



# RADIO TEST REPORT

Test Report No. : 11126950H-A-R1

**Applicant** : Canon Inc.  
**Type of Equipment** : ACCESSORY  
**Model No.** : DS586101  
**FCC ID** : AZD238  
**Test regulation** : FCC Part 15 Subpart C: 2015  
**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.
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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 11126950H-A. 11126950H-A is replaced with this report.

**Date of test:** January 13 to 22, 2016

**Representative test engineer:**

*T. Noguchi*

Takafumi Noguchi

Engineer

Consumer Technology Division

**Approved by:**

*Takayuki Shimada*

Takayuki Shimada

Engineer

Consumer Technology Division

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NVLAP LAB CODE: 200572-0

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : Canon Inc.  
Address : 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan  
Telephone Number : +81-3-3757-6798  
Facsimile Number : +81-3-3757-8431  
Contact Person : Ryoji Kon

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

### **2.1 Identification of E.U.T.**

Type of Equipment : ACCESSORY  
Model No. : DS586101  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : Typ. 3.3 V, Min. 2.97 V, Max. 3.63 V  
Receipt Date of Sample : January 13, 2016  
Country of Mass-production : Japan  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No Modification by the test lab

### **2.2 Product Description**

Model: DS586101 (referred to as the EUT in this report) is an ACCESSORY.

### **General Specification**

Clock frequency(ies) in the system : 38.4 MHz

### **Radio Specification**

#### **WLAN (IEEE802.11b/g/n-20)**

Equipment Type	Transceiver
Frequency of Operation	2412 MHz - 2462 MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20 MHz & 5 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 1.8 V / DC 3.3 V
Antenna Type	Monopole Pattern Antenna
Antenna Gain	-1.4 dBi

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015  
\*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

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

\* The EUT complies with FCC Part 15 Subpart B: 2015, final revised on November 23, 2015.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ----- IC: RSS-Gen 8.8	FCC: Section 15.207 ----- IC: RSS-Gen 8.8	QP 25.7 dB, 0.15000 MHz, N/L AV 24.3 dB, 24.87228MHz, N	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: -	FCC: Section 15.247(a)(2) ----- IC: RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- IC: RSS-247 5.4(4)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: -	FCC: Section 15.247(e) ----- IC: RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: RSS-Gen 6.13	FCC: Section15.247(d) ----- IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	0.1 dB 4924.000 MHz, AV, Hori.	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)

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

\*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r04 12.2.7.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

#### **FCC Part 15.31 (e)**

The EUT has the power supply regulator. However one of the input voltages to RF part doesn't go through the regulator. The stable voltage will be supplied by the end product, which will be required to have a power supply regulator. Therefore, the 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 6.6	IC: -	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  $k = 2$ .  
Ise EMC Lab.

Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	

Frequency range	Conducted emission using AMN(LISN) (+dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

Test distance	Radiated emission (+dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+dB)		(10 m*)(+dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(+dB)		(1 m*)(+dB)	(0.5 m*)(+dB)	(10 m*)(+dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

\*Measurement distance

#### Conducted Emission test

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

#### Radiated emission test

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

### 3.5 Test Location

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Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m 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 Test data, Test instruments, and Test set up

Refer to APPENDIX.

## **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

<b>Mode</b>	<b>Remarks*</b>
IEEE 802.11b (11b)	2 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n SISO 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 settings: 11g: 10, 11g: 8, 11n-20: 7 Software: Dut labtool version 2.0.0.83 *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.	

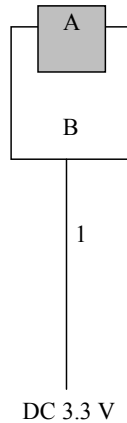
\*The details of Operating mode(s)

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

\*1) The operating mode and tested frequency were tested as a representative, because it had the highest power at antenna terminal test.



#### 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	ACCESSORY	DS586101	7 *1) 1 *2)	Canon Inc.	EUT
B	Jig	P2ML4629	-	-	-

\*1) Used for Antenna Terminal conducted tests

\*2) Used for Conducted Emission test and Radiated Emission test

#### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-

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## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

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

The rear of tabletop was located 40 cm 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 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

#### 1) 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 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm 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 MHz – 30 MHz  
**Test data** : APPENDIX  
**Test result** : Pass

## **SECTION 6: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r04".

[For below 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

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

The height of the measuring antenna varied between 1 and 4 m 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	30 MHz to 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

**20 dBc 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 FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).**

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.1 (11b)</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>12.2.5.2 (11g / 11n-20)</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.  Integration Method: <u>13.3.2</u> RBW: 100kHz VBW: 300kHz Span: 2MHz Band Power: 1MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	4.5 m *2) (below 10 GHz), 1 m *3) (above 10 GHz)		4.5 m *2) (below 10 GHz), 1 m *3) (above 10 GHz)

\*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r04"

\*2) Distance Factor:  $20 \times \log(4.5 \text{ m} / 3.0 \text{ m}) = 3.5 \text{ dB}$

\*3) Distance Factor:  $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

- 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 : 30 M - 26.5 GHz  
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	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

\*1) Peak hold was applied as Worst-case measurement.

\*2) Reference data

\*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".

\*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.

(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).

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: Test data**

**Conducted Emission**

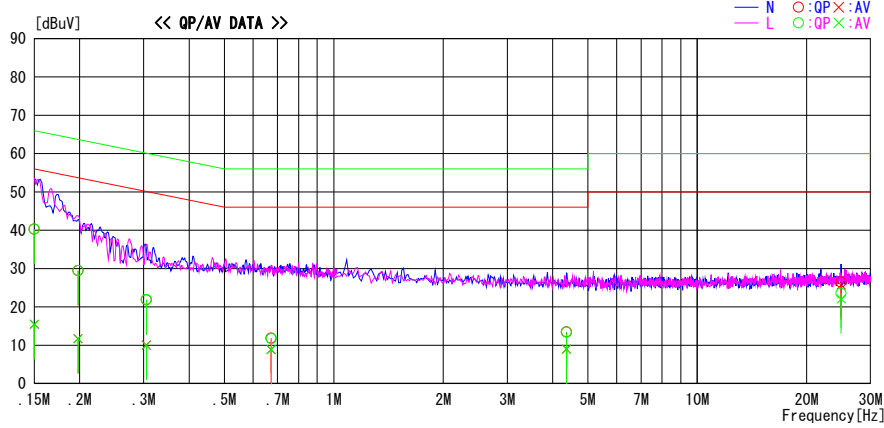
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber  
 Date : 2016/01/28

Report No. : 11126950H  
 Temp./Humi. : 23deg. C / 30% RH  
 Engineer : Takafumi Noguchi

Mode / Remarks : 11g 2412 MHz

LIMIT : FCC15.207 QP  
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	27.1	2.3	13.2	40.3	15.5	66.0	56.0	25.7	40.5	N	
0.19785	16.3	-1.5	13.2	29.5	11.7	63.7	53.7	34.2	42.0	N	
0.30515	8.6	-3.1	13.2	21.8	10.1	60.1	50.1	38.3	40.0	N	
0.67200	-1.5	-4.4	13.3	11.8	8.9	56.0	46.0	44.2	37.1	N	
4.36614	-0.3	-4.8	13.8	13.5	9.0	56.0	46.0	42.5	37.0	N	
24.87228	11.3	10.5	15.2	26.5	25.7	60.0	50.0	33.5	24.3	N	
0.15000	27.1	2.2	13.2	40.3	15.4	66.0	56.0	25.7	40.6	L	
0.19785	16.3	-1.5	13.2	29.5	11.7	63.7	53.7	34.2	42.0	L	
0.30515	8.7	-3.2	13.2	21.9	10.0	60.1	50.1	38.2	40.1	L	
0.67345	-1.6	-4.4	13.3	11.7	8.9	56.0	46.0	44.3	37.1	L	
4.36614	-0.4	-4.8	13.8	13.4	9.0	56.0	46.0	42.6	37.0	L	
24.87228	8.4	6.9	15.2	23.6	22.1	60.0	50.0	36.4	27.9	L	

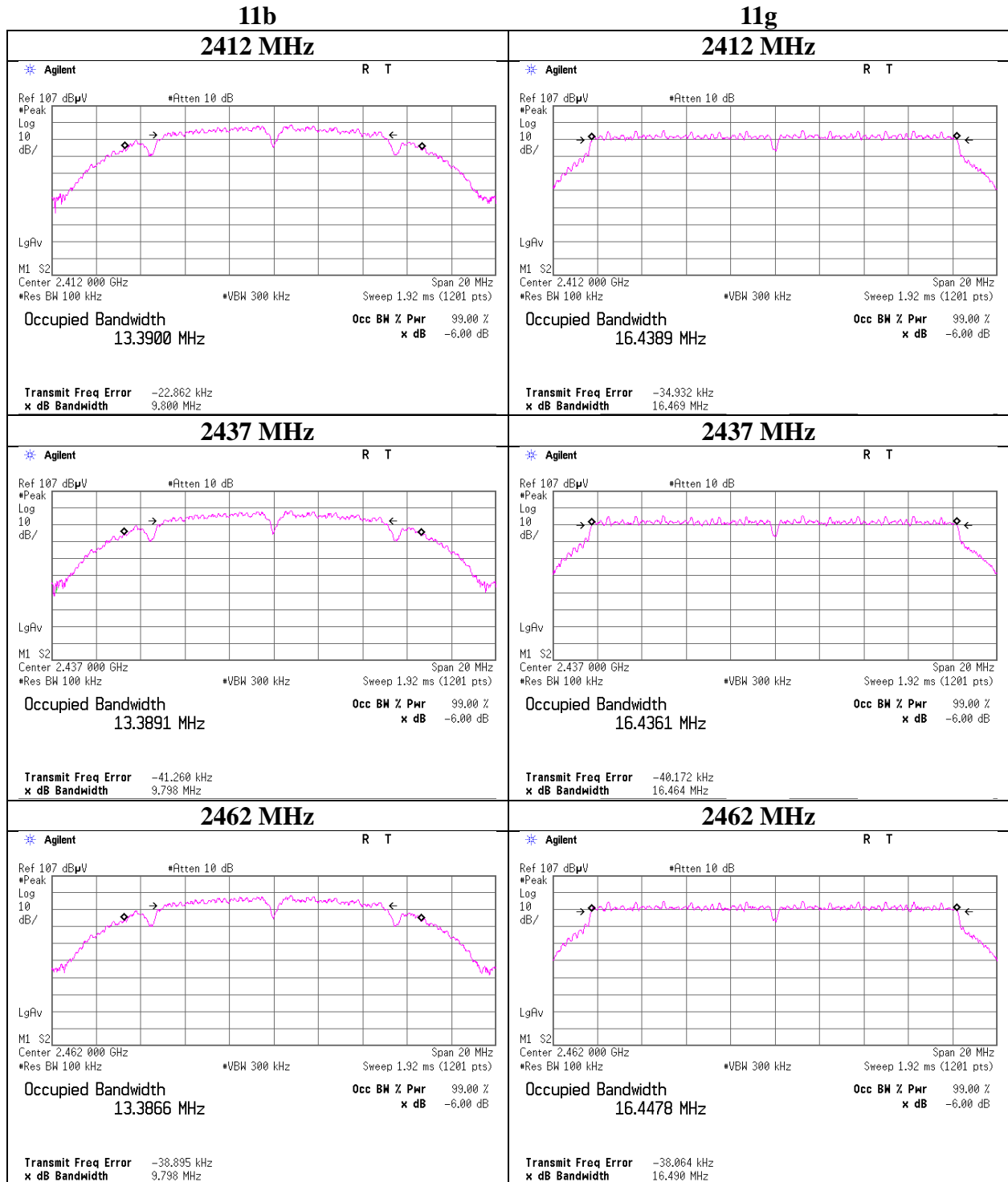
CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN. + CABLE)  
 Except for the above table : adequate margin data below the limits.

