



RADIO TEST REPORT cover sheet

Applicant : **Clarion Co., Ltd.**

Model No. : **QY-5120, PH-3782**

FCC ID : **AX2QY5120**

The difference between 3 models (QY-5111, QY-5120 and PH-3782) doesn't affect the radio characteristics.

The electrical characteristics among those models are identical to each other.

Therefore, we use test report No. 10705692S-K and 10705692S-L.

Date

July 9, 2015

A handwritten signature in blue ink that reads 'T. Imamura'.

Toyokazu Imamura

Leader

Consumer Technology Division

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



RADIO TEST REPORT

Test Report No.: 10705692S-L

(Original test report: 10399701S-H-R1)

Applicant : Clarion Co., Ltd.
Type of Equipment : Navigation Unit
Model No. : QY-5111
FCC ID : AX2QY5092
Test regulation : FCC Part15 Subpart C: 2015
Test item : Radiated Spurious emission
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: March 13 to 16, 2015

Representative test engineer:

T. Arai

Tatsuya Arai
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".

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

13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10705692S-L

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10705692S-L	July 23, 2015	-	-

Contents

	Page
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results	6
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Radiated emission.....	11
Contents of APPENDIXES	13
APPENDIX 1: Data of radio tests	14
APPENDIX 2: Test instruments	23
APPENDIX 3: Photographs of test setup	25

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

SECTION 1: Customer information

Company Name : Clarion Co., Ltd.
Address : 7-2 Shintoshin, Chuo-ku, Saitama-shi, Saitama, 330-0081 Japan
Telephone Number : +81-48-601-3602
Facsimile Number : +81-48-601-3802
Contact Person : Matsuhiko Hirano

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

2.1 Identification of E.U.T.

Type of Equipment : Navigation Unit
Model Number : QY-5111
Serial Number : Refer to Section 4.2
Rating : DC10-16V
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : March 11, 2015
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: QY-5111 (referred to as the EUT in this report) is a Navigation Unit.

Clock frequency(ies) in the system : 5.6448 MHz, 6.144 MHz, 8.192 MHz, 16.92 MHz, 12.8 MHz,
24.576 MHz, 26 MHz, 27 MHz, 28.224 MHz, 33.231 MHz, 41.6 MHz,
48 MHz

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

<Bluetooth part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth & channel spacing : 79MHz & 1MHz
Type of modulation : GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna type : Film
Antenna gain : 3.0dBi
Antenna connector type : U.FL
Operation temperature range : -30 to +70 deg.C.
ITU code : F1D, G1D

<Wireless LAN part>

Equipment type : Transceiver
Frequency of operation : 2412-2462MHz
Bandwidth & channel spacing : 20MHz & 5MHz
Type of modulation : CCK, OFDM
Antenna type : Film
Antenna gain : 3.0dBi
Antenna connector type : U.FL
Operation temperature range : -30 to +70 deg.C.
ITU code : G1D, D1D

* For Bluetooth part, refer to the test report: 10705692S-K.

FCC 15.31 (e)

The EUT provides stable voltage (DC3.3V) constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC 15.203

The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users.

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

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : F FCC Part 15 Subpart C: 2015, final revised on June 12, 2015 and effective July 13, 2015
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

* The revision on June 12, 2015 does not affect the test specification applied to the EUT.

The EUT has been tested for compliance with FCC Part 15 Subpart B. Refer to the test report 10705692S-E.

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 *2)		-
6dB bandwidth	ANSI C63.10:2009	FCC 15.247 (a)(2)	Conducted	*3)	-	-
Maximum peak output power	ANSI C63.10:2009	FCC 15.247 (b)(3)	Conducted	*3)		-
Out of band emission & Restricted band edges	ANSI C63.10:2009	FCC 15.109, 15.247 (d) & 15.209	Radiated	N/A	2.9dB Freq.: 662.986MHz Polarization: Vertical Detection: Quasi-Peak Mode: Tx 2437MHz, IEEE 802.11n HT20	Complied
Power density	ANSI C63.10:2009	FCC 15.247 (e)	Conducted	*3)	-	-

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".
*2) The test is not applicable since the EUT has no AC mains.
*3) Refer to the test report: 10399701S-H-R1 (Tested model: QY-5092)

3.3 Addition to standard

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

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

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 (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.9 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

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

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
<input checked="" type="checkbox"/> No.1 semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.2 semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.3 semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input type="checkbox"/> No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> 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.

