RADIO TEST REPORT

Test Report No. 15172810S-D-R2

Customer	**Canon Inc.**
Description of EUT	**Wireless LAN Module**
Model Number of EUT	**WM323**
FCC ID	**AZD323**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**July 22, 2024**
Remarks	**-**

Representative Test Engineer	Approved By
H. Sato	T.imamura
Hiromasa Sato Engineer	Toyokazu Imamura Engineer

CERTIFICATE 1266.03

☐ 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".

UL Japan, Inc. Shonan EMC Lab.
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REVISION HISTORY

Original Test Report No.: 15172810S-D

This report is a revised version of 15172810S-D-R1. 15172810S-D-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15172810S-D	July 1, 2024	-
1	15172810S-D-R1	July 12, 2024	P.5 The test date has been updated from “April 2 to June 19, 2024” to “April 2 to July 12, 2024”. P.6 The worst margin has been revised from “14.7 dB” to “10.3 dB”. P.10 The configuration diagram has been corrected for Conducted Emission test & Radiated Spurious Emission test. P.9, P.15, P.35 The operating mode has been changed from “11g 2437 MHz” to “11g 2462 MHz”.
2	15172810S-D-R2	July 22, 2024	P.31, P.32 The operating mode has been changed below 1GHz from “11g 2437 MHz” to “11g 2462 MHz”.

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	Canon Inc.
Address	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan
Telephone Number	+81-3-3757-6798
Contact Person	Tomohiro Suzuki

The information provided by the customer is as follows;
- Customer, Description 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 and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Wireless LAN Module
Model Number	WM323
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	February 21, 2024
Test Date	April 2 to July 12, 2024

2.2 Product Description

General Specification

Rating	DC 7.4 V
Operating temperature	+5 deg. C to +40 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer.
The data provided by the customer is marked “a)” in the table below.

WLAN (IEEE802.11b/11g)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS: BPSK, QPSK, CCK / OFDM: BPSK, QPSK, 16QAM, 64QAM
Antenna Gain a)	+1.65 dBi

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	10.3 dB, 0.15000 MHz, QP, N Mode: Tx 11g 2462 MHz	Complied	-
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(a)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4(d)			
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(e)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	5.6 dB 2483.500 MHz, AV, Horizontal Mode: Tx 11g 2462 MHz	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.
* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

*1) 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.

FCC Part 15.31 (e)
The RF Module has its own regulator.
The RF Module is constantly provided with voltage through the regulator regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
The antenna is not removable from 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	-	Conducted

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

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Item	Frequency range	Uncertainty (+/-)
Conducted Emission (AC Mains) LISN	150 kHz to 30 MHz	3.2 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.3 dB
	30 MHz to 200 MHz	4.9 dB
	200 MHz to 1 GHz	6.2 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.3 dB
	18 GHz to 40 GHz	5.5 dB
Radiated Emission (Measurement distance: 1 m)	1 GHz to 18 GHz	5.6 dB
	18 GHz to 40 GHz	5.8 dB

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)	1.3 dB
Power Measurement above 1 GHz (Peak Detector)	1.8 dB
Spurious Emission (Conducted) below 1 GHz	0.91 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	1.3 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	2.5 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.6 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature	2.2 deg.C.
Humidity	4.0 %
Voltage	0.74 %

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
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	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

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)

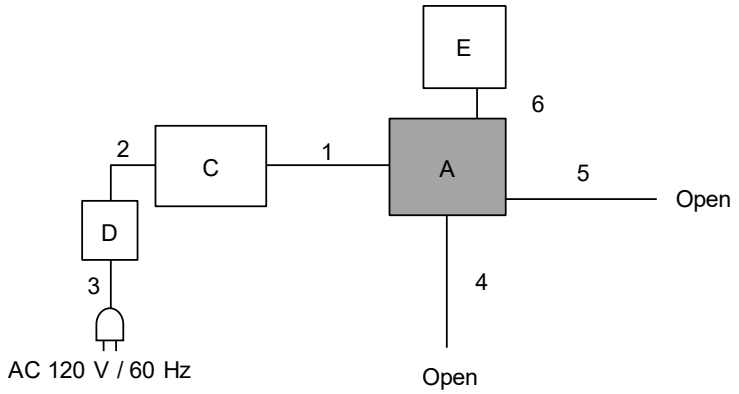
Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
*Transmitting duty was 100 % on all tests. *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power Setting: 11b: 13, 11g: 14 Software: MFG-Tool Version: 01.04 (Date: 2019.02.21, 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. 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.	

The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Frequency
Conducted Emission Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	Tx 11g	2462 MHz
Radiated Spurious Emission (Above 1 GHz), 6 dB Bandwidth, Maximum Peak Output Power, Power Density, 99 % Occupied Bandwidth	Tx 11b Tx 11g	2412 MHz 2437 MHz 2462 MHz

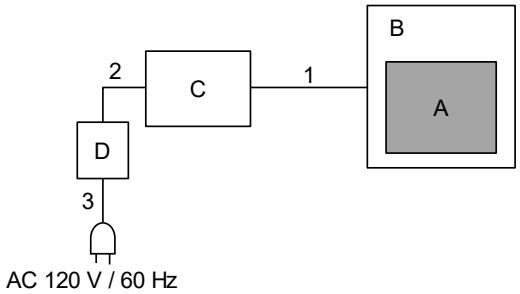
4.2 Configuration and Peripherals

<Conducted Emission test & Radiated Spurious Emission test>



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions. As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

< Antenna Terminal Conducted test >



Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Wireless LAN Module	WM323	40F8DFEB9201 *1) 40F8DFEB939D *2)	Canon Inc.	EUT
B	Compact Photo Printer	CD1174	(21)136018910120	Canon Inc.	-
C	Laptop Computer	ThinkPad L580	PF1LTWJ8	LENOVO	-
D	AC Adapter	ADLX45YLC2A	8SSA10E75842L1CZ94J0D3D	LENOVO	-
E	Battery	P0930-LF	P0930A013406A06423	EVE Energy Co. ,Ltd.	-

*1) Used for Conducted Emission test & Radiated Spurious Emission test
*2) Used for Antenna Terminal Conducted test.

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB	1.1	Shielded	Shielded	-
2	DC	1.8	Unshielded	Unshielded	-
3	AC	0.9	Unshielded	Unshielded	-
4	Flat Cable	0.15	Unshielded	Unshielded	
5	Flat Cable	0.05	Unshielded	Unshielded	
6	DC	0.02	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

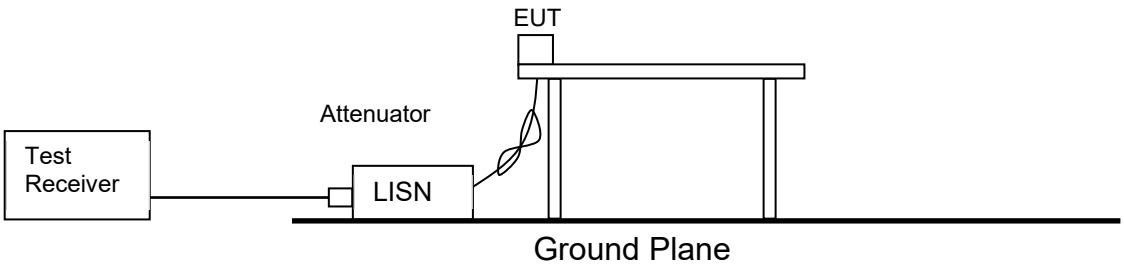
The EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.
The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a shieldedroom.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

Test results are rounded off and limit are rounded down, so some differences might be observed.

