



RADIO TEST REPORT

Test Report No.: 33AE0243-SH-01-D

Applicant : YAMAHA CORPORATION
Type of Equipment : USB WIRELESS LAN ADAPTOR
Model No. : UD-WL01
FCC ID : A6RUDWL01
Test regulation : FCC Part15 Subpart C: 2012
Test result : Complied

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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: October 4 to 23, 2012

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".



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13-EM-F0429

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SECTION 1: Customer information

Company Name : YAMAHA CORPORATION
Address : 10-1, Nakazawa-cho, Naka-ku, Hamamatsu Shizuoka 430-8650, Japan
Telephone Number : +81-53-460-3241
Facsimile Number : +81-53-460-2778
Contact Person : Motonori Sunako

SECTION 2: Equipment under test (E.U.T.)**2.1 Identification of E.U.T.**

Type of Equipment : USB WIRELESS LAN ADAPTOR
Model Number : UD-WL01
Serial Number : 25
Rating : DC5.0V
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : October 4, 2012
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: UD-WL01 (referred to as the EUT in this report) is a USB WIRELESS LAN ADAPTOR.

Clock frequency(ies) in the system : 40MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 2412-2462MHz
Bandwidth : 20MHz
Channel spacing : 5MHz
Type of modulation : DSSS (IEEE 802.11b), OFDM (IEEE 802.11g/n)
Antenna type : Chip antenna
Antenna connector type : None
Antenna gain : 0.2 dBi
ITU code : D1D, G1D
Operation temperature range : 0 to +40 deg.C

FCC 15.31 (e)

The RF transmitter is constantly provided voltage (DC3.3V) through the regulator 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 August 13, 2012 and effective September 12, 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. The test is performed by the customer.

3.2 Procedures & Results

Item	Test Procedure*1)	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	29.5dB Freq.: 0.20044MHz(Phase: N), 0.27044MHz(Phase: N), 0.25291MHz(Phase: L1), Detector: QP Mode: Tx 2437MHz, IEEE 802.11g	Complied
6dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(2)	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(3)	Conducted	N/A		Complied
Out of band 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	7.1dB Freq.: 12185MHz Detector: Average Polarization: Horizontal Mode: Tx 2437MHz, IEEE 802.11n(HT20)	Complied
Power density	ANSI C63.4:2009 13. Measurement of intentional radiators	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 v02 (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 ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	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
Radiated emission (Measurement distance: 1m)	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 has enough margin, more than the site margin.

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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Telephone number : +81 463 50 6400

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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 3 to 3.

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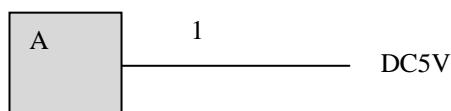
SECTION 4: Operation of E.U.T. during testing

4.1 Operating mode

Test item	Mode	Tested frequency	Power setting	Worst data rate *2)
Conducted emission *3) Radiated emission (below 1GHz) *3)	Transmitting IEEE 802.11g	2437MHz	*1)	6Mbps, PN9
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz		1Mbps, PN9
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz		6Mbps, PN9
	Transmitting IEEE 802.11n (HT20)	2412MHz, 2437MHz, 2462MHz		MCS0, PN9
*1) EUT has the power settings by the software as follows;				
Power settings	WID Command Numb:0106, Value : 02 11b: 12dBm, 11g: 10dBm, 11n(HT20): 9dBm (Average)			
Software	RADITS for 11n Test Mode ver .1.51			
*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	USB WIRELESS LAN ADAPTOR	UD-WL01	25	YAMAHA CORPORATION	EUT

List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB	2.8	Shielded	Shielded	*1)

*1) The cable was modified to supply 5V from DC power supply during testing.

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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 80cm 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 and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. 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 DC power supply 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.

The configuration was set in accordance with ANSI C63.4: 2009.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. 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) The test method was referred to Section 10.2.3.3 Average Power Measurement Procedures of KDB 558074 (FCC), "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	1-2.8GHz	2.8-25GHz
Horizontal	X	Y	X	Z
Vertical	Z	Z	Z	Y

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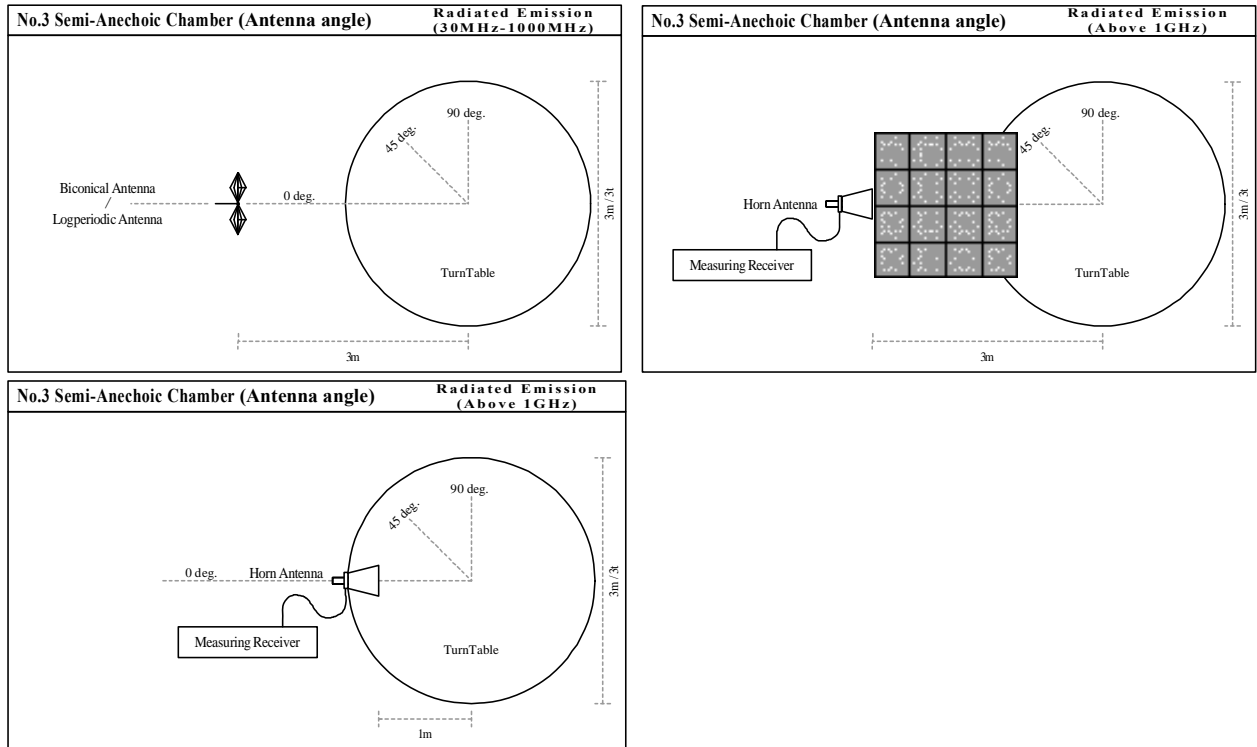
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Figure 1. Antenna angle



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 5th order harmonics.

Refer to APPENDIX 1

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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. This test was measured based on Method 7.1 Option 1 and 7.2 Option 2 of "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 output power

Test procedure

The Maximum Peak Output Power was measured with a power meter connected to the antenna port. This test was measured based on Method 8.1.3 Option 3 of "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) Testing using an average detector was performed in order to confirm that the output power of the EUT met the exclusion limits stated in FCC Part 2 Section 2.1093 and FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET 65 and the EUT was exempt from RF exposure SAR evaluation.

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 *1)
RBW / VBW : 3kHz / 9kHz

This test was measured based on Method 9.1 Option 1 of "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 : 2012/10/23

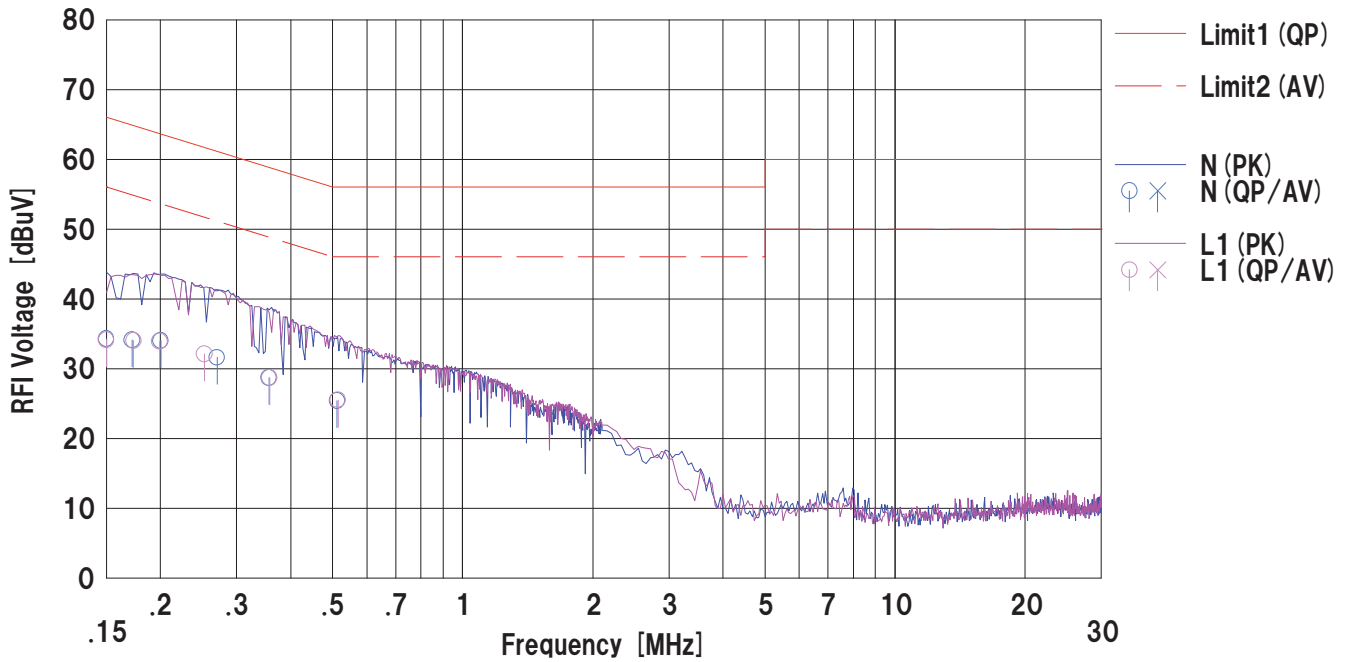
Company : YAMAHA CORPORATION
Kind of EUT : USB WIRELESS LAN ADAPTOR
Model No. : UD-WL01
Serial No. : 25

Mode : Tx 11g 2437MHz
Job No. : 33AE0243-SH-01
Power : AC 120V / 60Hz
Temp./Humi. : 27deg.C. / 51%RH

Remarks : -

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

Engineer : Shinichi Takano

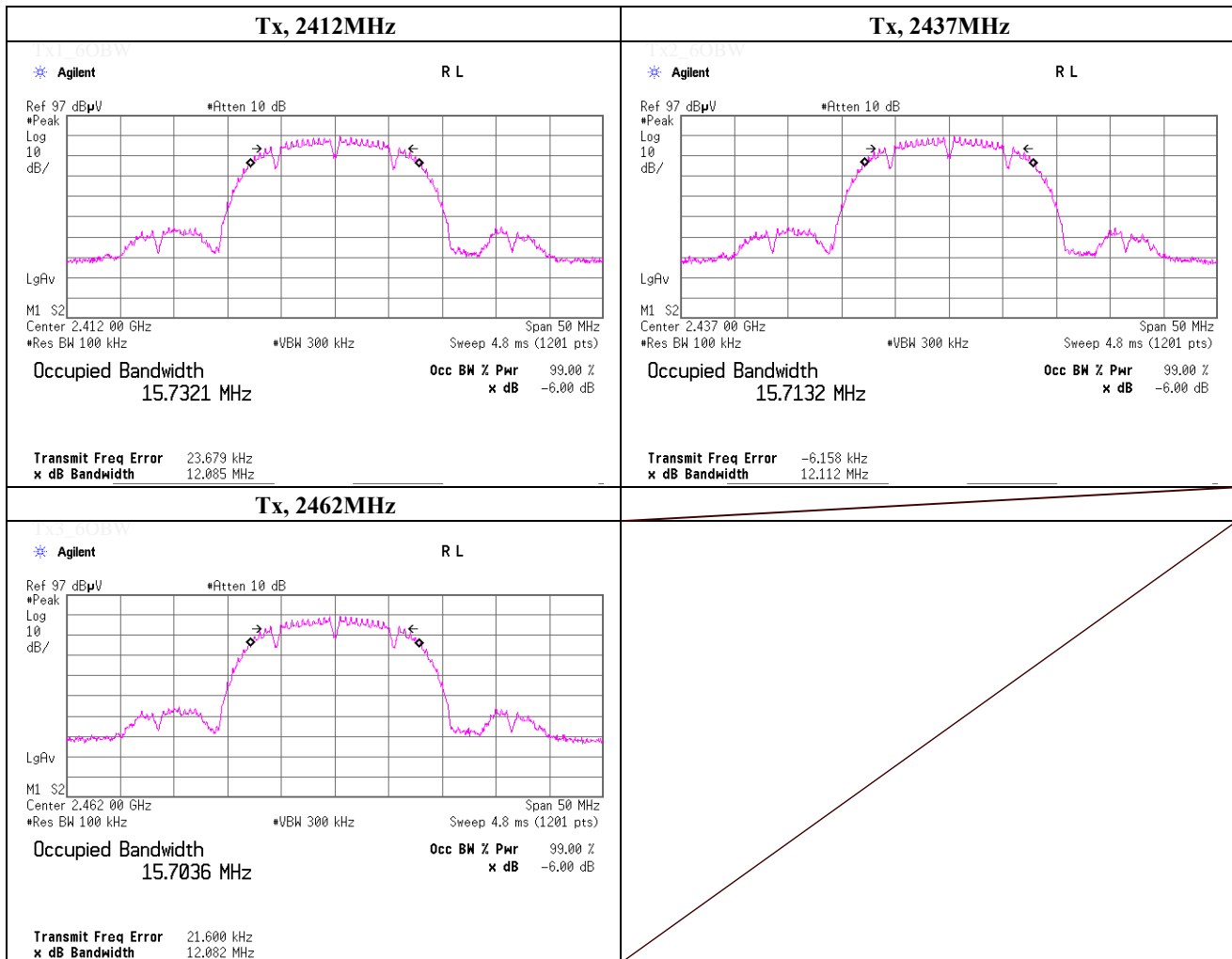


No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	21.6	---	12.7	34.3	---	66.0	56.0	31.7	---	N	
2	0.17207	21.4	---	12.7	34.1	---	64.8	54.8	30.7	---	N	
3	0.20044	21.3	---	12.7	34.0	---	63.5	53.5	29.5	---	N	
4	0.27044	18.9	---	12.7	31.6	---	61.1	51.1	29.5	---	N	
5	0.35621	16.0	---	12.7	28.7	---	58.8	48.8	30.1	---	N	
6	0.51242	12.7	---	12.7	25.4	---	56.0	46.0	30.6	---	N	
7	0.15000	21.4	---	12.7	34.1	---	66.0	56.0	31.9	---	L1	
8	0.17325	21.3	---	12.7	34.0	---	64.8	54.8	30.8	---	L1	
9	0.19922	21.2	---	12.7	33.9	---	63.6	53.6	29.7	---	L1	
10	0.25291	19.4	---	12.7	32.1	---	61.6	51.6	29.5	---	L1	
11	0.35758	16.0	---	12.7	28.7	---	58.7	48.7	30.0	---	L1	
12	0.51503	12.8	---	12.7	25.5	---	56.0	46.0	30.5	---	L1	

