



RADIO TEST REPORT

Test Report No. : 11854935S-A-R2

Applicant : PIONEER CORPORATION
Type of Equipment : MAIN UNIT
Model No. : D172G5
FCC ID : AJDK104
Test regulation : FCC Part 15 Subpart C: 2017
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 11854935S-A-R1.

Date of test: July 26 to 28, 2017

Representative test engineer:

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Makoto Hosaka

Engineer

Consumer Technology Division

Approved by:

A. Hayashi

Akio Hayashi

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

REVISION HISTORY

Original Test Report No.: 11854935S-A

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SECTION 1: Customer information

Company Name	:	PIONEER CORPORATION
Address	:	25-1, Yamada, Kawagoe-shi, Saitama-ken 350-8555, JAPAN
Telephone Number	:	+81-49-228-7787
Facsimile Number	:	+81-49-228-6493
Contact Person	:	Tomoyuki Tanaka

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

2.1 Identification of E.U.T.

Type of Equipment	:	MAIN UNIT
Model No.	:	D172G5
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample	:	July 22, 2017
Country of Mass-production	:	Japan
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: D172G5 (referred to as the EUT in this report) is a MAIN UNIT.

Clock frequency(ies) in the system	:	Oscillator	(Module) 0.032768 MHz
		Internal Communication	(Module) 195 MHz

Radio Specification

WLAN

Radio Type	:	Transceiver
Frequency of Operation	:	2412 MHz- 2462 MHz
Modulation	:	DSSS, OFDM
Power Supply (inner)	:	DC 3.3 V / 1.8 V
Antenna type	:	inverted F type
Antenna Gain	:	2.94 dBi
Operating Temperature	:	-20 deg. C - +65 deg. C

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz,
2400-2483.5 MHz, and 5725-5850 MHz

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	N/A	N/A	N/A*1)
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.7 dB 9648.000 MHz, AV, Hori. Tx 11g 2412 MHz	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

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

*1) The test is not applicable since the EUT does not have AC ports.

*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v04 12.2.7.

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

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V / 1.8 V) constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, Therefore this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (U.FL). 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 $k=2$.
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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 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	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

Radiated emission test

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

3.5 Test Location

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 Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
 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	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
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)

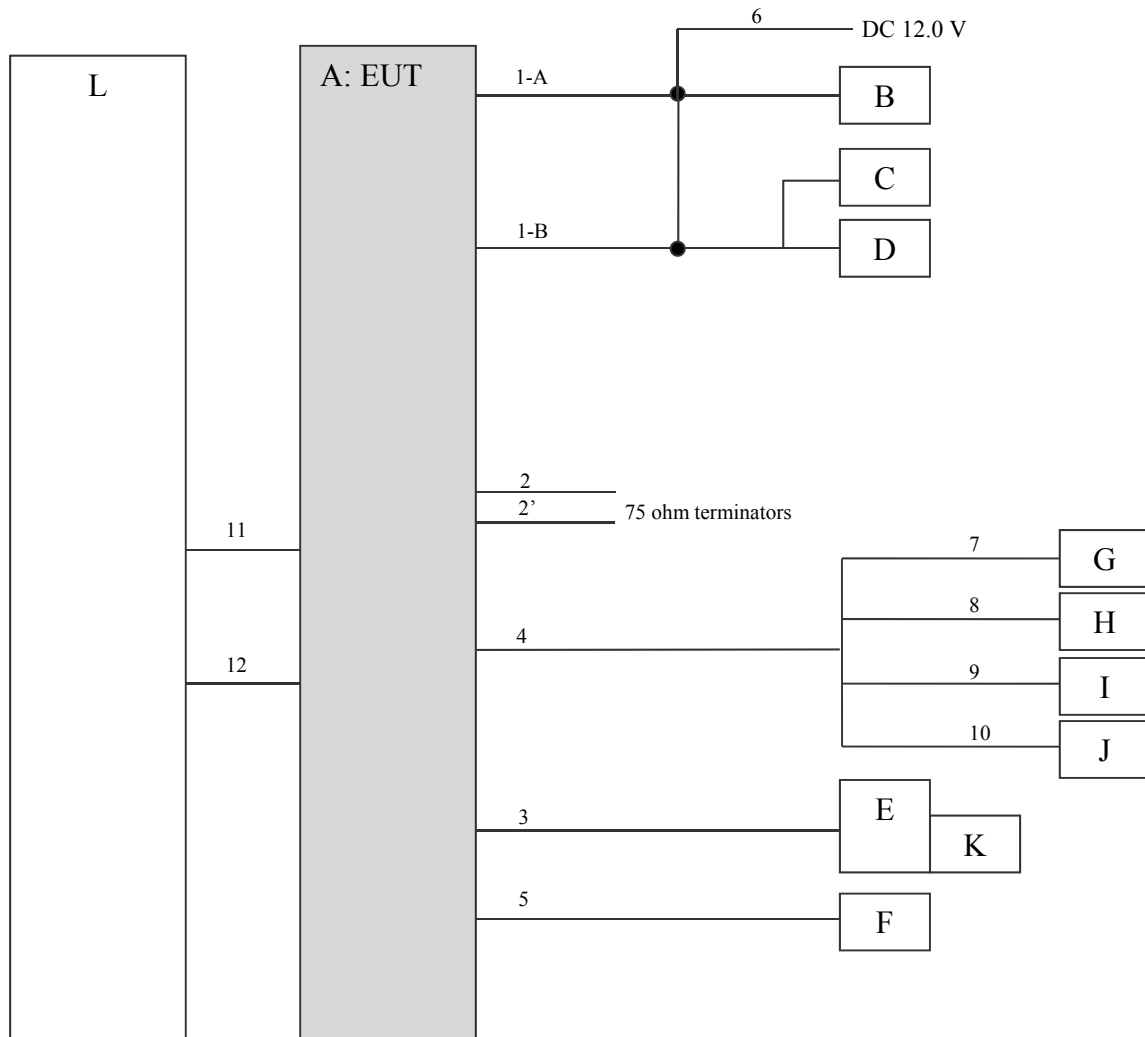
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 3 (GI: 400 ns), 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: 3 Software: WLAN A115 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission	11b Tx	2412 MHz
6dB Bandwidth	11g Tx	2437 MHz
Maximum Peak Output Power	11n-20 Tx	2462 MHz
Power Density		
99% Occupied Bandwidth		

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 and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MAIN UNIT	D172G5	AABB999998CS *1) AABB999999CS *2)	PIONEER	EUT
B	Steering SW	-	-	-	-
C	Mic	-	-	-	-
D	Rear Camera	-	-	-	-
E	USB	-	-	-	-
F	GPS Antenna	86860-71011	-	AISIN	-
G	Speaker	TS-F1030	V44QAH2	PIONEER	-
H	Speaker	TS-F1030	V44QAH2	PIONEER	-
I	Speaker	TS-F1030	V44QBA1	PIONEER	-
J	Speaker	TS-F1030	V44QBA1	PIONEER	-
K	USB Memory	-	-	-	-
L	Display	-	-	PIONEER	-

*1) Used for Radiated Emission test

*2) Used for Antenna Terminal conducted test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1-A	Wire Harness Set	1.0	Unshielded	Unshielded	-
1-B	Wire Harness	1.0	Unshielded	Unshielded	-
2, 2'	Radio antenna	1.5	Shielded	Shielded	-
3	USB connector	1.1	Shielded	Shielded	-
4	Speaker	1.1	Unshielded	Unshielded	-
5	GPS antenna connector	1.7	Shielded	Shielded	-
6	DC	1.0	Shielded	Unshielded	-
7	Speaker	2.0	Unshielded	Unshielded	-
8	Speaker	2.0	Unshielded	Unshielded	-
9	Speaker	2.0	Unshielded	Unshielded	-
10	Speaker	2.0	Unshielded	Unshielded	-
11	Flat cable	0.5	Unshielded	Unshielded	-
12	Flat cable	0.5	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[For below 1 GHz]

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 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, 0.25 m by 0.25 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 200 MHz	200 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>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3.87 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.87 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

*2) Distance Factor: $20 \times \log(3.87 \text{ m} / 3.0 \text{ m}) = 2.22 \text{ dB}$

*3) Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

Worst case:

The noise levels were confirmed at each position of 0 degree and 30 degree of EUT to see the position of maximum noise, and the test was made at representative 0 degree since no difference was found among each position.

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	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	Sample	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	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 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 v04".
 *4) In the frequency range below 30 MHz, 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.

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

Test data : APPENDIX
Test result : Pass

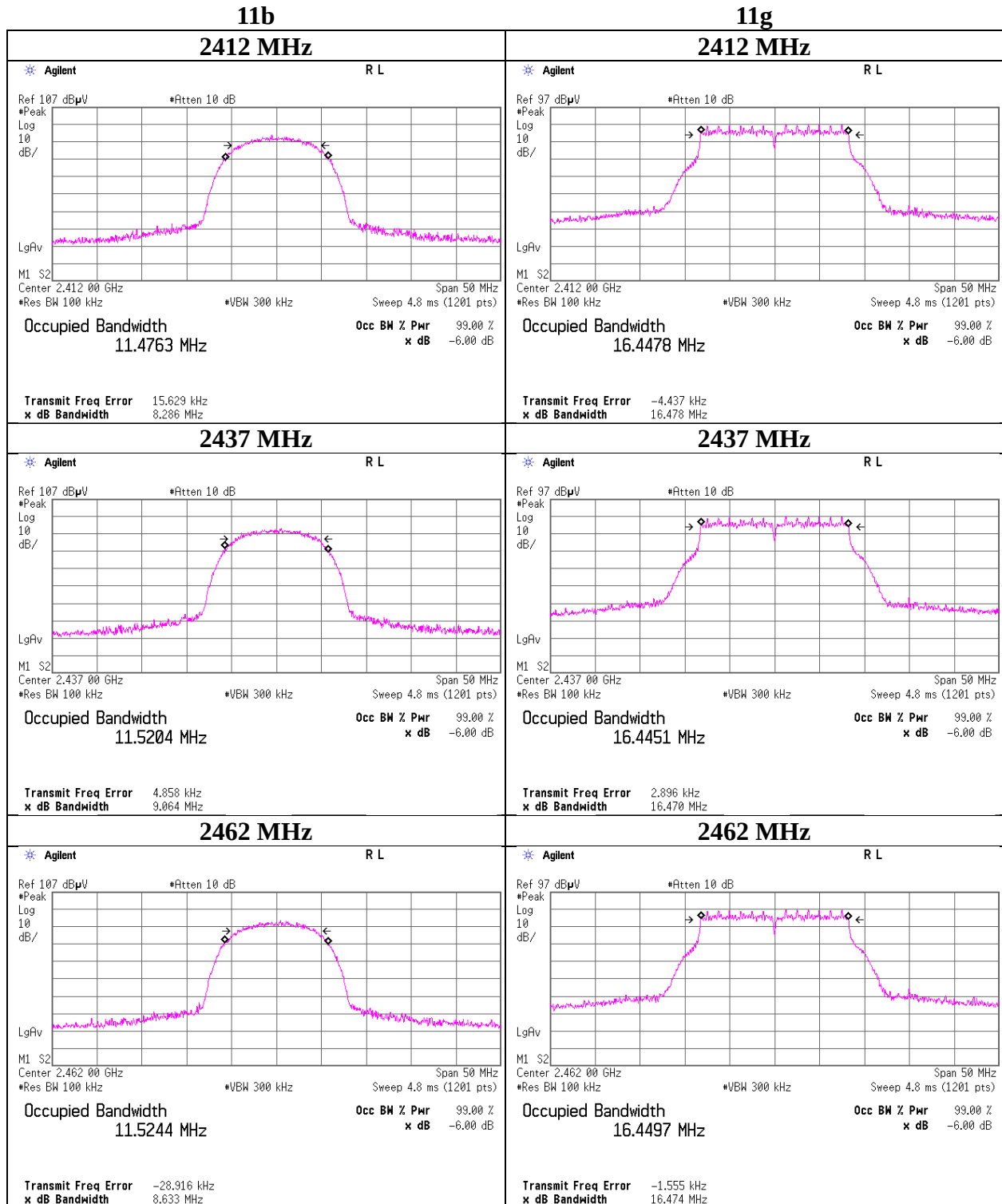
APPENDIX 1: Test data

6dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11854935S-A
Date	July 28, 2017
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Makoto Hosaka
Mode	Tx 11b, Tx 11g, Tx 11n-20