Detector : QP and CISPR AV
Measurement Range : 0.15 MHz to 30 MHz
Test Data : APPENDIX
Test Result : Pass

Figure 1: Test Setup



SECTION 6: 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]
The EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 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. 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 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.
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

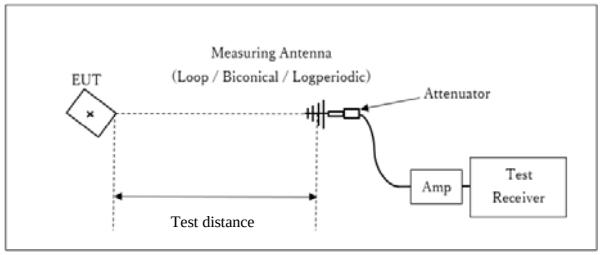
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired 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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 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

Figure 2: Test Setup

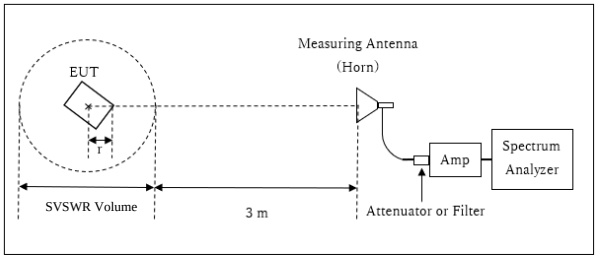
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

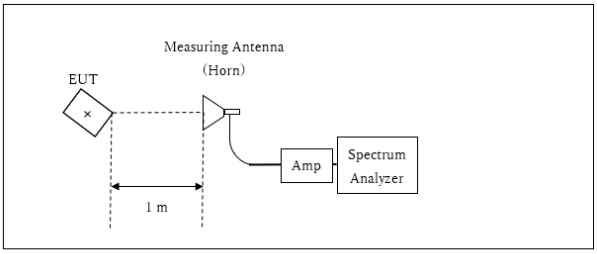


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.87 m / 3.0 m) = 2.22 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.87 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.13 m

10 GHz to 26.5 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 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.

Frequency / Test Antenna	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Horizontal	X	Z	Z	X	X
Vertical	Z	Y	Y	X	X

Test results are rounded off and limit are rounded down, so some differences might be observed.

Measurement Range : 30 MHz to 26.5 GHz
Test Data : APPENDIX
Test Result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
6dB Bandwidth	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: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	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 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)
*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 Ohmes. 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.

Test results are rounded off and limit are rounded down, 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

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

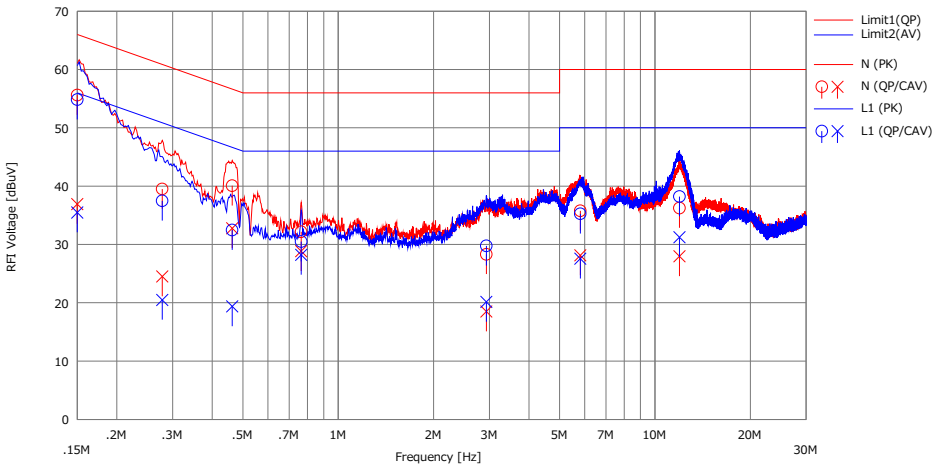
UL Japan,Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2024/07/12

Mode : Tx 11g 2462 MHz

Power : AC 120 V / 60 Hz (PC input)
Temp./Humi. : 27 deg.C / 32 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Hiromasa Sato



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉		〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	40.07	21.38	15.54	55.61	36.92	66.00	56.00	10.3	19.0	N	
2	0.27822	23.96	8.95	15.55	39.51	24.50	60.87	50.87	21.3	26.3	N	
3	0.46263	24.47	17.19	15.60	40.07	32.79	56.65	46.65	16.5	13.8	N	
4	0.76401	16.53	13.19	15.64	32.17	28.83	56.00	46.00	23.8	17.1	N	
5	2.93463	12.47	2.66	15.83	28.30	18.49	56.00	46.00	27.7	27.5	N	
6	5.81242	19.67	12.02	16.10	35.77	28.12	60.00	50.00	24.2	21.8	N	
7	11.95275	19.57	11.28	16.67	36.24	27.95	60.00	50.00	23.7	22.0	N	
8	0.15000	39.26	19.92	15.56	54.82	35.48	66.00	56.00	11.1	20.5	L1	
9	0.27825	21.92	4.91	15.56	37.48	20.47	60.87	50.87	23.3	30.4	L1	
10	0.46270	16.86	3.78	15.60	32.46	19.38	56.64	46.64	24.1	27.2	L1	
11	0.76437	14.84	12.58	15.64	30.48	28.22	56.00	46.00	25.5	17.7	L1	
12	2.93449	13.96	4.33	15.80	29.76	20.13	56.00	46.00	26.2	25.8	L1	
13	5.81257	19.22	11.51	16.04	35.26	27.55	60.00	50.00	24.7	22.4	L1	
14	11.95282	21.73	14.74	16.48	38.21	31.22	60.00	50.00	21.7	18.7	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN(AMN): 145542

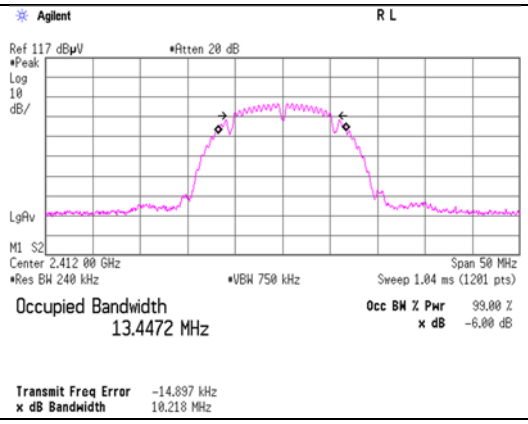
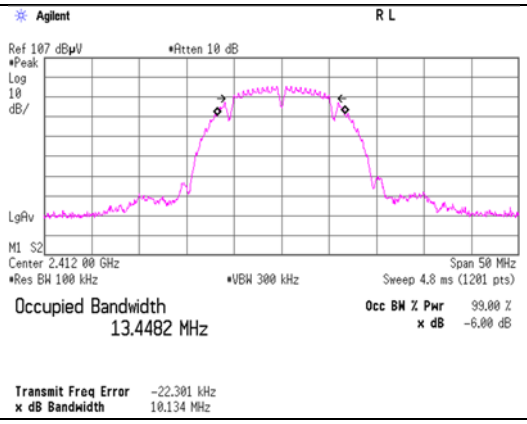
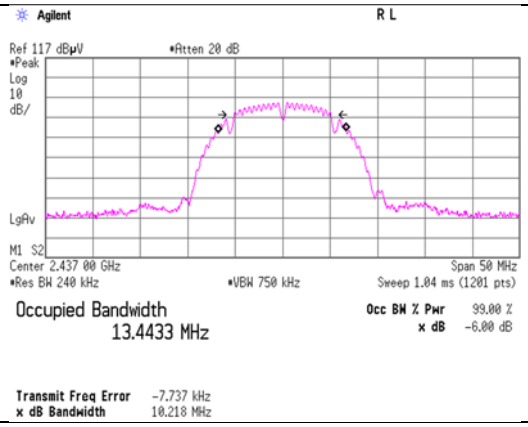
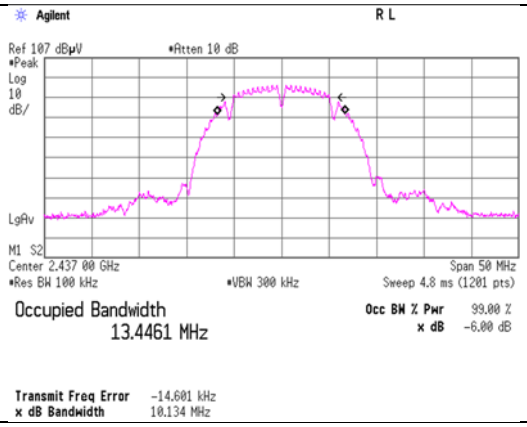
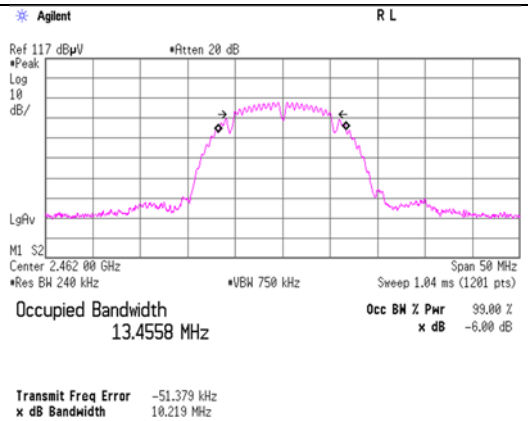
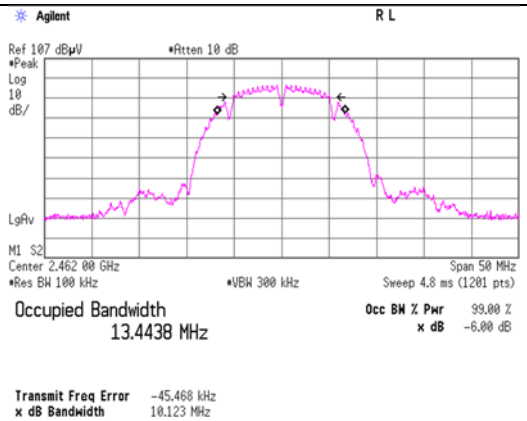
99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	April 2, 2024
Temperature / Humidity	25 deg. C / 30 % RH
Engineer	Hiromasa Sato
Mode	Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	13447.2	10.134	> 0.5000
	2437	13443.3	10.134	> 0.5000
	2462	***13455.8***	10.123	> 0.5000
11g	2412	***17250.9***	16.605	> 0.5000
	2437	17210.7	16.601	> 0.5000
	2462	17198.8	16.600	> 0.5000

