

Test report No. Page

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Issued date Revised date FCC ID

: December 11, 2014 : March 9, 2015 : UJHBD1G

: 10512882H-A-R1

RADIO TEST REPORT

Test Report No.: 10512882H-A-R1

Applicant

MITSUBISHI ELECTRIC CORPORATION SANDA

WORKS

Type of Equipment

: Blu-Ray Disc Player

Model No.

: BD-1G

FCC ID

UJHBD1G

Test regulation

: FCC Part 15 Subpart C: 2015

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 above regulation.
- 4. The test results in this 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 NVLAP, NIST, or any agency of the Federal Government.
- 6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
- 7. This report is a revised version of 10512882H-A. 10512882H-A is replaced with this report.

Date of test:

October 31 to November 11, 2014

Representative test engineer:

Yuta Moriya Engineer

Consumer Technology Division

Approved by:

Masanori Nishiyama

Manager

Consumer Technology Division



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. *As for the range of Accreditation in NVLAP, you may refer to the WEB address,

http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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REVISION HISTORY

Original Test Report No.: 10512882H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10512882H-A	December 11, 2014	-	-
1	10512882H-A-R1	March 9, 2015	P.1, 6	Update of FCC15 version
1	10512882H-A-R1	March 9, 2015	P.4	Addition of clock frequency (Radio part)
			1	

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SECTION 1: Customer information

Company Name : MITSUBISHI ELECTRIC CORPORATION SANDA WORKS

Address : 2-3-33, Miwa, Sanda-city, Hyogo, 669-1513, Japan

Telephone Number : +81-79-559-3820 Facsimile Number : +81-79-559-3876 Contact Person : Yoshihisa Araki

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

2.1 Identification of E.U.T.

Type of Equipment : Blu-Ray Disc Player

Model No. : BD-1G

Serial No. : Refer to Clause 4.2

Rating : DC 12.0V Receipt Date of Sample : October 11, 2014

Country of Mass-production : Thailand

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

General Specification

Clock frequency(ies) in the system : 24.576MHz, 37.4MHz (Radio part)

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Radio Specification

Radio Type : Transceiver Power Supply (inner) : DC3.3V

Specification of Wireless LAN (IEEE802.11b/g/a/n-20/n-40/11ac-20/11ac-40/11ac-80)

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band) /	IEEE802.11n (40 M band) /	IEEE802.11ac (80 M band)
				IEEE802.11ac	IEEE802.11ac	(00 M band)
				(20 M band)	(40 M band)	
Frequency	2412-2462MHz	2412-2462MHz	5180-5240MHz	2412-2462MHz *1)	5190-5230MHz	5210MHz
of operation	*1)	*1)	5745-5825MHz	5180-5240MHz	5755-5795MHz	5775MHz
				5745-5825MHz		
Type of modulation	DSSS	OFDM-CCK	OFDM			256QAM
	(CCK, DQPSK,	(64QAM,	(64QAM, 16QAM, Q	64QAM, 16QAM, QPSK, BPSK)		
	DBPSK)	16QAM, QPSK,				
		BPSK)		•		
Channel spacing	5MHz		20MHz	2.4GHz band	40MHz	80MHz
				5MHz		
				5GHz band		
				20MHz		
Antenna type	Inverted F Antenr	na				
Antenna Gain	2.4GHz: -0.15dBi					
	5GHz: 5150-5350					
	5470-5875	MHz :1.56dBi				
Antenna Connector	U.FL-LP-066					
type	1					

^{*1) 2412-2462}MHz is applied for this test report.

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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 15.247 Operation within the bands 902-928MHz,

2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2009 7. AC powerline Conducted Emission measurements IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	N/A	N/A *1)	-
6dB Bandwidth	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)" IC: -	FCC: Section 15.247(a)(2) IC: RSS-210 A8.2(a)		Complied	Conducted
Maximum Peak Output Power	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)" IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-210 A8.4(4)	See data.	Complied	Conducted
Power Density	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)" IC: -	FCC: Section 15.247 (e) IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)" IC: RSS-Gen 6.13	IC: RSS-210 A8.5 RSS-Gen 8.9 RSS-Gen 8.10	1.1dB 4722.145MHz, AV, Vert.	Complied	Conducted/ Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

FCC 15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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^{*} The revision on January 21, 2015 does not affect the test specification applied to the EUT.

^{*1)} The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

^{*} In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted
Bandwidth					

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

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room		Radiated emission						
(semi-		(3m*)((<u>+</u> dB)		(1m*)	(<u>+</u> dB)	$(0.5\text{m}^*)(\pm dB)$	
anechoic chamber)	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz	
No.1	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB	
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB	
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB	
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB	

^{*3}m/1m/0.5m = Measurement distance

Power meter (<u>+</u> dB)				
Below 1GHz	Above 1GHz			
0.7dB	1.5dB			

Antenna terminal conducted emission			Antenna terminal	Channel power	
and Power density (<u>+</u> dB)		(<u>+</u> dB)		(<u>+</u> dB)	
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Radiated emission test(3m)

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

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3.5 Test Location

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	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

^{*} Size of vertical conducting plane (for Conducted Emission test): 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

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.

Mode	Remarks*
IEEE 802.11b (11b)	11Mbps, PN9
IEEE 802.11g (11g)	18Mbps, PN9
IEEE 802.11n 20MHz BW (11n-20)	MCS 1, PN9

^{*}The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)

*Power of the EUT was set by the software as follows;

- Power Setting: default

- Software: Same as production model *This setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

In addition, end users cannot change the settings of the output power of the product.

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission (Conducted)	11n-20 Tx	2462MHz
*1)		
6dB Bandwidth,	11b Tx	2412MHz
Maximum Peak Output Power,	11g Tx	2437MHz
Power Density,	11n-20 Tx	2462MHz
99% Occupied Bandwidth		
Spurious Emission (Radiated)	11b Tx	2412MHz
	11n-20 Tx *2)	2437MHz
		2462MHz

^{*1)} The test was performed on the mode as a representative, because it had the highest power at antenna terminal test.

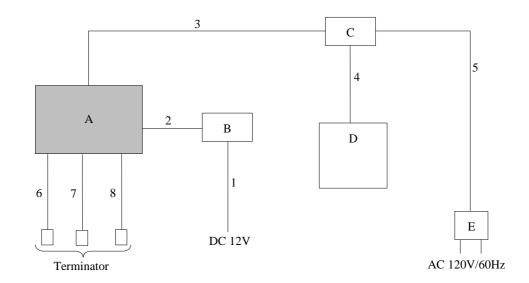
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^{*2)} Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.

