RADIO TEST REPORT

Test Report No. 15356903S-A-R2

Customer	**Canon Inc.**
Description of EUT	**Wireless LAN Module**
Model Number of EUT	**K30400**
FCC ID	**AZDK30400**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**December 20, 2024**
Remarks	**Wireless LAN (2.4 GHz band) part**

Representative Test Engineer	Approved By
Shiro Kobayashi Engineer	Shinichi Takano 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".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 23.0

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REVISION HISTORY

Original Test Report No.: 15356903S-A

This report is a revised version of 15356903S-A-R1. 15356903S-A-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15356903S-A	November 8, 2024	-
1	15356903S-A-R1	December 4, 2024	P7 Modified worst margin: 1.8 dB → 1.0 dB
2	15356903S-A-R2	December 20, 2024	P5 Modified test date: "June 17 to July 31, 2024" → "June 17 to August 25, 2024"

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

CONTENTS PAGE

SECTION 1: Customer Information

Company Name	Canon Inc.
Address	451, Tsukagoshi 3-chome, Saiwai-ku, Kawasaki-shi, Kanagawa 212-8530, Japan
Telephone Number	+81-3-3758-2111
Contact Person	Shuma Hashimoto

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	K30400
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	June 14, 2024: Initial receipt July 10, 2024: Adjustment of shielding by customer (Does not affect Antenna Terminal conducted test)
Test Date	June 17 to August 25, 2024

2.2 Product Description

General Specification

Rating	DC 3.3 V
Operating temperature	0 deg. C to +45 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/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Gain [a)]	2.51 dBi

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

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5825 MHz
	40 MHz Band	5190 MHz to 5230 MHz 5270 MHz to 5310 MHz 5510 MHz to 5670 MHz 5755 MHz to 5795 MHz
Type of Modulation	OFDM	
Antenna Gain [a)]	-0.47 dBi	(WLAN UNII-1 and UNII-2A band)
	0.41 dBi	(WLAN UNII-2C band)
	1.33 dBi	(WLAN UNII-3 band)

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	14.9 dB, 4.28703 MHz, QP, N 4.39499 MHz, QP, N	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)	1.0 dB 14472.000 MHz, AV, Horizontal, Tx 11b 2412 MHz	Complied	Conducted (below 30 MHz)/ Radiated *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 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 host device provides stable voltage constantly to RF Module 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)

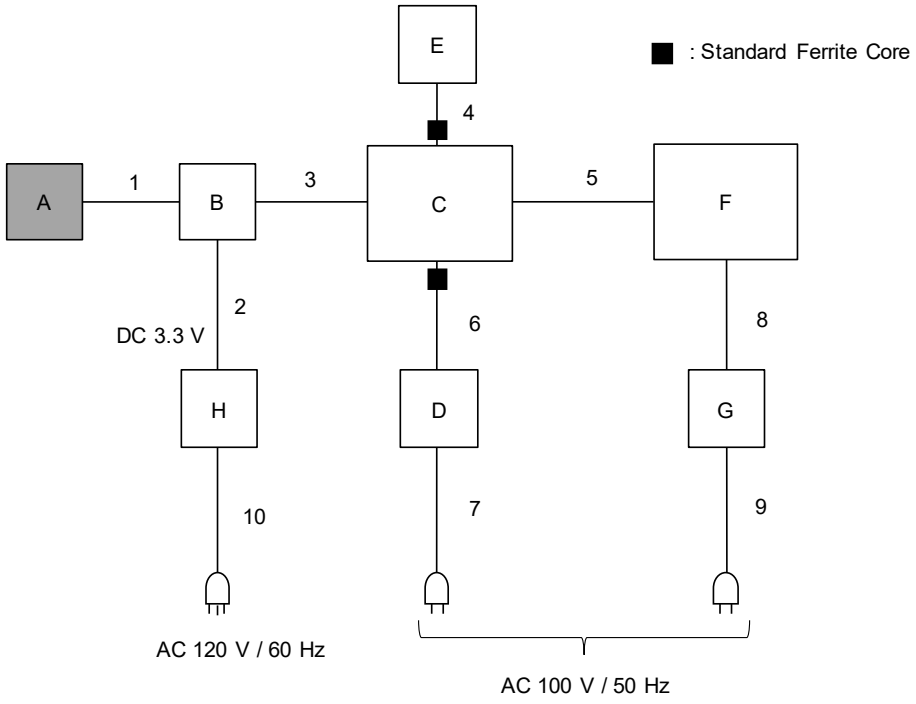
Mode	Remarks*
IEEE 802.11b (11b)	2 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 2, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)	
*Power of the EUT was set by the software as follows; Power Setting: 11b: 16 dBm 11g, 11n-20: 14 dBm (2422 MHz to 2452 MHz), 13 dBm (2417 MHz, 2457 MHz) 10 dBm (2412 MHz, 2462 MHz) Software: Labtool Version 1.0.0.15 FW Version: 16.80.21.128 (Date: 2023.9.21, 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 *1)	2437 MHz
6 dB Bandwidth, Maximum Peak Output Power, Power Density, 99 % Occupied Bandwidth	Tx 11b Tx 11g Tx 11n-20	2412 MHz 2437 MHz 2462 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx 11b	2412 MHz 2437 MHz 2462 MHz
	Tx 11g Tx 11n-20 *2)	2412 MHz 2417 MHz 2422 MHz 2437 MHz 2452 MHz 2457 MHz 2462 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test. *2) For those frequencies in 2417 / 2422 / 2452 / 2457 MHz, the test had been conducted only in band-edge.		

4.2 Configuration and Peripherals

<Conducted Emission and 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	Wireless LAN Module	K30400	E024	Canon	EUT
B	WLAN JOINT PCB	-	-	Canon	-
C	Laptop Computer	Thinkpad X61s 7666-77J	LV-B8PVT 08/05	LENOVO	-
D	AC Adapter	42T4422	11S42T4422Z1ZF3D9BV4XN	Lenovo	-
E	USB DVD-ROM DRIVE	LDV-P8U2LBK	1225762	Logitec	-
F	Laptop Computer	dynabook Satellite B453 M	ZE127581H	TOSHIBA	*1)
		ThinkPad E14 Gen2	PF397TS8	LENOVO	-
G	AC Adapter	PA3917U-1ACA	G71C000DP410	TOSHIBA	*1)
		ADLX65YCC2D	8SSA10R16922C2TJ19M0AZJ	LENOVO	-
H	Power Supply (DC)	PAN35-10A	BP002287	Kikusui Electronics Corp.	-

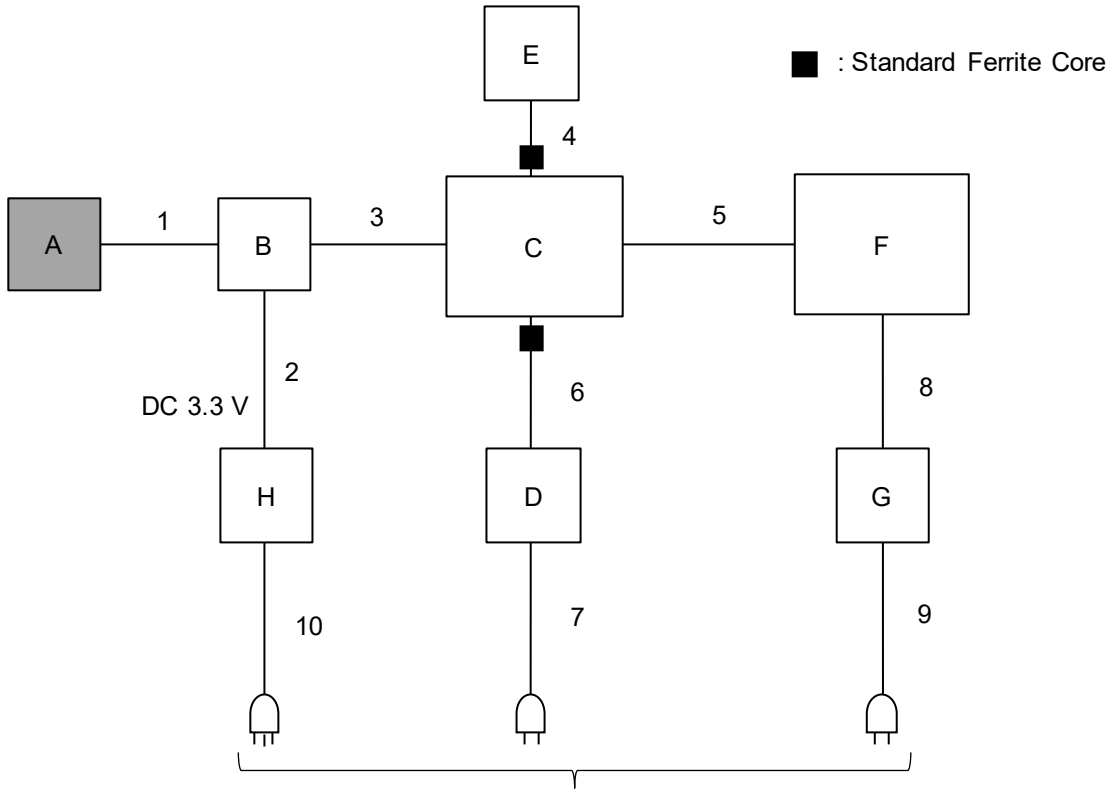
*1) Used for only Radiated Spurious Emission test.(Above 10 GHz)

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1.	Flat	0.1	Unshielded	Unshielded	-
2.	DC	0.3 + 2.0	Unshielded	Unshielded	-
3.	USB	1.0	Shielded	Shielded	-
4.	USB	0.4	Shielded	Shielded	-
5.	LAN	1.1	Unshielded	Unshielded	-
6.	DC	1.8	Unshielded	Unshielded	-
7.	AC	0.9	Unshielded	Unshielded	-
8.	DC	1.7	Unshielded	Unshielded	*1)
		1.8	Unshielded	Unshielded	-
9.	AC	0.8	Unshielded	Unshielded	*1)
		0.9	Unshielded	Unshielded	-
10.	AC	2.0	Unshielded	Unshielded	-

*1) Used for only Radiated Spurious Emission test.(Above 10 GHz)

<Antenna Terminal Conducted test>



Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Wireless LAN Module	K30400	E024	Canon	EUT
B	WLAN JOINT PCB	-	-	Canon	-
C	Laptop Computer	Thinkpad X61s 7666-77J	LV-B8PVT 08/05	LENOVO	-
D	AC Adapter	42T4422	11S42T4422Z 1ZF3D9BV4XN	Lenovo	-
E	USB DVD-ROM DRIVE	LDV-P8U2LBK	1225762	Logitec	-
F	Laptop Computer	dynabook Satellite B453 M	ZE127581H	TOSHIBA	-
G	AC Adapter	PA3917U-1ACA	G71C000DP410	TOSHIBA	-
H	Power Supply (DC)	PAN35-10A	ML002085	Kikusui	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Flat	0.1	Unshielded	Unshielded	-
2	DC	0.3 + 2.0	Unshielded	Unshielded	-
3	USB	1.0	Shielded	Shielded	-
4	USB	0.4	Shielded	Shielded	-
5	LAN	1.1	Unshielded	Unshielded	-
6	DC	1.8	Unshielded	Unshielded	-
7	AC	0.9	Unshielded	Unshielded	-
8	DC	1.7	Unshielded	Unshielded	-
9	AC	0.8	Unshielded	Unshielded	-
10	AC	2.0	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

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 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 80 cm 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.

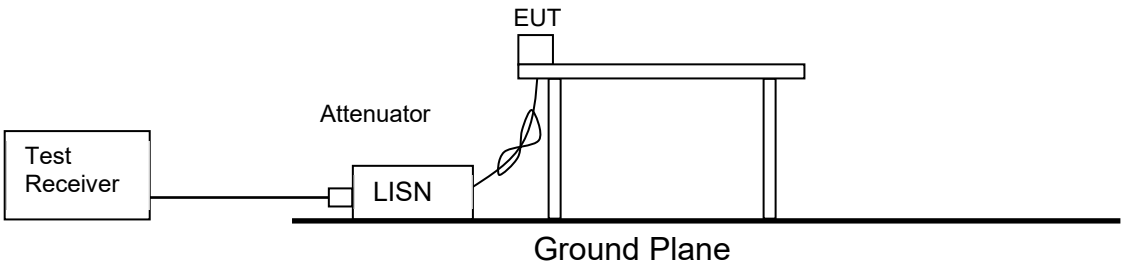
All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded room.
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]
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. 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	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(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	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

Figure 2: Direction of the Loop Antenna

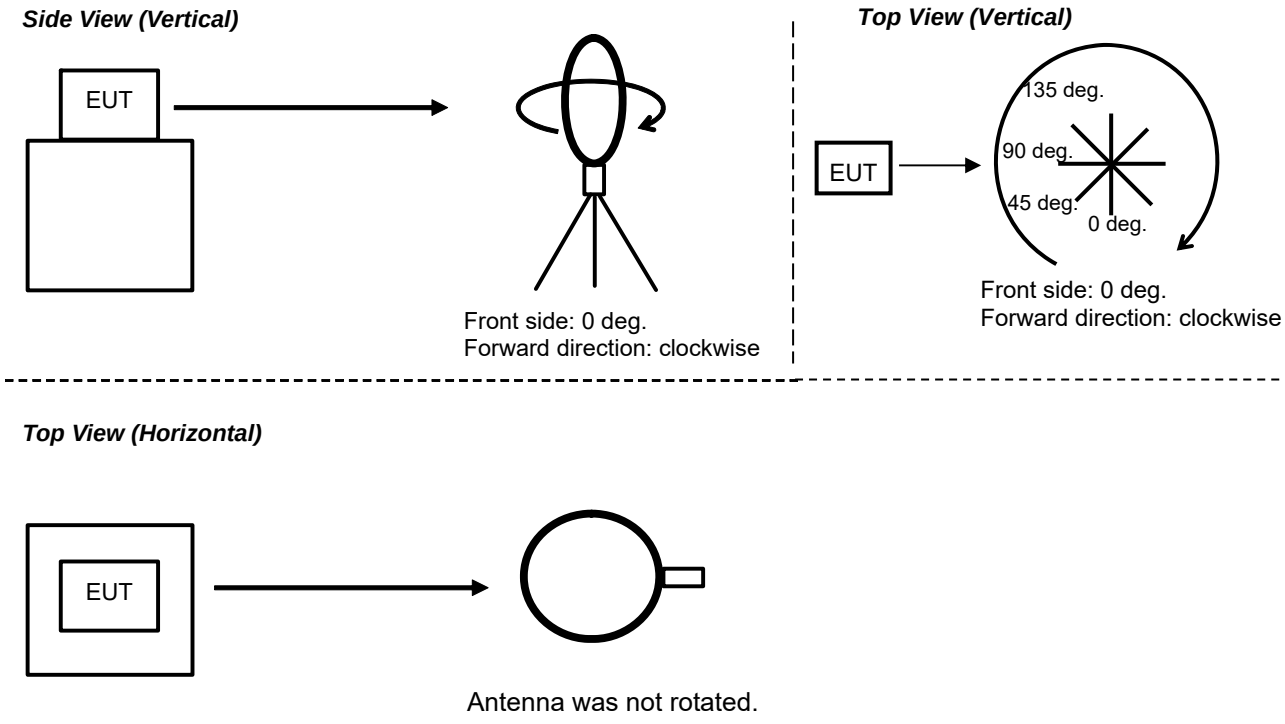
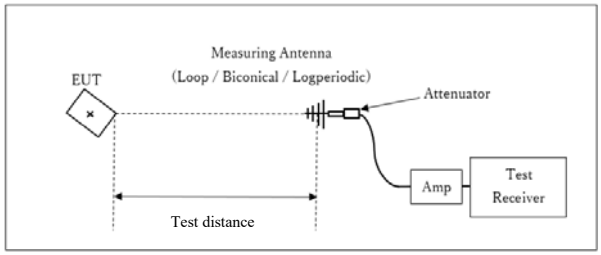


Figure 3: Test Setup

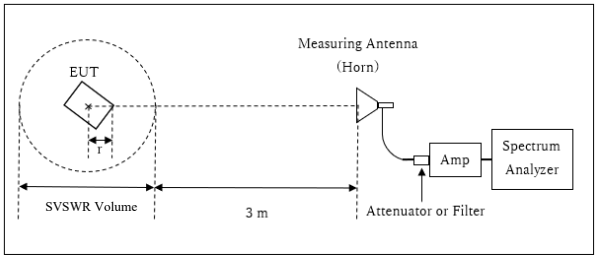
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

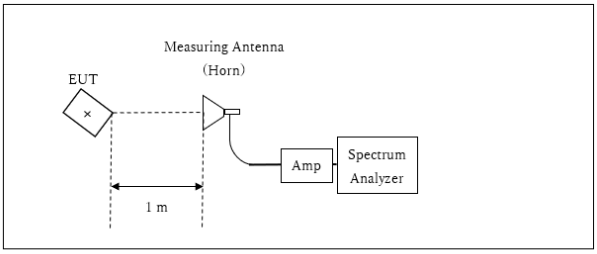


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.98 m / 3.0 m) = 2.46 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.98 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.02 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.

