



RADIO TEST REPORT

Test Report No.: 10420214S-D

Applicant : Canon Inc.
Type of Equipment : Wireless LAN Module
Model No. : K30365
FCC ID : AZDK30365
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: July 28 to August 13, 2014

Tested by:

S. Takano

Shinichi Takano
Engineer
Consumer Technology Division

Approved by :

U. Isozaki

Ichiro Isozaki
Leader
Consumer Technology Division



- ☐ 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

REVISION HISTORY

Original Test Report No.: 10420214S-D

[illegible]

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SECTION 1: Customer information

Company Name : Canon Inc.
Brand name : Canon
Address : 3-451 Tsukagoshi, Saiwai-ku, Kawasaki, kanagawa 212-8530 Japan
Telephone Number : +81-44-542-2111
Facsimile Number : +81-44-548-7513
Contact Person : Kenichi Nampei

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless LAN Module
Model Number : K30365
Serial Number : Refer to 4.2
Rating : DC3.3V
Country of Mass-production : Thailand, Vietnam
Condition of EUT : Engineering prototype
(Not for sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : July 28, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: K30365 (referred to as the EUT in this report) is a Wireless LAN Module.
The clock frequencies used in the EUT: 38.4MHz

Radio specification

Equipment type : Transceiver
Frequency of operation : 2412-2462MHz (IEEE 802.11b, 11g, 11n(HT20))
Bandwidth : 20MHz (IEEE 802.11b, 11g, 11n(HT20))
Channel spacing : 5MHz
Type of modulation : DSSS (IEEE 802.11b), OFDM (IEEE 802.11g/n)
Antenna type : Pattern antenna (meander)
Antenna connector type : U.FL
Antenna gain : -0.92 dBi
ITU code : D1D, G1D
Operation temperature range : -5 to +55 deg.C

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

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement.
The antenna connector is a unique type and not used by end user.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart 2014, final revised on May 1, 2014 and effective June 2, 2014
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	14.3dB Freq.: 0.15000MHz Detector: Quasi-Peak Phase: N Mode: Tx 2412MHz, IEEE 802.11g	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	5.1dB Freq.: 2483.500MHz Polarization: Vertical Detection: Average Mode: Tx 2462MHz, IEEE802.11n(HT20)	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 v03 r01 (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 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)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.6 dB	5.6 dB
	18GHz-40GHz	5.2 dB	4.3 dB	4.3 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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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☒ No.1 semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.3 semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☒ No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☒ No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

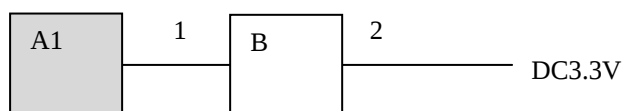
4.1 Operating mode

Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission Radiated emission (below 1GHz) *3)	Transmitting IEEE 802.11g	2412MHz	10	6Mbps, PN9
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	12	1Mbps, PN9
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	10	6Mbps, PN9
	Transmitting IEEE 802.11n (HT20)	2412MHz, 2437MHz, 2462MHz	10	MCS0, PN9
*1) The actual output power differs from the setting value. Software used for the test: DutApiWiFi8801BrdigeEth.exe, Ver.2.0.0.79 *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

4.2.1 Radiated emission test and Antenna port conducted test



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A1	Wireless LAN Module	K30365	*1)	Canon	EUT
B	WLAN JOINT PCB	-	-	Canon	-

*1) 1406NK110: Radiated emission, 1406NK109: Antenna port conducted test

List of cables used

No.	Name	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Flat	0.1	Unshielded	Unshielded	-
2	DC	2.2	Unshielded	Unshielded	-

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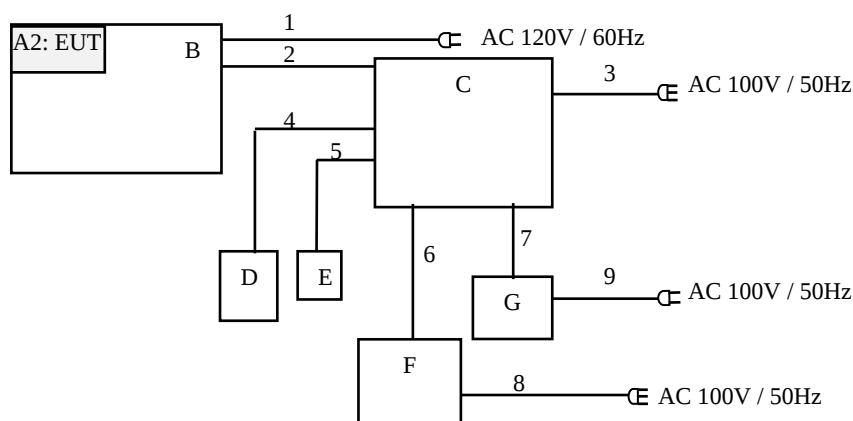
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4.2.2 Conducted emission test



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A2	Wireless LAN Module	K30365	1406NK110	CANON	EUT
B	MULTIFUNCTION PRINTER	MG3530	DE-011	CANON	-
C	Personal Computer	ThinkCentre A42	L3A1407	Lenovo	-
D	Keyboard	KU-0225	0051066	Lenovo	-
E	Mouse	MS111-L	CN-09RRC7-44751-17N-0406	Dell	-
F	LCD Monitor	L551	28651025	EIZO NANAO	-
G	Modem	ME3314B	6K07040	OMRON	-

List of cables used

No.	Name	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	AC	1.5	Unshielded	Unshielded	-
2	USB	1.8	Shielded	Shielded	-
3	AC	2.3	Unshielded	Unshielded	-
4	USB	1.8	Shielded	Shielded	-
5	USB	1.8	Shielded	Shielded	-
6	RGB	1.8	Shielded	Shielded	-
7	RS232	1.5	Shielded	Shielded	-
8	AC	2.0	Unshielded	Unshielded	-
9	AC	1.8	Unshielded	Unshielded	-

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

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SECTION 5: Conducted emission

5.1 Operating environment

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

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 2.0m, 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, a CISPR average detector. The conducted emission measurements were made with the following detection of the test receiver.

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

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1.

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SECTION 6: 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 7: 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".

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 8: 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.

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 9: 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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SECTION 10: Radiated emission

10.1 Operating environment

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

10.2 Test configuration

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

10.3 Test conditions

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

10.4 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 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	2.8-15GHz	15-25GHz
Horizontal	X	X	X	X	X
Vertical	Z	X	Z	Y	X

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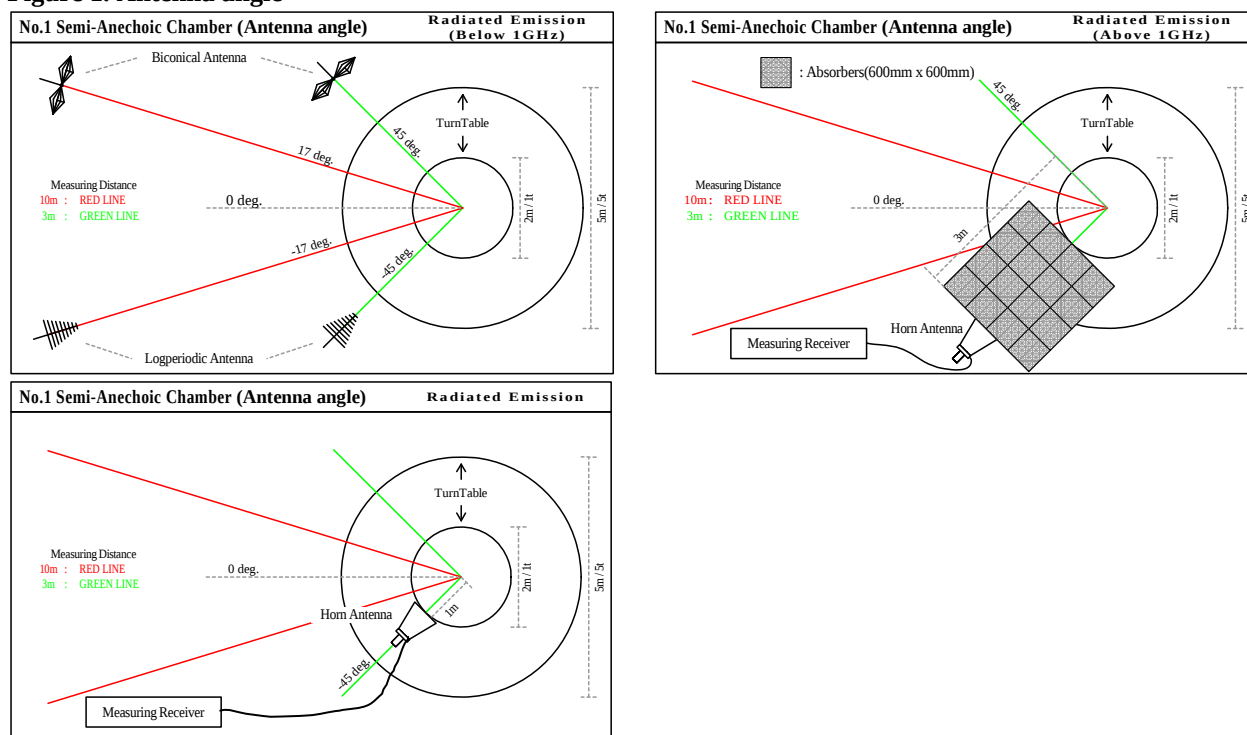
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Figure 1. Antenna angle



10.5 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.

10.6 Results

Summary of the test results : Pass
* No noise was detected above the 5th order harmonics.

Refer to APPENDIX 1.

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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 the worst position

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DATA OF CONDUCTED EMISSION TEST

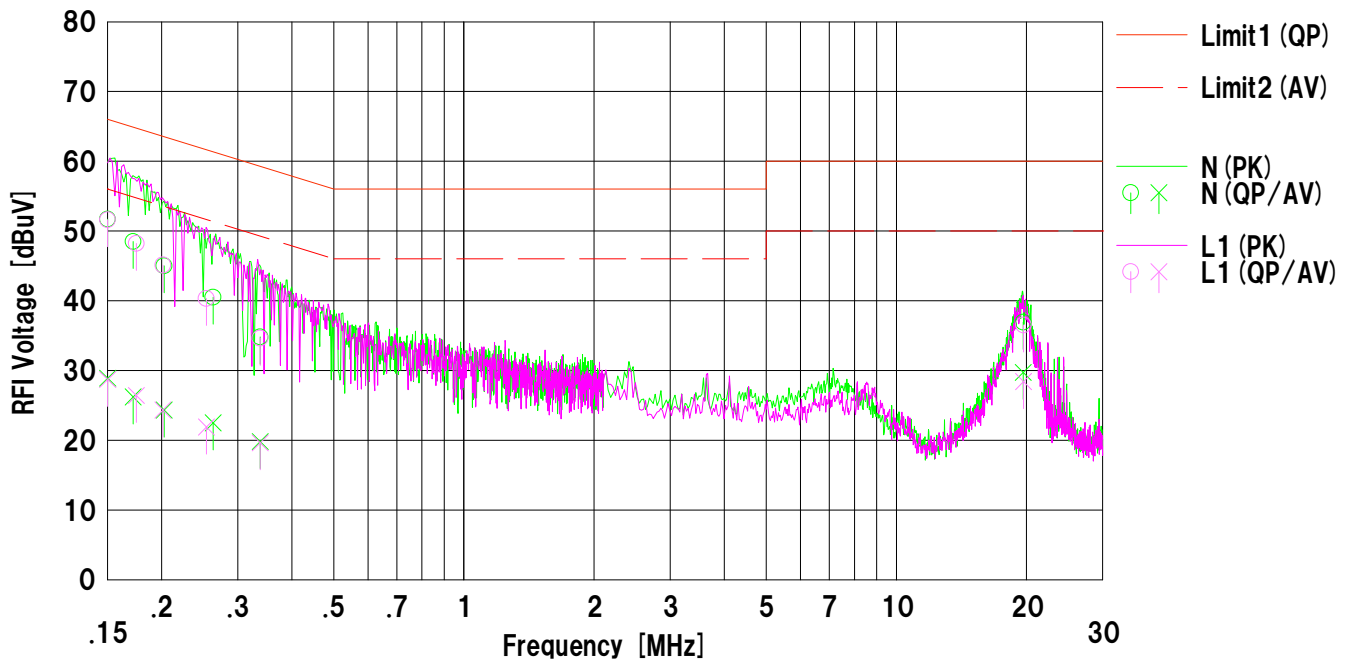
UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2014/08/13

Company : CANON INC.
Kind of EUT : Wireless LAN Module
Model No. : K30365
Serial No. : 1406NK110
Remarks : -

Mode : IEEE802.11g Tx 2412MHz
Order No. : 10420214S
Power : DC3.3V (Printer 120V/60Hz)
Temp./Humi. : 26deg.C/59%RH

