




# RADIO TEST REPORT


Test Report No. : 12021807S-C-R2

**Applicant** : JVC KENWOOD Corporation  
**Type of Equipment** : GPS NAVIGATION SYSTEM  
**Model No.** : DNX995S  
**FCC ID** : IOMJ5175  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**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 12021807S-C-R1.12021807S-C-R1 is replaced with this report.

**Date of test:** November 7 to 16, 2017

**Representative test engineer:**   
Makoto Hosaka  
Engineer  
Consumer Technology Division

**Approved by:**   
Akira Sato  
Engineer  
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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**Shonan EMC Lab.**

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : JVC KENWOOD Corporation  
Address : 2967-3, Ishikawa-machi, Hachioji, Tokyo 192-8525 Japan  
Telephone Number : +81-42-646-5525  
Facsimile Number : +81-42-646-1440  
Contact Person : Seigo Tsutsumi

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

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

Type of Equipment : GPS NAVIGATION SYSTEM  
Model No. : DNX995S  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 12 V  
Receipt Date of Sample : November 6, 2017  
Country of Mass-production : Indonesia  
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: DNX995S (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

Clock frequency in the system (Maximum) : 6.3 GHz

### **Radio Specification**

Type of radio	Bluetooth (BDR/EDR)	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2402 - 2480 MHz	2412 - 2462 MHz	2412 - 2462 MHz	5745 - 5805 MHz	2412 - 2462 MHz 5745 - 5805 MHz	5755 - 5795 MHz
Type of modulation	FHSS	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	1 MHz	5 MHz		20 MHz	<u>2.4 GHz band</u> 5 MHz <u>5 GHz band</u> 20 MHz	<u>2.4 GHz band</u> 5 MHz <u>5 GHz band</u> 40 MHz

Antenna type	Chip Antenna
Antenna Gain	-5.9 dBi (2.4 GHz), -5.2 dBi (5 GHz)
Power Supply (radio art input)	DC 3.6 V/ 3.3 V
Clock frequency (Maximum)	37.4 MHz

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on January 2, 2018 and effective February 1, 2018

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

\* The revision on January 2, 2018, 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: IC: RSS-Gen 8.8	FCC: Section 15.207 ----- IC: RSS-Gen 8.8	N/A	N/A*1)	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 ----- IC: -	FCC: Section15.247(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: Section15.247(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: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.2 dB 960.271 MHz, QP, Hori. (Tx, 11g, 2437 MHz)	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.  
\*1) The test is not applicable since the EUT has no AC mains.  
\*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)**

The EUT provides stable voltage (DC 3.6 V/ 3.3 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 the EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

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

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	RSS-Gen 6.6	IC: -	N/A	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  $k=2$ .  
Shonan EMC Lab.

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	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.3 dB	4.3 dB	4.3 dB	-	-
	200 MHz-1 GHz	5.9 dB	5.9 dB	5.9 dB	-	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 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	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Spurious emission (Conducted) below 1GHz	1.8 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.5 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.7 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

#### Radiated emission test

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

### 3.5 Test Location

JAB Accreditation No. RTL02610

FCC Test Firm Registration Number: 839876

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.

<b>Mode</b>	<b>Remarks*</b>
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g) *	6 Mbps, PN9
IEEE 802.11n (11n-20)	MCS 3, 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: Fixed Firmware: Version 1.0 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

\*The details of Operating mode(s)

<b>Test Item</b>	<b>Operating Mode</b>	<b>Tested frequency</b>
Spurious Emission (Radiated, above 1 GHz)	11b Tx	2412 MHz
6dB Bandwidth	11g Tx	2437 MHz
99% Occupied Bandwidth	11n-20 Tx	2462 MHz
Maximum Peak Output Power Power Density		
Spurious Emission (Radiated below 1 GHz) Spurious Emission (Conducted below 30 MHz)	11g Tx	2437 MHz

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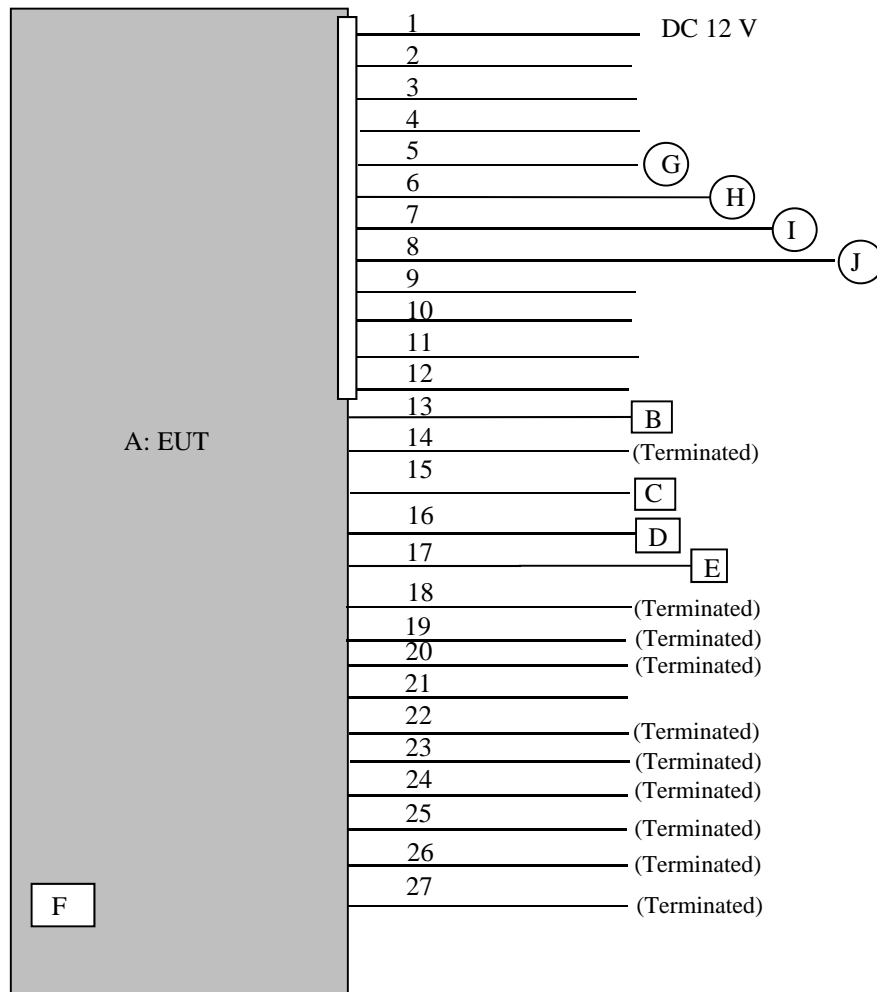
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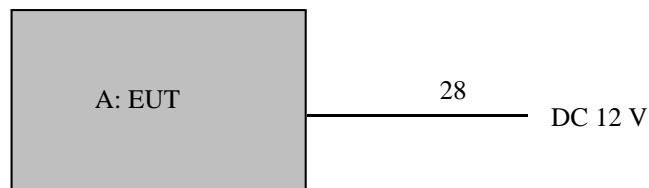


## 4.2 Configuration and peripherals

### Radiated Emission test



### Antenna Terminal conducted test



\* 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	GPS NAVIGATION SYSTEM	DNX995S	PK-X0045 *1) PK-X0046 *2)	JVC KENWOOD Corporation	EUT
B	GPS Antenna	-	-	JVC KENWOOD Corporation	-
C	USB Memory	Data Traveler	-	Kingston	-
D	USB Memory	SDK-USM1GL	-	Sony	-
E	Mic	-	-	JVC KENWOOD Corporation	-
F	micro SDHC Card	-	-	TDK	-
G	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
H	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
I	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
J	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-

\*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	DC	0.6 + 1.0	Unshielded	Unshielded	-
2	REMOTE CONT	0.1 + 1.0	Unshielded	Unshielded	-
3	MUTE	0.1 + 1.0	Unshielded	Unshielded	-
4	ANT. CONT	0.1 + 1.0	Unshielded	Unshielded	-
5	Speaker Front L	2.0 + 1.9	Unshielded	Unshielded	-
6	Speaker Front R	2.0 + 1.9	Unshielded	Unshielded	-
7	Speaker Rear L	2.0 + 1.9	Unshielded	Unshielded	-
8	Speaker Rear R	2.0 + 1.9	Unshielded	Unshielded	-
9	P. CONT	0.1 + 1.0	Unshielded	Unshielded	-
10	PRK SW	0.1 + 1.0	Unshielded	Unshielded	-
11	REVERSE	0.1 + 1.0	Unshielded	Unshielded	-
12	ILLUMI	0.1 + 1.0	Unshielded	Unshielded	-
13	GPS ANT	3.5	Shielded	Shielded	-
14	iDatalink I/F	0.7	Shielded	Shielded	-
15	USB	0.2 + 1.0	Shielded	Shielded	-
16	USB	0.2 + 1.0	Shielded	Shielded	-
17	MIC	3.0	Shielded	Shielded	-
18	FRONT AUDIO	1.0	Shielded	Shielded	-
19	REAR AUDIO	2.0	Shielded	Shielded	-
20	SW	2.0	Shielded	Shielded	-
21	I/F EXT	1.0	Unshielded	Unshielded	-
22	AV-IN	1.5	Shielded	Shielded	-
23	AV-OUT	1.5	Shielded	Shielded	-
24	VIDEO OUT	0.2 + 1.0	Shielded	Shielded	-
25	REAR VIEW CAMERA	0.2 + 1.0	Shielded	Shielded	-
26	FRONT VIEW CAMERA	0.2 + 1.0	Shielded	Shielded	-
27	ANT	0.1 + 3.0	Shielded	Shielded	-
28	DC	1.0	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 urethane platform of nominal size, 1.0 m by 2.0 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	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	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	<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: 300kHz
Test Distance	3 m	3.88 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 31.5 GHz),		3.88 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 31.5 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:  $20 \times \log(3.88 \text{ m}/3.0 \text{ m}) = 2.24 \text{ dB}$

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

The carrier level and noise levels were confirmed at angle of 0 deg. to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.)

