



# RADIO TEST REPORT

**Test Report No. : 32JE0163-SH-02-A**

**Applicant** : Sony Corporation  
**Type of Equipment** : Digital Book Reader  
**Model No.** : PRS-T2  
**FCC ID** : AK8PRST2  
**Test regulation** : FCC Part15 Subpart C: 2012  
**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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:** May 23 to June 6, 2012

**Representative test engineer:**

Tatsuya Arai  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

Toyokazu Imamura  
Leader of WiSE Japan,  
UL Verification Service

- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".



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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : Sony Corporation  
Address : Shinagawa INTERCITY C Tower 2-15-3, Konan, Minato-ku, Tokyo, Japan  
Telephone Number : +81-3-5769-5640  
Facsimile Number : +81-3-5769-5901  
Contact Person : Shinichi Maru

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Digital Book Reader  
Model No. : PRS-T2  
Serial No. : Refer to 4.2 in this report.  
Rating : DC4.2V  
Receipt Date of Sample : May 21, 2012  
Country of Mass-production : China  
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: PRS-T2 (referred to as the EUT in this report) is a Digital Book Reader.

Clock frequency(ies) in the system : 24MHz (CPU), 32.768kHz (PMIC), 26MHz (WLAN)

### **Radio specification**

Equipment type : Transceiver  
Frequency of operation : 2412-2462MHz  
Bandwidth & channel spacing : 20MHz & 5MHz  
Type of modulation : DSSS: CCK, DQPSK, DBPSK  
OFDM: 64QAM, 16QAM, QPSK, BPSK  
Antenna type : Pattern  
Antenna connector type : U.FL  
Antenna gain with cable loss : 2.11dBi  
ITU code : D1D, G1D  
Operation temperature range : +5 to +35 deg.C.

### **FCC 15.31 (e)**

This EUT provides stable voltage (DC3.3V and DC1.8V) constantly to RF transmitter regardless of input voltage. Therefore, this EUT complies with the requirement.

### **FCC 15.203**

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement.

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2012  
final revised on March 30, 2012 and effective April 30, 2012  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.209 Radiated emission limits, general requirements  
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,  
and 5725-5850MHz

The EUT complies with FCC Part 15 Subpart B. Refer to the test report: 32JE0163-SH-02-C.

### **3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	21.9dB Freq.: 0.15001MHz Detector: Quasi-Peak Phase: L1 Mode: Tx 2462MHz, IEEE 802.11g	Complied
6dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(2) & 15.209	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(3) & 15.209	Radiated	N/A		Complied
Spurious emission & Restricted band edges	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	7.4dB Freq.: 2483.5MHz Detector: Average Polarization: Horizontal Mode: Tx 2462MHz, IEEE 802.11g	Complied
Power density	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (e) & 15.209	Radiated	N/A	* See data	Complied

Note: UL Japan's Work Procedures No.13-EM-W0420 and 13-EM-W0422  
These tests were also referred to "Guidance on Measurement for Digital Transmission Systems Section15.247".

### **3.3 Addition to standard**

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	-	Conducted	-	-

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

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

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### 3.4 Uncertainty

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

Item	Frequency range	No.1 SAC <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.6 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	5.0 dB
	300MHz-1GHz	5.0 dB	5.2 dB	5.0 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.8 dB	4.3 dB	4.4 dB

\*1: SAC=Semi-Anechoic Chamber

\*2: SR= Shielded Room is applied besides radiated emission

#### Conducted emission test

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

#### Radiated emission test

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

#### Antenna port conducted test

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

Bandwidth measurement uncertainty for this test was: (±) 5.4%

### 3.5 Test location

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Full-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input checked="" type="checkbox"/> No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

### 3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

### 4.1 Operating mode

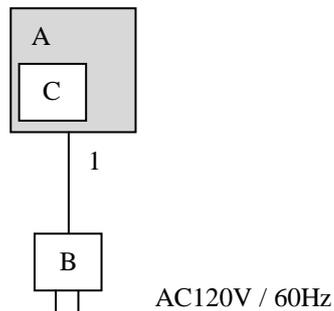
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission & Radiated emission (below 1GHz) *3)	Transmitting IEEE 802.11g	2462MHz	9	24Mbps, PN9
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	13	1Mbps, PN9
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	9	24Mbps, PN9
	Transmitting IEEE 802.11n-20	2412MHz, 2437MHz, 2462MHz	13	MCS2, PN9

\*1) Software: Tera Term Version 4.68  
\*2) The worst condition was determined based on the test result of Maximum Peak Output Power.  
\*3) Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - "of TCB Council Workshop October 2009.

**Justification:** The system was configured in typical fashion (as customer would normally use it) for testing.

### 4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.

#### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Book Reader	PRS-T2	9000203 *1) 9000320 *2)	SONY	EUT
B	AC Adaptor	PRSA-AC10	-	SONY	-
C	Micro SD Memory Card	SR-8C	-	SONY	*3)

\*1) For Antenna port conducted tests

\*2)\*3) For Other tests

#### List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC (USB)	1.5	Shielded	Shielded	-

\* All cables used for the measurement are exclusive use or marketed.

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## **SECTION 5: Conducted emission**

### **5.1 Operating environment**

Test place : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT was aligned and was 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 LISN and excess AC cable was bundled in center. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. Photographs of the set up are shown in APPENDIX 3.

### **5.3 Test conditions**

Frequency range : 0.15 - 30MHz  
EUT position : Table top

### **5.4 Test procedure**

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via AC adaptor within a shielded room. The EUT was connected to a Line Impedance Stabilization Network (LISN) via AC adaptor. An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, an average detector. The conducted emission measurements were made with the following detector of the test receiver.

Detector Type : Quasi-Peak/ Average  
IF Bandwidth : 9kHz

### **5.5 Results**

Summary of the test results : Pass  
Refer to APPENDIX 1

## **SECTION 6: 6dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1

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## **SECTION 7: Maximum peak output power (Radiated)**

### **7.1 Operating environment**

Test place : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **7.2 Test configuration**

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

### **7.3 Test conditions**

Bandwidth of the Power Sensor : 50MHz  
Detection type : Peak/Average

### **7.4 Test procedure**

The Maximum peak output power has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m. Measurements were performed with Power Meter and Power Sensor (50MHz Bandwidth) using peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The carrier level was 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.

Worst position:

Antenna polarization \ Frequency	Carrier
Horizontal	X
Vertical	Y

### **7.5 Results**

Summary of the test results : Pass  
Refer to APPENDIX 1

## **SECTION 8: Spurious emission (Antenna port conducted)**

### **Test procedure**

The spurious emission was measured with a spectrum analyzer connected to the antenna port. In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement. 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=10kHz)

Summary of the test results: Pass  
Refer to APPENDIX 1

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## **SECTION 9: Radiated emission**

### **9.1 Operating environment**

Test place : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **9.2 Test configuration**

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

### **9.3 Test conditions**

Frequency range : 30MHz to 25GHz  
EUT position : Table top

### **9.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection of the test receiver and spectrum analyzer.

Frequency	30-1000MHz	1-25GHz	
Detection type	Quasi-Peak	Peak	* Average
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz

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

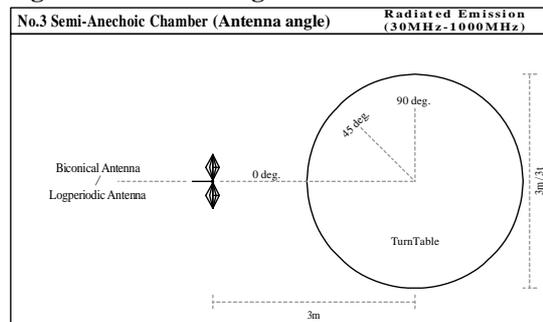
The test was performed with VBW 10Hz since the EUT had no intervals during which the transmitter was off (see APPENDIX 1).

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.

Worst position:

Antenna polarization \ Frequency	Band Edge	Spurious			
		30-1000MHz	1-15GHz	15-18GHz	18-25GHz
Horizontal	X	X	Y	X	Y
Vertical	Y	Y	X	X	Y

**Figure 1. Antenna angle**



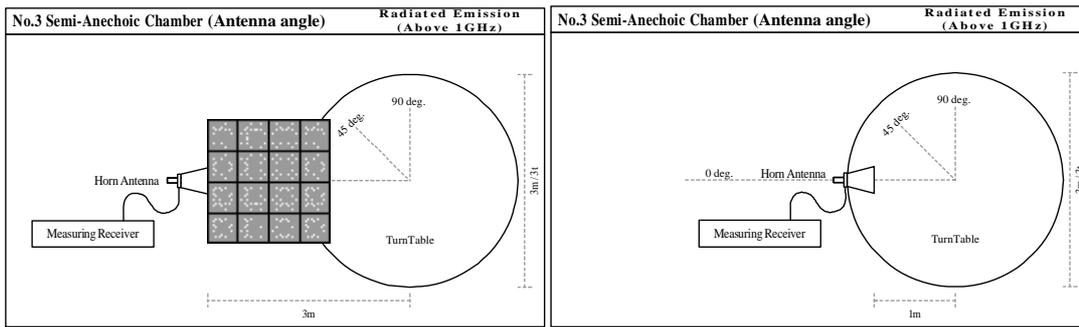
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## 9.5 Band edge

Band edge level is below the limits of FCC 15.209. Refer to the data (APPENDIX 1).

## 9.6 Results

Summary of the test results : Pass \*No noise was detected above the 6th order harmonics.  
 Refer to APPENDIX 1

## SECTION 10: Peak power density (Radiated)

### 10.1 Operating environment

Test place : See test data (APPENDIX 1)  
 Temperature : See test data (APPENDIX 1)  
 Humidity : See test data (APPENDIX 1)

### 10.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

### 10.3 Test conditions

Instrument used : Spectrum Analyzer \*1)  
 RBW / VBW : 30kHz / 100kHz \*2)

\*1) PSD Option 1 of " Measurement of Digital Transmission Systems Operating under Section 15.247".

\*2) The test was not performed at RBW: 3kHz that was stated in the Regulation. However, the measurement value with RBW: 3kHz is less than the value of RBW: 30kHz and the test data met the limit with RBW: 30kHz.

### 10.4 Test procedure

The power density has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m. Measurements were performed with spectrum analyzer using a peak detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

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

Worst position: Refer to the data (APPENDIX 1).

## 10.5 Results

Summary of the test results : Pass  
 Refer to APPENDIX 1

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## **Contents of APPENDIXES**

### **APPENDIX 1: Test data**

Conducted emission  
6dB bandwidth  
Maximum peak output power  
Radiated emission  
Spurious emission (Antenna port conducted)  
Peak power density  
99% Occupied bandwidth

### **APPENDIX 2: Test instruments**

Test instruments

### **APPENDIX 3: Photographs of test setup**

Conducted emission  
Radiated emission  
Pre-check of the worst position

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# DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room  
Date : 2012/05/27

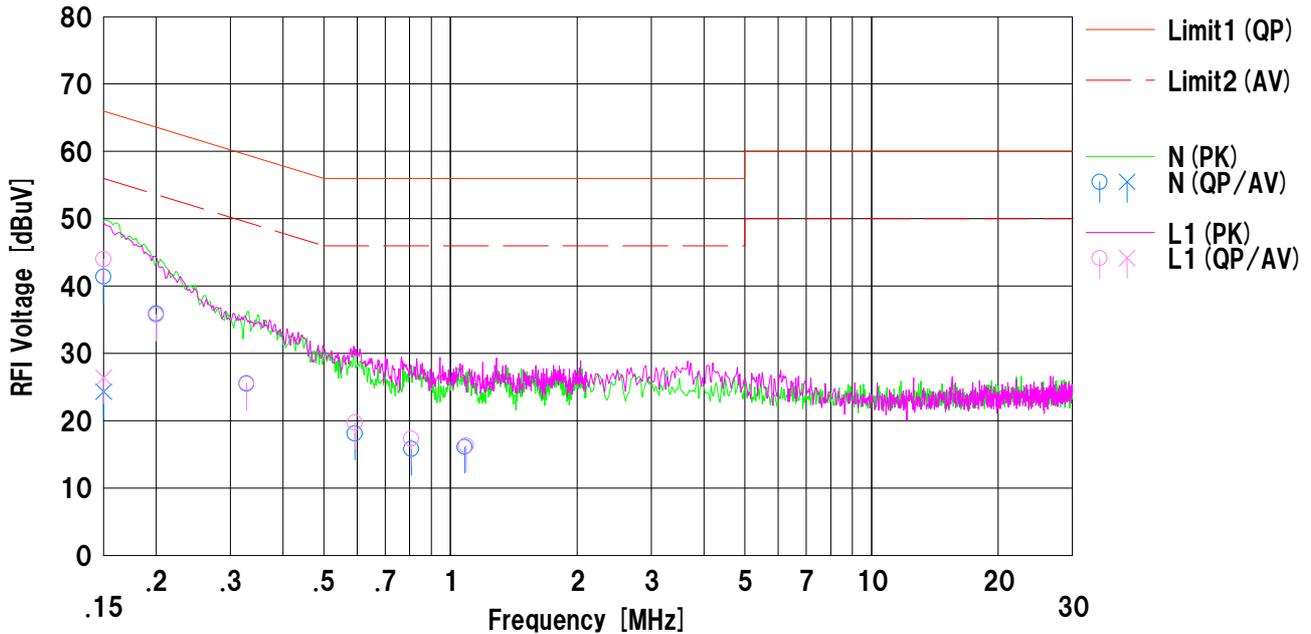
Company : Sony Corporation  
Kind of EUT :  
Model No. : PRS-T2  
Serial No. : 9000320

Mode : IEEE802.11g 2462MHz  
Report No : 3 EO -SH-02-A  
Power : AC120V/60Hz  
Temp./Humi. : 24deg.C /47%RH