-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
Mode	Tx, IEEE802.11b, PN9, worst data mode 1Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	12.085	> 0.500
2437.0000	12.112	> 0.500
2462.0000	12.082	> 0.500

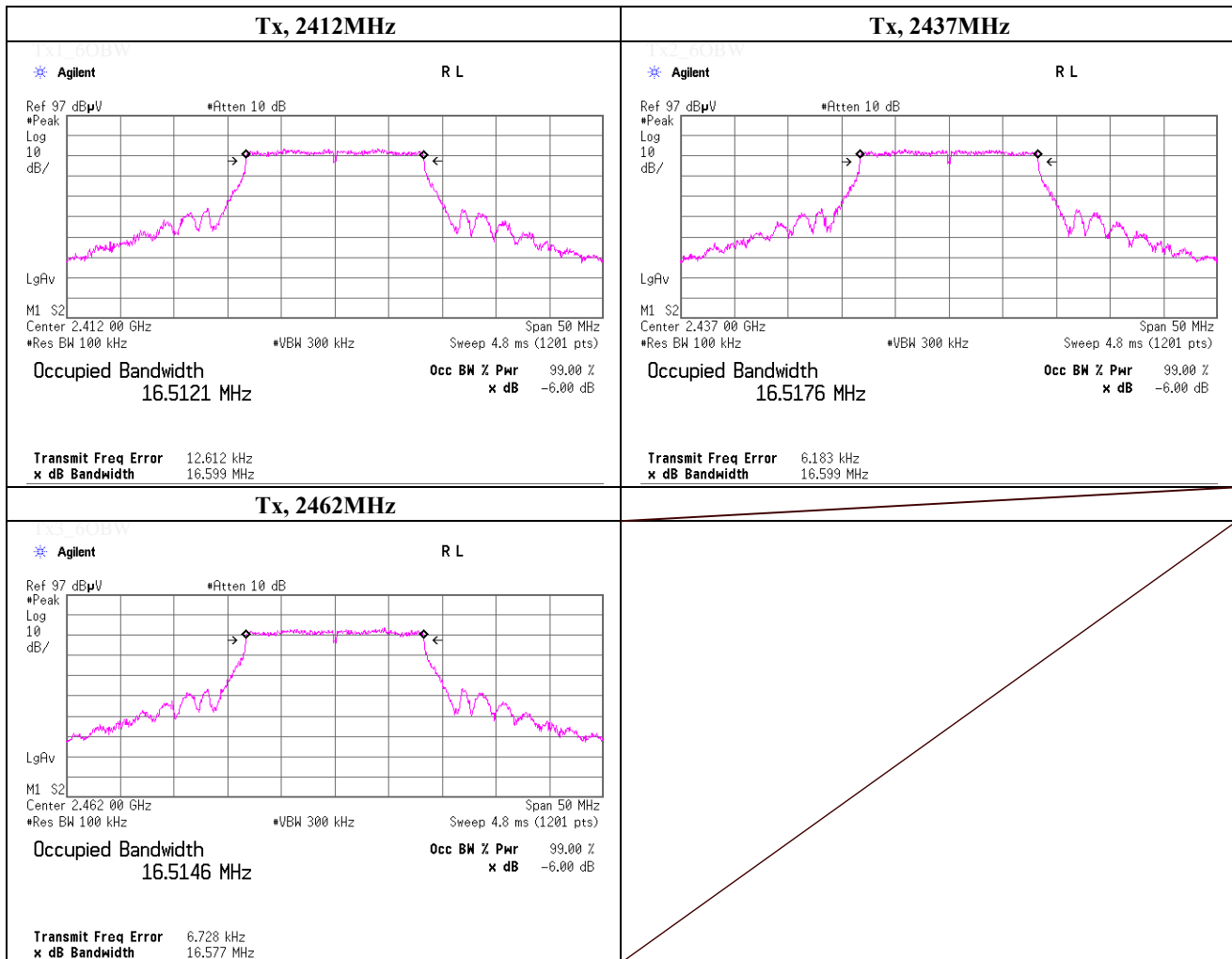


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-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
Mode	Tx, IEEE802.11g, PN9, worst data mode 6Mbps	

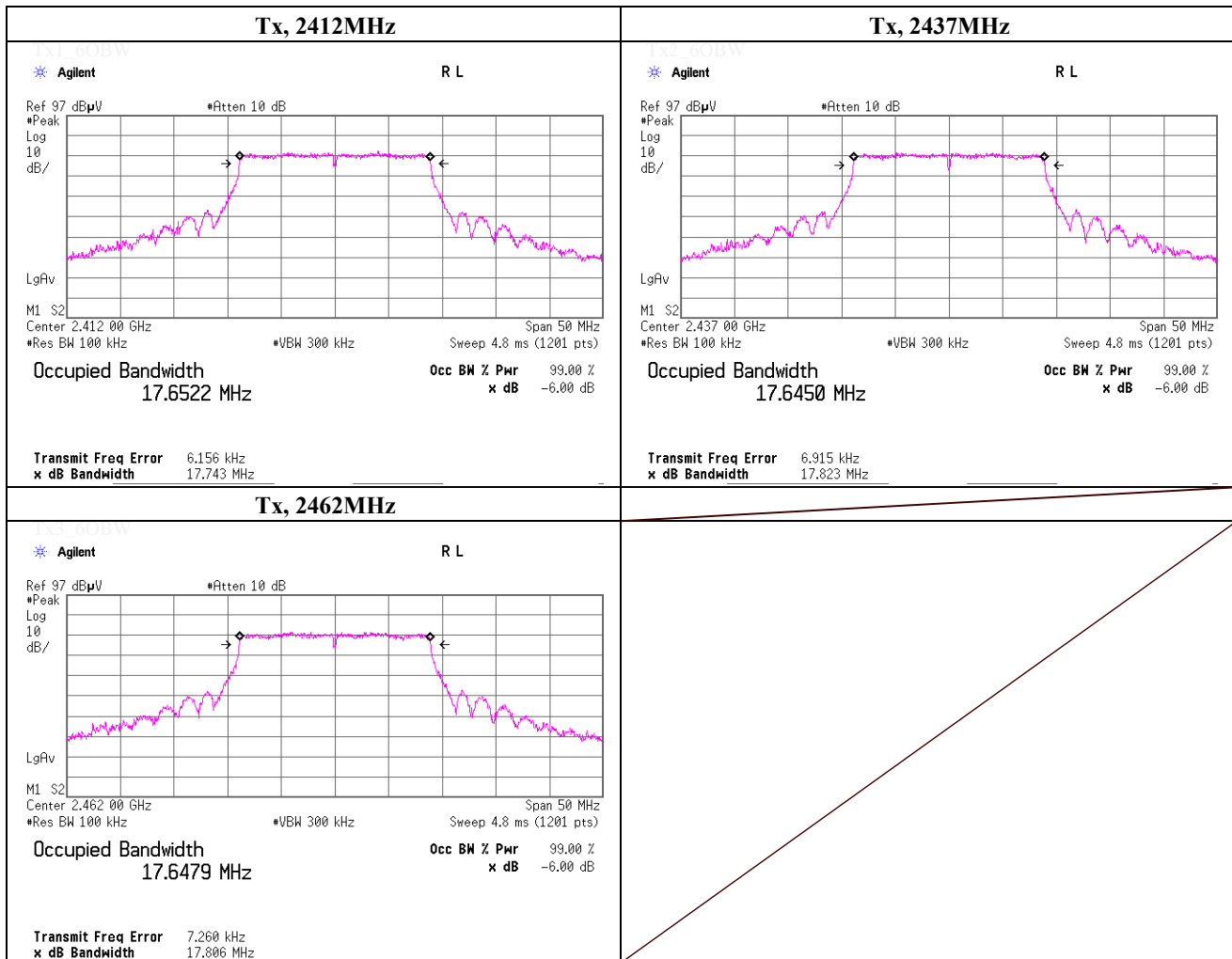
Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.599	> 0.500
2437.0000	16.599	> 0.500
2462.0000	16.577	> 0.500



-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
Mode	Tx, IEEE802.11n (HT20), PN9, worst data mode 0(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	17.743	> 0.500
2437.0000	17.823	> 0.500
2462.0000	17.806	> 0.500



Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date October 22, 2012 October 23, 2012
Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
Engineer Shinichi Takano Hikaru Shirasawa
Mode Tx, 2412 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.	2390.000	PK	46.7	27.4	14.2	41.4	46.9	73.9	27.0	100	258	
Hori.	4824.000	PK	48.5	31.1	6.8	41.2	45.2	73.9	28.7	129	166	
Hori.	7236.000	PK	47.5	36.6	8.5	41.4	51.2	73.9	22.7	100	0	
Hori.	9648.000	PK	45.0	38.6	9.4	38.9	54.1	73.9	19.8	100	206	
Hori.	12060.000	PK	45.8	39.5	10.7	39.4	56.6	73.9	17.3	100	0	
Hori.	2390.000	AV	37.4	27.4	14.2	41.4	37.6	53.9	16.3	100	258	
Hori.	4824.000	AV	41.0	31.1	6.8	41.2	37.7	53.9	16.2	129	166	
Hori.	7236.000	AV	38.1	36.6	8.5	41.4	41.8	53.9	12.1	100	0	
Hori.	9648.000	AV	35.2	38.6	9.4	38.9	44.3	53.9	9.6	100	206	
Hori.	12060.000	AV	35.7	39.5	10.7	39.4	46.5	53.9	7.4	100	0	
Vert.	2390.000	PK	46.4	27.4	14.2	41.4	46.6	73.9	27.3	100	291	
Vert.	4824.000	PK	48.2	31.1	6.8	41.2	44.9	73.9	29.0	100	214	
Vert.	7236.000	PK	47.2	36.6	8.5	41.4	50.9	73.9	23.0	100	0	
Vert.	9648.000	PK	44.3	38.6	9.4	38.9	53.4	73.9	20.5	100	212	
Vert.	12060.000	PK	46.3	39.5	10.7	39.4	57.1	73.9	16.8	100	0	
Vert.	2390.000	AV	37.6	27.4	14.2	41.4	37.8	53.9	16.1	100	291	
Vert.	4824.000	AV	40.4	31.1	6.8	41.2	37.1	53.9	16.8	100	214	
Vert.	7236.000	AV	38.2	36.6	8.5	41.4	41.9	53.9	12.0	100	0	
Vert.	9648.000	AV	34.8	38.6	9.4	38.9	43.9	53.9	10.0	100	212	
Vert.	12060.000	AV	35.3	39.5	10.7	39.4	46.1	53.9	7.8	100	0	

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	93.5	27.5	14.2	41.4	93.8	-	-	Carrier
Hori.	2397.015	PK	47.8	27.4	14.2	41.4	48.0	73.8	25.8	
Hori.	2400.000	PK	42.7	27.4	14.2	41.4	42.9	73.8	30.9	
Vert.	2412.000	PK	92.6	27.5	14.2	41.4	92.9	-	-	Carrier
Vert.	2397.021	PK	48.1	27.4	14.2	41.4	48.3	72.9	24.6	
Vert.	2400.000	PK	42.6	27.4	14.2	41.4	42.8	72.9	30.1	

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date October 22, 2012 October 23, 2012
 Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
 Engineer Shinichi Takano Hikaru Shirasawa
 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.	4874.000	PK	47.4	31.3	6.9	41.1	44.5	73.9	29.4	100	135	
Hori.	7311.000	PK	47.0	36.6	8.6	41.4	50.8	73.9	23.1	100	0	
Hori.	9748.000	PK	44.1	38.7	9.5	38.9	53.4	73.9	20.5	100	132	
Hori.	12185.000	PK	45.3	39.5	10.7	39.3	56.2	73.9	17.7	100	0	
Hori.	4874.000	AV	40.1	31.3	6.9	41.1	37.2	53.9	16.7	100	135	
Hori.	7311.000	AV	37.3	36.6	8.6	41.4	41.1	53.9	12.8	100	0	
Hori.	9748.000	AV	35.6	38.7	9.5	38.9	44.9	53.9	9.0	100	132	
Hori.	12185.000	AV	34.9	39.5	10.7	39.3	45.8	53.9	8.1	100	0	
Vert.	4874.000	PK	47.0	31.3	6.9	41.1	44.1	73.9	29.8	100	194	
Vert.	7311.000	PK	46.4	36.6	8.6	41.4	50.2	73.9	23.7	100	0	
Vert.	9748.000	PK	45.0	38.7	9.5	38.9	54.3	73.9	19.6	100	207	
Vert.	12185.000	PK	44.9	39.5	10.7	39.3	55.8	73.9	18.1	100	0	
Vert.	4874.000	AV	39.8	31.3	6.9	41.1	36.9	53.9	17.0	100	194	
Vert.	7311.000	AV	37.5	36.6	8.6	41.4	41.3	53.9	12.6	100	0	
Vert.	9748.000	AV	34.7	38.7	9.5	38.9	44.0	53.9	9.9	100	207	
Vert.	12185.000	AV	35.2	39.5	10.7	39.3	46.1	53.9	7.8	100	0	

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

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date October 22, 2012 October 23, 2012
 Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2462 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.	2483.500	PK	47.1	27.5	14.3	41.4	47.5	73.9	26.4	100	246	
Hori.	4924.000	PK	48.7	31.5	6.9	41.0	46.1	73.9	27.8	105	169	
Hori.	7386.000	PK	47.3	36.7	8.7	41.5	51.2	73.9	22.7	100	0	
Hori.	9848.000	PK	44.7	38.9	9.5	38.9	54.2	73.9	19.7	126	133	
Hori.	12310.000	PK	44.3	39.5	10.8	39.3	55.3	73.9	18.6	100	0	
Hori.	2483.500	AV	37.4	27.5	14.3	41.4	37.8	53.9	16.1	100	246	
Hori.	4924.000	AV	42.2	31.5	6.9	41.0	39.6	53.9	14.3	105	169	
Hori.	7386.000	AV	38.2	36.7	8.7	41.5	42.1	53.9	11.8	100	0	
Hori.	9848.000	AV	35.5	38.9	9.5	38.9	45.0	53.9	8.9	126	133	
Hori.	12310.000	AV	35.6	39.5	10.8	39.3	46.6	53.9	7.3	100	0	
Vert.	2483.500	PK	46.4	27.5	14.3	41.4	46.8	73.9	27.1	121	266	
Vert.	4924.000	PK	49.0	31.5	6.9	41.0	46.4	73.9	27.5	100	207	
Vert.	7386.000	PK	47.7	36.7	8.7	41.5	51.6	73.9	22.3	100	0	
Vert.	9848.000	PK	44.8	38.9	9.5	38.9	54.3	73.9	19.6	142	215	
Vert.	12310.000	PK	44.4	39.5	10.8	39.3	55.4	73.9	18.5	100	0	
Vert.	2483.500	AV	37.7	27.5	14.3	41.4	38.1	53.9	15.8	121	266	
Vert.	4924.000	AV	41.6	31.5	6.9	41.0	39.0	53.9	14.9	100	207	
Vert.	7386.000	AV	38.5	36.7	8.7	41.5	42.4	53.9	11.5	100	0	
Vert.	9848.000	AV	35.4	38.9	9.5	38.9	44.9	53.9	9.0	142	215	
Vert.	12310.000	AV	35.6	39.5	10.8	39.3	46.6	53.9	7.3	100	0	

