RADIO TEST REPORT

Test Report No.: 10517778S-A

Applicant	:	**OLYMPUS IMAGING CORP.**
Type of Equipment	:	**Wireless LAN Module**
Model No.	:	**S055WIFI-PCA**
FCC ID	:	**YSKW55**
Test regulation	:	**FCC Part 15 Subpart C: 2014**
Test result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: November 10 to 14, 2014

Tested by: W. Kojima

Wataru Kojima
Engineer
Consumer Technology Division

Approved by : T. Imamura

Toyokazu Imamura
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".

RTL02610

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 10517778S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10517778S-A	December 11, 2014	-	-
1	10517778S-A	December 16, 2014	4	Correction of antenna information

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Contents

SECTION 1: Customer information

Company Name	:	OLYMPUS IMAGING CORP.
Address	:	2951, Ishikawa-machi, Hachioji-shi, Tokyo, 192-8507, Japan
Telephone Number	:	+81-42-642-2283
Facsimile Number	:	+81-42-642-2398
Contact Person	:	Kenichi Aoki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless LAN Module
Model No.	:	S055WIFI-PCA
Serial No.	:	Refer to 4.2
Rating	:	DC3.2V
Receipt Date of Sample	:	November 7, 2014
Country of Mass-production	:	China
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: S055WIFI-PCA (referred to as the EUT in this report) is a Wireless LAN Module.

Clock frequency(ies) in the system : 26MHz

Radio specification:

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	:	λ/4 Monopole
Antenna connector type	:	None
Antenna gain	:	-3.5dBi
ITU code	:	D1D, G1D
Operation temperature range	:	-10 to +40 deg.C

FCC 15.31 (e) / 212
This host device provides stable voltage (DC3.2V) constantly to the module regardless of input voltage.
Therefore, the equipment complies with the requirement.

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

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014,
final revised on August 15, 2014 and effective October 14, 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	31.6dB Freq.: 0.18468MHz 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	7.4dB Freq.: 12060.000MHz Polarization: Horizontal Detection: Average Mode: Tx 2412MHz, IEEE 802.11n	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 r02 (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.

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	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.8 dB	4.9 dB	4.7 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	5.7 dB	5.7 dB
	18GHz-40GHz	4.5 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: (±) 0.68dB
Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.5dB
Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 1.7dB
Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 2.4dB
Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.5dB
Bandwidth Measurement uncertainty for this test was: (±) 0.66%

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
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.

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

4.1 Operating mode

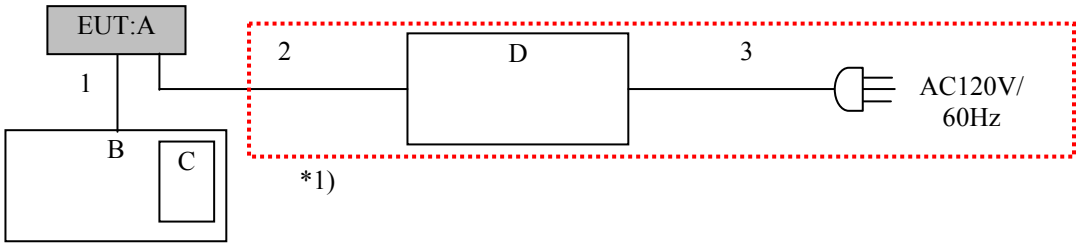
Test item	Mode	Tested frequency	Worst data mode *1)
Conducted emission, Radiated emission (below 1GHz) *2)	Transmitting IEEE 802.11g	2412MHz	PN9, 36Mbps
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	PN9, 11Mbps
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	PN9, 36Mbps
	Transmitting IEEE 802.11n HT20	2412MHz, 2437MHz, 2462MHz	PN9, MCS0
*1) The worst condition was determined based on the test result of Maximum Peak Output Power. *2) 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.			

EUT has the power settings by the software as follows;

Power settings	Fixed
Software	Wireless Test v1.0.1.2

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

4.2 Configuration and peripherals



*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	Remark
A	Wireless LAN Module	S055WIFI-PCA	*2)	OLYMPUS IMAGING CORP.	EUT
B	Digital Still Camera	E-P5	PP2-216	OLYMPUS IMAGING CORP.	-
C	Rechargeable Li-ion Battery	BLN-1	QTB0BLN1-008	OLYMPUS IMAGING CORP.	-
D	Power Supply	PAN35-10A	ML002085	Kikusui	*1)

List of cable used

No.	Item	Length (m)	Shield	Remark
1	FPC	0.04	Unshielded	-
2	DC line	0.2	Unshielded	*1)
3	AC Power	1.5	Unshielded	*1)

*1) This item was used during Conducted emission test and Antenna port conducted tests.
*2) Conducted emission test and Antenna port conducted tests: PP2-001, Radiated emission tests: PP2-002:

SECTION 5: Conducted emission

5.1 Operating environment

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

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.
Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

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

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded room.
The EUT was connected to a Line Impedance Stabilization Network (LISN) via DC power supply. 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.

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 8.2 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 9.1.2 PKPM1 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Detection type: Peak / Average *1)

Summary of the test results: Pass
Refer to APPENDIX 1

*1) Average detector was used only for Reference data.

SECTION 8: 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.

SECTION 9: Radiated emission

9.1 Operating environment

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

9.2 Test configuration

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

9.3 Test conditions

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

9.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz) (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.

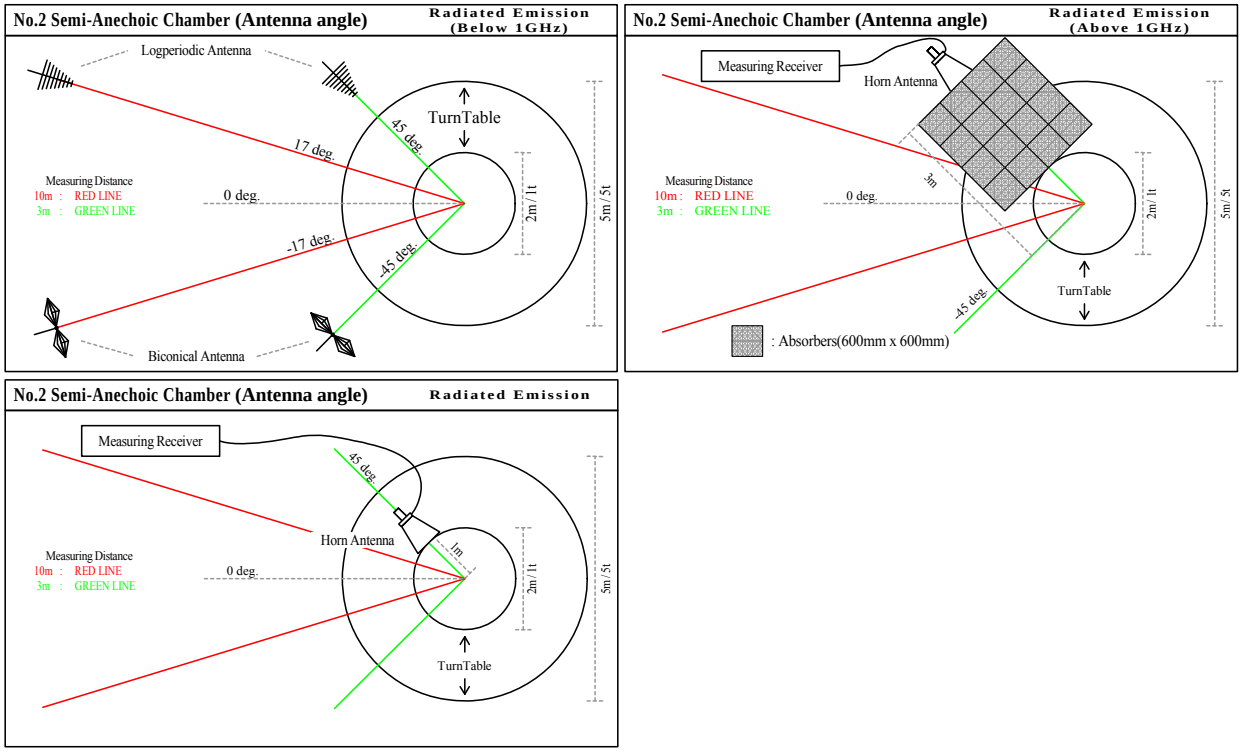
Frequency	30-1000MHz	1-25GHz		20dBc
Detection type	Quasi-Peak	Peak	Average *1)	Peak
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 3MHz Detector: Linear Voltage Averaging	RBW: 100kHz VBW: 300kHz

*1) Average Power Measurement was measured based on 13.3.2 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	Below 1GHz	Above 1GHz	
		1-18GHz	18-25GHz
Horizontal	Y	Y	Y
Vertical	Y	Z	X

Figure 1. Antenna angle



9.5 Band edge

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

9.6 Results

Summary of the test results : Pass
* No noise was detected above the 8th order harmonics.

Refer to APPENDIX 1.

Contents of APPENDIXES

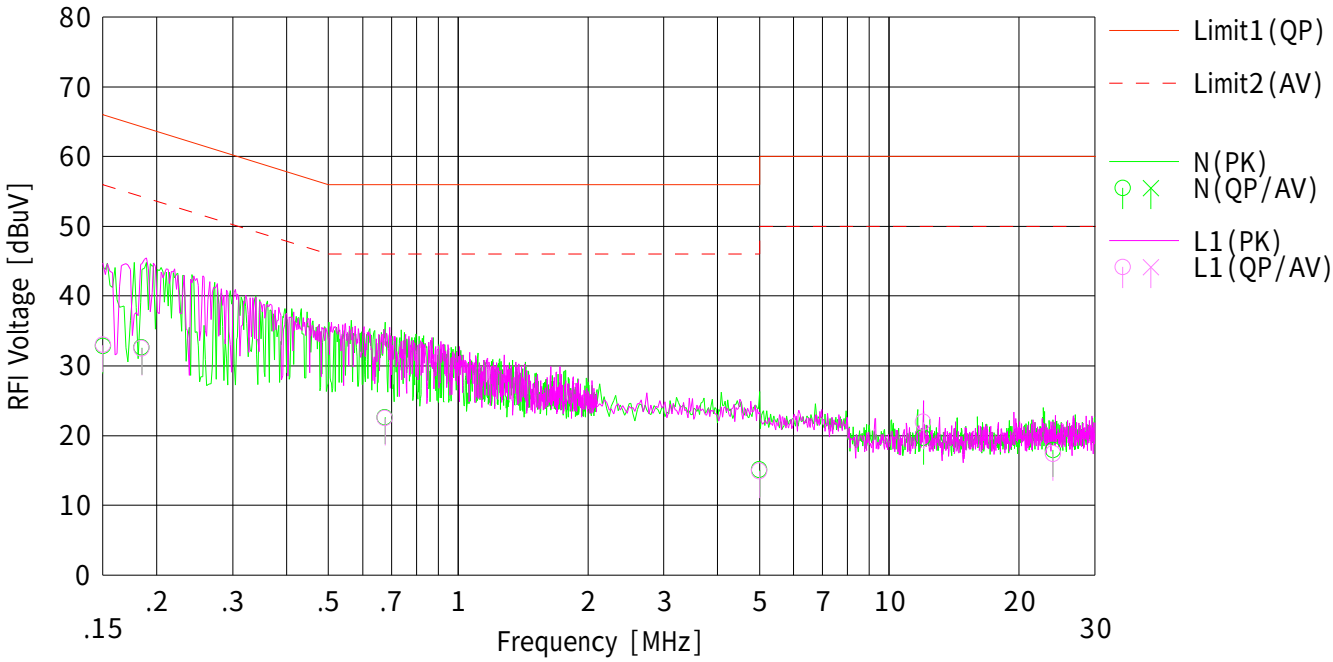
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2014/11/14

Company	: OLYMPUS IMAGING CORP.	Mode	: Transmitting(IEEE802.11g)2412MHz
Kind of EUT	: Wireless LAN Module	Order No.	: 10517778S
Model No.	: S055WIFI-PCA	Power	: DC 3.2V
Serial No.	: PP2-001	Temp./Humi.	: 23deg.C. / 30%RH
Remarks	: -		

