RADIO TEST REPORT

Test Report No.: 10656952S-A

(Original test report: 10315698S-E)

Applicant	:	**FUJIFILM Corporation**
Type of Equipment	:	**Flat Panel Sensor**
Model No.	:	**DR-ID 1200 FLAT PANEL SENSOR DR-ID 1213SE**
FCC ID	:	**W2Z-01000006**
Test regulation	:	**FCC Part 15 Subpart C: 2015**
Test item	:	**Radiated Spurious emission**
Test result	:	**Complied**

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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.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: January 23 to 25, 2015

Representative test engineer:

M. Hosaka

Makoto Hosaka
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".

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REVISION HISTORY

Original Test Report No.: 10656952S-A

Revision	Test report No.	Date	Page revised	Contents
-(Original)	10656952S-A	February 26, 2015	-	-

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SECTION 1: Customer information

Company Name	:	FUJIFILM Corporation
Address	:	2-26-30 Nishiazabu Minatoku Tokyo 106-8620, Japan
Telephone Number	:	81-3-6271-1975
Facsimile Number	:	81-3-6271-1189
Contact Person	:	Mitsuyuki Komiya

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

2.1 Identification of E.U.T.

Type of equipment	:	Flat Panel Sensor
Model No.	:	DR-ID 1200 FLAT PANEL SENSOR DR-ID 1213SE
Serial No.	:	Refer to Clause 4.2
Rating	:	DC 8V (Battery)
Country of Mass-production	:	Japan
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.
Receipt Date of Sample	:	January 23, 2015

2.2 Product description

Model: DR-ID 1200 FLAT PANEL SENSOR DR-ID 1213SE (referred to as the EUT in this report) is Flat Panel Sensor.

General specification:
Clock frequency(ies) in the system : 40MHz

Radio specification:

Radio Type	:	Transceiver
Method of Frequency Generation	:	Synthesizer
Power Supply (inner)	:	DC3.3V

	IEEE802.11b	**IEEE802.11g**	**IEEE802.11a**	**IEEE802.11n (20M band)**	**IEEE802.11n (40M band)**
Frequency of operation *1)	2412-2462MHz	2412-2462MHz	5180-5320MHz 5500-5700MHz 5745-5825MHz	2412-2462MHz 5180-5320MHz 5500-5700MHz 5745-5825MHz	2422-2452MHz 5190-5310MHz 5510-5670MHz 5755-5795MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5MHz		20MHz	2.4GHz band 5MHz 5GHz band 20MHz	2.4GHz band 5MHz 5GHz band 40MHz

Antenna	**antenna #0 (Bottom, short edge side)**	**antenna #1 (Left, long edge side)**
Antenna quantity	2 pcs. (*. Separation distance between the antenna 1 and the antenna 0: 315mm) 11b,g,a: One selected Tx antenna operation. 11n(20HT),n(40HT): One selected Tx antenna operation (MCS0~7) 11n(20HT),n(40HT): Two Tx antenna operation (MCS8~13)	
Antenna model	113Y120216 (cable length: 300mm)	
Antenna type / connector type	λ/2 dipole antenna / Connector; PCB side: U.FL, Antenna side: soldered	
Antenna gain (max.peak) (excluding cable loss)	-7.3(2.4GHz), -7.7(2.5GHz), -2.3(5.2GHz), -2.7(5.3GHz), -4.3(5.6GHz), -5.0(5.8GHz)	-7.1(2.4GHz), -6.5(2.5GHz), -0.3(5.2GHz), -1.1(5.3GHz), -4.4(5.6GHz), -4.5(5.8GHz)
	(*.including cable loss, It has built-in in a frame of EUT.)	

*1) Refer to the test reports: 10656952S-B for FCC 15.407.
* The EUT do not use the special transmitting technique such as “beam-forming” and “time-space code diversity.”

FCC 15.31 (e)
The EUT is a battery-operated device and test was performed with the full-charged battery.
Therefore, the EUT complies with the requirement.

FCC 15.203
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore the EUT complies with the requirement.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2015, final revised on January 21, 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

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	Conducted / Radiated	N/A	7.0dB Freq.: 9848.000MHz Polarization: Horizontal Detection: Average Mode: Tx 2462MHz, IEEE 802.11b	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 radio function does not operate during charging.
*3) Refer to the test report: 10315698S-E (Tested model: DR-ID1201SE)

3.3 Addition to standard

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 (±)
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 test report has enough margin, more than site margin.

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, Test data & 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 rate *1)	Antenna *1)
Radiated emission (below 1GHz), Out of band emissions (Conducted) *2)	Transmitting IEEE 802.11n (HT20), MIMO	2417MHz	MCS8, PN9	Side & Bottom
Radiated emission (above 1GHz) *4)	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	1Mbps, PN9	Side
	Transmitting IEEE 802.11n (HT20), MIMO	2412MHz, 2417MHz*3), 2437MHz, 2462MHz	MCS8, PN9	Side & Bottom
	Transmitting IEEE 802.11n (HT40), MIMO	2422MHz, 2427MHz*3), 2437MHz, 2452MHz	MCS8, PN9	Side & Bottom

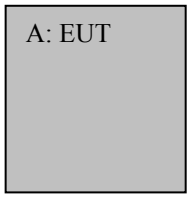
*1) The worst condition was determined based on the original test report.
*2) Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - "of TCB Council Workshop October 2009.
*3) Measurement was performed additionally since the channel has the highest power setting.
*4) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.