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

Engineer : Shinichi Takano

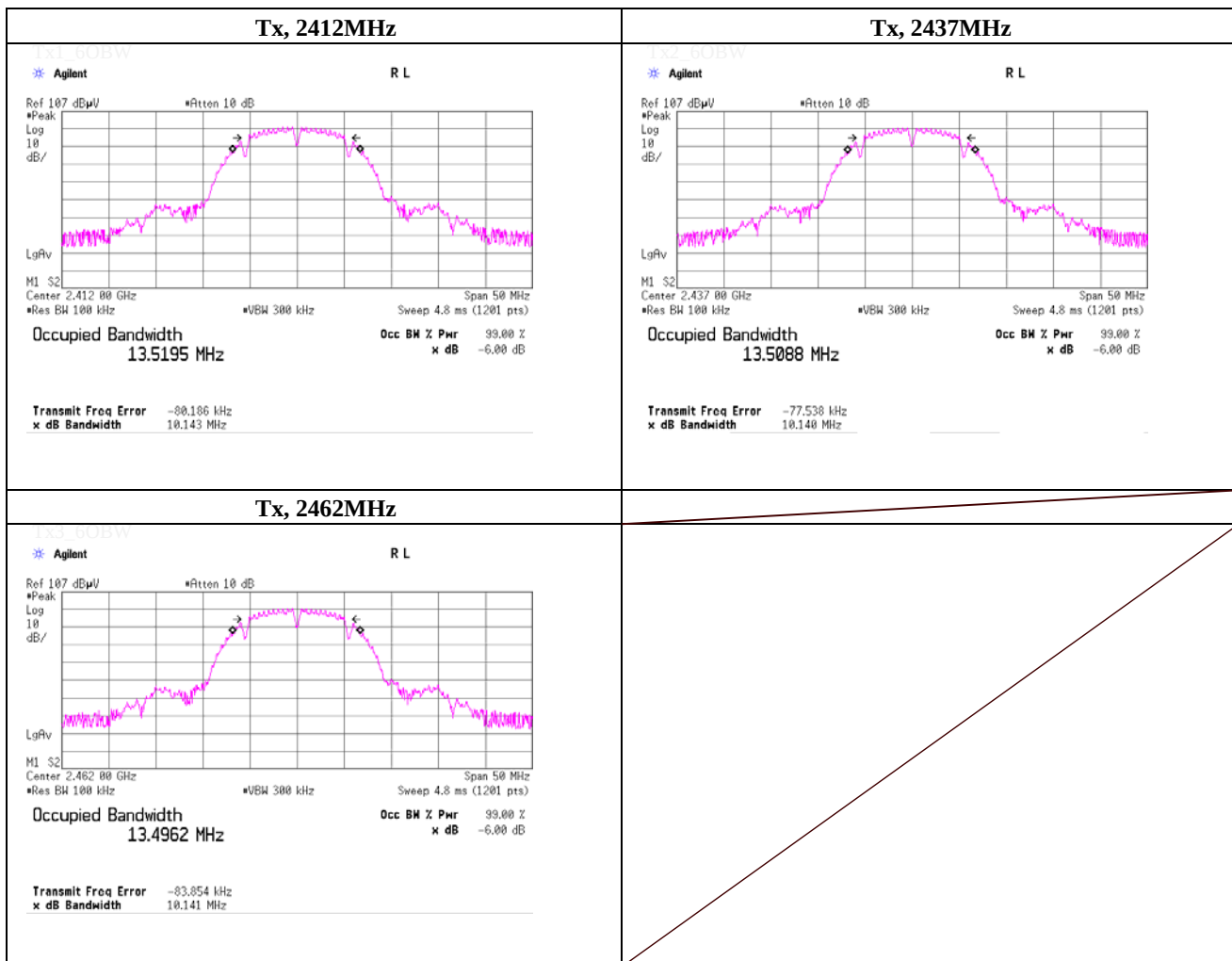


No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	39.1	16.3	12.6	51.7	28.9	66.0	56.0	14.3	27.1	N	
2	0.17177	36.0	13.7	12.5	48.5	26.2	64.8	54.8	16.3	28.6	N	
3	0.20275	32.5	11.8	12.5	45.0	24.3	63.4	53.4	18.4	29.1	N	
4	0.26303	27.9	9.9	12.6	40.5	22.5	61.3	51.3	20.8	28.8	N	
5	0.33795	22.3	7.3	12.5	34.8	19.8	59.2	49.2	24.4	29.4	N	
6	19.65250	23.3	16.1	13.6	36.9	29.7	60.0	50.0	23.1	20.3	N	
7	0.15000	39.0	16.1	12.6	51.6	28.7	66.0	56.0	14.4	27.3	L1	
8	0.17483	35.7	13.9	12.5	48.2	26.4	64.7	54.7	16.5	28.3	L1	
9	0.20150	32.6	11.8	12.5	45.1	24.3	63.5	53.5	18.4	29.2	L1	
10	0.25385	27.7	9.3	12.6	40.3	21.9	61.6	51.6	21.3	29.7	L1	
11	0.33803	22.1	7.1	12.5	34.6	19.6	59.2	49.2	24.6	29.6	L1	
12	19.68712	22.9	14.8	13.6	36.5	28.4	60.0	50.0	23.5	21.6	L1	

-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 1Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	10.143	> 0.500
2437.0000	10.140	> 0.500
2462.0000	10.141	> 0.500



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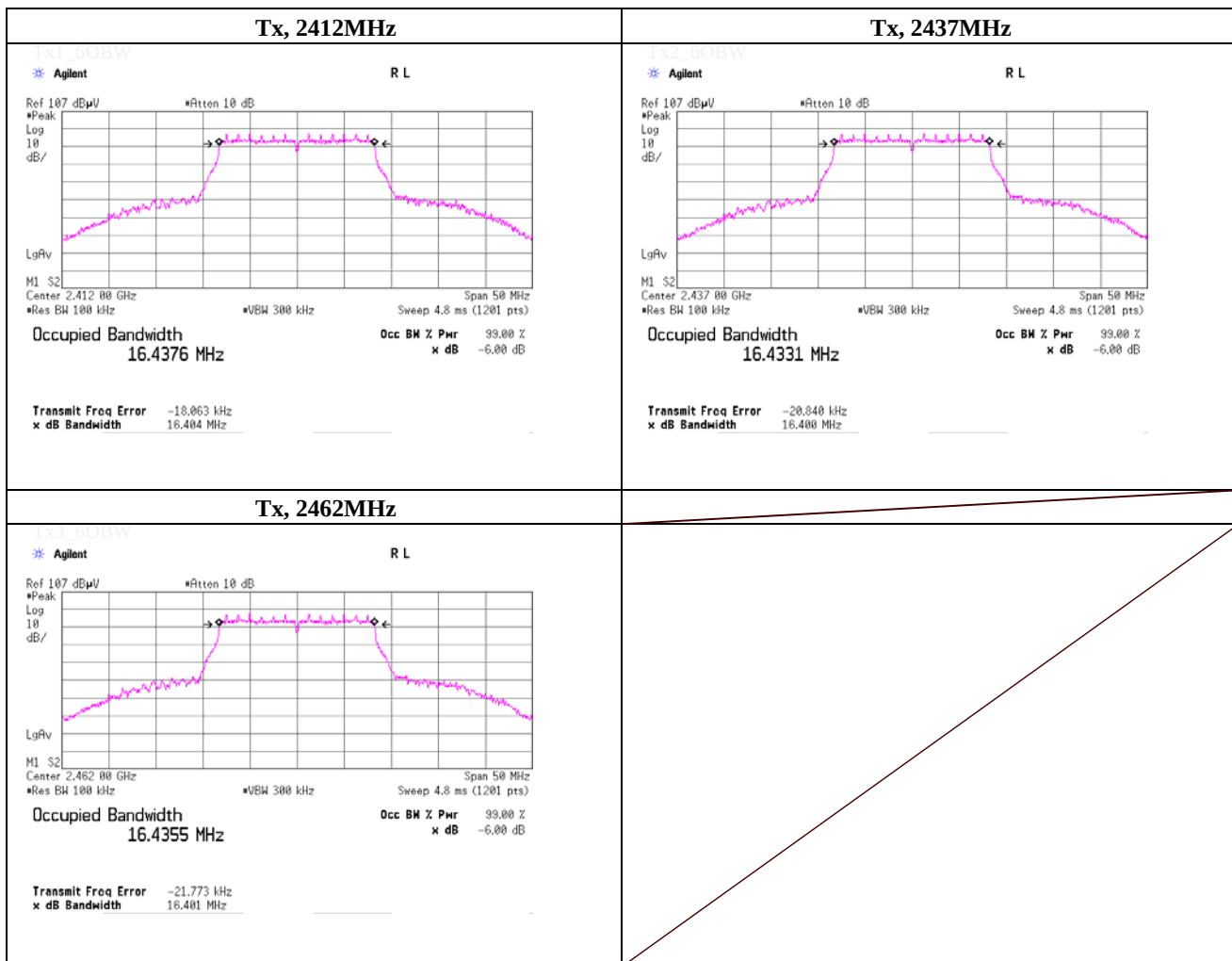
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-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11g, PN9, worst data mode 6Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.404	> 0.500
2437.0000	16.400	> 0.500
2462.0000	16.401	> 0.500



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

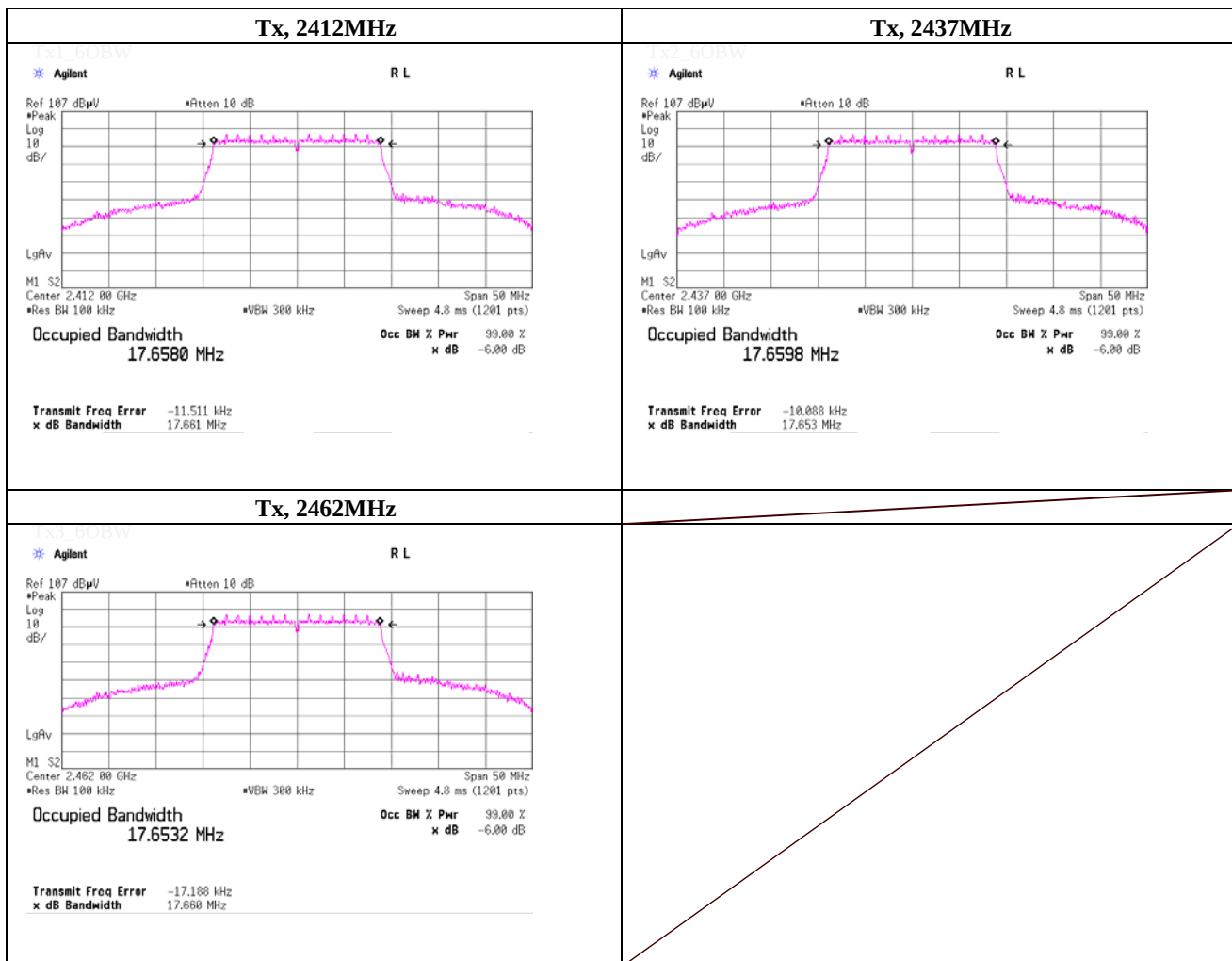
Telephone : +81 463 50 6400

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-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11n(HT20), PN9, worst data mode 0(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	17.661	> 0.500
2437.0000	17.653	> 0.500
2462.0000	17.660	> 0.500



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Maximum Peak Conducted Output Power

(PKPM1)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 28, 2014
 Temperature / Humidity 26deg.C , 56%RH
 Engineer Shinichi Takano
 Mode Tx, IEEE802.11b, PN9, worst data mode : 1 Mbps

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin
					[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	3.45	0.82	9.90	14.17	26.12	30.00	1000	15.83
Mid	2437.0	3.22	0.82	9.90	13.94	24.77	30.00	1000	16.06
High	2462.0	3.19	0.83	9.89	13.91	24.60	30.00	1000	16.09

Sample Calculation:

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

[Pre check]

	Data rate [Mbps]	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin
						[dBm]	[mW]	[dBm]	[mW]	[dB]
	1	2437.0	3.22	0.82	9.90	13.94	24.77	30.00	1000	16.06
	2	2437.0	3.17	0.82	9.90	13.89	24.49	30.00	1000	16.11
	5.5	2437.0	2.98	0.82	9.90	13.70	23.44	30.00	1000	16.30
	11	2437.0	3.05	0.82	9.90	13.77	23.82	30.00	1000	16.23

Worst

Sample Calculation:

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

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Maximum Peak Conducted Output Power

(PKPM1)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 28, 2014
 Temperature / Humidity 26deg.C , 56%RH
 Engineer Shinichi Takano
 Mode Tx, IEEE802.11g, PN9, worst data mode : 6 Mbps

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin
					[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	8.57	0.82	9.90	19.29	84.92	30.00	1000	10.71
Mid	2437.0	8.43	0.82	9.90	19.15	82.22	30.00	1000	10.85
High	2462.0	8.38	0.83	9.89	19.10	81.28	30.00	1000	10.90

Sample Calculation:

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

[Pre check]

	Data rate [Mbps]	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin
						[dBm]	[mW]	[dBm]	[mW]	[dB]
	6	2437.0	8.43	0.82	9.90	19.15	82.22	30.00	1000	10.85
	9	2437.0	8.16	0.82	9.90	18.88	77.27	30.00	1000	11.12
	12	2437.0	8.08	0.82	9.90	18.80	75.86	30.00	1000	11.20
	18	2437.0	8.13	0.82	9.90	18.85	76.74	30.00	1000	11.15
	24	2437.0	8.32	0.82	9.90	19.04	80.17	30.00	1000	10.96
	36	2437.0	8.13	0.82	9.90	18.85	76.74	30.00	1000	11.15
	48	2437.0	8.06	0.82	9.90	18.78	75.51	30.00	1000	11.22
	54	2437.0	8.25	0.82	9.90	18.97	78.89	30.00	1000	11.03

Worst

Sample Calculation:

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

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Maximum Peak Conducted Output Power

(PKPM1)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 28, 2014
 Temperature / Humidity 26deg.C , 56%RH
 Engineer Shinichi Takano
 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
					[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	8.41	0.82	9.90	19.13	81.85	30.00	1000	10.87
Mid	2437.0	8.26	0.82	9.90	18.98	79.07	30.00	1000	11.02
High	2462.0	7.93	0.83	9.89	18.65	73.28	30.00	1000	11.35

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
						[dBm]	[mW]	[dBm]	[mW]	[dB]
	0	2437.0	8.26	0.82	9.90	18.98	79.07	30.00	1000	11.02
	1	2437.0	8.22	0.82	9.90	18.94	78.34	30.00	1000	11.06
	2	2437.0	7.96	0.82	9.90	18.68	73.79	30.00	1000	11.32
	3	2437.0	7.91	0.82	9.90	18.63	72.95	30.00	1000	11.37
	4	2437.0	8.19	0.82	9.90	18.91	77.80	30.00	1000	11.09
	5	2437.0	8.01	0.82	9.90	18.73	74.64	30.00	1000	11.27
	6	2437.0	8.20	0.82	9.90	18.92	77.98	30.00	1000	11.08
	7	2437.0	8.10	0.82	9.90	18.82	76.21	30.00	1000	11.18

