



RADIO TEST REPORT

Test Report No. : 12622648S-C-R2

Applicant : JVC KENWOOD Corporation
Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX996XR
FCC ID : IOMJ5220
Test regulation : FCC Part 15 Subpart C: 2018
*Wireless LAN part
Test Result : Complied (Refer to Section 3.2)

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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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 12622648S-C-R1. 12622648S-C-R1 is replaced with this report.

Date of test: November 28 to December 7, 2018

Representative test engineer:

Shiro Kobayashi
Engineer
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Approved by:

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- 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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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

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

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

2.1 Identification of E.U.T.

Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX996XR
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12 V
Receipt Date of Sample : November 27, 2018
(Information from test lab.)
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: DNX996XR (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

There are eight variant models DDX9906XR, DDX8906S, DDX8706S, DNR876S, DMX906S, DMX9706S, KW-V950BW, KW-M855BW These models are identical except for the presence of Navigation function, Panel, DVD Slot, DVD, Dashboard Camera terminal, HD Radio, Display or SD card, and these differences do not affect the radio.

Radio Specification

Type of radio	Bluetooth (BDR/EDR)	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)	IEEE 802.11 ac
Frequency of operation	2402 MHz - 2480 MHz	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5745 MHz - 5805 MHz	2412 MHz - 2462 MHz 5745 MHz - 5805 MHz	5755 MHz - 5795 MHz	5745 MHz-5805 MHz (20M) 5755 MHz-5795 MHz (40M) 5775 MHz (80M)
Type of modulation	FHSS	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)			OFDM (256QAM, 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	20 MHz (20M) 40 MHz (40M) 80 MHz (80M)

Antenna type	Internal Antenna (Chip Antenna)
Antenna Gain	Antenna 0 (ANT-0) : -4.4 dBi (2.4 GHz Wireless LAN only), -2.8 dBi (5 GHz) Antenna 1 (ANT-1) : -2.3 dBi (2.4 GHz Bluetooth only), -4.2 dBi (5 GHz),
Power Supply (radio art input)	DC 3.6 V/ 3.3 V/1.8 V
Clock frequency (Maximum)	37.4 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ----- IC: RSS-Gen 8.8	FCC: Section 15.207 ----- IC: RSS-Gen 8.8	N/A	N/A*1)	-
6 dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05 ----- IC: -	FCC: Section 15.247(a)(2) ----- IC: RSS-247 5.2(a)	See data.	Complied a)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05 ----- IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- IC: RSS-247 5.4(d)		Complied b)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05 ----- IC: -	FCC: Section 15.247(e) ----- IC: RSS-247 5.2(b)		Complied c)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05 ----- IC: RSS-Gen 6.13	FCC: Section 15.247(d) ----- IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.8 dB 7386.000 MHz, AV, Vert. Tx 11g 2462 MHz	Complied d)/e)	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 does not have AC Mains.

*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)

b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)

c) Refer to APPENDIX 1 (data of Power Density)

d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)

e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

* 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 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 Bandwidth	RSS-Gen 6.7	IC: -	N/A	Complied a)	Conducted

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

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

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
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.1 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.7 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.1 dB	-
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB	-
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 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
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.04 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 %

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3.5 Test Location

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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)

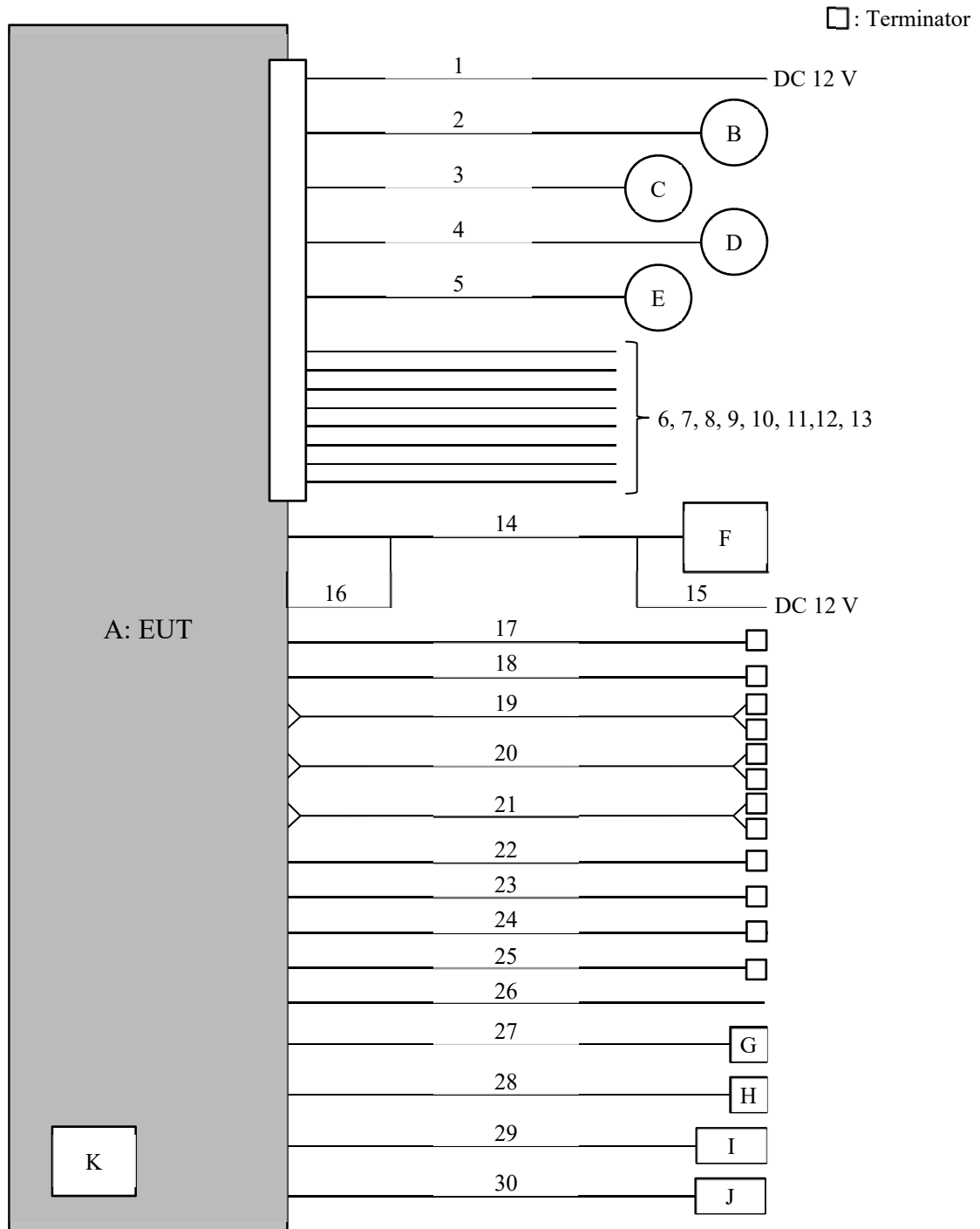
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 5, 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	
Software : Syscom : 0.0.0189.3100 Panel CPU : 0.0.0139.3700 SoC : 0.0.2509.3700	
*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 Antenna	Tested frequency
Conducted Emission	11b Tx 11g Tx 11n-20 Tx	ANT-0	2412 MHz 2437 MHz 2462 MHz
Spurious Emission	11b Tx 11g Tx 11n-20 Tx	ANT-0	2412 MHz 2437 MHz 2462 MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	ANT-0	2412 MHz 2437 MHz 2462 MHz

4.2 Configuration and peripherals



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

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	GPS NAVIGATION SYSTEM	DNX996XR	PK-X0001 *1) PK-X0003 *2)	JVC KENWOOD	EUT
B	Speaker	LV-002	-	L&V	-
C	Speaker	LV-002	-	L&V	-
D	Speaker	LV-002	-	L&V	-
E	Speaker	LV-002	-	L&V	-
F	DASH BOARD CAMERA	DRV-N520	082T1224	JVC KENWOOD	-
G	GPS Antenna	-	-	JVC KENWOOD	-
H	Microphone	-	-	JVC KENWOOD	-
I	USB Memory	AH321	-	Apacer	-
J	USB Memory	USM1GL	-	SONY	-
K	SDHC MEMORY CARD	MF-FSDH08GC6	-	ELECOM	-

*1) Used for Antenna Terminal conducted test

*2) Used for Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC (ACC, B+, GND)	3.0 + 0.5	Unshielded	Unshielded	-
2	Speaker	1.8 + 2.0	Unshielded	Unshielded	-
3	Speaker	1.8 + 2.0	Unshielded	Unshielded	-
4	Speaker	1.8 + 2.0	Unshielded	Unshielded	-
5	Speaker	1.8 + 2.0	Unshielded	Unshielded	-
6	ANT. CONT	0.15 + 1.0	Unshielded	Unshielded	-
7	P. CONT	0.15 + 1.0	Unshielded	Unshielded	-
8	ILLUMI	0.15 + 1.0	Unshielded	Unshielded	-
9	REMOTE CONT	0.15 + 1.0	Unshielded	Unshielded	-
10	CAM +	0.15 + 1.0	Unshielded	Unshielded	-
11	CAM -	0.15 + 1.0	Unshielded	Unshielded	-
12	PRK SW	0.15 + 1.0	Unshielded	Unshielded	-
13	REVERSE	0.15 + 1.0	Unshielded	Unshielded	-
14	DASH CAM	3.5	Unshielded	Unshielded	-
15	DC	1.9	Unshielded	Unshielded	-
16	FRONT VIEW CAMERA	0.2	Shielded	Shielded	-
17	REAR VIEW CAMERA	0.2 + 1.5	Shielded	Shielded	-
18	VIDEO OUT	0.2 + 1.0	Shielded	Shielded	-
19	AUDIO (FRONT)	3.0	Shielded	Shielded	-
20	AUDIO (REAR)	3.0	Shielded	Shielded	-
21	AUDIO (SW)	2.0	Shielded	Shielded	-
22	AV-OUT AUDIO	1.0	Shielded	Shielded	-
23	AV-IN	0.2 + 2.0	Shielded	Shielded	-
24	Antenna	0.15 + 1.5	Shielded	Shielded	-
25	Data Link	0.8	Shielded	Shielded	-
26	EXT-I/F	1.0	Shielded	Shielded	-
27	GPS	3.5	Shielded	Shielded	-
28	Microphone	3.0	Shielded	Shielded	-
29	USB	0.2 + 1.0	Shielded	Shielded	-
30	USB	0.2 + 1.0	Shielded	Shielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.2 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

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

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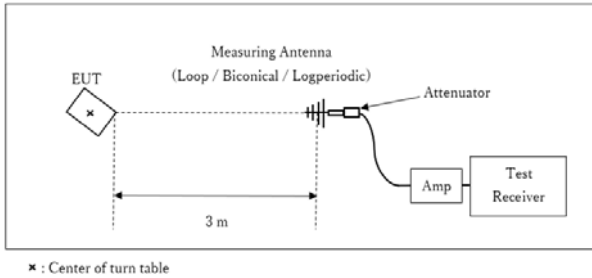
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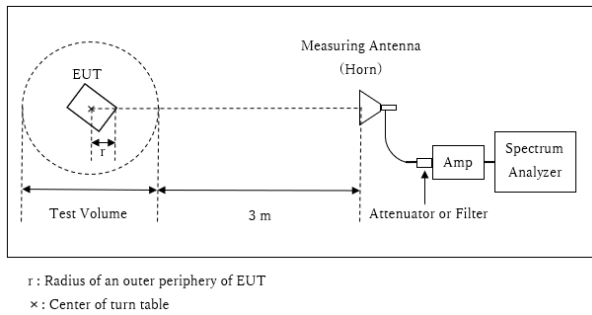
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

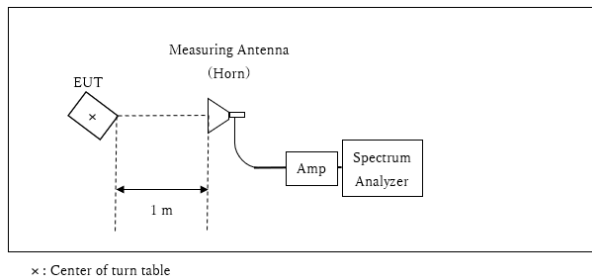
1 GHz - 13 GHz



Distance Factor: $20 \times \log(3.88 \text{ m} / 3.0 \text{ m}) = 2.24 \text{ dB}$
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.88 \text{ m}$

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.12 m

10 GHz - 40 GHz



Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at angle of 0 to 30 deg. Based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Frequency	30 MHz - 1000 MHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz - 40 GHz
Horizontal	0 deg.	30 deg.	30 deg.	0 deg.
Vertical	0 deg.	30 deg.	0 deg.	0 deg.