Remarks : 24Mbps

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Tatsuya Arai



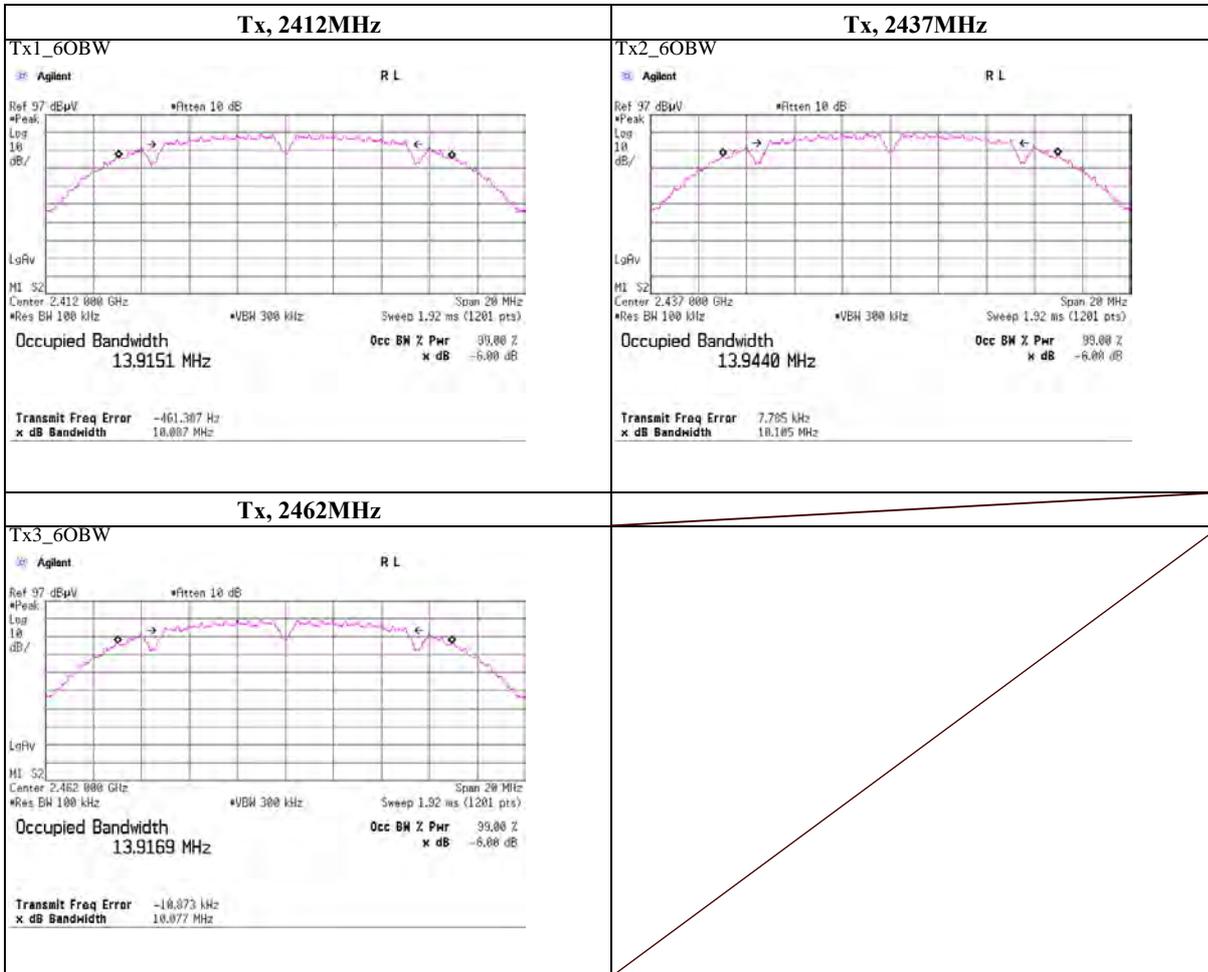
No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15001	28.6	11.5	12.8	41.4	24.3	65.9	55.9	24.5	31.6	N	
2	0.20000	23.1	---	12.8	35.9	---	63.6	53.6	27.7	---	N	
3	0.32800	12.7	---	12.8	25.5	---	59.5	49.5	34.0	---	N	
4	0.59300	5.3	---	12.8	18.1	---	56.0	46.0	37.9	---	N	
5	0.80800	3.0	---	12.8	15.8	---	56.0	46.0	40.2	---	N	
6	1.08100	3.2	---	12.9	16.1	---	56.0	46.0	39.9	---	N	
7	0.15001	31.2	13.6	12.8	44.0	26.4	65.9	55.9	21.9	29.5	L1	
8	0.20000	22.9	---	12.8	35.7	---	63.6	53.6	27.9	---	L1	
9	0.32800	12.8	---	12.8	25.6	---	59.5	49.5	33.9	---	L1	
10	0.59300	6.9	---	12.8	19.7	---	56.0	46.0	36.3	---	L1	
11	0.80700	4.5	---	12.8	17.3	---	56.0	46.0	38.7	---	L1	
12	1.09000	3.4	---	12.9	16.3	---	56.0	46.0	39.7	---	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+Att) [dB]  
LISN:SLS-02

### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 25, 2012	
Temperature / Humidity	25deg.C , 51%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 1Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	10.087	> 0.500
2437.0000	10.105	> 0.500
2462.0000	10.077	> 0.500

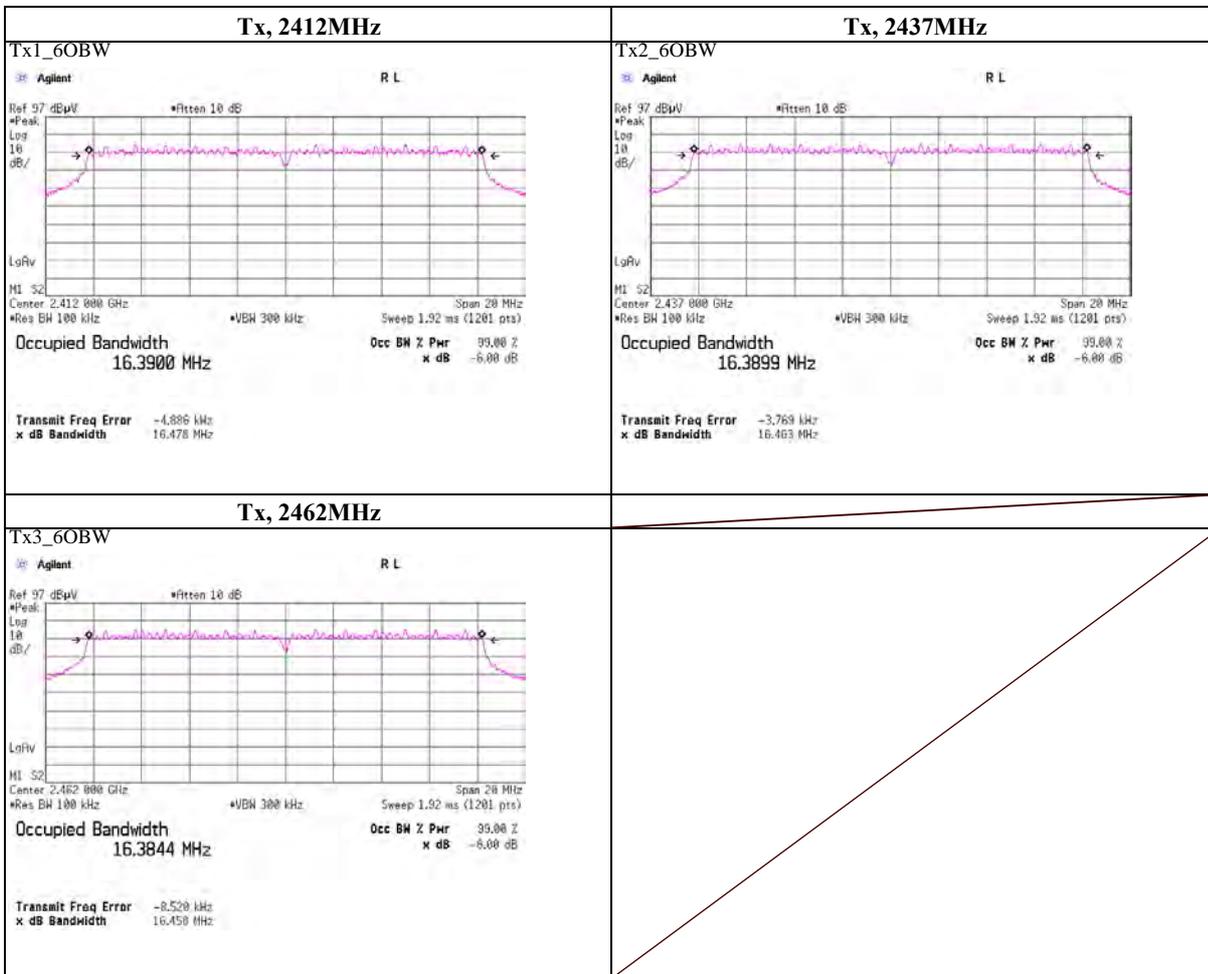


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### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 25, 2012	
Temperature / Humidity	25deg.C , 51%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11g, PN9, worst data mode 24Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.478	> 0.500
2437.0000	16.463	> 0.500
2462.0000	16.458	> 0.500

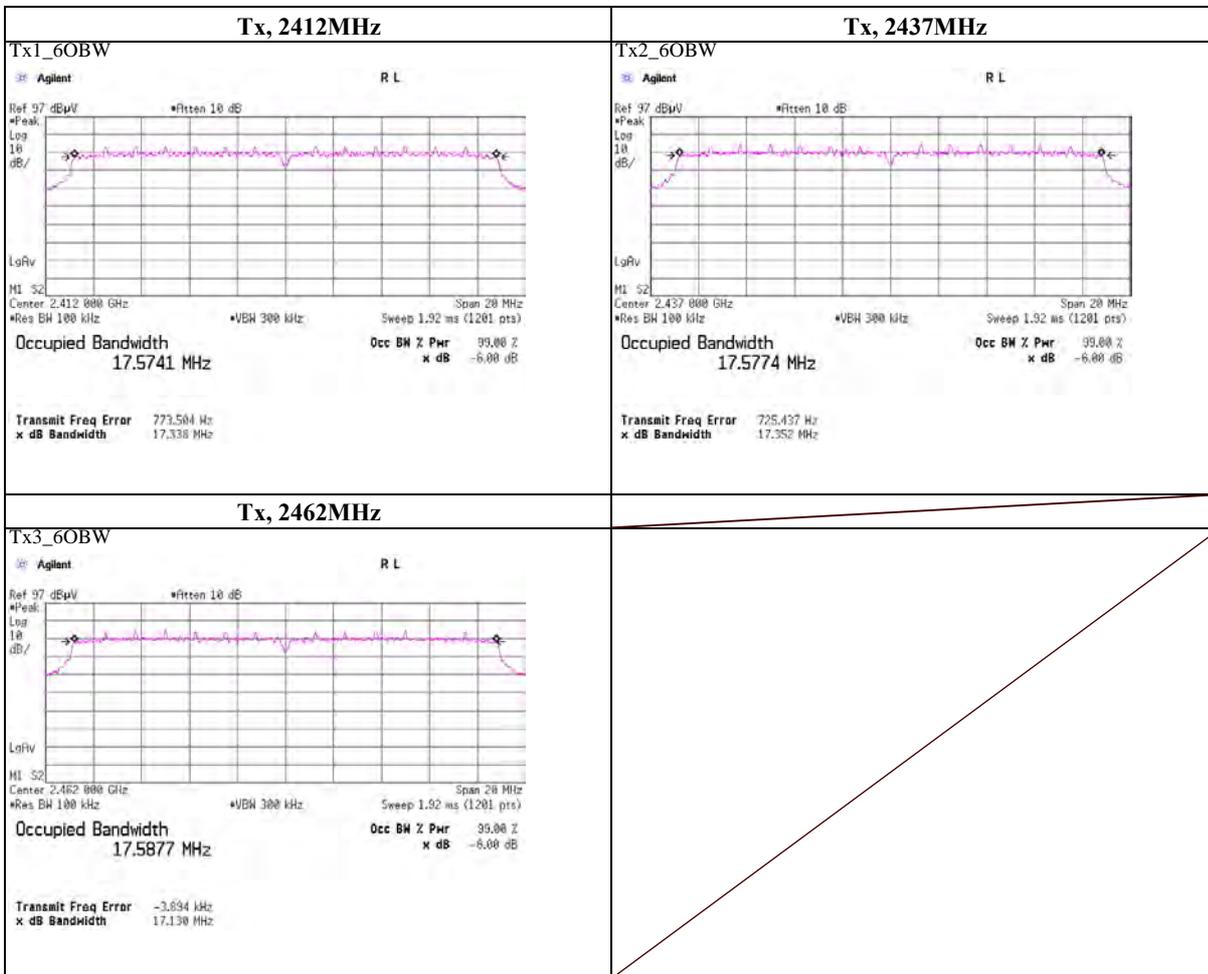


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### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 25, 2012	
Temperature / Humidity	25deg.C , 51%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEE802.11n, PN9, worst data mode 2(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	17.338	> 0.500
2437.0000	17.352	> 0.500
2462.0000	17.130	> 0.500



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**Peak / Average Output Power (Radiated)**

Test place: UL Japan, Inc. Shonan EMC Lab. No3 Semi-Anechoic Chamber  
 Date: May 25, 2012  
 Temperature / Humidity: 24deg.C, 42%RH  
 Engineer: Akira Sato  
 Mode: Tx, IEEE802.11b, PN9,

worst data mode : 1 Mbps  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Peak] (\* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Peak) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2				Limit		Margin	
		HOR	VER				HOR [dBuV]	VER [dBuV]	HOR [dBm]	VER [mW]	HOR [dBm]	VER [mW]	HOR [dB]	VER [dB]		
		[dBuV]	[dBuV]													
Low	2412.0	108.99	106.83	27.29	14.14	41.12	109.30	107.14	11.96	15.70	9.80	9.55	30.00	1000	18.04	20.20
Mid	2437.0	108.84	106.97	27.36	14.16	41.12	109.24	107.37	11.90	15.49	10.03	10.07	30.00	1000	18.10	19.97
High	2462.0	109.25	107.81	27.43	14.19	41.11	<b>109.76</b>	108.32	12.42	17.46	10.98	12.53	30.00	1000	<b>17.58</b>	19.02

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

worst data mode : 1 Mbps  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Average] (\* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2				Limit		Margin	
		HOR	VER				HOR [dBuV]	VER [dBuV]	HOR [dBm]	VER [mW]	HOR [dBm]	VER [mW]	HOR [dB]	VER [dB]		
		[dBuV]	[dBuV]													
Low	2412.0	106.22	104.06	27.29	14.14	41.12	106.53	104.37	9.19	8.30	7.03	5.05	30.00	1000	20.81	22.97
Mid	2437.0	106.06	104.25	27.36	14.16	41.12	106.46	104.65	9.12	8.17	7.31	5.38	30.00	1000	20.88	22.69
High	2462.0	106.56	105.02	27.43	14.19	41.11	<b>107.07</b>	105.53	<b>9.73</b>	9.40	8.19	6.59	30.00	1000	<b>20.27</b>	21.81

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

[Peak Pre check]

Data rate	Freq.	P/M (Peak) Hor		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin
[Mbps]	[MHz]	[dBuV]	[dBuV]				[dBuV]	[dBuV]	[dBm]	[mW]	[dBm]	[mW]	[dB]
1	2437.0	108.84	108.84	27.36	14.16	41.12	<b>109.24</b>	<b>11.90</b>	15.49	30.00	1000	<b>18.10</b>	
2	2437.0	108.68	108.68	27.36	14.16	41.12	109.08	11.74	14.93	30.00	1000	18.26	
6	2437.0	108.83	108.83	27.36	14.16	41.12	109.23	11.89	15.45	30.00	1000	18.11	
11	2437.0	108.81	108.81	27.36	14.16	41.12	109.21	11.87	15.38	30.00	1000	18.13	

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626  
 \*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.

[Average Pre check]

Data rate	Freq.	P/M (Average) Hor		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin
[Mbps]	[MHz]	[dBuV]	[dBuV]				[dBuV]	[dBuV]	[dBm]	[mW]	[dBm]	[mW]	[dB]
1	2437.0	106.06	106.06	27.36	14.16	41.12	<b>106.46</b>	<b>9.12</b>	8.17	30.00	1000	<b>20.88</b>	
2	2437.0	106.04	106.04	27.36	14.16	41.12	106.44	9.10	8.13	30.00	1000	20.90	
6	2437.0	106.05	106.05	27.36	14.16	41.12	106.45	9.11	8.15	30.00	1000	20.89	
11	2437.0	106.05	106.05	27.36	14.16	41.12	106.45	9.11	8.15	30.00	1000	20.89	

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626  
 \*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.