### 6dB Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room  
Report No. 11126950H  
Date January 13, 2016  
Temperature / Humidity 24 deg. C / 30 % RH  
Engineer Keisuke Kawamura  
Mode Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.800	> 500
	2437	9.798	> 500
	2462	9.798	> 500
11g	2412	16.469	> 500
	2437	16.464	> 500
	2462	16.490	> 500
11n-20	2412	17.668	> 500
	2437	17.676	> 500
	2462	17.667	> 500

### 6dB Bandwidth



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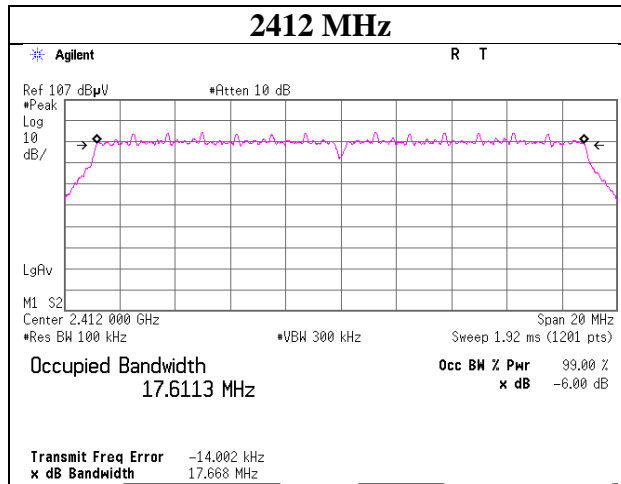
Facsimile : +81 596 24 8124



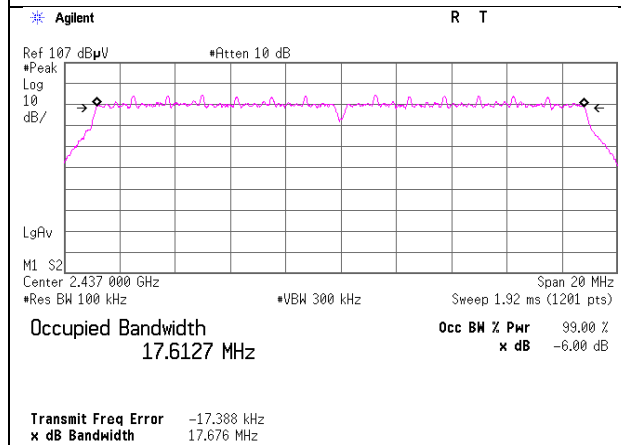
## 6dB Bandwidth

**11n-20**

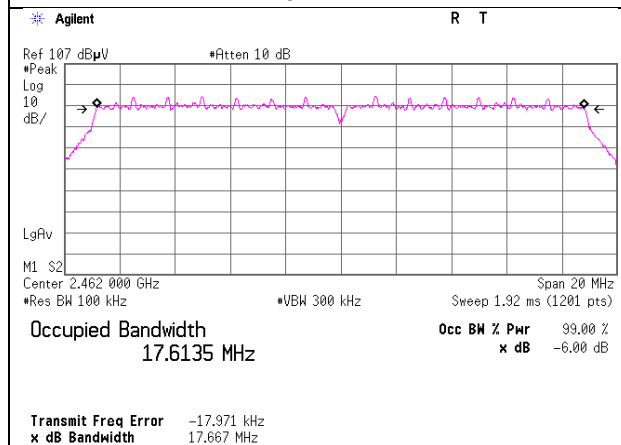
**2412 MHz**



**2437 MHz**



**2462 MHz**



### Maximum Peak Output Power

Test place : Ise EMC Lab. No.11 Measurement Room  
 Report No. : 11126950H  
 Date : January 13, 2016  
 Temperature / Humidity : 24 deg. C / 30 % RH  
 Engineer : Keisuke Kawamura  
 Mode : Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	0.91	2.34	10.11	13.36	21.68	30.00	1000	16.64
2437	0.77	2.35	10.11	13.23	21.04	30.00	1000	16.77
2462	0.70	2.35	10.11	13.16	20.70	30.00	1000	16.84

Sample Calculation:

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	0.74	
2	0.77	*
5.5	0.47	
11	0.54	

\*: Worst Rate

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

## Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.95	2.34	10.11	19.40	87.10	30.00	1000	10.60
2437	6.48	2.35	10.11	18.94	78.34	30.00	1000	11.06
2462	6.25	2.35	10.11	18.71	74.30	30.00	1000	11.29

Sample Calculation:

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

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	6.43	
9	6.01	
12	5.70	
18	5.57	
24	6.48	*
36	5.81	
48	6.24	
54	6.29	

\*: Worst Rate

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

## Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	5.35	2.34	10.11	17.80	60.26	30.00	1000	12.20
2437	5.11	2.35	10.11	17.57	57.15	30.00	1000	12.43
2462	4.97	2.35	10.11	17.43	55.34	30.00	1000	12.57

Sample Calculation:

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

2437 MHz

MCS Number	Reading [dBm]	Remark
0	5.04	
1	5.11	*
2	4.82	
3	4.58	
4	4.28	
5	4.95	
6	4.90	
7	4.86	

\* Worst MCS

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

**Average Output Power**  
**(Reference data for SAR testing)**

Test place : Ise EMC Lab. No.11 Measurement Room  
Report No. : 11126950H  
Date : January 13, 2016  
Temperature / Humidity : 24 deg. C / 30 % RH  
Engineer : Keisuke Kawamura  
Mode : Tx

**11b 1 Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-1.92	2.34	10.11	10.53	11.30	0.03	10.56	11.38
2437	-2.02	2.35	10.11	10.44	11.07	0.03	10.47	11.14
2462	-2.17	2.35	10.11	10.29	10.69	0.03	10.32	10.76

**11g 6 Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-4.03	2.34	10.11	8.42	6.95	0.17	8.59	7.23
2437	-4.38	2.35	10.11	8.08	6.43	0.17	8.25	6.68
2462	-4.22	2.35	10.11	8.24	6.67	0.17	8.41	6.93

**11n-20 MCS 0**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.02	2.34	10.11	7.43	5.53	0.18	7.61	5.77
2437	-5.29	2.35	10.11	7.17	5.21	0.18	7.35	5.43
2462	-5.33	2.35	10.11	7.13	5.16	0.18	7.31	5.38

Sample Calculation:

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

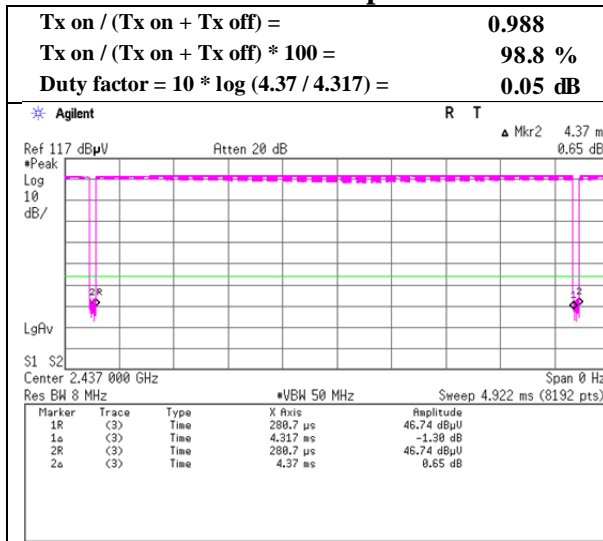
Result (Burst power) = Frame power + Duty factor