Measurement range : 30 MHz - 40 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	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	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 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013". *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. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)							

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

Test data : APPENDIX
Test result : Pass

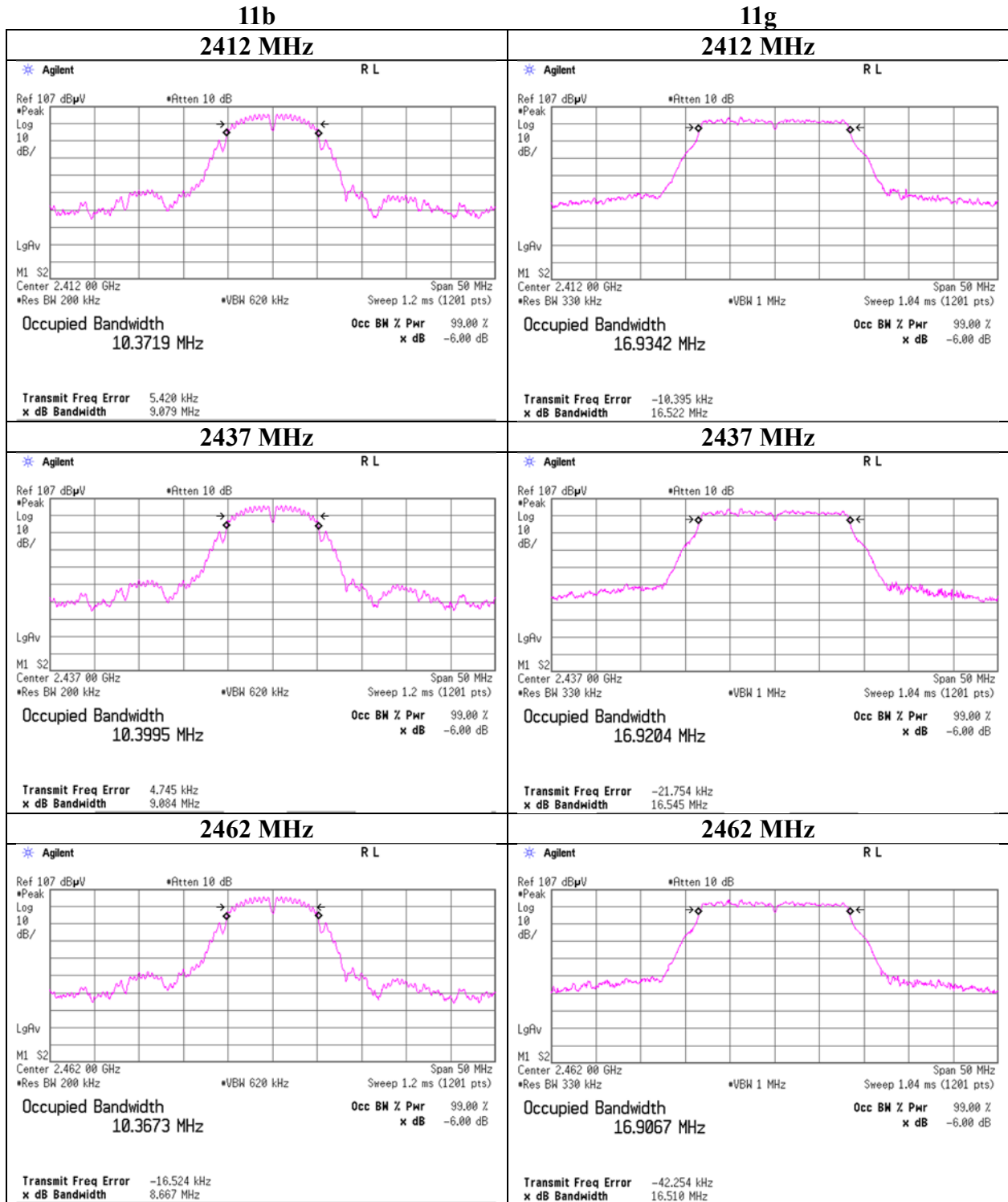
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 4, 2018
Temperature / Humidity 25 deg. C / 45 % RH
Engineer Kazutaka Takeyama
Mode Tx Antenna 0

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	10371.9	8.113	> 0.5000
	2437	10399.5	8.137	> 0.5000
	2462	10367.3	8.140	> 0.5000
11g	2412	16934.2	16.469	> 0.5000
	2437	16920.4	16.468	> 0.5000
	2462	16906.7	16.474	> 0.5000
11n-20	2412	18070.5	17.718	> 0.5000
	2437	18066.7	17.745	> 0.5000
	2462	18037.9	17.743	> 0.5000

99%Occupied Bandwidth



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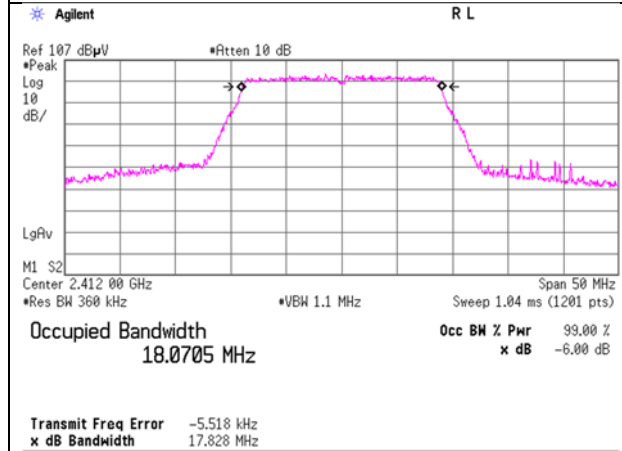
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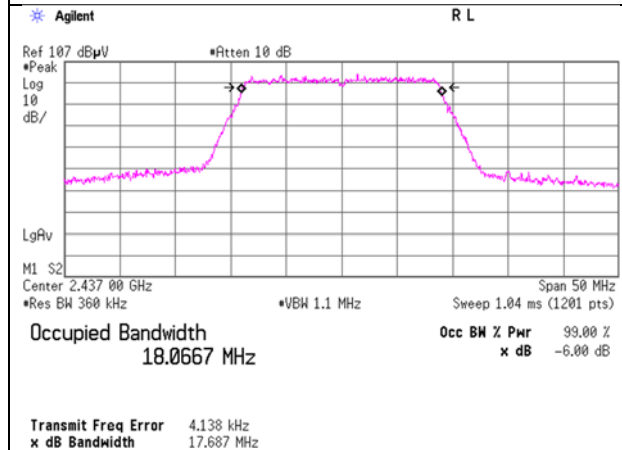
99% Occupied Bandwidth

11n-20

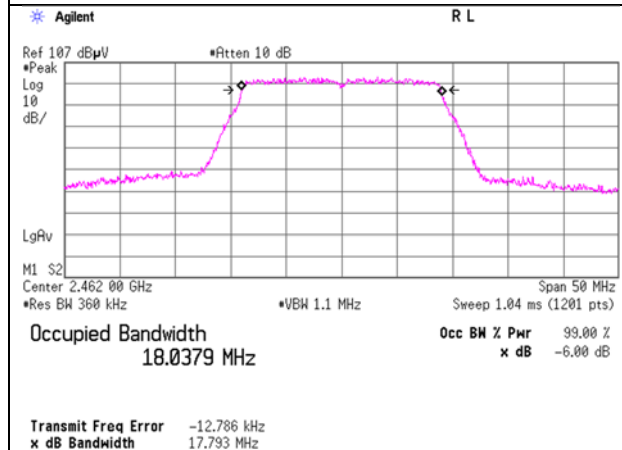
2412 MHz



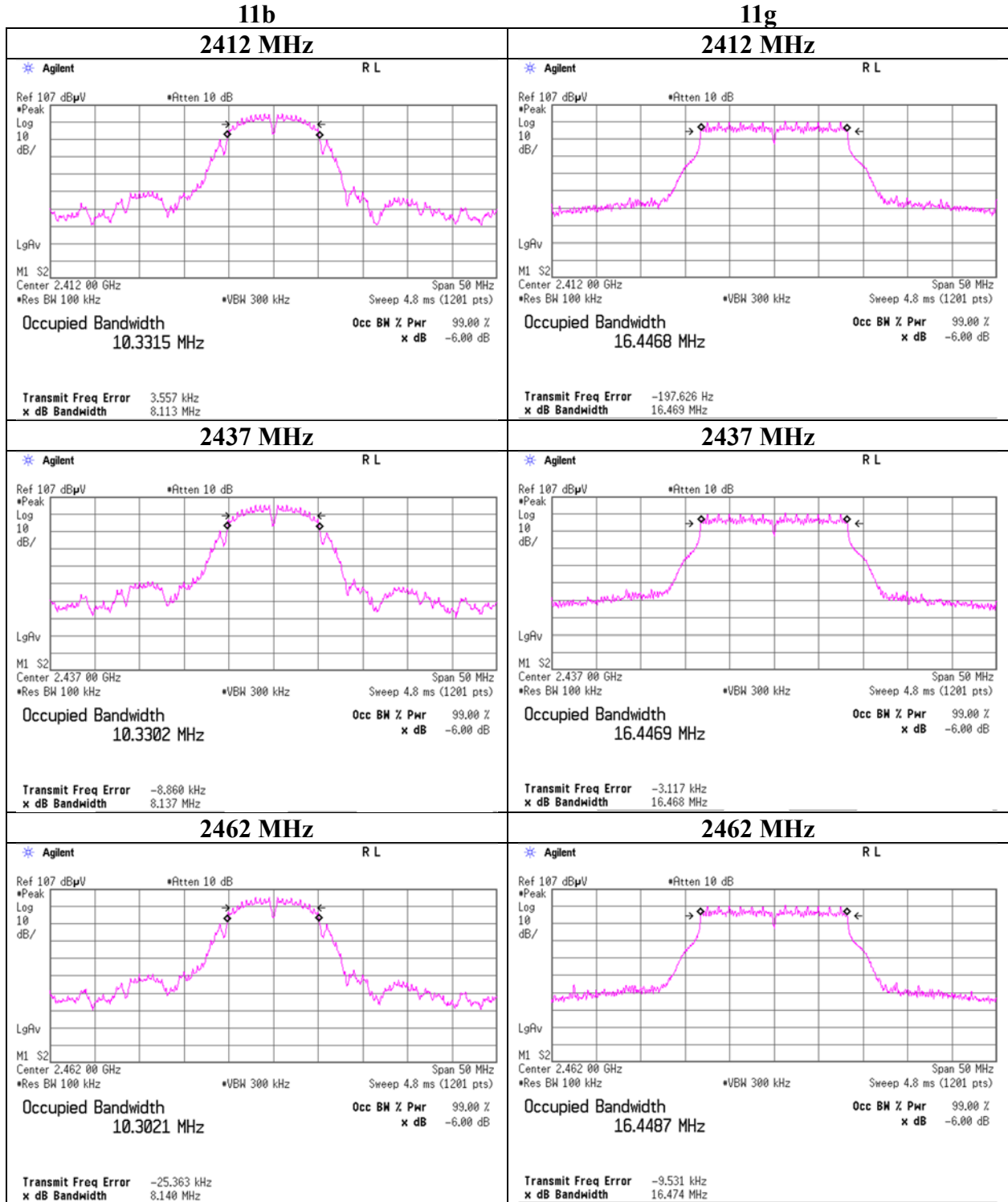
2437 MHz



2462 MHz



6dB Bandwidth



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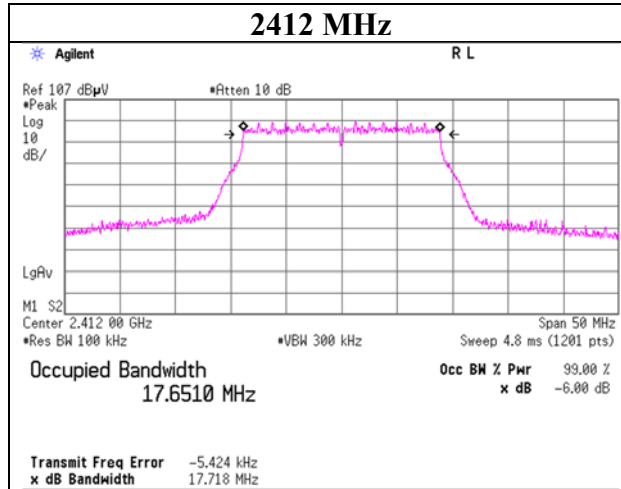
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