**Peak / Average Output Power (Radiated)**

Test place: UL Japan, Inc. Shonan EMC Lab. No3 Semi-Anechoic Chamber  
 Date: May 25, 2012  
 Temperature / Humidity: 24deg.C, 42%RH  
 Engineer: Akira Sato  
 Mode: Tx, IEEE802.11g, PN9,

worst data mode : 24 Mbps  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Peak] (\* P.M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Peak) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin			
		HOR	VER				HOR	VER	HOR	VER	HOR	VER				
		[dBuV]	[dBuV]				[dBm]	[mW]	[dBm]	[mW]	[dB]	[dB]				
Low	2412.0	112.14	109.03	27.29	14.14	41.12	112.45	109.34	15.11	32.43	12.00	15.85	30.00	1000	14.89	18.00
Mid	2437.0	111.93	109.86	27.36	14.16	41.12	112.33	110.26	14.99	31.55	12.92	19.59	30.00	1000	15.01	17.08
High	2462.0	112.63	110.60	27.43	14.19	41.11	<b>113.14</b>	111.11	<b>15.80</b>	38.02	13.77	23.82	30.00	1000	<b>14.20</b>	16.23

Sample Calculation:  
 \*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

worst data mode : 6 Mbps  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Average] (\* P.M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin			
		HOR	VER				HOR	VER	HOR	VER	HOR	VER				
		[dBuV]	[dBuV]				[dBm]	[mW]	[dBm]	[mW]	[dB]	[dB]				
Low	2412.0	102.27	99.41	27.29	14.14	41.12	102.58	99.72	5.24	3.34	2.38	1.73	30.00	1000	24.76	27.62
Mid	2437.0	102.08	99.95	27.36	14.16	41.12	102.48	100.35	5.14	3.27	3.01	2.00	30.00	1000	24.86	26.99
High	2462.0	102.98	100.86	27.43	14.19	41.11	<b>103.49</b>	101.37	<b>6.15</b>	4.12	4.03	2.53	30.00	1000	<b>23.85</b>	25.97

Sample Calculation:  
 \*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

[Peak Pre check]

Data rate	Freq.	P/M (Peak) Hor		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin Hor
[Mbps]	[MHz]	[dBuV]	[dBuV]				[dBuV]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]
6	2437.0	111.64	111.64	27.36	14.16	41.12	112.04	14.70	29.51	30.00	<b>1000</b>	15.30	
9	2437.0	111.77	111.77	27.36	14.16	41.12	112.17	14.83	30.41	30.00	1000	15.17	
12	2437.0	112.10	112.10	27.36	14.16	41.12	112.50	15.16	32.81	30.00	1000	14.84	
18	2437.0	111.14	111.14	27.36	14.16	41.12	111.54	14.20	26.30	30.00	1000	15.80	
24	2437.0	112.19	112.19	27.36	14.16	41.12	<b>112.59</b>	<b>15.25</b>	33.50	30.00	1000	<b>14.75</b>	
36	2437.0	111.61	111.61	27.36	14.16	41.12	112.01	14.67	29.31	30.00	1000	15.33	
48	2437.0	111.22	111.22	27.36	14.16	41.12	111.62	14.28	26.79	30.00	1000	15.72	
54	2437.0	111.56	111.56	27.36	14.16	41.12	111.96	14.62	28.97	30.00	1000	15.38	

Sample Calculation:  
 \*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626  
 \*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.

[Average Pre check]

Data rate	Freq.	P/M (Average) Hor		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin Hor
[Mbps]	[MHz]	[dBuV]	[dBuV]				[dBuV]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]
6	2437.0	101.92	101.92	27.36	14.16	41.12	<b>102.32</b>	<b>4.98</b>	3.15	30.00	1000	<b>25.02</b>	
9	2437.0	101.91	101.91	27.36	14.16	41.12	102.31	4.97	3.14	30.00	1000	25.03	
12	2437.0	101.88	101.88	27.36	14.16	41.12	102.28	4.94	3.12	30.00	1000	25.06	
18	2437.0	101.89	101.89	27.36	14.16	41.12	102.29	4.95	3.13	30.00	1000	25.05	
24	2437.0	101.61	101.61	27.36	14.16	41.12	102.01	4.67	2.93	30.00	1000	25.33	
36	2437.0	101.04	101.04	27.36	14.16	41.12	101.44	4.10	2.57	30.00	1000	25.90	
48	2437.0	101.02	101.02	27.36	14.16	41.12	101.42	4.08	2.56	30.00	1000	25.92	
54	2437.0	100.97	100.97	27.36	14.16	41.12	101.37	4.03	2.53	30.00	1000	25.97	

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain  
 \*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626  
 \*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.

**Peak / Average Output Power (Radiated)**

Test place: UL Japan, Inc. Shonan EMC Lab. No3 Semi-Anechoic Chamber  
 Date: May 25, 2012  
 Temperature / Humidity: 24deg.C, 42%RH  
 Engineer: Akira Sato  
 Mode: Tx, IEEE802.11n, PN9

worst data mode: 2 MCS  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Peak] (\* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Peak) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2				Limit		Margin	
		HOR	VER				HOR	VER	HOR	VER	HOR	VER	HOR	VER		
															[dBuV]	[dBm]
Low	2412.0	110.80	108.70	27.29	14.14	41.12	111.11	109.01	13.77	23.82	11.67	14.69	30.00	1000	16.23	18.33
Mid	2437.0	110.49	108.37	27.36	14.16	41.12	110.89	108.77	13.55	22.65	11.43	13.90	30.00	1000	16.45	18.57
High	2462.0	111.61	109.88	27.43	14.19	41.11	<b>112.12</b>	<b>110.39</b>	14.78	30.06	13.05	20.18	30.00	1000	<b>15.22</b>	16.95

Worst

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain

\*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

worst data mode: 0 MCS  
 Test Distance: 3 m  
 EUT Antenna Gain: 1.626 (2.11dBi)

[Average] (\* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading		Ant Factor [dB/m]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2				Limit		Margin	
		HOR	VER				HOR	VER	HOR	VER	HOR	VER	HOR	VER		
															[dBuV]	[dBm]
Low	2412.0	101.30	99.05	27.29	14.14	41.12	101.61	99.36	4.27	2.67	2.02	1.59	30.00	1000	25.73	27.98
Mid	2437.0	101.01	98.47	27.36	14.16	41.12	101.41	98.87	4.07	2.55	1.53	1.42	30.00	1000	25.93	28.47
High	2462.0	102.20	100.10	27.43	14.19	41.11	<b>102.71</b>	<b>100.61</b>	<b>5.37</b>	3.44	3.27	2.12	30.00	1000	<b>24.63</b>	26.73

Worst

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain

\*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

[Peak Pre check]

Data rate	Freq.	P/M (Peak) Reading		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin Hor [dB]
[MCS]	[MHz]	HOR	VER				HOR	VER	HOR	VER	HOR	VER	
0	2437.0	110.66		27.36	14.16	41.12	111.06	13.72	23.55	30.00	1000	16.28	
1	2437.0	110.40		27.36	14.16	41.12	110.80	13.46	22.18	30.00	1000	16.54	
2	2437.0	110.88		27.36	14.16	41.12	<b>111.28</b>	<b>13.94</b>	24.77	30.00	1000	<b>16.06</b>	
3	2437.0	110.22		27.36	14.16	41.12	110.62	13.28	21.28	30.00	1000	16.72	
4	2437.0	109.13		27.36	14.16	41.12	109.53	12.19	16.56	30.00	1000	17.81	
5	2437.0	109.70		27.36	14.16	41.12	110.10	12.76	18.88	30.00	1000	17.24	
6	2437.0	110.40		27.36	14.16	41.12	110.80	13.46	22.18	30.00	1000	16.54	
7	2437.0	109.46		27.36	14.16	41.12	109.86	12.52	17.86	30.00	1000	17.48	

Worst

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain

\*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

\*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.

[Pre check]

0	Freq.	P/M (Average) Reading		Ant Factor [dB]	Att+Cable Loss [dB]	Amp Gain [dB]	Result 1:*1		Result 2:*2		Limit		Margin Hor [dB]
[MCS]	[MHz]	HOR	VER				HOR	VER	HOR	VER	HOR	VER	
0	2437.0	101.14		27.36	14.16	41.12	<b>101.54</b>	<b>4.20</b>	2.63	30.00	1000	<b>25.80</b>	
1	2437.0	101.04		27.36	14.16	41.12	101.44	4.10	2.57	30.00	1000	25.90	
2	2437.0	101.06		27.36	14.16	41.12	101.46	4.12	2.58	30.00	1000	25.88	
3	2437.0	100.42		27.36	14.16	41.12	100.82	3.48	2.23	30.00	1000	26.52	
4	2437.0	99.43		27.36	14.16	41.12	99.83	2.49	1.77	30.00	1000	27.51	
5	2437.0	99.36		27.36	14.16	41.12	99.76	2.42	1.75	30.00	1000	27.58	
6	2437.0	99.33		27.36	14.16	41.12	99.73	2.39	1.73	30.00	1000	27.61	
7	2437.0	99.27		27.36	14.16	41.12	99.67	2.33	1.71	30.00	1000	27.67	

Worst

Sample Calculation:

\*1: Result 1=>Reading+Antenna Factor+Cable Loss+Atten.Loss-Amp Gain

\*2: Result 2=>P=(ED)<sup>2</sup>/30G, E=Result1, D=3m, G=1.626

\*3: Signal levels were compared at polarizations of horizontal and vertical, and pre-check measurement was performed at the polarization in which the level was greater.



**Radiated Emission**

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Date 2012/5/23 2012/5/24 2012/5/25 2012/5/27  
 Temperature / Humidity 24 deg.C , 42%RH 26 deg.C , 46%RH 24 deg.C , 42%RH 24 deg.C , 47%RH  
 Engineer Akira Sato Akira Sato Akira Sato Tatsuya Arai  
 Mode Tx, 2437 MHz  
 Tx, IEEE802.11b, PN9, worst data mode 1Mbps

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	2312.650	PK	48.4	27.0	24.4	41.1	58.7	73.9	15.2	135	315	
Hori.	2513.660	PK	46.0	27.6	24.6	41.1	57.1	73.9	16.8	135	315	
Hori.	2561.320	PK	46.7	27.7	24.6	41.1	57.9	73.9	16.0	135	315	
Hori.	4874.000	PK	50.4	31.2	6.9	41.0	47.5	73.9	26.4	100	227	
Hori.	7311.000	PK	47.8	36.7	8.6	41.4	51.7	73.9	22.2	100	0	
Hori.	9748.000	PK	45.5	38.5	9.5	38.8	54.7	73.9	19.2	100	0	
Hori.	12185.000	PK	46.1	39.3	10.7	39.2	56.9	73.9	17.0	100	0	
Hori.	2312.650	AV	34.7	27.0	24.4	41.1	45.0	53.9	8.9	135	315	
Hori.	2513.660	AV	34.6	27.6	24.6	41.1	45.7	53.9	8.2	135	315	
Hori.	2561.320	AV	34.5	27.7	24.6	41.1	45.7	53.9	8.2	135	315	
Hori.	4874.000	AV	44.4	31.2	6.9	41.0	41.5	53.9	12.4	100	227	
Hori.	7311.000	AV	35.4	36.7	8.6	41.4	39.3	53.9	14.6	100	0	
Hori.	9748.000	AV	31.9	38.5	9.5	38.8	41.1	53.9	12.8	100	0	
Hori.	12185.000	AV	33.0	39.3	10.7	39.2	43.8	53.9	10.1	100	0	
Vert.	2313.190	PK	48.4	27.0	24.4	41.1	58.7	73.9	15.2	167	85	
Vert.	2513.565	PK	47.1	27.6	24.6	41.1	58.2	73.9	15.7	167	85	
Vert.	2560.485	PK	47.0	27.7	24.6	41.1	58.2	73.9	15.7	167	85	
Vert.	4874.000	PK	48.6	31.2	6.9	41.0	45.7	73.9	28.2	100	55	
Vert.	7311.000	PK	48.2	36.7	8.6	41.4	52.1	73.9	21.8	100	0	
Vert.	9748.000	PK	44.5	38.5	9.5	38.8	53.7	73.9	20.2	100	0	
Vert.	12185.000	PK	45.8	39.3	10.7	39.2	56.6	73.9	17.3	100	0	
Vert.	2313.190	AV	34.7	27.0	24.4	41.1	45.0	53.9	8.9	167	85	
Vert.	2513.565	AV	34.6	27.6	24.6	41.1	45.7	53.9	8.2	167	85	
Vert.	2560.485	AV	34.0	27.7	24.6	41.1	45.2	53.9	8.7	167	85	
Vert.	4874.000	AV	38.7	31.2	6.9	41.0	35.8	53.9	18.1	100	55	
Vert.	7311.000	AV	35.3	36.7	8.6	41.4	39.2	53.9	14.7	100	0	
Vert.	9748.000	AV	31.8	38.5	9.5	38.8	41.0	53.9	12.9	100	0	
Vert.	12185.000	AV	33.0	39.3	10.7	39.2	43.8	53.9	10.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

Distance factor : 15GHz -40GHz :  $20\log(3.0m/1.0m)= 9.5dB$

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## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
 Date                         2012/5/23   2012/5/24   2012/5/25   2012/5/27  
 Temperature / Humidity   24 deg.C , 42%RH                                     26 deg.C , 46%RH                                     24 deg.C , 42%RH                                     24 deg.C , 47%RH  
 Engineer                   Akira Sato   Akira Sato   Akira Sato   Tatsuya Arai  
 Mode                         Tx,   2437 MHz  
                                   Tx, IEEE802.11n, PN9, worst data mode 2(MCS)

