



# RADIO TEST REPORT

Test Report No. : 11151247S-A-R2

**Applicant** : FUJIFILM Corporation  
**Type of Equipment** : instax SHARE  
**Model No.** : SP-2  
**FCC ID** : W2Z-03000003  
**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.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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 11151247S-A-R1. 11151247S-A-R1 is replaced with this report.

**Date of test:** February 3 to 16, 2016

**Representative test engineer:**

*S. Takano*

Shinichi Takano

Engineer

Consumer Technology Division

**Approved by:**

*T. Imamura*

Toyokazu Imamura

Leader

Consumer Technology Division



- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : FUJIFILM Corporation  
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Telephone Number : +81-3-6271-3614  
Facsimile Number : +81-3-6271-3161  
Contact Person : Hirofumi Katsura

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

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

Type of Equipment : instax SHARE  
Model No. : SP-2  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 5 V (USB), DC 3.7 V (Battery)  
Receipt Date of Sample : February 2, 2016  
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**

Model: SP-2 (referred to as the EUT in this report) is instax SHARE.

### **General Specification**

Clock frequency(ies) in the system : 37.4 MHz

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 2412 MHz - 2462 MHz  
Modulation : DSSS, OFDM  
Power Supply (radio part input) : DC 3.3 V  
Antenna type : Monopole pattern  
Antenna Gain : -4.1 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

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

\*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.

### **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	11.4 dB, 0.47898 MHz, L1 AV, Tx 2412 MHz IEEE 802.11n-20	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	2.5 dB 72.007 MHz, QP, Vertical Tx 2412 MHz IEEE 802.11n-20	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 RF transmitter is constantly provided voltage (DC 3.3 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203**

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 requirement.

### 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

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.1 dB	2.1 dB	2.6 dB	2.2 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

#### 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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JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

### 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)	11 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 6, 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: 36 (9 × 4) Software: mfgtest Version 7.13.52.4	
*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 Spurious Emission (below 1GHz)	11n-20 Tx	2412 MHz
Spurious Emission (above 1GHz) 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz

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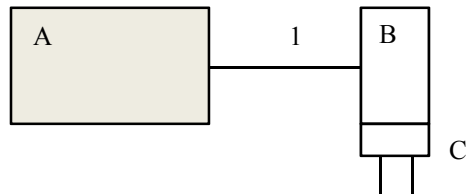
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## 4.2 Configuration and peripherals



AC 120 V/ 60 Hz

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

### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	instax SHARE	SP-2	*1)	FUJIFILM	EUT
B	AC Adapter	1528R	FF-1	FUJIFILM	-
C	AC Plug	TEU-001M	FF-1	FUJIFILM	-

\*1) T2000041: used for Radiated emission tests, T2000042: used for Antenna terminal tests.

### List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB Cable	1.0	Shielded	Shielded	-

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## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

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).

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a shielded room. 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 1 GHz]

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 1 GHz]

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 *3)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Voltage Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3 m (below 13 GHz), 1 m *1) (above 13 GHz)		3 m *1) (below 13 GHz), 1 m *2) (above 13 GHz)

\*1) Distance Factor:  $20 \times \log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$

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

\*3) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r04"

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The carrier level and noise levels were confirmed at each position of X and Y axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

**Worst case:**

Antenna polarization	Carrier (Band edge)	Spurious		
		Below 1 GHz	Above 1GHz	
			1 - 2.8 GHz	2.8 – 25 GHz
Horizontal	Y	Y	Y	Y
Vertical	X	Y	X	Y

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

**Measurement range** : 30 M - 26 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

## **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	50 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: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 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	10 kHz	30 kHz				
Band Edge confirmation	100 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *2)

\*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 not detected as shown in the chart.

(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 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**

**APPENDIX 1: Test data**

**Conducted Emission**

**DATA OF CONDUCTED EMISSION TEST**

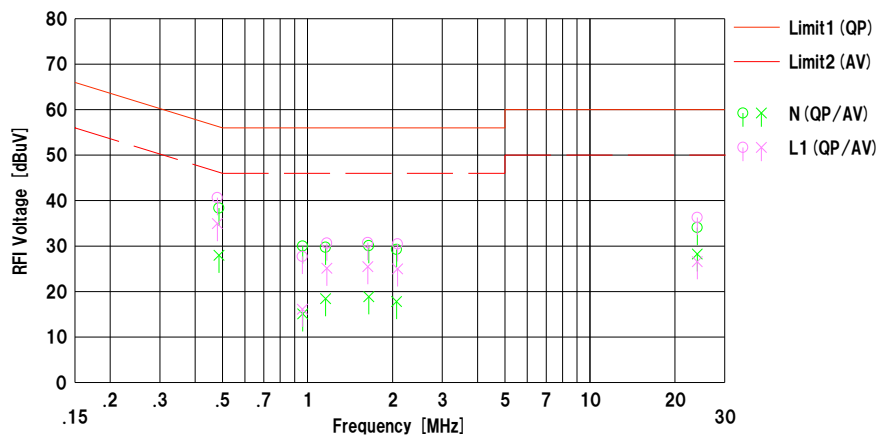
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room  
 Date : 2016/02/07

Mode : Tx.1 1n-20, 2412 MHz  
 Power : DC 3.7 V (AC adapter in AC120V/60Hz)  
 Temp./Humi. : 23 deg.C / 21 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP  
 Limit2 : FCC 15C (15.207) AV

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.48565	22.60	12.20	15.76	38.36	27.96	56.24	46.24	17.8	19.2	N	
2	0.96124	14.20	-0.70	15.81	30.01	15.11	56.00	46.00	25.9	30.8	N	
3	1.15815	13.90	2.60	15.83	29.73	18.43	56.00	46.00	26.2	27.5	N	
4	1.64762	14.20	3.00	15.87	30.07	18.87	56.00	46.00	25.9	27.1	N	
5	2.06693	13.40	1.90	15.89	29.29	17.79	56.00	46.00	26.7	28.2	N	
6	24.00008	16.20	10.40	17.88	34.08	28.28	60.00	50.00	25.9	21.7	N	
7	0.47898	24.90	19.20	15.76	40.66	34.96	56.36	46.36	15.7	11.4	L1	
8	0.95921	11.90	0.30	15.81	27.71	16.11	56.00	46.00	28.2	29.8	L1	
9	1.17095	14.80	9.30	15.83	30.63	25.13	56.00	46.00	25.3	20.8	L1	
10	1.63472	14.90	9.60	15.87	30.77	25.47	56.00	46.00	25.2	20.5	L1	
11	2.08470	14.60	9.10	15.89	30.49	24.99	56.00	46.00	25.5	21.0	L1	
12	24.00009	18.40	8.70	17.88	36.28	26.58	60.00	50.00	23.7	23.4	L1	

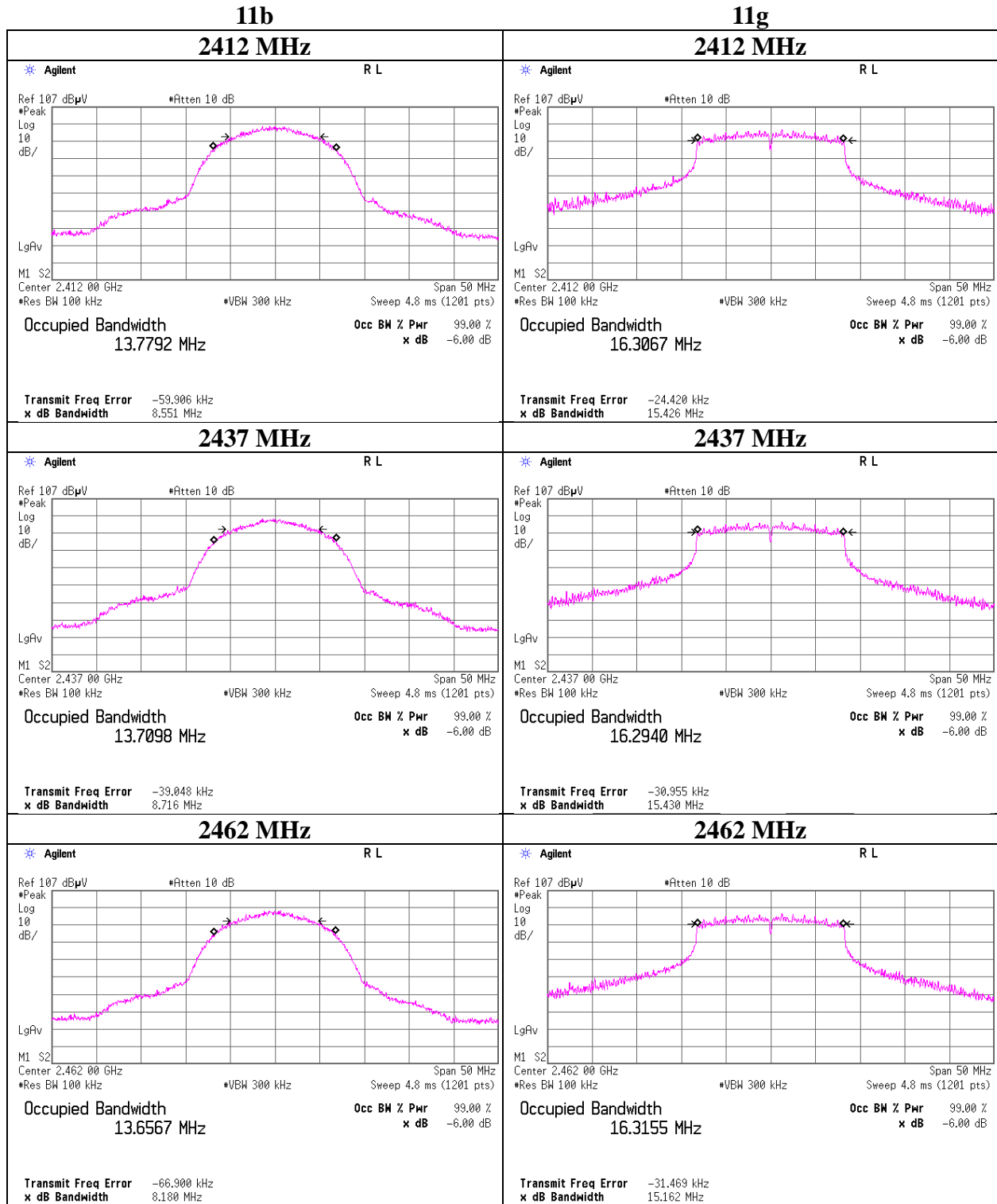
Calculation:Result [dBuV]=Reading [dBuV]+C.Fac (LISN+Cable+ATT) [dB]  
 LISN: SLS-02

### 6dB Bandwidth

Test place                   Shonan EMC Lab. No.6 Shielded Room  
Report No.                 11151247S-A-R2  
Date                         February 15, 2016  
Temperature / Humidity   20 deg. C / 33 % RH  
Engineer                  Yosuke Ishikawa  
Mode                        Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	8.551	> 500
	2437	8.716	> 500
	2462	8.180	> 500
11g	2412	15.426	> 500
	2437	15.430	> 500
	2462	15.162	> 500
11n-20	2412	15.135	> 500
	2437	15.411	> 500
	2462	16.009	> 500