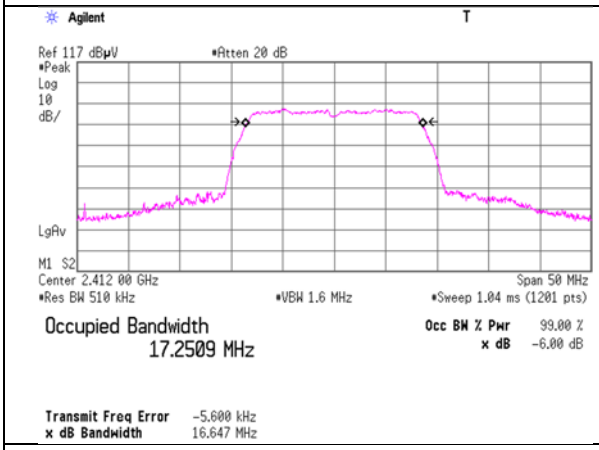
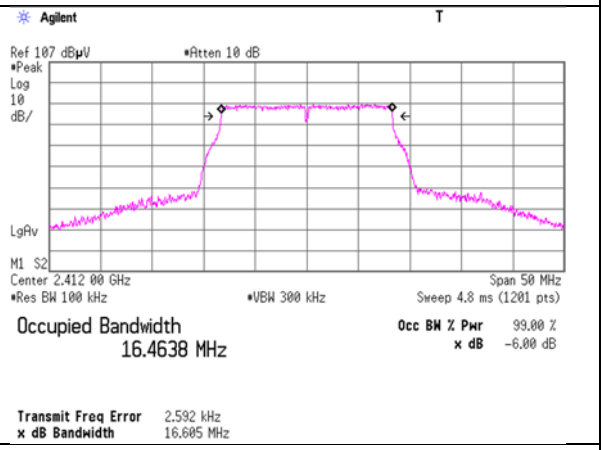
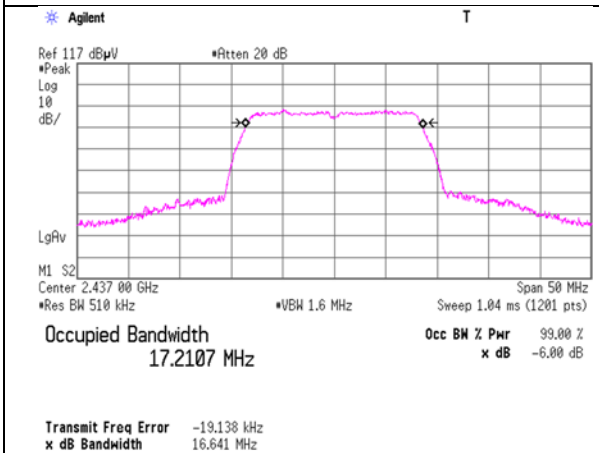
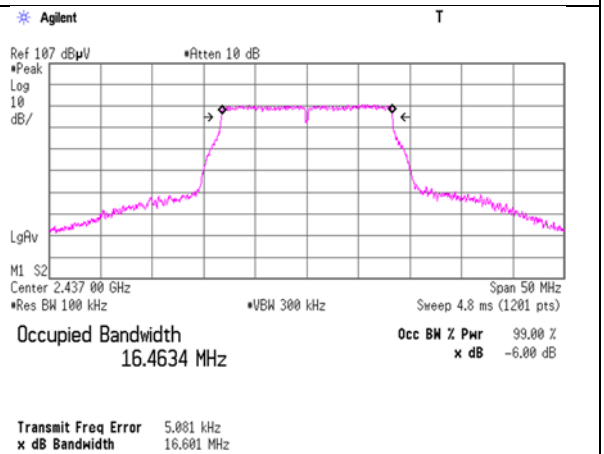
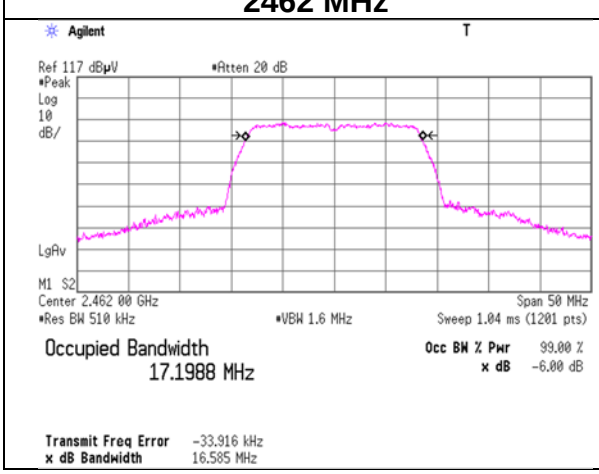
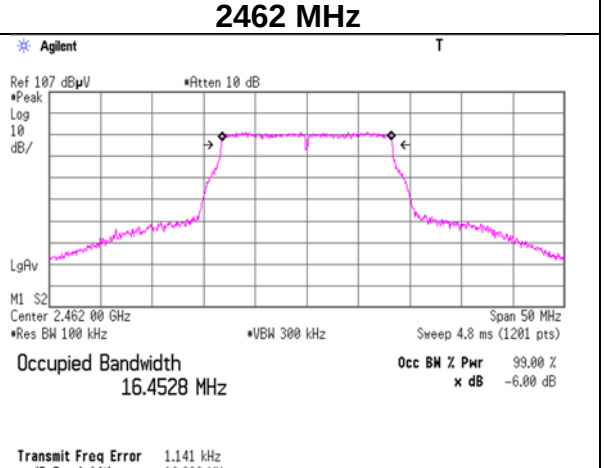
99 % Occupied Bandwidth and 6 dB Bandwidth

11b

99 % Occupied Bandwidth	6 dB Bandwidth
2412 MHz	2412 MHz
	
2437 MHz	2437 MHz
	
2462 MHz	2462 MHz
	

99 % Occupied Bandwidth and 6 dB Bandwidth

11g

99 % Occupied Bandwidth	6 dB Bandwidth
2412 MHz	2412 MHz
	
2437 MHz	2437 MHz
	
2462 MHz	2462 MHz
	

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx 11b

Antenna 1				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	1.67	1.91	9.95	13.53	22.54	30.00	1000	16.47	1.65	15.18	32.96	36.02	4000	20.84
2437	2.36	1.91	9.95	14.22	26.42	30.00	1000	15.78	1.65	15.87	38.64	36.02	4000	20.15
2462	2.41	1.92	9.95	***14.28***	***26.79***	30.00	1000	15.72	1.65	***15.93***	***39.17***	36.02	4000	20.09

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

Antenna 1, 2412 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	1.67	*
2	1.62	
5.5	1.49	
11	1.56	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx 11g

Antenna 1				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.29	1.91	9.95	21.15	130.32	30.00	1000	8.85	1.65	22.80	190.55	36.02	4000	13.22
2437	9.72	1.91	9.95	21.58	143.88	30.00	1000	8.42	1.65	23.23	210.38	36.02	4000	12.79
2462	9.94	1.92	9.95	***21.81***	***151.71***	30.00	1000	8.19	1.65	***23.46***	***221.82***	36.02	4000	12.56

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

Antenna 1, 2412 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	9.29	*
9	8.56	
12	8.12	
18	7.92	
24	8.99	
36	8.16	
48	8.40	
54	8.05	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx

11b **1 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-1.46	1.91	9.95	10.40	10.96	0.00	10.40	10.96
2437	-0.76	1.91	9.95	11.10	12.88	0.00	11.10	12.88
2462	-0.52	1.92	9.95	***11.35***	***13.65***	0.00	***11.35***	***13.65***

11g **6 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-1.72	1.91	9.95	10.14	10.33	0.00	10.14	10.33
2437	-1.04	1.91	9.95	10.82	12.08	0.00	10.82	12.08
2462	-0.80	1.92	9.95	***11.07***	***12.79***	0.00	***11.07***	***12.79***

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

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

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx

Antenna 1, 2412 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	-1.46	0.00	-1.46	*
	2	-1.59	0.00	-1.59	
	5.5	-1.64	0.00	-1.64	
	11	-1.60	0.00	-1.60	
11g	6	-1.72	0.00	-1.72	*
	9	-1.91	0.00	-1.91	
	12	-1.90	0.00	-1.90	
	18	-1.89	0.00	-1.89	
	24	-1.91	0.00	-1.91	
	36	-2.02	0.00	-2.02	
	48	-2.02	0.00	-2.02	
	54	-2.06	0.00	-2.06	

* Worst rate

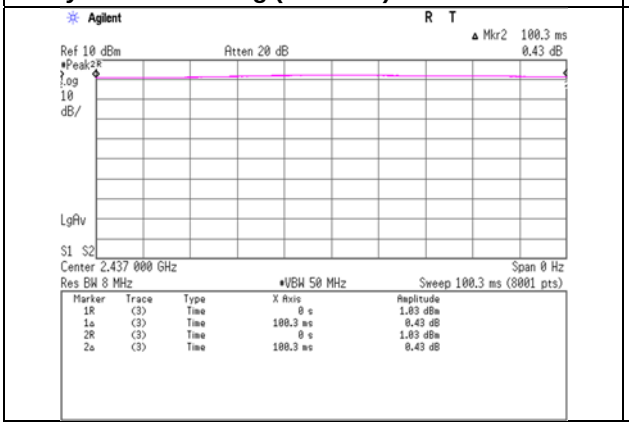
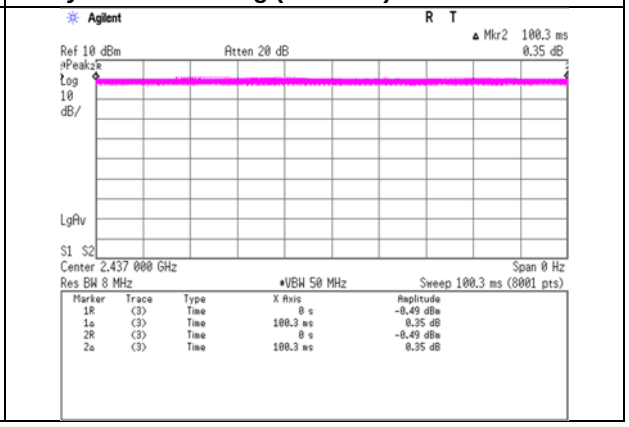
Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	April 2, 2024
Temperature / Humidity	25 deg. C / 30 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx

11b 1 Mbps		11g 6 Mbps	
Tx on / (Tx on + Tx off) =	**1.000**	**Tx on / (Tx on + Tx off) =**	**1.000**
Tx on / (Tx on + Tx off) * 100 =	**100.0 %**	**Tx on / (Tx on + Tx off) * 100 =**	**100.0 %**
Duty factor = 10 * log (100 / 100) =	**0.00 dB**	**Duty factor = 10 * log (100 / 100) =**	**0.00 dB**
			

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11b 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	56.78	27.80	14.09	38.78	2.22	62.11	73.9	11.7	143	23	-
Hori.	4824.000	PK	45.28	31.21	6.49	38.60	2.22	46.60	73.9	27.3	150	0	-
Hori.	7236.000	PK	45.16	37.07	7.96	39.24	2.22	53.17	73.9	20.7	150	0	-
Hori.	9648.000	PK	46.54	38.53	9.29	39.73	2.22	56.85	73.9	17.0	150	0	-
Hori.	2390.000	AV	34.58	27.80	14.09	38.78	2.22	39.91	53.9	13.9	143	23	-
Hori.	4824.000	AV	33.80	31.21	6.49	38.60	2.22	35.12	53.9	18.7	150	0	Floor noise
Hori.	7236.000	AV	33.96	37.07	7.96	39.24	2.22	41.97	53.9	11.9	150	0	Floor noise
Hori.	9648.000	AV	35.26	38.53	9.29	39.73	2.22	45.57	53.9	**8.3**	150	0	Floor noise
Vert.	2390.000	PK	56.47	27.80	14.09	38.78	2.22	61.80	73.9	12.1	162	101	-
Vert.	4824.000	PK	45.72	31.21	6.49	38.60	2.22	47.04	73.9	26.8	150	0	-
Vert.	7236.000	PK	45.11	37.07	7.96	39.24	2.22	53.12	73.9	20.7	150	0	-
Vert.	9648.000	PK	46.06	38.53	9.29	39.73	2.22	56.37	73.9	17.5	150	0	-
Vert.	2390.000	AV	33.41	27.80	14.09	38.78	2.22	38.74	53.9	15.1	162	101	-
Vert.	4824.000	AV	33.65	31.21	6.49	38.60	2.22	34.97	53.9	18.9	150	0	Floor noise
Vert.	7236.000	AV	34.14	37.07	7.96	39.24	2.22	42.15	53.9	11.7	150	0	Floor noise
Vert.	9648.000	AV	34.95	38.53	9.29	39.73	2.22	45.26	53.9	8.6	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

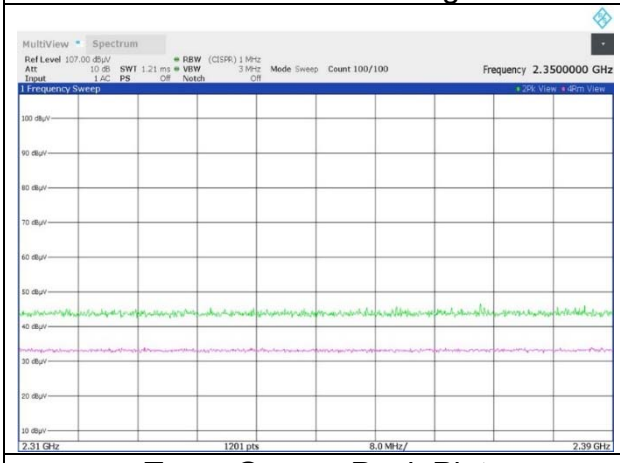
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

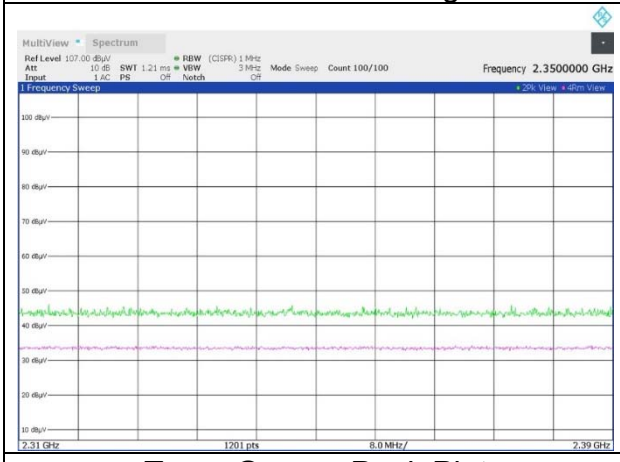
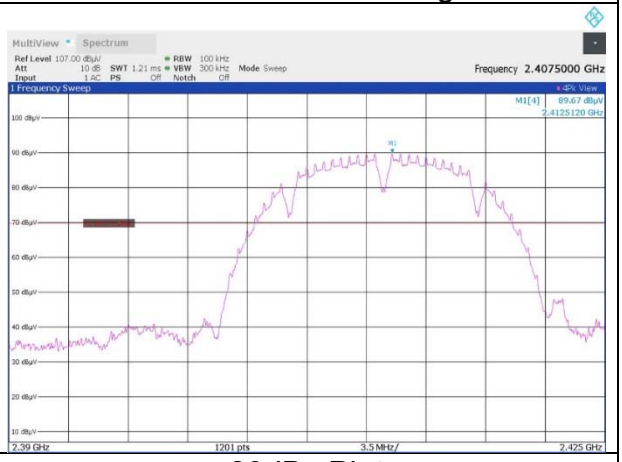
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	91.07	27.77	14.11	38.77	2.22	96.40	-	-	Carrier
Hori.	2400.000	PK	45.85	27.78	14.10	38.77	2.22	51.18	76.4	25.2	-
Vert.	2412.000	PK	89.73	27.77	14.11	38.77	2.22	95.06	-	-	Carrier
Vert.	2400.000	PK	46.25	27.78	14.10	38.77	2.22	51.58	75.0	23.4	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba (1 GHz to 26.5 GHz)
Mode	Tx 11b 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11b 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	45.73	31.22	6.52	38.62	2.22	47.07	73.9	26.8	150	0	-
Hori.	7311.000	PK	45.37	37.18	8.00	39.28	2.22	53.49	73.9	20.4	150	0	-
Hori.	9748.000	PK	47.34	38.86	9.33	39.75	2.22	58.00	73.9	15.9	150	0	-
Hori.	4874.000	AV	33.40	31.22	6.52	38.62	2.22	34.74	53.9	19.1	150	0	Floor noise
Hori.	7311.000	AV	33.36	37.18	8.00	39.28	2.22	41.48	53.9	12.4	150	0	Floor noise
Hori.	9748.000	AV	34.78	38.86	9.33	39.75	2.22	45.44	53.9	**8.4**	150	0	Floor noise
Vert.	4874.000	PK	45.60	31.22	6.52	38.62	2.22	46.94	73.9	26.9	150	0	-
Vert.	7311.000	PK	45.65	37.18	8.00	39.28	2.22	53.77	73.9	20.1	150	0	-
Vert.	9748.000	PK	46.60	38.86	9.33	39.75	2.22	57.26	73.9	16.6	150	0	-
Vert.	4874.000	AV	33.37	31.22	6.52	38.62	2.22	34.71	53.9	19.1	150	0	Floor noise
Vert.	7311.000	AV	33.13	37.18	8.00	39.28	2.22	41.25	53.9	12.6	150	0	Floor noise
Vert.	9748.000	AV	34.51	38.86	9.33	39.75	2.22	45.17	53.9	8.7	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11b 2462 MHz