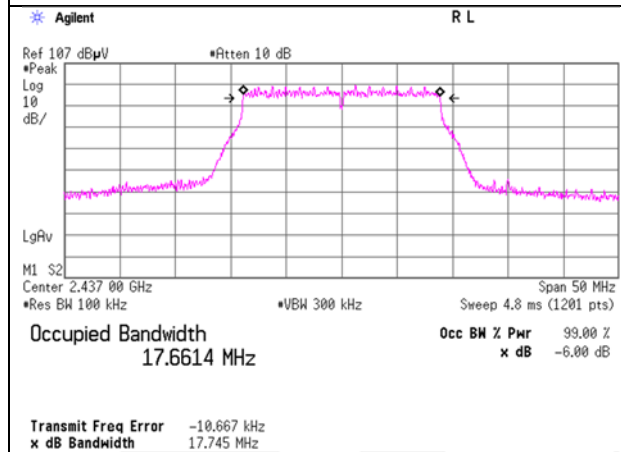
6dB Bandwidth

11n-20

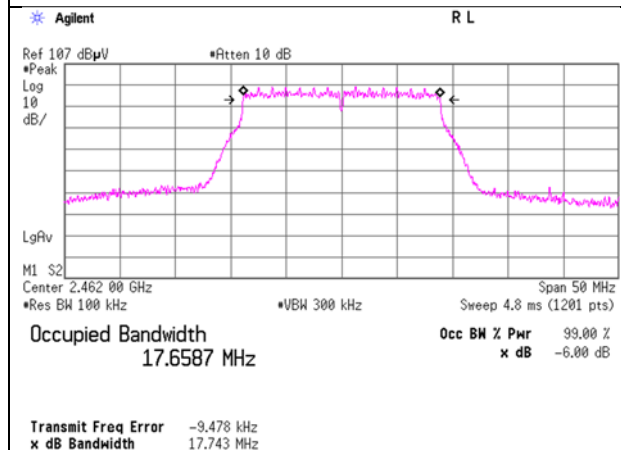
2412 MHz



2437 MHz



2462 MHz



Maximum Peak Output Power

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 29, 2018
Temperature / Humidity 24 deg. C / 43 % RH
Engineer Kazuya Noda
Mode Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	6.84	2.37	9.82	19.03	79.98	30.00	1000	10.97	-4.40	14.63	29.04	36.02	4000	21.39
2437	7.12	2.38	9.82	19.32	85.51	30.00	1000	10.68	-4.40	14.92	31.05	36.02	4000	21.10
2462	6.81	2.39	9.82	19.02	79.80	30.00	1000	10.98	-4.40	14.62	28.97	36.02	4000	21.40

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	7.12	*
2	6.87	
5.5	6.78	
11	7.07	

*: Worst Rate

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

Maximum Peak Output Power

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 29, 2018
Temperature / Humidity 24 deg. C / 43 % RH
Engineer Kazuya Noda
Mode Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	12.28	2.37	9.82	24.47	279.90	30.00	1000	5.53	-4.40	20.07	101.62	36.02	4000	15.95
2437	12.36	2.38	9.82	24.56	285.76	30.00	1000	5.44	-4.40	20.16	103.75	36.02	4000	15.86
2462	12.34	2.39	9.82	24.55	285.10	30.00	1000	5.45	-4.40	20.15	103.51	36.02	4000	15.87

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	11.05	
9	10.78	
12	10.75	
18	10.80	
24	10.94	
36	11.12	
48	12.36	*
54	10.45	

*: Worst Rate

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

Maximum Peak Output Power

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 29, 2018
Temperature / Humidity 24 deg. C / 43 % RH
Engineer Kazuya Noda
Mode Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	12.21	2.37	9.82	24.40	275.42	30.00	1000	5.60	-4.40	20.00	100.00	36.02	4000	16.02
2437	12.12	2.38	9.82	24.32	270.40	30.00	1000	5.68	-4.40	19.92	98.17	36.02	4000	16.10
2462	12.05	2.39	9.82	24.26	266.69	30.00	1000	5.74	-4.40	19.86	96.83	36.02	4000	16.16

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

2437 MHz

Rate	Reading	Remark
[MCS]	[dBm]	
0	11.23	
1	11.09	
2	11.21	
3	11.63	
4	11.51	
5	12.12	*
6	11.66	
7	11.54	

*: Worst Rate

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

Average Output Power
(Reference data for RF Exposure)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 29, 2018
Temperature / Humidity 24 deg. C / 43 % RH
Engineer Kazuya Noda
Mode Tx

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	3.22	2.37	9.82	15.41	34.75	0.04	15.45	35.08
2437	3.41	2.38	9.82	15.61	36.39	0.04	15.65	36.73
2462	3.19	2.39	9.82	15.40	34.67	0.04	15.44	34.99

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	0.95	2.37	9.82	13.14	20.61	0.29	13.43	22.03
2437	1.15	2.38	9.82	13.35	21.63	0.29	13.64	23.12
2462	1.18	2.39	9.82	13.39	21.83	0.29	13.68	23.33

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	-0.03	2.37	9.82	12.16	16.44	0.31	12.47	17.66
2437	0.11	2.38	9.82	12.31	17.02	0.31	12.62	18.28
2462	0.01	2.39	9.82	12.22	16.67	0.31	12.53	17.91

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.

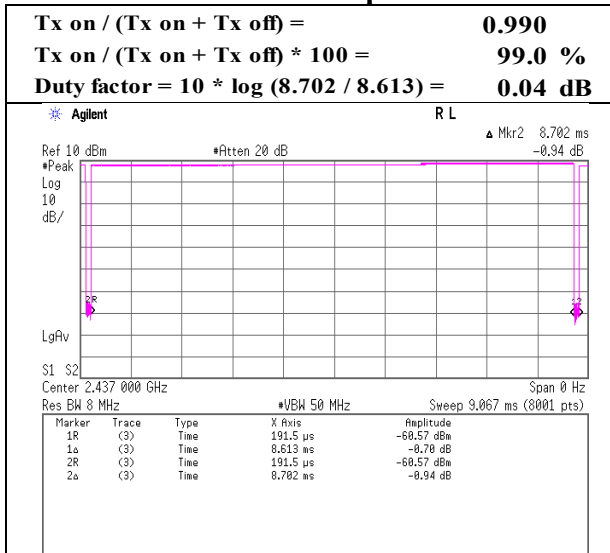
The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

Burst rate confirmation

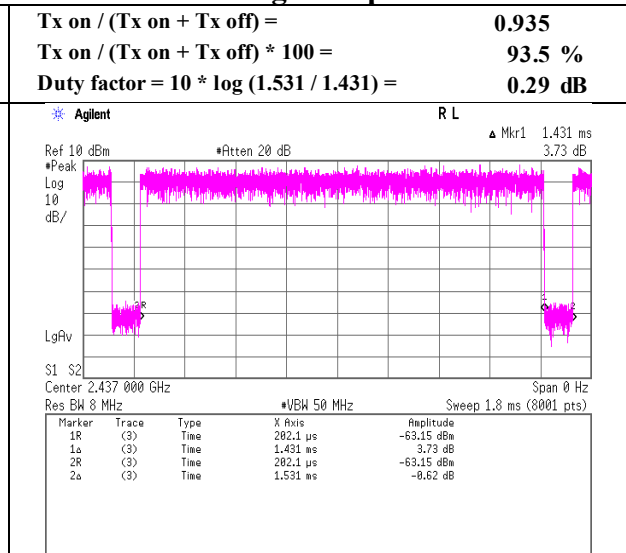
Report No.	12622648S-C-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 29, 2018
Temperature / Humidity	24 deg. C / 43 % RH
Engineer	Kazuya Noda
Mode	Tx

Lowest Rate

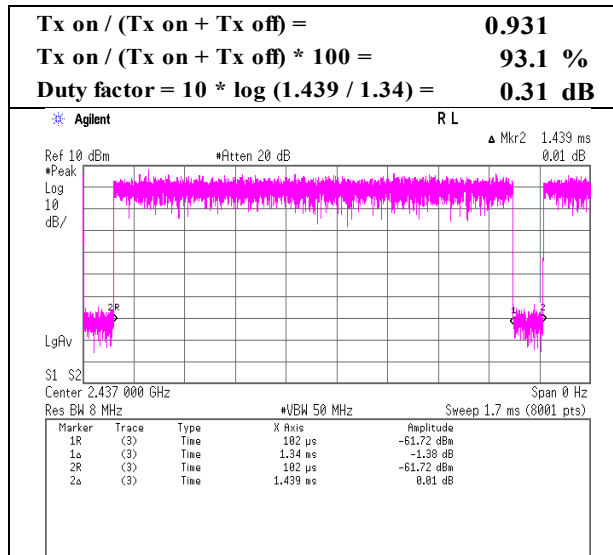
11b 1 Mbps



11g 6 Mbps



11n-20 MCS 0



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

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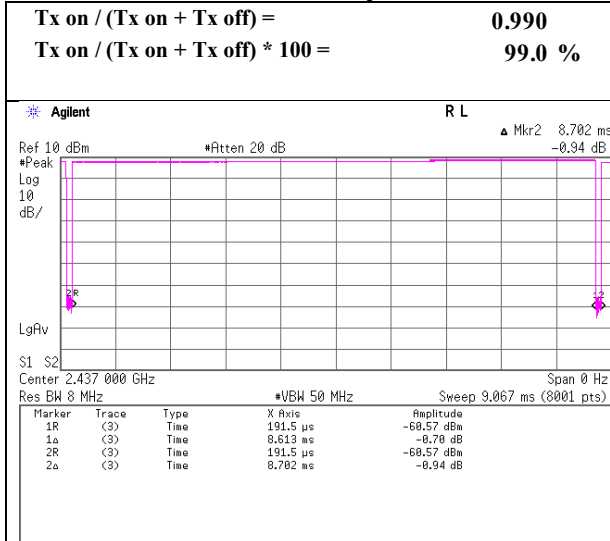
Facsimile : +81 463 50 6401

Burst rate confirmation

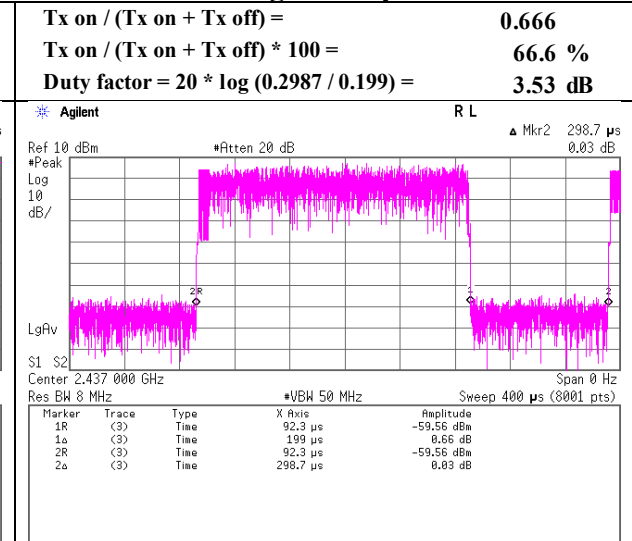
Report No.	12622648S-C-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 29, 2018
Temperature / Humidity	24 deg. C / 43 % RH
Engineer	Kazuya Noda
Mode	Tx