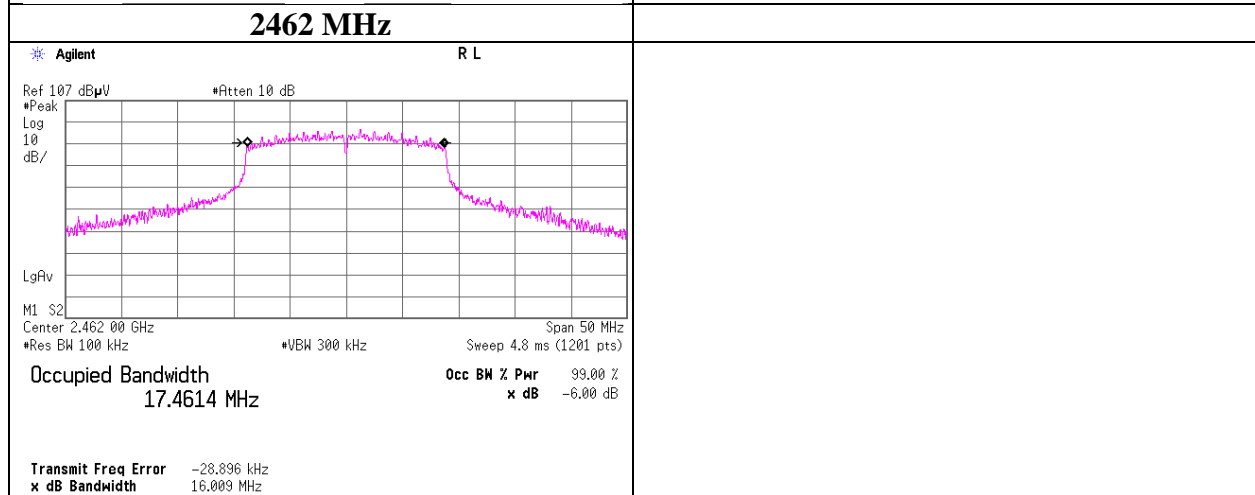
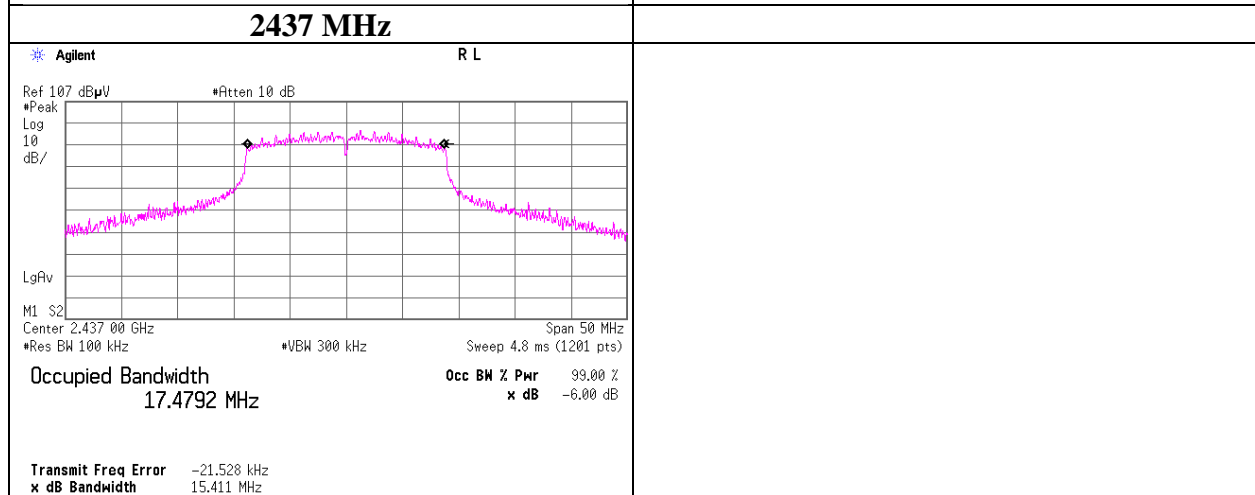
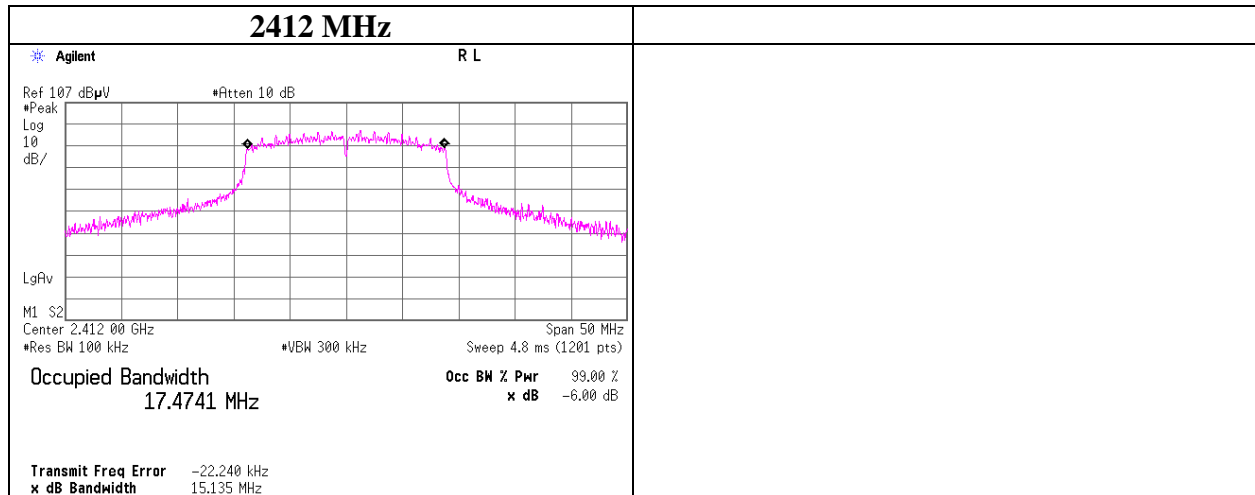
### 6dB Bandwidth





**6dB Bandwidth**

**11n-20**



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### Maximum Peak Output Power

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11151247S-A-R2  
Date : February 15, 2016  
Temperature / Humidity : 20 deg. C / 33 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-0.48	1.68	10.01	11.21	13.21	30.00	1000	18.79
2437	-0.59	1.68	10.01	11.10	12.88	30.00	1000	18.90
2462	-0.92	1.69	10.01	10.78	11.97	30.00	1000	19.22

Sample Calculation:

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-0.86	
2	-0.81	
5.5	-0.85	
11	-0.59	*

\*: Worst Rate

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

## Maximum Peak Output Power

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11151247S-A-R2  
Date : February 15, 2016  
Temperature / Humidity : 20 deg. C / 33 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.77	1.68	10.01	16.46	44.26	30.00	1000	13.54
2437	4.50	1.68	10.01	16.19	41.59	30.00	1000	13.81
2462	4.25	1.69	10.01	15.95	39.36	30.00	1000	14.05

Sample Calculation:

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

\*The equipment and cables were not used for factor 0 dB of the data sheets.

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	4.41	
9	4.35	
12	4.31	
18	4.27	
24	4.26	
36	4.35	
48	4.50	*
54	4.43	

\*: Worst Rate

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

**UL Japan, Inc.**

**Shonan EMC Lab.**

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

Telephone : +81 463 50 6400

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### Maximum Peak Output Power

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11151247S-A-R2  
Date : February 15, 2016  
Temperature / Humidity : 20 deg. C / 33 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	5.33	1.68	10.01	17.02	50.35	30.00	1000	12.98
2437	4.42	1.68	10.01	16.11	40.83	30.00	1000	13.89
2462	4.75	1.69	10.01	16.45	44.16	30.00	1000	13.55

Sample Calculation:

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

\*The equipment and cables were not used for factor 0.0 dB of the data sheets.

2437 MHz

MCS Number	Reading [dBm]	Remark
0	4.32	
1	4.26	
2	4.30	
3	4.26	
4	4.27	
5	4.37	
6	4.42	*
7	4.33	

\* Worst MCS

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

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**Average Output Power**  
**(Reference data for RF Exposure)**

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11151247S-A-R2  
Date : February 15, 2016  
Temperature / Humidity : 20 deg. C / 33 % RH  
Engineer : Yosuke Ishikawa  
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	-3.18	1.68	10.01	8.51	7.10	0.00	8.51	7.10
2437	-3.30	1.68	10.01	8.39	6.90	0.00	8.39	6.90
2462	-3.50	1.69	10.01	8.20	6.61	0.00	8.20	6.61

**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	-3.09	1.68	10.01	8.60	7.24	0.05	8.65	7.33
2437	-2.94	1.68	10.01	8.75	7.50	0.05	8.80	7.59
2462	-3.20	1.69	10.01	8.50	7.08	0.05	8.55	7.16

**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	-3.16	1.68	10.01	8.53	7.13	0.05	8.58	7.21
2437	-3.20	1.68	10.01	8.49	7.06	0.05	8.54	7.14
2462	-3.42	1.69	10.01	8.28	6.73	0.05	8.33	6.81

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

\*The equipment and cables were not used for factor 0 dB of the data sheets.

**Average Output Power**  
**(Reference data for RF Exposure)**

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11151247S-A-R2  
Date : February 15, 2016  
Temperature / Humidity : 20 deg. C / 33 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	-3.30	0.00	-3.30	*
	2	-3.34	0.00	-3.34	
	5.5	-3.36	0.00	-3.36	
	11	-3.39	0.00	-3.39	
11g	6	-2.94	0.05	-2.89	*
	9	-3.10	0.08	-3.02	
	12	-3.14	0.10	-3.04	
	18	-3.21	0.14	-3.07	
	24	-3.28	0.20	-3.08	
	36	-3.34	0.27	-3.07	
	48	-3.32	0.31	-3.01	
	54	-3.33	0.35	-2.98	

\* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

2437 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-3.11	0.05	-3.06	*
	1	-3.33	0.16	-3.17	
	2	-3.36	0.17	-3.19	
	3	-3.44	0.19	-3.25	
	4	-3.48	0.25	-3.23	
	5	-3.48	0.35	-3.13	
	6	-3.50	0.39	-3.11	
	7	-3.55	0.48	-3.07	

\* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

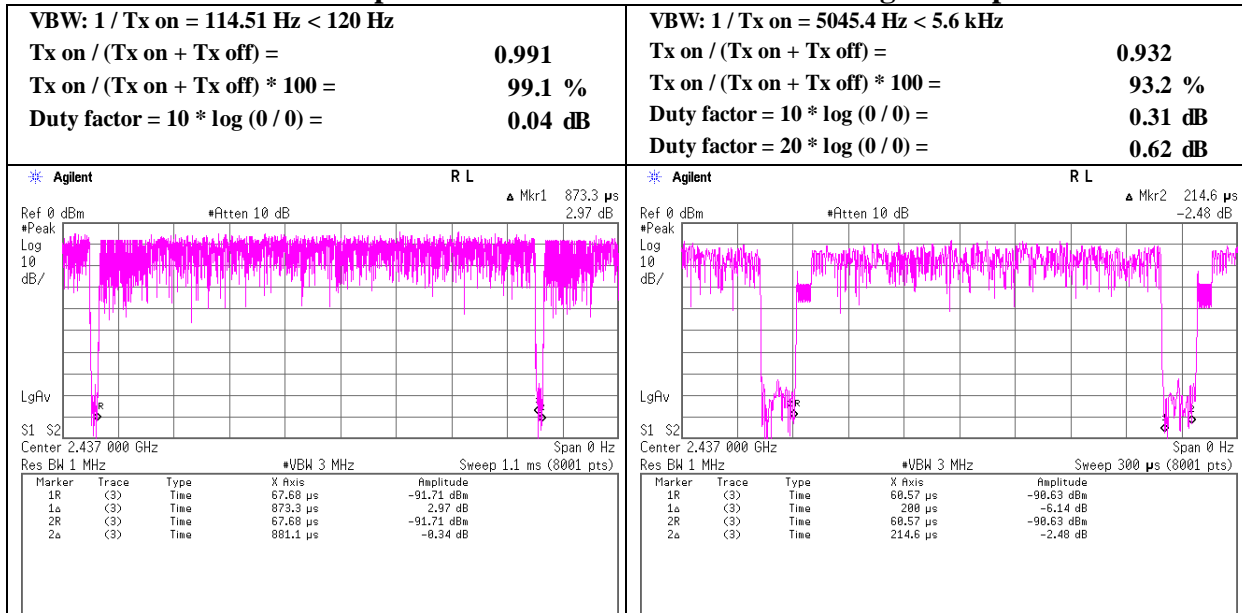
All comparison were carried out on same frequency and measurement factors.