Worst

Sample Calculation:

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

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Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH
 Engineer Shinichi Takano Shinichi Takano
 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	55.3	26.7	14.6	40.9	55.7	73.9	18.2	100	333	
Hori.	4824.000	PK	48.3	31.0	7.5	41.7	45.1	73.9	28.8	100	79	
Hori.	7236.000	PK	46.6	35.9	8.6	41.5	49.6	73.9	24.3	100	0	
Hori.	9648.000	PK	45.0	38.1	9.6	40.4	52.3	73.9	21.6	100	0	
Hori.	12060.000	PK	44.8	39.1	10.7	39.7	54.9	73.9	19.0	100	0	
Hori.	2390.000	AV	37.6	26.7	14.6	40.9	38.0	53.9	15.9	100	333	
Hori.	4824.000	AV	39.3	31.0	7.5	41.7	36.1	53.9	17.8	100	79	
Hori.	7236.000	AV	37.3	35.9	8.6	41.5	40.3	53.9	13.6	100	0	
Hori.	9648.000	AV	35.5	38.1	9.6	40.4	42.8	53.9	11.1	100	0	
Hori.	12060.000	AV	35.2	39.1	10.7	39.7	45.3	53.9	8.6	100	0	
Vert.	2390.000	PK	56.0	26.7	14.6	40.9	56.4	73.9	17.5	100	310	
Vert.	4824.000	PK	48.8	31.0	7.5	41.7	45.6	73.9	28.3	100	88	
Vert.	7236.000	PK	45.4	35.9	8.6	41.5	48.4	73.9	25.5	100	0	
Vert.	9648.000	PK	45.2	38.1	9.6	40.4	52.5	73.9	21.4	100	0	
Vert.	12060.000	PK	44.0	39.1	10.7	39.7	54.1	73.9	19.8	100	0	
Vert.	2390.000	AV	37.9	26.7	14.6	40.9	38.3	53.9	15.6	100	310	
Vert.	4824.000	AV	40.5	31.0	7.5	41.7	37.3	53.9	16.6	100	88	
Vert.	7236.000	AV	36.9	35.9	8.6	41.5	39.9	53.9	14.0	100	0	
Vert.	9648.000	AV	35.0	38.1	9.6	40.4	42.3	53.9	11.6	100	0	
Vert.	12060.000	AV	35.2	39.1	10.7	39.7	45.3	53.9	8.6	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	98.5	26.7	14.6	40.9	98.9	-	-	
Hori.	2397.994	PK	55.9	26.7	14.6	40.9	56.3	78.9	22.6	
Hori.	2400.000	PK	52.0	26.7	14.6	40.9	52.4	78.9	26.5	
Vert.	2412.000	PK	99.2	26.7	14.6	40.9	99.6	-	-	
Vert.	2396.975	PK	53.1	26.7	14.6	40.9	53.5	79.6	26.1	
Vert.	2400.000	PK	53.0	26.7	14.6	40.9	53.4	79.6	26.2	

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

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Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH
 Engineer Shinichi Takano Shinichi Takano
 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	48.4	31.1	7.5	41.6	45.4	73.9	28.5	100	323	
Hori.	7311.000	PK	46.3	36.0	8.6	41.5	49.4	73.9	24.5	100	0	
Hori.	9748.000	PK	45.2	38.2	9.6	40.4	52.6	73.9	21.3	100	0	
Hori.	12185.000	PK	44.4	39.2	10.8	39.7	54.7	73.9	19.2	100	0	
Hori.	4874.000	AV	39.3	31.1	7.5	41.6	36.3	53.9	17.6	100	323	
Hori.	7311.000	AV	37.5	36.0	8.6	41.5	40.6	53.9	13.3	100	0	
Hori.	9748.000	AV	35.3	38.2	9.6	40.4	42.7	53.9	11.2	100	0	
Hori.	12185.000	AV	35.1	39.2	10.8	39.7	45.4	53.9	8.5	100	0	
Vert.	4874.000	PK	48.9	31.1	7.5	41.6	45.9	73.9	28.0	100	88	
Vert.	7311.000	PK	46.9	36.0	8.6	41.5	50.0	73.9	23.9	100	0	
Vert.	9748.000	PK	44.3	38.2	9.6	40.4	51.7	73.9	22.2	100	0	
Vert.	12185.000	PK	44.5	39.2	10.8	39.7	54.8	73.9	19.1	100	0	
Vert.	4874.000	AV	40.3	31.1	7.5	41.6	37.3	53.9	16.6	100	88	
Vert.	7311.000	AV	37.6	36.0	8.6	41.5	40.7	53.9	13.2	100	0	
Vert.	9748.000	AV	35.4	38.2	9.6	40.4	42.8	53.9	11.1	100	0	
Vert.	12185.000	AV	35.2	39.2	10.8	39.7	45.5	53.9	8.4	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.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH
 Engineer Shinichi Takano Shinichi Takano
 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	52.9	26.8	14.7	40.9	53.5	73.9	20.4	100	323	
Hori.	4924.000	PK	48.7	31.3	7.5	41.5	46.0	73.9	27.9	100	323	
Hori.	7386.000	PK	46.7	36.1	8.8	41.4	50.2	73.9	23.7	100	0	
Hori.	9848.000	PK	44.8	38.3	9.6	40.4	52.3	73.9	21.6	100	0	
Hori.	12310.000	PK	45.4	39.3	10.8	39.7	55.8	73.9	18.1	100	0	
Hori.	2483.500	AV	37.2	26.8	14.7	40.9	37.8	53.9	16.1	100	323	
Hori.	4924.000	AV	38.5	31.3	7.5	41.5	35.8	53.9	18.1	100	323	
Hori.	7386.000	AV	37.5	36.1	8.8	41.4	41.0	53.9	12.9	100	0	
Hori.	9848.000	AV	35.1	38.3	9.6	40.4	42.6	53.9	11.3	100	0	
Hori.	12310.000	AV	35.5	39.3	10.8	39.7	45.9	53.9	8.0	100	0	
Vert.	2483.500	PK	55.5	26.8	14.7	40.9	56.1	73.9	17.8	100	312	
Vert.	4924.000	PK	49.6	31.3	7.5	41.5	46.9	73.9	27.0	100	89	
Vert.	7386.000	PK	47.0	36.1	8.8	41.4	50.5	73.9	23.4	100	0	
Vert.	9848.000	PK	44.6	38.3	9.6	40.4	52.1	73.9	21.8	100	0	
Vert.	12310.000	PK	44.8	39.3	10.8	39.7	55.2	73.9	18.7	100	0	
Vert.	2483.500	AV	37.8	26.8	14.7	40.9	38.4	53.9	15.5	100	312	
Vert.	4924.000	AV	40.0	31.3	7.5	41.5	37.3	53.9	16.6	100	89	
Vert.	7386.000	AV	37.2	36.1	8.8	41.4	40.7	53.9	13.2	100	0	
Vert.	9848.000	AV	35.3	38.3	9.6	40.4	42.8	53.9	11.1	100	0	
Vert.	12310.000	AV	35.3	39.3	10.8	39.7	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 : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014 August 13, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH 24 deg.C, 68 %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.	38.400	QP	22.1	15.3	7.1	31.8	12.7	40.0	27.3	100	0	
Hori.	384.000	QP	21.9	15.8	7.0	31.8	12.9	46.0	33.1	100	0	
Hori.	2390.000	PK	56.9	26.7	14.6	40.9	57.3	73.9	16.6	100	330	
Hori.	4824.000	PK	47.3	31.0	7.5	41.7	44.1	73.9	29.8	100	0	
Hori.	7236.000	PK	45.8	35.9	8.6	41.5	48.8	73.9	25.1	100	0	
Hori.	9648.000	PK	44.8	38.1	9.6	40.4	52.1	73.9	21.8	100	0	
Hori.	12060.000	PK	45.0	39.1	10.7	39.7	55.1	73.9	18.8	100	0	
Hori.	2390.000	AV	45.1	26.7	14.6	40.9	45.5	53.9	8.4	100	330	
Hori.	4824.000	AV	37.6	31.0	7.5	41.7	34.4	53.9	19.5	100	0	
Hori.	7236.000	AV	36.8	35.9	8.6	41.5	39.8	53.9	14.1	100	0	
Hori.	9648.000	AV	35.2	38.1	9.6	40.4	42.5	53.9	11.4	100	0	
Hori.	12060.000	AV	35.8	39.1	10.7	39.7	45.9	53.9	8.0	100	0	
Vert.	38.400	QP	22.0	15.3	7.1	31.8	12.6	40.0	27.4	100	0	
Vert.	384.000	QP	21.7	15.8	7.0	31.8	12.7	46.0	33.3	100	0	
Vert.	2390.000	PK	57.4	26.7	14.6	40.9	57.8	73.9	16.1	132	313	
Vert.	4824.000	PK	47.2	31.0	7.5	41.7	44.0	73.9	29.9	100	0	
Vert.	7236.000	PK	46.3	35.9	8.6	41.5	49.3	73.9	24.6	100	0	
Vert.	9648.000	PK	44.2	38.1	9.6	40.4	51.5	73.9	22.4	100	0	
Vert.	12060.000	PK	46.3	39.1	10.7	39.7	56.4	73.9	17.5	100	0	
Vert.	2390.000	AV	44.9	26.7	14.6	40.9	45.3	53.9	8.6	132	313	
Vert.	4824.000	AV	37.5	31.0	7.5	41.7	34.3	53.9	19.6	100	0	
Vert.	7236.000	AV	36.7	35.9	8.6	41.5	39.7	53.9	14.2	100	0	
Vert.	9648.000	AV	35.4	38.1	9.6	40.4	42.7	53.9	11.2	100	0	
Vert.	12060.000	AV	35.0	39.1	10.7	39.7	45.1	53.9	8.8	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	95.0	26.7	14.6	40.9	95.4	-	-	
Hori.	2400.000	PK	61.0	26.7	14.6	40.9	61.4	75.4	14.0	
Vert.	2412.000	PK	96.2	26.7	14.6	40.9	96.6	-	-	
Vert.	2400.000	PK	59.5	26.7	14.6	40.9	59.9	76.6	16.7	

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

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Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH
 Engineer 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	47.3	31.1	7.5	41.6	44.3	73.9	29.6	100	0	
Hori.	7311.000	PK	46.4	36.0	8.6	41.5	49.5	73.9	24.4	100	0	
Hori.	9748.000	PK	46.0	38.2	9.6	40.4	53.4	73.9	20.5	100	0	
Hori.	12185.000	PK	44.6	39.2	10.8	39.7	54.9	73.9	19.0	100	0	
Hori.	4874.000	AV	37.4	31.1	7.5	41.6	34.4	53.9	19.5	100	0	
Hori.	7311.000	AV	37.3	36.0	8.6	41.5	40.4	53.9	13.5	100	0	
Hori.	9748.000	AV	35.4	38.2	9.6	40.4	42.8	53.9	11.1	100	0	
Hori.	12185.000	AV	35.4	39.2	10.8	39.7	45.7	53.9	8.2	100	0	
Vert.	4874.000	PK	46.8	31.1	7.5	41.6	43.8	73.9	30.1	100	0	
Vert.	7311.000	PK	46.9	36.0	8.6	41.5	50.0	73.9	23.9	100	0	
Vert.	9748.000	PK	44.8	38.2	9.6	40.4	52.2	73.9	21.7	100	0	
Vert.	12185.000	PK	44.8	39.2	10.8	39.7	55.1	73.9	18.8	100	0	
Vert.	4874.000	AV	37.3	31.1	7.5	41.6	34.3	53.9	19.6	100	0	
Vert.	7311.000	AV	37.3	36.0	8.6	41.5	40.4	53.9	13.5	100	0	
Vert.	9748.000	AV	35.2	38.2	9.6	40.4	42.6	53.9	11.3	100	0	
Vert.	12185.000	AV	35.4	39.2	10.8	39.7	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 : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 11, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 26 deg.C, 61 %RH
 Engineer 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	58.3	26.8	14.7	40.9	58.9	73.9	15.0	100	159	
Hori.	4924.000	PK	46.6	31.3	7.5	41.5	43.9	73.9	30.0	100	0	
Hori.	7386.000	PK	47.0	36.1	8.8	41.4	50.5	73.9	23.4	100	0	
Hori.	9848.000	PK	44.7	38.3	9.6	40.4	52.2	73.9	21.7	100	0	
Hori.	12310.000	PK	44.4	39.3	10.8	39.7	54.8	73.9	19.1	100	0	
Hori.	2483.500	AV	44.0	26.8	14.7	40.9	44.6	53.9	9.3	100	159	
Hori.	4924.000	AV	37.7	31.3	7.5	41.5	35.0	53.9	18.9	100	0	
Hori.	7386.000	AV	37.2	36.1	8.8	41.4	40.7	53.9	13.2	100	0	
Hori.	9848.000	AV	35.5	38.3	9.6	40.4	43.0	53.9	10.9	100	0	
Hori.	12310.000	AV	35.2	39.3	10.8	39.7	45.6	53.9	8.3	100	0	
Vert.	2483.500	PK	57.9	26.8	14.7	40.9	58.5	73.9	15.4	100	310	
Vert.	4924.000	PK	47.1	31.3	7.5	41.5	44.4	73.9	29.5	100	0	
Vert.	7386.000	PK	45.9	36.1	8.8	41.4	49.4	73.9	24.5	100	0	
Vert.	9848.000	PK	45.1	38.3	9.6	40.4	52.6	73.9	21.3	100	0	
Vert.	12310.000	PK	44.2	39.3	10.8	39.7	54.6	73.9	19.3	100	0	
Vert.	2483.500	AV	45.2	26.8	14.7	40.9	45.8	53.9	8.1	100	310	
Vert.	4924.000	AV	37.8	31.3	7.5	41.5	35.1	53.9	18.8	100	0	
Vert.	7386.000	AV	37.1	36.1	8.8	41.4	40.6	53.9	13.3	100	0	
Vert.	9848.000	AV	35.3	38.3	9.6	40.4	42.8	53.9	11.1	100	0	
Vert.	12310.000	AV	35.6	39.3	10.8	39.7	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 : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 12, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 25 deg.C, 65 %RH
 Engineer 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	67.3	26.7	14.6	40.9	67.7	73.9	6.2	100	336	
Hori.	4824.000	PK	47.6	31.0	7.5	41.7	44.4	73.9	29.5	100	0	
Hori.	7236.000	PK	46.7	35.9	8.6	41.5	49.7	73.9	24.2	100	0	
Hori.	9648.000	PK	45.2	38.1	9.6	40.4	52.5	73.9	21.4	100	0	
Hori.	12060.000	PK	44.8	39.1	10.7	39.7	54.9	73.9	19.0	100	0	
Hori.	2390.000	AV	47.7	26.7	14.6	40.9	48.1	53.9	5.8	100	336	
Hori.	4824.000	AV	37.8	31.0	7.5	41.7	34.6	53.9	19.3	100	0	
Hori.	7236.000	AV	37.4	35.9	8.6	41.5	40.4	53.9	13.5	100	0	
Hori.	9648.000	AV	35.3	38.1	9.6	40.4	42.6	53.9	11.3	100	0	
Hori.	12060.000	AV	35.6	39.1	10.7	39.7	45.7	53.9	8.2	100	0	
Vert.	2390.000	PK	65.6	26.7	14.6	40.9	66.0	73.9	7.9	100	311	
Vert.	4824.000	PK	46.8	31.0	7.5	41.7	43.6	73.9	30.3	100	0	
Vert.	7236.000	PK	46.3	35.9	8.6	41.5	49.3	73.9	24.6	100	0	
Vert.	9648.000	PK	44.5	38.1	9.6	40.4	51.8	73.9	22.1	100	0	
Vert.	12060.000	PK	44.6	39.1	10.7	39.7	54.7	73.9	19.2	100	0	
Vert.	2390.000	AV	47.0	26.7	14.6	40.9	47.4	53.9	6.5	100	311	
Vert.	4824.000	AV	37.9	31.0	7.5	41.7	34.7	53.9	19.2	100	0	
Vert.	7236.000	AV	37.0	35.9	8.6	41.5	40.0	53.9	13.9	100	0	
Vert.	9648.000	AV	35.4	38.1	9.6	40.4	42.7	53.9	11.2	100	0	
Vert.	12060.000	AV	35.5	39.1	10.7	39.7	45.6	53.9	8.3	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	96.2	26.7	14.6	40.9	96.6	-	-	
Hori.	2400.000	PK	59.9	26.7	14.6	40.9	60.3	76.6	16.3	
Vert.	2412.000	PK	96.7	26.7	14.6	40.9	97.1	-	-	
Vert.	2400.000	PK	58.2	26.7	14.6	40.9	58.6	77.1	18.5	

