



RADIO TEST REPORT

Test Report No. : 14118411H-C-R1

Applicant : ICOM Incorporated
Type of EUT : WLAN TRANSCEIVER
Model Number of EUT : IP110H
FCC ID : AFJ399500
Test regulation : FCC Part 15 Subpart C: 2021
Test result : Complied (Refer to SECTION 3)

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8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. 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 14118411H-C. 14118411H-C is replaced with this report.

Date of test: December 3, 2021 to March 15, 2022

Representative test engineer:

Hiroki Numata
Engineer

Approved by:

Takayuki Shimada
Leader



CERTIFICATE 5107.02

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

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REVISION HISTORY

Original Test Report No.: 14118411H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14118411H-C	February 14, 2022	-	-
1	14118411H-C-R1	March 15, 2022	P1	Updated Date of test: December 3, 2021 to January 20, 2022 → December 3, 2021 to March 15, 2022
1	14118411H-C-R1	March 15, 2022	P45, 47	Remeasured Power Density of 2422 MHz, 2452 MHz
1	14118411H-C-R1	March 15, 2022	P48	Updated Last Calibration Dates of Local ID: - MOS-24 - MMM-12

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	LIMS	Laboratory Information Management System
AC	Alternating Current	MCS	Modulation and Coding Scheme
AFH	Adaptive Frequency Hopping	MRA	Mutual Recognition Arrangement
AM	Amplitude Modulation	N/A	Not Applicable
Amp, AMP	Amplifier	NIST	National Institute of Standards and Technology
ANSI	American National Standards Institute	NS	No signal detect.
Ant, ANT	Antenna	NSA	Normalized Site Attenuation
AP	Access Point	OBW	Occupied BandWidth
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadrature Phase Shift Keying
CW	Continuous Wave	RBW	Resolution BandWidth
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RNSS	Radio Navigation Satellite Service
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
DUT	Device Under Test	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR, T/R	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
ETSI	European Telecommunications Standards Institute	Vert.	Vertical
EU	European Union	WLAN	Wireless LAN
EUT	Equipment Under Test		
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		

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CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (EUT).....	5
SECTION 3: Test specification, procedures & results.....	7
SECTION 4: Operation of EUT during testing.....	10
SECTION 5: Radiated Spurious Emission	13
SECTION 6: Antenna Terminal Conducted Tests.....	15
APPENDIX 1: Test data	16
99 % Occupied Bandwidth and 6 dB Bandwidth.....	16
Maximum Peak Output Power	21
Average Output Power	25
Radiated Spurious Emission	28
Conducted Spurious Emission	44
Power Density	45
APPENDIX 2: Test instruments	48
APPENDIX 3: Photographs of test setup	50
Radiated Spurious Emission	50
Worst Case Position	51
Antenna Terminal Conducted Tests.....	52

SECTION 1: Customer information

Company Name : ICOM Incorporated
Address : 1-1-32, Kamiminami, Hirano-Ku, Osaka, 547-0003, Japan
Telephone Number : +81-6-6794-7783
Contact Person : Atushi Tomiyama

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
 - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
 - SECTION 1: Customer information
 - SECTION 2: Equipment under test (EUT) other than the Receipt Date
 - SECTION 4: Operation of EUT 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 (EUT)

2.1 Identification of EUT

Type : WLAN TRANSCEIVER
Model Number : IP110H
Serial Number : Refer to SECTION 4.2
Receipt Date : November 26, 2021
Condition : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification : No Modification by the test lab.

2.2 Product Description

Model: IP110H (referred to as the EUT in this report) is a WLAN TRANSCEIVER.

General Specification

Rating : DC 3.75 V (Internal battery)

Radio Specification

WLAN (IEEE802.11b/g/n-20/n-40)

Radio Type	Transceiver
Frequency of Operation	[20 MHz Band] 2412 MHz to 2462 MHz [40 MHz Band] 2422 MHz to 2452 MHz
Modulation	DSSS, OFDM
Antenna type	Split ring (internal)
Antenna Gain	1.15 dBi

WLAN (IEEE802.11a/n-20/n-40/ac-20/ac-40/ac-80)

Radio Type	Transceiver
Frequency of Operation	[20 MHz Band] 5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5580 MHz, 5660 MHz to 5700 MHz 5745 MHz to 5825 MHz [40 MHz Band] 5190 MHz, 5230 MHz 5270 MHz, 5310 MHz 5510 MHz, 5550 MHz, 5670 MHz 5755 MHz, 5795 MHz [80 MHz Band] 5210 MHz 5290 MHz 5530 MHz 5775 MHz
Modulation	OFDM
Antenna type	Split ring (internal)
Antenna Gain	0.15 dBi (5180 MHz to 5320 MHz) 0.62 dBi (5500 MHz to 5825 MHz)

Bluetooth (BR / EDR function) *1)

Radio Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Modulation	FHSS
Antenna type	$\lambda/4$ printed inverted F antenna
Antenna Gain	-1.5 dBi

*This report applies to WLAN (2.4 GHz band) part.

*1) The test is not applicable to Bluetooth (BR / EDR function) part since the approved module (FCC ID: VIYHRM1016) is mounted on the EUT.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47 CFR Part 15 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

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ----- ISED: RSS-Gen 8.8	-	N/A	*1)
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(a)(2) ----- ISED: RSS-247 5.2(a)	See data.	Complied a)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- ISED: RSS-247 5.4(d)		Complied b)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(e) ----- ISED: RSS-247 5.2(b)		Complied c)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ----- ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	0.7 dB, 2390.0 MHz, AV, Horizontal	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 user manual specifies that EUT is powered off (transmission is stopped) during the charging.

*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 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.

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FCC Part 15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, this 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.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
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

There is no applicable rule of uncertainty in this applied standard. Therefore, the 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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Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.4 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.6 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

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3.5 Test Location

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*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

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

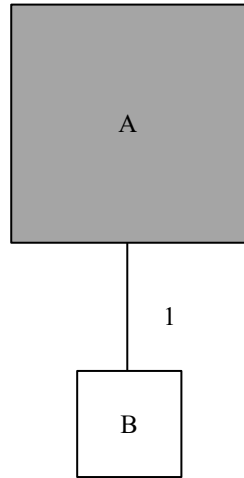
Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	54 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 5, PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 5, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; - Power settings: 11b: 13, 11g: 10, 11n-20: 13, 11n-40: 12 - Software: MFG Tool for IP200H (Date: 2020.03.27 Storage location: Driven by connected PC)	
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Radiated Spurious Emission (Below 1 GHz)	Tx 11n-20 *1)	2437 MHz
Radiated Spurious Emission (Above 1 GHz), 6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth	Tx 11b	2412 MHz
	Tx 11n-20 *2)	2437 MHz
		2462 MHz
	Tx 11n-40	2422 MHz
		2437 MHz
		2452 MHz
Conducted Spurious Emission	Tx 11n-20 *1)	2437 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		
*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest output power.		

4.2 Configuration and peripherals

Radiated Spurious Emission 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	WLAN TRANSCEIVER	IP110H	1	ICOM Incorporated	EUT
B	Microphone	HM-179PI	-	ICOM Incorporated	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Microphone Cable	1.0	Unshielded	Unshielded	-

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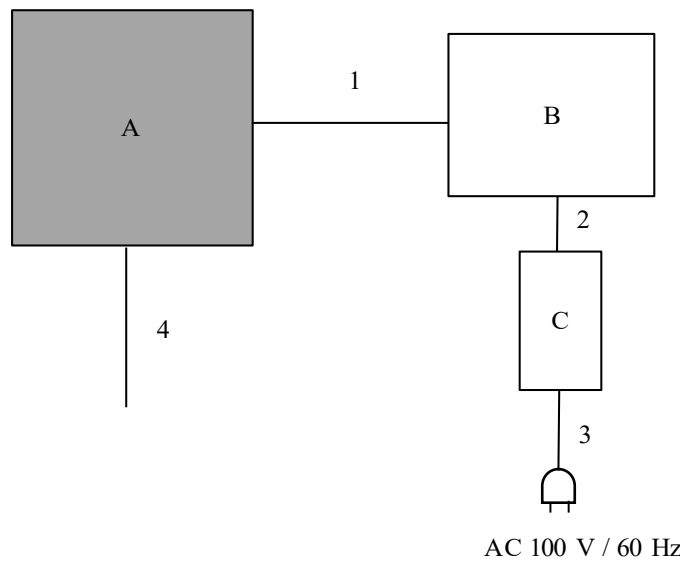
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Antenna Terminal Conducted tests



* 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	WLAN TRANSCEIVER	IP110H	12	ICOM Incorporated	EUT
B	Laptop PC	X1 Carbon	R9-OH8OBW 15/9	Lenovo	-
C	AC Adapter	ADLX45NCC2A	8SSA10E75794C1SG 59R0GHF	Lenovo	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.1	Shielded	Shielded	-
2	DC Cable	1.4	Unshielded	Unshielded	-
3	AC Cable	1.0	Unshielded	Unshielded	-
4	DC Cable	2.3	Unshielded	Unshielded	*1)

*1) This cable is not used for test, and it also doesn't affect the test results.

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 v05r02".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The 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 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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>11.12.2.5.1</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>11.12.2.5.2</u> The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

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

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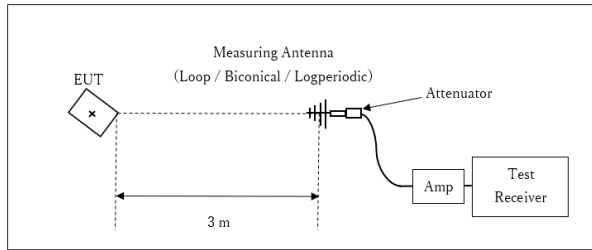
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Figure 2: Test Setup

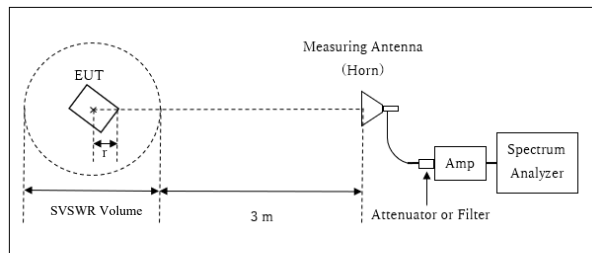
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

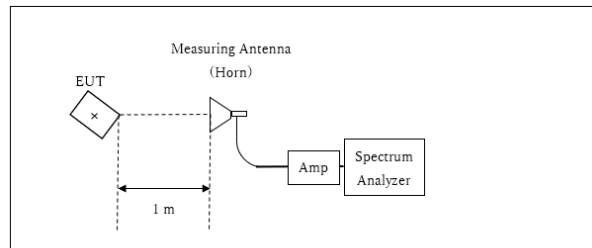


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: $20 \times \log(3.95 \text{ m} / 3.0 \text{ m}) = 2.39 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.95 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.05 m

10 GHz - 26.5 GHz



× : Center of turn table

Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$
*Test Distance: 1 m

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

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				
<p>*1) Peak hold was applied as Worst-case measurement.</p> <p>*2) Reference data</p> <p>*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".</p> <p>*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).</p> <p>*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.</p>							

The test results and limit are rounded off to two decimals place, so some differences might be observed. The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

