



# RADIO TEST REPORT

Test Report No.: 10005569S-A

**Applicant** : Canon Inc.  
**Type of Equipment** : Wireless Module  
**Model No.** : RF401  
**FCC ID** : AZD401  
**Test regulation** : FCC Part15 Subpart C: 2012  
**Test result** : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
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 5 to 15, 2013

**Tested by:**

*S. Takano*

Shinichi Takano  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

*T. Imamura*

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".

**UL Japan, Inc.**  
**Shonan EMC Lab.**

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : Canon Inc.  
Address : 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo, 146-8501 Japan  
Telephone Number : +81-3-5482-8070  
Facsimile Number : +81-3-3757-8431  
Contact Person : Yasushi Sasaki

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

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

Type of Equipment : Wireless Module  
Model Number : RF401  
Serial Number : See Section 4.  
Rating : DC3.3V  
Country of Mass-production : Philippines  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Receipt Date of Sample : April 13, 2013  
Modification of EUT : No modification by the test lab.

### **2.2 Product description**

Model: RF401 (referred to as the EUT in this report) is a Wireless Module.

Clock frequency(ies) in the system : 32.768KHz, 38.4MHz

<Radio part>

Equipment type : Transceiver  
Frequency of operation : 2412-2462MHz (IEEE 802.11b, 11g, 11n (HT20))  
2422-2452MHz (IEEE 802.11n (HT40))  
Bandwidth : 20MHz (IEEE 802.11a, b, 11g, 11n (HT20)), 40MHz (IEEE 802.11n (HT40))  
Channel spacing : 5MHz  
Type of modulation : DSSS, OFDM  
Antenna type : Monopole type chip antenna  
Antenna connector type : None  
Antenna gain : -0.94dBi  
ITU code : D1D, G1D  
Operation temperature range : -20 to +85 deg.C

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FCC 15.31 (e) / 212

The module is constantly provided the stable voltage from the host device regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203 / 212

It is impossible for end users to replace the antenna, because it is soldered on the circuit board. Therefore the equipment complies with the requirement of 15.203/212.

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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 December 27, 2012 and effective January 28, 2013  
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

### **3.2 Procedures & Results**

Item	Test Procedure *1)	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.10:2009	FCC 15.207	-	N/A	17.7dB Freq.: 0.19510MHz Detector: AV Phase: L1 Mode: 11g 2412MHz	Complied
6dB bandwidth	ANSI C63.10:2009	FCC 15.247 (a)(2)	Conducted	N/A	* See data	Complied
Maximum peak conducted output power	ANSI C63.10:2009	FCC 15.247 (b)(3)	Conducted	N/A		Complied
Out of band emission & Restricted band edges	ANSI C63.10:2009	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	2.7dB Freq.: 48.001MHz Polarization: Vertical Detection: Quasi-Peak Mode: 11g 2412MHz	Complied
Power density	ANSI C63.10:2009	FCC 15.247 (e)	Conducted	N/A	* See data	Complied
Note: UL Japan's EMI Work Procedures No.13-EM-W0420 and 13-EM-W0422. *1) These tests were also referred to KDB 558074 v03r01 (FCC), "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".						

### **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 (±)
<b>Conducted emission (AC Mains) LISN</b>	150kHz-30MHz	3.6 dB	3.6 dB	3.5 dB
<b>Radiated emission (Measurement distance: 3m)</b>	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
<b>Radiated emission (Measurement distance: 1m)</b>	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.6 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 the site margin.

#### Radiated emission test

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

#### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

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%

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### 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 semi-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 EMI & 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

Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission Radiated emission (below 1GHz) *3)	Transmitting (Tx) IEEE 802.11g	2412MHz	12dBm	6Mbps, PN9
Other items	Transmitting (Tx) IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	12dBm	2Mbps, PN9
	Transmitting (Tx) IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	12dBm	6Mbps, PN9
	Transmitting (Tx) IEEE 802.11n (HT20)	2412MHz, 2437MHz, 2462MHz	12dBm	MCS0, PN9
	Transmitting (Tx) IEEE 802.11n(HT40)	2422MHz, 2437MHz, 2452MHz	12dBm	MCS0, PN9

\*1) The actual output power differs from the setting value. Software used for the test: RFTTEST ver. 14.0.11.p51

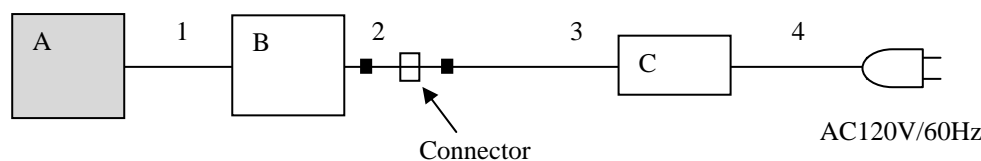
\*2) The worst condition was determined based on the test result of Maximum Peak Conducted Output Power.

\*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

■: Ferrite core (Standard attachment)



\* Test data was taken under worse case conditions.

### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Module	RF401	*1)	Canon	EUT
B	Digital Camera	PC1739	PR-MT000100	Canon	-
C	Compact Power Adapter	CA-DC10 N	1152	Canon	-

\*1) E80356: Conducted / Radiated emission, E80357: Antenna port conducted tests

### List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Jig	0.15	Unshielded	Unshielded	-
2	DC	0.15	Unshielded	Unshielded	-
3	DC	1.9	Unshielded	Unshielded	-
4	AC	1.9	Unshielded	Unshielded	-

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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, including peripherals 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. 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 host device within a Shielded room. The EUT was connected to a Line Impedance Stabilization Network (LISN) via host device. 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 detection of the test receiver.

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

### **5.5 Results**

Summary of the test results : Pass  
Refer to APPENDIX 1

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## **SECTION 6: Radiated emission**

### **6.1 Operating environment**

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

### **6.2 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.

### **6.3 Test conditions**

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

### **6.4 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) (Refer to Figure 1). 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.

Frequency	30-1000MHz	1-25GHz		20dBc
Detection type	Quasi-Peak	Peak	Average *1)	Peak
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 3MHz Detector: RMS	RBW: 100kHz VBW: 300kHz

\*1) Average Power Measurement was measured based on 12.2.5.1 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

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 case:**

Antenna polarization	Carrier (Band edge)	Spurious		
		Below 1GHz	Above 1GHz	
			1-2.8GHz	2.8-25GHz
Horizontal	Y	X	Y	Y
Vertical	Z	X	Z	Y

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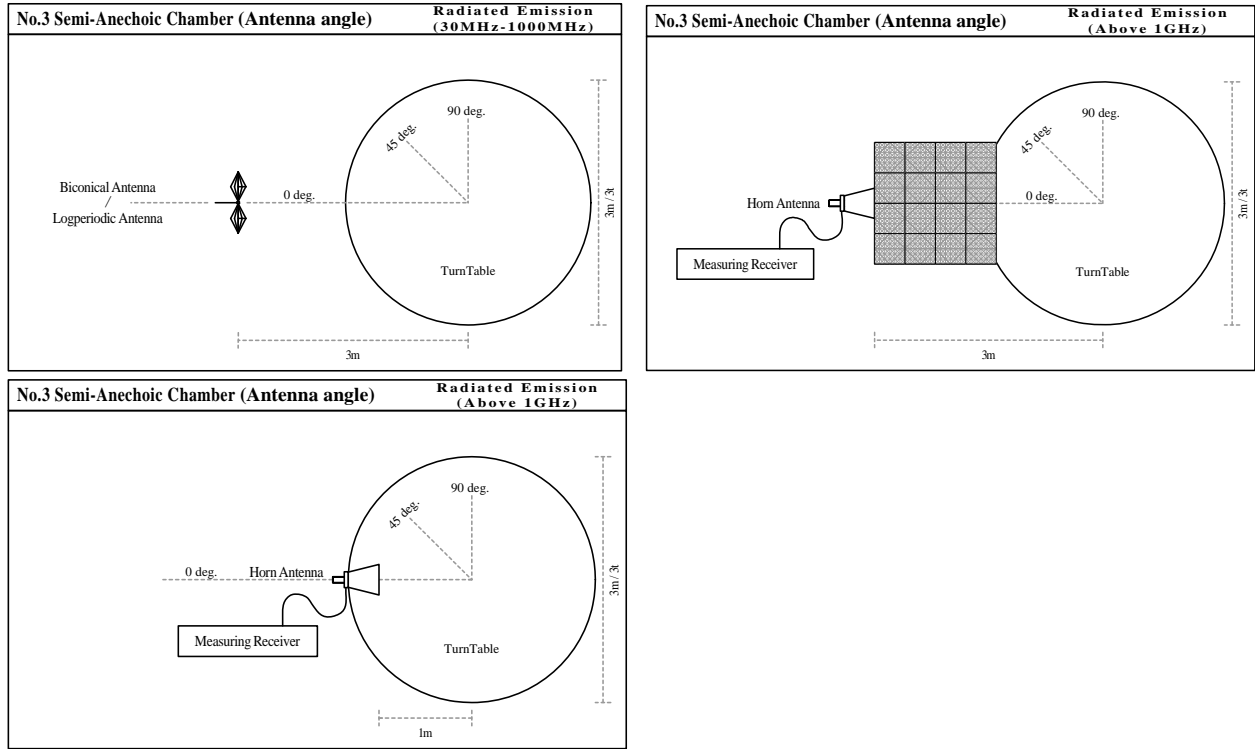
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**Figure 1. Antenna angle**



**6.5 Band edge**

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

**6.6 Results**

Summary of the test results : Pass  
\* No noise was detected above the 5<sup>th</sup> order harmonics.

Refer to APPENDIX 1

## **SECTION 7: Out of band emissions (Antenna port conducted)**

### **Test procedure**

The Out of Band Emissions 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

## **SECTION 8: 6dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port. The test was measured based on Method 8.1 Option 1 and 8.2 Option 2 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass

Refer to APPENDIX 1

## **SECTION 9: Maximum peak conducted output power**

### **Test procedure**

The Maximum Peak Output Power was measured with a power meter connected to the antenna port. The test was measured based on Method 9.1.3 PKPM1 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".  
Detection type: Peak / Average \*1)

Summary of the test results: Pass

Refer to APPENDIX 1

\*1) Average detector was used only for Reference data of SAR testing.

## **SECTION 10: Peak power density**

### **Test procedure**

The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used : Spectrum Analyzer  
RBW / VBW : 3kHz / 9.1kHz

The test was measured based on Method 10.2 PKPSD of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass

Refer to APPENDIX 1

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## **Contents of APPENDIXES**

### **APPENDIX 1: Data of Radio tests**

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

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

Test instruments

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

Conducted emission  
Radiated emission  
Pre-check of worst position

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# DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.3 Shielded Room  
Date : 2013/05/15

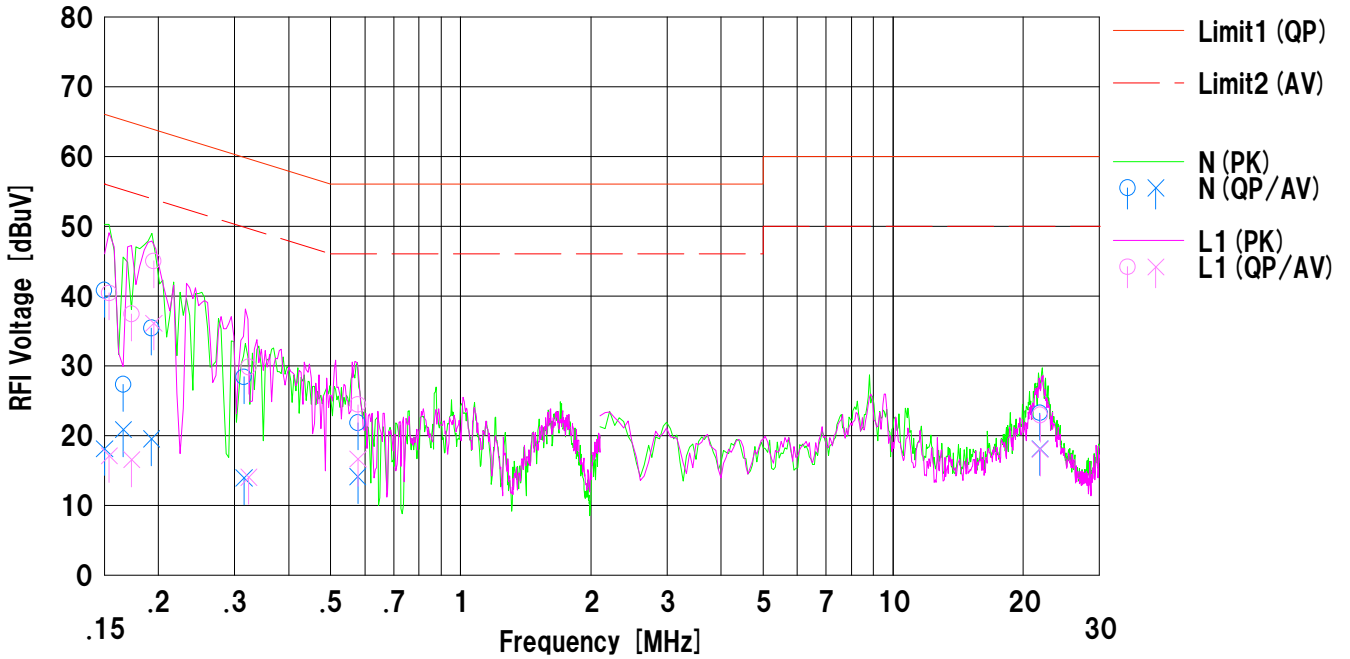
Company : Canon Inc.  
Kind of EUT : Wireless Module  
Model No. : RF401  
Serial No. : E80356

Mode : Tx 11g 2412MHz  
Order No. : 10005569S  
Power : AC 120V / 60Hz (AC Adaptor)  
Temp./Humi. : 24deg.C. / 55%RH

Remarks : -

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

Engineer : Shinichi Takano

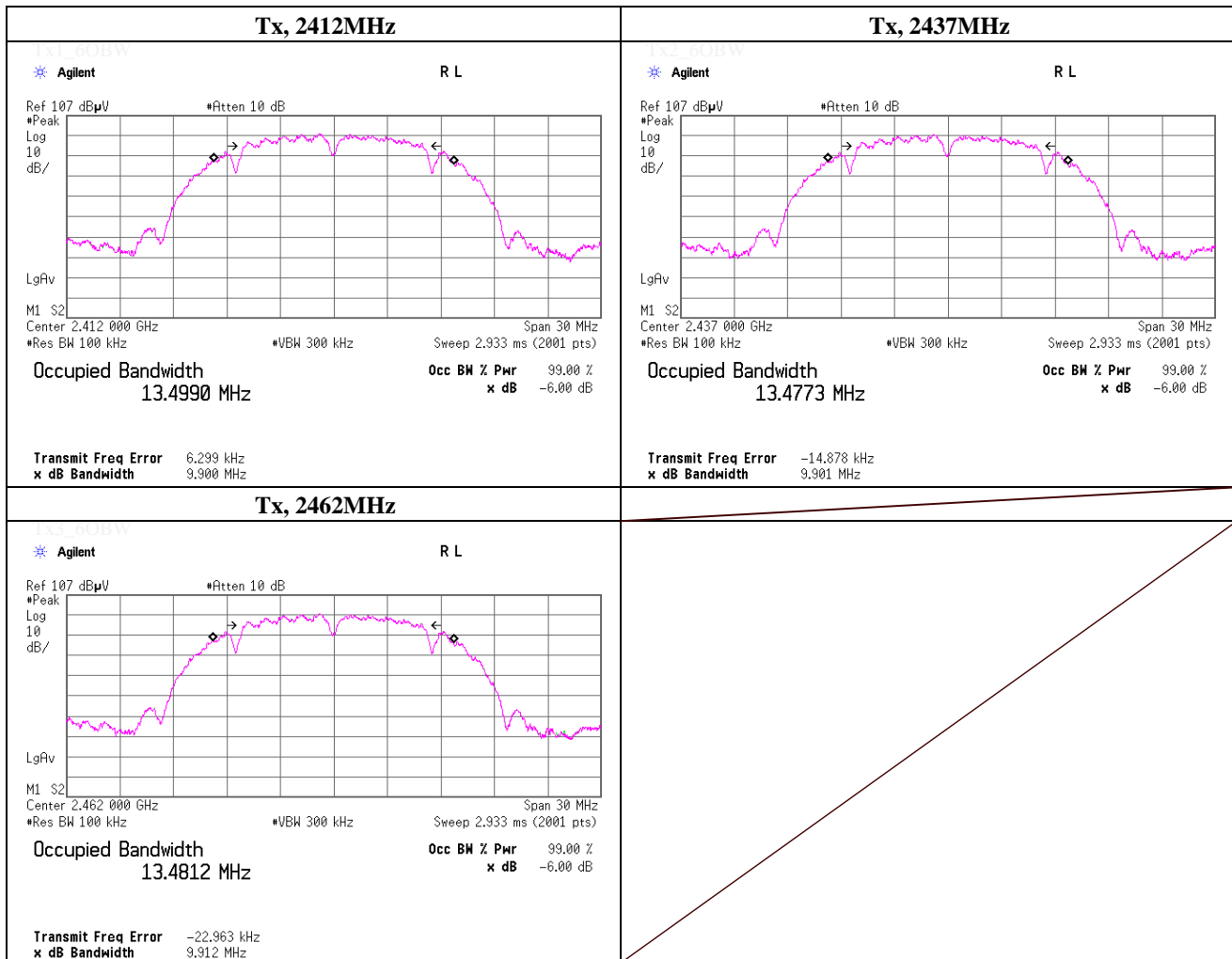


No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	28.1	5.4	12.7	40.8	18.1	66.0	56.0	25.2	37.9	N	
2	0.16584	14.6	8.1	12.7	27.3	20.8	65.1	55.1	37.8	34.3	N	
3	0.19279	22.7	6.8	12.7	35.4	19.5	63.9	53.9	28.5	34.4	N	
4	0.31541	15.7	1.2	12.7	28.4	13.9	59.8	49.8	31.4	35.9	N	
5	0.57833	9.1	1.4	12.7	21.8	14.1	56.0	46.0	34.2	31.9	N	
6	21.84261	9.6	4.5	13.6	23.2	18.1	60.0	50.0	36.8	31.9	N	
7	0.15392	27.7	4.4	12.7	40.4	17.1	65.7	55.7	25.3	38.6	L1	
8	0.17327	24.7	3.8	12.7	37.4	16.5	64.8	54.8	27.4	38.3	L1	
9	0.19510	32.3	23.4	12.7	45.0	36.1	63.8	53.8	18.8	17.7	L1	
10	0.32327	17.1	1.3	12.7	29.8	14.0	59.6	49.6	29.8	35.6	L1	
11	0.57865	11.7	3.9	12.7	24.4	16.6	56.0	46.0	31.6	29.4	L1	
12	21.88206	9.3	4.4	13.6	22.9	18.0	60.0	50.0	37.1	32.0	L1	

### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 2Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	9.900	> 0.500
2437.0000	9.901	> 0.500
2462.0000	9.912	> 0.500



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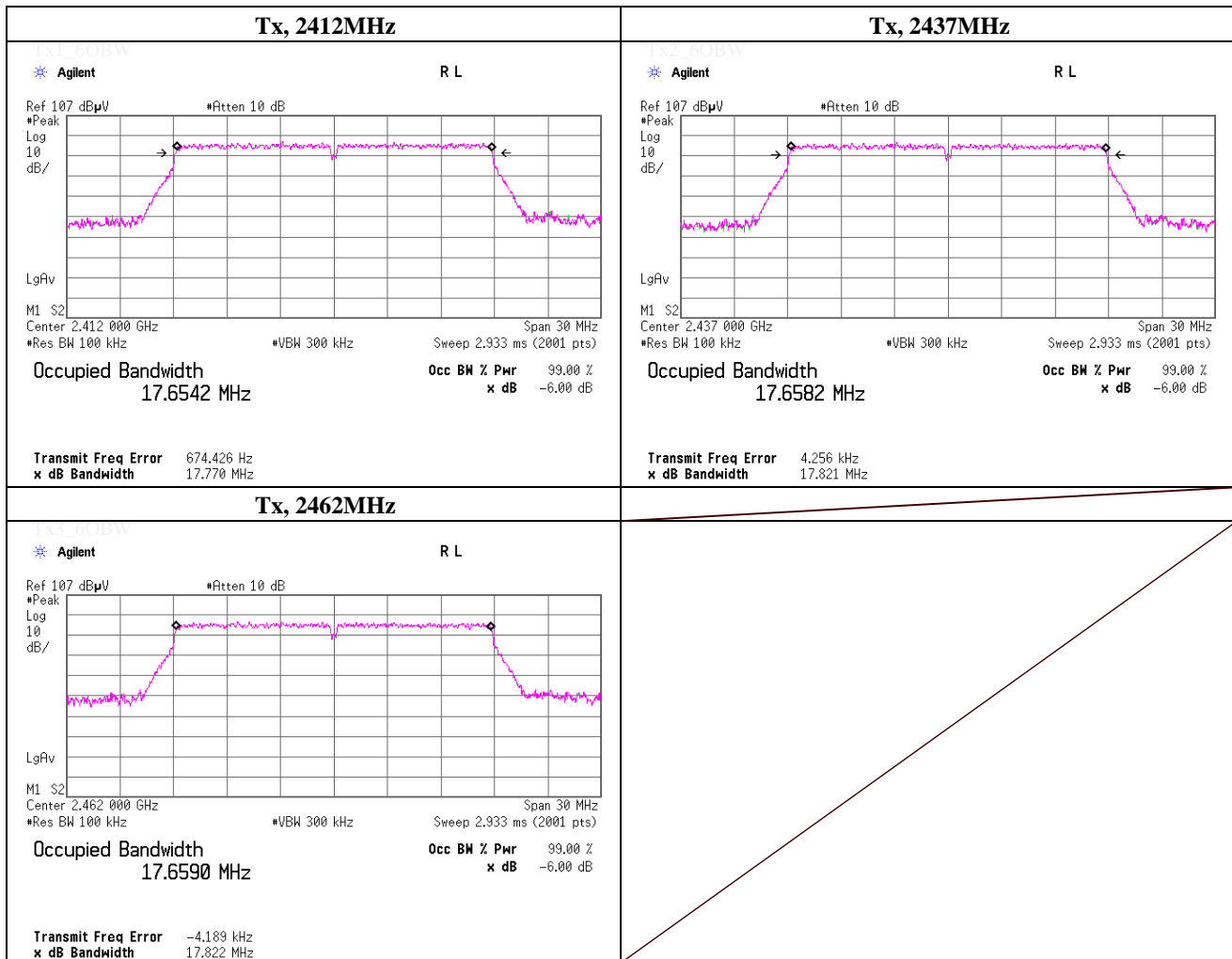




### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	17.770	> 0.500
2437.0000	17.821	> 0.500
2462.0000	17.822	> 0.500



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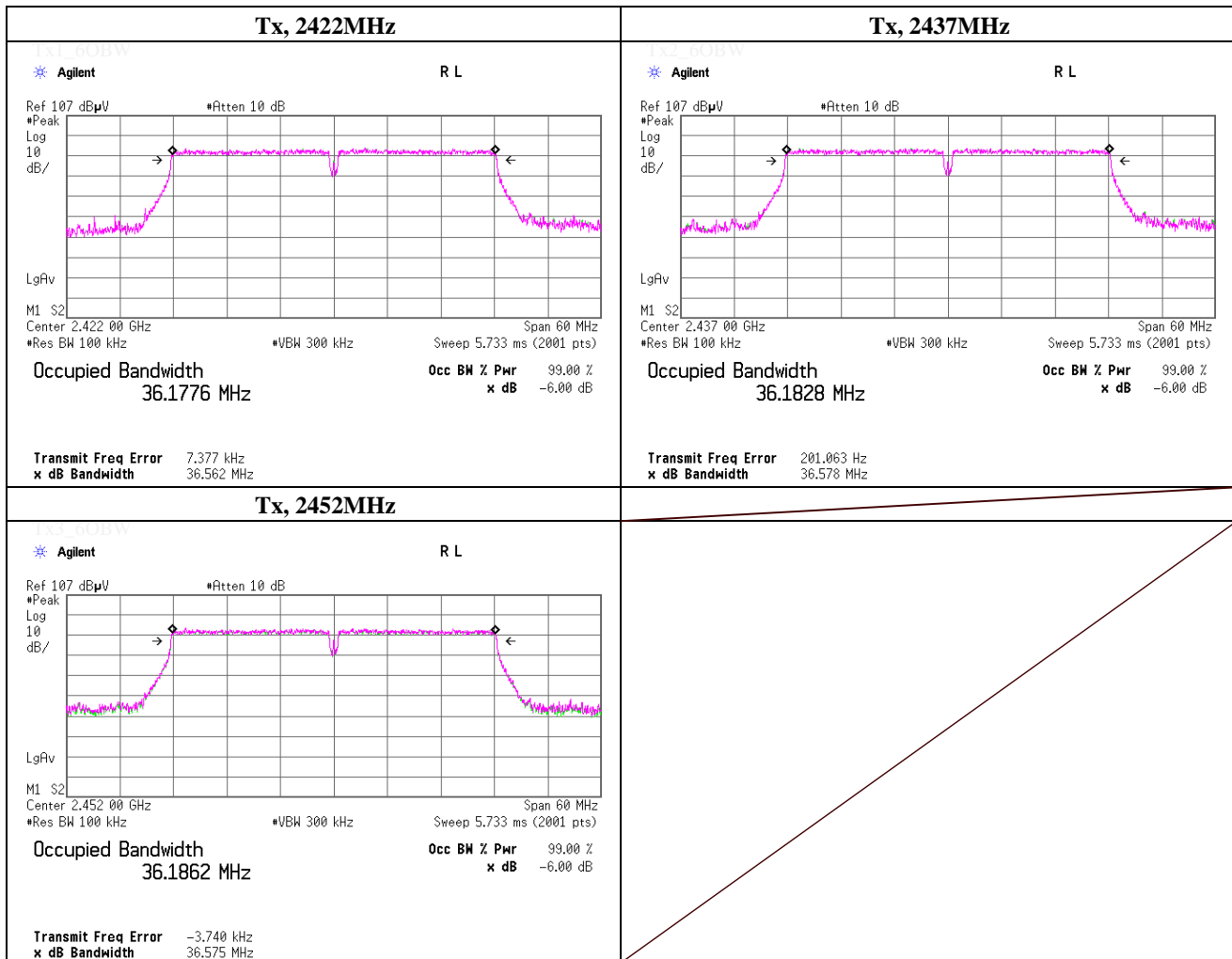
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### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2422.0000	36.562	> 0.500
2437.0000	36.578	> 0.500
2452.0000	36.575	> 0.500



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## Maximum Peak Conducted Output Power

Test place                    UL Japan, Inc. Shonan EMC Lab.            No.5 Shielded Room  
 Date                            May 5, 2013  
 Temperature / Humidity    24deg.C            , 37%RH  
 Engineer                    Kenichi Adachi                                    S/N: E80357  
 Mode                         Tx, IEEE802.11n (HT20), PN9,                                    worst data mode :                    0 (MCS)

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	9.62	1.98	9.98	21.58	143.88	30.00	1000	8.42
Mid	2437.0	9.46	1.99	9.98	21.43	139.00	30.00	1000	8.57
High	2462.0	9.43	2.00	9.98	21.41	138.36	30.00	1000	8.59

Sample Calculation:

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

**[Pre check]**

Mode (MCS)	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
0	2437.0	9.46	1.99	9.98	<b>21.43</b>	139.00	30.00	1000	<b>8.57</b>
1	2437.0	9.33	1.99	9.98	21.30	134.90	30.00	1000	8.70
2	2437.0	9.41	1.99	9.98	21.38	137.40	30.00	1000	8.62
3	2437.0	9.39	1.99	9.98	21.36	136.77	30.00	1000	8.64
4	2437.0	9.28	1.99	9.98	21.25	133.35	30.00	1000	8.75
5	2437.0	9.25	1.99	9.98	21.22	132.43	30.00	1000	8.78
6	2437.0	9.31	1.99	9.98	21.28	134.28	30.00	1000	8.72
7	2437.0	9.26	1.99	9.98	21.23	132.74	30.00	1000	8.77

**Worst**


Sample Calculation:

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

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## Maximum Peak Conducted Output Power

Test place                    UL Japan, Inc. Shonan EMC Lab.            No.5 Shielded Room  
 Date                            May 5, 2013  
 Temperature / Humidity    24deg.C            , 37%RH  
 Engineer                    Kenichi Adachi                                    S/N: E80357  
 Mode                            Tx, IEEE802.11n (HT40), PN9,                                    worst data mode :                    0 (MCS)

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2422.0	10.11	1.99	9.98	22.08	161.44	30.00	1000	7.92
Mid	2437.0	10.12	1.99	9.98	22.09	161.81	30.00	1000	7.91
High	2452.0	9.76	1.99	9.98	21.73	148.94	30.00	1000	8.27

Sample Calculation:

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

**[Pre check]**

Mode (MCS)	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
0	2437.0	10.12	1.99	9.98	<b>22.09</b>	161.81	30.00	1000	<b>7.91</b>
1	2437.0	9.70	1.99	9.98	21.67	146.89	30.00	1000	8.33
2	2437.0	10.07	1.99	9.98	22.04	159.96	30.00	1000	7.96
3	2437.0	10.04	1.99	9.98	22.01	158.85	30.00	1000	7.99
4	2437.0	9.97	1.99	9.98	21.94	156.31	30.00	1000	8.06
5	2437.0	10.11	1.99	9.98	22.08	161.44	30.00	1000	7.92
6	2437.0	9.76	1.99	9.98	21.73	148.94	30.00	1000	8.27
7	2437.0	9.67	1.99	9.98	21.64	145.88	30.00	1000	8.36

**Worst**


Sample Calculation:

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

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## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date May 13, 2013 May 14, 2013 May 15, 2013  
 Temperature / Humidity 22 deg.C, 56 %RH 24 deg.C, 55 %RH 22 deg.C, 59 %RH  
 Engineer Shinichi Takano Shinichi Takano Shinichi Takano  
 Mode Tx, 2412 MHz  
 Tx, IEEE802.11b, PN9, worst data mode 2Mbps

(\* 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.	2390.000	PK	46.7	27.4	14.8	41.4	47.5	73.9	26.4	100	215	
Hori.	4824.000	PK	51.6	31.1	7.6	41.2	49.1	73.9	24.8	100	136	
Hori.	6432.092	PK	48.2	34.9	8.5	40.6	51.0	73.9	22.9	132	143	
Hori.	7236.000	PK	47.2	36.6	9.1	41.4	51.5	73.9	22.4	100	0	
Hori.	9648.000	PK	43.4	38.6	10.3	38.9	53.4	73.9	20.5	100	0	
Hori.	12060.000	PK	45.2	39.5	11.5	39.4	56.8	73.9	17.1	100	0	
Hori.	2390.000	AV	36.3	27.4	14.8	41.4	37.1	53.9	16.8	100	215	
Hori.	4824.000	AV	44.8	31.1	7.6	41.2	42.3	53.9	11.6	100	136	
Hori.	6432.092	AV	39.3	34.9	8.5	40.6	42.1	53.9	11.8	132	143	
Hori.	7236.000	AV	36.9	36.6	9.1	41.4	41.2	53.9	12.7	100	0	
Hori.	9648.000	AV	33.5	38.6	10.3	38.9	43.5	53.9	10.4	100	0	
Hori.	12060.000	AV	34.5	39.5	11.5	39.4	46.1	53.9	7.8	100	0	
Vert.	2390.000	PK	47.5	27.4	14.8	41.4	48.3	73.9	25.6	100	93	
Vert.	4824.000	PK	50.0	31.1	7.6	41.2	47.5	73.9	26.4	100	186	
Vert.	6432.072	PK	46.6	34.9	8.5	40.6	49.4	73.9	24.5	100	225	
Vert.	7236.000	PK	47.2	36.6	9.1	41.4	51.5	73.9	22.4	100	0	
Vert.	9648.000	PK	42.7	38.6	10.3	38.9	52.7	73.9	21.2	100	0	
Vert.	12060.000	PK	46.1	39.5	11.5	39.4	57.7	73.9	16.2	100	0	
Vert.	2390.000	AV	36.4	27.4	14.8	41.4	37.2	53.9	16.7	100	93	
Vert.	4824.000	AV	41.3	31.1	7.6	41.2	38.8	53.9	15.1	100	186	
Vert.	6432.072	AV	37.6	34.9	8.5	40.6	40.4	53.9	13.5	100	225	
Vert.	7236.000	AV	36.8	36.6	9.1	41.4	41.1	53.9	12.8	100	0	
Vert.	9648.000	AV	33.4	38.6	10.3	38.9	43.4	53.9	10.5	100	0	
Vert.	12060.000	AV	34.6	39.5	11.5	39.4	46.2	53.9	7.7	100	0	

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

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

**20dBc Data Sheet (RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	91.7	27.5	14.8	41.4	92.6	-	-	
Hori.	2396.982	PK	47.7	27.4	14.8	41.4	48.5	72.6	24.1	
Hori.	2400.000	PK	49.9	27.4	14.8	41.4	50.7	72.6	21.9	
Vert.	2412.000	PK	91.5	27.5	14.8	41.4	92.4	-	-	
Vert.	2396.865	PK	47.9	27.4	14.8	41.4	48.7	72.4	23.7	
Vert.	2400.000	PK	50.7	27.4	14.8	41.4	51.5	72.4	20.9	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                    Shinichi Takano                    Shinichi Takano  
 Mode                    Tx,                    2437 MHz  
                               Tx, IEEE802.11b, PN9, worst data mode 2Mbps

(\* 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.	4874.000	PK	51.9	31.3	7.7	41.1	49.8	73.9	24.1	100	144	
Hori.	6498.624	PK	47.2	35.2	8.5	40.7	50.2	73.9	23.7	139	143	
Hori.	7311.000	PK	46.6	36.6	9.2	41.4	51.0	73.9	22.9	100	0	
Hori.	9748.000	PK	43.7	38.7	10.2	38.9	53.7	73.9	20.2	100	0	
Hori.	12185.000	PK	44.3	39.5	11.4	39.3	55.9	73.9	18.0	100	0	
Hori.	4874.000	AV	46.2	31.3	7.7	41.1	44.1	53.9	9.8	100	144	
Hori.	6498.624	AV	39.2	35.2	8.5	40.7	42.2	53.9	11.7	139	143	
Hori.	7311.000	AV	37.1	36.6	9.2	41.4	41.5	53.9	12.4	100	0	
Hori.	9748.000	AV	33.6	38.7	10.2	38.9	43.6	53.9	10.3	100	0	
Hori.	12185.000	AV	34.3	39.5	11.4	39.3	45.9	53.9	<b>8.0</b>	100	0	
Vert.	4874.000	PK	50.4	31.3	7.7	41.1	48.3	73.9	25.6	100	185	
Vert.	6498.841	PK	47.4	35.2	8.5	40.7	50.4	73.9	23.5	100	224	
Vert.	7311.000	PK	46.8	36.6	9.2	41.4	51.2	73.9	22.7	100	0	
Vert.	9748.000	PK	43.3	38.7	10.2	38.9	53.3	73.9	20.6	100	0	
Vert.	12185.000	PK	44.0	39.5	11.4	39.3	55.6	73.9	18.3	100	0	
Vert.	4874.000	AV	43.7	31.3	7.7	41.1	41.6	53.9	12.3	100	185	
Vert.	6498.841	AV	37.4	35.2	8.5	40.7	40.4	53.9	13.5	100	224	
Vert.	7311.000	AV	36.6	36.6	9.2	41.4	41.0	53.9	12.9	100	0	
Vert.	9748.000	AV	33.5	38.7	10.2	38.9	43.5	53.9	10.4	100	0	
Vert.	12185.000	AV	34.2	39.5	11.4	39.3	45.8	53.9	8.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
 Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
 Mode                    Tx,                    2462 MHz  
                               Tx, IEEE802.11b, PN9, worst data mode 2Mbps

(\* 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.	2483.500	PK	60.9	27.5	14.9	41.4	61.9	73.9	12.0	100	259	
Hori.	4924.000	PK	53.3	31.5	7.7	41.0	51.5	73.9	22.4	100	125	
Hori.	6565.398	PK	48.0	35.3	8.6	40.8	51.1	73.9	22.8	137	145	
Hori.	7386.000	PK	47.6	36.7	9.2	41.5	52.0	73.9	21.9	100	0	
Hori.	9848.000	PK	44.0	38.9	10.2	38.9	54.2	73.9	19.7	100	0	
Hori.	12310.000	PK	44.4	39.5	11.3	39.3	55.9	73.9	18.0	100	0	
Hori.	2483.500	AV	36.4	27.5	14.9	41.4	37.4	53.9	16.5	100	259	
Hori.	4924.000	AV	48.4	31.5	7.7	41.0	46.6	53.9	7.3	100	125	
Hori.	6565.398	AV	38.9	35.3	8.6	40.8	42.0	53.9	11.9	137	145	
Hori.	7386.000	AV	37.7	36.7	9.2	41.5	42.1	53.9	11.8	100	0	
Hori.	9848.000	AV	34.0	38.9	10.2	38.9	44.2	53.9	9.7	100	0	
Hori.	12310.000	AV	34.2	39.5	11.3	39.3	45.7	53.9	8.2	100	0	
Vert.	2483.500	PK	56.8	27.5	14.9	41.4	57.8	73.9	16.1	100	95	
Vert.	4924.000	PK	51.4	31.5	7.7	41.0	49.6	73.9	24.3	100	185	
Vert.	6565.351	PK	46.7	35.3	8.6	40.8	49.8	73.9	24.1	100	226	
Vert.	7386.000	PK	46.3	36.7	9.2	41.5	50.7	73.9	23.2	100	0	
Vert.	9848.000	PK	43.5	38.9	10.2	38.9	53.7	73.9	20.2	100	0	
Vert.	12310.000	PK	44.8	39.5	11.3	39.3	56.3	73.9	17.6	100	0	
Vert.	2483.500	AV	36.2	27.5	14.9	41.4	37.2	53.9	16.7	100	95	
Vert.	4924.000	AV	45.3	31.5	7.7	41.0	43.5	53.9	10.4	100	185	
Vert.	6565.351	AV	37.5	35.3	8.6	40.8	40.6	53.9	13.3	100	226	
Vert.	7386.000	AV	37.0	36.7	9.2	41.5	41.4	53.9	12.5	100	0	
Vert.	9848.000	AV	33.8	38.9	10.2	38.9	44.0	53.9	9.9	100	0	
Vert.	12310.000	AV	34.4	39.5	11.3	39.3	45.9	53.9	8.0	100	0	

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

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

## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
 Mode                    Tx,                    2412 MHz  
                               Tx, IEEE802.11g, PN9, worst data mode 6Mbps

(\* 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.	239.997	QP	44.6	16.9	8.2	32.0	37.7	46.0	8.3	134	119	
Hori.	336.002	QP	50.4	14.8	8.7	31.9	42.0	46.0	4.0	227	101	
Hori.	2390.000	PK	58.5	27.4	14.8	41.4	59.3	73.9	14.6	100	228	
Hori.	4824.000	PK	48.1	31.1	7.6	41.2	45.6	73.9	28.3	100	142	
Hori.	6431.925	PK	47.3	34.9	8.5	40.6	50.1	73.9	23.8	130	140	
Hori.	7236.000	PK	46.2	36.6	9.1	41.4	50.5	73.9	23.4	100	0	
Hori.	9648.000	PK	43.8	38.6	10.3	38.9	53.8	73.9	20.1	100	0	
Hori.	12060.000	PK	44.3	39.5	11.5	39.4	55.9	73.9	18.0	100	0	
Hori.	2390.000	AV	40.8	27.4	14.8	41.4	41.6	53.9	12.3	100	228	
Hori.	4824.000	AV	38.4	31.1	7.6	41.2	35.9	53.9	18.0	100	142	
Hori.	6431.925	AV	38.7	34.9	8.5	40.6	41.5	53.9	12.4	130	140	
Hori.	7236.000	AV	36.9	36.6	9.1	41.4	41.2	53.9	12.7	100	0	
Hori.	9648.000	AV	33.8	38.6	10.3	38.9	43.8	53.9	10.1	100	0	
Hori.	12060.000	AV	34.4	39.5	11.5	39.4	46.0	53.9	7.9	100	0	
Vert.	48.001	QP	51.3	11.5	6.7	32.2	37.3	40.0	2.7	100	188	
Vert.	527.997	QP	43.0	17.9	9.6	32.0	38.5	46.0	7.5	100	204	
Vert.	623.999	QP	42.6	19.2	9.9	31.9	39.8	46.0	6.2	100	313	
Vert.	2390.000	PK	59.9	27.4	14.8	41.4	60.7	73.9	13.2	100	117	
Vert.	4824.000	PK	47.8	31.1	7.6	41.2	45.3	73.9	28.6	100	187	
Vert.	6431.970	PK	46.0	34.9	8.5	40.6	48.8	73.9	25.1	100	224	
Vert.	7236.000	PK	46.2	36.6	9.1	41.4	50.5	73.9	23.4	100	0	
Vert.	9648.000	PK	42.8	38.6	10.3	38.9	52.8	73.9	21.1	100	0	
Vert.	12060.000	PK	44.9	39.5	11.5	39.4	56.5	73.9	17.4	100	0	
Vert.	2390.000	AV	42.9	27.4	14.8	41.4	43.7	53.9	10.2	100	117	
Vert.	4824.000	AV	37.0	31.1	7.6	41.2	34.5	53.9	19.4	100	187	
Vert.	6431.970	AV	37.1	34.9	8.5	40.6	39.9	53.9	14.0	100	224	
Vert.	7236.000	AV	36.6	36.6	9.1	41.4	40.9	53.9	13.0	100	0	
Vert.	9648.000	AV	33.8	38.6	10.3	38.9	43.8	53.9	10.1	100	0	
Vert.	12060.000	AV	34.6	39.5	11.5	39.4	46.2	53.9	7.7	100	0	

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

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

### 20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	87.3	27.5	14.8	41.4	88.2	-	-	
Hori.	2400.000	PK	53.7	27.4	14.8	41.4	54.5	68.2	13.7	
Vert.	2412.000	PK	88.5	27.5	14.8	41.4	89.4	-	-	
Vert.	2400.000	PK	55.8	27.4	14.8	41.4	56.6	69.4	12.8	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
Mode                    Tx,                    2437 MHz  
                              Tx, IEEE802.11g, PN9, worst data mode 6Mbps

