



RADIO TEST REPORT

Test Report No. : 10129391H-A-R1

Applicant : BROTHER INDUSTRIES, LTD.
Type of Equipment : Label Writer
Model No. : PT-E550W
FCC ID : B3Q8VA633
Test regulation : FCC Part 15 Subpart C: 2013
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 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 report is a revised version of 10129391H-A. 10129391H-A is replaced with this report.

Date of test: November 27 to December 5, 2013

Representative test engineer:

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Satofumi Matsuyama
Engineer of WiSE Japan,
UL Verification Service

Approved by:

T. Hatakeda

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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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13-EM-F0429

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SECTION 1: Customer information

Company Name : BROTHER INDUSTRIES, LTD.
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Facsimile Number : +81-52-821-1068
Contact Person : Shintaro Uno

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

2.1 Identification of E.U.T.

Type of Equipment : Label Writer
Model No. : PT-E550W
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC12V
Receipt Date of Sample : November 27, 2013
Country of Mass-production : China
Condition of EUT : Production 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 : CPU:96MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2412-2462MHz
Modulation : DSSS / OFDM
Power Supply (radio part input) : DC 3.3V
Antenna type : PCB Antenna
Antenna Gain : 2.03dBi

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2013, final revised on September 30, 2013 and effective October 30, 2013

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 C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	QP 14.5dB, 0.45008MHz, N AV 17.5dB, 0.45008MHz, N	Complied	-
6dB Bandwidth	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on April 9, 2013)" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on April 9, 2013)" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on April 9, 2013)" ----- 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 April 9, 2013)" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3	2.4dB 141.528MHz, QP, Hori.	Complied	Conducted/ Radiated

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

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

This EUT provides stable voltage (DC3.3V) constantly to RF Part regardless of input 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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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted

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 (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	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

*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+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

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

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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	FCC Registration Number	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	313583	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	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	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	134570	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	2.4 x 3.4m	-

* 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)	1Mbps, PN9
IEEE 802.11g (11g)	6Mbps, PN9
IEEE 802.11n SISO 20MHz BW (11n-20)	MCS 0, 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 settings: 11b : 17.0dBm, 11g : 13.0dBm, 11n-20 :12.0dBm - Software: Printer Setting Tool Version 1.2.001 Write PTUSB Version 2.1.0 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.	

*Details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission	11g Tx *1)	2437MHz *1)
Radiated Spurious Emission	11b Tx 11g Tx	2412MHz 2437MHz 2462MHz
	11n-20 Tx	2412MHz 2462MHz
Conducted Spurious Emission Power Density	11b Tx 11g Tx *2)	2412MHz 2437MHz 2462MHz
6dB Bandwidth Maximum Peak Output Power 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412MHz 2437MHz 2462MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test. *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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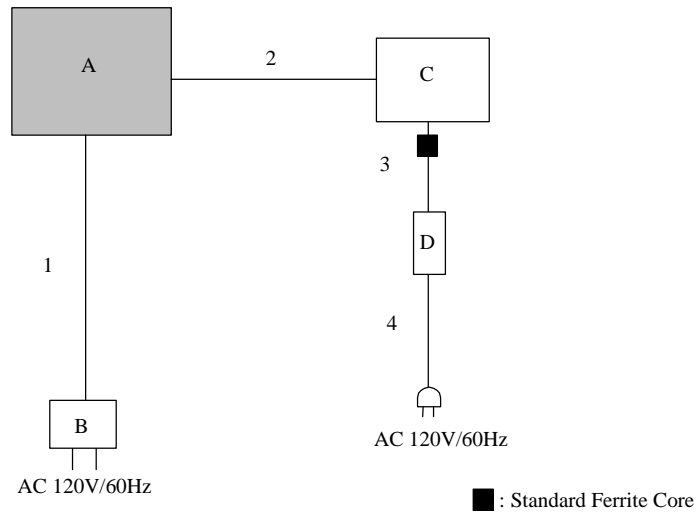
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4.2 Configuration and peripherals



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Label Writer	PT-E550W	U63599-H3Z308780	BROTHER INDUSTRIES, LTD.	EUT
B	AC Adaptor	AD-E001	D08-0051302	BROTHER INDUSTRIES, LTD.	-
C	Personal Computer	CF-R6MW4AJS	7BKSA01029	Panasonic Corporation	-
D	AC Adaptor	CF-AA6282A	6282AM107708152A	Panasonic Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	USB Cable	0.9	Shielded	Shielded	-
3	DC Cable	1.4	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 0.8m above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector	: QP and CISPR AV
Measurement range	: 0.15-30MHz
Test data	: APPENDIX
Test result	: Pass

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SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on April 9, 2013)".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	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 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	Average Power Method: <u>WLAN: 12.2.5.1</u> RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: Free Run	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on April 9, 2013)"

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

- 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.

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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SECTION 7: 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 Emission *4)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				

*1) The measurement was performed with Max Hold since the duty cycle was not 100%.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on April 9, 2013)".
*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 not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

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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APPENDIX 1: Data of EMI test

Conducted Emission

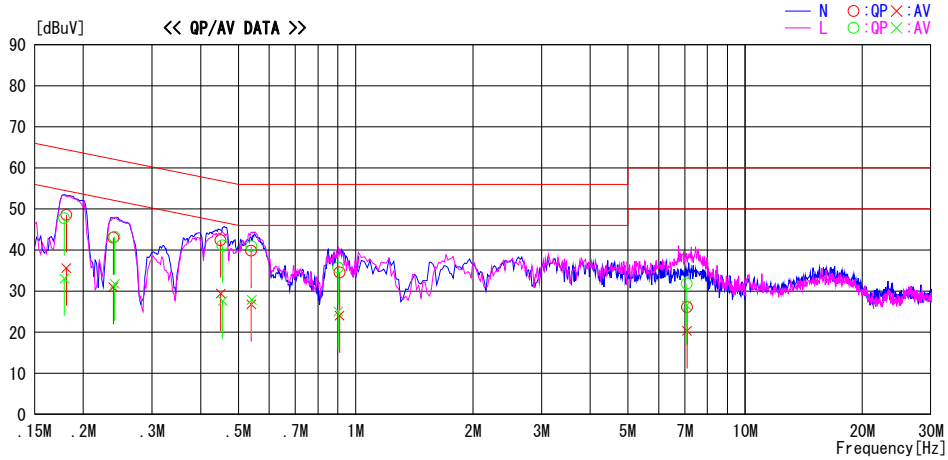
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2013/11/29

Report No. : 10129391H
 Temp./Humi. : 23deg. C / 42% RH
 Engineer : Takumi Shimada

Mode / Remarks : Tx 11g 6Mbps 2437MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.18074	35.4	22.4	13.2	48.6	35.6	64.5	54.5	15.9	18.9	N	
0.23880	29.8	17.8	13.2	43.0	31.0	62.1	52.1	19.1	21.1	N	
0.45008	29.1	16.1	13.3	42.4	29.4	56.9	46.9	14.5	17.5	N	
0.53947	26.5	13.5	13.3	39.8	26.8	56.0	46.0	16.2	19.2	N	
0.90948	21.2	10.7	13.4	34.6	24.1	56.0	46.0	21.4	21.9	N	
7.09881	11.3	5.5	14.8	26.1	20.3	60.0	50.0	33.9	29.7	N	
0.17869	34.5	19.9	13.2	47.7	33.1	64.5	54.5	16.8	21.4	L	
0.24048	30.0	18.6	13.2	43.2	31.8	62.1	52.1	18.9	20.3	L	
0.45536	27.8	14.3	13.3	41.1	27.6	56.8	46.8	15.7	19.2	L	
0.54054	27.6	14.6	13.3	40.9	27.9	56.0	46.0	15.1	18.1	L	
0.90256	22.3	11.7	13.4	35.7	25.1	56.0	46.0	20.3	20.9	L	
7.07681	17.0	11.7	14.8	31.8	26.5	60.0	50.0	28.2	23.5	L	

CHART:WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F (ISN LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