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

**Measurement range : 30 MHz – 31.5 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.

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used</b>
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**

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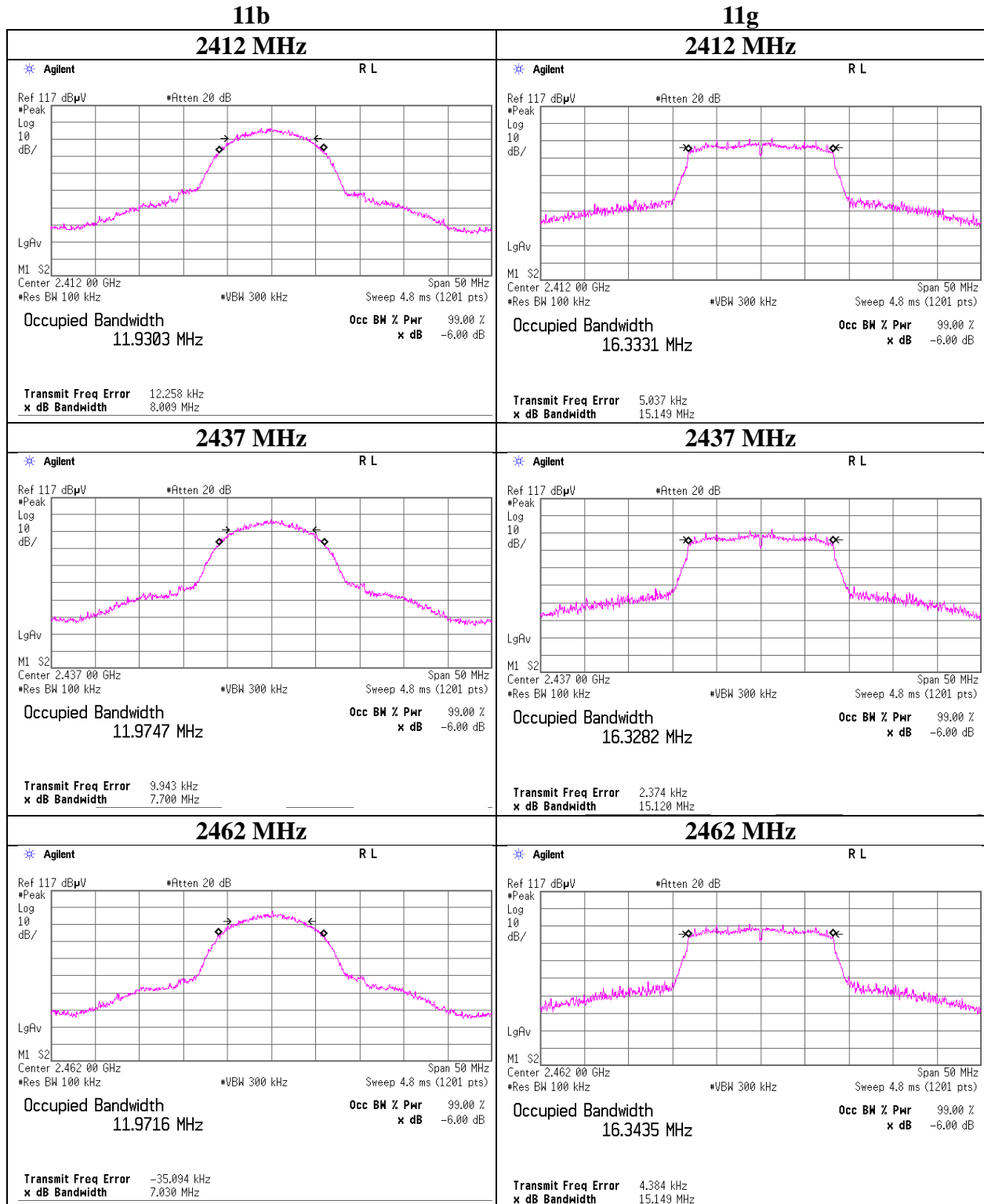
**APPENDIX 1: Test data**

**6 dB Bandwidth and 99 % Occupied Bandwidth**

Test place                      Shonan EMC Lab. No. Shielded Room  
Report No.                      12021807S-C-R2  
Date                              November 8, 2017                      November 16, 2017  
Temperature / Humidity        25 deg. C / 44 % RH                26 deg. C / 37 % RH  
Engineer                        Tatsuya Arai                              Makoto Hosaka  
Mode                                Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Limit for 6dB Bandwidth [kHz]
11b	2412	8.009	11907.9	> 500
	2437	7.700	11927.1	> 500
	2462	7.030	12009.0	> 500
11g	2412	15.149	16532.0	> 500
	2437	15.120	16536.1	> 500
	2462	15.149	16519.0	> 500
11n-20	2412	17.609	17607.9	> 500
	2437	16.358	17572.5	> 500
	2462	15.435	17600.8	> 500

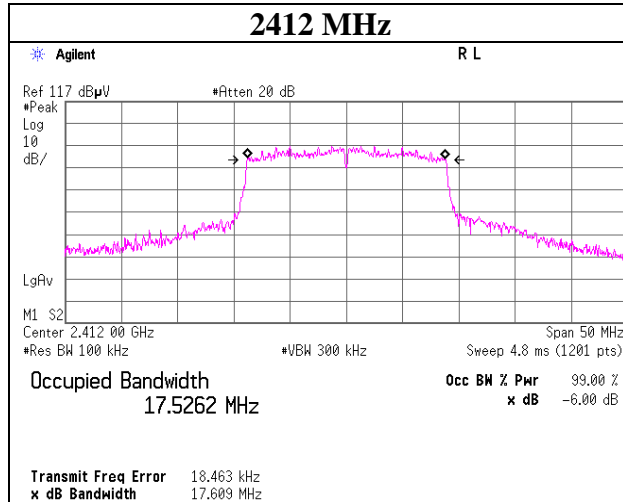
### 6dB Bandwidth



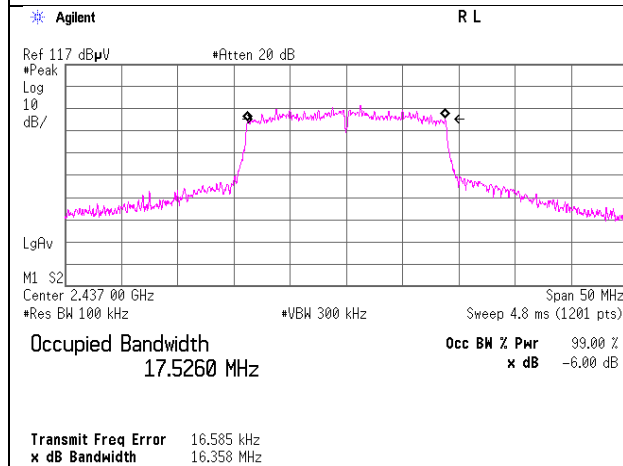
## 6dB Bandwidth

**11n-20**

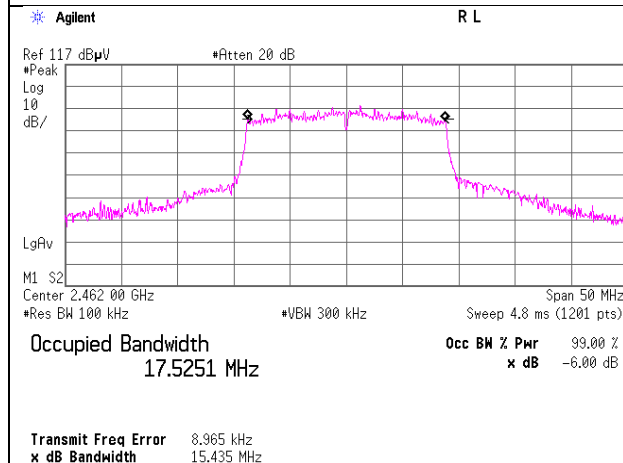
**2412 MHz**



**2437 MHz**



**2462 MHz**



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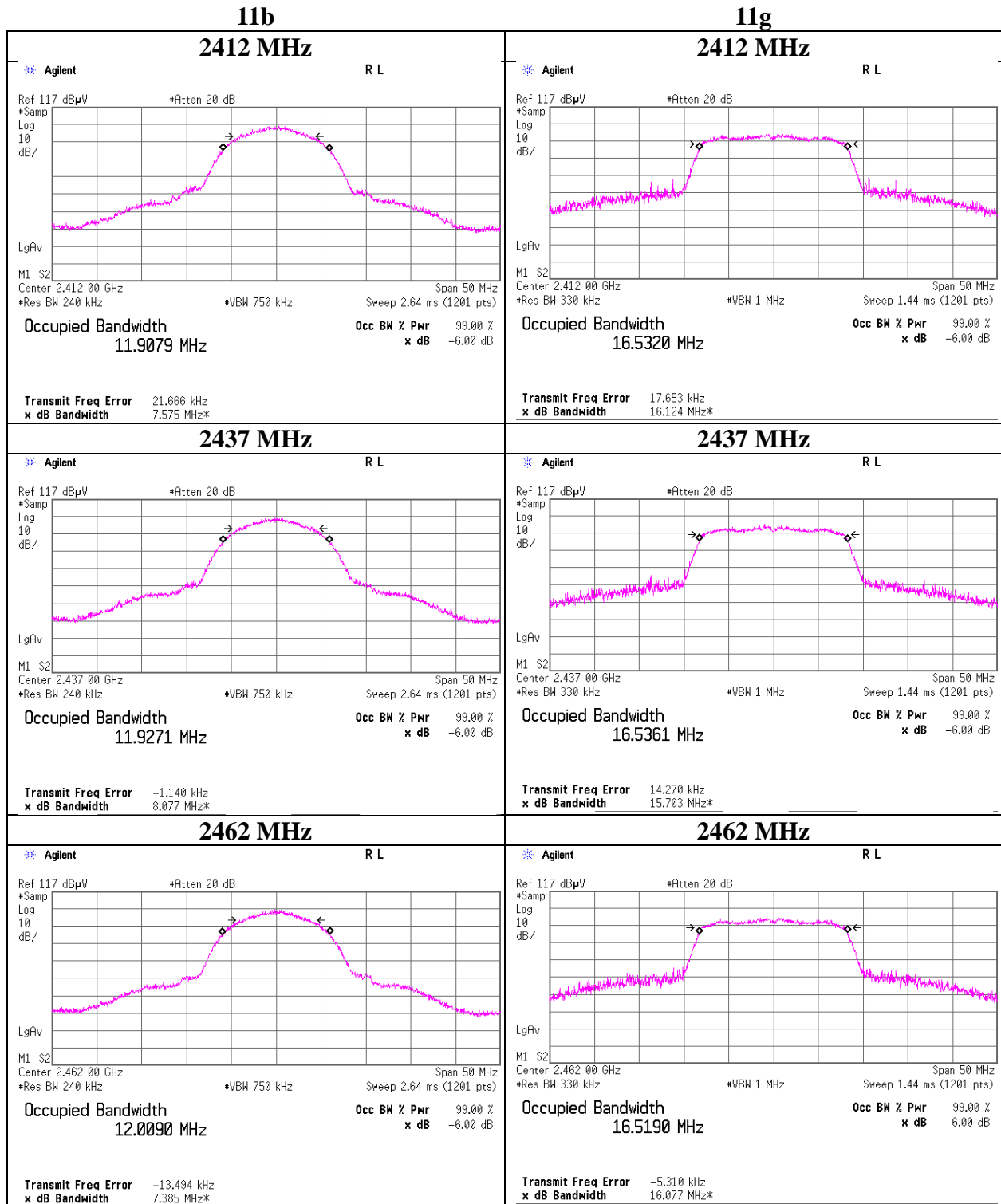
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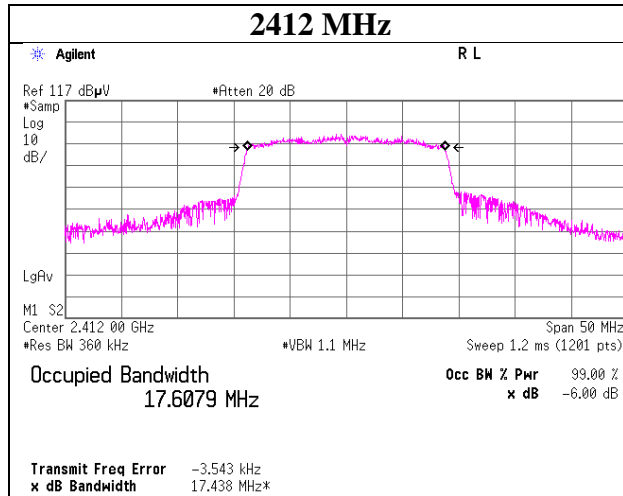
**99%Occupied Bandwidth**