(\* 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.	4874.000	PK	50.6	31.3	7.7	41.1	48.5	73.9	25.4	100	139	
Hori.	6498.705	PK	48.1	35.2	8.5	40.7	51.1	73.9	22.8	136	142	
Hori.	7311.000	PK	46.3	36.6	9.2	41.4	50.7	73.9	23.2	100	0	
Hori.	9748.000	PK	44.3	38.7	10.2	38.9	54.3	73.9	19.6	100	0	
Hori.	12185.000	PK	45.0	39.5	11.4	39.3	56.6	73.9	17.3	100	0	
Hori.	4874.000	AV	40.3	31.3	7.7	41.1	38.2	53.9	15.7	100	139	
Hori.	6498.705	AV	38.6	35.2	8.5	40.7	41.6	53.9	12.3	136	142	
Hori.	7311.000	AV	36.8	36.6	9.2	41.4	41.2	53.9	12.7	100	0	
Hori.	9748.000	AV	33.6	38.7	10.2	38.9	43.6	53.9	10.3	100	0	
Hori.	12185.000	AV	34.4	39.5	11.4	39.3	46.0	53.9	<b>7.9</b>	100	0	
Vert.	4874.000	PK	47.9	31.3	7.7	41.1	45.8	73.9	28.1	100	188	
Vert.	6498.638	PK	47.4	35.2	8.5	40.7	50.4	73.9	23.5	100	222	
Vert.	7311.000	PK	46.4	36.6	9.2	41.4	50.8	73.9	23.1	100	0	
Vert.	9748.000	PK	43.7	38.7	10.2	38.9	53.7	73.9	20.2	100	0	
Vert.	12185.000	PK	44.0	39.5	11.4	39.3	55.6	73.9	18.3	100	0	
Vert.	4874.000	AV	37.7	31.3	7.7	41.1	35.6	53.9	18.3	100	188	
Vert.	6498.638	AV	37.2	35.2	8.5	40.7	40.2	53.9	13.7	100	222	
Vert.	7311.000	AV	36.3	36.6	9.2	41.4	40.7	53.9	13.2	100	0	
Vert.	9748.000	AV	33.8	38.7	10.2	38.9	43.8	53.9	10.1	100	0	
Vert.	12185.000	AV	34.2	39.5	11.4	39.3	45.8	53.9	8.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
Distance factor : 15GHz -40GHz :  $20\log(3.0m/1.0m) = 9.5dB$



## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
 Mode                    Tx,                    2462 MHz  
                               Tx, IEEE802.11g, PN9, worst data mode 6Mbps

(\* 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.	2483.500	PK	62.8	27.5	14.9	41.4	63.8	73.9	10.1	100	225	
Hori.	4924.000	PK	51.7	31.5	7.7	41.0	49.9	73.9	24.0	100	147	
Hori.	6565.329	PK	48.3	35.3	8.6	40.8	51.4	73.9	22.5	132	141	
Hori.	7386.000	PK	47.0	36.7	9.2	41.5	51.4	73.9	22.5	100	0	
Hori.	9848.000	PK	44.6	38.9	10.2	38.9	54.8	73.9	19.1	100	0	
Hori.	12310.000	PK	44.3	39.5	11.3	39.3	55.8	73.9	18.1	100	0	
Hori.	2483.500	AV	39.0	27.5	14.9	41.4	40.0	53.9	13.9	100	225	
Hori.	4924.000	AV	41.4	31.5	7.7	41.0	39.6	53.9	14.3	100	147	
Hori.	6565.329	AV	38.6	35.3	8.6	40.8	41.7	53.9	12.2	132	141	
Hori.	7386.000	AV	37.0	36.7	9.2	41.5	41.4	53.9	12.5	100	0	
Hori.	9848.000	AV	33.8	38.9	10.2	38.9	44.0	53.9	9.9	100	0	
Hori.	12310.000	AV	34.3	39.5	11.3	39.3	45.8	53.9	8.1	100	0	
Vert.	2483.500	PK	62.2	27.5	14.9	41.4	63.2	73.9	10.7	100	94	
Vert.	4924.000	PK	48.0	31.5	7.7	41.0	46.2	73.9	27.7	100	195	
Vert.	6565.305	PK	47.3	35.3	8.6	40.8	50.4	73.9	23.5	100	222	
Vert.	7386.000	PK	47.1	36.7	9.2	41.5	51.5	73.9	22.4	100	0	
Vert.	9848.000	PK	43.7	38.9	10.2	38.9	53.9	73.9	20.0	100	0	
Vert.	12310.000	PK	45.4	39.5	11.3	39.3	56.9	73.9	17.0	100	0	
Vert.	2483.500	AV	39.3	27.5	14.9	41.4	40.3	53.9	13.6	100	94	
Vert.	4924.000	AV	39.2	31.5	7.7	41.0	37.4	53.9	16.5	100	195	
Vert.	6565.305	AV	37.6	35.3	8.6	40.8	40.7	53.9	13.2	100	222	
Vert.	7386.000	AV	37.1	36.7	9.2	41.5	41.5	53.9	12.4	100	0	
Vert.	9848.000	AV	34.1	38.9	10.2	38.9	44.3	53.9	9.6	100	0	
Vert.	12310.000	AV	34.5	39.5	11.3	39.3	46.0	53.9	7.9	100	0	

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

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

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## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date May 13, 2013 May 14, 2013 May 15, 2013  
 Temperature / Humidity 22 deg.C, 56 %RH 24 deg.C, 55 %RH 22 deg.C, 59 %RH  
 Engineer Shinichi Takano Shinichi Takano Shinichi Takano  
 Mode Tx, 2412 MHz  
 Tx, IEEE802.11n (HT20), PN9, worst data mode 0(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.	2390.000	PK	61.0	27.4	14.8	41.4	61.8	73.9	12.1	100	234	
Hori.	4824.000	PK	48.7	31.1	7.6	41.2	46.2	73.9	27.7	100	137	
Hori.	6432.080	PK	48.0	34.9	8.5	40.6	50.8	73.9	23.1	134	143	
Hori.	7236.000	PK	47.1	36.6	9.1	41.4	51.4	73.9	22.5	100	0	
Hori.	9648.000	PK	42.6	38.6	10.3	38.9	52.6	73.9	21.3	100	0	
Hori.	12060.000	PK	44.6	39.5	11.5	39.4	56.2	73.9	17.7	100	0	
Hori.	2390.000	AV	41.2	27.4	14.8	41.4	42.0	53.9	11.9	100	234	
Hori.	4824.000	AV	38.3	31.1	7.6	41.2	35.8	53.9	18.1	100	137	
Hori.	6432.080	AV	38.9	34.9	8.5	40.6	41.7	53.9	12.2	134	143	
Hori.	7236.000	AV	37.0	36.6	9.1	41.4	41.3	53.9	12.6	100	0	
Hori.	9648.000	AV	33.3	38.6	10.3	38.9	43.3	53.9	10.6	100	0	
Hori.	12060.000	AV	34.5	39.5	11.5	39.4	46.1	53.9	7.8	100	0	
Vert.	2390.000	PK	64.1	27.4	14.8	41.4	64.9	73.9	9.0	100	114	
Vert.	4824.000	PK	47.0	31.1	7.6	41.2	44.5	73.9	29.4	100	189	
Vert.	6432.034	PK	46.3	34.9	8.5	40.6	49.1	73.9	24.8	100	225	
Vert.	7236.000	PK	46.8	36.6	9.1	41.4	51.1	73.9	22.8	100	0	
Vert.	9648.000	PK	44.1	38.6	10.3	38.9	54.1	73.9	19.8	100	0	
Vert.	12060.000	PK	44.9	39.5	11.5	39.4	56.5	73.9	17.4	100	0	
Vert.	2390.000	AV	43.9	27.4	14.8	41.4	44.7	53.9	9.2	100	114	
Vert.	4824.000	AV	36.9	31.1	7.6	41.2	34.4	53.9	19.5	100	189	
Vert.	6432.034	AV	37.2	34.9	8.5	40.6	40.0	53.9	13.9	100	225	
Vert.	7236.000	AV	37.3	36.6	9.1	41.4	41.6	53.9	12.3	100	0	
Vert.	9648.000	AV	33.4	38.6	10.3	38.9	43.4	53.9	10.5	100	0	
Vert.	12060.000	AV	34.2	39.5	11.5	39.4	45.8	53.9	8.1	100	0	

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

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

**20dBc Data Sheet (RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	87.5	27.5	14.8	41.4	88.4	-	-	
Hori.	2400.000	PK	55.3	27.4	14.8	41.4	56.1	68.4	12.3	
Vert.	2412.000	PK	89.2	27.5	14.8	41.4	90.1	-	-	
Vert.	2400.000	PK	54.7	27.4	14.8	41.4	55.5	70.1	14.6	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date May 13, 2013 May 14, 2013 May 15, 2013  
 Temperature / Humidity 22 deg.C, 56 %RH 24 deg.C, 55 %RH 22 deg.C, 59 %RH  
 Engineer Shinichi Takano Shinichi Takano Shinichi Takano  
 Mode Tx, 2437 MHz  
 Tx, IEEE802.11n (HT20), PN9, worst data mode 0(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.	4874.000	PK	50.7	31.3	7.7	41.1	48.6	73.9	25.3	100	144	
Hori.	6498.693	PK	47.9	35.2	8.5	40.7	50.9	73.9	23.0	133	140	
Hori.	7311.000	PK	47.2	36.6	9.2	41.4	51.6	73.9	22.3	100	0	
Hori.	9748.000	PK	44.0	38.7	10.2	38.9	54.0	73.9	19.9	100	0	
Hori.	12185.000	PK	45.3	39.5	11.4	39.3	56.9	73.9	17.0	100	0	
Hori.	4874.000	AV	40.0	31.3	7.7	41.1	37.9	53.9	16.0	100	144	
Hori.	6498.693	AV	38.5	35.2	8.5	40.7	41.5	53.9	12.4	133	140	
Hori.	7311.000	AV	36.6	36.6	9.2	41.4	41.0	53.9	12.9	100	0	
Hori.	9748.000	AV	33.8	38.7	10.2	38.9	43.8	53.9	10.1	100	0	
Hori.	12185.000	AV	34.4	39.5	11.4	39.3	46.0	53.9	7.9	100	0	
Vert.	4874.000	PK	48.4	31.3	7.7	41.1	46.3	73.9	27.6	100	190	
Vert.	6498.687	PK	47.9	35.2	8.5	40.7	50.9	73.9	23.0	100	229	
Vert.	7311.000	PK	46.2	36.6	9.2	41.4	50.6	73.9	23.3	100	0	
Vert.	9748.000	PK	44.6	38.7	10.2	38.9	54.6	73.9	19.3	100	0	
Vert.	12185.000	PK	44.4	39.5	11.4	39.3	56.0	73.9	17.9	100	0	
Vert.	4874.000	AV	37.6	31.3	7.7	41.1	35.5	53.9	18.4	100	190	
Vert.	6498.687	AV	37.0	35.2	8.5	40.7	40.0	53.9	13.9	100	229	
Vert.	7311.000	AV	36.6	36.6	9.2	41.4	41.0	53.9	12.9	100	0	
Vert.	9748.000	AV	33.7	38.7	10.2	38.9	43.7	53.9	10.2	100	0	
Vert.	12185.000	AV	34.5	39.5	11.4	39.3	46.1	53.9	7.8	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
 Distance factor : 15GHz -40GHz :  $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date May 13, 2013 May 14, 2013 May 15, 2013  
 Temperature / Humidity 22 deg.C, 56 %RH 24 deg.C, 55 %RH 22 deg.C, 59 %RH  
 Engineer Shinichi Takano Shinichi Takano Shinichi Takano  
 Mode Tx, 2462 MHz  
 Tx, IEEE802.11n (HT20), PN9, worst data mode 0(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.	2483.500	PK	61.0	27.5	14.9	41.4	62.0	73.9	11.9	100	229	
Hori.	4924.000	PK	52.1	31.5	7.7	41.0	50.3	73.9	23.6	100	146	
Hori.	6565.325	PK	48.7	35.3	8.6	40.8	51.8	73.9	22.1	135	143	
Hori.	7386.000	PK	47.9	36.7	9.2	41.5	52.3	73.9	21.6	100	0	
Hori.	9848.000	PK	43.7	38.9	10.2	38.9	53.9	73.9	20.0	100	0	
Hori.	12310.000	PK	45.2	39.5	11.3	39.3	56.7	73.9	17.2	100	0	
Hori.	2483.500	AV	40.0	27.5	14.9	41.4	41.0	53.9	12.9	100	229	
Hori.	4924.000	AV	41.1	31.5	7.7	41.0	39.3	53.9	14.6	100	146	
Hori.	6565.325	AV	38.3	35.3	8.6	40.8	41.4	53.9	12.5	135	143	
Hori.	7386.000	AV	37.2	36.7	9.2	41.5	41.6	53.9	12.3	100	0	
Hori.	9848.000	AV	33.8	38.9	10.2	38.9	44.0	53.9	9.9	100	0	
Hori.	12310.000	AV	34.4	39.5	11.3	39.3	45.9	53.9	8.0	100	0	
Vert.	2483.500	PK	65.2	27.5	14.9	41.4	66.2	73.9	7.7	100	94	
Vert.	4924.000	PK	48.2	31.5	7.7	41.0	46.4	73.9	27.5	100	194	
Vert.	6565.312	PK	47.7	35.3	8.6	40.8	50.8	73.9	23.1	100	226	
Vert.	7386.000	PK	46.4	36.7	9.2	41.5	50.8	73.9	23.1	100	0	
Vert.	9848.000	PK	44.9	38.9	10.2	38.9	55.1	73.9	18.8	100	0	
Vert.	12310.000	PK	45.9	39.5	11.3	39.3	57.4	73.9	16.5	100	0	
Vert.	2483.500	AV	39.8	27.5	14.9	41.4	40.8	53.9	13.1	100	94	
Vert.	4924.000	AV	38.8	31.5	7.7	41.0	37.0	53.9	16.9	100	194	
Vert.	6565.312	AV	37.9	35.3	8.6	40.8	41.0	53.9	12.9	100	226	
Vert.	7386.000	AV	37.5	36.7	9.2	41.5	41.9	53.9	12.0	100	0	
Vert.	9848.000	AV	34.0	38.9	10.2	38.9	44.2	53.9	9.7	100	0	
Vert.	12310.000	AV	34.2	39.5	11.3	39.3	45.7	53.9	8.2	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
 Distance factor : 15GHz -40GHz :  $20\log(3.0m/1.0m) = 9.5dB$

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## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date May 13, 2013 May 14, 2013 May 15, 2013  
 Temperature / Humidity 22 deg.C, 56 %RH 24 deg.C, 55 %RH 22 deg.C, 59 %RH  
 Engineer Shinichi Takano Shinichi Takano Shinichi Takano  
 Mode Tx, 2422 MHz  
 Tx, IEEE802.11n (HT40), PN9, worst data mode 0(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.	2390.000	PK	64.1	27.4	14.8	41.4	64.9	73.9	9.0	100	229	
Hori.	4844.000	PK	48.1	31.2	7.7	41.1	45.9	73.9	28.0	100	143	
Hori.	6458.724	PK	48.2	35.0	8.5	40.7	51.0	73.9	22.9	138	142	
Hori.	7266.000	PK	46.9	36.6	9.2	41.4	51.3	73.9	22.6	100	0	
Hori.	9688.000	PK	43.6	38.6	10.2	38.9	53.5	73.9	20.4	100	0	
Hori.	12110.000	PK	44.7	39.5	11.5	39.4	56.3	73.9	17.6	100	0	
Hori.	2390.000	AV	42.5	27.4	14.8	41.4	43.3	53.9	10.6	100	229	
Hori.	4844.000	AV	38.2	31.2	7.7	41.1	36.0	53.9	17.9	100	143	
Hori.	6458.724	AV	39.8	35.0	8.5	40.7	42.6	53.9	11.3	138	142	
Hori.	7266.000	AV	36.9	36.6	9.2	41.4	41.3	53.9	12.6	100	0	
Hori.	9688.000	AV	33.9	38.6	10.2	38.9	43.8	53.9	10.1	100	0	
Hori.	12110.000	AV	34.3	39.5	11.5	39.4	45.9	53.9	8.0	100	0	
Vert.	2390.000	PK	64.9	27.4	14.8	41.4	65.7	73.9	8.2	100	114	
Vert.	4844.000	PK	46.8	31.2	7.7	41.1	44.6	73.9	29.3	100	187	
Vert.	6458.687	PK	48.2	35.0	8.5	40.7	51.0	73.9	22.9	100	227	
Vert.	7266.000	PK	46.0	36.6	9.2	41.4	50.4	73.9	23.5	100	0	
Vert.	9688.000	PK	44.2	38.6	10.2	38.9	54.1	73.9	19.8	100	0	
Vert.	12110.000	PK	43.8	39.5	11.5	39.4	55.4	73.9	18.5	100	0	
Vert.	2390.000	AV	45.6	27.4	14.8	41.4	46.4	53.9	7.5	100	114	
Vert.	4844.000	AV	37.1	31.2	7.7	41.1	34.9	53.9	19.0	100	187	
Vert.	6458.687	AV	37.7	35.0	8.5	40.7	40.5	53.9	13.4	100	227	
Vert.	7266.000	AV	37.1	36.6	9.2	41.4	41.5	53.9	12.4	100	0	
Vert.	9688.000	AV	33.7	38.6	10.2	38.9	43.6	53.9	10.3	100	0	
Vert.	12110.000	AV	34.6	39.5	11.5	39.4	46.2	53.9	7.7	100	0	

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

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

**20dBc Data Sheet (RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	84.2	27.5	14.8	41.4	85.1	-	-	
Hori.	2400.000	PK	49.0	27.4	14.8	41.4	49.8	65.1	15.3	
Vert.	2422.000	PK	85.0	27.5	14.8	41.4	85.9	-	-	
Vert.	2400.000	PK	54.8	27.4	14.8	41.4	55.6	65.9	10.3	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
 Mode                    Tx,                    2437 MHz  
                               Tx, IEEE802.11n (HT40), PN9, worst data mode 0(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.	4874.000	PK	49.0	31.3	7.7	41.1	46.9	73.9	27.0	100	141	
Hori.	6498.689	PK	47.6	35.2	8.5	40.7	50.6	73.9	23.3	131	144	
Hori.	7311.000	PK	47.9	36.6	9.2	41.4	52.3	73.9	21.6	100	0	
Hori.	9748.000	PK	44.7	38.7	10.2	38.9	54.7	73.9	19.2	100	0	
Hori.	12185.000	PK	45.8	39.5	11.4	39.3	57.4	73.9	16.5	100	0	
Hori.	4874.000	AV	39.2	31.3	7.7	41.1	37.1	53.9	16.8	100	141	
Hori.	6498.689	AV	38.8	35.2	8.5	40.7	41.8	53.9	12.1	131	144	
Hori.	7311.000	AV	36.8	36.6	9.2	41.4	41.2	53.9	12.7	100	0	
Hori.	9748.000	AV	34.2	38.7	10.2	38.9	44.2	53.9	9.7	100	0	
Hori.	12185.000	AV	34.2	39.5	11.4	39.3	45.8	53.9	8.1	100	0	
Vert.	4874.000	PK	47.7	31.3	7.7	41.1	45.6	73.9	28.3	100	188	
Vert.	6498.692	PK	46.3	35.2	8.5	40.7	49.3	73.9	24.6	100	232	
Vert.	7311.000	PK	46.9	36.6	9.2	41.4	51.3	73.9	22.6	100	0	
Vert.	9748.000	PK	44.3	38.7	10.2	38.9	54.3	73.9	19.6	100	0	
Vert.	12185.000	PK	45.3	39.5	11.4	39.3	56.9	73.9	17.0	100	0	
Vert.	4874.000	AV	37.4	31.3	7.7	41.1	35.3	53.9	18.6	100	188	
Vert.	6498.692	AV	37.0	35.2	8.5	40.7	40.0	53.9	13.9	100	232	
Vert.	7311.000	AV	36.8	36.6	9.2	41.4	41.2	53.9	12.7	100	0	
Vert.	9748.000	AV	34.4	38.7	10.2	38.9	44.4	53.9	9.5	100	0	
Vert.	12185.000	AV	34.3	39.5	11.4	39.3	45.9	53.9	8.0	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)  
 Distance factor : 15GHz -40GHz :  $20\log(3.0m/1.0m) = 9.5dB$

## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    May 13, 2013                    May 14, 2013                    May 15, 2013  
 Temperature / Humidity    22 deg.C, 56 %RH            24 deg.C, 55 %RH            22 deg.C, 59 %RH  
 Engineer                Shinichi Takano                Shinichi Takano                Shinichi Takano  
 Mode                    Tx,                    2452 MHz  
                               Tx, IEEE802.11n (HT40), PN9, worst data mode 0(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.	2483.500	PK	56.1	27.5	14.9	41.4	57.1	73.9	16.8	100	228	
Hori.	4904.000	PK	50.6	31.4	7.7	41.0	48.7	73.9	25.2	100	147	
Hori.	6538.753	PK	49.5	35.3	8.6	40.7	52.7	73.9	21.2	135	141	
Hori.	7356.000	PK	47.6	36.6	9.1	41.5	51.8	73.9	22.1	100	0	
Hori.	9808.000	PK	43.9	38.8	10.3	38.9	54.1	73.9	19.8	100	0	
Hori.	12260.000	PK	44.4	39.5	11.3	39.3	55.9	73.9	18.0	100	0	
Hori.	2483.500	AV	42.2	27.5	14.9	41.4	43.2	53.9	10.7	100	228	
Hori.	4904.000	AV	40.7	31.4	7.7	41.0	38.8	53.9	15.1	100	147	
Hori.	6538.753	AV	38.8	35.3	8.6	40.7	42.0	53.9	11.9	135	141	
Hori.	7356.000	AV	37.1	36.6	9.1	41.5	41.3	53.9	12.6	100	0	
Hori.	9808.000	AV	33.7	38.8	10.3	38.9	43.9	53.9	10.0	100	0	
Hori.	12260.000	AV	34.4	39.5	11.3	39.3	45.9	53.9	8.0	100	0	
Vert.	2483.500	PK	61.2	27.5	14.9	41.4	62.2	73.9	11.7	100	98	
Vert.	4904.000	PK	47.7	31.4	7.7	41.0	45.8	73.9	28.1	100	192	
Vert.	6538.736	PK	47.8	35.3	8.6	40.7	51.0	73.9	22.9	100	229	
Vert.	7356.000	PK	46.8	36.6	9.1	41.5	51.0	73.9	22.9	100	0	
Vert.	9808.000	PK	42.8	38.8	10.3	38.9	53.0	73.9	20.9	100	0	
Vert.	12260.000	PK	43.5	39.5	11.3	39.3	55.0	73.9	18.9	100	0	
Vert.	2483.500	AV	43.2	27.5	14.9	41.4	44.2	53.9	9.7	100	98	
Vert.	4904.000	AV	38.0	31.4	7.7	41.0	36.1	53.9	17.8	100	192	
Vert.	6538.736	AV	37.5	35.3	8.6	40.7	40.7	53.9	13.2	100	229	
Vert.	7356.000	AV	37.0	36.6	9.1	41.5	41.2	53.9	12.7	100	0	
Vert.	9808.000	AV	33.4	38.8	10.3	38.9	43.6	53.9	10.3	100	0	
Vert.	12260.000	AV	34.2	39.5	11.3	39.3	45.7	53.9	8.2	100	0	

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

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

**UL Japan, Inc.****Shonan EMC Lab.**

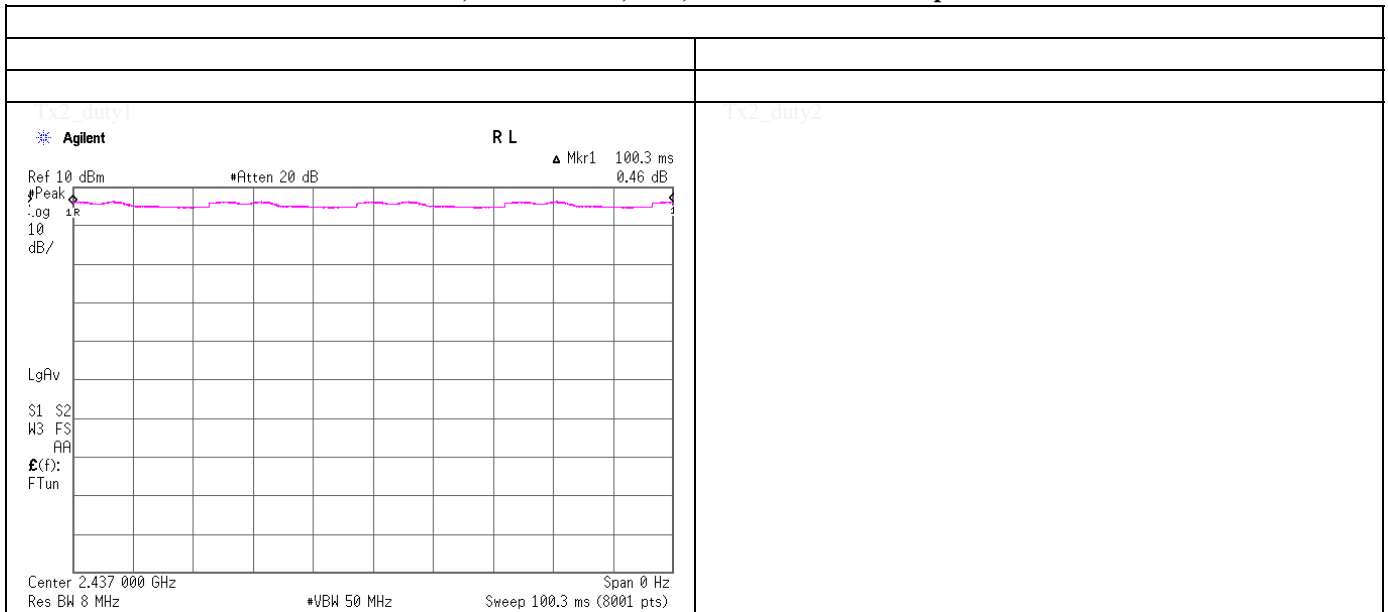
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Burst rate confirmation

**Tx, IEEE802.11b, PN9, worst data mode 2Mbps**



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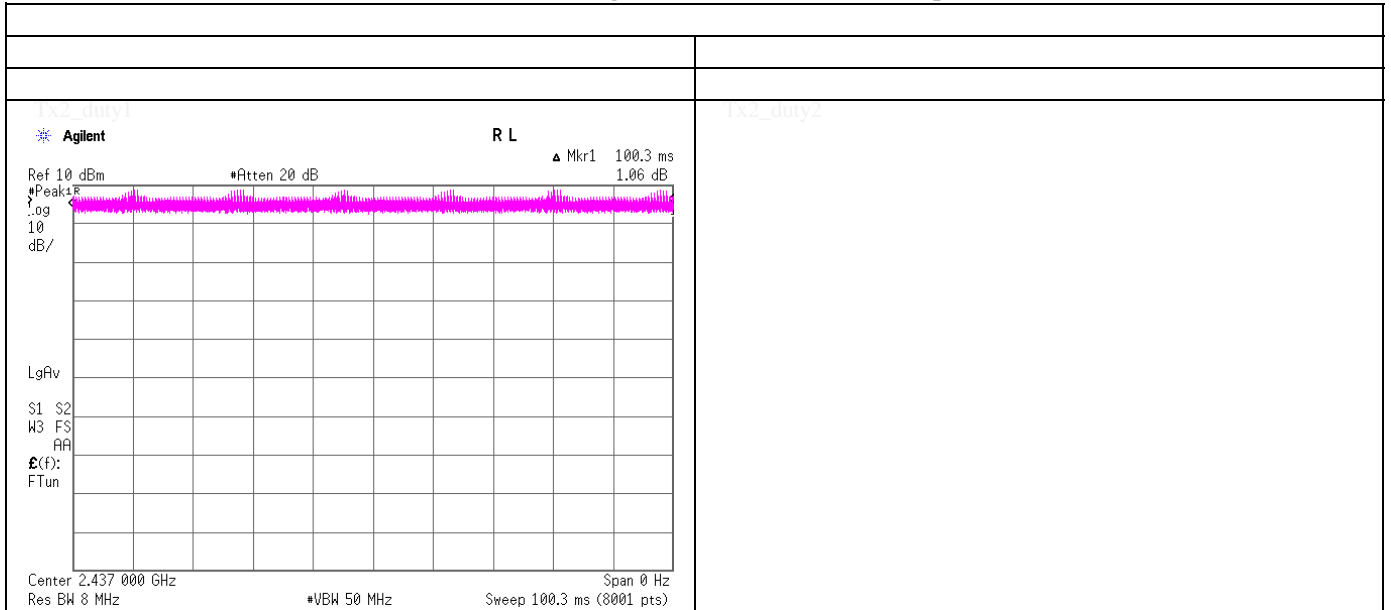
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Facsimile : +81 463 50 6401



**Burst rate confirmation**

**Tx, IEEE802.11g, PN9, worst data mode 6Mbps**



**UL Japan, Inc.**

**Shonan EMC Lab.**

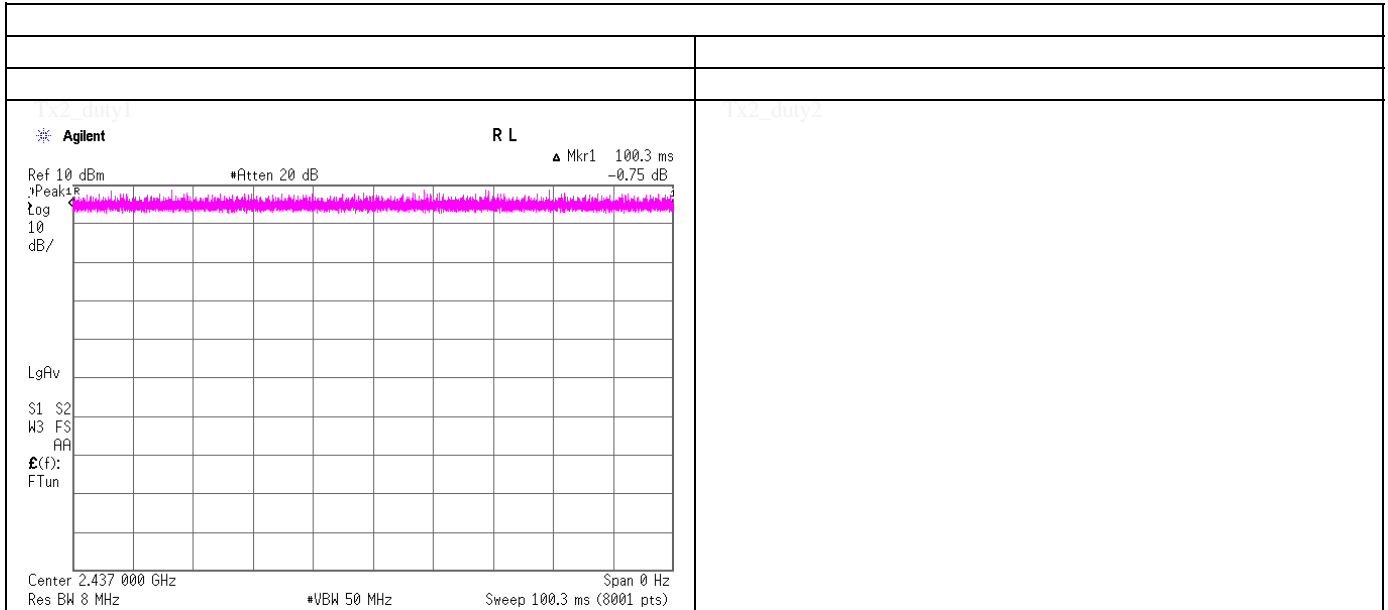
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

**Burst rate confirmation**

**Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

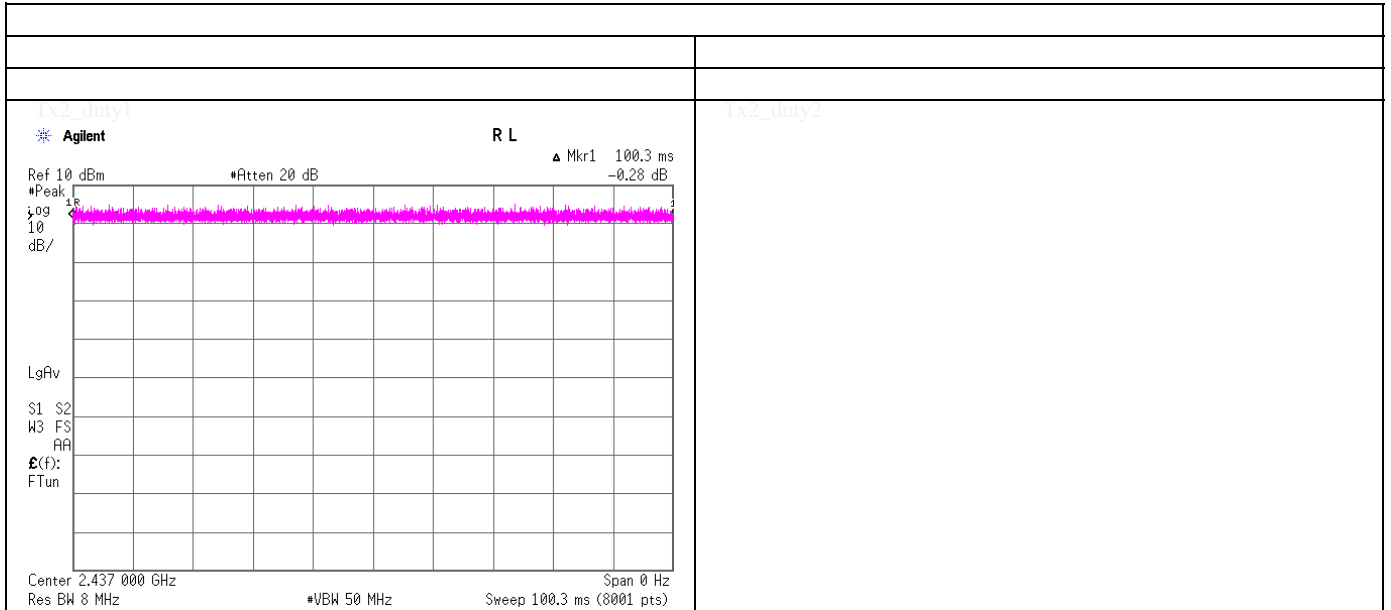
**1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN**

**Telephone : +81 463 50 6400**

**Facsimile : +81 463 50 6401**

**Burst rate confirmation**

**Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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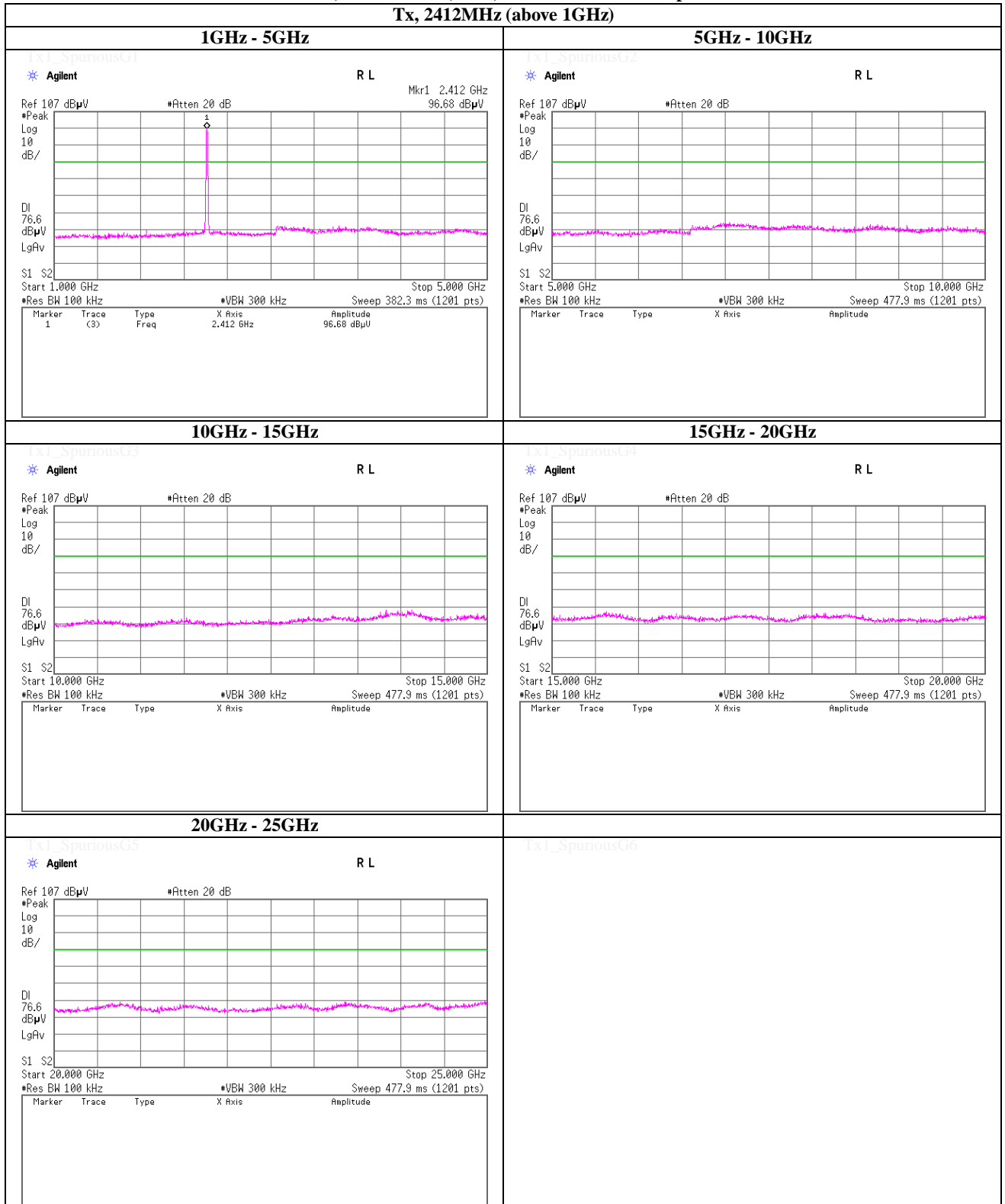
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11b, PN9, worst data mode 2Mbps**

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



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**Shonan EMC Lab.**

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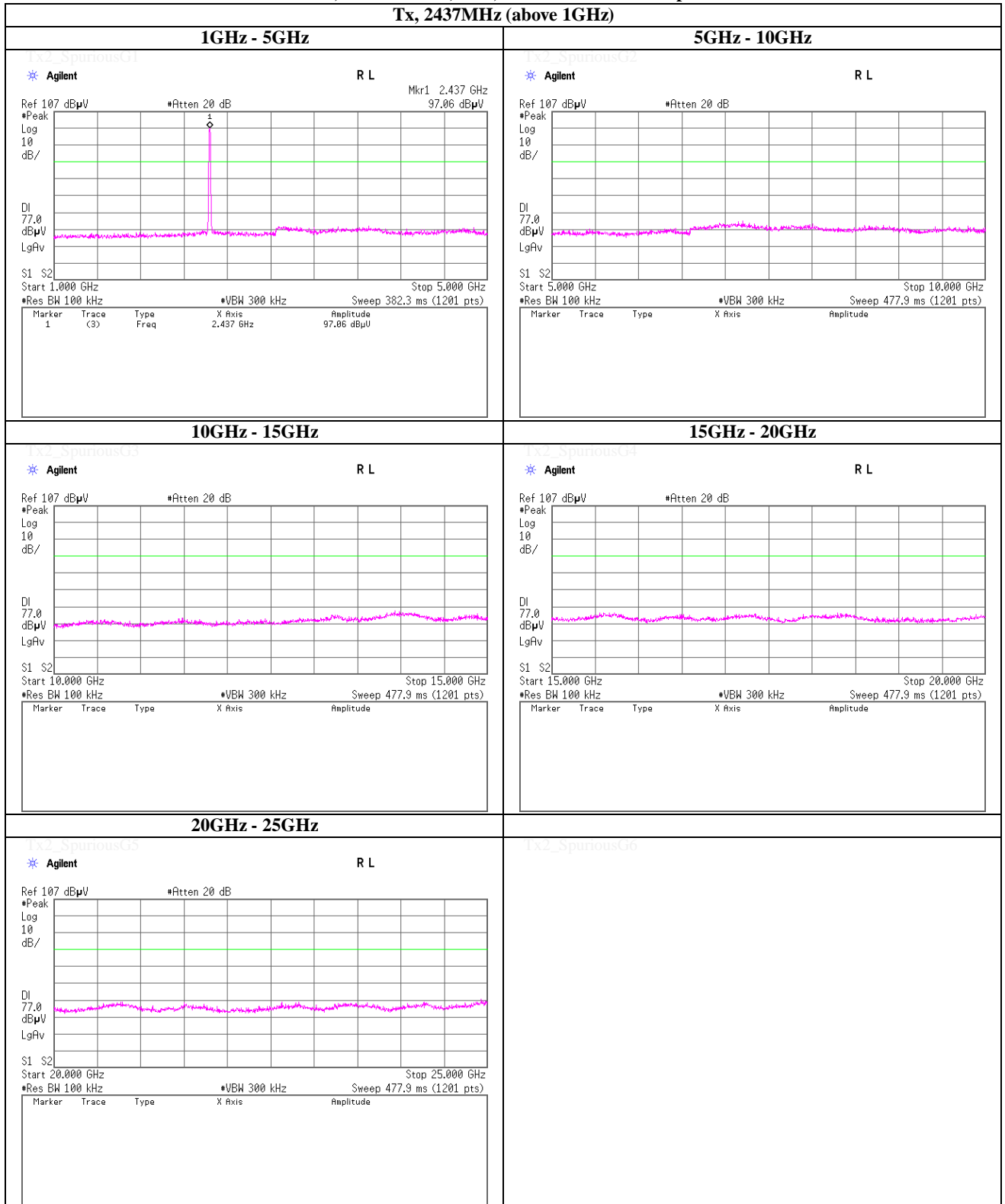
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11b, PN9, worst data mode 2Mbps**