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4.2 Configuration and peripherals



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

	iption of EUT and Supp			7.5	
No.	Item	Model number	Serial number	Manufacturer	Remarks
	Blu-Ray Disc Player	BD-1G	6114155AE6100034 *1)	MITSUBISHI	EUT
Α			6114104AE6100012 *2)	ELECTRIC	
Λ				CORPORATION	
				SANDA WORKS	
	Jig board	-	184	MITSUBISHI	-
В				ELECTRIC	
Ъ				CORPORATION	
				SANDA WORKS	
	LVDS board	-	2	MITSUBISHI	-
С				ELECTRIC	
				CORPORATION	
				SANDA WORKS	
D	Display	HSD070PWW1	B0E010S2603414	HannStar	-
Е	AC Adapter	STD-05030U	3	ADAPTER TEC	-

^{*1)} Used for antenna terminal conducted tests

List of cables used

No.	Name	Length (m)	Shio	Remarks	
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	Control and DC Cable	0.5	Unshielded	Unshielded	-
3	Control Cable	2.0	Shielded	Shielded	-
4	Flat Cable	0.15	Unshielded	Unshielded	-
5	DC Cable	1.8	Unshielded	Unshielded	-
6	USB Cable	1.7	Shielded	Shielded	-
7	HDMI Cable	1.0	Shielded	Shielded	-
8	Video Cable	1.0	Shielded	Shielded	-

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^{*2)} Used for spurious emission test

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SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)".

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC 15.205 / Table 6 of RSS-Gen 8.10 (IC).

confectution of the Color of th								
Frequency	Below 1GHz	Above 1GHz		20dBc				
Instrument used	Test Receiver	Spectrum Analy	/zer	Spectrum Analyzer				
Detector	QP	PK	AV *1)	PK				
IF Bandwidth	BW 120kHz	RBW: 1MHz	Average Power Method:	RBW: 100kHz				
		VBW: 3MHz	WLAN: 12.2.5.2	VBW: 300kHz				
			RBW: 1MHz					
			VBW: 3MHz					
			Detector:					
			Power Averaging (RMS)					
			Trace: 100 traces					
			Duty factor was added to					
			the results.					
Test Distance	3m	3m (below 10G	Hz),	3m (below 10GHz),				
		1m *2) (above 1	10GHz)	1m *2) (above 10GHz)				

^{*1)} Average Power Measurement was performed based on 6.0 & 12.2.5 of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)"

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-26.5GHz
Test data : APPENDIX
Test result : Pass

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^{*2)} Distance Factor: $20 \times \log (3.0 \text{m}/1.0 \text{m}) = 9.5 \text{dB}$

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SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold*1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3kHz	10kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
Emission *4)	150kHz to 30MHz	9.1kHz	27kHz				

^{*1)} The measurement was performed with Max Hold since the duty cycle was not 100%.

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX Test result : Pass

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^{*2)} Reference data

^{*3)} Section 10.2 Method PKPSD (peak PSD) of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)".

^{*4)} In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

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APPENDIX 1: Data of EMI test

6dB Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room

 Report No.
 10512882H

 Date
 11/04/2014

 Temperature/ Humidity
 25deg. C / 32% RH

Engineer Hironobu Ohnishi Mode 11b/11g/11n-20 Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	7.845	>500
2437	7.725	>500
2462	7.526	>500

11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	16.412	>500
2437	16.419	>500
2462	16.411	>500

11n-20

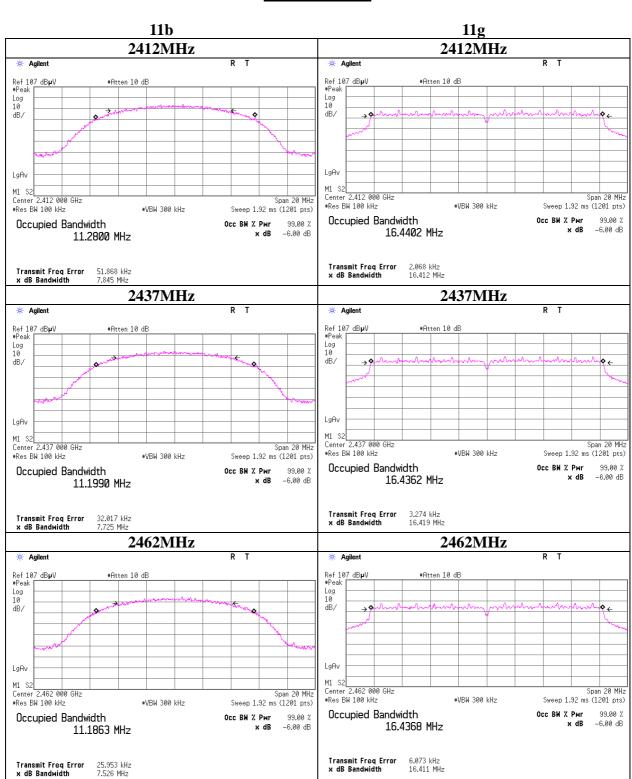
Frequency	6dB Bandwidth	Limit
[MHz]	[MHz]	[kHz]
2412	17.681	>500
2437	17.658	>500
2462	17.681	>500

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6dB Bandwidth



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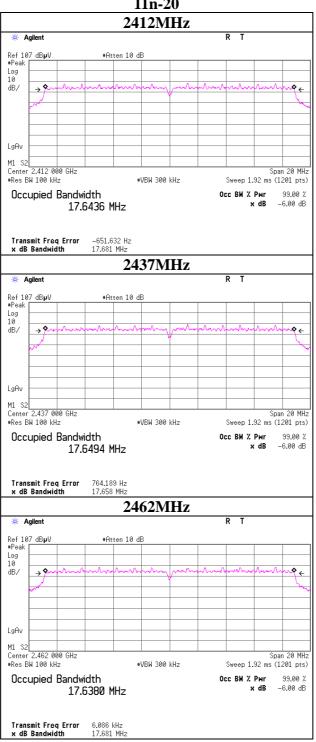
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6dB Bandwidth

11n-20



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Maximum Peak Output Power

Test place Ise EMC Lab. No.3 Measurement Room

Report No. 10512882H
Date 10/31/2014
Temperature/ Humidity 24deg. C / 61% RH
Engineer Satofumi Matsuyama

Mode 11b Tx

Freq.	Reading	Cable	Atten.	Result		Limit		Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	5.04	2.31	10.08	17.43	55.34	30.00	1000	12.57
2437	5.30	2.32	10.08	17.70	58.88	30.00	1000	12.30
2462	5.61	2.33	10.08	18.02	63.39	30.00	1000	11.98

Sample Calculation:

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	4.91	
2	5.14	
5.5	5.08	
11	5.30	*

^{*:} Worst Rate

All comparizon were carried out on same frequency and measurement factors.