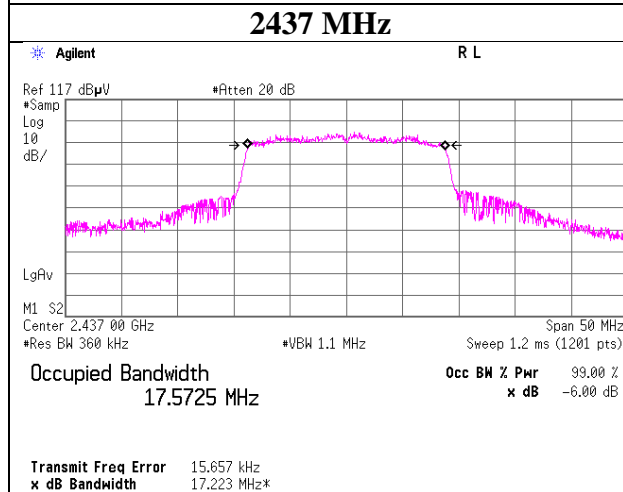
## 99% Occupied Bandwidth

**11n-20**

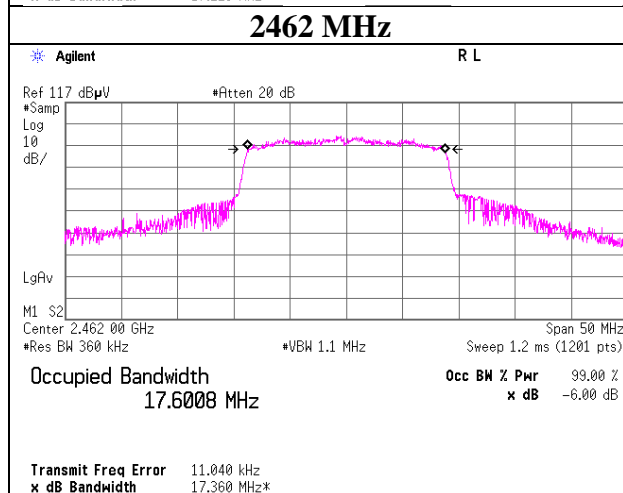
**2412 MHz**



**2437 MHz**



**2462 MHz**



## Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 12021807S-C-R2  
Date : November 7, 2017  
Temperature / Humidity : 27 deg. C / 41 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11b

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	8.18	2.29	9.96	20.43	110.41	30.00	1000	9.57
2437	8.40	2.29	9.96	20.65	116.14	30.00	1000	9.35
2462	8.31	2.30	9.97	20.58	114.29	30.00	1000	9.42

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 [Mbps]	Reading [dBm]	Remark
1	8.19	
2	8.16	
5.5	8.27	
11	8.40	*

\*: 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.	12021807S-C-R2
Date	November 16, 2017
Temperature / Humidity	26 deg. C / 37 % RH
Engineer	Makoto Hosaka
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.47	2.29	9.96	22.72	187.07	30.00	1000	7.28
2437	10.65	2.29	9.96	22.90	194.98	30.00	1000	7.10
2462	10.44	2.30	9.97	22.71	186.64	30.00	1000	7.29

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 [Mbps]	Reading [dBm]	Remark
6	10.65	*
9	10.58	
12	10.35	
18	10.19	
24	9.86	
36	9.77	
48	9.86	
54	10.04	

\*: 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. : 12021807S-C-R2  
Date : November 16, 2017  
Temperature / Humidity : 26 deg. C / 37 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-20

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.41	2.29	9.96	22.66	184.50	30.00	1000	7.34
2437	10.40	2.29	9.96	22.65	184.08	30.00	1000	7.35
2462	10.42	2.30	9.97	22.69	185.78	30.00	1000	7.31

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.

2412 MHz

Rate [Mbps]	Reading [dBm]	Remark
0	10.03	
1	9.69	
2	10.00	
3	10.40	*
4	9.99	
5	9.49	
6	9.38	
7	9.39	

\*: Worst Rate

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. Shielded Room  
Report No. : 12021807S-C-R2  
Date : November 8, 2017      November 16, 2017  
Temperature / Humidity : 25 deg. C / 44 % RH      26 deg. C / 37 % RH  
Engineer : Tatsuya Arai      Makoto Hosaka  
Mode : Tx

**11b      11 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	4.19	2.29	9.96	16.44	44.06	0.28	16.72	46.99
2437	4.40	2.29	9.96	16.65	46.24	0.28	16.93	49.32
2462	4.42	2.30	9.97	16.69	46.67	0.28	16.97	49.77

**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	0.91	2.29	9.96	13.16	20.70	0.16	13.32	21.48
2437	1.13	2.29	9.96	13.38	21.78	0.16	13.54	22.59
2462	0.98	2.30	9.97	13.25	21.13	0.16	13.41	21.93

**11n-20      MCS 3**

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	-0.57	2.29	9.96	11.68	14.72	0.65	12.33	17.10
2437	-0.42	2.29	9.96	11.83	15.24	0.65	12.48	17.70
2462	-0.45	2.30	9.97	11.82	15.21	0.65	12.47	17.66

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 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.5 Shielded Room  
Report No. : 12021807S-C-R2  
Date : November 8, 2017  
Temperature / Humidity : 25 deg. C / 44 % RH  
Engineer : Tatsuya Arai  
Mode : Tx  
November 16, 2017  
26 deg. C / 37 % RH  
Makoto Hosaka

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	4.56	0.03	4.59	
	2	4.45	0.05	4.50	
	5.5	4.49	0.14	4.63	
	11	4.40	0.28	4.68	*
11g	6	1.13	0.16	1.29	*
	9	0.94	0.24	1.18	
	12	0.83	0.32	1.15	
	18	0.61	0.47	1.08	
	24	-0.22	0.62	0.40	
	36	-0.51	0.89	0.38	
	48	-0.75	1.12	0.37	
	54	-0.84	1.24	0.40	
11n-20	0	-0.02	0.18	0.16	
	1	-0.14	0.35	0.21	
	2	-0.33	0.34	0.01	
	3	-0.42	0.65	0.23	*
	4	-0.69	0.91	0.22	
	5	-1.88	1.15	-0.73	
	6	-1.97	1.25	-0.72	
	7	-2.14	1.35	-0.79	

\* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

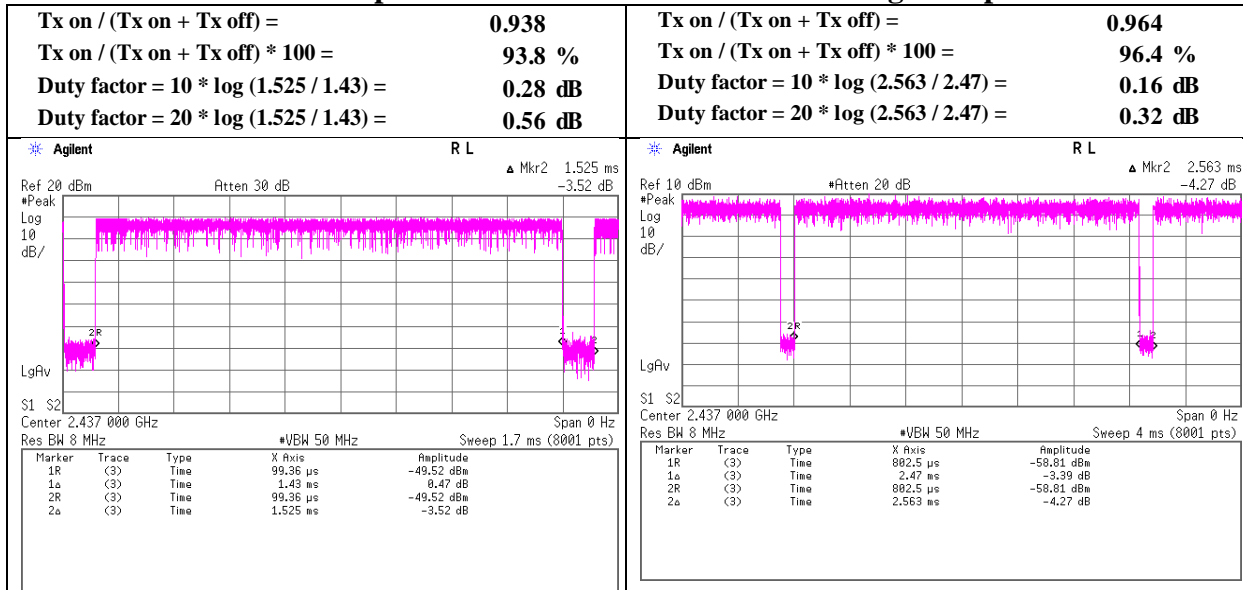
All comparison were carried out on same frequency and measurement factors.

### Burst rate confirmation

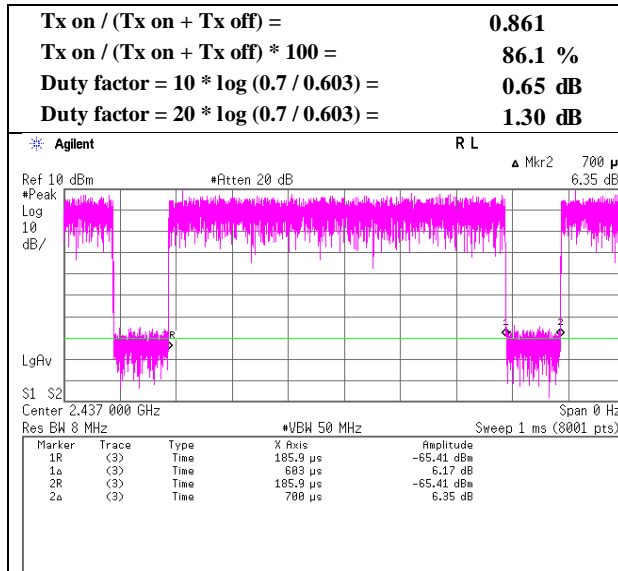
Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 12021807S-C-R2  
Date : November 8, 2017  
Temperature / Humidity : 23 deg. C / 68 % RH  
Engineer : Tatsuya Arai  
Mode : Tx

#### 11b 11 Mbps

#### 11g 6 Mbps



#### 11n-20 MCS 3



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



## Radiated Spurious Emission

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3 3 3 3  
Date November 11, 2017 November 15, 2017 November 15, 2017 November 16, 2017  
Temperature / Humidity 23 deg. C / 42 % RH 23 deg. C / 43 % RH 24 deg. C / 41 % RH 24 deg. C / 36 % RH  
Engineer Hiroyuki Morikawa Makoto Hosaka Kazuya Noda Kazuya Noda  
(1 GHz - 13 GHz) (13 GHz - 18 GHz) (18 GHz - 26.5 GHz) (26.5 GHz - 31.5 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	51.51	27.26	13.60	44.13	2.24	50.48	73.90	23.4	135	216	
Hori.	4824.000	PK	48.08	31.46	5.61	44.46	2.24	42.93	73.90	30.9	150	0	
Hori.	7236.000	PK	47.60	36.62	6.88	44.00	2.24	49.34	73.90	24.5	150	0	
Hori.	9648.000	PK	47.65	38.66	7.87	43.83	2.24	52.59	73.90	<b>21.3</b>	150	0	
Vert.	2390.000	PK	51.28	27.26	13.60	44.13	2.24	50.25	73.90	23.6	263	52	
Vert.	4824.000	PK	49.22	31.46	5.61	44.46	2.24	44.07	73.90	29.8	150	0	
Vert.	7236.000	PK	47.46	36.62	6.88	44.00	2.24	49.20	73.90	24.7	150	0	
Vert.	9648.000	PK	47.31	38.66	7.87	43.83	2.24	52.25	73.90	21.6	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 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	41.04	27.26	13.60	44.13	0.56	2.24	40.57	53.90	13.3	*1)
Hori.	4824.000	AV	39.87	31.46	5.61	44.46	0.56	2.24	35.28	53.90	18.6	
Hori.	7236.000	AV	39.15	36.62	6.88	44.00	0.56	2.24	41.45	53.90	12.4	
Hori.	9648.000	AV	39.33	38.66	7.87	43.83	0.56	2.24	44.83	53.90	<b>9.1</b>	
Vert.	2390.000	AV	41.70	27.26	13.60	44.13	0.56	2.24	41.23	53.90	12.7	*1)
Vert.	4824.000	AV	39.79	31.46	5.61	44.46	0.56	2.24	35.20	53.90	18.7	
Vert.	7236.000	AV	39.02	36.62	6.88	44.00	0.56	2.24	41.32	53.90	12.6	
Vert.	9648.000	AV	39.06	38.66	7.87	43.83	0.56	2.24	44.56	53.90	9.3	