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

Engineer : Wataru Kojima



No.	Freq.	Reading <QP>	Reading <AV>	C.Fac	Results <QP>	Results <AV>	Limit <QP>	Limit <AV>	Margin <QP>	Margin <AV>	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	20.2	---	12.6	32.8	---	66.0	56.0	33.2	---	N	
2	0.18468	20.0	---	12.6	32.6	---	64.2	54.2	31.6	---	N	
3	0.67703	10.0	---	12.6	22.6	---	56.0	46.0	33.4	---	N	
4	4.99999	2.1	---	13.0	15.1	---	56.0	46.0	40.9	---	N	
5	12.00396	6.3	---	13.4	19.7	---	60.0	50.0	40.3	---	N	
6	24.00000	4.0	---	13.9	17.9	---	60.0	50.0	42.1	---	N	
7	0.15000	20.4	---	12.6	33.0	---	66.0	56.0	33.0	---	L1	
8	0.18469	19.9	---	12.6	32.5	---	64.2	54.2	31.7	---	L1	
9	0.67703	9.9	---	12.6	22.5	---	56.0	46.0	33.5	---	L1	
10	4.99999	1.9	---	13.0	14.9	---	56.0	46.0	41.1	---	L1	
11	12.00000	8.5	---	13.4	21.9	---	60.0	50.0	38.1	---	L1	
12	24.00000	3.5	---	13.9	17.4	---	60.0	50.0	42.6	---	L1	

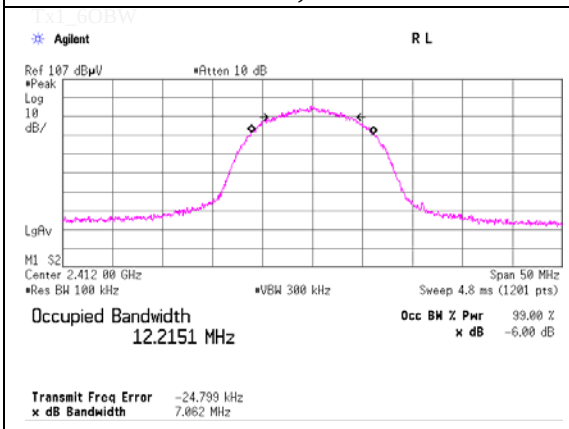
Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+ATT+Cable)[dB]
LISN:SLS-03

-6dB Bandwidth

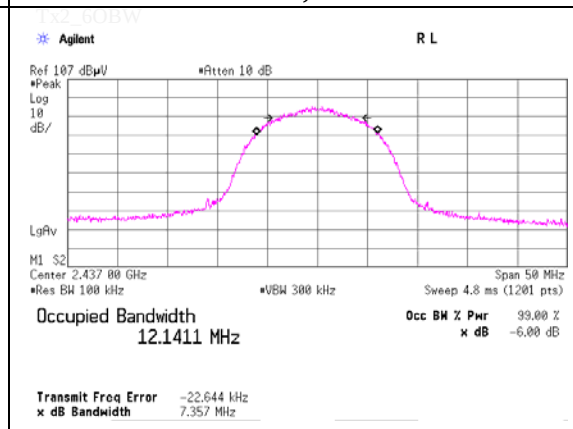
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 11Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	7.062	> 0.500
2437.0000	7.357	> 0.500
2462.0000	7.489	> 0.500

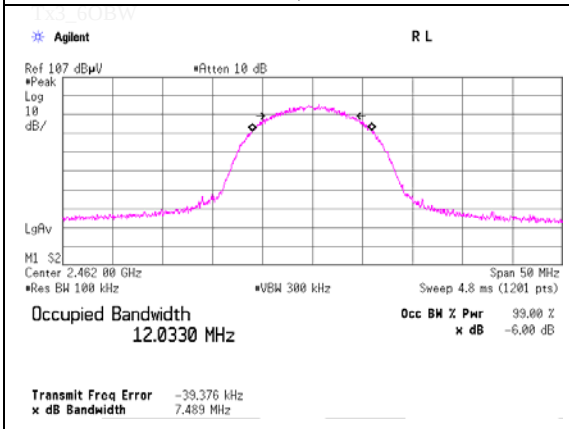
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



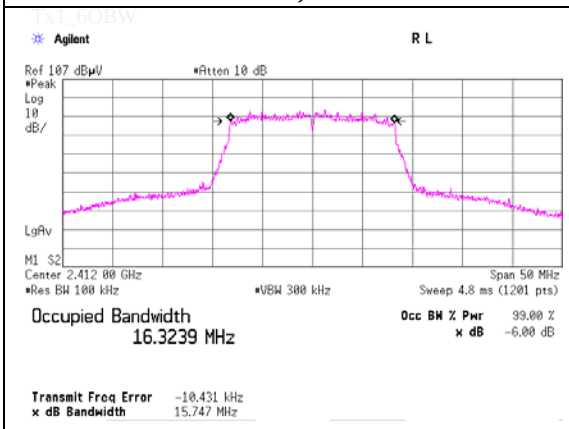
UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

-6dB Bandwidth

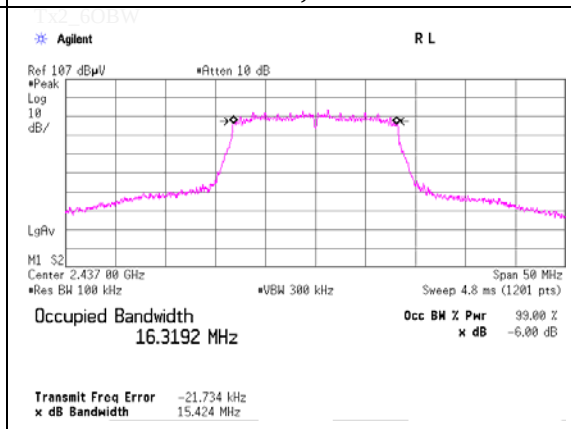
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802. 11g, PN9, worst data mode 36Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	15.747	> 0.500
2437.0000	15.424	> 0.500
2462.0000	15.748	> 0.500

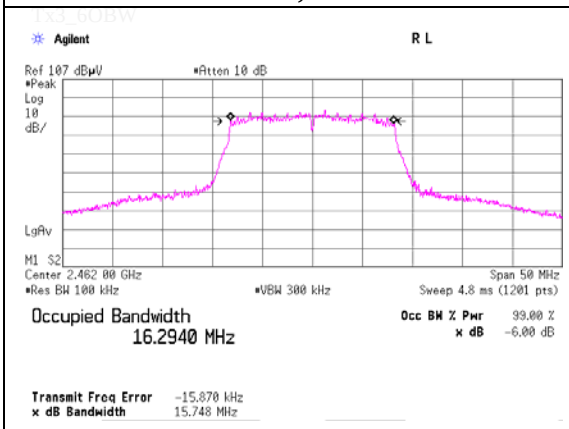
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



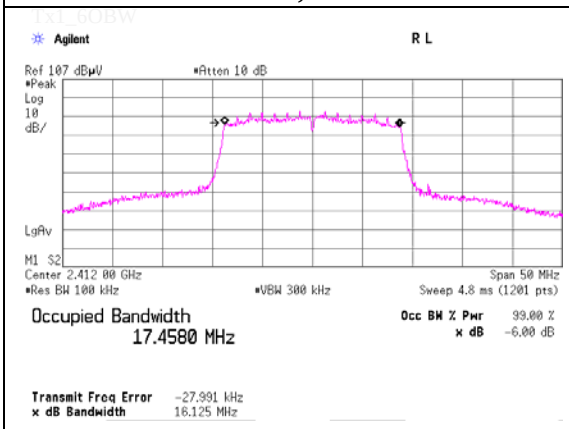
UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

-6dB Bandwidth

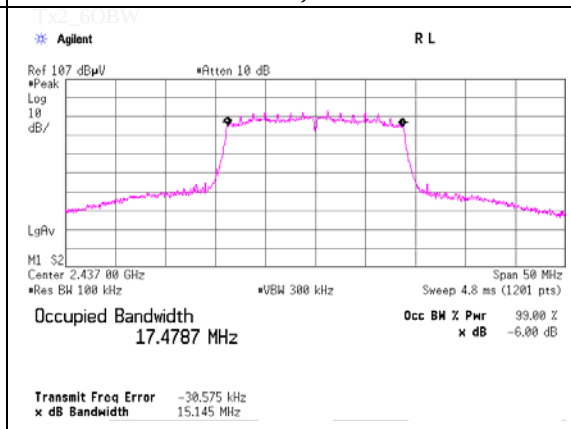
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11n HT20, PN9, worst data mode 0(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.125	> 0.500
2437.0000	15.145	> 0.500
2462.0000	15.135	> 0.500

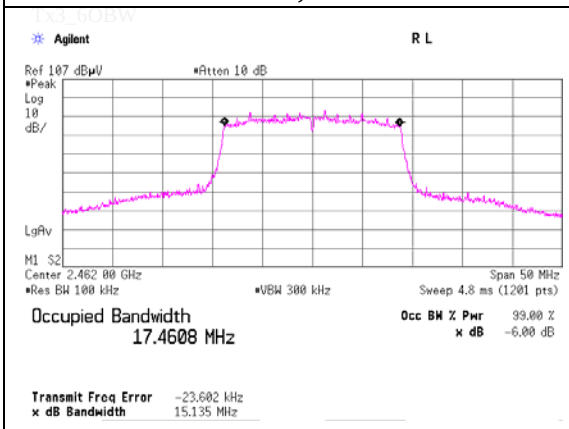
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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Maximum Peak Conducted Output Power

(PKPM1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9,	worst data mode : 11 Mbps

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

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	-2.83	1.85	9.90	8.92	7.80	30.00	1000	21.08
Mid	2437.0	-3.39	1.86	9.90	8.37	6.87	30.00	1000	21.63
High	2462.0	-3.50	1.88	9.89	8.27	6.71	30.00	1000	21.73

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

[Pre check]

	Data rate	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
	[Mbps]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
	1	2412.0	-3.18	1.85	9.90	8.57	7.19	30.00	1000	21.43	
	2	2412.0	-3.13	1.85	9.90	8.62	7.28	30.00	1000	21.38	
	5.5	2412.0	-3.08	1.85	9.90	8.67	7.36	30.00	1000	21.33	
	11	2412.0	-2.83	1.85	9.90	**8.92**	7.80	30.00	1000	**21.08**	**Worst**

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

Maximum Conducted Output Power(Reference)

(AVGPM)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room	
Date	November 10, 2014		
Temperature / Humidity	25deg.C , 54%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11b, PN9,	worst data mode :	11 Mbps

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

Ch	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
Low	2412.0	-6.29	1.85	9.90		5.46	3.52
Mid	2437.0	-6.64	1.86	9.90		5.12	3.25
High	2462.0	-6.78	1.88	9.89		4.99	3.16

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

[Pre check]

	Data rate [Mbps]	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
	1	2412.0	-6.50	1.85	9.90		5.25	3.35
	2	2412.0	-6.40	1.85	9.90		5.35	3.43
	5.5	2412.0	-6.32	1.85	9.90		5.43	3.49
	11	2412.0	-6.29	1.85	9.90		**5.46**	3.52

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
(*1) Power was measured with using the gate function of power meter.
It was means that the intervals during which the transmitter is off or is transmitting at reduced power level is not included in the average.
Therefore, there is no need to add duty cycle correction to the result.

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

Maximum Peak Conducted Output Power

(PKPM1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room	
Date	November 10, 2014		
Temperature / Humidity	25deg.C , 54%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802. 11g, PN9,	worst data mode :	36 Mbps

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

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	5.65	1.85	9.90	17.40	54.95	30.00	1000	12.60
Mid	2437.0	5.10	1.86	9.90	16.86	48.53	30.00	1000	13.14
High	2462.0	5.00	1.88	9.89	16.77	47.53	30.00	1000	13.23

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

[Pre check]

	Data rate	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
	[Mbps]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
	6	2412.0	4.26	1.85	9.90	16.01	39.90	30.00	1000	13.99	
	9	2412.0	5.47	1.85	9.90	17.22	52.72	30.00	1000	12.78	
	12	2412.0	4.81	1.85	9.90	16.56	45.29	30.00	1000	13.44	
	18	2412.0	4.21	1.85	9.90	15.96	39.45	30.00	1000	14.04	
	24	2412.0	5.00	1.85	9.90	16.75	47.32	30.00	1000	13.25	
	36	2412.0	5.65	1.85	9.90	**17.40**	54.95	30.00	1000	**12.60**	**Worst**
	48	2412.0	5.53	1.85	9.90	17.28	53.46	30.00	1000	12.72	
	54	2412.0	4.67	1.85	9.90	16.42	43.85	30.00	1000	13.58	

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

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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

Maximum Conducted Output Power(Reference)

(AVGPM)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room	
Date	November 10, 2014		
Temperature / Humidity	25deg.C , 54%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802. 11g, PN9,	worst data mode :	24 Mbps

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

Ch	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
Low	2412.0	-5.86	1.85	9.90		5.89	3.88
Mid	2437.0	-6.31	1.86	9.90		5.45	3.51
High	2462.0	-6.36	1.88	9.89		5.41	3.48

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

[Pre check]

	Data rate [Mbps]	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
	6	2412.0	-6.10	1.85	9.90		5.65	3.67
	9	2412.0	-6.15	1.85	9.90		5.60	3.63
	12	2412.0	-6.02	1.85	9.90		5.73	3.74
	18	2412.0	-6.20	1.85	9.90		5.55	3.59
	24	2412.0	-5.86	1.85	9.90		**5.89**	3.88
	36	2412.0	-5.98	1.85	9.90		5.77	3.78
	48	2412.0	-5.99	1.85	9.90		5.76	3.77
	54	2412.0	-6.01	1.85	9.90		5.74	3.75

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
(*1) Power was measured with using the gate function of power meter.
It was means that the intervals during which the transmitter is off or is transmitting at reduced power level is not included in the average.
Therefore, there is no need to add duty cycle correction to the result.