6dB Bandwidth

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 10129391H
Date 12/05/2013
Temperature/ Humidity 24deg. C / 48% RH
Engineer Takumi Shimada
Mode Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	7.575	>500
2437	7.095	>500
2462	7.533	>500

11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.051	>500
2437	14.168	>500
2462	15.063	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.023	>500
2437	15.067	>500
2462	15.102	>500

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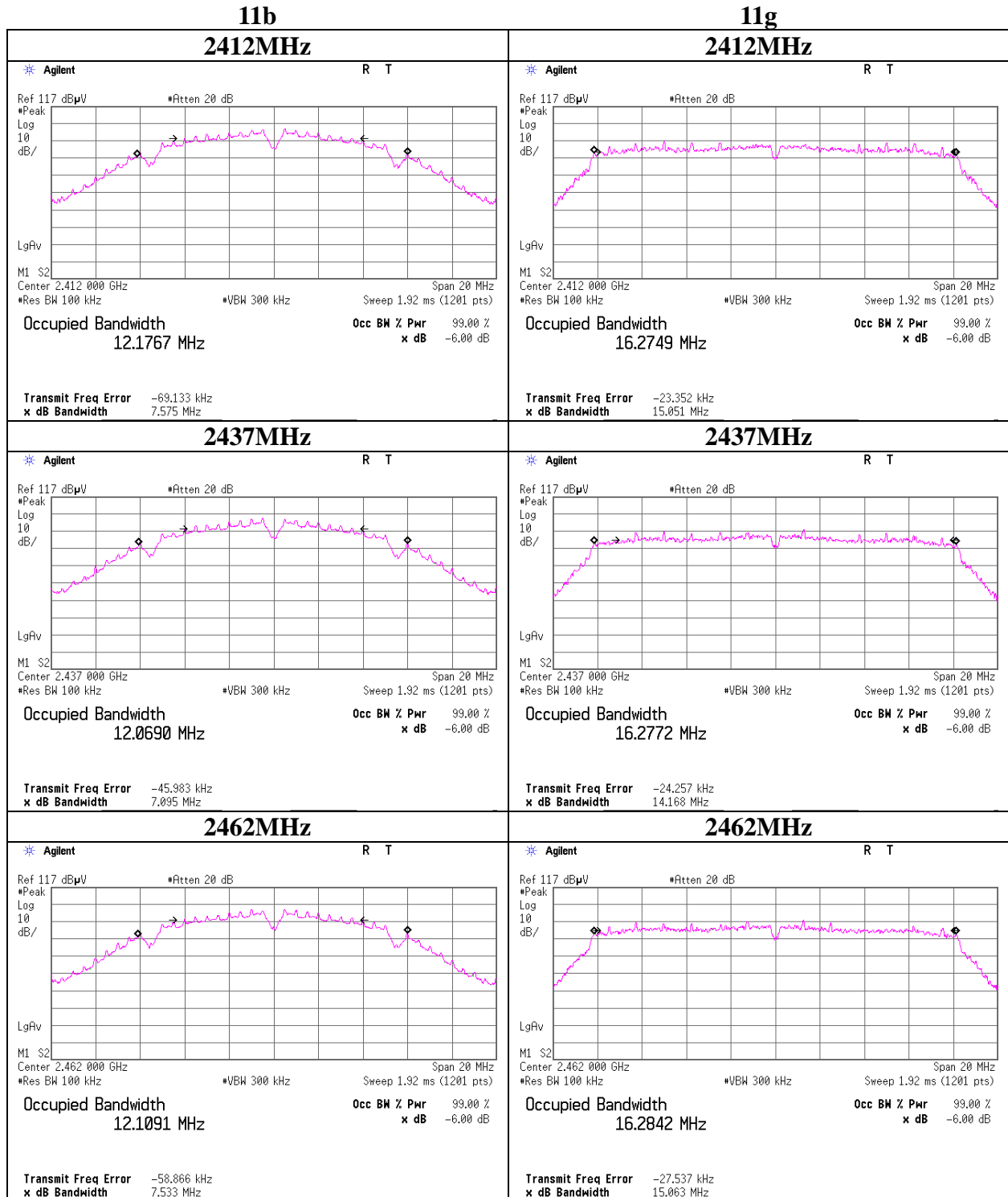
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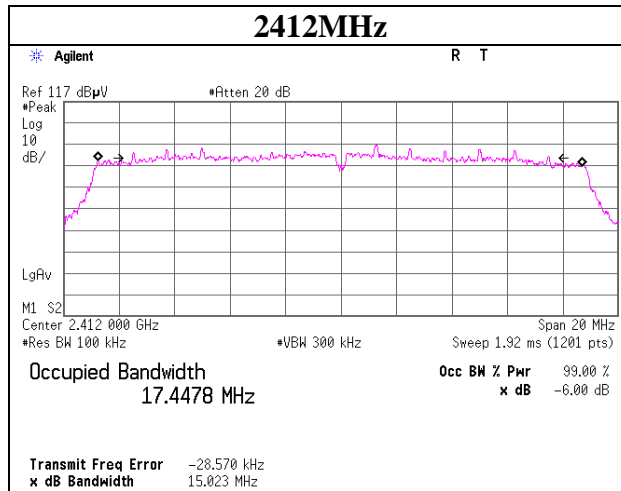
6dB Bandwidth



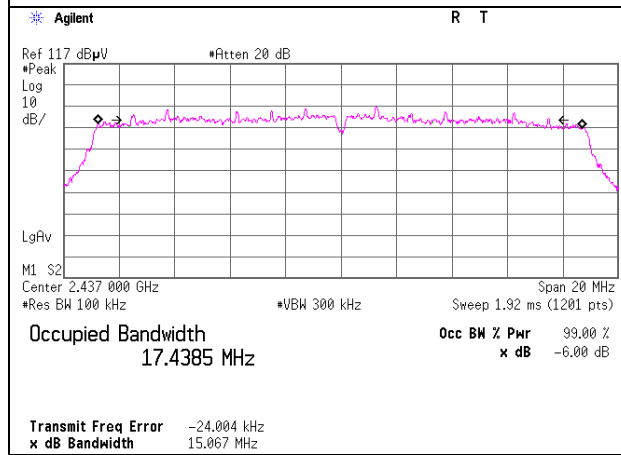
6dB Bandwidth

11n-20

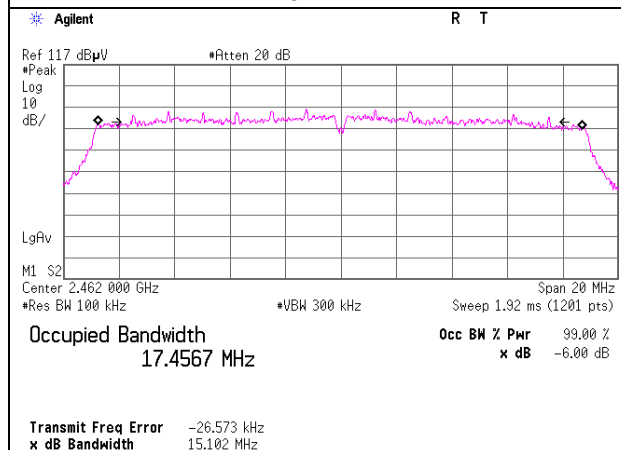
2412MHz



2437MHz



2462MHz



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Maximum Peak Output Power

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10129391H
Date	11/27/2013
Temperature/ Humidity	24deg.C / 31% RH
Engineer	Yutaka Yoshida
Mode	11b Tx

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	8.32	0.93	10.01	19.26	84.33	30.00	1000	10.74
2437	8.79	0.94	10.01	19.74	94.19	30.00	1000	10.26
2462	8.23	0.95	10.01	19.19	82.99	30.00	1000	10.81

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading PK [dBm]	Remark
1	8.79	*
2	8.64	
5.5	8.67	
11	8.77	

*: Worst Rate

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

[For reporting purpose only]

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				[dBm]	[mW]
2412	4.98	0.93	10.01	15.92	39.08
2437	5.27	0.94	10.01	16.22	41.88
2462	4.90	0.95	10.01	15.86	38.55

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading AV [dBm]	Remark
1	5.27	*
2	4.83	
5.5	3.92	
11	2.73	

*: Worst Rate

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

UL Japan, Inc.