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 (3.88 m / 3.0 m) = 2.24 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	97.19	27.33	13.62	44.14	2.24	96.24	-	-	Carrier
Hori.	2400.000	PK	53.39	27.29	13.61	44.14	2.24	52.39	76.24	23.9	
Vert.	2412.000	PK	94.92	27.33	13.62	44.14	2.24	93.97	-	-	Carrier
Vert.	2400.000	PK	52.27	27.29	13.61	44.14	2.24	51.27	73.97	22.7	

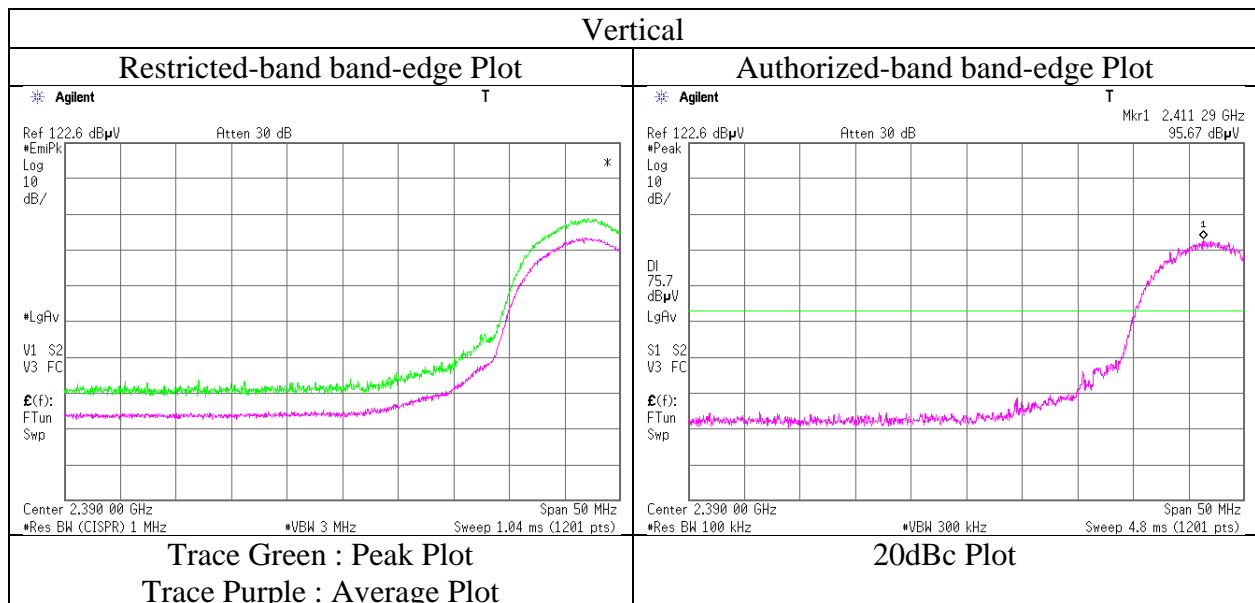
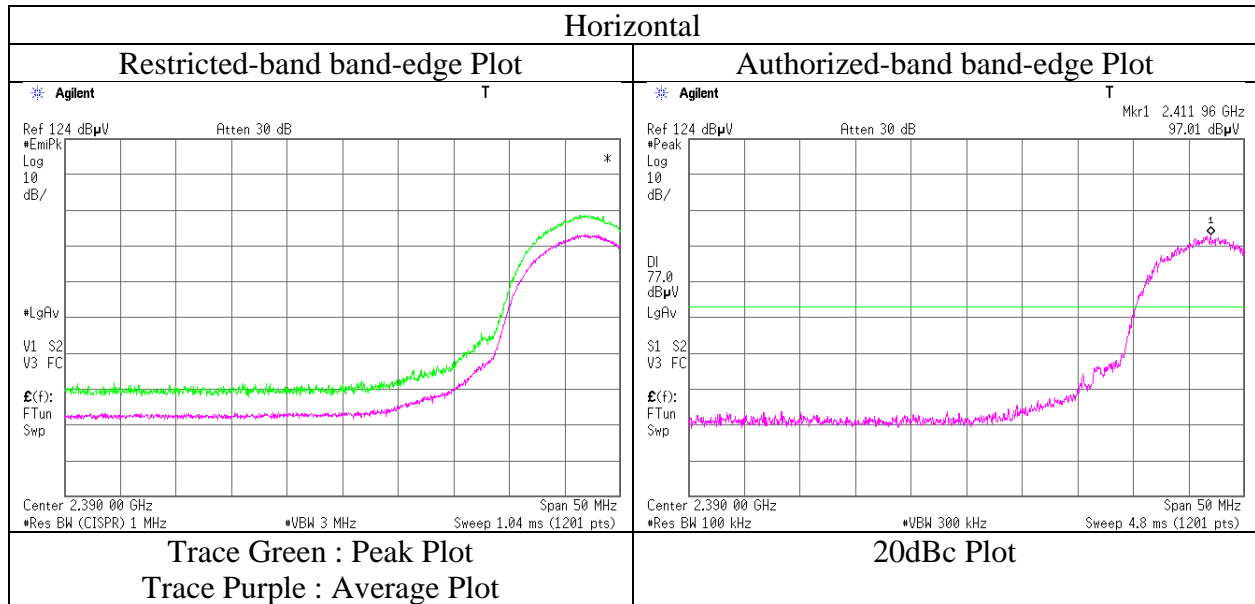
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

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

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3  
Date November 11, 2017  
Temperature / Humidity 23 deg. C / 42 % RH  
Engineer Hiroyuki Morikawa  
(1 GHz -13 GHz)  
Mode Tx 11b 2412 MHz



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

## Radiated Spurious Emission

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3 3 3 3  
Date November 11, 2017 November 15, 2017 November 15, 2017 November 16, 2017  
Temperature / Humidity 23 deg. C / 42 % RH 23 deg. C / 43 % RH 24 deg. C / 41 % RH 24 deg. C / 36 % RH  
Engineer Hiroyuki Morikawa Makoto Hosaka Kazuyua Noda Kazuyua Noda  
(I GHz - 13 GHz) (13 GHz - 18 GHz) (18 GHz - 26.5 GHz) (26.5 GHz - 31.5 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.	4874.000	PK	48.12	31.59	5.60	44.47	2.24	43.08	73.90	30.8	150	0	
Hori.	7311.000	PK	47.74	36.75	6.89	44.03	2.24	49.59	73.90	24.3	150	0	
Hori.	9748.000	PK	46.80	38.78	7.93	43.84	2.24	51.91	73.90	<b>21.9</b>	150	0	
Vert.	4874.000	PK	47.45	31.59	5.60	44.47	2.24	42.41	73.90	31.4	150	0	
Vert.	7311.000	PK	47.12	36.75	6.89	44.03	2.24	48.97	73.90	24.9	150	0	
Vert.	9748.000	PK	46.64	38.78	7.93	43.84	2.24	51.75	73.90	22.1	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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.	4874.000	AV	39.60	31.59	5.60	44.47	0.56	2.24	35.12	53.90	18.8	
Hori.	7311.000	AV	39.14	36.75	6.89	44.03	0.56	2.24	41.55	53.90	12.3	
Hori.	9748.000	AV	38.09	38.78	7.93	43.84	0.56	2.24	43.76	53.90	10.1	
Vert.	4874.000	AV	39.81	31.59	5.60	44.47	0.56	2.24	35.33	53.90	18.6	
Vert.	7311.000	AV	38.94	36.75	6.89	44.03	0.56	2.24	41.35	53.90	12.5	
Vert.	9748.000	AV	38.31	38.78	7.93	43.84	0.56	2.24	43.98	53.90	<b>9.9</b>	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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.

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## Radiated Spurious Emission

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3 3 3 3  
Date November 11, 2017 November 15, 2017 November 15, 2017 November 16, 2017  
Temperature / Humidity 23 deg. C / 42 % RH 23 deg. C / 43 % RH 24 deg. C / 41 % RH 24 deg. C / 36 % RH  
Engineer Hiroyuki Morikawa Makoto Hosaka Kazuya Noda Kazuya Noda  
(1 GHz - 13 GHz) (13 GHz - 18 GHz) (18 GHz - 26.5 GHz) (26.5 GHz - 31.5 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.	2483.500	PK	58.24	27.55	13.69	44.16	2.24	57.56	73.90	16.3	110	105	
Hori.	4924.000	PK	47.77	31.73	5.59	44.49	2.24	42.84	73.90	31.0	150	0	
Hori.	7386.000	PK	47.85	36.88	6.91	44.06	2.24	49.82	73.90	24.0	150	0	
Hori.	9848.000	PK	47.02	38.90	7.99	43.86	2.24	52.29	73.90	21.6	150	0	
Vert.	2483.500	PK	53.25	27.55	13.69	44.16	2.24	52.57	73.90	21.3	259	227	
Vert.	4924.000	PK	48.49	31.73	5.59	44.49	2.24	43.56	73.90	30.3	150	0	
Vert.	7386.000	PK	48.32	36.88	6.91	44.06	2.24	50.29	73.90	23.6	150	0	
Vert.	9848.000	PK	46.98	38.90	7.99	43.86	2.24	52.25	73.90	21.6	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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	45.09	27.55	13.69	44.16	0.56	2.24	44.97	53.90	8.9	*1)
Hori.	4924.000	AV	39.98	31.73	5.59	44.49	0.56	2.24	35.61	53.90	18.3	
Hori.	7386.000	AV	39.35	36.88	6.91	44.06	0.56	2.24	41.88	53.90	12.0	
Hori.	9848.000	AV	38.73	38.90	7.99	43.86	0.56	2.24	44.56	53.90	9.3	
Vert.	2483.500	AV	41.73	27.55	13.69	44.16	0.56	2.24	41.61	53.90	12.3	*1)
Vert.	4924.000	AV	40.00	31.73	5.59	44.49	0.56	2.24	35.63	53.90	18.3	
Vert.	7386.000	AV	39.11	36.88	6.91	44.06	0.56	2.24	41.64	53.90	12.3	
Vert.	9848.000	AV	38.79	38.90	7.99	43.86	0.56	2.24	44.62	53.90	9.3	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