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	8.286	> 500
	2437	9.064	> 500
	2462	8.633	> 500
11g	2412	16.478	> 500
	2437	16.470	> 500
	2462	16.474	> 500
11n-20	2412	17.741	> 500
	2437	17.746	> 500
	2462	17.738	> 500

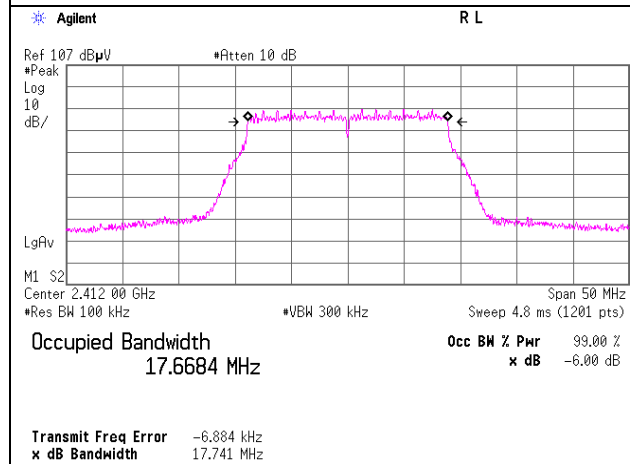
6dB Bandwidth



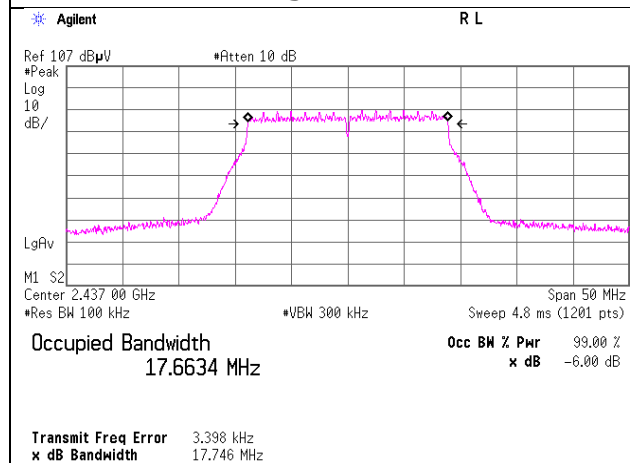
6dB Bandwidth

11n-20

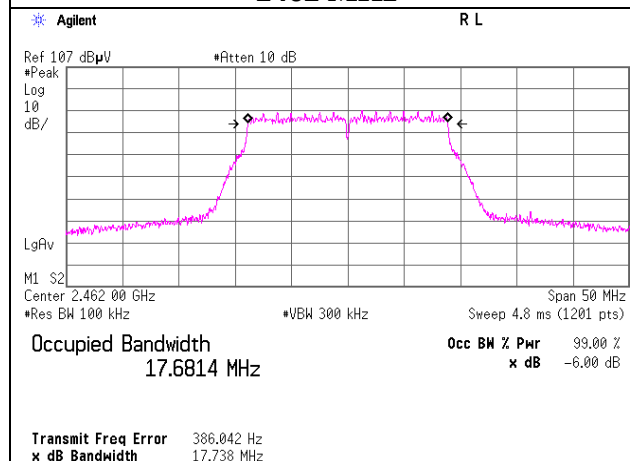
2412 MHz



2437 MHz



2462 MHz



Maximum Peak Output Power

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11854935S-A
Date July 26, 2017
Temperature / Humidity 27 deg. C / 54 % RH
Engineer Makoto Hosaka
Mode Tx 11b

11b

Freq. [MHz]	Reading P/M (Peak) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-4.03	2.02	9.96	7.95	6.24	30.00	1000	22.05
2437	-4.02	2.03	9.96	7.97	6.27	30.00	1000	22.03
2462	-4.15	2.04	9.97	7.86	6.11	30.00	1000	22.14

Sample Calculation:

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

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-4.56	
2	-4.12	
5.5	-4.19	
11	-4.02	*

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 27 deg. C / 54 % RH
Engineer : Makoto Hosaka
Mode : Tx 11g

11g

Freq. [MHz]	Reading P/M (Peak) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	0.94	2.02	9.96	12.92	19.59	30.00	1000	17.08
2437	0.90	2.03	9.96	12.89	19.45	30.00	1000	17.11
2462	1.15	2.04	9.97	13.16	20.70	30.00	1000	16.84

Sample Calculation:

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

Rate [Mbps]	Reading [dBm]	Remark
6	-1.82	
9	-1.83	
12	-1.47	
18	-1.46	
24	0.19	
36	0.68	
48	0.90	*
54	-0.02	

*: Worst Rate

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

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	27 deg. C / 54 % RH
Engineer	Makoto Hosaka
Mode	Tx 11n-20

11n-20

Freq. [MHz]	Reading P/M (Peak) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	1.44	2.02	9.96	13.42	21.98	30.00	1000	16.58
2437	1.42	2.03	9.96	13.41	21.93	30.00	1000	16.59
2462	1.31	2.04	9.97	13.32	21.48	30.00	1000	16.68

Sample Calculation:

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

GI: 800 ns

MCS Number	Reading [dBm]	Remark
0	-1.43	
1	-1.04	
2	-0.88	
3	1.05	
4	1.35	
5	0.99	
6	1.12	
7	0.90	

GI: 400 ns

MCS Number	Reading [dBm]	Remark
0	-1.32	
1	-1.11	
2	-0.85	
3	1.42	*
4	1.34	
5	0.98	
6	1.14	
7	1.18	

* Worst MCS

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

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

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	27 deg. C / 54 % RH
Engineer	Makoto Hosaka
Mode	Tx 11b, Tx 11g, Tx 11n-20

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-8.31	2.02	9.96	3.67	2.33	0.04	3.71	2.35
2437	-8.34	2.03	9.96	3.65	2.32	0.04	3.69	2.34
2462	-8.41	2.04	9.97	3.60	2.29	0.04	3.64	2.31

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-9.20	2.02	9.96	2.78	1.90	0.29	3.07	2.03
2437	-9.29	2.03	9.96	2.70	1.86	0.29	2.99	1.99
2462	-9.49	2.04	9.97	2.52	1.79	0.29	2.81	1.91

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-9.32	2.02	9.96	2.66	1.85	0.31	2.97	1.98
2437	-9.27	2.03	9.96	2.72	1.87	0.31	3.03	2.01
2462	-9.35	2.04	9.97	2.66	1.85	0.31	2.97	1.98

Sample Calculation:

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

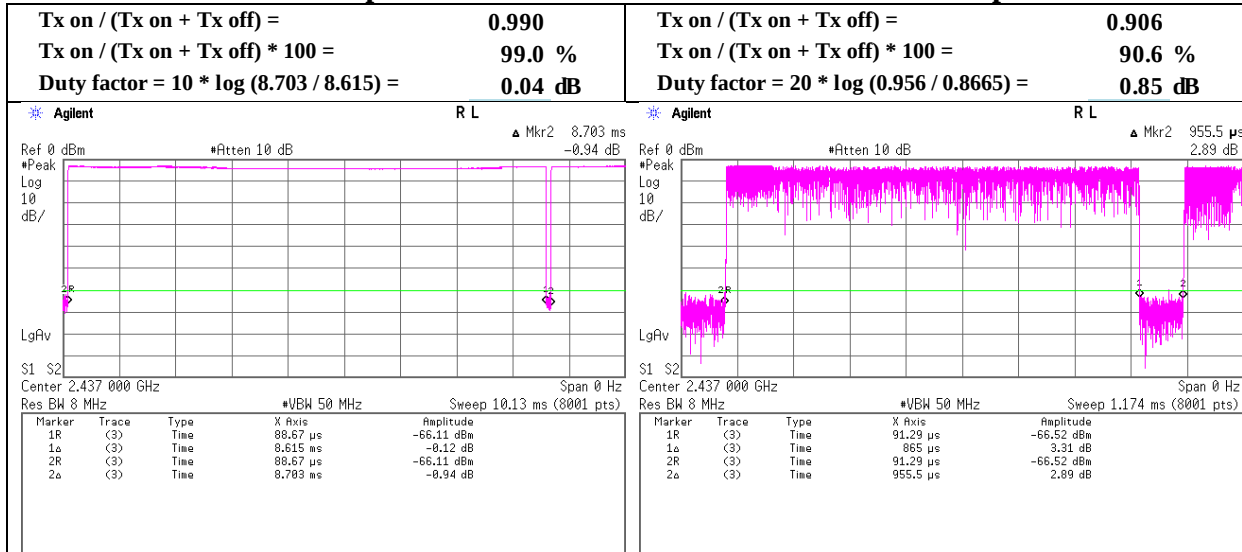
Result (Burst power average) = Time average + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

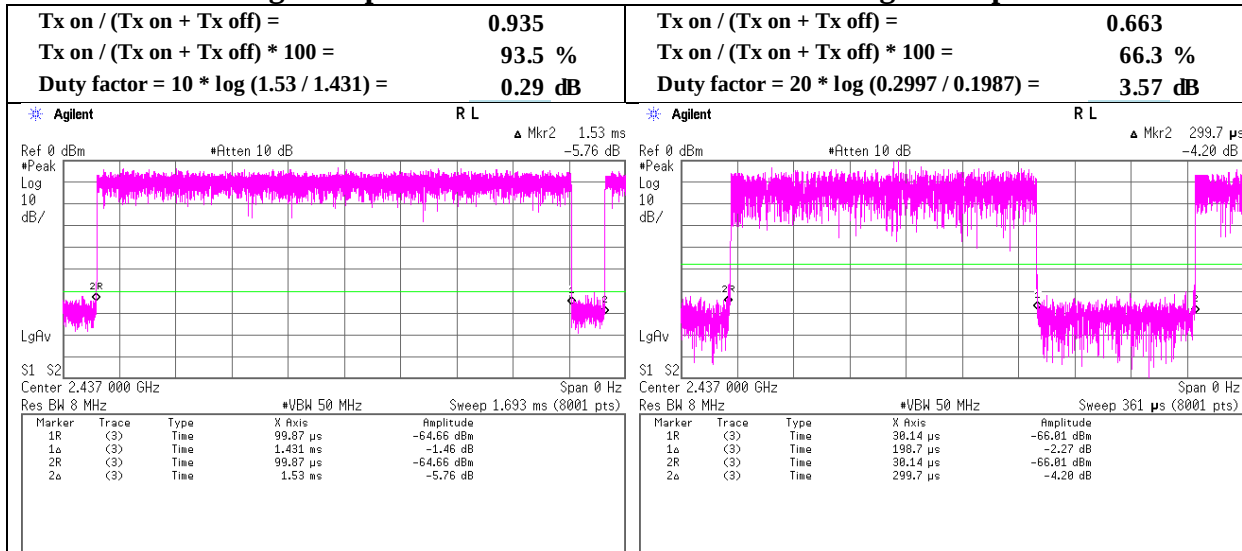
Burst rate confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 28, 2017
Temperature / Humidity : 25 deg. C / 55 % RH
Engineer : Makoto Hosaka
Mode : Tx 11b, Tx 11g, Tx 11n-20

11b 1 Mbps



11g 6 Mbps



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

UL Japan, Inc.