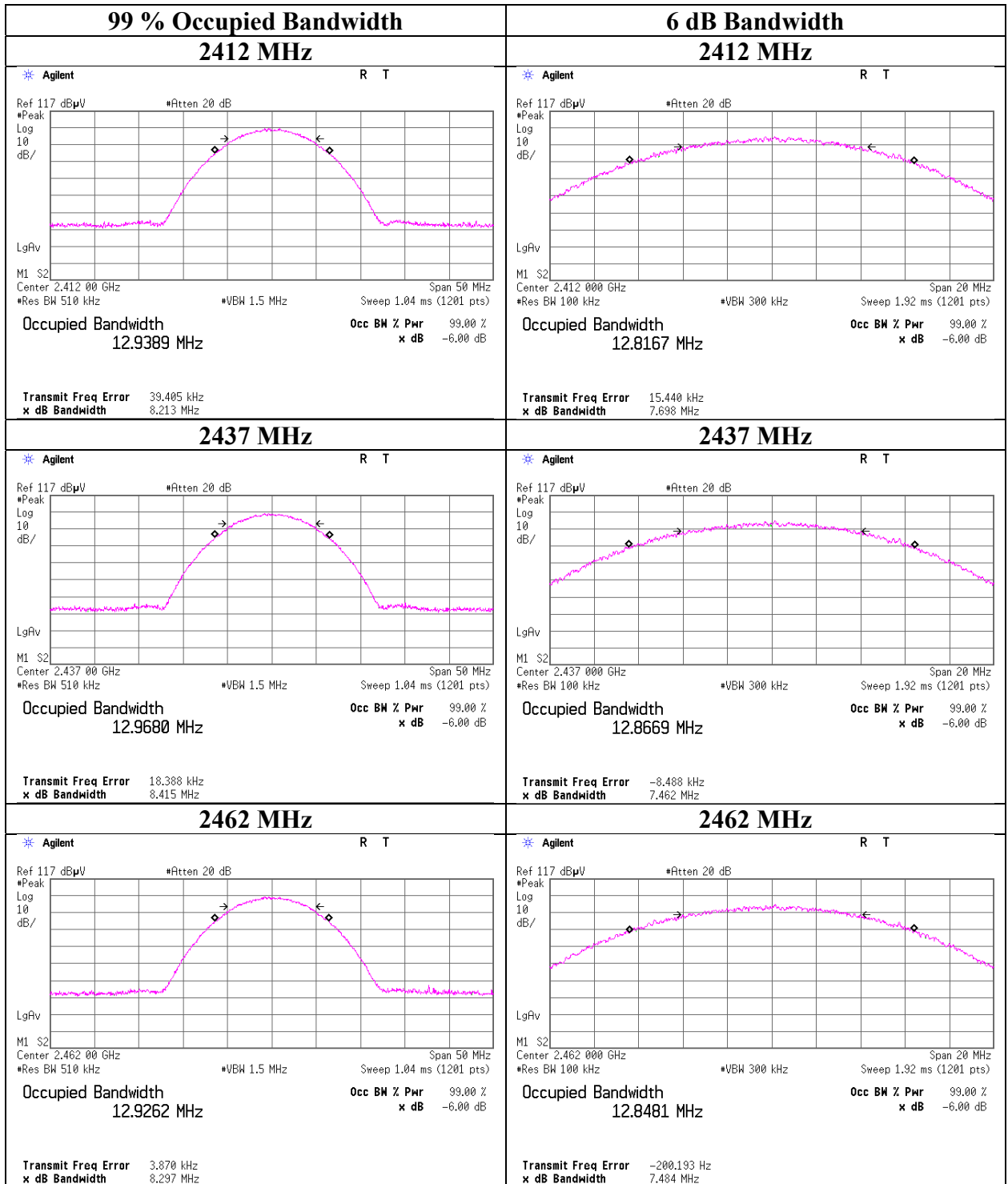
99 % Occupied Bandwidth and 6 dB Bandwidth

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 15, 2021
Temperature / Humidity 24 deg. C / 28 % RH
Engineer Nachi Konegawa
Mode Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
11b	2412	12938.9	7.698	> 0.5000
	2437	12968.0	7.462	> 0.5000
	2462	12926.2	7.484	> 0.5000
11g	2412	17173.3	16.507	> 0.5000
	2437	17245.8	16.493	> 0.5000
	2462	17151.4	16.511	> 0.5000
11n-20	2412	18228.7	17.717	> 0.5000
	2437	18276.9	17.718	> 0.5000
	2462	18267.6	17.716	> 0.5000
11n-40	2422	36937.6	36.485	> 0.5000
	2437	37000.6	36.474	> 0.5000
	2452	36961.3	36.454	> 0.5000

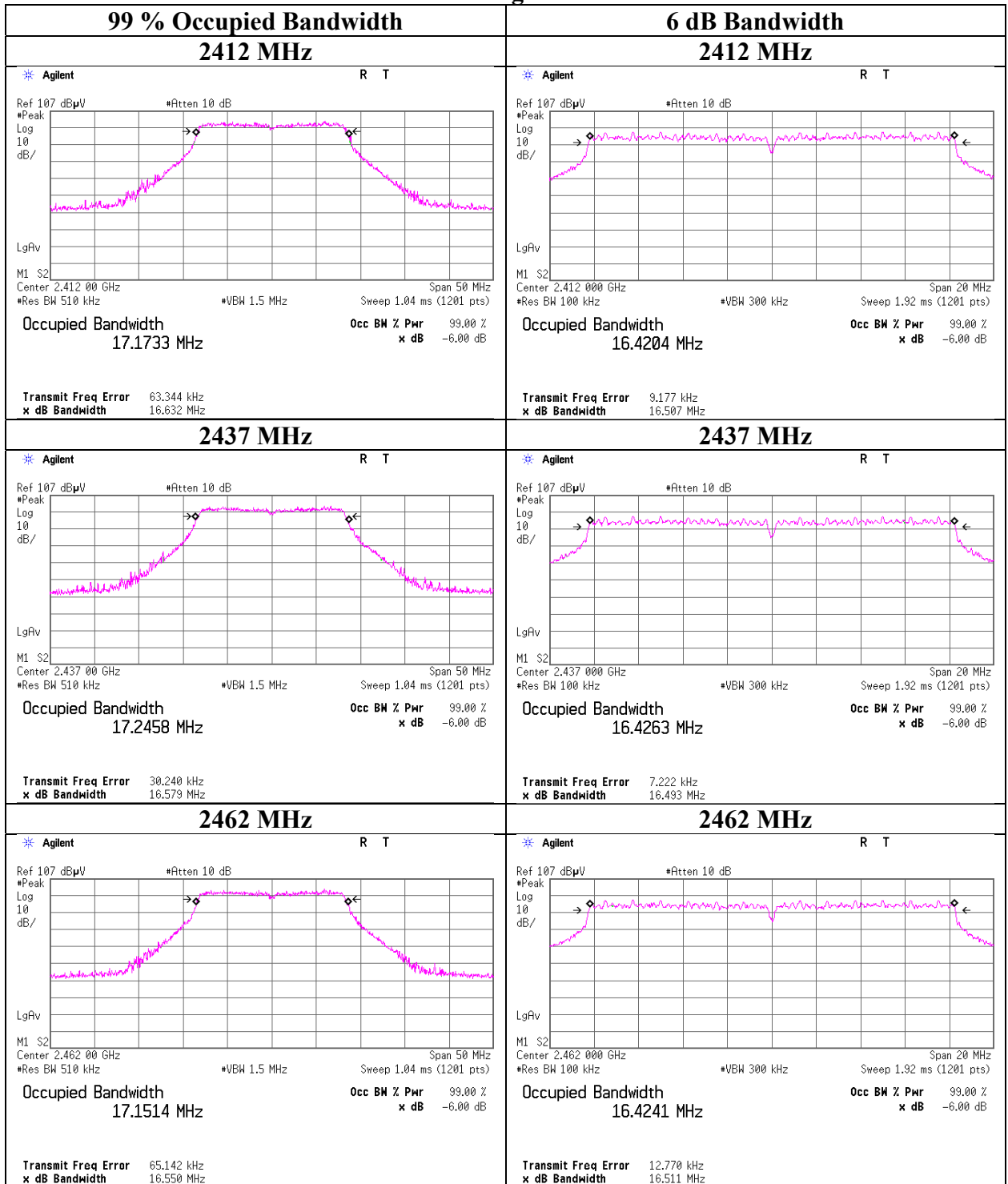
99 % Occupied Bandwidth and 6 dB Bandwidth

11b



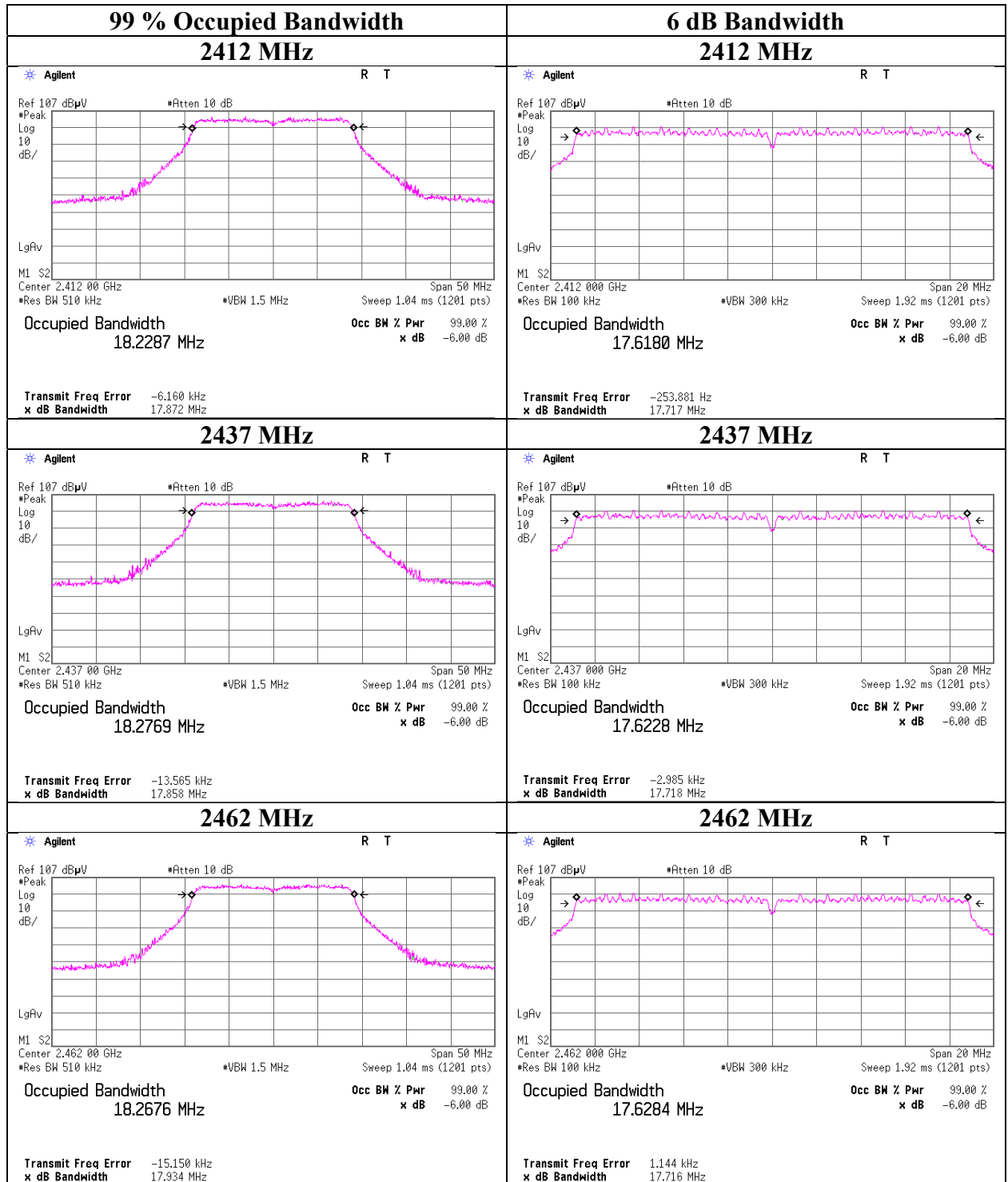
99 % Occupied Bandwidth and 6 dB Bandwidth