### Burst rate confirmation

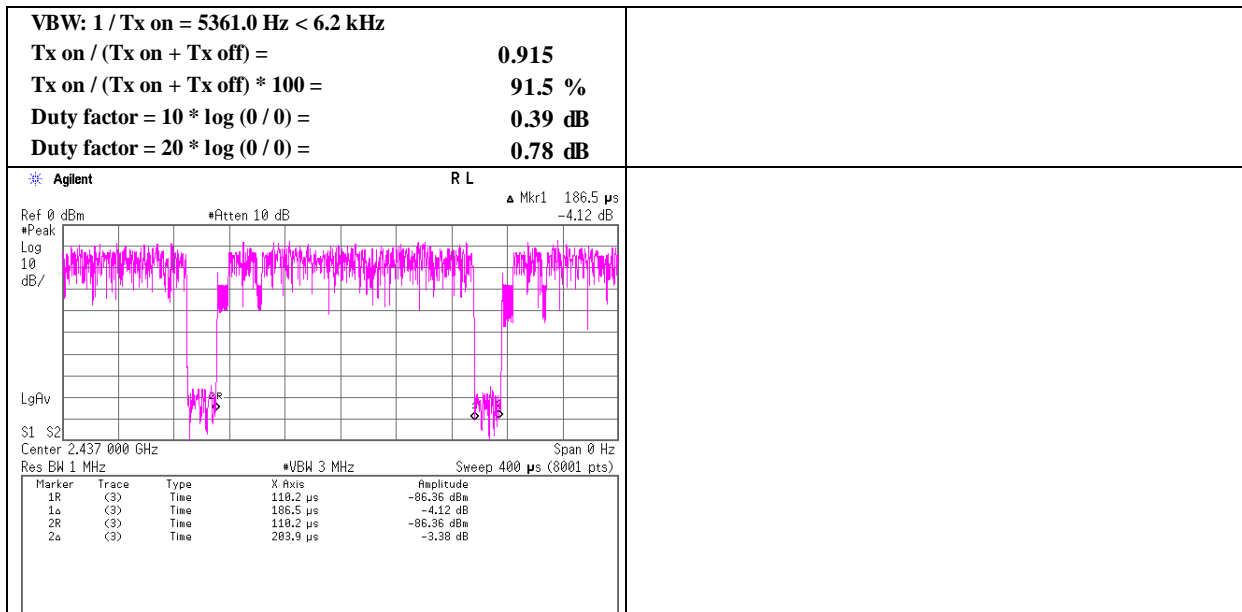
Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11151247S-A-R2
Date	February 15, 2016
Temperature / Humidity	20 deg. C / 33 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

#### 11b 11 Mbps

#### 11g 48 Mbps



#### 11n-20 MCS 6



\* Duty factor (=10 x log ()) was used for average output power.  
\* Duty factor (=20 x log ()) was used for radiated spurious emission

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11b 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	45.6	27.8	13.7	41.0	3.4	49.5	73.9	24.4	147	264	
Hori.	3618.033	PK	51.9	28.5	5.5	40.8	3.4	48.5	73.9	25.4	148	173	
Hori.	4824.000	PK	45.3	31.5	5.8	39.5	3.4	46.5	73.9	27.4	144	74	
Hori.	7236.000	PK	46.8	36.9	7.2	40.1	3.4	54.2	73.9	19.7	148	73	
Hori.	14472.000	PK	49.4	41.1	10.4	40.5	-9.5	50.9	73.9	23.0	141	69	
Hori.	2390.000	AV	36.5	27.8	13.7	41.0	3.4	40.4	53.9	13.5	147	264	
Hori.	3618.033	AV	48.2	28.5	5.5	40.8	3.4	44.8	53.9	9.1	148	173	
Hori.	4824.000	AV	35.2	31.5	5.8	39.5	3.4	36.4	53.9	17.5	144	74	
Hori.	7236.000	AV	37.8	36.9	7.2	40.1	3.4	45.2	53.9	8.7	148	73	
Hori.	14472.000	AV	41.7	41.1	10.4	40.5	-9.5	43.2	53.9	10.7	141	69	
Vert.	2390.000	PK	45.5	27.8	13.7	41.0	3.4	49.4	73.9	24.5	275	110	
Vert.	3618.033	PK	51.3	28.5	5.5	40.8	3.4	47.9	73.9	26.0	149	104	
Vert.	4824.000	PK	45.3	31.5	5.8	39.5	3.4	46.5	73.9	27.4	148	101	
Vert.	7236.000	PK	46.7	36.9	7.2	40.1	3.4	54.1	73.9	19.8	204	263	
Vert.	14472.000	PK	49.1	41.1	10.4	40.5	-9.5	50.6	73.9	23.3	132	103	
Vert.	2390.000	AV	36.2	27.8	13.7	41.0	3.4	40.1	53.9	13.8	275	110	
Vert.	3618.033	AV	47.1	28.5	5.5	40.8	3.4	43.7	53.9	10.2	149	104	
Vert.	4824.000	AV	35.4	31.5	5.8	39.5	3.4	36.6	53.9	17.3	148	101	
Vert.	7236.000	AV	39.0	36.9	7.2	40.1	3.4	46.4	53.9	7.5	204	263	
Vert.	14472.000	AV	40.6	41.1	10.4	40.5	-9.5	42.1	53.9	11.8	132	103	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	94.0	27.8	13.7	41.0	3.4	97.9	-	-	Carrier
Hori.	2400.000	PK	51.6	27.8	13.7	41.0	3.4	55.5	77.9	22.4	
Hori.	9648.000	PK	46.2	38.5	8.3	39.6	3.4	56.8	77.9	21.1	
Vert.	2412.000	PK	91.1	27.8	13.7	41.0	3.4	95.0	-	-	Carrier
Vert.	2400.000	PK	48.8	27.8	13.7	41.0	3.4	52.7	75.0	22.3	
Vert.	9648.000	PK	47.8	38.5	8.3	39.6	3.4	58.4	75.0	16.6	

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

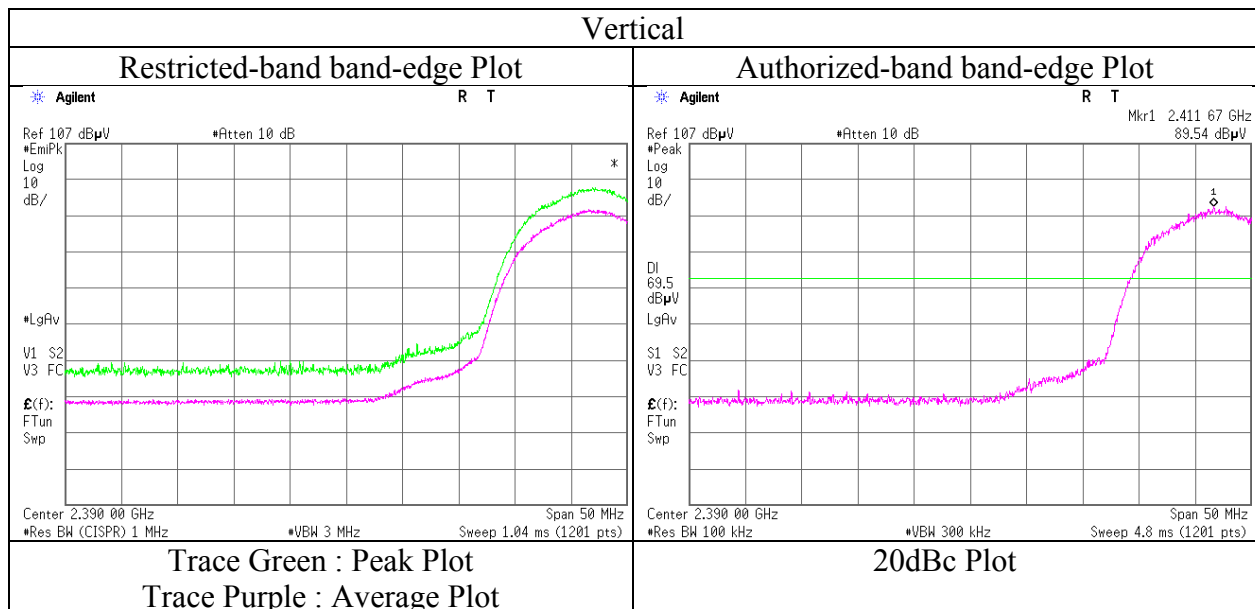
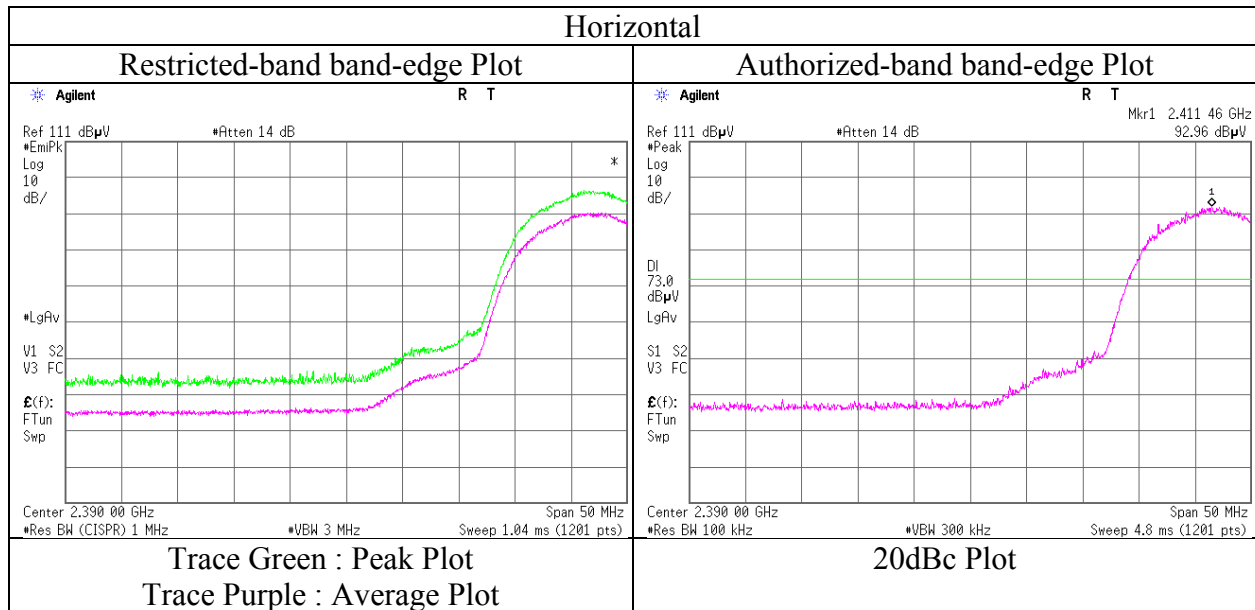
Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB



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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH  
Engineer : Kenichi Adachi  
(1-13 GHz)  
Mode : Tx 11b 2412 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11b 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3655.536	PK	51.0	28.6	5.5	40.7	3.4	47.8	73.9	26.1	149	175	
Hori.	4874.000	PK	45.2	31.7	5.9	39.5	3.4	46.7	73.9	27.2	150	0	
Hori.	7311.000	PK	46.7	36.9	7.3	40.2	3.4	54.1	73.9	19.8	145	72	
Hori.	14622.000	PK	50.0	41.0	10.4	40.6	-9.5	51.3	73.9	22.6	166	48	
Hori.	3655.536	AV	46.9	28.6	5.5	40.7	3.4	43.7	53.9	10.2	149	175	
Hori.	4874.000	AV	35.2	31.7	5.9	39.5	3.4	36.7	53.9	17.2	150	0	
Hori.	7311.000	AV	37.6	36.9	7.3	40.2	3.4	45.0	53.9	8.9	145	72	
Hori.	14622.000	AV	42.0	41.0	10.4	40.6	-9.5	43.3	53.9	10.6	166	48	
Vert.	3655.536	PK	50.4	28.6	5.5	40.7	3.4	47.2	73.9	26.7	147	109	
Vert.	4874.000	PK	45.3	31.7	5.9	39.5	3.4	46.8	73.9	27.1	150	0	
Vert.	7311.000	PK	46.8	36.9	7.3	40.2	3.4	54.2	73.9	19.7	201	264	
Vert.	14622.000	PK	48.9	41.0	10.4	40.6	-9.5	50.2	73.9	23.7	152	89	
Vert.	3655.536	AV	46.1	28.6	5.5	40.7	3.4	42.9	53.9	11.0	147	109	
Vert.	4874.000	AV	35.3	31.7	5.9	39.5	3.4	36.8	53.9	17.1	150	0	
Vert.	7311.000	AV	38.9	36.9	7.3	40.2	3.4	46.3	53.9	7.6	201	264	
Vert.	14622.000	AV	38.9	41.0	10.4	40.6	-9.5	40.2	53.9	13.7	152	89	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	93.2	27.8	13.7	41.0	3.4	97.1	-	-	Carrier
Hori.	9748.000	PK	45.8	38.5	8.3	39.5	3.4	56.5	77.2	20.7	
Vert.	2437.000	PK	90.5	27.8	13.7	41.0	3.4	94.4	-	-	Carrier
Vert.	9748.000	PK	47.0	38.5	8.3	39.5	3.4	57.7	74.5	16.8	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11b 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	46.7	27.9	13.8	41.0	3.4	50.8	73.9	23.1	147	254	
Hori.	3693.037	PK	51.4	28.6	5.5	40.7	3.4	48.2	73.9	25.7	146	176	
Hori.	4924.000	PK	45.0	31.9	5.9	39.4	3.4	46.8	73.9	27.1	143	71	
Hori.	7386.000	PK	45.5	36.9	7.4	40.3	3.4	52.9	73.9	21.0	147	74	
Hori.	14772.000	PK	49.3	40.9	10.5	40.6	-9.5	50.6	73.9	23.3	165	44	
Hori.	2483.500	AV	37.2	27.9	13.8	41.0	3.4	41.3	53.9	12.6	147	254	
Hori.	3693.037	AV	47.7	28.6	5.5	40.7	3.4	44.5	53.9	9.4	146	176	
Hori.	4924.000	AV	35.4	31.9	5.9	39.4	3.4	37.2	53.9	16.7	143	71	
Hori.	7386.000	AV	36.8	36.9	7.4	40.3	3.4	44.2	53.9	9.7	147	74	
Hori.	14772.000	AV	42.1	40.9	10.5	40.6	-9.5	43.4	53.9	10.5	165	44	
Vert.	2483.500	PK	45.9	27.9	13.8	41.0	3.4	50.0	73.9	23.9	274	108	
Vert.	3693.037	PK	50.9	28.6	5.5	40.7	3.4	47.7	73.9	26.2	147	107	
Vert.	4924.000	PK	45.0	31.9	5.9	39.4	3.4	46.8	73.9	27.1	146	101	
Vert.	7386.000	PK	46.3	36.9	7.4	40.3	3.4	53.7	73.9	20.2	194	263	
Vert.	14772.000	PK	47.4	40.9	10.5	40.6	-9.5	48.7	73.9	25.2	152	92	
Vert.	2483.500	AV	36.5	27.9	13.8	41.0	3.4	40.6	53.9	13.3	274	108	
Vert.	3693.037	AV	46.8	28.6	5.5	40.7	3.4	43.6	53.9	10.3	147	107	
Vert.	4924.000	AV	35.5	31.9	5.9	39.4	3.4	37.3	53.9	16.6	146	101	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB  
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