**Tx, 2437MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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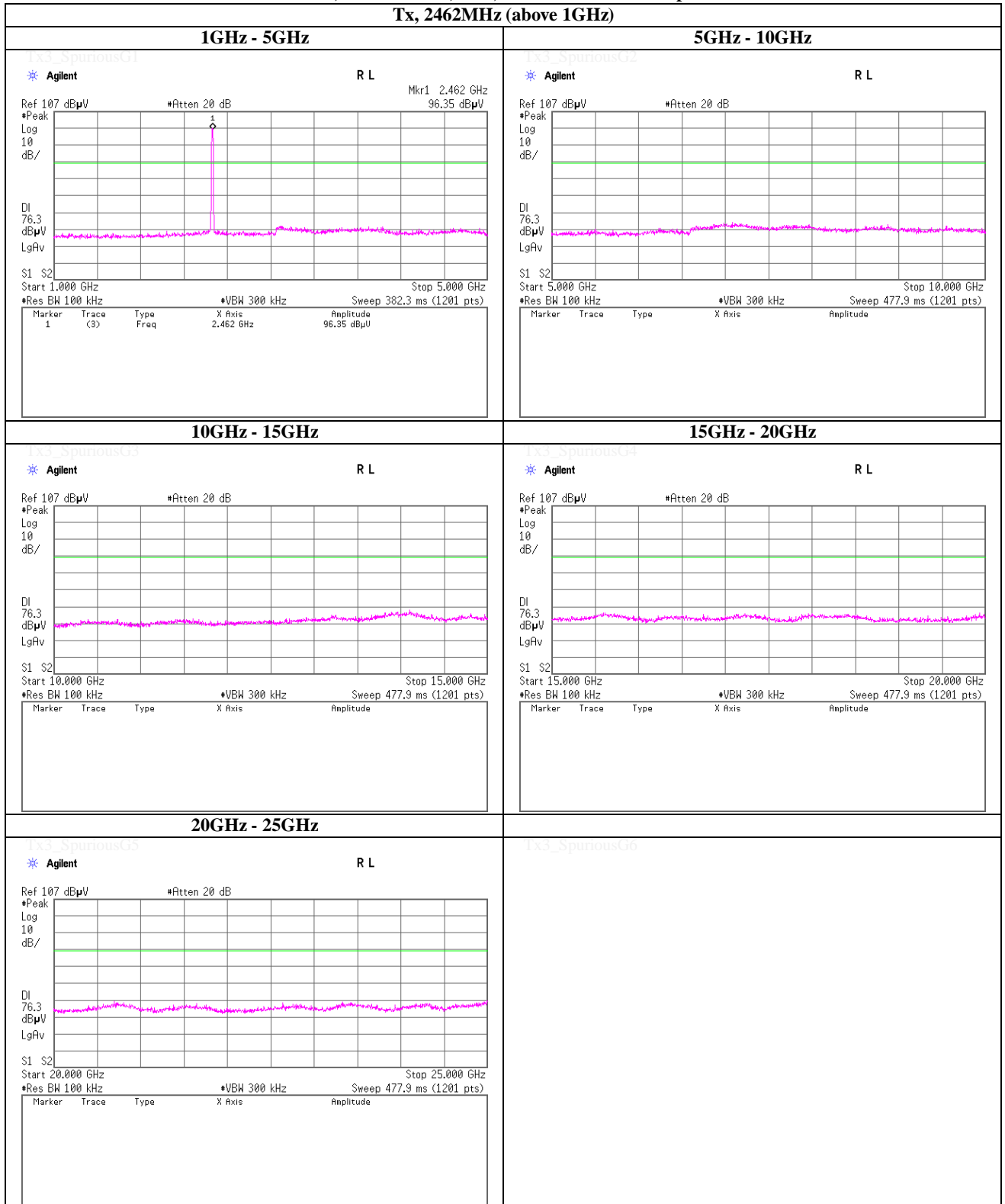
**Telephone : +81 463 50 6400**

**Facsimile : +81 463 50 6401**

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11b, PN9, worst data mode 2Mbps**

**Tx, 2462MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

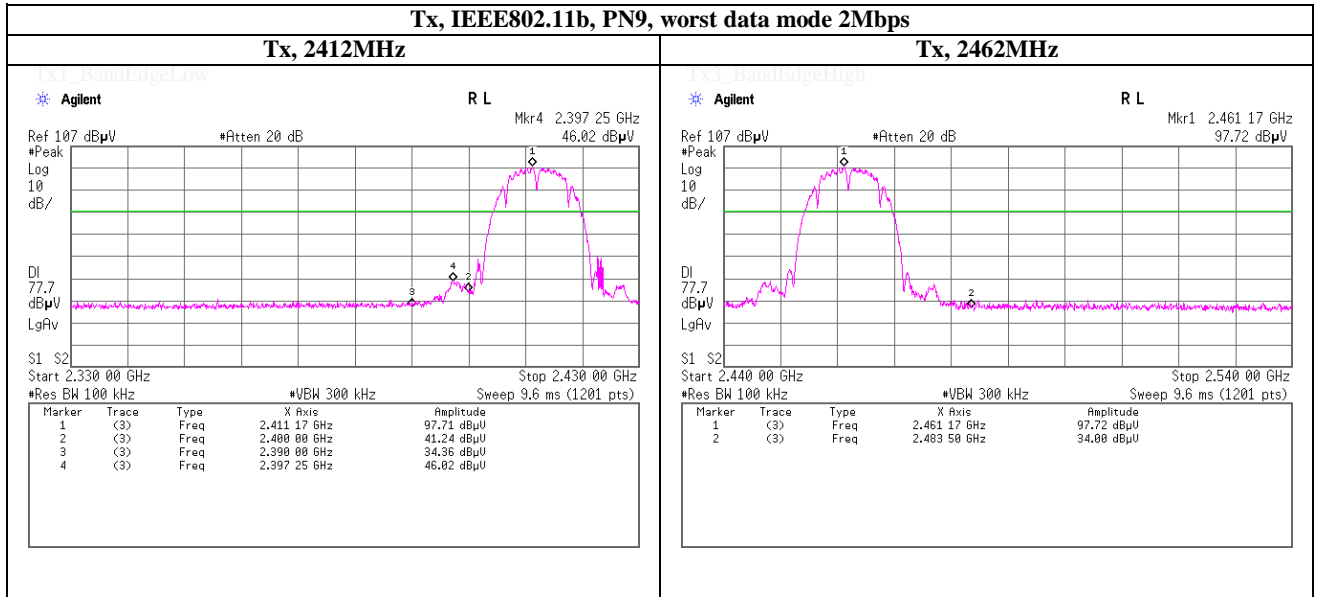
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Band Edge compliance**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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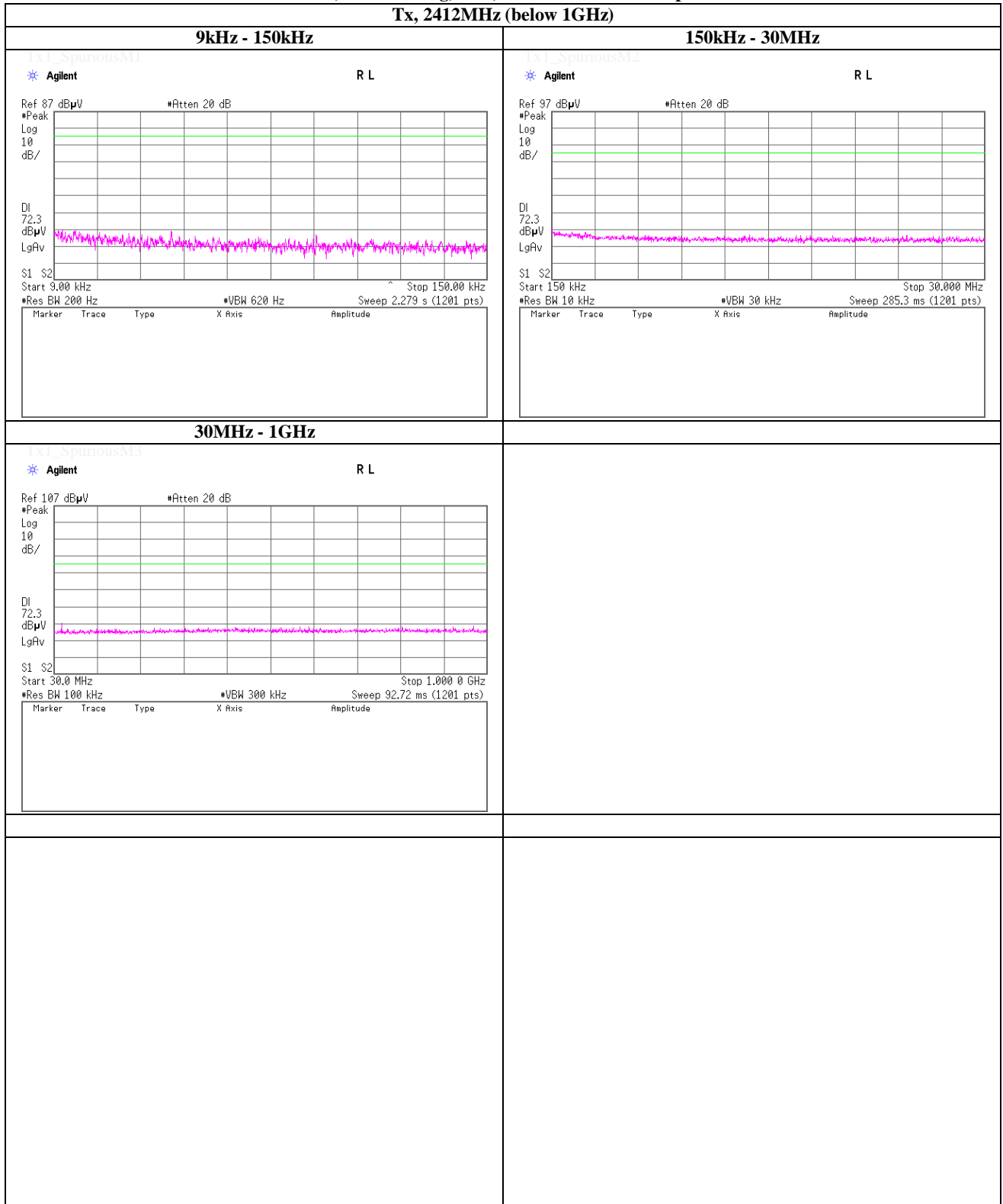
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11g, PN9, worst data mode 6Mbps**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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Telephone : +81 463 50 6400

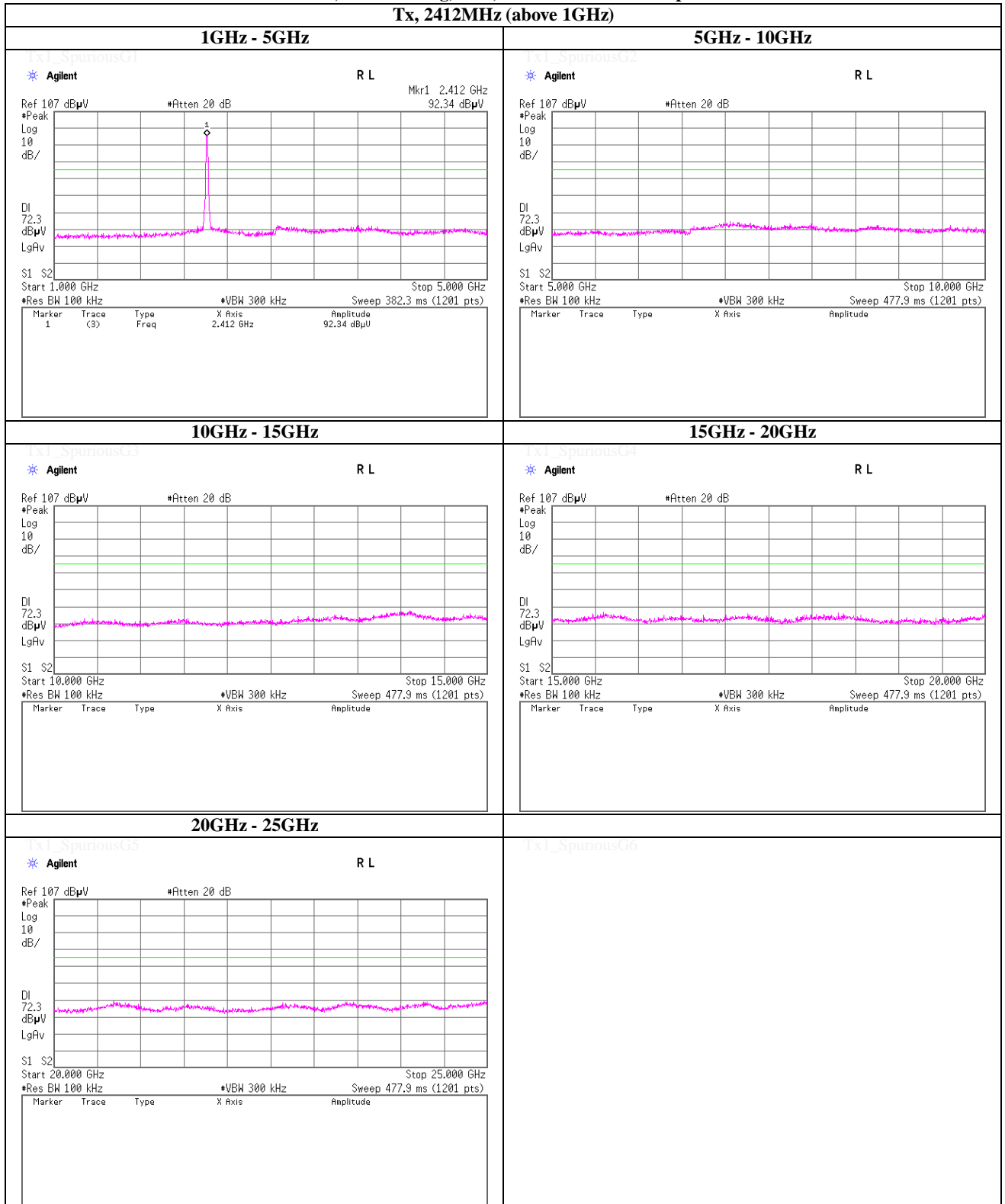
Facsimile : +81 463 50 6401



**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11g, PN9, worst data mode 6Mbps**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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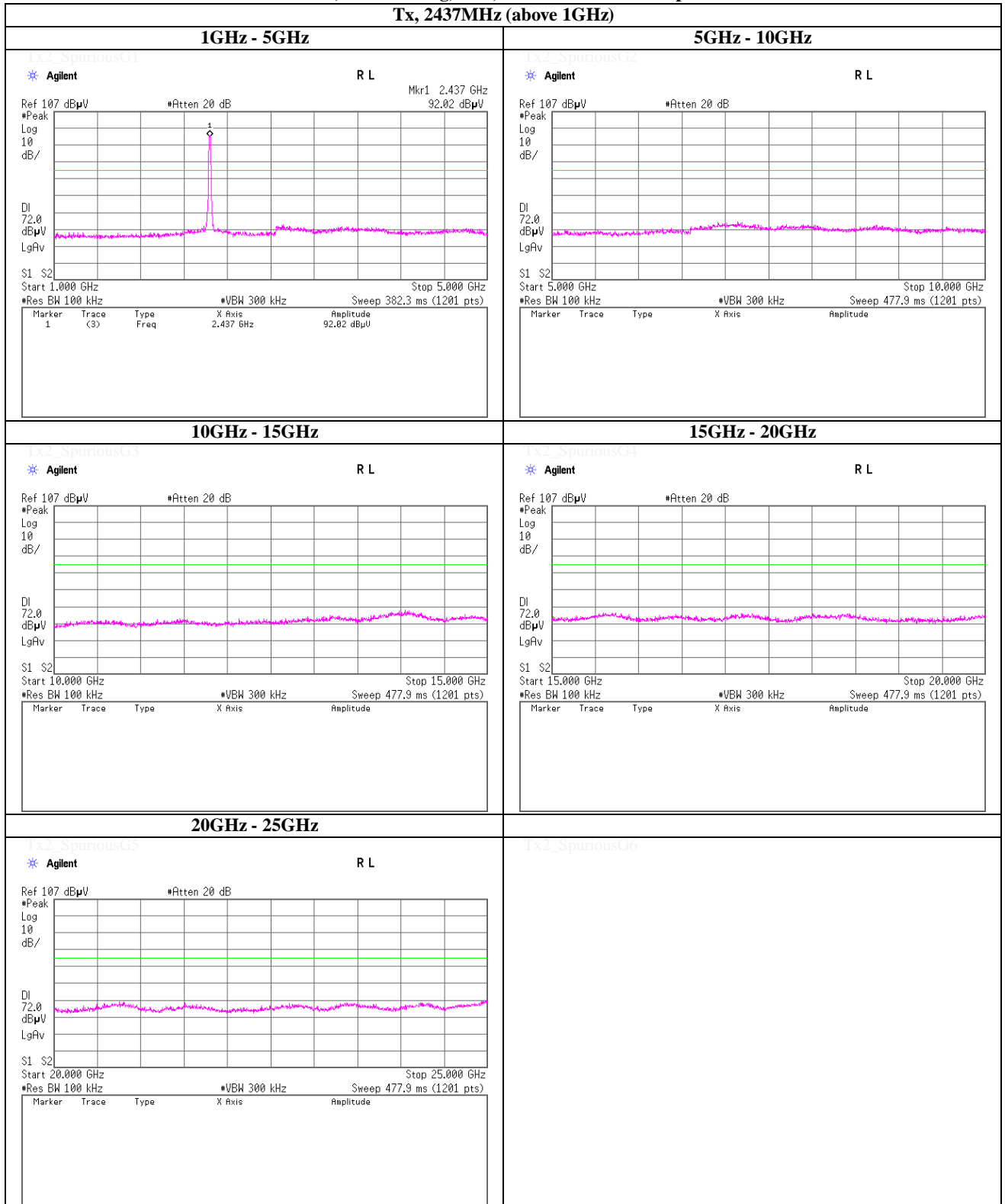
Telephone : +81 463 50 6400

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**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11g, PN9, worst data mode 6Mbps**

**Tx, 2437MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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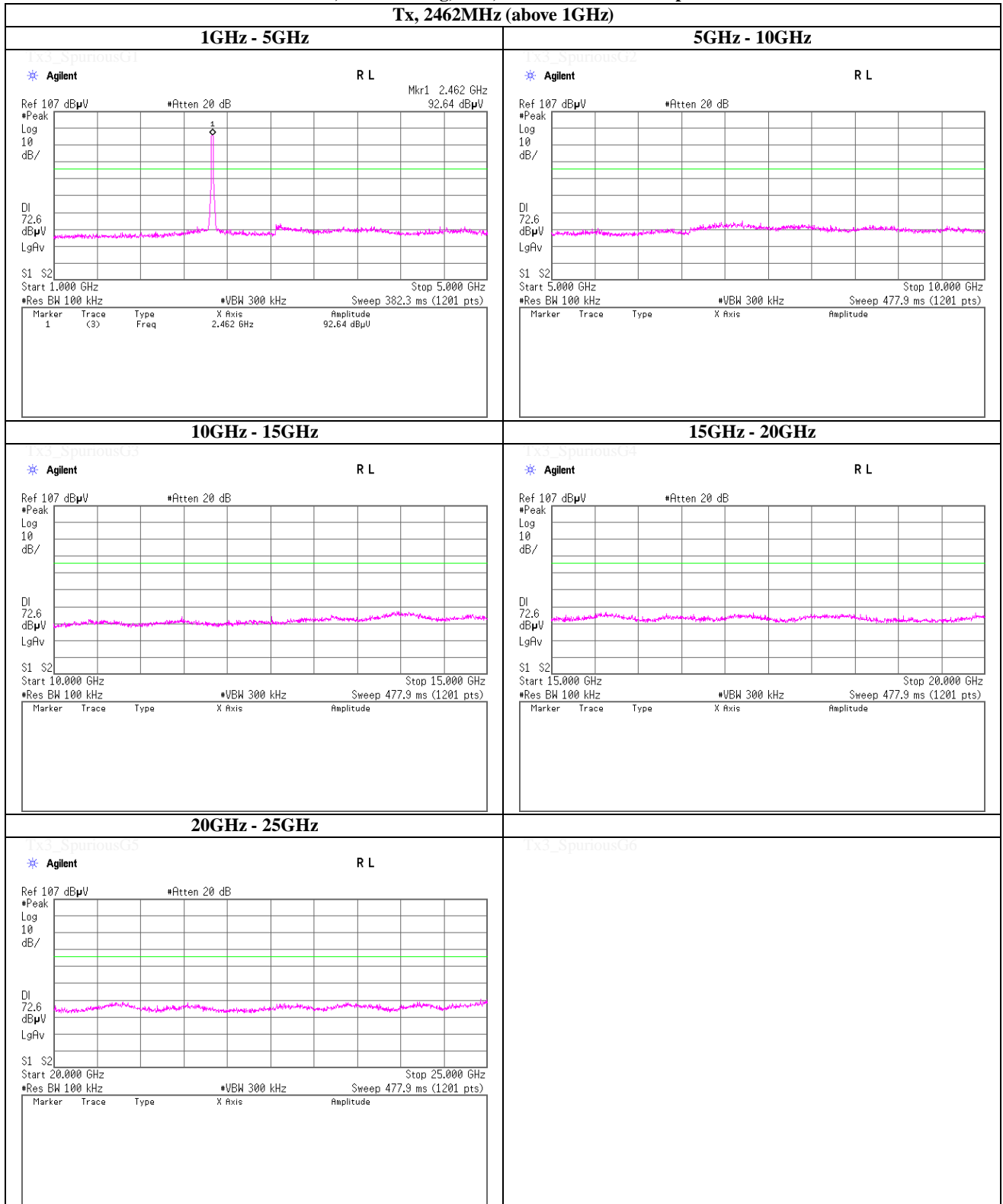
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11g, PN9, worst data mode 6Mbps**