EUT has the power settings by the software as follows;

Power settings	IEEE 802.11b (1Mbps) : 13.5dBm, IEEE 802.11g (6Mbps) : 13.5dBm (2412MHz), 17.0dBm (2417MHz), 16.0dBm (2437MHz), 15.0dBm (2462MHz) IEEE 802.11n (HT20, MCS8): 10.5dBm (2412MHz), 14.5dBm (2417MHz), 12.5dBm (2437MHz), 10.5dBm (2462MHz) IEEE 802.11n (HT40, MCS8): 6.0dBm (2422MHz), 13.5dBm (2427MHz), 10.5dBm (2437MHz), 7.0dBm (2452MHz)
Software	Atheros Radio Test (ART) - Revision 0.9 BUILD #27 ART_11n - Customer Version (ANWI BUILD)

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Flat Panel Sensor	DR-ID 1200 FLAT PANEL SENSOR DR-ID 1213SE	#107	FUJIFILM	EUT

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 polystyrene 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.

5.3 Test conditions

Frequency range : 30MHz to 25GHz *
EUT position : Table top
* Measurement in 9kHz to 30MHz was not performed since the EUT does not use the clock frequency below 30MHz.

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 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.
SISO:

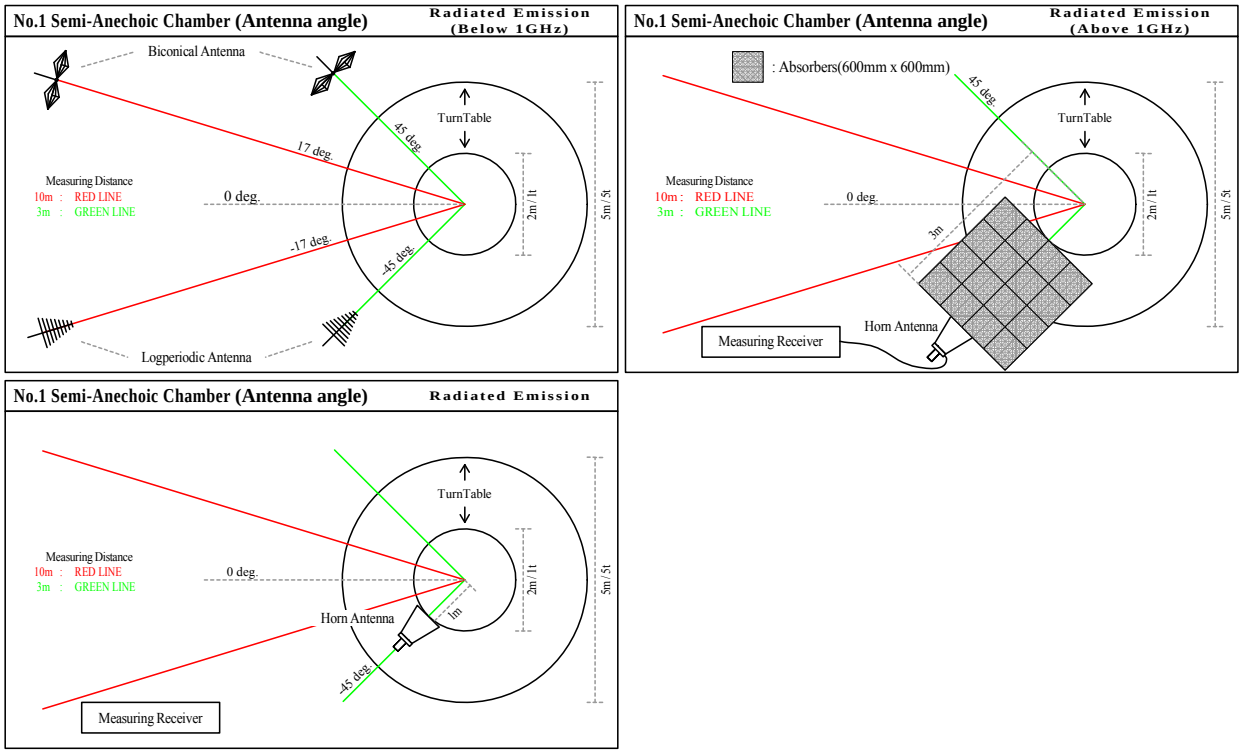
Antenna polarization	Carrier (Band edge)	Spurious (Below 1GHz)	Spurious (1-15GHz)	Spurious (15-18GHz)	Spurious (18-25GHz)
Horizontal	Z	-	Z	Z	Z
Vertical	Y	-	Y	Y	Y

MIMO:

Antenna polarization	Carrier (Band edge)	Spurious (Below 1GHz)	Spurious (1-15GHz)	Spurious (15-18GHz)	Spurious (18-25GHz)
Horizontal	Z	Y	Z	Z	Z
Vertical	Z	Y	Z	Z	Z

* The definition of each position is shown in a ‘Pre-check of the worst position’ in APPENDIX 3.

Figure 1. Antenna angle



5.5 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.