Worst Rate

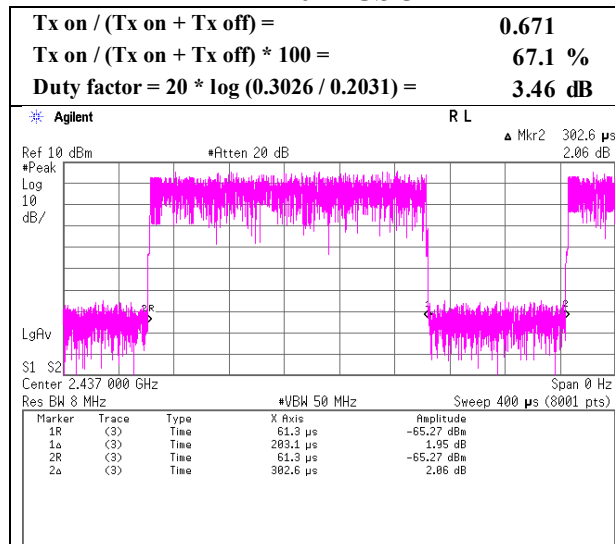
11b 1 Mbps



11g 48 Mbps



11n-20 MCS 5



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

Radiated Spurious Emission

Report No.	12622648S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	3	1	1
Date	December 3, 2018	December 4, 2018	December 7, 2018	December 4, 2018
Temperature / Humidity	21 deg. C / 41 % RH	23 deg. C / 43 % RH	21 deg. C / 43 % RH	21 deg. C / 41 % RH
Engineer	Shiro Kobayashi (1 GHz – 2.8 GHz)	Kazuya Noda (2.8 GHz – 13 GHz)	Kazuya Noda (13 GHz – 18 GHz)	Shiro Kobayashi (18 GHz – 26.5 GHz)
Semi Anechoic Chamber	1			
Date	December 6, 2018			
Temperature / Humidity	24 deg. C / 35 % RH			
Engineer	Makoto Hosaka (26.5 GHz – 40 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.	1440.023	PK	47.63	24.97	13.13	39.08	2.24	48.89	73.90	25.0	230	34	
Hori.	2387.250	PK	46.83	27.88	14.06	39.46	2.24	51.55	73.90	22.3	397	80	
Hori.	2390.000	PK	47.20	27.89	14.06	39.46	2.24	51.93	73.90	21.9	397	80	
Hori.	4824.000	PK	44.74	31.34	6.46	39.50	2.24	45.28	73.90	28.6	122	241	
Hori.	7236.000	PK	44.73	36.81	8.39	39.31	2.24	52.86	73.90	21.0	149	331	
Hori.	1440.023	AV	40.47	24.97	13.13	39.08	2.24	41.73	53.90	12.1	230	34	
Hori.	2387.250	AV	37.54	27.88	14.06	39.46	2.24	42.26	53.90	11.6	397	80	
Hori.	2390.000	AV	37.56	27.89	14.06	39.46	2.24	42.29	53.90	11.6	397	80	
Hori.	4824.000	AV	36.66	31.34	6.46	39.50	2.24	37.20	53.90	16.7	122	241	
Hori.	7236.000	AV	35.71	36.81	8.39	39.31	2.24	43.84	53.90	10.0	149	331	
Vert.	1440.023	PK	46.85	24.97	13.13	39.08	2.24	48.11	73.90	25.7	131	115	
Vert.	2387.258	PK	48.03	27.88	14.06	39.46	2.24	52.75	73.90	21.1	137	182	
Vert.	2390.000	PK	47.13	27.89	14.06	39.46	2.24	51.86	73.90	22.0	137	182	
Vert.	4824.000	PK	44.81	31.34	6.46	39.50	2.24	45.35	73.90	28.5	173	173	
Vert.	7236.000	PK	44.96	36.81	8.39	39.31	2.24	53.09	73.90	20.8	149	151	
Vert.	1440.023	AV	38.57	24.97	13.13	39.08	2.24	39.83	53.90	14.0	131	115	
Vert.	2387.258	AV	39.31	27.88	14.06	39.46	2.24	44.03	53.90	9.8	137	182	
Vert.	2390.000	AV	38.94	27.89	14.06	39.46	2.24	43.67	53.90	10.2	137	182	
Vert.	4824.000	AV	37.13	31.34	6.46	39.50	2.24	37.67	53.90	16.2	173	173	
Vert.	7236.000	AV	35.67	36.81	8.39	39.31	2.24	43.80	53.90	10.1	149	151	

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

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	27.86	14.08	39.46	2.24	90.95	-	-	Carrier
Hori.	2398.012	PK	44.90	27.89	14.07	39.46	2.24	49.64	70.95	21.3	
Hori.	2400.000	PK	41.81	27.89	14.07	39.46	2.24	46.55	70.95	24.4	
Vert.	2412.000	PK	89.36	27.86	14.08	39.46	2.24	94.08	-	-	Carrier
Vert.	2397.986	PK	47.38	27.89	14.07	39.46	2.24	52.12	74.08	21.9	
Vert.	2400.000	PK	42.36	27.89	14.07	39.46	2.24	47.10	74.08	26.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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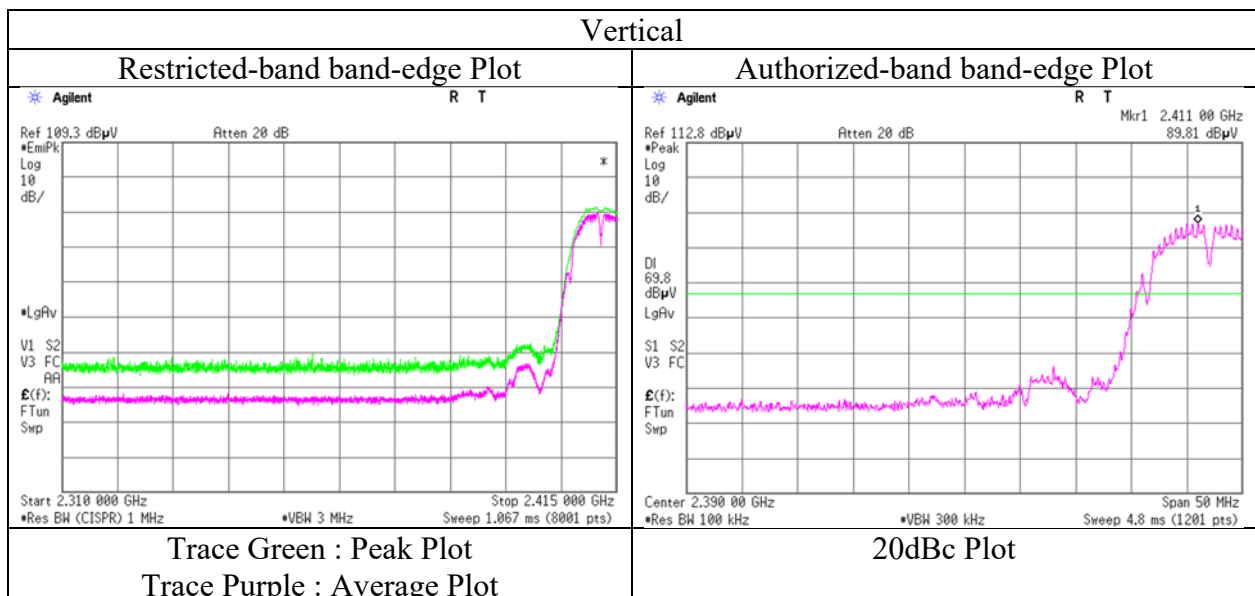
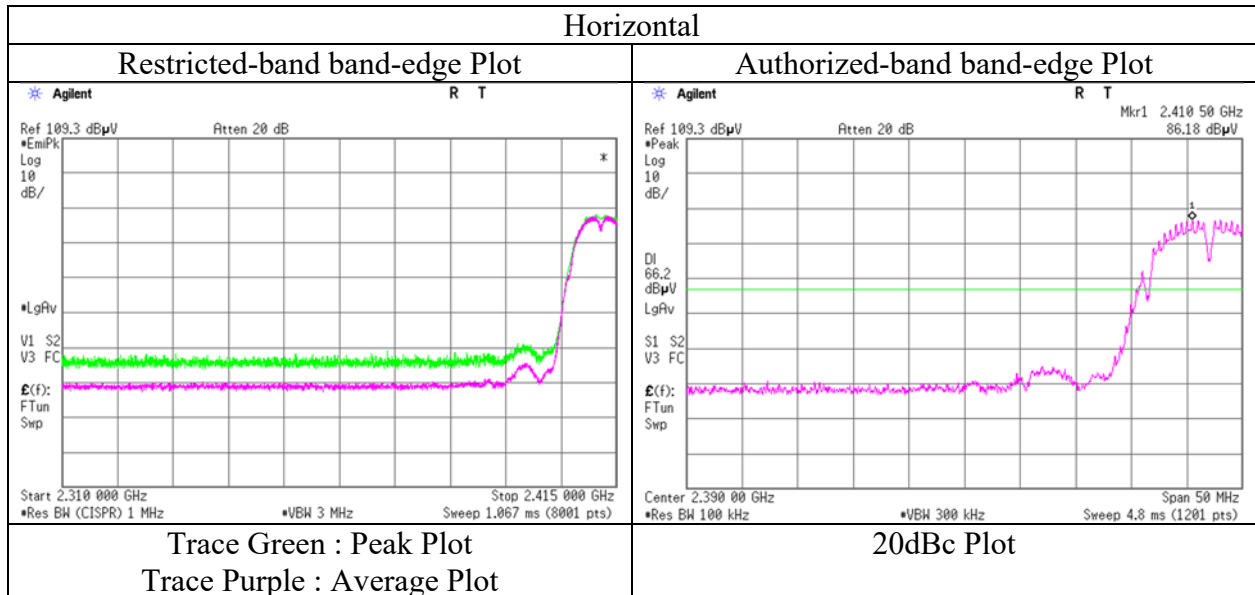
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11b 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12622648S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	3	1	1
Date	December 3, 2018	December 4, 2018	December 7, 2018	December 4, 2018
Temperature / Humidity	21 deg. C / 41 % RH	23 deg. C / 43 % RH	21 deg. C / 43 % RH	21 deg. C / 41 % RH
Engineer	Shiro Kobayashi	Kazuya Noda	Kazuya Noda	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 18 GHz)	(18 GHz – 26.5 GHz)
Semi Anechoic Chamber	1			
Date	December 6, 2018			
Temperature / Humidity	24 deg. C / 35 % RH			
Engineer	Makoto Hosaka			
	(26.5 GHz – 40 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.	1439.997	PK	47.35	24.97	13.13	39.08	2.24	48.61	73.90	25.2	241	34	
Hori.	4874.000	PK	45.25	31.22	6.45	39.50	2.24	45.66	73.90	28.2	125	244	
Hori.	7311.000	PK	45.04	36.70	8.39	39.35	2.24	53.02	73.90	20.8	144	338	
Hori.	1439.997	AV	40.31	24.97	13.13	39.08	2.24	41.57	53.90	12.3	241	34	
Hori.	4874.000	AV	35.69	31.22	6.45	39.50	2.24	36.10	53.90	17.8	125	244	
Hori.	7311.000	AV	35.45	36.70	8.39	39.35	2.24	43.43	53.90	10.4	144	338	
Vert.	1439.997	PK	46.92	24.97	13.13	39.08	2.24	48.18	73.90	25.7	132	115	
Vert.	4874.000	PK	45.13	31.22	6.45	39.50	2.24	45.54	73.90	28.3	178	188	
Vert.	7311.000	PK	45.03	36.70	8.39	39.35	2.24	53.01	73.90	20.8	145	163	
Vert.	1439.997	AV	38.38	24.97	13.13	39.08	2.24	39.64	53.90	14.2	132	115	
Vert.	4874.000	AV	36.57	31.22	6.45	39.50	2.24	36.98	53.90	16.9	178	188	
Vert.	7311.000	AV	35.51	36.70	8.39	39.35	2.24	43.49	53.90	10.4	145	163	

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

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Radiated Spurious Emission

Report No.	12622648S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	3	1	1
Date	December 3, 2018	December 4, 2018	December 7, 2018	December 4, 2018
Temperature / Humidity	21 deg. C / 41 % RH	23 deg. C / 43 % RH	21 deg. C / 43 % RH	21 deg. C / 41 % RH
Engineer	Shiro Kobayashi	Kazuya Noda	Kazuya Noda	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 18 GHz)	(18 GHz – 26.5 GHz)
Semi Anechoic Chamber	1			
Date	December 6, 2018			
Temperature / Humidity	24 deg. C / 35 % RH			
Engineer	Makoto Hosaka			
	(26.5 GHz – 40 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.	1440.004	PK	47.95	24.97	13.13	39.08	2.24	49.21	73.90	24.6	231	35	
Hori.	2483.500	PK	47.22	27.64	14.13	39.46	2.24	51.77	73.90	22.1	383	87	
Hori.	2486.937	PK	46.94	27.63	14.13	39.46	2.24	51.48	73.90	22.4	383	87	
Hori.	4924.000	PK	45.58	31.22	6.46	39.50	2.24	46.00	73.90	27.9	129	234	
Hori.	7386.000	PK	45.79	36.75	8.39	39.39	2.24	53.78	73.90	20.1	147	289	
Hori.	1440.004	AV	40.39	24.97	13.13	39.08	2.24	41.65	53.90	12.2	231	35	
Hori.	2483.500	AV	37.70	27.64	14.13	39.46	2.24	42.25	53.90	11.6	383	87	
Hori.	2486.937	AV	37.90	27.63	14.13	39.46	2.24	42.44	53.90	11.4	383	87	
Hori.	4924.000	AV	35.86	31.22	6.46	39.50	2.24	36.28	53.90	17.6	129	234	
Hori.	7386.000	AV	36.14	36.75	8.39	39.39	2.24	44.13	53.90	9.7	147	289	
Vert.	1440.004	PK	47.24	24.97	13.13	39.08	2.24	48.50	73.90	25.4	128	118	
Vert.	2483.500	PK	48.42	27.64	14.13	39.46	2.24	52.97	73.90	20.9	125	180	
Vert.	2486.844	PK	47.77	27.64	14.13	39.46	2.24	52.32	73.90	21.5	125	180	
Vert.	4924.000	PK	45.03	31.22	6.46	39.50	2.24	45.45	73.90	28.4	173	176	
Vert.	7386.000	PK	44.89	36.75	8.39	39.39	2.24	52.88	73.90	21.0	152	178	
Vert.	1440.004	AV	38.57	24.97	13.13	39.08	2.24	39.83	53.90	14.0	128	118	
Vert.	2483.500	AV	40.57	27.64	14.13	39.46	2.24	45.12	53.90	8.7	125	180	
Vert.	2486.844	AV	39.73	27.64	14.13	39.46	2.24	44.28	53.90	9.6	125	180	
Vert.	4924.000	AV	36.04	31.22	6.46	39.50	2.24	36.46	53.90	17.4	173	176	
Vert.	7386.000	AV	35.81	36.75	8.39	39.39	2.24	43.80	53.90	10.1	152	178	