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

Maximum Peak Conducted Output Power

(PKPM1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room	
Date	November 10, 2014		
Temperature / Humidity	25deg.C , 54%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11n HT20, PN9,	worst data mode :	0 (MCS)

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

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	4.80	1.85	9.90	16.55	45.19	30.00	1000	13.45
Mid	2437.0	4.32	1.86	9.90	16.08	40.55	30.00	1000	13.92
High	2462.0	4.62	1.88	9.89	16.39	43.55	30.00	1000	13.61

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

[Pre check]

	Mode	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
	(MCS)	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
	0	2412.0	4.80	1.85	9.90	**16.55**	45.19	30.00	1000	**13.45**	**Worst**
	1	2412.0	4.00	1.85	9.90	15.75	37.58	30.00	1000	14.25	
	2	2412.0	4.40	1.85	9.90	16.15	41.21	30.00	1000	13.85	
	3	2412.0	4.67	1.85	9.90	16.42	43.85	30.00	1000	13.58	
	4	2412.0	4.61	1.85	9.90	16.36	43.25	30.00	1000	13.64	
	5	2412.0	3.82	1.85	9.90	15.57	36.06	30.00	1000	14.43	
	6	2412.0	4.29	1.85	9.90	16.04	40.18	30.00	1000	13.96	
	7	2412.0	3.78	1.85	9.90	15.53	35.73	30.00	1000	14.47	

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

Maximum Conducted Output Power(Reference)

(AVGPM)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room	
Date	November 10, 2014		
Temperature / Humidity	25deg.C , 54%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11n HT20, PN9,	worst data mode :	5 (MCS)

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

Ch	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
Low	2412.0	-6.09	1.85	9.90		5.66	3.68
Mid	2437.0	-6.29	1.86	9.90		5.47	3.52
High	2462.0	-6.41	1.88	9.89		5.36	3.44

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

[Pre check]

	Mode (MCS)	Freq. [MHz]	P/M (AV) Reading (*1) [dBm]	Cable Loss [dB]	Atten. Loss [dB]		Result [dBm]	Result [mW]
	0	2412.0	-6.23	1.85	9.90		5.52	3.56
	1	2412.0	-6.14	1.85	9.90		5.61	3.64
	2	2412.0	-6.22	1.85	9.90		5.53	3.57
	3	2412.0	-6.12	1.85	9.90		5.63	3.66
	4	2412.0	-6.26	1.85	9.90		5.49	3.54
	5	2412.0	-6.09	1.85	9.90		**5.66**	3.68
	6	2412.0	-6.13	1.85	9.90		5.62	3.65
	7	2412.0	-6.13	1.85	9.90		5.62	3.65

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
(*1) Power was measured with using the gate function of power meter.
It was means that the intervals during which the transmitter is off or is transmitting at reduced power level is not included in the average.
Therefore, there is no need to add duty cycle correction to the result.

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

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2412 MHz	
	Tx, IEEE802.11b, PN9, 11Mbps	

(* 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	43.2	25.9	14.5	38.2	45.4	73.9	28.5	100	354	
Hori.	3618.000	PK	45.5	28.1	6.8	37.9	42.5	73.9	31.4	100	354	
Hori.	4824.000	PK	41.2	30.5	8.0	37.1	42.6	73.9	31.3	100	0	
Hori.	7236.000	PK	44.5	36.3	9.0	39.4	50.4	73.9	23.5	100	0	
Hori.	9648.000	PK	42.7	38.3	9.9	37.6	53.3	73.9	20.6	100	0	
Hori.	12060.000	PK	43.0	39.3	11.3	38.5	55.1	73.9	18.8	100	0	
Hori.	18090.000	PK	52.1	40.8	1.6	49.0	45.5	73.9	28.4	100	16	
Hori.	2390.000	AV	33.1	25.9	14.5	38.2	35.3	53.9	18.6	100	354	
Hori.	3618.000	AV	39.7	28.1	6.8	37.9	36.7	53.9	17.2	100	354	
Hori.	4824.000	AV	32.1	30.5	8.0	37.1	33.5	53.9	20.4	100	0	
Hori.	7236.000	AV	34.2	36.3	9.0	39.4	40.1	53.9	13.8	100	0	
Hori.	9648.000	AV	32.2	38.3	9.9	37.6	42.8	53.9	11.1	100	0	
Hori.	12060.000	AV	34.2	39.3	11.3	38.5	46.3	53.9	**7.6**	100	0	
Hori.	18090.000	AV	50.3	40.8	1.6	49.0	43.7	53.9	10.2	100	16	
Vert.	2390.000	PK	43.2	25.9	14.5	38.2	45.4	73.9	28.5	100	354	
Vert.	3618.000	PK	44.9	28.1	6.8	37.9	41.9	73.9	32.0	100	136	
Vert.	4824.000	PK	41.1	30.5	8.0	37.1	42.5	73.9	31.4	100	0	
Vert.	7236.000	PK	44.7	36.3	9.0	39.4	50.6	73.9	23.3	100	0	
Vert.	9648.000	PK	42.4	38.3	9.9	37.6	53.0	73.9	20.9	100	0	
Vert.	12060.000	PK	43.1	39.3	11.3	38.5	55.2	73.9	18.7	100	0	
Vert.	18090.000	PK	51.0	40.8	1.6	49.0	44.4	73.9	29.5	100	7	
Vert.	2390.000	AV	33.2	25.9	14.5	38.2	35.4	53.9	18.5	100	354	
Vert.	3618.000	AV	39.4	28.1	6.8	37.9	36.4	53.9	17.5	100	136	
Vert.	4824.000	AV	32.1	30.5	8.0	37.1	33.5	53.9	20.4	100	0	
Vert.	7236.000	AV	34.2	36.3	9.0	39.4	40.1	53.9	13.8	100	0	
Vert.	9648.000	AV	32.2	38.3	9.9	37.6	42.8	53.9	11.1	100	0	
Vert.	12060.000	AV	34.2	39.3	11.3	38.5	46.3	53.9	**7.6**	100	0	
Vert.	18090.000	AV	48.8	40.8	1.6	49.0	42.2	53.9	11.7	100	7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
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	79.1	25.9	14.6	38.2	81.4	-	-	
Hori.	2400.000	PK	34.2	25.9	14.5	38.2	36.4	61.4	25.0	
Vert.	2412.000	PK	81.6	25.9	14.6	38.2	83.9	-	-	
Vert.	2400.000	PK	34.0	25.9	14.5	38.2	36.2	63.9	27.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place No.2 Semi Anechoic Chamber
Date November 12, 2014 November 13, 2014
Temperature / Humidity 24 deg.C, 49 %RH 24 deg.C, 34 %RH
Engineer Wataru Kojima
Mode Tx, 2437 MHz
Tx, IEEE802.11b, PN9, 11Mbps

(* 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.	3655.490	PK	48.0	28.1	6.9	37.9	45.1	73.9	28.8	100	1	
Hori.	4874.000	PK	41.0	30.7	8.0	37.1	42.6	73.9	31.3	100	0	
Hori.	7311.000	PK	42.5	36.4	9.0	39.4	48.5	73.9	25.4	100	0	
Hori.	9748.000	PK	41.5	38.3	9.9	37.6	52.1	73.9	21.8	100	0	
Hori.	12185.000	PK	42.5	39.2	11.3	38.4	54.6	73.9	19.3	100	0	
Hori.	18277.450	PK	52.8	40.8	1.6	49.0	46.2	73.9	27.7	100	1	
Hori.	3655.490	AV	40.4	28.1	6.9	37.9	37.5	53.9	16.4	100	1	
Hori.	4874.000	AV	31.1	30.7	8.0	37.1	32.7	53.9	21.2	100	0	
Hori.	7311.000	AV	33.3	36.4	9.0	39.4	39.3	53.9	14.6	100	0	
Hori.	9748.000	AV	31.0	38.3	9.9	37.6	41.6	53.9	12.3	100	0	
Hori.	12185.000	AV	32.6	39.2	11.3	38.4	44.7	53.9	**9.2**	100	0	
Hori.	18277.450	AV	50.1	40.8	1.6	49.0	43.5	53.9	10.4	100	1	
Vert.	3655.490	PK	45.4	28.1	6.9	37.9	42.5	73.9	31.4	100	357	
Vert.	4874.000	PK	40.7	30.7	8.0	37.1	42.3	73.9	31.6	100	0	
Vert.	7311.000	PK	42.3	36.4	9.0	39.4	48.3	73.9	25.6	100	0	
Vert.	9748.000	PK	41.6	38.3	9.9	37.6	52.2	73.9	21.7	100	0	
Vert.	12185.000	PK	42.4	39.2	11.3	38.4	54.5	73.9	19.4	100	0	
Vert.	18277.450	PK	50.4	40.8	1.6	49.0	43.8	73.9	30.1	100	12	
Vert.	3655.490	AV	37.0	28.1	6.9	37.9	34.1	53.9	19.8	100	357	
Vert.	4874.000	AV	31.1	30.7	8.0	37.1	32.7	53.9	21.2	100	0	
Vert.	7311.000	AV	32.9	36.4	9.0	39.4	38.9	53.9	15.0	100	0	
Vert.	9748.000	AV	31.2	38.3	9.9	37.6	41.8	53.9	12.1	100	0	
Vert.	12185.000	AV	32.5	39.2	11.3	38.4	44.6	53.9	9.3	100	0	
Vert.	18277.450	AV	47.2	40.8	1.6	49.0	40.6	53.9	13.3	100	12	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place No.2 Semi Anechoic Chamber
Date November 12, 2014 November 13, 2014
Temperature / Humidity 24 deg.C, 49 %RH 24 deg.C, 34 %RH
Engineer Wataru Kojima
Mode Tx, 2462 MHz
Tx, IEEE802.11b, PN9, 11Mbps

(* 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	41.9	25.9	14.6	38.1	44.3	73.9	29.6	100	4	
Hori.	3692.800	PK	45.4	28.2	6.9	37.9	42.6	73.9	31.3	100	326	
Hori.	4924.000	PK	42.3	30.9	8.0	37.0	44.2	73.9	29.7	100	0	
Hori.	7386.000	PK	42.7	36.5	9.1	39.4	48.9	73.9	25.0	100	0	
Hori.	9848.000	PK	39.7	38.3	9.9	37.5	50.4	73.9	23.5	100	0	
Hori.	12310.000	PK	41.0	39.1	11.4	38.3	53.2	73.9	20.7	100	0	
Hori.	18465.000	PK	52.1	40.8	1.6	49.1	45.4	73.9	28.5	100	1	
Hori.	2483.500	AV	32.7	25.9	14.6	38.1	35.1	53.9	18.8	100	4	
Hori.	3692.800	AV	40.0	28.2	6.9	37.9	37.2	53.9	16.7	100	326	
Hori.	4924.000	AV	31.7	30.9	8.0	37.0	33.6	53.9	20.3	100	0	
Hori.	7386.000	AV	32.7	36.5	9.1	39.4	38.9	53.9	15.0	100	0	
Hori.	9848.000	AV	30.2	38.3	9.9	37.5	40.9	53.9	13.0	100	0	
Hori.	12310.000	AV	31.4	39.1	11.4	38.3	43.6	53.9	**10.3**	100	0	
Hori.	18465.000	AV	49.2	40.8	1.6	49.1	42.5	53.9	11.4	100	1	
Vert.	2483.500	PK	42.5	25.9	14.6	38.1	44.9	73.9	29.0	121	117	
Vert.	3693.000	PK	44.5	28.2	6.9	37.9	41.7	73.9	32.2	100	138	
Vert.	4924.000	PK	41.4	30.9	8.0	37.0	43.3	73.9	30.6	100	0	
Vert.	7386.000	PK	43.3	36.5	9.1	39.4	49.5	73.9	24.4	100	0	
Vert.	9848.000	PK	40.0	38.3	9.9	37.5	50.7	73.9	23.2	100	0	
Vert.	12310.000	PK	40.4	39.1	11.4	38.3	52.6	73.9	21.3	100	0	
Vert.	18465.000	PK	50.9	40.8	1.6	49.1	44.2	73.9	29.7	114	10	
Vert.	2483.500	AV	33.1	25.9	14.6	38.1	35.5	53.9	18.4	121	117	
Vert.	3693.000	AV	38.1	28.2	6.9	37.9	35.3	53.9	18.6	100	138	
Vert.	4924.000	AV	31.4	30.9	8.0	37.0	33.3	53.9	20.6	100	0	
Vert.	7386.000	AV	32.7	36.5	9.1	39.4	38.9	53.9	15.0	100	0	
Vert.	9848.000	AV	30.3	38.3	9.9	37.5	41.0	53.9	12.9	100	0	
Vert.	12310.000	AV	31.0	39.1	11.4	38.3	43.2	53.9	10.7	100	0	
Vert.	18465.000	AV	48.7	40.8	1.6	49.1	42.0	53.9	11.9	114	10	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2412 MHz	
	Tx, IEEE802.11g, PN9, 36Mbps	