5.6 Results

Summary of the test results : Pass
* No noise was detected above the 5th 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
Pre-check of the worst position

APPENDIX 1: Data of Radio tests

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2412 MHz		
	Tx, IEEE802.11b, PN9, antenna port 0, 1Mbps		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	45.9	25.9	14.6	40.9	45.5	73.9	28.4	100	116	
Hori.	4824.000	PK	46.1	30.6	7.0	41.7	42.0	73.9	31.9	100	115	
Hori.	7236.000	PK	43.8	36.2	8.4	41.5	46.9	73.9	27.0	100	0	
Hori.	9648.000	PK	44.8	38.3	9.3	40.4	52.0	73.9	21.9	100	202	
Hori.	12060.000	PK	44.3	39.4	10.3	39.7	54.3	73.9	19.6	100	0	
Hori.	2390.000	AV	36.5	25.9	14.6	40.9	36.1	53.9	17.8	100	116	
Hori.	4824.000	AV	37.7	30.6	7.0	41.7	33.6	53.9	20.3	100	115	
Hori.	7236.000	AV	35.9	36.2	8.4	41.5	39.0	53.9	14.9	100	0	
Hori.	9648.000	AV	36.7	38.3	9.3	40.4	43.9	53.9	10.0	100	202	
Hori.	12060.000	AV	34.2	39.4	10.3	39.7	44.2	53.9	9.7	100	0	
Vert.	2390.000	PK	45.5	25.9	14.6	40.9	45.1	73.9	28.8	100	126	
Vert.	4824.000	PK	46.5	30.6	7.0	41.7	42.4	73.9	31.5	100	122	
Vert.	7236.000	PK	45.7	36.2	8.4	41.5	48.8	73.9	25.1	100	0	
Vert.	9648.000	PK	45.3	38.3	9.3	40.4	52.5	73.9	21.4	100	110	
Vert.	12060.000	PK	44.1	39.4	10.3	39.7	54.1	73.9	19.8	100	0	
Vert.	2390.000	AV	36.4	25.9	14.6	40.9	36.0	53.9	17.9	100	126	
Vert.	4824.000	AV	38.3	30.6	7.0	41.7	34.2	53.9	19.7	100	122	
Vert.	7236.000	AV	35.8	36.2	8.4	41.5	38.9	53.9	15.0	100	0	
Vert.	9648.000	AV	34.8	38.3	9.3	40.4	42.0	53.9	11.9	100	110	
Vert.	12060.000	AV	34.5	39.4	10.3	39.7	44.5	53.9	**9.4**	100	0	

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	83.6	26.0	14.6	40.9	83.3	-	-	
Hori.	2396.999	PK	46.0	25.9	14.6	40.9	45.6	63.3	17.7	
Hori.	2400.000	PK	44.0	26.0	14.6	40.9	43.7	63.3	19.6	
Vert.	2412.000	PK	82.9	26.0	14.6	40.9	82.6	-	-	
Vert.	2396.999	PK	46.1	25.9	14.6	40.9	45.7	62.6	16.9	
Vert.	2400.000	PK	44.0	26.0	14.6	40.9	43.7	62.6	18.9	

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

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2437 MHz		
	Tx, IEEE802.11b, PN9, antenna port 0, 1Mbps		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	49.0	30.8	7.0	41.6	45.2	73.9	28.7	100	101	
Hori.	7311.000	PK	47.1	36.3	8.3	41.5	50.2	73.9	23.7	100	0	
Hori.	9748.000	PK	45.7	38.3	9.5	40.4	53.1	73.9	20.8	100	87	
Hori.	12185.000	PK	44.6	39.3	10.4	39.7	54.6	73.9	19.3	100	0	
Hori.	4874.000	AV	41.8	30.8	7.0	41.6	38.0	53.9	15.9	100	101	
Hori.	7311.000	AV	37.7	36.3	8.3	41.5	40.8	53.9	13.1	100	0	
Hori.	9748.000	AV	37.1	38.3	9.5	40.4	44.5	53.9	9.4	100	87	
Hori.	12185.000	AV	35.3	39.3	10.4	39.7	45.3	53.9	**8.6**	100	0	
Vert.	4874.000	PK	48.8	30.8	7.0	41.6	45.0	73.9	28.9	100	124	
Vert.	7311.000	PK	47.1	36.3	8.3	41.5	50.2	73.9	23.7	100	0	
Vert.	9748.000	PK	44.3	38.3	9.5	40.4	51.7	73.9	22.2	100	79	
Vert.	12185.000	PK	45.2	39.3	10.4	39.7	55.2	73.9	18.7	100	0	
Vert.	4874.000	AV	41.4	30.8	7.0	41.6	37.6	53.9	16.3	100	124	
Vert.	7311.000	AV	37.6	36.3	8.3	41.5	40.7	53.9	13.2	100	0	
Vert.	9748.000	AV	36.2	38.3	9.5	40.4	43.6	53.9	10.3	100	79	
Vert.	12185.000	AV	35.2	39.3	10.4	39.7	45.2	53.9	8.7	100	0	