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

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Radiated Emission

Test place No.1 Semi Anechoic Chamber
 Date August 8, 2014 August 12, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 25 deg.C, 65 %RH
 Engineer 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	46.5	31.1	7.5	41.6	43.5	73.9	30.4	100	0	
Hori.	7311.000	PK	46.3	36.0	8.6	41.5	49.4	73.9	24.5	100	0	
Hori.	9748.000	PK	44.9	38.2	9.6	40.4	52.3	73.9	21.6	100	0	
Hori.	12185.000	PK	43.7	39.2	10.8	39.7	54.0	73.9	19.9	100	0	
Hori.	4874.000	AV	37.5	31.1	7.5	41.6	34.5	53.9	19.4	100	0	
Hori.	7311.000	AV	37.5	36.0	8.6	41.5	40.6	53.9	13.3	100	0	
Hori.	9748.000	AV	35.2	38.2	9.6	40.4	42.6	53.9	11.3	100	0	
Hori.	12185.000	AV	35.1	39.2	10.8	39.7	45.4	53.9	8.5	100	0	
Vert.	4874.000	PK	47.0	31.1	7.5	41.6	44.0	73.9	29.9	100	0	
Vert.	7311.000	PK	47.0	36.0	8.6	41.5	50.1	73.9	23.8	100	0	
Vert.	9748.000	PK	44.5	38.2	9.6	40.4	51.9	73.9	22.0	100	0	
Vert.	12185.000	PK	44.0	39.2	10.8	39.7	54.3	73.9	19.6	100	0	
Vert.	4874.000	AV	37.6	31.1	7.5	41.6	34.6	53.9	19.3	100	0	
Vert.	7311.000	AV	37.3	36.0	8.6	41.5	40.4	53.9	13.5	100	0	
Vert.	9748.000	AV	35.6	38.2	9.6	40.4	43.0	53.9	10.9	100	0	
Vert.	12185.000	AV	35.0	39.2	10.8	39.7	45.3	53.9	8.6	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.1 Semi Anechoic Chamber
 Date August 8, 2014 August 12, 2014
 Temperature / Humidity 24 deg.C, 67 %RH 25 deg.C, 65 %RH
 Engineer 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	60.6	26.8	14.7	40.9	61.2	73.9	12.7	100	335	
Hori.	4924.000	PK	47.6	31.3	7.5	41.5	44.9	73.9	29.0	100	0	
Hori.	7386.000	PK	47.0	36.1	8.8	41.4	50.5	73.9	23.4	100	0	
Hori.	9848.000	PK	44.8	38.3	9.6	40.4	52.3	73.9	21.6	100	0	
Hori.	12310.000	PK	43.3	39.3	10.8	39.7	53.7	73.9	20.2	100	0	
Hori.	2483.500	AV	45.9	26.8	14.7	40.9	46.5	53.9	7.4	100	335	
Hori.	4924.000	AV	37.8	31.3	7.5	41.5	35.1	53.9	18.8	100	0	
Hori.	7386.000	AV	37.8	36.1	8.8	41.4	41.3	53.9	12.6	100	0	
Hori.	9848.000	AV	35.1	38.3	9.6	40.4	42.6	53.9	11.3	100	0	
Hori.	12310.000	AV	34.3	39.3	10.8	39.7	44.7	53.9	9.2	100	0	
Vert.	2483.500	PK	64.1	26.8	14.7	40.9	64.7	73.9	9.2	100	315	
Vert.	4924.000	PK	47.1	31.3	7.5	41.5	44.4	73.9	29.5	100	0	
Vert.	7386.000	PK	47.5	36.1	8.8	41.4	51.0	73.9	22.9	100	0	
Vert.	9848.000	PK	44.6	38.3	9.6	40.4	52.1	73.9	21.8	100	0	
Vert.	12310.000	PK	43.8	39.3	10.8	39.7	54.2	73.9	19.7	100	0	
Vert.	2483.500	AV	48.2	26.8	14.7	40.9	48.8	53.9	5.1	100	315	
Vert.	4924.000	AV	38.0	31.3	7.5	41.5	35.3	53.9	18.6	100	0	
Vert.	7386.000	AV	37.4	36.1	8.8	41.4	40.9	53.9	13.0	100	0	
Vert.	9848.000	AV	35.5	38.3	9.6	40.4	43.0	53.9	10.9	100	0	
Vert.	12310.000	AV	34.4	39.3	10.8	39.7	44.8	53.9	9.1	100	0	

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

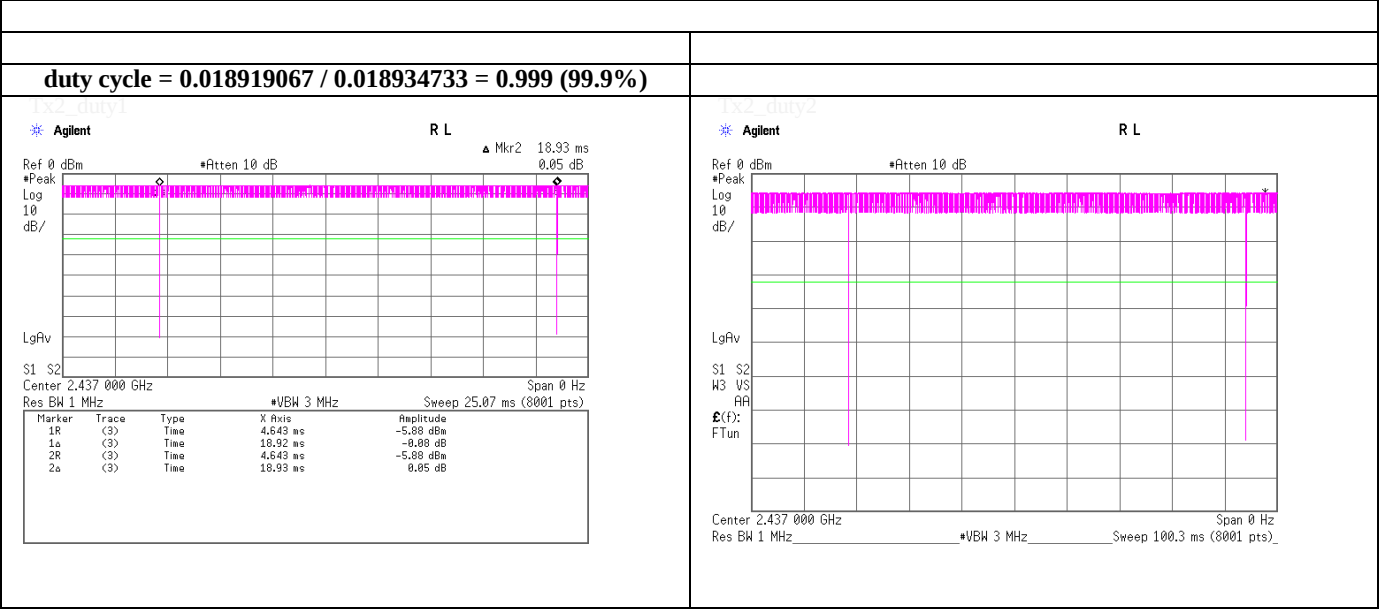
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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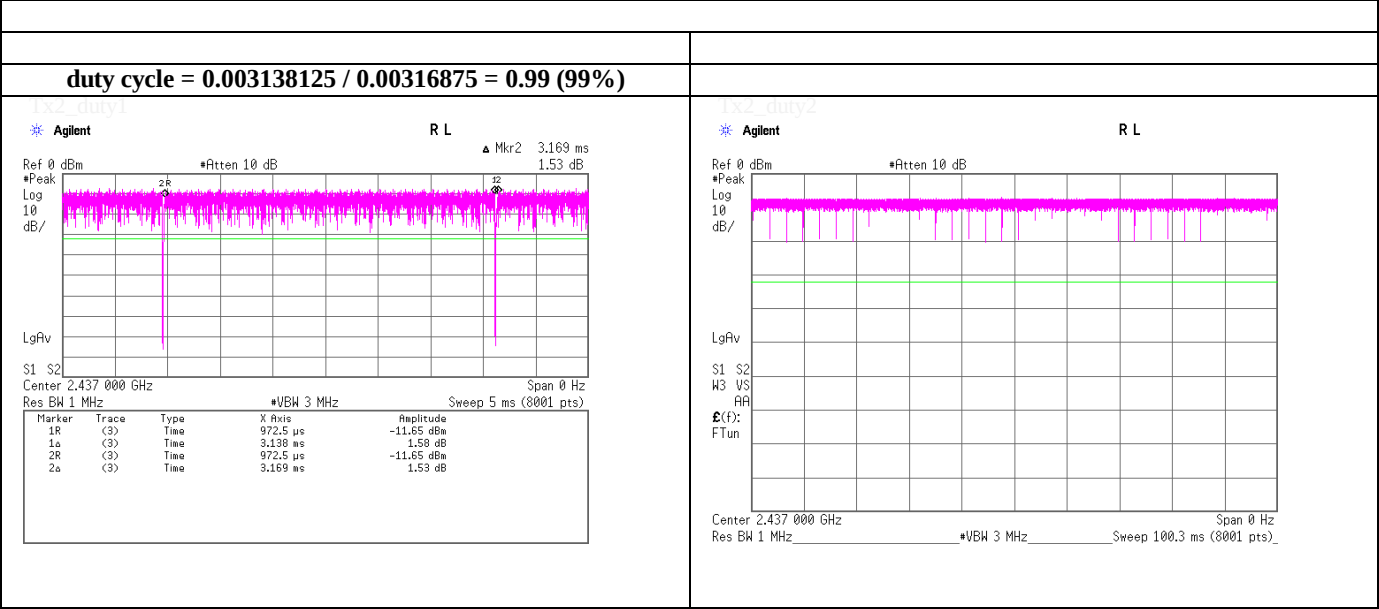
Burst rate confirmation