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

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

4.1 Operating mode

Test item	Mode	Tested frequency	Worst data mode *1)
Band edge compliance & Spurious emission	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	PN9, 2Mbps
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	PN9, 48Mbps
	Transmitting IEEE 802.11n HT20	2412MHz, 2437MHz, 2462MHz	PN9, MCS2
*1) The worst condition was determined based on the original test report.			

EUT has the power settings by the software as follows;

Power settings	Fixed
Software	Tera Term Ver. 4.83

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

UL Japan, Inc.

Shonan EMC Lab.

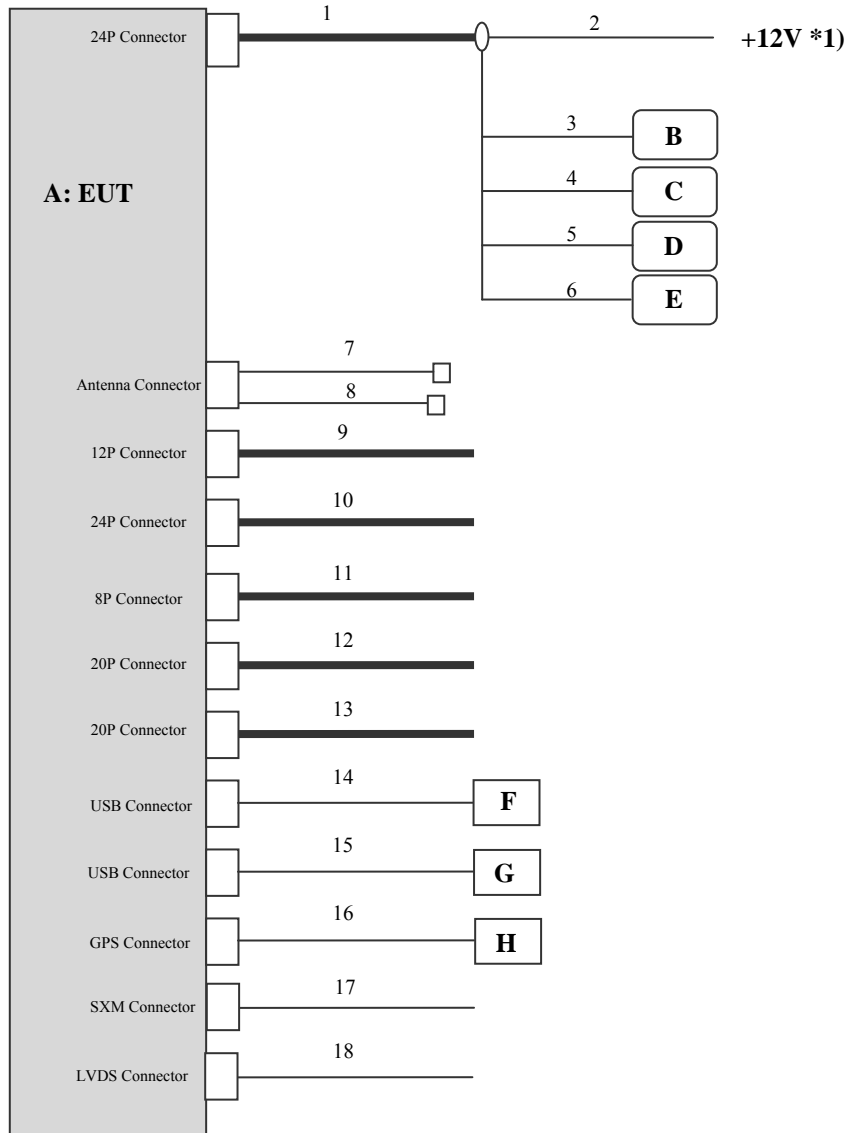
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

4.2 Configuration and peripherals

□ : Terminated



* Test data was taken under worse case conditions.

*1) DC power supply (Model No.: PAN35-10A) was used for DC 12V input.

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

Description of EUT and Auxiliary equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Navigation Unit	QY-5111	CL****540000032	Clarion	EUT
B	Speaker	KFC-RS160	-	KENWOOD	-
C	Speaker	KFC-RS160	-	KENWOOD	-
D	Speaker	KFC-RS160	-	KENWOOD	-
E	Speaker	KFC-RS160	-	KENWOOD	-
F	USB Memory	MF-RSU204GPN	BR00004173	ELECOM	-
G	USB Memory	HUD-128PJ	-	HAGIWARA SYS-COM	-
H	GPS Antenna	-	0960138000763	-	-