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Maximum Peak Output Power

Test place Ise EMC Lab. No.3 Measurement Room

Report No. 10512882H
Date 10/31/2014
Temperature/ Humidity 24deg. C / 61% RH
Engineer Satofumi Matsuyama

Mode 11g Tx

Freq.	Reading	Cable	Atten.	Result		Limit		Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.24	2.31	10.08	21.63	145.55	30.00	1000	8.37
2437	9.45	2.32	10.08	21.85	153.11	30.00	1000	8.15
2462	9.72	2.33	10.08	22.13	163.31	30.00	1000	7.87

Sample Calculation:

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	8.68	
9	8.61	
12	9.36	
18	9.45	*
24	8.75	
36	8.73	
48	9.14	
54	7.82	

^{*:} Worst Rate

All comparison were carried out on same frequency and measurement factors.

UL Japan, Inc. Ise EMC Lab.

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Maximum Peak Output Power

Test place Ise EMC Lab. No.3 Measurement Room

Report No. 10512882H
Date 10/31/2014
Temperature/ Humidity 24deg. C / 61% RH
Engineer Satofumi Matsuyama

Mode 11n-20 Tx

Freq.	Reading	Cable	Atten.	Result		Limit		Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.64	2.31	10.08	22.03	159.59	30.00	1000	7.97
2437	9.91	2.32	10.08	22.31	170.22	30.00	1000	7.69
2462	10.17	2.33	10.08	22.58	181.13	30.00	1000	7.42

Sample Calculation:

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

2437MHz

MCS	Reading	Remark
Number		
	[dBm]	
0	9.53	
1	9.91	*
2	9.85	
3	9.54	
4	9.50	
5	9.36	
6	9.57	
7	9.35	

^{*:} Worst Rate

All comparison were carried out on same frequency and measurement factors.

UL Japan, Inc. Ise EMC Lab.

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Average Output Power

Test place Ise EMC Lab. No.11 Measurement Room

Report No. 10512882H Date 11/20/2014

Temperature/ Humidity 25deg. C / 24% RH Engineer Tomohisa Nakagawa Mode 11b/g/n-20 Tx

[AV]

11b **11Mbps**

Freq.	Reading	Cable	Atten.	Result		Li	mit	Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	0.92	2.32	10.08	13.32	21.48	30.00	1000	16.68
2437	1.35	2.32	10.08	13.75	23.71	30.00	1000	16.25
2462	1.38	2.33	10.08	13.79	23.93	30.00	1000	16.21

11g **18Mbps**

Freq.	Reading	Cable	Atten.	Re	sult	Liı	mit	Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	-1.71	2.32	10.08	10.69	11.72	30.00	1000	19.31
2437	-1.35	2.32	10.08	11.05	12.74	30.00	1000	18.95
2462	-1.31	2.33	10.08	11.10 12.88		30.00 1000		18.90

11n-20 MCS1

Freq.	Reading	Cable	Atten.	Result		Liı	mit	Margin
		Loss						
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	-0.99	2.32	10.08	11.41	13.84	30.00	1000	18.59
2437	-0.72	2.32	10.08	11.68	14.72	30.00	1000	18.32
2462	-0.61	2.33	10.08	11.80	15.14	30.00	1000	18.20

Sample Calculation:

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

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Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

 Date
 11/01/2014
 11/06/2014

 Temperature/ Humidity
 22deg. C / 57% RH
 23deg. C / 51% RH

 Engineer
 Kazuya Yoshioka
 Yuta Moriya

 (1-10GHz)
 (10-26.5GHz)

Mode 11b Tx 2412MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	1079.206	PK	60.2	24.2	2.2	35.1	-	51.5	73.9	22.4	
Hori	1349.312	PK	62.4	25.0	2.5	34.3	-	55.6	73.9	18.3	
Hori	1416.653	PK	61.2	25.2	2.5	34.2	-	54.7	73.9	19.2	
Hori	2390.000	PK	58.7	26.8	3.2	32.7	-	56.0	73.9	17.9	*1)
Hori	4722.497	PK	49.9	30.4	5.2	31.8	-	53.7	73.9	20.2	
Hori	4824.000	PK	40.7	30.6	5.3	31.8	-	44.8	73.9	29.1	Floor Noise
Hori	7236.000	PK	40.8	35.9	6.6	32.7	-	50.6	73.9	23.3	Floor Noise
Hori	9648.000	PK	41.6	38.5	7.0	33.4	-	53.7	73.9	20.2	Floor Noise
Hori	1079.206	AV	56.9	24.2	2.2	35.1	-	48.2	53.9	5.7	
Hori	1349.312	AV	58.3	25.0	2.5	34.3	-	51.5	53.9	2.4	
Hori	1416.653	AV	55.8	25.2	2.5	34.2	-	49.3	53.9	4.6	
Hori	2390.000	AV	44.2	26.8	3.2	32.7	0.5	42.0	53.9	11.9	*1)
Hori	4722.497	AV	47.4	30.4	5.2	31.8	-	51.2	53.9	2.7	
Hori	4824.000	AV	33.1	30.6	5.3	31.8	-	37.2	53.9	16.7	Floor Noise
Hori	7236.000	AV	34.1	35.9	6.6	32.7	-	43.9	53.9	10.0	Floor Noise
Hori	9648.000	AV	34.4	38.5	7.0	33.4	-	46.5	53.9	7.4	Floor Noise
Vert	1079.308	PK	62.9	24.2	2.2	35.1	-	54.2	73.9	19.7	
Vert	1349.267	PK	59.9	25.0	2.5	34.3	-	53.1	73.9	20.8	
Vert	1416.621	PK	60.0	25.2	2.5	34.2	-	53.5	73.9	20.4	
Vert	2390.000	PK	56.7	26.8	3.2	32.7	-	54.0	73.9	19.9	*1)
Vert	4722.300	PK	50.5	30.4	5.2	31.8	-	54.3	73.9	19.6	
Vert	4824.000	PK	40.9	30.6	5.3	31.8	-	45.0	73.9	28.9	Floor Noise
Vert	7236.000	PK	41.0	35.9	6.6	32.7	-	50.8	73.9	23.1	Floor Noise
Vert	9648.000	PK	41.8	38.5	7.0	33.4	-	53.9	73.9		Floor Noise
Vert	1079.308	AV	59.8	24.2	2.2	35.1	-	51.1	53.9	2.8	
Vert	1349.267	I	54.7	25.0	2.5	34.3	-	47.9	53.9	6.0	
Vert		AV	56.1	25.2	2.5	34.2	-	49.6	53.9	4.3	
Vert	2390.000	I	43.3	26.8	3.2	32.7	0.5	41.1	53.9	12.8	*1)
Vert	4722.300	AV	47.9	30.4	5.2	31.8	-	51.7	53.9	2.2	
Vert	4824.000	AV	33.1	30.6	5.3	31.8	-	37.2	53.9		Floor Noise
Vert	7236.000	AV	34.1	35.9	6.6	32.7	-	43.9	53.9	10.0	Floor Noise
Vert	9648.000	AV	34.4	38.5	7.0	33.4	-	46.5	53.9	7.4	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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