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

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Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2462 MHz		
	Tx, IEEE802.11b, PN9, antenna port 0, 1Mbps		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	46.3	26.1	14.7	40.9	46.2	73.9	27.7	100	113	
Hori.	4924.000	PK	50.0	31.0	7.1	41.5	46.6	73.9	27.3	100	115	
Hori.	7386.000	PK	47.1	36.4	8.4	41.4	50.5	73.9	23.4	100	0	
Hori.	9848.000	PK	48.8	38.3	9.5	40.4	56.2	73.9	17.7	100	204	
Hori.	12310.000	PK	45.5	39.3	10.4	39.7	55.5	73.9	18.4	100	0	
Hori.	2483.500	AV	36.9	26.1	14.7	40.9	36.8	53.9	17.1	100	113	
Hori.	4924.000	AV	44.0	31.0	7.1	41.5	40.6	53.9	13.3	100	115	
Hori.	7386.000	AV	37.5	36.4	8.4	41.4	40.9	53.9	13.0	100	0	
Hori.	9848.000	AV	39.5	38.3	9.5	40.4	46.9	53.9	**7.0**	100	204	
Hori.	12310.000	AV	35.4	39.3	10.4	39.7	45.4	53.9	8.5	100	0	
Vert.	2483.500	PK	47.0	26.1	14.7	40.9	46.9	73.9	27.0	100	149	
Vert.	4924.000	PK	50.5	31.0	7.1	41.5	47.1	73.9	26.8	100	78	
Vert.	7386.000	PK	46.4	36.4	8.4	41.4	49.8	73.9	24.1	100	0	
Vert.	9848.000	PK	47.1	38.3	9.5	40.4	54.5	73.9	19.4	100	101	
Vert.	12310.000	PK	43.7	39.3	10.4	39.7	53.7	73.9	20.2	100	0	
Vert.	2483.500	AV	36.8	26.1	14.7	40.9	36.7	53.9	17.2	100	149	
Vert.	4924.000	AV	44.7	31.0	7.1	41.5	41.3	53.9	12.6	100	78	
Vert.	7386.000	AV	37.5	36.4	8.4	41.4	40.9	53.9	13.0	100	0	
Vert.	9848.000	AV	38.2	38.3	9.5	40.4	45.6	53.9	8.3	100	101	
Vert.	12310.000	AV	35.2	39.3	10.4	39.7	45.2	53.9	8.7	100	0	

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

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Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2412 MHz		
	Tx, IEEE802.11n(HT20), PN9, antenna port 0+1, MCS8		

(* 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	47.9	25.9	14.6	40.9	47.5	73.9	26.4	100	116	
Hori.	4824.000	PK	46.4	30.6	7.0	41.7	42.3	73.9	31.6	100	0	
Hori.	7236.000	PK	45.8	36.2	8.4	41.5	48.9	73.9	25.0	100	0	
Hori.	9648.000	PK	44.6	38.3	9.3	40.4	51.8	73.9	22.1	100	0	
Hori.	12060.000	PK	44.2	39.4	10.3	39.7	54.2	73.9	19.7	100	0	
Hori.	2390.000	AV	36.9	25.9	14.6	40.9	36.5	53.9	17.4	100	116	
Hori.	4824.000	AV	37.3	30.6	7.0	41.7	33.2	53.9	20.7	100	0	
Hori.	7236.000	AV	37.1	36.2	8.4	41.5	40.2	53.9	13.7	100	0	
Hori.	9648.000	AV	35.3	38.3	9.3	40.4	42.5	53.9	11.4	100	0	
Hori.	12060.000	AV	35.3	39.4	10.3	39.7	45.3	53.9	**8.6**	100	0	
Vert.	2390.000	PK	51.5	25.9	14.6	40.9	51.1	73.9	22.8	100	170	
Vert.	4824.000	PK	47.4	30.6	7.0	41.7	43.3	73.9	30.6	100	0	
Vert.	7236.000	PK	46.2	36.2	8.4	41.5	49.3	73.9	24.6	100	0	
Vert.	9648.000	PK	44.3	38.3	9.3	40.4	51.5	73.9	22.4	100	0	
Vert.	12060.000	PK	44.5	39.4	10.3	39.7	54.5	73.9	19.4	100	0	
Vert.	2390.000	AV	37.2	25.9	14.6	40.9	36.8	53.9	17.1	100	170	
Vert.	4824.000	AV	37.4	30.6	7.0	41.7	33.3	53.9	20.6	100	0	
Vert.	7236.000	AV	37.1	36.2	8.4	41.5	40.2	53.9	13.7	100	0	
Vert.	9648.000	AV	35.5	38.3	9.3	40.4	42.7	53.9	11.2	100	0	
Vert.	12060.000	AV	35.2	39.4	10.3	39.7	45.2	53.9	8.7	100	0	

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	83.2	26.0	14.6	40.9	82.9	-	-	
Hori.	2400.000	PK	52.6	26.0	14.6	40.9	52.3	62.9	10.6	
Vert.	2412.000	PK	84.4	26.0	14.6	40.9	84.1	-	-	
Vert.	2400.000	PK	56.2	26.0	14.6	40.9	55.9	64.1	8.2	

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

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2417 MHz		
	Tx, IEEE802.11n(HT20), PN9, antenna port 0+1, MCS8		