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

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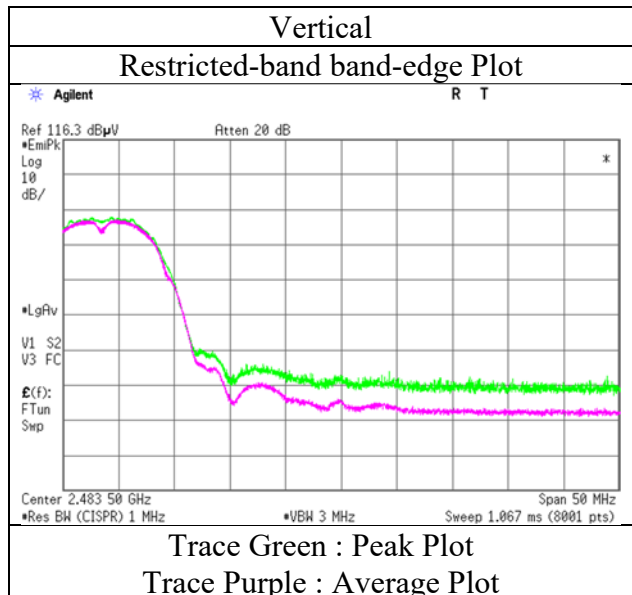
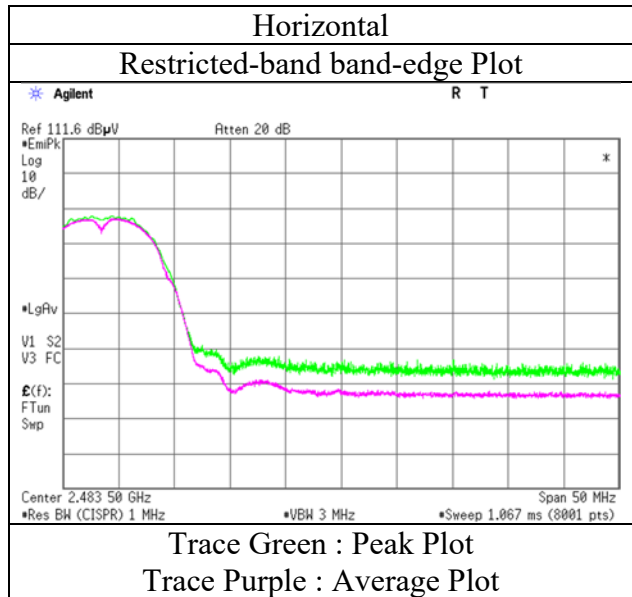
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11b 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1 1
Date December 3, 2018 December 4, 2018 December 7, 2018 December 4, 2018
Temperature / Humidity 21 deg. C / 41 % RH 23 deg. C / 43 % RH 21 deg. C / 43 % RH 21 deg. C / 41 % RH
Engineer Shiro Kobayashi Kazuya Noda Kazuya Noda Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 18 GHz) (18 GHz – 26.5 GHz)

Semi Anechoic Chamber 1
Date December 6, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Makoto Hosaka
(26.5 GHz – 40 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.	1440.041	PK	47.42	24.97	13.13	39.08	2.24	48.68	73.90	25.2	230	36	
Hori.	2390.000	PK	46.86	27.89	14.06	39.46	2.24	51.59	73.90	22.3	387	97	
Hori.	4824.000	PK	45.80	31.34	6.46	39.50	2.24	46.34	73.90	27.5	132	244	
Hori.	7236.000	PK	45.41	36.81	8.39	39.31	2.24	53.54	73.90	20.3	148	169	
Hori.	1440.041	AV	40.76	24.97	13.13	39.08	2.24	42.02	53.90	11.8	230	36	
Vert.	1440.041	PK	47.07	24.97	13.13	39.08	2.24	48.33	73.90	25.5	132	116	
Vert.	2390.000	PK	48.34	27.89	14.06	39.46	2.24	53.07	73.90	20.8	131	183	
Vert.	4824.000	PK	45.51	31.34	6.46	39.50	2.24	46.05	73.90	27.8	166	188	
Vert.	7236.000	PK	45.42	36.81	8.39	39.31	2.24	53.55	73.90	20.3	147	166	
Vert.	1440.041	AV	38.77	24.97	13.13	39.08	2.24	40.03	53.90	13.8	132	116	

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	37.13	27.89	14.06	39.46	3.53	2.24	45.39	53.90	8.5	*1)
Hori.	4824.000	AV	35.87	31.34	6.46	39.50	3.53	2.24	39.94	53.90	13.9	
Hori.	7236.000	AV	35.92	36.81	8.39	39.31	3.53	2.24	47.58	53.90	6.3	
Vert.	2390.000	AV	37.85	27.89	14.06	39.46	3.53	2.24	46.11	53.90	7.7	*1)
Vert.	4824.000	AV	37.01	31.34	6.46	39.50	3.53	2.24	41.08	53.90	12.8	
Vert.	7236.000	AV	35.92	36.81	8.39	39.31	3.53	2.24	47.58	53.90	6.3	

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	82.33	27.86	14.08	39.46	2.24	87.05	-	-	Carrier
Hori.	2396.985	PK	41.86	27.89	14.07	39.46	2.24	46.60	67.05	20.4	
Hori.	2400.000	PK	40.19	27.89	14.07	39.46	2.24	44.93	67.05	22.1	
Vert.	2412.000	PK	84.39	27.86	14.08	39.46	2.24	89.11	-	-	Carrier
Vert.	2396.971	PK	43.24	27.89	14.07	39.46	2.24	47.98	69.11	21.1	
Vert.	2400.000	PK	42.05	27.89	14.07	39.46	2.24	46.79	69.11	22.3	

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

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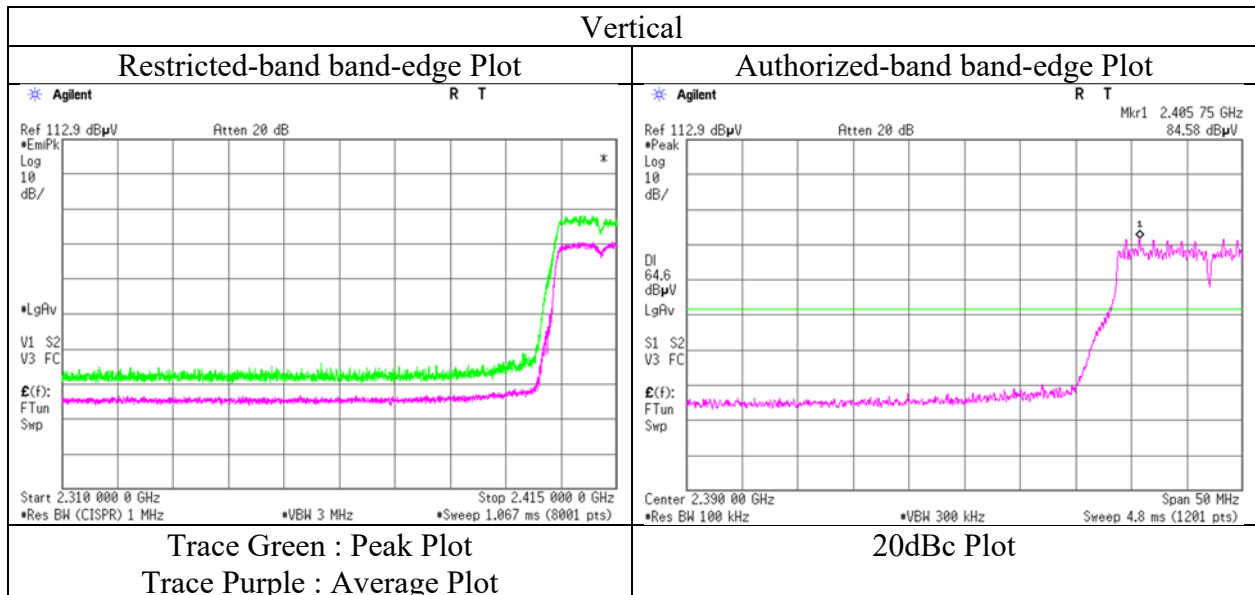
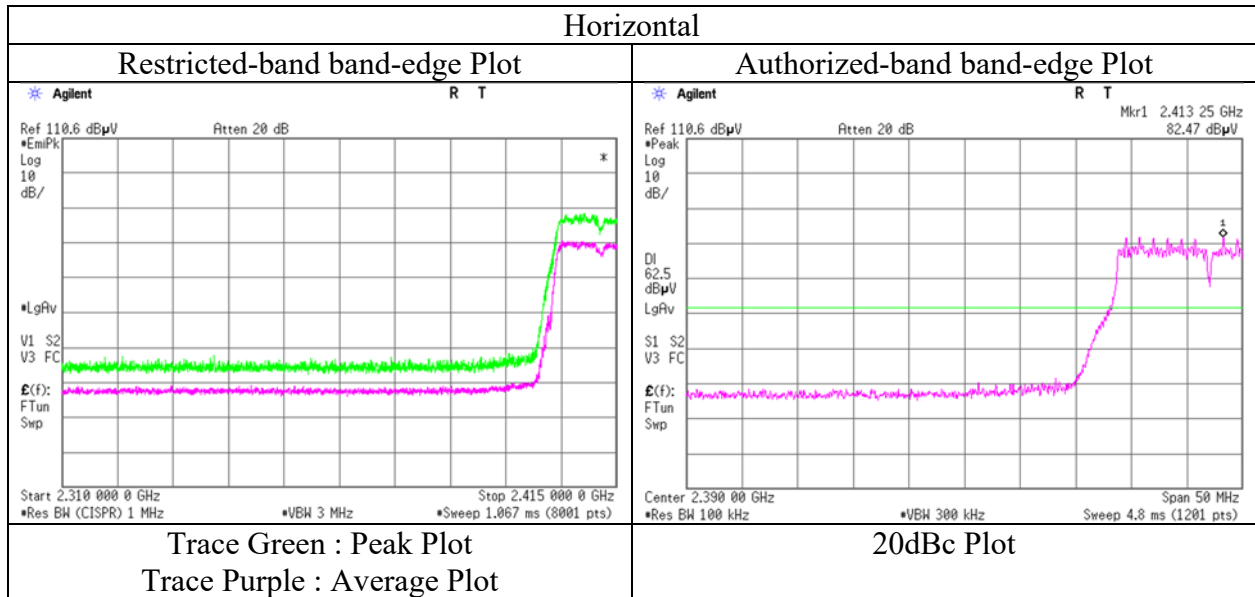
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11g 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12622648S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	3	1
Date	December 5, 2018	December 3, 2018	December 4, 2018	December 7, 2018
Temperature / Humidity	23 deg. C / 57 % RH	21 deg. C / 41 % RH	23 deg. C / 43 % RH	21 deg. C / 43 % RH
Engineer	Kenichi Adachi	Shiro Kobayashi	Kazuya Noda	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 13 GHz)	(13 GHz - 18 GHz)
Semi Anechoic Chamber	1	1		
Date	December 4, 2018	December 6, 2018		
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 35 % RH		
Engineer	Shiro Kobayashi	Makoto Hosaka		
	(18 GHz - 26.5 GHz)	(26.5 GHz - 40 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.	73.727	QP	46.56	6.35	7.85	31.82	0.00	28.94	40.00	11.0	254	307	
Hori.	165.235	QP	36.66	15.47	8.96	31.78	0.00	29.31	43.50	14.1	192	118	
Hori.	242.998	QP	45.25	11.61	6.29	31.75	0.00	31.40	46.00	14.6	172	144	
Hori.	419.999	QP	46.44	16.08	7.57	31.85	0.00	38.24	46.00	7.7	100	188	
Hori.	466.940	QP	46.33	16.96	7.76	31.89	0.00	39.16	46.00	6.8	100	331	
Hori.	840.004	QP	35.98	21.28	9.42	31.65	0.00	35.03	46.00	10.9	100	132	
Hori.	960.266	QP	42.36	22.06	9.87	30.89	0.00	43.40	53.90	10.5	100	225	
Hori.	1439.996	PK	47.71	24.97	13.13	39.08	2.24	48.97	73.90	24.9	233	39	
Hori.	4874.000	PK	45.00	31.22	6.45	39.50	2.24	45.41	73.90	28.4	120	246	
Hori.	7311.000	PK	45.31	36.70	8.39	39.35	2.24	53.29	73.90	20.6	143	295	
Hori.	1439.996	AV	40.63	24.97	13.13	39.08	2.24	41.89	53.90	12.0	233	39	
Vert.	33.869	QP	34.43	17.12	7.11	31.84	0.00	26.82	40.00	13.1	100	311	
Vert.	73.727	QP	47.23	6.35	7.85	31.82	0.00	29.61	40.00	10.3	100	293	
Vert.	165.235	QP	34.96	15.47	8.96	31.78	0.00	27.61	43.50	15.8	100	239	
Vert.	242.998	QP	47.26	11.61	6.29	31.75	0.00	33.41	46.00	12.5	100	159	
Vert.	419.999	QP	42.78	16.08	7.57	31.85	0.00	34.58	46.00	11.4	141	138	
Vert.	466.940	QP	40.95	16.96	7.76	31.89	0.00	33.78	46.00	12.2	124	321	
Vert.	840.004	QP	37.24	21.28	9.42	31.65	0.00	36.29	46.00	9.7	100	313	
Vert.	960.266	QP	34.33	22.06	9.87	30.89	0.00	35.37	53.90	18.5	100	298	
Vert.	1439.996	PK	46.85	24.97	13.13	39.08	2.24	48.11	73.90	25.7	139	118	
Vert.	4874.000	PK	45.02	31.22	6.45	39.50	2.24	45.43	73.90	28.4	163	171	
Vert.	7311.000	PK	44.67	36.70	8.39	39.35	2.24	52.65	73.90	21.2	149	167	
Vert.	1439.996	AV	38.66	24.97	13.13	39.08	2.24	39.92	53.90	13.9	139	118	