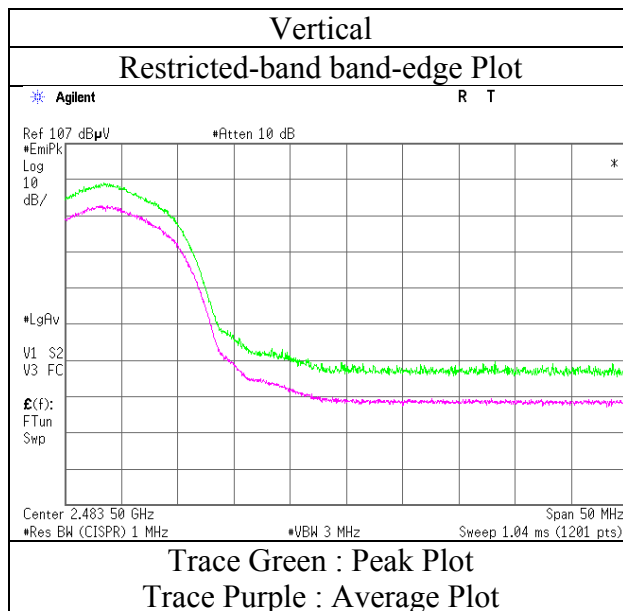
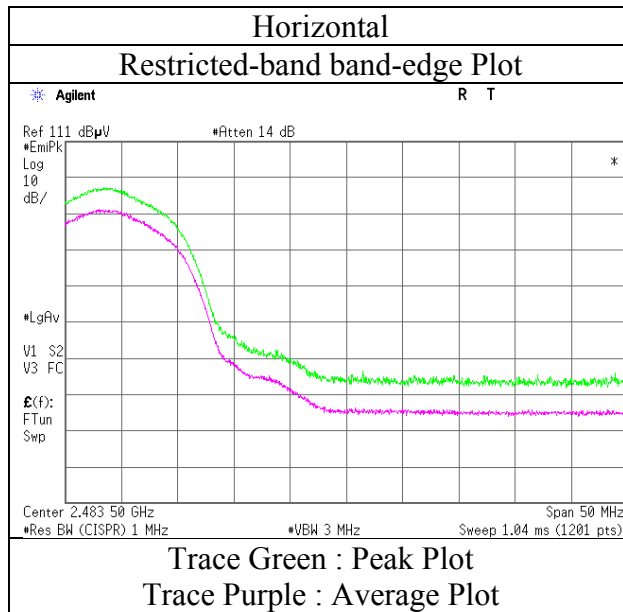
### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	92.6	27.9	13.8	41.0	3.4	96.7	-	-	Carrier
Hori.	9848.000	PK	45.7	38.5	8.4	39.4	3.4	56.6	76.6	20.0	Carrier
Vert.	2462.000	PK	89.8	27.9	13.8	41.0	3.4	93.9	-	-	Carrier
Vert.	9848.000	PK	46.6	38.5	8.4	39.4	3.4	57.5	73.8	16.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB  
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11151247S-A-R2
Date	February 3, 2016
Temperature / Humidity	24 deg. C / 23 % RH
Engineer	Kenichi Adachi (1-13 GHz)
Mode	Tx 11b 2462 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 6, 2016      February 7, 2016  
Temperature / Humidity : 24 deg. C / 27 % RH      23 deg. C / 21 % RH  
Engineer : Shinichi Takano      Yosuke Ishikawa  
            (1-26 GHz)      (30-1000 MHz)  
Mode : Tx 11g 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	62.2	27.8	13.7	41.0	3.4	66.1	73.9	7.8	125	269	
Hori.	3618.040	PK	51.1	28.5	5.5	40.8	3.4	47.7	73.9	26.2	118	359	
Hori.	4824.000	PK	45.4	31.5	5.8	39.5	3.4	46.6	73.9	27.3	100	0	
Hori.	7236.000	PK	45.6	36.9	7.2	40.1	3.4	53.0	73.9	20.9	148	81	
Hori.	14472.000	PK	49.3	41.1	10.4	40.5	-9.5	50.8	73.9	23.1	142	69	
Hori.	3618.040	AV	46.8	28.5	5.5	40.8	3.4	43.4	53.9	10.5	118	359	
Vert.	2390.000	PK	60.5	27.8	13.7	41.0	3.4	64.4	73.9	9.5	243	92	
Vert.	3618.095	PK	52.0	28.5	5.5	40.8	3.4	48.6	73.9	25.3	151	308	
Vert.	4824.000	PK	43.7	31.5	5.8	39.5	3.4	44.9	73.9	29.0	100	0	
Vert.	7236.000	PK	46.1	36.9	7.2	40.1	3.4	53.5	73.9	20.4	217	263	
Vert.	14472.000	PK	48.8	41.1	10.4	40.5	-9.5	50.3	73.9	23.6	177	119	
Vert.	3618.095	AV	46.7	28.5	5.5	40.8	3.4	43.3	53.9	10.6	151	308	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$   
13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	42.4	27.8	13.7	41.0	0.7	3.4	47.0	53.9	6.9	*1)
Hori.	4824.000	AV	35.3	31.5	5.8	39.5	0.7	3.4	37.2	53.9	16.7	
Hori.	7236.000	AV	36.7	36.9	7.2	40.1	0.7	3.4	44.8	53.9	9.1	
Hori.	14472.000	AV	41.9	41.1	10.4	40.5	0.7	-9.5	44.1	53.9	9.8	
Vert.	2390.000	AV	40.4	27.8	13.7	41.0	0.7	3.4	45.0	53.9	8.9	*1)
Vert.	4824.000	AV	35.3	31.5	5.8	39.5	0.7	3.4	37.2	53.9	16.7	
Vert.	7236.000	AV	38.5	36.9	7.2	40.1	0.7	3.4	46.6	53.9	7.3	
Vert.	14472.000	AV	40.7	41.1	10.4	40.5	0.7	-9.5	42.9	53.9	11.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor  
Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$   
13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

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

\*1) Not out of band emission (Leakage Power)