**The test was performed with condition that obtained the maximum frame power in pre-check.**

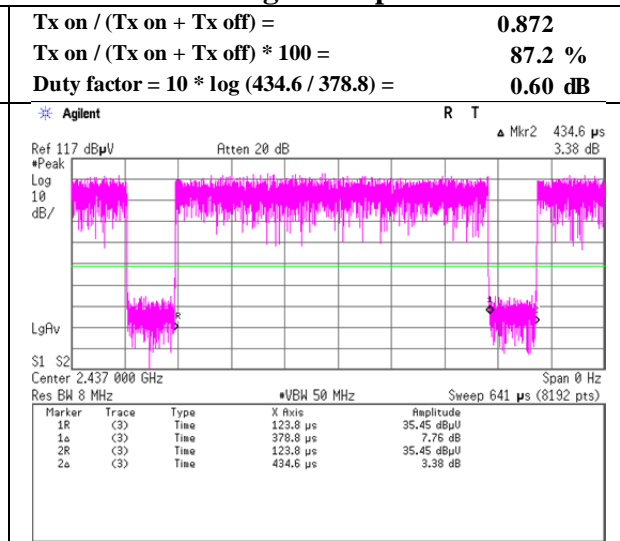
### Burst rate confirmation

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx

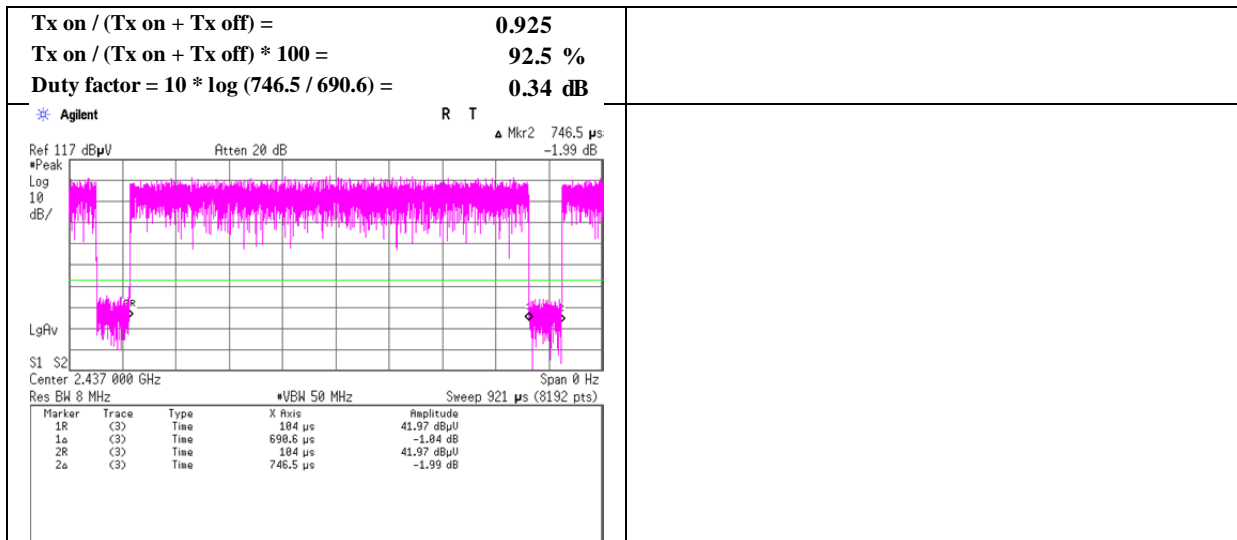
#### 11b 2 Mbps



#### 11g 24 Mbps



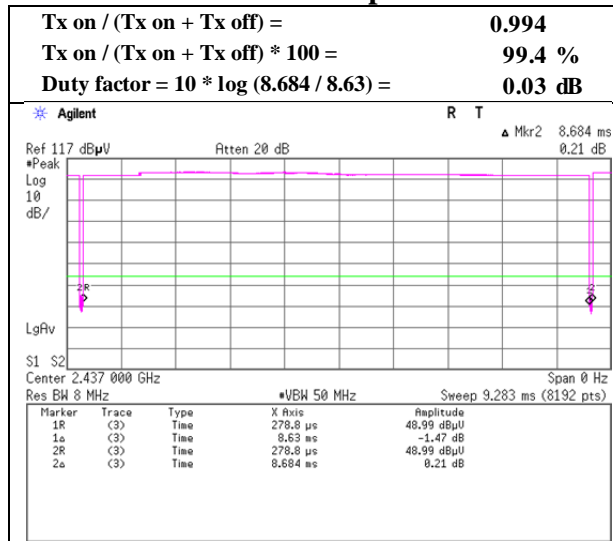
#### 11n-20 MCS 1



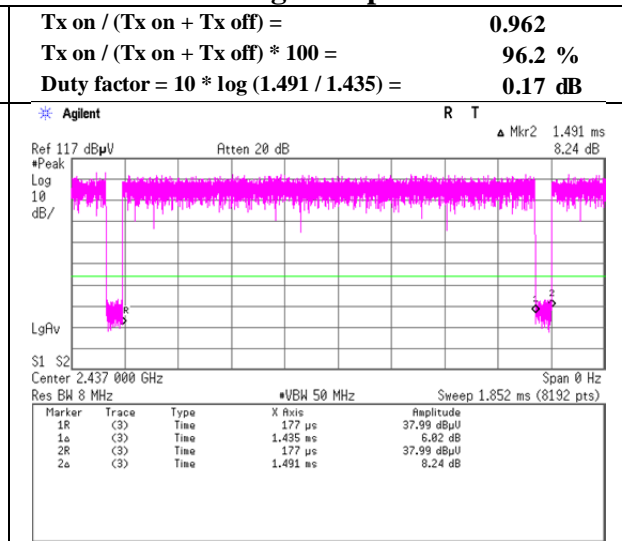
**Burst rate confirmation**  
**(Reference data for SAR testing)**

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx

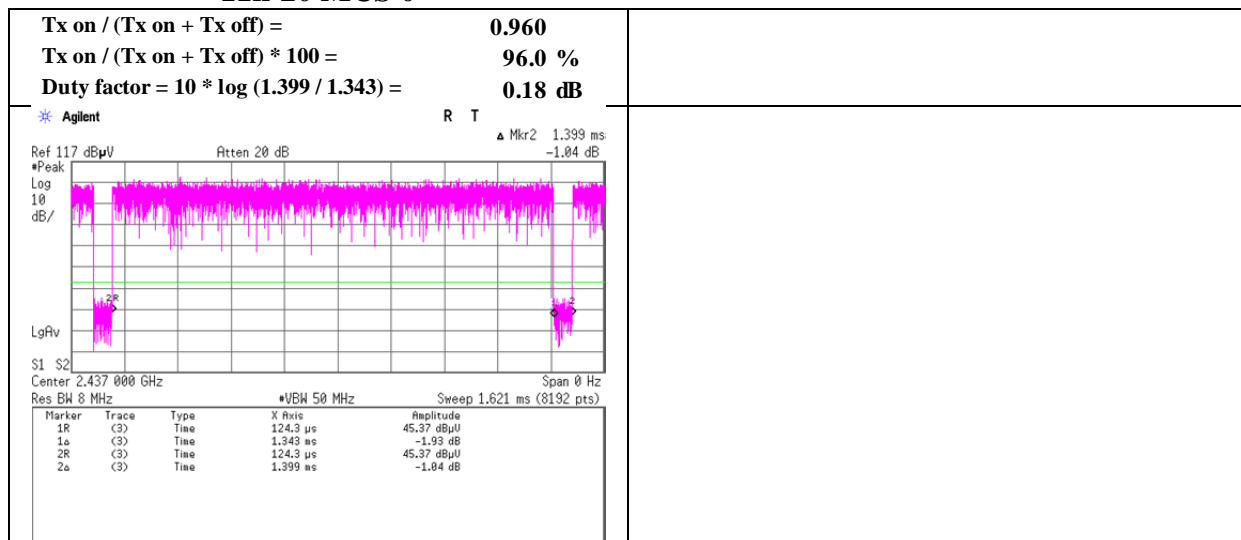
**11b 1 Mbps**



**11g 6 Mbps**



**11n-20 MCS 0**



## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and No.4 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 20, 2016  
Temperature / Humidity : 18 deg. C / 32 % RH  
Engineer : Takafumi Noguchi  
(1 GHz - 26.5 GHz)  
Mode : Tx 11b 2412 MHz

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	57.2	27.9	6.8	32.1	-	59.8	73.9	14.1	
Hori	4824.000	PK	48.0	32.9	9.2	31.3	-	58.8	73.9	15.1	
Hori	7236.000	PK	41.3	36.8	9.7	32.6	-	55.2	73.9	18.7	Floor Noise
Hori	9648.000	PK	41.5	38.1	10.5	32.6	-	57.5	73.9	16.4	Floor Noise
Hori	2390.000	AV	35.7	27.9	6.8	32.1	-	38.3	53.9	15.6	*1)
Hori	4824.000	AV	42.6	32.9	9.2	31.3	-	53.4	53.9	0.5	
Hori	7236.000	AV	32.9	36.8	9.7	32.6	-	46.8	53.9	7.1	Floor Noise
Hori	9648.000	AV	33.0	38.1	10.5	32.6	-	49.0	53.9	4.9	Floor Noise
Vert	2390.000	PK	53.7	27.9	6.8	32.1	-	56.3	73.9	17.6	
Vert	4824.000	PK	48.2	32.9	9.2	31.3	-	59.0	73.9	14.9	
Vert	7236.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Vert	9648.000	PK	41.5	38.1	11.2	32.6	-	58.2	73.9	15.7	Floor Noise
Vert	2390.000	AV	34.2	27.9	6.8	32.1	-	36.8	53.9	17.1	*1)
Vert	4824.000	AV	42.9	32.9	9.2	31.3	-	53.7	53.9	0.2	
Vert	7236.000	AV	32.9	36.8	10.4	32.6	-	47.5	53.9	6.4	Floor Noise
Vert	9648.000	AV	33.0	38.1	11.2	32.6	-	49.7	53.9	4.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB  
26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

### 20dBc Data Sheet

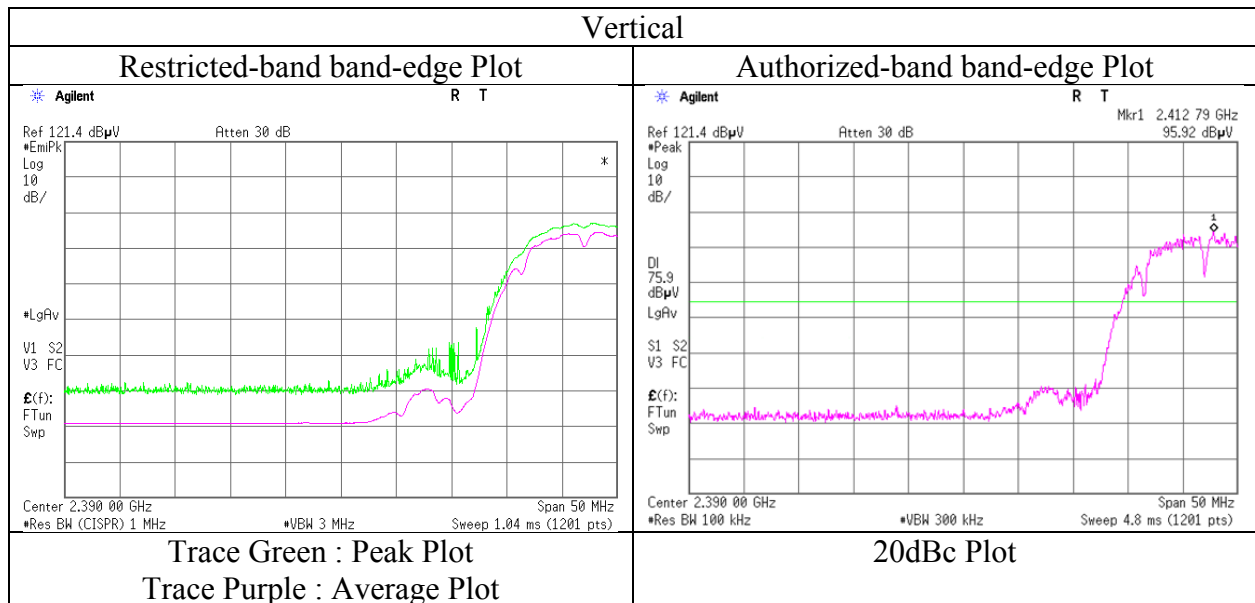
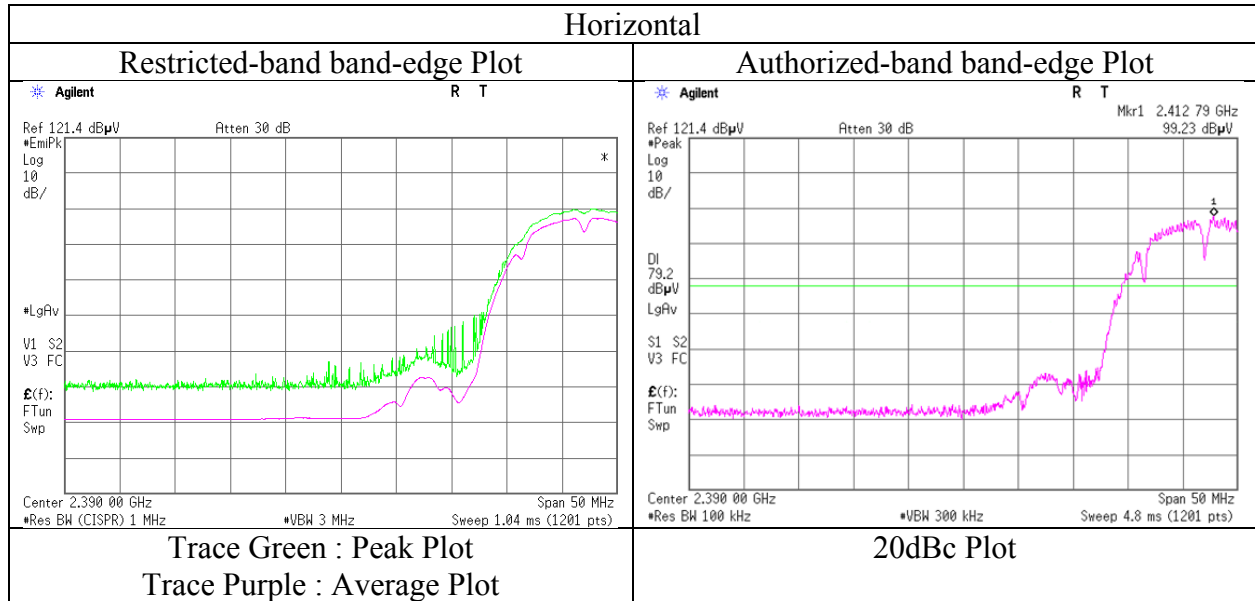
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	99.2	28.0	6.8	32.1	101.9	-	-	Carrier
Hori	2400.000	PK	50.9	28.0	6.8	32.1	53.6	81.9	28.3	
Vert	2412.000	PK	95.9	28.0	6.8	32.1	98.6	-	-	Carrier
Vert	2400.000	PK	48.8	28.0	6.8	32.1	51.5	78.6	27.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1GHz)) - Gain(Amplifier)



## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 20, 2016
Temperature / Humidity	18 deg. C / 32 % RH
Engineer	Takafumi Noguchi
	(1-26.5GHz)
Mode	Tx 11b 2412 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. : 11126950H  
 Date : January 20, 2016  
 Temperature / Humidity : 18 deg. C / 32 % RH  
 Engineer : Takafumi Noguchi  
 (1-26.5GHz)  
 Mode : Tx 11b 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	47.7	33.1	9.2	31.3	-	58.7	73.9	15.2	
Hori	7311.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Hori	9748.000	PK	41.5	38.2	11.2	32.7	-	58.2	73.9	15.7	Floor Noise
Hori	4874.000	AV	42.7	33.1	9.2	31.3	-	53.7	53.9	0.2	
Hori	7311.000	AV	32.9	36.8	10.4	32.6	-	47.5	53.9	6.4	Floor Noise
Hori	9748.000	AV	33.0	38.2	11.2	32.7	-	49.7	53.9	4.2	Floor Noise
Vert	4874.000	PK	47.9	33.1	9.2	31.3	-	58.9	73.9	15.0	
Vert	7311.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Vert	9748.000	PK	41.5	38.2	11.2	32.7	-	58.2	73.9	15.7	Floor Noise
Vert	4874.000	AV	42.7	33.1	9.2	31.3	-	53.7	53.9	0.2	
Vert	7311.000	AV	32.9	36.8	10.4	32.6	-	47.5	53.9	6.4	Floor Noise
Vert	9748.000	AV	33.0	38.2	11.2	32.7	-	49.7	53.9	4.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz  $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$   
 10 GHz - 26.5 GHz  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$   
 26.5 GHz - 40 GHz  $20\log(0.5\text{ m} / 3.0\text{ m}) = -15.6\text{ dB}$

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 20, 2016  
Temperature / Humidity : 18 deg. C / 32 % RH  
Engineer : Takafumi Noguchi  
(1-26.5GHz)  
Mode : Tx 11b 2462 MHz

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	58.2	28.1	6.9	32.1	-	61.1	73.9	12.8	
Hori	4924.000	PK	47.7	33.3	9.3	31.3	-	59.0	73.9	14.9	
Hori	7386.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Hori	9848.000	PK	41.5	38.2	11.2	32.7	-	58.2	73.9	15.7	Floor Noise
Hori	2483.500	AV	38.6	28.1	6.9	32.1	-	41.5	53.9	12.4	
Hori	4924.000	AV	42.5	33.3	9.3	31.3	-	53.8	53.9	0.1	
Hori	7386.000	AV	32.9	36.8	10.4	32.6	-	47.5	53.9	6.4	Floor Noise
Hori	9848.000	AV	33.0	38.2	11.2	32.7	-	49.7	53.9	4.2	Floor Noise
Vert	2483.500	PK	55.3	28.1	6.9	32.1	-	58.2	73.9	15.7	
Vert	4924.000	PK	46.6	33.3	9.3	31.3	-	57.9	73.9	16.0	
Vert	7386.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Vert	9848.000	PK	41.5	38.2	11.2	32.7	-	58.2	73.9	15.7	Floor Noise
Vert	2483.500	AV	38.2	28.1	6.9	32.1	-	41.1	53.9	12.8	
Vert	4924.000	AV	41.8	33.3	9.3	31.3	-	53.1	53.9	0.8	
Vert	7386.000	AV	32.9	36.8	10.4	32.6	-	47.5	53.9	6.4	Floor Noise
Vert	9848.000	AV	33.0	38.2	11.2	32.7	-	49.7	53.9	4.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

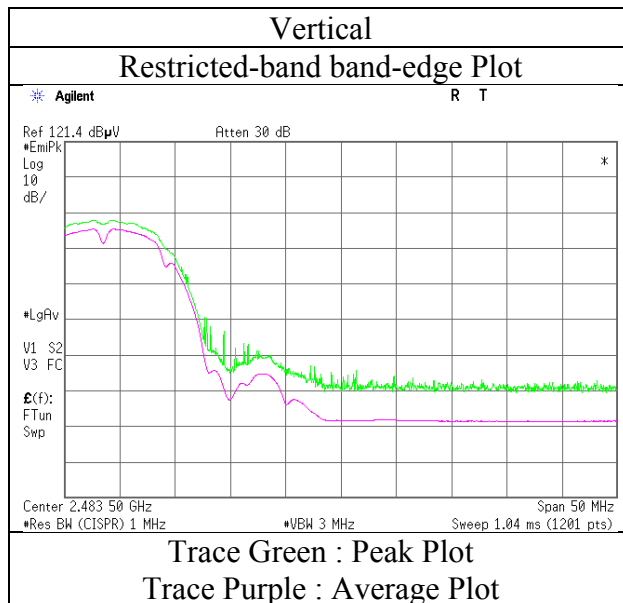
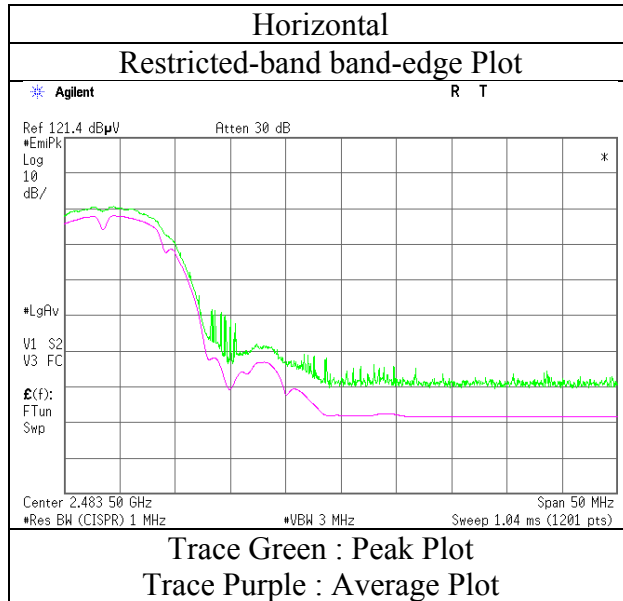
\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz  $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$   
10 GHz - 26.5 GHz  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$   
26.5 GHz - 40 GHz  $20\log(0.5\text{ m} / 3.0\text{ m}) = -15.6\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 20, 2016
Temperature / Humidity	18 deg. C / 32 % RH
Engineer	Takafumi Noguchi
	(1-26.5GHz)
Mode	Tx 11b 2462 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 19, 2016      January 20, 2016      January 20, 2016  
Temperature / Humidity : 18 deg. C / 33 % RH      18 deg. C / 32 % RH      20 deg. C / 30 % RH  
Engineer : Takafumi Noguchi      Takafumi Noguchi      Shinichi Miyazono  
            (1-10GHz)      (10-26.5GHz)      (30 MHz - 1000 MHz)  
Mode : Tx 11g 2412 MHz

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	68.767	QP	40.0	6.2	7.7	32.0	-	21.9	40.0	18.1	
Hori	69.829	QP	40.8	6.1	7.7	32.0	-	22.6	40.0	17.4	
Hori	70.931	QP	42.2	6.1	7.7	32.0	-	24.0	40.0	16.0	
Hori	73.146	QP	41.5	6.2	7.8	32.0	-	23.5	40.0	16.5	
Hori	336.172	QP	31.6	17.9	10.2	31.8	-	27.9	46.0	18.1	
Hori	365.225	QP	32.8	18.1	10.4	31.8	-	29.5	46.0	16.5	
Hori	2390.000	PK	54.3	26.9	6.8	32.0	-	56.0	73.9	17.9	
Hori	4824.000	PK	42.3	31.8	9.0	31.3	-	51.8	73.9	22.1	
Hori	7236.000	PK	42.5	36.0	9.4	32.0	-	55.9	73.9	18.0	Floor Noise
Hori	9648.000	PK	42.5	38.2	10.4	32.4	-	58.7	73.9	15.2	Floor Noise
Hori	2390.000	AV	41.6	26.9	6.8	32.0	0.6	43.9	53.9	10.0	*1)
Hori	4824.000	AV	34.5	31.8	9.0	31.3	0.6	44.6	53.9	9.3	
Hori	7236.000	AV	34.2	36.0	9.4	32.0	-	47.6	53.9	6.3	Floor Noise
Hori	9648.000	AV	34.2	38.2	10.4	32.4	-	50.4	53.9	3.5	Floor Noise
Vert	46.152	QP	39.1	12.0	7.4	32.1	-	26.4	40.0	13.6	
Vert	68.276	QP	44.5	6.3	7.7	32.0	-	26.5	40.0	13.5	
Vert	71.302	QP	44.4	6.1	7.8	32.0	-	26.3	40.0	13.7	
Vert	71.683	QP	44.5	6.2	7.8	32.0	-	26.5	40.0	13.5	
Vert	359.891	QP	30.8	18.1	10.3	31.8	-	27.4	46.0	18.6	
Vert	379.058	QP	28.9	18.2	10.5	31.9	-	25.7	46.0	20.3	
Vert	2390.000	PK	53.5	26.9	6.8	32.0	-	55.2	73.9	18.7	
Vert	4824.000	PK	42.7	31.8	9.0	31.3	-	52.2	73.9	21.7	
Vert	7236.000	PK	42.6	36.0	9.4	32.0	-	56.0	73.9	17.9	Floor Noise
Vert	9648.000	PK	42.6	38.2	10.4	32.4	-	58.8	73.9	15.1	Floor Noise
Vert	2390.000	AV	42.1	26.9	6.8	32.0	0.6	44.4	53.9	9.5	*1)
Vert	4824.000	AV	34.3	31.8	9.0	31.3	0.6	44.4	53.9	9.5	
Vert	7236.000	AV	34.2	36.0	9.4	32.0	-	47.6	53.9	6.3	Floor Noise
Vert	9648.000	AV	34.2	38.2	10.4	32.4	-	50.4	53.9	3.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log(4.5 m / 3.0 m) = 3.5 dB  
                                  10 GHz - 26.5 GHz      20log(3.0 m / 3.0 m) = -9.5 dB  
                                  26.5 GHz - 40 GHz      20log(0.5 m / 3.0 m) = -15.6 dB