(* 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.	336.000	QP	42.5	14.7	6.7	31.7	32.2	46.0	13.8	100	221	
Hori.	2390.000	PK	42.5	25.9	14.5	38.2	44.7	73.9	29.2	100	314	
Hori.	3618.000	PK	45.8	28.1	6.8	37.9	42.8	73.9	31.1	100	0	
Hori.	4824.000	PK	41.1	30.5	8.0	37.1	42.5	73.9	31.4	100	0	
Hori.	7236.000	PK	43.5	36.3	9.0	39.4	49.4	73.9	24.5	100	0	
Hori.	9648.000	PK	43.1	38.3	9.9	37.6	53.7	73.9	20.2	100	0	
Hori.	12060.000	PK	43.4	39.3	11.3	38.5	55.5	73.9	18.4	100	0	
Hori.	18090.000	PK	53.4	40.8	1.6	49.0	46.8	73.9	27.1	100	3	
Hori.	2390.000	AV	32.0	25.9	14.5	38.2	34.2	53.9	19.7	100	314	
Hori.	3618.000	AV	39.0	28.1	6.8	37.9	36.0	53.9	17.9	100	0	
Hori.	18090.000	AV	51.5	40.8	1.6	49.0	44.9	53.9	**9.0**	100	3	
Vert.	143.936	QP	36.5	14.6	8.3	31.8	27.6	43.5	15.9	100	275	
Vert.	336.000	QP	45.2	14.7	6.7	31.7	34.9	46.0	11.1	176	320	
Vert.	432.002	QP	39.9	16.6	7.3	31.7	32.1	46.0	13.9	128	247	
Vert.	2390.000	PK	43.1	25.9	14.5	38.2	45.3	73.9	28.6	100	146	
Vert.	3618.000	PK	45.6	28.1	6.8	37.9	42.6	73.9	31.3	100	332	
Vert.	4824.000	PK	41.6	30.5	8.0	37.1	43.0	73.9	30.9	100	0	
Vert.	7236.000	PK	43.6	36.3	9.0	39.4	49.5	73.9	24.4	100	0	
Vert.	9648.000	PK	42.3	38.3	9.9	37.6	52.9	73.9	21.0	100	0	
Vert.	12060.000	PK	43.3	39.3	11.3	38.5	55.4	73.9	18.5	100	0	
Vert.	18090.000	PK	52.7	40.8	1.6	49.0	46.1	73.9	27.8	110	12	
Vert.	2390.000	AV	32.9	25.9	14.5	38.2	35.1	53.9	18.8	100	146	
Vert.	3618.000	AV	38.7	28.1	6.8	37.9	35.7	53.9	18.2	100	332	
Vert.	18090.000	AV	50.5	40.8	1.6	49.0	43.9	53.9	10.0	110	12	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4824.000	AV	30.7	30.5	8.0	37.1	1.0	33.1	53.9	20.8	
Hori.	7236.000	AV	33.2	36.3	9.0	39.4	1.0	40.1	53.9	13.8	
Hori.	9648.000	AV	31.3	38.3	9.9	37.6	1.0	42.9	53.9	11.0	
Hori.	12060.000	AV	33.1	39.3	11.3	38.5	1.0	46.2	53.9	**7.7**	
Vert.	4824.000	AV	30.7	30.5	8.0	37.1	1.0	33.1	53.9	20.8	
Vert.	7236.000	AV	33.4	36.3	9.0	39.4	1.0	40.3	53.9	13.6	
Vert.	9648.000	AV	31.0	38.3	9.9	37.6	1.0	42.6	53.9	11.3	
Vert.	12060.000	AV	33.0	39.3	11.3	38.5	1.0	46.1	53.9	7.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
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	76.4	25.9	14.6	38.2	78.7	-	-	
Hori.	2400.000	PK	36.3	25.9	14.5	38.2	38.5	58.7	20.2	
Vert.	2412.000	PK	80.0	25.9	14.6	38.2	82.3	-	-	
Vert.	2400.000	PK	37.9	25.9	14.5	38.2	40.1	62.3	22.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2437 MHz	
	Tx, IEEE802.11g, PN9, 36Mbps	

(* 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.	3655.500	PK	45.2	28.1	6.9	37.9	42.3	73.9	31.6	100	333	
Hori.	4874.000	PK	40.6	30.7	8.0	37.1	42.2	73.9	31.7	100	0	
Hori.	7311.000	PK	42.6	36.4	9.0	39.4	48.6	73.9	25.3	100	0	
Hori.	9748.000	PK	41.4	38.3	9.9	37.6	52.0	73.9	21.9	100	0	
Hori.	12185.000	PK	41.8	39.2	11.3	38.4	53.9	73.9	20.0	100	0	
Hori.	18277.400	PK	52.4	40.8	1.6	49.0	45.8	73.9	28.1	100	1	
Hori.	3655.500	AV	39.4	28.1	6.9	37.9	36.5	53.9	17.4	100	333	
Hori.	18277.400	AV	50.0	40.8	1.6	49.0	43.4	53.9	**10.5**	100	1	
Vert.	3655.500	PK	43.8	28.1	6.9	37.9	40.9	73.9	33.0	100	12	
Vert.	4874.000	PK	41.0	30.7	8.0	37.1	42.6	73.9	31.3	100	0	
Vert.	7311.000	PK	42.5	36.4	9.0	39.4	48.5	73.9	25.4	100	0	
Vert.	9748.000	PK	41.8	38.3	9.9	37.6	52.4	73.9	21.5	100	0	
Vert.	12185.000	PK	42.0	39.2	11.3	38.4	54.1	73.9	19.8	100	0	
Vert.	18277.400	PK	51.6	40.8	1.6	49.0	45.0	73.9	28.9	110	12	
Vert.	3655.500	AV	36.8	28.1	6.9	37.9	33.9	53.9	20.0	100	12	
Vert.	18277.400	AV	48.4	40.8	1.6	49.0	41.8	53.9	12.1	110	12	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	31.3	30.7	8.0	37.1	1.0	33.9	53.9	20.0	
Hori.	7311.000	AV	33.1	36.4	9.0	39.4	1.0	40.1	53.9	13.8	
Hori.	9748.000	AV	31.3	38.3	9.9	37.6	1.0	42.9	53.9	11.0	
Hori.	12185.000	AV	32.5	39.2	11.3	38.4	1.0	45.6	53.9	8.3	
Vert.	4874.000	AV	31.6	30.7	8.0	37.1	1.0	34.2	53.9	19.7	
Vert.	7311.000	AV	33.1	36.4	9.0	39.4	1.0	40.1	53.9	13.8	
Vert.	9748.000	AV	31.6	38.3	9.9	37.6	1.0	43.2	53.9	10.7	
Vert.	12185.000	AV	32.8	39.2	11.3	38.4	1.0	45.9	53.9	**8.0**	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2462 MHz	
	Tx, IEEE802.11g, PN9, 36Mbps	

(* 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	43.9	25.9	14.6	38.1	46.3	73.9	27.6	138	6	
Hori.	3693.000	PK	44.0	28.2	6.9	37.9	41.2	73.9	32.7	100	0	
Hori.	4924.000	PK	42.0	30.9	8.0	37.0	43.9	73.9	30.0	100	0	
Hori.	7386.000	PK	42.5	36.5	9.1	39.4	48.7	73.9	25.2	100	0	
Hori.	9848.000	PK	40.3	38.3	9.9	37.5	51.0	73.9	22.9	100	0	
Hori.	12310.000	PK	40.8	39.1	11.4	38.3	53.0	73.9	20.9	100	0	
Hori.	18464.900	PK	52.8	40.8	1.6	49.1	46.1	73.9	27.8	100	18	
Hori.	2483.500	AV	34.6	25.9	14.6	38.1	37.0	53.9	16.9	138	6	
Hori.	3693.000	AV	38.1	28.2	6.9	37.9	35.3	53.9	18.6	100	0	
Hori.	18464.900	AV	49.9	40.8	1.6	49.1	43.2	53.9	**10.7**	100	18	
Vert.	2483.500	PK	42.3	25.9	14.6	38.1	44.7	73.9	29.2	100	355	
Vert.	3693.000	PK	43.6	28.2	6.9	37.9	40.8	73.9	33.1	100	8	
Vert.	4924.000	PK	41.7	30.9	8.0	37.0	43.6	73.9	30.3	100	0	
Vert.	7386.000	PK	42.9	36.5	9.1	39.4	49.1	73.9	24.8	100	0	
Vert.	9848.000	PK	40.2	38.3	9.9	37.5	50.9	73.9	23.0	100	0	
Vert.	12310.000	PK	40.6	39.1	11.4	38.3	52.8	73.9	21.1	100	0	
Vert.	18464.900	PK	52.4	40.8	1.6	49.1	45.7	73.9	28.2	107	10	
Vert.	2483.500	AV	34.1	25.9	14.6	38.1	36.5	53.9	17.4	100	355	
Vert.	3693.000	AV	37.2	28.2	6.9	37.9	34.4	53.9	19.5	100	8	
Vert.	18464.900	AV	49.5	40.8	1.6	49.1	42.8	53.9	11.1	107	10	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4924.000	AV	31.6	30.9	8.0	37.0	1.0	34.5	53.9	19.4	
Hori.	7386.000	AV	32.9	36.5	9.1	39.4	1.0	40.1	53.9	13.8	
Hori.	9848.000	AV	30.7	38.3	9.9	37.5	1.0	42.4	53.9	11.5	
Hori.	12310.000	AV	31.4	39.1	11.4	38.3	1.0	44.6	53.9	**9.3**	
Vert.	4924.000	AV	31.6	30.9	8.0	37.0	1.0	34.5	53.9	19.4	
Vert.	7386.000	AV	33.0	36.5	9.1	39.4	1.0	40.2	53.9	13.7	
Vert.	9848.000	AV	30.6	38.3	9.9	37.5	1.0	42.3	53.9	11.6	
Vert.	12310.000	AV	31.2	39.1	11.4	38.3	1.0	44.4	53.9	9.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2412 MHz	
	Tx, IEEE802.11n, PN9, MCS0	

(* 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	45.8	25.9	14.5	38.2	48.0	73.9	25.9	143	15	
Hori.	3618.000	PK	44.7	28.1	6.8	37.9	41.7	73.9	32.2	100	355	
Hori.	4824.000	PK	41.8	30.5	8.0	37.1	43.2	73.9	30.7	100	0	
Hori.	7236.000	PK	44.6	36.3	9.0	39.4	50.5	73.9	23.4	100	0	
Hori.	9648.000	PK	42.4	38.3	9.9	37.6	53.0	73.9	20.9	100	0	
Hori.	12060.000	PK	44.0	39.3	11.3	38.5	56.1	73.9	17.8	100	0	
Hori.	18090.000	PK	53.6	40.8	1.6	49.0	47.0	73.9	26.9	100	359	
Hori.	2390.000	AV	37.8	25.9	14.5	38.2	40.0	53.9	13.9	143	15	
Hori.	3618.000	AV	39.5	28.1	6.8	37.9	36.5	53.9	17.4	100	355	
Hori.	18090.000	AV	51.5	40.8	1.6	49.0	44.9	53.9	**9.0**	100	359	
Vert.	2390.000	PK	42.7	25.9	14.5	38.2	44.9	73.9	29.0	115	293	
Vert.	3618.000	PK	44.4	28.1	6.8	37.9	41.4	73.9	32.5	100	108	
Vert.	4824.000	PK	41.7	30.5	8.0	37.1	43.1	73.9	30.8	100	0	
Vert.	7236.000	PK	44.5	36.3	9.0	39.4	50.4	73.9	23.5	100	0	
Vert.	9648.000	PK	42.1	38.3	9.9	37.6	52.7	73.9	21.2	100	0	
Vert.	12060.000	PK	43.7	39.3	11.3	38.5	55.8	73.9	18.1	100	0	
Vert.	18090.000	PK	51.9	40.8	1.6	49.0	45.3	73.9	28.6	108	14	
Vert.	2390.000	AV	32.9	25.9	14.5	38.2	35.1	53.9	18.8	115	293	
Vert.	3618.000	AV	38.2	28.1	6.8	37.9	35.2	53.9	18.7	100	108	
Vert.	18090.000	AV	49.6	40.8	1.6	49.0	43.0	53.9	10.9	108	14	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4824.000	AV	31.7	30.5	8.0	37.1	0.2	33.3	53.9	20.6	
Hori.	7236.000	AV	34.0	36.3	9.0	39.4	0.2	40.1	53.9	13.8	
Hori.	9648.000	AV	32.3	38.3	9.9	37.6	0.2	43.1	53.9	10.8	
Hori.	12060.000	AV	34.2	39.3	11.3	38.5	0.2	46.5	53.9	**7.4**	
Vert.	4824.000	AV	31.6	30.5	8.0	37.1	0.2	33.2	53.9	20.7	
Vert.	7236.000	AV	33.9	36.3	9.0	39.4	0.2	40.0	53.9	13.9	
Vert.	9648.000	AV	32.3	38.3	9.9	37.6	0.2	43.1	53.9	10.8	
Vert.	12060.000	AV	33.9	39.3	11.3	38.5	0.2	46.2	53.9	7.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
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	79.9	25.9	14.6	38.2	82.2	-	-	
Hori.	2400.000	PK	41.4	25.9	14.5	38.2	43.6	62.2	18.6	
Vert.	2412.000	PK	76.3	25.9	14.6	38.2	78.6	-	-	
Vert.	2400.000	PK	36.1	25.9	14.5	38.2	38.3	58.6	20.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	
Date	November 12, 2014	November 13, 2014
Temperature / Humidity	24 deg.C, 49 %RH	24 deg.C, 34 %RH
Engineer	Wataru Kojima	
Mode	Tx, 2437 MHz	
	Tx, IEEE802.11n, PN9, MCS0	