Head Office EMC Lab.

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Maximum Peak Output Power

Test place : Head Office EMC Lab. No.3 Measurement Room
Report No. : 10129391H
Date : 11/27/2013
Temperature/ Humidity : 24deg.C / 31% RH
Engineer : Yutaka Yoshida
Mode : 11g Tx

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	12.05	0.93	10.01	22.99	199.07	30.00	1000	7.01
2437	12.51	0.94	10.01	23.46	221.82	30.00	1000	6.54
2462	12.43	0.95	10.01	23.39	218.27	30.00	1000	6.61

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading PK [dBm]	Remark
6	12.51	*
9	11.96	
12	11.93	
18	11.71	
24	11.76	
36	11.72	
48	11.82	
54	11.76	

*: Worst Rate

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

[For reporting purpose only]

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				[dBm]	[mW]
2412	-0.92	0.93	10.01	10.02	10.05
2437	-0.49	0.94	10.01	10.46	11.12
2462	-0.37	0.95	10.01	10.59	11.46

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading AV [dBm]	Remark
6	-0.49	*
9	-1.97	
12	-1.92	
18	-3.02	
24	-3.84	
36	-5.00	
48	-5.98	
54	-6.29	

*: Worst Rate

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

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Maximum Peak Output Power

Test place : Head Office EMC Lab. No.3 Measurement Room
Report No. : 10129391H
Date : 11/27/2013
Temperature/ Humidity : 24deg.C / 31% RH
Engineer : Yutaka Yoshida
Mode : 11n-20 Tx

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.40	0.93	10.01	21.34	136.14	30.00	1000	8.66
2437	11.10	0.94	10.01	22.05	160.32	30.00	1000	7.95
2462	10.92	0.95	10.01	21.88	154.17	30.00	1000	8.12

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

MCS Index	Reading PK [dBm]	Remark
0	11.10	*
1	10.72	
2	10.52	
3	10.46	
4	10.62	
5	10.24	
6	10.25	
7	10.36	

*: Worst Rate

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

[For reporting purpose only]

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				[dBm]	[mW]
2412	-2.30	0.93	10.01	8.64	7.31
2437	-1.82	0.94	10.01	9.13	8.18
2462	-1.81	0.95	10.01	9.15	8.22

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

MCS Index	Reading AV [dBm]	Remark
0	-1.82	*
1	-3.41	
2	-4.36	
3	-5.15	
4	-6.23	
5	-7.21	
6	-7.59	
7	-7.87	

*: Worst Rate

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

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Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Report No. : 10129391H
 Date : 11/28/2013 11/28/2013
 Temperature/ Humidity : 23 deg. C / 42% RH 23 deg. C / 42% RH
 Engineer : Satofumi Matsuyama Takumi Shimada
 (1-10GHz) (Above 10GHz)
 Mode : 11b Tx 2412MHz

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	2319.995	PK	53.7	26.8	2.4	35.7	-	47.2	73.9	26.7	
Hori	2390.000	PK	54.1	26.8	2.4	35.7	-	47.6	73.9	26.3	
Hori	3617.990	PK	48.8	28.3	4.6	34.8	-	46.9	73.9	27.0	
Hori	4824.000	PK	43.9	30.7	4.4	34.9	-	44.1	73.9	29.8	
Hori	7236.000	PK	43.6	35.6	5.2	34.9	-	49.5	73.9	24.4	
Hori	9648.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2319.995	AV	47.1	26.8	2.4	35.7	0.4	41.0	53.9	12.9	
Hori	2390.000	AV	44.7	26.8	2.4	35.7	0.4	38.6	53.9	15.3	*1
Hori	3617.990	AV	43.8	28.3	4.6	34.8	0.0	41.9	53.9	12.0	
Hori	4824.000	AV	34.5	30.7	4.4	34.9	0.4	35.1	53.9	18.8	
Hori	7236.000	AV	35.2	35.6	5.2	34.9	0.4	41.5	53.9	12.4	
Hori	9648.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	2319.995	PK	54.3	26.8	2.4	35.7	-	47.8	73.9	26.1	
Vert	2390.000	PK	52.9	26.8	2.4	35.7	-	46.4	73.9	27.5	
Vert	3617.990	PK	48.4	28.3	4.6	34.8	-	46.5	73.9	27.4	
Vert	4824.000	PK	44.0	30.7	4.4	34.9	-	44.2	73.9	29.7	
Vert	7236.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2319.995	AV	46.6	26.8	2.4	35.7	0.4	40.5	53.9	13.4	
Vert	2390.000	AV	43.7	26.8	2.4	35.7	0.4	37.6	53.9	16.3	*1
Vert	3617.990	AV	44.0	28.3	4.6	34.8	0.0	42.1	53.9	11.8	
Vert	4824.000	AV	35.2	30.7	4.4	34.9	0.4	35.8	53.9	18.1	
Vert	7236.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

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

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

NS: No signal detected

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	10129391H
Date	11/28/2013
Temperature/ Humidity	23 deg. C / 42% RH
Engineer	Satofumi Matsuyama (1-10GHz)
Mode	11b Tx 2412MHz

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	104.0	26.8	2.4	35.7	97.5	-	-	Carrier
Hori	2399.466	PK	58.5	26.8	2.4	35.7	52.0	77.5	25.5	
Vert	2412.000	PK	101.9	26.8	2.4	35.7	95.4	-	-	Carrier
Vert	2399.466	PK	57.1	26.8	2.4	35.7	50.6	75.4	24.8	

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

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10129391H
Date 11/28/2013 11/28/2013
Temperature/ Humidity 23 deg. C / 42% RH 23 deg. C / 42% RH
Engineer Satofumi Matsuyama Takumi Shimada
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2437MHz

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	2319.983	PK	58.0	26.8	2.4	35.7	-	51.5	73.9	22.4	
Hori	3655.495	PK	48.9	28.4	4.5	34.8	-	47.0	73.9	26.9	
Hori	4874.000	PK	48.3	30.8	4.4	34.9	-	48.6	73.9	25.3	
Hori	7311.000	PK	44.9	35.7	5.3	34.9	-	51.0	73.9	22.9	
Hori	9748.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2319.983	AV	51.0	26.8	2.4	35.7	0.4	44.9	53.9	9.0	
Hori	3655.495	AV	44.5	28.4	4.5	34.8	0.0	42.6	53.9	11.3	
Hori	4874.000	AV	42.8	30.8	4.4	34.9	0.4	43.5	53.9	10.4	
Hori	7311.000	AV	37.3	35.7	5.3	34.9	0.4	43.8	53.9	10.1	
Hori	9748.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	2319.983	PK	56.4	26.8	2.4	35.7	-	49.9	73.9	24.0	
Vert	3655.495	PK	49.6	28.4	4.5	34.8	-	47.7	73.9	26.2	
Vert	4874.000	PK	46.8	30.8	4.4	34.9	-	47.1	73.9	26.8	
Vert	7311.000	PK	44.6	35.7	5.3	34.9	-	50.7	73.9	23.2	
Vert	9748.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2319.983	AV	48.9	26.8	2.4	35.7	0.4	42.8	53.9	11.1	
Vert	3655.495	AV	43.8	28.4	4.5	34.8	0.0	41.9	53.9	12.0	
Vert	4874.000	AV	40.2	30.8	4.4	34.9	0.4	40.9	53.9	13.0	
Vert	7311.000	AV	35.7	35.7	5.3	34.9	0.4	42.2	53.9	11.7	
Vert	9748.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

NS: No signal detected

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10129391H
Date 11/28/2013 11/28/2013
Temperature/ Humidity 23 deg. C / 42% RH 23 deg. C / 42% RH
Engineer Satofumi Matsuyama Takumi Shimada
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2462MHz