\*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	93.8	26.9	6.8	32.0	95.5	-	-	Carrier
Hori	2400.000	PK	56.3	26.9	6.8	32.0	58.0	75.5	17.5	
Vert	2412.000	PK	93.2	26.9	6.8	32.0	94.9	-	-	Carrier
Vert	2400.000	PK	55.2	26.9	6.8	32.0	56.9	74.9	18.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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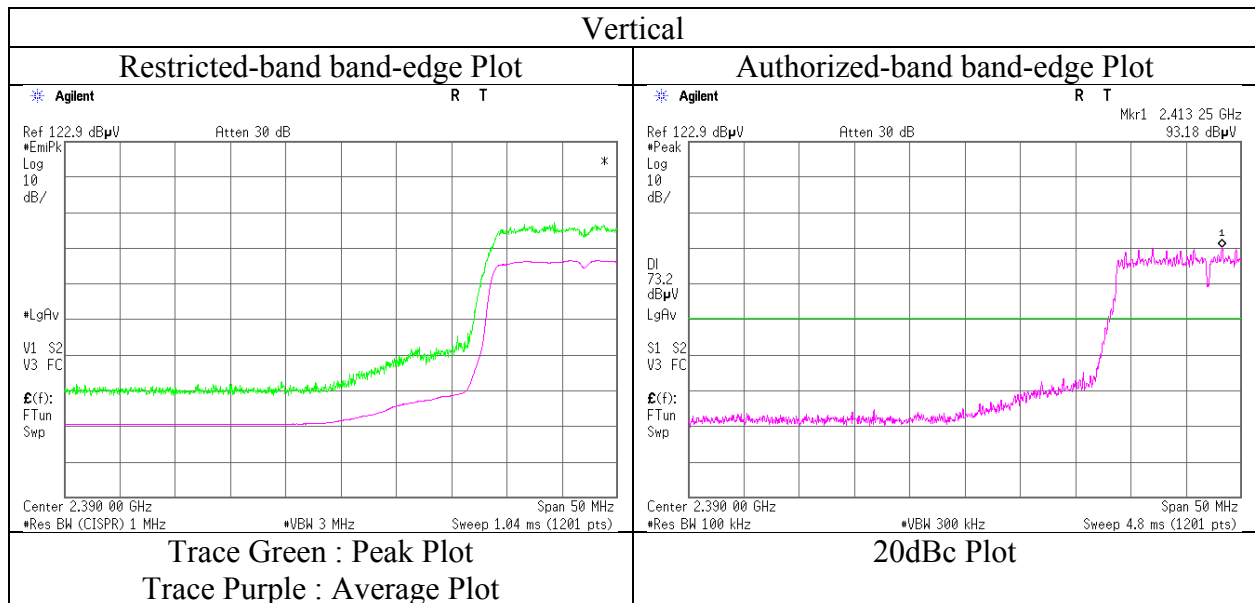
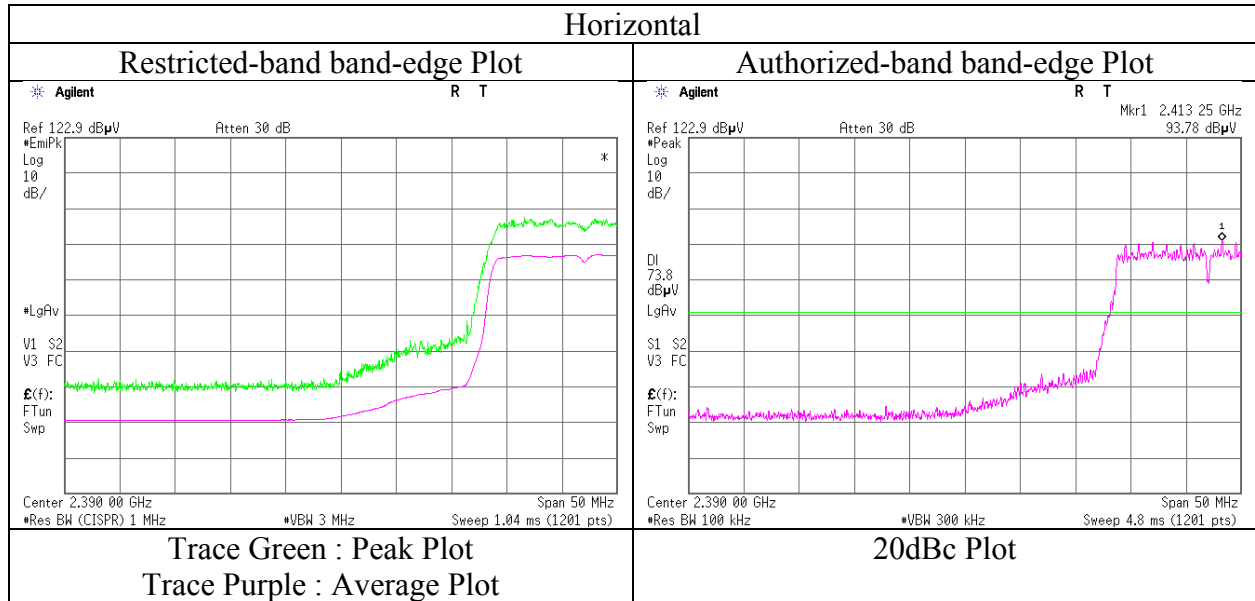
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## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 19, 2016
Temperature / Humidity	18 deg. C / 33 % RH
Engineer	Takafumi Noguchi (1-10GHz)
Mode	Tx 11g 2412 MHz



\* Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 19, 2016      January 20, 2016  
Temperature / Humidity : 18 deg. C / 33 % RH      18 deg. C / 32 % RH  
Engineer : Takafumi Noguchi      Takafumi Noguchi  
            (1-10GHz)      (10-26.5GHz)  
Mode : Tx 11g 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	43.6	31.9	9.0	31.3	-	53.2	73.9	20.7	
Hori	7311.000	PK	42.5	36.0	10.3	32.0	-	56.8	73.9	17.1	Floor Noise
Hori	9748.000	PK	42.5	38.2	11.0	32.4	-	59.3	73.9	14.6	Floor Noise
Hori	4874.000	AV	35.0	31.9	9.0	31.3	0.6	45.2	53.9	8.7	
Hori	7311.000	AV	34.2	36.0	10.3	32.0	-	48.5	53.9	5.4	Floor Noise
Hori	9748.000	AV	34.2	38.2	11.0	32.4	-	51.0	53.9	2.9	Floor Noise
Vert	4874.000	PK	43.7	31.9	9.0	31.3	-	53.3	73.9	20.6	
Vert	7311.000	PK	42.6	36.0	10.3	32.0	-	56.9	73.9	17.0	Floor Noise
Vert	9748.000	PK	42.6	38.2	11.0	32.4	-	59.4	73.9	14.5	Floor Noise
Vert	4874.000	AV	35.0	31.9	9.0	31.3	0.6	45.2	53.9	8.7	
Vert	7311.000	AV	34.2	36.0	10.3	32.0	-	48.5	53.9	5.4	Floor Noise
Vert	9748.000	AV	34.2	38.2	11.0	32.4	-	51.0	53.9	2.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log (4.5 m / 3.0 m) = 3.5 dB  
                            10 GHz - 26.5 GHz 20log (3.0 m / 3.0 m) = -9.5 dB  
                            26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 19, 2016      January 20, 2016  
Temperature / Humidity : 18 deg. C / 33 % RH      18 deg. C / 32 % RH  
Engineer : Takafumi Noguchi      Takafumi Noguchi  
            (1-10GHz)                      (10-26.5GHz)  
Mode : Tx 11g 2462 MHz

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	63.1	26.9	6.8	32.0	-	64.8	73.9	9.1	
Hori	4924.000	PK	44.9	32.0	8.9	31.3	-	54.5	73.9	19.4	
Hori	7386.000	PK	42.5	36.0	9.5	32.1	-	55.9	73.9	18.0	Floor Noise
Hori	9848.000	PK	42.5	38.2	10.6	32.5	-	58.8	73.9	15.1	Floor Noise
Hori	2483.500	AV	50.6	26.9	6.8	32.0	0.6	52.9	53.9	1.0	*1)
Hori	4924.000	AV	35.2	32.0	8.9	31.3	0.6	45.4	53.9	8.5	
Hori	7386.000	AV	34.2	36.0	9.5	32.1	-	47.6	53.9	6.3	Floor Noise
Hori	9848.000	AV	34.2	38.2	10.6	32.5	-	50.5	53.9	3.4	Floor Noise
Vert	2483.500	PK	60.7	26.9	6.8	32.0	-	62.4	73.9	11.5	
Vert	4924.000	PK	43.9	32.0	8.9	31.3	-	53.5	73.9	20.4	
Vert	7386.000	PK	42.6	36.0	9.5	32.1	-	56.0	73.9	17.9	Floor Noise
Vert	9848.000	PK	42.6	38.2	10.6	32.5	-	58.9	73.9	15.0	Floor Noise
Vert	2483.500	AV	49.2	26.9	6.8	32.0	0.6	51.5	53.9	2.4	*1)
Vert	4924.000	AV	34.7	32.0	8.9	31.3	0.6	44.9	53.9	9.0	
Vert	7386.000	AV	34.2	36.0	9.5	32.1	-	47.6	53.9	6.3	Floor Noise
Vert	9848.000	AV	34.2	38.2	10.6	32.5	-	50.5	53.9	3.4	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