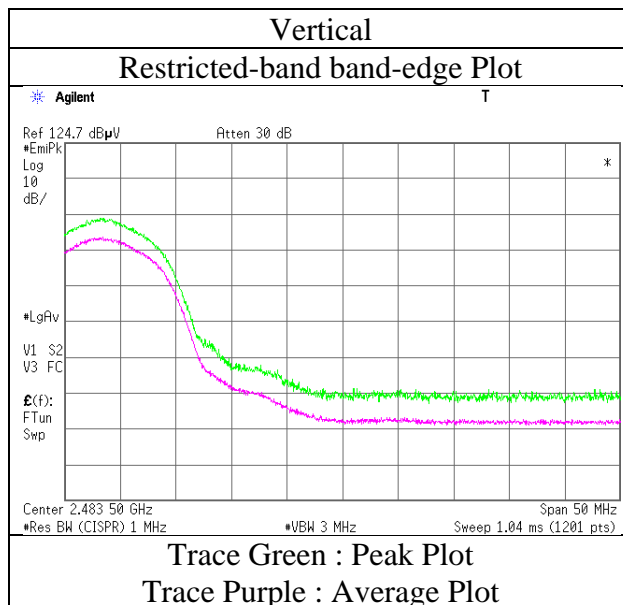
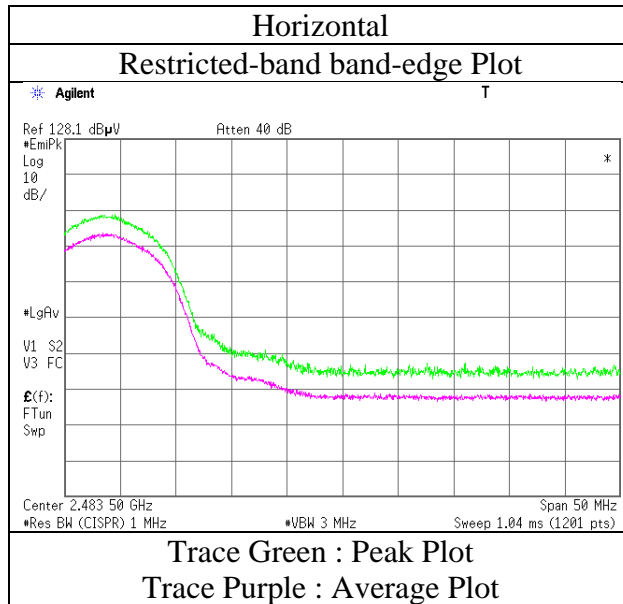
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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)**

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3  
Date November 11, 2017  
Temperature / Humidity 23 deg. C / 42 % RH  
Engineer Hiroyuki Morikawa  
(1 GHz -13 GHz)  
Mode Tx 11b 2462 MHz



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

## Radiated Spurious Emission

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3 3 3  
Date November 15, 2017 November 15, 2017 November 16, 2017  
Temperature / Humidity 23 deg. C / 43 % RH 24 deg. C / 41 % RH 24 deg. C / 36 % RH  
Engineer Makoto Hosaka Kazuya Noda Kazuya Noda  
(1 GHz - 18 GHz) (18 GHz - 26.5 GHz) (26.5 GHz - 31.5 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.	2390.000	PK	61.14	27.26	13.60	44.13	2.24	60.11	73.90	13.7	154	104	
Hori.	4824.000	PK	49.01	31.46	5.61	44.46	2.24	43.86	73.90	30.0	150	0	
Hori.	7236.000	PK	49.05	36.62	6.88	44.00	2.24	50.79	73.90	23.1	150	0	
Hori.	9648.000	PK	49.97	38.66	7.87	43.83	2.24	54.91	73.90	18.9	150	0	
Vert.	2390.000	PK	61.78	27.26	13.60	44.13	2.24	60.75	73.90	<b>13.1</b>	253	238	
Vert.	4824.000	PK	48.10	31.46	5.61	44.46	2.24	42.95	73.90	30.9	150	0	
Vert.	7236.000	PK	47.36	36.62	6.88	44.00	2.24	49.10	73.90	24.8	150	0	
Vert.	9648.000	PK	48.36	38.66	7.87	43.83	2.24	53.30	73.90	20.6	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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	42.87	27.26	13.60	44.13	0.32	2.24	42.16	53.90	11.7	*1)
Hori.	4824.000	AV	39.66	31.46	5.61	44.46	0.32	2.24	34.83	53.90	19.1	
Hori.	7236.000	AV	38.78	36.62	6.88	44.00	0.32	2.24	40.84	53.90	13.1	
Hori.	9648.000	AV	39.45	38.66	7.87	43.83	0.32	2.24	44.71	53.90	9.2	
Vert.	2390.000	AV	43.29	27.26	13.60	44.13	0.32	2.24	42.58	53.90	11.3	*1)
Vert.	4824.000	AV	40.00	31.46	5.61	44.46	0.32	2.24	35.17	53.90	18.7	
Vert.	7236.000	AV	38.71	36.62	6.88	44.00	0.32	2.24	40.77	53.90	13.1	
Vert.	9648.000	AV	39.61	38.66	7.87	43.83	0.32	2.24	44.87	53.90	<b>9.0</b>	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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	91.27	27.33	13.62	44.14	2.24	90.32	-	-	Carrier
Hori.	2400.000	PK	55.24	27.29	13.61	44.14	2.24	54.24	70.32	16.1	
Vert.	2412.000	PK	91.20	27.33	13.62	44.14	2.24	90.25	-	-	Carrier
Vert.	2400.000	PK	55.62	27.29	13.61	44.14	2.24	54.62	70.25	15.6	

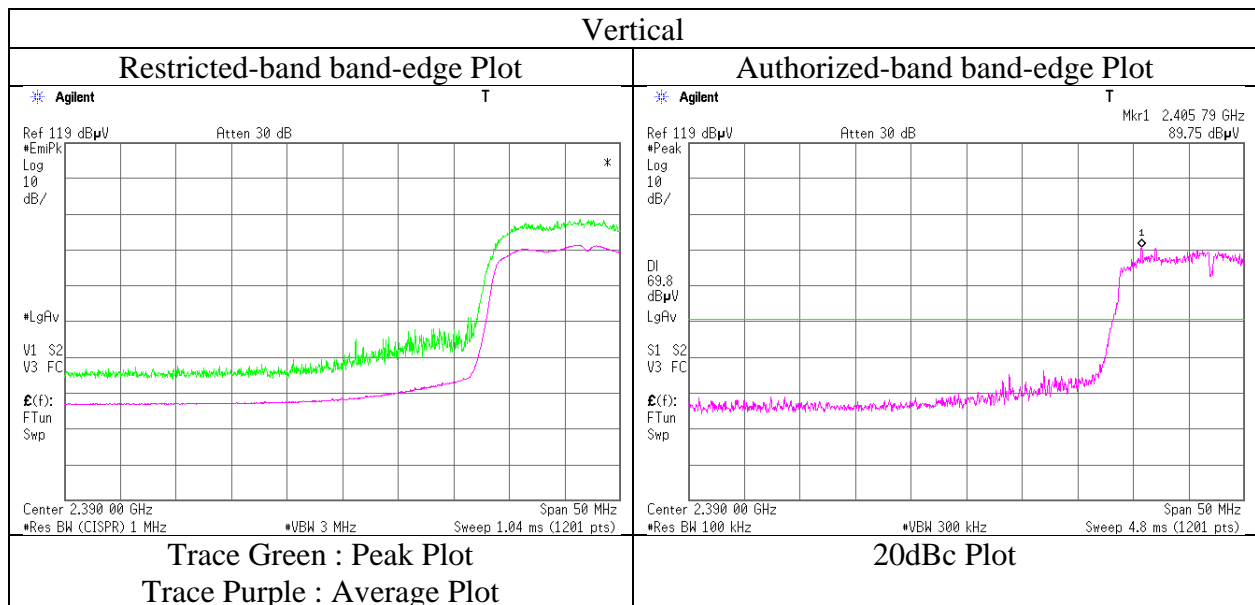
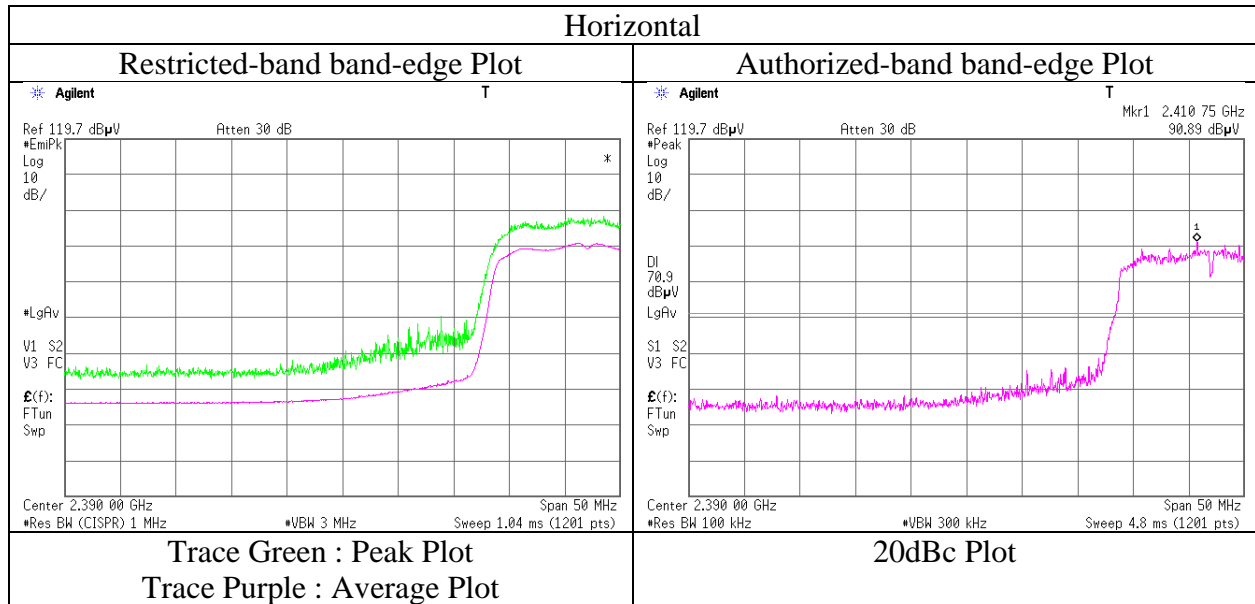
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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)**

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3  
Date November 15, 2017  
Temperature / Humidity 23 deg. C / 43 % RH  
Engineer Makoto Hosaka  
(1 GHz - 13 GHz)  
Mode Tx 11g 2412 MHz



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

## Radiated Spurious Emission

Report No.	12021807S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	November 16, 2017	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	20 deg. C / 40 % RH	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Kazutaka Takeyama	Makoto Hosaka	Kazuya Noda	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(26.5 GHz - 31.5 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.	73.710	QP	44.00	6.21	7.26	32.10	0.00	25.37	40.00	14.6	250	71	
Hori.	110.593	QP	44.80	11.59	7.40	32.07	0.00	31.72	43.50	11.7	300	124	
Hori.	122.877	QP	45.10	13.16	7.44	32.06	0.00	33.64	43.50	9.8	300	75	
Hori.	221.188	QP	52.00	11.52	8.27	31.96	0.00	39.83	46.00	6.1	150	44	
Hori.	224.993	QP	50.30	11.54	8.29	31.96	0.00	38.17	46.00	7.8	150	49	
Hori.	368.333	QP	42.00	14.91	9.07	31.85	0.00	34.13	46.00	11.8	100	29	
Hori.	466.941	QP	42.30	16.97	9.51	31.85	0.00	36.93	46.00	9.0	100	144	
Hori.	959.925	QP	31.80	22.12	11.23	30.40	0.00	34.75	46.00	11.2	100	213	
Hori.	960.000	QP	25.40	22.12	11.23	30.40	0.00	28.35	46.00	17.6	100	213	
Hori.	960.271	QP	45.70	22.12	11.23	30.40	0.00	48.65	53.90	5.2	100	213	
Hori.	4874.000	PK	47.89	31.59	5.60	44.47	2.24	42.85	73.90	31.0	150	0	
Hori.	7311.000	PK	47.36	36.75	6.89	44.03	2.24	49.21	73.90	24.6	150	0	
Hori.	9748.000	PK	47.72	38.78	7.93	43.84	2.24	52.83	73.90	21.0	150	0	
Vert.	221.096	QP	47.40	11.52	8.27	31.96	0.00	35.23	46.00	10.7	100	144	
Vert.	933.016	QP	38.00	22.04	11.15	30.63	0.00	40.56	46.00	5.4	100	1	
Vert.	4874.000	PK	48.58	31.59	5.60	44.47	2.24	43.54	73.90	30.3	150	0	
Vert.	7311.000	PK	48.36	36.75	6.89	44.03	2.24	50.21	73.90	23.6	150	0	
Vert.	9748.000	PK	47.41	38.78	7.93	43.84	2.24	52.52	73.90	21.3	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 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	39.52	31.59	5.60	44.47	0.32	2.24	34.80	53.90	19.1	
Hori.	7311.000	AV	38.87	36.75	6.89	44.03	0.32	2.24	41.04	53.90	12.9	
Hori.	9748.000	AV	38.55	38.78	7.93	43.84	0.32	2.24	43.98	53.90	9.9	
Vert.	4874.000	AV	39.69	31.59	5.60	44.47	0.32	2.24	34.97	53.90	18.9	
Vert.	7311.000	AV	38.64	36.75	6.89	44.03	0.32	2.24	40.81	53.90	13.1	
Vert.	9748.000	AV	38.46	38.78	7.93	43.84	0.32	2.24	43.89	53.90	10.0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