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	2320.005	PK	58.3	26.8	2.4	35.7	-	51.8	73.9	22.1	
Hori	2483.500	PK	49.6	26.7	2.5	35.7	-	43.1	73.9	30.8	
Hori	3693.090	PK	49.8	28.5	4.5	34.7	-	48.1	73.9	25.8	
Hori	4924.000	PK	50.8	31.0	4.4	34.9	-	51.3	73.9	22.6	
Hori	7386.000	PK	46.2	35.8	5.3	34.9	-	52.4	73.9	21.5	
Hori	9848.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2320.005	AV	51.2	26.8	2.4	35.7	0.4	45.1	53.9	8.8	
Hori	2483.500	AV	40.2	26.7	2.5	35.7	0.4	34.1	53.9	19.8	*1
Hori	3693.090	AV	45.6	28.5	4.5	34.7	0.0	43.9	53.9	10.0	
Hori	4924.000	AV	46.6	31.0	4.4	34.9	0.4	47.5	53.9	6.4	
Hori	7386.000	AV	38.0	35.8	5.3	34.9	0.4	44.6	53.9	9.3	
Hori	9848.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	2320.005	PK	56.6	26.8	2.4	35.7	-	50.1	73.9	23.8	
Vert	2483.500	PK	52.2	26.7	2.5	35.7	-	45.7	73.9	28.2	
Vert	3693.090	PK	48.0	28.5	4.5	34.7	-	46.3	73.9	27.6	
Vert	4924.000	PK	47.6	31.0	4.4	34.9	-	48.1	73.9	25.8	
Vert	7386.000	PK	44.0	35.8	5.3	34.9	-	50.2	73.9	23.7	
Vert	9848.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2320.005	AV	50.3	26.8	2.4	35.7	0.4	44.2	53.9	9.7	
Vert	2483.500	AV	41.1	26.7	2.5	35.7	0.4	35.0	53.9	18.9	*1
Vert	3693.090	AV	42.6	28.5	4.5	34.7	0.0	40.9	53.9	13.0	
Vert	4924.000	AV	41.9	31.0	4.4	34.9	0.4	42.8	53.9	11.1	
Vert	7386.000	AV	36.3	35.8	5.3	34.9	0.4	42.9	53.9	11.0	
Vert	9848.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

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

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

NS: No signal detected

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10129391H
Date 11/28/2013 11/28/2013
Temperature/ Humidity 23 deg. C / 42% RH 23 deg. C / 42% RH
Engineer Satofumi Matsuyama Takumi Shimada
(1-10GHz) (Above 10GHz)
Mode 1g Tx 2412MHz

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	2320.066	PK	52.9	26.8	2.4	35.7	-	46.4	73.9	27.5	
Hori	2390.000	PK	69.2	26.8	2.4	35.7	-	62.7	73.9	11.2	
Hori	3618.002	PK	49.7	28.3	3.2	34.8	-	46.4	73.9	27.5	
Hori	4824.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	7236.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	9648.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2320.066	AV	45.2	26.8	2.4	35.7	2.3	41.0	53.9	12.9	
Hori	2390.000	AV	54.2	26.8	2.4	35.7	2.3	50.0	53.9	3.9	*1
Hori	3618.002	AV	45.4	28.3	3.2	34.8	0.0	42.1	53.9	11.8	
Hori	4824.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	7236.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	9648.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	2320.066	PK	51.7	26.8	2.4	35.7	-	45.2	73.9	28.7	
Vert	2390.000	PK	66.3	26.8	2.4	35.7	-	59.8	73.9	14.1	
Vert	3618.002	PK	49.3	28.3	3.2	34.8	-	46.0	73.9	27.9	
Vert	4824.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	7236.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2320.066	AV	43.2	26.8	2.4	35.7	2.3	39.0	53.9	14.9	
Vert	2390.000	AV	52.3	26.8	2.4	35.7	2.3	48.1	53.9	5.8	*1
Vert	3618.002	AV	44.9	28.3	3.2	34.8	0.0	41.6	53.9	12.3	
Vert	4824.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	7236.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

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

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

NS: No signal detected

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	10129391H
Date	11/28/2013
Temperature/ Humidity	23 deg. C / 42% RH
Engineer	Satofumi Matsuyama (1-10GHz)
Mode	11g Tx 2412MHz

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	98.1	26.8	2.4	35.7	91.6	-	-	Carrier
Hori	2400.000	PK	61.7	26.8	2.4	35.7	55.2	71.6	16.4	
Vert	2412.000	PK	96.1	26.8	2.4	35.7	89.6	-	-	Carrier
Vert	2400.000	PK	58.9	26.8	2.4	35.7	52.4	69.6	17.2	

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

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10129391H
Date 11/28/2013 11/28/2013
Temperature/ Humidity 23 deg. C / 42% RH 23 deg. C / 42% RH
Engineer Satofumi Matsuyama Takumi Shimada
(1-10GHz) (Below 1GHz , Above 10GHz)
Mode 11g Tx 2437MHz

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	46.337	QP	29.9	12.3	6.9	28.5	-	20.6	40.0	19.4	
Hori	141.528	QP	47.1	14.5	7.8	28.3	-	41.1	43.5	2.4	
Hori	161.605	QP	44.0	15.3	7.9	28.1	-	39.1	43.5	4.4	
Hori	307.333	QP	43.3	14.4	8.8	27.7	-	38.8	46.0	7.2	
Hori	354.467	QP	34.2	16.0	9.1	28.0	-	31.3	46.0	14.7	
Hori	454.000	QP	30.0	17.7	9.6	28.6	-	28.7	46.0	17.3	
Hori	2320.041	PK	55.5	26.8	2.4	35.7	-	49.0	73.9	24.9	
Hori	3655.496	PK	49.1	28.4	4.5	34.8	-	47.2	73.9	26.7	
Hori	4874.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	7311.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	9748.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2320.041	AV	47.7	26.8	2.4	35.7	2.3	43.5	53.9	10.4	
Hori	3655.496	AV	45.0	28.4	4.5	34.8	0.0	43.1	53.9	10.8	
Hori	4874.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	7311.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	9748.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	46.337	QP	41.8	12.3	6.9	28.5	-	32.5	40.0	7.5	
Vert	141.526	QP	46.4	14.5	7.8	28.3	-	40.4	43.5	3.1	
Vert	161.608	QP	44.7	15.3	7.9	28.1	-	39.8	43.5	3.7	
Vert	306.475	QP	34.8	14.4	8.8	27.7	-	30.3	46.0	15.7	
Vert	383.999	QP	30.2	16.8	9.2	28.2	-	28.0	46.0	18.0	
Vert	520.325	QP	30.6	18.4	9.9	28.8	-	30.1	46.0	15.9	
Vert	2320.041	PK	54.1	26.8	2.4	35.7	-	47.6	73.9	26.3	
Vert	3655.496	PK	48.1	28.4	4.5	34.8	-	46.2	73.9	27.7	
Vert	4874.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	7311.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	9748.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2320.041	AV	46.0	26.8	2.4	35.7	2.3	41.8	53.9	12.1	
Vert	3655.496	AV	43.2	28.4	4.5	34.8	0.0	41.3	53.9	12.6	
Vert	4874.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	7311.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	9748.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

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

NS: No signal detected

UL Japan, Inc.