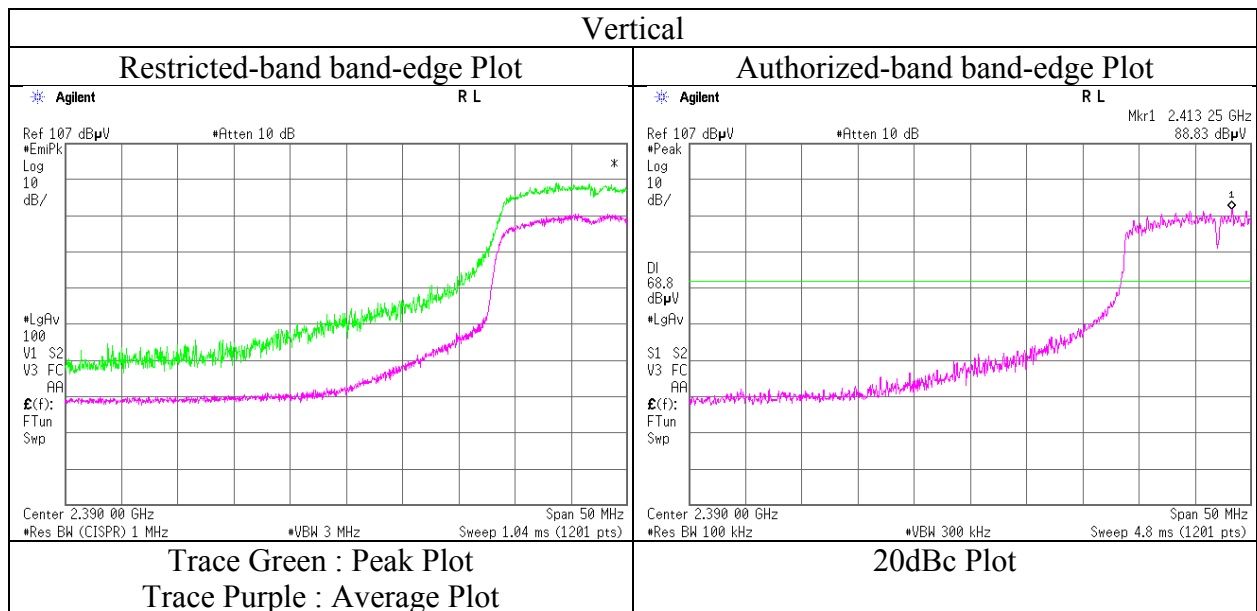
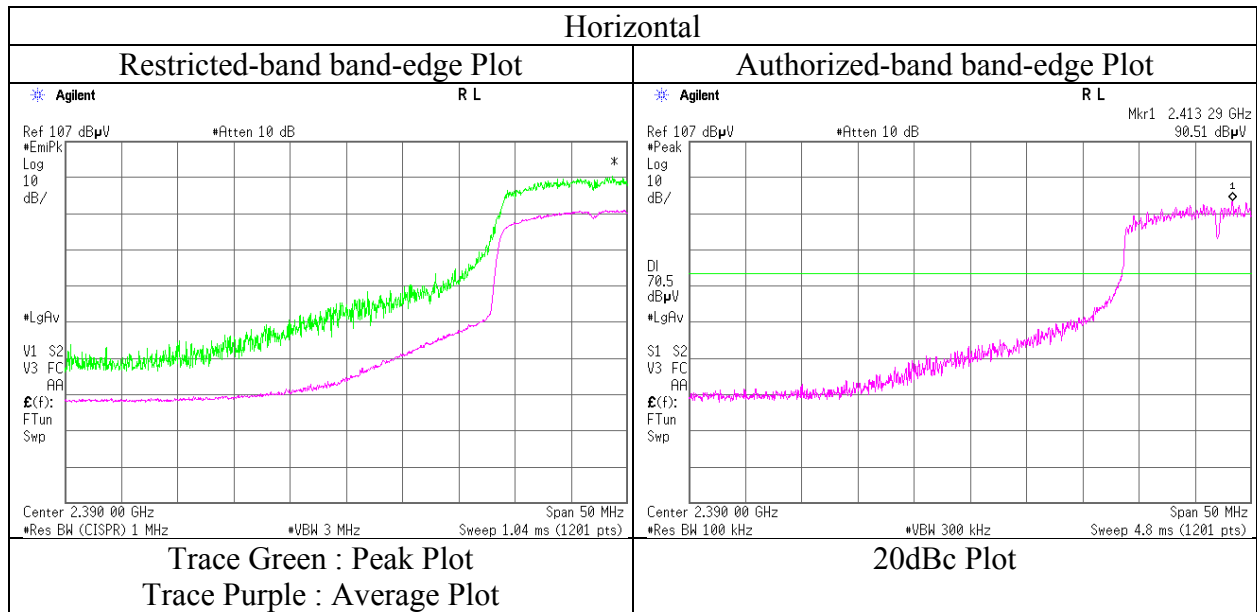
### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	90.5	27.8	13.7	41.0	3.4	94.4	-	-	Carrier
Hori.	2400.000	PK	57.7	27.8	13.7	41.0	3.4	61.6	74.4	12.8	
Hori.	9648.000	PK	44.3	38.5	8.3	39.6	3.4	54.9	74.4	19.5	
Vert.	2412.000	PK	88.8	27.8	13.7	41.0	3.4	92.7	-	-	Carrier
Vert.	2400.000	PK	55.8	27.8	13.7	41.0	3.4	59.7	72.7	13.0	
Vert.	9648.000	PK	45.6	38.5	8.3	39.6	3.4	56.2	72.7	16.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$   
13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 6, 2016  
Temperature / Humidity : 24 deg. C / 27 % RH  
Engineer : Shinichi Takano  
(1-26 GHz)  
Mode : Tx 11g 2412 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 6, 2016  
Temperature / Humidity : 24 deg. C / 27 % RH  
Engineer : Shinichi Takano  
(1-26 GHz)  
Mode : Tx 11g 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3655.562	PK	50.7	28.6	5.5	40.7	3.4	47.5	73.9	26.4	100	174	
Hori.	4874.000	PK	44.8	31.7	5.9	39.5	3.4	46.3	73.9	27.6	100	0	
Hori.	7311.000	PK	46.2	36.9	7.3	40.2	3.4	53.6	73.9	20.3	100	72	
Hori.	14622.000	PK	48.3	41.0	10.4	40.6	-9.5	49.6	73.9	24.3	139	70	
Hori.	3655.562	AV	46.3	28.6	5.5	40.7	3.4	43.1	53.9	10.8	100	174	
Vert.	3655.559	PK	51.1	28.6	5.5	40.7	3.4	47.9	73.9	26.0	250	107	
Vert.	4874.000	PK	44.3	31.7	5.9	39.5	3.4	45.8	73.9	28.1	100	0	
Vert.	7311.000	PK	46.8	36.9	7.3	40.2	3.4	54.2	73.9	19.7	224	259	
Vert.	14622.000	PK	47.9	41.0	10.4	40.6	-9.5	49.2	73.9	24.7	177	122	
Vert.	3655.559	AV	47.3	28.6	5.5	40.7	3.4	44.1	53.9	<b>9.8</b>	250	107	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	35.4	31.7	5.9	39.5	0.7	3.4	37.6	53.9	16.3	
Hori.	7311.000	AV	38.2	36.9	7.3	40.2	0.7	3.4	46.3	53.9	7.6	
Hori.	14622.000	AV	41.2	41.0	10.4	40.6	0.7	-9.5	43.2	53.9	10.7	
Vert.	4874.000	AV	35.4	31.7	5.9	39.5	0.7	3.4	37.6	53.9	16.3	
Vert.	7311.000	AV	39.2	36.9	7.3	40.2	0.7	3.4	47.3	53.9	<b>6.6</b>	
Vert.	14622.000	AV	40.0	41.0	10.4	40.6	0.7	-9.5	42.0	53.9	11.9	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	91.1	27.8	13.7	41.0	3.4	95.0	-	-	Carrier
Hori.	9748.000	PK	44.8	38.5	8.3	39.5	3.4	55.5	75.1	19.6	
Vert.	2437.000	PK	89.1	27.8	13.7	41.0	3.4	93.0	-	-	Carrier
Vert.	9748.000	PK	46.4	38.5	8.3	39.5	3.4	57.1	73.0	15.9	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 6, 2016  
Temperature / Humidity : 24 deg. C / 27 % RH  
Engineer : Shinichi Takano  
(1-26 GHz)  
Mode : Tx 11g 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	63.1	27.9	13.8	41.0	3.4	67.2	73.9	6.7	104	248	
Hori.	3693.041	PK	49.8	28.6	5.5	40.7	3.4	46.6	73.9	27.3	148	168	
Hori.	4924.000	PK	45.0	31.9	5.9	39.4	3.4	46.8	73.9	27.1	100	0	
Hori.	7386.000	PK	46.3	36.9	7.4	40.3	3.4	53.7	73.9	20.2	100	80	
Hori.	14772.000	PK	48.7	40.9	10.5	40.6	-9.5	50.0	73.9	23.9	139	71	
Hori.	3693.041	AV	45.0	28.6	5.5	40.7	3.4	41.8	53.9	12.1	148	168	
Vert.	2483.500	PK	62.8	27.9	13.8	41.0	3.4	66.9	73.9	7.0	297	90	
Vert.	3693.021	PK	50.8	28.6	5.5	40.7	3.4	47.6	73.9	26.3	286	109	
Vert.	4924.000	PK	44.3	31.9	5.9	39.4	3.4	46.1	73.9	27.8	100	0	
Vert.	7386.000	PK	47.1	36.9	7.4	40.3	3.4	54.5	73.9	19.4	133	261	
Vert.	14772.000	PK	47.5	40.9	10.5	40.6	-9.5	48.8	73.9	25.1	174	122	
Vert.	3693.021	AV	46.4	28.6	5.5	40.7	3.4	43.2	53.9	10.7	286	109	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	43.7	27.9	13.8	41.0	0.7	3.4	48.5	53.9	5.4	*1)
Hori.	4924.000	AV	35.7	31.9	5.9	39.4	0.7	3.4	38.2	53.9	15.7	
Hori.	7386.000	AV	38.0	36.9	7.4	40.3	0.7	3.4	46.1	53.9	7.8	
Hori.	14772.000	AV	40.1	40.9	10.5	40.6	0.7	-9.5	42.1	53.9	11.8	
Vert.	2483.500	AV	43.4	27.9	13.8	41.0	0.7	3.4	48.2	53.9	5.7	*1)
Vert.	4924.000	AV	35.2	31.9	5.9	39.4	0.7	3.4	37.7	53.9	16.2	
Vert.	7386.000	AV	38.8	36.9	7.4	40.3	0.7	3.4	46.9	53.9	7.0	
Vert.	14772.000	AV	39.1	40.9	10.5	40.6	0.7	-9.5	41.1	53.9	12.8	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

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

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	89.1	27.9	13.8	41.0	3.4	93.2	-	-	Carrier
Hori.	9848.000	PK	45.2	38.5	8.4	39.4	3.4	56.1	73.2	17.1	
Vert.	2462.000	PK	88.7	27.9	13.8	41.0	3.4	92.8	-	-	Carrier
Vert.	9848.000	PK	46.2	38.5	8.4	39.4	3.4	57.1	72.7	15.6	

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

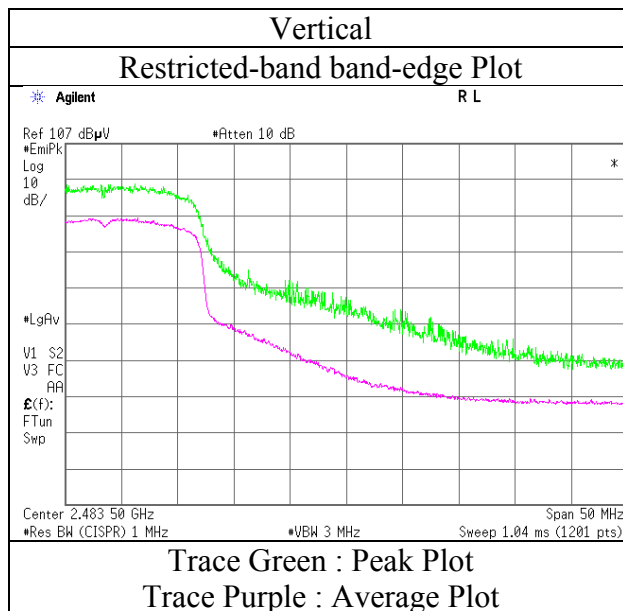
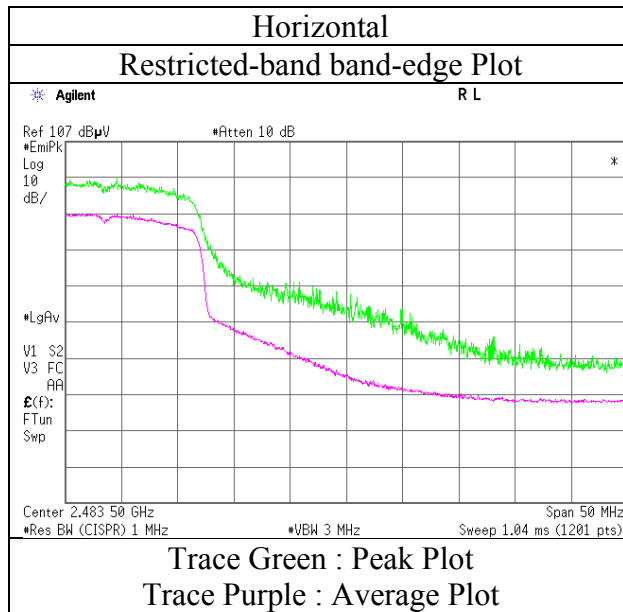
Distance factor : 1 GHz - 13 GHz :  $20\log(4.44 \text{ m} / 3.0 \text{ m}) = 3.4 \text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$



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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 6, 2016  
Temperature / Humidity : 24 deg. C / 27 % RH  
Engineer : Shinichi Takano  
(1-26 GHz)  
Mode : Tx 11g 2462 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11n-20 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	792.033	QP	32.0	20.9	10.6	31.5	0.0	32.0	46.0	14.0	112	54	
Hori.	839.996	QP	36.9	21.5	10.8	31.3	0.0	37.9	46.0	8.1	100	19	
Hori.	887.998	QP	30.1	22.2	10.9	31.0	0.0	32.2	46.0	13.8	100	63	
Hori.	2390.000	PK	62.0	27.8	13.7	41.0	3.4	65.9	73.9	8.0	146	259	
Hori.	3618.034	PK	52.2	28.5	5.5	40.8	3.4	48.8	73.9	25.1	149	176	
Hori.	4824.000	PK	45.3	31.5	5.8	39.5	3.4	46.5	73.9	27.4	142	74	
Hori.	7236.000	PK	46.2	36.9	7.2	40.1	3.4	53.6	73.9	20.3	145	72	
Hori.	14472.000	PK	49.1	41.1	10.4	40.5	-9.5	50.6	73.9	23.3	139	62	
Hori.	3618.034	AV	48.0	28.5	5.5	40.8	3.4	44.6	53.9	9.3	149	176	
Vert.	55.998	QP	42.6	8.5	7.0	32.1	0.0	26.0	40.0	14.0	100	105	
Vert.	72.007	QP	56.6	5.9	7.2	32.1	0.0	37.5	40.0	2.5	100	263	
Vert.	280.000	QP	32.6	18.4	8.6	32.0	0.0	27.6	46.0	18.4	100	44	
Vert.	743.985	QP	29.5	20.6	10.5	31.7	0.0	28.9	46.0	17.1	100	316	
Vert.	2390.000	PK	59.0	27.8	13.7	41.0	3.4	62.9	73.9	11.0	271	107	
Vert.	3618.034	PK	51.7	28.5	5.5	40.8	3.4	48.3	73.9	25.6	143	109	
Vert.	4824.000	PK	45.4	31.5	5.8	39.5	3.4	46.6	73.9	27.3	145	99	
Vert.	7236.000	PK	46.6	36.9	7.2	40.1	3.4	54.0	73.9	19.9	204	258	
Vert.	7236.000	PK	40.5	36.9	7.2	40.1	3.4	47.9	73.9	26.0	204	258	
Vert.	14472.000	PK	48.2	41.1	10.4	40.5	-9.5	49.7	73.9	24.2	182	110	
Vert.	3618.034	AV	47.9	28.5	5.5	40.8	3.4	44.5	53.9	9.4	143	109	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	41.4	27.8	13.7	41.0	0.8	3.4	46.1	53.9	7.8	*1)
Hori.	4824.000	AV	35.3	31.5	5.8	39.5	0.8	3.4	37.3	53.9	16.6	
Hori.	7236.000	AV	37.7	36.9	7.2	40.1	0.8	3.4	45.9	53.9	8.0	
Hori.	14472.000	AV	42.2	41.1	10.4	40.5	0.8	-9.5	44.5	53.9	9.4	
Vert.	2390.000	AV	39.0	27.8	13.7	41.0	0.8	3.4	43.7	53.9	10.2	*1)
Vert.	4824.000	AV	35.4	31.5	5.8	39.5	0.8	3.4	37.4	53.9	16.5	
Vert.	7236.000	AV	38.3	36.9	7.2	40.1	0.8	3.4	46.5	53.9	7.4	
Vert.	14472.000	AV	40.4	41.1	10.4	40.5	0.8	-9.5	42.7	53.9	11.2	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	91.8	27.8	13.7	41.0	3.4	95.7	-	-	Carrier
Hori.	2400.000	PK	59.0	27.8	13.7	41.0	3.4	62.9	75.7	12.8	
Hori.	9648.000	PK	44.5	38.5	8.3	39.6	3.4	55.1	75.7	20.6	
Vert.	2412.000	PK	88.2	27.8	13.7	41.0	3.4	92.1	-	-	Carrier
Vert.	2400.000	PK	56.8	27.8	13.7	41.0	3.4	60.7	72.2	11.5	
Vert.	9648.000	PK	45.7	38.5	8.3	39.6	3.4	56.3	72.2	15.9	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