**Tx, 2462MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

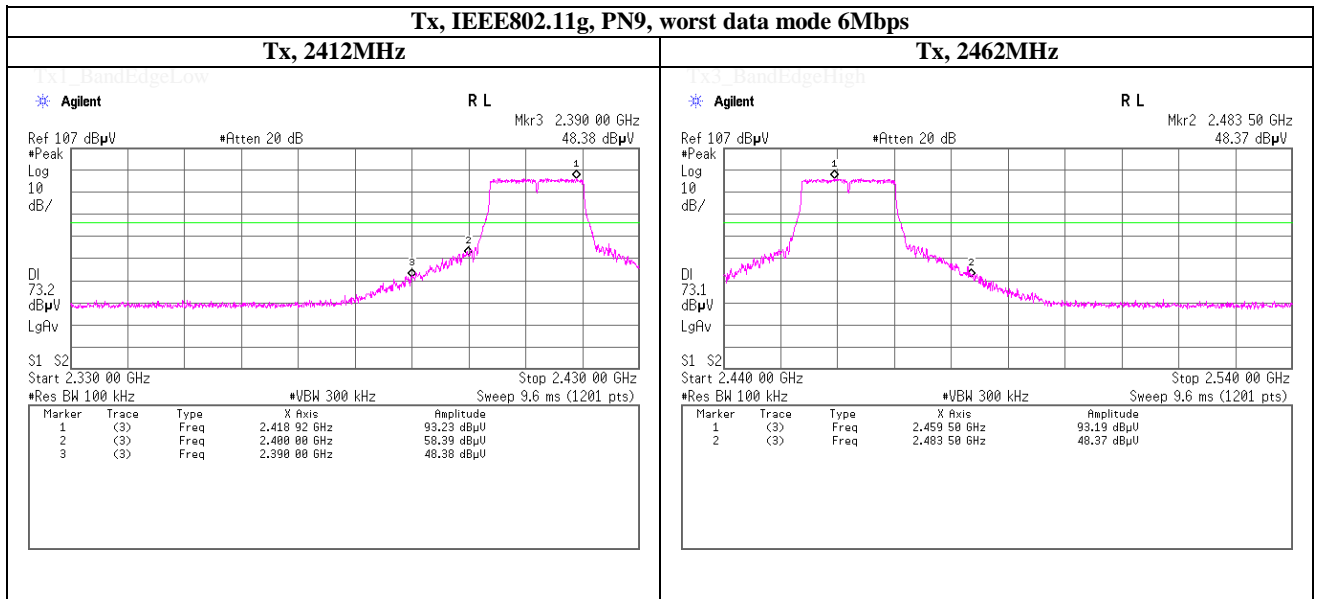
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Band Edge compliance**



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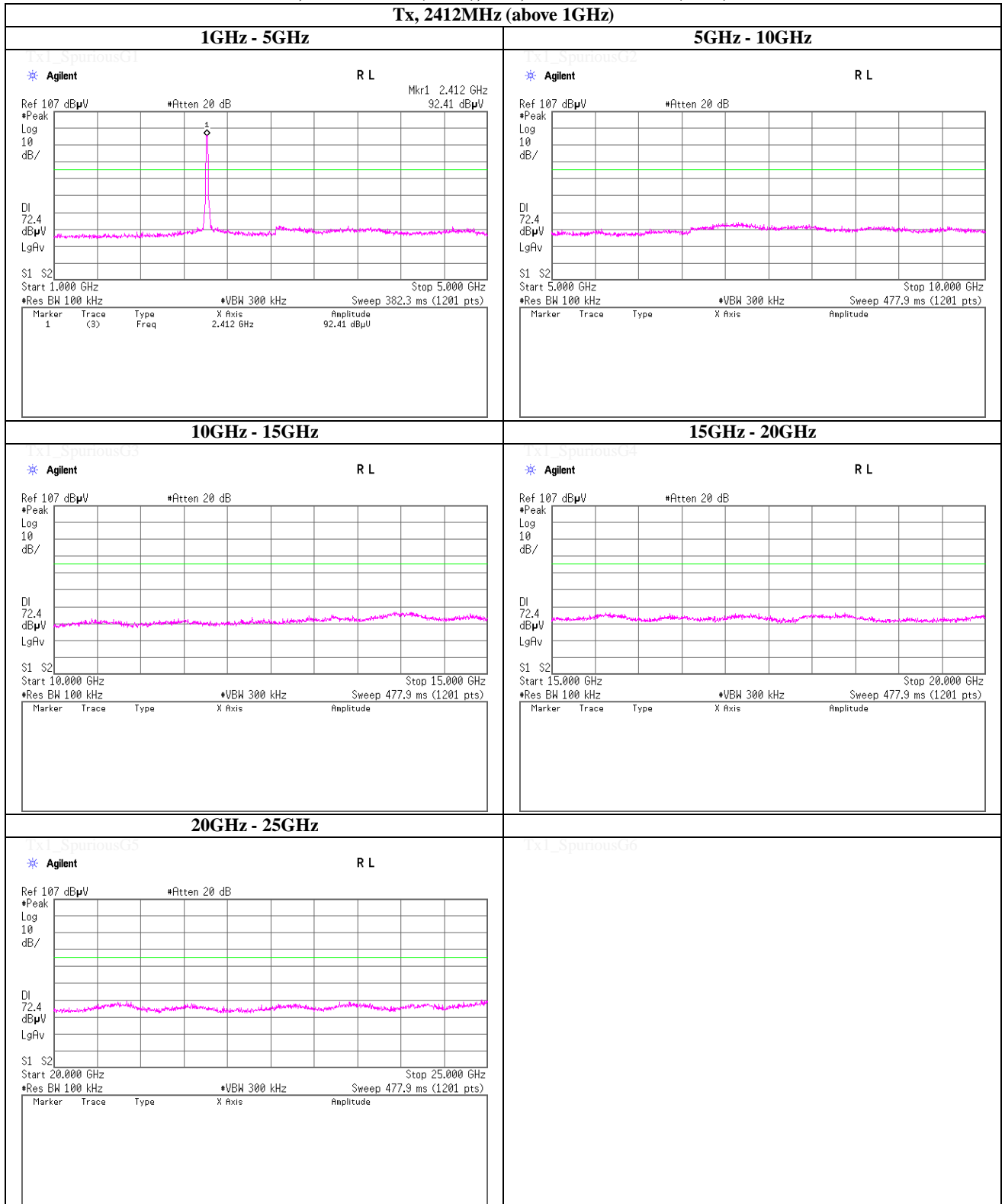
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)**

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



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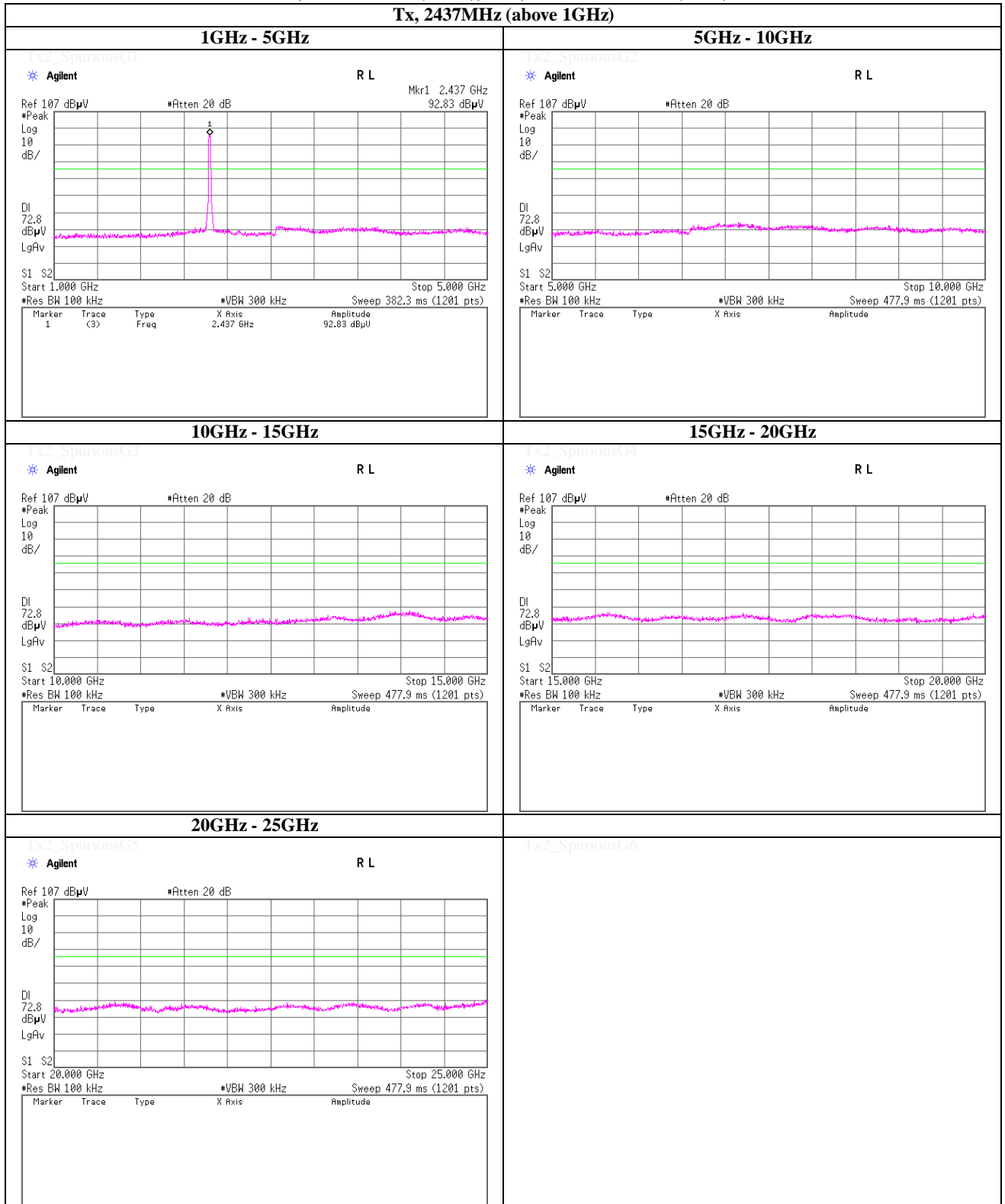
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)**

**Tx, 2437MHz (above 1GHz)**



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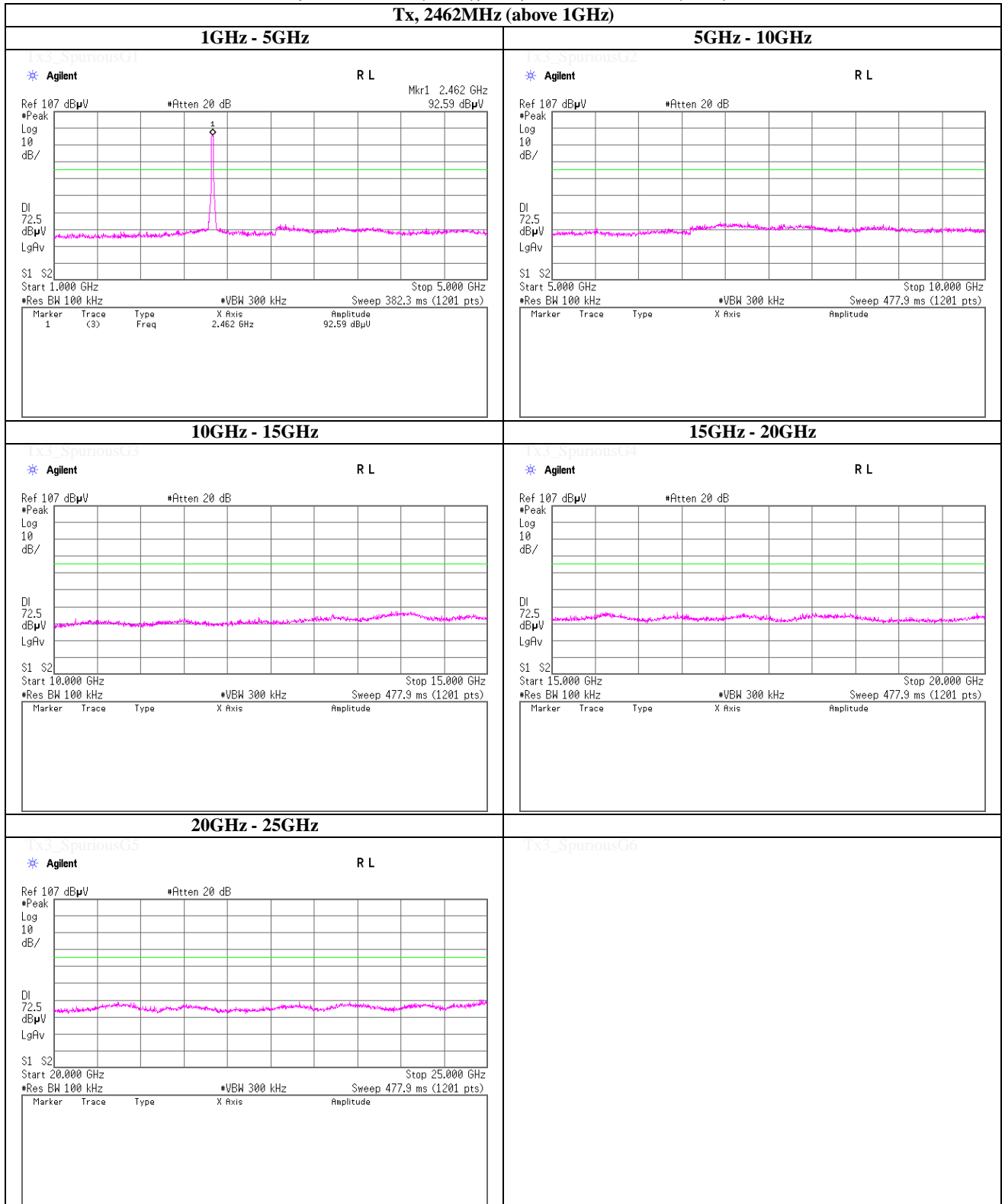
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)**

**Tx, 2462MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

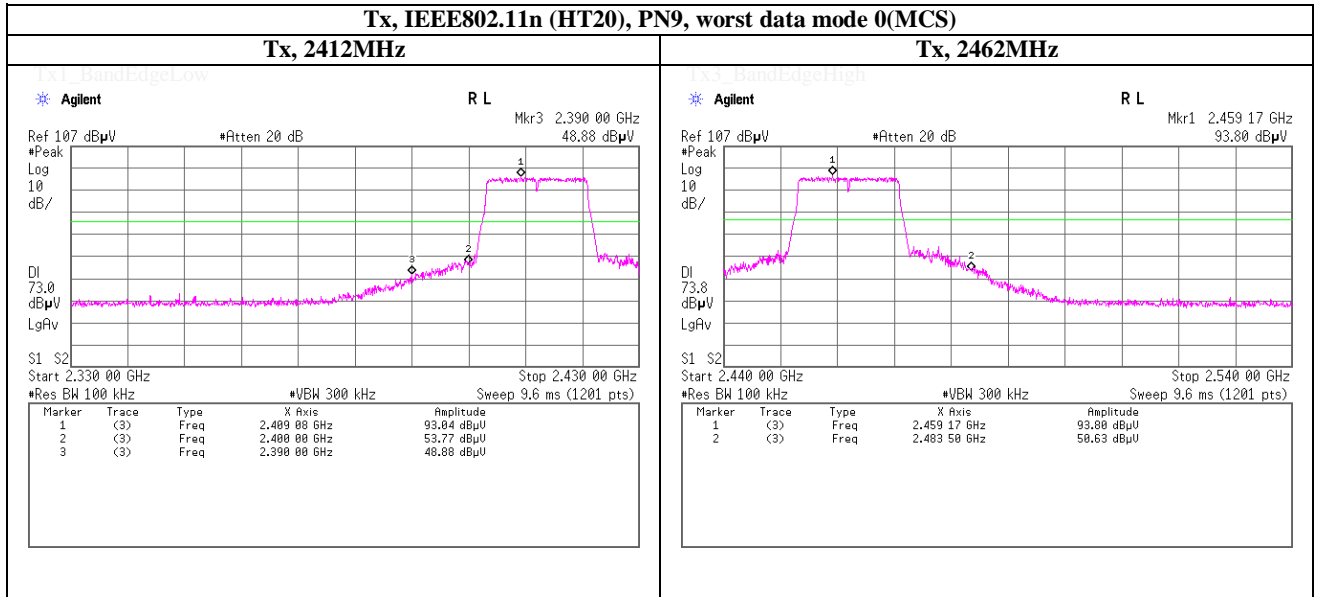
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Band Edge compliance**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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Telephone : +81 463 50 6400