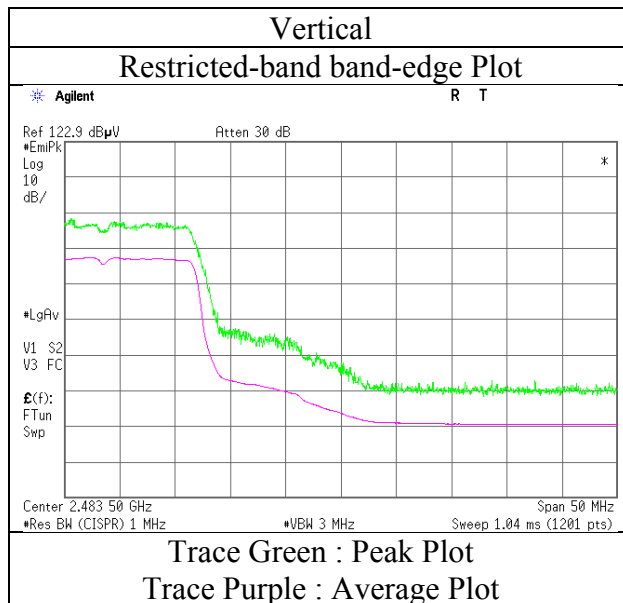
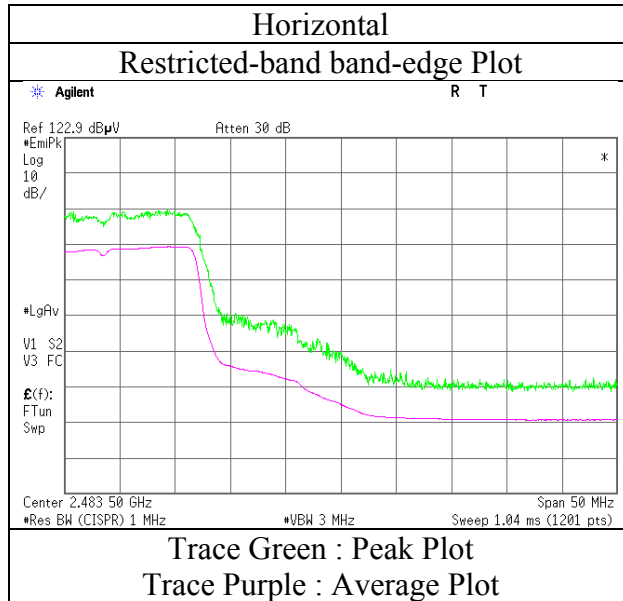
Distance factor:      1 GHz - 10 GHz      20log (4.5 m / 3.0 m) = 3.5 dB  
                             10 GHz - 26.5 GHz 20log (3.0 m / 3.0 m) = -9.5 dB  
                             26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

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



## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 19, 2016
Temperature / Humidity	18 deg. C / 33 % RH
Engineer	Takafumi Noguchi (1-10GHz)
Mode	Tx 11g 2462 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11126950H  
Date : January 19, 2016  
Temperature / Humidity : 18 deg. C / 33 % RH  
Engineer : Takafumi Noguchi  
(1-10GHz)  
Mode : Tx 11n-20 2412 MHz

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	56.0	26.9	6.8	32.0	-	57.7	73.9	16.2	
Hori	2390.000	AV	45.2	26.9	6.8	32.0	0.3	47.2	53.9	6.7	*1)
Vert	2390.000	PK	57.3	26.9	6.8	32.0	-	59.0	73.9	14.9	
Vert	2390.000	AV	45.8	26.9	6.8	32.0	0.3	47.8	53.9	6.1	*1)

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

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

26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

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

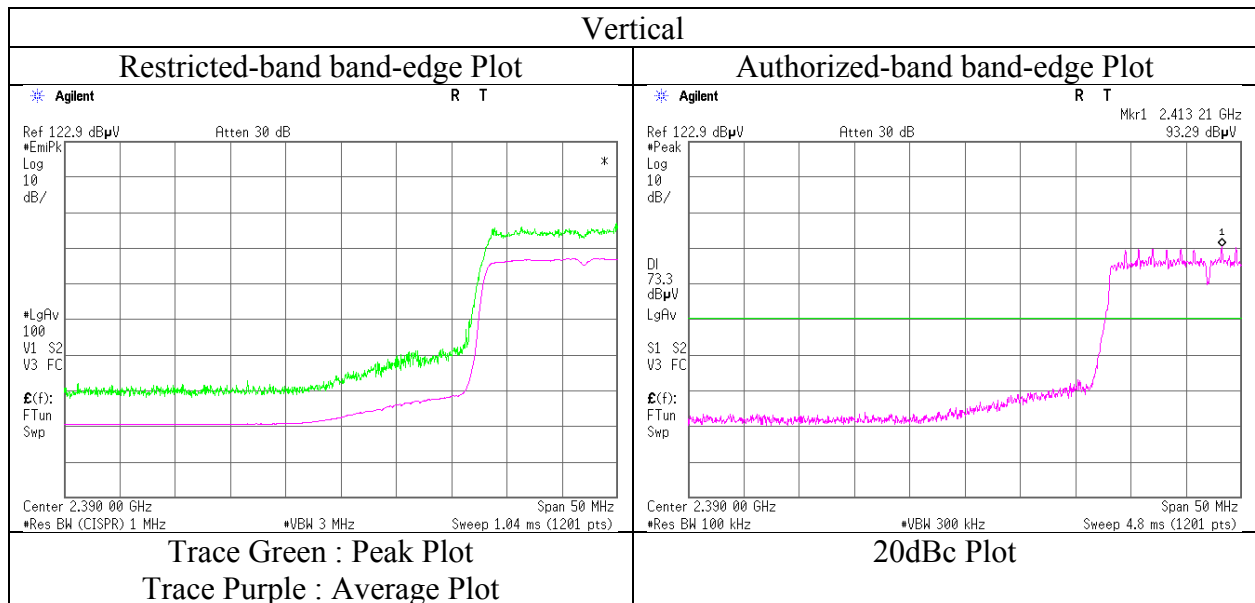
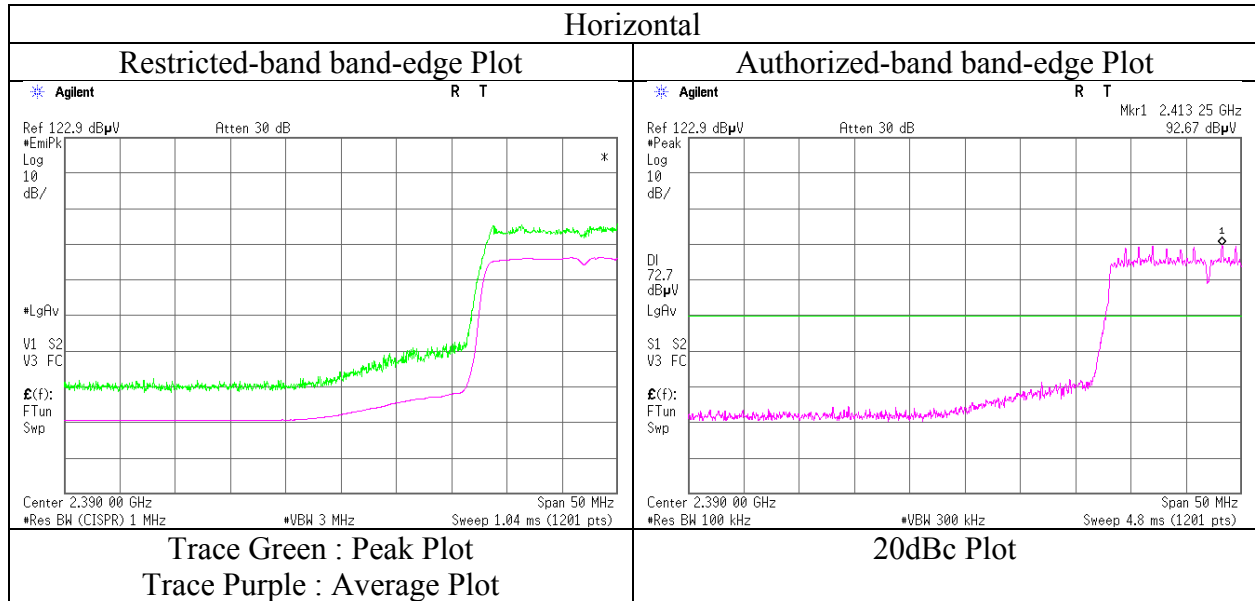
### 20dBc Data Sheet

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	92.7	26.9	6.8	32.0	94.4	-	-	Carrier
Hori	2400.000	PK	53.4	26.9	6.8	32.0	55.1	74.4	19.3	
Vert	2412.000	PK	93.3	26.9	6.8	32.0	95.0	-	-	Carrier
Vert	2400.000	PK	54.0	26.9	6.8	32.0	55.7	75.0	19.3	

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

## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 19, 2016
Temperature / Humidity	18 deg. C / 33 % RH
Engineer	Takafumi Noguchi (1-10GHz)
Mode	Tx 11n-20 2412 MHz



\* Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. : 11126950H  
 Date : January 19, 2016  
 Temperature / Humidity : 18 deg. C / 33 % RH  
 Engineer : Takafumi Noguchi  
 (1-10GHz)  
 Mode : Tx 11n-20 2462 MHz

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	63.6	26.9	6.8	32.0	-	65.3	73.9	8.6	
Hori	2483.500	AV	49.2	26.9	6.8	32.0	0.3	51.2	53.9	2.7	*1) Integration
Vert	2483.500	PK	62.8	26.9	6.8	32.0	-	64.5	73.9	9.4	
Vert	2483.500	AV	47.2	26.9	6.8	32.0	0.3	49.2	53.9	4.7	*1) Integration

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

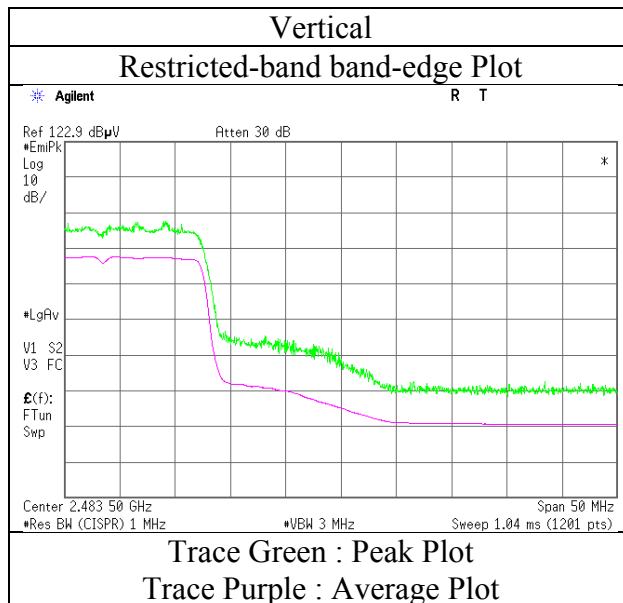
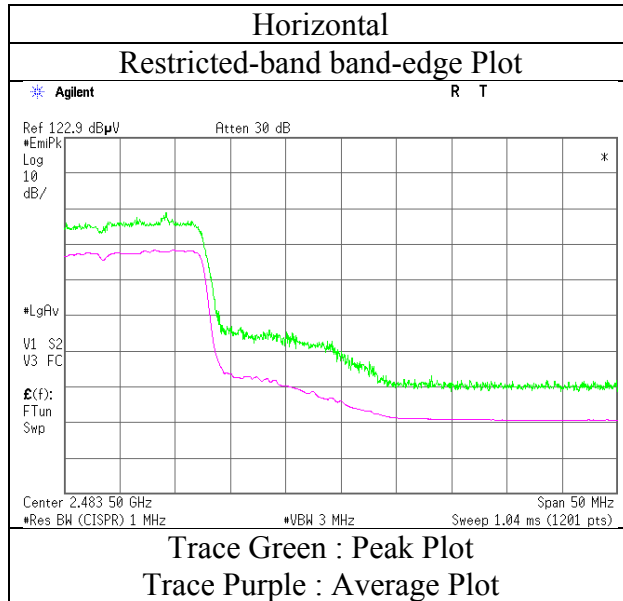
10 GHz - 26.5 GHz 20log (3.0 m / 3.0 m) = -9.5 dB