11g



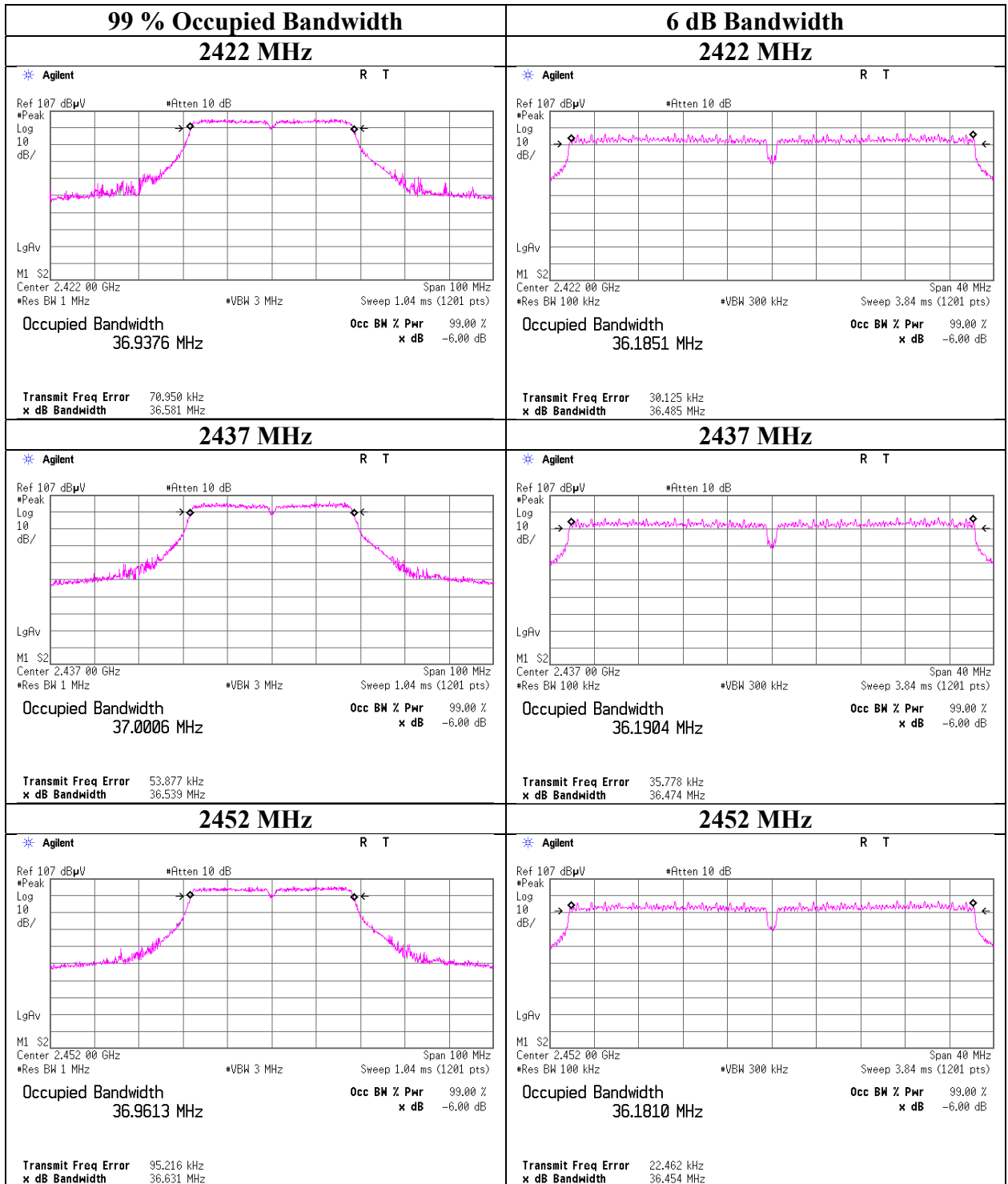
99 % Occupied Bandwidth and 6 dB Bandwidth

11n-20



99 % Occupied Bandwidth and 6 dB Bandwidth

11n-40



Maximum Peak Output Power

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 3, 2021 December 15, 2021
Temperature / Humidity 25 deg. C / 24 % RH 24 deg. C / 28 % RH
Engineer Kiyoshiro Okazaki Nachi Konegawa
Mode Tx 11b

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]	
2412	4.93	1.86	10.04	16.83	48.19	30.00	1000	13.17	1.15	17.98	62.80	36.02	4000	18.04
2437	4.80	1.89	10.04	16.73	47.14	30.00	1000	13.27	1.15	17.88	61.44	36.02	4000	18.14
2462	4.52	1.89	10.04	16.45	44.19	30.00	1000	13.55	1.15	17.60	57.59	36.02	4000	18.42

Sample Calculation:

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

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	3.44	
2	3.45	
5.5	3.44	
11	3.46	*

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 3, 2021 December 15, 2021
Temperature / Humidity 25 deg. C / 24 % RH 24 deg. C / 28 % RH
Engineer Kiyoshiro Okazaki Nachi Konegawa
Mode Tx 11g

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]	
2412	9.07	1.86	10.04	20.97	125.01	30.00	1000	9.03	1.15	22.12	162.91	36.02	4000	13.90
2437	9.12	1.89	10.04	21.05	127.48	30.00	1000	8.95	1.15	22.20	166.12	36.02	4000	13.82
2462	8.64	1.89	10.04	20.57	114.11	30.00	1000	9.43	1.15	21.72	148.71	36.02	4000	14.30

Sample Calculation:

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

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	4.21	
9	4.40	
12	4.38	
18	4.72	
24	7.66	
36	9.19	
48	8.97	
54	10.17	*

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 3, 2021 December 15, 2021
Temperature / Humidity 25 deg. C / 24 % RH 24 deg. C / 28 % RH
Engineer Kiyoshiro Okazaki Nachi Konegawa
Mode Tx 11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]	
2412	11.78	1.86	10.04	23.68	233.31	30.00	1000	6.32	1.15	24.83	304.04	36.02	4000	11.19
2437	11.76	1.89	10.04	23.69	234.12	30.00	1000	6.31	1.15	24.84	305.09	36.02	4000	11.18
2462	11.70	1.89	10.04	23.63	230.85	30.00	1000	6.37	1.15	24.78	300.84	36.02	4000	11.24

Sample Calculation:

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

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
0	8.29	
1	8.24	
2	8.39	
3	12.33	
4	12.54	
5	13.24	*
6	12.32	
7	12.70	

*: Worst Rate

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

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Maximum Peak Output Power

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 3, 2021 December 16, 2021
Temperature / Humidity 25 deg. C / 24 % RH 24 deg. C / 28 % RH
Engineer Kiyoshiro Okazaki Nachi Konegawa
Mode Tx 11n-40

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]	
2422	11.59	1.86	10.04	23.49	223.32	30.00	1000	6.51	1.15	24.64	291.03	36.02	4000	11.38
2437	11.55	1.89	10.04	23.48	223.07	30.00	1000	6.52	1.15	24.63	290.69	36.02	4000	11.39
2452	11.01	1.90	10.04	22.95	197.37	30.00	1000	7.05	1.15	24.10	257.21	36.02	4000	11.92

Sample Calculation:

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

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
0	7.69	
1	7.56	
2	7.37	
3	11.74	
4	11.86	
5	12.77	*
6	12.13	
7	12.03	

*: Worst Rate

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

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Average Output Power
(Reference data for SAR testing)

Report No.	14118411H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	December 15, 2021
Temperature / Humidity	24 deg. C / 28 % RH
Engineer	Nachi Konegawa
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	2.16	1.86	10.04	14.06	25.46	0.03	14.09	25.64
2437	2.15	1.89	10.04	14.08	25.61	0.03	14.11	25.79
2462	2.00	1.89	10.04	13.93	24.74	0.03	13.96	24.91

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	-1.31	1.86	10.04	10.59	11.45	0.24	10.83	12.10
2437	-1.39	1.89	10.04	10.54	11.34	0.24	10.78	11.98
2462	-1.52	1.89	10.04	10.41	11.00	0.24	10.65	11.62

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	1.23	1.86	10.04	13.13	20.56	0.36	13.49	22.33
2437	1.30	1.89	10.04	13.23	21.06	0.36	13.59	22.88
2462	1.14	1.89	10.04	13.07	20.29	0.36	13.43	22.05

11n-40 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]
2422	-0.01	1.86	10.04	11.89	15.45	0.46	12.35	17.18
2437	0.01	1.89	10.04	11.94	15.65	0.46	12.40	17.40
2452	-0.02	1.90	10.04	11.92	15.57	0.46	12.38	17.31

Sample Calculation:

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

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

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

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Ise EMC Lab.

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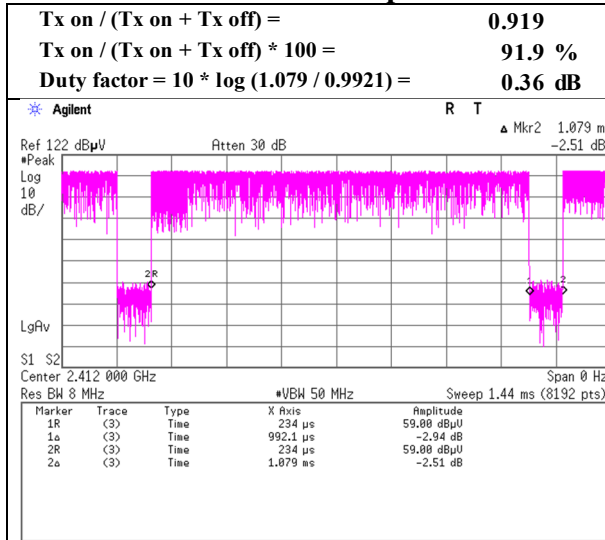
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

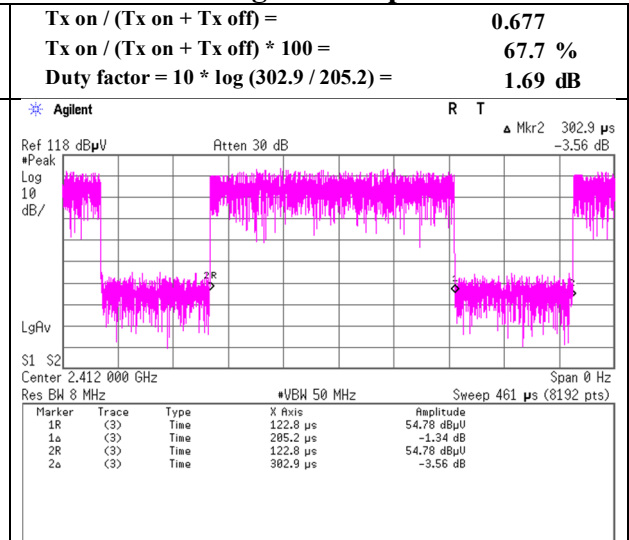
Burst rate confirmation

Report No. 14118411H
Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Date December 6, 2021
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Takafumi Noguchi
Mode Tx

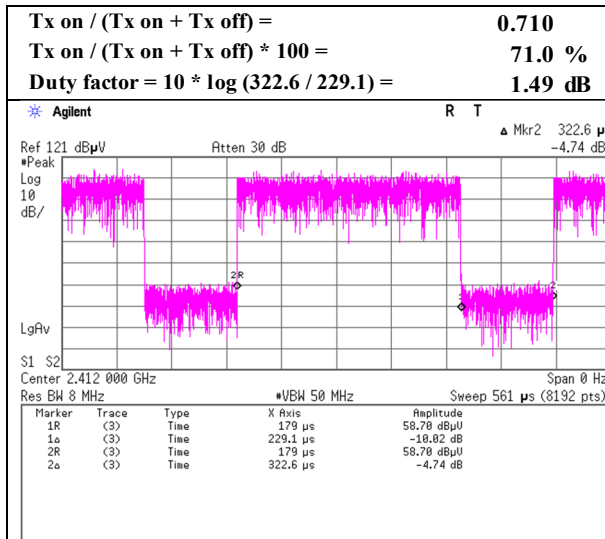
11b 11 Mbps



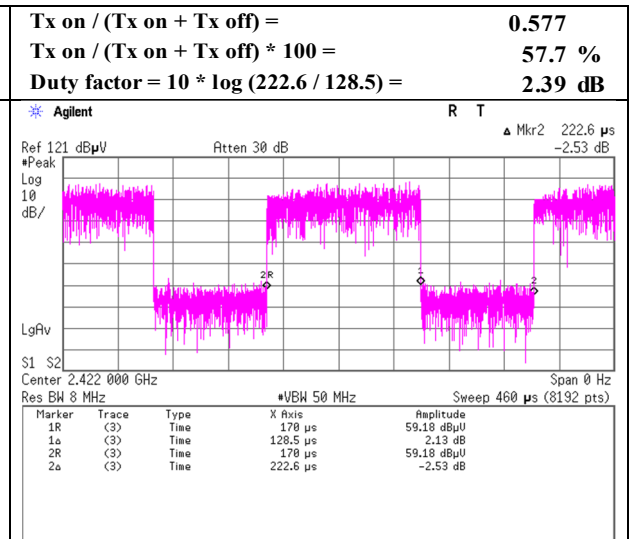
11g 54 Mbps



11n-20 MCS 5



11n-40 MCS 5



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

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Ise EMC Lab.