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	2340.320	PK	46.8	27.1	24.4	41.1	57.2	73.9	16.7	100	16	
Hori.	2520.075	PK	46.7	27.6	24.6	41.1	57.8	73.9	16.1	100	301	
Hori.	2553.800	PK	46.7	27.7	24.6	41.1	57.9	73.9	16.0	100	301	
Hori.	4874.000	PK	47.3	31.2	6.9	41.0	44.4	73.9	29.5	100	244	
Hori.	7311.000	PK	47.0	36.7	8.6	41.4	50.9	73.9	23.0	100	0	
Hori.	9748.000	PK	43.1	38.5	9.5	38.8	52.3	73.9	21.6	100	0	
Hori.	12185.000	PK	44.5	39.3	10.7	39.2	55.3	73.9	18.6	100	0	
Hori.	2340.320	AV	34.7	27.1	24.4	41.1	45.1	53.9	8.8	100	16	
Hori.	2520.075	AV	34.7	27.6	24.6	41.1	45.8	53.9	8.1	100	301	
Hori.	2553.800	AV	34.5	27.7	24.6	41.1	45.7	53.9	8.2	100	301	
Hori.	4874.000	AV	35.6	31.2	6.9	41.0	32.7	53.9	21.2	100	244	
Hori.	7311.000	AV	35.1	36.7	8.6	41.4	39.0	53.9	14.9	100	0	
Hori.	9748.000	AV	32.2	38.5	9.5	38.8	41.4	53.9	12.5	100	0	
Hori.	12185.000	AV	33.4	39.3	10.7	39.2	44.2	53.9	9.7	100	0	
Vert.	2339.565	PK	46.6	27.1	24.4	41.1	57.0	73.9	16.9	144	108	
Vert.	2519.340	PK	46.9	27.6	24.6	41.1	58.0	73.9	15.9	144	108	
Vert.	2553.220	PK	46.9	27.7	24.6	41.1	58.1	73.9	15.8	144	108	
Vert.	4874.000	PK	48.8	31.2	6.9	41.0	45.9	73.9	28.0	100	67	
Vert.	7311.000	PK	47.8	36.7	8.6	41.4	51.7	73.9	22.2	100	0	
Vert.	9748.000	PK	44.7	38.5	9.5	38.8	53.9	73.9	20.0	100	0	
Vert.	12185.000	PK	45.9	39.3	10.7	39.2	56.7	73.9	17.2	100	0	
Vert.	2339.565	AV	34.7	27.1	24.4	41.1	45.1	53.9	8.8	144	108	
Vert.	2519.340	AV	34.0	27.6	24.6	41.1	45.1	53.9	8.8	144	108	
Vert.	2553.220	AV	34.0	27.7	24.6	41.1	45.2	53.9	8.7	144	108	
Vert.	4874.000	AV	34.6	31.2	6.9	41.0	31.7	53.9	22.2	100	67	
Vert.	7311.000	AV	35.2	36.7	8.6	41.4	39.1	53.9	14.8	100	0	
Vert.	9748.000	AV	31.9	38.5	9.5	38.8	41.1	53.9	12.8	100	0	
Vert.	12185.000	AV	33.0	39.3	10.7	39.2	43.8	53.9	10.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

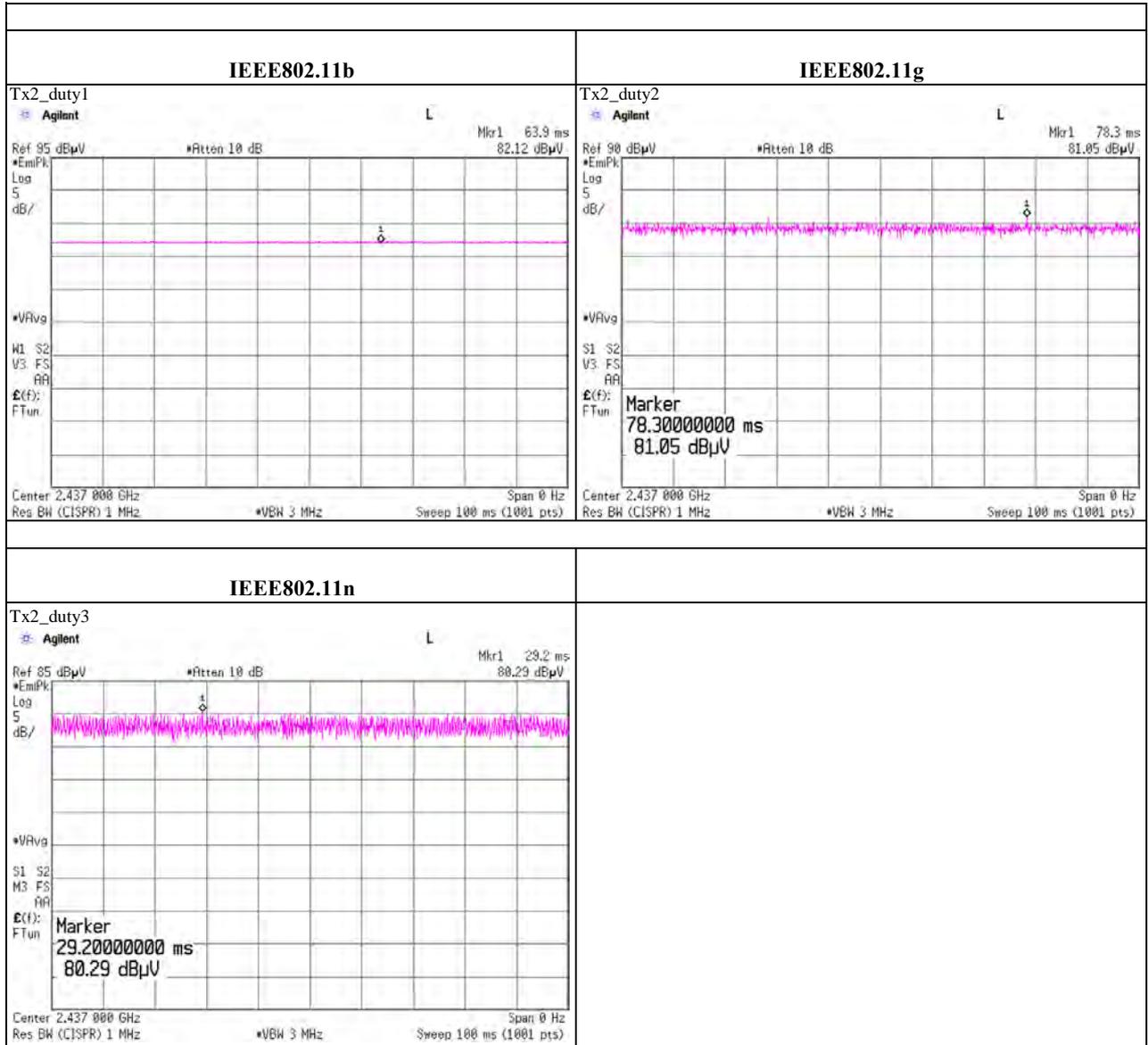
\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor :           15GHz -40GHz :                                     20log(3.0m/1.0m)= 9.5dB

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**Burst rate confirmation**



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11b, PN9, worst data mode 1Mbps**

Tx, 2412MHz (Below 1GHz)

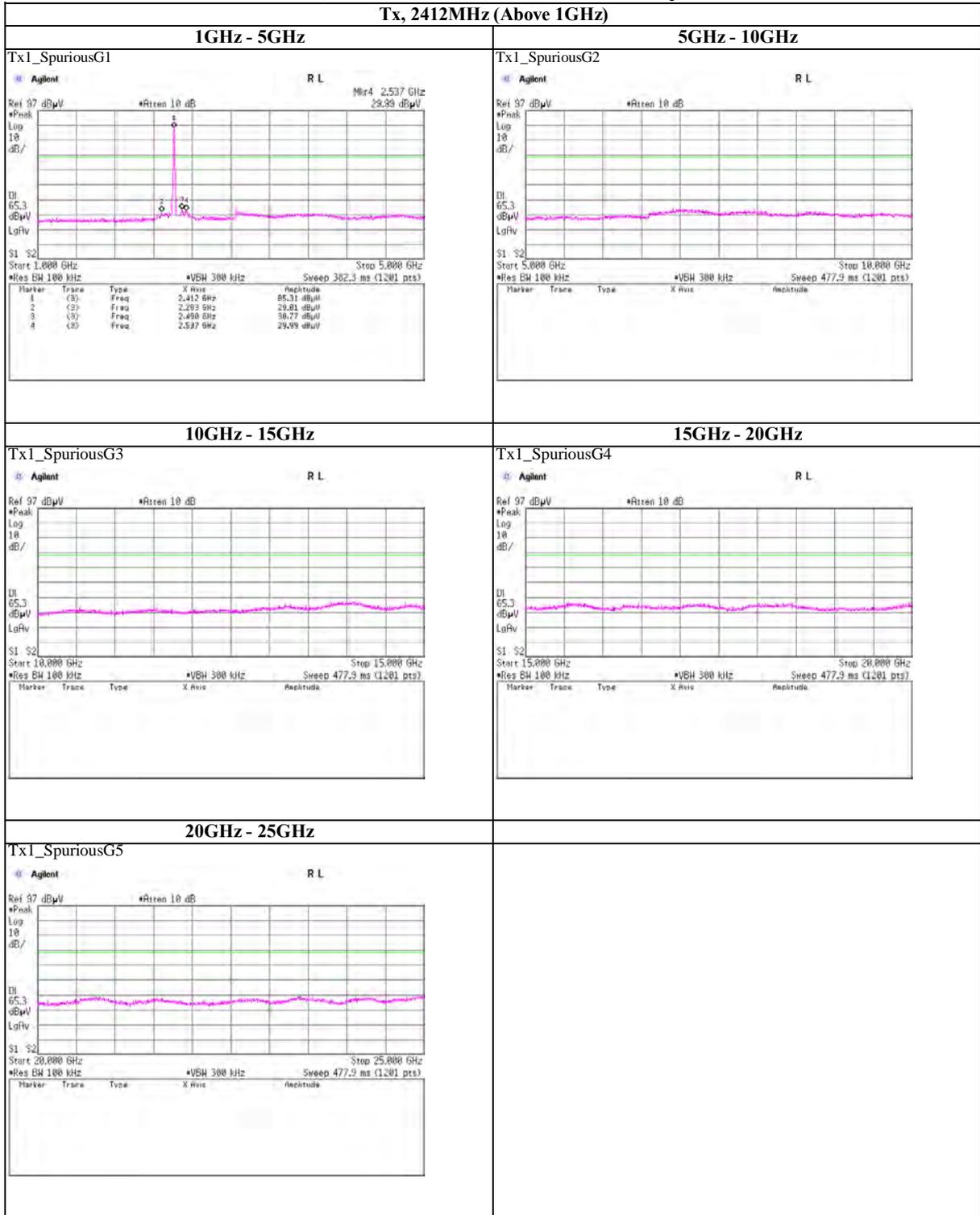


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**Tx, 2412MHz (Above 1GHz)**



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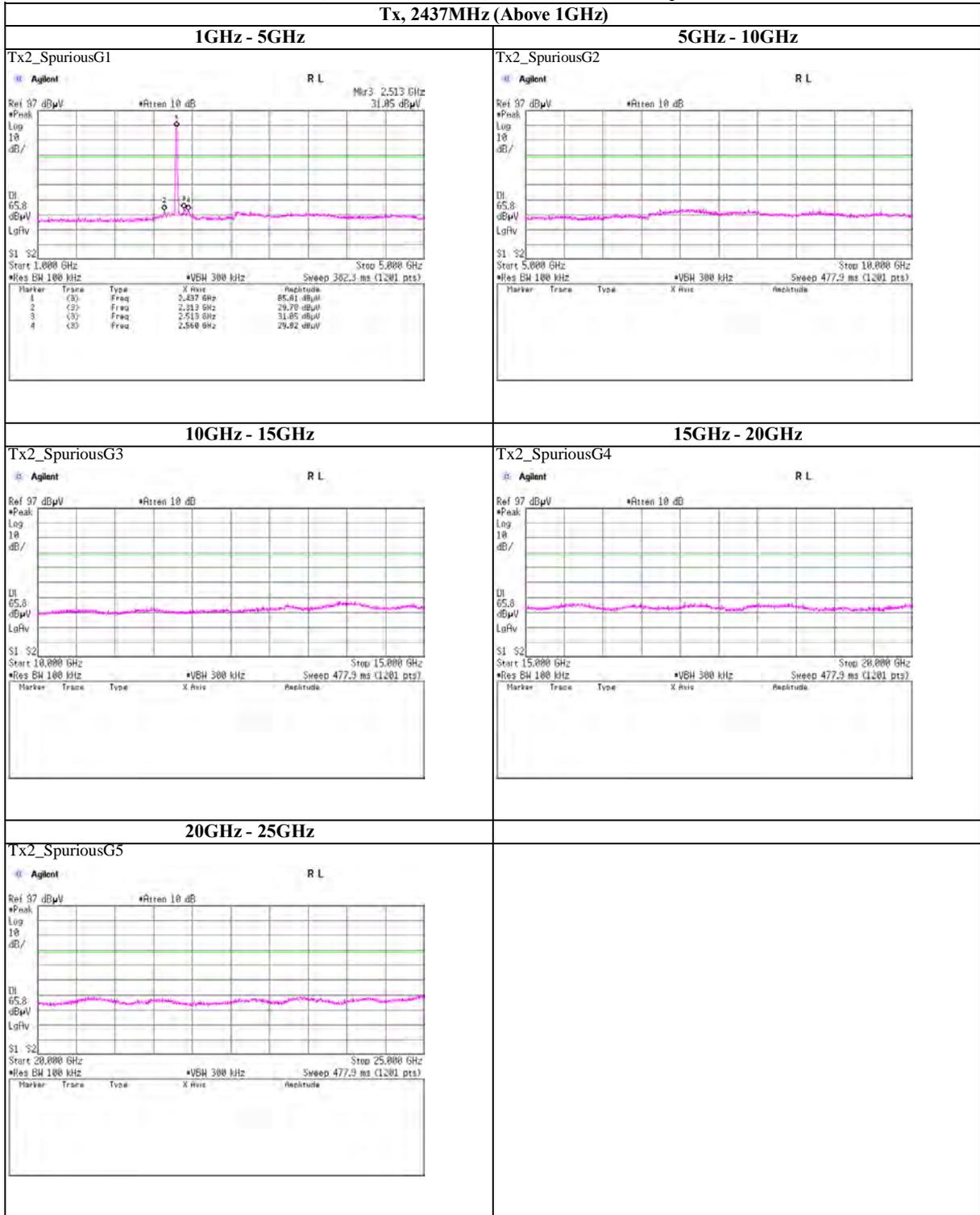
Tx, 2437MHz (Below 1GHz)



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**Tx, IEEE802.11b, PN9, worst data mode 1Mbps**

Tx, 2437MHz (Above 1GHz)