20dBc Data Sheet

ZUUDU Da	200BC Data Sheet												
Polarity	Frequency	Detector	Reading	Ant	Loss	Gain	Result	Limit	Margin	Remark			
				Factor									
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]				
Hori	2412.000	PK	102.8	26.8	3.2	32.7	100.1	-	-	Carrier			
Hori	2400.000	PK	54.5	26.8	3.2	32.7	51.8	80.1	28.3				
Vert	2412.000	PK	102.1	26.8	3.2	32.7	99.4	-	-	Carrier			
Vert	2400.000	PK	53.3	26.8	3.2	32.7	50.6	79.4	28.8				

 $Result = Reading + Ant\ Factor + Loss\ (Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amprifier)$

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 $[*]Other\ frequency\ noises\ omitted\ in\ this\ report\ were\ not\ seen\ or\ had\ enough\ margin\ (more\ than\ 20dB).$

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FCC ID : UJHBD1G

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

Kazuya Yoshioka Yuta Moriya (1-10GHz) (10-26.5GHz)

Mode 11b Tx 2437MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	1079.467	PK	59.9	24.2	2.2	35.1	51.2	73.9	22.7	
Hori	1349.346	PK	62.4	25.0	2.5	34.3	55.6	73.9	18.3	
Hori	1416.877	PK	59.7	25.2	2.5	34.2	53.2	73.9	20.7	
Hori	4722.253	PK	50.5	30.4	5.2	31.8	54.3	73.9	19.6	
Hori	4874.000	PK	40.9	30.7	5.3	31.7	45.2	73.9	28.7	Floor Noise
Hori	7311.000	PK	41.0	35.9	6.5	32.7	50.7	73.9	23.2	Floor Noise
Hori	9748.000	PK	41.3	38.7	7.1	33.4	53.7	73.9	20.2	Floor Noise
Hori	1079.467	AV	56.9	24.2	2.2	35.1	48.2	53.9	5.7	
Hori	1349.346	AV	58.2	25.0	2.5	34.3	51.4	53.9	2.5	
Hori	1416.877	AV	55.2	25.2	2.5	34.2	48.7	53.9	5.2	
Hori	4722.253	AV	47.6	30.4	5.2	31.8	51.4	53.9	2.5	
Hori	4874.000	AV	33.5	30.7	5.3	31.7	37.8	53.9	16.1	Floor Noise
Hori	7311.000	AV	34.4	35.9	6.5	32.7	44.1	53.9	9.8	Floor Noise
Hori	9748.000	AV	34.0	38.7	7.1	33.4	46.4	53.9	7.5	Floor Noise
Vert	1079.382	PK	62.5	24.2	2.2	35.1	53.8	73.9	20.1	
Vert	1349.187	PK	58.3	25.0	2.5	34.3	51.5	73.9	22.4	
Vert	1416.767	PK	60.1	25.2	2.5	34.2	53.6	73.9	20.3	
Vert	4722.511	PK	50.9	30.4	5.2	31.8	54.7	73.9	19.2	
Vert	4874.000	PK	41.0	30.7	5.3	31.7	45.3	73.9	28.6	Floor Noise
Vert	7311.000	PK	41.1	35.9	6.5	32.7	50.8	73.9	23.1	Floor Noise
Vert	9748.000	PK	41.4	38.7	7.1	33.4	53.8	73.9	20.1	Floor Noise
Vert	1079.382	AV	59.3	24.2	2.2	35.1	50.6	53.9	3.3	
Vert	1349.187	AV	53.8	25.0	2.5	34.3	47.0	53.9	6.9	
Vert	1416.767	AV	55.4	25.2	2.5	34.2	48.9	53.9	5.0	
Vert	4722.511	AV	47.9	30.4	5.2	31.8	51.7	53.9	2.2	
Vert	4874.000	AV	33.5	30.7	5.3	31.7	37.8	53.9	16.1	Floor Noise
Vert	7311.000	AV	34.4	35.9	6.5	32.7	44.1	53.9	9.8	Floor Noise
Vert	9748.000	AV	34.0	38.7	7.1	33.4	46.4	53.9	7.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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

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Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

 Date
 11/01/2014
 11/06/2014

 Temperature/ Humidity
 22deg. C / 57% RH
 23deg. C / 51% RH

Engineer Kazuya Yoshioka Yuta Moriya

(1-10GHz) (10-26.5GHz)

Mode 11b Tx 2462MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
'	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	1079.338	PK	61.3	24.2	2.2	35.1	-	52.6	73.9	21.3	
Hori	1349.264	PK	61.5	25.0	2.5	34.3	-	54.7	73.9	19.2	
Hori	1416.828	PK	58.7	25.2	2.5	34.2	-	52.2	73.9	21.7	
Hori	2483.500	PK	61.0	26.9	3.2	32.7	-	58.4	73.9	15.5	
Hori	4722.333	PK	49.7	30.4	5.2	31.8	-	53.5	73.9	20.4	
Hori	4924.000	PK	41.1	30.8	5.3	31.7	-	45.5	73.9	28.4	Floor Noise
Hori	7386.000	PK	41.0	35.9	6.5	32.7	-	50.7	73.9	23.2	Floor Noise
Hori	9848.000	PK	41.2	38.8	7.1	33.5	-	53.6	73.9	20.3	Floor Noise
Hori	1079.338	AV	57.9	24.2	2.2	35.1	-	49.2	53.9	4.7	
Hori	1349.264	AV	57.2	25.0	2.5	34.3	-	50.4	53.9	3.5	
Hori	1416.828	AV	54.3	25.2	2.5	34.2	-	47.8	53.9	6.1	
Hori	2483.500	AV	44.6	26.9	3.2	32.7	0.5	42.5	53.9	11.4	
Hori	4722.333	AV	46.6	30.4	5.2	31.8	-	50.4	53.9	3.5	
Hori	4924.000	AV	34.0	30.8	5.3	31.7	-	38.4	53.9	15.5	Floor Noise
Hori	7386.000	AV	34.3	35.9	6.5	32.7	-	44.0	53.9	9.9	Floor Noise
Hori	9848.000	AV	34.3	38.8	7.1	33.5	-	46.7	53.9	7.2	Floor Noise
Vert	1079.380	PK	61.7	24.2	2.2	35.1	-	53.0	73.9	20.9	
Vert	1349.426	PK	57.2	25.0	2.5	34.3	-	50.4	73.9	23.5	
Vert	1416.686	PK	60.6	25.2	2.5	34.2	-	54.1	73.9	19.8	
Vert	2483.500	PK	60.5	26.9	3.2	32.7	-	57.9	73.9	16.0	
Vert	4722.132	PK	51.5	30.4	5.2	31.8	-	55.3	73.9	18.6	
Vert	4924.000	PK	41.3	30.8	5.3	31.7	-	45.7	73.9	28.2	Floor Noise
Vert	7386.000	PK	41.2	35.9	6.5	32.7	-	50.9	73.9	23.0	Floor Noise
Vert	9848.000	PK	41.4	38.8	7.1	33.5	-	53.8	73.9	20.1	Floor Noise
Vert	1079.380	AV	58.2	24.2	2.2	35.1	-	49.5	53.9	4.4	
Vert	1349.426	AV	52.8	25.0	2.5	34.3	-	46.0	53.9	7.9	
Vert	1416.686	AV	55.8	25.2	2.5	34.2	-	49.3	53.9	4.6	
Vert	2483.500	AV	44.1	26.9	3.2	32.7	0.5	42.0	53.9	11.9	
Vert	4722.132	AV	48.9	30.4	5.2	31.8	-	52.7	53.9	1.2	
Vert	4924.000	AV	34.0	30.8	5.3	31.7	-	38.4	53.9	15.5	Floor Noise
Vert	7386.000	AV	34.3	35.9	6.5	32.7	-	44.0	53.9	9.9	Floor Noise
Vert	9848.000	AV	34.3	38.8	7.1	33.5	-	46.7	53.9	7.2	Floor Noise