(* 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.	3655.500	PK	44.6	28.1	6.9	37.9	41.7	73.9	32.2	100	346	
Hori.	4874.000	PK	41.4	30.7	8.0	37.1	43.0	73.9	30.9	100	0	
Hori.	7311.000	PK	42.1	36.4	9.0	39.4	48.1	73.9	25.8	100	0	
Hori.	9748.000	PK	41.2	38.3	9.9	37.6	51.8	73.9	22.1	100	0	
Hori.	12185.000	PK	42.1	39.2	11.3	38.4	54.2	73.9	19.7	100	0	
Hori.	18277.400	PK	53.0	40.8	1.6	49.0	46.4	73.9	27.5	100	359	
Hori.	3655.500	AV	39.6	28.1	6.9	37.9	36.7	53.9	17.2	100	346	
Hori.	18277.400	AV	50.3	40.8	1.6	49.0	43.7	53.9	**10.2**	100	359	
Vert.	3655.500	PK	44.0	28.1	6.9	37.9	41.1	73.9	32.8	100	144	
Vert.	4874.000	PK	41.2	30.7	8.0	37.1	42.8	73.9	31.1	100	0	
Vert.	7311.000	PK	41.9	36.4	9.0	39.4	47.9	73.9	26.0	100	0	
Vert.	9748.000	PK	41.2	38.3	9.9	37.6	51.8	73.9	22.1	100	0	
Vert.	12185.000	PK	42.0	39.2	11.3	38.4	54.1	73.9	19.8	100	0	
Vert.	18277.400	PK	52.6	40.8	1.6	49.0	46.0	73.9	27.9	110	10	
Vert.	3655.500	AV	37.7	28.1	6.9	37.9	34.8	53.9	19.1	100	144	
Vert.	18277.400	AV	49.2	40.8	1.6	49.0	42.6	53.9	11.3	110	10	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	31.6	30.7	8.0	37.1	0.2	33.4	53.9	20.5	
Hori.	7311.000	AV	33.3	36.4	9.0	39.4	0.2	39.5	53.9	14.4	
Hori.	9748.000	AV	31.2	38.3	9.9	37.6	0.2	42.0	53.9	11.9	
Hori.	12185.000	AV	32.5	39.2	11.3	38.4	0.2	44.8	53.9	**9.1**	
Vert.	4874.000	AV	31.5	30.7	8.0	37.1	0.2	33.3	53.9	20.6	
Vert.	7311.000	AV	32.8	36.4	9.0	39.4	0.2	39.0	53.9	14.9	
Vert.	9748.000	AV	31.3	38.3	9.9	37.6	0.2	42.1	53.9	11.8	
Vert.	12185.000	AV	32.5	39.2	11.3	38.4	0.2	44.8	53.9	**9.1**	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place No.2 Semi Anechoic Chamber
Date November 12, 2014 November 13, 2014
Temperature / Humidity 24 deg.C, 49 %RH 24 deg.C, 34 %RH
Engineer Wataru Kojima
Mode Tx, 2462 MHz
Tx, IEEE802.11n, PN9, MCS0

(* 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	46.1	25.9	14.6	38.1	48.5	73.9	25.4	150	6	
Hori.	3693.000	PK	45.1	28.2	6.9	37.9	42.3	73.9	31.6	100	355	
Hori.	4924.000	PK	40.8	30.9	8.0	37.0	42.7	73.9	31.2	100	0	
Hori.	7386.000	PK	42.4	36.5	9.1	39.4	48.6	73.9	25.3	100	0	
Hori.	9848.000	PK	40.3	38.3	9.9	37.5	51.0	73.9	22.9	100	0	
Hori.	12310.000	PK	41.1	39.1	11.4	38.3	53.3	73.9	20.6	100	0	
Hori.	18464.900	PK	52.2	40.8	1.6	49.1	45.5	73.9	28.4	100	359	
Hori.	2483.500	AV	34.8	25.9	14.6	38.1	37.2	53.9	16.7	150	6	
Hori.	3693.000	AV	39.2	28.2	6.9	37.9	36.4	53.9	17.5	100	355	
Hori.	18464.900	AV	49.7	40.8	1.6	49.1	43.0	53.9	**10.9**	100	359	
Vert.	2483.500	PK	44.3	25.9	14.6	38.1	46.7	73.9	27.2	117	290	
Vert.	3693.000	PK	43.7	28.2	6.9	37.9	40.9	73.9	33.0	100	125	
Vert.	4924.000	PK	41.1	30.9	8.0	37.0	43.0	73.9	30.9	100	0	
Vert.	7386.000	PK	41.9	36.5	9.1	39.4	48.1	73.9	25.8	100	0	
Vert.	9848.000	PK	39.9	38.3	9.9	37.5	50.6	73.9	23.3	100	0	
Vert.	12310.000	PK	40.6	39.1	11.4	38.3	52.8	73.9	21.1	100	0	
Vert.	18464.900	PK	51.5	40.8	1.6	49.1	44.8	73.9	29.1	111	11	
Vert.	2483.500	AV	35.8	25.9	14.6	38.1	38.2	53.9	15.7	117	290	
Vert.	3693.000	AV	38.3	28.2	6.9	37.9	35.5	53.9	18.4	100	125	
Vert.	18464.900	AV	48.3	40.8	1.6	49.1	41.6	53.9	12.3	111	11	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4924.000	AV	31.6	30.9	8.0	37.0	0.2	33.7	53.9	20.2	
Hori.	7386.000	AV	32.8	36.5	9.1	39.4	0.2	39.2	53.9	14.7	
Hori.	9848.000	AV	30.3	38.3	9.9	37.5	0.2	41.2	53.9	12.7	
Hori.	12310.000	AV	31.3	39.1	11.4	38.3	0.2	43.7	53.9	**10.2**	
Vert.	4924.000	AV	31.9	30.9	8.0	37.0	0.2	34.0	53.9	19.9	
Vert.	7386.000	AV	32.6	36.5	9.1	39.4	0.2	39.0	53.9	14.9	
Vert.	9848.000	AV	30.3	38.3	9.9	37.5	0.2	41.2	53.9	12.7	
Vert.	12310.000	AV	31.1	39.1	11.4	38.3	0.2	43.5	53.9	10.4	

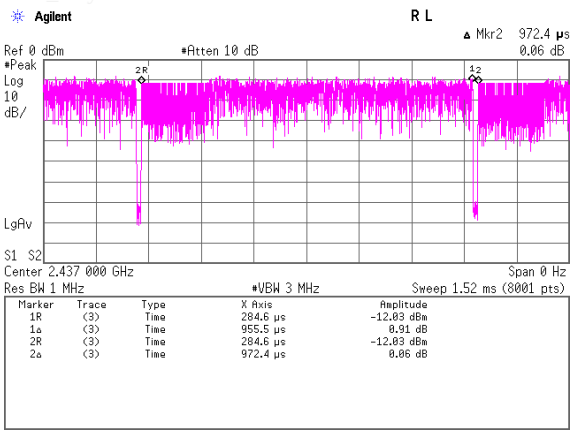
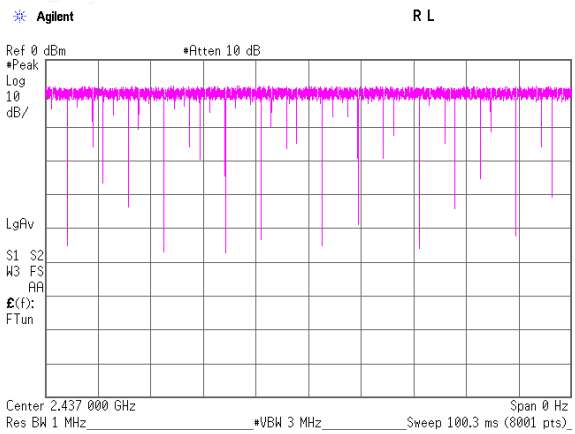
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier) + Duty factor
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Burst rate confirmation

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

duty cycle = 0.000956 / 0.000972 = 0.983 (98.3%)	
	

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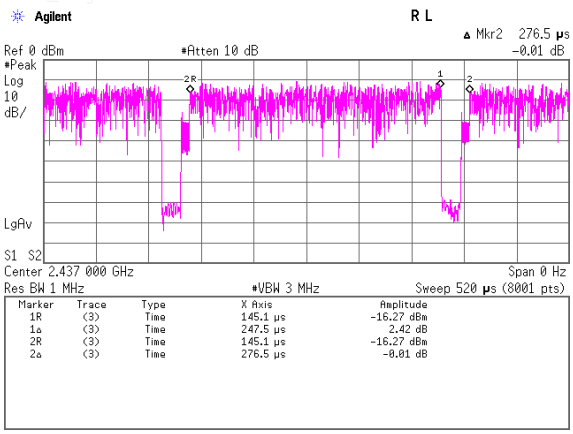
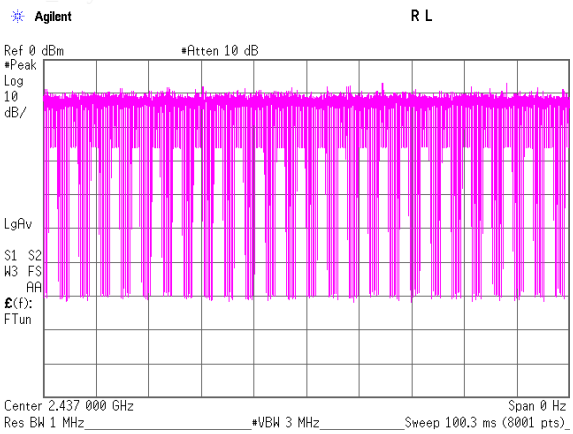
Engineer	Akio Hayashi	

Duty Factor Calculation chart

Tx, IEEE802. 11g, PN9, worst data mode 36Mbps

Duty Factor Calculation	
Duty Factor: 20log (1/duty cycle) = 1.0dB	
duty cycle = 0.000247 / 0.000277 = 0.895 (89.5%)	
Tx2_duty1	Tx2_duty2





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Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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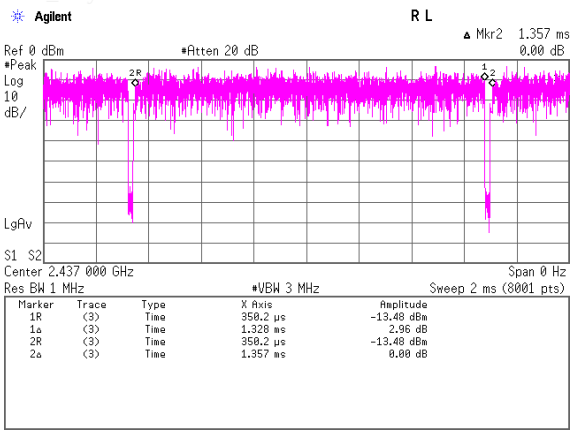
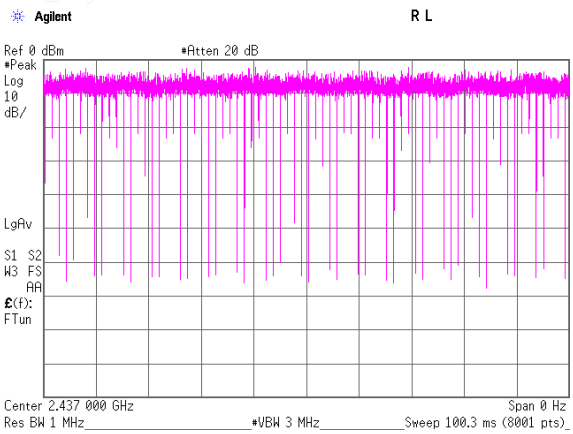
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Duty Factor Calculation chart