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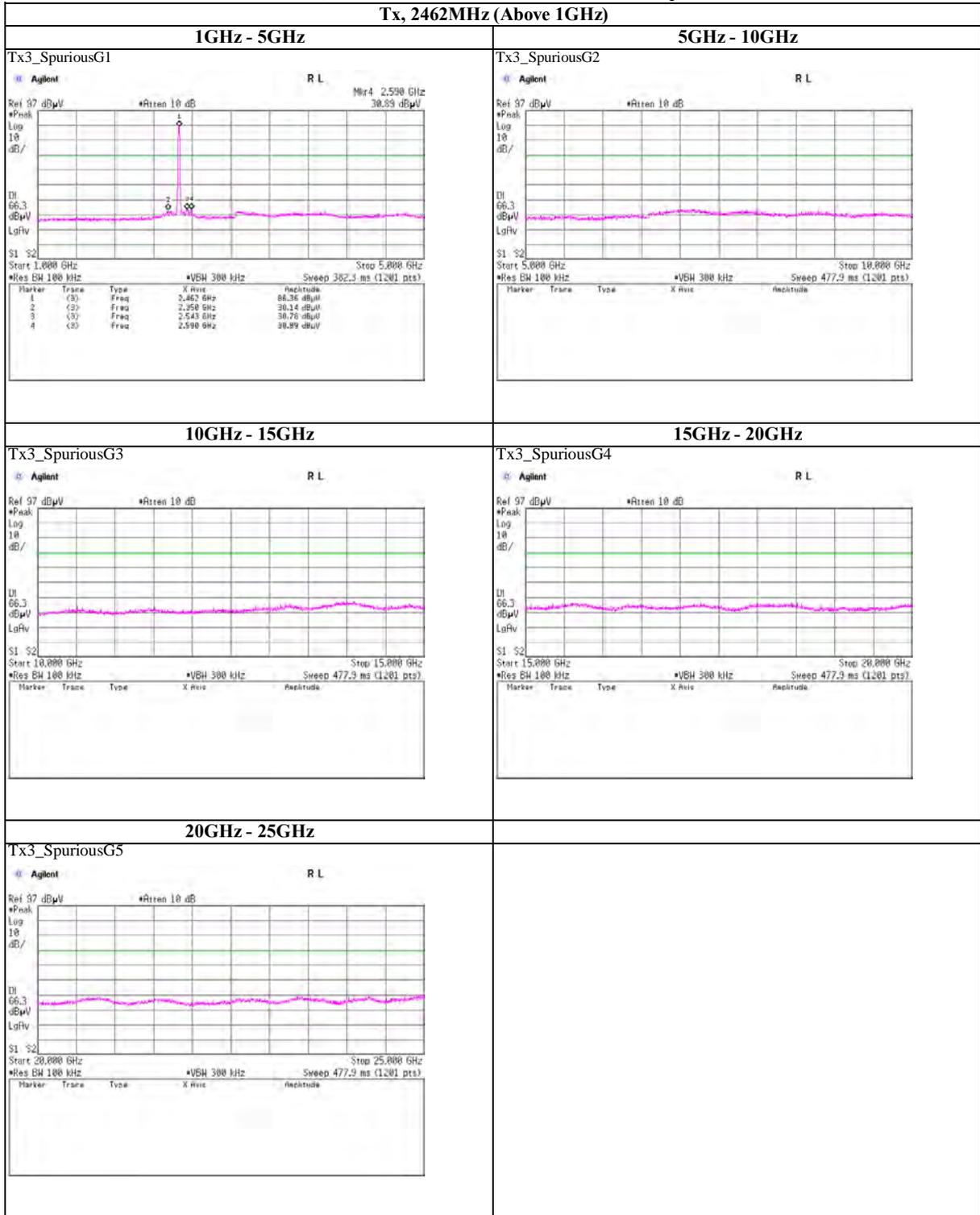
Tx, 2462MHz (Below 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11b, PN9, worst data mode 1Mbps**

Tx, 2462MHz (Above 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11g, PN9, worst data mode 24Mbps**

Tx, 2412MHz (Below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

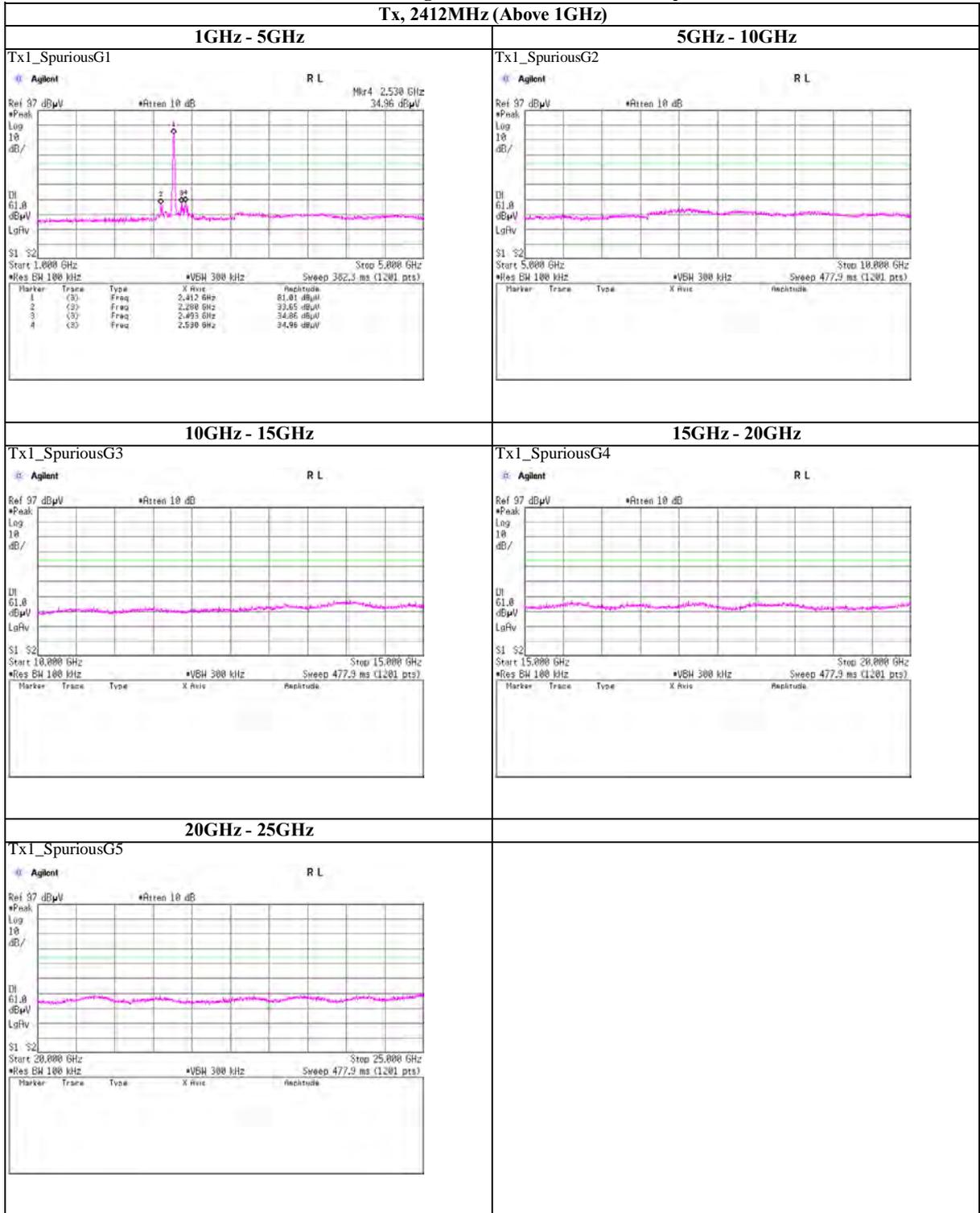
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**Spurious emission (Conducted)**  
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Tx, 2412MHz (Above 1GHz)



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**Tx, IEEE802.11g, PN9, worst data mode 24Mbps**

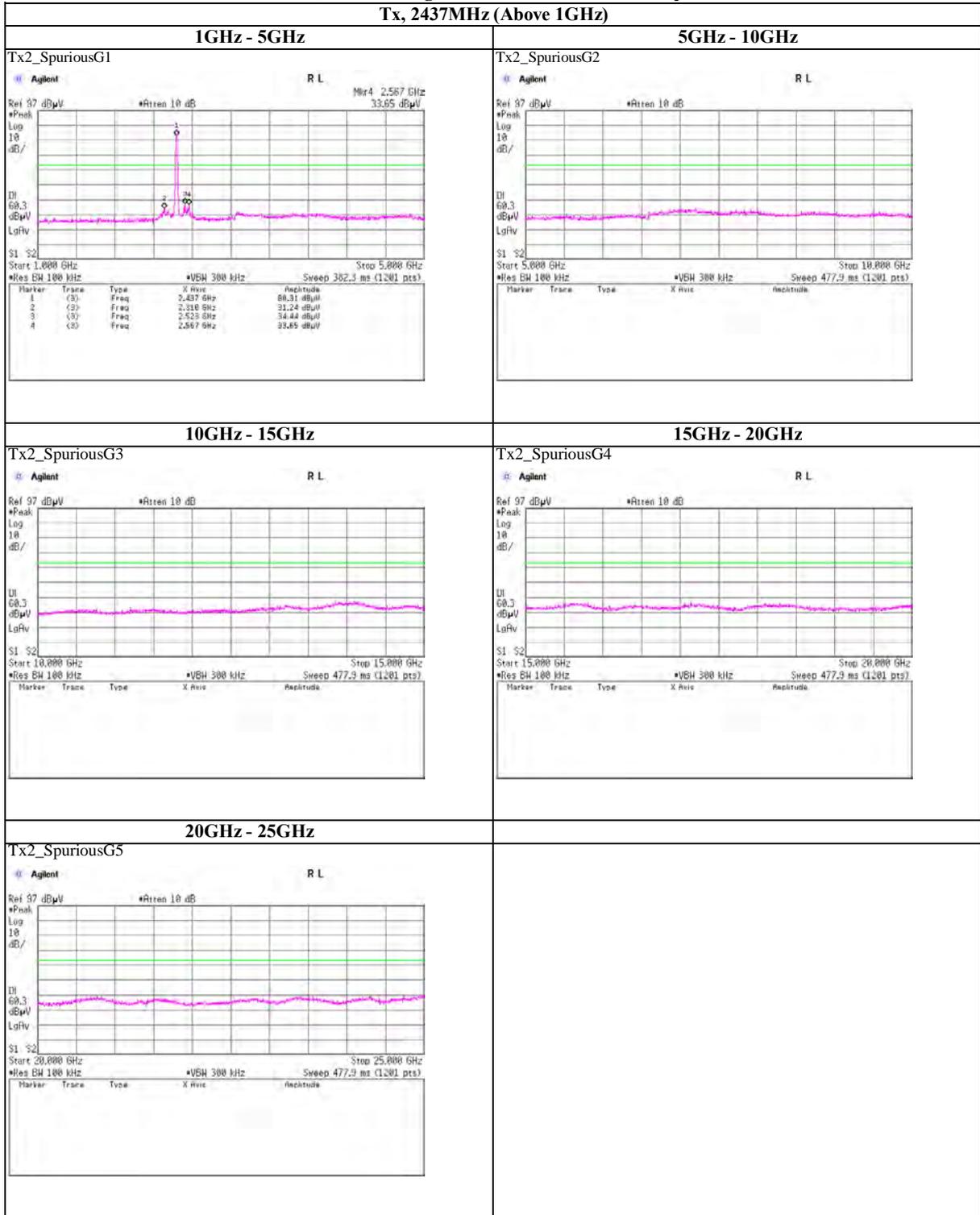
Tx, 2437MHz (Below 1GHz)



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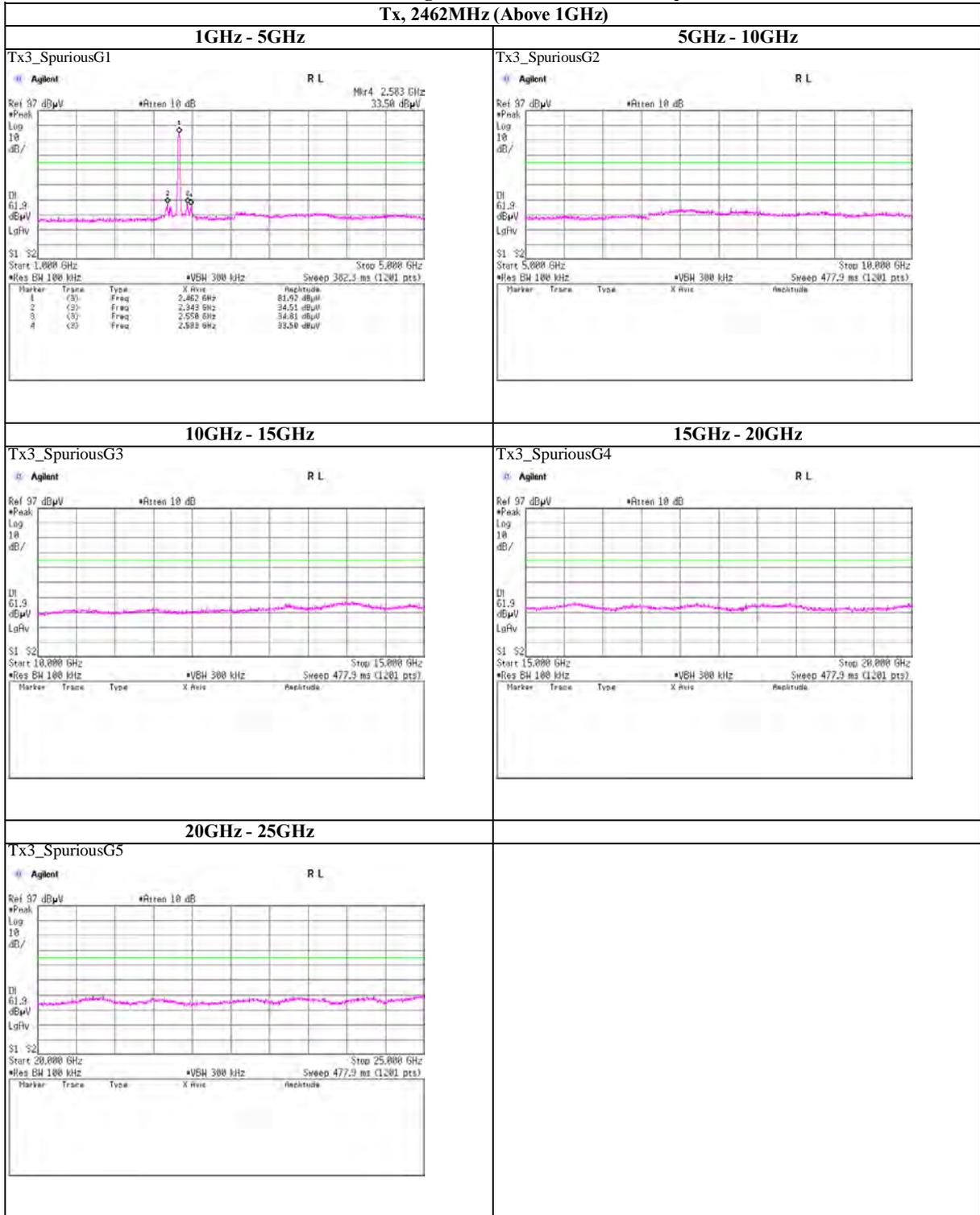
Tx, 2462MHz (Below 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11g, PN9, worst data mode 24Mbps**

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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