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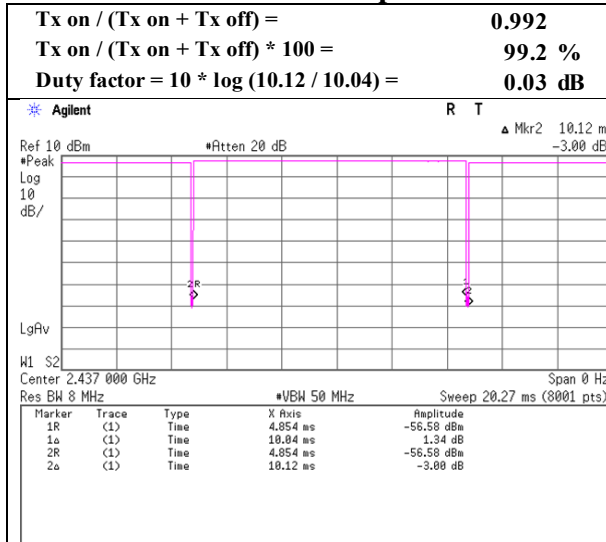
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

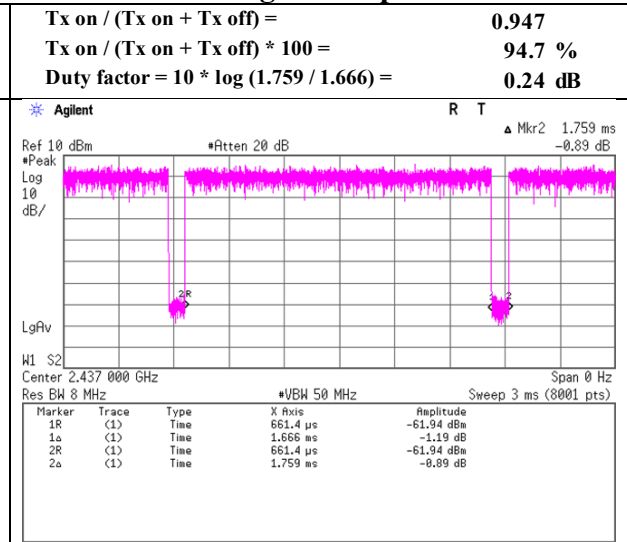
Burst rate confirmation

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 15, 2021
Temperature / Humidity 24 deg. C / 28 % RH
Engineer Nachi Konegawa
Mode Tx

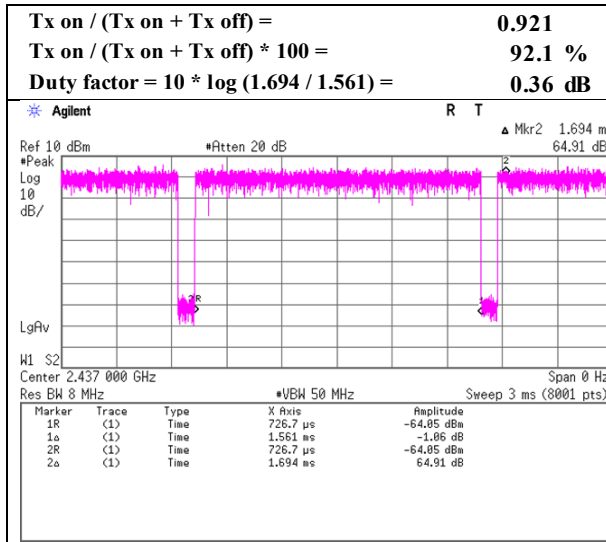
11b 1 Mbps



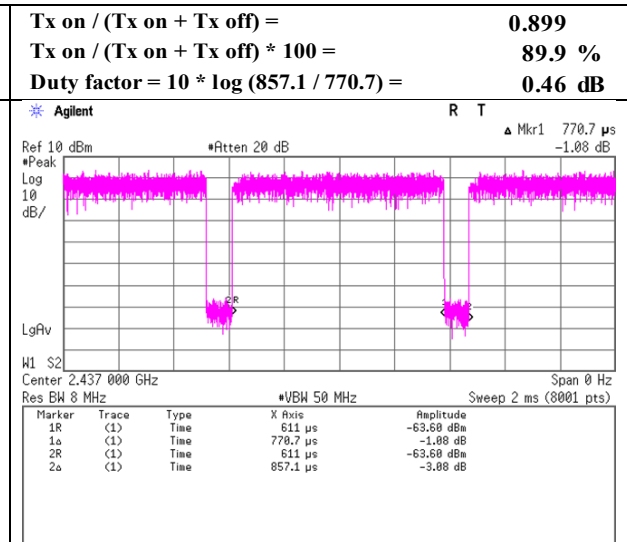
11g 6 Mbps



11n-20 MCS 0



11n-40 MCS 0



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

Radiated Spurious Emission

Report No.	14118411H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	December 6, 2021	December 9, 2021
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takumi Nishida (10 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2390.0	53.5	44.0	27.6	4.9	32.6	0.4	53.5	44.3	73.9	53.9	20.5	9.6	*1)
Hori.	4824.0	40.7	32.3	31.5	6.9	31.6	-	47.4	39.1	73.9	53.9	26.5	14.8	Floor noise
Hori.	7236.0	42.1	33.9	35.8	8.0	32.6	-	53.2	45.0	73.9	53.9	20.7	8.9	Floor noise
Hori.	9648.0	42.0	32.8	38.8	8.8	33.0	-	56.6	47.3	73.9	53.9	17.4	6.6	Floor noise
Vert.	2390.0	52.7	43.5	27.6	4.9	32.6	0.4	52.6	43.7	73.9	53.9	21.3	10.2	*1)
Vert.	4824.0	40.7	32.3	31.5	6.9	31.6	-	47.4	39.1	73.9	53.9	26.5	14.8	Floor noise
Vert.	7236.0	42.1	33.9	35.8	8.0	32.6	-	53.2	45.0	73.9	53.9	20.7	8.9	Floor noise
Vert.	9648.0	42.0	32.8	38.8	8.8	33.0	-	56.6	47.3	73.9	53.9	17.4	6.6	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	102.9	27.5	4.9	32.6	102.8	-	-	Carrier
Hori.	2400.0	47.3	27.5	4.9	32.6	47.2	82.8	35.6	
Vert.	2412.0	101.7	27.5	4.9	32.6	101.6	-	-	Carrier
Vert.	2400.0	46.3	27.5	4.9	32.6	46.2	81.6	35.4	

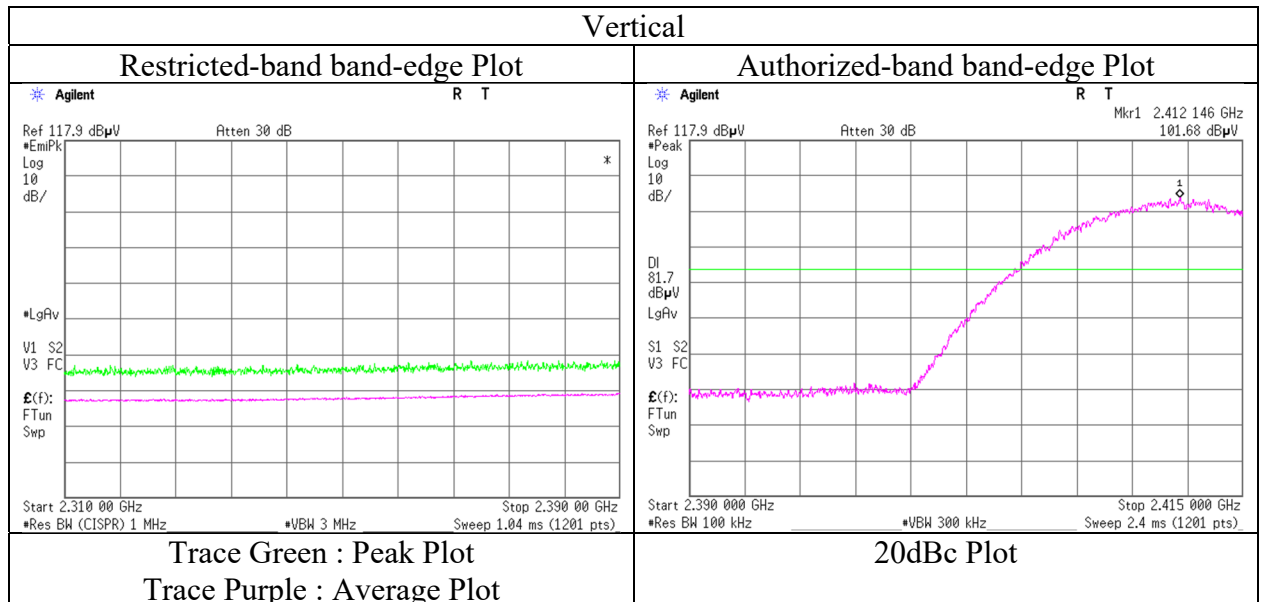
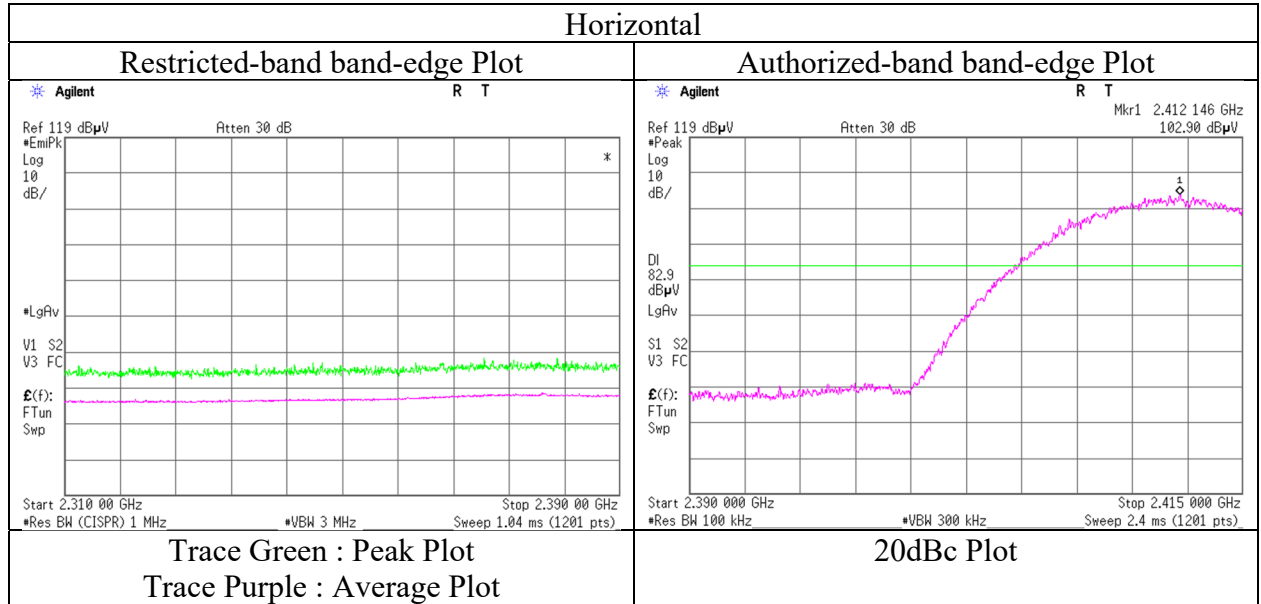
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 6, 2021
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 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.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	
Date	December 6, 2021	December 9, 2021	
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH	
Engineer	Takafumi Noguchi	Takumi Nishida	
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	
Mode	Tx 11b 2437 MHz		