**UL Japan, Inc.**

**Shonan EMC Lab.**

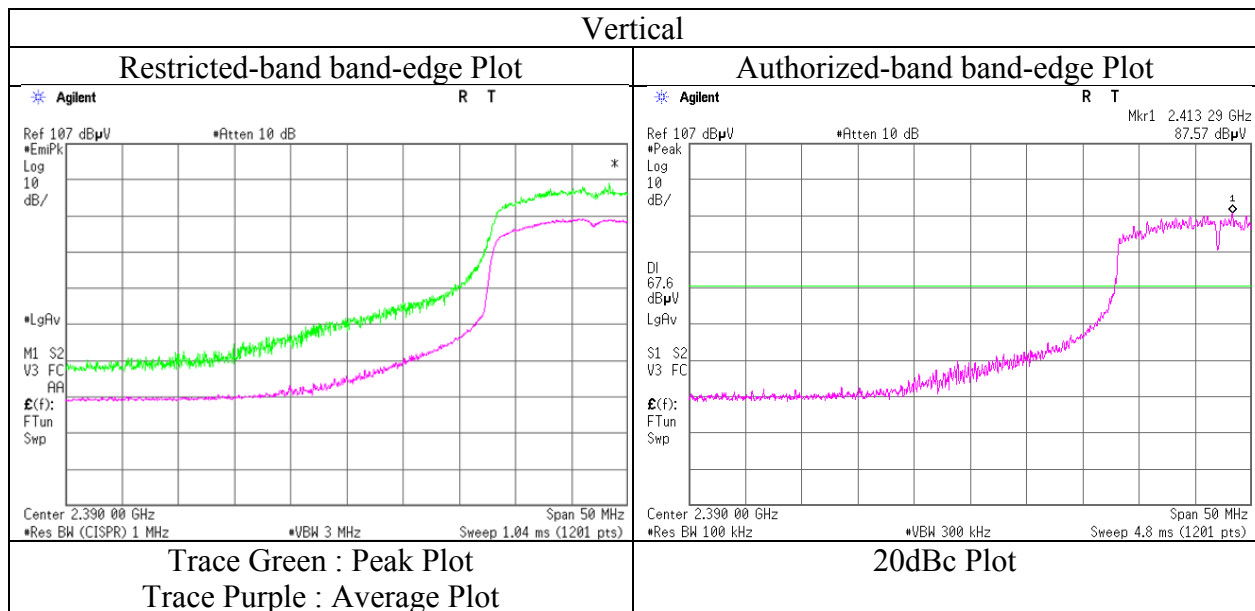
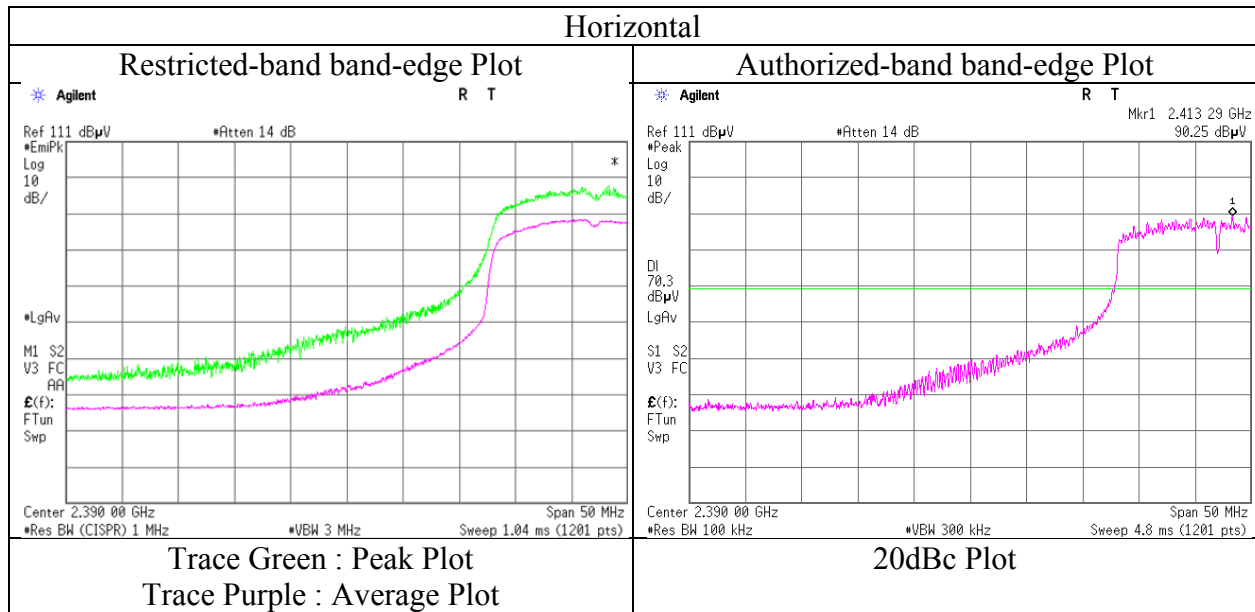
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH  
Engineer : Kenichi Adachi  
(1-13 GHz)  
Mode : Tx 11n-20 2412 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11n-20 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3655.535	PK	50.9	28.6	5.5	40.7	3.4	47.7	73.9	26.2	148	171	
Hori.	4874.000	PK	45.3	31.7	5.9	39.5	3.4	46.8	73.9	27.1	150	0	
Hori.	7311.000	PK	46.1	36.9	7.3	40.2	3.4	53.5	73.9	20.4	143	73	
Hori.	14622.000	PK	49.0	41.0	10.4	40.6	-9.5	50.3	73.9	23.6	140	68	
Hori.	3655.535	AV	46.0	28.6	5.5	40.7	3.4	42.8	53.9	11.1	148	171	
Vert.	3655.535	PK	50.7	28.6	5.5	40.7	3.4	47.5	73.9	26.4	146	102	
Vert.	4874.000	PK	45.2	31.7	5.9	39.5	3.4	46.7	73.9	27.2	150	0	
Vert.	7311.000	PK	46.4	36.9	7.3	40.2	3.4	53.8	73.9	20.1	203	258	
Vert.	14622.000	PK	48.4	41.0	10.4	40.6	-9.5	49.7	73.9	24.2	177	120	
Vert.	3655.535	AV	45.8	28.6	5.5	40.7	3.4	42.6	53.9	11.3	146	102	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	35.3	31.7	5.9	39.5	0.8	3.4	37.6	53.9	16.3	
Hori.	7311.000	AV	37.5	36.9	7.3	40.2	0.8	3.4	45.7	53.9	8.2	
Hori.	14622.000	AV	41.0	41.0	10.4	40.6	0.8	-9.5	43.1	53.9	10.8	
Vert.	4874.000	AV	35.3	31.7	5.9	39.5	0.8	3.4	37.6	53.9	16.3	
Vert.	7311.000	AV	38.1	36.9	7.3	40.2	0.8	3.4	46.3	53.9	7.6	
Vert.	14622.000	AV	40.0	41.0	10.4	40.6	0.8	-9.5	42.1	53.9	11.8	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	90.9	27.8	13.7	41.0	3.4	94.8	-	-	Carrier
Hori.	9748.000	PK	44.9	38.5	8.3	39.5	3.4	55.6	74.8	19.2	
Vert.	2437.000	PK	87.9	27.8	13.7	41.0	3.4	91.8	-	-	Carrier
Vert.	9748.000	PK	45.9	38.5	8.3	39.5	3.4	56.6	71.8	15.2	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016      February 6, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH      24 deg. C / 27 % RH  
Engineer : Kenichi Adachi      Shinichi Takano  
            (1-13 GHz)      (13-26 GHz)  
Mode : Tx 11n-20 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	62.7	27.9	13.8	41.0	3.4	66.8	73.9	7.1	129	257	
Hori.	3693.036	PK	51.2	28.6	5.5	40.7	3.4	48.0	73.9	25.9	145	177	
Hori.	4924.000	PK	45.3	31.9	5.9	39.4	3.4	47.1	73.9	26.8	150	0	
Hori.	7386.000	PK	45.2	36.9	7.4	40.3	3.4	52.6	73.9	21.3	144	74	
Hori.	14772.000	PK	48.9	40.9	10.5	40.6	-9.5	50.2	73.9	23.7	139	65	
Hori.	3693.036	AV	47.5	28.6	5.5	40.7	3.4	44.3	53.9	9.6	145	177	
Hori.	14772.000	AV	40.4	40.9	10.5	40.6	-9.5	41.7	53.9	12.2	139	65	
Vert.	2483.500	PK	59.6	27.9	13.8	41.0	3.4	63.7	73.9	10.2	271	107	
Vert.	3693.036	PK	50.8	28.6	5.5	40.7	3.4	47.6	73.9	26.3	147	102	
Vert.	4924.000	PK	45.4	31.9	5.9	39.4	3.4	47.2	73.9	26.7	150	0	
Vert.	7386.000	PK	47.1	36.9	7.4	40.3	3.4	54.5	73.9	19.4	194	261	
Vert.	14772.000	PK	48.2	40.9	10.5	40.6	-9.5	49.5	73.9	24.4	172	124	
Vert.	3693.036	AV	46.9	28.6	5.5	40.7	3.4	43.7	53.9	10.2	147	102	
Vert.	14772.000	AV	39.5	40.9	10.5	40.6	-9.5	40.8	53.9	13.1	172	124	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	43.8	27.9	13.8	41.0	0.8	3.4	48.7	53.9	5.2	*1)
Hori.	4924.000	AV	35.3	31.9	5.9	39.4	0.8	3.4	37.9	53.9	16.0	
Hori.	7386.000	AV	36.3	36.9	7.4	40.3	0.8	3.4	44.5	53.9	9.4	
Vert.	2483.500	AV	40.9	27.9	13.8	41.0	0.8	3.4	45.8	53.9	8.1	*1)
Vert.	4924.000	AV	35.4	31.9	5.9	39.4	0.8	3.4	38.0	53.9	15.9	
Vert.	7386.000	AV	37.5	36.9	7.4	40.3	0.8	3.4	45.7	53.9	8.2	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	91.3	27.9	13.8	41.0	3.4	95.4	-	-	Carrier
Hori.	9848.000	PK	44.9	38.5	8.4	39.4	3.4	55.8	75.4	19.6	
Vert.	2462.000	PK	87.7	27.9	13.8	41.0	3.4	91.8	-	-	Carrier
Vert.	9848.000	PK	45.5	38.5	8.4	39.4	3.4	56.4	71.7	15.3	

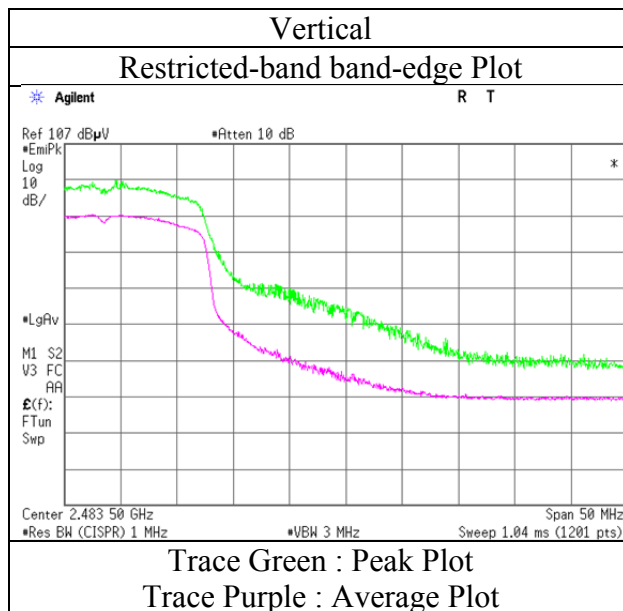
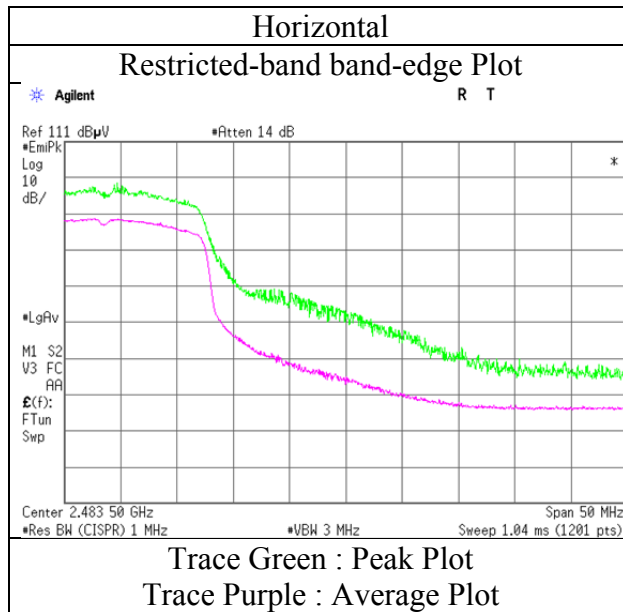
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(4.44 m / 3.0 m) = 3.4 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