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



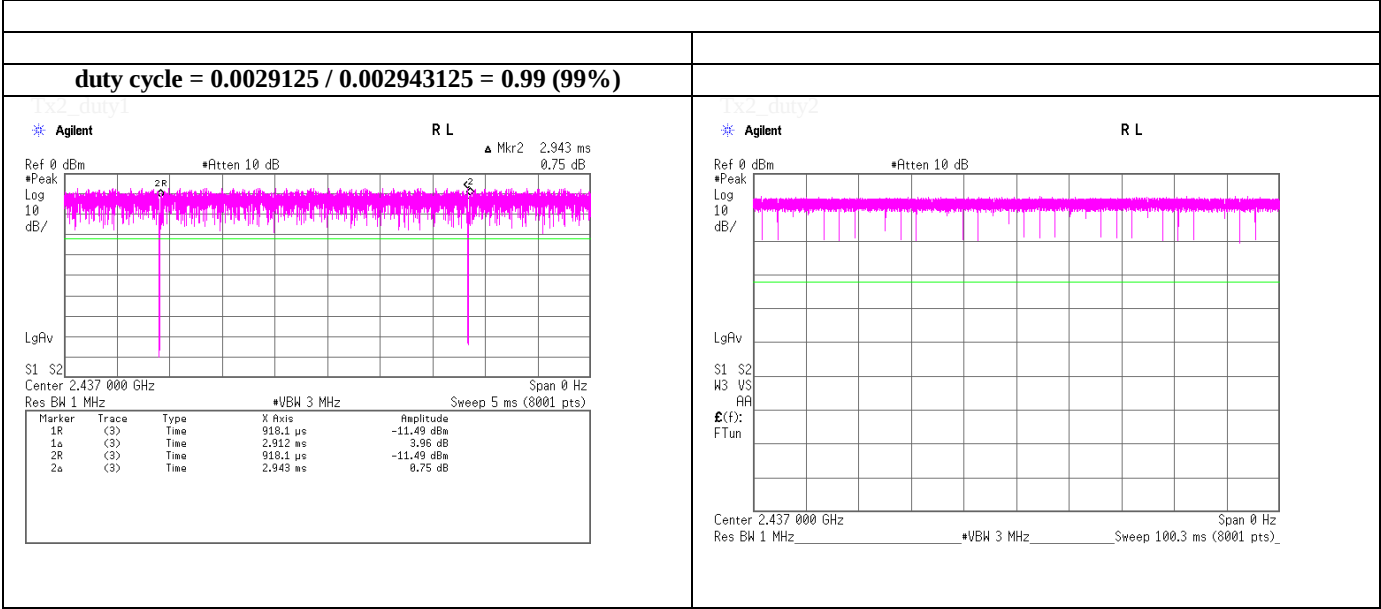
Burst rate confirmation

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



Burst rate confirmation

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

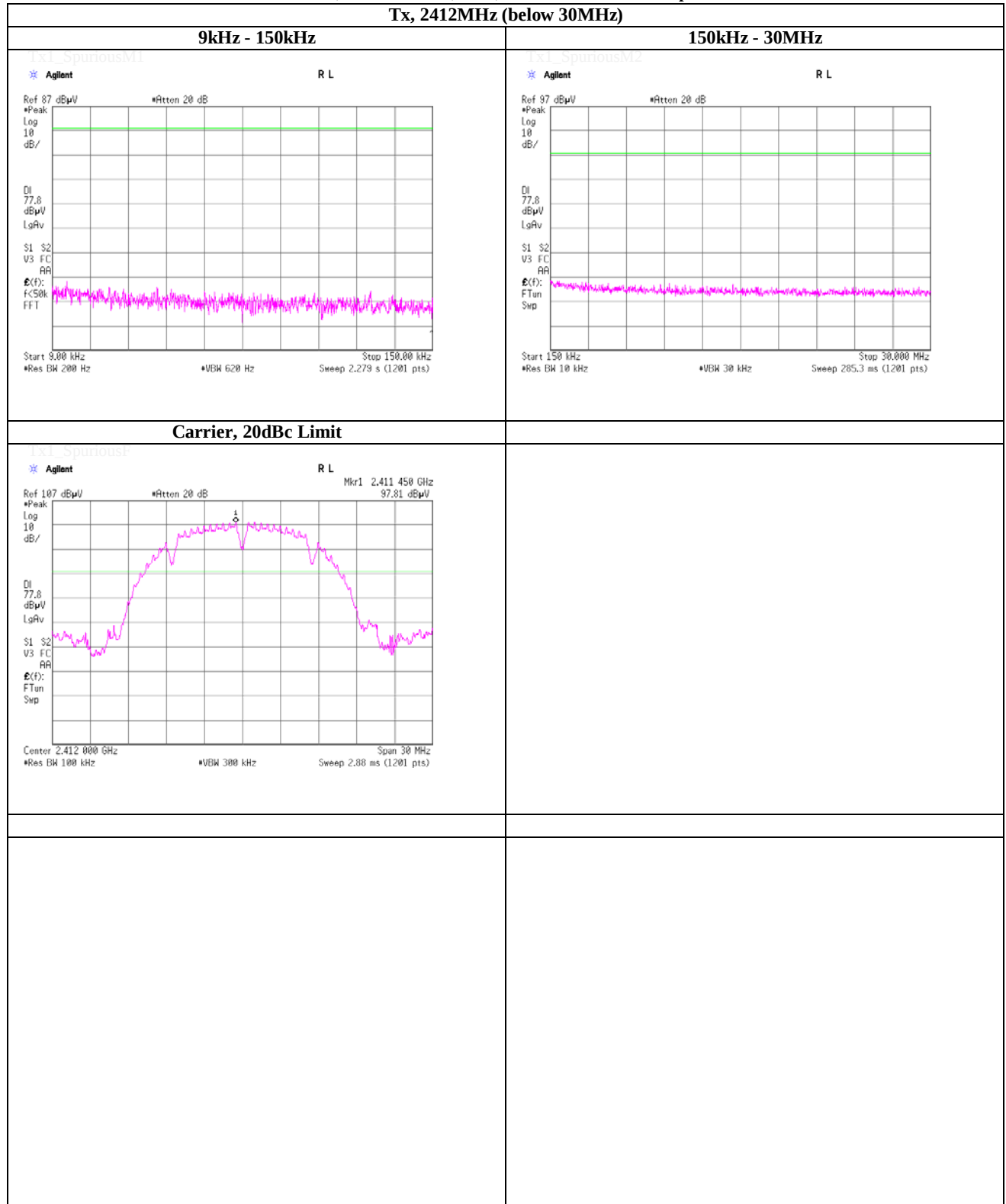


Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date July 29, 2014
Temperature / Humidity 27deg.C , 45%RH
Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2412MHz (below 30MHz)



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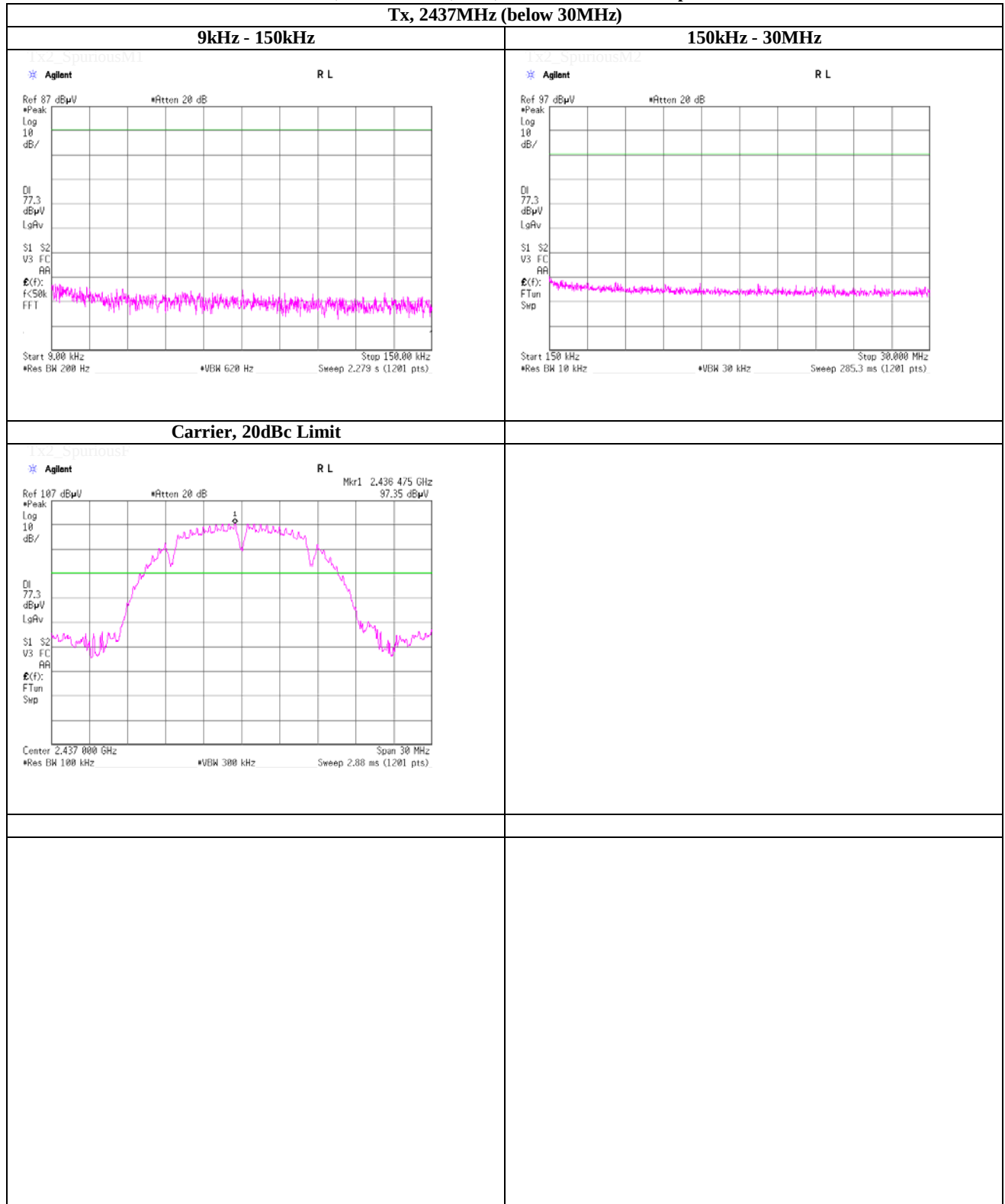
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date July 29, 2014
Temperature / Humidity 27deg.C , 45%RH
Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2437MHz (below 30MHz)



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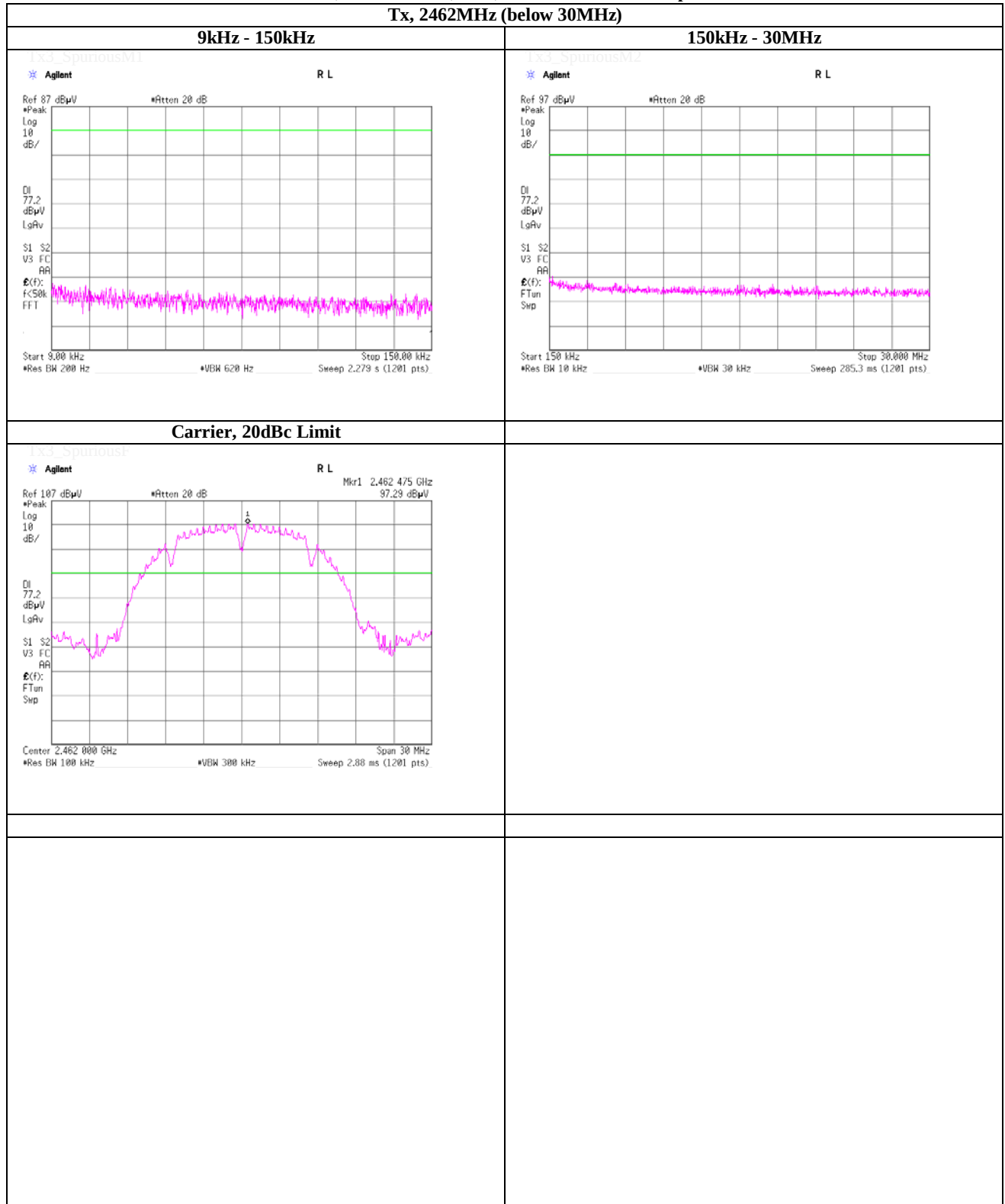
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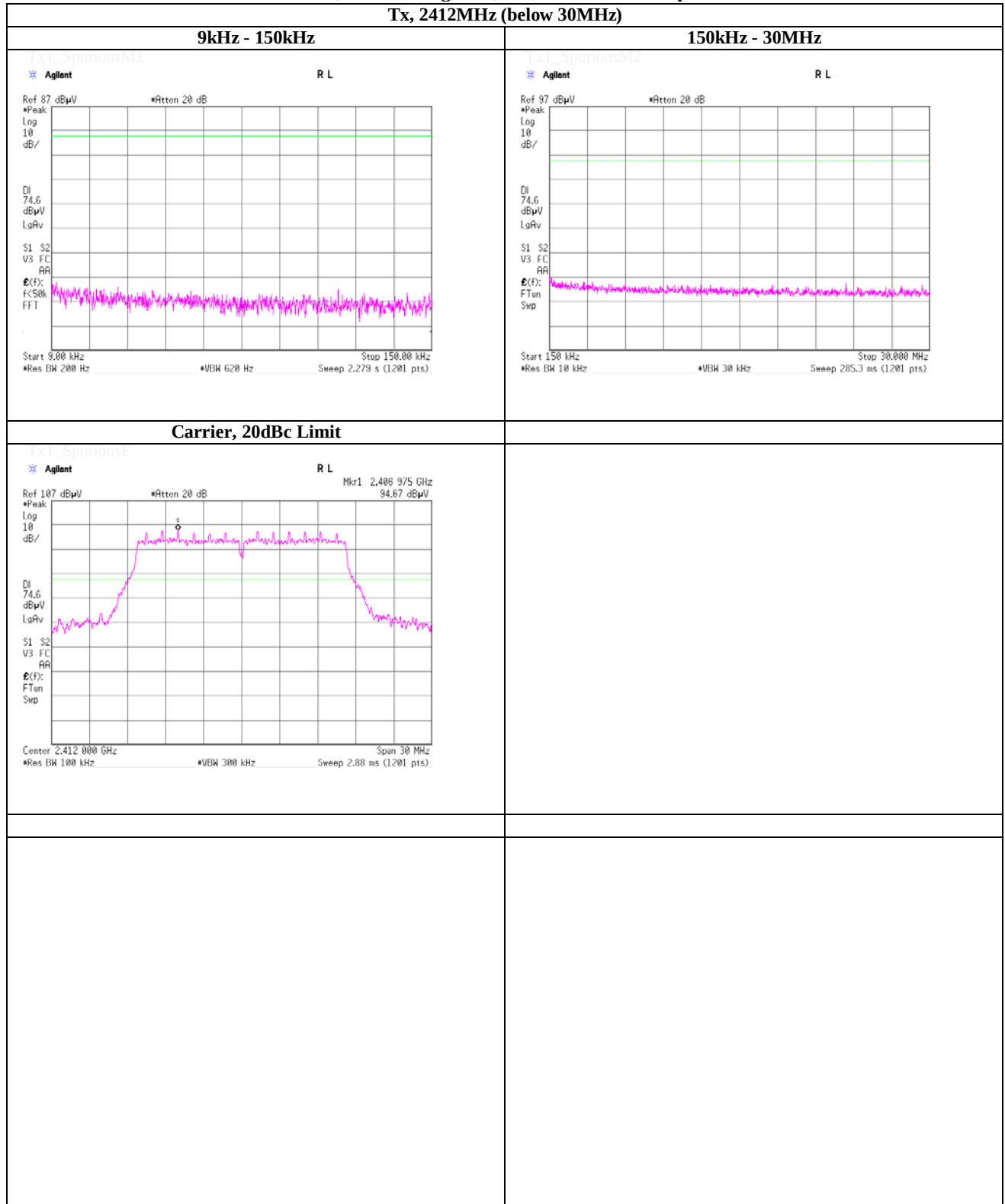
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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2412MHz (below 30MHz)



UL Japan, Inc.