Antenna polarization	Carrier	Spurious (Below 30 MHz)	Spurious (30 MHz to 1 GHz)	Spurious (1 GHz to 2.8 GHz)	Spurious (2.8 GHz to 10 GHz)	Spurious (10 GHz to 18 GHz)	Spurious (18 GHz to 26.5 GHz)
Horizontal	X	X	X	X	X	Y	Z
Vertical	Z	X	X	Z	Y	X	X

Test results are rounded off and limit are rounded down, so some differences might be observed.
There was no noise detection for below 30 MHz.

Measurement Range : 9 kHz 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
6 dB 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 6 dB 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 30 MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately and the noise was detected as shown in the chart, and therefore, Radiated Emission below 30 MHz was performed.
*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 : 2024/07/31

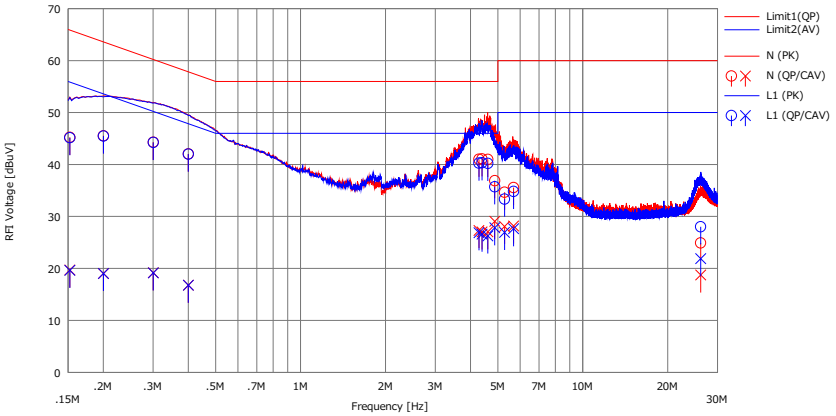
Mode : Tx_11g_2437MHz

Power : DC 3.3 V (AC 120 V / 60 Hz)
Temp./Humi. : 25 deg.C / 35 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Takahiro Suzuki



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	0.15223	29.81	4.30	15.41	45.22	19.71	65.88	55.88	20.6	36.1	N	
2	0.20030	30.11	3.61	15.42	45.53	19.03	63.60	53.60	18.0	34.5	N	
3	0.30083	28.86	3.74	15.44	44.30	19.18	60.22	50.22	15.9	31.0	N	
4	0.40030	26.61	1.35	15.44	42.05	16.79	57.85	47.85	15.8	31.0	N	
5	4.28703	25.34	11.62	15.67	41.01	27.29	56.00	46.00	14.9	18.7	N	
6	4.39499	25.42	11.36	15.68	41.10	27.04	56.00	46.00	14.9	18.9	N	
7	4.60957	25.28	11.37	15.69	40.97	27.06	56.00	46.00	15.0	18.9	N	
8	4.87703	21.17	13.35	15.71	36.88	29.06	56.00	46.00	19.1	16.9	N	
9	5.28305	18.93	12.36	15.73	34.66	28.09	60.00	50.00	25.3	21.9	N	
10	5.68348	19.81	12.41	15.76	35.57	28.17	60.00	50.00	24.4	21.8	N	
11	26.17107	8.33	2.17	16.58	24.91	18.75	60.00	50.00	35.0	31.2	N	
12	0.15223	29.74	4.22	15.42	45.16	19.64	65.88	55.88	20.7	36.2	L1	
13	0.20030	30.05	3.60	15.43	45.48	19.03	63.60	53.60	18.1	34.5	L1	
14	0.30083	28.81	3.70	15.45	44.26	19.15	60.22	50.22	15.9	31.0	L1	
15	0.40030	26.56	1.33	15.45	42.01	16.78	57.85	47.85	15.8	31.0	L1	
16	4.28703	24.61	11.22	15.66	40.27	26.88	56.00	46.00	15.7	19.1	L1	
17	4.39499	24.68	10.91	15.67	40.35	26.58	56.00	46.00	15.6	19.4	L1	
18	4.60957	24.54	10.59	15.68	40.22	26.27	56.00	46.00	15.7	19.7	L1	
19	4.87703	20.01	12.12	15.70	35.71	27.82	56.00	46.00	20.2	18.1	L1	
20	5.28305	17.63	11.21	15.71	33.34	26.92	60.00	50.00	26.6	23.0	L1	
21	5.68348	19.07	11.90	15.74	34.81	27.64	60.00	50.00	25.1	22.3	L1	
22	26.17107	11.77	5.63	16.26	28.03	21.89	60.00	50.00	31.9	28.1	L1	

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

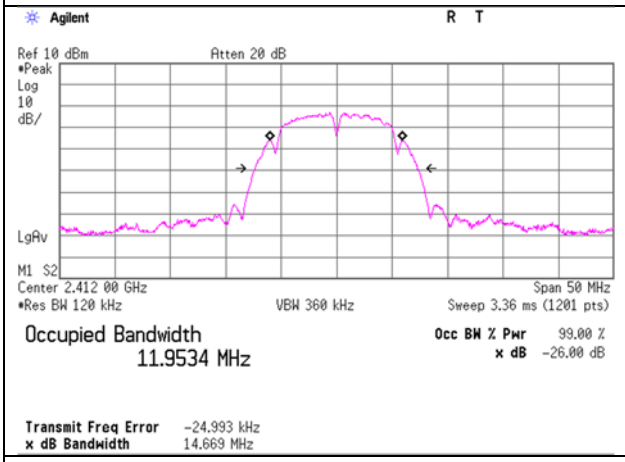
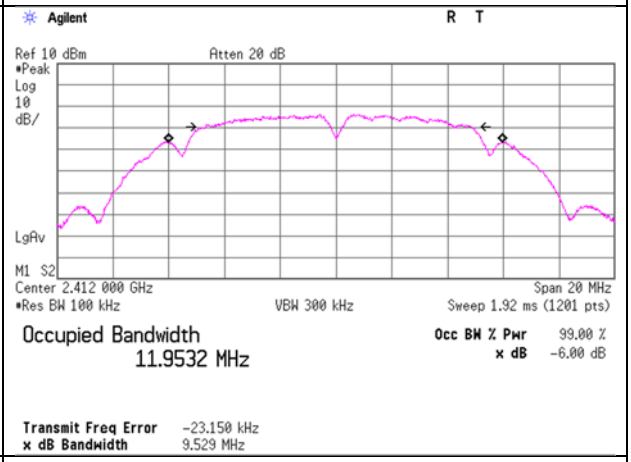
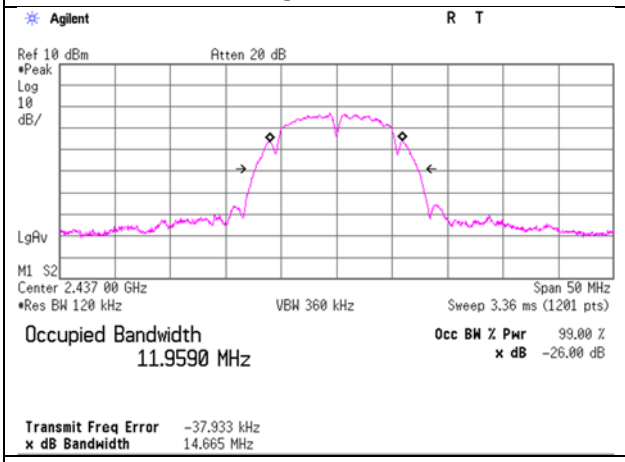
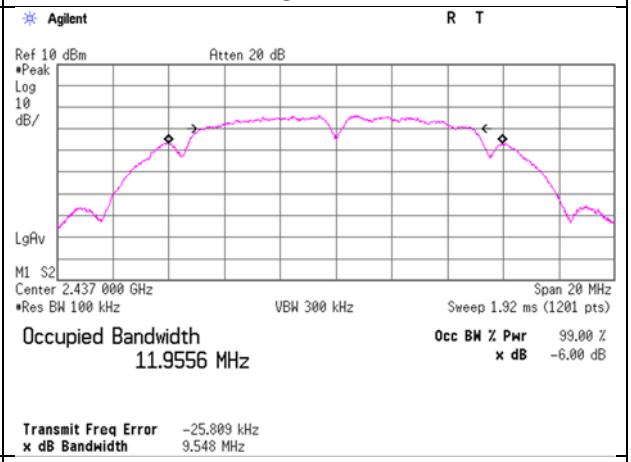
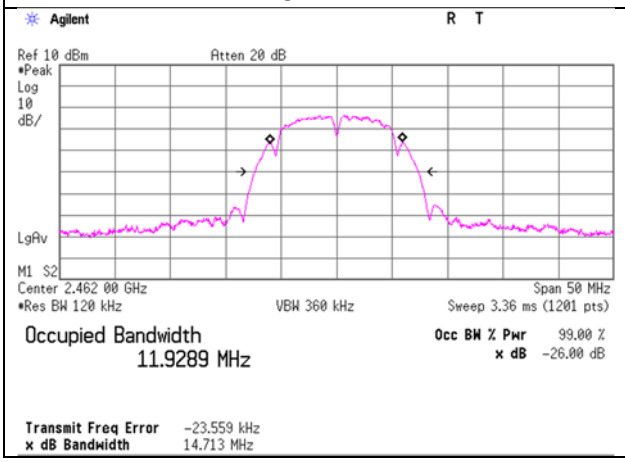
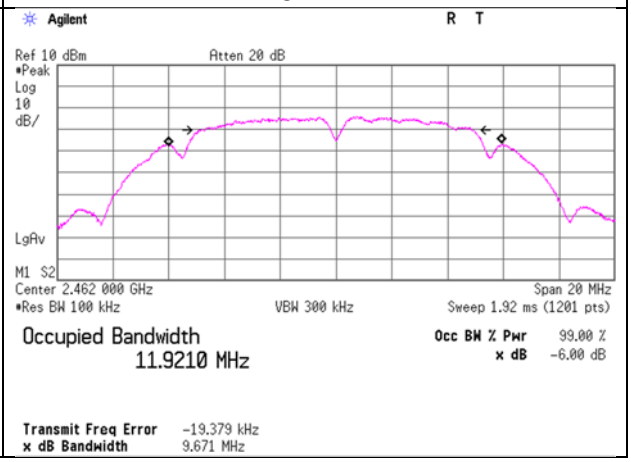
99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Shiro Kobayashi
Mode	Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
11b	2412	11953.4	9.529	> 0.5000
	2437	***11959.0***	9.548	> 0.5000
	2462	11928.9	9.671	> 0.5000
11g	2412	16567.0	16.477	> 0.5000
	2437	***16587.1***	16.487	> 0.5000
	2462	16570.6	16.486	> 0.5000
11n-20	2412	17630.4	17.604	> 0.5000
	2437	***17646.5***	17.603	> 0.5000
	2462	17628.7	17.635	> 0.5000

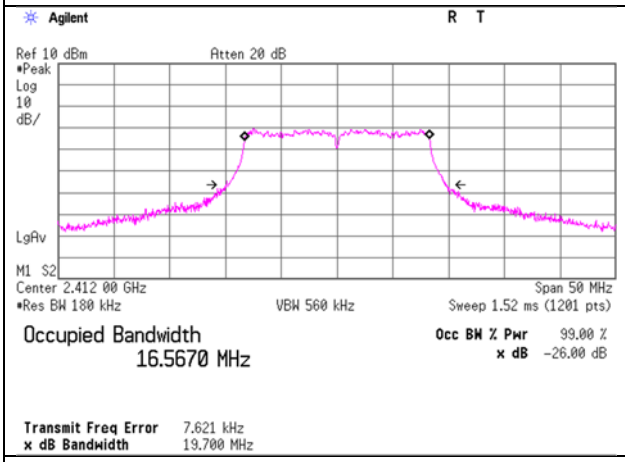
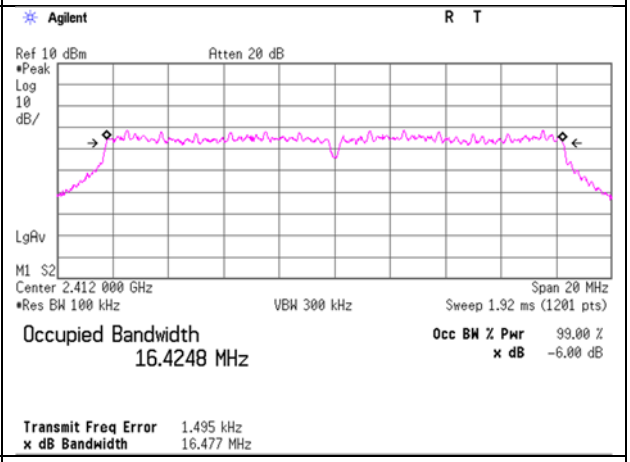
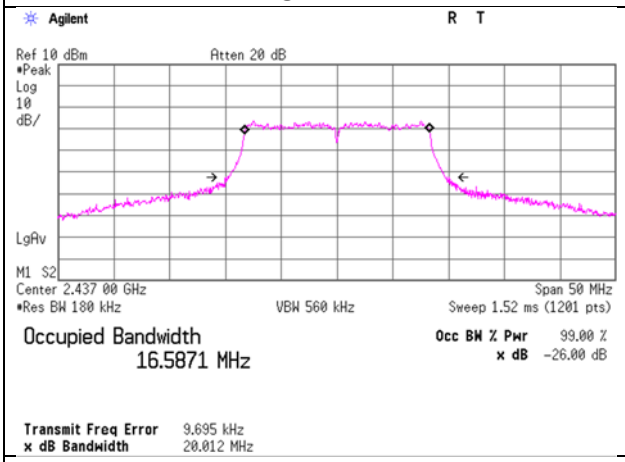
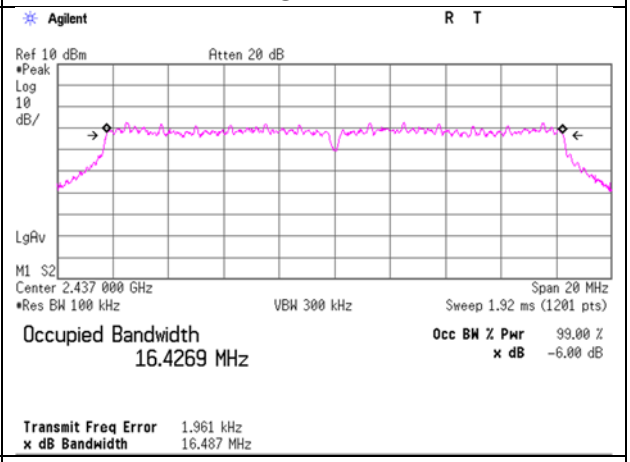
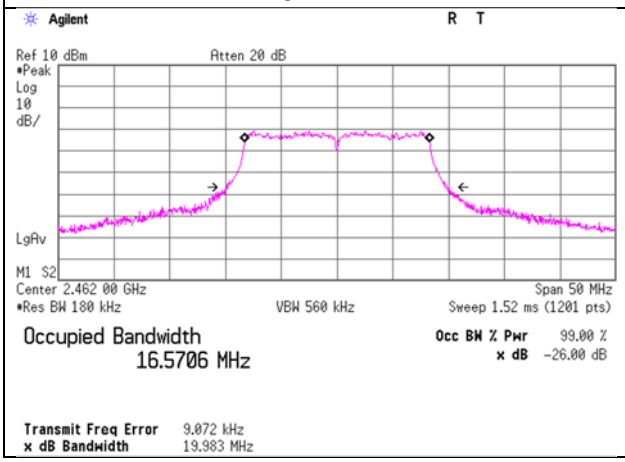
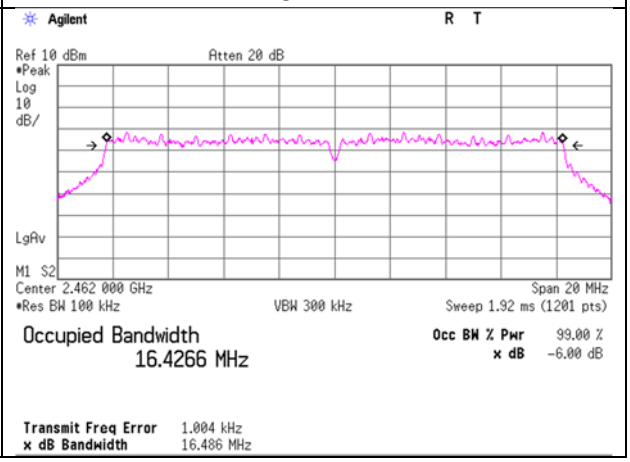
99 % Occupied Bandwidth and 6 dB Bandwidth