 $Result = Reading + Ant\ Factor + Loss\ (Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor (above\ 10GHz)) - Gain (Amplifier) + Duty\ Factor + Cable + Attenuator + Filter-Distance\ factor + Cable + Cable$

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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

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Revised date : March 9, 2015
FCC ID : UJHBD1G

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

Date 11/01/2014 11/06/2014
Temperature/ Humidity 22deg. C / 57% RH 23deg. C / 51% RH
Engineer Kazuya Yoshioka Yuta Moriya

Kazuya Yoshioka Yuta Moriya (1-10GHz) (10-26.5GHz)

Mode 11n-20 Tx 2412MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
,	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	1079.509	PK	61.8	24.2	2.2	35.1	-	53.1	73.9	20.8	
Hori	1349.391	PK	61.4	25.0	2.5	34.3	-	54.6	73.9	19.3	
Hori	1416.590	PK	62.1	25.2	2.5	34.2	-	55.6	73.9	18.3	
Hori	2390.000	PK	65.4	26.8	3.2	32.7	-	62.7	73.9	11.2	*1)
Hori	4722.096	PK	49.5	30.4	5.2	31.8	-	53.3	73.9	20.6	
Hori	4824.000	PK	40.5	30.6	5.3	31.8	-	44.6	73.9	29.3	Floor Noise
Hori	7236.000	PK	40.7	35.9	6.6	32.7	-	50.5	73.9	23.4	Floor Noise
Hori	9648.000	PK	41.4	38.5	7.0	33.4	-	53.5	73.9	20.4	Floor Noise
Hori	1079.509	AV	58.3	24.2	2.2	35.1	-	49.6	53.9	4.3	
Hori	1349.391	AV	57.4	25.0	2.5	34.3	-	50.6	53.9	3.3	
Hori	1416.590	AV	57.2	25.2	2.5	34.2	-	50.7	53.9	3.2	
Hori	2390.000	AV	44.6	26.8	3.2	32.7	0.6	42.5	53.9	11.4	*1)
Hori	4722.096	AV	46.6	30.4	5.2	31.8	-	50.4	53.9	3.5	
Hori	4824.000	AV	33.1	30.6	5.3	31.8	-	37.2	53.9	16.7	Floor Noise
Hori	7236.000	AV	34.1	35.9	6.6	32.7	-	43.9	53.9	10.0	Floor Noise
Hori	9648.000	AV	34.3	38.5	7.0	33.4	-	46.4	53.9	7.5	Floor Noise
Vert	1079.279	PK	62.2	24.2	2.2	35.1	-	53.5	73.9	20.4	
Vert	1349.129	PK	57.4	25.0	2.5	34.3	-	50.6	73.9	23.3	
Vert	1416.770	PK	59.6	25.2	2.5	34.2	-	53.1	73.9	20.8	
Vert	2390.000	PK	63.0	26.8	3.2	32.7	-	60.3	73.9	13.6	*1)
Vert	4722.339	PK	52.0	30.4	5.2	31.8	-	55.8	73.9	18.1	
Vert	4824.000	PK	40.7	30.6	5.3	31.8	-	44.8	73.9	29.1	Floor Noise
Vert	7236.000	PK	40.9	35.9	6.6	32.7	-	50.7	73.9	23.2	Floor Noise
Vert	9648.000	PK	41.3	38.5	7.0	33.4	-	53.4	73.9	20.5	Floor Noise
Vert	1079.279	AV	59.2	24.2	2.2	35.1	-	50.5	53.9	3.4	
Vert	1349.129	AV	53.0	25.0	2.5	34.3	-	46.2	53.9	7.7	
Vert	1416.770	AV	55.0	25.2	2.5	34.2	-	48.5	53.9	5.4	
Vert	2390.000	AV	43.7	26.8	3.2	32.7	0.6	41.6	53.9	12.3	*1)
Vert	4722.339	AV	48.8	30.4	5.2	31.8	-	52.6	53.9	1.3	
Vert	4824.000	AV	33.1	30.6	5.3	31.8	-	37.2	53.9	16.7	Floor Noise
Vert	7236.000	AV	34.1	35.9	6.6	32.7	-	43.9	53.9	10.0	Floor Noise
Vert	9648.000	AV	34.3	38.5	7.0	33.4	-	46.4	53.9	7.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

	vube butti biteti												
Polarity	Frequency	Detector	Reading	Ant	Loss	Gain	Result	Limit	Margin	Remark			
				Factor									
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]				
Hori	2412.000	PK	96.4	26.8	3.2	32.7	93.7	-	-	Carrier			
Hori	2400.000	PK	48.9	26.8	3.2	32.7	46.2	73.7	27.5				
Vert	2412.000	PK	97.2	26.8	3.2	32.7	94.5	-	-	Carrier			
Vert	2400.000	PK	54.5	26.8	3.2	32.7	51.8	74.5	22.7				

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

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

^{*1)} Not Out of Band emission(Leakage Power)

: 10512882H-A-R1 Test report No.