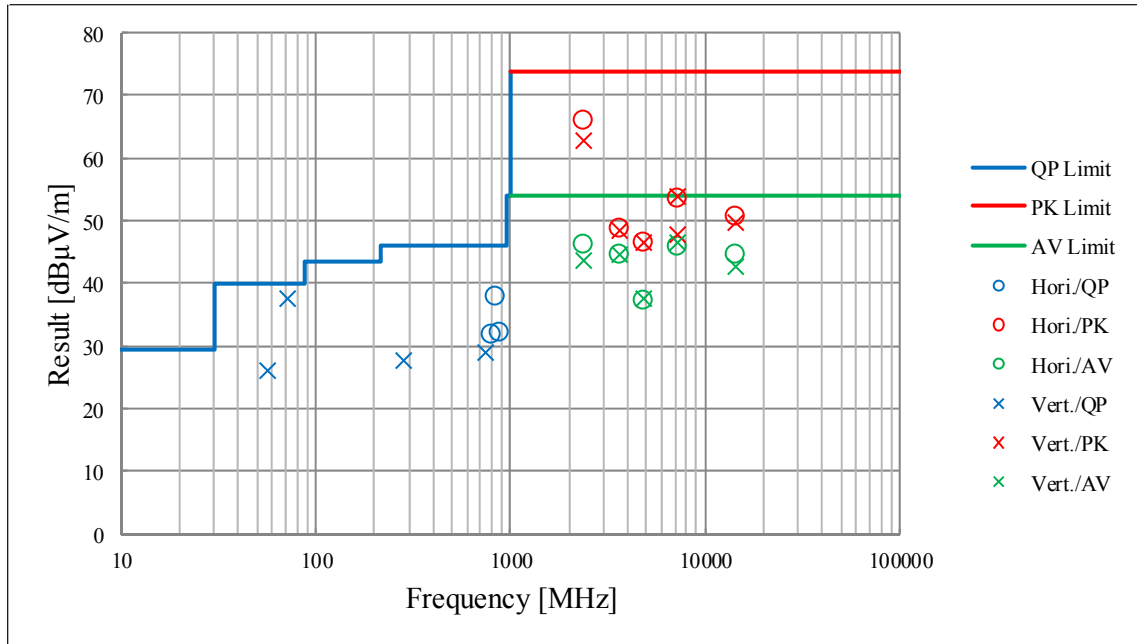
Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11151247S-A-R2  
Date : February 3, 2016  
Temperature / Humidity : 24 deg. C / 23 % RH  
Engineer : Kenichi Adachi  
(1-13 GHz)  
Mode : Tx 11n-20 2462 MHz



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

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

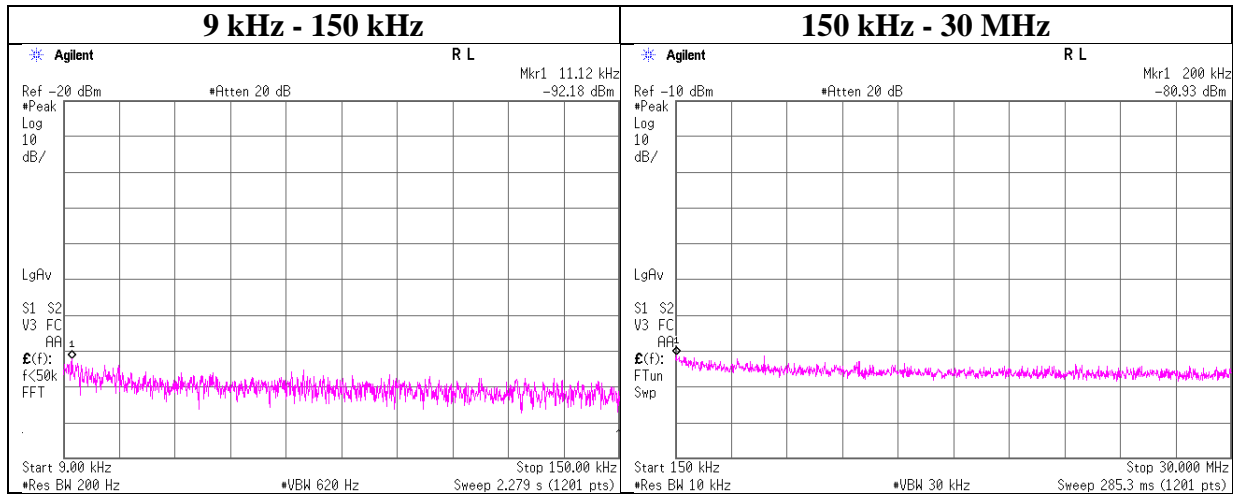
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11151247S-A-R2	
Date	February 6, 2016	February 7, 2016
Temperature / Humidity	24 deg. C / 27 % RH	23 deg. C / 21 % RH
Engineer	Shinichi Takano	Yosuke Ishikawa
	(1-26 GHz)	(30-1000 MHz)
Mode	Tx 11g 2412 MHz	



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

### Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11151247S-A-R2
Date	February 16, 2016
Temperature / Humidity	20 deg. C / 35 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11n-20 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
11.12	-92.2	0.01	9.9	2.0	1	-80.2	300	6.0	-19.0	46.6	65.6	
200.00	-80.9	0.01	9.9	2.0	1	-69.0	300	6.0	-7.7	21.5	29.2	

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

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



### Power Density

Test place Shonan EMC Lab. No.6 Shielded Room  
Report No. 11151247S-A-R2  
Date February 15, 2016  
Temperature / Humidity 20 deg. C / 33 % RH  
Engineer Yosuke Ishikawa  
Mode Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-25.23	1.68	10.01	-13.54	8.00	21.54
2437.00	-24.62	1.68	10.01	-12.93	8.00	20.93
2462.00	-26.16	1.69	10.01	-14.46	8.00	22.46

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-27.31	1.68	10.01	-15.62	8.00	23.62
2437.00	-27.23	1.68	10.01	-15.54	8.00	23.54
2462.00	-26.95	1.69	10.01	-15.25	8.00	23.25

11n-20

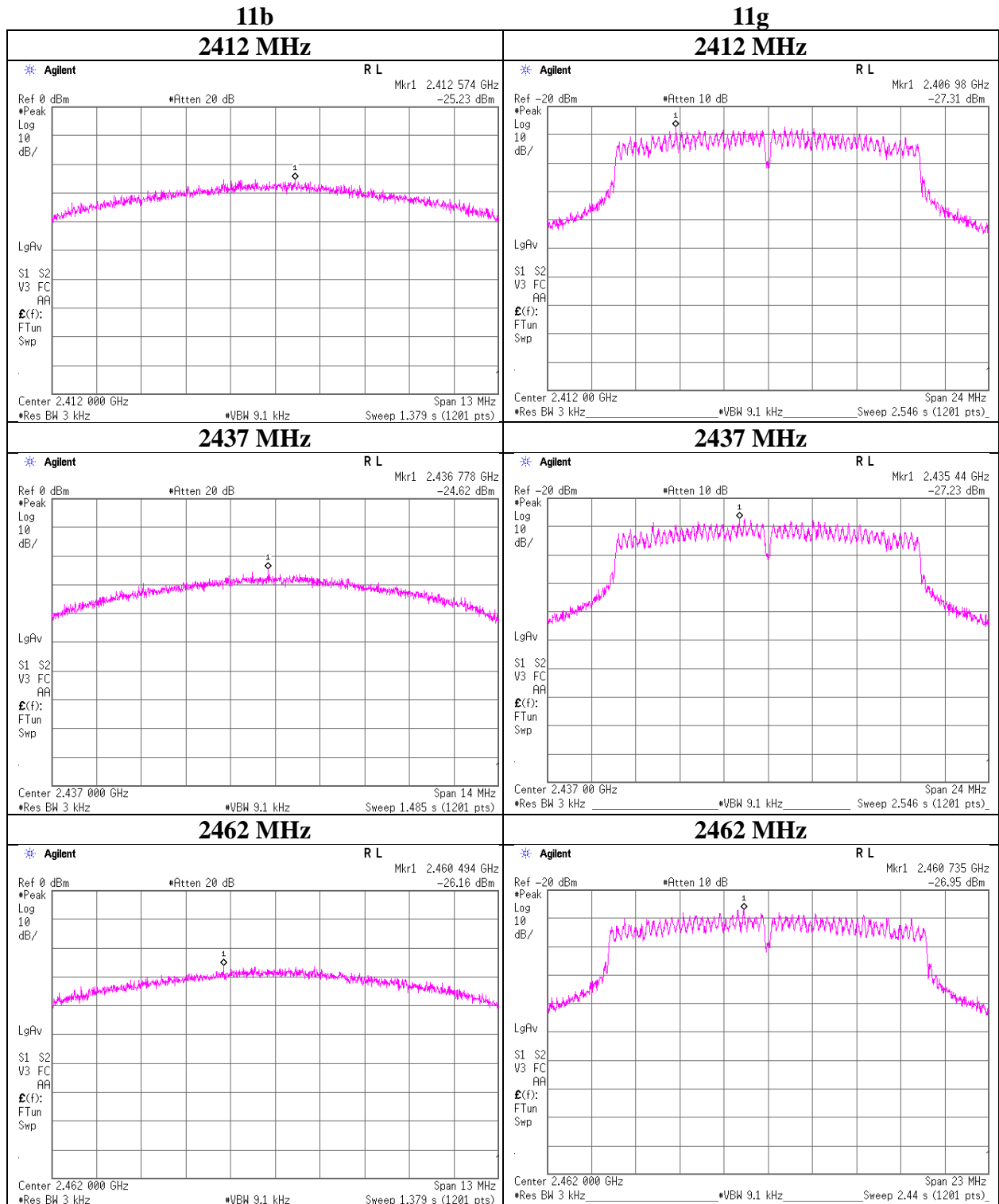
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-26.47	1.68	10.01	-14.78	8.00	22.78
2437.00	-27.73	1.68	10.01	-16.04	8.00	24.04
2462.00	-27.50	1.69	10.01	-15.80	8.00	23.80

Sample Calculation:

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

\*The equipment and cables were not used for factor 0 dB of the data sheets.

**Power Density**



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**Shonan EMC Lab.**

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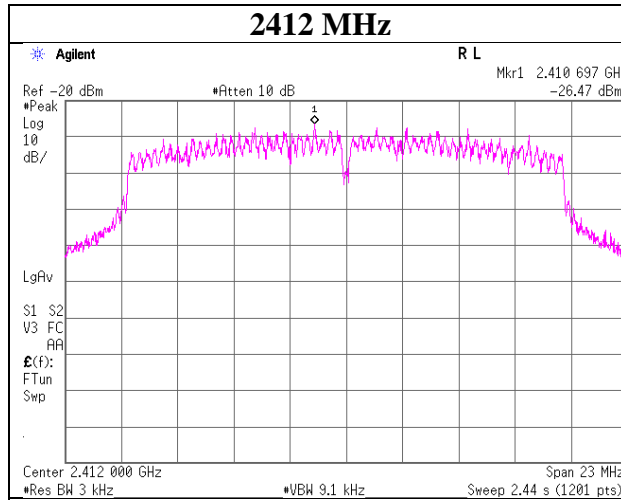
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