Shonan EMC Lab.

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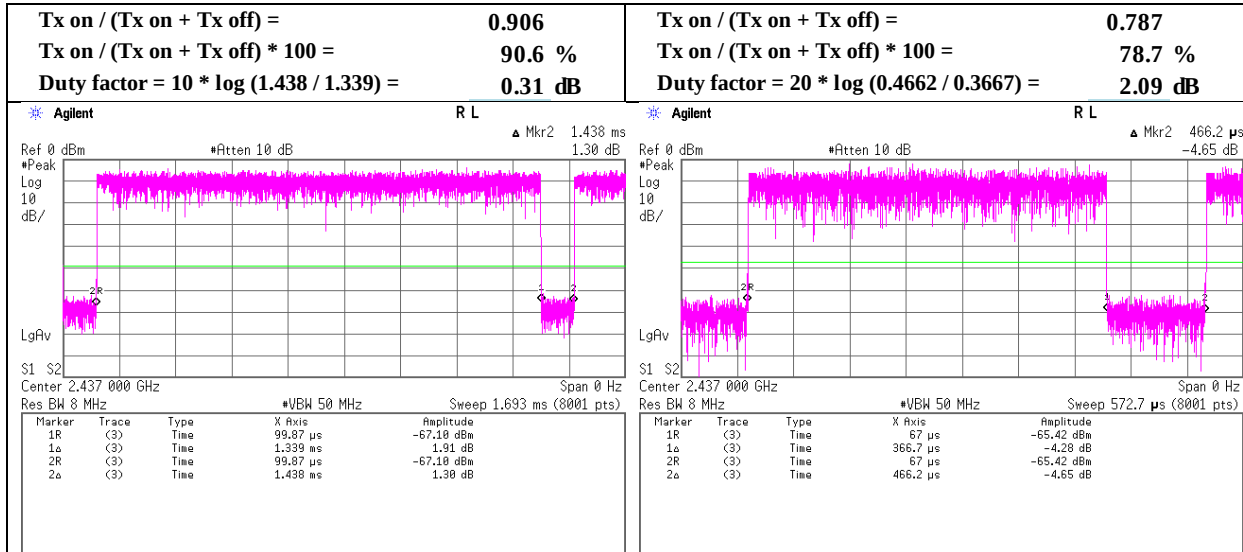
Facsimile : +81 463 50 6401

Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11854935S-A-R2
Date	July 28, 2017
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Makoto Hosaka
Mode	Tx 11b, Tx 11g, Tx 11n-20

11n-20 MCS 0

11n-20 MCS 3



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

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Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 23 deg. C / 63 % RH
Engineer : Yosuke Ishikawa
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.	1979.901	PK	50.12	25.78	13.17	41.02	2.22	50.27	73.90	23.6	148	312	
Hori.	2390.000	PK	46.58	27.41	13.52	40.85	2.22	48.88	73.90	25.0	171	26	
Hori.	4824.000	PK	48.78	31.17	5.67	41.84	2.22	46.00	73.90	27.9	150	0	
Hori.	7236.000	PK	45.86	36.52	6.85	41.20	2.22	50.25	73.90	23.6	150	0	
Hori.	9648.000	PK	45.07	38.66	7.76	40.60	2.22	53.11	73.90	20.7	150	0	
Hori.	1979.901	AV	42.13	25.78	13.17	41.02	2.22	42.28	53.90	11.6	148	312	*1)
Vert.	1980.114	PK	48.73	25.78	13.17	41.02	2.22	48.88	73.90	25.0	127	221	
Vert.	2390.000	PK	46.15	27.41	13.52	40.85	2.22	48.45	73.90	25.4	154	245	
Vert.	4824.000	PK	47.24	31.17	5.67	41.84	2.22	44.46	73.90	29.4	150	0	
Vert.	7236.000	PK	46.48	36.52	6.85	41.20	2.22	50.87	73.90	23.0	150	0	
Vert.	9648.000	PK	44.78	38.66	7.76	40.60	2.22	52.82	73.90	21.0	150	0	
Vert.	1980.114	AV	40.32	25.78	13.17	41.02	2.22	40.47	53.90	13.4	127	221	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87 \text{ m} / 3.0 \text{ m}) = 2.22 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	37.56	27.41	13.52	40.85	0.85	2.22	40.71	53.90	13.2	*1)
Hori.	4824.000	AV	38.62	31.17	5.67	41.84	0.85	2.22	36.69	53.90	17.2	
Hori.	7236.000	AV	38.31	36.52	6.85	41.20	0.85	2.22	43.55	53.90	10.3	
Hori.	9648.000	AV	36.55	38.66	7.76	40.60	0.85	2.22	45.44	53.90	8.5	
Vert.	2390.000	AV	37.58	27.41	13.52	40.85	0.85	2.22	40.73	53.90	13.2	*1)
Vert.	4824.000	AV	38.55	31.17	5.67	41.84	0.85	2.22	36.62	53.90	17.3	
Vert.	7236.000	AV	38.16	36.52	6.85	41.20	0.85	2.22	43.40	53.90	10.5	
Vert.	9648.000	AV	36.44	38.66	7.76	40.60	0.85	2.22	45.33	53.90	8.6	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87 \text{ m} / 3.0 \text{ m}) = 2.22 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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	89.14	27.50	13.54	40.84	2.22	91.56	-	-	Carrier
Hori.	2400.000	PK	38.58	27.45	13.53	40.84	2.22	40.94	71.56	30.6	
Vert.	2412.000	PK	88.50	27.50	13.54	40.84	2.22	90.92	-	-	Carrier
Vert.	2400.000	PK	38.02	27.45	13.53	40.84	2.22	40.38	70.92	30.5	

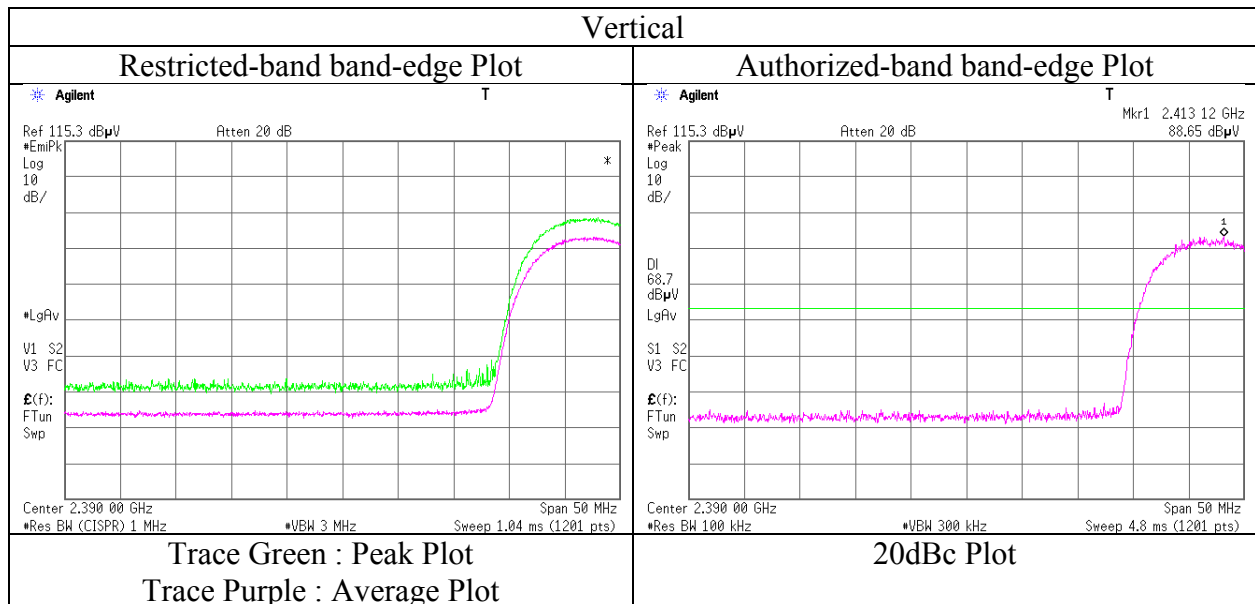
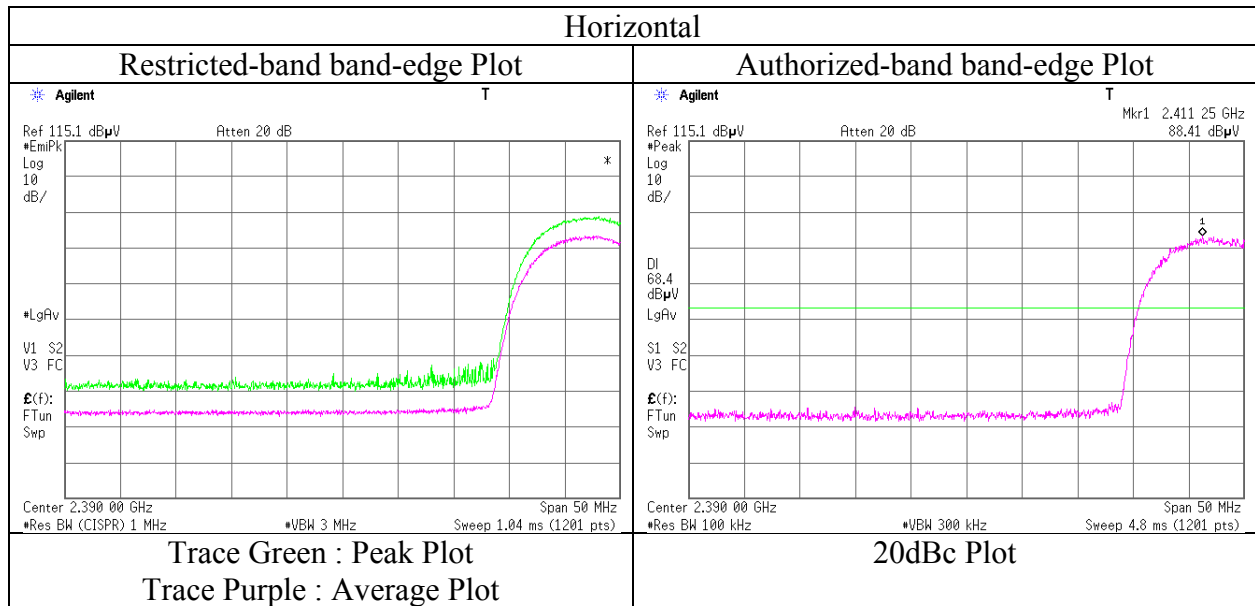
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.87 \text{ m} / 3.0 \text{ m}) = 2.22 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa (1 GHz -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. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.026	PK	50.11	25.78	13.17	41.02	2.22	50.26	73.90	23.6	148	311	
Hori.	4874.000	PK	46.56	31.28	5.67	41.77	2.22	43.96	73.90	29.9	150	0	
Hori.	7311.000	PK	47.22	36.74	6.85	41.26	2.22	51.77	73.90	22.1	150	0	
Hori.	9748.000	PK	44.53	38.74	7.78	40.62	2.22	52.65	73.90	21.2	150	0	
Hori.	1980.026	AV	42.23	25.78	13.17	41.02	2.22	42.38	53.90	11.5	148	311	*1)
Vert.	1980.026	PK	48.68	25.78	13.17	41.02	2.22	48.83	73.90	25.0	128	222	
Vert.	4874.000	PK	46.58	31.28	5.67	41.77	2.22	43.98	73.90	29.9	150	0	
Vert.	7311.000	PK	46.66	36.74	6.85	41.26	2.22	51.21	73.90	22.6	150	0	
Vert.	9748.000	PK	45.85	38.74	7.78	40.62	2.22	53.97	73.90	19.9	150	0	
Vert.	1980.026	AV	40.33	25.78	13.17	41.02	2.22	40.48	53.90	13.4	128	222	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.14	31.28	5.67	41.77	0.85	2.22	36.39	53.90	17.5	
Hori.	7311.000	AV	38.51	36.74	6.85	41.26	0.85	2.22	43.91	53.90	10.0	
Hori.	9748.000	AV	36.62	38.74	7.78	40.62	0.85	2.22	45.59	53.90	8.3	
Vert.	4874.000	AV	38.50	31.28	5.67	41.77	0.85	2.22	36.75	53.90	17.2	
Vert.	7311.000	AV	38.52	36.74	6.85	41.26	0.85	2.22	43.92	53.90	10.0	
Vert.	9748.000	AV	36.14	38.74	7.78	40.62	0.85	2.22	45.11	53.90	8.8	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.126	PK	49.39	25.78	13.17	41.02	2.22	49.54	73.90	24.3	142	317	
Hori.	2483.500	PK	49.26	27.79	13.60	40.81	2.22	52.06	73.90	21.8	137	14	
Hori.	4924.000	PK	47.01	31.38	5.67	41.70	2.22	44.58	73.90	29.3	150	0	
Hori.	7386.000	PK	46.35	36.95	6.86	41.32	2.22	51.06	73.90	22.8	150	0	
Hori.	9848.000	PK	45.03	38.81	7.80	40.64	2.22	53.22	73.90	20.6	150	0	
Hori.	1980.126	AV	42.16	25.78	13.17	41.02	2.22	42.31	53.90	11.5	142	317	*1)
Vert.	1980.043	PK	49.22	25.78	13.17	41.02	2.22	49.37	73.90	24.5	124	153	
Vert.	2483.500	PK	47.75	27.79	13.60	40.81	2.22	50.55	73.90	23.3	126	81	
Vert.	4924.000	PK	46.60	31.38	5.67	41.70	2.22	44.17	73.90	29.7	150	0	
Vert.	7386.000	PK	46.46	36.95	6.86	41.32	2.22	51.17	73.90	22.7	150	0	
Vert.	9848.000	PK	44.85	38.81	7.80	40.64	2.22	53.04	73.90	20.8	150	0	
Vert.	1980.043	AV	41.58	25.78	13.17	41.02	2.22	41.73	53.90	12.1	124	153	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	37.15	27.79	13.60	40.81	0.85	2.22	40.80	53.90	13.1	*1)
Hori.	4924.000	AV	38.37	31.38	5.67	41.70	0.85	2.22	36.79	53.90	17.1	
Hori.	7386.000	AV	38.00	36.95	6.86	41.32	0.85	2.22	43.56	53.90	10.3	
Hori.	9848.000	AV	36.43	38.81	7.80	40.64	0.85	2.22	45.47	53.90	8.4	
Vert.	2483.500	AV	37.51	27.79	13.60	40.81	0.85	2.22	41.16	53.90	12.7	*1)
Vert.	4924.000	AV	38.60	31.38	5.67	41.70	0.85	2.22	37.02	53.90	16.9	
Vert.	7386.000	AV	38.11	36.95	6.86	41.32	0.85	2.22	43.67	53.90	10.2	
Vert.	9848.000	AV	36.42	38.81	7.80	40.64	0.85	2.22	45.46	53.90	8.4	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