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

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date October 22, 2012 October 23, 2012
 Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
 Engineer Shinichi Takano Hikaru Shirasawa
 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.	2390.000	PK	52.8	27.4	14.2	41.4	53.0	73.9	20.9	100	259	
Hori.	4824.000	PK	47.2	31.1	6.8	41.2	43.9	73.9	30.0	100	226	
Hori.	7236.000	PK	47.3	36.6	8.5	41.4	51.0	73.9	22.9	100	0	
Hori.	9648.000	PK	43.0	38.6	9.4	38.9	52.1	73.9	21.8	100	0	
Hori.	12060.000	PK	46.9	39.5	10.7	39.4	57.7	73.9	16.2	100	0	
Hori.	2390.000	AV	40.5	27.4	14.2	41.4	40.7	53.9	13.2	100	259	
Hori.	4824.000	AV	37.8	31.1	6.8	41.2	34.5	53.9	19.4	100	226	
Hori.	7236.000	AV	38.4	36.6	8.5	41.4	42.1	53.9	11.8	100	0	
Hori.	9648.000	AV	34.8	38.6	9.4	38.9	43.9	53.9	10.0	100	0	
Hori.	12060.000	AV	35.8	39.5	10.7	39.4	46.6	53.9	7.3	100	0	
Vert.	2390.000	PK	51.1	27.4	14.2	41.4	51.3	73.9	22.6	100	244	
Vert.	4824.000	PK	46.3	31.1	6.8	41.2	43.0	73.9	30.9	100	341	
Vert.	7236.000	PK	47.7	36.6	8.5	41.4	51.4	73.9	22.5	100	0	
Vert.	9648.000	PK	43.9	38.6	9.4	38.9	53.0	73.9	20.9	100	0	
Vert.	12060.000	PK	47.3	39.5	10.7	39.4	58.1	73.9	15.8	100	0	
Vert.	2390.000	AV	40.6	27.4	14.2	41.4	40.8	53.9	13.1	100	244	
Vert.	4824.000	AV	38.0	31.1	6.8	41.2	34.7	53.9	19.2	100	341	
Vert.	7236.000	AV	38.1	36.6	8.5	41.4	41.8	53.9	12.1	100	0	
Vert.	9648.000	AV	34.4	38.6	9.4	38.9	43.5	53.9	10.4	100	0	
Vert.	12060.000	AV	35.4	39.5	10.7	39.4	46.2	53.9	7.7	100	0	

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	87.3	27.5	14.2	41.4	87.6	-	-	Carrier
Hori.	2400.000	PK	56.6	27.4	14.2	41.4	56.8	67.6	10.8	
Vert.	2412.000	PK	87.9	27.5	14.2	41.4	88.2	-	-	Carrier
Vert.	2400.000	PK	56.5	27.4	14.2	41.4	56.7	68.2	11.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date October 22, 2012 October 23, 2012
Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
Engineer Shinichi Takano Hikaru Shirasawa
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.	960.000	QP	28.8	23.0	10.9	30.6	32.1	46.0	13.9	100	17	
Hori.	4874.000	PK	46.5	31.3	6.9	41.1	43.6	73.9	30.3	108	84	
Hori.	7311.000	PK	47.7	36.6	8.6	41.4	51.5	73.9	22.4	100	0	
Hori.	9748.000	PK	44.1	38.7	9.5	38.9	53.4	73.9	20.5	100	0	
Hori.	12185.000	PK	45.1	39.5	10.7	39.3	56.0	73.9	17.9	100	0	
Hori.	4874.000	AV	38.1	31.3	6.9	41.1	35.2	53.9	18.7	108	84	
Hori.	7311.000	AV	37.2	36.6	8.6	41.4	41.0	53.9	12.9	100	0	
Hori.	9748.000	AV	34.5	38.7	9.5	38.9	43.8	53.9	10.1	100	0	
Hori.	12185.000	AV	35.5	39.5	10.7	39.3	46.4	53.9	7.5	100	0	
Vert.	180.003	QP	34.6	15.8	7.8	32.1	26.1	43.5	17.4	100	344	
Vert.	960.000	QP	30.3	23.0	10.9	30.6	33.6	46.0	12.4	119	96	
Vert.	4874.000	PK	47.6	31.3	6.9	41.1	44.7	73.9	29.2	100	334	
Vert.	7311.000	PK	47.3	36.6	8.6	41.4	51.1	73.9	22.8	100	0	
Vert.	9748.000	PK	43.2	38.7	9.5	38.9	52.5	73.9	21.4	100	0	
Vert.	12185.000	PK	44.7	39.5	10.7	39.3	55.6	73.9	18.3	100	0	
Vert.	4874.000	AV	38.0	31.3	6.9	41.1	35.1	53.9	18.8	100	334	
Vert.	7311.000	AV	37.7	36.6	8.6	41.4	41.5	53.9	12.4	100	0	
Vert.	9748.000	AV	34.8	38.7	9.5	38.9	44.1	53.9	9.8	100	0	
Vert.	12185.000	AV	35.3	39.5	10.7	39.3	46.2	53.9	7.7	100	0	

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

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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date October 22, 2012 October 23, 2012 October 23, 2012
Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH 25 deg.C , 57%RH
Engineer Shinichi Takano Hikaru Shirasawa 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	50.9	27.5	14.3	41.4	51.3	73.9	22.6	100	238	
Hori.	4924.000	PK	47.2	31.5	6.9	41.0	44.6	73.9	29.3	105	127	
Hori.	7386.000	PK	47.7	36.7	8.7	41.5	51.6	73.9	22.3	100	0	
Hori.	9848.000	PK	44.6	38.9	9.5	38.9	54.1	73.9	19.8	100	0	
Hori.	12310.000	PK	44.7	39.5	10.8	39.3	55.7	73.9	18.2	100	0	
Hori.	2483.500	AV	40.3	27.5	14.3	41.4	40.7	53.9	13.2	100	238	
Hori.	4924.000	AV	38.5	31.5	6.9	41.0	35.9	53.9	18.0	105	127	
Hori.	7386.000	AV	37.8	36.7	8.7	41.5	41.7	53.9	12.2	100	0	
Hori.	9848.000	AV	36.1	38.9	9.5	38.9	45.6	53.9	8.3	100	0	
Hori.	12310.000	AV	35.2	39.5	10.8	39.3	46.2	53.9	7.7	100	0	
Vert.	2483.500	PK	51.6	27.5	14.3	41.4	52.0	73.9	21.9	100	228	
Vert.	4924.000	PK	47.5	31.5	6.9	41.0	44.9	73.9	29.0	100	205	
Vert.	7386.000	PK	47.5	36.7	8.7	41.5	51.4	73.9	22.5	100	0	
Vert.	9848.000	PK	45.2	38.9	9.5	38.9	54.7	73.9	19.2	100	0	
Vert.	12310.000	PK	44.9	39.5	10.8	39.3	55.9	73.9	18.0	100	0	
Vert.	2483.500	AV	40.2	27.5	14.3	41.4	40.6	53.9	13.3	100	228	
Vert.	4924.000	AV	38.4	31.5	6.9	41.0	35.8	53.9	18.1	100	205	
Vert.	7386.000	AV	37.2	36.7	8.7	41.5	41.1	53.9	12.8	100	0	
Vert.	9848.000	AV	35.7	38.9	9.5	38.9	45.2	53.9	8.7	100	0	
Vert.	12310.000	AV	35.4	39.5	10.8	39.3	46.4	53.9	7.5	100	0	

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

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date October 22, 2012 October 23, 2012
Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
Engineer Shinichi Takano Hikaru Shirasawa
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	54.4	27.4	14.2	41.4	54.6	73.9	19.3	100	263	
Hori.	4824.000	PK	46.6	31.1	6.8	41.2	43.3	73.9	30.6	100	67	
Hori.	7236.000	PK	47.3	36.6	8.5	41.4	51.0	73.9	22.9	100	0	
Hori.	9648.000	PK	43.5	38.6	9.4	38.9	52.6	73.9	21.3	100	0	
Hori.	12060.000	PK	44.9	39.5	10.7	39.4	55.7	73.9	18.2	100	0	
Hori.	2390.000	AV	39.9	27.4	14.2	41.4	40.1	53.9	13.8	100	263	
Hori.	4824.000	AV	38.1	31.1	6.8	41.2	34.8	53.9	19.1	100	67	
Hori.	7236.000	AV	38.5	36.6	8.5	41.4	42.2	53.9	11.7	100	0	
Hori.	9648.000	AV	35.1	38.6	9.4	38.9	44.2	53.9	9.7	100	0	
Hori.	12060.000	AV	35.9	39.5	10.7	39.4	46.7	53.9	7.2	100	0	
Vert.	2390.000	PK	53.1	27.4	14.2	41.4	53.3	73.9	20.6	100	232	
Vert.	4824.000	PK	47.6	31.1	6.8	41.2	44.3	73.9	29.6	104	340	
Vert.	7236.000	PK	47.4	36.6	8.5	41.4	51.1	73.9	22.8	100	0	
Vert.	9648.000	PK	43.9	38.6	9.4	38.9	53.0	73.9	20.9	100	0	
Vert.	12060.000	PK	45.3	39.5	10.7	39.4	56.1	73.9	17.8	100	0	
Vert.	2390.000	AV	39.7	27.4	14.2	41.4	39.9	53.9	14.0	100	232	
Vert.	4824.000	AV	38.1	31.1	6.8	41.2	34.8	53.9	19.1	104	340	
Vert.	7236.000	AV	38.2	36.6	8.5	41.4	41.9	53.9	12.0	100	0	
Vert.	9648.000	AV	34.5	38.6	9.4	38.9	43.6	53.9	10.3	100	0	
Vert.	12060.000	AV	35.3	39.5	10.7	39.4	46.1	53.9	7.8	100	0	

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	85.7	27.5	14.2	41.4	86.0	-	-	Carrier
Hori.	2400.000	PK	56.4	27.4	14.2	41.4	56.6	66.0	9.4	
Vert.	2412.000	PK	84.8	27.5	14.2	41.4	85.1	-	-	Carrier
Vert.	2400.000	PK	55.5	27.4	14.2	41.4	55.7	65.1	9.4	

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

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Shonan EMC Lab.

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Telephone : +81 463 50 6400

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date October 22, 2012 October 23, 2012
 Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
 Engineer Shinichi Takano Hikaru Shirasawa
 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	47.7	31.3	6.9	41.1	44.8	73.9	29.1	100	123	
Hori.	7311.000	PK	47.5	36.6	8.6	41.4	51.3	73.9	22.6	100	0	
Hori.	9748.000	PK	44.1	38.7	9.5	38.9	53.4	73.9	20.5	100	0	
Hori.	12185.000	PK	45.1	39.5	10.7	39.3	56.0	73.9	17.9	100	0	
Hori.	4874.000	AV	37.9	31.3	6.9	41.1	35.0	53.9	18.9	100	123	
Hori.	7311.000	AV	38.7	36.6	8.6	41.4	42.5	53.9	11.4	100	0	
Hori.	9748.000	AV	34.7	38.7	9.5	38.9	44.0	53.9	9.9	100	0	
Hori.	12185.000	AV	35.9	39.5	10.7	39.3	46.8	53.9	7.1	100	0	
Vert.	4874.000	PK	47.3	31.3	6.9	41.1	44.4	73.9	29.5	100	210	
Vert.	7311.000	PK	47.1	36.6	8.6	41.4	50.9	73.9	23.0	100	0	
Vert.	9748.000	PK	44.4	38.7	9.5	38.9	53.7	73.9	20.2	100	0	
Vert.	12185.000	PK	45.1	39.5	10.7	39.3	56.0	73.9	17.9	100	0	
Vert.	4874.000	AV	38.1	31.3	6.9	41.1	35.2	53.9	18.7	100	210	
Vert.	7311.000	AV	38.3	36.6	8.6	41.4	42.1	53.9	11.8	100	0	
Vert.	9748.000	AV	35.1	38.7	9.5	38.9	44.4	53.9	9.5	100	0	
Vert.	12185.000	AV	35.8	39.5	10.7	39.3	46.7	53.9	7.2	100	0	

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

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date October 22, 2012 October 23, 2012
 Temperature / Humidity 27 deg.C , 43%RH 25 deg.C , 57%RH
 Engineer Shinichi Takano Hikaru Shirasawa
 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	52.1	27.5	14.3	41.4	52.5	73.9	21.4	100	251	
Hori.	4924.000	PK	47.8	31.5	6.9	41.0	45.2	73.9	28.7	105	126	
Hori.	7386.000	PK	47.8	36.7	8.7	41.5	51.7	73.9	22.2	100	0	
Hori.	9848.000	PK	44.2	38.9	9.5	38.9	53.7	73.9	20.2	100	0	
Hori.	12310.000	PK	45.7	39.5	10.8	39.3	56.7	73.9	17.2	100	0	
Hori.	2483.500	AV	40.4	27.5	14.3	41.4	40.8	53.9	13.1	100	251	
Hori.	4924.000	AV	38.9	31.5	6.9	41.0	36.3	53.9	17.6	105	126	
Hori.	7386.000	AV	38.5	36.7	8.7	41.5	42.4	53.9	11.5	100	0	
Hori.	9848.000	AV	35.1	38.9	9.5	38.9	44.6	53.9	9.3	100	0	
Hori.	12310.000	AV	35.5	39.5	10.8	39.3	46.5	53.9	7.4	100	0	
Vert.	2483.500	PK	53.1	27.5	14.3	41.4	53.5	73.9	20.4	100	232	
Vert.	4924.000	PK	47.9	31.5	6.9	41.0	45.3	73.9	28.6	100	208	
Vert.	7386.000	PK	47.3	36.7	8.7	41.5	51.2	73.9	22.7	100	0	
Vert.	9848.000	PK	44.1	38.9	9.5	38.9	53.6	73.9	20.3	100	0	
Vert.	12310.000	PK	44.8	39.5	10.8	39.3	55.8	73.9	18.1	100	0	
Vert.	2483.500	AV	40.3	27.5	14.3	41.4	40.7	53.9	13.2	100	232	
Vert.	4924.000	AV	38.8	31.5	6.9	41.0	36.2	53.9	17.7	100	208	
Vert.	7386.000	AV	38.4	36.7	8.7	41.5	42.3	53.9	11.6	100	0	
Vert.	9848.000	AV	35.6	38.9	9.5	38.9	45.1	53.9	8.8	100	0	
Vert.	12310.000	AV	35.6	39.5	10.8	39.3	46.6	53.9	7.3	100	0	

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

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

Burst rate confirmation

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



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Shonan EMC Lab.