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

Duty Factor Calculation	
Duty Factor: 20log (1/duty cycle) = 0.2dB	
duty cycle = 0.001328 / 0.001357 = 0.978 (97.8%)	
Tx2_duty1	Tx2_duty2





UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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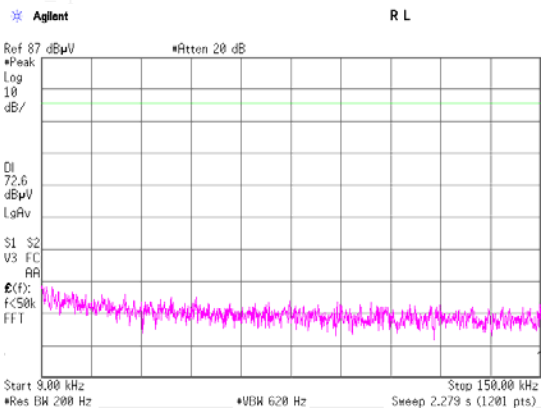
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

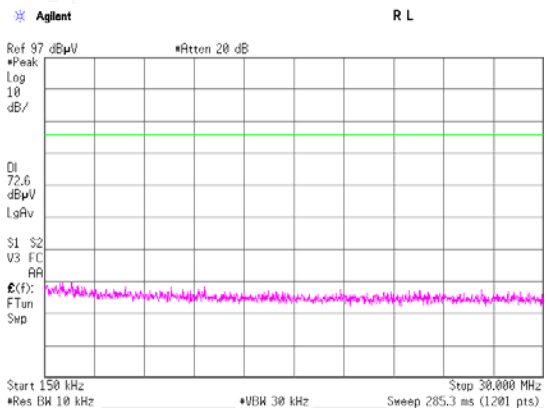
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2412MHz (below 30MHz)

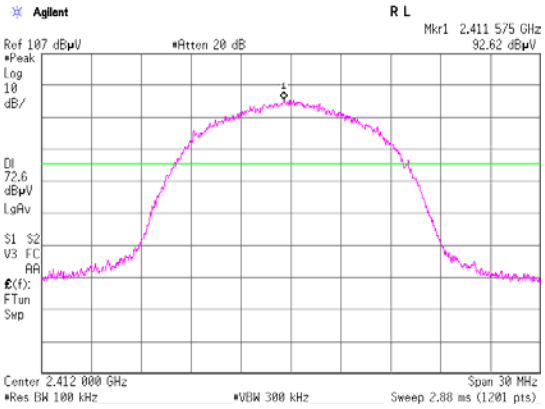
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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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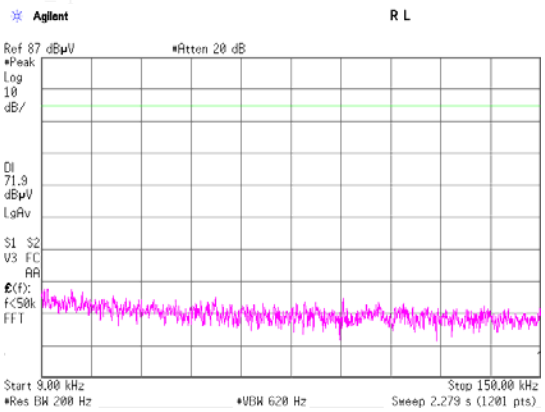
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

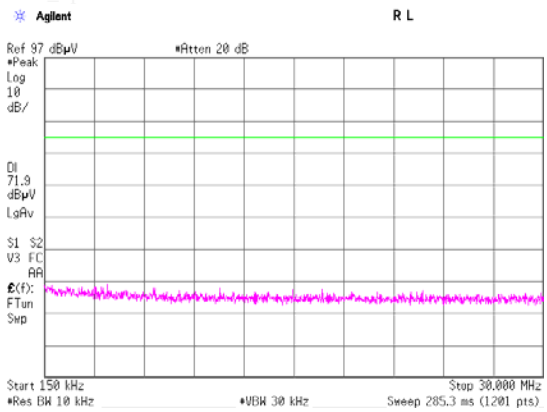
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2437MHz (below 30MHz)

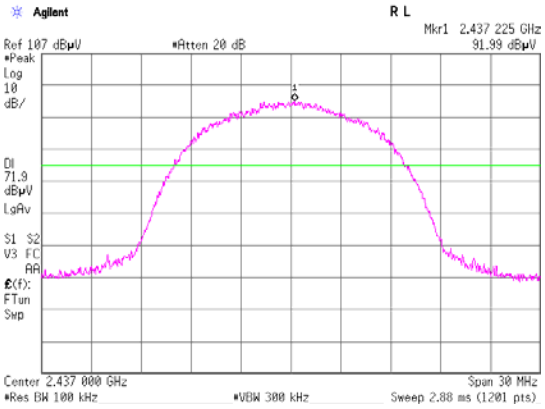
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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

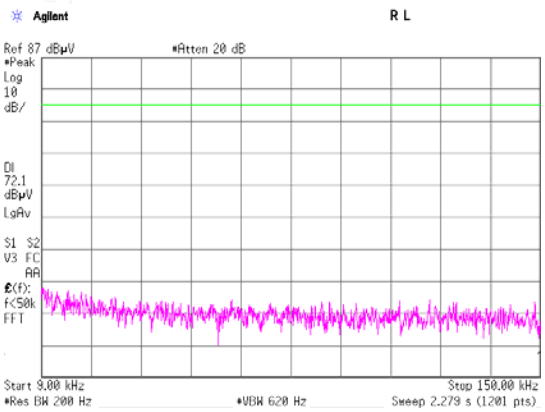
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

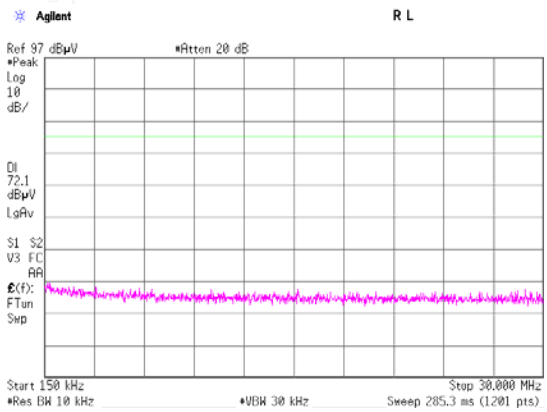
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2462MHz (below 30MHz)

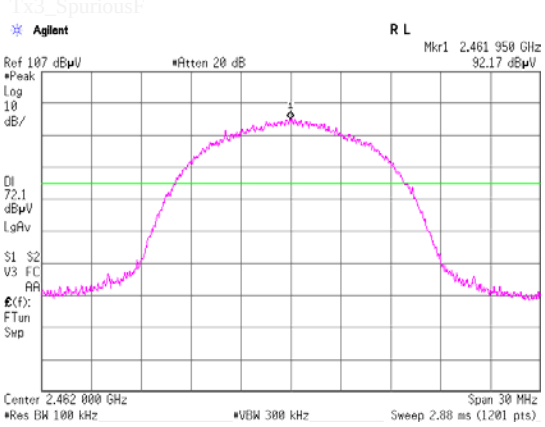
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



UL Japan, Inc.
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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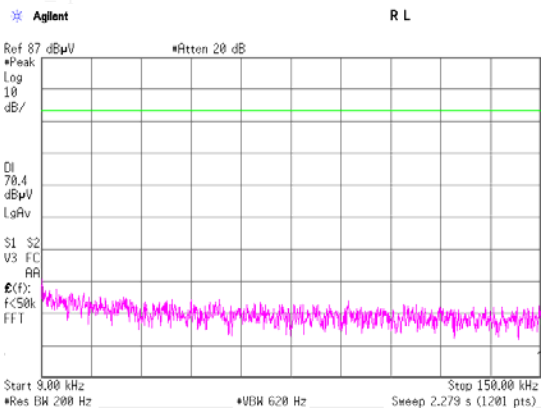
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

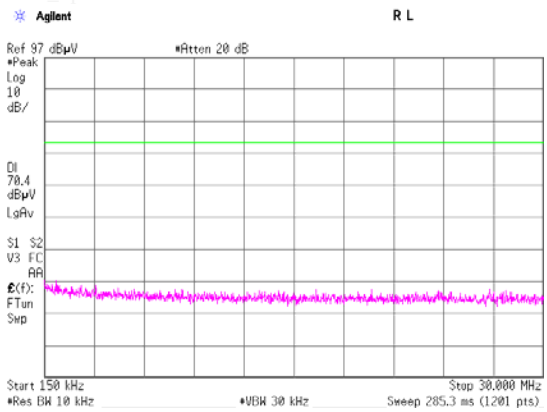
Tx, IEEE802. 11g, PN9, worst data mode 36Mbps

Tx, 2412MHz (below 30MHz)

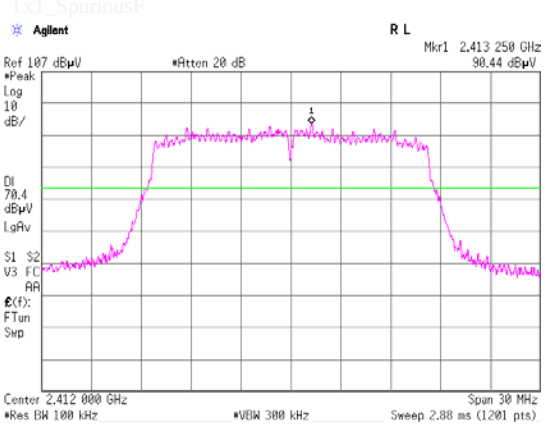
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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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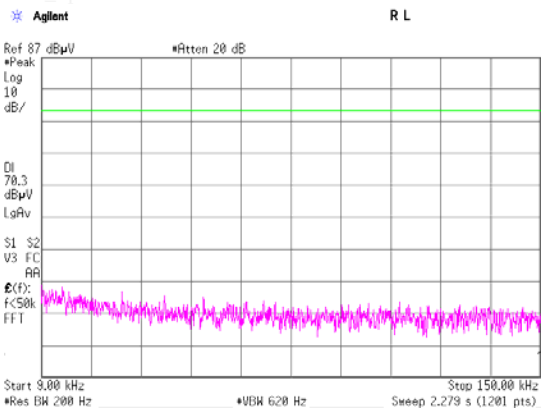
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

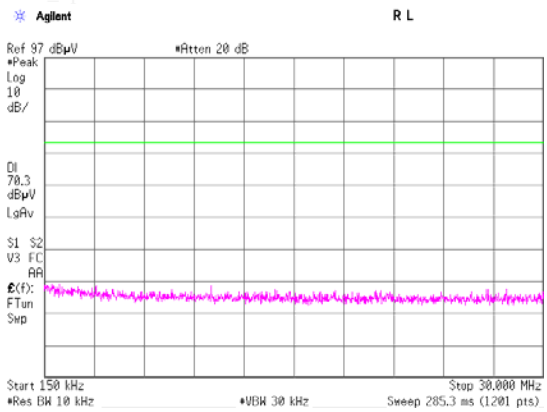
Tx, IEEE802. 11g, PN9, worst data mode 36Mbps

Tx, 2437MHz (below 30MHz)

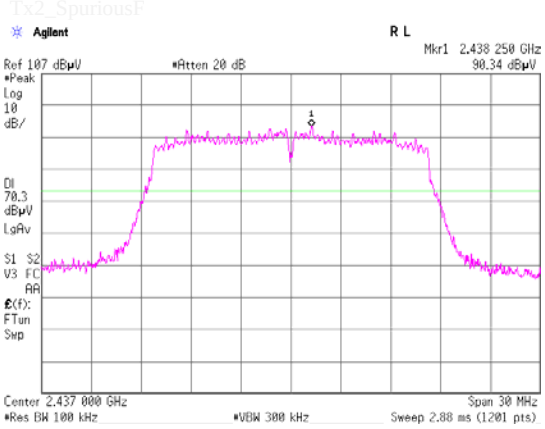
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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