Shonan EMC Lab.

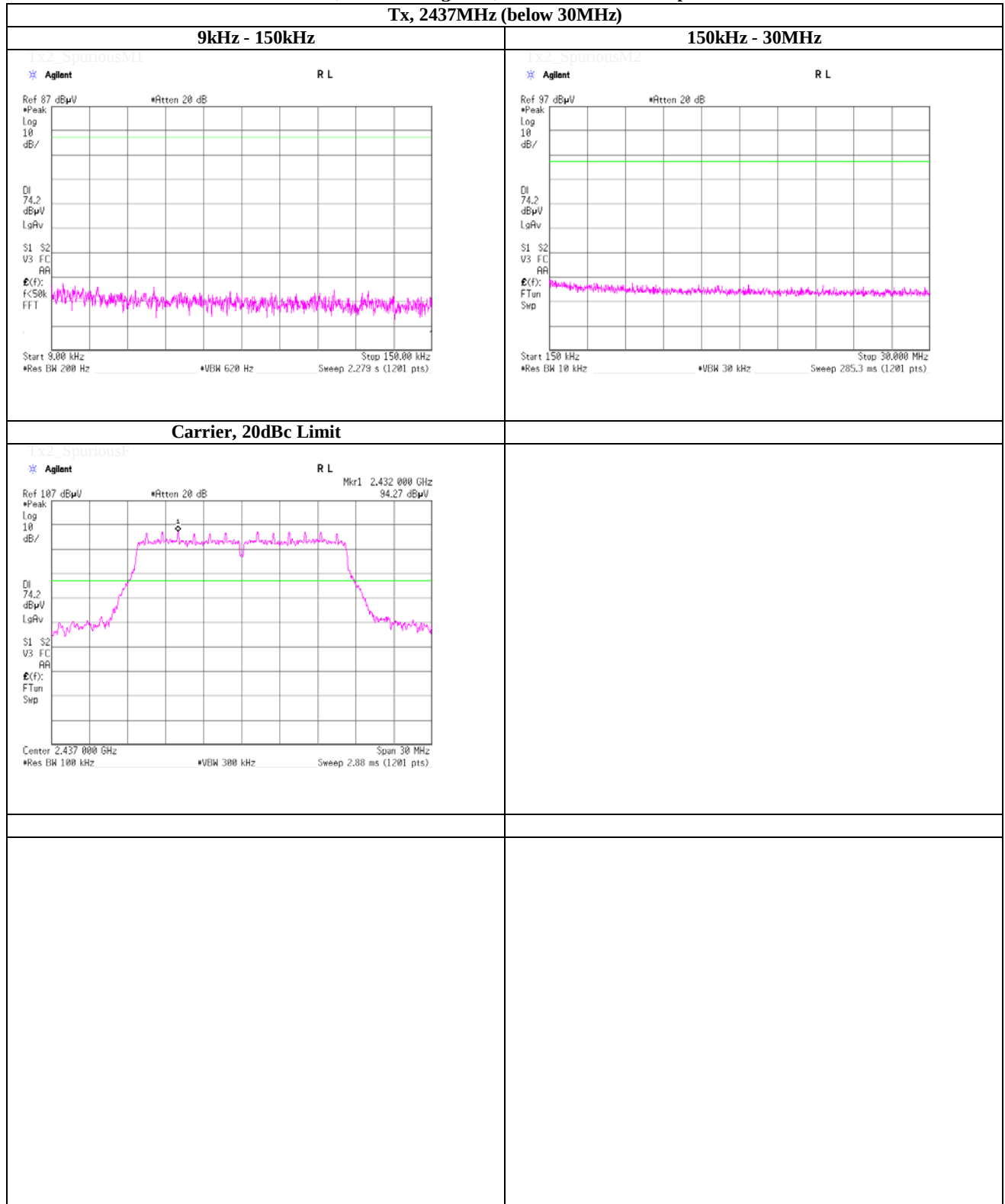
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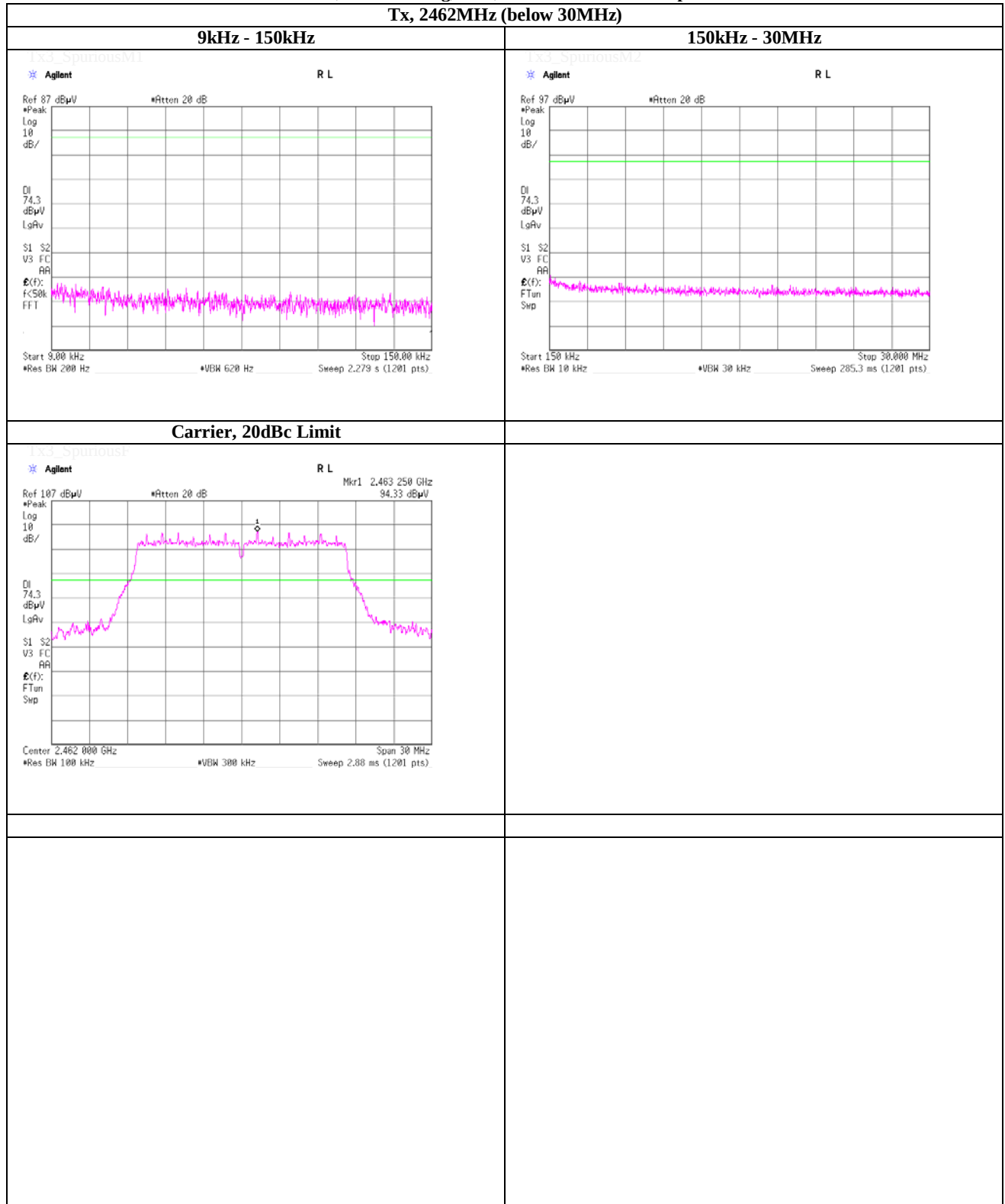
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	

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



Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	

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

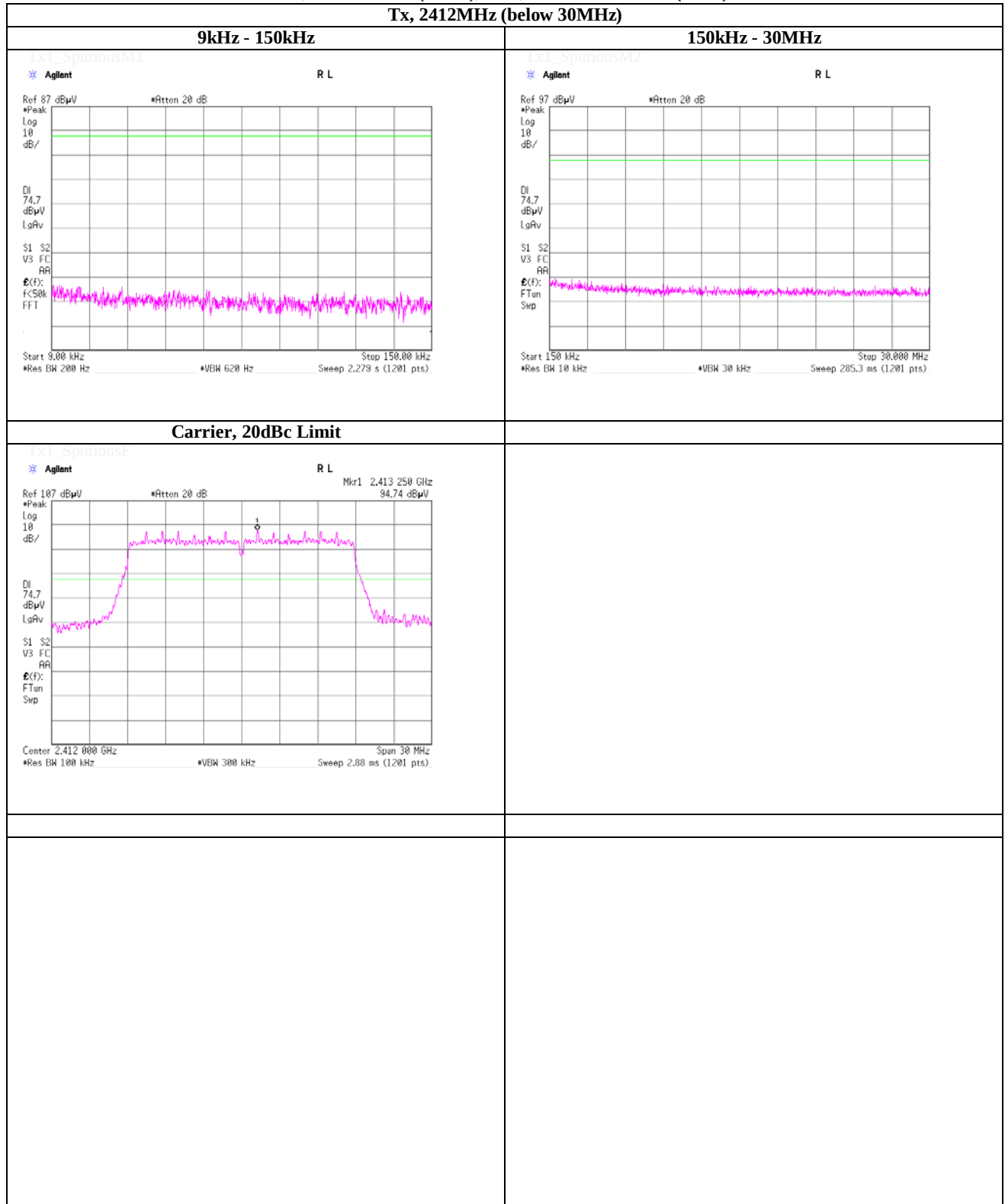


Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2412MHz (below 30MHz)



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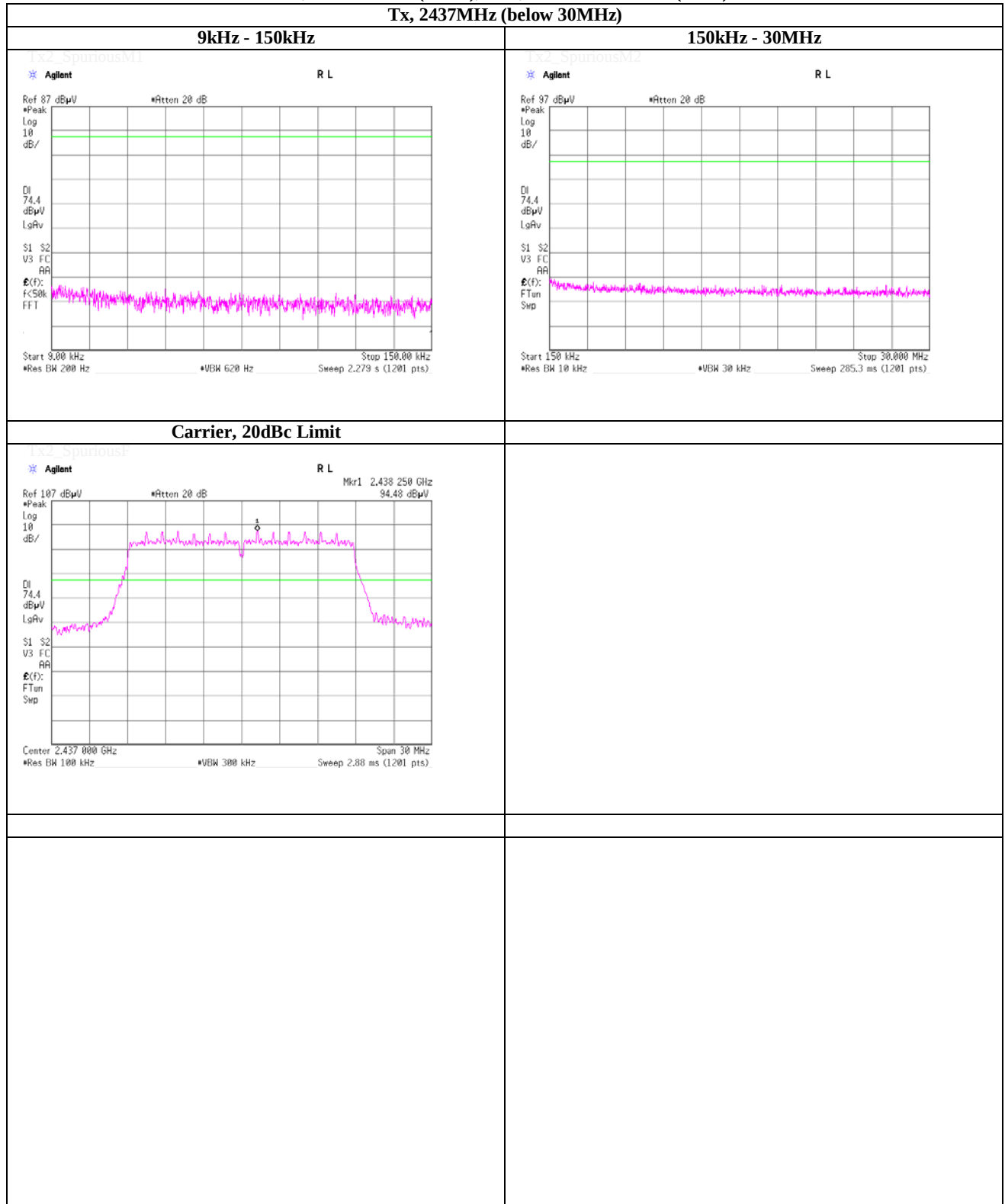
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date July 29, 2014
Temperature / Humidity 27deg.C , 45%RH
Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2437MHz (below 30MHz)