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10129391H
Date 11/28/2013 11/28/2013
Temperature/ Humidity 23 deg. C / 42% RH 23 deg. C / 42% RH
Engineer Satofumi Matsuyama Takumi Shimada
(1-10GHz) (Above 10GHz)
Mode 1g Tx 2462MHz

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	2319.977	PK	56.2	26.8	2.4	35.7	-	49.7	73.9	24.2	
Hori	2483.500	PK	61.7	26.7	2.5	35.7	-	55.2	73.9	18.7	
Hori	3693.003	PK	49.7	28.5	4.5	34.7	-	48.0	73.9	25.9	
Hori	4924.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	7386.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	9848.000	PK	NS	-	-	-	-	-	73.9	-	
Hori	2319.977	AV	48.3	26.8	2.4	35.7	2.3	44.1	53.9	9.8	
Hori	2483.500	AV	49.5	26.7	2.5	35.7	2.3	45.3	53.9	8.6	*1
Hori	3693.003	AV	45.4	28.5	4.5	34.7	0.0	43.7	53.9	10.2	
Hori	4924.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	7386.000	AV	NS	-	-	-	-	-	53.9	-	
Hori	9848.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	2319.977	PK	55.0	26.8	2.4	35.7	-	48.5	73.9	25.4	
Vert	2483.500	PK	61.3	26.7	2.5	35.7	-	54.8	73.9	19.1	
Vert	3693.003	PK	49.2	28.5	4.5	34.7	-	47.5	73.9	26.4	
Vert	4924.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	7386.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	9848.000	PK	NS	-	-	-	-	-	73.9	-	
Vert	2319.977	AV	46.4	26.8	2.4	35.7	2.3	42.2	53.9	11.7	
Vert	2483.500	AV	48.3	26.7	2.5	35.7	2.3	44.1	53.9	9.8	*1
Vert	3693.003	AV	44.2	28.5	4.5	34.7	0.0	42.5	53.9	11.4	
Vert	4924.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	7386.000	AV	NS	-	-	-	-	-	53.9	-	
Vert	9848.000	AV	NS	-	-	-	-	-	53.9	-	

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

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

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

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

NS: No signal detected

UL Japan, Inc.

Head Office EMC Lab.

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

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Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10129391H
Date : 11/28/2013
Temperature/ Humidity : 23 deg. C / 42% RH
Engineer : Takumi Shimada
(1-10GHz)
Mode : 11n-20 2412MHz / 2462MHz

2412MHz

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	PK	63.4	26.8	2.4	35.7	-	56.9	73.9	17.0	
Hori	2390.000	AV	53.3	26.8	2.4	35.7	2.4	49.2	53.9	7.1	*1
Vert	2390.000	PK	62.0	26.8	2.4	35.7	-	55.5	73.9	18.4	
Vert	2390.000	AV	51.3	26.8	2.4	35.7	2.4	47.2	53.9	9.1	*1

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

*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)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	96.4	26.8	2.4	35.7	89.9	-	-	Carrier
Hori	2400.000	PK	60.5	26.8	2.4	35.7	54.0	69.9	15.9	
Vert	2412.000	PK	94.2	26.8	2.4	35.7	87.7	-	-	Carrier
Vert	2400.000	PK	56.9	26.8	2.4	35.7	50.4	67.7	17.3	

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

2462MHz

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	PK	60.0	26.7	2.5	35.7	-	53.5	73.9	20.5	
Hori	2483.500	AV	48.2	26.7	2.5	35.7	2.4	44.1	53.9	12.2	*1
Vert	2483.500	PK	61.2	26.7	2.5	35.7	-	54.7	73.9	19.2	
Vert	2483.500	AV	47.5	26.7	2.5	35.7	2.4	43.4	53.9	12.9	*1

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

*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)

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Head Office EMC Lab.

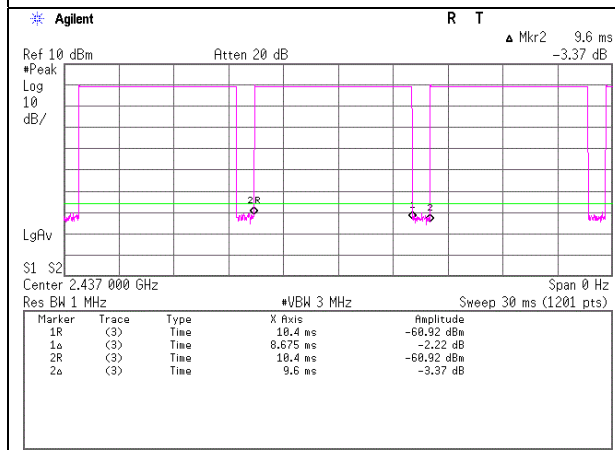
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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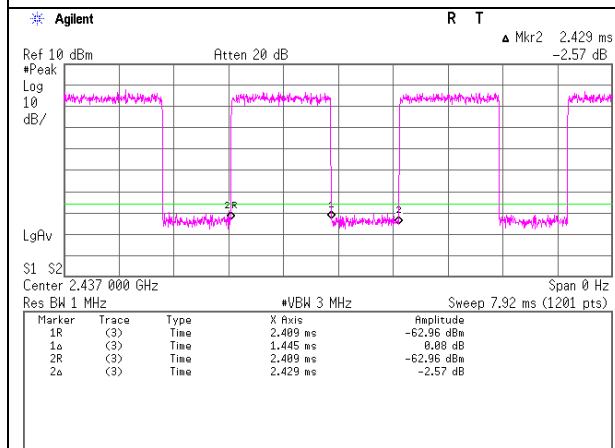
11b 1Mbps

Tx on / (Tx on + Tx off) = 0.904
Tx on / (Tx on + Tx off) * 100 = 90.4 %
Duty factor = 10 * log (9.6 / 8.675) = 0.44 dB



11g 6Mbps

Tx on / (Tx on + Tx off) = 0.595
Tx on / (Tx on + Tx off) * 100 = 59.5 %
Duty factor = 10 * log (2.429 / 1.445) = 2.26 dB



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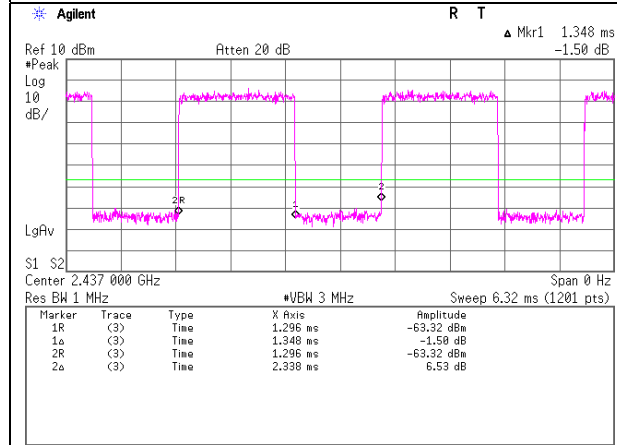
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11n-20 MCS0

Tx on / (Tx on + Tx off) = 0.577
Tx on / (Tx on + Tx off) * 100 = 57.7 %
Duty factor = 10 * log (2.338 / 1.348) = 2.39 dB



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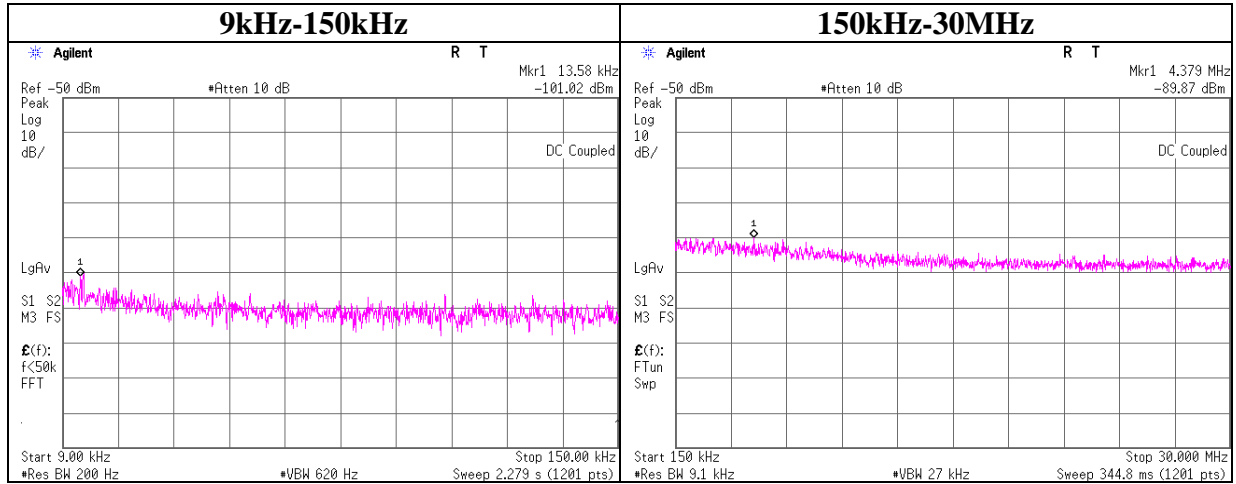
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11b Tx 2412MHz