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: December 11, 2014 **Issued date** Revised date : March 9, 2015 FCC ID : UJHBD1G

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

Date 11/01/2014 11/06/2014

Temperature/ Humidity 22deg. C / 57% RH 23deg. C / 51% RH Engineer

Kazuya Yoshioka Yuta Moriya (1-10GHz) (10-26.5GHz)

Mode 11n-20 Tx 2437MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	1079.457	PK	61.5	24.2	2.2	35.1	52.8	73.9	21.1	
Hori	1349.278	PK	62.0	25.0	2.5	34.3	55.2	73.9	18.7	
Hori	1416.635	PK	61.1	25.2	2.5	34.2	54.6	73.9	19.3	
Hori	4722.042	PK	49.6	30.4	5.2	31.8	53.4	73.9	20.5	
Hori	4874.000	PK	40.7	30.7	5.3	31.7	45.0	73.9	28.9	Floor Noise
Hori	7311.000	PK	41.1	35.9	6.5	32.7	50.8	73.9	23.1	Floor Noise
Hori	9748.000	PK	41.5	38.7	7.1	33.4	53.9	73.9	20.0	Floor Noise
Hori	1079.457	AV	58.3	24.2	2.2	35.1	49.6	53.9	4.3	
Hori	1349.278	AV	57.5	25.0	2.5	34.3	50.7	53.9	3.2	
Hori	1416.635	AV	57.0	25.2	2.5	34.2	50.5	53.9	3.4	
Hori	4722.042	AV	47.0	30.4	5.2	31.8	50.8	53.9	3.1	
Hori	4874.000	AV	32.9	30.7	5.3	31.7	37.2	53.9	16.7	Floor Noise
Hori	7311.000	AV	33.7	35.9	6.5	32.7	43.4	53.9	10.5	Floor Noise
Hori	9748.000	AV	33.5	38.7	7.1	33.4	45.9	53.9	8.0	Floor Noise
Vert	1079.352	PK	62.5	24.2	2.2	35.1	53.8	73.9	20.1	
Vert	1349.181	PK	59.8	25.0	2.5	34.3	53.0	73.9	20.9	
Vert	1416.685	PK	59.5	25.2	2.5	34.2	53.0	73.9	20.9	
Vert	4722.145	PK	52.1	30.4	5.2	31.8	55.9	73.9	18.0	
Vert	4874.000	PK	40.9	30.7	5.3	31.7	45.2	73.9	28.7	Floor Noise
Vert	7311.000	PK	41.3	35.9	6.5	32.7	51.0	73.9	22.9	Floor Noise
Vert	9748.000	PK	41.4	38.7	7.1	33.4	53.8	73.9	20.1	Floor Noise
Vert	1079.352	AV	59.3	24.2	2.2	35.1	50.6	53.9	3.3	
Vert	1349.181	AV	54.7	25.0	2.5	34.3	47.9	53.9	6.0	
Vert	1416.685	AV	55.2	25.2	2.5	34.2	48.7	53.9	5.2	
Vert	4722.145	AV	49.0	30.4	5.2	31.8	52.8	53.9	1.1	
Vert	4874.000	AV	32.9	30.7	5.3	31.7	37.2	53.9	16.7	Floor Noise
Vert	7311.000	AV	33.7	35.9	6.5	32.7	43.4	53.9	10.5	Floor Noise
Vert	9748.000	AV	33.5	38.7	7.1	33.4	45.9	53.9	8.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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

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Issued date : December 11, 2014
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Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H

 Date
 11/01/2014
 11/06/2014
 11/04/2014

 Temperature/ Humidity
 22deg. C / 57% RH
 23deg. C / 51% RH
 24deg. C / 50% RH

 Engineer
 Kazuya Yoshioka
 Yuta Moriya
 Tsubasa Takayama

(1-10GHz) (10-26.5GHz) (30-1000MHz)

Mode 11n-20 Tx 2462MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	78.120	QP	45.0	6.8	8.1	38.8	-	21.1	40.0	18.9	
Hori	159.690	QP	41.9	15.5	9.1	38.9	-	27.6	43.5	15.9	
Hori	169.565	QP	42.0	15.8	9.2	39.0	-	28.0	43.5	15.5	
Hori	270.780	QP	45.1	18.4	10.2	38.7	-	35.0	46.0	11.0	
Hori	539.710	QP	48.3	18.7	12.2	38.3	-	40.9	46.0	5.1	
Hori	607.156	QP	46.9	19.5	12.5	38.1	-	40.8	46.0	5.2	
Hori	674.624	QP	46.0	20.0	12.9	38.1	-	40.8	46.0	5.2	
Hori	809.556	QP	42.5	22.0	13.7	38.2	-	40.0	46.0	6.0	
Hori	877.022	QP	41.2	22.0	14.0	38.0	-	39.2	46.0	6.8	
Hori	944.471	QP	43.1	22.7	14.4	37.8	-	42.4	46.0	3.6	
Hori	1349.161	PK	61.6	25.0	2.5	34.3	-	54.8	73.9	19.1	
Hori	1416.506	PK	60.9	25.2	2.5	34.2	-	54.4	73.9	19.5	
Hori	2483.500	PK	67.9	26.9	3.2	32.7	_	65.3	73.9	8.6	
Hori	4722.444	PK	49.2	30.4	5.2	31.8	-	53.0	73.9	20.9	
Hori	4924.000	PK	40.6	30.8	5.3	31.7	-	45.0	73.9	28.9	Floor Noise
Hori	7386.000	PK	41.1	35.9	6.5	32.7	_	50.8	73.9	23.1	Floor Noise
Hori	9848.000	PK	41.0	38.8	7.1	33.5	_	53.4	73.9	20.5	Floor Noise
Hori	1079.590	AV	58.3	24.2	2.2	35.1	-	49.6	53.9	4.3	
Hori	1349.161	AV	57.8	25.0	2.5	34.3	-	51.0	53.9	2.9	
Hori	1416.506	AV	56.4	25.2	2.5	34.2	_	49.9	53.9	4.0	
Hori	2483.500	AV	51.3	26.9	3.2	32.7	0.6	49.3	53.9	4.6	
Hori	4722.444	AV	45.7	30.4	5.2	31.8	_	49.5	53.9	4.4	
Hori	4924.000	AV	32.9	30.8	5.3	31.7	_	37.3	53.9		Floor Noise
Hori		AV	34.3	35.9	6.5	32.7	_	44.0	53.9	9.9	Floor Noise
Hori	9848.000	AV	34.2	38.8	7.1	33.5		46.6	53.9	7.3	Floor Noise
Vert	40.281	OP	50.2	14.4	7.5	38.7	-	33.4	40.0	6.6	
Vert	52.438	QP	49.8	10.0	7.7	38.7	_	28.8	40.0	11.2	
Vert	110.621	QP	44.3	11.7	8.6	38.8	_	25.8	43.5	17.7	
Vert	134.970	OP	50.1	14.1	8.9	38.9	_	34.2	43.5	9.3	
Vert	168.670	QP	47.2	15.8	9.2	39.0	_	33.2	43.5	10.3	
Vert	202.605	OP	47.8	16.4	9.6	39.1	_	34.7	43.5	8.8	
Vert	674.630	QP	46.4	20.0	12.9	38.1	-	41.2	46.0	4.8	
Vert	877.012	QP	40.2	22.0	14.0	38.0	-	38.2	46.0	7.8	
Vert	944.481	QP	40.1	22.7	14.4	37.8	-	39.4	46.0	6.6	
Vert	1349.210	PK	57.7	25.0	2.5	34.3	-	50.9	73.9	23.0	
Vert	1416.479	PK	58.0	25.2	2.5	34.2	-	51.5	73.9	22.4	
Vert	2483.500	PK	65.8	26.9	3.2	32.7	-	63.2	73.9	10.7	
Vert	4722.424	PK	51.9	30.4	5.2	31.8	-	55.7	73.9	18.2	
Vert	4924.000	PK	40.8	30.8	5.3	31.7	-	45.2	73.9	28.7	Floor Noise
Vert	7386.000	PK	41.0	35.9	6.5	32.7	-	50.7	73.9	23.2	Floor Noise
Vert	9848.000	PK	41.3	38.8	7.1	33.5	-	53.7	73.9	20.2	Floor Noise
Vert	1349.210	AV	53.2	25.0	2.5	34.3	-	46.4	53.9	7.5	
Vert	1416.479	AV	54.2	25.2	2.5	34.2	-	47.7	53.9	6.2	
Vert	2483.500	AV	48.5	26.9	3.2	32.7	0.6	46.5	53.9	7.4	
Vert	4722.424	AV	48.9	30.4	5.2	31.8	-	52.7	53.9	1.2	
Vert	4924.000	AV	32.9	30.8	5.3	31.7	-	37.3	53.9		Floor Noise
Vert	7386.000	AV	34.3	35.9	6.5	32.7	-	44.0	53.9		Floor Noise
Vert	9848.000		34.2	38.8	7.1	33.5	-	46.6	53.9		Floor Noise
	Panding An										