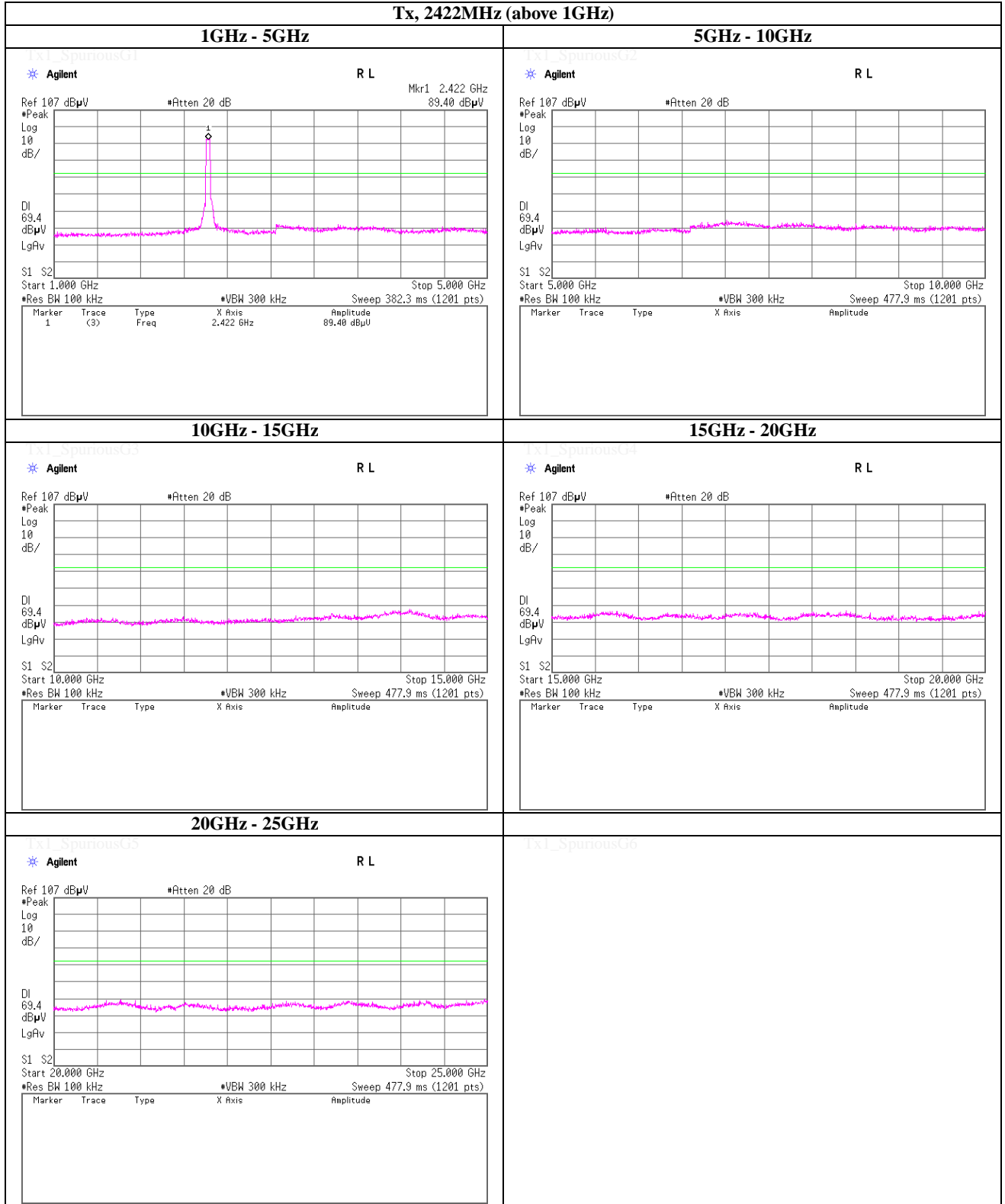
Facsimile : +81 463 50 6401



**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)**

**Tx, 2422MHz (above 1GHz)**



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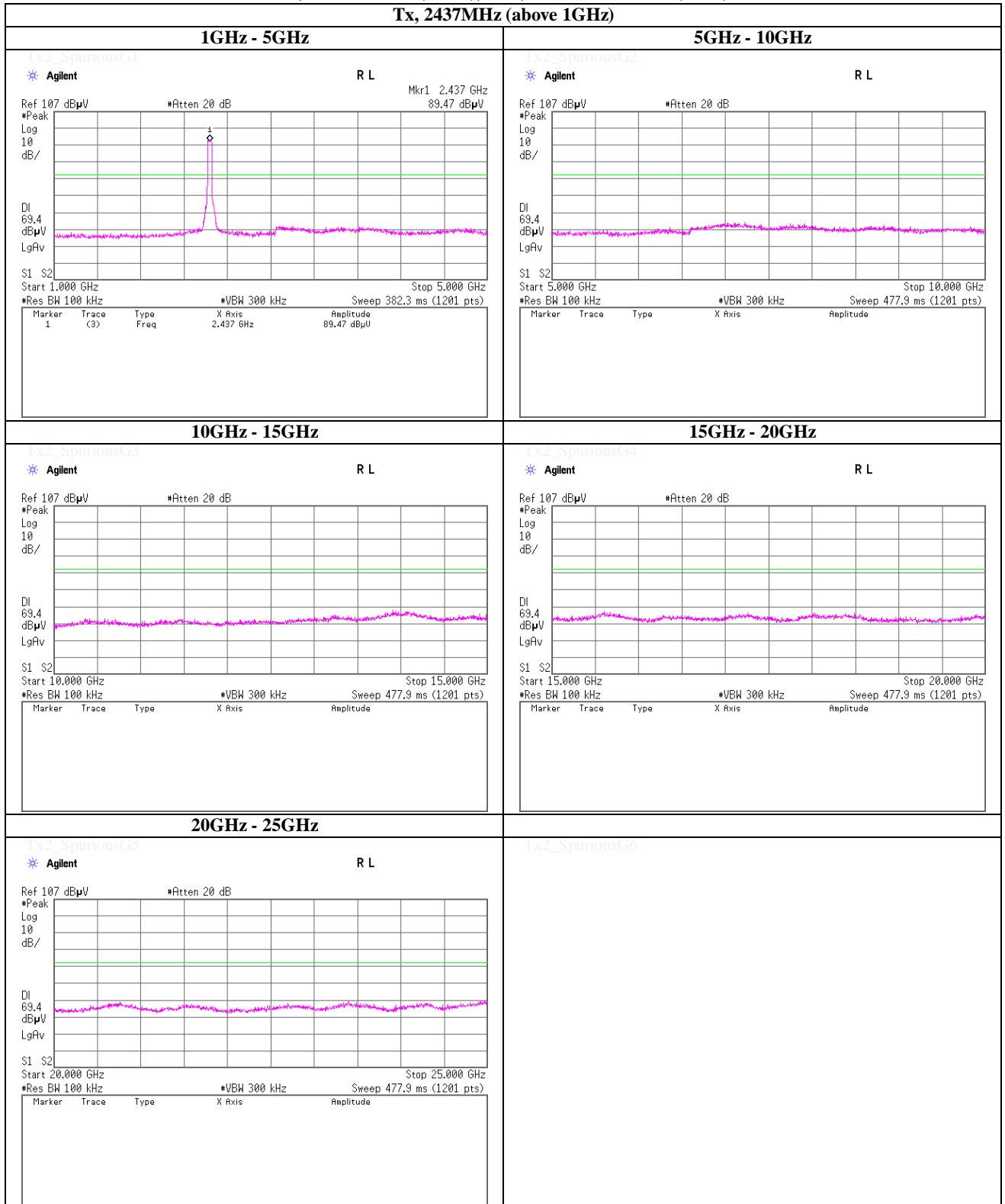
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)**

**Tx, 2437MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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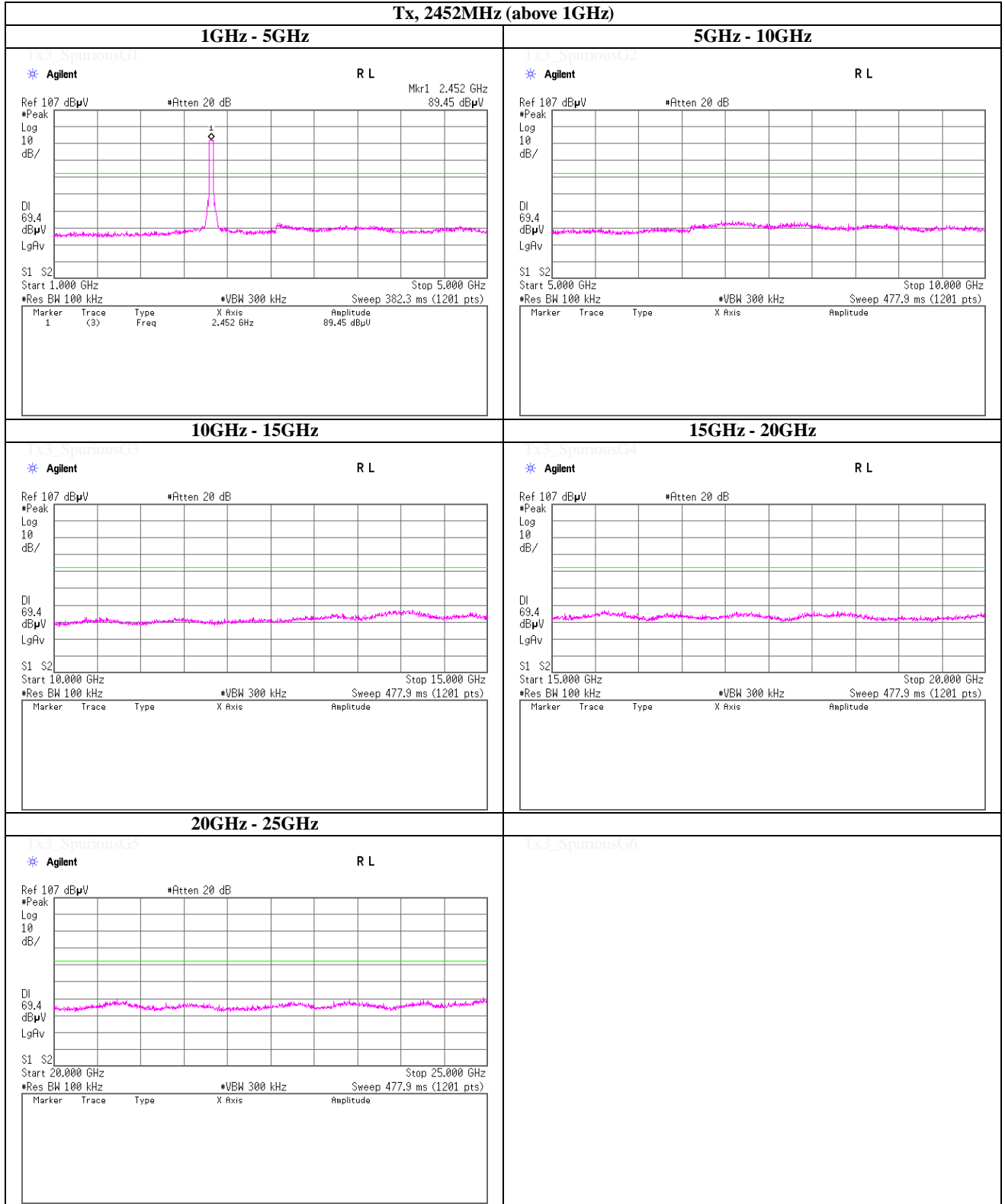
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)**

**Tx, 2452MHz (above 1GHz)**



**UL Japan, Inc.**

**Shonan EMC Lab.**

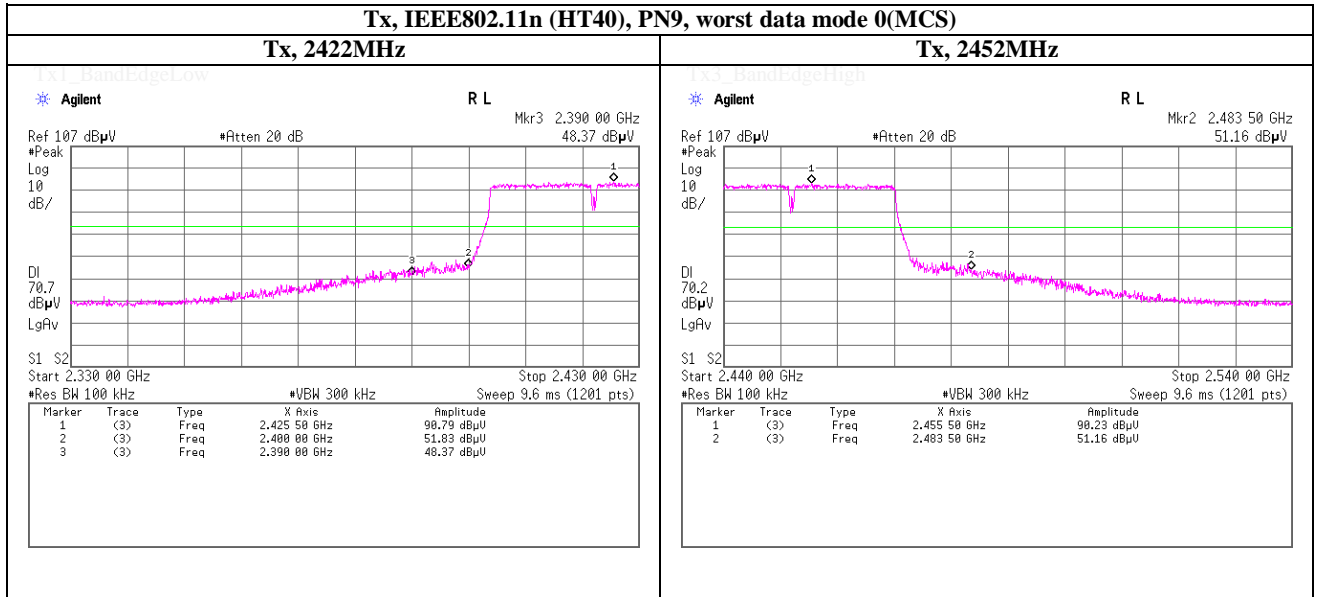
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**(Reference chart) Spurious emission (Conducted)**

**Band Edge compliance**



**UL Japan, Inc.**

**Shonan EMC Lab.**

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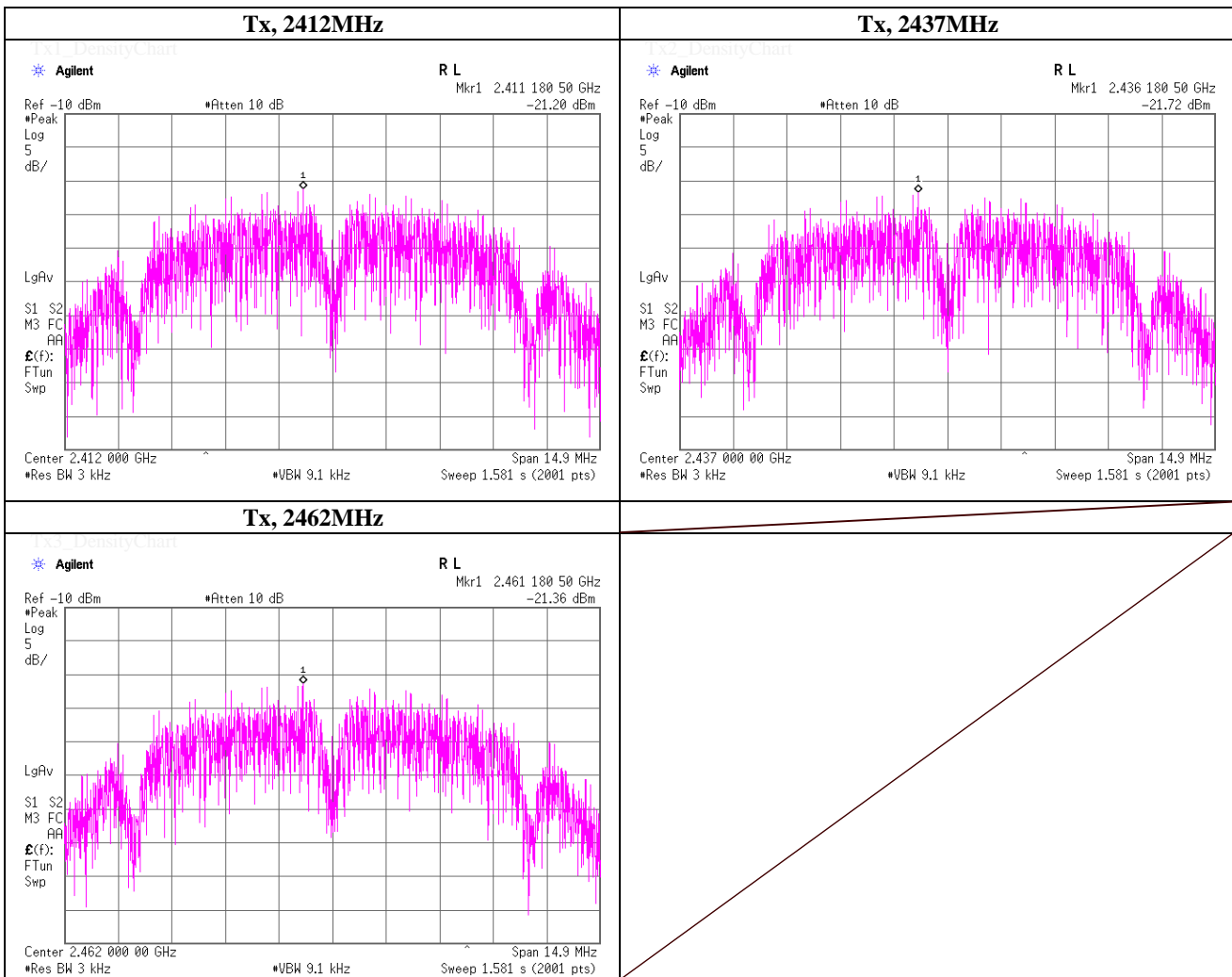
### Maximum Power Spectral Density

(Method PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 2Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2411.18	-21.20	1.98	9.98	-9.24	8.00	17.24
2437.0000	2436.18	-21.72	1.99	9.98	-9.75	8.00	17.75
2462.0000	2461.18	-21.36	2.00	9.98	-9.38	8.00	17.38

Sample Calculation:  
 Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



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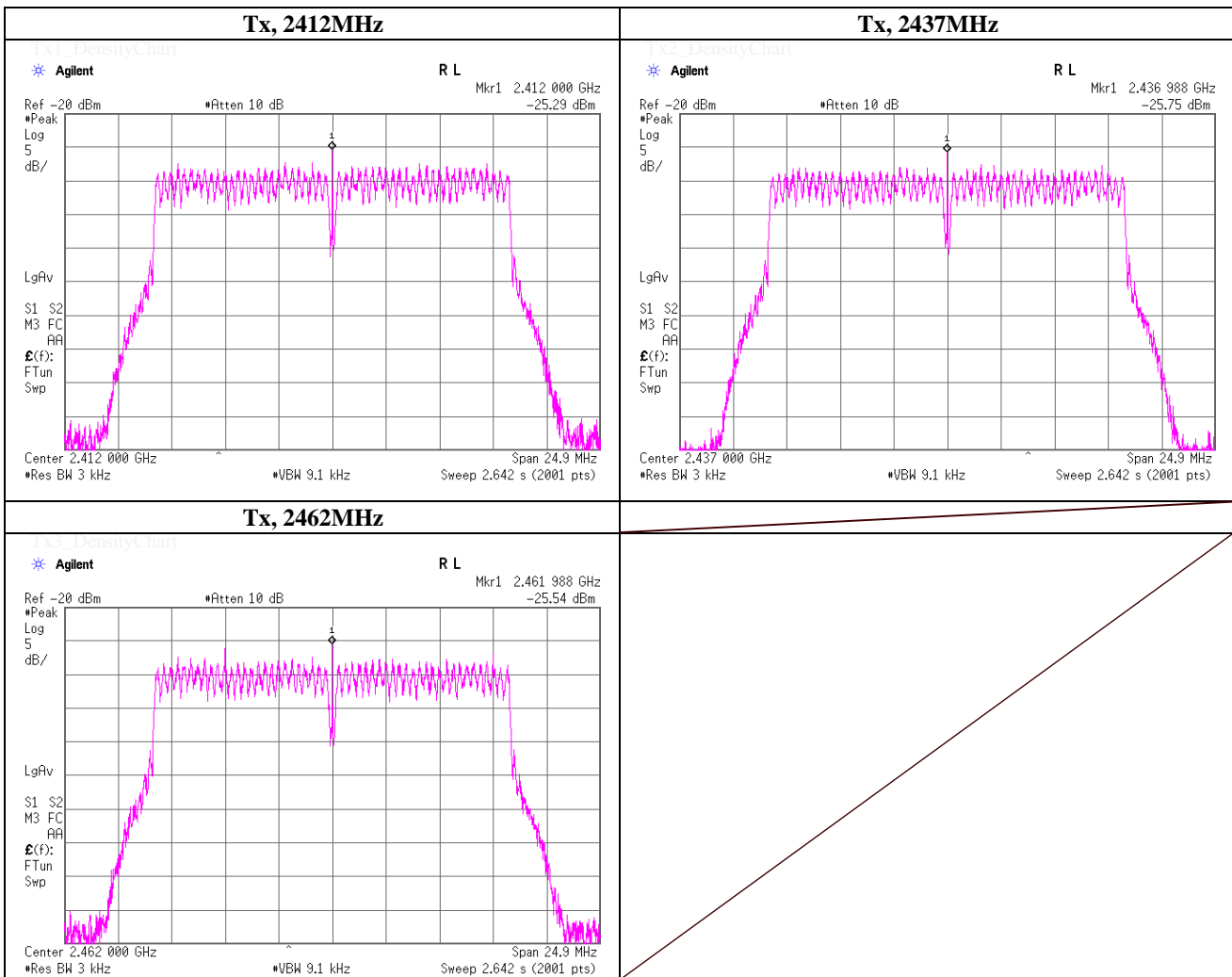
### Maximum Power Spectral Density

(Method PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11g, PN9, worst data mode 6Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2412.00	-25.29	1.98	9.98	-13.33	8.00	21.33
2437.0000	2436.99	-25.75	1.99	9.98	-13.78	8.00	21.78
2462.0000	2461.99	-25.54	2.00	9.98	-13.56	8.00	21.56

Sample Calculation:  
 Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



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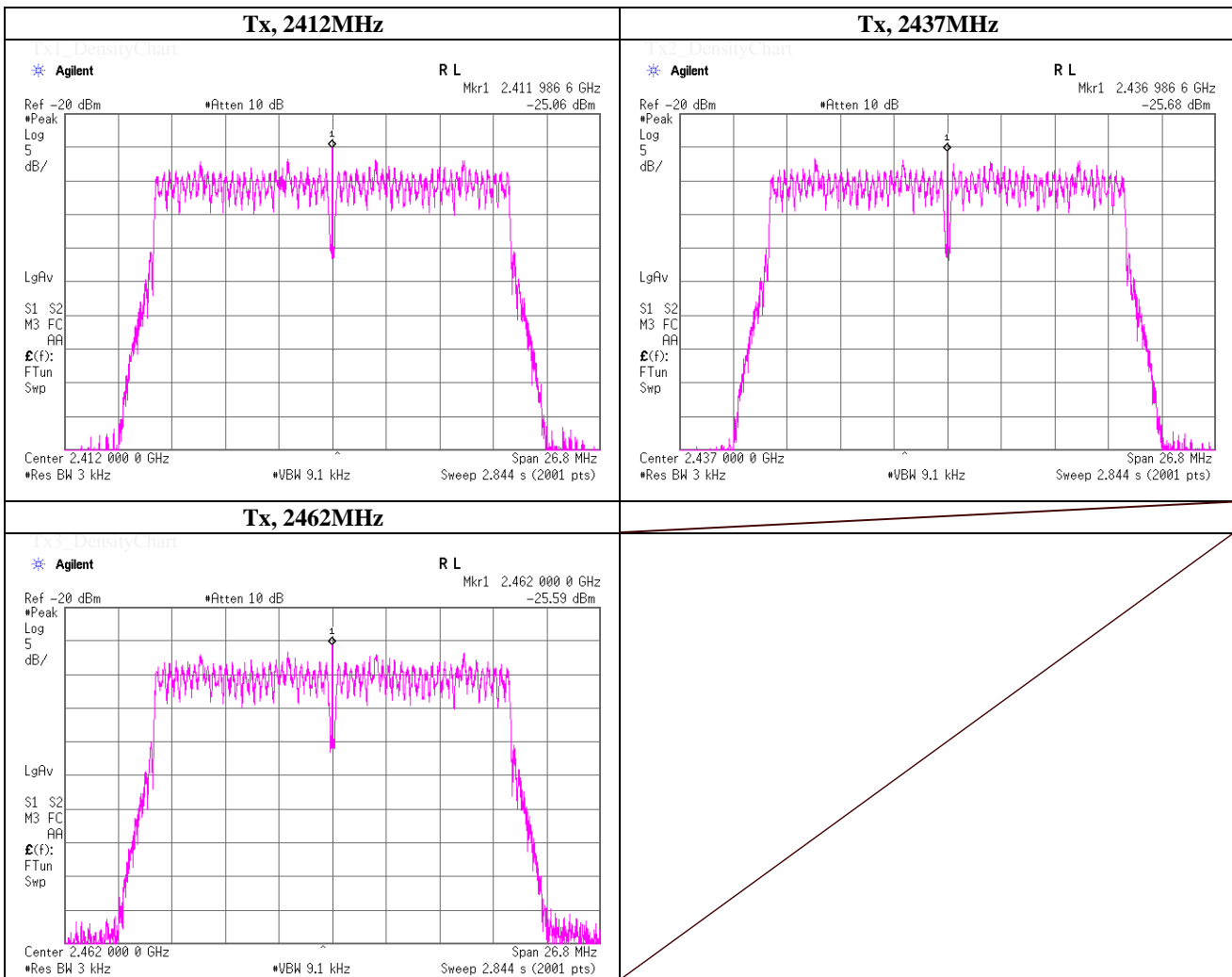
### Maximum Power Spectral Density