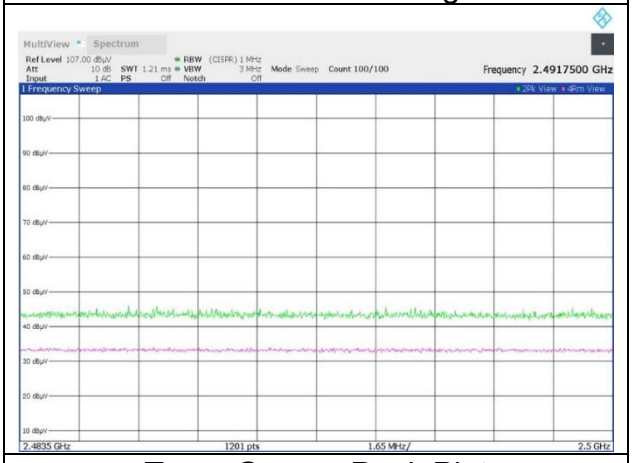
(* PK: Peak, AV: Average, QP: Quasi-Peak)

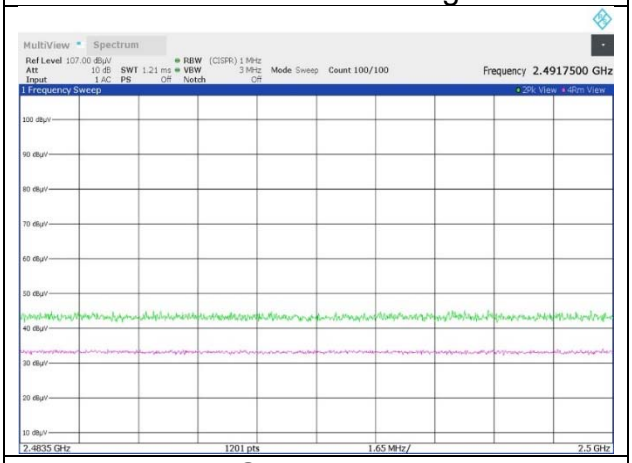
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	58.86	27.69	14.19	38.73	2.22	64.23	73.9	9.6	139	27	-
Hori.	4924.000	PK	45.52	31.30	6.55	38.64	2.22	46.95	73.9	26.9	150	0	-
Hori.	7386.000	PK	45.36	37.33	8.04	39.32	2.22	53.63	73.9	20.2	150	0	-
Hori.	9848.000	PK	46.37	39.05	9.38	39.78	2.22	57.24	73.9	16.6	150	0	-
Hori.	2483.500	AV	33.70	27.69	14.19	38.73	2.22	39.07	53.9	14.8	139	27	-
Hori.	4924.000	AV	33.10	31.30	6.55	38.64	2.22	34.53	53.9	19.3	150	0	Floor noise
Hori.	7386.000	AV	33.43	37.33	8.04	39.32	2.22	41.70	53.9	12.2	150	0	Floor noise
Hori.	9848.000	AV	34.63	39.05	9.38	39.78	2.22	45.50	53.9	**8.4**	150	0	Floor noise
Vert.	2483.500	PK	57.94	27.69	14.19	38.73	2.22	63.31	73.9	10.5	155	93	-
Vert.	4924.000	PK	46.68	31.30	6.55	38.64	2.22	48.11	73.9	25.7	150	0	-
Vert.	7386.000	PK	46.90	37.33	8.04	39.32	2.22	55.17	73.9	18.7	150	0	-
Vert.	9848.000	PK	47.26	39.05	9.38	39.78	2.22	58.13	73.9	15.7	150	0	-
Vert.	2483.500	AV	34.13	27.69	14.19	38.73	2.22	39.50	53.9	14.4	155	93	-
Vert.	4924.000	AV	33.20	31.30	6.55	38.64	2.22	34.63	53.9	19.2	150	0	Floor noise
Vert.	7386.000	AV	33.70	37.33	8.04	39.32	2.22	41.97	53.9	11.9	150	0	Floor noise
Vert.	9848.000	AV	34.33	39.05	9.38	39.78	2.22	45.20	53.9	8.7	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11b 2462 MHz

Horizontal
Restricted-band band-edge Plot

Trace Green : Peak Plot Trace Purple : Average Plot

Vertical
Restricted-band band-edge Plot

Trace Green : Peak Plot Trace Purple : Average Plot

* 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

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	59.73	27.80	14.09	38.78	2.22	65.06	73.9	**8.8**	170	124	-
Hori.	4824.000	PK	43.37	31.21	6.49	38.60	2.22	44.69	73.9	29.2	150	0	-
Hori.	7236.000	PK	45.93	37.07	7.96	39.24	2.22	53.94	73.9	19.9	150	0	-
Hori.	9648.000	PK	46.71	38.53	9.29	39.73	2.22	57.02	73.9	16.8	150	0	-
Hori.	2390.000	AV	36.46	27.80	14.09	38.78	2.22	41.79	53.9	12.1	170	124	-
Hori.	4824.000	AV	33.00	31.21	6.49	38.60	2.22	34.32	53.9	19.5	150	0	Floor noise
Hori.	7236.000	AV	33.58	37.07	7.96	39.24	2.22	41.59	53.9	12.3	150	0	Floor noise
Hori.	9648.000	AV	34.64	38.53	9.29	39.73	2.22	44.95	53.9	8.9	150	0	Floor noise
Vert.	2390.000	PK	58.53	27.80	14.09	38.78	2.22	63.86	73.9	10.0	133	235	-
Vert.	4824.000	PK	45.12	31.21	6.49	38.60	2.22	46.44	73.9	27.4	150	0	-
Vert.	7236.000	PK	45.59	37.07	7.96	39.24	2.22	53.60	73.9	20.3	150	0	-
Vert.	9648.000	PK	46.39	38.53	9.29	39.73	2.22	56.70	73.9	17.2	150	0	-
Vert.	2390.000	AV	36.73	27.80	14.09	38.78	2.22	42.06	53.9	11.8	133	235	-
Vert.	4824.000	AV	32.99	31.21	6.49	38.60	2.22	34.31	53.9	19.5	150	0	Floor noise
Vert.	7236.000	AV	33.43	37.07	7.96	39.24	2.22	41.44	53.9	12.4	150	0	Floor noise
Vert.	9648.000	AV	34.44	38.53	9.29	39.73	2.22	44.75	53.9	9.1	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