11b

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

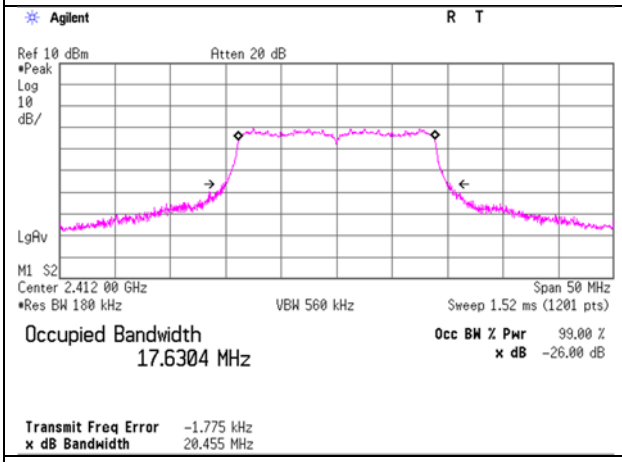
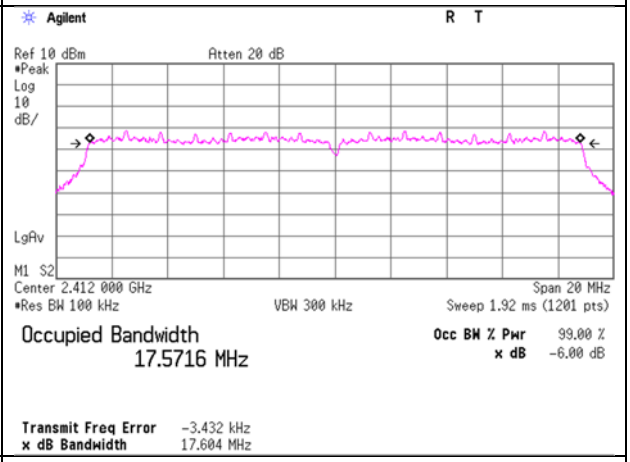
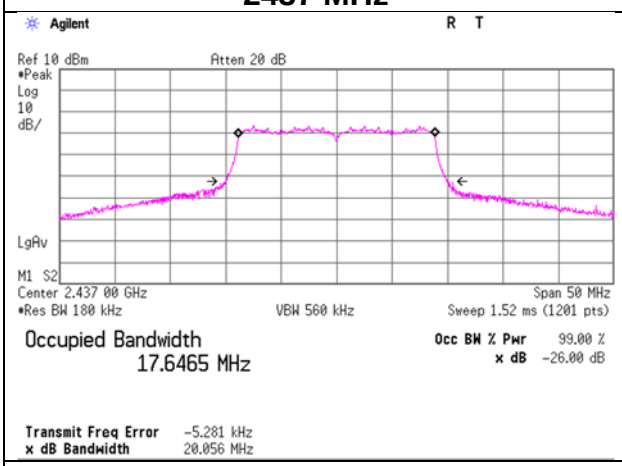
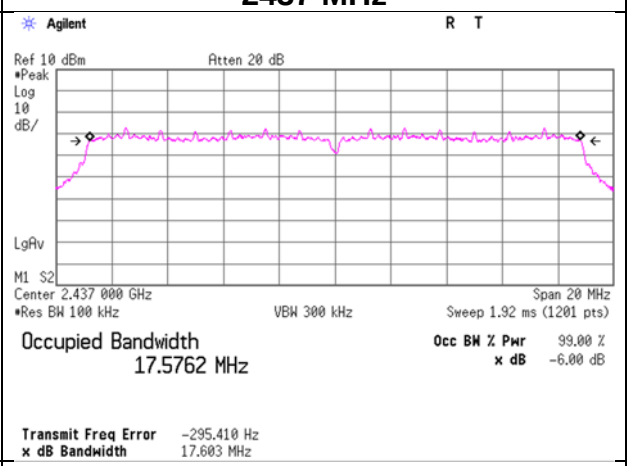
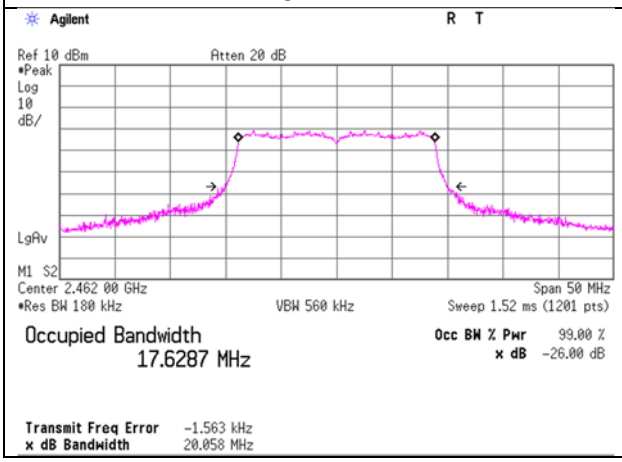
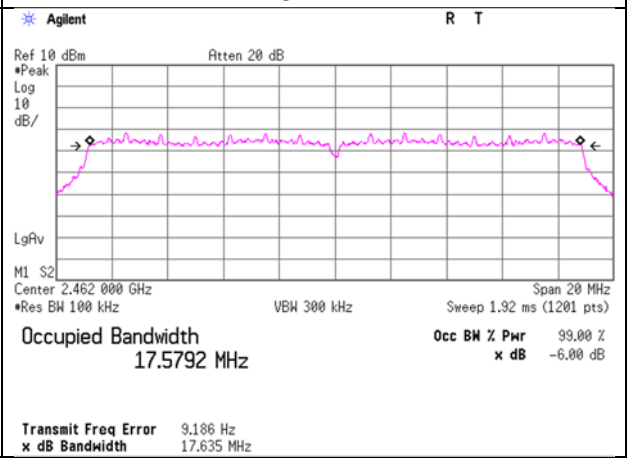
99 % Occupied Bandwidth and 6 dB Bandwidth

11g

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

99 % Occupied Bandwidth and 6 dB Bandwidth

11n-20

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 17, 2024	July 3, 2024
Temperature / Humidity	26 deg. C / 48 % RH	24 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Yosuke Murakami
Mode	Tx 11b	

				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	0.10	1.00	20.24	***21.34***	***136.14***	30.00	1000	8.66	2.51	***23.85***	***242.66***	36.02	4000	12.17
2437	-0.07	1.00	20.24	21.17	130.92	30.00	1000	8.83	2.51	23.68	233.35	36.02	4000	12.34
2462	-0.19	1.01	20.25	21.07	127.94	30.00	1000	8.93	2.51	23.58	228.03	36.02	4000	12.44

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

2412 MHz

Rate [Mbps]	Reading [dBm]	Remark
1	0.08	-
2	0.10	*
5.5	0.01	-
11	0.06	-

*: 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 17, 2024
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11g

				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	0.40	1.00	20.24	21.64	145.88	30.00	1000	8.36	2.51	24.15	260.02	36.02	4000	11.87
2437	0.76	1.00	20.24	***22.00***	***158.49***	30.00	1000	8.00	2.51	***24.51***	***282.49***	36.02	4000	11.51
2462	-0.26	1.01	20.25	21.00	125.89	30.00	1000	9.00	2.51	23.51	224.39	36.02	4000	12.51

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

2412 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	0.30	-
9	-0.18	-
12	0.07	-
18	-0.06	-
24	0.40	*
36	0.06	-
48	-0.16	-
54	-0.20	-

*: 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 17, 2024
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11n-20

				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	0.74	1.00	20.24	21.98	157.76	30.00	1000	8.02	2.51	24.49	281.19	36.02	4000	11.53
2437	0.75	1.00	20.24	***21.99***	***158.12***	30.00	1000	8.01	2.51	***24.50***	***281.84***	36.02	4000	11.52
2462	0.53	1.01	20.25	21.79	151.01	30.00	1000	8.21	2.51	24.30	269.15	36.02	4000	11.72

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

2412 MHz

MCS Number	Reading [dBm]	Remark
0	-0.09	-
1	0.21	-
2	0.74	*
3	0.59	-
4	0.22	-
5	0.39	-
6	0.27	-
7	0.06	-

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

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	June 17, 2024	July 3, 2024
Temperature / Humidity	26 deg. C / 48 % RH	24 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Yosuke Murakami
Mode	Tx	

11b **2 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	-4.19	1.00	20.24	***17.05***	***50.70***	0.00	***17.05***	***50.70***
2437	-4.37	1.00	20.24	16.87	48.64	0.00	16.87	48.64
2462	-4.52	1.01	20.25	16.74	47.21	0.00	16.74	47.21

11g **54 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	-10.65	1.00	20.24	10.59	11.46	0.00	10.59	11.46
2437	-6.85	1.00	20.24	***14.39***	***27.48***	0.00	***14.39***	***27.48***
2462	-10.93	1.01	20.25	10.33	10.79	0.00	10.33	10.79

11n-20 **MCS 7**

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	-10.42	1.00	20.24	10.82	12.08	0.00	10.82	12.08
2437	-6.65	1.00	20.24	***14.59***	***28.77***	0.00	***14.59***	***28.77***
2462	-10.75	1.01	20.25	10.51	11.25	0.00	10.51	11.25

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor
This measurement was performed only on the on time using the gate function of power meter.

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	June 17, 2024	July 3, 2024
Temperature / Humidity	26 deg. C / 48 % RH	24 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Yosuke Murakami
Mode	Tx	

2412 MHz

Mode	Rate Mbps	Reading [dBm]	Remarks
11b	1	-4.21	-
	2	-4.19	*
	5.5	-5.15	-
	11	-5.18	-

* Worst rate
All comparison were carried out on same frequency and measurement factors.
This measurement was performed only on the on time using the gate function of power meter.

2412 MHz

Mode	Rate Mbps	Reading [dBm]	Remarks
11g	6	-10.66	-
	9	-10.71	-
	12	-10.69	-
	18	-10.68	-
	24	-10.69	-
	36	-10.67	-
	48	-10.69	-
	54	-10.65	*

* Worst rate
All comparison were carried out on same frequency and measurement factors.
This measurement was performed only on the on time using the gate function of power meter.

2412 MHz

Mode	MCS Index	Reading [dBm]	Remarks
11n-20	0	-10.50	-
	1	-10.50	-
	2	-10.49	-
	3	-10.47	-
	4	-10.46	-
	5	-10.43	-
	6	-10.43	-
	7	-10.42	*

* Worst rate
All comparison were carried out on same frequency and measurement factors.
This measurement was performed only on the on time using the gate function of power meter.

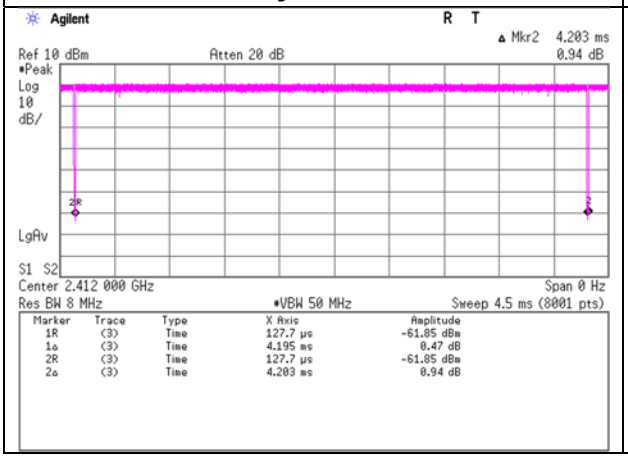
Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Shiro Kobayashi
Mode	Tx

11b 2 Mbps

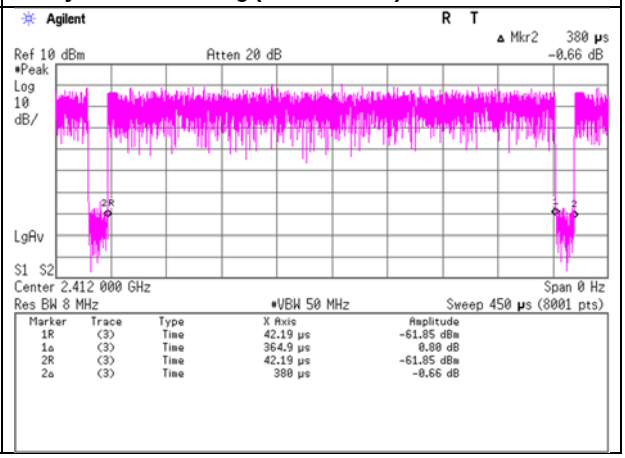
Tx on / (Tx on + Tx off) =	0.998
Tx on / (Tx on + Tx off) * 100 =	99.8 %

Duty > 98 %



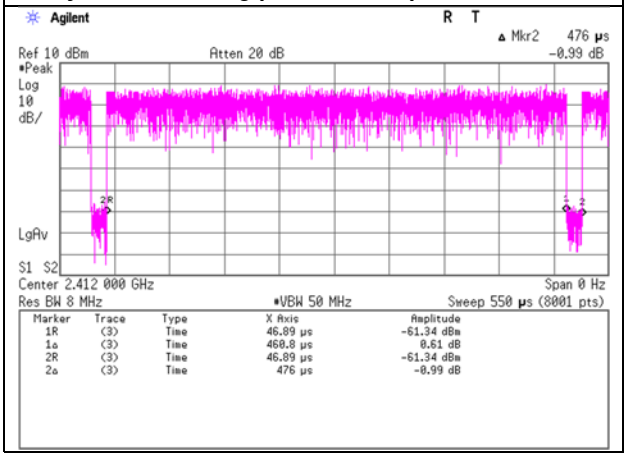
11g 24 Mbps

Tx on / (Tx on + Tx off) =	0.960
Tx on / (Tx on + Tx off) * 100 =	96.0 %
Duty factor = 20 * log (0.38 / 0.3649) =	0.36 dB