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	36.29	31.22	6.45	39.50	3.53	2.24	40.23	53.90	13.6	
Hori.	7311.000	AV	35.51	36.70	8.39	39.35	3.53	2.24	47.02	53.90	6.8	
Vert.	4874.000	AV	36.62	31.22	6.45	39.50	3.53	2.24	40.56	53.90	13.3	
Vert.	7311.000	AV	36.47	36.70	8.39	39.35	3.53	2.24	47.98	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 : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1 1
Date December 3, 2018 December 4, 2018 December 7, 2018 December 4, 2018
Temperature / Humidity 21 deg. C / 41 % RH 23 deg. C / 43 % RH 21 deg. C / 43 % RH 21 deg. C / 41 % RH
Engineer Shiro Kobayashi Kazuya Noda Kazuya Noda Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 18 GHz) (18 GHz – 26.5 GHz)
Semi Anechoic Chamber 1
Date December 6, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Makoto Hosaka
(26.5 GHz – 40 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.	1440.006	PK	48.00	24.97	13.13	39.08	2.24	49.26	73.90	24.6	232	39	
Hori.	2483.500	PK	46.76	27.64	14.13	39.46	2.24	51.31	73.90	22.5	381	89	
Hori.	4924.000	PK	45.18	31.22	6.46	39.50	2.24	45.60	73.90	28.3	118	246	
Hori.	7386.000	PK	45.57	36.75	8.39	39.39	2.24	53.56	73.90	20.3	171	168	
Hori.	1440.006	AV	40.71	24.97	13.13	39.08	2.24	41.97	53.90	11.9	232	39	
Vert.	1440.006	PK	47.02	24.97	13.13	39.08	2.24	48.28	73.90	25.6	135	115	
Vert.	2483.500	PK	49.75	27.64	14.13	39.46	2.24	54.30	73.90	19.6	124	179	
Vert.	4924.000	PK	44.78	31.22	6.46	39.50	2.24	45.20	73.90	28.7	174	179	
Vert.	7386.000	PK	44.39	36.75	8.39	39.39	2.24	52.38	73.90	21.5	134	158	
Vert.	1440.006	AV	38.68	24.97	13.13	39.08	2.24	39.94	53.90	13.9	135	115	

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.	2483.500	AV	37.59	27.64	14.13	39.46	3.53	2.24	45.67	53.90	8.2	*1)
Hori.	4924.000	AV	35.82	31.22	6.46	39.50	3.53	2.24	39.77	53.90	14.1	
Hori.	7386.000	AV	35.49	36.75	8.39	39.39	3.53	2.24	47.01	53.90	6.8	
Vert.	2483.500	AV	39.25	27.64	14.13	39.46	3.53	2.24	47.33	53.90	6.5	*1)
Vert.	4924.000	AV	36.80	31.22	6.46	39.50	3.53	2.24	40.75	53.90	13.1	
Vert.	7386.000	AV	36.51	36.75	8.39	39.39	3.53	2.24	48.03	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 : 20log(3.88 m / 3.0 m) = 2.24 dB

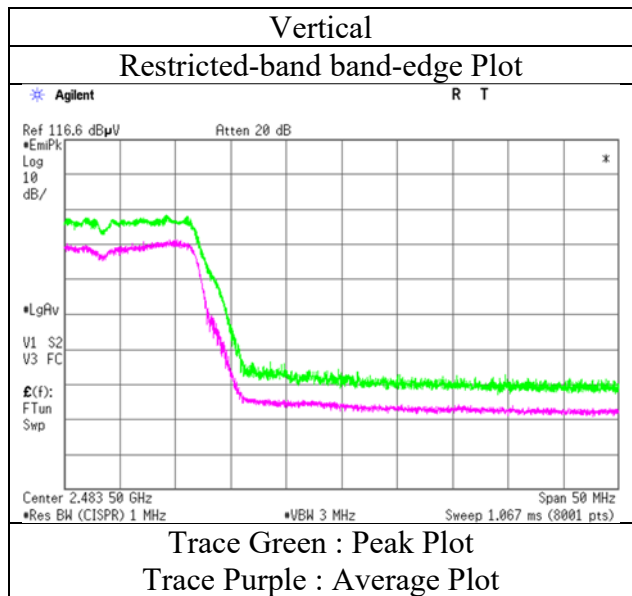
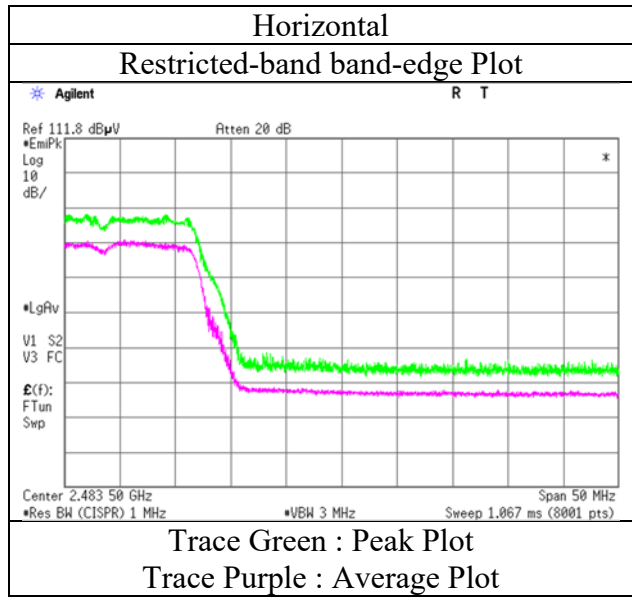
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11g 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1 1
Date December 3, 2018 December 4, 2018 December 7, 2018 December 4, 2018
Temperature / Humidity 21 deg. C / 41 % RH 23 deg. C / 43 % RH 21 deg. C / 43 % RH 21 deg. C / 41 % RH
Engineer Shiro Kobayashi Kazuya Noda Kazuya Noda Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 18 GHz) (18 GHz – 26.5 GHz)

Semi Anechoic Chamber 1
Date December 6, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Makoto Hosaka
(26.5 GHz – 40 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.	1440.008	PK	47.69	24.97	13.13	39.08	2.24	48.95	73.90	24.9	233	37	
Hori.	2390.000	PK	46.73	27.89	14.06	39.46	2.24	51.46	73.90	22.4	389	100	
Hori.	4824.000	PK	45.24	31.34	6.46	39.50	2.24	45.78	73.90	28.1	149	258	
Hori.	7236.000	PK	46.36	36.81	8.39	39.31	2.24	54.49	73.90	19.4	152	188	
Hori.	1440.008	AV	40.57	24.97	13.13	39.08	2.24	41.83	53.90	12.0	233	37	
Vert.	1440.008	PK	47.10	24.97	13.13	39.08	2.24	48.36	73.90	25.5	137	113	
Vert.	2390.000	PK	48.26	27.89	14.06	39.46	2.24	52.99	73.90	20.9	139	181	
Vert.	4824.000	PK	44.82	31.34	6.46	39.50	2.24	45.36	73.90	28.5	165	159	
Vert.	7236.000	PK	45.51	36.81	8.39	39.31	2.24	53.64	73.90	20.2	135	169	
Vert.	1440.008	AV	38.85	24.97	13.13	39.08	2.24	40.11	53.90	13.7	137	113	

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	36.92	27.89	14.06	39.46	3.46	2.24	45.11	53.90	8.7	*1)
Hori.	4824.000	AV	35.66	31.34	6.46	39.50	3.46	2.24	39.66	53.90	14.2	
Hori.	7236.000	AV	35.62	36.81	8.39	39.31	3.46	2.24	47.21	53.90	6.6	
Vert.	2390.000	AV	37.25	27.89	14.06	39.46	3.46	2.24	45.44	53.90	8.4	*1)
Vert.	4824.000	AV	35.59	31.34	6.46	39.50	3.46	2.24	39.59	53.90	14.3	
Vert.	7236.000	AV	35.46	36.81	8.39	39.31	3.46	2.24	47.05	53.90	6.8	

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

Distance factor : 1 GHz - 13 GHz : 20log(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	81.11	27.86	14.08	39.46	2.24	85.83	-	-	Carrier
Hori.	2400.000	PK	40.48	27.89	14.07	39.46	2.24	45.22	65.83	20.6	
Vert.	2412.000	PK	83.75	27.86	14.08	39.46	2.24	88.47	-	-	Carrier
Vert.	2400.000	PK	44.15	27.89	14.07	39.46	2.24	48.89	68.47	19.5	

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

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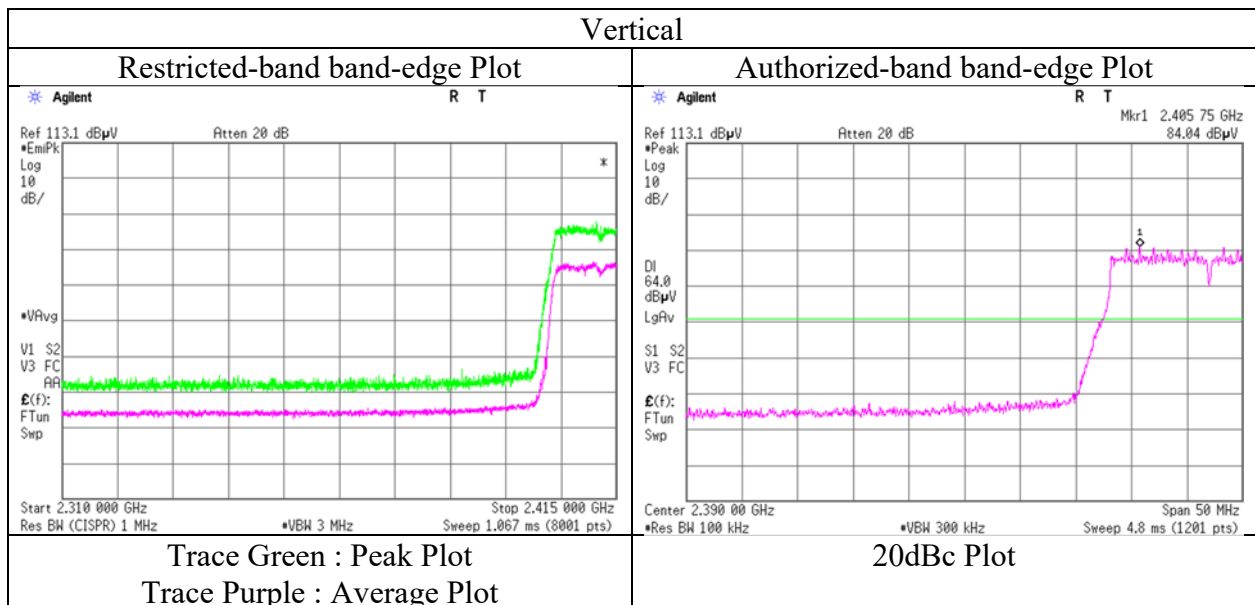
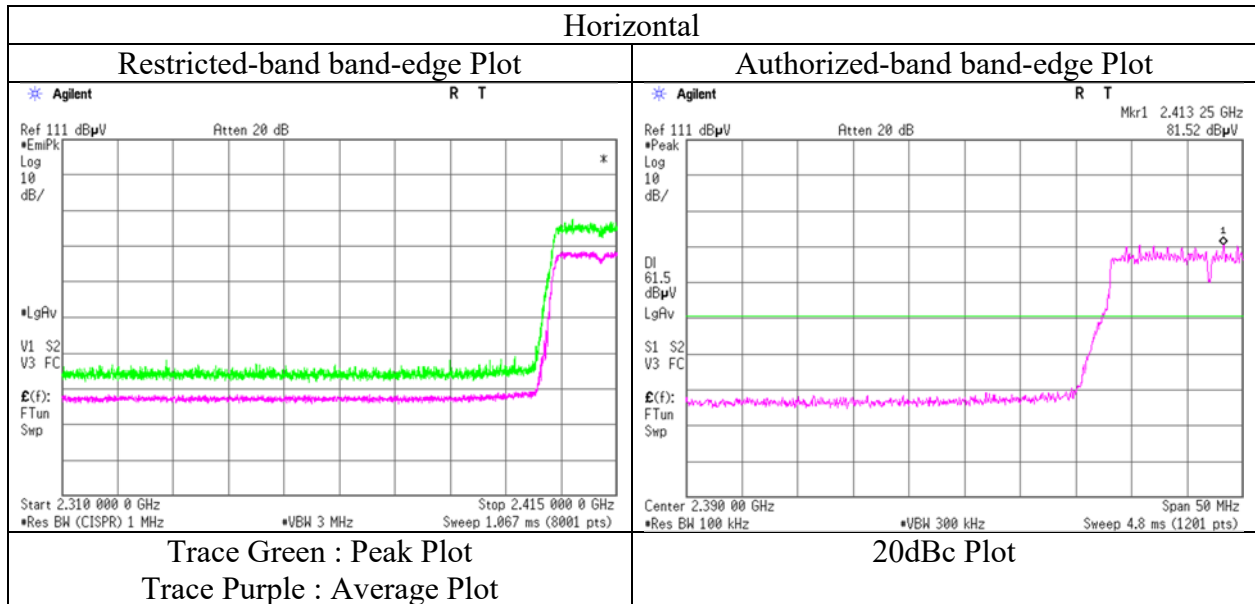
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11g 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1 1
Date December 3, 2018 December 4, 2018 December 7, 2018 December 4, 2018
Temperature / Humidity 21 deg. C / 41 % RH 23 deg. C / 43 % RH 21 deg. C / 43 % RH 21 deg. C / 41 % RH
Engineer Shiro Kobayashi Kazuya Noda Kazuya Noda Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 18 GHz) (18 GHz – 26.5 GHz)
Semi Anechoic Chamber 1
Date December 6, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Makoto Hosaka
(26.5 GHz – 40 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.	1440.030	PK	48.43	24.97	13.13	39.08	2.24	49.69	73.90	24.2	231	37	
Hori.	4874.000	PK	44.69	31.22	6.45	39.50	2.24	45.10	73.90	28.8	129	246	
Hori.	7311.000	PK	44.48	36.70	8.39	39.35	2.24	52.46	73.90	21.4	145	166	
Hori.	1440.030	AV	40.68	24.97	13.13	39.08	2.24	41.94	53.90	11.9	231	37	
Vert.	1440.030	PK	46.93	24.97	13.13	39.08	2.24	48.19	73.90	25.7	134	113	
Vert.	4874.000	PK	45.28	31.22	6.45	39.50	2.24	45.69	73.90	28.2	173	172	
Vert.	7311.000	PK	45.34	36.70	8.39	39.35	2.24	53.32	73.90	20.5	138	151	
Vert.	1440.030	AV	38.54	24.97	13.13	39.08	2.24	39.80	53.90	14.1	134	113	