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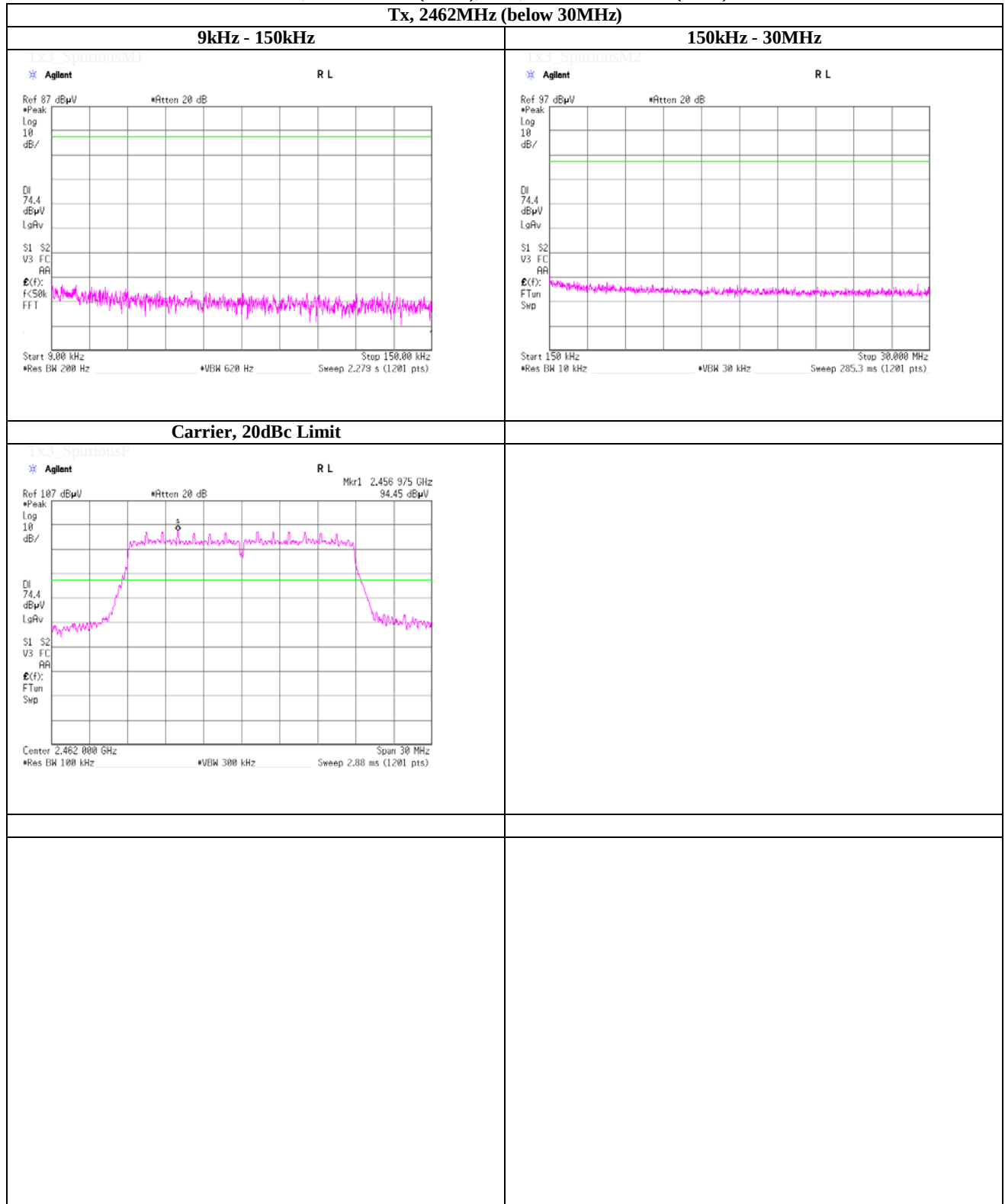
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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

Spurious emission (Conducted)

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

Tx, 2462MHz (below 30MHz)



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Facsimile : +81 463 50 6401

Maximum Power Spectral Density

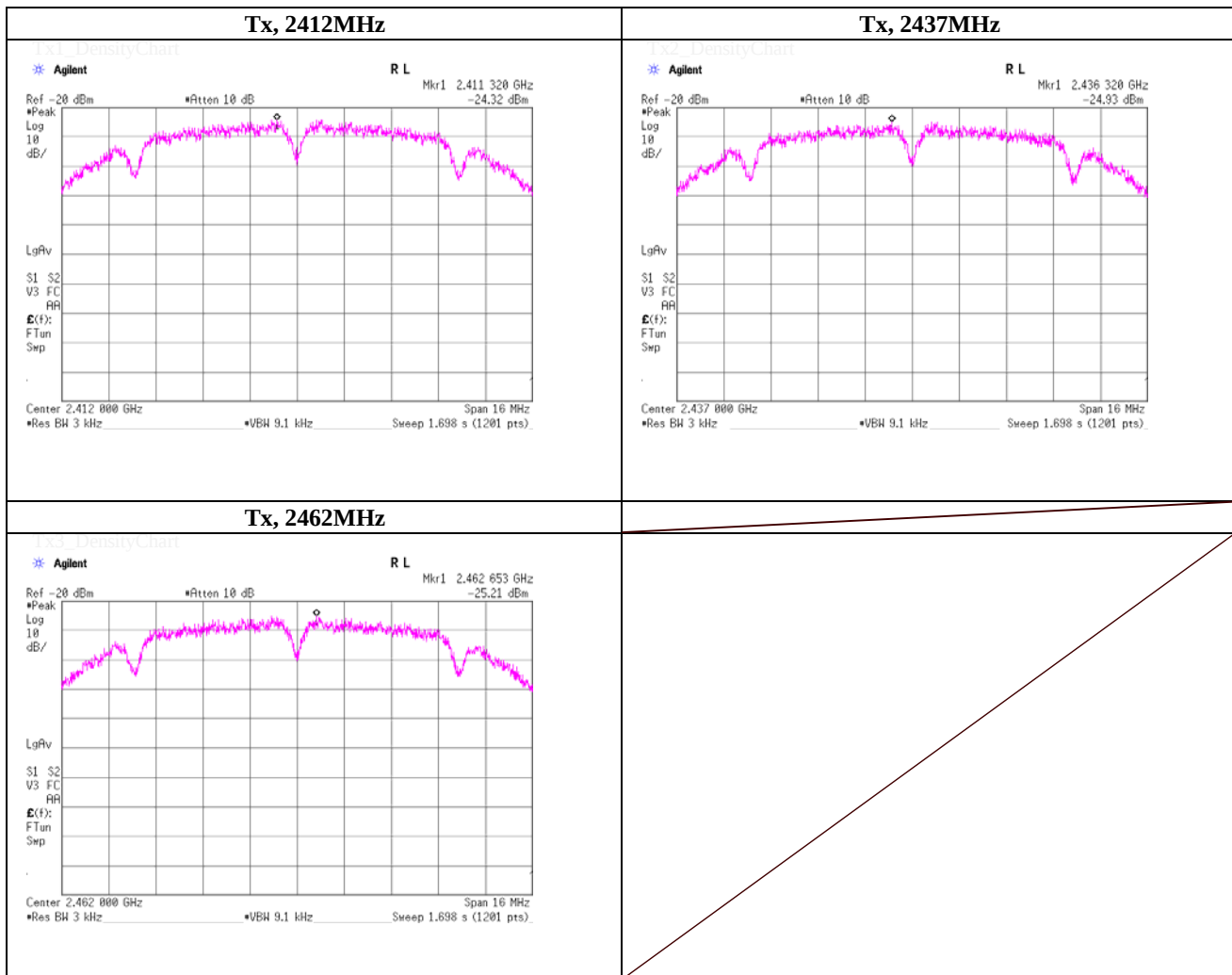
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
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	2411.32	-24.32	0.82	9.90	-13.60	8.00	21.60
2437.0000	2436.32	-24.93	0.82	9.90	-14.21	8.00	22.21
2462.0000	2462.65	-25.21	0.83	9.89	-14.49	8.00	22.49

Sample Calculation:

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

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Maximum Power Spectral Density

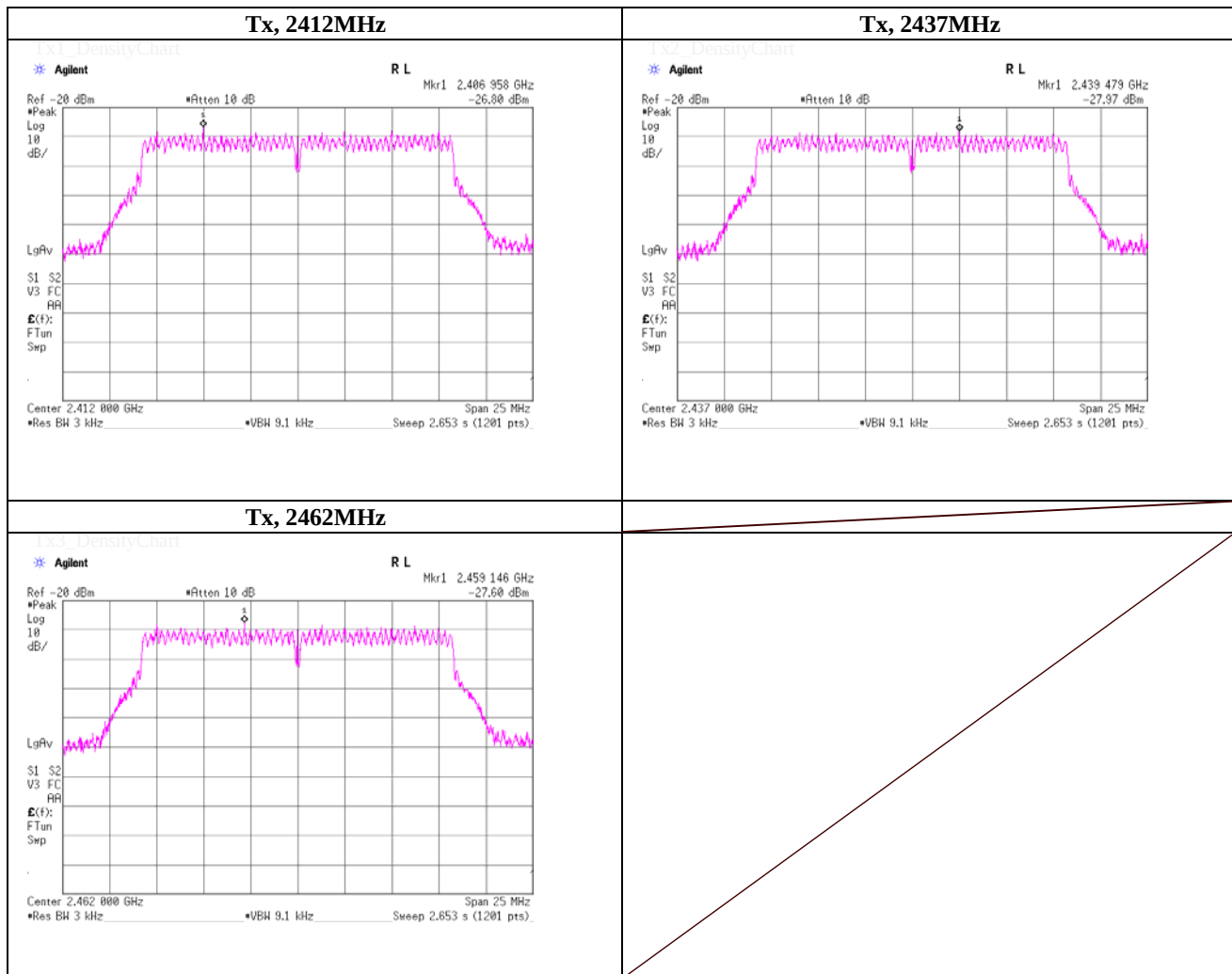
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
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	2406.96	-26.80	0.82	9.90	-16.08	8.00	24.08
2437.0000	2439.48	-27.97	0.82	9.90	-17.25	8.00	25.25
2462.0000	2459.15	-27.60	0.83	9.89	-16.88	8.00	24.88

Sample Calculation:

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

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Maximum Power Spectral Density