List of cables used

No.	Item	Length(m)	Shield (Cable)	Shield (Connector)	Remarks
1	24P Connector (Gray)	2.0	Unshielded	Unshielded	-
2	+B, ACC, GND	1.2	Unshielded	Unshielded	-
3	Speaker Front Left	1.8	Unshielded	Unshielded	-
4	Speaker Front Right	1.8	Unshielded	Unshielded	-
5	Speaker Rear Left	1.8	Unshielded	Unshielded	-
6	Speaker Rear Right	1.8	Unshielded	Unshielded	-
7	Main antenna	0.2+3.0	Shielded	Shielded	-
8	Sub antenna	0.2	Shielded	Shielded	-
9	12P Connector (Gray)	2.2	Unshielded	Unshielded	-
10	24P Connector (Gray)	2.2	Unshielded	Unshielded	-
11	8P Connector (Gray)	2.5	Unshielded	Unshielded	-
12	20P Connector (Gray)	2.2	Unshielded	Unshielded	-
13	28P Connector (Gray)	2.2	Unshielded	Unshielded	-
14	USB connector	0.5	Shielded	Shielded	-
15	USB connector	0.5	Shielded	Shielded	-
16	GPS connector	2.5	Shielded	Shielded	-
17	SXM connector	2.0	Shielded	Shielded	-
18	LVDS connector	2.0	Shielded	Shielded	-

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

SECTION 5: Radiated 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, 1.0m 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 EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

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

5.4 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 EUT was set at 38 degree as normal position according to the EUT's specification.

UL Japan, Inc.

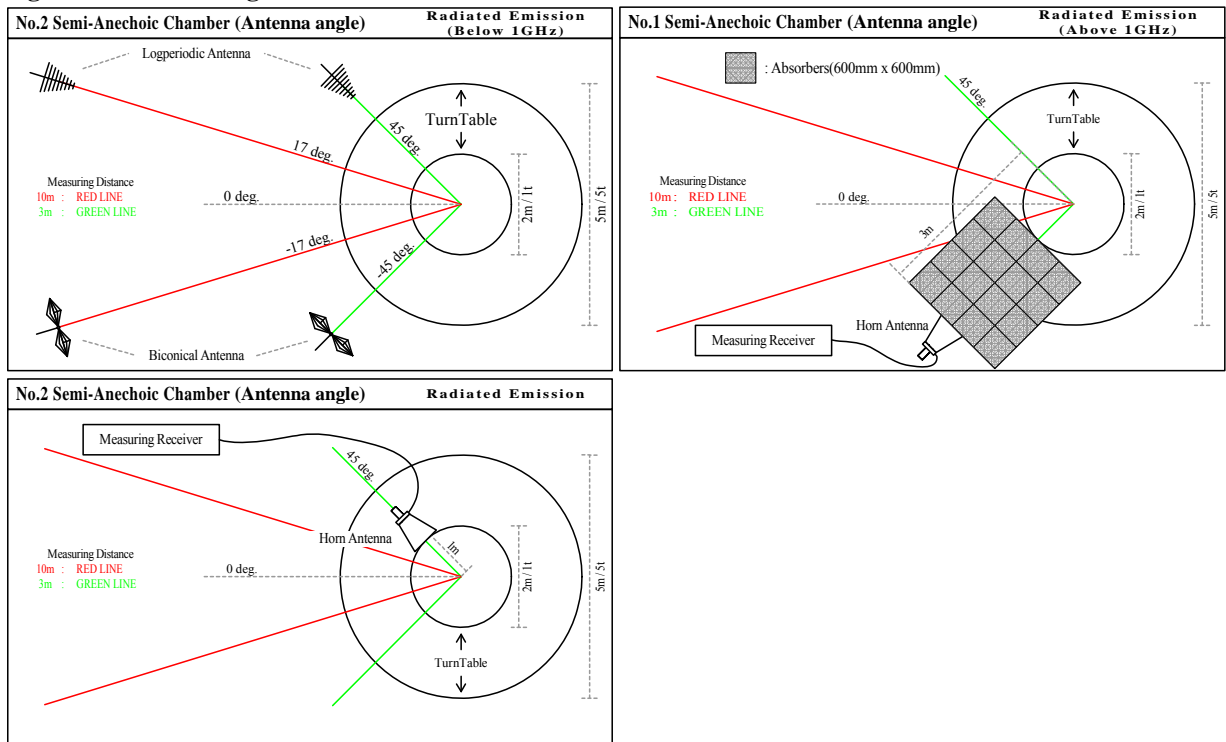
Shonan EMC Lab.

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

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Figure 1. Antenna angle



5.5 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.

5.6 Results

Summary of the test results : Pass
 * No noise was detected above the 4th order harmonics.