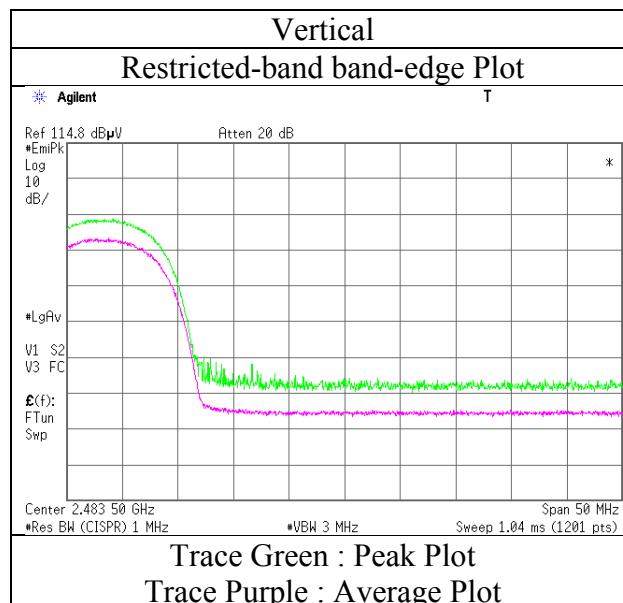
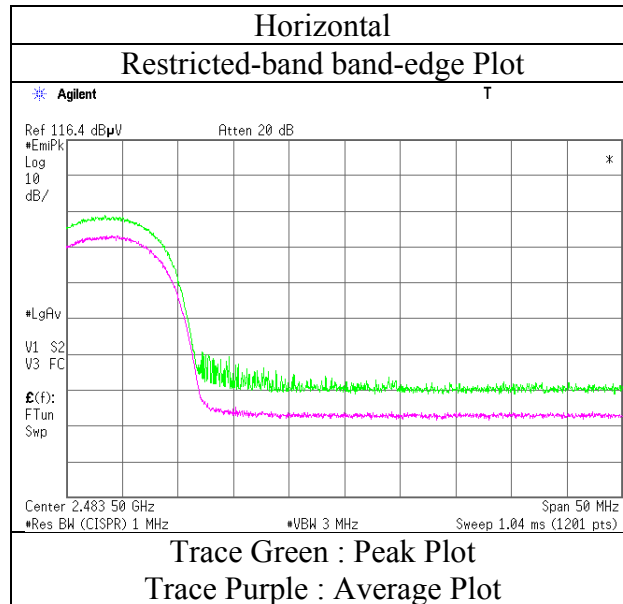
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa (1 GHz -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. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 GHz)
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.	1980.034	PK	49.61	25.78	13.17	41.02	2.22	49.76	73.90	24.1	151	40	
Hori.	2390.000	PK	46.81	27.41	13.52	40.85	2.22	49.11	73.90	24.7	145	23	
Hori.	4824.000	PK	47.56	31.17	5.67	41.84	2.22	44.78	73.90	29.1	150	0	
Hori.	7236.000	PK	46.08	36.52	6.85	41.20	2.22	50.47	73.90	23.4	150	0	
Hori.	9648.000	PK	45.63	38.66	7.76	40.60	2.22	53.67	73.90	20.2	150	0	
Hori.	1980.034	AV	41.32	25.78	13.17	41.02	2.22	41.47	53.90	12.4	151	40	*1)
Vert.	1979.829	PK	48.43	25.77	13.17	41.02	2.22	48.57	73.90	25.3	152	2	
Vert.	2390.000	PK	47.20	27.41	13.52	40.85	2.22	49.50	73.90	24.4	164	253	
Vert.	4824.000	PK	47.40	31.17	5.67	41.84	2.22	44.62	73.90	29.2	150	0	
Vert.	7236.000	PK	46.72	36.52	6.85	41.20	2.22	51.11	73.90	22.7	150	0	
Vert.	9648.000	PK	45.21	38.66	7.76	40.60	2.22	53.25	73.90	20.6	150	0	
Vert.	1979.829	AV	40.45	25.77	13.17	41.02	2.22	40.59	53.90	13.3	152	2	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.15	27.41	13.52	40.85	3.57	2.22	44.02	53.90	9.9	*1)
Hori.	4824.000	AV	38.65	31.17	5.67	41.84	3.57	2.22	39.44	53.90	14.5	
Hori.	7236.000	AV	38.07	36.52	6.85	41.20	3.57	2.22	46.03	53.90	7.9	
Hori.	9648.000	AV	36.63	38.66	7.76	40.60	3.57	2.22	48.24	53.90	5.7	
Vert.	2390.000	AV	37.62	27.41	13.52	40.85	3.57	2.22	43.49	53.90	10.4	*1)
Vert.	4824.000	AV	38.65	31.17	5.67	41.84	3.57	2.22	39.44	53.90	14.5	
Vert.	7236.000	AV	38.43	36.52	6.85	41.20	3.57	2.22	46.39	53.90	7.5	
Vert.	9648.000	AV	36.53	38.66	7.76	40.60	3.57	2.22	48.14	53.90	5.8	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	86.23	27.50	13.54	40.84	2.22	88.65	-	-	Carrier
Hori.	2400.000	PK	40.53	27.45	13.53	40.84	2.22	42.89	68.65	25.8	
Vert.	2412.000	PK	85.65	27.50	13.54	40.84	2.22	88.07	-	-	Carrier
Vert.	2400.000	PK	39.30	27.45	13.53	40.84	2.22	41.66	68.07	26.4	