26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

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

## Radiated Spurious Emission (Reference Plot for band-edge)

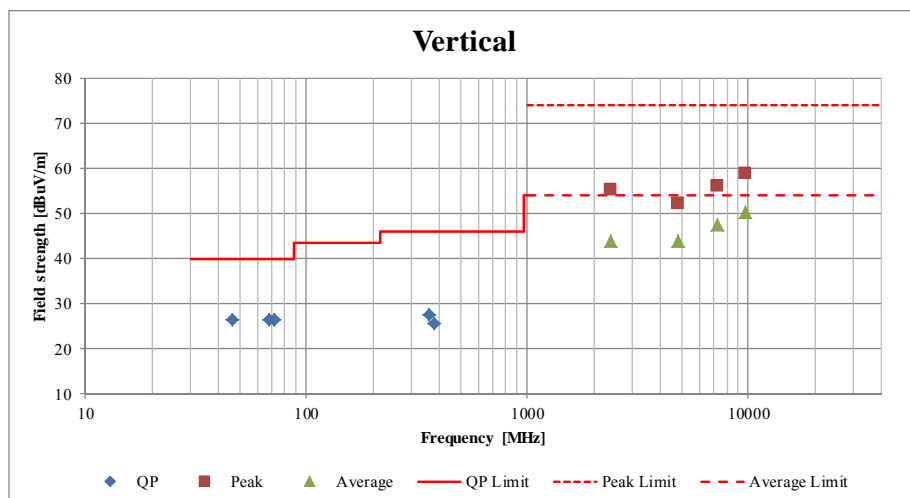
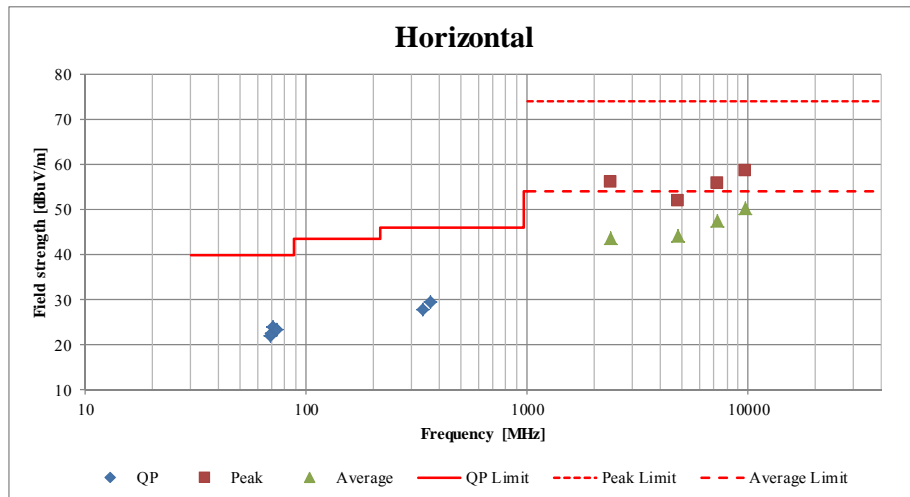
Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11126950H
Date	January 19, 2016
Temperature / Humidity	18 deg. C / 33 % RH
Engineer	Takafumi Noguchi
	(1-10GHz)
Mode	Tx 11n-20 2462 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission (Plot data, Worst case)

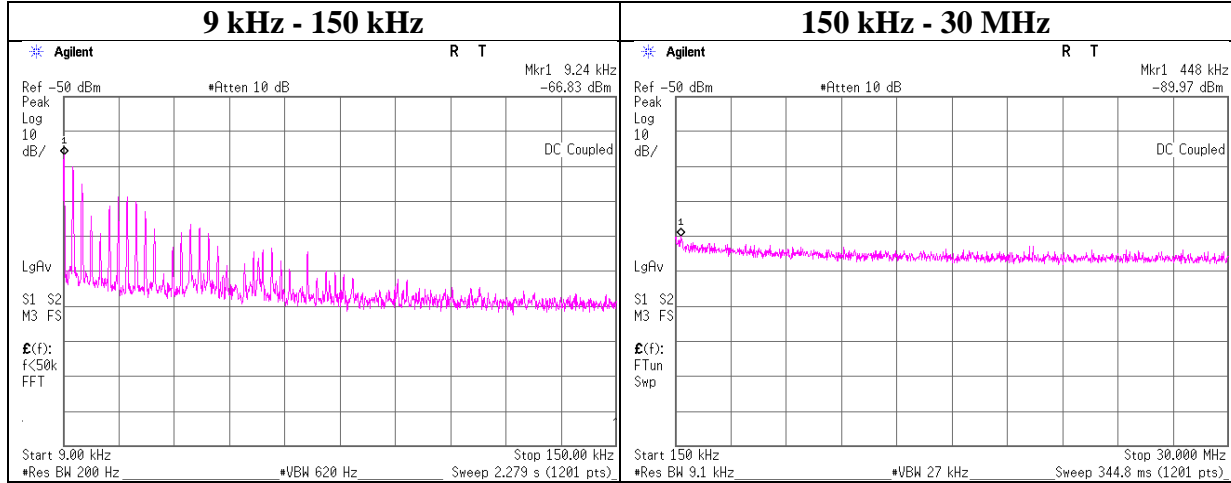
Test place	Ise EMC Lab. No.3 and No.4 Semi Anechoic Chamber		
Report No.	11126950H		
Date	January 19, 2016	January 20, 2016	January 20, 2016
Temperature / Humidity	18 deg. C / 33 % RH	18 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	Shinichi Miyazono
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	(30 MHz - 1000 MHz)
Mode	Tx 11g 2412 MHz		



\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

### Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx 11g 2412 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.24	-66.8	0.01	10.0	2.0	1	-54.8	300	6.0	6.4	48.2	41.8	
448.00	-90.0	0.01	10.0	2.0	1	-78.0	300	6.0	-16.7	14.5	31.2	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$

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### Power Density

Test place Ise EMC Lab. No.11 Measurement Room  
Report No. 11126950H  
Date January 13, 2016  
Temperature / Humidity 24 deg. C / 30 % RH  
Engineer Keisuke Kawamura  
Mode Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-23.62	2.34	10.11	-11.17	8.00	19.17
2437.00	-24.15	2.35	10.11	-11.69	8.00	19.69
2462.00	-24.34	2.35	10.11	-11.88	8.00	19.88

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-28.15	2.34	10.11	-15.70	8.00	23.70
2437.00	-27.65	2.35	10.11	-15.19	8.00	23.19
2462.00	-28.27	2.35	10.11	-15.81	8.00	23.81

11n-20

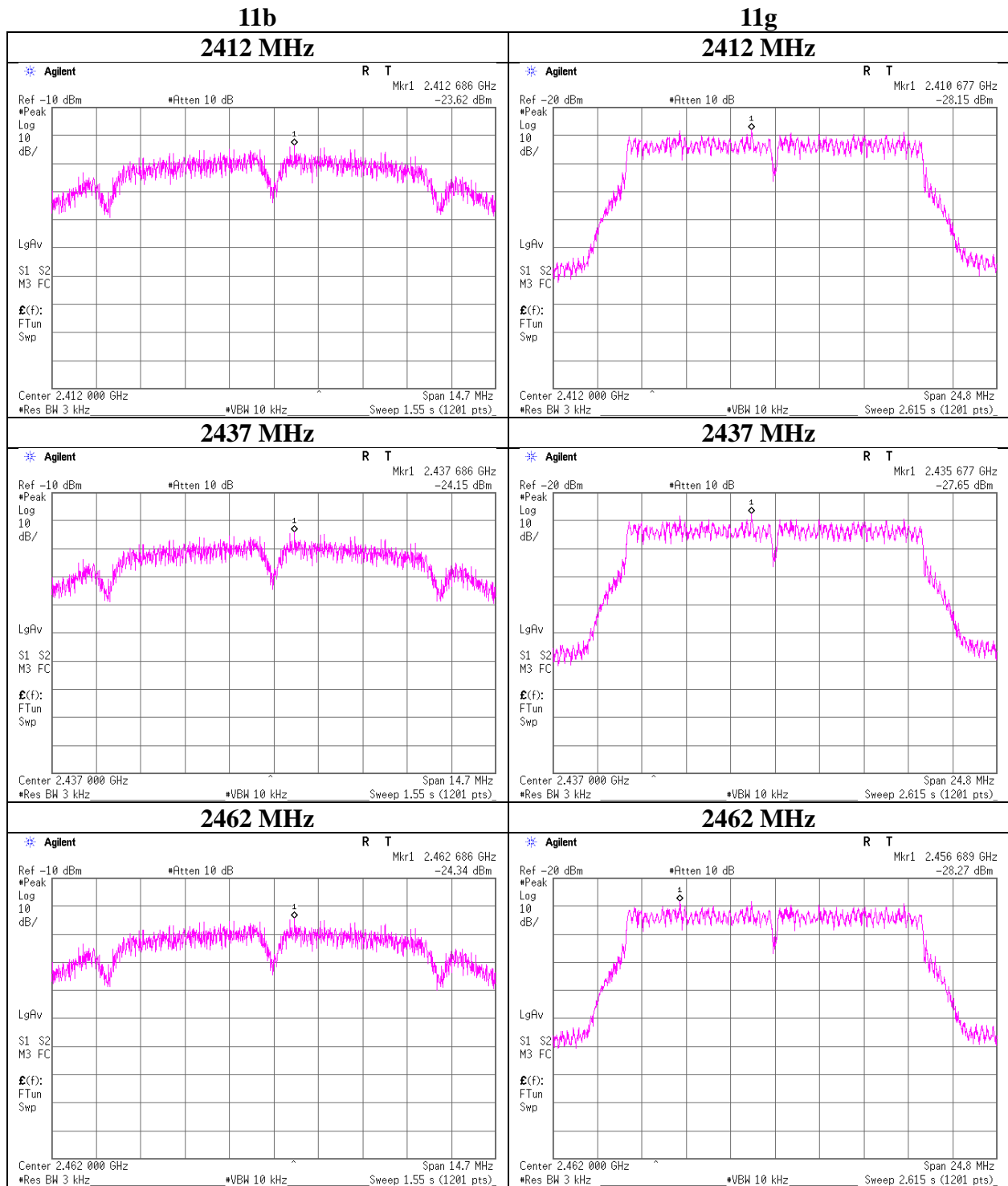
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-30.94	2.34	10.11	-18.49	8.00	26.49
2437.00	-29.97	2.35	10.11	-17.51	8.00	25.51
2462.00	-30.75	2.35	10.11	-18.29	8.00	26.29