Refer to APPENDIX 1

Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Radiated emission

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Radiated emission

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

APPENDIX 1: Data of radio tests**Radiated Emission**

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2412 MHz Tx, IEEE802.11b, PN9, worst data mode 2Mbps	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	62.9	25.9	14.6	40.9	62.5	73.9	11.4	100	0	
Hori.	3353.597	PK	52.7	27.9	6.5	41.5	45.6	73.9	28.3	100	0	
Hori.	4824.000	PK	49.2	30.6	7.0	41.7	45.1	73.9	28.8	100	236	
Hori.	7236.000	PK	45.2	36.2	8.4	41.5	48.3	73.9	25.6	100	0	
Hori.	9648.000	PK	41.1	38.3	9.3	40.4	48.3	73.9	25.6	100	0	
Hori.	2390.000	AV	37.3	25.9	14.6	40.9	36.9	53.9	17.0	100	0	
Hori.	3353.597	AV	36.0	27.9	6.5	41.5	28.9	53.9	25.0	100	0	
Hori.	4824.000	AV	45.5	30.6	7.0	41.7	41.4	53.9	12.5	100	236	
Hori.	7236.000	AV	34.8	36.2	8.4	41.5	37.9	53.9	16.0	100	0	
Hori.	9648.000	AV	34.1	38.3	9.3	40.4	41.3	53.9	12.6	100	0	
Vert.	2390.000	PK	56.7	25.9	14.6	40.9	56.3	73.9	17.6	100	0	
Vert.	4824.000	PK	52.5	30.6	7.0	41.7	48.4	73.9	25.5	100	328	
Vert.	7236.000	PK	45.1	36.2	8.4	41.5	48.2	73.9	25.7	100	0	
Vert.	9648.000	PK	39.4	38.3	9.3	40.4	46.6	73.9	27.3	100	0	
Vert.	2390.000	AV	36.0	25.9	14.6	40.9	35.6	53.9	18.3	100	0	
Vert.	4824.000	AV	47.5	30.6	7.0	41.7	43.4	53.9	10.5	100	328	
Vert.	7236.000	AV	34.3	36.2	8.4	41.5	37.4	53.9	16.5	100	0	
Vert.	9648.000	AV	33.2	38.3	9.3	40.4	40.4	53.9	13.5	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-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	94.0	26.0	14.6	40.9	93.7	-	-	Carrier
Hori.	2400.000	PK	48.6	26.0	14.6	40.9	48.3	73.7	25.4	
Vert.	2412.000	PK	87.3	26.0	14.6	40.9	87.0	-	-	Carrier
Vert.	2400.000	PK	37.2	26.0	14.6	40.9	36.9	67.0	30.1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2437 MHz Tx, IEEE802.11b, PN9, worst data mode 2Mbps	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3373.186	PK	51.8	27.9	6.5	41.6	44.6	73.9	29.3	100	74	
Hori.	4874.000	PK	49.9	30.8	7.0	41.6	46.1	73.9	27.8	100	321	
Hori.	7311.000	PK	45.6	36.3	8.3	41.5	48.7	73.9	25.2	100	0	
Hori.	9748.000	PK	44.6	38.3	9.5	40.4	52.0	73.9	21.9	100	0	
Hori.	3373.186	AV	36.1	27.9	6.5	41.6	28.9	53.9	25.0	100	74	
Hori.	4874.000	AV	42.9	30.8	7.0	41.6	39.1	53.9	14.8	100	321	
Hori.	7311.000	AV	35.3	36.3	8.3	41.5	38.4	53.9	15.5	100	0	
Hori.	9748.000	AV	34.4	38.3	9.5	40.4	41.8	53.9	12.1	100	0	
Vert.	4874.000	PK	51.4	30.8	7.0	41.6	47.6	73.9	26.3	100	333	
Vert.	7311.000	PK	43.1	36.3	8.3	41.5	46.2	73.9	27.7	100	0	
Vert.	9748.000	PK	40.8	38.3	9.5	40.4	48.2	73.9	25.7	100	0	
Vert.	4874.000	AV	47.3	30.8	7.0	41.6	43.5	53.9	10.4	100	333	