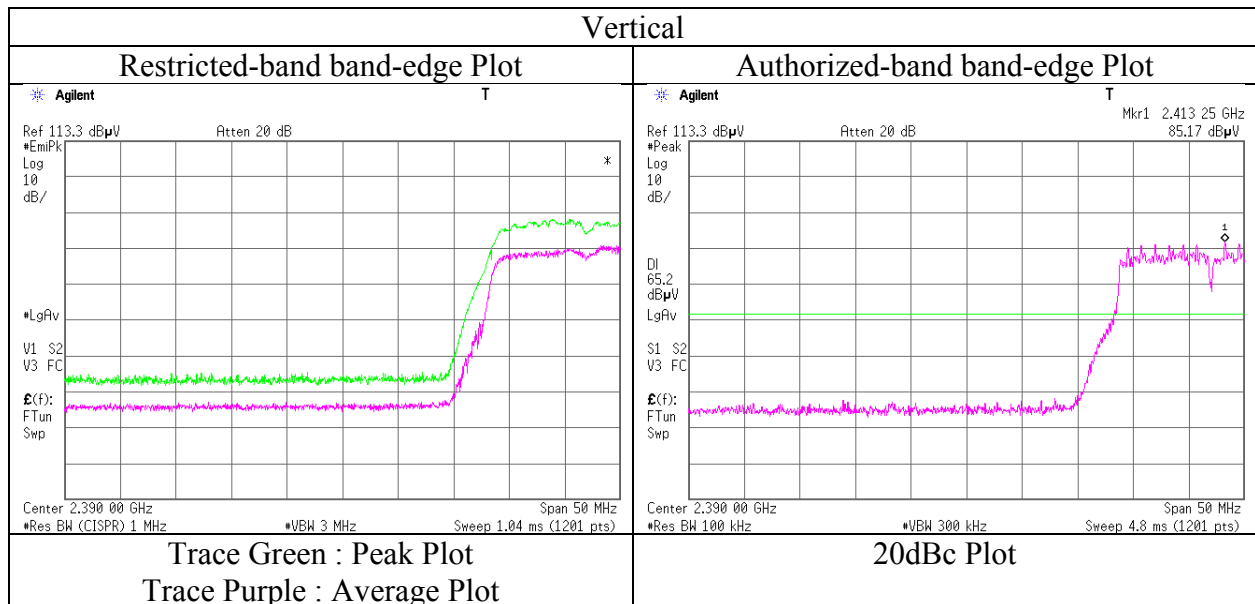
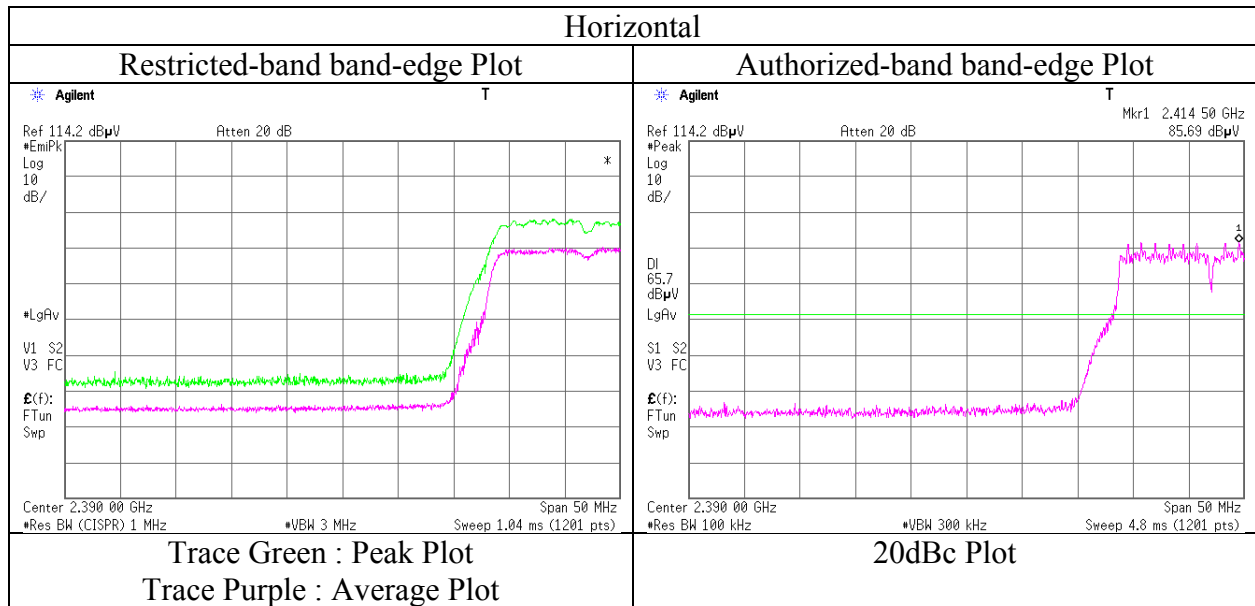
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa (1 GHz -13 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. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.146	PK	49.68	25.78	13.17	41.02	2.22	49.83	73.90	24.0	148	58	
Hori.	4874.000	PK	47.23	31.28	5.67	41.77	2.22	44.63	73.90	29.2	150	0	
Hori.	7311.000	PK	47.52	36.74	6.85	41.26	2.22	52.07	73.90	21.8	150	0	
Hori.	9748.000	PK	45.43	38.74	7.78	40.62	2.22	53.55	73.90	20.3	150	0	
Hori.	1980.146	AV	42.53	25.78	13.17	41.02	2.22	42.68	53.90	11.2	148	58	*1)
Vert.	1980.000	PK	49.00	25.78	13.17	41.02	2.22	49.15	73.90	24.7	155	313	
Vert.	4874.000	PK	47.25	31.28	5.67	41.77	2.22	44.65	73.90	29.2	150	0	
Vert.	7311.000	PK	47.42	36.74	6.85	41.26	2.22	51.97	73.90	21.9	150	0	
Vert.	9748.000	PK	44.86	38.74	7.78	40.62	2.22	52.98	73.90	20.9	150	0	
Vert.	1980.000	AV	40.18	25.78	13.17	41.02	2.22	40.33	53.90	13.5	155	313	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.46	31.28	5.67	41.77	3.57	2.22	39.43	53.90	14.5	
Hori.	7311.000	AV	38.39	36.74	6.85	41.26	3.57	2.22	46.51	53.90	7.4	
Hori.	9748.000	AV	36.18	38.74	7.78	40.62	3.57	2.22	47.87	53.90	6.0	
Vert.	4874.000	AV	38.38	31.28	5.67	41.77	3.57	2.22	39.35	53.90	14.5	
Vert.	7311.000	AV	38.26	36.74	6.85	41.26	3.57	2.22	46.38	53.90	7.5	
Vert.	9748.000	AV	36.24	38.74	7.78	40.62	3.57	2.22	47.93	53.90	6.0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.041	PK	49.06	25.78	13.17	41.02	2.22	49.21	73.90	24.6	133	97	
Hori.	2483.500	PK	47.43	27.79	13.60	40.81	2.22	50.23	73.90	23.6	165	50	
Hori.	4924.000	PK	47.37	31.38	5.67	41.70	2.22	44.94	73.90	28.9	150	0	
Hori.	7386.000	PK	46.11	36.95	6.86	41.32	2.22	50.82	73.90	23.0	150	0	
Hori.	9848.000	PK	45.58	38.81	7.80	40.64	2.22	53.77	73.90	20.1	150	0	
Hori.	1980.041	AV	41.25	25.78	13.17	41.02	2.22	41.40	53.90	12.5	133	97	*1)
Vert.	1980.062	PK	48.40	25.78	13.17	41.02	2.22	48.55	73.90	25.3	155	3	
Vert.	2483.500	PK	47.56	27.79	13.60	40.81	2.22	50.36	73.90	23.5	125	256	
Vert.	4924.000	PK	46.82	31.38	5.67	41.70	2.22	44.39	73.90	29.5	150	0	
Vert.	7386.000	PK	46.37	36.95	6.86	41.32	2.22	51.08	73.90	22.8	150	0	
Vert.	9848.000	PK	46.13	38.81	7.80	40.64	2.22	54.32	73.90	19.5	150	0	
Vert.	1980.062	AV	40.52	25.78	13.17	41.02	2.22	40.67	53.90	13.2	155	3	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.00	27.79	13.60	40.81	3.57	2.22	44.37	53.90	9.5	*1)
Hori.	4924.000	AV	38.57	31.38	5.67	41.70	3.57	2.22	39.71	53.90	14.2	
Hori.	7386.000	AV	38.01	36.95	6.86	41.32	3.57	2.22	46.29	53.90	7.6	
Hori.	9848.000	AV	36.38	38.81	7.80	40.64	3.57	2.22	48.14	53.90	5.8	
Vert.	2483.500	AV	38.08	27.79	13.60	40.81	3.57	2.22	44.45	53.90	9.4	*1)
Vert.	4924.000	AV	38.55	31.38	5.67	41.70	3.57	2.22	39.69	53.90	14.2	
Vert.	7386.000	AV	38.21	36.95	6.86	41.32	3.57	2.22	46.49	53.90	7.4	
Vert.	9848.000	AV	36.24	38.81	7.80	40.64	3.57	2.22	48.00	53.90	5.9	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

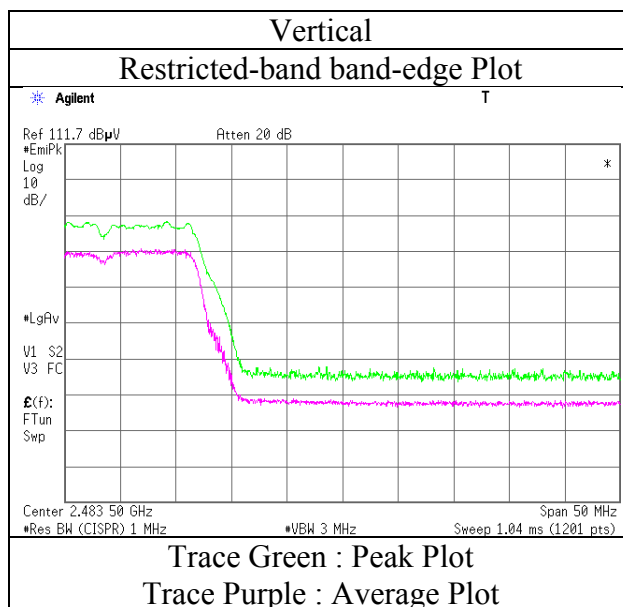
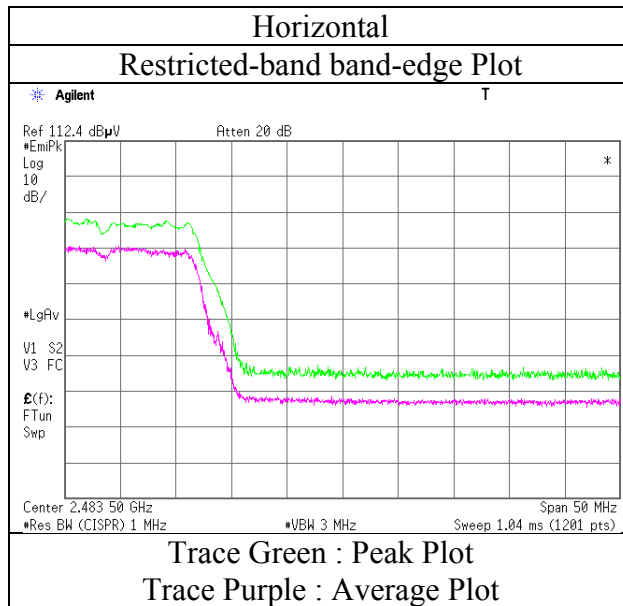
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa
	(1 GHz -13 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.	11854935S-A-R2		
Date	July 28, 2017	July 26, 2017	July 27, 2017
Temperature / Humidity	22 deg. C / 61 % RH	23 deg. C / 63 % RH	24 deg. C / 62 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Yosuke Ishikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 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.	70.351	QP	38.51	6.29	6.97	32.10	0.00	19.67	40.00	20.3	257	264	
Hori.	74.016	QP	41.56	6.25	7.28	32.10	0.00	22.99	40.00	17.0	261	265	
Hori.	111.010	QP	33.62	11.55	7.40	32.07	0.00	20.50	43.50	23.0	277	285	
Hori.	148.030	QP	31.71	14.74	7.90	32.03	0.00	22.32	43.50	21.1	219	276	
Hori.	180.332	QP	26.43	16.28	7.97	32.01	0.00	18.67	43.50	24.8	171	52	
Hori.	185.035	QP	32.52	16.27	7.96	32.00	0.00	24.75	43.50	18.7	183	301	
Hori.	259.042	QP	32.67	11.99	8.50	31.92	0.00	21.24	46.00	24.7	126	273	
Hori.	1980.145	PK	49.53	25.78	13.17	41.02	2.22	49.68	73.90	24.2	162	48	
Hori.	2390.000	PK	48.41	27.41	13.52	40.85	2.22	50.71	73.90	23.1	165	18	
Hori.	4824.000	PK	47.75	31.17	5.67	41.84	2.22	44.97	73.90	28.9	150	0	
Hori.	7236.000	PK	46.63	36.52	6.85	41.20	2.22	51.02	73.90	22.8	150	0	
Hori.	9648.000	PK	45.89	38.66	7.76	40.60	2.22	53.93	73.90	19.9	150	0	
Hori.	1980.145	AV	42.73	25.78	13.17	41.02	2.22	42.88	53.90	11.0	162	48	*1)
Vert.	71.155	QP	34.44	6.28	7.03	32.10	0.00	15.65	40.00	24.3	100	1	
Vert.	74.015	QP	42.21	6.25	7.28	32.10	0.00	23.64	40.00	16.3	125	102	
Vert.	592.113	QP	32.95	18.85	9.99	31.83	0.00	29.96	46.00	16.0	100	88	
Vert.	1980.033	PK	48.58	25.78	13.17	41.02	2.22	48.73	73.90	25.1	143	2	
Vert.	2390.000	PK	47.27	27.41	13.52	40.85	2.22	49.57	73.90	24.3	150	259	
Vert.	4824.000	PK	47.51	31.17	5.67	41.84	2.22	44.73	73.90	29.1	150	0	
Vert.	7236.000	PK	47.45	36.52	6.85	41.20	2.22	51.84	73.90	22.0	150	0	
Vert.	9648.000	PK	45.98	38.66	7.76	40.60	2.22	54.02	73.90	19.8	150	0	
Vert.	1980.033	AV	39.53	25.78	13.17	41.02	2.22	39.68	53.90	14.2	143	2	*1)