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



## Radiated Spurious Emission

Report No.	12021807S-C-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Makoto Hosaka (1 GHz - 18 GHz)	Kazuya Noda (18 GHz - 26.5 GHz)	Kazuya Noda (26.5 GHz - 31.5 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.	2483.500	PK	67.47	27.55	13.69	44.16	2.24	66.79	73.90	7.1	143	78	
Hori.	4924.000	PK	48.43	31.73	5.59	44.49	2.24	43.50	73.90	30.4	150	0	
Hori.	7386.000	PK	47.74	36.88	6.91	44.06	2.24	49.71	73.90	24.1	150	0	
Hori.	9848.000	PK	48.92	38.90	7.99	43.86	2.24	54.19	73.90	19.7	150	0	
Vert.	2483.500	PK	62.70	27.55	13.69	44.16	2.24	62.02	73.90	11.8	158	149	
Vert.	4924.000	PK	49.35	31.73	5.59	44.49	2.24	44.42	73.90	29.4	150	0	
Vert.	7386.000	PK	47.82	36.88	6.91	44.06	2.24	49.79	73.90	24.1	150	0	
Vert.	9848.000	PK	48.10	38.90	7.99	43.86	2.24	53.37	73.90	20.5	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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	48.42	27.55	13.69	44.16	0.32	2.24	48.06	53.90	5.8	*1)
Hori.	4924.000	AV	39.71	31.73	5.59	44.49	0.32	2.24	35.10	53.90	18.8	
Hori.	7386.000	AV	38.89	36.88	6.91	44.06	0.32	2.24	41.18	53.90	12.7	
Hori.	9848.000	AV	38.93	38.90	7.99	43.86	0.32	2.24	44.52	53.90	9.4	
Vert.	2483.500	AV	45.24	27.55	13.69	44.16	0.32	2.24	44.88	53.90	9.0	*1)
Vert.	4924.000	AV	39.78	31.73	5.59	44.49	0.32	2.24	35.17	53.90	18.7	
Vert.	7386.000	AV	38.97	36.88	6.91	44.06	0.32	2.24	41.26	53.90	12.6	
Vert.	9848.000	AV	39.13	38.90	7.99	43.86	0.32	2.24	44.72	53.90	9.2	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

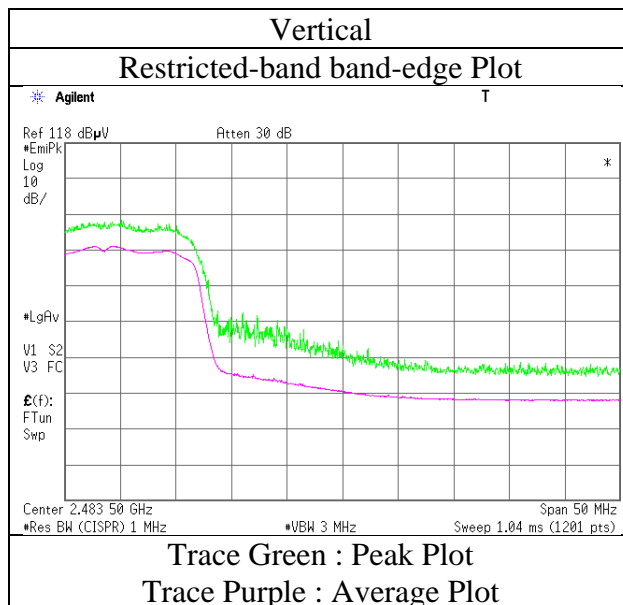
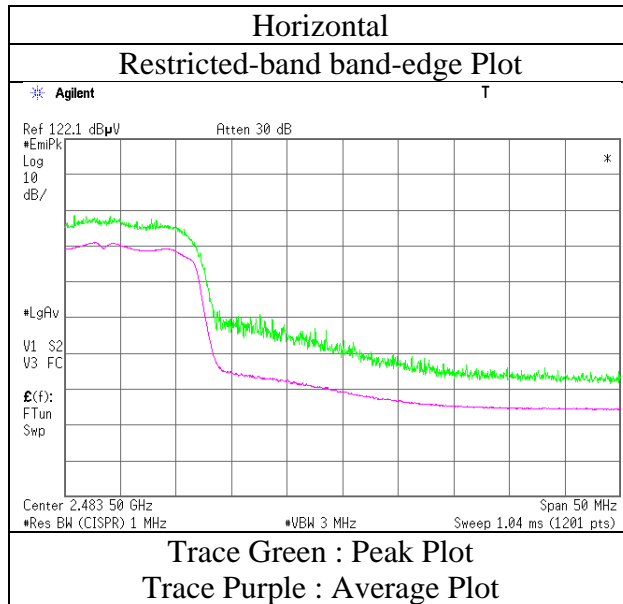
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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)**

Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3  
Date November 15, 2017  
Temperature / Humidity 23 deg. C / 43 % RH  
Engineer Makoto Hosaka  
(1 GHz - 13 GHz)  
Mode Tx 11g 2462 MHz



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

## Radiated Spurious Emission

Report No.	12021807S-C-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda	Kazuya Noda
	(1 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(26.5 GHz - 31.5 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.	2390.000	PK	60.52	27.26	13.60	44.13	2.24	59.49	73.90	<b>14.4</b>	153	104	
Hori.	4824.000	PK	48.06	31.46	5.61	44.46	2.24	42.91	73.90	30.9	150	0	
Hori.	7236.000	PK	47.18	36.62	6.88	44.00	2.24	48.92	73.90	24.9	150	0	
Hori.	9648.000	PK	48.26	38.66	7.87	43.83	2.24	53.20	73.90	20.7	150	0	
Vert.	2390.000	PK	59.76	27.26	13.60	44.13	2.24	58.73	73.90	15.1	229	188	
Vert.	4824.000	PK	48.40	31.46	5.61	44.46	2.24	43.25	73.90	30.6	150	0	
Vert.	7236.000	PK	47.32	36.62	6.88	44.00	2.24	49.06	73.90	24.8	150	0	
Vert.	9648.000	PK	47.84	38.66	7.87	43.83	2.24	52.78	73.90	21.1	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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	42.36	27.26	13.60	44.13	1.30	2.24	42.63	53.90	11.3	*1)
Hori.	4824.000	AV	39.61	31.46	5.61	44.46	1.30	2.24	35.76	53.90	18.1	
Hori.	7236.000	AV	38.84	36.62	6.88	44.00	1.30	2.24	41.88	53.90	12.0	
Hori.	9648.000	AV	39.38	38.66	7.87	43.83	1.30	2.24	45.62	53.90	8.3	
Vert.	2390.000	AV	41.67	27.26	13.60	44.13	1.30	2.24	41.94	53.90	12.0	*1)
Vert.	4824.000	AV	39.66	31.46	5.61	44.46	1.30	2.24	35.81	53.90	18.1	
Vert.	7236.000	AV	38.67	36.62	6.88	44.00	1.30	2.24	41.71	53.90	12.2	
Vert.	9648.000	AV	39.60	38.66	7.87	43.83	1.30	2.24	45.84	53.90	<b>8.1</b>	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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	90.67	27.33	13.62	44.14	2.24	89.72	-	-	Carrier
Hori.	2400.000	PK	52.75	27.29	13.61	44.14	2.24	51.75	69.72	18.0	
Vert.	2412.000	PK	87.78	27.33	13.62	44.14	2.24	86.83	-	-	Carrier
Vert.	2400.000	PK	50.74	27.29	13.61	44.14	2.24	49.74	66.83	17.1	

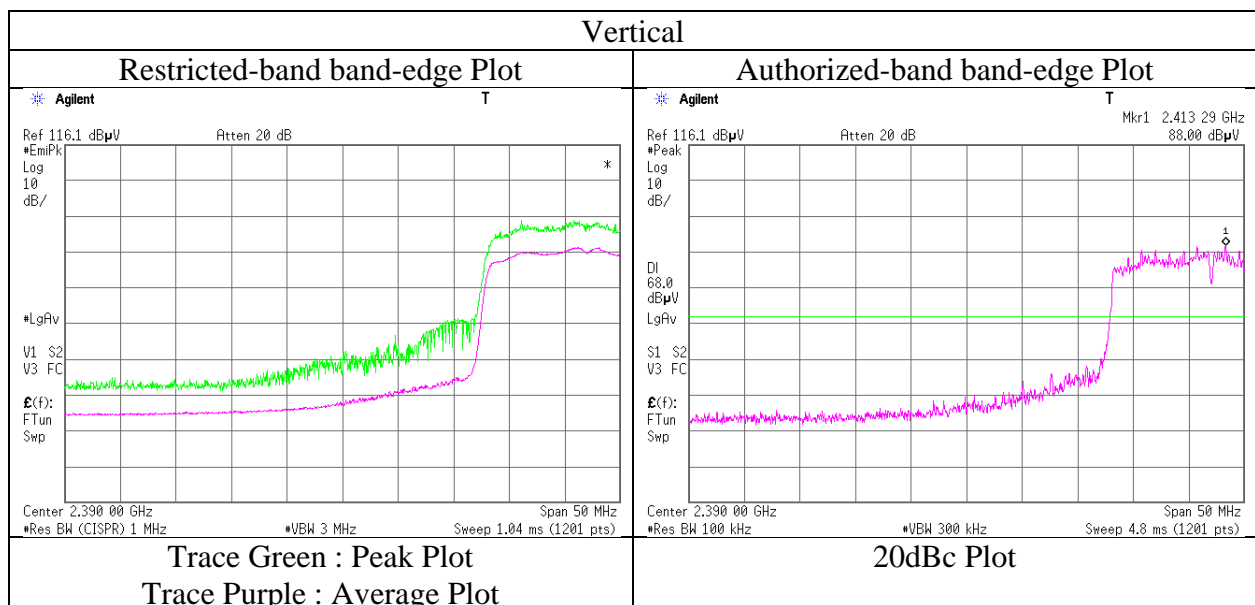
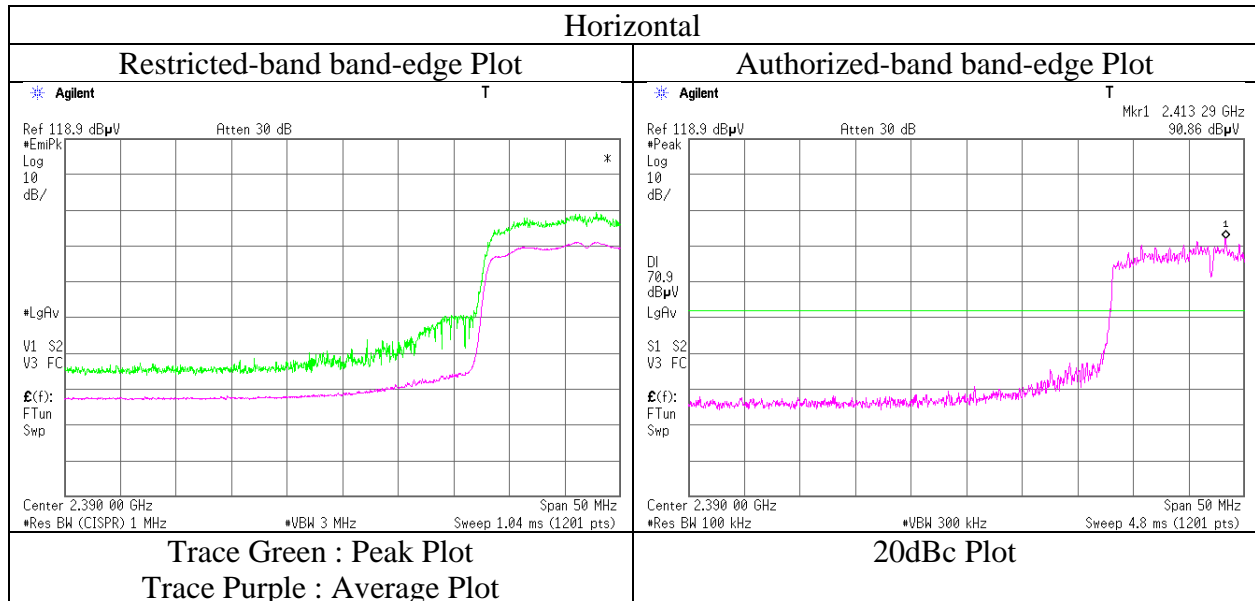
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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)