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	4874.0	40.7	32.4	31.5	6.9	31.6	-	47.5	39.2	73.9	53.9	26.5	14.8	Floor noise
Hori.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.6	8.8	Floor noise
Hori.	9748.0	42.0	32.9	39.1	8.8	33.1	-	56.9	47.7	73.9	53.9	17.1	6.2	Floor noise
Vert.	4874.0	40.7	32.4	31.5	6.9	31.6	-	47.5	39.2	73.9	53.9	26.5	14.8	Floor noise
Vert.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.6	8.8	Floor noise
Vert.	9748.0	42.0	32.9	39.1	8.8	33.1	-	56.9	47.7	73.9	53.9	17.1	6.2	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No.	14118411H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	December 7, 2021	December 9, 2021
Temperature / Humidity	20 deg. C / 43 % RH	24 deg. C / 43 % RH
Engineer	Hiroki Numata	Takumi Nishida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx 11b 2462 MHz	

Polarity	Frequency	Reading	Reading	Ant.	Loss	Gain	Duty	Result	Result	Limit	Limit	Margin	Margin	Remark
[Hori/Vert]	[MHz]	(QP / PK)	(AV)	Factor	[dB]	[dB]	Factor	(QP / PK)	(AV)	(QP / PK)	(AV)	(QP / PK)	(AV)	
		[dBuV]	[dBuV]	[dB/m]			[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	54.2	46.1	27.4	5.0	32.5	0.4	54.1	46.3	73.9	53.9	19.8	7.6	*1)
Hori.	4924.0	40.4	32.3	31.6	7.8	31.6	-	48.3	40.1	73.9	53.9	25.7	13.8	Floor noise
Hori.	7386.0	41.4	33.9	36.0	9.3	32.7	-	54.1	46.6	73.9	53.9	19.8	7.3	Floor noise
Hori.	9848.0	40.7	31.9	39.2	9.9	33.1	-	56.6	47.8	73.9	53.9	17.3	6.1	Floor noise
Vert.	2483.5	50.6	40.7	27.4	5.0	32.5	0.4	50.5	40.9	73.9	53.9	23.4	13.0	*1)
Vert.	4924.0	40.1	32.3	31.6	7.8	31.6	-	47.9	40.1	73.9	53.9	26.0	13.8	Floor noise
Vert.	7386.0	41.5	34.0	36.0	9.3	32.7	-	54.2	46.7	73.9	53.9	19.7	7.2	Floor noise
Vert.	9848.0	40.6	31.8	39.2	9.9	33.1	-	56.6	47.8	73.9	53.9	17.3	6.1	Floor noise

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

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

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

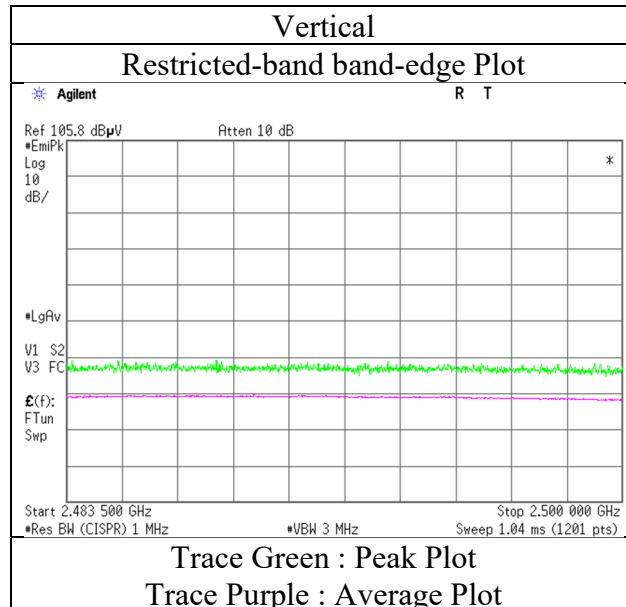
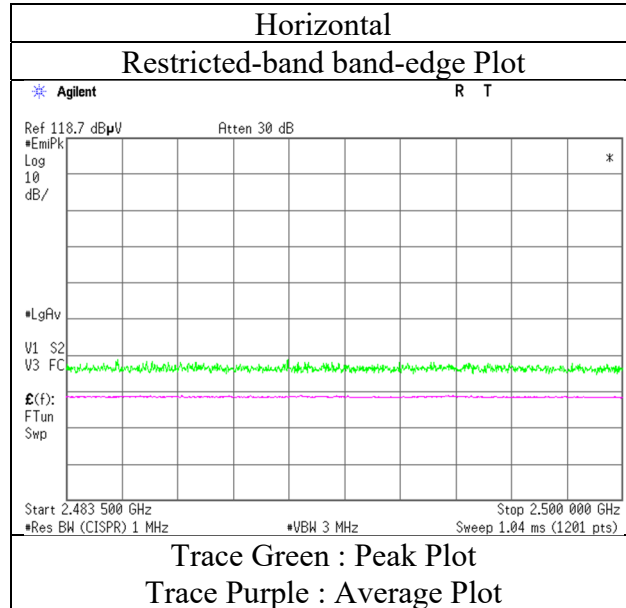
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 7, 2021
Temperature / Humidity 20 deg. C / 43 % RH
Engineer Hiroki Numata
(1 GHz - 10 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.	14118411H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	December 6, 2021	December 9, 2021
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH
Engineer	Takafumi Noguchi	Takumi Nishida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx 11n-20 2412 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2390.0	60.5	49.3	27.6	4.9	32.6	1.5	60.4	50.7	73.9	53.9	13.5	3.2	*1)
Hori.	4824.0	40.7	32.3	31.5	6.9	31.6	-	47.5	39.1	73.9	53.9	26.4	14.8	Floor noise
Hori.	7236.0	42.2	34.0	35.8	8.0	32.6	-	53.3	45.1	73.9	53.9	20.6	8.8	Floor noise
Hori.	9648.0	42.2	32.9	38.8	8.8	33.0	-	56.8	47.4	73.9	53.9	17.1	6.5	Floor noise
Vert.	2390.0	61.3	49.0	27.6	4.9	32.6	1.5	61.2	50.4	73.9	53.9	12.7	3.5	*1)
Vert.	4824.0	40.7	32.3	31.5	6.9	31.6	-	47.5	39.1	73.9	53.9	26.4	14.8	Floor noise
Vert.	7236.0	42.2	34.0	35.8	8.0	32.6	-	53.3	45.1	73.9	53.9	20.6	8.8	Floor noise
Vert.	9648.0	42.2	32.9	38.8	8.8	33.0	-	56.8	47.4	73.9	53.9	17.1	6.5	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.0	98.6	27.5	4.9	32.6	98.4	-	-	Carrier
Hori.	2400.0	64.4	27.5	4.9	32.6	64.2	78.4	14.2	
Vert.	2412.0	97.0	27.5	4.9	32.6	96.8	-	-	Carrier
Vert.	2400.0	63.0	27.5	4.9	32.6	62.9	76.8	13.9	

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

Distance factor: 1 GHz - 10 GHz 20log(3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

UL Japan, Inc.

Ise EMC Lab.

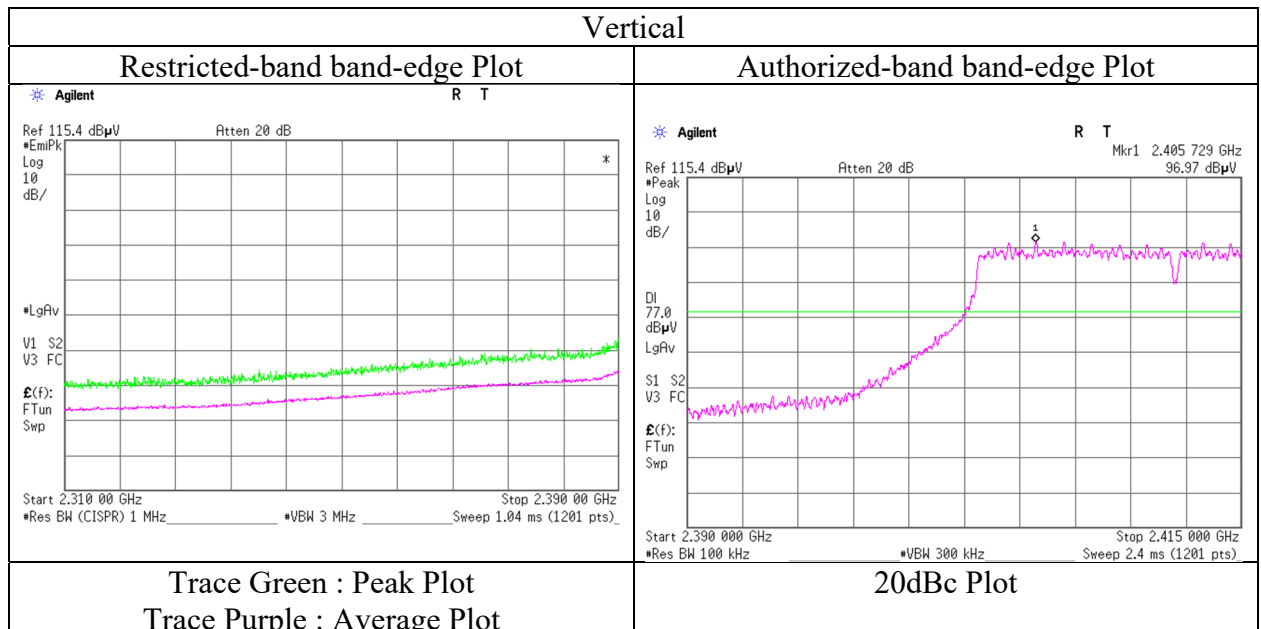
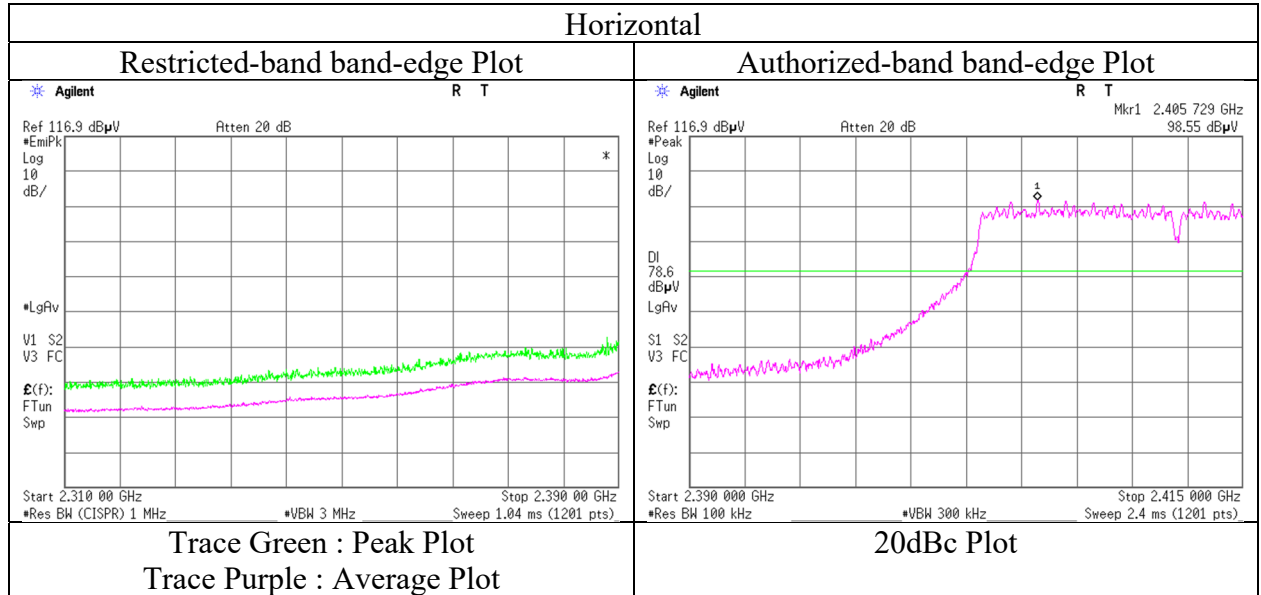
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 6, 2021
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11n-20 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.