(* 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.	31.629	QP	23.8	16.9	7.0	31.8	15.9	40.0	24.1	300	0	
Hori.	366.665	QP	31.0	15.6	6.8	31.8	21.6	46.0	24.4	100	162	
Hori.	792.126	QP	24.8	21.1	8.9	31.9	22.9	46.0	23.1	100	283	
Hori.	799.986	QP	30.3	21.2	9.0	31.9	28.6	46.0	17.4	173	92	
Hori.	2390.000	PK	47.0	25.9	14.6	40.9	46.6	73.9	27.3	100	117	
Hori.	4834.000	PK	47.8	30.7	7.0	41.7	43.8	73.9	30.1	100	0	
Hori.	7251.000	PK	45.8	36.2	8.4	41.5	48.9	73.9	25.0	100	0	
Hori.	9668.000	PK	45.3	38.3	9.3	40.4	52.5	73.9	21.4	100	0	
Hori.	12085.000	PK	44.3	39.4	10.3	39.7	54.3	73.9	19.6	100	0	
Hori.	2390.000	AV	37.4	25.9	14.6	40.9	37.0	53.9	16.9	100	117	
Hori.	4834.000	AV	37.3	30.7	7.0	41.7	33.3	53.9	20.6	100	0	
Hori.	7251.000	AV	37.0	36.2	8.4	41.5	40.1	53.9	13.8	100	0	
Hori.	9668.000	AV	35.8	38.3	9.3	40.4	43.0	53.9	10.9	100	0	
Hori.	12085.000	AV	35.6	39.4	10.3	39.7	45.6	53.9	**8.3**	100	0	
Vert.	35.486	QP	23.7	16.0	7.1	31.8	15.0	40.0	25.0	100	0	
Vert.	366.661	QP	30.4	15.6	6.8	31.8	21.0	46.0	25.0	142	113	
Vert.	2390.000	PK	50.1	25.9	14.6	40.9	49.7	73.9	24.2	100	169	
Vert.	4834.000	PK	46.8	30.7	7.0	41.7	42.8	73.9	31.1	100	0	
Vert.	7251.000	PK	46.0	36.2	8.4	41.5	49.1	73.9	24.8	100	0	
Vert.	9668.000	PK	44.3	38.3	9.3	40.4	51.5	73.9	22.4	100	0	
Vert.	12085.000	PK	44.3	39.4	10.3	39.7	54.3	73.9	19.6	100	0	
Vert.	2390.000	AV	39.1	25.9	14.6	40.9	38.7	53.9	15.2	100	169	
Vert.	4834.000	AV	37.8	30.7	7.0	41.7	33.8	53.9	20.1	100	0	
Vert.	7251.000	AV	37.1	36.2	8.4	41.5	40.2	53.9	13.7	100	0	
Vert.	9668.000	AV	36.0	38.3	9.3	40.4	43.2	53.9	10.7	100	0	
Vert.	12085.000	AV	35.3	39.4	10.3	39.7	45.3	53.9	8.6	100	0	

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.	2417.000	PK	87.2	26.0	14.6	40.9	86.9	-	-	
Hori.	2400.000	PK	47.0	26.0	14.6	40.9	46.7	66.9	20.2	
Vert.	2417.000	PK	88.0	26.0	14.6	40.9	87.7	-	-	
Vert.	2400.000	PK	53.2	26.0	14.6	40.9	52.9	67.7	14.8	

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

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2437 MHz		
	Tx, IEEE802.11n(HT20), PN9, antenna port 0+1, MCS8		

(* 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	46.4	30.8	7.0	41.6	42.6	73.9	31.3	100	0	
Hori.	7311.000	PK	46.3	36.3	8.3	41.5	49.4	73.9	24.5	100	0	
Hori.	9748.000	PK	45.2	38.3	9.5	40.4	52.6	73.9	21.3	100	0	
Hori.	12185.000	PK	44.0	39.3	10.4	39.7	54.0	73.9	19.9	100	0	
Hori.	4874.000	AV	37.0	30.8	7.0	41.6	33.2	53.9	20.7	100	0	
Hori.	7311.000	AV	37.5	36.3	8.3	41.5	40.6	53.9	13.3	100	0	
Hori.	9748.000	AV	35.5	38.3	9.5	40.4	42.9	53.9	11.0	100	0	
Hori.	12185.000	AV	35.2	39.3	10.4	39.7	45.2	53.9	8.7	100	0	
Vert.	4874.000	PK	46.7	30.8	7.0	41.6	42.9	73.9	31.0	100	0	
Vert.	7311.000	PK	46.8	36.3	8.3	41.5	49.9	73.9	24.0	100	0	
Vert.	9748.000	PK	45.2	38.3	9.5	40.4	52.6	73.9	21.3	100	0	
Vert.	12185.000	PK	43.6	39.3	10.4	39.7	53.6	73.9	20.3	100	0	
Vert.	4874.000	AV	37.0	30.8	7.0	41.6	33.2	53.9	20.7	100	0	
Vert.	7311.000	AV	37.4	36.3	8.3	41.5	40.5	53.9	13.4	100	0	
Vert.	9748.000	AV	35.3	38.3	9.5	40.4	42.7	53.9	11.2	100	0	
Vert.	12185.000	AV	35.3	39.3	10.4	39.7	45.3	53.9	**8.6**	100	0	

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

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Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2462 MHz		
	Tx, IEEE802.11n(HT20), PN9, antenna port 0+1, MCS8		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	47.2	26.1	14.7	40.9	47.1	73.9	26.8	100	136	
Hori.	4924.000	PK	46.4	31.0	7.1	41.5	43.0	73.9	30.9	100	0	
Hori.	7386.000	PK	47.1	36.4	8.4	41.4	50.5	73.9	23.4	100	0	
Hori.	9848.000	PK	45.8	38.3	9.5	40.4	53.2	73.9	20.7	100	0	
Hori.	12310.000	PK	44.6	39.3	10.4	39.7	54.6	73.9	19.3	100	0	
Hori.	2483.500	AV	36.8	26.1	14.7	40.9	36.7	53.9	17.2	100	136	
Hori.	4924.000	AV	37.6	31.0	7.1	41.5	34.2	53.9	19.7	100	0	
Hori.	7386.000	AV	37.6	36.4	8.4	41.4	41.0	53.9	12.9	100	0	
Hori.	9848.000	AV	35.8	38.3	9.5	40.4	43.2	53.9	10.7	100	0	
Hori.	12310.000	AV	35.3	39.3	10.4	39.7	45.3	53.9	**8.6**	100	0	
Vert.	2483.500	PK	48.5	26.1	14.7	40.9	48.4	73.9	25.5	100	168	
Vert.	4924.000	PK	47.7	31.0	7.1	41.5	44.3	73.9	29.6	100	0	
Vert.	7386.000	PK	48.0	36.4	8.4	41.4	51.4	73.9	22.5	100	0	
Vert.	9848.000	PK	45.3	38.3	9.5	40.4	52.7	73.9	21.2	100	0	
Vert.	12310.000	PK	44.7	39.3	10.4	39.7	54.7	73.9	19.2	100	0	
Vert.	2483.500	AV	37.2	26.1	14.7	40.9	37.1	53.9	16.8	100	168	
Vert.	4924.000	AV	37.3	31.0	7.1	41.5	33.9	53.9	20.0	100	0	
Vert.	7386.000	AV	37.7	36.4	8.4	41.4	41.1	53.9	12.8	100	0	
Vert.	9848.000	AV	36.0	38.3	9.5	40.4	43.4	53.9	10.5	100	0	
Vert.	12310.000	AV	35.3	39.3	10.4	39.7	45.3	53.9	**8.6**	100	0	