Vert.	7311.000	AV	35.1	36.3	8.3	41.5	38.2	53.9	15.7	100	0	
Vert.	9748.000	AV	33.8	38.3	9.5	40.4	41.2	53.9	12.7	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2462 MHz Tx, IEEE802.11b, PN9, worst data mode 2Mbps	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	62.5	26.1	14.7	40.9	62.4	73.9	11.5	100	20	
Hori.	3436.603	PK	53.0	28.0	6.5	41.6	45.9	73.9	28.0	100	130	
Hori.	4924.000	PK	48.3	31.0	7.1	41.5	44.9	73.9	29.0	100	301	
Hori.	7386.000	PK	45.3	36.4	8.4	41.4	48.7	73.9	25.2	100	0	
Hori.	9848.000	PK	43.7	38.3	9.5	40.4	51.1	73.9	22.8	100	0	
Hori.	2483.500	AV	36.5	26.1	14.7	40.9	36.4	53.9	17.5	100	20	
Hori.	3436.603	AV	36.3	28.0	6.5	41.6	29.2	53.9	24.7	100	130	
Hori.	4924.000	AV	42.5	31.0	7.1	41.5	39.1	53.9	14.8	100	301	
Hori.	7386.000	AV	35.2	36.4	8.4	41.4	38.6	53.9	15.3	100	0	
Hori.	9848.000	AV	34.7	38.3	9.5	40.4	42.1	53.9	11.8	100	0	
Vert.	2483.500	PK	55.0	26.1	14.7	40.9	54.9	73.9	19.0	111	300	
Vert.	4924.000	PK	49.2	31.0	7.1	41.5	45.8	73.9	28.1	100	323	
Vert.	7386.000	PK	46.3	36.4	8.4	41.4	49.7	73.9	24.2	100	0	
Vert.	9848.000	PK	43.6	38.3	9.5	40.4	51.0	73.9	22.9	100	0	
Vert.	2483.500	AV	35.0	26.1	14.7	40.9	34.9	53.9	19.0	111	300	
Vert.	4924.000	AV	45.8	31.0	7.1	41.5	42.4	53.9	11.5	100	323	
Vert.	7386.000	AV	35.4	36.4	8.4	41.4	38.8	53.9	15.1	100	0	
Vert.	9848.000	AV	33.2	38.3	9.5	40.4	40.6	53.9	13.3	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2412 MHz Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.9	25.9	14.6	40.9	52.5	73.9	21.4	102	328	
Hori.	4824.000	PK	46.5	30.6	7.0	41.7	42.4	73.9	31.5	100	308	
Hori.	7236.000	PK	44.7	36.2	8.4	41.5	47.8	73.9	26.1	100	0	
Hori.	9648.000	PK	44.1	38.3	9.3	40.4	51.3	73.9	22.6	100	0	
Vert.	2390.000	PK	49.2	25.9	14.6	40.9	48.8	73.9	25.1	100	10	
Vert.	3443.268	PK	49.2	28.0	6.5	41.6	42.1	73.9	31.8	100	173	
Vert.	4824.000	PK	49.5	30.6	7.0	41.7	45.4	73.9	28.5	100	327	
Vert.	7236.000	PK	45.4	36.2	8.4	41.5	48.5	73.9	25.4	100	0	
Vert.	9648.000	PK	42.3	38.3	9.3	40.4	49.5	73.9	24.4	100	0	
Vert.	3443.268	AV	35.7	28.0	6.5	41.6	28.6	53.9	25.3	100	173	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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.	2390.000	AV	39.5	25.9	14.6	40.9	2.1	41.2	53.9	12.7	*1)
Hori.	4824.000	AV	35.9	30.6	7.0	41.7	2.1	33.9	53.9	20.0	
Hori.	7236.000	AV	34.5	36.2	8.4	41.5	2.1	39.7	53.9	14.2	
Hori.	9648.000	AV	33.5	38.3	9.3	40.4	2.1	42.8	53.9	11.1	
Vert.	2390.000	AV	36.8	25.9	14.6	40.9	2.1	38.5	53.9	15.4	*1)
Vert.	4824.000	AV	37.8	30.6	7.0	41.7	2.1	35.8	53.9	18.1	
Vert.	7236.000	AV	35.1	36.2	8.4	41.5	2.1	40.3	53.9	13.6	
Vert.	9648.000	AV	32.7	38.3	9.3	40.4	2.1	42.0	53.9	11.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Duty factor