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

Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.20	27.41	13.52	40.85	2.09	2.22	42.59	53.90	11.3	*1)
Hori.	4824.000	AV	38.82	31.17	5.67	41.84	2.09	2.22	38.13	53.90	15.8	
Hori.	7236.000	AV	38.11	36.52	6.85	41.20	2.09	2.22	44.59	53.90	9.3	
Hori.	9648.000	AV	36.48	38.66	7.76	40.60	2.09	2.22	46.61	53.90	7.3	
Vert.	2390.000	AV	37.83	27.41	13.52	40.85	2.09	2.22	42.22	53.90	11.7	*1)
Vert.	4824.000	AV	38.65	31.17	5.67	41.84	2.09	2.22	37.96	53.90	15.9	
Vert.	7236.000	AV	38.22	36.52	6.85	41.20	2.09	2.22	44.70	53.90	9.2	
Vert.	9648.000	AV	36.62	38.66	7.76	40.60	2.09	2.22	46.75	53.90	7.2	

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 (3.87 m / 3.0 m) = 2.22 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 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	86.15	27.50	13.54	40.84	2.22	88.57	-	-	Carrier
Hori.	2400.000	PK	43.81	27.45	13.53	40.84	2.22	46.17	68.57	22.4	
Vert.	2412.000	PK	84.84	27.50	13.54	40.84	2.22	87.26	-	-	Carrier
Vert.	2400.000	PK	40.00	27.45	13.53	40.84	2.22	42.36	67.26	24.9	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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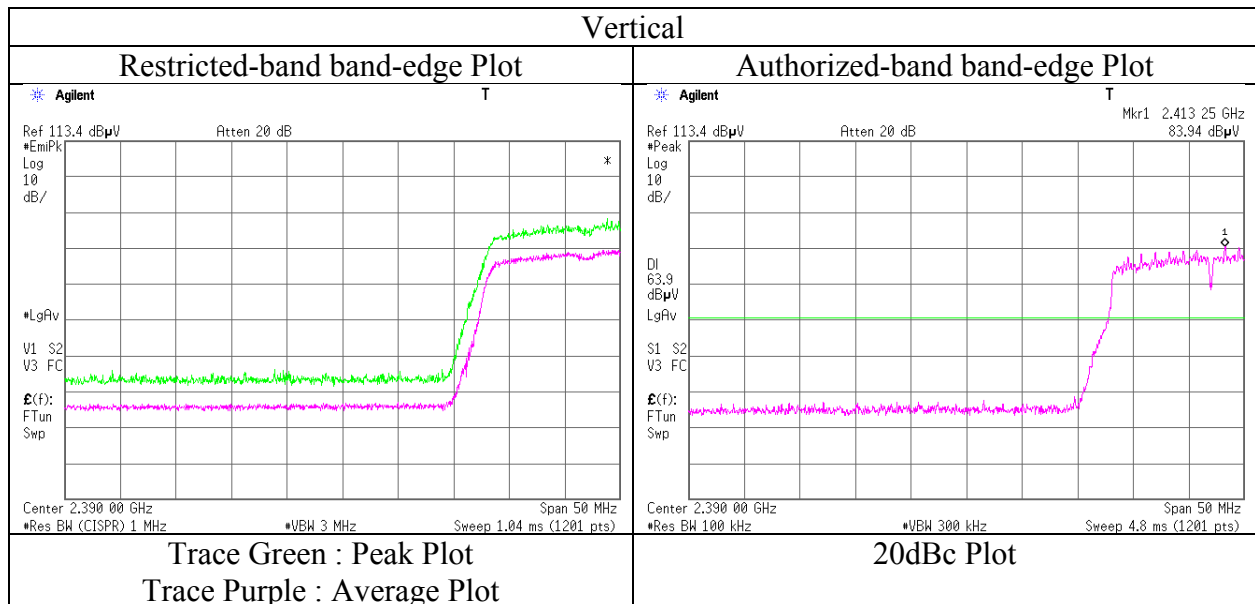
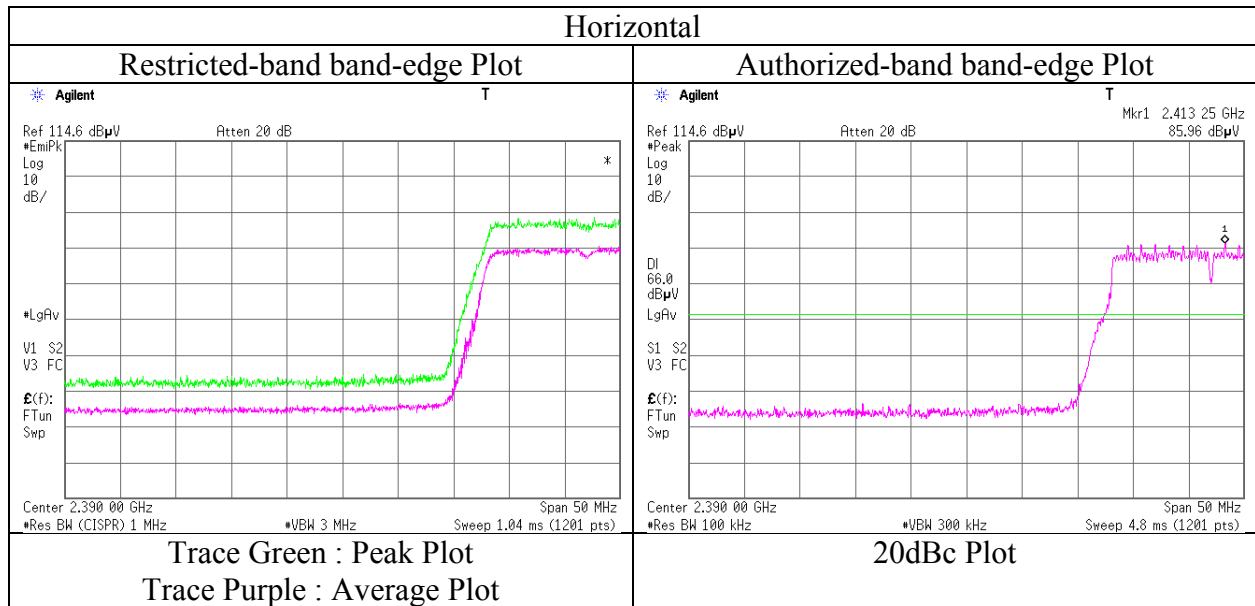
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa (1 GHz -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. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.080	PK	49.37	25.78	13.17	41.02	2.22	49.52	73.90	24.3	143	65	
Hori.	4874.000	PK	47.22	31.28	5.67	41.77	2.22	44.62	73.90	29.2	150	0	
Hori.	7311.000	PK	47.12	36.74	6.85	41.26	2.22	51.67	73.90	22.2	150	0	
Hori.	9748.000	PK	45.03	38.74	7.78	40.62	2.22	53.15	73.90	20.7	150	0	
Hori.	1980.080	AV	42.55	25.78	13.17	41.02	2.22	42.70	53.90	11.2	143	65	*1)
Vert.	1980.129	PK	47.36	25.78	13.17	41.02	2.22	47.51	73.90	26.3	162	19	
Vert.	4874.000	PK	46.87	31.28	5.67	41.77	2.22	44.27	73.90	29.6	150	0	
Vert.	7311.000	PK	47.17	36.74	6.85	41.26	2.22	51.72	73.90	22.1	150	0	
Vert.	9748.000	PK	45.00	38.74	7.78	40.62	2.22	53.12	73.90	20.7	150	0	
Vert.	1980.129	AV	40.63	25.78	13.17	41.02	2.22	40.78	53.90	13.1	162	19	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.43	31.28	5.67	41.77	2.09	2.22	37.92	53.90	16.0	
Hori.	7311.000	AV	38.47	36.74	6.85	41.26	2.09	2.22	45.11	53.90	8.8	
Hori.	9748.000	AV	36.36	38.74	7.78	40.62	2.09	2.22	46.57	53.90	7.3	
Vert.	4874.000	AV	38.37	31.28	5.67	41.77	2.09	2.22	37.86	53.90	16.0	
Vert.	7311.000	AV	38.40	36.74	6.85	41.26	2.09	2.22	45.04	53.90	8.9	
Vert.	9748.000	AV	36.48	38.74	7.78	40.62	2.09	2.22	46.69	53.90	7.2	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 GHz -26.5 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.	1980.025	PK	49.82	25.78	13.17	41.02	2.22	49.97	73.90	23.9	198	55	
Hori.	2483.500	PK	48.12	27.79	13.60	40.81	2.22	50.92	73.90	22.9	197	52	
Hori.	4924.000	PK	47.57	31.38	5.67	41.70	2.22	45.14	73.90	28.7	150	0	
Hori.	7386.000	PK	46.61	36.95	6.86	41.32	2.22	51.32	73.90	22.5	150	0	
Hori.	9848.000	PK	45.86	38.81	7.80	40.64	2.22	54.05	73.90	19.8	150	0	
Hori.	1980.025	AV	42.57	25.78	13.17	41.02	2.22	42.72	53.90	11.1	198	55	*1)
Vert.	1980.137	PK	49.32	25.78	13.17	41.02	2.22	49.47	73.90	24.4	167	9	
Vert.	2483.500	PK	47.57	27.79	13.60	40.81	2.22	50.37	73.90	23.5	131	251	
Vert.	4924.000	PK	47.46	31.38	5.67	41.70	2.22	45.03	73.90	28.8	150	0	
Vert.	7386.000	PK	47.66	36.95	6.86	41.32	2.22	52.37	73.90	21.5	150	0	
Vert.	9848.000	PK	44.37	38.81	7.80	40.64	2.22	52.56	73.90	21.3	150	0	
Vert.	1980.137	AV	40.13	25.78	13.17	41.02	2.22	40.28	53.90	13.6	167	9	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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	38.56	27.79	13.60	40.81	2.09	2.22	43.45	53.90	10.4	*1)
Hori.	4924.000	AV	38.50	31.38	5.67	41.70	2.09	2.22	38.16	53.90	15.7	
Hori.	7386.000	AV	38.10	36.95	6.86	41.32	2.09	2.22	44.90	53.90	9.0	
Hori.	9848.000	AV	36.63	38.81	7.80	40.64	2.09	2.22	46.91	53.90	7.0	
Vert.	2483.500	AV	38.36	27.79	13.60	40.81	2.09	2.22	43.25	53.90	10.7	*1)
Vert.	4924.000	AV	38.58	31.38	5.67	41.70	2.09	2.22	38.24	53.90	15.7	
Vert.	7386.000	AV	37.88	36.95	6.86	41.32	2.09	2.22	44.68	53.90	9.2	
Vert.	9848.000	AV	36.42	38.81	7.80	40.64	2.09	2.22	46.70	53.90	7.2	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