Report No.	12021807S-C-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 15, 2017
Temperature / Humidity	23 deg. C / 43 % RH
Engineer	Makoto Hosaka
	(1 GHz - 13 GHz)
Mode	Tx 11n-20 2412 MHz



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

## Radiated Spurious Emission

Report No.	12021807S-C-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Makoto Hosaka (1 GHz - 18 GHz)	Kazuya Noda (18 GHz - 26.5 GHz)	Kazuya Noda (26.5 GHz - 31.5 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.	4874.000	PK	49.73	31.59	5.60	44.47	2.24	44.69	73.90	29.2	150	0	
Hori.	7311.000	PK	48.41	36.75	6.89	44.03	2.24	50.26	73.90	23.6	150	0	
Hori.	9748.000	PK	47.11	38.78	7.93	43.84	2.24	52.22	73.90	21.6	150	0	
Vert.	4874.000	PK	47.99	31.59	5.60	44.47	2.24	42.95	73.90	30.9	150	0	
Vert.	7311.000	PK	48.00	36.75	6.89	44.03	2.24	49.85	73.90	24.0	150	0	
Vert.	9748.000	PK	47.48	38.78	7.93	43.84	2.24	52.59	73.90	<b>21.3</b>	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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.	4874.000	AV	39.63	31.59	5.60	44.47	1.30	2.24	35.89	53.90	18.0	
Hori.	7311.000	AV	38.67	36.75	6.89	44.03	1.30	2.24	41.82	53.90	12.1	
Hori.	9748.000	AV	38.67	38.78	7.93	43.84	1.30	2.24	45.08	53.90	<b>8.8</b>	
Vert.	4874.000	AV	39.81	31.59	5.60	44.47	1.30	2.24	36.07	53.90	17.8	
Vert.	7311.000	AV	38.64	36.75	6.89	44.03	1.30	2.24	41.79	53.90	12.1	
Vert.	9748.000	AV	38.55	38.78	7.93	43.84	1.30	2.24	44.96	53.90	8.9	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

Report No.	12021807S-C-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda	Kazuya Noda
	(1 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(26.5 GHz - 31.5 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.	2483.500	PK	63.58	27.55	13.69	44.16	2.24	62.90	73.90	<b>11.0</b>	142	77	
Hori.	4924.000	PK	49.06	31.73	5.59	44.49	2.24	44.13	73.90	29.7	150	0	
Hori.	7386.000	PK	47.82	36.88	6.91	44.06	2.24	49.79	73.90	24.1	150	0	
Hori.	9848.000	PK	48.10	38.90	7.99	43.86	2.24	53.37	73.90	20.5	150	0	
Vert.	2483.500	PK	59.11	27.55	13.69	44.16	2.24	58.43	73.90	15.4	160	150	
Vert.	4924.000	PK	47.97	31.73	5.59	44.49	2.24	43.04	73.90	30.8	150	0	
Vert.	7386.000	PK	47.57	36.88	6.91	44.06	2.24	49.54	73.90	24.3	150	0	
Vert.	9848.000	PK	47.77	38.90	7.99	43.86	2.24	53.04	73.90	20.8	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

### 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	44.64	27.55	13.69	44.16	1.30	2.24	45.26	53.90	8.6	*1)
Hori.	4924.000	AV	39.77	31.73	5.59	44.49	1.30	2.24	36.14	53.90	17.8	
Hori.	7386.000	AV	38.94	36.88	6.91	44.06	1.30	2.24	42.21	53.90	11.7	
Hori.	9848.000	AV	38.91	38.90	7.99	43.86	1.30	2.24	45.48	53.90	8.4	
Vert.	2483.500	AV	41.77	27.55	13.69	44.16	1.30	2.24	42.39	53.90	11.5	*1)
Vert.	4924.000	AV	39.76	31.73	5.59	44.49	1.30	2.24	36.13	53.90	17.8	
Vert.	7386.000	AV	38.77	36.88	6.91	44.06	1.30	2.24	42.04	53.90	11.9	
Vert.	9848.000	AV	38.99	38.90	7.99	43.86	1.30	2.24	45.56	53.90	<b>8.3</b>	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

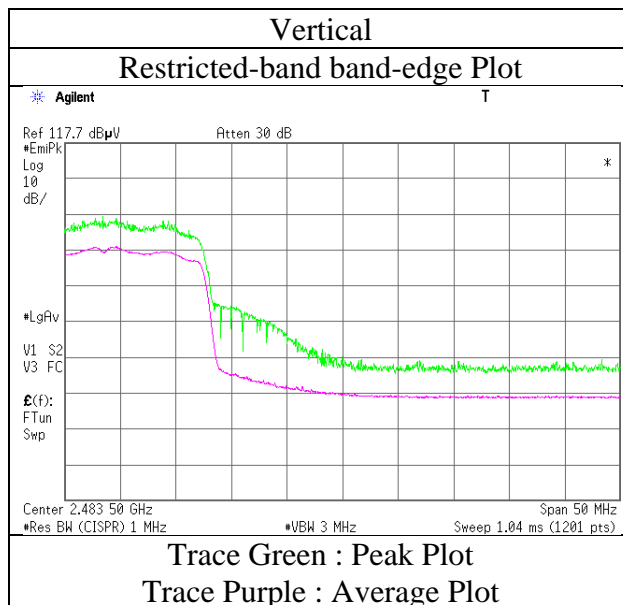
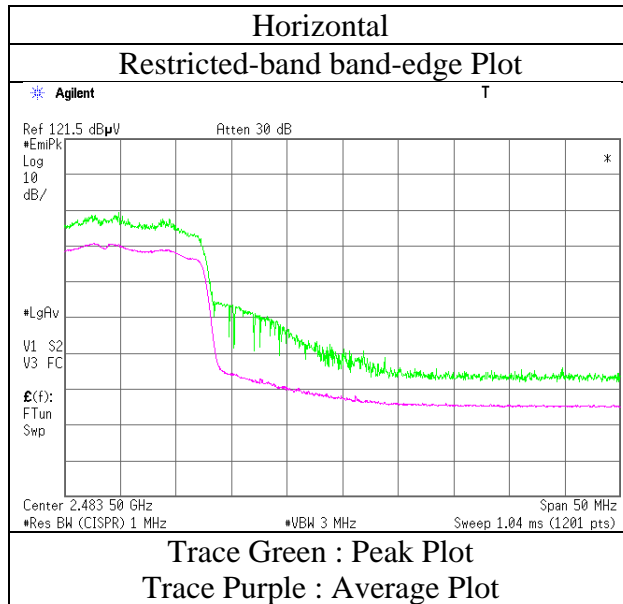
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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)**

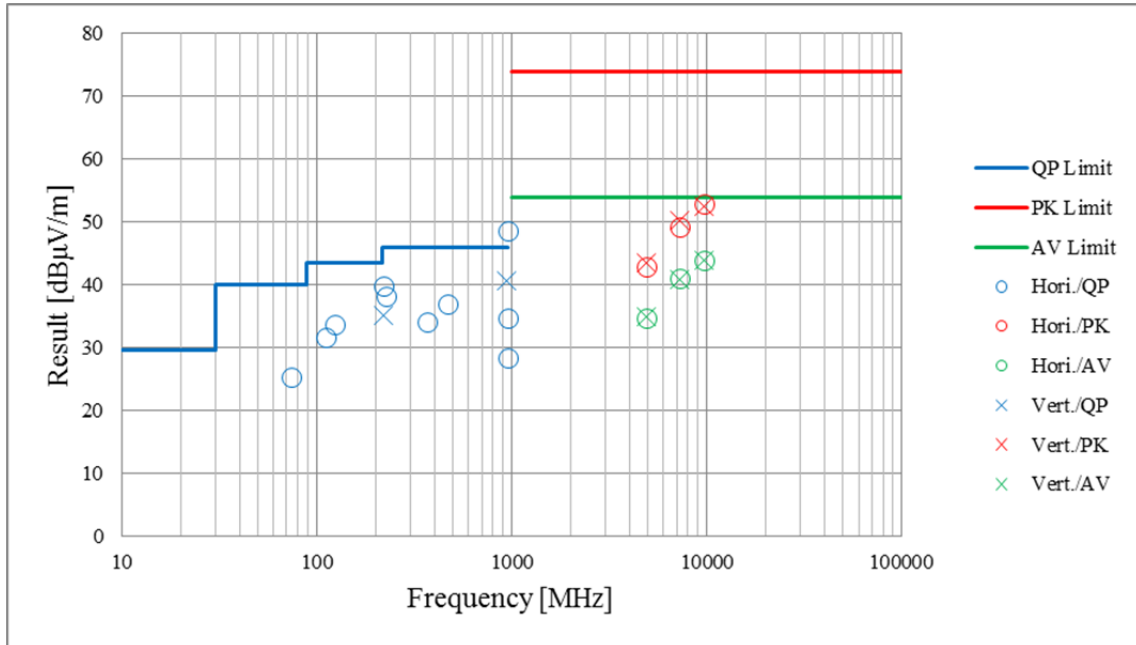
Report No. 12021807S-C-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 3  
Date November 15, 2017  
Temperature / Humidity 23 deg. C / 43 % RH  
Engineer Makoto Hosaka  
(1 GHz - 13 GHz)  
Mode Tx 11n-20 2462 MHz