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Report No.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.4
Date	December 6, 2021	December 9, 2021	December 18, 2021
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH	21 deg. C / 38 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takumi Nishida (10 GHz - 26.5 GHz)	Nachi Konegawa (Below 1 GHz)
Mode	Tx 11n-20 2437 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	34.7	22.1	-	16.9	7.1	32.0	-	14.0	-	40.0	-	26.0	-	Floor noise
Hori.	46.2	22.5	-	12.6	7.3	32.0	-	10.3	-	40.0	-	29.7	-	Floor noise
Hori.	159.7	22.7	-	15.4	8.4	32.0	-	14.6	-	43.5	-	28.9	-	Floor noise
Hori.	348.4	22.8	-	15.2	9.7	31.9	-	15.9	-	46.0	-	30.1	-	Floor noise
Hori.	500.0	26.7	-	18.0	10.7	32.0	-	23.4	-	46.0	-	22.6	-	
Hori.	756.3	21.8	-	20.4	11.7	31.9	-	22.0	-	46.0	-	24.0	-	Floor noise
Hori.	4874.0	40.6	32.3	31.5	6.9	31.6	-	47.4	39.1	73.9	53.9	26.5	14.8	Floor noise
Hori.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.5	8.8	Floor noise
Hori.	9748.0	42.3	32.9	39.1	8.8	33.1	-	57.2	47.7	73.9	53.9	16.8	6.2	Floor noise
Vert.	34.7	22.0	-	16.9	7.1	32.0	-	13.9	-	40.0	-	26.1	-	Floor noise
Vert.	46.2	22.5	-	12.6	7.3	32.0	-	10.3	-	40.0	-	29.7	-	Floor noise
Vert.	159.7	22.8	-	15.4	8.4	32.0	-	14.7	-	43.5	-	28.8	-	Floor noise
Vert.	348.4	22.9	-	15.2	9.7	31.9	-	16.0	-	46.0	-	30.0	-	Floor noise
Vert.	500.0	28.8	-	18.0	10.7	32.0	-	25.5	-	46.0	-	20.5	-	
Vert.	756.3	21.7	-	20.4	11.7	31.9	-	21.9	-	46.0	-	24.1	-	Floor noise
Vert.	4874.0	40.6	32.3	31.5	6.9	31.6	-	47.4	39.1	73.9	53.9	26.5	14.8	Floor noise
Vert.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.5	8.8	Floor noise
Vert.	9748.0	42.3	32.9	39.1	8.8	33.1	-	57.2	47.7	73.9	53.9	16.8	6.2	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log(3.95 m / 3.0 m) = 2.39 dB
 10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	
Date	December 7, 2021	December 9, 2021	
Temperature / Humidity	20 deg. C / 43 % RH	24 deg. C / 43 % RH	
Engineer	Hiroki Numata	Takumi Nishida	
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	
Mode	Tx 11n-20 2462 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	59.9	48.9	27.4	5.6	32.5	1.5	60.3	50.8	73.9	53.9	13.6	3.1	*1)
Hori.	4924.0	40.9	32.3	31.6	7.8	31.6	-	48.7	40.1	73.9	53.9	25.2	13.8	Floor noise
Hori.	7386.0	41.3	33.8	36.0	9.3	32.7	-	54.0	46.5	73.9	53.9	19.9	7.5	Floor noise
Hori.	9848.0	40.7	31.9	39.2	9.9	33.1	-	56.6	47.8	73.9	53.9	17.3	6.1	Floor noise
Vert.	2483.5	55.9	46.0	27.4	5.6	32.5	1.5	56.3	47.9	73.9	53.9	17.6	6.0	*1)
Vert.	4924.0	40.4	32.3	31.6	7.8	31.6	-	48.3	40.1	73.9	53.9	25.7	13.8	Floor noise
Vert.	7386.0	41.4	33.8	36.0	9.3	32.7	-	54.1	46.5	73.9	53.9	19.8	7.4	Floor noise
Vert.	9848.0	40.2	31.9	39.2	9.9	33.1	-	56.2	47.8	73.9	53.9	17.7	6.1	Floor noise

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

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

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

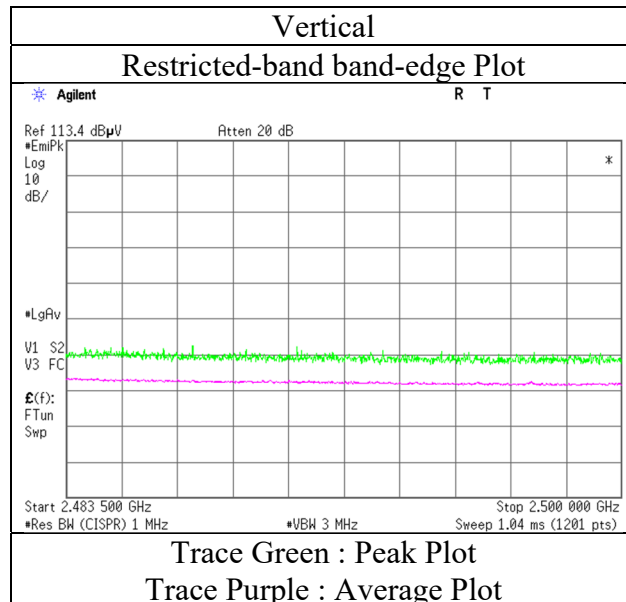
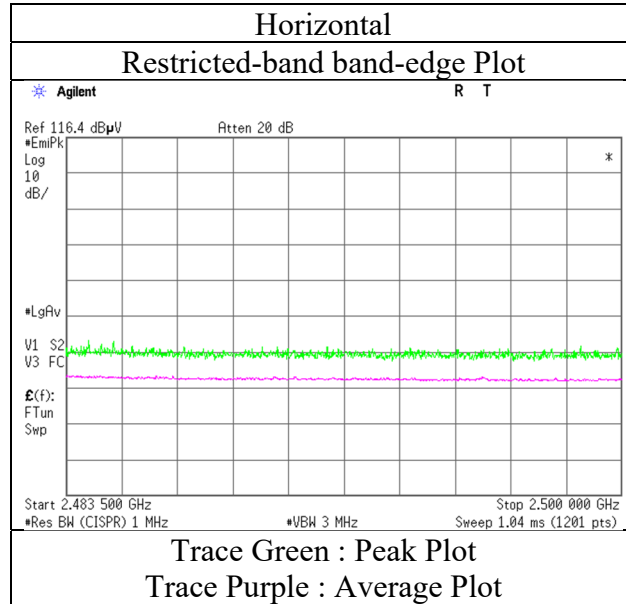
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 7, 2021
Temperature / Humidity 20 deg. C / 43 % RH
Engineer Hiroki Numata
(1 GHz - 10 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

Report No.	14118411H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	December 6, 2021	December 9, 2021
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH
Engineer	Takafumi Noguchi	Takumi Nishida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx 11n-40 2422 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2390.0	62.6	50.9	27.6	4.9	32.6	2.4	62.5	53.2	73.9	53.9	11.4	0.7	*1)
Hori.	4844.0	40.8	32.4	31.5	6.9	31.6	-	47.6	39.1	73.9	53.9	26.3	14.8	Floor noise
Hori.	7266.0	42.2	34.2	35.8	8.0	32.6	-	53.4	45.3	73.9	53.9	20.6	8.6	Floor noise
Hori.	9688.0	42.2	32.9	39.0	8.8	33.1	-	56.9	47.6	73.9	53.9	17.0	6.3	Floor noise
Vert.	2390.0	61.7	50.3	27.6	4.9	32.6	2.4	61.6	52.6	73.9	53.9	12.3	1.3	*1)
Vert.	4844.0	40.8	32.4	31.5	6.9	31.6	-	47.6	39.1	73.9	53.9	26.3	14.8	Floor noise
Vert.	7266.0	42.2	34.2	35.8	8.0	32.6	-	53.4	45.3	73.9	53.9	20.6	8.6	Floor noise
Vert.	9688.0	42.2	32.9	39.0	8.8	33.1	-	56.9	47.6	73.9	53.9	17.0	6.3	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.0	94.2	27.5	4.9	32.6	94.1	-	-	Carrier
Hori.	2400.0	62.4	27.5	4.9	32.6	62.3	74.1	11.7	
Vert.	2422.0	93.2	27.5	4.9	32.6	93.0	-	-	Carrier
Vert.	2400.0	61.6	27.5	4.9	32.6	61.5	73.0	11.5	