11n-20 MCS 2

Tx on / (Tx on + Tx off) =	0.968
Tx on / (Tx on + Tx off) * 100 =	96.8 %
Duty factor = 20 * log (0.476 / 0.4608) =	0.29 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 3	SAC 3	SAC 3	SAC 3
Date	August 25, 2024	August 25, 2024	July 23, 2024	August 25, 2024
Temperature / Humidity	23 deg. C / 42 % RH	23 deg. C / 42 % RH	24 deg. C / 39 % RH	23 deg. C / 42 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Yuta Shiba	Shiro Kobayashi
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 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.	2386.961	PK	56.76	27.80	14.55	41.55	2.46	60.02	73.9	13.8	192	98	-
Hori.	2390.000	PK	56.77	27.79	14.55	41.55	2.46	60.02	73.9	13.8	192	98	-
Hori.	4824.000	PK	50.13	31.28	7.36	42.82	2.46	48.41	73.9	25.4	116	76	-
Hori.	7236.000	PK	53.44	36.93	8.89	43.29	2.46	58.43	73.9	15.4	147	1	-
Hori.	9648.000	PK	50.92	38.63	10.21	43.01	2.46	59.21	73.9	14.6	143	338	-
Hori.	12060.000	PK	61.06	38.51	12.26	42.16	-9.54	60.13	73.9	13.7	144	325	-
Hori.	14472.000	PK	56.22	39.25	13.86	41.42	-9.54	58.37	73.9	15.5	133	296	-
Hori.	19296.000	PK	46.83	40.30	13.72	47.79	-9.54	43.52	73.9	30.3	180	152	-
Hori.	24120.000	PK	46.16	40.07	15.37	46.90	-9.54	45.16	73.9	28.7	174	280	-
Hori.	2386.961	AV	47.68	27.80	14.55	41.55	2.46	50.94	53.9	2.9	192	98	-
Hori.	2390.000	AV	45.60	27.79	14.55	41.55	2.46	48.85	53.9	5.0	192	98	-
Hori.	4824.000	AV	38.65	31.28	7.36	42.82	2.46	36.93	53.9	16.9	116	76	-
Hori.	7236.000	AV	45.51	36.93	8.89	43.29	2.46	50.50	53.9	3.4	147	1	-
Hori.	9648.000	AV	39.34	38.63	10.21	43.01	2.46	47.63	53.9	6.2	143	338	-
Hori.	12060.000	AV	53.11	38.51	12.26	42.16	-9.54	52.18	53.9	1.7	144	325	-
Hori.	14472.000	AV	50.66	39.25	13.86	41.42	-9.54	52.81	53.9	**1.0**	133	296	-
Hori.	19296.000	AV	40.03	40.30	13.72	47.79	-9.54	36.72	53.9	17.1	180	152	-
Hori.	24120.000	AV	38.60	40.07	15.37	46.90	-9.54	37.60	53.9	16.3	174	280	-
Vert.	2385.360	PK	59.29	27.80	14.54	41.55	2.46	62.54	73.9	11.3	100	359	-
Vert.	2390.000	PK	57.14	27.79	14.55	41.55	2.46	60.39	73.9	13.5	150	359	-
Vert.	4824.000	PK	50.38	31.28	7.36	42.82	2.46	48.66	73.9	25.2	109	254	-
Vert.	7236.000	PK	54.25	36.93	8.89	43.29	2.46	59.24	73.9	14.6	110	35	-
Vert.	9648.000	PK	52.05	38.63	10.21	43.01	2.46	60.34	73.9	13.5	245	124	-
Vert.	12060.000	PK	54.32	38.51	12.26	42.16	-9.54	53.39	73.9	20.5	132	327	-
Vert.	14472.000	PK	56.18	39.25	13.86	41.42	-9.54	58.33	73.9	15.5	127	75	-
Vert.	19296.000	PK	46.70	40.30	13.72	47.79	-9.54	43.39	73.9	30.5	137	302	-
Vert.	24120.000	PK	44.87	40.07	15.37	46.90	-9.54	43.87	73.9	30.0	137	297	-
Vert.	2385.360	AV	48.31	27.80	14.54	41.55	2.46	51.56	53.9	2.3	100	359	-
Vert.	2390.000	AV	43.63	27.79	14.55	41.55	2.46	46.88	53.9	7.0	150	359	-
Vert.	4824.000	AV	39.66	31.28	7.36	42.82	2.46	37.94	53.9	15.9	109	254	-
Vert.	7236.000	AV	43.31	36.93	8.89	43.29	2.46	48.30	53.9	5.6	110	35	-
Vert.	9648.000	AV	38.80	38.63	10.21	43.01	2.46	47.09	53.9	6.8	245	124	-
Vert.	12060.000	AV	44.05	38.51	12.26	42.16	-9.54	43.12	53.9	10.7	132	327	-
Vert.	14472.000	AV	50.14	39.25	13.86	41.42	-9.54	52.29	53.9	1.6	127	75	-
Vert.	19296.000	AV	40.86	40.30	13.72	47.79	-9.54	37.55	53.9	16.3	137	302	-
Vert.	24120.000	AV	36.00	40.07	15.37	46.90	-9.54	35.00	53.9	18.9	137	297	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

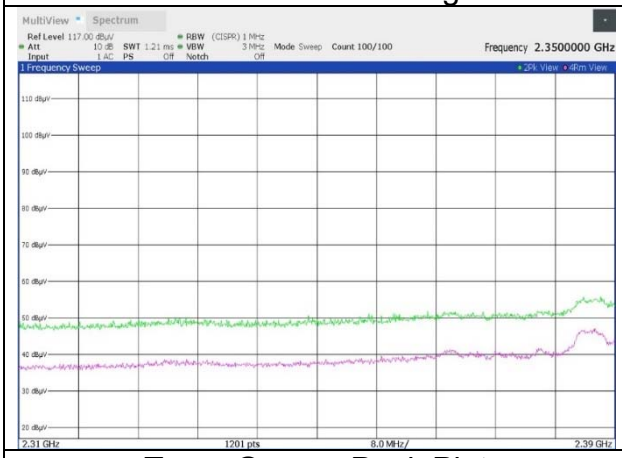
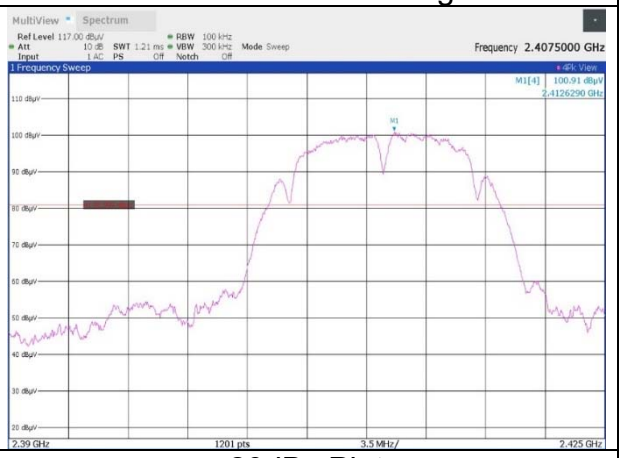
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

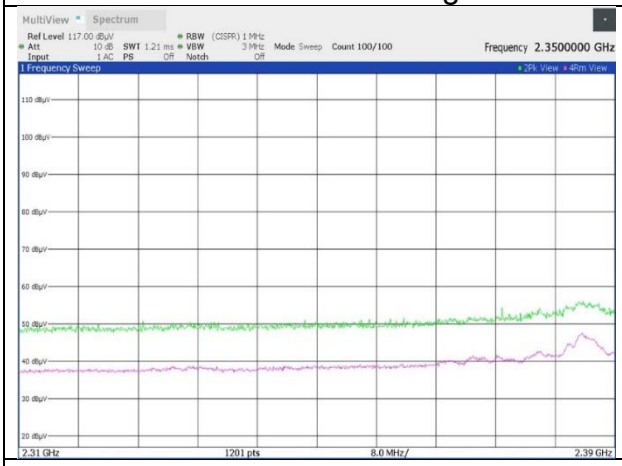
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	100.91	27.76	14.58	41.56	2.46	104.15	-	-	Carrier
Hori.	2397.985	PK	57.59	27.77	14.57	41.56	2.46	60.83	84.1	23.2	-
Hori.	2400.000	PK	52.22	27.77	14.57	41.56	2.46	55.46	84.1	28.6	-
Vert.	2412.000	PK	101.37	27.76	14.58	41.56	2.46	104.61	-	-	Carrier
Vert.	2397.057	PK	53.41	27.78	14.57	41.56	2.46	56.66	84.6	27.9	-
Vert.	2400.000	PK	48.63	27.77	14.57	41.56	2.46	51.87	84.6	32.7	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	August 25, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shiro Kobayashi
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 3	SAC 3	SAC 3	SAC 3
Date	July 26, 2024	July 26, 2024	July 10, 2024	July 11, 2024
Temperature / Humidity	22 deg. C / 49 % RH	21 deg. C / 45 % RH	23 deg. C / 34 % RH	22 deg. C / 52 % RH
Engineer	Yuta Shiba	Yosuke Murakami	Takahiro Suzuki	Kouki Yamada
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 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	50.24	31.34	7.23	42.82	2.46	48.45	73.9	25.4	117	359	-
Hori.	7311.000	PK	55.00	37.02	8.71	43.34	2.46	59.85	73.9	14.0	100	354	-
Hori.	9748.000	PK	50.82	38.86	10.07	42.94	2.46	59.27	73.9	14.6	116	329	-
Hori.	12185.000	PK	60.13	38.45	12.31	42.03	-9.54	59.32	73.9	14.5	113	276	-
Hori.	14622.000	PK	55.26	39.37	13.84	41.20	-9.54	57.73	73.9	16.1	126	280	-
Hori.	19496.000	PK	46.96	40.27	14.06	47.68	-9.54	44.07	73.9	29.8	123	161	-
Hori.	24370.000	PK	44.53	40.08	15.74	46.97	-9.54	43.84	73.9	30.0	158	205	-
Hori.	4874.000	AV	39.27	31.34	7.23	42.82	2.46	37.48	53.9	16.4	117	359	-
Hori.	7311.000	AV	44.38	37.02	8.71	43.34	2.46	49.23	53.9	4.6	100	354	-
Hori.	9748.000	AV	38.02	38.86	10.07	42.94	2.46	46.47	53.9	7.4	116	329	-
Hori.	12185.000	AV	51.98	38.45	12.31	42.03	-9.54	51.17	53.9	2.7	113	276	-
Hori.	14622.000	AV	48.96	39.37	13.84	41.20	-9.54	51.43	53.9	**2.4**	126	280	-
Hori.	19496.000	AV	39.98	40.27	14.06	47.68	-9.54	37.09	53.9	16.8	123	161	-
Hori.	24370.000	AV	34.55	40.08	15.74	46.97	-9.54	33.86	53.9	20.0	158	205	-
Vert.	4874.000	PK	50.42	31.34	7.23	42.82	2.46	48.63	73.9	25.2	107	3	-
Vert.	7311.000	PK	51.16	37.02	8.71	43.34	2.46	56.01	73.9	17.8	141	38	-
Vert.	9748.000	PK	49.90	38.86	10.07	42.94	2.46	58.35	73.9	15.5	150	0	-
Vert.	12185.000	PK	54.44	38.45	12.31	42.03	-9.54	53.63	73.9	20.2	223	274	-
Vert.	14622.000	PK	53.66	39.37	13.84	41.20	-9.54	56.13	73.9	17.7	123	283	-
Vert.	19496.000	PK	45.07	40.27	14.06	47.68	-9.54	42.18	73.9	31.7	139	123	-
Vert.	24370.000	PK	44.37	40.08	15.74	46.97	-9.54	43.68	73.9	30.2	163	213	-
Vert.	4874.000	AV	38.79	31.34	7.23	42.82	2.46	37.00	53.9	16.9	107	3	-
Vert.	7311.000	AV	39.66	37.02	8.71	43.34	2.46	44.51	53.9	9.3	141	38	-
Vert.	9748.000	AV	36.95	38.86	10.07	42.94	2.46	45.40	53.9	8.5	150	0	Floor noise
Vert.	12185.000	AV	44.26	38.45	12.31	42.03	-9.54	43.45	53.9	10.4	223	274	-
Vert.	14622.000	AV	47.76	39.37	13.84	41.20	-9.54	50.23	53.9	3.6	123	283	-
Vert.	19496.000	AV	36.20	40.27	14.06	47.68	-9.54	33.31	53.9	20.5	139	123	-
Vert.	24370.000	AV	33.91	40.08	15.74	46.97	-9.54	33.22	53.9	20.6	163	213	-

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

Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3	SAC 3	SAC 3	SAC 3
Date	July 26, 2024	July 26, 2024	July 10, 2024	July 11, 2024
Temperature / Humidity	22 deg. C / 49 % RH	21 deg. C / 45 % RH	23 deg. C / 34 % RH	22 deg. C / 52 % RH
Engineer	Yuta Shiba	Yosuke Murakami	Takahiro Suzuki	Kouki Yamada
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 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	54.04	27.67	14.68	41.58	2.46	57.27	73.9	16.6	143	106	-
Hori.	3282.387	PK	55.79	28.32	6.51	41.95	2.46	51.13	73.9	22.7	155	131	-
Hori.	4924.000	PK	52.17	31.43	7.25	42.82	2.46	50.49	73.9	23.4	132	353	-
Hori.	7386.000	PK	55.06	37.12	8.74	43.39	2.46	59.99	73.9	13.9	104	331	-
Hori.	9848.000	PK	49.65	38.88	10.13	42.88	2.46	58.24	73.9	15.6	150	0	-
Hori.	12310.000	PK	58.79	38.27	12.38	41.90	-9.54	58.00	73.9	15.9	117	280	-
Hori.	14772.000	PK	53.99	39.43	13.83	40.95	-9.54	56.76	73.9	17.1	137	289	-
Hori.	19696.000	PK	44.26	40.20	14.09	47.64	-9.54	41.37	73.9	32.5	155	153	-
Hori.	24620.000	PK	44.95	40.17	15.86	47.01	-9.54	44.43	73.9	29.4	164	316	-
Hori.	2483.500	AV	44.69	27.67	14.68	41.58	2.46	47.92	53.9	5.9	143	106	-
Hori.	3282.387	AV	50.36	28.32	6.51	41.95	2.46	45.70	53.9	8.2	155	131	-
Hori.	4924.000	AV	43.06	31.43	7.25	42.82	2.46	41.38	53.9	12.5	132	353	-
Hori.	7386.000	AV	45.23	37.12	8.74	43.39	2.46	50.16	53.9	3.7	104	331	-
Hori.	9848.000	AV	36.77	38.88	10.13	42.88	2.46	45.36	53.9	8.5	150	0	Floor noise
Hori.	12310.000	AV	50.04	38.27	12.38	41.90	-9.54	49.25	53.9	4.6	117	280	-
Hori.	14772.000	AV	48.08	39.43	13.83	40.95	-9.54	50.85	53.9	**3.0**	137	289	-
Hori.	19696.000	AV	34.79	40.20	14.09	47.64	-9.54	31.90	53.9	22.0	155	153	-
Hori.	24620.000	AV	33.77	40.17	15.86	47.01	-9.54	33.25	53.9	20.6	164	316	-
Vert.	2483.500	PK	52.91	27.67	14.68	41.58	2.46	56.14	73.9	17.7	152	339	-
Vert.	3282.387	PK	54.45	28.32	6.51	41.95	2.46	49.79	73.9	24.1	122	0	-
Vert.	4924.000	PK	51.37	31.43	7.25	42.82	2.46	49.69	73.9	24.2	100	2	-
Vert.	7386.000	PK	51.96	37.12	8.74	43.39	2.46	56.89	73.9	17.0	155	251	-
Vert.	9848.000	PK	49.64	38.88	10.13	42.88	2.46	58.23	73.9	15.6	150	0	-
Vert.	12310.000	PK	54.11	38.27	12.38	41.90	-9.54	53.32	73.9	20.5	131	318	-
Vert.	14772.000	PK	53.15	39.43	13.83	40.95	-9.54	55.92	73.9	17.9	119	74	-
Vert.	19696.000	PK	44.74	40.20	14.09	47.64	-9.54	41.85	73.9	32.0	122	124	-
Vert.	24620.000	PK	46.05	40.17	15.86	47.01	-9.54	45.53	73.9	28.3	139	359	-
Vert.	2483.500	AV	43.23	27.67	14.68	41.58	2.46	46.46	53.9	7.4	152	339	-
Vert.	3282.387	AV	47.66	28.32	6.51	41.95	2.46	43.00	53.9	10.9	122	0	-
Vert.	4924.000	AV	40.14	31.43	7.25	42.82	2.46	38.46	53.9	15.4	100	2	-
Vert.	7386.000	AV	40.38	37.12	8.74	43.39	2.46	45.31	53.9	8.5	155	251	-
Vert.	9848.000	AV	36.44	38.88	10.13	42.88	2.46	45.03	53.9	8.8	150	0	Floor noise
Vert.	12310.000	AV	44.55	38.27	12.38	41.90	-9.54	43.76	53.9	10.1	131	318	-
Vert.	14772.000	AV	46.04	39.43	13.83	40.95	-9.54	48.81	53.9	5.0	119	74	-
Vert.	19696.000	AV	35.74	40.20	14.09	47.64	-9.54	32.85	53.9	21.0	122	124	-
Vert.	24620.000	AV	37.34	40.17	15.86	47.01	-9.54	36.82	53.9	17.0	139	359	-