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

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Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2422 MHz		
	Tx, IEEE802.11n(HT40), PN9, antenna port 0+1, MCS8		

(* 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	48.2	25.9	14.6	40.9	47.8	73.9	26.1	100	113	
Hori.	4844.000	PK	46.8	30.7	7.0	41.7	42.8	73.9	31.1	100	0	
Hori.	7266.000	PK	46.7	36.2	8.3	41.5	49.7	73.9	24.2	100	0	
Hori.	9688.000	PK	44.5	38.3	9.3	40.4	51.7	73.9	22.2	100	0	
Hori.	12110.000	PK	45.4	39.4	10.3	39.7	55.4	73.9	18.5	100	0	
Vert.	2390.000	PK	49.7	25.9	14.6	40.9	49.3	73.9	24.6	100	175	
Vert.	4844.000	PK	46.7	30.7	7.0	41.7	42.7	73.9	31.2	100	0	
Vert.	7266.000	PK	46.6	36.2	8.3	41.5	49.6	73.9	24.3	100	0	
Vert.	9688.000	PK	44.6	38.3	9.3	40.4	51.8	73.9	22.1	100	0	
Vert.	12110.000	PK	45.7	39.4	10.3	39.7	55.7	73.9	**18.2**	100	0	

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.	2390.000	AV	37.6	25.9	14.6	40.9	0.2	37.4	53.9	16.5	*1
Hori.	4844.000	AV	37.3	30.7	7.0	41.7	0.2	33.5	53.9	20.4	
Hori.	7266.000	AV	36.8	36.2	8.3	41.5	0.2	40.0	53.9	13.9	
Hori.	9688.000	AV	35.8	38.3	9.3	40.4	0.2	43.2	53.9	10.7	
Hori.	12110.000	AV	35.4	39.4	10.3	39.7	0.2	45.6	53.9	8.3	
Vert.	2390.000	AV	38.3	25.9	14.6	40.9	0.2	38.1	53.9	15.8	*1
Vert.	4844.000	AV	37.2	30.7	7.0	41.7	0.2	33.4	53.9	20.5	
Vert.	7266.000	AV	36.8	36.2	8.3	41.5	0.2	40.0	53.9	13.9	
Vert.	9688.000	AV	35.4	38.3	9.3	40.4	0.2	42.8	53.9	11.1	
Vert.	12110.000	AV	35.7	39.4	10.3	39.7	0.2	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
* Duty factor refer to "Duty Factor Calculation chart" sheet.
*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.	2422.000	PK	77.2	26.0	14.6	40.9	76.9	-	-	
Hori.	2400.000	PK	46.3	26.0	14.6	40.9	46.0	56.9	10.9	
Vert.	2422.000	PK	78.0	26.0	14.6	40.9	77.7	-	-	
Vert.	2400.000	PK	48.4	26.0	14.6	40.9	48.1	57.7	9.6	

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

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2427 MHz		
	Tx, IEEE802.11n(HT40), PN9, antenna port 0+1, MCS8		

(* 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	53.7	25.9	14.6	40.9	53.3	73.9	20.6	100	112	
Hori.	4854.000	PK	46.5	30.7	7.0	41.6	42.6	73.9	31.3	100	0	
Hori.	7281.000	PK	46.8	36.2	8.3	41.5	49.8	73.9	24.1	100	0	
Hori.	9708.000	PK	44.8	38.3	9.4	40.4	52.1	73.9	21.8	100	0	
Hori.	12135.000	PK	44.5	39.3	10.4	39.7	54.5	73.9	19.4	100	0	
Vert.	2390.000	PK	57.6	25.9	14.6	40.9	57.2	73.9	**16.7**	100	171	
Vert.	4854.000	PK	46.7	30.7	7.0	41.6	42.8	73.9	31.1	100	0	
Vert.	7281.000	PK	46.8	36.2	8.3	41.5	49.8	73.9	24.1	100	0	
Vert.	9708.000	PK	45.4	38.3	9.4	40.4	52.7	73.9	21.2	100	0	
Vert.	12135.000	PK	44.6	39.3	10.4	39.7	54.6	73.9	19.3	100	0	