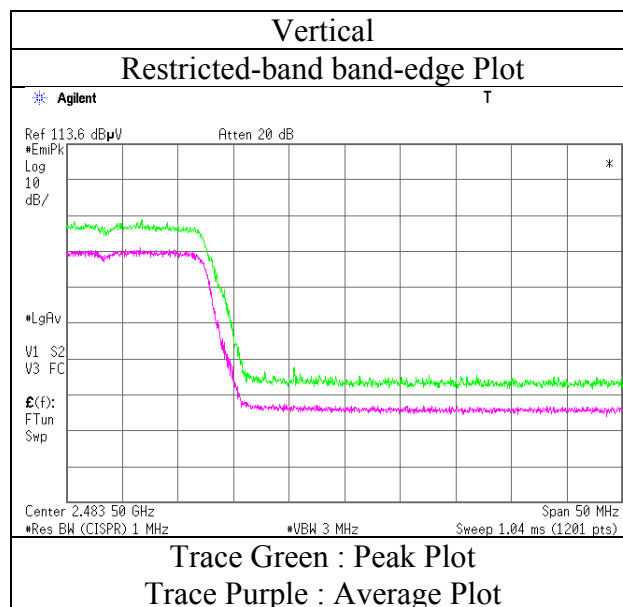
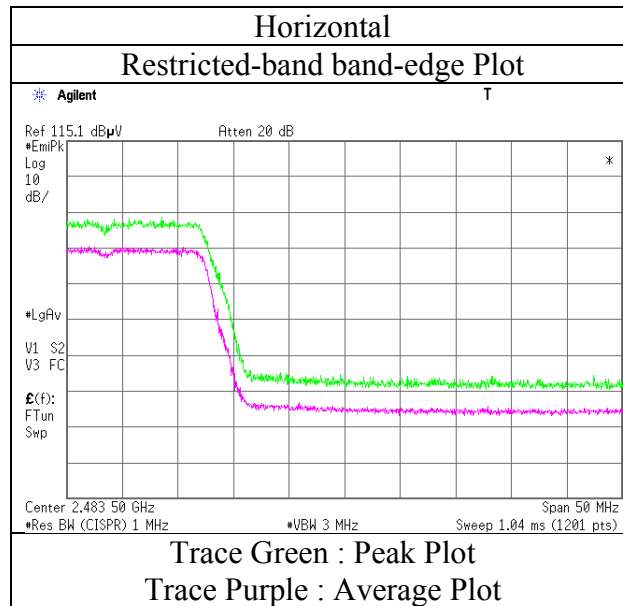
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

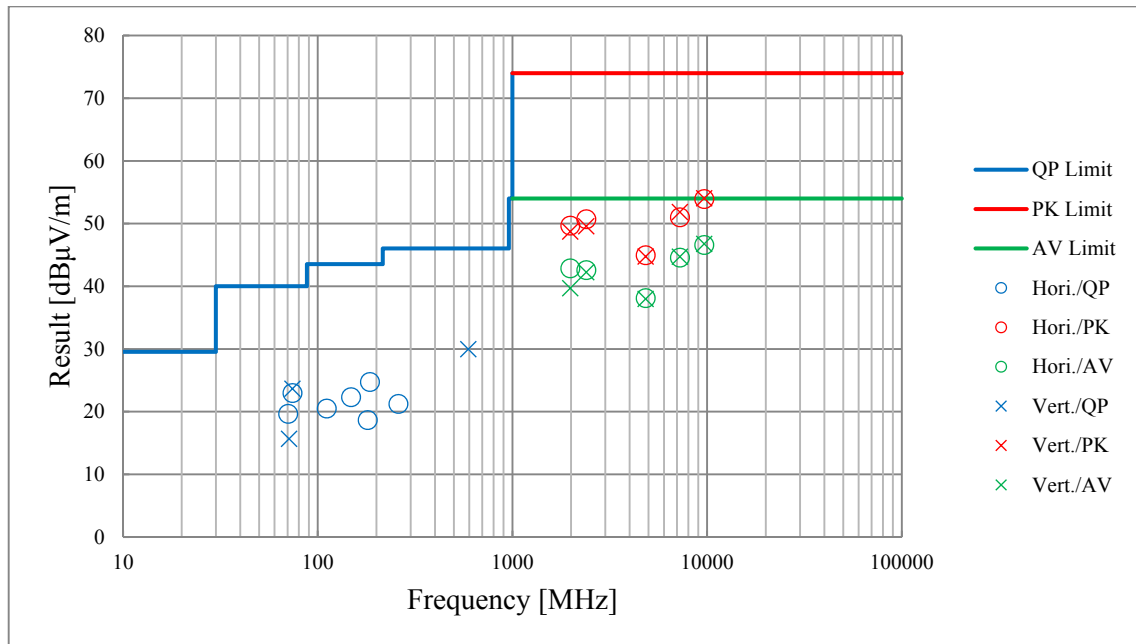
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11854935S-A-R2
Date	July 26, 2017
Temperature / Humidity	23 deg. C / 63 % RH
Engineer	Yosuke Ishikawa
	(1 GHz -13 GHz)
Mode	Tx 11n-20 2462 MHz



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

Radiated Spurious Emission (Plot data, Worst case)

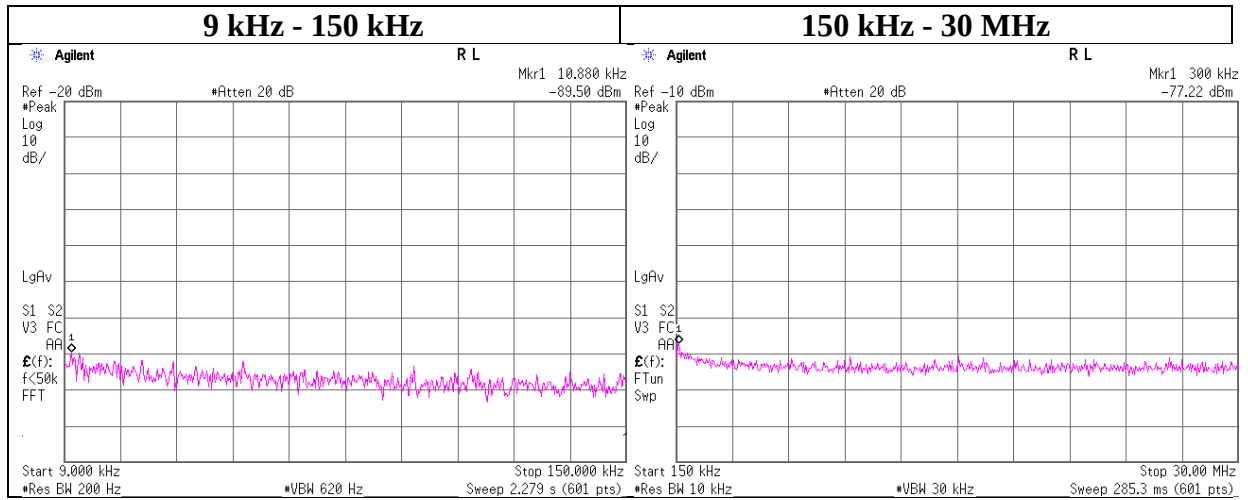
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11854935S-A-R2		
Date	July 28, 2017	July 26, 2017	July 27, 2017
Temperature / Humidity	22 deg. C / 61 % RH	23 deg. C / 63 % RH	24 deg. C / 62 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Yosuke Ishikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx 11n-20 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.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 28, 2017
Temperature / Humidity : 25 deg. C / 55 % RH
Engineer : Makoto Hosaka
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
10.88	-89.5	0.99	9.7	2.94	1	-75.9	300	6.0	-14.6	46.8	61.4	
300.00	-77.2	0.99	9.7	2.94	1	-63.6	300	6.0	-2.3	18.0	20.3	

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

$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

Power Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 28, 2017
Temperature / Humidity : 25 deg. C / 55 % RH
Engineer : Makoto Hosaka
Mode : Tx 11b, Tx 11g, Tx 11n-20

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-29.78	2.02	9.96	-17.80	8.00	25.80
2437.00	-30.41	2.03	9.96	-18.42	8.00	26.42
2462.00	-31.17	2.04	9.97	-19.16	8.00	27.16

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-35.85	2.02	9.96	-23.87	8.00	31.87
2437.00	-35.95	2.03	9.96	-23.96	8.00	31.96
2462.00	-35.85	2.04	9.97	-23.84	8.00	31.84

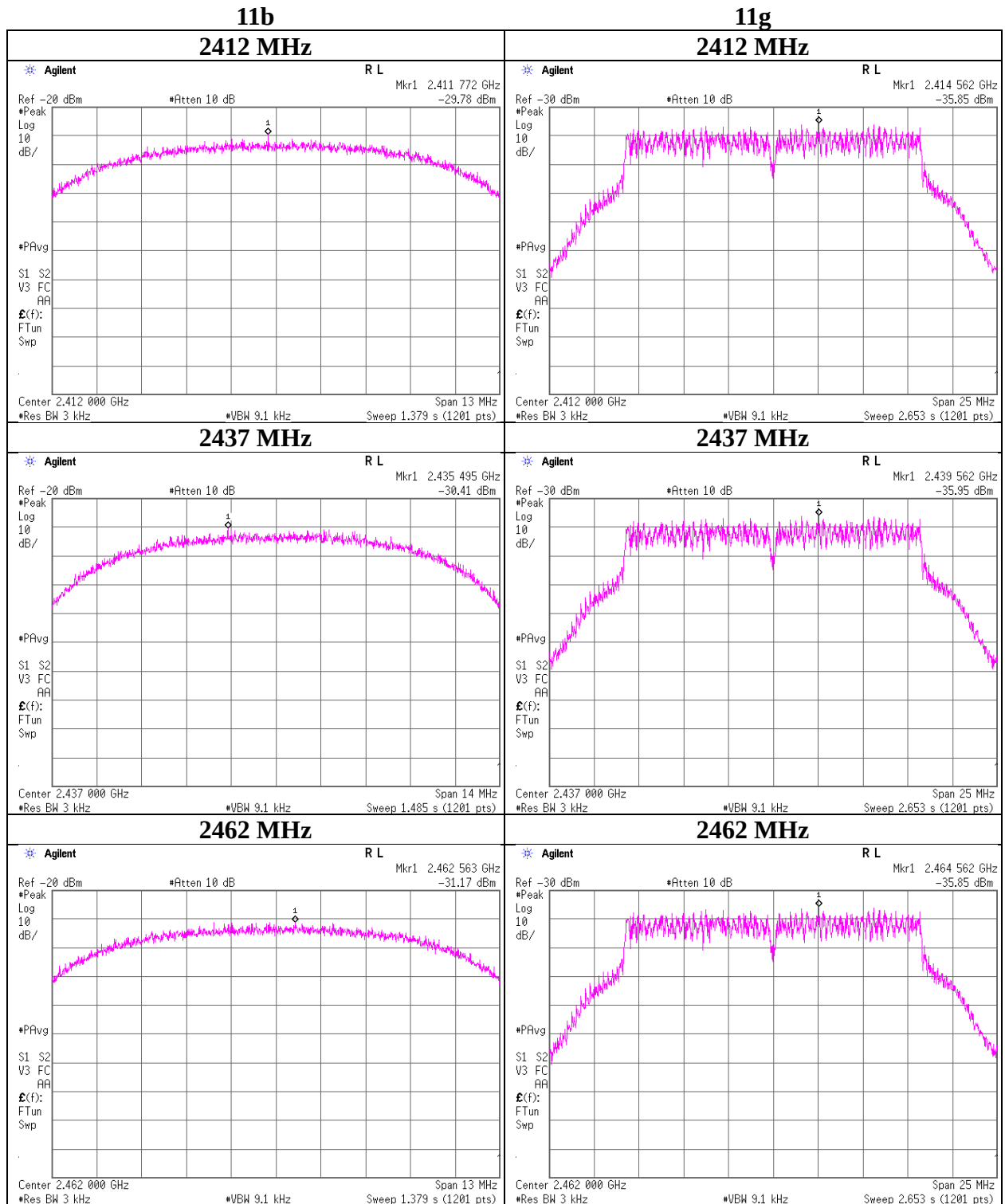
11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-34.80	2.02	9.96	-22.82	8.00	30.82
2437.00	-33.62	2.03	9.96	-21.63	8.00	29.63
2462.00	-34.73	2.04	9.97	-22.72	8.00	30.72