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

*1)Not out of Band emission(Leakage Power)

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	89.8	26.0	14.6	40.9	89.5	-	-	Carrier
Hori.	2400.000	PK	52.8	26.0	14.6	40.9	52.5	69.5	17.0	-
Vert.	2412.000	PK	83.7	26.0	14.6	40.9	83.4	-	-	Carrier
Vert.	2400.000	PK	47.4	26.0	14.6	40.9	47.1	63.4	16.3	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2437 MHz Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

(* 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	46.6	30.8	7.0	41.6	42.8	73.9	31.1	100	296	
Hori.	7311.000	PK	45.6	36.3	8.3	41.5	48.7	73.9	25.2	100	0	
Hori.	9748.000	PK	43.6	38.3	9.5	40.4	51.0	73.9	22.9	100	0	
Vert.	3417.594	PK	47.0	28.0	6.5	41.6	39.9	73.9	34.0	100	62	
Vert.	4874.000	PK	50.5	30.8	7.0	41.6	46.7	73.9	27.2	100	328	
Vert.	7311.000	PK	43.6	36.3	8.3	41.5	46.7	73.9	27.2	100	0	
Vert.	9748.000	PK	44.2	38.3	9.5	40.4	51.6	73.9	22.3	100	0	
Vert.	3417.594	AV	35.0	28.0	6.5	41.6	27.9	53.9	26.0	100	62	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)
 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	35.1	30.8	7.0	41.6	2.1	33.4	53.9	20.5	
Hori.	7311.000	AV	35.0	36.3	8.3	41.5	2.1	40.2	53.9	13.7	
Hori.	9748.000	AV	34.7	38.3	9.5	40.4	2.1	44.2	53.9	9.7	
Vert.	4874.000	AV	38.2	30.8	7.0	41.6	2.1	36.5	53.9	17.4	
Vert.	7311.000	AV	35.3	36.3	8.3	41.5	2.1	40.5	53.9	13.4	
Vert.	9748.000	AV	33.0	38.3	9.5	40.4	2.1	42.5	53.9	11.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + 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	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 16, 2015
Temperature / Humidity	25 deg.C, 27 %RH	23 deg.C, 34 %RH
Engineer	Kenichi Adachi	Shinichi Takano
Mode	Tx, 2462 MHz Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

(* 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	58.5	26.1	14.7	40.9	58.4	73.9	15.5	100	310	
Hori.	3404.831	PK	50.8	28.0	6.5	41.6	43.7	73.9	30.2	100	88	
Hori.	4924.000	PK	46.4	31.0	7.1	41.5	43.0	73.9	30.9	100	309	
Hori.	7386.000	PK	45.9	36.4	8.4	41.4	49.3	73.9	24.6	100	0	
Hori.	9848.000	PK	44.2	38.3	9.5	40.4	51.6	73.9	22.3	100	0	
Hori.	3404.831	AV	36.0	28.0	6.5	41.6	28.9	53.9	25.0	100	88	
Vert.	2483.500	PK	53.7	26.1	14.7	40.9	53.6	73.9	20.3	111	307	
Vert.	4924.000	PK	46.0	31.0	7.1	41.5	42.6	73.9	31.3	112	322	
Vert.	7386.000	PK	46.3	36.4	8.4	41.4	49.7	73.9	24.2	100	0	
Vert.	9848.000	PK	44.5	38.3	9.5	40.4	51.9	73.9	22.0	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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.	2483.500	AV	43.7	26.1	14.7	40.9	2.1	45.7	53.9	8.2	*1)
Hori.	4924.000	AV	36.3	31.0	7.1	41.5	2.1	35.0	53.9	18.9	
Hori.	7386.000	AV	35.6	36.4	8.4	41.4	2.1	41.1	53.9	12.8	
Hori.	9848.000	AV	35.6	38.3	9.5	40.4	2.1	45.1	53.9	8.9	
Vert.	2483.500	AV	37.5	26.1	14.7	40.9	2.1	39.5	53.9	14.4	*1)
Vert.	4924.000	AV	35.7	31.0	7.1	41.5	2.1	34.4	53.9	19.5	
Vert.	7386.000	AV	35.8	36.4	8.4	41.4	2.1	41.3	53.9	12.6	
Vert.	9848.000	AV	34.1	38.3	9.5	40.4	2.1	43.6	53.9	10.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Duty factor

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

*1)Not out of Band emission(Leakage Power)