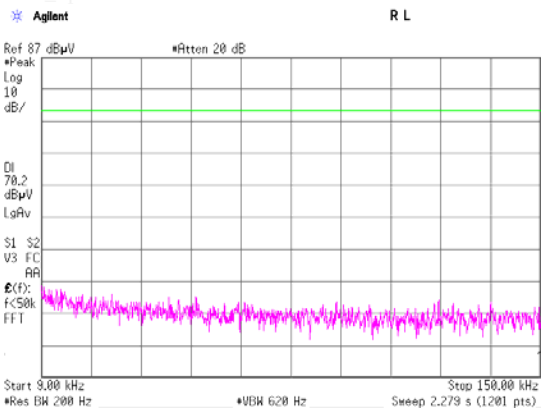
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

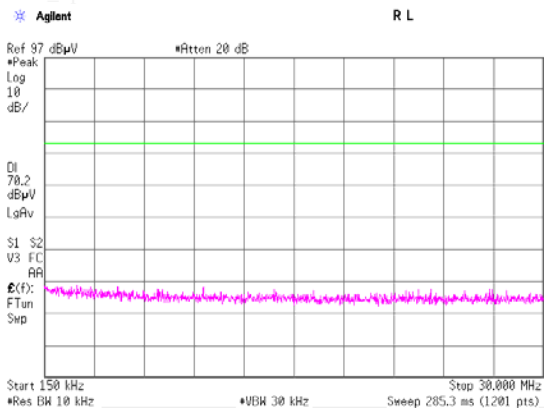
Tx, IEEE802. 11g, PN9, worst data mode 36Mbps

Tx, 2462MHz (below 30MHz)

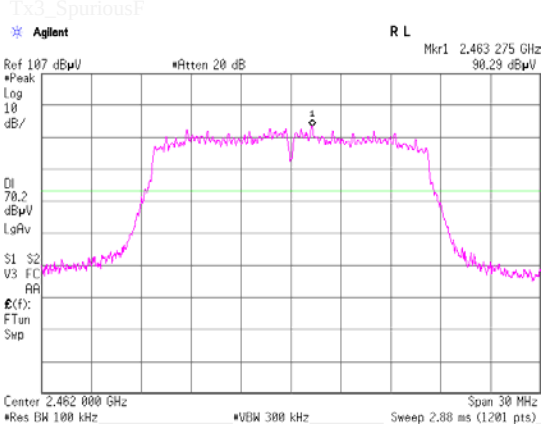
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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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
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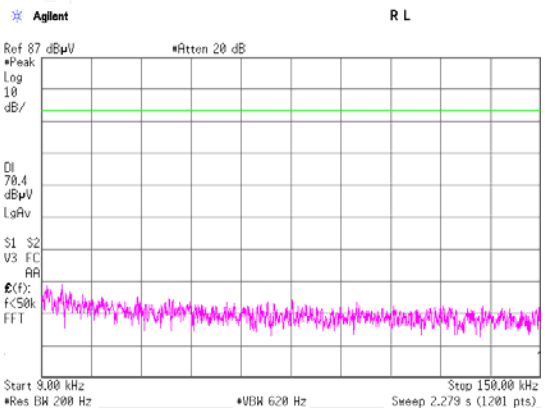
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

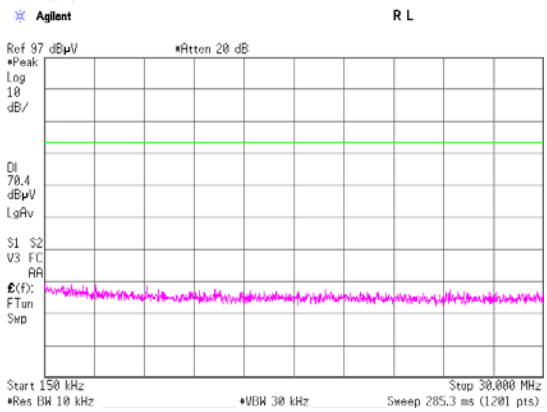
Tx, IEEE802.11n HT20, PN9, worst data mode 0(MCS)

Tx, 2412MHz (below 30MHz)

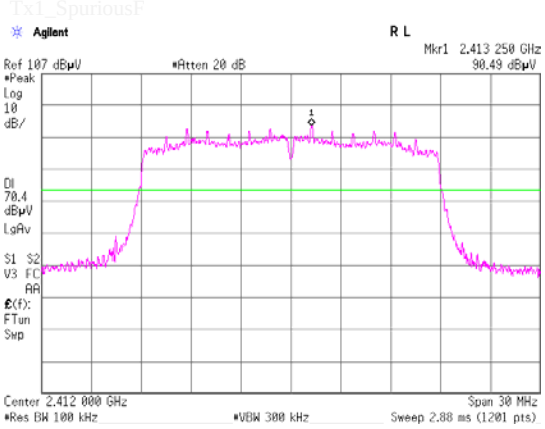
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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Date	November 10, 2014	
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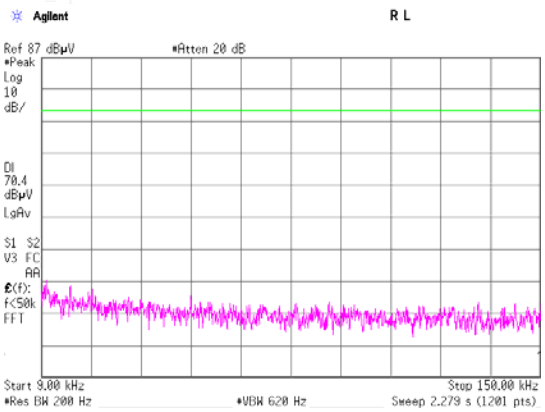
Engineer	Akio Hayashi	

Spurious emission (Conducted)

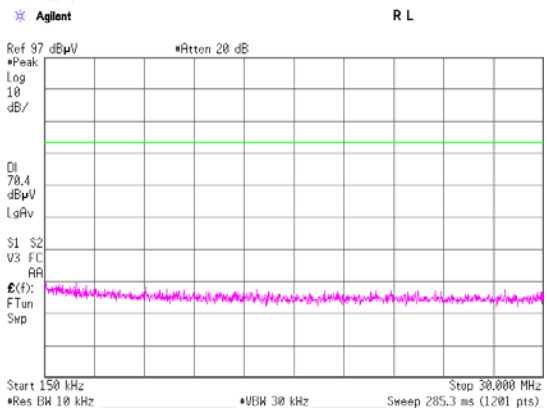
Tx, IEEE802.11n HT20, PN9, worst data mode 0(MCS)

Tx, 2437MHz (below 30MHz)

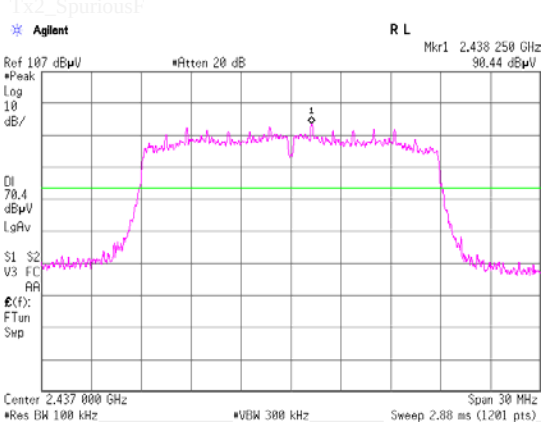
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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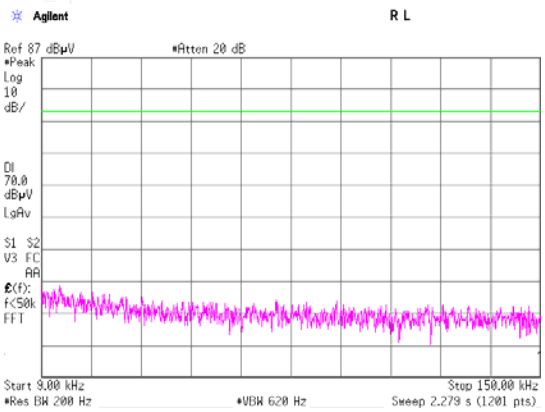
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

Spurious emission (Conducted)

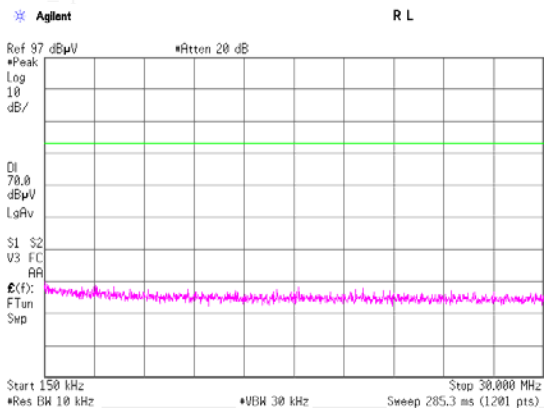
Tx, IEEE802.11n HT20, PN9, worst data mode 0(MCS)

Tx, 2462MHz (below 30MHz)

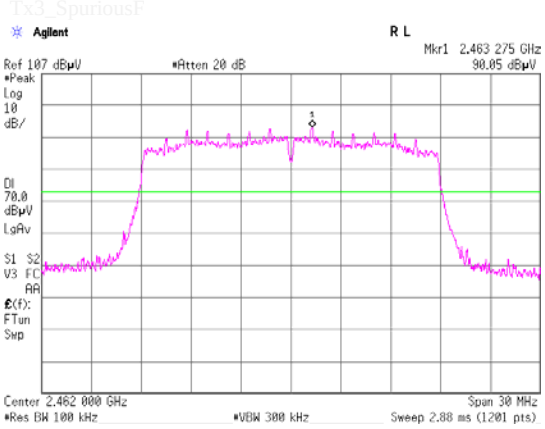
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



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Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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Maximum Power Spectral Density

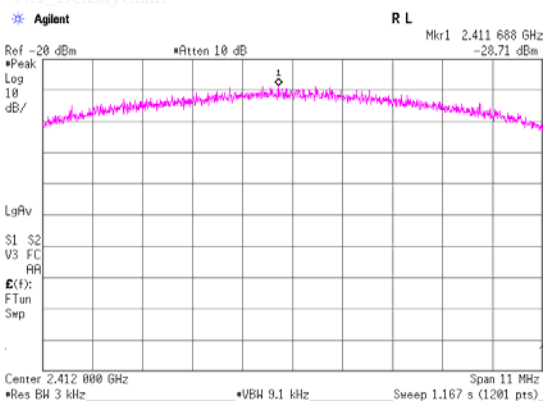
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 11Mbps	

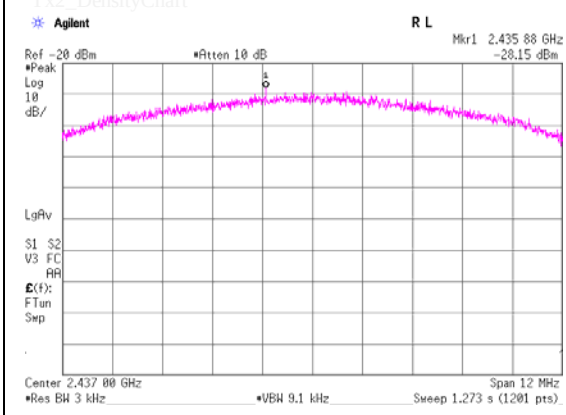
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2411.69	-28.71	1.38	9.90	-17.43	8.00	25.43
2437.0000	2435.88	-28.15	1.39	9.90	-16.86	8.00	24.86
2462.0000	2461.84	-29.08	1.40	9.89	-17.79	8.00	25.79

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

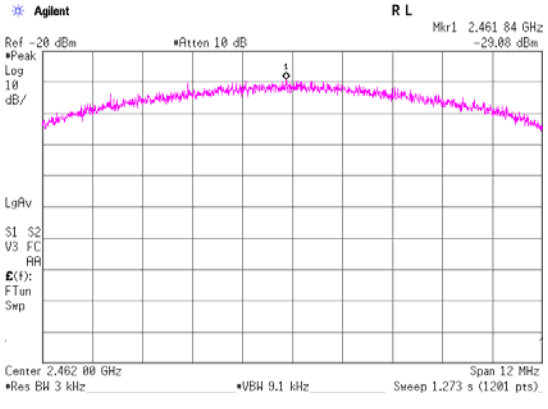
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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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Maximum Power Spectral Density

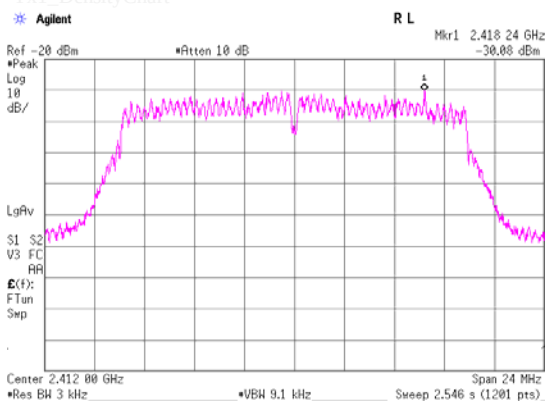
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802. 11g, PN9, worst data mode 36Mbps	