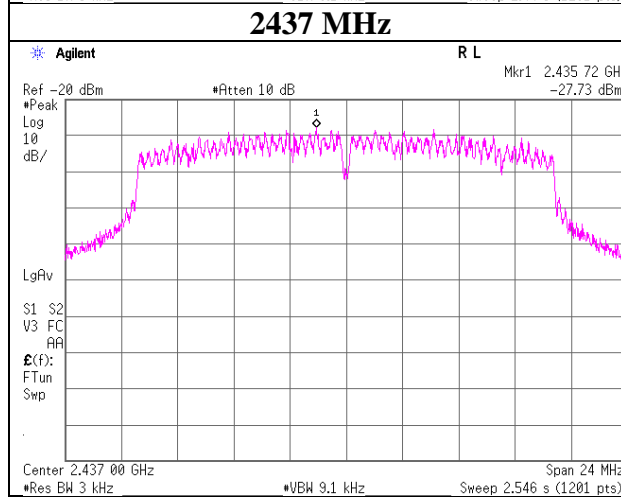
**Power Density**

**11n-20**

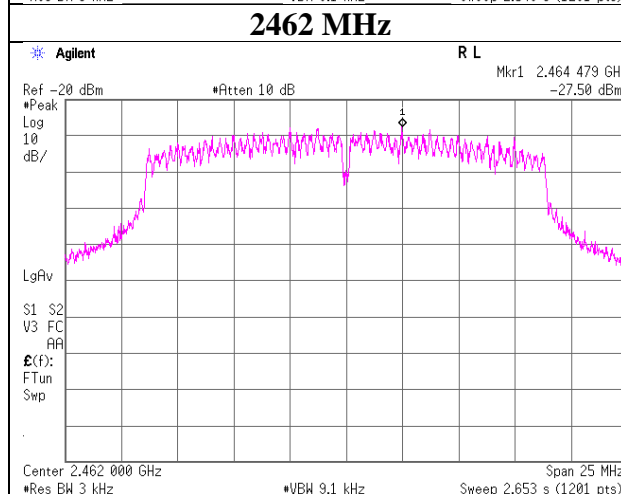
**2412 MHz**



**2437 MHz**



**2462 MHz**



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**Shonan EMC Lab.**

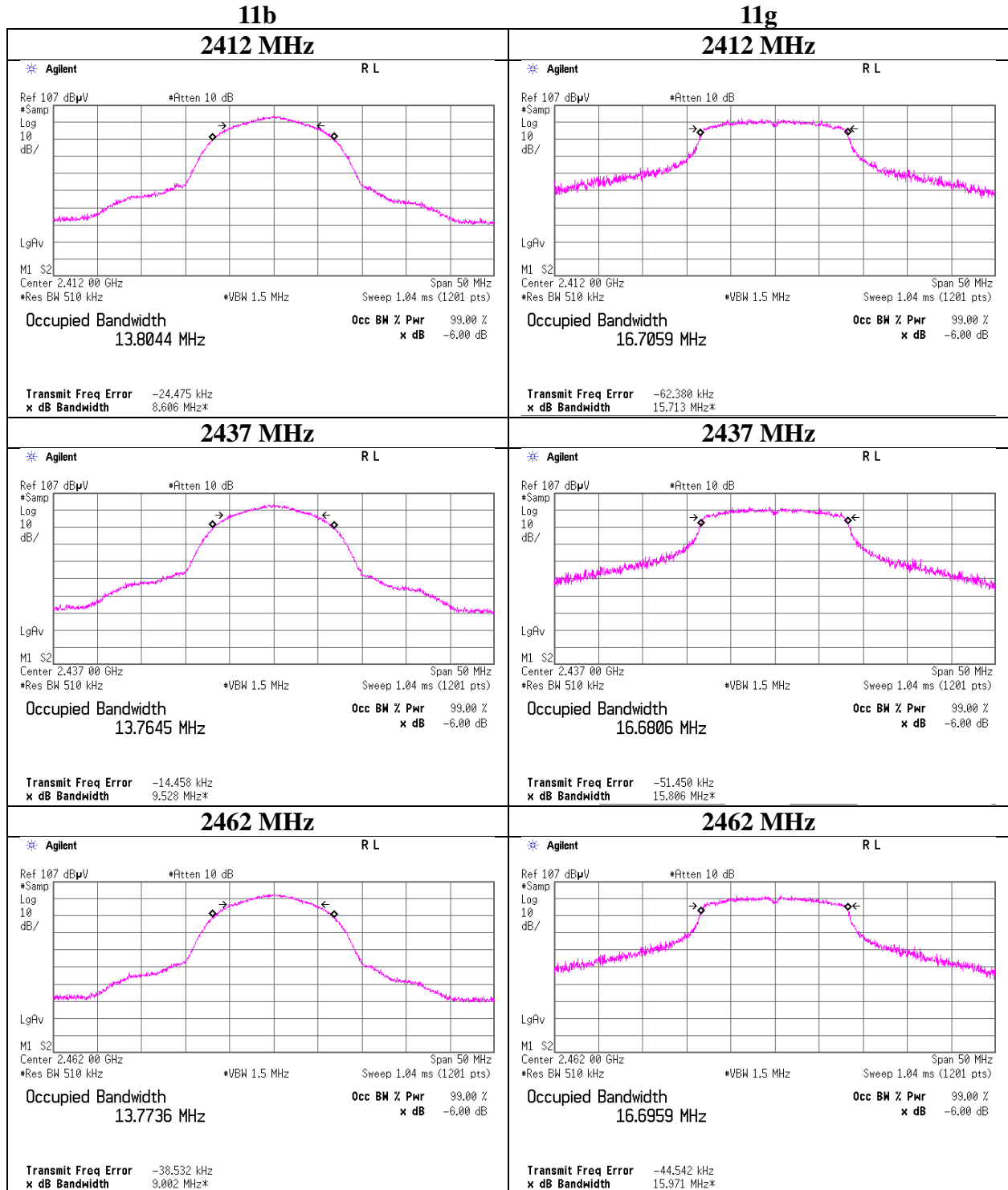
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### 99% Occupied Bandwidth

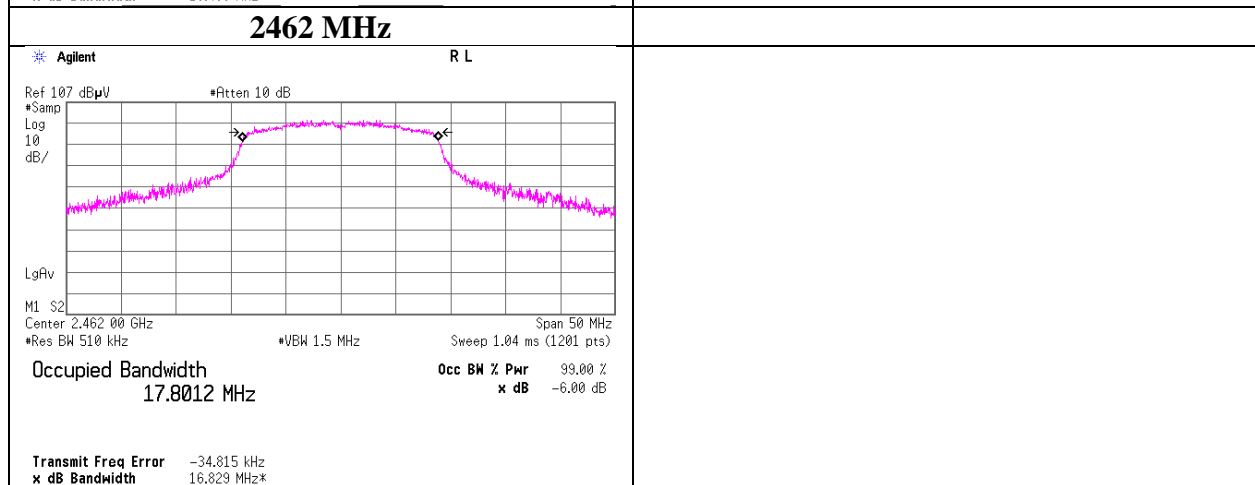
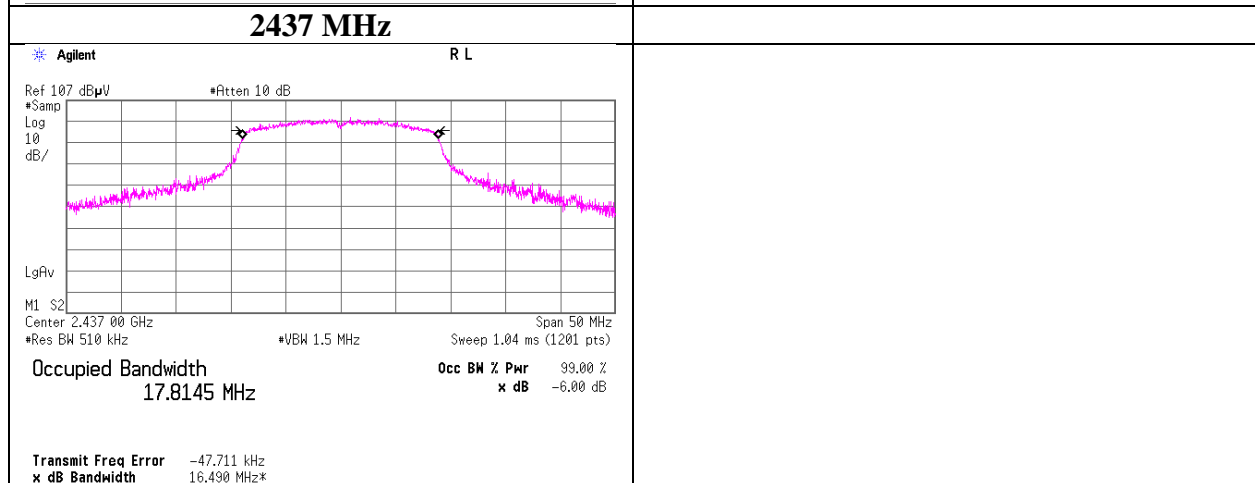
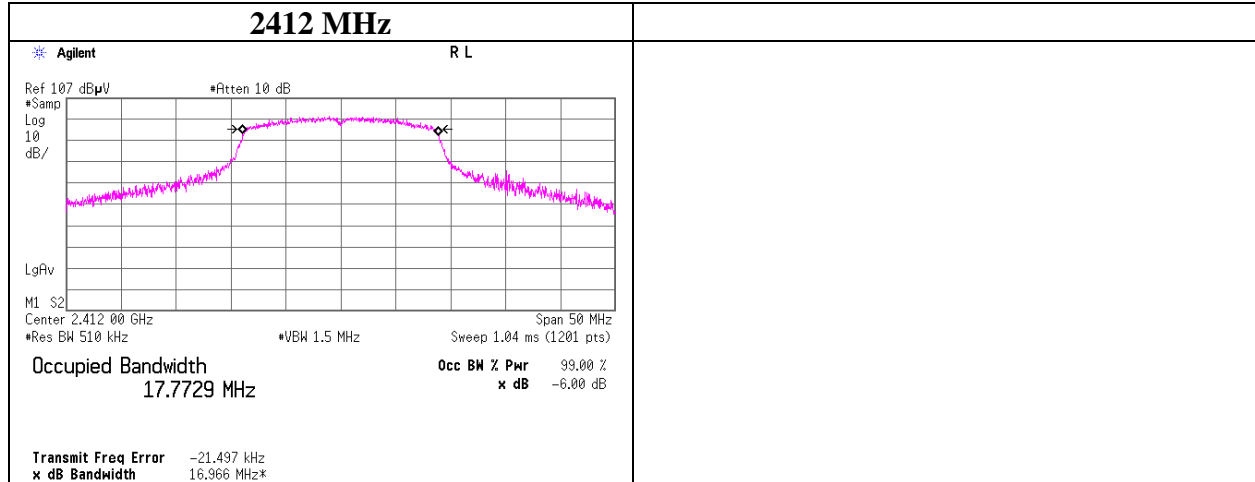
Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11151247S-A-R2
Date	February 15, 2016
Temperature / Humidity	20 deg. C / 33 % RH
Engineer	Yosuke Ishikawa
Mode	Tx



## 99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11151247S-A-R2
Date	February 15, 2016
Temperature / Humidity	20 deg. C / 33 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

### 11n-20



## **APPENDIX 2: Test instruments**

### **Test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2015/03/26 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2015/11/04 * 12
SCC-G32	Coaxial Cable	Junkosha	MWX241-0200 0KMSKMS	OCT-09-13-0 05	AT	2015/10/08 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2015/10/22 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2015/04/02 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2015/04/02 * 12
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SV WR)	3	RE	2015/08/28 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-0 18	RE	2015/06/08 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2015/11/04 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2015/11/16 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2015/05/27 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2015/05/19 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2015/03/26 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE ,CE,RFI,MF)	-	RE,CE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2015/11/18 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2015/03/23 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2015/03/17 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2015/03/23 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2015/03/11 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA )	3	RE	2015/07/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2015/10/11 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2015/10/11 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2015/08/31 * 12
SCC-C1/C2/C3/C 4/C5/C10/SRSE- 03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner /Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA /141PE/141PE/ 141PE/141PE/ NS4906	-/0901-271(R F Selector)	RE	2015/04/17 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2015/02/18 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2015/03/24 * 12
SCC-C9/C10/SR SE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141P E/NS4906	-/0901-271(R F Selector)	CE	2015/04/17 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2015/02/24 * 12
SAT6-09	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	CE	2015/08/31 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2015/12/07 * 12
STM-05	Terminator	TME	CT-01 BP	-	CE	2015/12/18 * 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 test**  
                              **RE: Radiated Emission test**  
                              **AT: Antenna Terminal Conducted test**

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