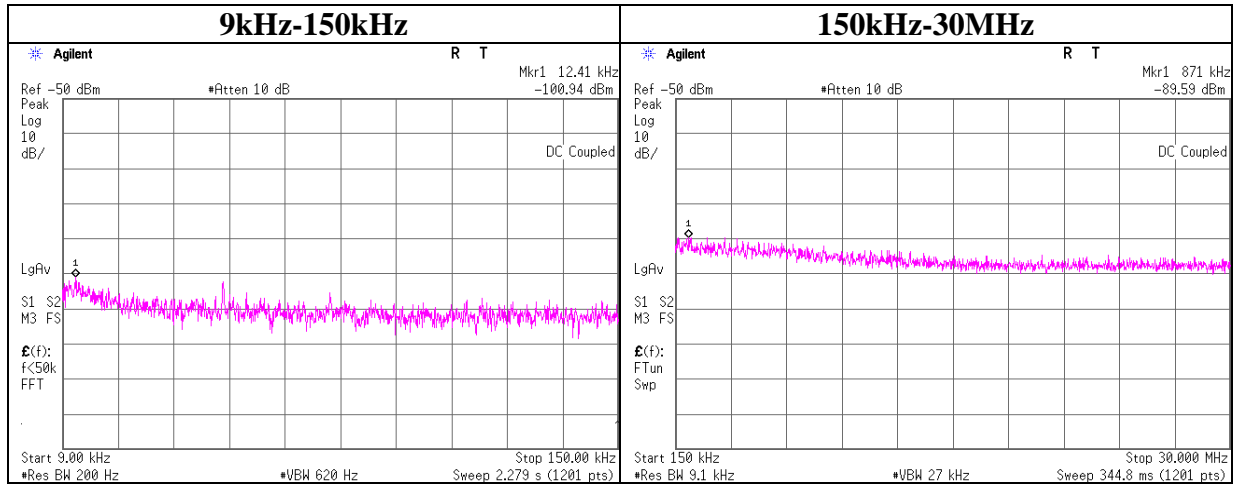
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
13.58	-101.0	0.01	10.0	2.03	-89.0	300.0	6.0	-27.7	44.9
4379	-89.9	0.01	10.0	2.03	-77.8	300.0	6.0	-16.6	-5.2

$E = \text{EIRP} - 20\log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11b Tx 2437MHz



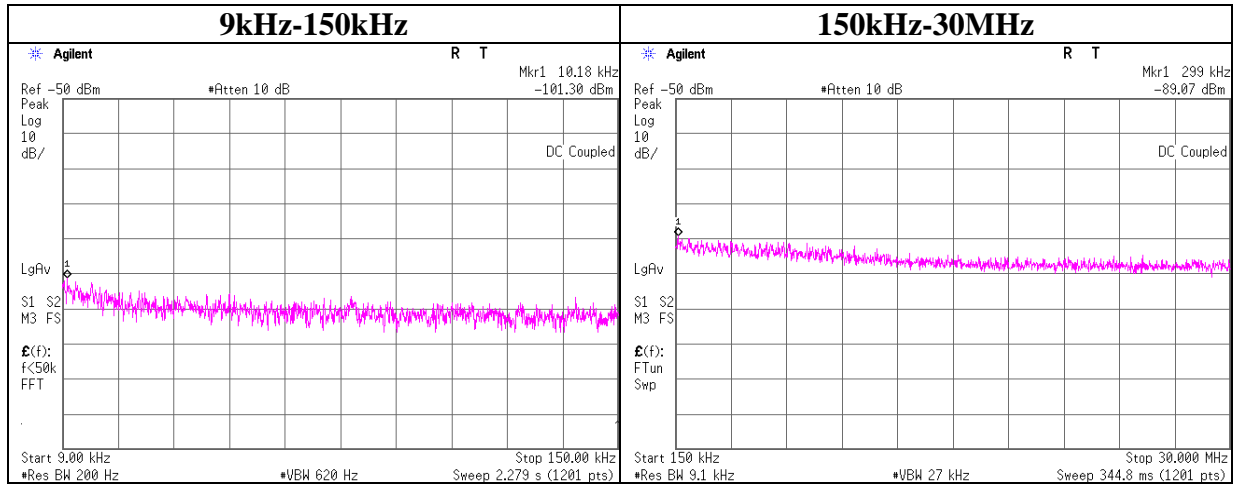
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
12.41	-100.9	0.01	10.0	2.03	-88.9	300.0	6.0	-27.6	45.7
871	-89.6	0.01	10.0	2.03	-77.6	300.0	6.0	-16.3	8.8

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11b Tx 2462MHz



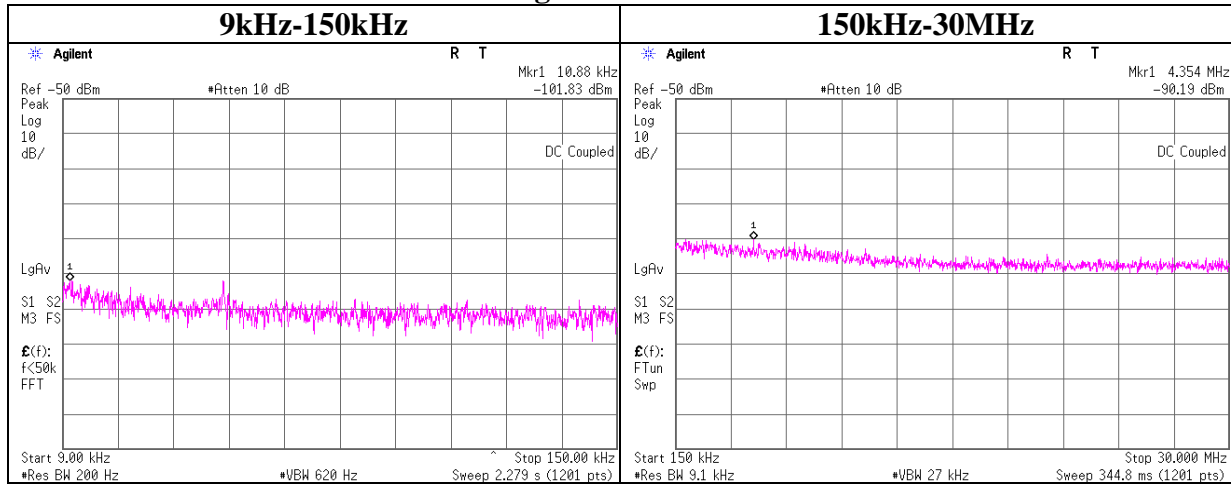
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
10.18	-101.3	0.01	10.0	2.03	-89.3	300.0	6.0	-28.0	47.4
299	-89.1	0.01	10.0	2.03	-77.0	300.0	6.0	-15.8	18.1

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11g Tx 2412MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
10.88	-101.8	0.01	10.0	2.03	-89.8	300.0	6.0	-28.5	46.9
4354	-90.2	0.01	10.0	2.03	-78.2	300.0	6.0	-16.9	-5.2