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	36.60	31.22	6.45	39.50	3.46	2.24	40.47	53.90	13.4	
Hori.	7311.000	AV	35.43	36.70	8.39	39.35	3.46	2.24	46.87	53.90	7.0	
Vert.	4874.000	AV	35.56	31.22	6.45	39.50	3.46	2.24	39.43	53.90	14.4	
Vert.	7311.000	AV	35.51	36.70	8.39	39.35	3.46	2.24	46.95	53.90	6.9	

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.

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Radiated Spurious Emission

Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1 1
Date December 3, 2018 December 4, 2018 December 7, 2018 December 4, 2018
Temperature / Humidity 21 deg. C / 41 % RH 23 deg. C / 43 % RH 21 deg. C / 43 % RH 21 deg. C / 41 % RH
Engineer Shiro Kobayashi Kazuya Noda Kazuya Noda Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 18 GHz) (18 GHz – 26.5 GHz)
Semi Anechoic Chamber 1
Date December 6, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Makoto Hosaka
(26.5 GHz – 40 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.	1440.033	PK	48.03	24.97	13.13	39.08	2.24	49.29	73.90	24.6	233	36	
Hori.	2483.500	PK	46.85	27.64	14.13	39.46	2.24	51.40	73.90	22.5	383	88	
Hori.	4924.000	PK	45.41	31.22	6.46	39.50	2.24	45.83	73.90	28.0	128	253	
Hori.	7386.000	PK	45.11	36.75	8.39	39.39	2.24	53.10	73.90	20.8	149	166	
Hori.	1440.033	AV	40.66	24.97	13.13	39.08	2.24	41.92	53.90	11.9	233	36	
Vert.	1440.033	PK	46.81	24.97	13.13	39.08	2.24	48.07	73.90	25.8	135	117	
Vert.	2483.500	PK	49.78	27.64	14.13	39.46	2.24	54.33	73.90	19.5	134	178	
Vert.	4924.000	PK	45.12	31.22	6.46	39.50	2.24	45.54	73.90	28.3	132	241	
Vert.	7386.000	PK	45.10	36.75	8.39	39.39	2.24	53.09	73.90	20.8	141	158	
Vert.	1440.033	AV	39.01	24.97	13.13	39.08	2.24	40.27	53.90	13.6	135	117	

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.	2483.500	AV	37.44	27.64	14.13	39.46	3.46	2.24	45.45	53.90	8.4	*1)
Hori.	4924.000	AV	35.95	31.22	6.46	39.50	3.46	2.24	39.83	53.90	14.0	
Hori.	7386.000	AV	35.49	36.75	8.39	39.39	3.46	2.24	46.94	53.90	6.9	
Vert.	2483.500	AV	38.81	27.64	14.13	39.46	3.46	2.24	46.82	53.90	7.0	*1)
Vert.	4924.000	AV	36.00	31.22	6.46	39.50	3.46	2.24	39.88	53.90	14.0	
Vert.	7386.000	AV	35.34	36.75	8.39	39.39	3.46	2.24	46.79	53.90	7.1	

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

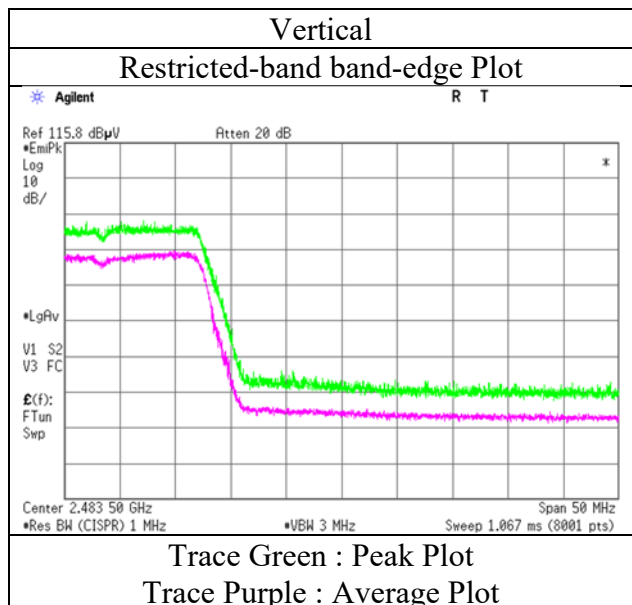
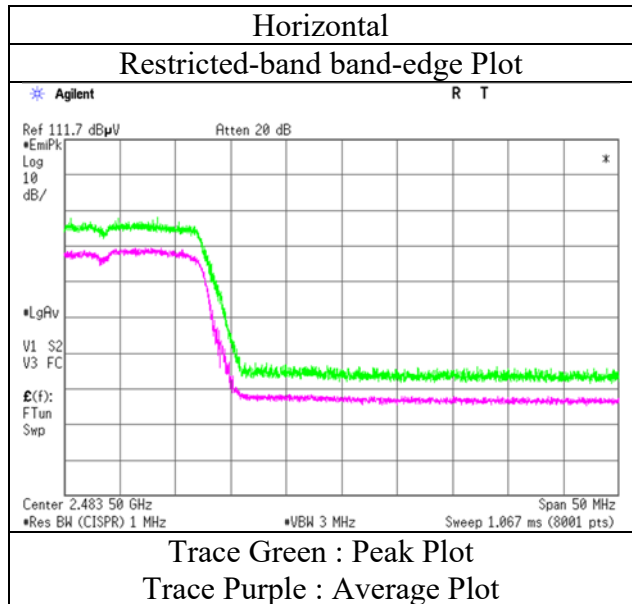
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

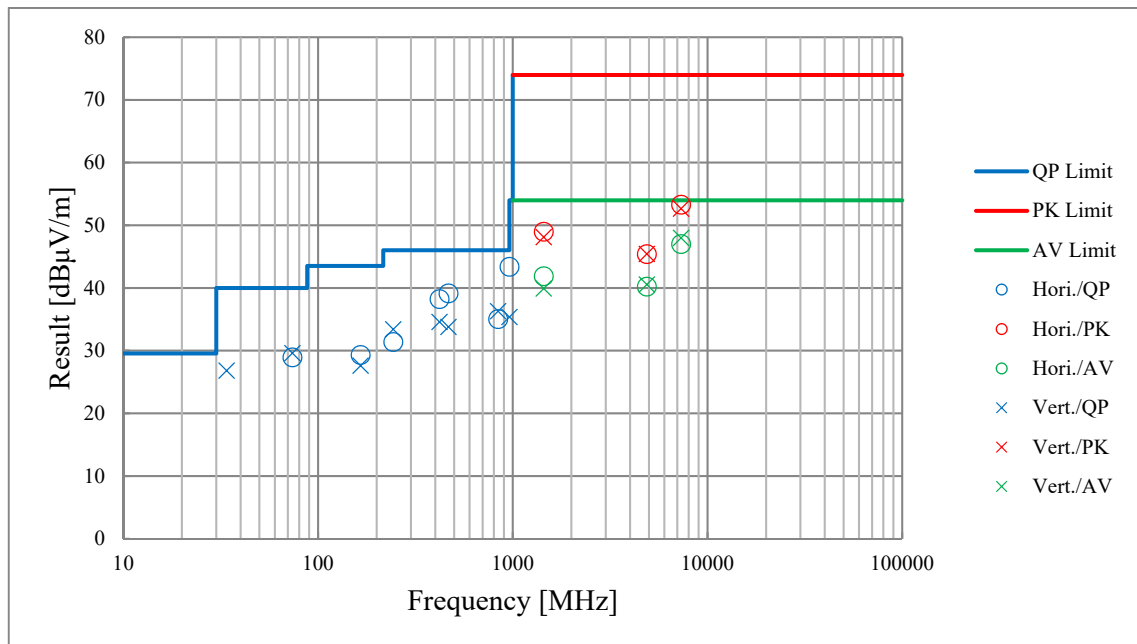
Report No. 12622648S-C-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date December 3, 2018
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Shiro Kobayashi
(1 GHz – 2.8 GHz)
Mode Tx 11n-20 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

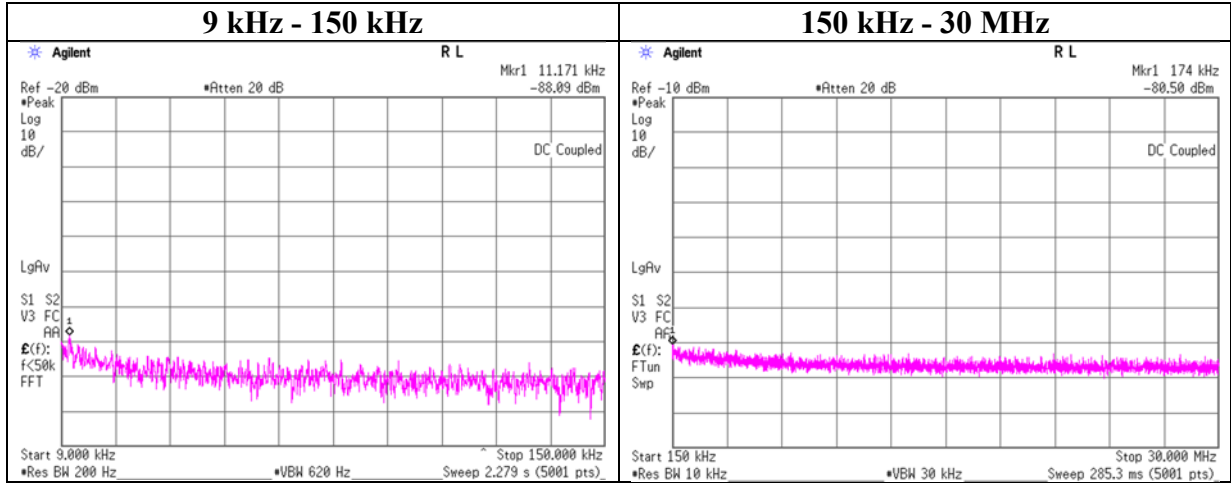
Report No.	12622648S-C-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	3	1
Date	December 5, 2018	December 3, 2018	December 4, 2018	December 7, 2018
Temperature / Humidity	23 deg. C / 57 % RH	21 deg. C / 41 % RH	23 deg. C / 43 % RH	21 deg. C / 43 % RH
Engineer	Kenichi Adachi (30 MHz - 1 GHz)	Shiro Kobayashi (1 GHz - 2.8 GHz)	Kazuya Noda (2.8 GHz - 13 GHz)	Kazuya Noda (13 GHz - 18 GHz)
Semi Anechoic Chamber	1	1		
Date	December 4, 2018	December 6, 2018		
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 35 % RH		
Engineer	Shiro Kobayashi (18 GHz - 26.5 GHz)	Makoto Hosaka (26.5 GHz - 40 GHz)		
Mode	Tx 11g 2437 MHz			