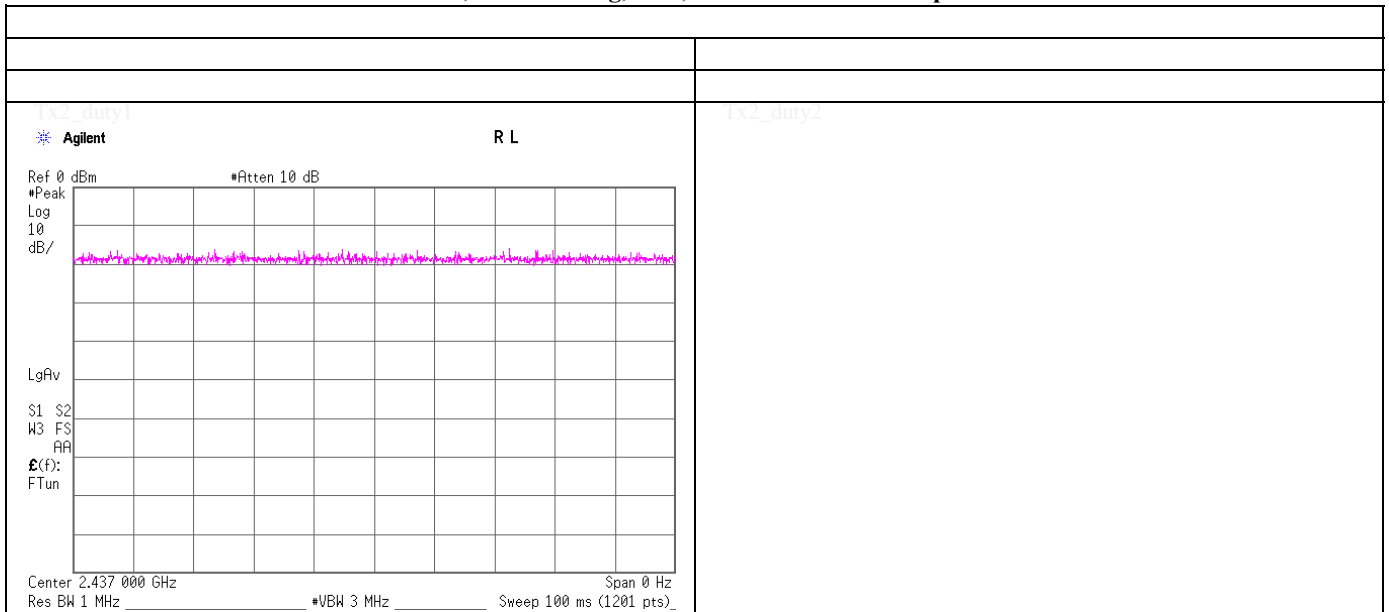
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Burst rate confirmation

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



UL Japan, Inc.

Shonan EMC Lab.

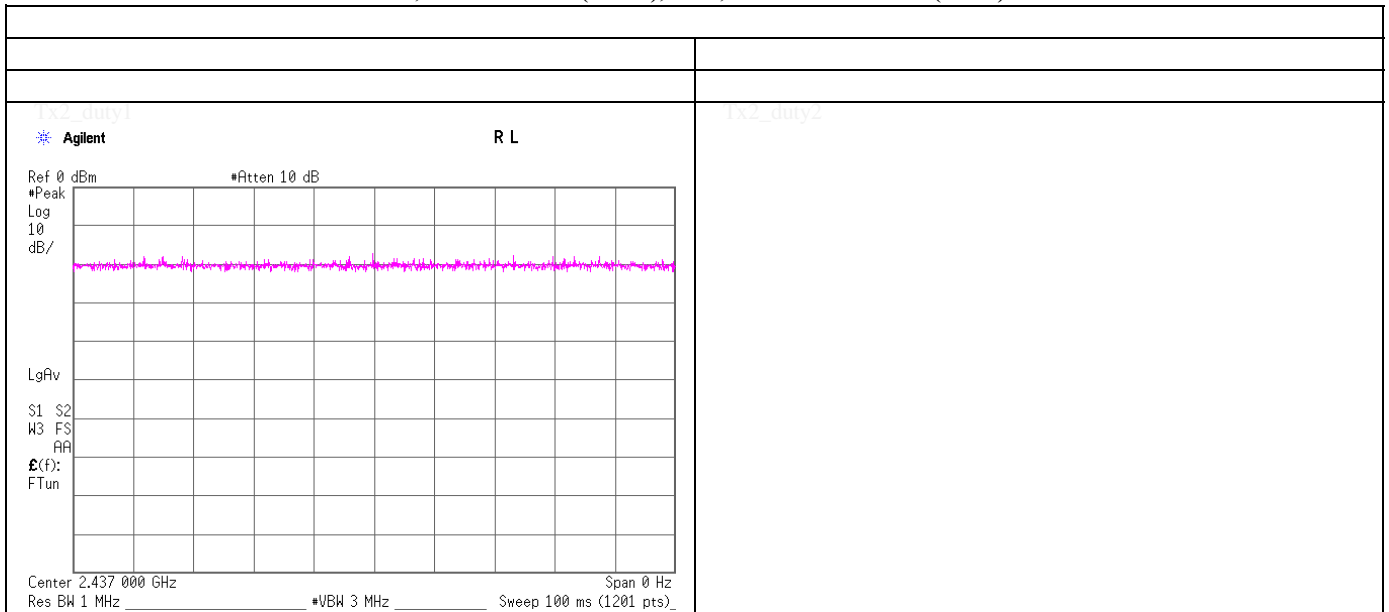
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Burst rate confirmation

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



UL Japan, Inc.

Shonan EMC Lab.

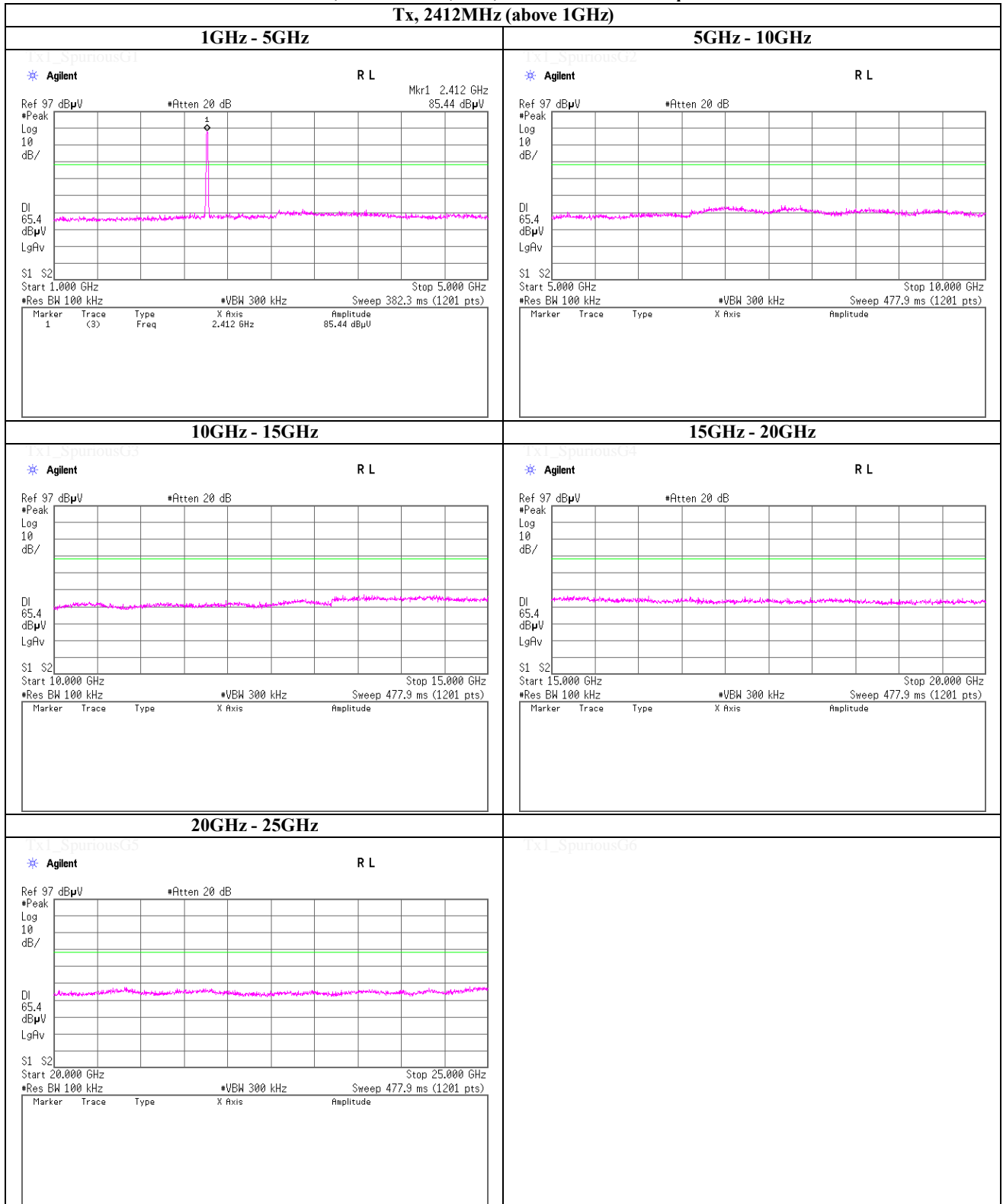
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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

Tx, 2412MHz (above 1GHz)

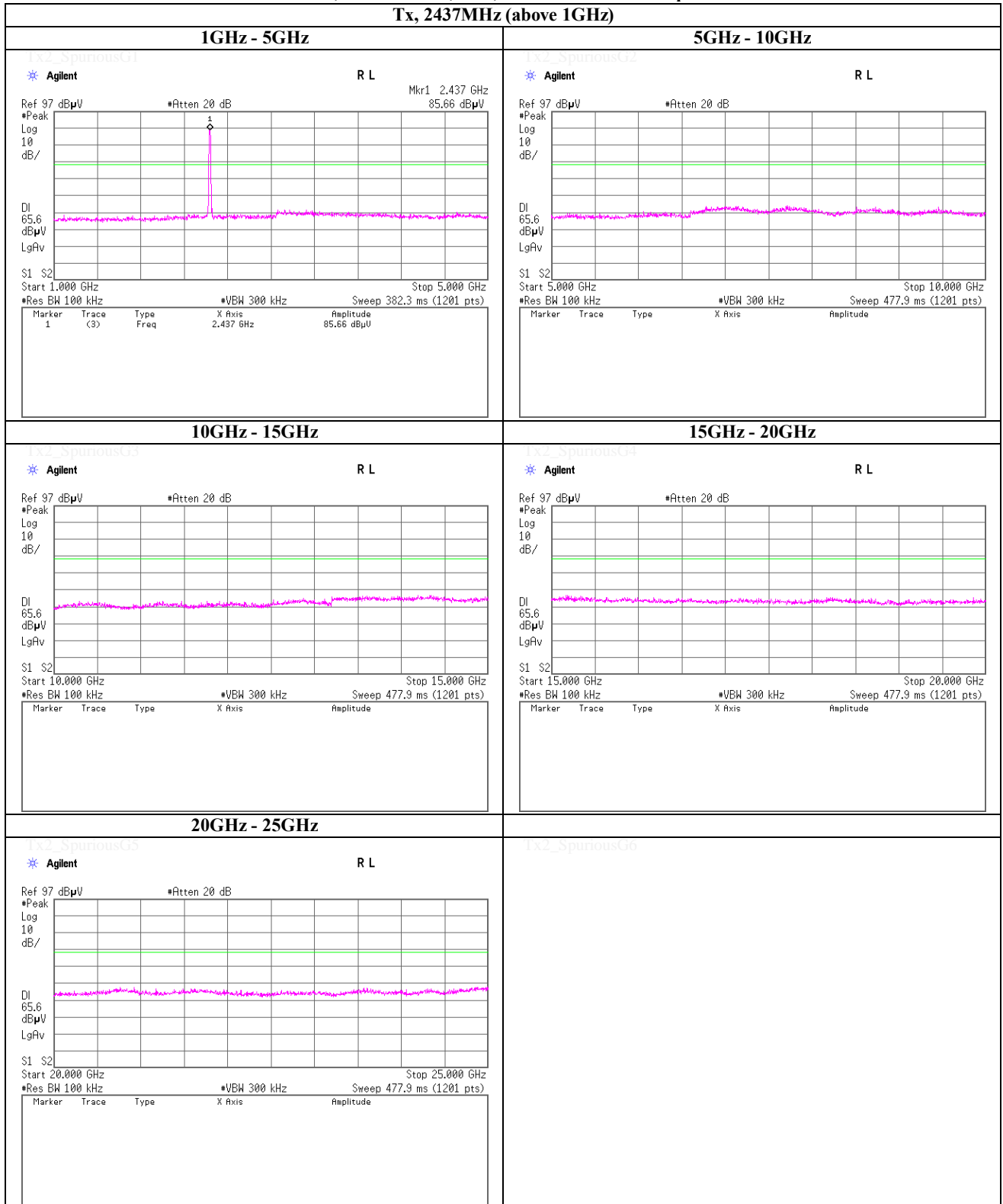


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Spurious emission (Conducted)

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

Tx, 2437MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

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

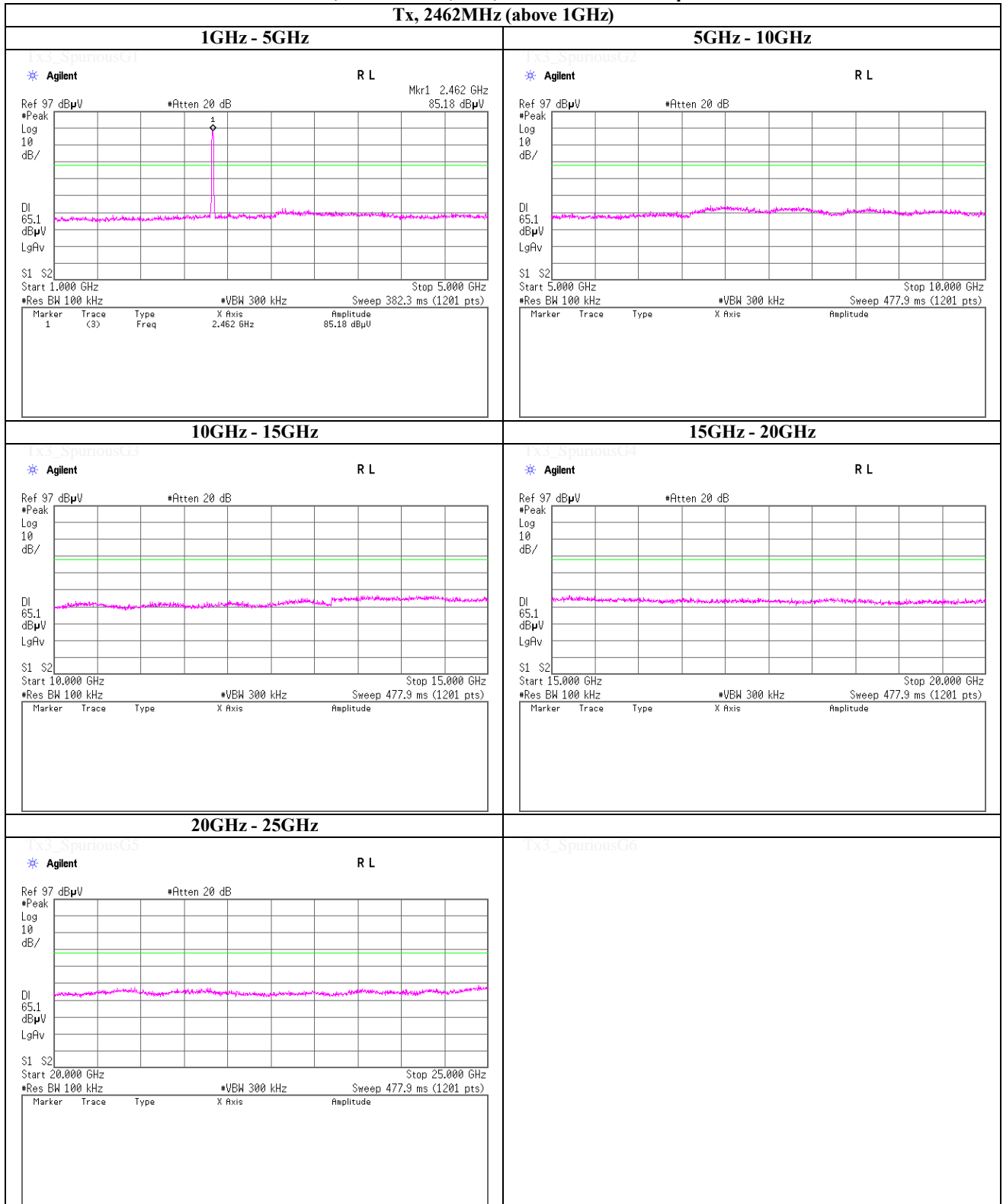
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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