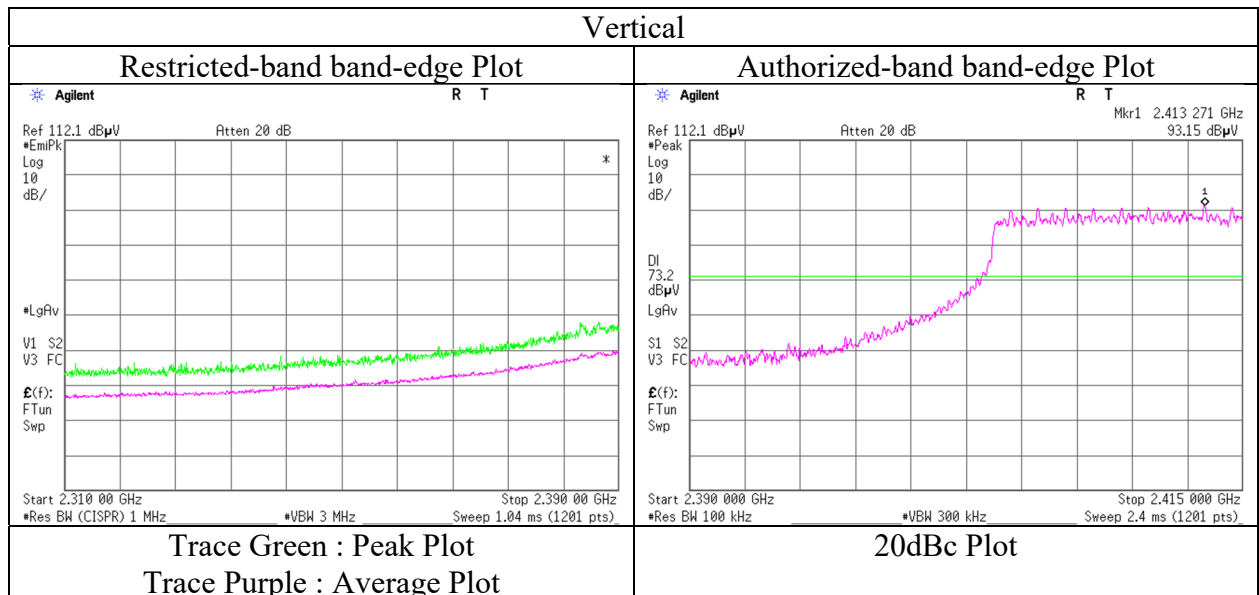
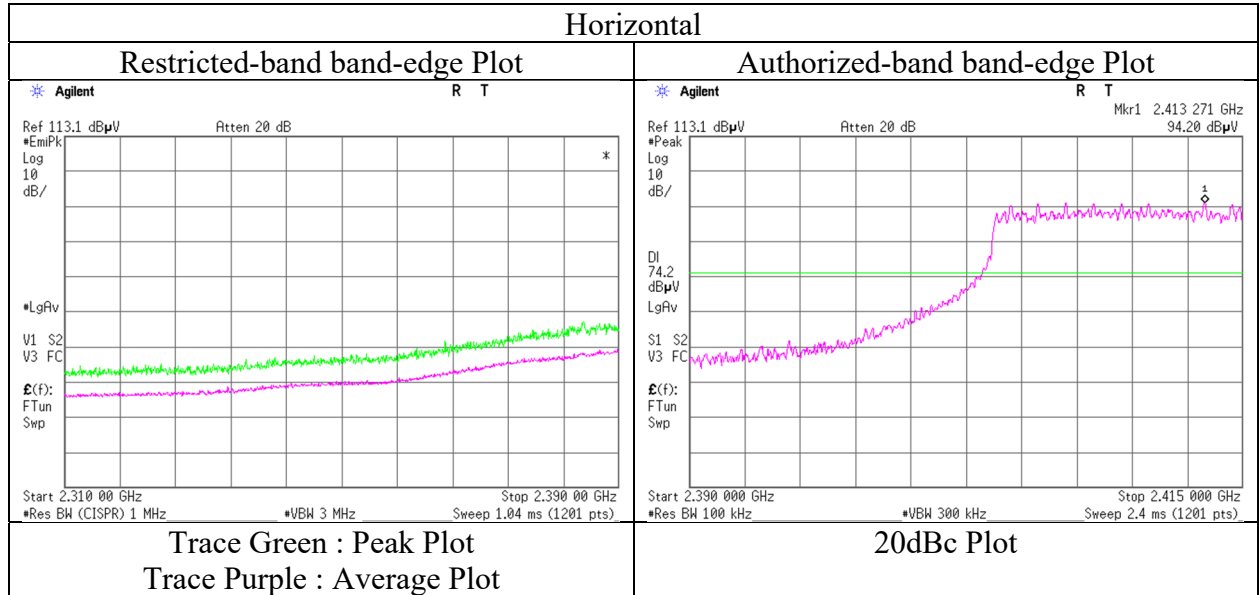
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log(3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 6, 2021
Temperature / Humidity 21 deg. C / 41 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11n-40 2422 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.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	
Date	December 6, 2021	December 9, 2021	
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH	
Engineer	Takafumi Noguchi	Takumi Nishida	
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	
Mode	Tx 11n-40 2437 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	4874.0	40.6	32.4	31.5	6.9	31.6	-	47.4	39.2	73.9	53.9	26.5	14.7	Floor noise
Hori.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.5	8.8	Floor noise
Hori.	9748.0	42.4	32.9	39.1	8.8	33.1	-	57.2	47.7	73.9	53.9	16.7	6.2	Floor noise
Vert.	4874.0	40.6	32.4	31.5	6.9	31.6	-	47.4	39.2	73.9	53.9	26.5	14.7	Floor noise
Vert.	7311.0	42.2	33.9	35.9	8.0	32.7	-	53.4	45.1	73.9	53.9	20.5	8.8	Floor noise
Vert.	9748.0	42.4	32.9	39.1	8.8	33.1	-	57.2	47.7	73.9	53.9	16.7	6.2	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	
Date	December 7, 2021	December 9, 2021	
Temperature / Humidity	20 deg. C / 43 % RH	24 deg. C / 43 % RH	
Engineer	Hiroki Numata	Takumi Nishida	
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	
Mode	Tx 11n-40 2452 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	62.0	48.3	27.4	5.6	32.5	2.4	62.5	51.1	73.9	53.9	11.4	2.8	*1)
Hori.	4904.0	40.9	32.3	31.6	7.8	31.6	-	48.7	40.1	73.9	53.9	25.3	13.8	Floor noise
Hori.	7356.0	41.4	33.7	36.0	9.3	32.7	-	54.0	46.4	73.9	53.9	19.9	7.5	Floor noise
Hori.	9808.0	40.8	31.9	39.2	9.9	33.1	-	56.8	47.9	73.9	53.9	17.2	6.0	Floor noise
Vert.	2483.5	59.9	46.1	27.4	5.6	32.5	2.4	60.3	49.0	73.9	53.9	13.6	4.9	*1)
Vert.	4904.0	40.3	32.4	31.6	7.8	31.6	-	48.1	40.2	73.9	53.9	25.8	13.7	Floor noise
Vert.	7356.0	41.4	33.6	36.0	9.3	32.7	-	54.1	46.3	73.9	53.9	19.8	7.6	Floor noise
Vert.	9808.0	40.5	31.9	39.2	9.9	33.1	-	56.4	47.9	73.9	53.9	17.5	6.1	Floor noise

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

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

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

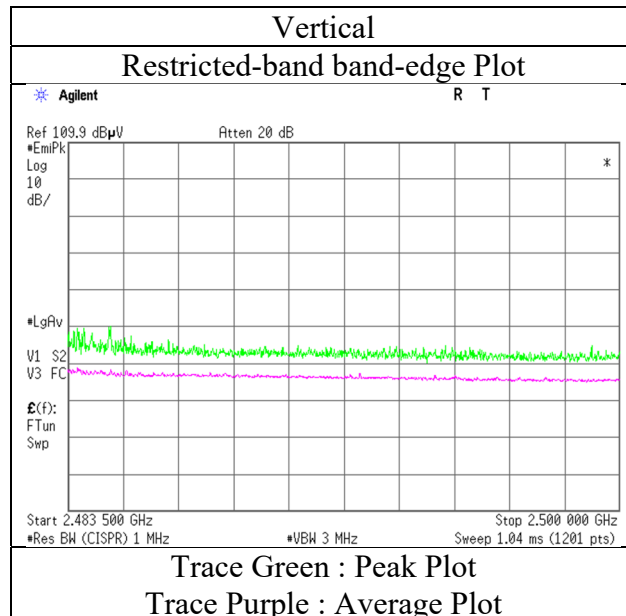
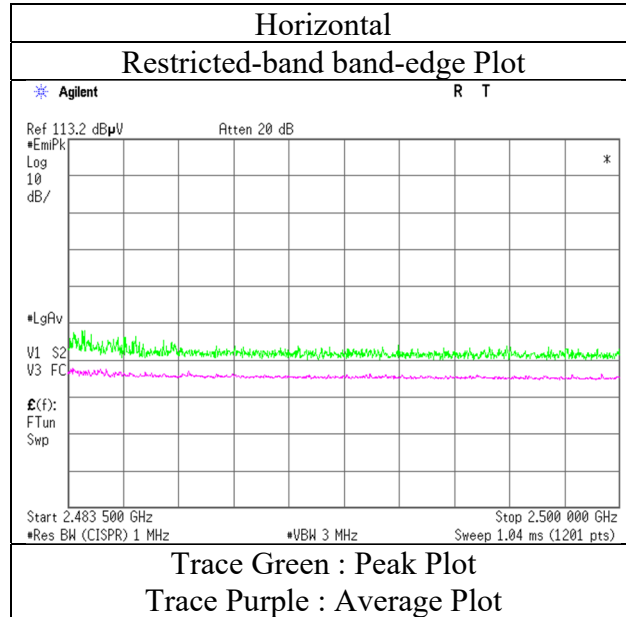
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

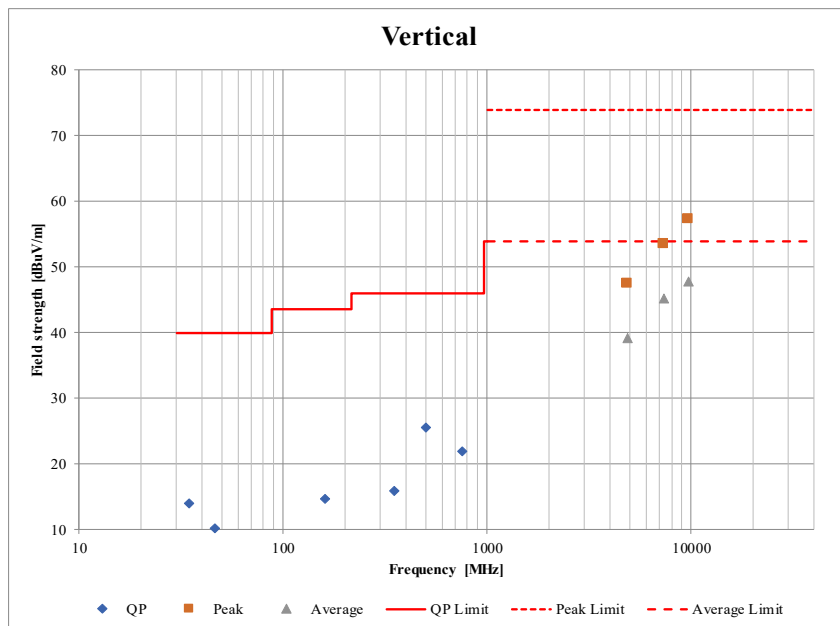
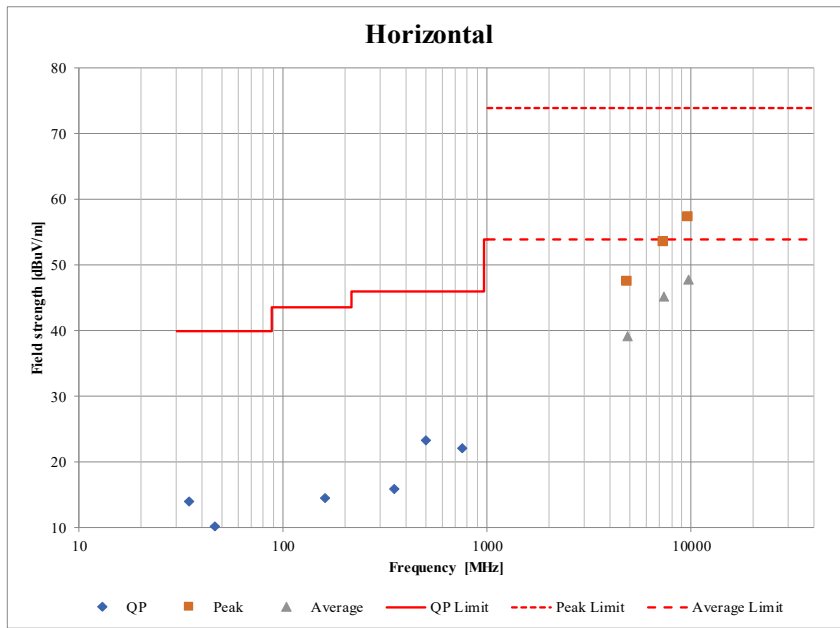
Report No. 14118411H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date December 7, 2021
Temperature / Humidity 20 deg. C / 43 % RH
Engineer Hiroki Numata
(1 GHz - 10 GHz)
Mode Tx 11n-40 2452 MHz



* 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 mode for Maximum Peak Output Power)

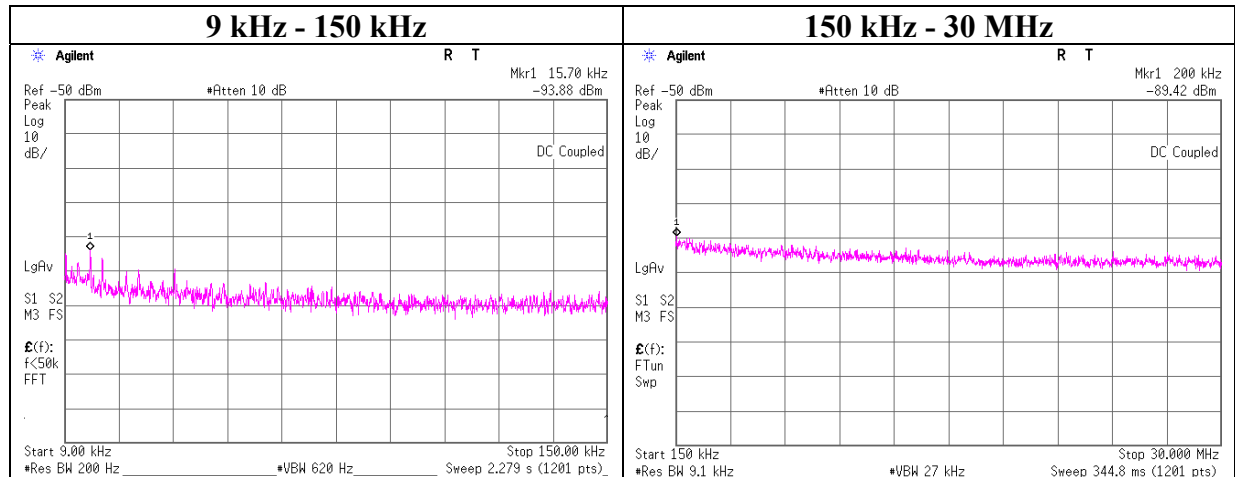
Report No.	14118411H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.4
Date	December 6, 2021	December 9, 2021	December 18, 2021
Temperature / Humidity	21 deg. C / 41 % RH	24 deg. C / 43 % RH	21 deg. C / 38 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takumi Nishida (10 GHz - 26.5 GHz)	Nachi Konegawa (Below 1 GHz)
Mode	Tx 11n-20 2437 MHz		