Sample Calculation:

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



**Power Density**



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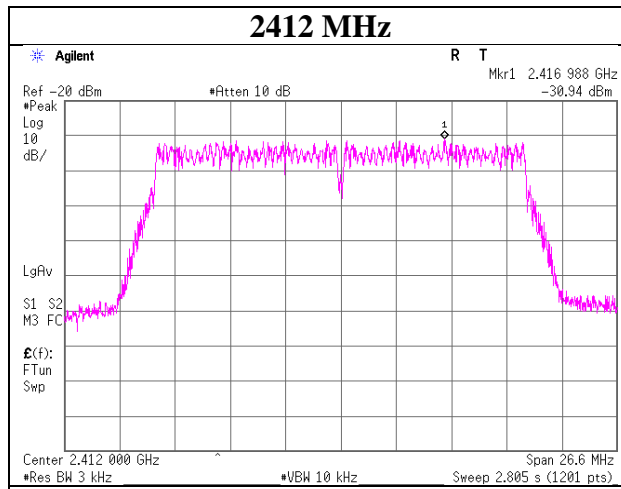
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

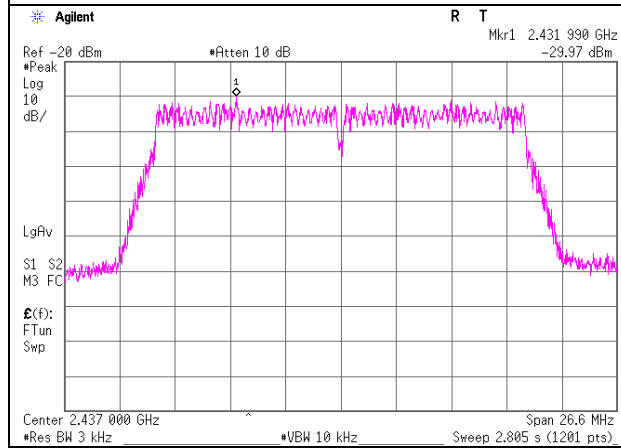
## Power Density

11n-20

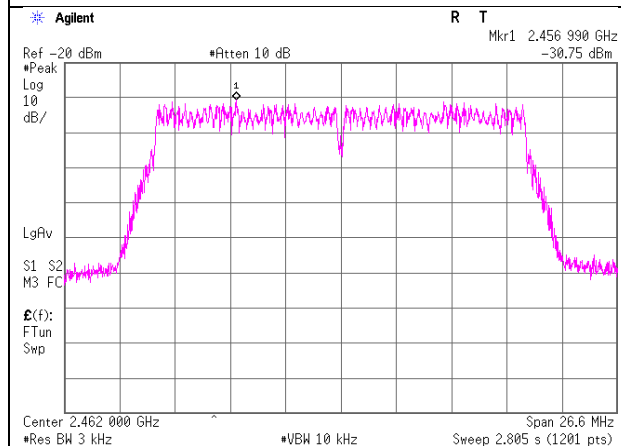
2412 MHz



2437 MHz



2462 MHz



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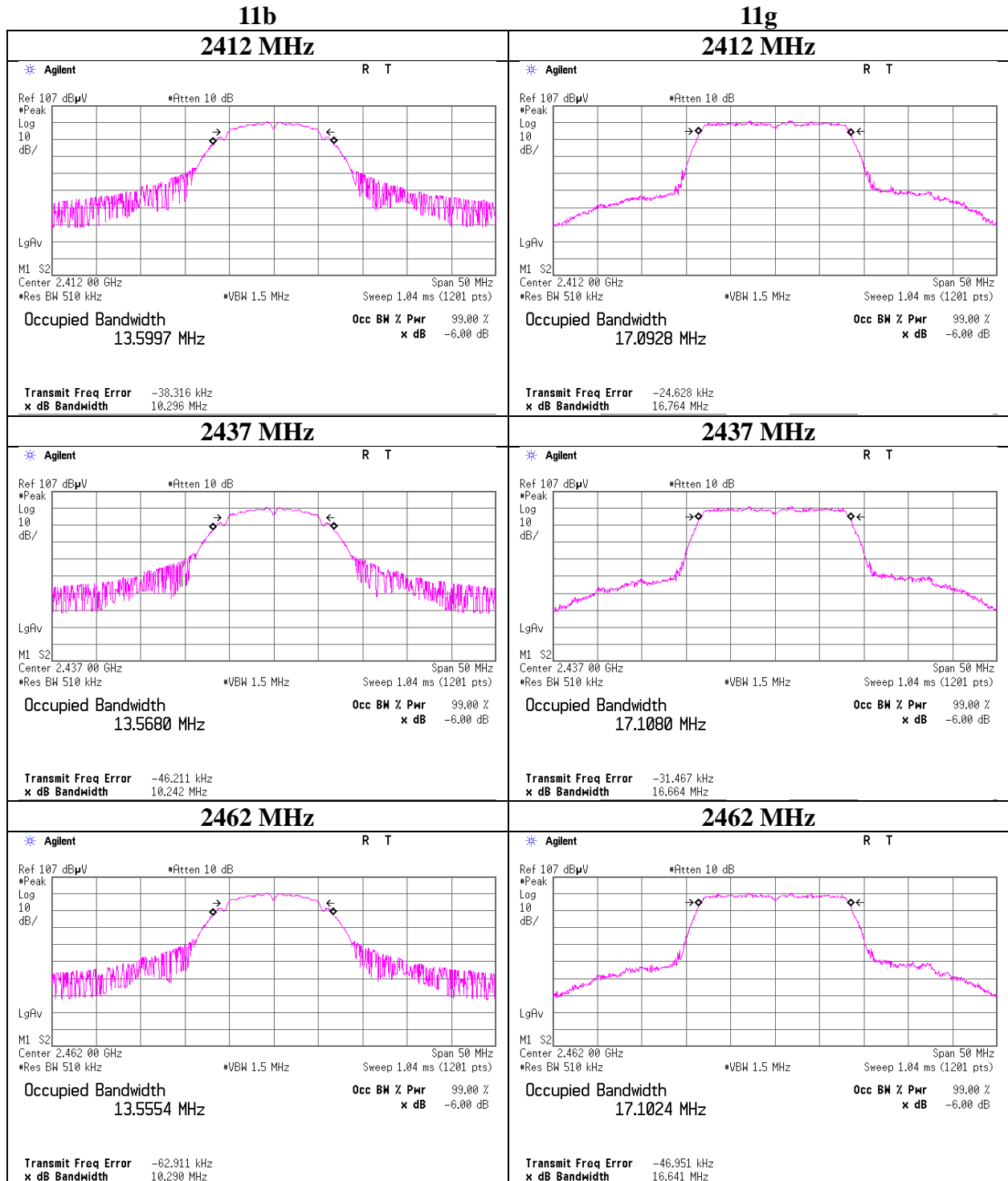
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## 99% Occupied Bandwidth

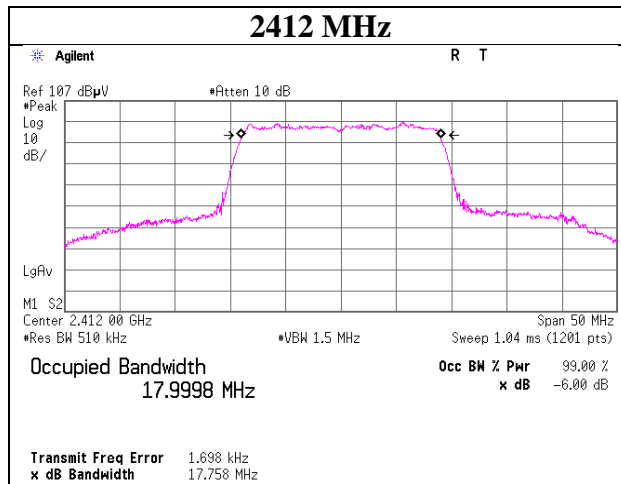
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11126950H
Date	January 13, 2016
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Keisuke Kawamura
Mode	Tx



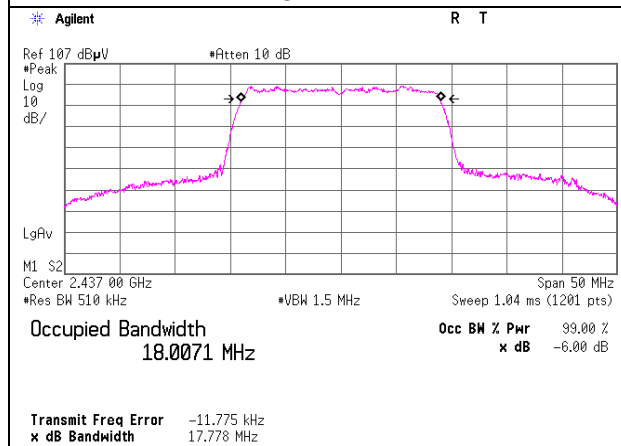
## 99% Occupied Bandwidth

**11n-20**

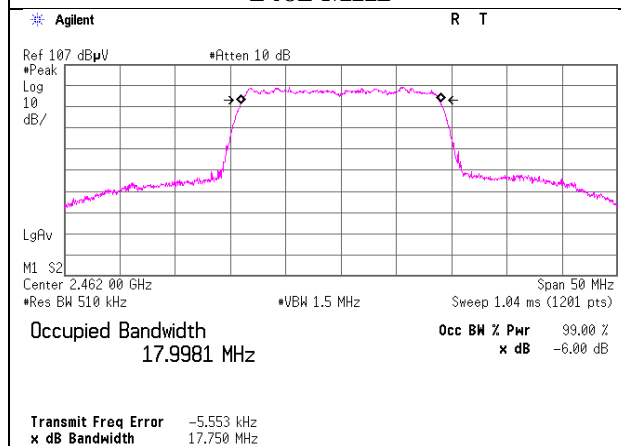
**2412 MHz**



**2437 MHz**



**2462 MHz**



**UL Japan, Inc.**

**Ise EMC Lab.**

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## APPENDIX 2: Test instruments

### Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2015/12/08 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	AT	2015/06/02 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2015/11/11 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2015/11/11 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/13 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2015/08/06 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2015/03/19 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2016/01/13 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2015/09/16 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2015/01/13 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	RE	2015/07/31 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2015/11/28 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2015/11/02 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2015/11/03 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	CE	2015/07/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	CE	2016/01/21 * 12
MJM-14	Measure	KOMELON	KMC-36	-	CE	-
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE	2015/10/11 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE	2015/07/10 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2 W(5m)/5D-2W(0.8 m)/5D-2W(1m)	-	CE	2015/02/06 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	CE	2015/08/19 * 12

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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 test  
                      RE: Radiated Emission test  
                      AT: Antenna Terminal Conducted test