(Method PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2411.99	-25.06	1.98	9.98	-13.10	8.00	21.10
2437.0000	2436.99	-25.68	1.99	9.98	-13.71	8.00	21.71
2462.0000	2462.00	-25.59	2.00	9.98	-13.61	8.00	21.61

Sample Calculation:  
 Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



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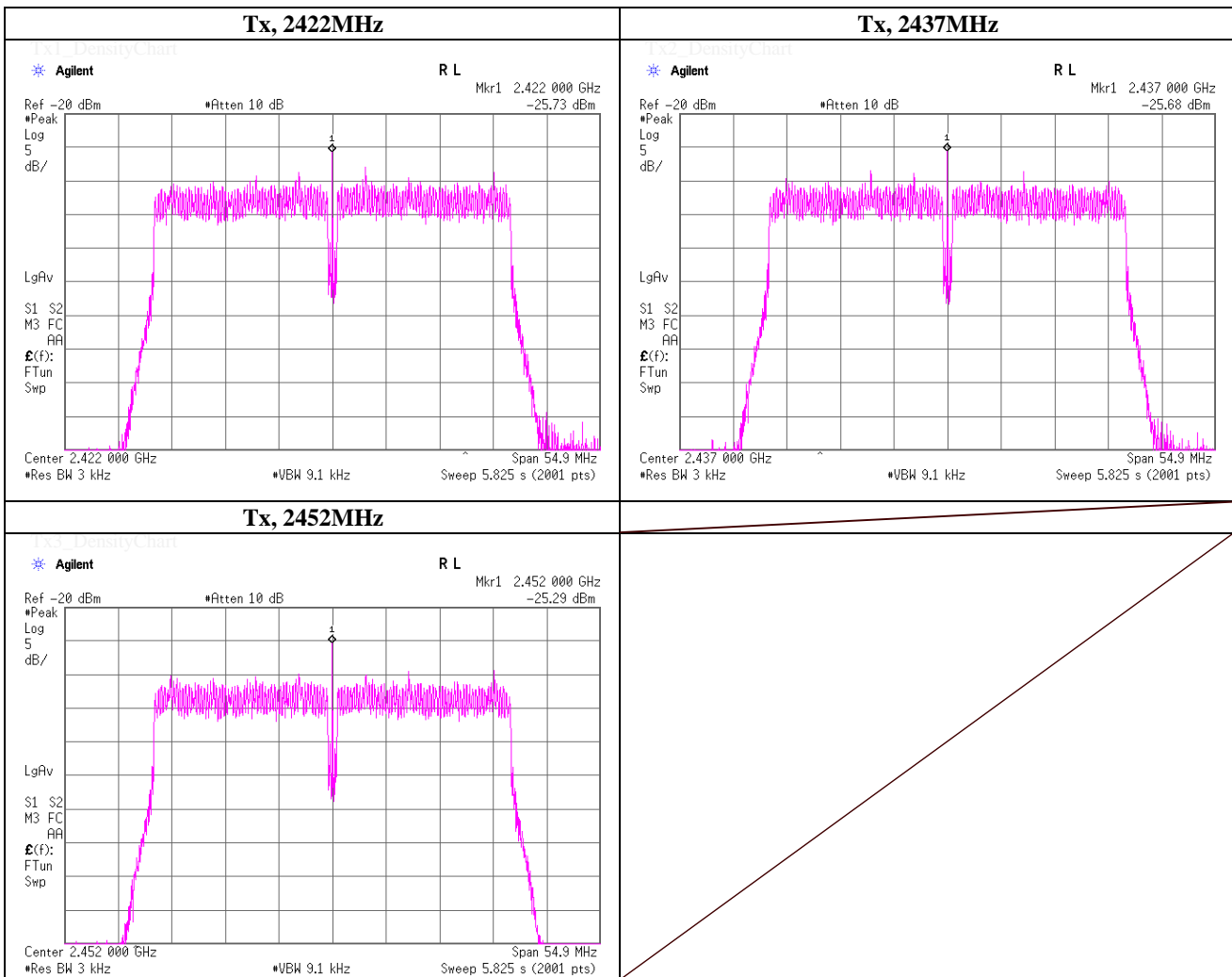
### Maximum Power Spectral Density

(Method PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 6, 2013	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Kenichi Adachi	
Mode	Tx, IEEE802.11n (HT40), PN9, worst data mode 0(MCS)	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2422.0000	2422.00	-25.73	1.99	9.98	-13.76	8.00	21.76
2437.0000	2437.00	-25.68	1.99	9.98	-13.71	8.00	21.71
2452.0000	2452.00	-25.29	1.99	9.98	-13.32	8.00	21.32

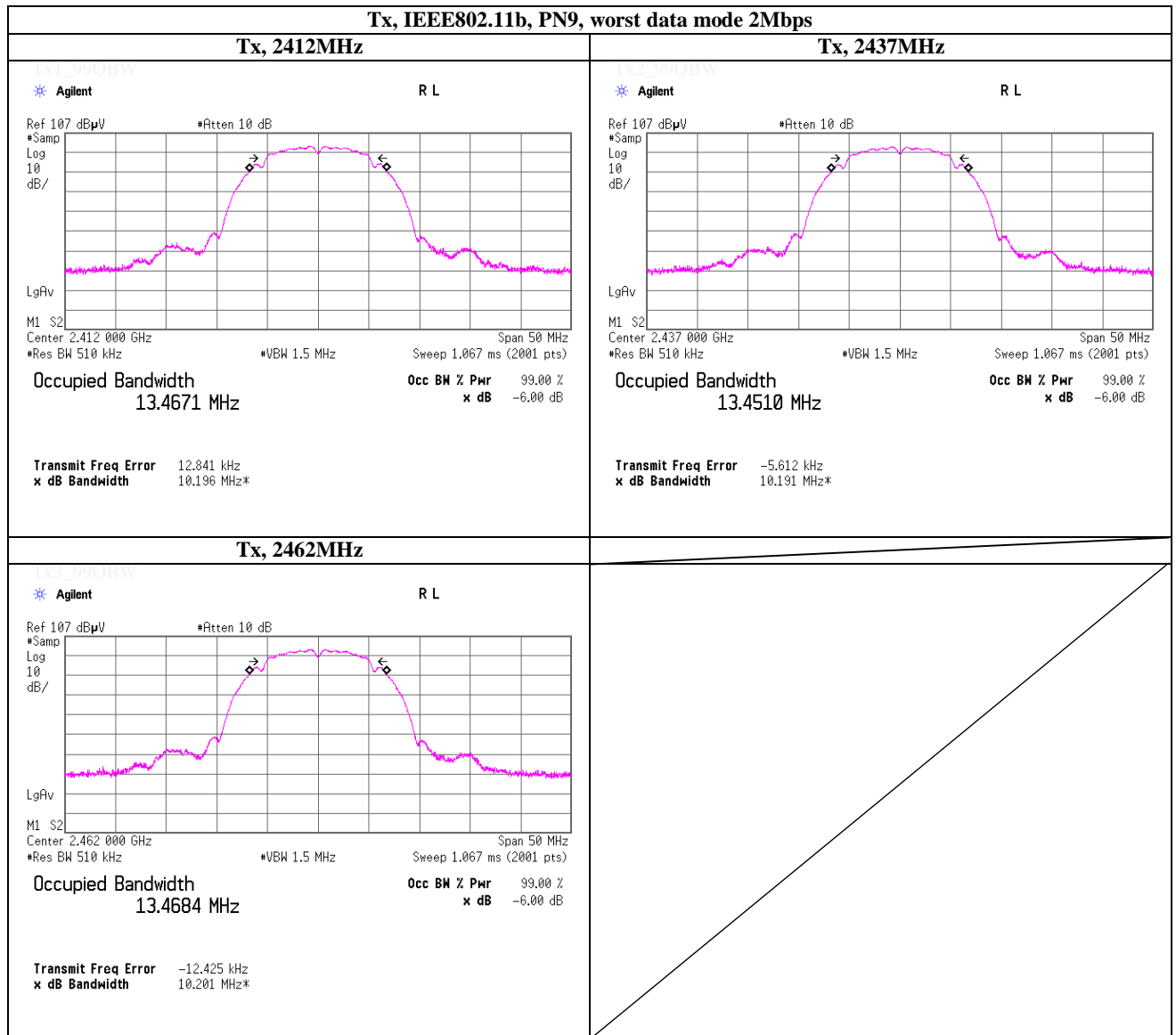
Sample Calculation:  
 Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss



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### 99% Occupied Bandwidth



**UL Japan, Inc.**

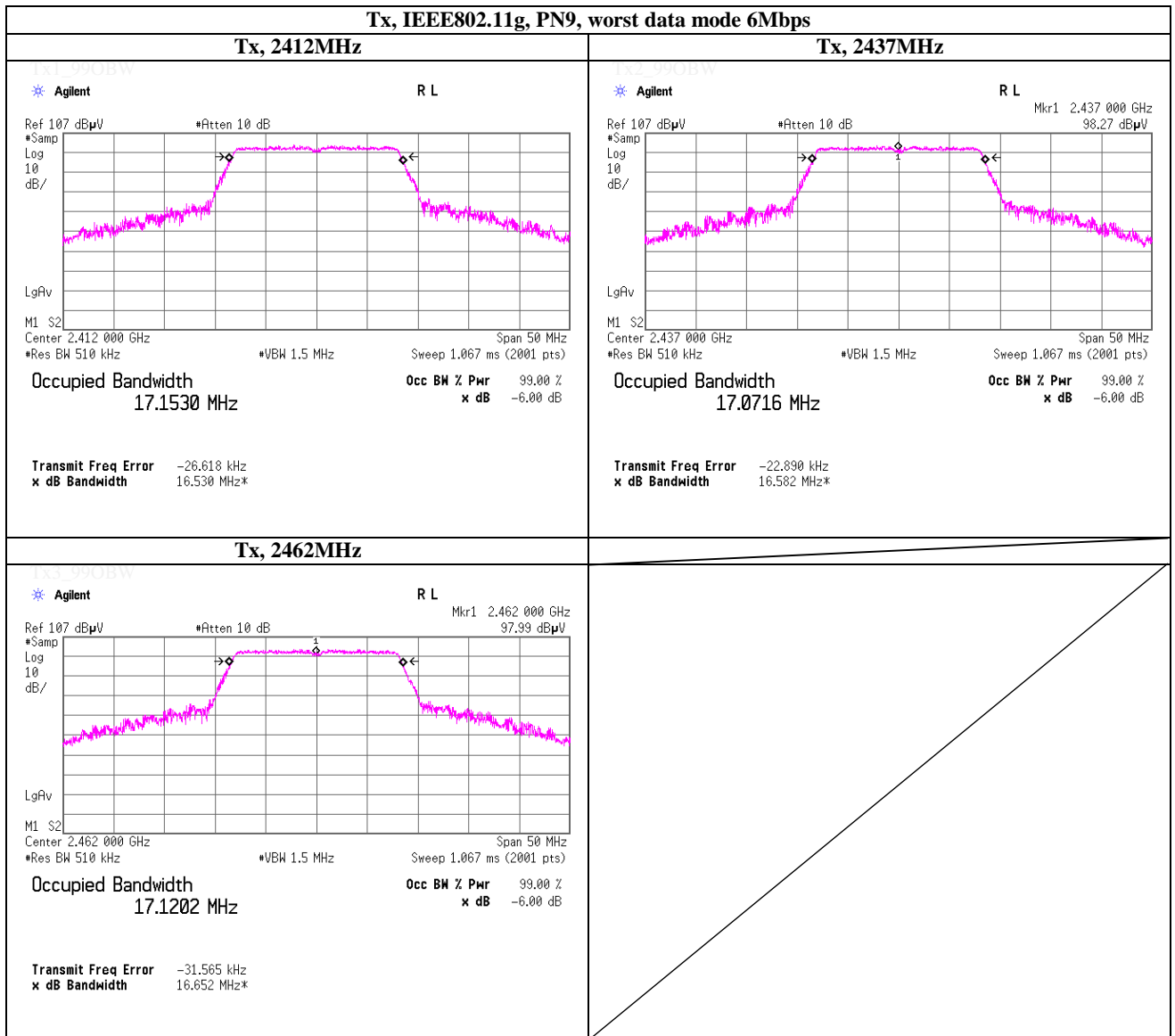
**Shonan EMC Lab.**

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### 99% Occupied Bandwidth



**UL Japan, Inc.**

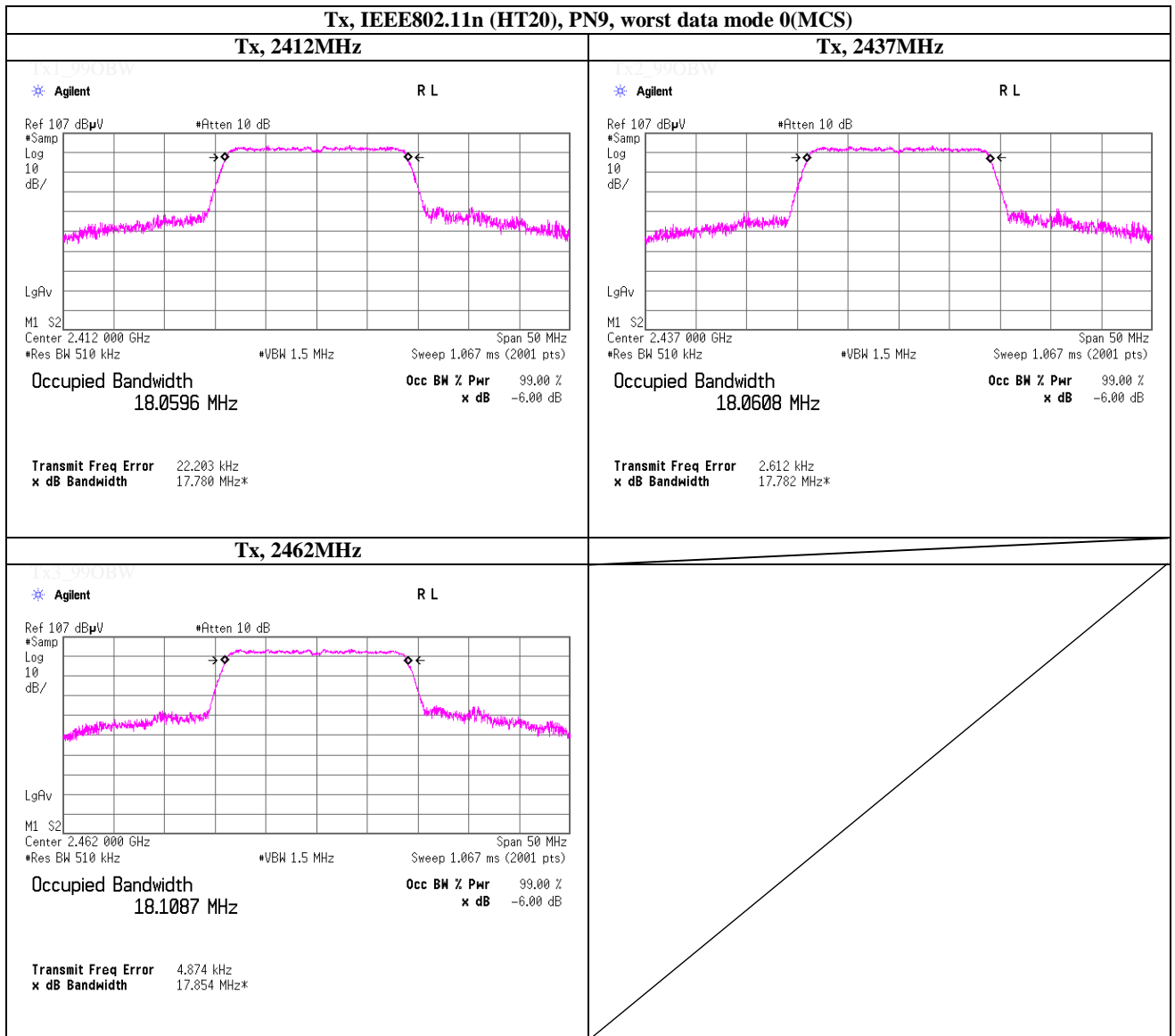
**Shonan EMC Lab.**

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### 99% Occupied Bandwidth



**UL Japan, Inc.**

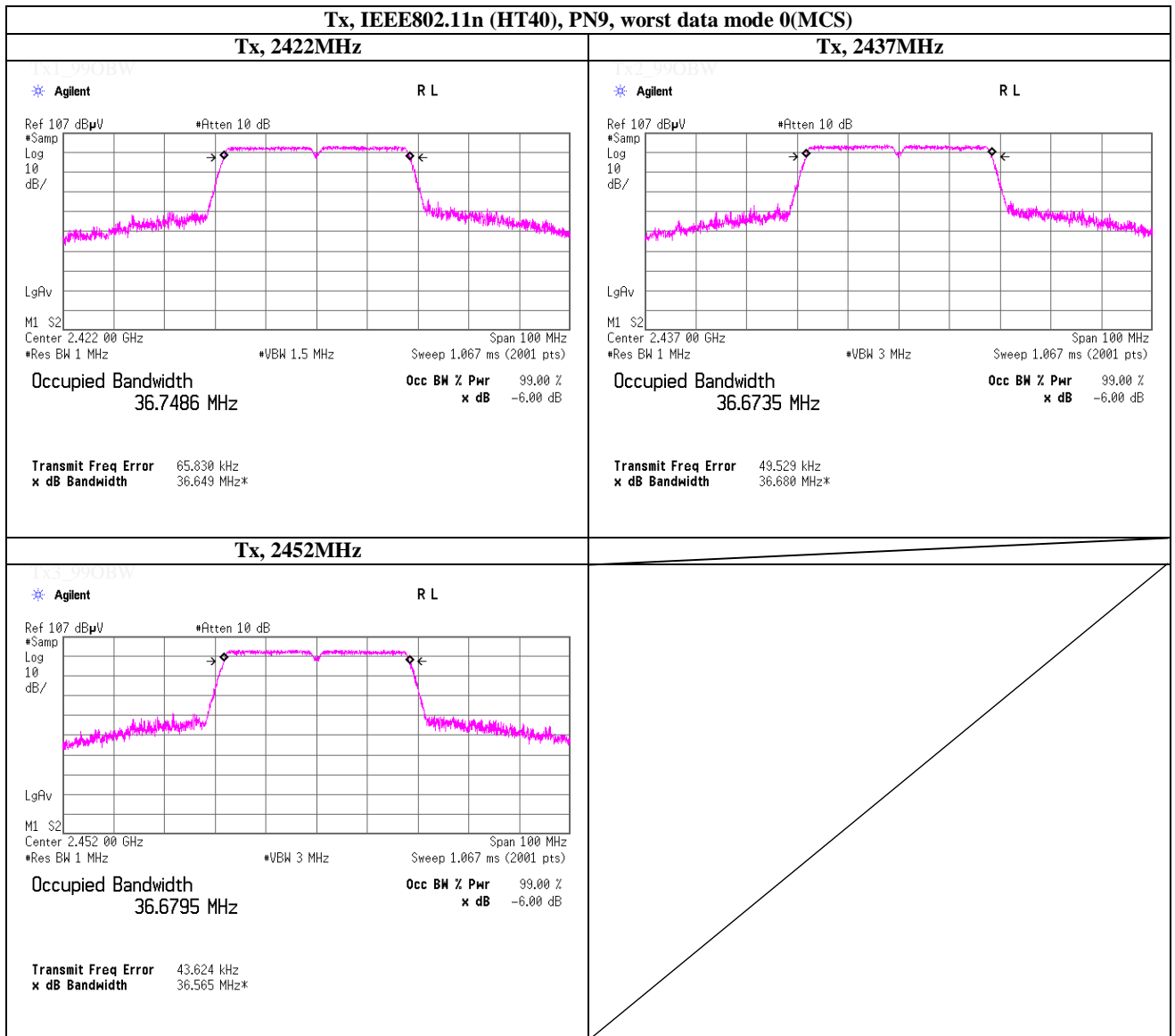
**Shonan EMC Lab.**

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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)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2013/04/09 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2013/04/09 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2013/01/08 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2013/04/09 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2013/03/16 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2013/03/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2012/09/21 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2012/07/18 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2013/04/11 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2012/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2012/08/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2013/02/27 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2013/03/04 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE,CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE,CE	-
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2012/12/18 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2012/12/18 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2013/03/14 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2013/03/19 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2013/03/16 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2013/02/12 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2012/10/08 * 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	2013/04/03 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2012/10/08 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2013/02/27 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2013/04/03 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2013/02/25 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2013/02/12 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2013/03/07 * 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 conducted tests ,