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

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

Report No.	12021807S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	November 16, 2017	November 15, 2017	November 15, 2017	November 16, 2017
Temperature / Humidity	20 deg. C / 40 % RH	23 deg. C / 43 % RH	24 deg. C / 41 % RH	24 deg. C / 36 % RH
Engineer	Kazutaka Takeyama (30 MHz - 1 GHz)	Makoto Hosaka (1 GHz - 18 GHz)	Kazuya Noda (18 GHz - 26.5 GHz)	Kazuya Noda (26.5 GHz - 31.5 GHz)
Mode	Tx 11g 2437 MHz			

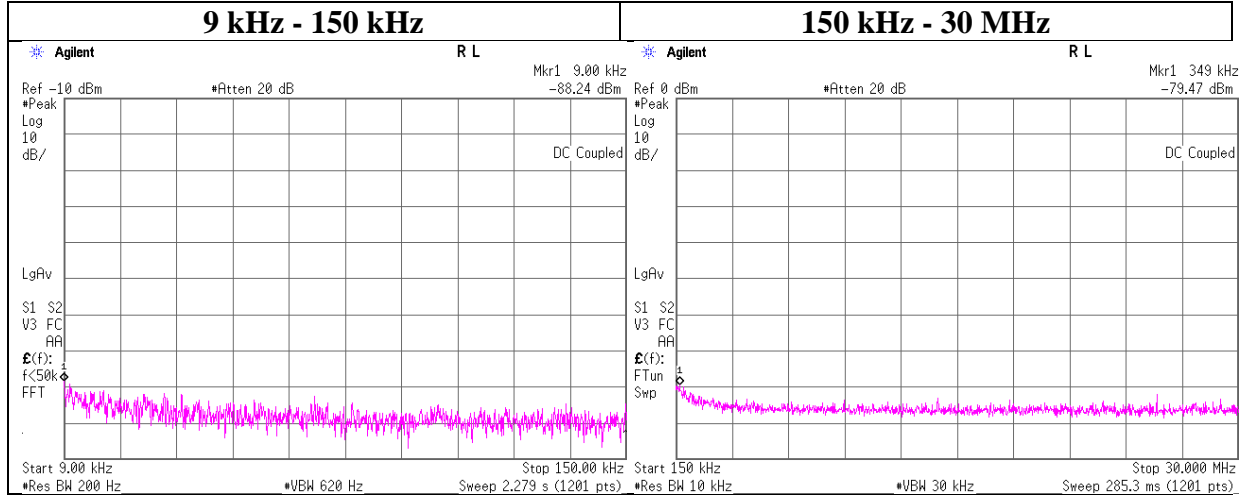


\*These plots data contains sufficient number to show the trend of characteristic features for EUT.



### Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	12021807S-C-R2
Date	November 16, 2017
Temperature / Humidity	26 deg. C / 37 % RH
Engineer	Makoto Hosaka
Mode	Tx 11g 2437 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-88.24	0.01	9.82	2.00	1	-76.41	300	6.00	-15.15	48.51	63.66	
349.00	-79.47	0.01	9.82	2.00	1	-67.64	300	6.00	-6.38	16.74	23.12	

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

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

N: Number of output

\*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

### Power Density

Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 12021807S-C-R2  
Date November 8, 2017 November 16, 2017  
Temperature / Humidity 25 deg. C / 44 % RH 26 deg. C / 37 % RH  
Engineer Tatsuya Arai Makoto Hosaka  
Mode Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-17.40	2.29	9.96	-5.15	8.00	13.15
2437.00	-17.57	2.29	9.96	-5.32	8.00	13.32
2462.00	-17.72	2.30	9.97	-5.45	8.00	13.45

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-21.89	2.29	9.96	-9.64	8.00	17.64
2437.00	-21.86	2.29	9.96	-9.61	8.00	17.61
2462.00	-22.16	2.30	9.97	-9.89	8.00	17.89

11n-20

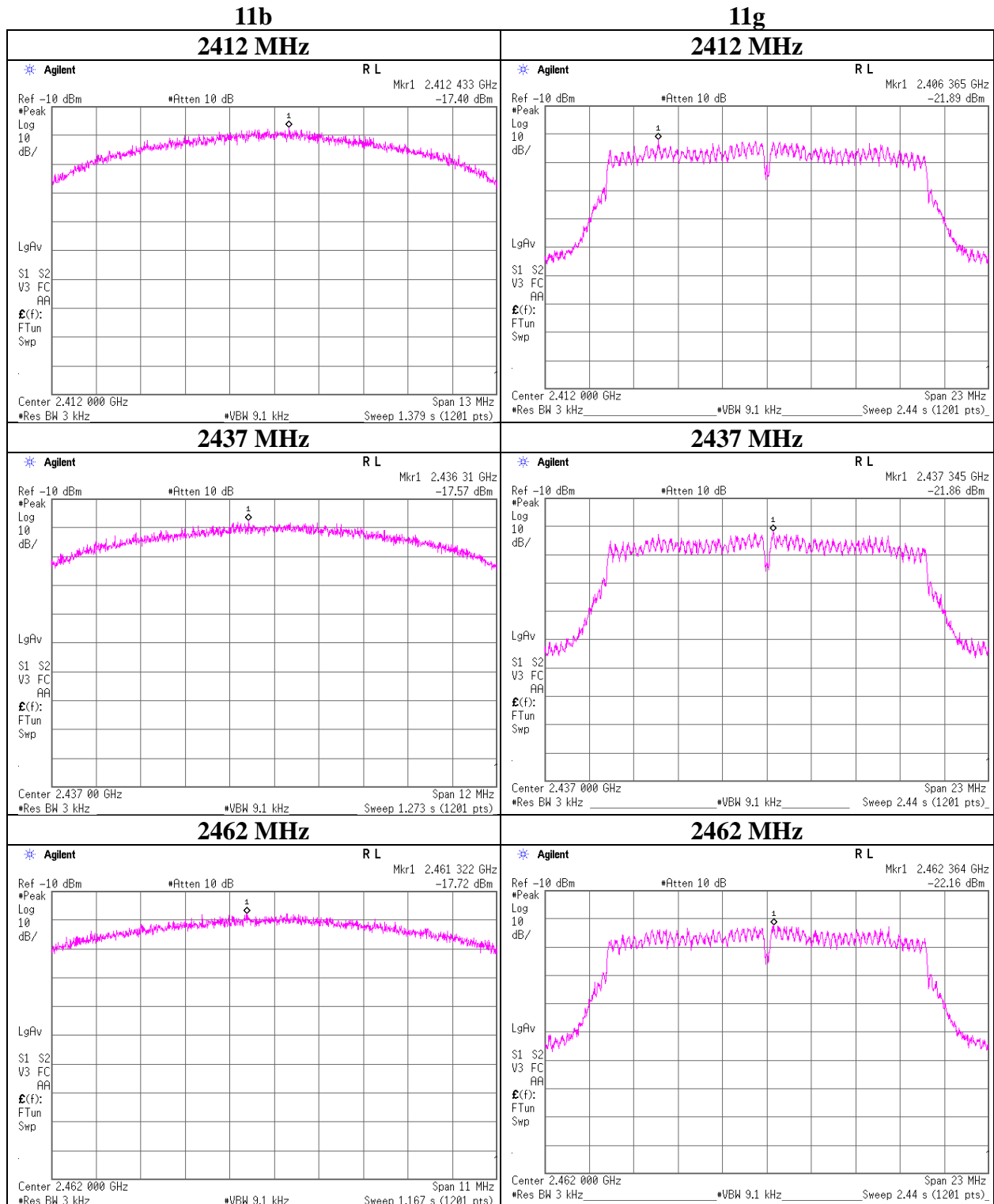
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-23.62	2.29	9.96	-11.37	8.00	19.37
2437.00	-22.81	2.29	9.96	-10.56	8.00	18.56
2462.00	-23.06	2.30	9.97	-10.79	8.00	18.79

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.

**Power Density**



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**Shonan EMC Lab.**

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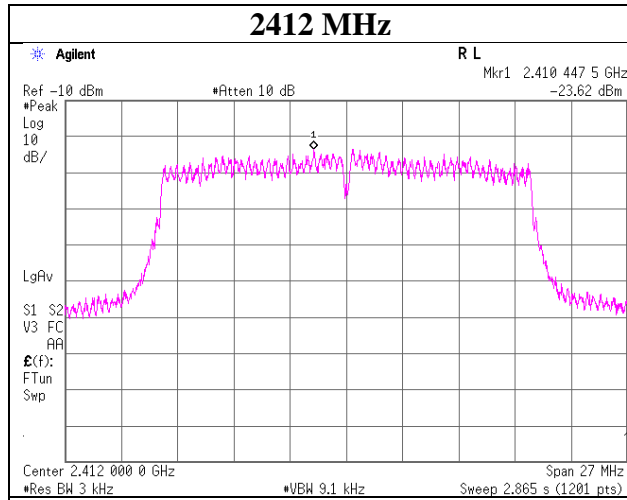
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

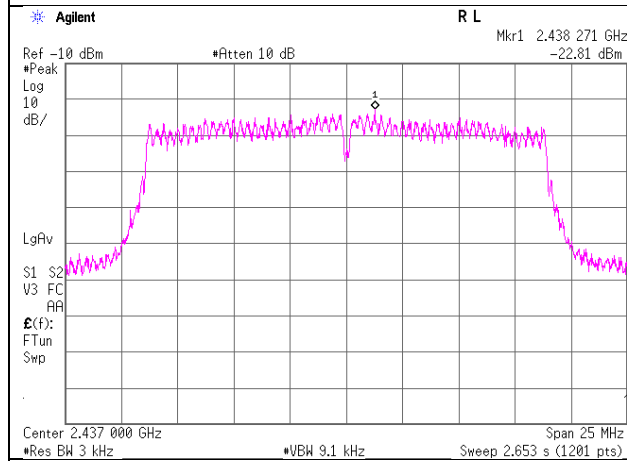
## Power Density

11n-20

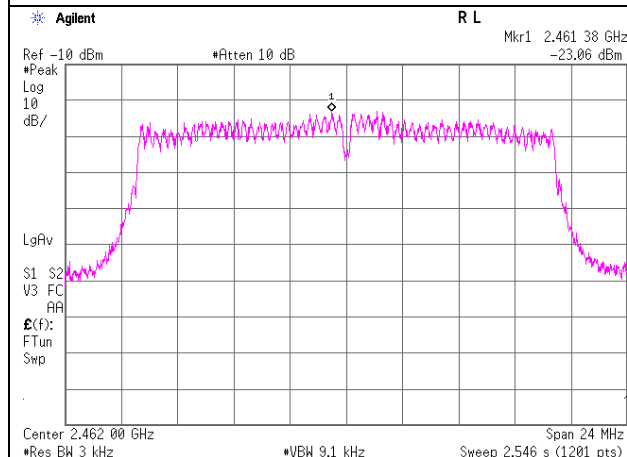
2412 MHz



2437 MHz



2462 MHz



## **APPENDIX 2: Test instruments**

### **Test equipment**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Serial No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2017/08/20 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2017/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2017/10/16 * 12
SRENT-10	Spectrum Analyzer	Agilent	E4440A	US41421511	AT	2016/12/05 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SCC-G07	Coaxial Cable	Junkosha	J12J103316-00- R	OCT-12-17-0 54	RE	2017/10/23 * 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	2017/08/23 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2017/10/10 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03 (SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03 (SVSWR)	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	2017/10/16 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	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	2017/09/22 * 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
SHA-06	Horn Antenna	ETS LINDGREN	3160-10	LM3459	RE	2017/03/15 * 12
SAF-10	Pre Amplifier	TOYO Corporation	HAP26-40W	00000010	RE	2017/03/17 * 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	2017/10/02 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2017/08/24 * 12
SCC-C1/C2/C3/ C4/C5/C10/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhner /TOYO	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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