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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

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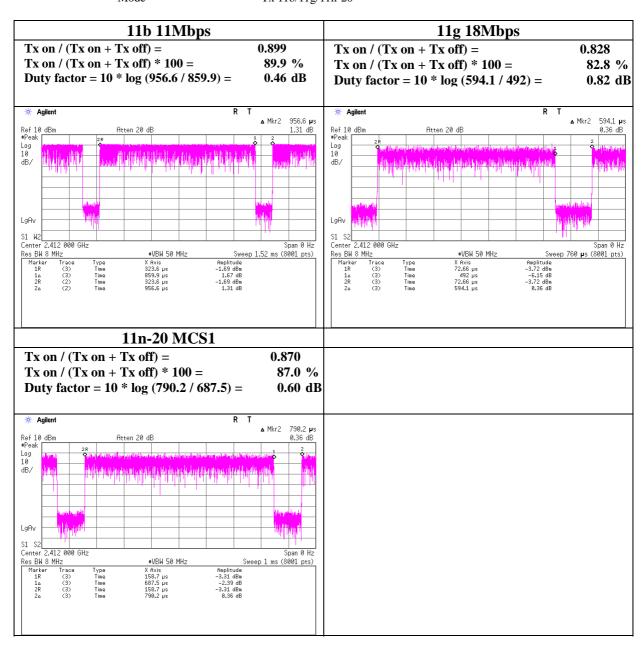
ge : 26 of 34 sued date : December

Issued date : December 11, 2014
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FCC ID : UJHBD1G

Burst rate confirmation

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. 10512882H
Date 11/01/2014
Temperature/ Humidity 22deg. C / 57% RH
Engineer Kazuya Yoshioka
Mode Tx 11b/11g/11n-20



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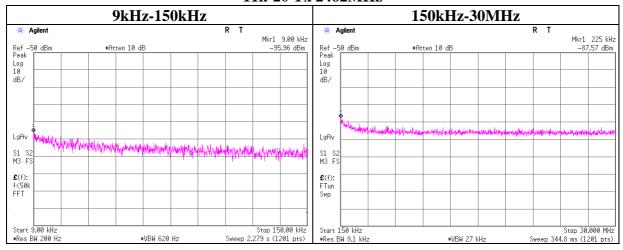
Issued date : December 11, 2014
Revised date : March 9, 2015
FCC ID : UJHBD1G

Conducted Spurious Emission

Test place Ise EMC Lab. No.11 Measurement Room

Report No. 10512882H
Date 11/11/2014
Temperature/ Humidity 26deg. C / 30% RH
Engineer Yuta Moriya
Mode 11n-20 Tx

11n-20 Tx 2462MHz



Frequency	Reading	Cable	Attenator	Antenna	EIRP	Distance	Ground	Е	Limit
		Loss		Gain			bounce	(field strength)	
[kHz]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]
9.00	-96.0	0.01	10.0	2.0	-84.0	300.0	6.0	-22.7	48.5
225	-87.6	0.01	10.0	2.0	-75.6	300.0	6.0	-14.3	20.5

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m] EIRP=Reading+Cable Loss+Attenator+Antenna Gain

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Power Density

Test place Ise EMC Lab. No.11 Measurement Room

Report No. 10512882H
Date 11/04/2014
Temperature/ Humidity 25deg. C / 32% RH
Engineer Hironobu Ohnishi
Mode 11b/11g/11n-20 Tx

11b

Freq.	Reading	Cable	Atten.	Result	Limit	Margin
		Loss				
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-30.30	2.28	19.96	-8.06	8.00	16.06
2437.00	-29.97	2.29	19.96	-7.72	8.00	15.72
2462.00	-30.15	2.30	19.96	-7.89	8.00	15.89

11g

Freq.	Reading	Cable	Atten.	Result	Limit	Margin
		Loss				
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-36.21	2.28	19.96	-13.97	8.00	21.97
2437.00	-36.00	2.29	19.96	-13.75	8.00	21.75
2462.00	-36.10	2.30	19.96	-13.84	8.00	21.84

11n-20

Freq.	Reading	Cable	Atten.	Result	Limit	Margin
		Loss				
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-35.78	2.28	19.96	-13.54	8.00	21.54
2437.00	-35.26	2.29	19.96	-13.01	8.00	21.01
2462.00	-34.62	2.30	19.96	-12.36	8.00	20.36

Sample Calculation:

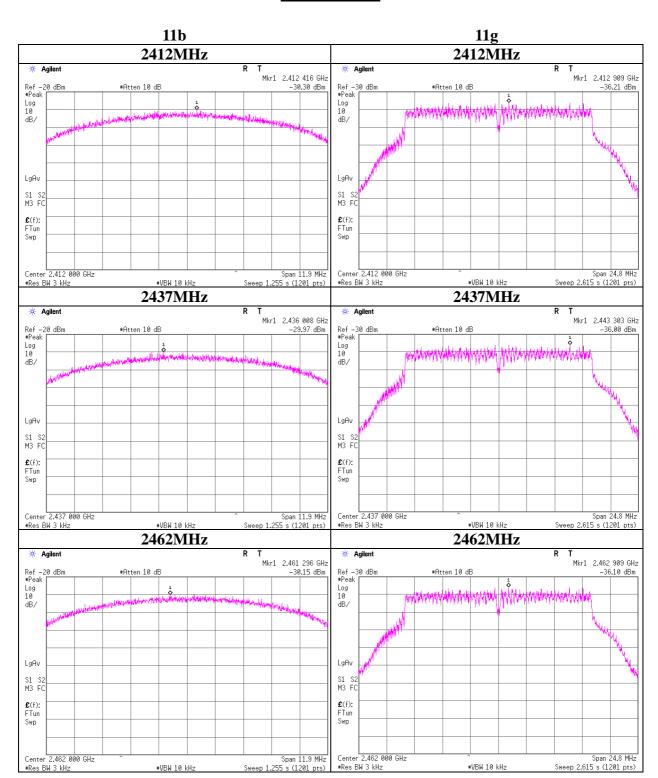
 $Result = Reading + Cable\ Loss\ (including\ the\ cable(s)\ customer\ supplied) + Attenuator$

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Power Density



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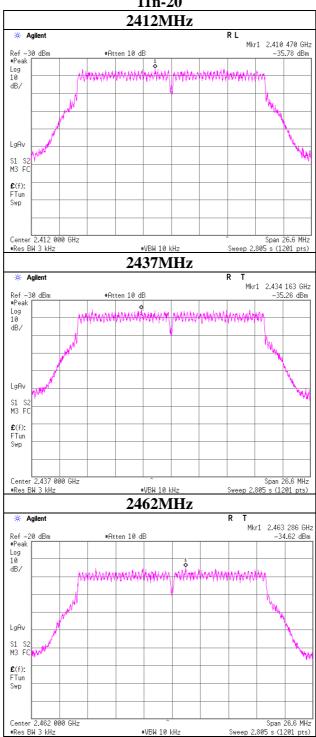
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Power Density

11n-20



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Issued date : December 11, 2014
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FCC ID : UJHBD1G

99%Occupied Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room

Report No. 10512882H
Date 11/04/2014
Temperature/ Humidity 25deg. C / 32% RH
Engineer Hironobu Ohnishi
Mode 11b/11g Tx

11b 11g 2412MHz 2412MHz * Agilent Ref 107 dB**µ**V •Peak □ #Atten 10 dB Log 10 dB/ LgAv LgAv M1 S2 Center 2.412 00 GHz #Res BW 510 kHz Center 2.412 00 GHz •Res BW 510 kHz *VBW 1.5 MHz Sweep 1.04 ms (1201 pts) #VBW 1.5 MHz Sweep 1.04 ms (1201 pts) Occupied Bandwidth Occupied Bandwidth Occ BW % Pwr 99.00 % x dB -6.00 dB 11.3082 MHz Transmit Freq Error x dB Bandwidth -48.366 kHz Transmit Freq Error 4.035 kHz x dB Bandwidth 8.238 MHz 2437MHz 2437MHz # Agilent Ref 107 dBpV Ref 107 dB**µ**U •Peak #Atten 10 dB Log 10 dB/ Log 10 dB/ LgAv M1 S2 Center 2.437 00 GHz *Res BW 510 kHz Span 50 MHz Sweep 1.04 ms (1201 pts) 2 437 00 GH *VBW 1.5 MHz Sweep 1.04 ms (1201 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % Occupied Bandwidth Occ BW % Pwr 99 00 % 17.5341 MHz 11.2963 MHz Transmit Freq Error x dB Bandwidth Transmit Freq Error 2462MHz 2462MHz Ref 107 dBµV •Peak Ref 107 dB**µ**V •Peak #Atten 10 dB #Atten 10 dE Log 10 dB/ Log 10 dB/ LaAv LgAv M1 S2 2.462 00 GHz Span 50 MHz •Res BW 510 kHz *VBW 1.5 MHz Sweep 1.04 ms (1201 pts) Res BW 510 kHz #VBW 1.5 MHz Sweep 1.04 ms (1201 pts) Occupied Bandwidth Occ BW % Pwr Occupied Bandwidth Occ BW % Pwr 99.00 % 17.4903 MHz x dB -6.00 dB 11.3217 MHz x dB -6.00 dB Transmit Freq Error x dB Bandwidth -52.138 kHz 16.584 MHz Transmit Freq Error x dB Bandwidth

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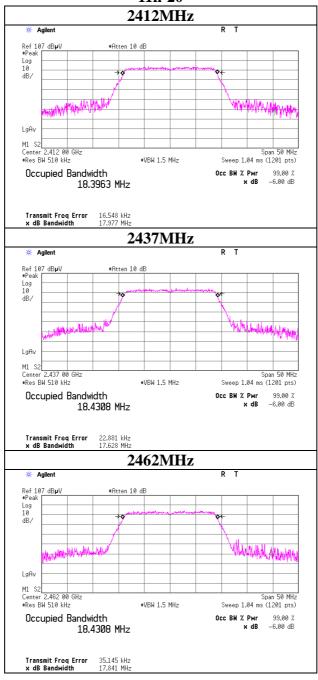
Issued date : December 11, 2014
Revised date : March 9, 2015
FCC ID : UJHBD1G

99% Occupied Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room

Report No. 10512882H
Date 11/04/2014
Temperature/ Humidity 25deg. C / 32% RH
Engineer Hironobu Ohnishi
Mode 11n-20 Tx





UL Japan, Inc. Ise EMC Lab.

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APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2014/06/16 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2014/06/16 * 12
MCC-67	Microwave Cable 1G- 40GHz	Suhner	SUCOFLEX102	28635/2	AT	2014/04/14 * 12
MAT-23	Attenuator(10dB) 1- 18GHz	Orient Microwave	BX10-0476-00	-	AT	2014/03/13 * 12
MOS-12	Thermo-Hygrometer	Custom	CTH-180	1201	AT	2014/01/14 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-116	Spectrum Analyzer	Agilent	E4440A	MY46187620	RE	2014/03/05 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2014/05/26 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2014/05/26 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2014/03/24 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2013/12/17 * 12
MRENT-114						
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2014/10/02 * 12
MAT-21	Attenuator(20dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	AT	2014/01/15 * 12
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2014/09/01 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2014/02/20 * 12
MJM-21	Measure	KOMELON	KMC-36	-	RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE	2014/06/06 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2013/11/24 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2013/11/24 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2013/11/26 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent/T SJ	-	-	RE	2014/09/12 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01- 35	1237616	RE	2014/02/17 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2014/05/26 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2014/04/08 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2014/03/11 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2014/06/30 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2013/11/25 * 12
MCC-66	Microwave Cable 1G- 40GHz	Suhner	SUCOFLEX102	28636/2	AT	2014/04/09 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	AT	2014/03/28 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: RE: Radiated Emission

AT: Antenna Terminal Conducted test

UL Japan, Inc. Ise EMC Lab.

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