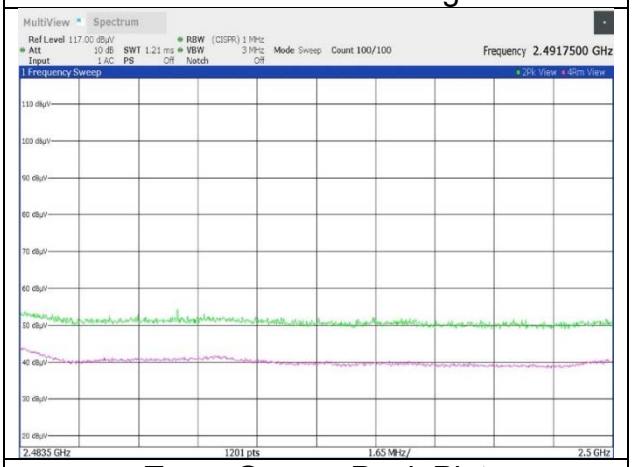
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

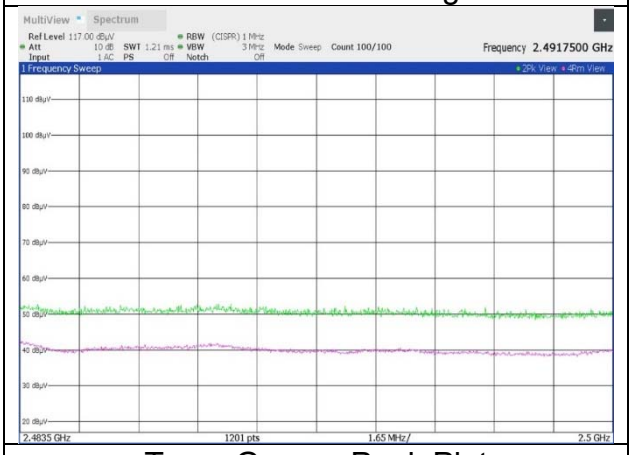
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB

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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
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 3	SAC 3	SAC 3	SAC 3
Date	July 26, 2024	July 26, 2024	July 10, 2024	July 24, 2024
Temperature / Humidity	22 deg. C / 49 % RH	21 deg. C / 45 % RH	23 deg. C / 34 % RH	24 deg. C / 39 % RH
Engineer	Yuta Shiba	Yosuke Murakami	Takahiro Suzuki	Yuta Shiba
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 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	63.11	27.79	14.57	41.55	2.46	66.38	73.9	7.5	140	102	-
Hori.	4824.000	PK	49.72	31.28	7.20	42.82	2.46	47.84	73.9	26.0	150	0	-
Hori.	7236.000	PK	52.52	36.93	8.66	43.29	2.46	57.28	73.9	16.6	136	4	-
Hori.	9648.000	PK	49.50	38.63	10.02	43.01	2.46	57.60	73.9	16.3	150	0	-
Hori.	12060.000	PK	50.42	38.51	12.26	42.16	-9.54	49.49	73.9	24.4	139	331	-
Hori.	14472.000	PK	47.83	39.25	13.86	41.42	-9.54	49.98	73.9	23.9	123	279	-
Hori.	4824.000	AV	36.79	31.28	7.20	42.82	2.46	34.91	53.9	18.9	150	0	Floor noise
Hori.	9648.000	AV	37.37	38.63	10.02	43.01	2.46	45.47	53.9	8.4	150	0	Floor noise
Vert.	2390.000	PK	64.33	27.79	14.57	41.55	2.46	67.60	73.9	**6.3**	152	351	-
Vert.	4824.000	PK	49.21	31.28	7.20	42.82	2.46	47.33	73.9	26.5	150	0	-
Vert.	7236.000	PK	51.18	36.93	8.66	43.29	2.46	55.94	73.9	17.9	143	57	-
Vert.	9648.000	PK	49.59	38.63	10.02	43.01	2.46	57.69	73.9	16.2	100	0	-
Vert.	12060.000	PK	47.96	38.51	12.26	42.16	-9.54	47.03	73.9	26.8	139	10	-
Vert.	14472.000	PK	47.52	39.25	13.86	41.42	-9.54	49.67	73.9	24.2	133	33	-
Vert.	4824.000	AV	36.60	31.28	7.20	42.82	2.46	34.72	53.9	19.1	150	0	Floor noise
Vert.	9648.000	AV	36.20	38.63	10.02	43.01	2.46	44.30	53.9	9.6	100	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	41.68	27.79	14.57	41.55	0.36	2.46	45.31	53.9	8.5	*1)
Hori.	7236.000	AV	39.35	36.93	8.66	43.29	0.36	2.46	44.47	53.9	9.4	-
Hori.	12060.000	AV	41.45	38.51	12.26	42.16	0.36	-9.54	40.88	53.9	13.0	-
Hori.	14472.000	AV	38.72	39.25	13.86	41.42	0.36	-9.54	41.23	53.9	12.6	-
Vert.	2390.000	AV	42.92	27.79	14.57	41.55	0.36	2.46	46.55	53.9	7.3	*1)
Vert.	7236.000	AV	37.51	36.93	8.66	43.29	0.36	2.46	42.63	53.9	11.2	-
Vert.	12060.000	AV	39.19	38.51	12.26	42.16	0.36	-9.54	38.62	53.9	15.2	-
Vert.	14472.000	AV	38.36	39.25	13.86	41.42	0.36	-9.54	40.87	53.9	13.0	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

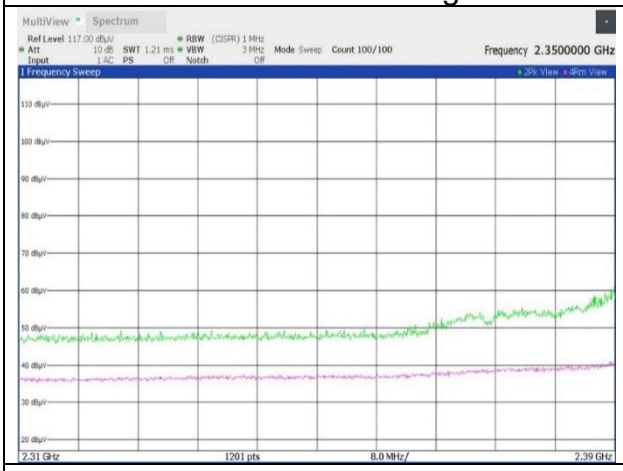
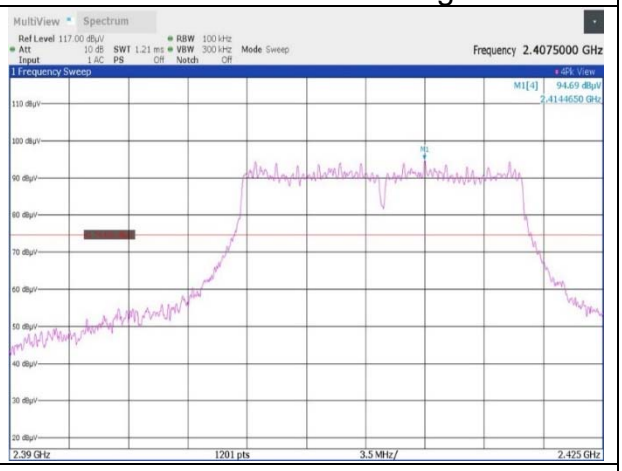
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

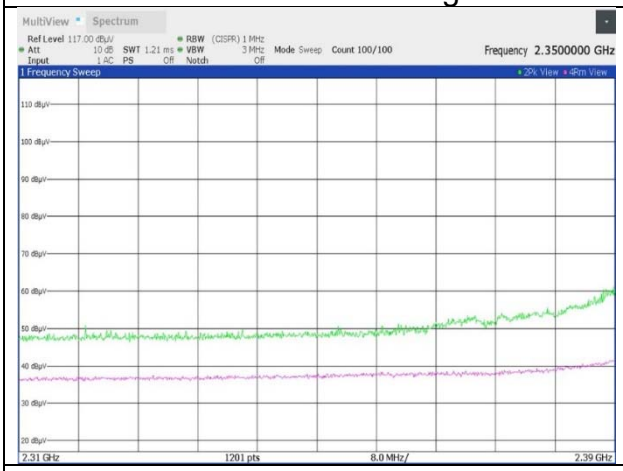
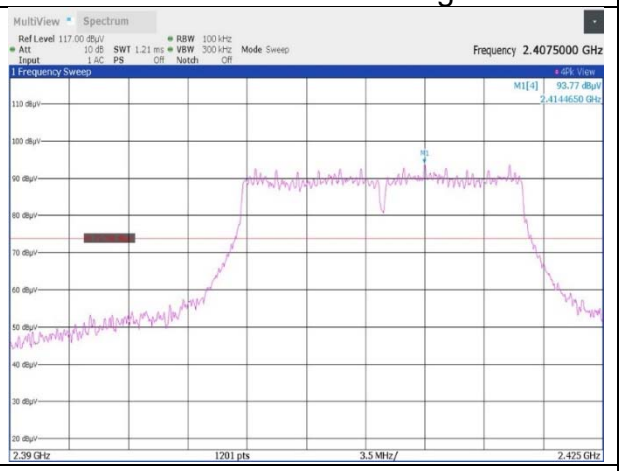
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	94.69	27.76	14.60	41.56	2.46	97.95	-	-	Carrier
Hori.	2400.000	PK	56.32	27.77	14.59	41.56	2.46	59.58	77.9	18.3	-
Vert.	2412.000	PK	93.77	27.76	14.60	41.56	2.46	97.03	-	-	Carrier
Vert.	2400.000	PK	56.49	27.77	14.59	41.56	2.46	59.75	77.0	17.2	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11g 2417 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	61.67	27.79	14.57	41.55	2.46	64.94	73.9	8.9	140	102	-
Vert.	2390.000	PK	62.83	27.79	14.57	41.55	2.46	66.10	73.9	7.8	158	341	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	44.97	27.79	14.57	41.55	0.36	2.46	48.60	53.9	5.3	*1)
Vert.	2390.000	AV	45.22	27.79	14.57	41.55	0.36	2.46	48.85	53.9	**5.0**	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

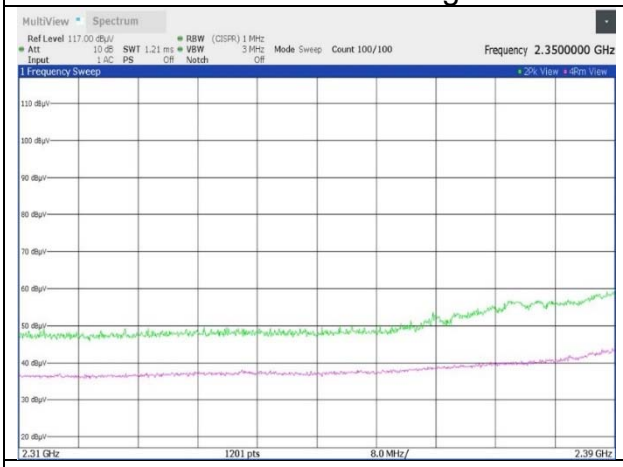
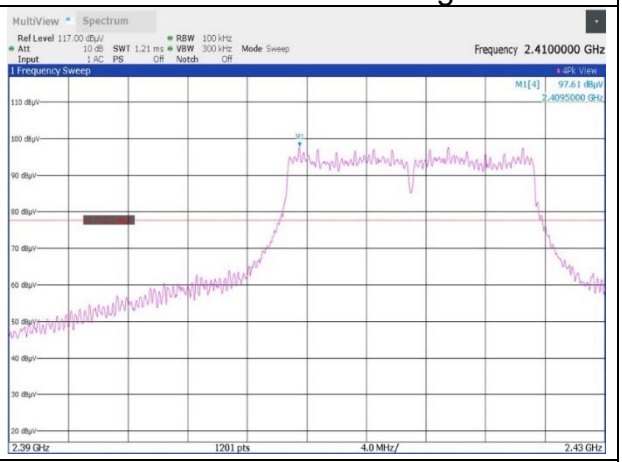
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

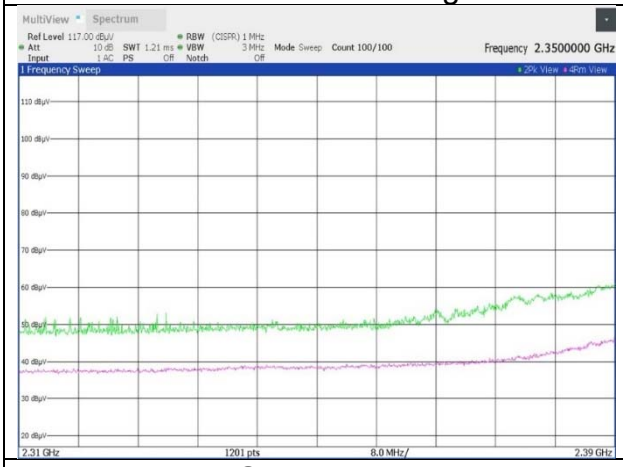
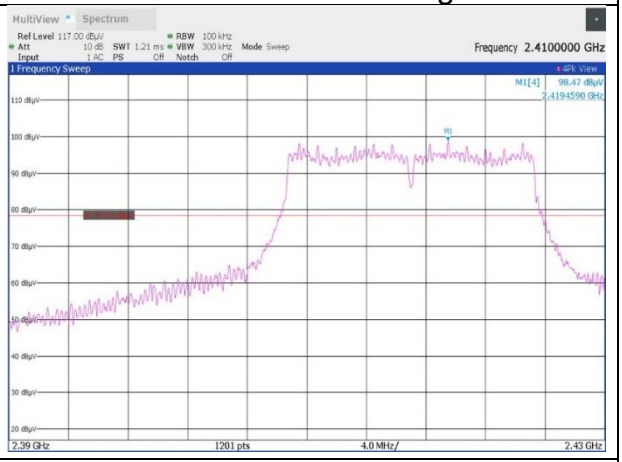
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2417.000	PK	97.61	27.75	14.60	41.56	2.46	100.86	-	-	Carrier
Hori.	2400.000	PK	56.06	27.77	14.59	41.56	2.46	59.32	80.8	21.4	-
Vert.	2417.000	PK	98.47	27.75	14.60	41.56	2.46	101.72	-	-	Carrier
Vert.	2400.000	PK	57.69	27.77	14.59	41.56	2.46	60.95	81.7	20.7	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11g 2417 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11g 2422 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	61.15	27.79	14.57	41.55	2.46	64.42	73.9	9.4	143	102	-
Vert.	2390.000	PK	63.52	27.79	14.57	41.55	2.46	66.79	73.9	7.1	151	342	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	44.68	27.79	14.57	41.55	0.36	2.46	48.31	53.9	5.5	*1)
Vert.	2390.000	AV	45.14	27.79	14.57	41.55	0.36	2.46	48.77	53.9	**5.1**	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

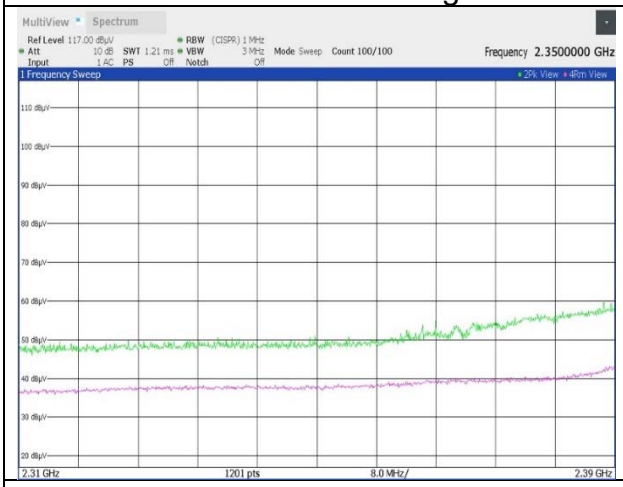
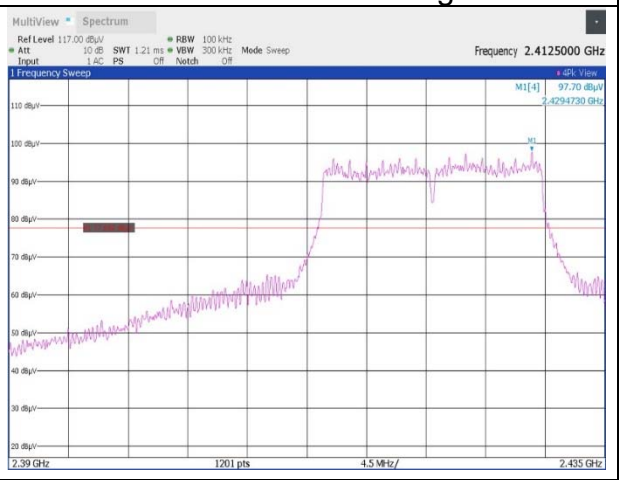
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