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

Conducted Spurious Emission

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 15, 2021
Temperature / Humidity 24 deg. C / 28 % RH
Engineer Nachi Konegawa
Mode Tx 11n-20 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
15.70	-93.9	0.08	9.8	2.0	1	-82.0	300	6.0	-20.7	43.6	64.3	
200.00	-89.4	0.34	9.9	2.0	1	-77.2	300	6.0	-16.0	21.5	37.5	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Power Density

Report No. 14118411H
Test place Ise EMC Lab. No.6 Measurement Room
Date December 15, 2021 January 20, 2022 March 15, 2022
Temperature / Humidity 24 deg. C / 28 % RH 24 deg. C / 40 % RH 25 deg. C / 30 % RH
Engineer Nachi Konegawa Nachi Konegawa Nachi Konegawa
Mode Tx

11b

Freq. [MHz]	Reading dBm / 3 kHz	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-15.09	2.16	10.02	-2.91	8.00	10.91
2437	-14.45	2.19	10.02	-2.24	8.00	10.24
2462	-15.38	2.20	10.02	-3.16	8.00	11.16

11g

Freq. [MHz]	Reading dBm / 3 kHz	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-26.78	2.16	10.02	-14.60	8.00	22.60
2437	-27.68	2.19	10.02	-15.47	8.00	23.47
2462	-26.75	2.20	10.02	-14.53	8.00	22.53

11n-20

Freq. [MHz]	Reading dBm / 3 kHz	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-24.56	2.16	10.02	-12.38	8.00	20.38
2437	-23.62	2.19	10.02	-11.41	8.00	19.41
2462	-22.61	2.20	10.02	-10.39	8.00	18.39

11n-40

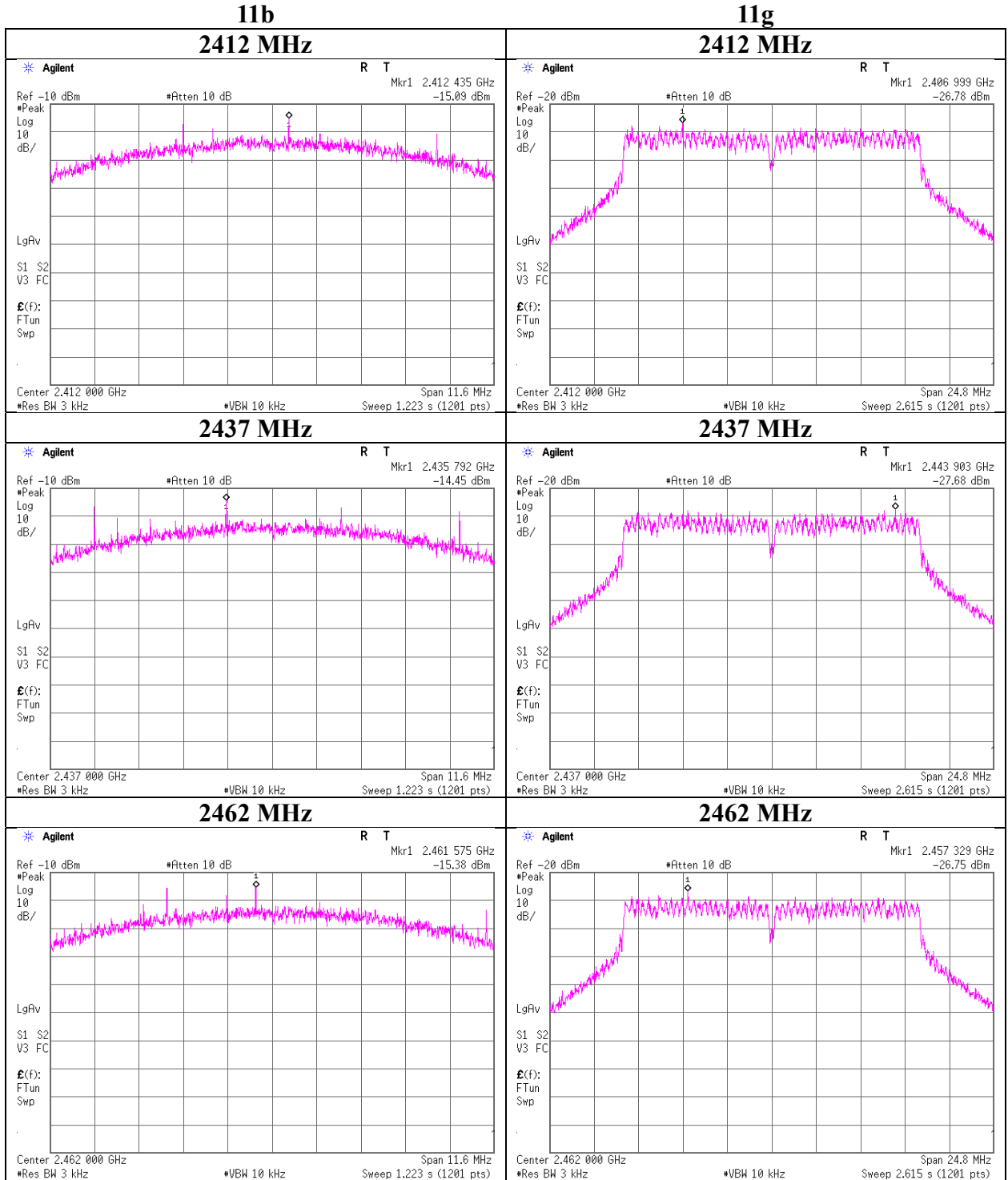
Freq. [MHz]	Reading dBm / 3 kHz	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2422	-28.42	2.16	10.02	-16.24	8.00	24.24
2437	-29.50	2.19	10.02	-17.29	8.00	25.29
2452	-29.30	2.20	10.02	-17.08	8.00	25.08

Sample Calculation:

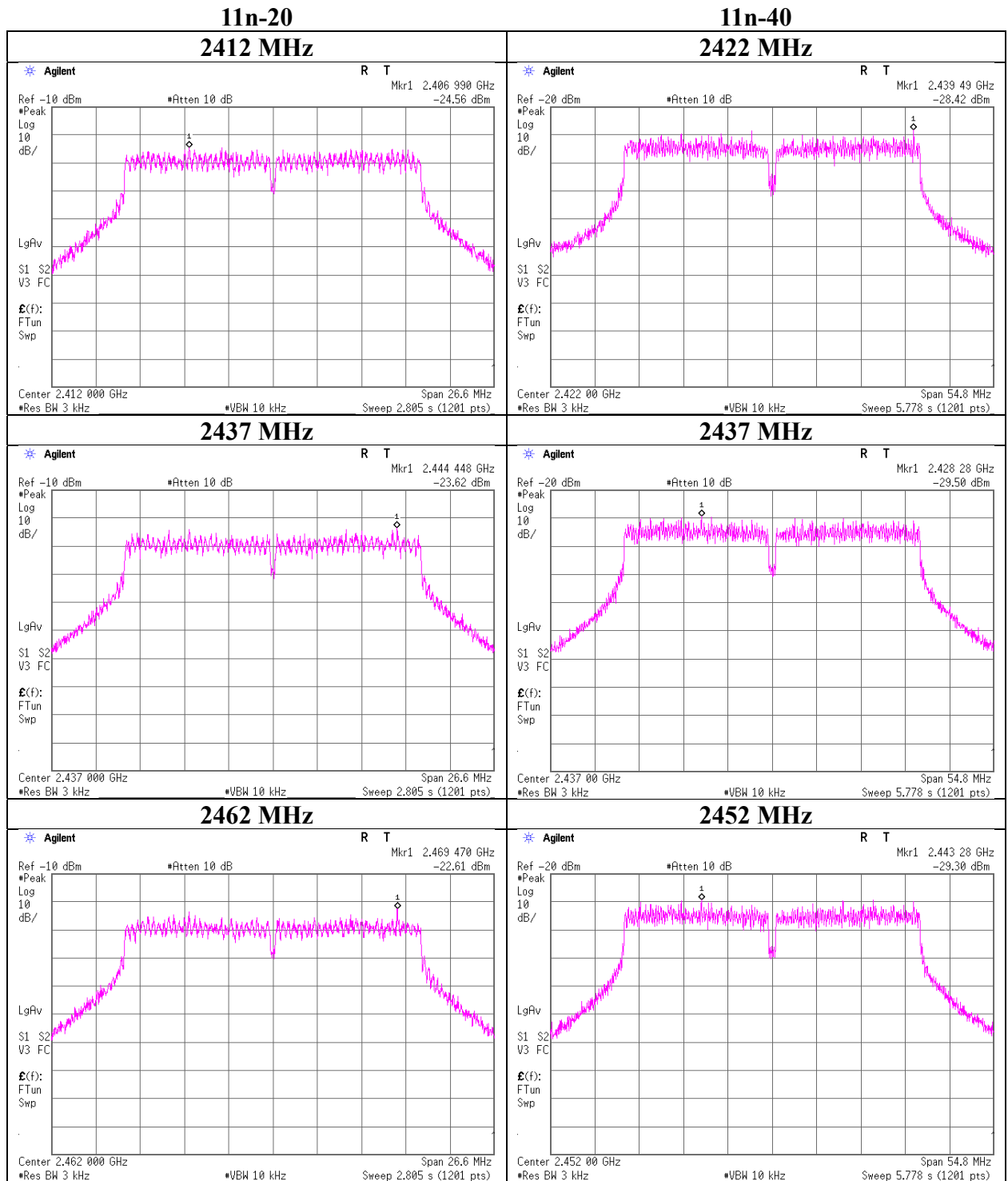
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

Power Density



Power Density



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APPENDIX 2: Test instruments

Test equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	03/10/2021	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/09/2021	12
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/04/2021	12
RE	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/03/2021	12
RE	MHF-06	141404	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	05/18/2021	12
RE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2020	24
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/15/2021	12
RE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	01/07/2021	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/01/2021	24
RE	MHF-25	141232	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	09/30/2021	12
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	06/07/2021	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/15/2021	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/07/2021	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/02/2021	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+ BBA9106	VHA 91031302	08/28/2021	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/03/2021	12
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	08/28/2021	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2021	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	03/09/2021	12
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0005	01/10/2022	12
AT	MMM-12	141547	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	60500120	02/01/2022	12
AT	MJM-24	142225	Measure	ASKUL	-	-	-	-
AT	MRENT-130	141855	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187750	11/28/2021	12
AT	MPM-13	141810	Power Meter	Anritsu Corporation	ML2495A	824014	12/14/2020	12

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Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MPSE-18	141832	Power sensor	Anritsu Corporation	MA2411B	738174	12/14/2020	12
AT	MAT-23	141361	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	04/07/2021	12
AT	MCC-66	141328	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	04/16/2021	12
AT	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/15/2021	12
AT	MMM-18	141558	Digital Tester(TRUE RMS MULTIMETER)	Fluke Corporation	115	17930030	05/24/2021	12
AT	MSA-13	141900	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185823	09/30/2021	12
AT	MCC-144	141414	Microwave Cable	Junkosha	MWX221	1207S407	08/11/2021	12
AT	MAT-58	141334	Attenuator(10dB)	Suhner	6810.19.A	-	12/08/2021	12
AT	MCC-64	141327	Coaxial Cable	UL Japan	-	-	02/03/2021	12
AT	MAT-10	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/09/2021	12

*Hyphens for Last Calibration 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.

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

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

Test item: RE: Radiated Emission
AT: Antenna Terminal Conducted