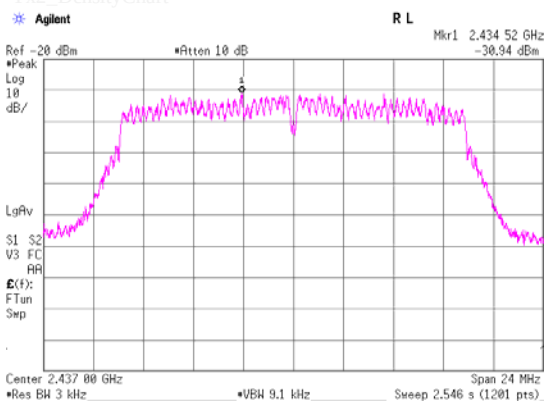
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2418.24	-30.08	1.38	9.90	-18.80	8.00	26.80
2437.0000	2434.52	-30.94	1.39	9.90	-19.65	8.00	27.65
2462.0000	2461.38	-30.41	1.40	9.89	-19.12	8.00	27.12

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

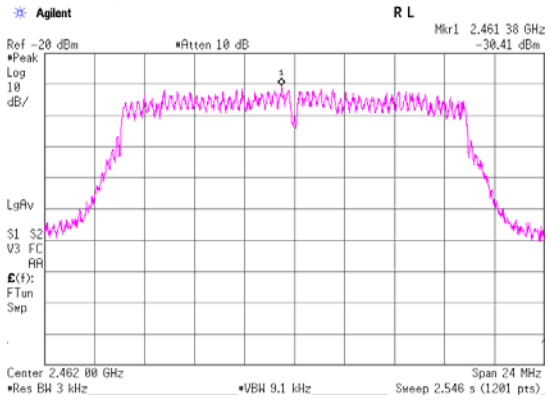
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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Maximum Power Spectral Density

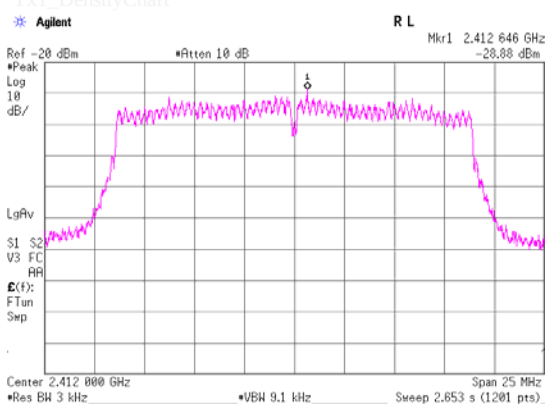
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11n HT20, PN9, worst data mode 0(MCS)	

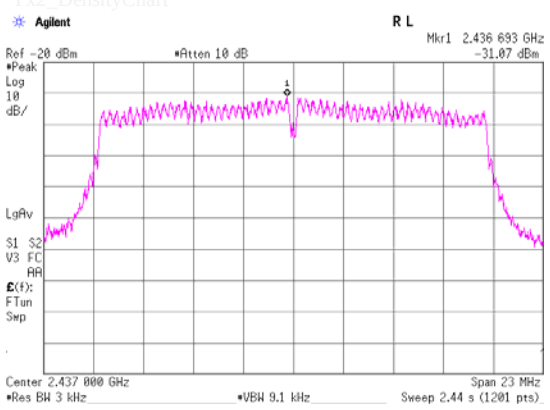
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2412.65	-28.88	1.38	9.90	-17.60	8.00	25.60
2437.0000	2436.69	-31.07	1.39	9.90	-19.78	8.00	27.78
2462.0000	2462.61	-30.91	1.40	9.89	-19.62	8.00	27.62

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

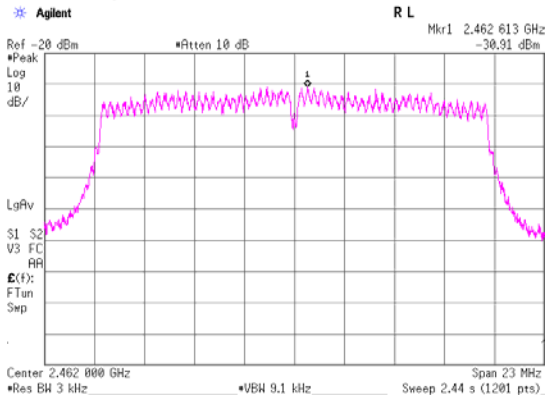
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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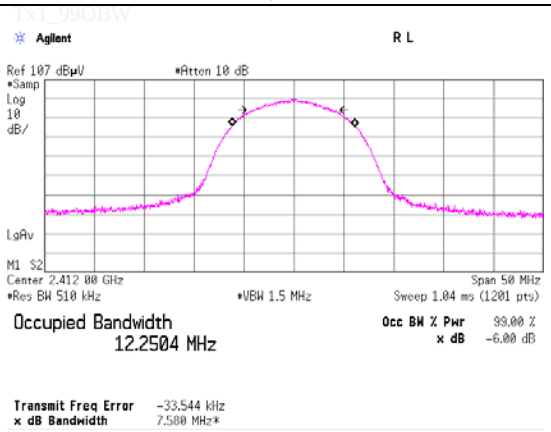
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

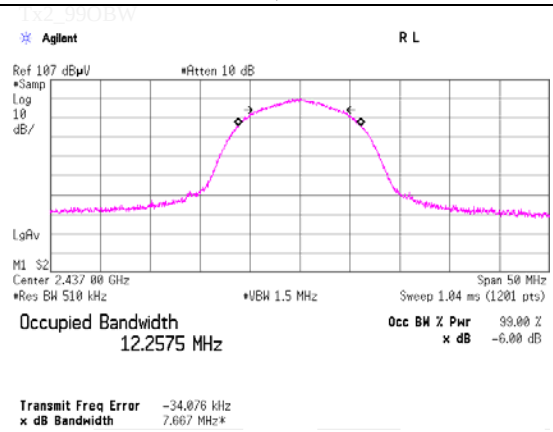
99% Occupied Bandwidth

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

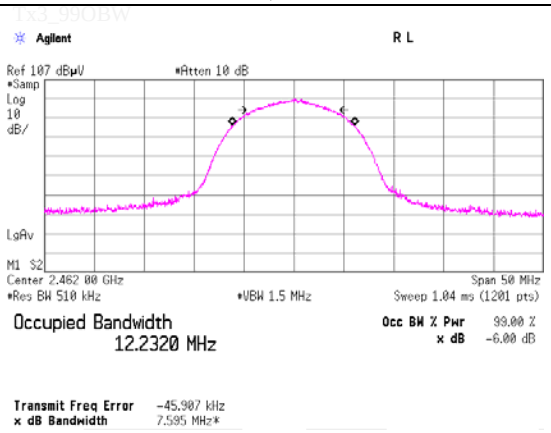
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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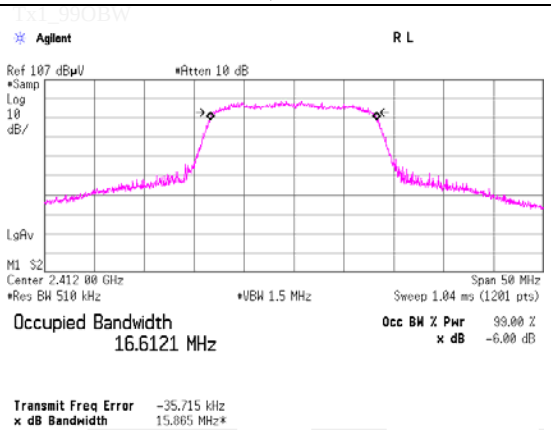
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

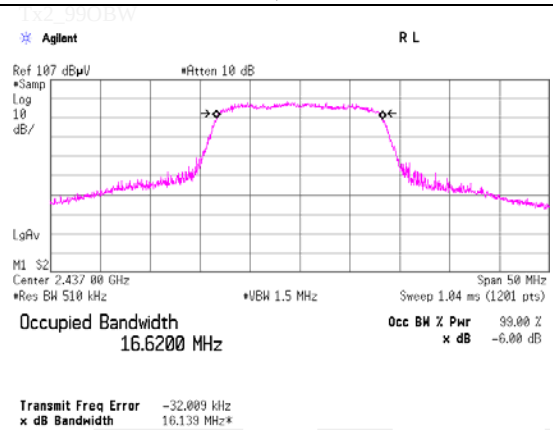
99% Occupied Bandwidth

Tx, IEEE802. 11g, PN9, worst data mode 36Mbps

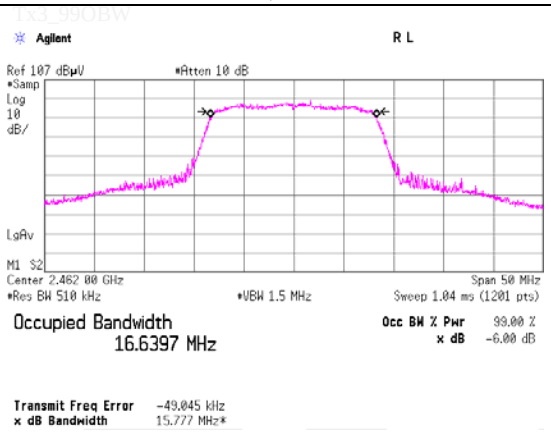
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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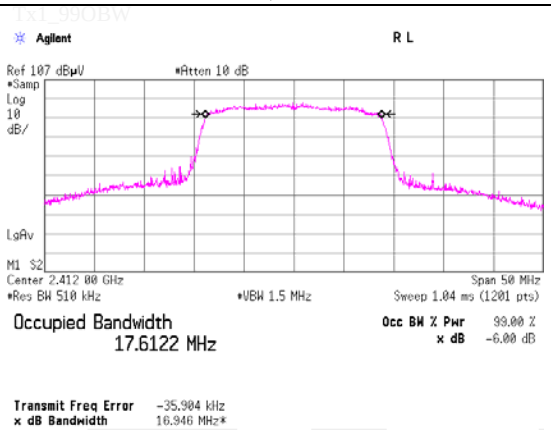
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	November 10, 2014	
Temperature / Humidity	25deg.C , 54%RH	
Engineer	Akio Hayashi	

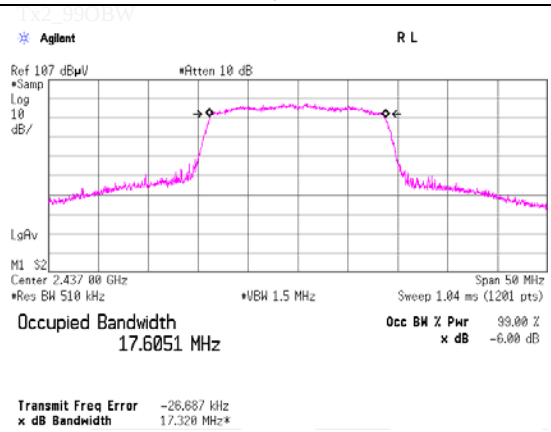
99% Occupied Bandwidth

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

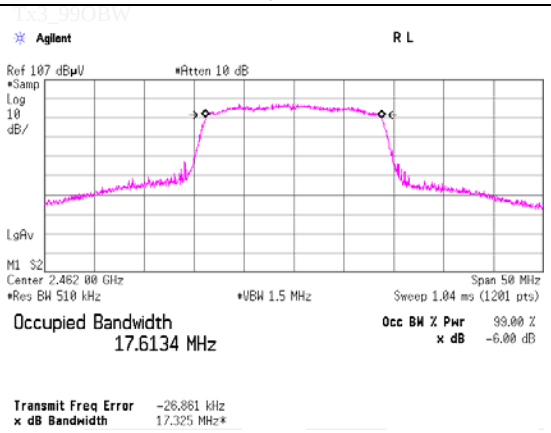
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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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)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2014/03/04 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2014/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2014/04/04 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2014/03/14 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2014/04/22 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2014/04/22 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2014/07/08 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2013/11/22 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104A	46498/4A	RE	2014/04/22 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2014/05/15 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2014/08/12 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/10/30 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 12
SJM-14	Measure	ASKUL	-	-	RE,CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE,CE	-
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2013/11/22 * 12
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		2014/03/13 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2014/02/17 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2013/11/24 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2013/11/24 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE,CE	2014/09/03 * 12
SCC-B12/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	CE	2014/04/25 * 12
SLS-03	LISN	Rohde & Schwarz	ENV216	100513	CE	2014/02/14 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2014/03/07 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .
Test Item :
CE: Conducted emission ,
RE: Radiated emission ,
AT: Antenna terminal disturbance voltage