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.	2390.000	AV	41.3	25.9	14.6	40.9	0.2	41.1	53.9	12.8	*1
Hori.	4854.000	AV	37.4	30.7	7.0	41.6	0.2	33.7	53.9	20.2	
Hori.	7281.000	AV	37.0	36.2	8.3	41.5	0.2	40.2	53.9	13.7	
Hori.	9708.000	AV	35.7	38.3	9.4	40.4	0.2	43.2	53.9	10.7	
Hori.	12135.000	AV	35.7	39.3	10.4	39.7	0.2	45.9	53.9	**8.0**	
Vert.	2390.000	AV	44.2	25.9	14.6	40.9	0.2	44.0	53.9	9.9	*1
Vert.	4854.000	AV	37.5	30.7	7.0	41.6	0.2	33.8	53.9	20.1	
Vert.	7281.000	AV	37.0	36.2	8.3	41.5	0.2	40.2	53.9	13.7	
Vert.	9708.000	AV	35.6	38.3	9.4	40.4	0.2	43.1	53.9	10.8	
Vert.	12135.000	AV	35.6	39.3	10.4	39.7	0.2	45.8	53.9	8.1	

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
* Duty factor refer to "Duty Factor Calculation chart" sheet.
*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.	2427.000	PK	83.5	26.0	14.6	40.9	83.2	-	-	
Hori.	2400.000	PK	49.8	26.0	14.6	40.9	49.5	63.2	13.7	
Vert.	2427.000	PK	85.0	26.0	14.6	40.9	84.7	-	-	
Vert.	2400.000	PK	51.9	26.0	14.6	40.9	51.6	64.7	13.1	

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

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2437 MHz		
	Tx, IEEE802.11n(HT40), PN9, antenna port 0+1, MCS8		

(* 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	46.8	30.8	7.0	41.6	43.0	73.9	30.9	100	0	
Hori.	7311.000	PK	46.6	36.3	8.3	41.5	49.7	73.9	24.2	100	0	
Hori.	9748.000	PK	45.0	38.3	9.5	40.4	52.4	73.9	21.5	100	0	
Hori.	12185.000	PK	44.6	39.3	10.4	39.7	54.6	73.9	**19.3**	100	0	
Vert.	4874.000	PK	47.3	30.8	7.0	41.6	43.5	73.9	30.4	100	0	
Vert.	7311.000	PK	46.6	36.3	8.3	41.5	49.7	73.9	24.2	100	0	
Vert.	9748.000	PK	44.8	38.3	9.5	40.4	52.2	73.9	21.7	100	0	
Vert.	12185.000	PK	44.5	39.3	10.4	39.7	54.5	73.9	19.4	100	0	

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	37.4	30.8	7.0	41.6	0.2	33.8	53.9	20.1	
Hori.	7311.000	AV	37.7	36.3	8.3	41.5	0.2	41.0	53.9	12.9	
Hori.	9748.000	AV	35.8	38.3	9.5	40.4	0.2	43.4	53.9	10.5	
Hori.	12185.000	AV	35.1	39.3	10.4	39.7	0.2	45.3	53.9	8.6	
Vert.	4874.000	AV	37.3	30.8	7.0	41.6	0.2	33.7	53.9	20.2	
Vert.	7311.000	AV	37.5	36.3	8.3	41.5	0.2	40.8	53.9	13.1	
Vert.	9748.000	AV	35.6	38.3	9.5	40.4	0.2	43.2	53.9	10.7	
Vert.	12185.000	AV	35.3	39.3	10.4	39.7	0.2	45.5	53.9	**8.4**	

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

* Duty factor refer to "Duty Factor Calculation chart" sheet.

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Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber
Date	January 23, 2015	January 24, 2015	January 25, 2015
Temperature / Humidity	24 deg.C, 41 %RH	21 deg.C, 30 %RH	20 deg.C, 31 %RH
Engineer	Makoto Hosaka	Makoto Hosaka	Makoto Hosaka
Mode	Tx, 2452 MHz		
	Tx, IEEE802.11n(HT40), PN9, antenna port 0+1, MCS8		

(* 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	49.1	26.1	14.7	40.9	49.0	73.9	24.9	100	112	
Hori.	4904.000	PK	47.1	30.9	7.1	41.6	43.5	73.9	30.4	100	0	
Hori.	7356.000	PK	46.7	36.3	8.4	41.5	49.9	73.9	24.0	100	0	
Hori.	9808.000	PK	44.3	38.3	9.5	40.4	51.7	73.9	22.2	100	0	
Hori.	12260.000	PK	45.0	39.3	10.4	39.7	55.0	73.9	**18.9**	100	0	
Vert.	2483.500	PK	49.7	26.1	14.7	40.9	49.6	73.9	24.3	100	174	
Vert.	4904.000	PK	46.7	30.9	7.1	41.6	43.1	73.9	30.8	100	0	
Vert.	7356.000	PK	46.4	36.3	8.4	41.5	49.6	73.9	24.3	100	0	
Vert.	9808.000	PK	45.0	38.3	9.5	40.4	52.4	73.9	21.5	100	0	
Vert.	12260.000	PK	44.6	39.3	10.4	39.7	54.6	73.9	19.3	100	0	

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.	2483.500	AV	37.6	26.1	14.7	40.9	0.2	37.7	53.9	16.2	*1
Hori.	4904.000	AV	37.7	30.9	7.1	41.6	0.2	34.3	53.9	19.6	
Hori.	7356.000	AV	37.4	36.3	8.4	41.5	0.2	40.8	53.9	13.1	
Hori.	9808.000	AV	35.5	38.3	9.5	40.4	0.2	43.1	53.9	10.8	
Hori.	12260.000	AV	36.0	39.3	10.4	39.7	0.2	46.2	53.9	7.7	
Vert.	2483.500	AV	38.4	26.1	14.7	40.9	0.2	38.5	53.9	15.4	*1
Vert.	4904.000	AV	37.6	30.9	7.1	41.6	0.2	34.2	53.9	19.7	
Vert.	7356.000	AV	37.6	36.3	8.4	41.5	0.2	41.0	53.9	12.9	
Vert.	9808.000	AV	35.7	38.3	9.5	40.4	0.2	43.3	53.9	10.6	
Vert.	12260.000	AV	36.1	39.3	10.4	39.7	0.2	46.3	53.9	**7.6**	

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

* Duty factor refer to "Duty Factor Calculation chart" sheet.