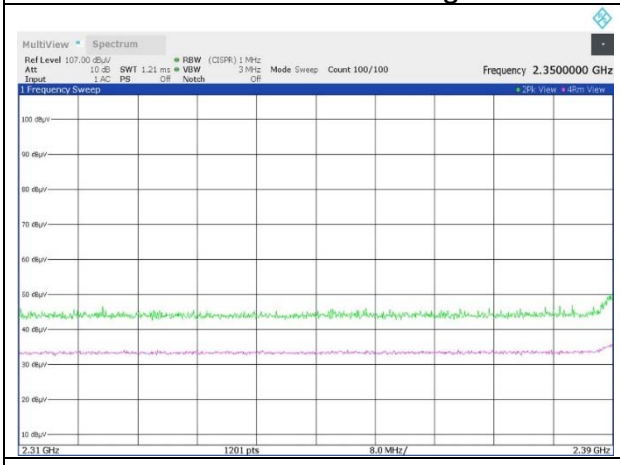
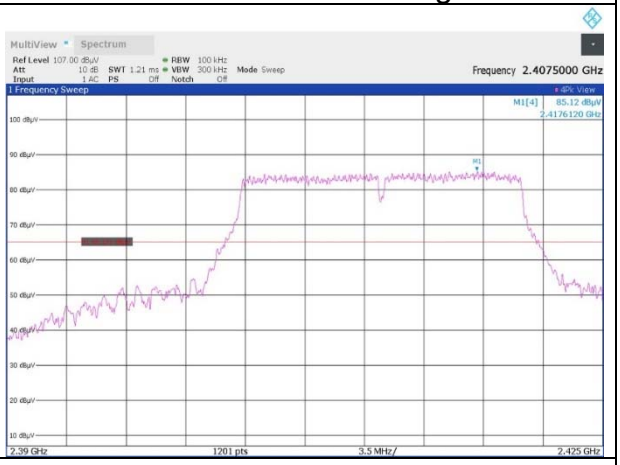
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

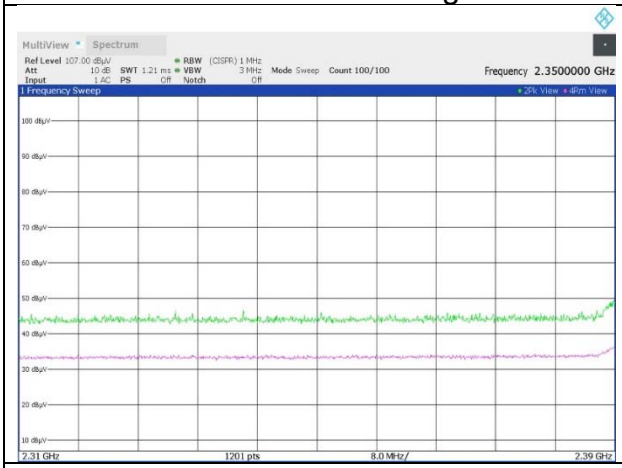
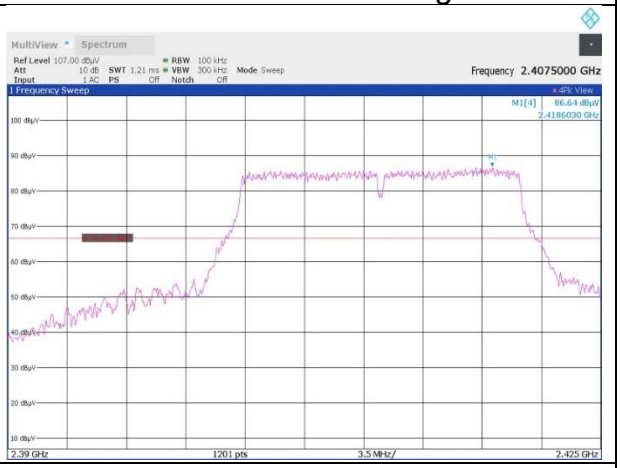
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	85.12	27.77	14.11	38.77	2.22	90.45	-	-	Carrier
Hori.	2400.000	PK	51.94	27.78	14.10	38.77	2.22	57.27	70.4	13.1	-
Vert.	2412.000	PK	86.64	27.77	14.11	38.77	2.22	91.97	-	-	Carrier
Vert.	2400.000	PK	50.24	27.78	14.10	38.77	2.22	55.57	71.9	16.3	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	45.66	31.22	6.52	38.62	2.22	47.00	73.9	26.9	150	0	-
Hori.	7311.000	PK	45.67	37.18	8.00	39.28	2.22	53.79	73.9	20.1	150	0	-
Hori.	9748.000	PK	47.25	38.86	9.33	39.75	2.22	57.91	73.9	15.9	150	0	-
Hori.	4874.000	AV	33.81	31.22	6.52	38.62	2.22	35.15	53.9	18.7	150	0	Floor noise
Hori.	7311.000	AV	33.87	37.18	8.00	39.28	2.22	41.99	53.9	11.9	150	0	Floor noise
Hori.	9748.000	AV	35.34	38.86	9.33	39.75	2.22	46.00	53.9	**7.9**	150	0	Floor noise
Vert.	4874.000	PK	45.22	31.22	6.52	38.62	2.22	46.56	73.9	27.3	150	0	-
Vert.	7311.000	PK	45.04	37.18	8.00	39.28	2.22	53.16	73.9	20.7	150	0	-
Vert.	9748.000	PK	46.97	38.86	9.33	39.75	2.22	57.63	73.9	16.2	150	0	-
Vert.	4874.000	AV	34.14	31.22	6.52	38.62	2.22	35.48	53.9	18.4	150	0	Floor noise
Vert.	7311.000	AV	33.88	37.18	8.00	39.28	2.22	42.00	53.9	11.9	150	0	Floor noise
Vert.	9748.000	AV	35.04	38.86	9.33	39.75	2.22	45.70	53.9	8.2	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC 2	SAC 2
Date	June 17, 2024	June 19, 2024
Temperature / Humidity	21 deg. C / 54 % RH	25 deg. C / 56 % RH
Engineer	Yuta Shiba	Yuta Shiba
	(30 MHz to 1 GHz)	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2462 MHz	

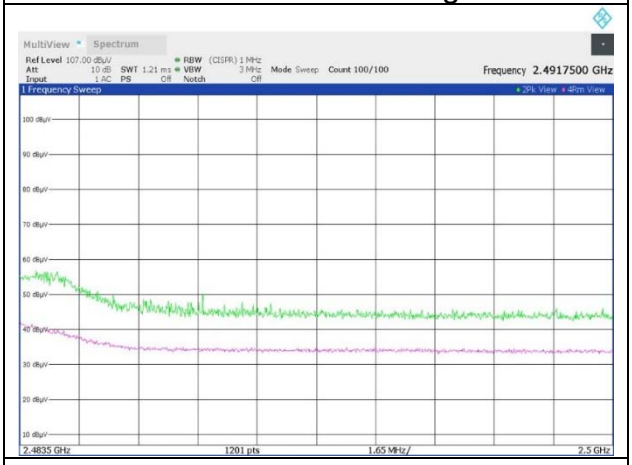
(* PK: Peak, AV: Average, QP: Quasi-Peak)