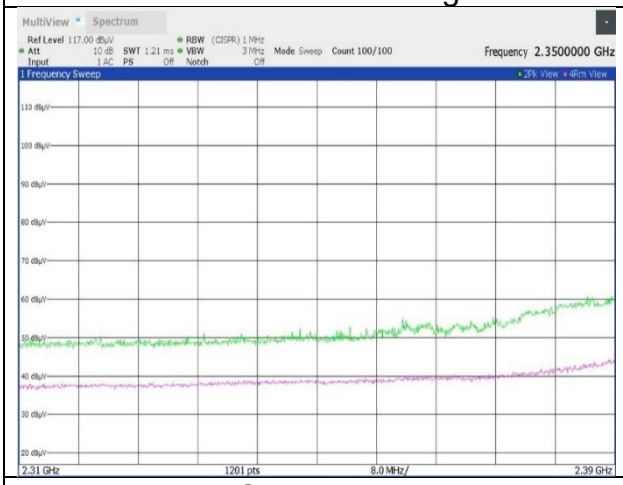
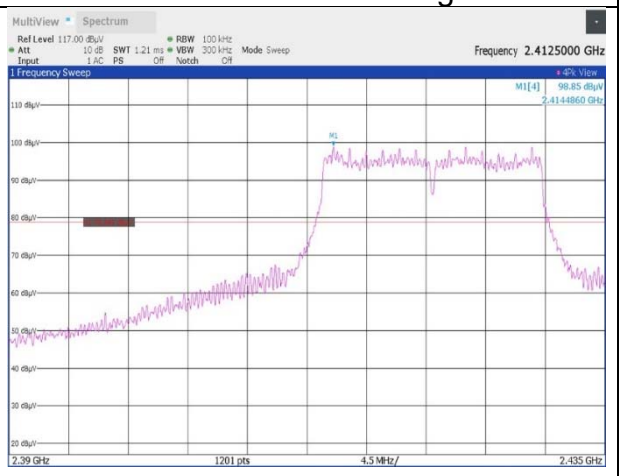
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	97.70	27.75	14.61	41.57	2.46	100.95	-	-	Carrier
Hori.	2400.000	PK	54.65	27.77	14.59	41.56	2.46	57.91	80.9	22.9	-
Vert.	2422.000	PK	98.85	27.75	14.61	41.57	2.46	102.10	-	-	Carrier
Vert.	2400.000	PK	54.91	27.77	14.59	41.56	2.46	58.17	82.1	23.9	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11g 2422 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 1	SAC 3	SAC 3
Date	July 30, 2024	July 26, 2024	July 26, 2024
Temperature / Humidity	24 deg. C / 51 % RH	22 deg. C / 49 % RH	21 deg. C / 45 % RH
Engineer	Yosuke Murakami	Yuta Shiba	Yosuke Murakami
	(Below 30 MHz)		
	(30 MHz-to 1,000 MHz)	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)

SAC 3	SAC 3
July 23, 2024	July 24, 2024
24 deg. C / 39 % RH	24 deg. C / 39 % RH
Yuta Shiba	Yuta Shiba
(10 GHz to 18 GHz)	(18 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.	167.992	QP	35.30	15.66	9.00	31.80	0.00	28.16	43.5	15.3	267	126	-
Hori.	4874.000	PK	49.50	31.34	7.23	42.82	2.46	47.71	73.9	26.1	150	0	-
Hori.	7311.000	PK	53.58	37.02	8.71	43.34	2.46	58.43	73.9	15.4	113	3	-
Hori.	9748.000	PK	49.71	38.86	10.07	42.94	2.46	58.16	73.9	15.7	150	0	-
Hori.	12185.000	PK	53.57	38.45	12.31	42.03	-9.54	52.76	73.9	21.1	135	330	-
Hori.	14622.000	PK	48.87	39.37	13.84	41.20	-9.54	51.34	73.9	22.5	132	277	-
Hori.	4874.000	AV	36.69	31.34	7.23	42.82	2.46	34.90	53.9	19.0	150	0	Floor noise
Hori.	9748.000	AV	36.91	38.86	10.07	42.94	2.46	45.36	53.9	8.5	150	0	Floor noise
Vert.	41.873	QP	34.40	14.12	7.32	31.84	0.00	24.00	40.0	16.0	100	73	-
Vert.	46.696	QP	38.80	12.34	7.43	31.84	0.00	26.73	40.0	13.2	100	71	-
Vert.	60.376	QP	43.20	8.08	7.27	31.84	0.00	26.71	40.0	13.2	100	35	-
Vert.	72.454	QP	46.70	6.30	7.77	31.83	0.00	28.94	40.0	11.0	100	13	-
Vert.	84.404	QP	47.30	7.09	8.43	31.83	0.00	30.99	40.0	9.0	100	167	-
Vert.	98.189	QP	42.50	9.92	8.29	31.82	0.00	28.89	43.5	14.6	100	26	-
Vert.	113.577	QP	41.00	12.39	8.18	31.81	0.00	29.76	43.5	13.7	100	178	-
Vert.	168.006	QP	39.40	15.66	9.00	31.80	0.00	32.26	43.5	11.2	100	24	-
Vert.	181.674	QP	34.20	16.26	8.99	31.80	0.00	27.65	43.5	15.8	100	166	-
Vert.	4874.000	PK	49.65	31.34	7.23	42.82	2.46	47.86	73.9	26.0	150	0	-
Vert.	7311.000	PK	51.52	37.02	8.71	43.34	2.46	56.37	73.9	17.5	107	50	-
Vert.	9748.000	PK	49.94	38.86	10.07	42.94	2.46	58.39	73.9	15.5	150	0	-
Vert.	12185.000	PK	49.48	38.45	12.31	42.03	-9.54	48.67	73.9	25.2	132	22	-
Vert.	14622.000	PK	47.58	39.37	13.84	41.20	-9.54	50.05	73.9	23.8	139	37	-
Vert.	4874.000	AV	36.97	31.34	7.23	42.82	2.46	35.18	53.9	18.7	150	0	Floor noise
Vert.	9748.000	AV	37.14	38.86	10.07	42.94	2.46	45.59	53.9	8.3	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7311.000	AV	42.11	37.02	8.71	43.34	0.36	2.46	47.32	53.9	**6.5**	-
Hori.	12185.000	AV	44.43	38.45	12.31	42.03	0.36	-9.54	43.98	53.9	9.9	-
Hori.	14622.000	AV	39.51	39.37	13.84	41.20	0.36	-9.54	42.34	53.9	11.5	-
Vert.	7311.000	AV	39.26	37.02	8.71	43.34	0.36	2.46	44.47	53.9	9.4	-
Vert.	12185.000	AV	39.92	38.45	12.31	42.03	0.36	-9.54	39.47	53.9	14.4	-
Vert.	14622.000	AV	38.12	39.37	13.84	41.20	0.36	-9.54	40.95	53.9	12.9	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

*No noise was detected below 30 MHz.

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11g 2452 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	63.41	27.67	14.68	41.58	2.46	66.64	73.9	7.2	143	107	-
Vert.	2483.500	PK	63.50	27.67	14.68	41.58	2.46	66.73	73.9	7.1	148	334	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

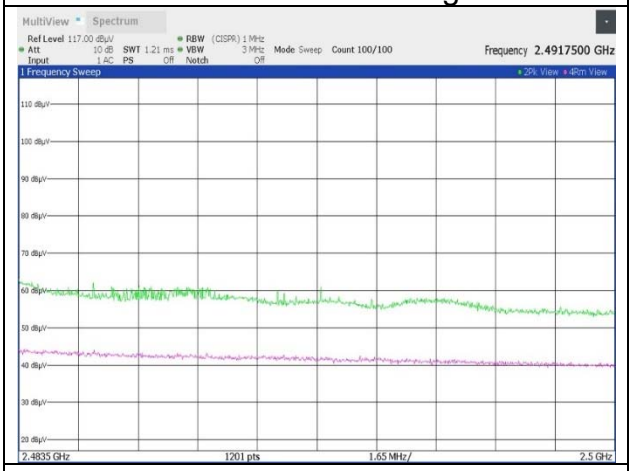
Average measurement value with duty factor

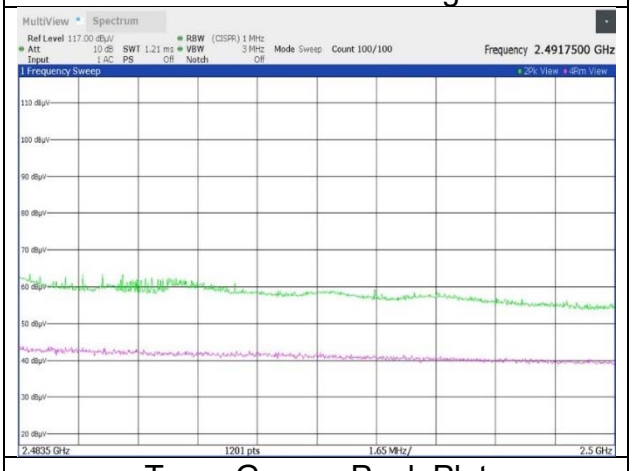
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	45.89	27.67	14.68	41.58	0.36	2.46	49.48	53.9	**4.4**	*1)
Vert.	2483.500	AV	45.16	27.67	14.68	41.58	0.36	2.46	48.75	53.9	5.1	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11g 2452 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11g 2457 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	62.32	27.67	14.68	41.58	2.46	65.55	73.9	8.3	144	105	-
Vert.	2483.500	PK	61.73	27.67	14.68	41.58	2.46	64.96	73.9	8.9	152	339	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

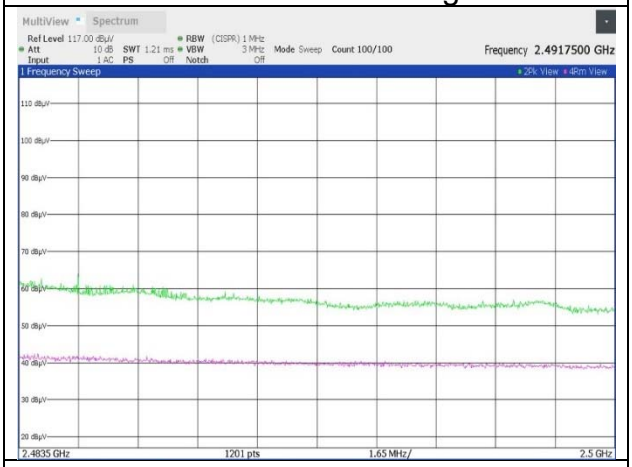
Average measurement value with duty factor

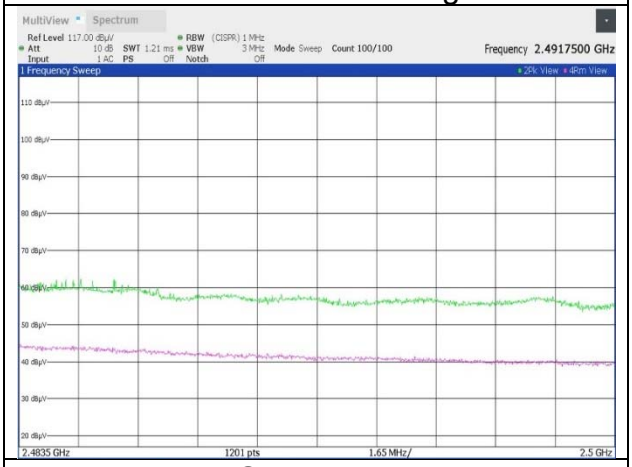
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	43.35	27.67	14.68	41.58	0.36	2.46	46.94	53.9	6.9	*1)
Vert.	2483.500	AV	45.78	27.67	14.68	41.58	0.36	2.46	49.37	53.9	**4.5**	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11g 2457 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 3	SAC 3	SAC 3	SAC 3
Date	July 26, 2024	July 26, 2024	July 23, 2024	July 24, 2024
Temperature / Humidity	22 deg. C / 49 % RH	21 deg. C / 45 % RH	24 deg. C / 39 % RH	24 deg. C / 39 % RH
Engineer	Yuta Shiba	Yosuke Murakami	Yuta Shiba	Yuta Shiba
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 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.	2483.500	PK	62.77	27.67	14.68	41.58	2.46	66.00	73.9	7.9	146	108	-
Hori.	3282.387	PK	51.54	28.32	6.51	41.95	2.46	46.88	73.9	27.0	155	131	-
Hori.	4924.000	PK	49.27	31.43	7.25	42.82	2.46	47.59	73.9	26.3	150	0	-
Hori.	7386.000	PK	51.84	37.12	8.74	43.39	2.46	56.77	73.9	17.1	111	13	-
Hori.	9848.000	PK	49.08	38.88	10.13	42.88	2.46	57.67	73.9	16.2	150	0	-
Hori.	12310.000	PK	49.11	38.27	12.38	41.90	-9.54	48.32	73.9	25.5	137	331	-
Hori.	14772.000	PK	46.93	39.43	13.83	40.95	-9.54	49.70	73.9	24.2	133	275	-
Hori.	4924.000	AV	36.47	31.43	7.25	42.82	2.46	34.79	53.9	19.1	150	0	Floor noise
Hori.	9848.000	AV	37.12	38.88	10.13	42.88	2.46	45.71	53.9	8.1	150	0	Floor noise
Vert.	2483.500	PK	62.77	27.67	14.68	41.58	2.46	66.00	73.9	7.9	156	335	-
Vert.	3282.387	PK	51.49	28.32	6.51	41.95	2.46	46.83	73.9	27.0	122	0	-
Vert.	4924.000	PK	49.13	31.43	7.25	42.82	2.46	47.45	73.9	26.4	150	0	-
Vert.	7386.000	PK	50.49	37.12	8.74	43.39	2.46	55.42	73.9	18.4	125	46	-
Vert.	9848.000	PK	49.19	38.88	10.13	42.88	2.46	57.78	73.9	16.1	150	0	-
Vert.	12310.000	PK	48.11	38.27	12.38	41.90	-9.54	47.32	73.9	26.5	135	11	-
Vert.	14772.000	PK	46.50	39.43	13.83	40.95	-9.54	49.27	73.9	24.6	133	52	-
Vert.	4924.000	AV	36.29	31.43	7.25	42.82	2.46	34.61	53.9	19.2	150	0	Floor noise
Vert.	9848.000	AV	36.99	38.88	10.13	42.88	2.46	45.58	53.9	8.3	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

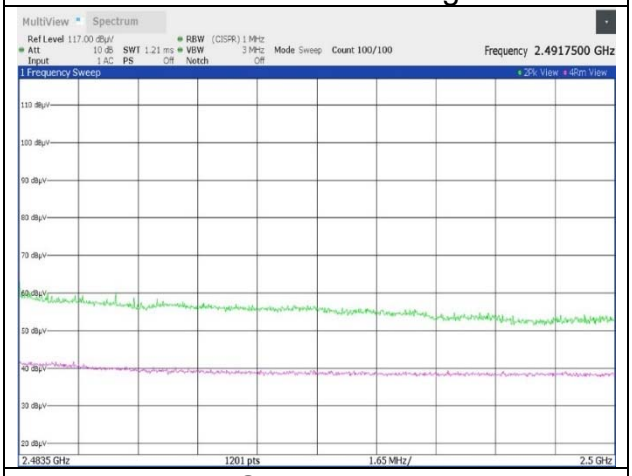
Average measurement value with duty factor