Tx, 2462MHz (above 1GHz)



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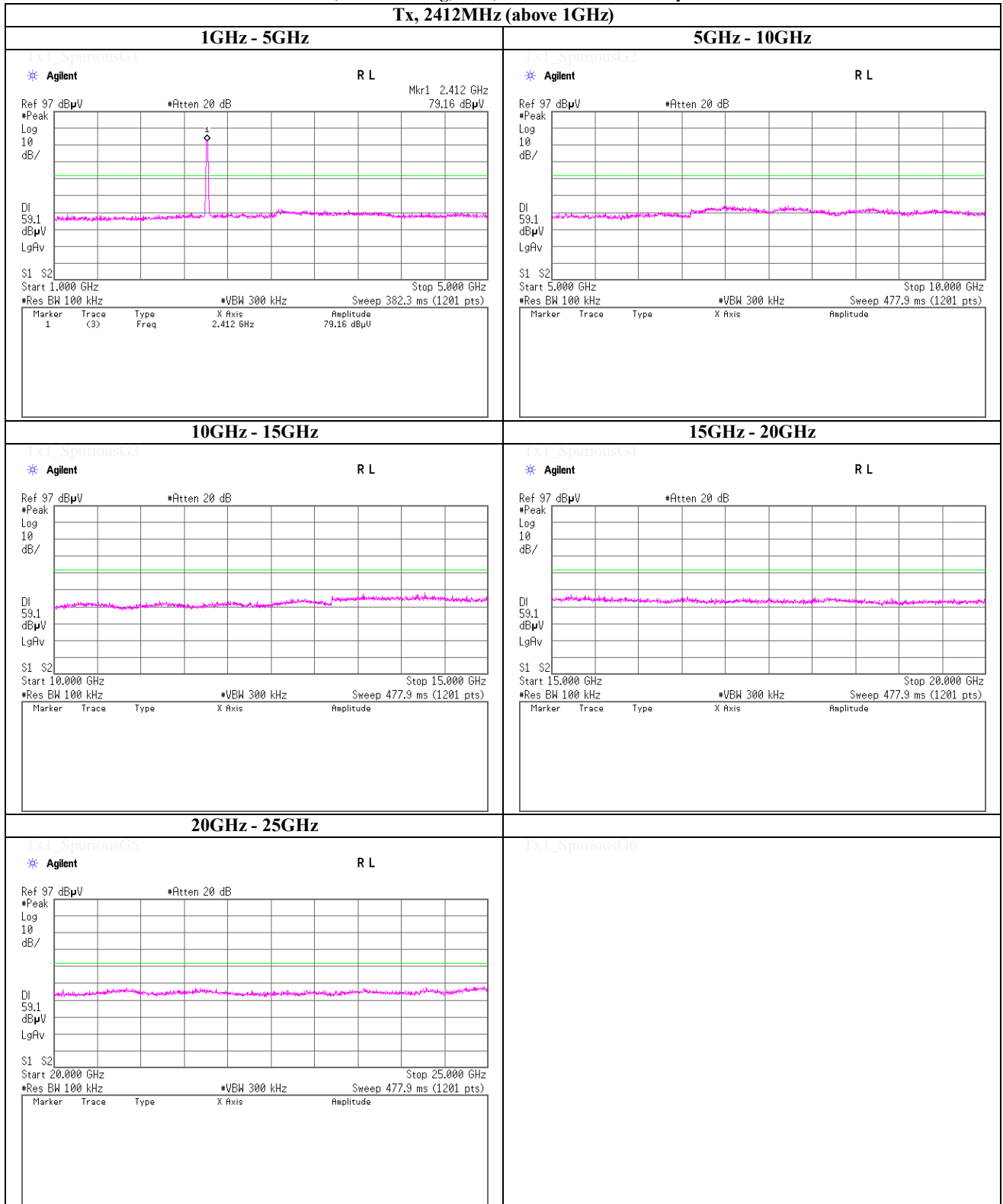
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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

Tx, 2412MHz (above 1GHz)



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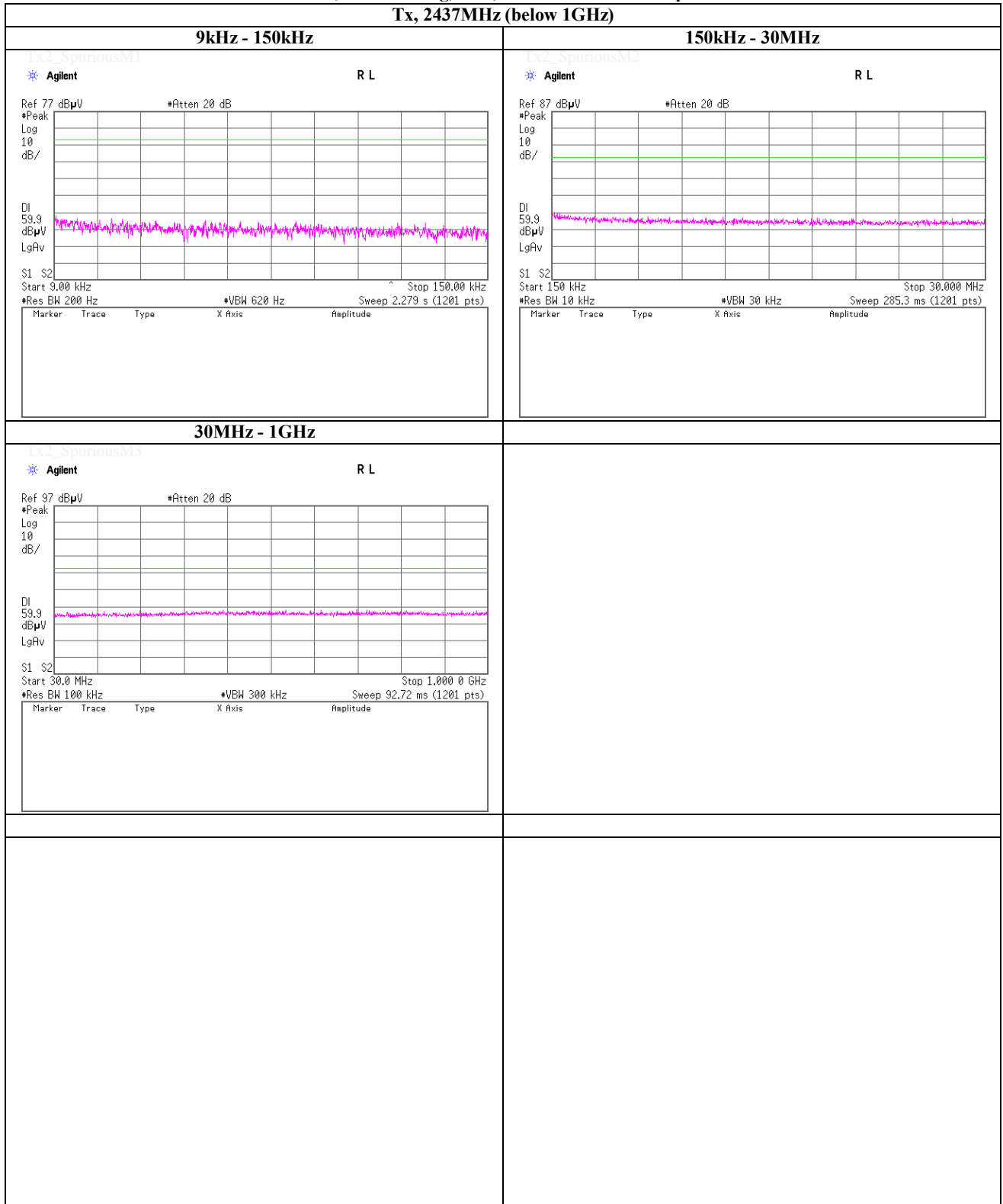
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

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Spurious emission (Conducted)
Tx, IEEE802.11g, PN9, worst data mode 6Mbps

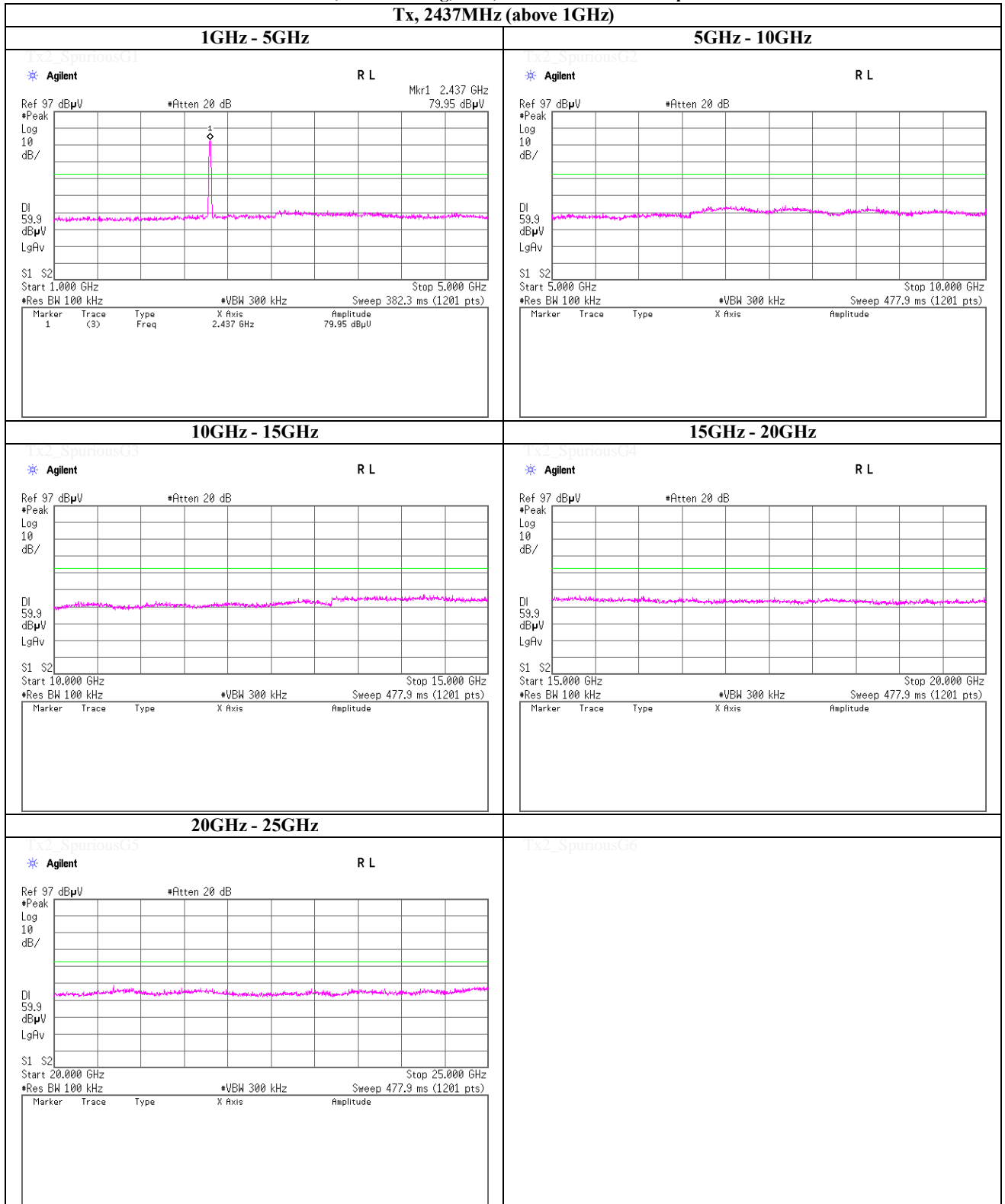
Tx, 2437MHz (below 1GHz)



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Spurious emission (Conducted)
Tx, IEEE802.11g, PN9, worst data mode 6Mbps

Tx, 2437MHz (above 1GHz)

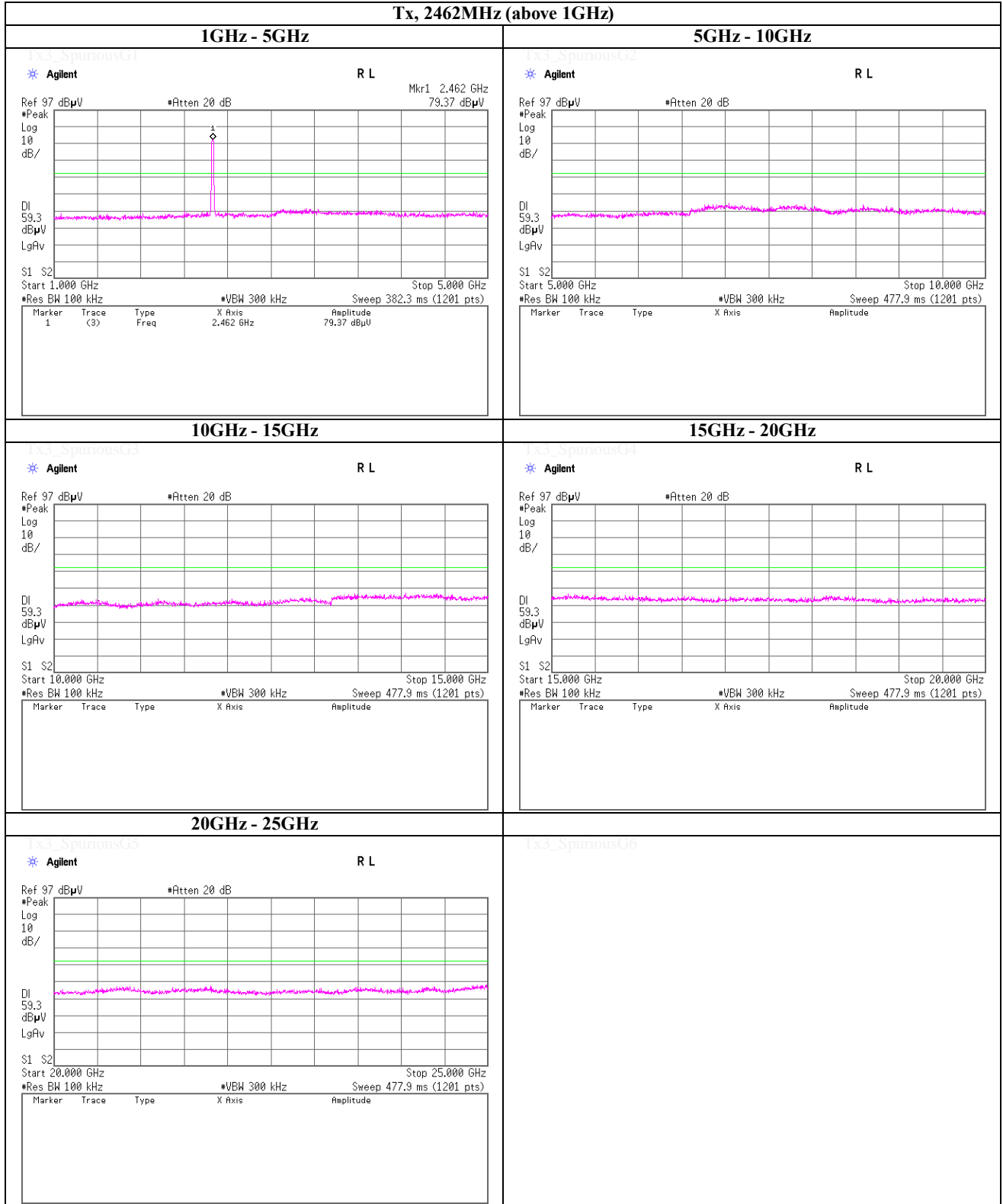


UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
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Spurious emission (Conducted)