*1) Not out of band emission (Leakage power).

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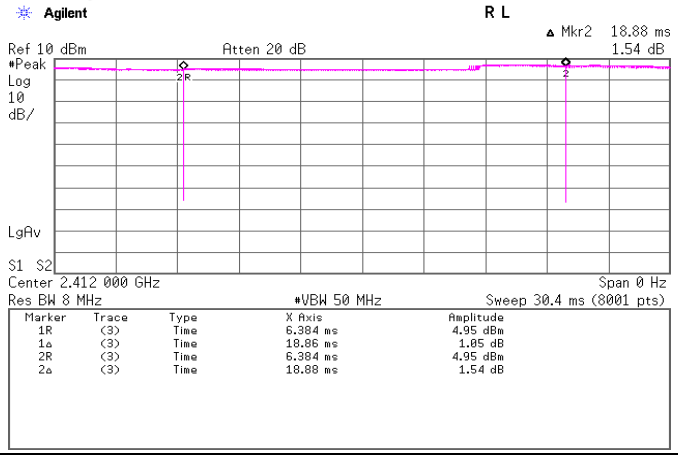
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Semi Anechoic Chamber
Date	January 23, 2015	
Temperature / Humidity	24 deg.C , 41%RH	
Engineer	Makoto Hosaka	

Burst rate confirmation

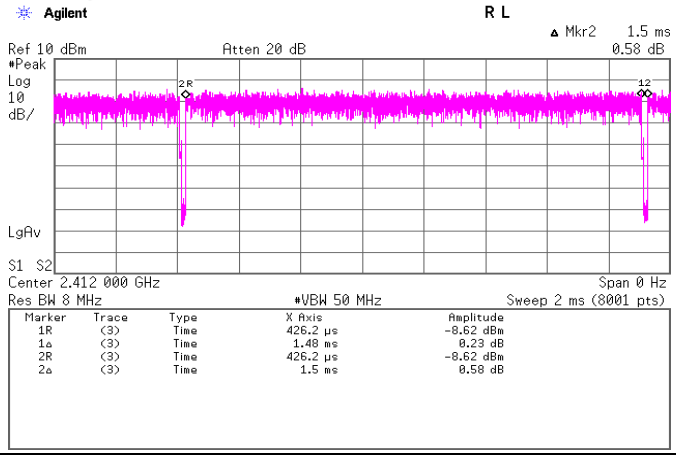
Tx, IEEE802.11b, PN9, worst antenna port 0, worst data mode 1Mbps

duty cycle = 18.86 / 18.88 = 0.999 (99.9%)	
Tx2_duty1  	Tx2_duty2

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Semi Anechoic Chamber
Date	January 23, 2015	
Temperature / Humidity	24 deg.C , 41%RH	
Engineer	Makoto Hosaka	

Burst rate confirmation

Tx, IEEE802.11n (HT20), MIMO, PN9, worst data mode 8(MCS)

duty cycle = 1.48 / 1.5 = 0.987 (98.7%)	
Tx2_duty1  	Tx2_duty2

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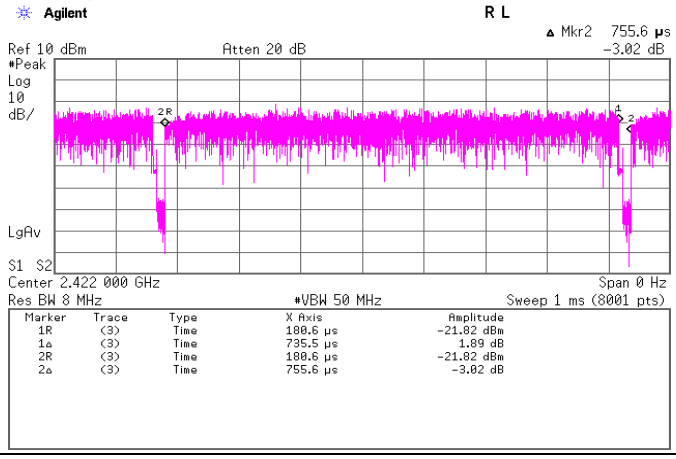
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Semi Anechoic Chamber
Date	January 23, 2015	
Temperature / Humidity	24 deg.C , 41%RH	
Engineer	Makoto Hosaka	

Duty Factor Calculation chart

Tx, IEEE802.11n (HT40), MIMO, PN9, worst data mode 8(MCS)

Duty Factor: 20log (1/duty cycle) = 0.2dB	
duty cycle = 0.7355 / 0.7556 = 0.973 (97.3%)	
Tx2_duty1  	Tx2_duty2

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
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2014/11/21 ＊ 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, RFI,MF)	-	RE	-
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2014/04/22 ＊ 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2014/03/15 ＊ 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2014/05/15 ＊ 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2014/03/14 ＊ 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2014/02/17 ＊ 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2014/12/19 ＊ 12
KAT3-09	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 ＊ 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2014/10/18 ＊ 12
SCC-A1/A3/A5 /A7/A8/A13/S RSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE /141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 ＊ 12
SCC-A2/A4/A6 /A7/A8/A13/S RSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE /141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 ＊ 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2014/10/18 ＊ 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2014/11/11 ＊ 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,