Tx, 2412MHz (Below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

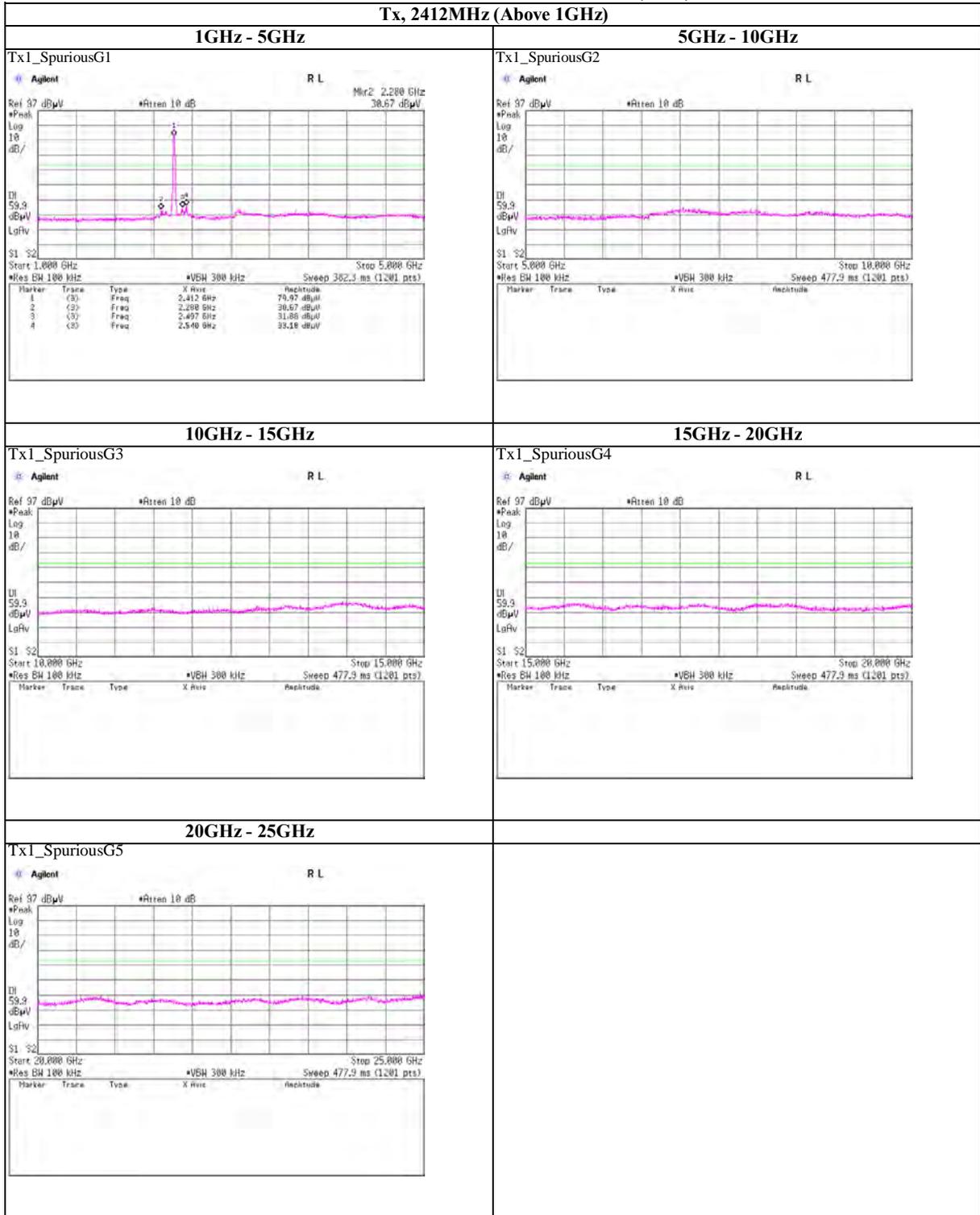
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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

Tx, 2412MHz (Above 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

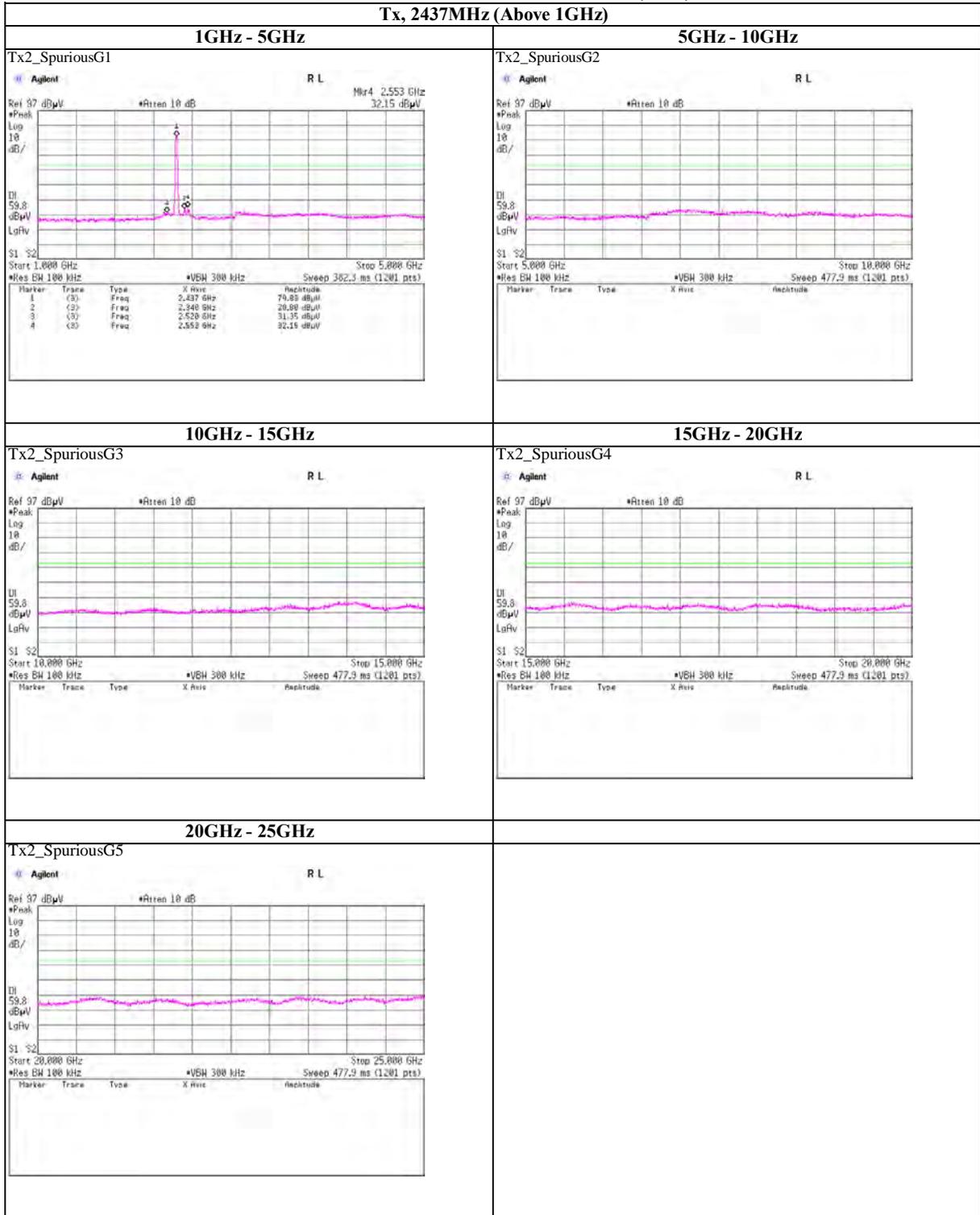
Tx, 2437MHz (Below 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

Tx, 2437MHz (Above 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

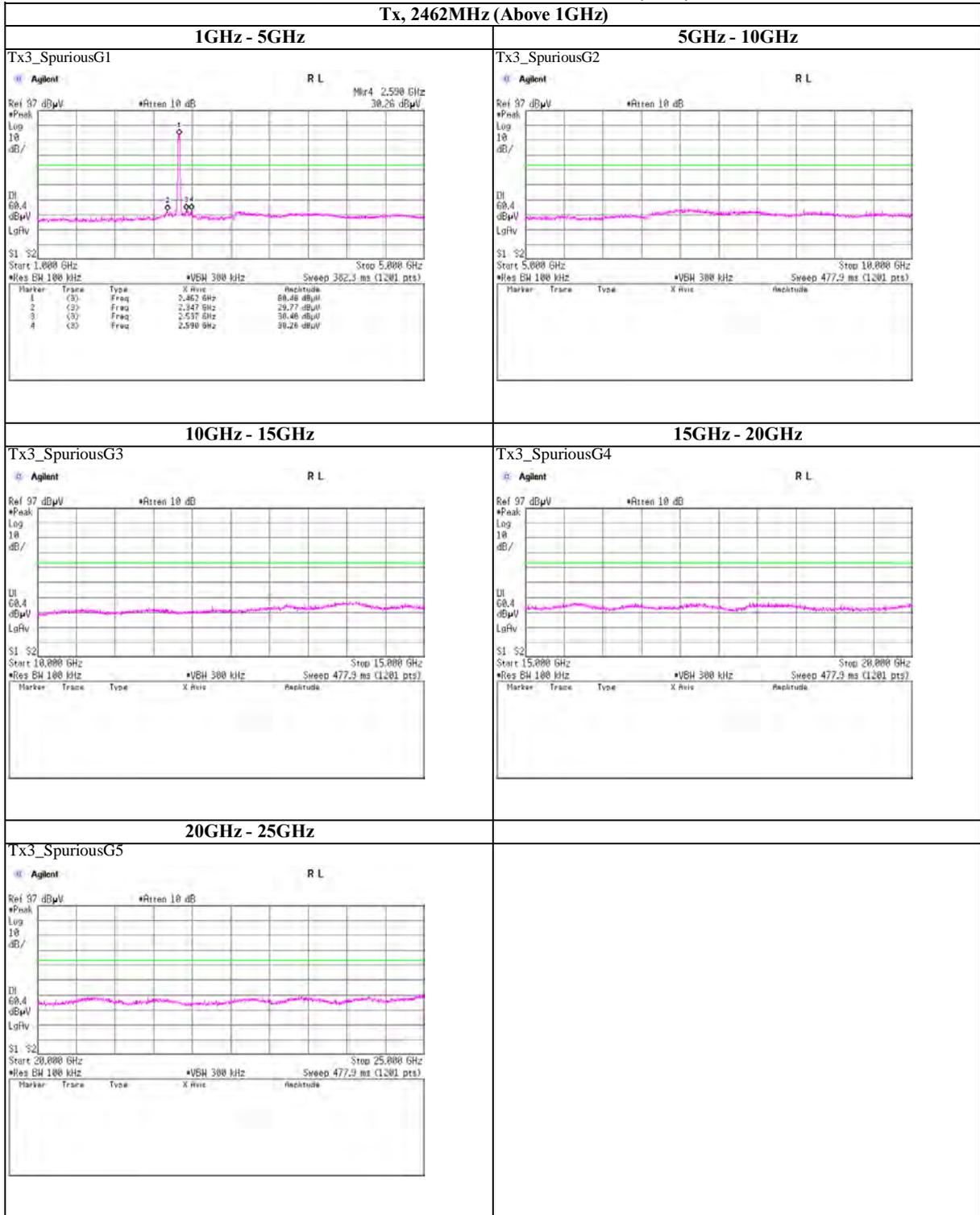
Tx, 2462MHz (Below 1GHz)



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**Spurious emission (Conducted)**  
**Tx, IEEE802.11n, PN9, worst data mode 2(MCS)**

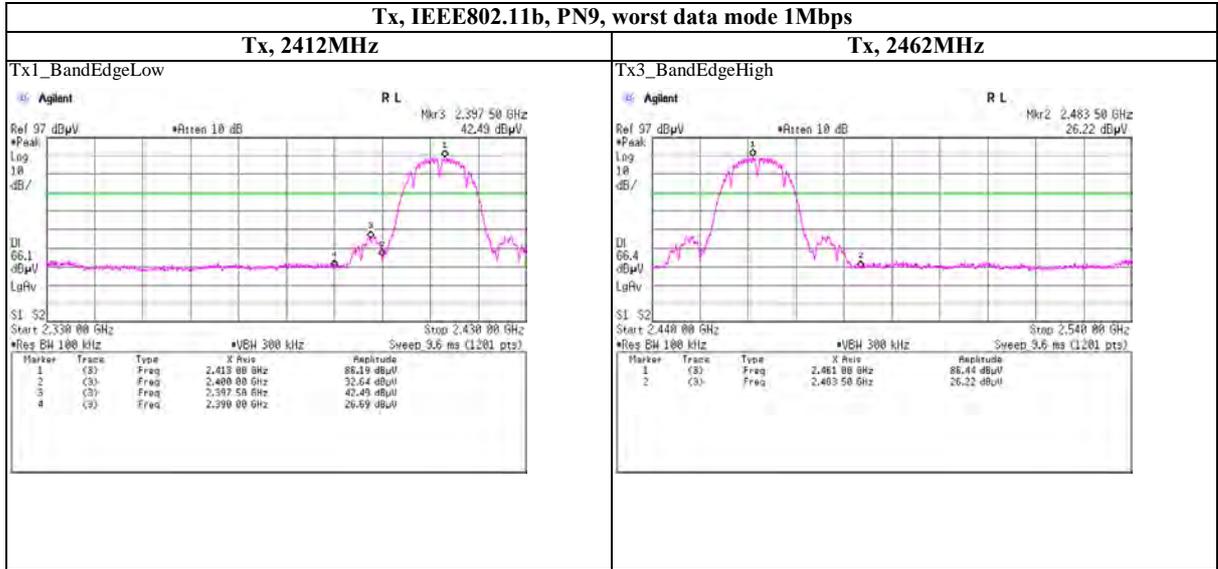
Tx, 2462MHz (Above 1GHz)



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**Spurious emission (Conducted)**

**Band Edge compliance**



**UL Japan, Inc.**

**Shonan EMC Lab.**

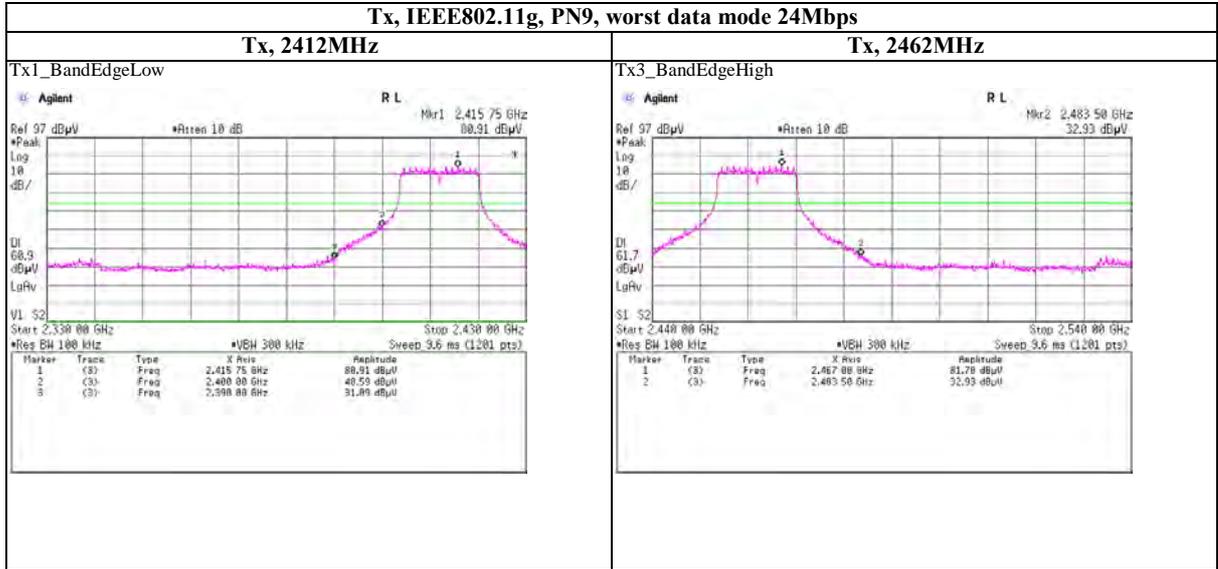
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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**Spurious emission (Conducted)**