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

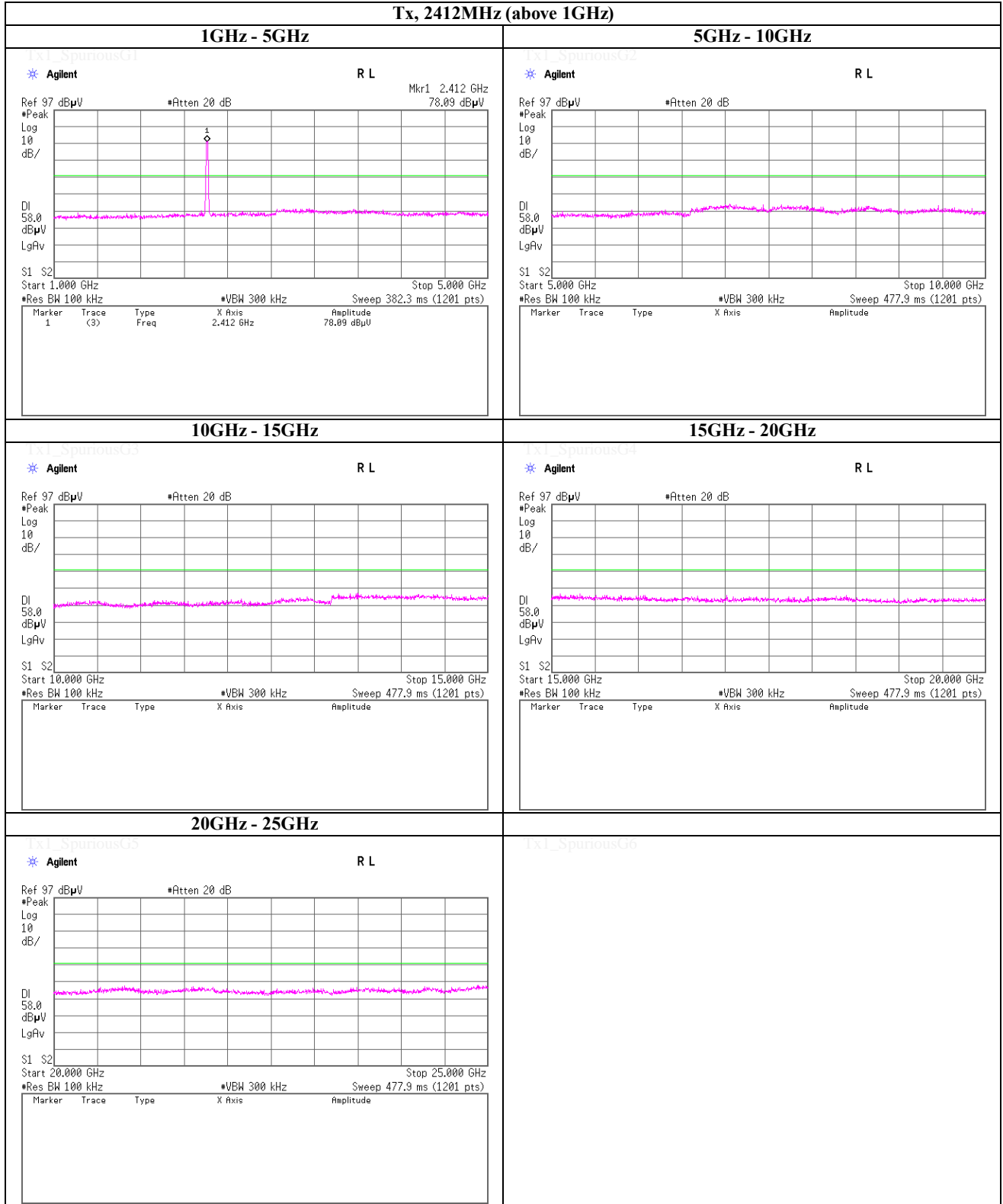
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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

Tx, 2412MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

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

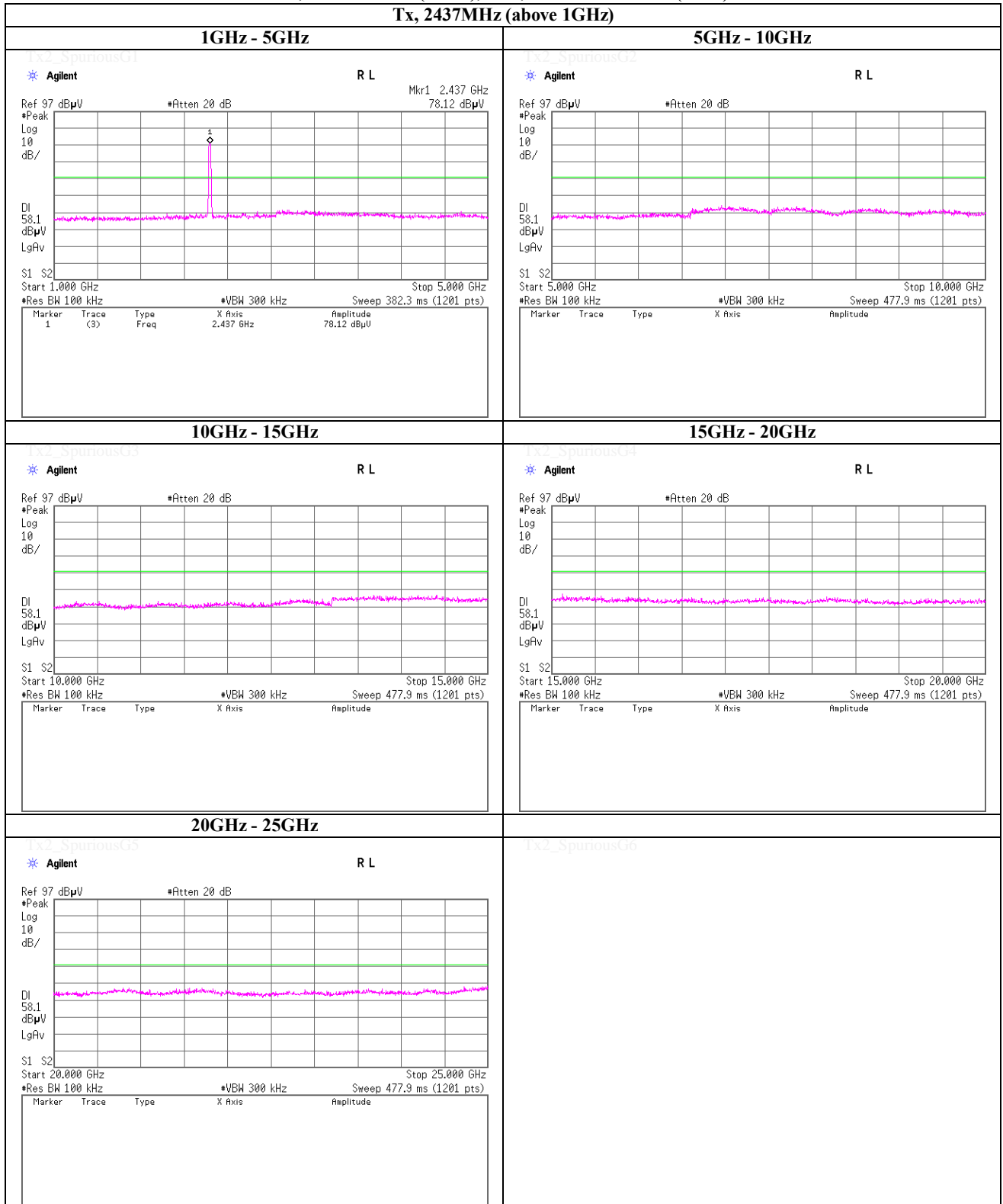
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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

Tx, 2437MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

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

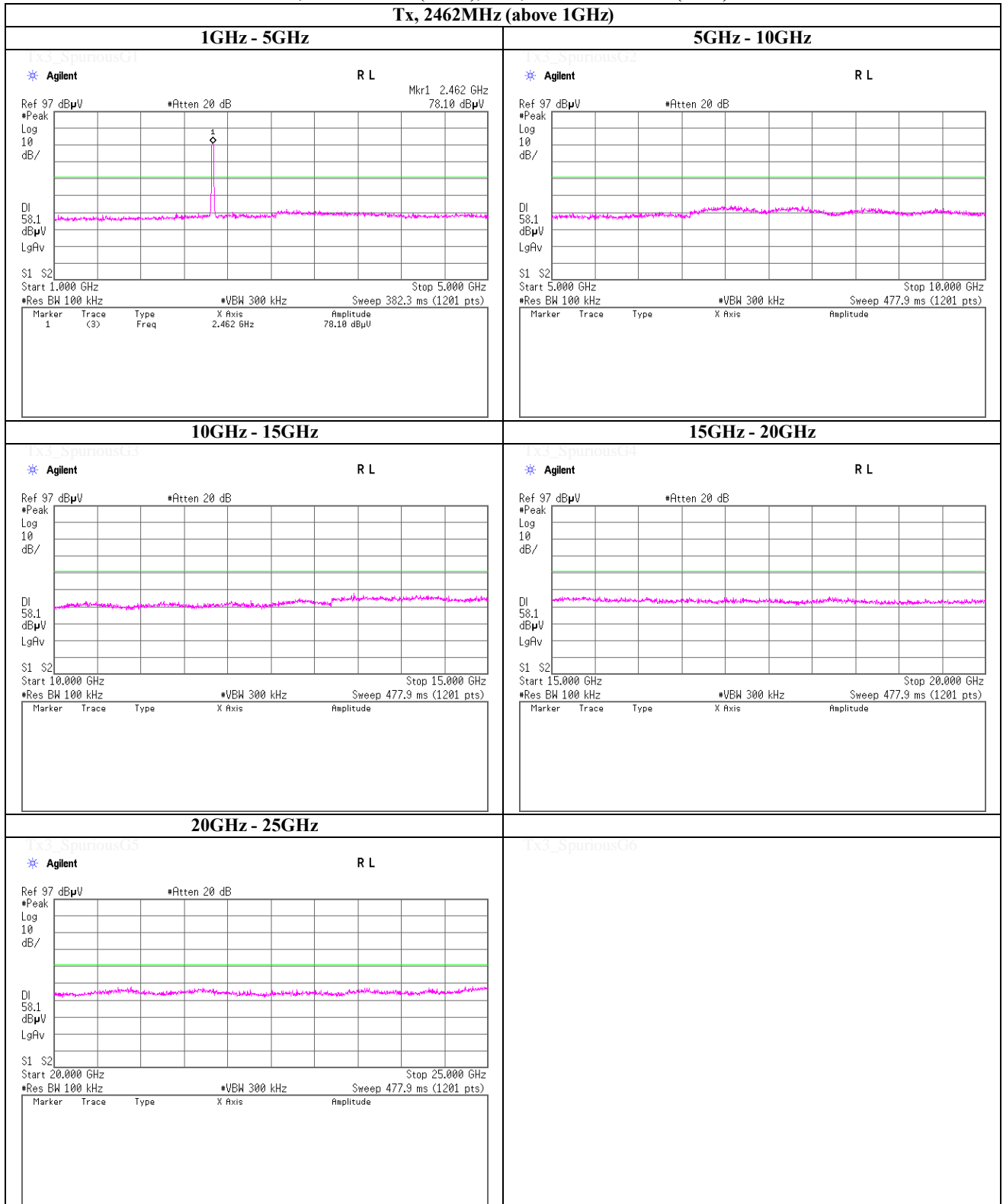
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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

Tx, 2462MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

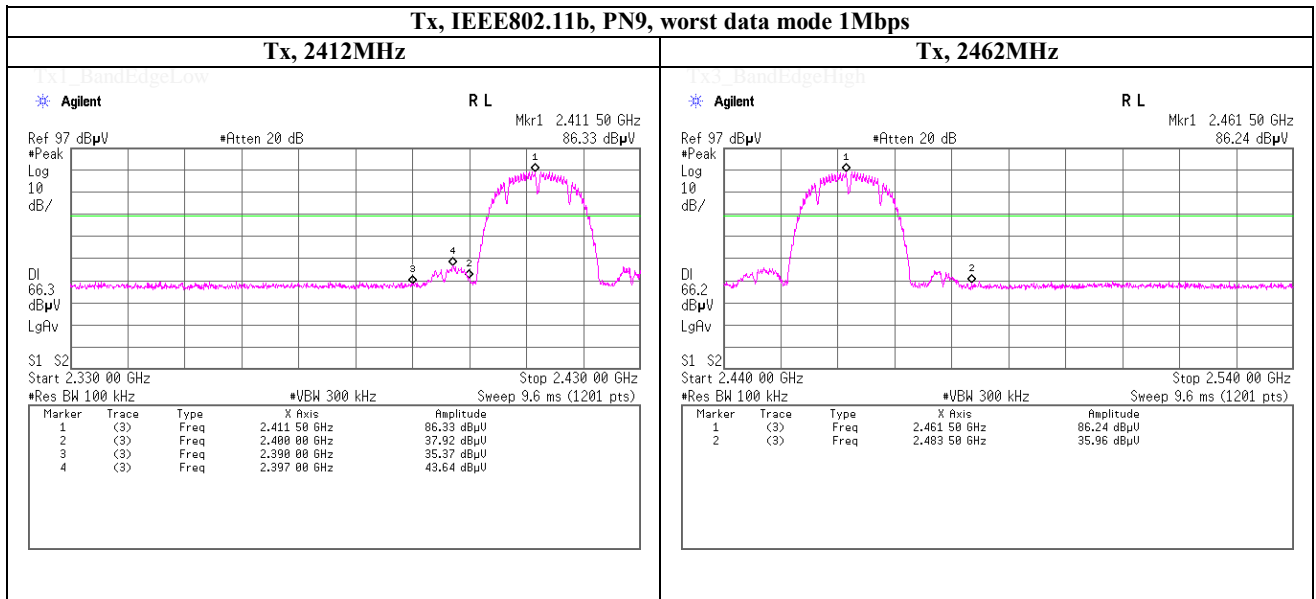
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Band Edge compliance



UL Japan, Inc.