$E = \text{EIRP} - 20\log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

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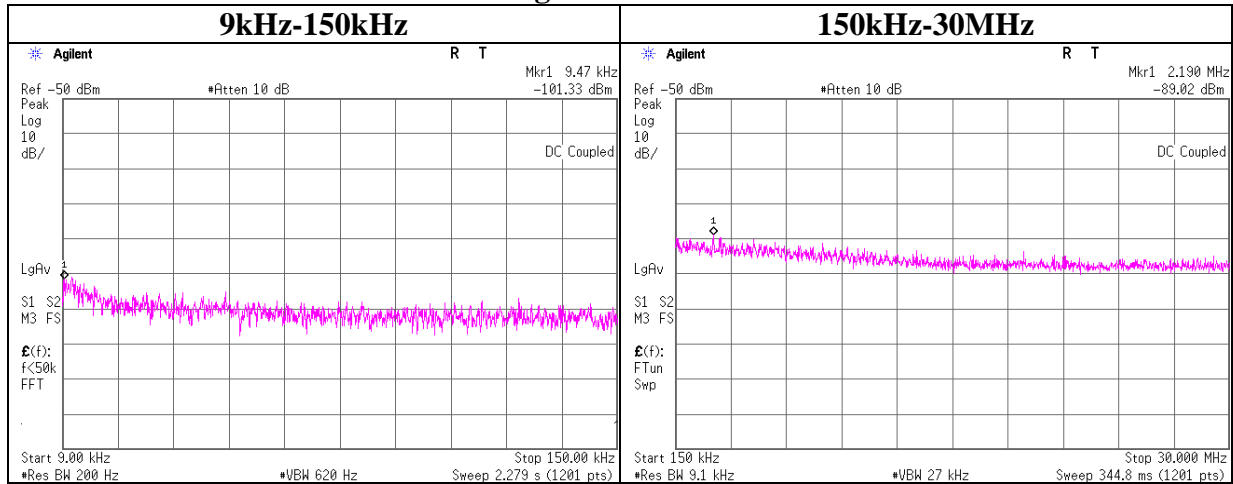
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11g Tx 2437MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
9.47	-101.3	0.01	10.0	2.03	-89.3	300.0	6.0	-28.0	48.1
2190	-89.0	0.01	10.0	2.03	-77.0	300.0	6.0	-15.7	0.8

$E = \text{EIRP} - 20\log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

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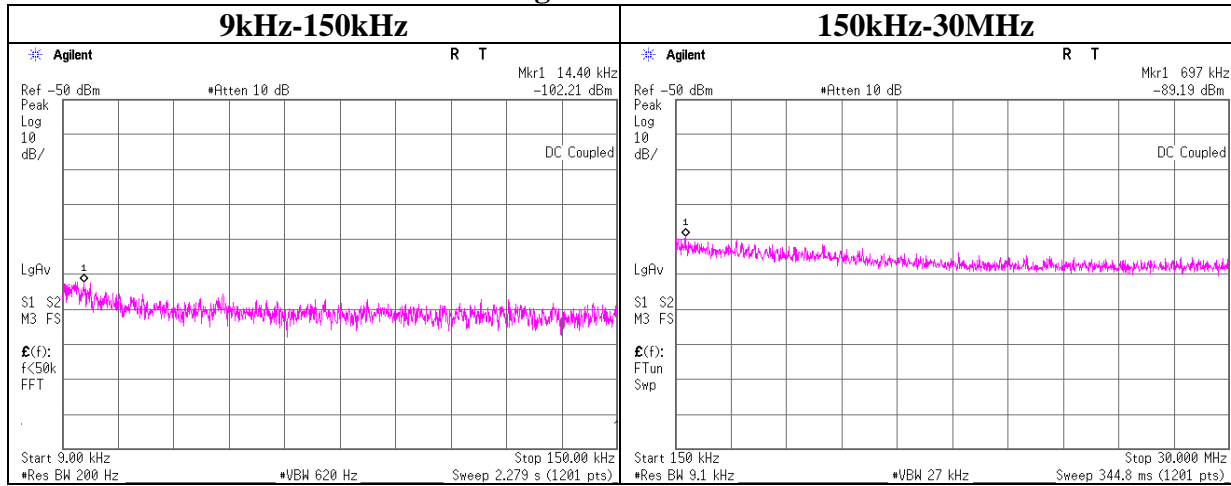
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

11g Tx 2462MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
14.40	-102.2	0.01	10.0	2.03	-90.2	300.0	6.0	-28.9	44.4
697	-89.2	0.01	10.0	2.03	-77.2	300.0	6.0	-15.9	10.7

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 [\text{dBuV/m}]$
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

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Head Office EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Power Density

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 10129391H
Date 12/05/2013
Temperature/ Humidity 24deg. C / 48% RH
Engineer Takumi Shimada
Mode 11b Tx, 11g Tx

11b

Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-17.25	2.21	9.97	-5.07	8.00	13.07
2437.00	-16.81	2.22	9.97	-4.62	8.00	12.62
2462.00	-15.89	2.24	9.97	-3.68	8.00	11.68

11g

Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-24.45	2.21	9.97	-12.27	8.00	20.27
2437.00	-24.46	2.22	9.97	-12.27	8.00	20.27
2462.00	-24.69	2.24	9.97	-12.48	8.00	20.48

Sample Calculation:

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

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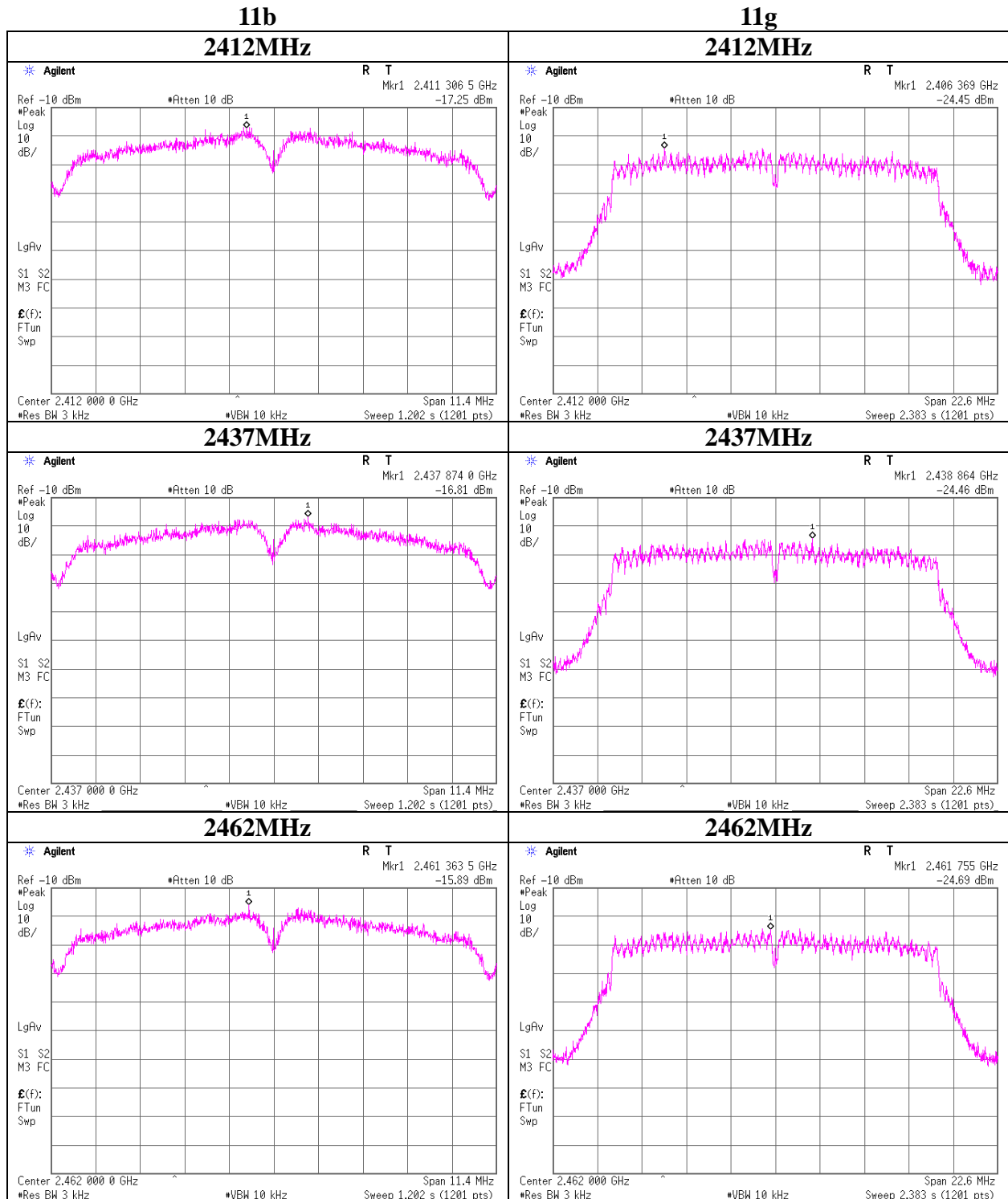
Head Office EMC Lab.