**Band Edge compliance**



**UL Japan, Inc.**

**Shonan EMC Lab.**

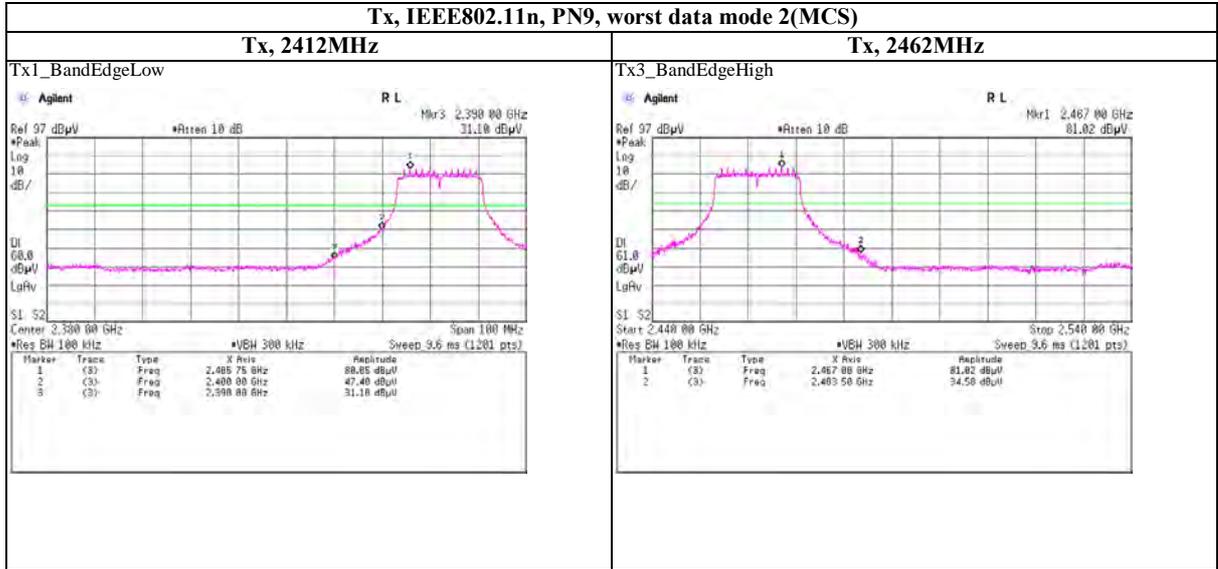
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**Spurious emission (Conducted)**

**Band Edge compliance**



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### Power Density (Radiated)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi-Anechoic Chamber
Date	June 6, 2012	
Temperature / Humidity	26deg.C / 53%RH	
Engineer	Kenichi Adachi	Test Distance: 3 m
Mode	Tx, IEEE802.11b, worst data mode 1Mbps	EUT Antenna Gain: 2.11dBi (= 1.626)
Worst axis = X-axis, Horizontal,		

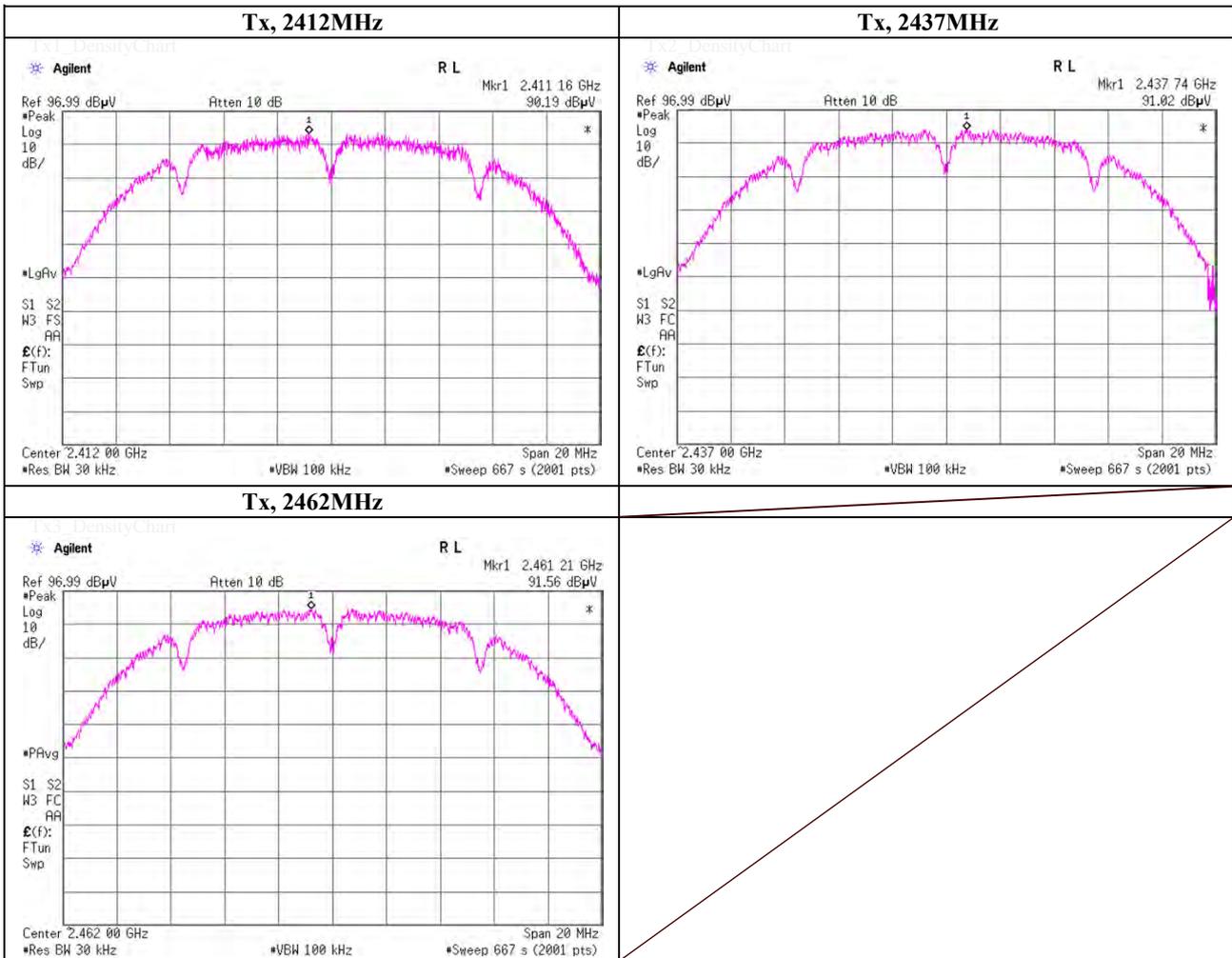
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBuV]	Ant. Factor [dB/m]	Cable, Atten. Loss [dB]	Pre Amp Gain [dB]	Result (3m) [dBuV/m]	Result (Tx) [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2411.16	90.19	27.30	14.20	41.10	90.59	-6.75	8.00	14.75
2437.0000	2437.74	91.02	27.40	14.20	41.10	91.52	-5.82	8.00	13.82
2462.0000	2461.21	91.56	27.40	14.20	41.10	92.06	-5.28	8.00	13.28

Sample Calculation:

\*1: Result (3m) [dBuV/m] = Reading [dBuV] + Ant. Factor [dB/m] + Cable, Atten. Loss [dB] - Pre Amp Gain [dB]

\*2: Result (Tx) [dBm] = ( E x D ) ^ 2 / ( 30 x G ) , \* E = ( 10 ^ ( Result (3m) / 20 ) ) / ( 10 ^ 6 ) , D = 3m , G = 1.626

\*3: Signal levels were compared at polarizations of horizontal and vertical, and measurement was performed at the polarization in which the level was greater.



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### Power Density (Radiated)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi-Anechoic Chamber
Date	June 6, 2012	
Temperature / Humidity	26deg.C / 53%RH	
Engineer	Kenichi Adachi	Test Distance: 3 m
Mode	Tx, IEEE802.11g, worst data mode 24Mbps	EUT Antenna Gain: 2.11dBi (= 1.626)
	Worst axis = X-axis, Horizontal,	

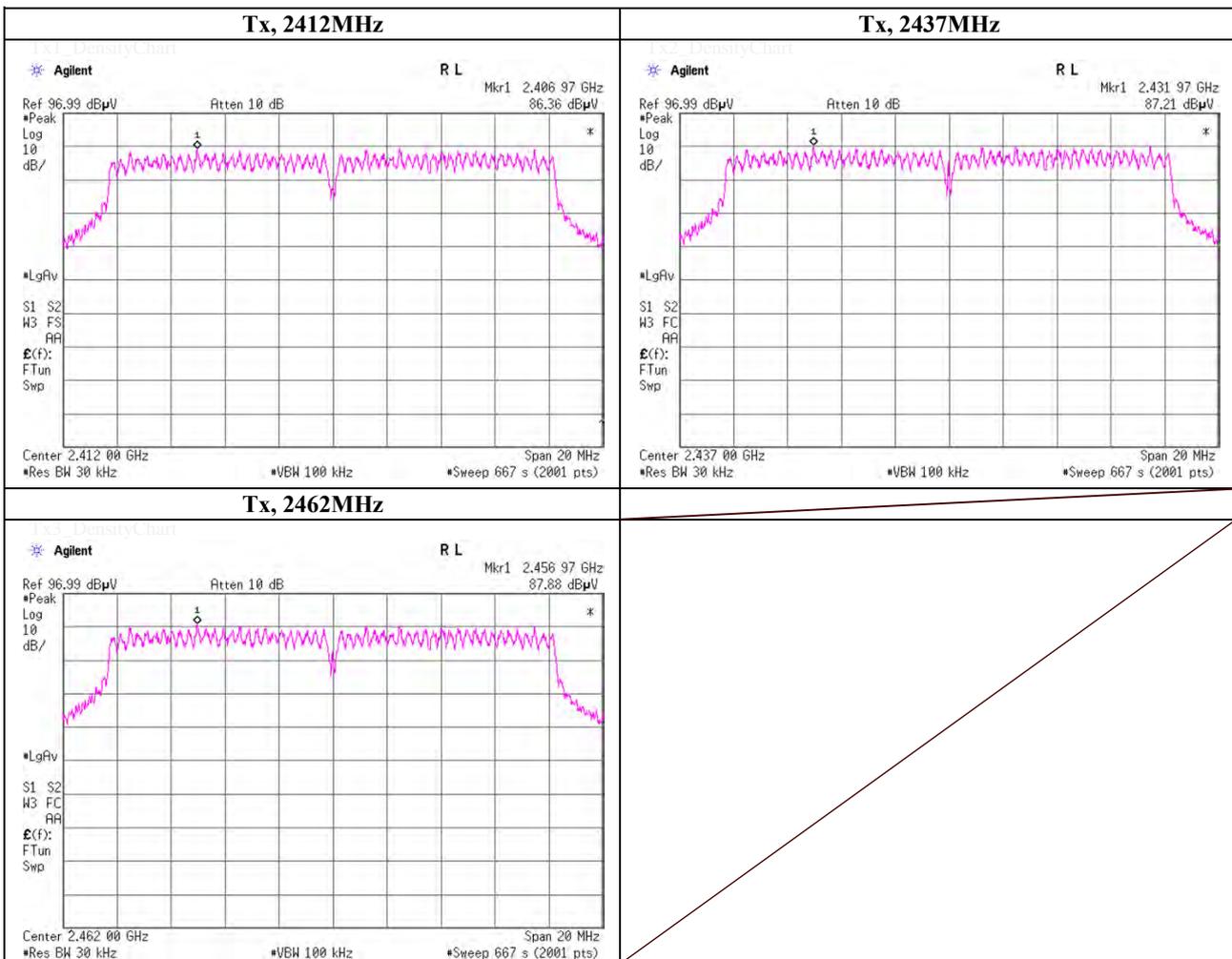
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBuV]	Ant. Factor [dB/m]	Cable, Atten. Loss [dB]	Pre Amp Gain [dB]	Result (3m) [dBuV/m]	Result (Tx) [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2406.97	86.36	27.30	14.20	41.10	86.76	-10.58	8.00	18.58
2437.0000	2431.97	87.21	27.40	14.20	41.10	87.71	-9.63	8.00	17.63
2462.0000	2456.97	87.88	27.40	14.20	41.10	88.38	-8.96	8.00	16.96

Sample Calculation:

\*1: Result (3m) [dBuV/m] = Reading [dBuV] + Ant. Factor [dB/m] + Cable, Atten. Loss [dB] - Pre Amp Gain [dB]

\*2: Result (Tx) [dBm] = ( E x D ) ^ 2 / ( 30 x G ) , \* E = ( 10 ^ ( Result (3m) / 20 ) ) / ( 10 ^ 6 ) , D = 3m , G = 1.626

\*3: Signal levels were compared at polarizations of horizontal and vertical, and measurement was performed at the polarization in which the level was greater.



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### Power Density (Radiated)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi-Anechoic Chamber
Date	June 6, 2012	
Temperature / Humidity	26deg.C / 53%RH	
Engineer	Kenichi Adachi	Test Distance: 3 m
Mode	Tx, IEEE802.11n(HT20), worst data mode MCS2	EUT Antenna Gain: 2.11dBi (= 1.626)
Worst axis = X-axis, Horizontal,		

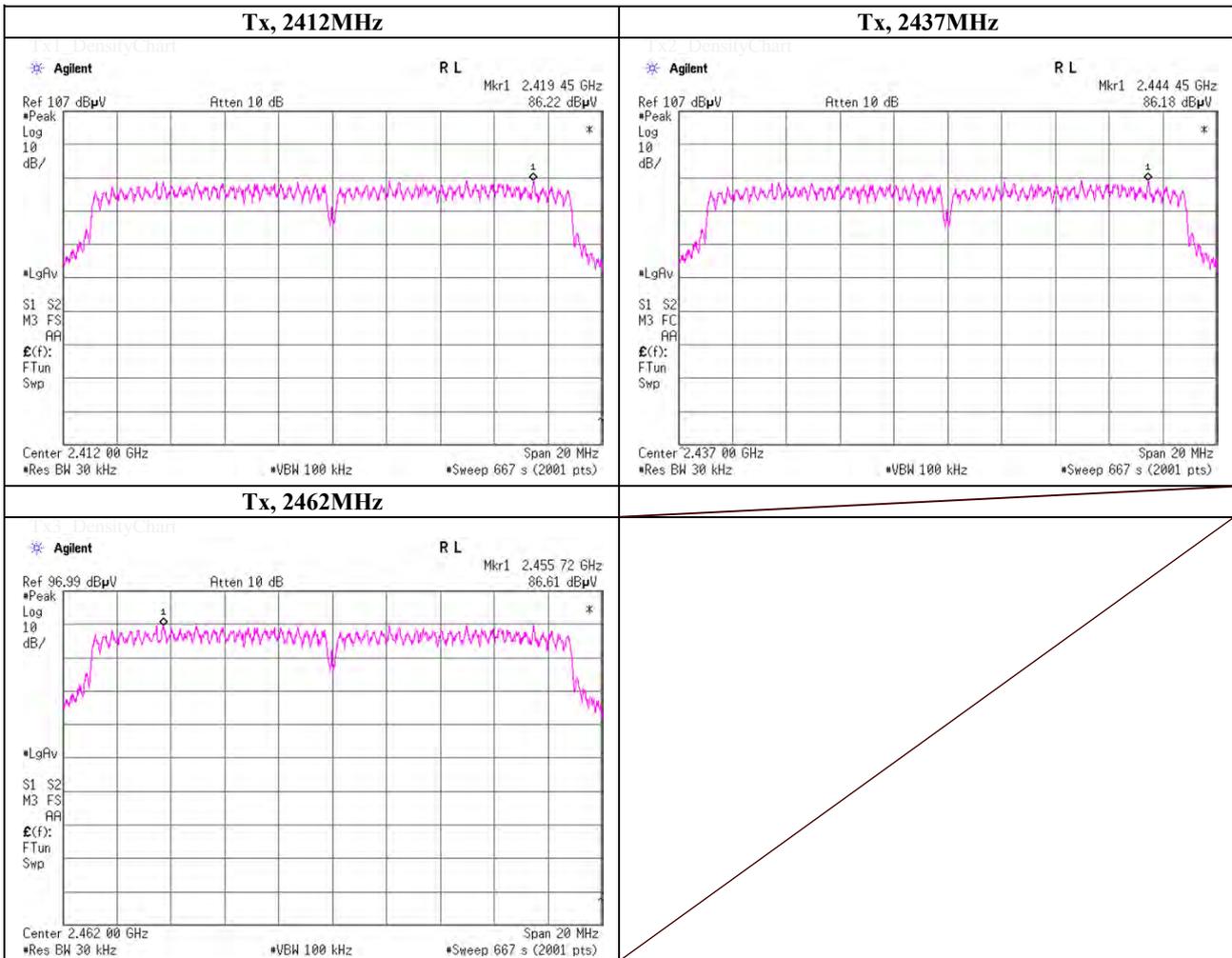
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBuV]	Ant. Factor [dB/m]	Cable, Atten. Loss [dB]	Pre Amp Gain [dB]	Result (3m) [dBuV/m]	Result (Tx) [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2419.45	86.22	27.30	14.20	41.10	86.62	-10.72	8.00	18.72
2437.0000	2444.45	86.18	27.40	14.20	41.10	86.68	-10.66	8.00	18.66
2462.0000	2455.72	86.61	27.40	14.20	41.10	87.11	-10.23	8.00	18.23