Shonan EMC Lab.

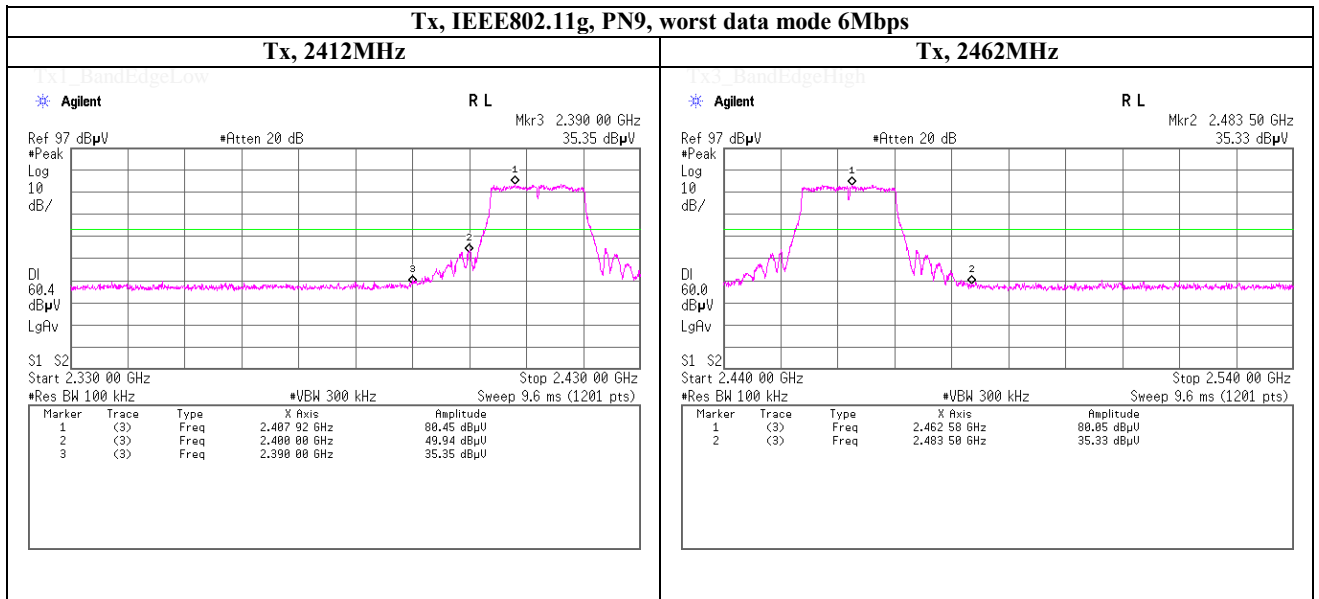
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Band Edge compliance



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Shonan EMC Lab.

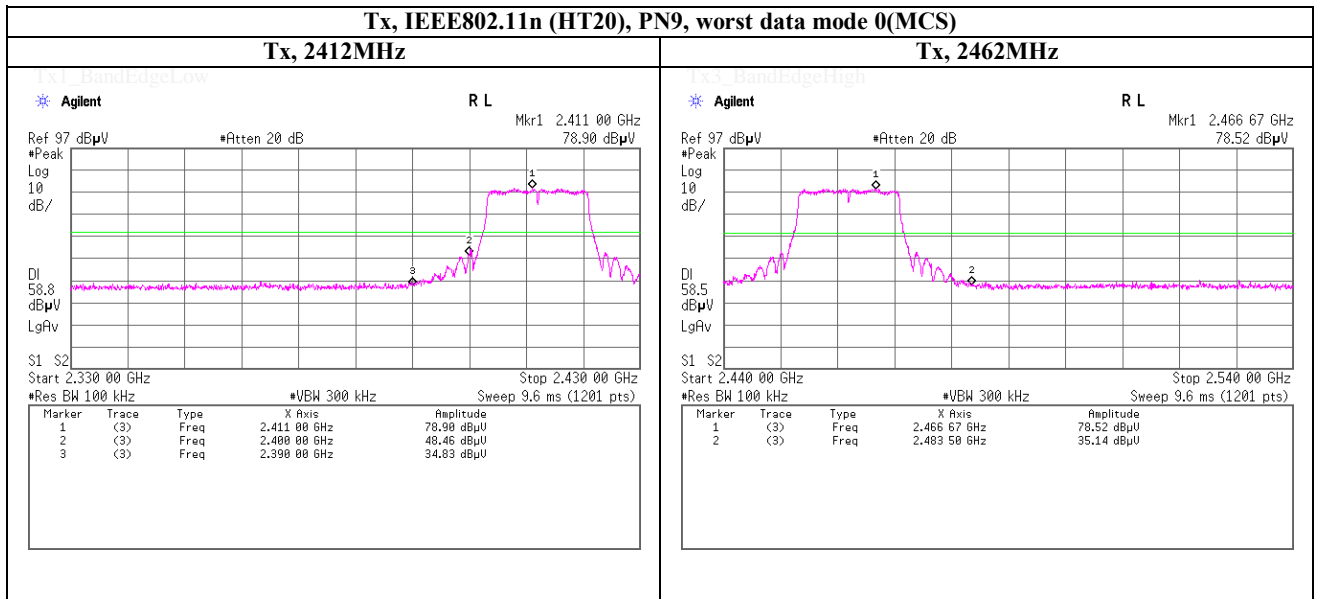
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Spurious emission (Conducted)

Band Edge compliance



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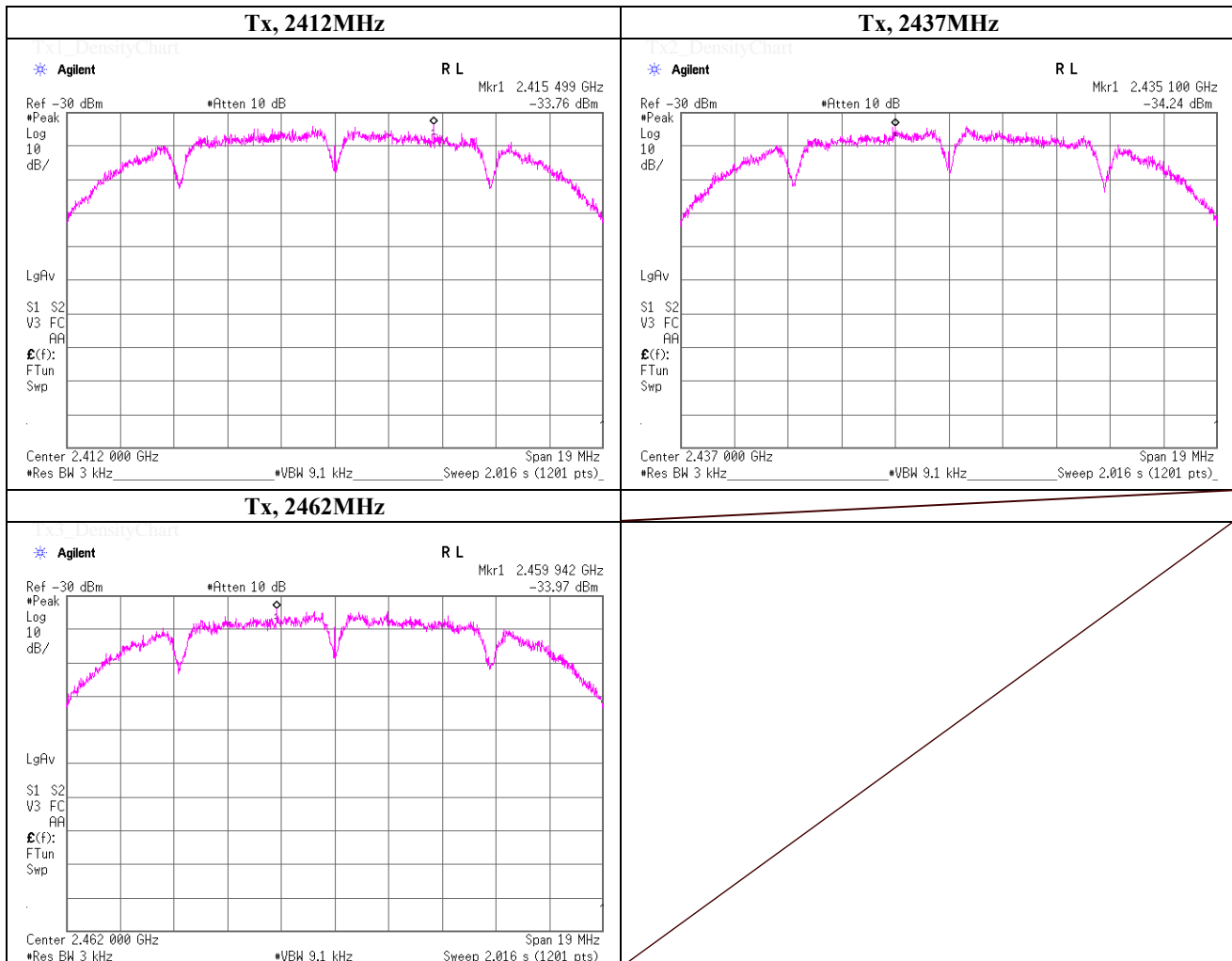
Facsimile : +81 463 50 6401

Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
Mode	Tx, IEEE802.11b, PN9, worst data mode 1Mbps	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2415.50	-33.76	2.24	20.15	-11.37	8.00	19.37
2437.0000	2435.10	-34.24	2.24	20.15	-11.85	8.00	19.85
2462.0000	2459.94	-33.97	2.24	20.15	-11.58	8.00	19.58

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



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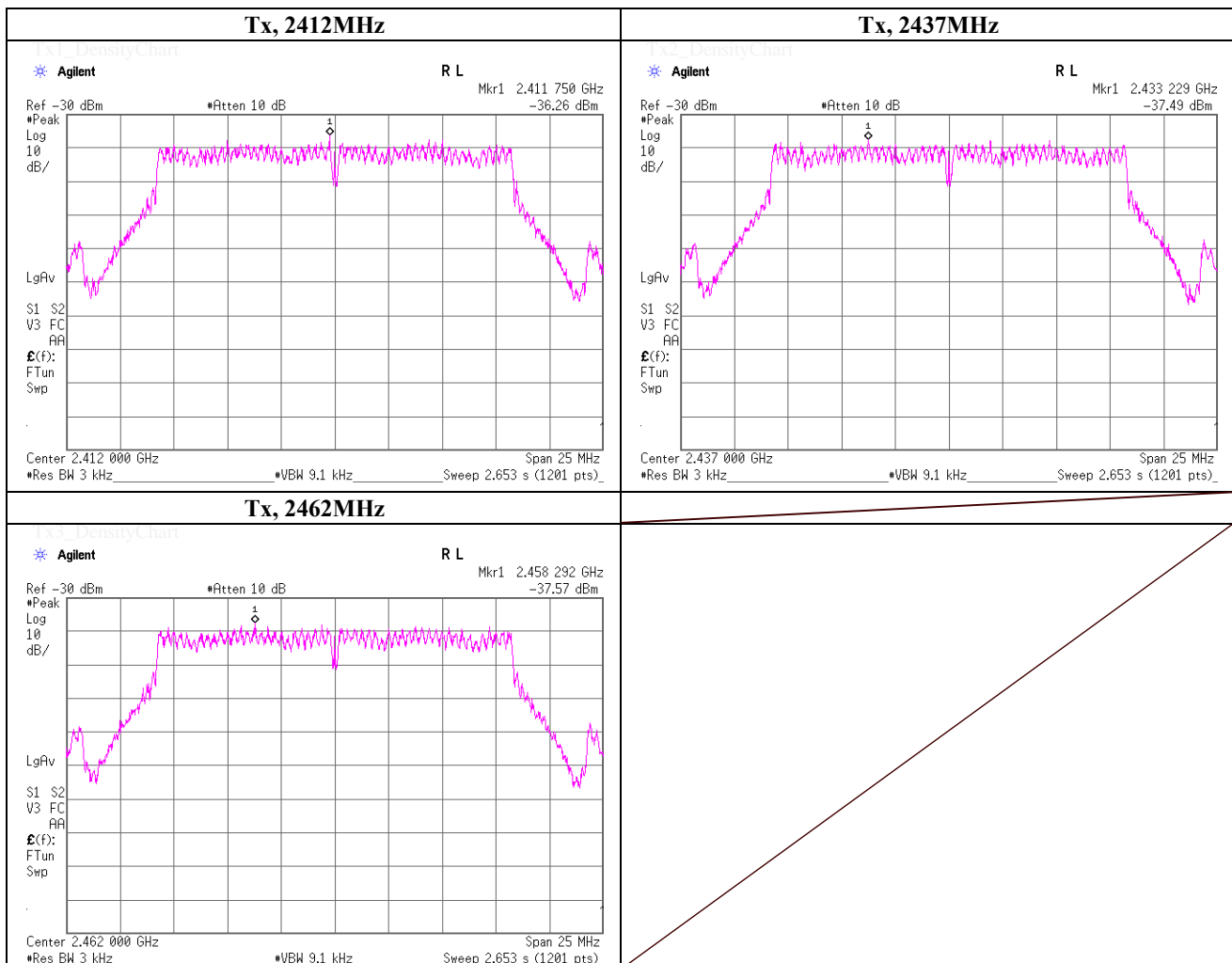
Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
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	2411.75	-36.26	2.24	20.15	-13.87	8.00	21.87
2437.0000	2433.23	-37.49	2.24	20.15	-15.10	8.00	23.10
2462.0000	2458.29	-37.57	2.24	20.15	-15.18	8.00	23.18

Sample Calculation:

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



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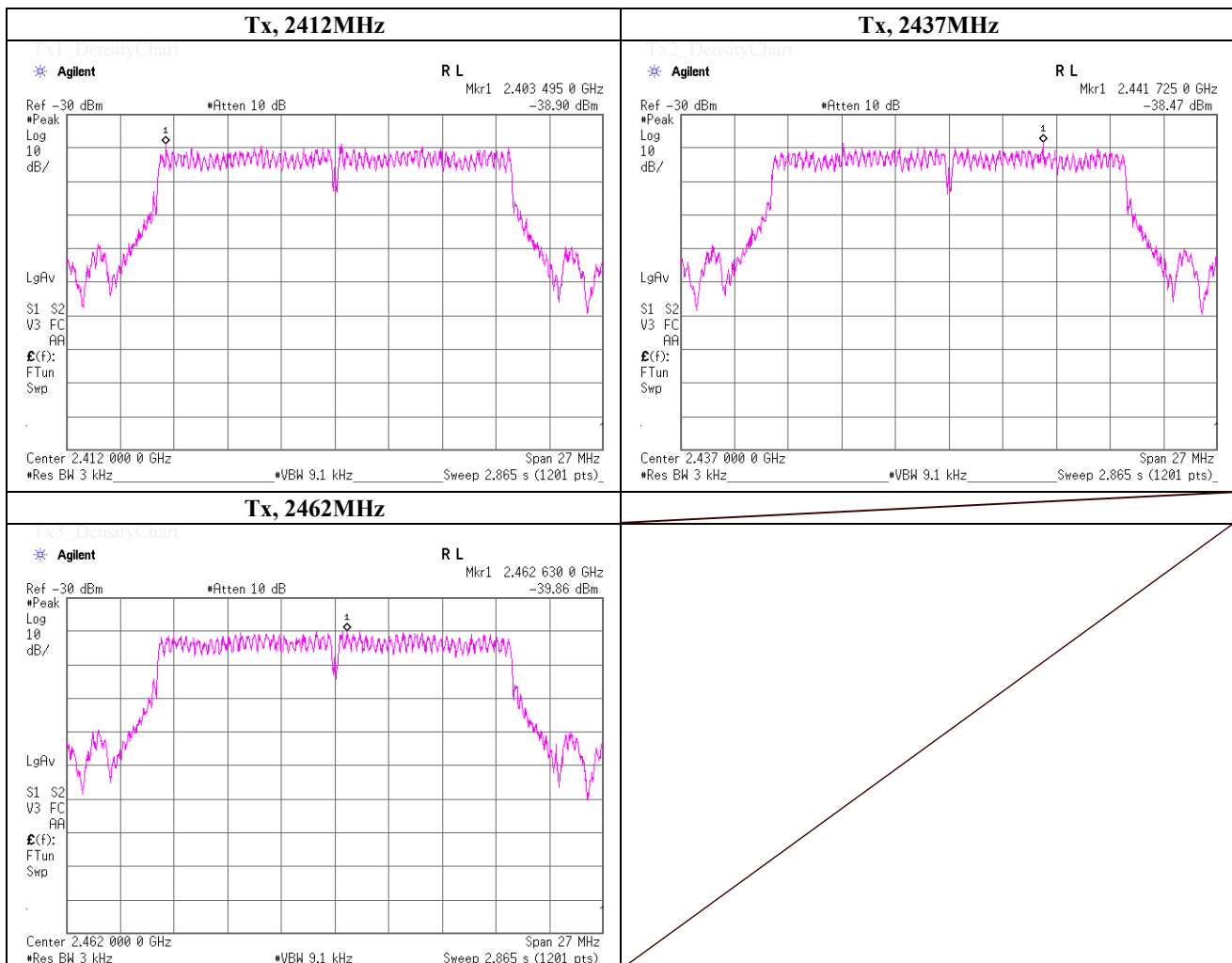
Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 11, 2012	
Temperature / Humidity	24deg.C , 55%RH	
Engineer	Shinichi Takano	
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	2403.50	-38.90	2.24	20.15	-16.51	8.00	24.51
2437.0000	2441.73	-38.47	2.24	20.15	-16.08	8.00	24.08
2462.0000	2462.63	-39.86	2.24	20.15	-17.47	8.00	25.47

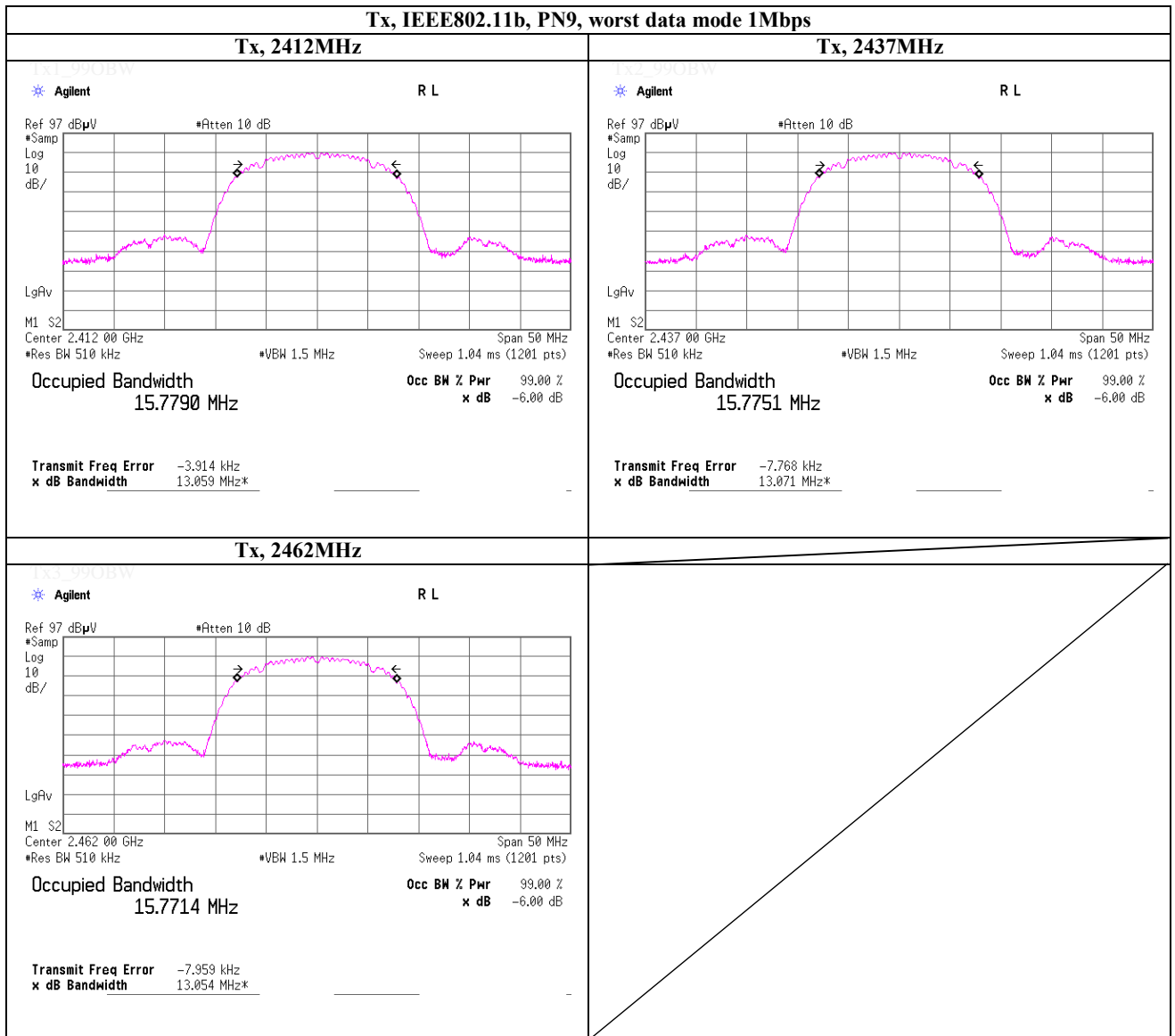
Sample Calculation:

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



UL Japan, Inc.
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99% Occupied Bandwidth



UL Japan, Inc.

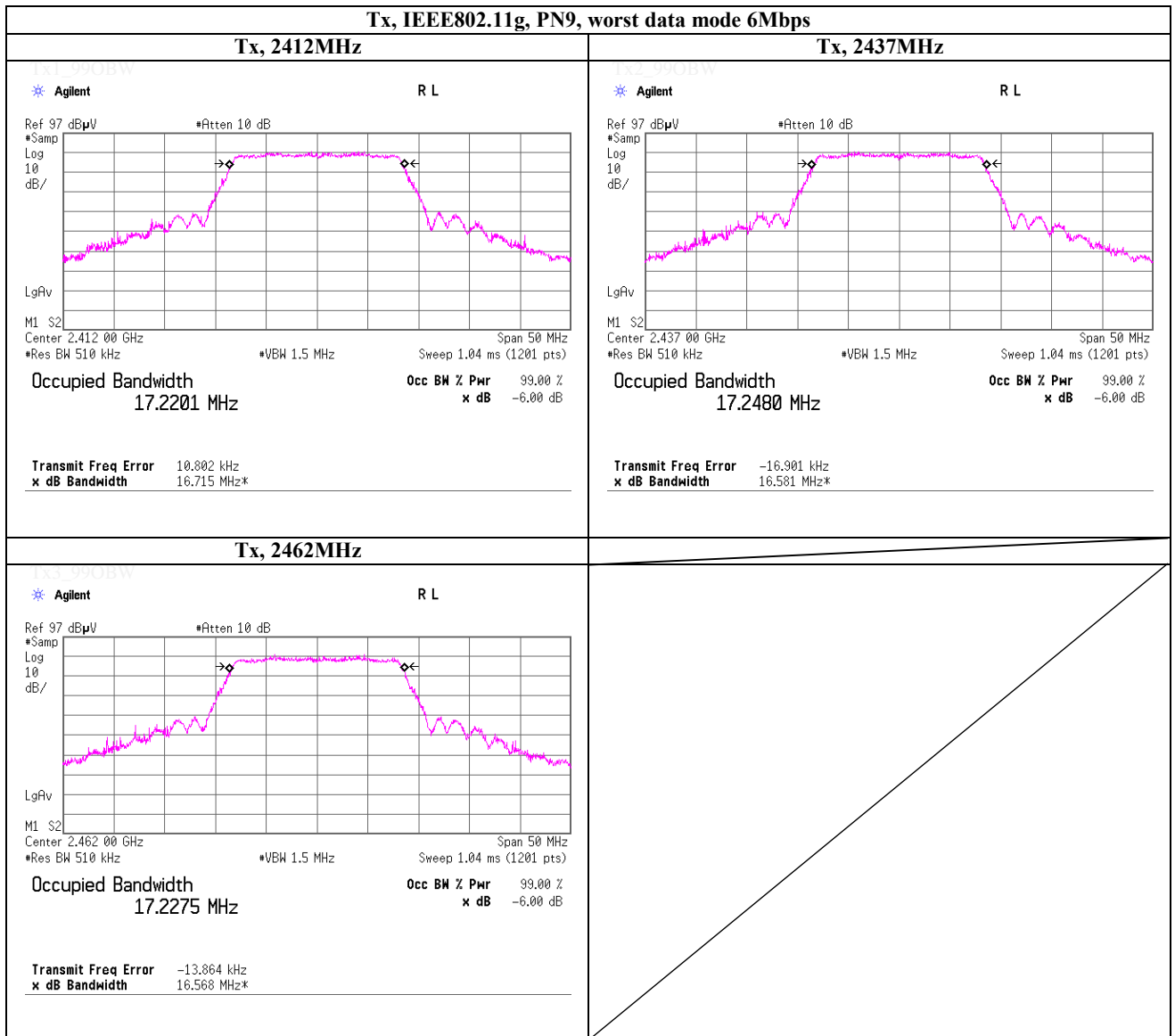
Shonan EMC Lab.

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99% Occupied Bandwidth



UL Japan, Inc.

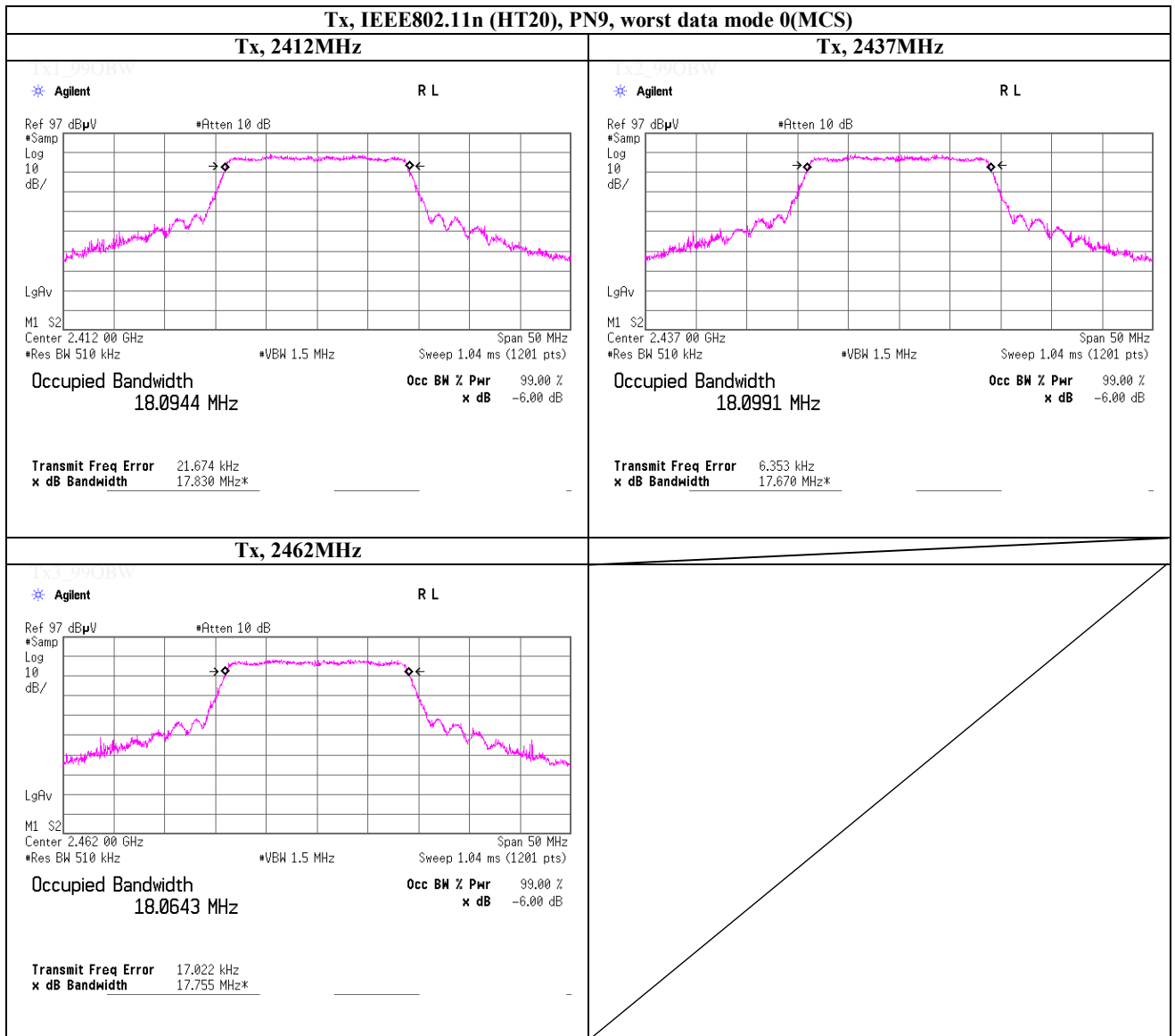
Shonan EMC Lab.

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99% Occupied Bandwidth



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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)
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2012/04/19 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2012/04/19 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2012/03/12 * 12
SAT20-03	Attenuator	Agilent	8493C-020	74891	AT	2012/03/12 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2011/12/05 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2012/03/16 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2012/03/26 * 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	2012/04/10 * 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	2012/02/06 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2012/02/16 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE,CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE,CE	-
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2011/12/27 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2011/12/27 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2012/03/30 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2012/03/12 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2012/03/12 * 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	2012/10/08 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/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	2012/10/08 * 12
STR-03	Test Receiver	Rohde & Schwarz	ES140	100054/040	RE,CE	2012/06/14 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2012/04/10 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2012/02/23 * 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 conducted test