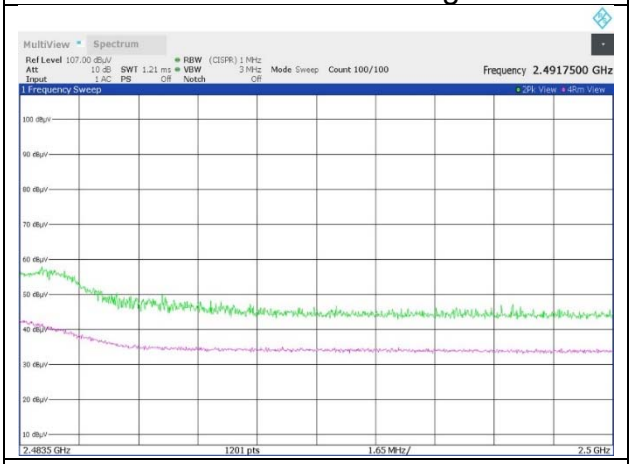
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	56.610	QP	36.90	9.28	6.65	32.15	0.00	20.68	40.0	19.3	381	181	-
Hori.	57.164	QP	37.80	9.14	6.64	32.15	0.00	21.43	40.0	18.5	383	187	-
Hori.	146.915	QP	32.60	14.66	7.71	32.07	0.00	22.90	43.5	20.6	220	324	-
Hori.	273.781	QP	44.10	13.02	8.43	31.96	0.00	33.59	46.0	12.4	120	298	-
Hori.	358.028	QP	33.50	15.04	8.87	31.90	0.00	25.51	46.0	20.4	100	245	-
Hori.	578.399	QP	30.50	18.59	9.82	31.90	0.00	27.01	46.0	18.9	153	61	-
Hori.	2483.500	PK	61.03	27.69	14.19	38.73	2.22	66.40	73.9	7.5	172	125	-
Hori.	2484.491	PK	62.75	27.69	14.19	38.73	2.22	68.12	73.9	5.7	172	125	-
Hori.	4924.000	PK	46.30	31.30	6.55	38.64	2.22	47.73	73.9	26.1	150	0	-
Hori.	7386.000	PK	46.00	37.33	8.04	39.32	2.22	54.27	73.9	19.6	150	0	-
Hori.	9848.000	PK	46.98	39.05	9.38	39.78	2.22	57.85	73.9	16.0	150	0	-
Hori.	2483.500	AV	42.85	27.69	14.19	38.73	2.22	48.22	53.9	**5.6**	172	125	-
Hori.	2484.491	AV	39.37	27.69	14.19	38.73	2.22	44.74	53.9	9.1	172	125	-
Hori.	4924.000	AV	33.16	31.30	6.55	38.64	2.22	34.59	53.9	19.3	150	0	Floor noise
Hori.	7386.000	AV	33.79	37.33	8.04	39.32	2.22	42.06	53.9	11.8	150	0	Floor noise
Hori.	9848.000	AV	34.95	39.05	9.38	39.78	2.22	45.82	53.9	8.0	150	0	Floor noise
Vert.	31.428	QP	39.20	18.40	6.45	32.16	0.00	31.89	40.0	8.1	100	23	-
Vert.	57.155	QP	42.10	9.14	6.64	32.15	0.00	25.73	40.0	14.2	100	258	-
Vert.	135.862	QP	33.50	14.22	7.49	32.08	0.00	23.13	43.5	20.3	100	53	-
Vert.	292.776	QP	36.70	13.57	8.54	31.94	0.00	26.87	46.0	19.1	100	100	-
Vert.	506.105	QP	35.20	17.76	9.52	31.89	0.00	30.59	46.0	15.4	100	357	-
Vert.	578.397	QP	33.00	18.59	9.82	31.90	0.00	29.51	46.0	16.4	100	201	-
Vert.	2483.500	PK	59.83	27.69	14.19	38.73	2.22	65.20	73.9	8.7	134	233	-
Vert.	2484.482	PK	60.40	27.69	14.19	38.73	2.22	65.77	73.9	8.1	134	233	-
Vert.	4924.000	PK	46.13	31.30	6.55	38.64	2.22	47.56	73.9	26.3	150	0	-
Vert.	7386.000	PK	45.52	37.33	8.04	39.32	2.22	53.79	73.9	20.1	150	0	-
Vert.	9848.000	PK	47.52	39.05	9.38	39.78	2.22	58.39	73.9	15.5	150	0	-
Vert.	2483.500	AV	42.76	27.69	14.19	38.73	2.22	48.13	53.9	5.7	134	233	-
Vert.	2484.482	AV	40.32	27.69	14.19	38.73	2.22	45.69	53.9	8.2	134	233	-
Vert.	4924.000	AV	33.14	31.30	6.55	38.64	2.22	34.57	53.9	19.3	150	0	Floor noise
Vert.	7386.000	AV	33.80	37.33	8.04	39.32	2.22	42.07	53.9	11.8	150	0	Floor noise
Vert.	9848.000	AV	34.93	39.05	9.38	39.78	2.22	45.80	53.9	8.1	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 2
Date	June 19, 2024
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Yuta Shiba
	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2462 MHz

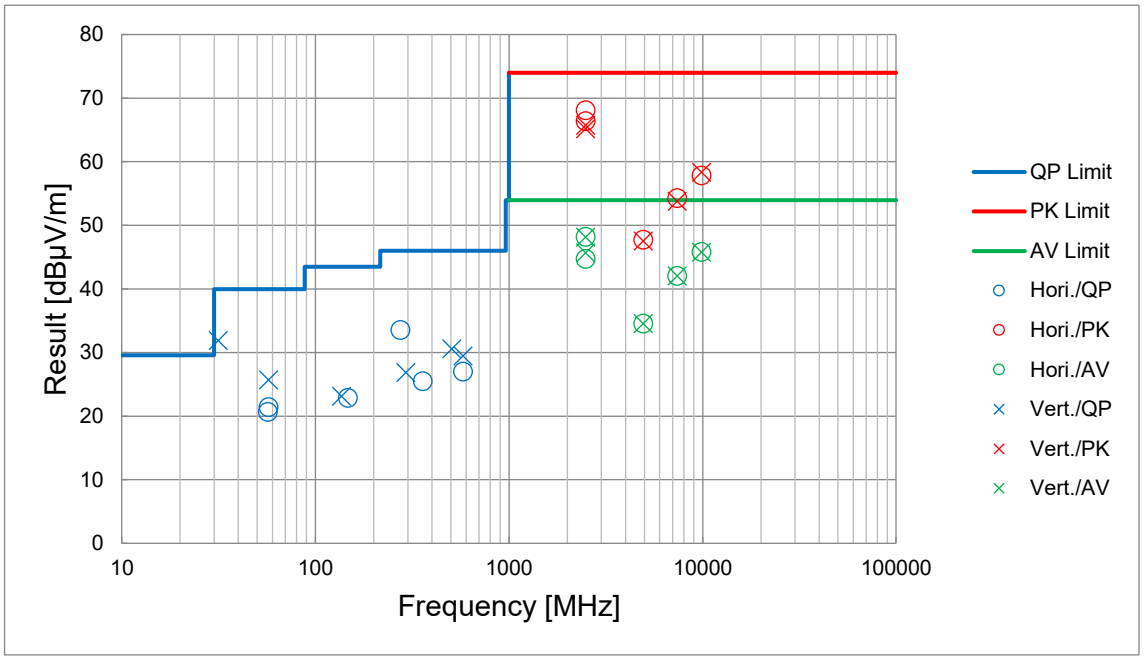
Horizontal
Restricted-band band-edge Plot

Trace Green : Peak Plot Trace Purple : Average Plot

Vertical
Restricted-band band-edge Plot

Trace Green : Peak Plot Trace Purple : Average Plot

* 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)

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC 3	SAC 2
Date	June 17, 2024	June 19, 2024
Temperature / Humidity	21 deg. C / 54 % RH	25 deg. C / 56 % RH
Engineer	Yuta Shiba	Yuta Shiba
	(30 MHz to 1 GHz)	(1 GHz to 26.5 GHz)
Mode	Tx 11g 2462 MHz	

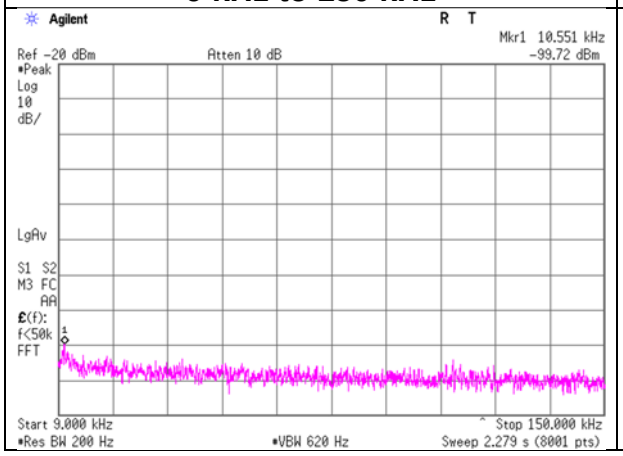


*These plots data contain sufficient number to show the trend of characteristic features for EUT.