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

Telephone : +81 596 24 8999

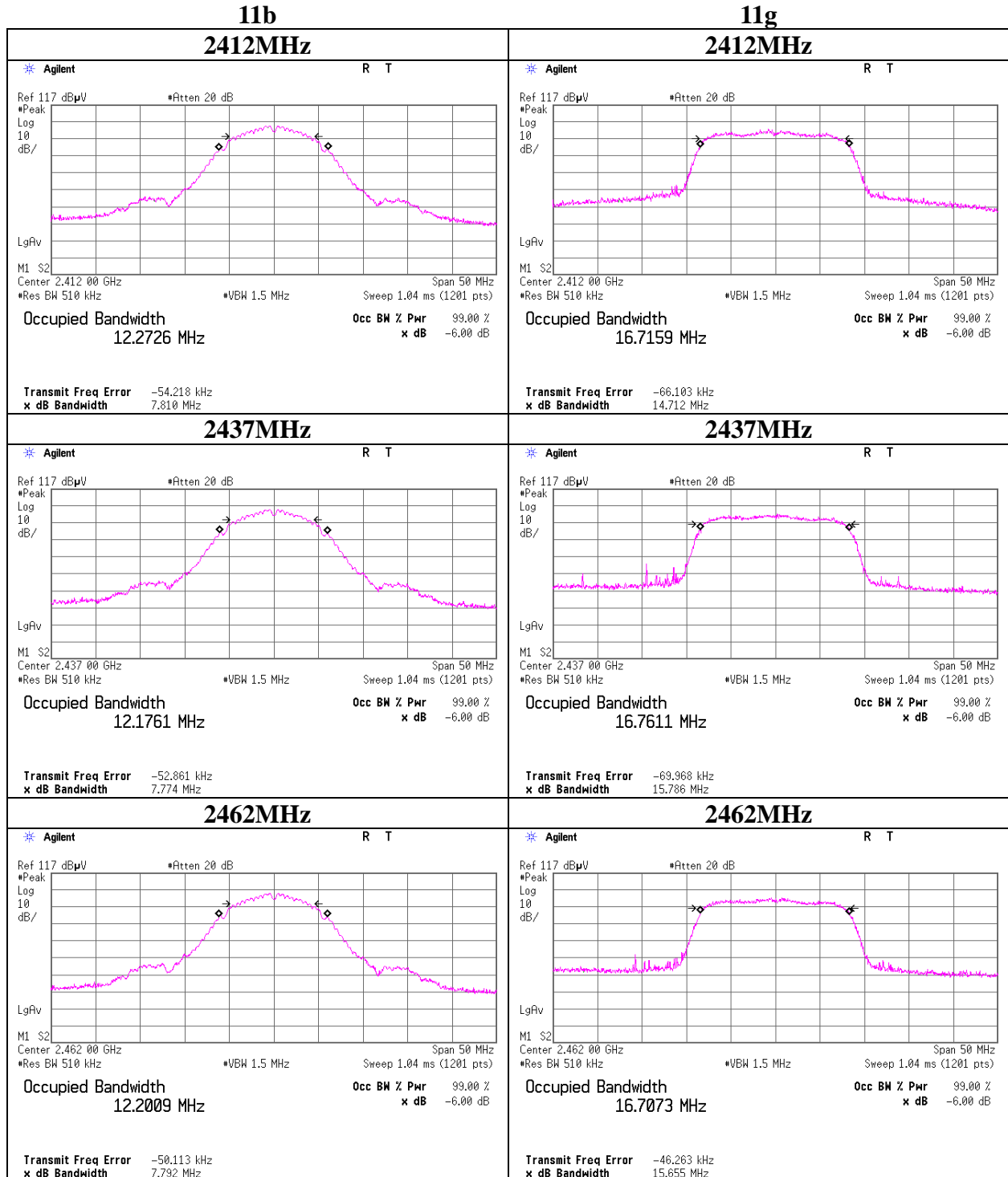
Facsimile : +81 596 24 8124

Power Density



99% Occupied Bandwidth

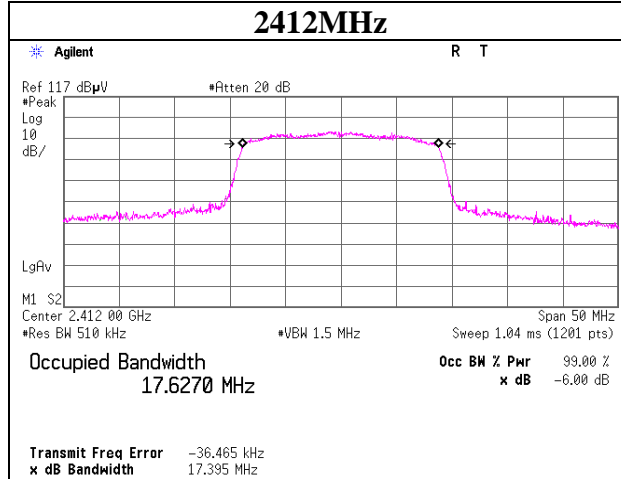
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx



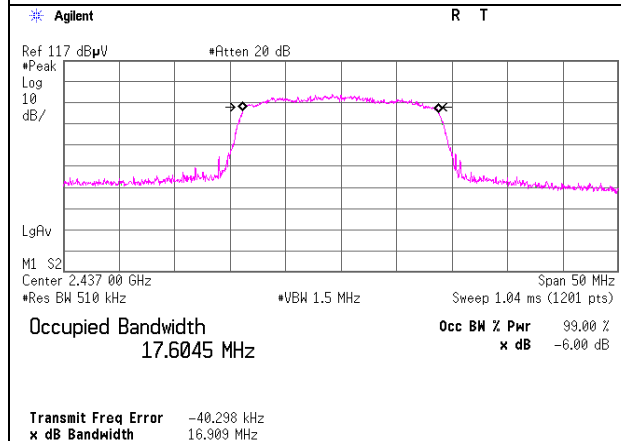
99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10129391H
Date	12/05/2013
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	Tx

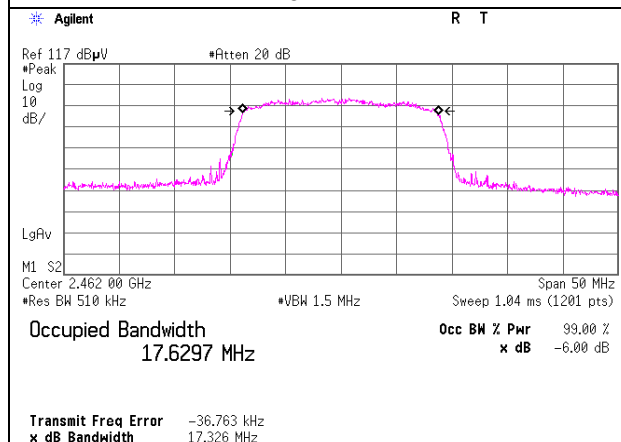
11n-20



2437MHz



2462MHz



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2013/02/22 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2013/10/15 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2013/10/15 * 12
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2013/06/20 * 12
MCC-163	Microwave Cable	Murata	MXGS83RK3000	-	AT	2013/11/08 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2013/06/30 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2013/02/26 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE/CE	2013/10/04 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2013/02/15 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2013/01/10 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2013/05/30 * 12
MCC-166	Microwave Cable	Junkosha	MWX221	1303S120(1m) / 1311S167(5m)	RE	2013/11/27 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2013/02/15 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE/CE	2013/06/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2013/01/07 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2013/01/07 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2013/01/21 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2013/02/06 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2013/01/09 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2013/10/13 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2013/10/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2013/02/06 * 12

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EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2013/11/26 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2013/09/12 * 12
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2013/10/04 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2013/06/05 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2013/10/18 * 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: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test**

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