Sample Calculation:

\*1: Result (3m) [dBuV/m] = Reading [dBuV] + Ant. Factor [dB/m] + Cable, Atten. Loss [dB] - Pre Amp Gain [dB]

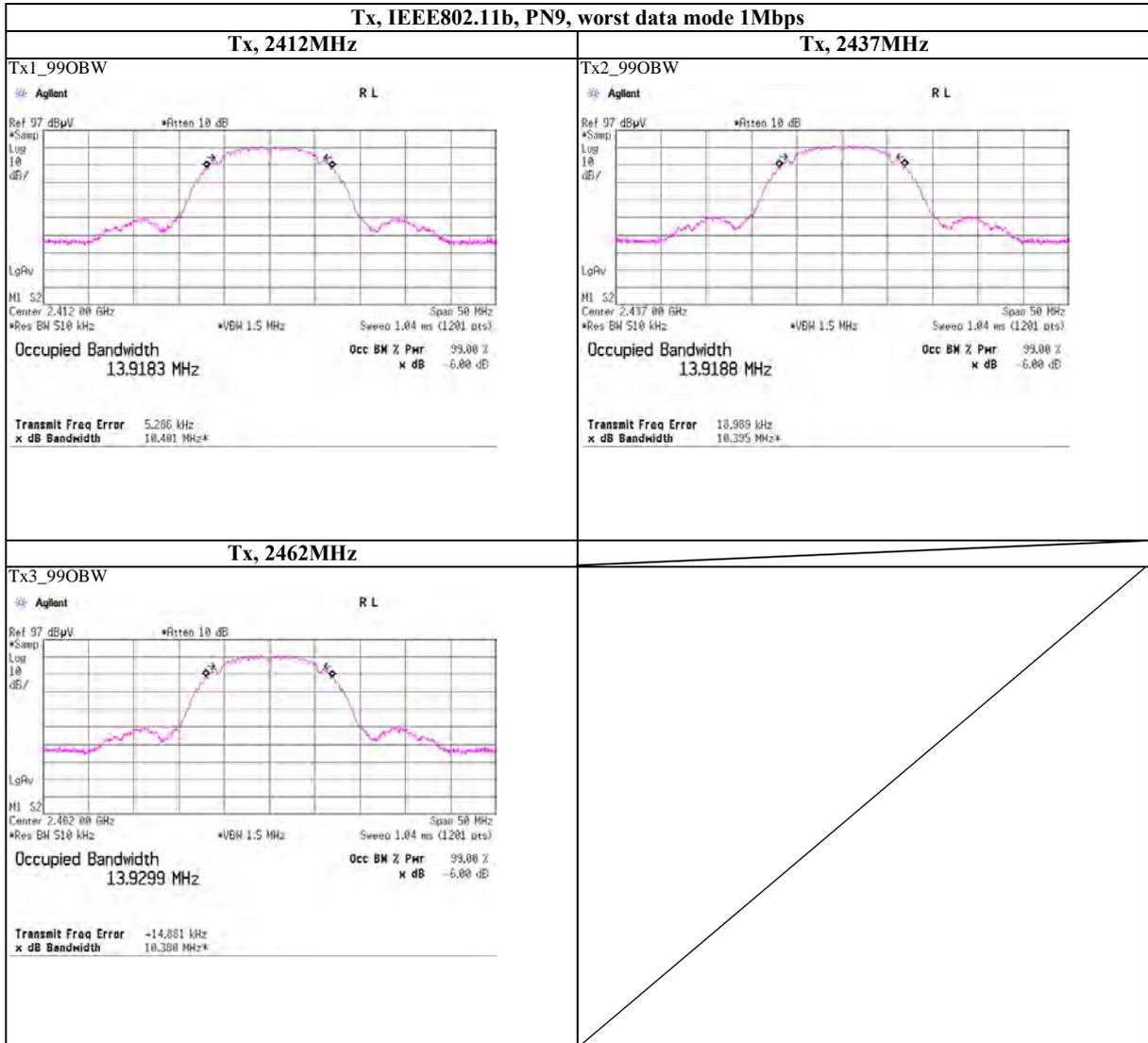
\*2: Result (Tx) [dBm] = ( E x D ) ^ 2 / ( 30 x G ) , \* E = ( 10 ^ ( Result (3m) / 20 ) ) / ( 10 ^ 6 ) , D = 3m , G = 1.626

\*3: Signal levels were compared at polarizations of horizontal and vertical, and measurement was performed at the polarization in which the level was greater.



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**99% Occupied Bandwidth**



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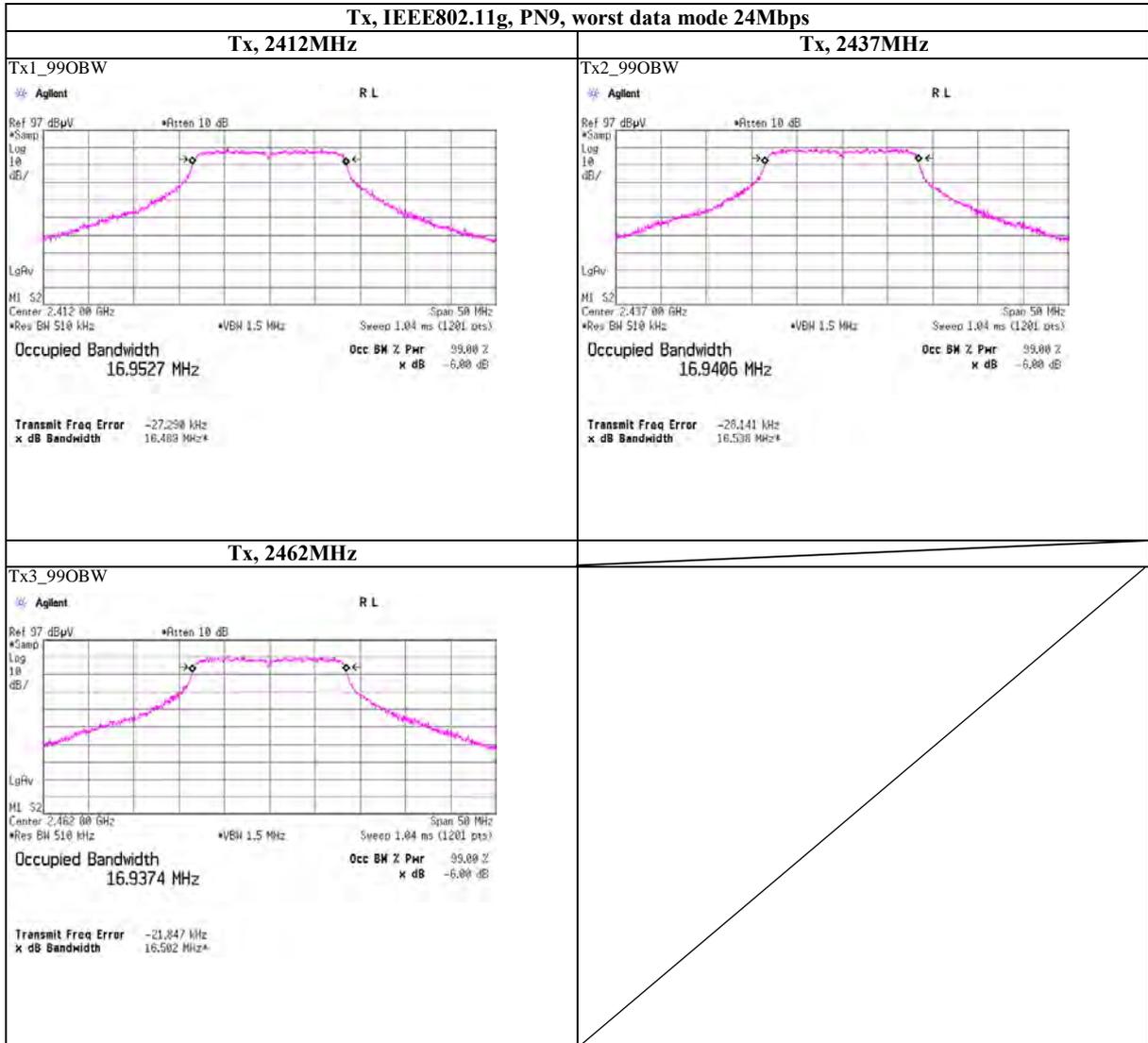
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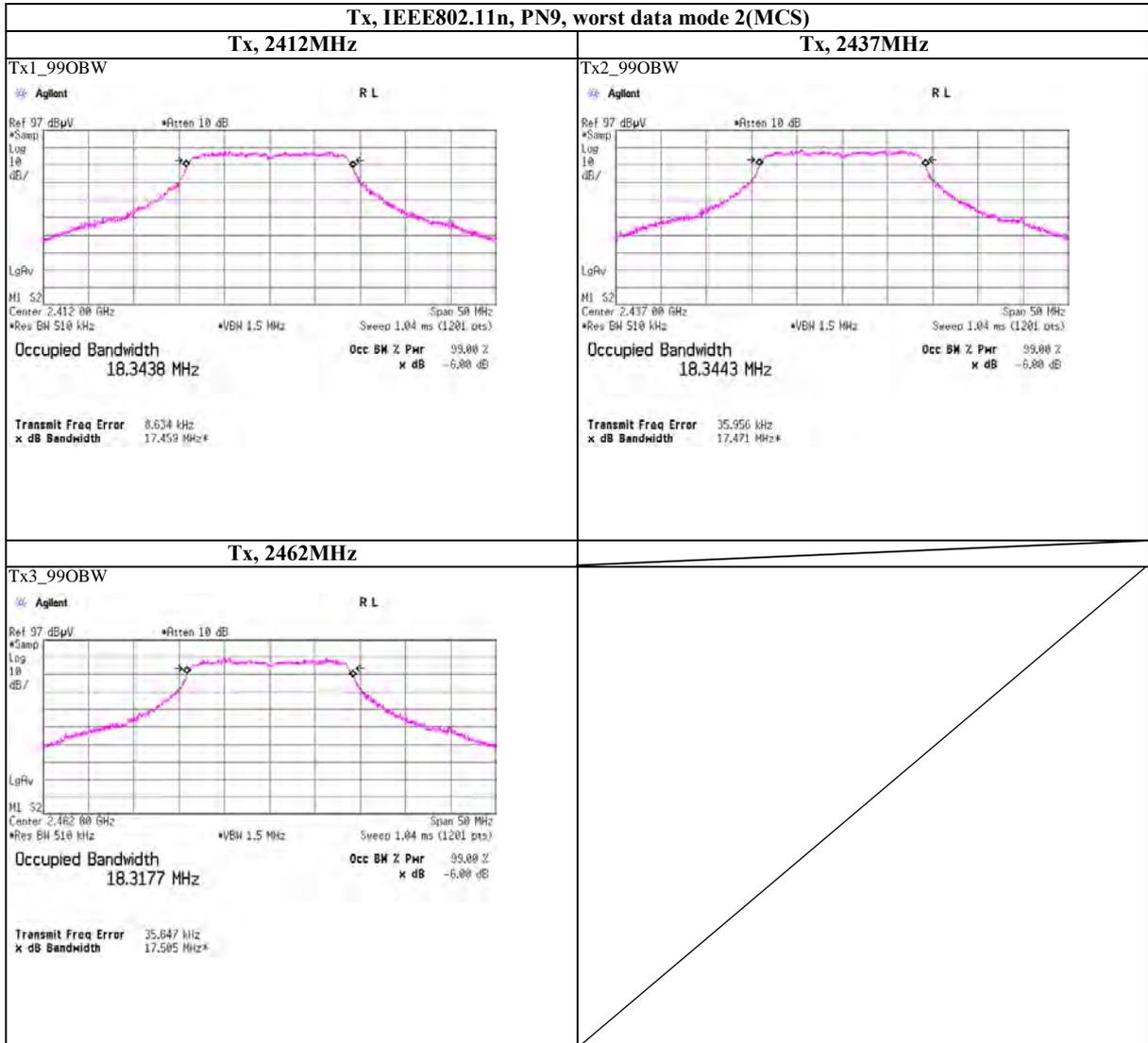
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**APPENDIX 2**  
**Test Instruments**

**EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2012/03/26 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	RE / AT	2012/04/19 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	RE / AT	2012/04/19 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT / RE	2011/12/05 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2011/12/27 * 12
SAT20-02	Attenuator	Agilent	8493C-020	74890	AT	2012/03/12 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2012/03/12 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2012/03/12 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/07/19 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2012/03/12 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2012/04/10 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	RE	2012/03/12 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2012/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2011/08/28 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2012/03/30 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2012/02/06 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2012/02/16 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE / CE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2011/09/23 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,LF)	-	RE / CE	-
SAT20-01	Attenuator(above 1GHz)	Agilent	8493C-020	74889	RE	2011/12/27 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2011/12/27 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2012/02/10 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2011/10/23 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271 (RF Selector)	RE	2012/04/10 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2011/10/23 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE / CE	2012/02/07 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/N S4906	-/0901-271 (RF Selector)	CE	2012/04/10 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2012/02/28 * 12
SAT3-03	Attenuator	JFW	50HF-003N	-	CE	2012/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2012/03/26 * 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 :

CE: Conducted emission ,

RE: Radiated emission ,

AT: Antenna terminal disturbance voltage