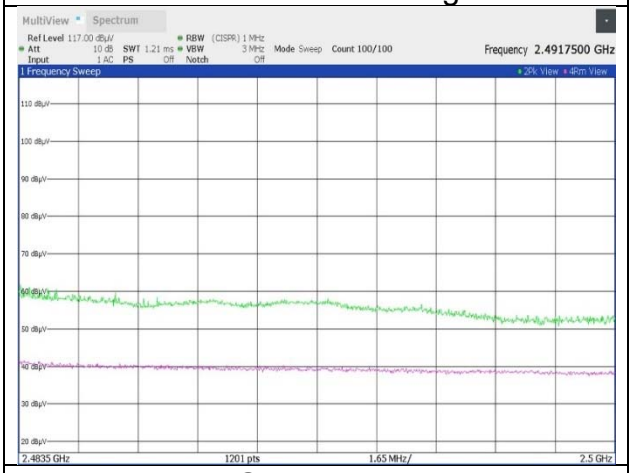
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	43.45	27.67	14.68	41.58	0.36	2.46	47.04	53.9	**6.8**	*1)
Hori.	3282.387	AV	40.73	28.32	6.51	41.95	0.36	2.46	36.43	53.9	17.4	*2)
Hori.	7386.000	AV	39.67	37.12	8.74	43.39	0.36	2.46	44.96	53.9	8.9	-
Hori.	12310.000	AV	39.67	38.27	12.38	41.90	0.36	-9.54	39.24	53.9	14.6	-
Hori.	14772.000	AV	37.48	39.43	13.83	40.95	0.36	-9.54	40.61	53.9	13.2	-
Vert.	2483.500	AV	42.31	27.67	14.68	41.58	0.36	2.46	45.90	53.9	8.0	*1)
Vert.	3282.387	AV	41.91	28.32	6.51	41.95	0.36	2.46	37.61	53.9	16.2	*2)
Vert.	7386.000	AV	38.30	37.12	8.74	43.39	0.36	2.46	43.59	53.9	10.3	-
Vert.	12310.000	AV	38.22	38.27	12.38	41.90	0.36	-9.54	37.79	53.9	16.1	-
Vert.	14772.000	AV	37.17	39.43	13.83	40.95	0.36	-9.54	40.30	53.9	13.6	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)
*2) This noise has the same duty cycle as the carrier.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
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

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	SAC 3	SAC 3	SAC 3	SAC 3
Date	July 26, 2024	July 26, 2024	July 23, 2024	July 24, 2024
Temperature / Humidity	22 deg. C / 49 % RH	21 deg. C / 45 % RH	24 deg. C / 39 % RH	24 deg. C / 39 % RH
Engineer	Yuta Shiba	Yosuke Murakami	Yuta Shiba	Yuta Shiba
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 11n-20 2412 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	62.68	27.79	14.57	41.55	2.46	65.95	73.9	7.9	140	102	-
Hori.	4824.000	PK	49.88	31.28	7.20	42.82	2.46	48.00	73.9	25.9	150	0	-
Hori.	7236.000	PK	51.74	36.93	8.66	43.29	2.46	56.50	73.9	17.4	111	12	-
Hori.	9648.000	PK	49.87	38.63	10.02	43.01	2.46	57.97	73.9	15.9	150	0	-
Hori.	12060.000	PK	50.95	38.51	12.26	42.16	-9.54	50.02	73.9	23.8	142	353	-
Hori.	14472.000	PK	47.92	39.25	13.86	41.42	-9.54	50.07	73.9	23.8	128	280	-
Hori.	4824.000	AV	36.95	31.28	7.20	42.82	2.46	35.07	53.9	18.8	150	0	Floor noise
Hori.	9648.000	AV	36.81	38.63	10.02	43.01	2.46	44.91	53.9	8.9	150	0	Floor noise
Vert.	2390.000	PK	62.74	27.79	14.57	41.55	2.46	66.01	73.9	7.8	153	358	-
Vert.	4824.000	PK	49.78	31.28	7.20	42.82	2.46	47.90	73.9	26.0	150	0	-
Vert.	7236.000	PK	50.50	36.93	8.66	43.29	2.46	55.26	73.9	18.6	143	48	-
Vert.	9648.000	PK	50.04	38.63	10.02	43.01	2.46	58.14	73.9	15.7	150	0	-
Vert.	12060.000	PK	48.66	38.51	12.26	42.16	-9.54	47.73	73.9	26.1	100	0	-
Vert.	14472.000	PK	47.49	39.25	13.86	41.42	-9.54	49.64	73.9	24.2	139	40	-
Vert.	4824.000	AV	36.53	31.28	7.20	42.82	2.46	34.65	53.9	19.2	150	0	Floor noise
Vert.	9648.000	AV	37.17	38.63	10.02	43.01	2.46	45.27	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	43.75	27.79	14.57	41.55	0.29	2.46	47.31	53.9	6.5	*1)
Hori.	7236.000	AV	40.00	36.93	8.66	43.29	0.29	2.46	45.05	53.9	8.8	-
Hori.	12060.000	AV	41.18	38.51	12.26	42.16	0.29	-9.54	40.54	53.9	13.3	-
Hori.	14472.000	AV	38.69	39.25	13.86	41.42	0.29	-9.54	41.13	53.9	12.7	-
Vert.	2390.000	AV	44.81	27.79	14.57	41.55	0.29	2.46	48.37	53.9	**5.5**	*1)
Vert.	7236.000	AV	37.61	36.93	8.66	43.29	0.29	2.46	42.66	53.9	11.2	-
Vert.	12060.000	AV	39.39	38.51	12.26	42.16	0.29	-9.54	38.75	53.9	15.1	-
Vert.	14472.000	AV	38.24	39.25	13.86	41.42	0.29	-9.54	40.68	53.9	13.2	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

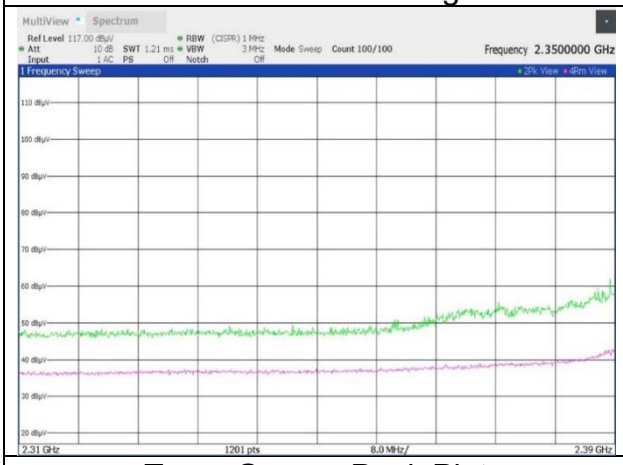
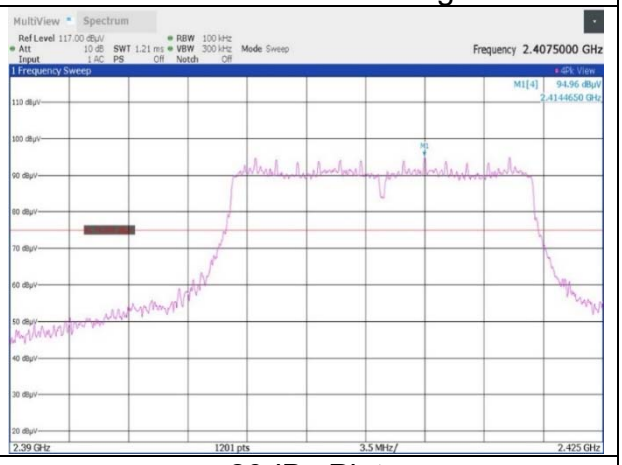
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

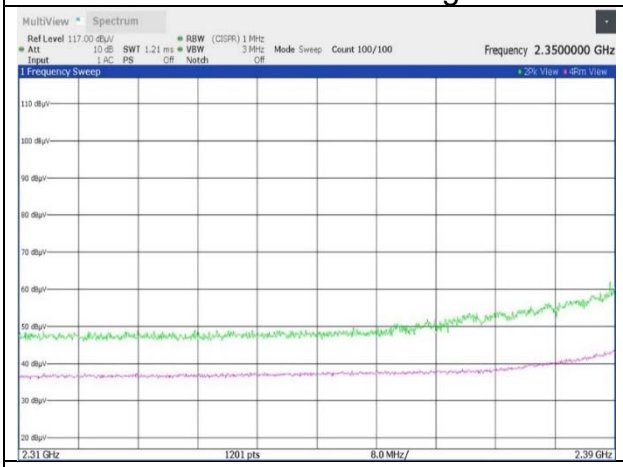
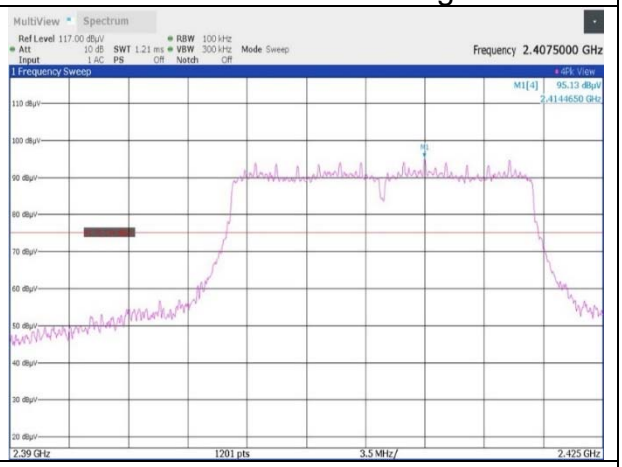
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	94.96	27.76	14.60	41.56	2.46	98.22	-	-	Carrier
Hori.	2400.000	PK	56.92	27.77	14.59	41.56	2.46	60.18	78.2	18.0	-
Vert.	2412.000	PK	95.13	27.76	14.60	41.56	2.46	98.39	-	-	Carrier
Vert.	2400.000	PK	56.87	27.77	14.59	41.56	2.46	60.13	78.3	18.1	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11n-20 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11n-20 2417 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	63.51	27.79	14.57	41.55	2.46	66.78	73.9	7.1	141	103	-
Vert.	2390.000	PK	63.17	27.79	14.57	41.55	2.46	66.44	73.9	7.4	139	322	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	46.11	27.79	14.57	41.55	0.29	2.46	49.67	53.9	4.2	*1)
Vert.	2390.000	AV	46.26	27.79	14.57	41.55	0.29	2.46	49.82	53.9	**4.0**	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

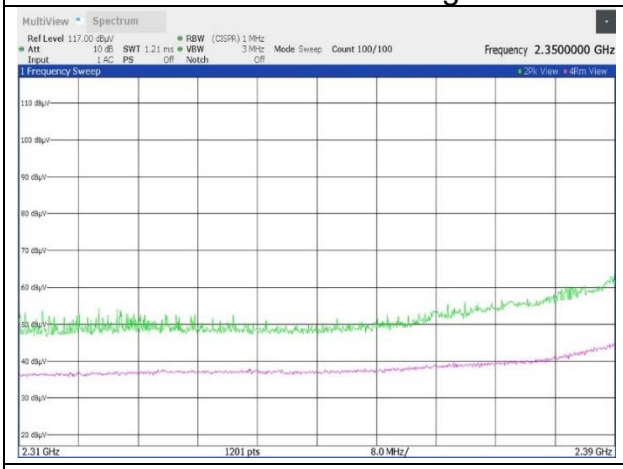
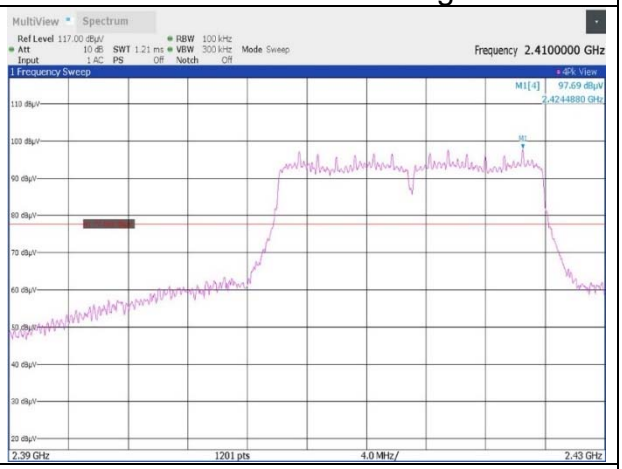
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

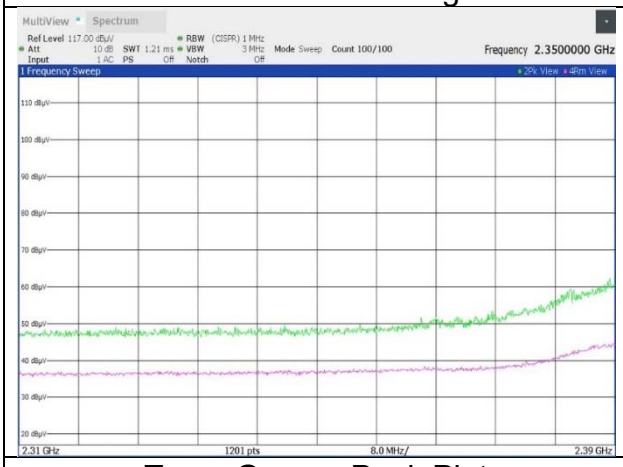
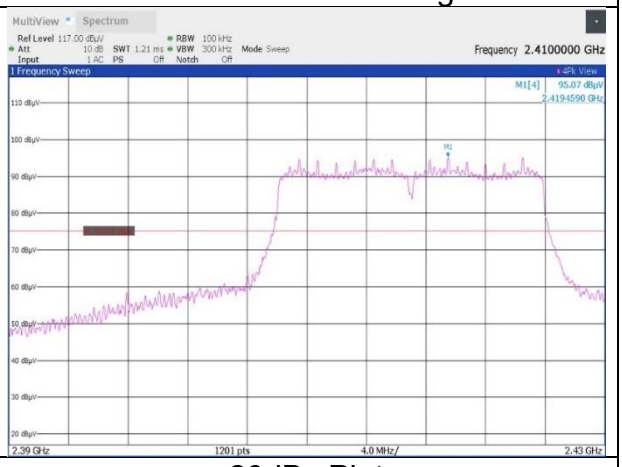
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2417.000	PK	97.69	27.75	14.60	41.56	2.46	100.94	-	-	Carrier
Hori.	2400.000	PK	57.86	27.77	14.59	41.56	2.46	61.12	80.9	19.7	-
Vert.	2417.000	PK	95.07	27.75	14.60	41.56	2.46	98.32	-	-	Carrier
Vert.	2400.000	PK	55.09	27.77	14.59	41.56	2.46	58.35	78.3	19.9	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11n-20 2417 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx 11n-20 2422 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	63.92	27.79	14.57	41.55	2.46	67.19	73.9	6.7	140	102	-
Vert.	2390.000	PK	64.47	27.79	14.57	41.55	2.46	67.74	73.9	6.1	140	350	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	47.17	27.79	14.57	41.55	0.29	2.46	50.73	53.9	**3.1**	*1)
Vert.	2390.000	AV	46.81	27.79	14.57	41.55	0.29	2.46	50.37	53.9	3.5	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

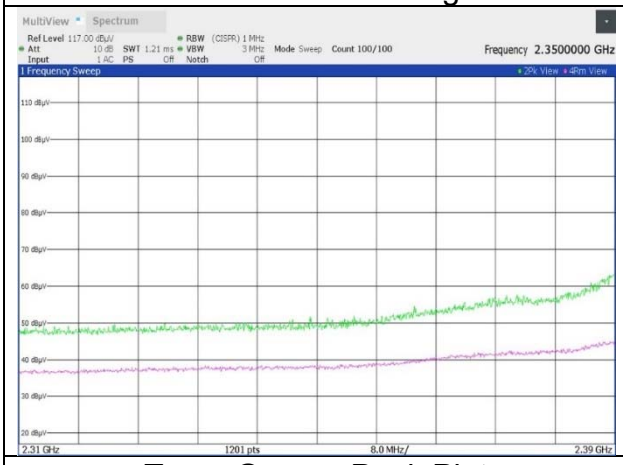
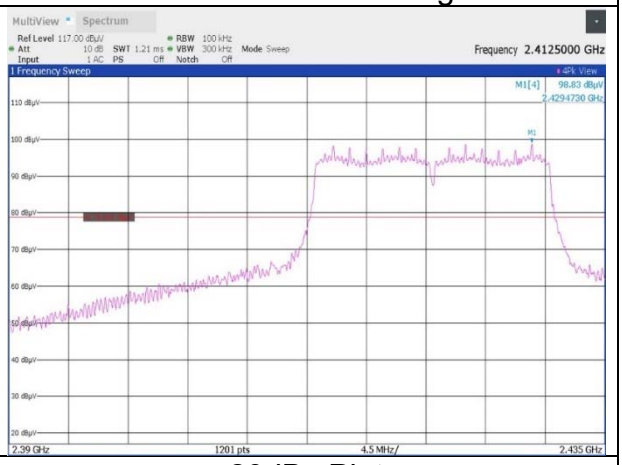
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