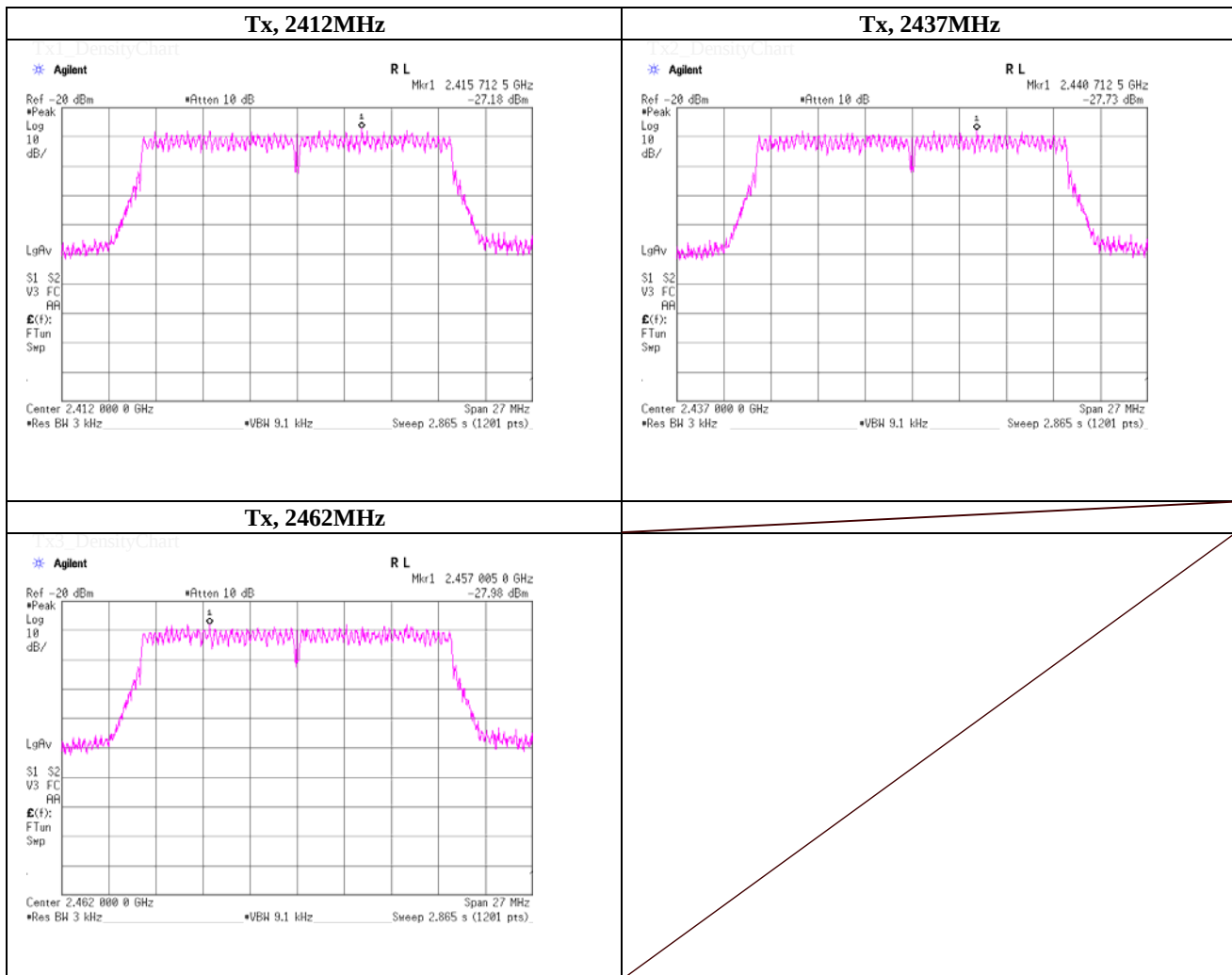
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	July 29, 2014	
Temperature / Humidity	27deg.C , 45%RH	
Engineer	Akio Hayashi	
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	2415.71	-27.18	0.82	9.90	-16.46	8.00	24.46
2437.0000	2440.71	-27.73	0.82	9.90	-17.01	8.00	25.01
2462.0000	2457.01	-27.98	0.83	9.89	-17.26	8.00	25.26

Sample Calculation:

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

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

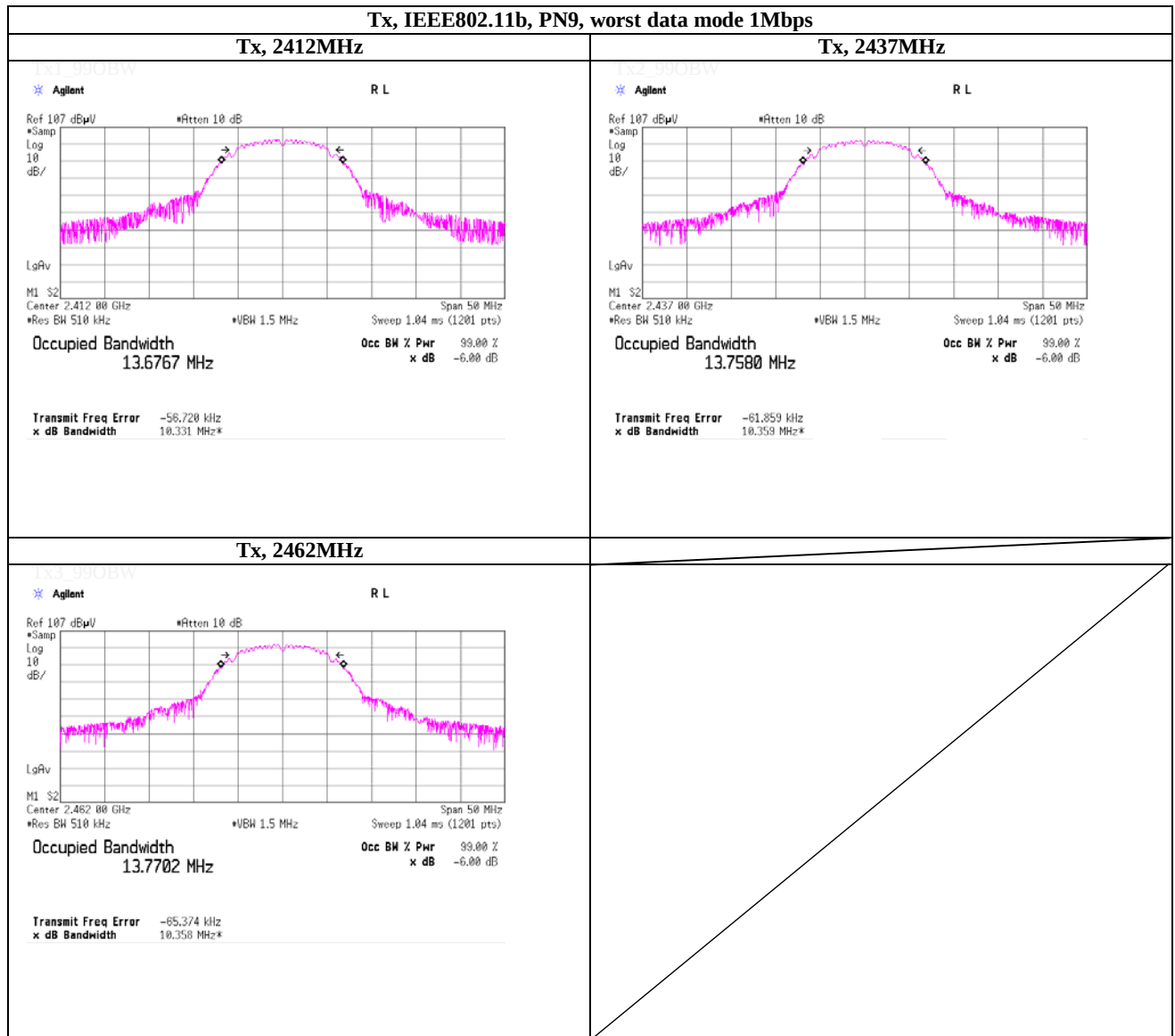
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

99% Occupied Bandwidth



UL Japan, Inc.

Shonan EMC Lab.

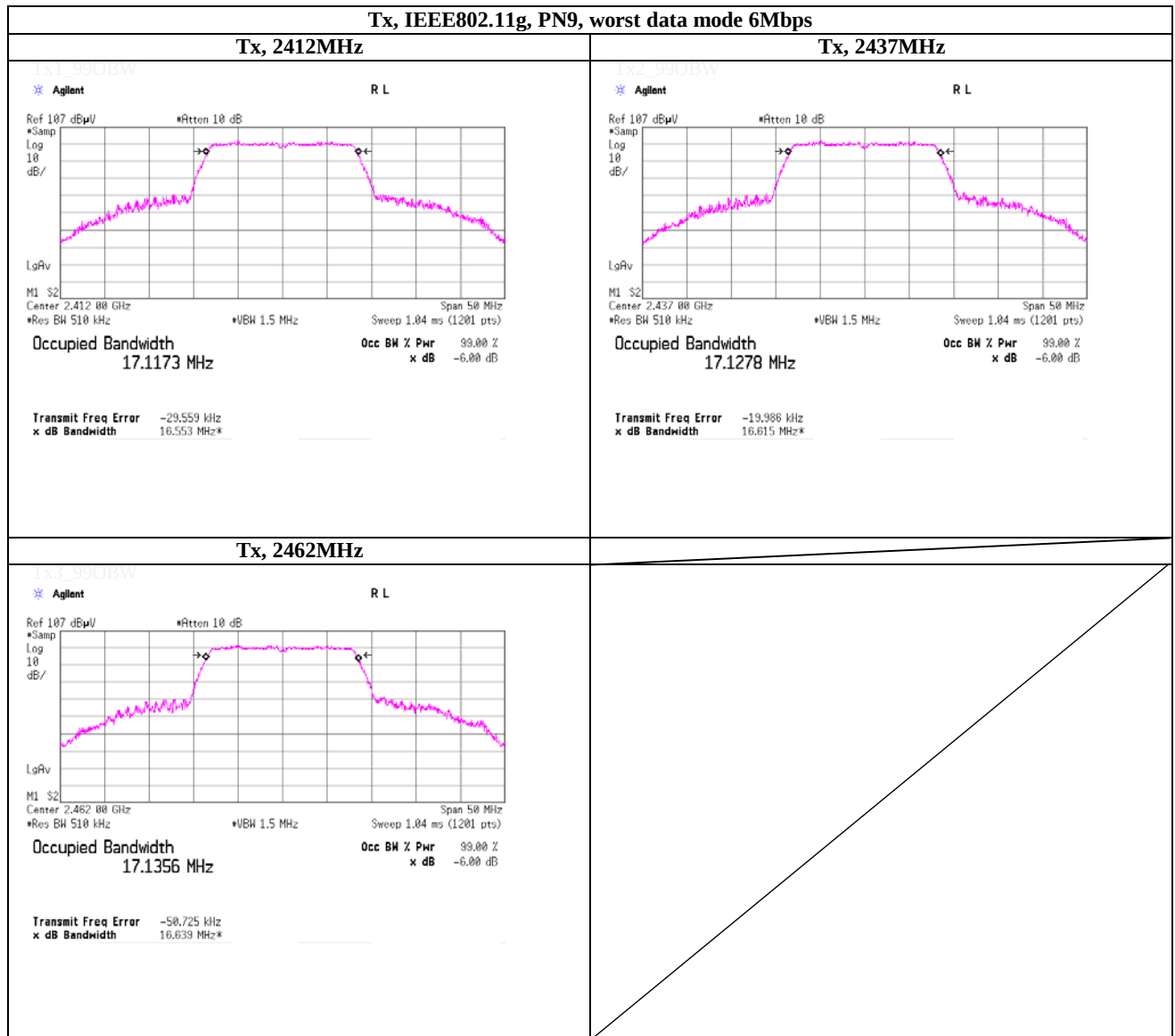
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

99% Occupied Bandwidth



UL Japan, Inc.

Shonan EMC Lab.

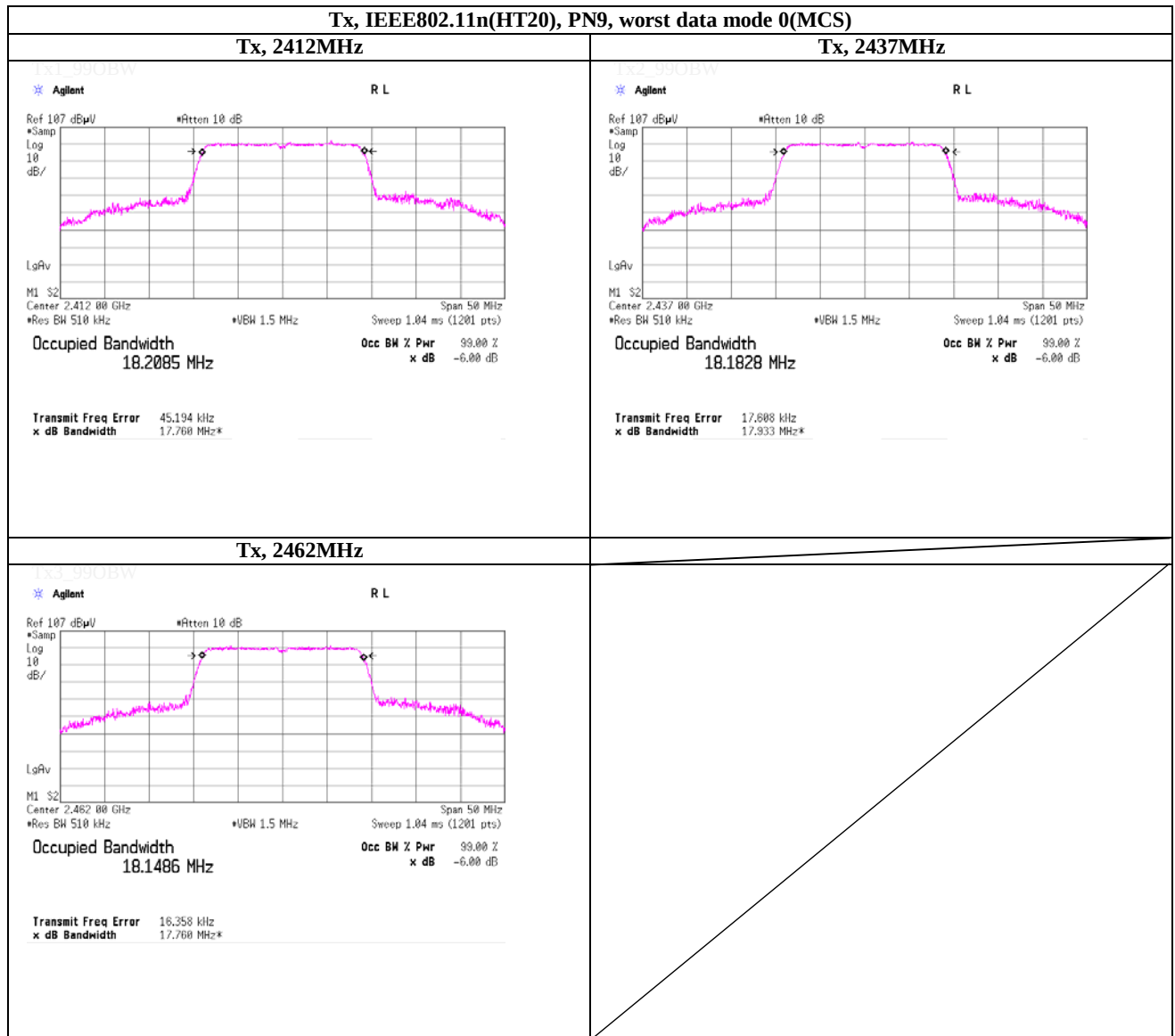
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Telephone : +81 463 50 6400

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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date July 29, 2014
 Temperature / Humidity 27deg.C , 45%RH
 Engineer Akio Hayashi

99% Occupied Bandwidth



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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)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2014/03/17 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2014/04/22 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2014/03/13 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2014/04/08 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2014/04/08 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2014/04/22 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2014/07/09 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2014/03/14 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2014/04/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2014/05/15 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2013/08/12 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2014/02/21 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE,CE	2013/11/20 * 12
SJM-13	Measure	ASKUL	-	-	RE,CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE,CE	-
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2013/11/22 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2014/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2014/03/14 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2014/03/13 * 12
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2014/05/16 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2013/11/22 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2014/03/04 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2014/02/17 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2013/12/26 * 12
KAT3-09	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2013/08/23 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2013/10/13 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2013/10/26 * 12
SCC-A12/A13/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	CE	2014/04/25 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE(EUT)	2014/02/14 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE(AE)	2014/03/05 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2014/03/07 * 12
STM-03	Terminator	TME	CT-01 BP	-	CE	2013/12/26 * 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