Sample Calculation:

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

Power Density



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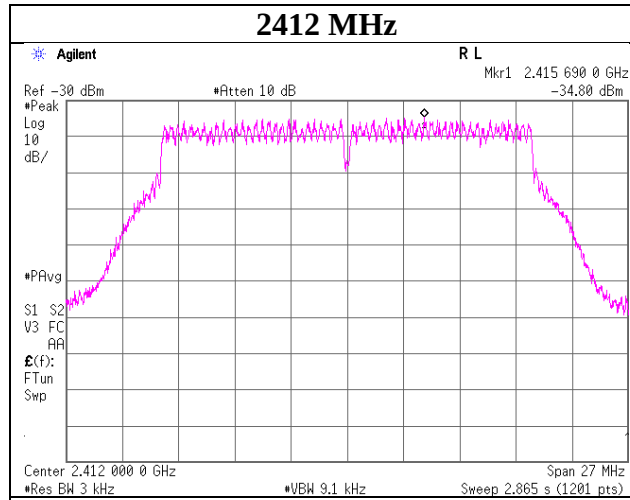
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

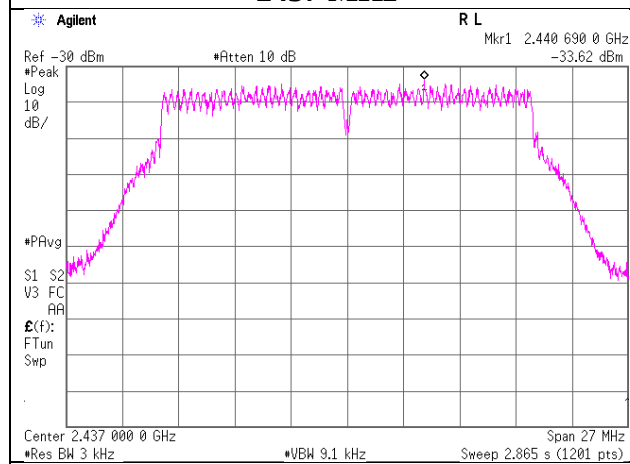
Power Density

11n-20

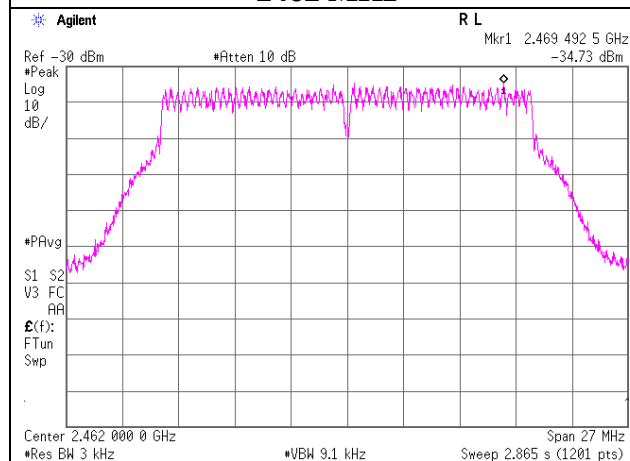
2412 MHz



2437 MHz



2462 MHz



UL Japan, Inc.

Shonan EMC Lab.

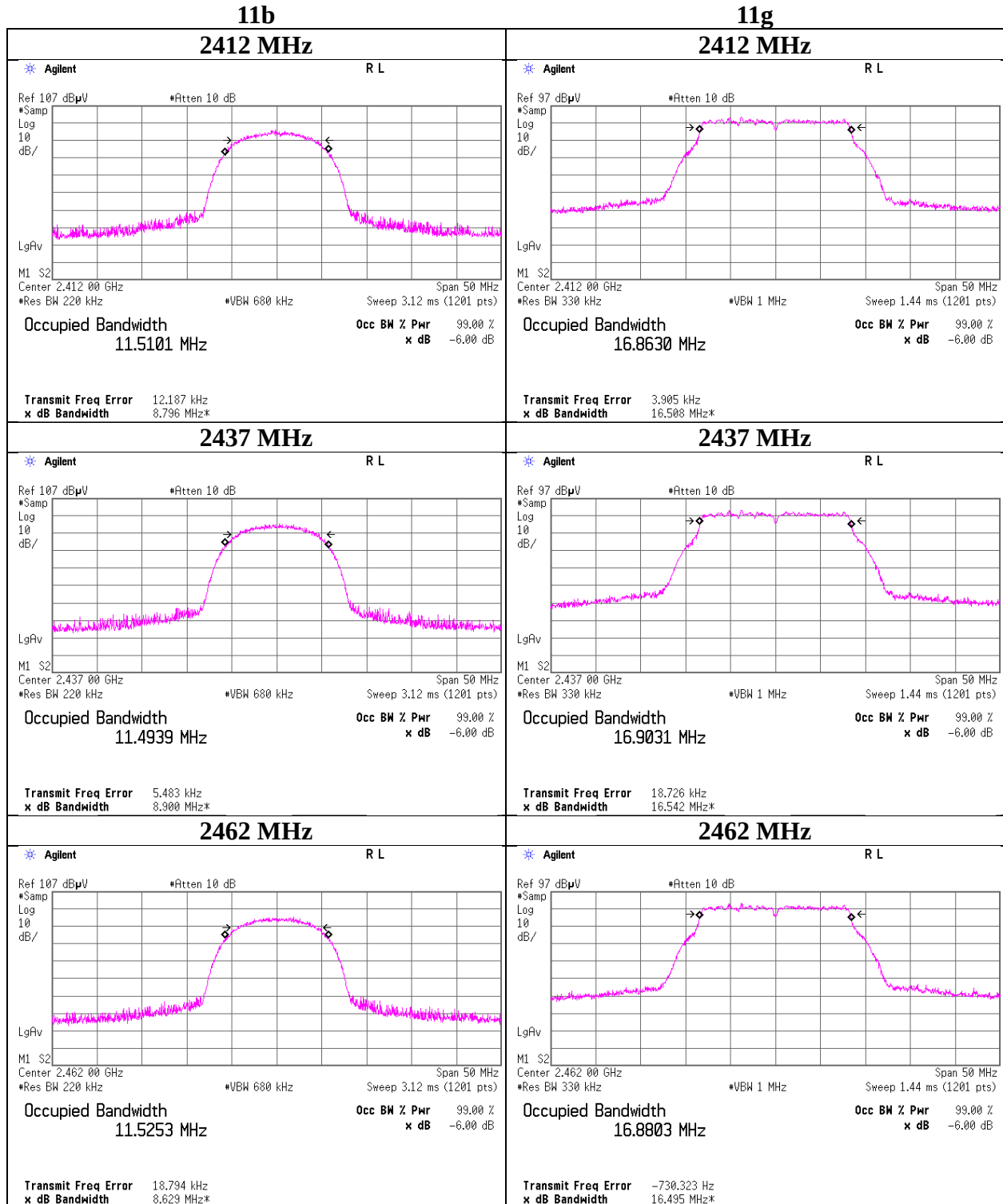
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Facsimile : +81 463 50 6401

99% Occupied Bandwidth

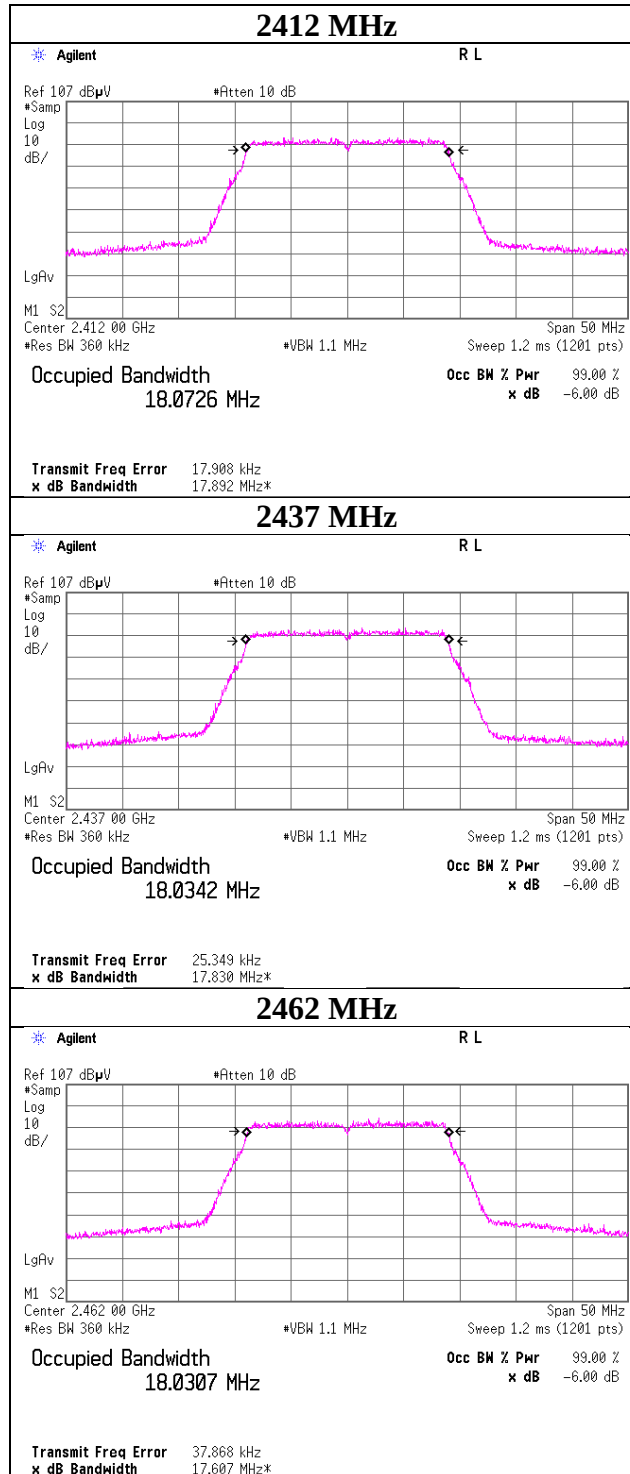
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11854935S-A-R2
Date	July 28, 2017
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Makoto Hosaka
Mode	Tx 11b ,Tx 11g



99% Occupied Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11854935S-A-R2
Date July 28, 2017
Temperature / Humidity 25 deg. C / 55 % RH
Engineer Makoto Hosaka
Mode Tx 11n-20

11n-20



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	AT,RE	2016/10/24 * 12
SCC-G32	Coaxial Cable	Junkosha	MWX241-0200 0KMSKMS	OCT-09-13-005	AT	2016/11/07 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	AT	2016/10/17 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2017/05/01 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SCC-G07	Coaxial Cable	Junkosha	J12J103316-00	MAY-25-17-008	RE	2017/06/13 * 12
SCC-G43	Coaxial Cable	HUBER+SUHNER	SUCOFLEX_1 04_E	SN MY 13406/4E	RE	2017/07/10 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2016/08/22 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/10/11 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSW R)	3	RE	2017/07/17 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE _CE,RFI,MF)	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2016/10/17 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2016/11/07 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2017/04/20 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	RE	2017/04/20 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	3008A01268	RE	2017/04/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2016/10/18 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2016/08/04 * 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(RF Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2016/11/08 * 12

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

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

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

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

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