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	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 15, 2015
Temperature / Humidity	25 deg.C, 27 %RH	21 deg.C, 37 %RH
Engineer	Kenichi Adachi	Tatsuya Arai
Mode	Tx, 2412 MHz	
	Tx, IEEE802.11n HT20, PN9, Guard interval long, worst data mode 2(MCS)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	207.187	QP	45.5	16.5	8.9	31.8	39.1	43.5	4.4	157	75	
Hori.	231.562	QP	48.4	16.7	9.1	31.7	42.5	46.0	3.5	147	67	
Hori.	255.935	QP	47.3	17.2	9.3	31.7	42.1	46.0	3.9	133	202	
Hori.	487.500	QP	47.6	17.3	7.6	31.6	40.9	46.0	5.1	211	123	
Hori.	960.066	QP	39.5	22.6	9.7	30.4	41.4	53.9	12.5	100	190	
Hori.	2390.000	PK	55.3	25.9	14.6	40.9	54.9	73.9	19.0	100	325	
Hori.	3315.132	PK	47.2	27.8	6.4	41.5	39.9	73.9	34.0	100	67	
Hori.	4824.000	PK	46.8	30.6	7.0	41.7	42.7	73.9	31.2	100	303	
Hori.	7236.000	PK	44.3	36.2	8.4	41.5	47.4	73.9	26.5	100	0	
Hori.	9648.000	PK	44.4	38.3	9.3	40.4	51.6	73.9	22.3	100	0	
Hori.	3315.132	AV	35.0	27.8	6.4	41.5	27.7	53.9	26.2	100	67	
Vert.	182.813	QP	44.2	16.0	8.7	31.8	37.1	43.5	6.4	100	317	
Vert.	207.187	QP	44.0	16.5	8.9	31.8	37.6	43.5	5.9	100	325	
Vert.	231.561	QP	47.9	16.7	9.1	31.7	42.0	46.0	4.0	100	123	
Vert.	487.499	QP	45.6	17.3	7.6	31.6	38.9	46.0	7.1	100	223	
Vert.	2390.000	PK	51.5	25.9	14.6	40.9	51.1	73.9	22.8	136	333	
Vert.	4824.000	PK	47.4	30.6	7.0	41.7	43.3	73.9	30.6	100	332	
Vert.	7236.000	PK	45.5	36.2	8.4	41.5	48.6	73.9	25.3	100	0	
Vert.	9648.000	PK	42.9	38.3	9.3	40.4	50.1	73.9	23.8	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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.	2390.000	AV	43.0	25.9	14.6	40.9	0.3	42.9	53.9	11.0	*1)
Hori.	4824.000	AV	36.2	30.6	7.0	41.7	0.3	32.4	53.9	21.5	
Hori.	7236.000	AV	35.2	36.2	8.4	41.5	0.3	38.6	53.9	15.3	
Hori.	9648.000	AV	33.6	38.3	9.3	40.4	0.3	41.1	53.9	12.8	
Vert.	2390.000	AV	37.5	25.9	14.6	40.9	0.3	37.4	53.9	16.5	*1)
Vert.	4824.000	AV	37.4	30.6	7.0	41.7	0.3	33.6	53.9	20.3	
Vert.	7236.000	AV	34.6	36.2	8.4	41.5	0.3	38.0	53.9	15.9	
Vert.	9648.000	AV	33.6	38.3	9.3	40.4	0.3	41.1	53.9	12.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Duty factor

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

*1)Not out of Band emission(Leakage Power)