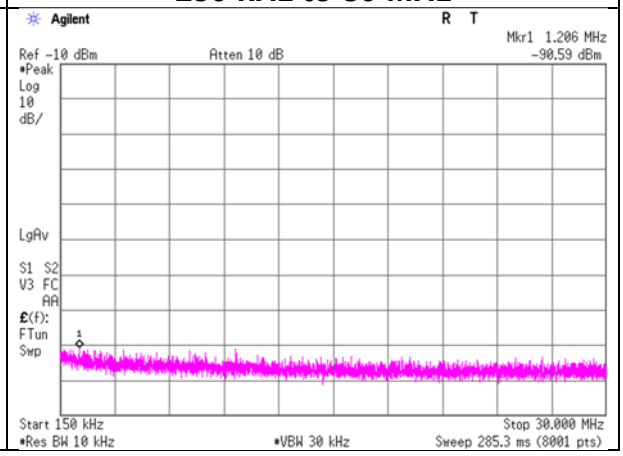
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 12, 2024
Temperature / Humidity	24 deg. C / 38 % RH
Engineer	Hiromasa Sato
Mode	Tx 11g 2462 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.55	-99.7	0.71	9.8	2.0	1	-87.2	300	6.0	-25.9	47.1	73.0	-
1.21	-90.6	0.71	9.8	2.0	1	-78.1	300	6.0	-16.8	65.9	82.7	-

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

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + 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

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 55 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx

11b Antenna 1

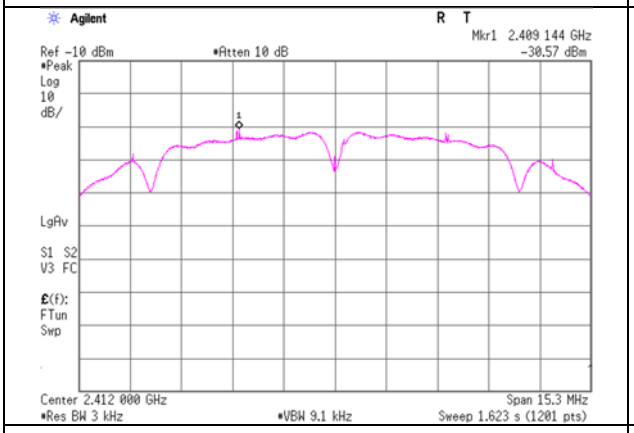
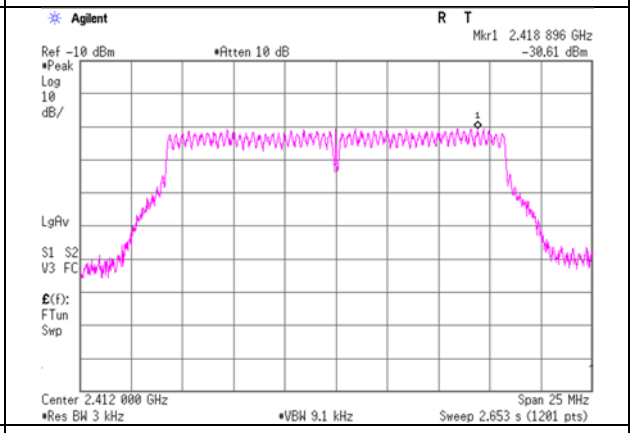
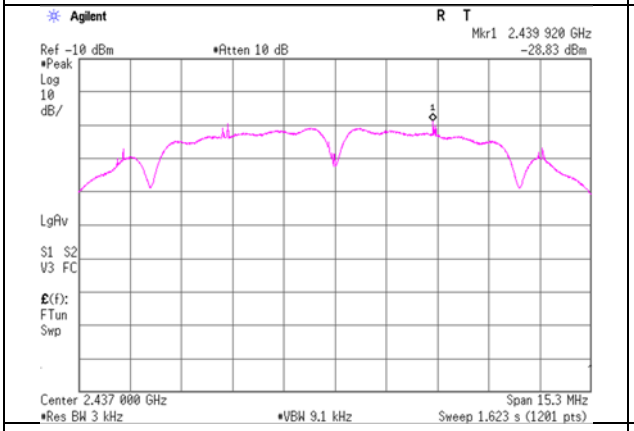
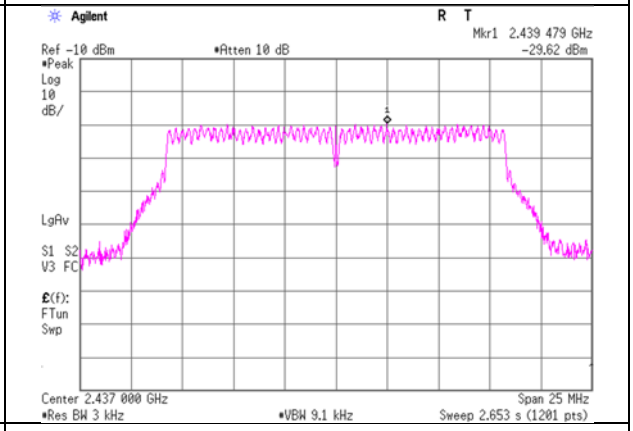
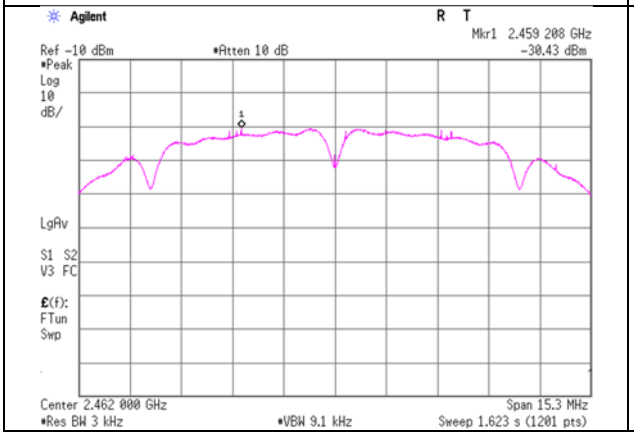
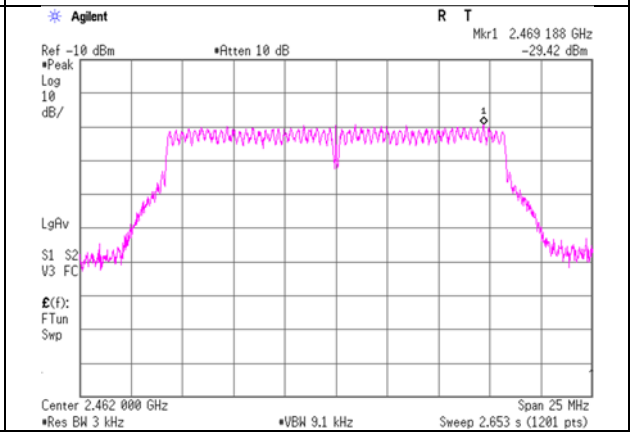
Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-30.57	1.91	9.95	-18.71	8.00	26.71
2437	-28.83	1.91	9.95	***-16.97***	8.00	24.97
2462	-30.43	1.92	9.95	-18.56	8.00	26.56

11g Antenna 1

Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-30.61	1.91	9.95	-18.75	8.00	26.75
2437	-29.62	1.91	9.95	-17.76	8.00	25.76
2462	-29.42	1.92	9.95	***-17.55***	8.00	25.55

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

Power Density

11b	11g
2412 MHz	2412 MHz
	
2437 MHz	2437 MHz
	
2462 MHz	2462 MHz
	

APPENDIX 2: Test Instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2023/12/13	12
AT	146247	Power Meter	Keysight Technologies Inc	8990B	MY51000272	2024/05/14	12
AT	146311	Power sensor	Keysight Technologies Inc	N1923A	MY5349008	2024/05/14	12
AT	151609	Attenuator	Weinschel Corp.	54A-10	81601	2024/03/12	12
AT	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/07	12
AT	235697	Coaxial Cable	Hayashi-Repic co., Ltd.	KMS020B-GL140sE-KMS020B-2.0m	47456-01-01	2024/04/09	12
CE	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2024/04/01	12
CE	145542	LISN	Rohde & Schwarz	ENV216	100516	2024/02/06	12
CE	191841	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/01	12
CE,RE	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2023/09/25	12
CE,RE	146432	Tape Measure	TAJIMA	GL19-55	-	-	-
CE,RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2023/08/25	12
CE,RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
CE,RE	199786	Attenuator	JFW	50HF-006N	-	2024/06/14	12
RE	144932	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	1926	2024/03/01	12
RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2024/03/05	12
RE	145126	Pre Amplifier	SONOMA	310N	290213	2024/02/07	12
RE	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2024/05/08	12
RE	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2023/10/11	12
RE	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2024/04/01	12
RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2023/08/23	12
RE	145305	Highpass Filter	Micro-Tronics	HPM50111	119	2024/03/05	12
RE	145384	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-726	2024/03/11	12
RE	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2023/06/12	12
RE	145527	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	193	2024/04/10	12
RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2024/04/03	12
RE	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2024/05/22	12
RE	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2024/05/29	12
RE	146351	Horn Antenna	EMCO	3160-09	1278	2024/05/23	12
RE	178573	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	MY13407/4E	2024/03/05	12
RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2024/03/05	12
RE	191838	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/03	12
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/03	12
RE	194684	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	695	2024/03/11	12
RE	200009	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575617/4	2023/06/06	12
RE	207277	Measuring	ASKUL	-	-	-	-
RE	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2024/02/22	12
RE	243215	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-9.0m	49306-01-03	2023/12/20	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:

AT: Antenna Terminal Conducted test
CE: Conducted Emission
RE: Radiated Emission