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

Conducted Spurious Emission

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 4, 2018
Temperature / Humidity 25 deg. C / 45 % RH
Engineer Kazutaka Takeyama
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
11.17	-88.1	0.01	9.7	2.0	1	-76.4	300	6.0	-15.1	46.6	61.7	
174.00	-80.5	0.01	9.7	2.0	1	-68.8	300	6.0	-7.5	22.7	30.2	

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

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

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

Report No. 12622648S-C-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 4, 2018
Temperature / Humidity 25 deg. C / 45 % RH
Engineer Kazutaka Takeyama
Mode Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-18.52	2.37	9.82	-6.33	8.00	14.33
2437.00	-18.44	2.38	9.82	-6.24	8.00	14.24
2462.00	-18.58	2.39	9.82	-6.37	8.00	14.37

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-25.58	2.37	9.82	-13.39	8.00	21.39
2437.00	-25.37	2.38	9.82	-13.17	8.00	21.17
2462.00	-25.49	2.39	9.82	-13.28	8.00	21.28

11n-20

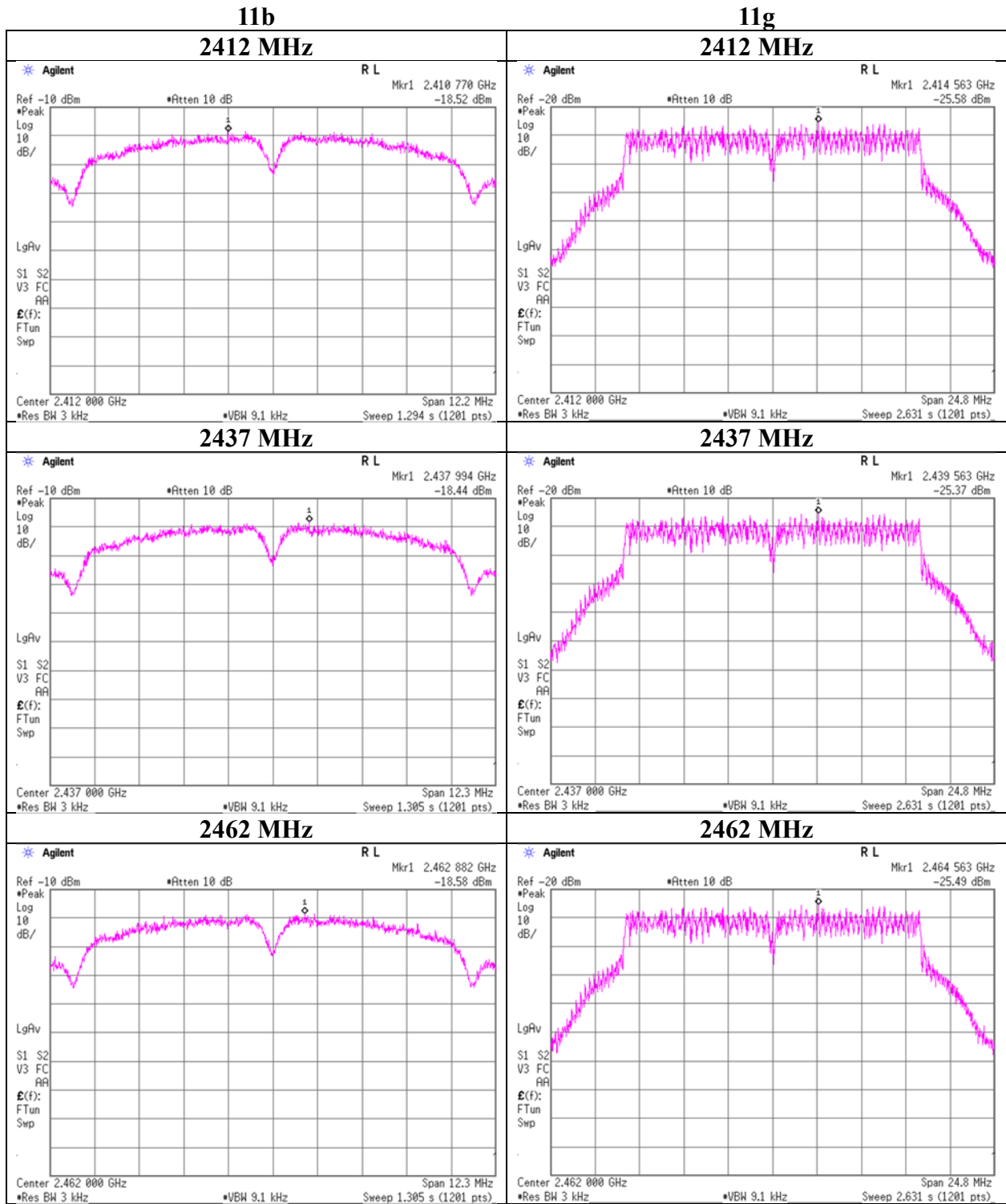
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-25.03	2.37	9.82	-12.84	8.00	20.84
2437.00	-25.63	2.38	9.82	-13.43	8.00	21.43
2462.00	-24.57	2.39	9.82	-12.36	8.00	20.36

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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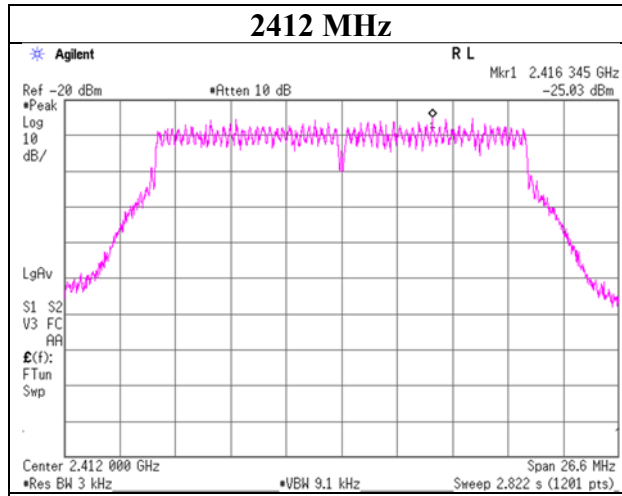
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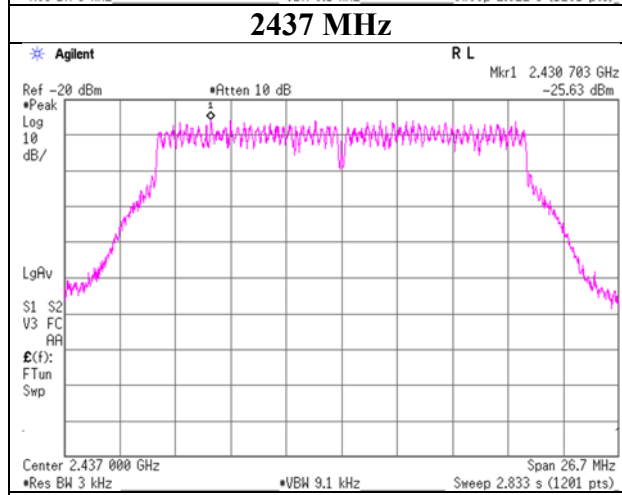
Power Density

11n-20

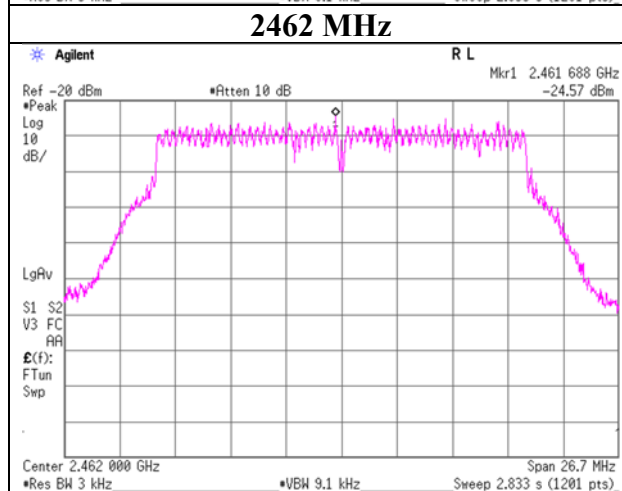
2412 MHz



2437 MHz



2462 MHz



APPENDIX 2: Test instruments

Test Instruments (1/2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
KTS-07	AT	145111	Digital Tester	SANWA	PC500	7019232	2018/10/17	2019/10/31	12
SAT10-14	AT	154591	Attenuator	Weinschel Corp.	54A-10	81595	2018/4/20	2019/4/30	12
SCC-G14	AT	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2018/3/19	2019/3/31	12
SOS-09	AT	146318	Humidity Indicator	A&D	AD-5681	4061484	2018/12/5	2019/12/31	12
SPM-07	AT	146247	Power Meter	AGILENT	8990B	MY5100272	2018/7/13	2019/7/31	12
SPSS-04	AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2018/7/13	2019/7/31	12
SSA-03	AT	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2018/8/30	2019/8/31	12
STM-G10	AT	171617	Terminator	WEINSCHTEL	M1459A	92420	2018/7/10	2019/7/31	12
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)		-	-	-
KAT6-04	RE	144899	Attenuator	Inmet	18N-6dB	-	2017/12/14	2018/12/31	12
KJM-02	RE	146432	Measure	TAJIMA	GL19-55	-	-	-	-
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
KSA-08	RE	145089	Spectrum Analyzer	AGILENT	E4446A	MY46180525	2018/10/7	2019/10/31	12
SAEC-01(NSA)	RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2018/5/29	2019/5/31	12
SAEC-01(SVSWR)	RE	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2018/7/19	2019/7/31	12
SAEC-03(SVSWR)	RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2018/7/17	2019/7/31	12
SAF-01	RE	145003	Pre Amplifier	SONOMA	310N	290211	2018/2/16	2019/2/28	12
SAF-04	RE	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2018/6/26	2019/6/30	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2018/3/27	2019/3/31	12
SAF-10	RE	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2018/3/27	2019/3/31	12
SAT10-06	RE	145137	Attenuator	AGILENT	8493C-010	74865	2018/11/25	2019/11/30	12
SAT3-09	RE	144959	Attenuator	JFW	50HF-003N	-	2018/8/23	2019/8/31	12
SBA-01	RE	145161	Biconical Antenna	Schwarzbeck	BBA9106	91032664	2018/6/5	2019/6/30	12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	RE	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	RE	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-G05	RE	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2018/1/29	2019/1/31	12
SCC-G06	RE	145173	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	2018/6/1	2019/6/30	12
SCC-G22	RE	145180	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	2018/5/11	2019/5/31	12
SCC-G23	RE	145168	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	2018/5/11	2019/5/31	12
SCC-G33	RE	145184	Coaxial Cable	Junkosha	MWX241-01000KMSK MS	-	2018/4/20	2019/4/30	12

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Test Instruments (2/2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SCC-G40	RE	166491	Coaxial Cable	Junkosha	MWX221-01000NFSN MS/B	1612S005	2018/1/29	2019/1/31	12
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSN MS/B	1612S006	2018/1/29	2019/1/31	12
SCC-G43	RE	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104 E	SN MY 13406/4E	2018/7/10	2019/7/31	12
SCC-G44	RE	168300	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800070/4A	2018/3/28	2019/3/31	12
SCC-G45	RE	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102 E	800137/2E A	2018/3/28	2019/3/31	12
SFL-02	RE	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2018/11/16	2019/11/30	12
SHA-01	RE	145383	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	2018/7/23	2019/7/31	12
SHA-03	RE	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2018/7/23	2019/7/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	Sep-60	LM3640	2018/7/23	2019/7/31	12
SHA-06	RE	145514	Horn Antenna	ETS LINDGREN	Oct-60	LM3459	2018/7/23	2019/7/31	12
SLA-05	RE	145527	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	2018/6/5	2019/6/30	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-05	RE	146293	Humidity Indicator	A&D	AD-5681	4062518	2018/10/25	2019/10/31	12
SSA-02	RE	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31	12
STR-01	RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2018/4/13	2019/4/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2018/10/16	2019/10/31	12
STS-03	RE	146210	Digital Hitester	HIOKI	3805-50	80997823	2018/10/16	2019/10/31	12

*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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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