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	89.9	26.0	14.6	40.9	89.6	-	-	Carrier
Hori.	2400.000	PK	48.8	26.0	14.6	40.9	48.5	69.6	21.1	-
Vert.	2412.000	PK	83.9	26.0	14.6	40.9	83.6	-	-	Carrier
Vert.	2400.000	PK	48.1	26.0	14.6	40.9	47.8	63.6	15.8	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	No.2 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 15, 2015
Temperature / Humidity	25 deg.C, 27 %RH	21 deg.C, 37 %RH
Engineer	Kenichi Adachi	Tatsuya Arai
Mode	Tx, 2437 MHz	
	Tx, IEEE802.11n HT20, PN9, Guard interval long, worst data mode 2(MCS)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	207.186	QP	45.6	16.5	8.9	31.8	39.2	43.5	4.3	157	79	
Hori.	231.563	QP	48.5	16.7	9.1	31.7	42.6	46.0	3.4	142	69	
Hori.	255.938	QP	47.8	17.2	9.3	31.7	42.6	46.0	3.4	136	203	
Hori.	487.499	QP	47.4	17.3	7.6	31.6	40.7	46.0	5.3	215	122	
Hori.	960.063	QP	40.6	22.6	9.7	30.4	42.5	53.9	11.4	100	191	
Hori.	3390.494	PK	51.0	27.9	6.5	41.6	43.8	73.9	30.1	100	76	
Hori.	4874.000	PK	41.9	30.8	7.0	41.6	38.1	73.9	35.8	100	311	
Hori.	7311.000	PK	46.1	36.3	8.3	41.5	49.2	73.9	24.7	100	0	
Hori.	9748.000	PK	43.5	38.3	9.5	40.4	50.9	73.9	23.0	100	0	
Hori.	3390.494	AV	36.2	27.9	6.5	41.6	29.0	53.9	24.9	100	76	
Vert.	207.186	QP	43.9	16.5	8.9	31.8	37.5	43.5	6.0	100	322	
Vert.	231.563	QP	47.9	16.7	9.1	31.7	42.0	46.0	4.0	100	122	
Vert.	487.499	QP	45.6	17.3	7.6	31.6	38.9	46.0	7.1	100	226	
Vert.	662.986	QP	46.4	19.8	8.4	31.5	43.1	46.0	2.9	100	57	
Vert.	4874.000	PK	45.6	30.8	7.0	41.6	41.8	73.9	32.1	114	332	
Vert.	7311.000	PK	44.0	36.3	8.3	41.5	47.1	73.9	26.8	100	0	
Vert.	9748.000	PK	39.1	38.3	9.5	40.4	46.5	73.9	27.4	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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	35.1	30.8	7.0	41.6	0.3	31.6	53.9	22.3	
Hori.	7311.000	AV	35.1	36.3	8.3	41.5	0.3	38.5	53.9	15.4	
Hori.	9748.000	AV	34.0	38.3	9.5	40.4	0.3	41.7	53.9	12.2	
Vert.	4874.000	AV	35.4	30.8	7.0	41.6	0.3	31.9	53.9	22.0	
Vert.	7311.000	AV	36.0	36.3	8.3	41.5	0.3	39.4	53.9	14.6	
Vert.	9748.000	AV	34.4	38.3	9.5	40.4	0.3	42.1	53.9	11.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + 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	No.1 Semi Anechoic Chamber
Date	March 13, 2016	March 15, 2015
Temperature / Humidity	25 deg.C, 27 %RH	21 deg.C, 37 %RH
Engineer	Kenichi Adachi	Tatsuya Arai
Mode	Tx, 2462 MHz	
	Tx, IEEE802.11n HT20, PN9, Guard interval long, worst data mode 2(MCS)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	61.2	26.1	14.7	40.9	61.1	73.9	12.8	100	311	
Hori.	3437.491	PK	54.4	28.0	6.5	41.6	47.3	73.9	26.6	100	74	
Hori.	4924.000	PK	46.2	31.0	7.1	41.5	42.8	73.9	31.1	100	303	
Hori.	7386.000	PK	45.2	36.4	8.4	41.4	48.6	73.9	25.3	100	0	
Hori.	9848.000	PK	40.7	38.3	9.5	40.4	48.1	73.9	25.8	100	0	
Vert.	2483.500	PK	53.3	26.1	14.7	40.9	53.2	73.9	20.7	133	33	
Vert.	4924.000	PK	44.6	31.0	7.1	41.5	41.2	73.9	32.7	120	334	
Vert.	7386.000	PK	44.7	36.4	8.4	41.4	48.1	73.9	25.8	100	0	
Vert.	9848.000	PK	40.8	38.3	9.5	40.4	48.2	73.9	25.7	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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.	2483.500	AV	46.2	26.1	14.7	40.9	0.3	46.4	53.9	7.5	*1)
Hori.	3437.491	AV	36.3	28.0	6.5	41.6	0.3	29.5	53.9	24.4	
Hori.	4924.000	AV	36.0	31.0	7.1	41.5	0.3	32.9	53.9	21.0	
Hori.	7386.000	AV	35.2	36.4	8.4	41.4	0.3	38.9	53.9	15.1	
Hori.	9848.000	AV	33.8	38.3	9.5	40.4	0.3	41.5	53.9	12.4	
Vert.	2483.500	AV	39.2	26.1	14.7	40.9	0.3	39.4	53.9	14.5	*1)
Vert.	4924.000	AV	37.5	31.0	7.1	41.5	0.3	34.4	53.9	19.6	
Vert.	7386.000	AV	35.5	36.4	8.4	41.4	0.3	39.2	53.9	14.7	
Vert.	9848.000	AV	34.3	38.3	9.5	40.4	0.3	42.0	53.9	11.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Duty factor

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

*1)Not out of Band emission(Leakage Power)

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

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2014/08/12 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104A	46498/4A	RE	2014/04/22 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2014/11/21 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2014/05/15 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/10/30 * 12
SJM-14	Measure	ASKUL	-	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFL,MF)	-	RE	-
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2014/11/21 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2015/03/11 * 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
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2015/02/18 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2014/11/22 * 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	2014/11/22 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2014/09/03 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2014/07/08 * 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 :

RE: Radiated emission

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
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	2014/08/12 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2014/10/30 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2014/03/04 * 12
SJM-13	Measure	ASKUL	-	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE	-
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2014/04/22 * 12
SAT10-06	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2014/11/21 * 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 :

RE: Radiated emission