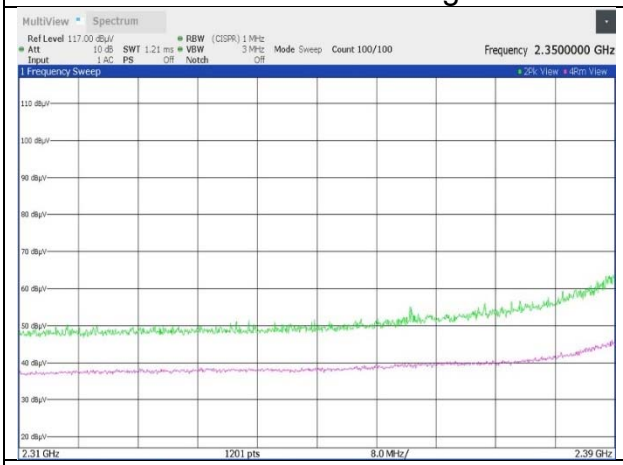
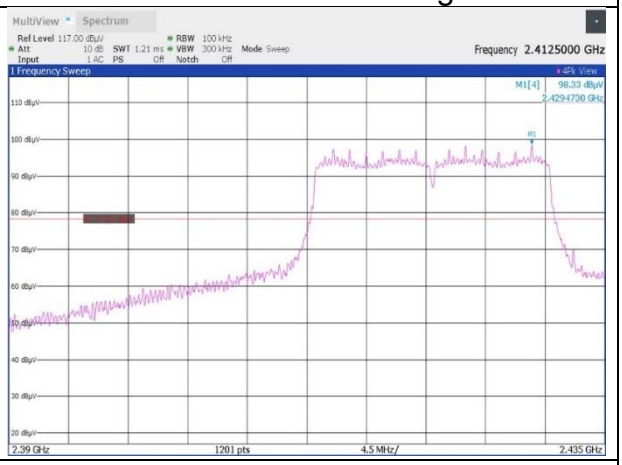
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	98.83	27.75	14.61	41.57	2.46	102.08	-	-	Carrier
Hori.	2400.000	PK	56.16	27.77	14.59	41.56	2.46	59.42	82.0	22.5	-
Vert.	2422.000	PK	98.33	27.75	14.61	41.57	2.46	101.58	-	-	Carrier
Vert.	2400.000	PK	55.05	27.77	14.59	41.56	2.46	58.31	81.5	23.1	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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 3
Date	July 26, 2024
Temperature / Humidity	22 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx 11n-20 2422 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 3	SAC 3	SAC 3	SAC 3
Date	July 27, 2024	July 26, 2024	July 23, 2024	July 24, 2024
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 49 % RH	24 deg. C / 39 % RH	24 deg. C / 39 % RH
Engineer	Yosuke Murakami	Yuta Shiba	Yuta Shiba	Yuta Shiba
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 11n-20 2437 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	48.71	31.34	7.23	42.82	2.46	46.92	73.9	26.9	150	0	-
Hori.	7311.000	PK	52.87	37.02	8.71	43.34	2.46	57.72	73.9	16.1	144	5	-
Hori.	9748.000	PK	49.23	38.86	10.07	42.94	2.46	57.68	73.9	16.2	150	0	-
Hori.	12185.000	PK	53.38	38.45	12.31	42.03	-9.54	52.57	73.9	21.3	138	331	-
Hori.	14622.000	PK	49.41	39.37	13.84	41.20	-9.54	51.88	73.9	22.0	133	289	-
Hori.	4874.000	AV	37.27	31.34	7.23	42.82	2.46	35.48	53.9	18.4	150	0	Floor noise
Hori.	9748.000	AV	37.94	38.86	10.07	42.94	2.46	46.39	53.9	7.5	150	0	Floor noise
Vert.	4874.000	PK	49.48	31.34	7.23	42.82	2.46	47.69	73.9	26.2	150	0	-
Vert.	7311.000	PK	50.69	37.02	8.71	43.34	2.46	55.54	73.9	18.3	102	354	-
Vert.	9748.000	PK	48.89	38.86	10.07	42.94	2.46	57.34	73.9	16.5	150	0	-
Vert.	12185.000	PK	49.86	38.45	12.31	42.03	-9.54	49.05	73.9	24.8	131	9	-
Vert.	14622.000	PK	47.04	39.37	13.84	41.20	-9.54	49.51	73.9	24.3	141	33	-
Vert.	4874.000	AV	37.65	31.34	7.23	42.82	2.46	35.86	53.9	18.0	150	0	Floor noise
Vert.	9748.000	AV	38.01	38.86	10.07	42.94	2.46	46.46	53.9	7.4	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7311.000	AV	42.71	37.02	8.71	43.34	0.29	2.46	47.85	53.9	**6.0**	-
Hori.	12185.000	AV	44.10	38.45	12.31	42.03	0.29	-9.54	43.58	53.9	10.3	-
Hori.	14622.000	AV	39.38	39.37	13.84	41.20	0.29	-9.54	42.14	53.9	11.7	-
Vert.	7311.000	AV	39.54	37.02	8.71	43.34	0.29	2.46	44.68	53.9	9.2	-
Vert.	12185.000	AV	40.09	38.45	12.31	42.03	0.29	-9.54	39.57	53.9	14.3	-
Vert.	14622.000	AV	37.89	39.37	13.84	41.20	0.29	-9.54	40.65	53.9	13.2	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
	(1 GHz to 2.8 GHz)
Mode	Tx 11n-20 2452 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	66.74	27.67	14.68	41.58	2.46	69.97	73.9	**3.9**	235	120	-
Vert.	2483.500	PK	65.29	27.67	14.68	41.58	2.46	68.52	73.9	5.3	114	20	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

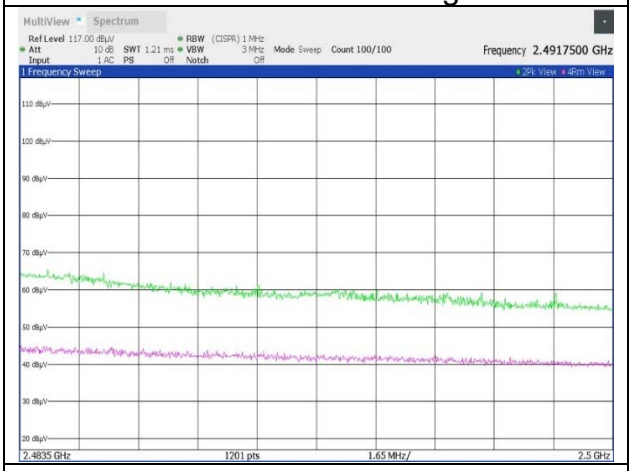
Average measurement value with duty factor

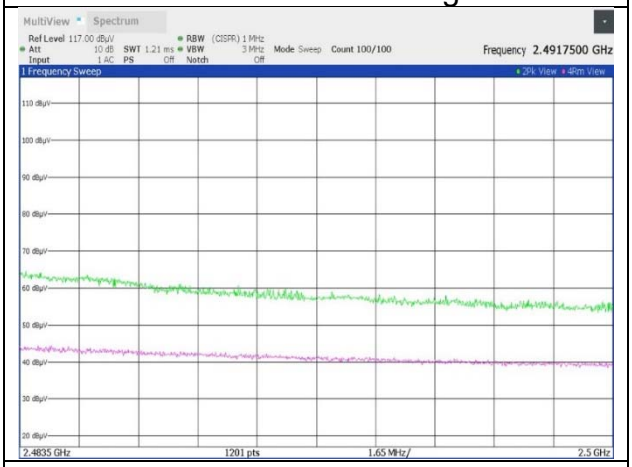
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	44.82	27.67	14.68	41.58	0.29	2.46	48.34	53.9	5.5	*1)
Vert.	2483.500	AV	44.45	27.67	14.68	41.58	0.29	2.46	47.97	53.9	5.9	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
Mode	Tx 11n-20 2452 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 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
	(1 GHz to 2.8 GHz)
Mode	Tx 11n-20 2457 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	64.15	27.67	14.68	41.58	2.46	67.38	73.9	6.5	232	120	-
Vert.	2483.500	PK	64.93	27.67	14.68	41.58	2.46	68.16	73.9	**5.7**	113	22	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

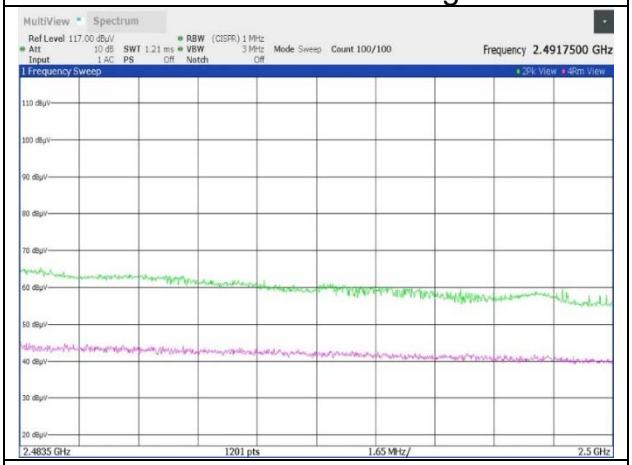
Average measurement value with duty factor

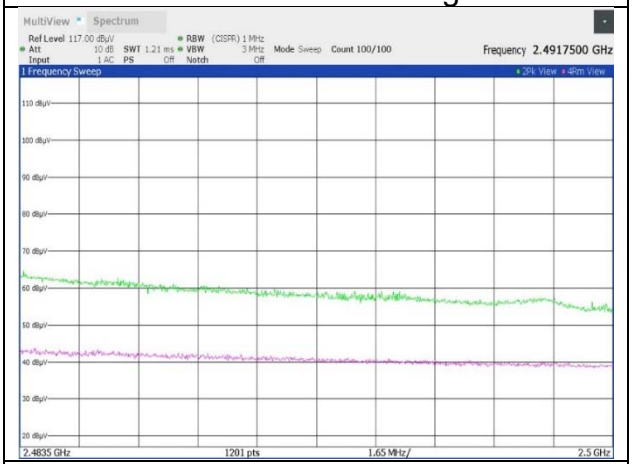
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	44.34	27.67	14.68	41.58	0.29	2.46	47.86	53.9	6.0	*1)
Vert.	2483.500	AV	44.14	27.67	14.68	41.58	0.29	2.46	47.66	53.9	6.2	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
Mode	Tx 11n-20 2457 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 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
	(1 GHz to 2.8 GHz)
Mode	Tx 11n-20 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	63.30	27.67	14.68	41.58	2.46	66.53	73.9	7.3	236	124	-
Hori.	3282.659	PK	50.94	28.32	6.51	41.95	2.46	46.28	73.9	27.6	144	115	-
Hori.	4924.000	PK	49.53	31.43	7.25	42.82	2.46	47.85	73.9	26.0	150	0	-
Hori.	7386.000	PK	51.36	37.12	8.74	43.39	2.46	56.29	73.9	17.6	139	2	-
Hori.	9848.000	PK	49.43	38.88	10.13	42.88	2.46	58.02	73.9	15.8	150	0	-
Hori.	12310.000	PK	49.22	38.27	12.38	41.90	-9.54	48.43	73.9	25.4	133	310	-
Hori.	14772.000	PK	47.31	39.43	13.83	40.95	-9.54	50.08	73.9	23.8	135	280	-
Hori.	4924.000	AV	37.68	31.43	7.25	42.82	2.46	36.00	53.9	17.9	150	0	Floor noise
Hori.	9848.000	AV	37.95	38.88	10.13	42.88	2.46	46.54	53.9	7.3	150	0	Floor noise
Vert.	2483.500	PK	64.58	27.67	14.68	41.58	2.46	67.81	73.9	**6.0**	115	25	-
Vert.	3282.659	PK	50.29	28.32	6.51	41.95	2.46	45.63	73.9	28.2	118	358	-
Vert.	4924.000	PK	48.69	31.43	7.25	42.82	2.46	47.01	73.9	26.8	150	0	-
Vert.	7386.000	PK	50.70	37.12	8.74	43.39	2.46	55.63	73.9	18.2	126	29	-
Vert.	9848.000	PK	49.13	38.88	10.13	42.88	2.46	57.72	73.9	16.1	150	0	-
Vert.	12310.000	PK	48.52	38.27	12.38	41.90	-9.54	47.73	73.9	26.1	133	11	-
Vert.	14772.000	PK	47.25	39.43	13.83	40.95	-9.54	50.02	73.9	23.8	141	51	-
Vert.	4924.000	AV	37.34	31.43	7.25	42.82	2.46	35.66	53.9	18.2	150	0	Floor noise
Vert.	9848.000	AV	38.12	38.88	10.13	42.88	2.46	46.71	53.9	7.1	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

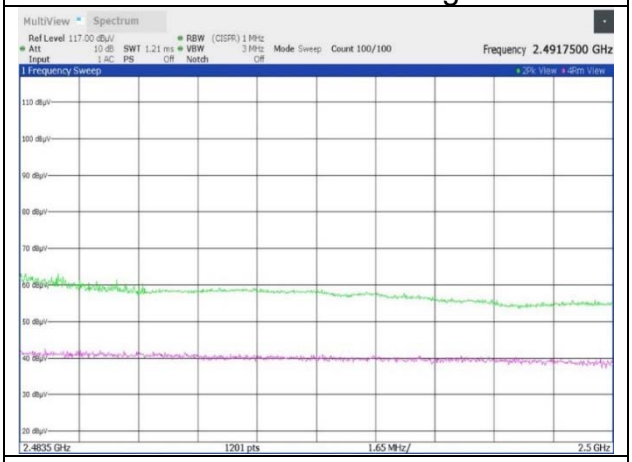
Average measurement value with duty factor

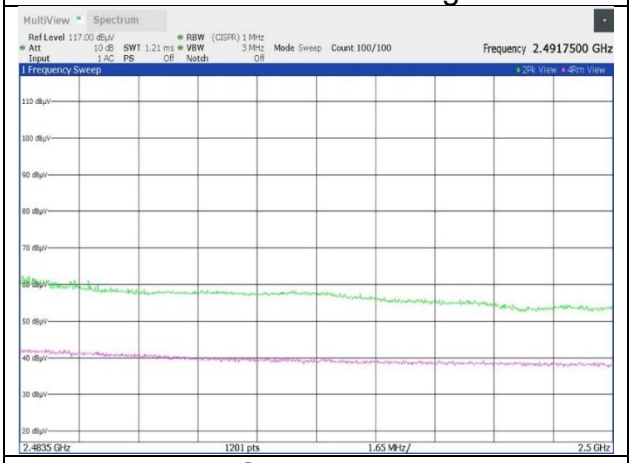
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	41.48	27.67	14.68	41.58	0.29	2.46	45.00	53.9	8.8	*1)
Hori.	3282.659	AV	43.28	28.32	6.51	41.95	0.29	2.46	38.91	53.9	14.9	*2)
Hori.	7386.000	AV	41.27	37.12	8.74	43.39	0.29	2.46	46.49	53.9	7.4	-
Hori.	12310.000	AV	39.55	38.27	12.38	41.90	0.29	-9.54	39.05	53.9	14.8	-
Hori.	14772.000	AV	37.44	39.43	13.83	40.95	0.29	-9.54	40.50	53.9	13.4	-
Vert.	2483.500	AV	42.16	27.67	14.68	41.58	0.29	2.46	45.68	53.9	8.2	*1)
Vert.	3282.659	AV	41.66	28.32	6.51	41.95	0.29	2.46	37.29	53.9	16.6	*2)
Vert.	7386.000	AV	39.25	37.12	8.74	43.39	0.29	2.46	44.47	53.9	9.4	-
Vert.	12310.000	AV	38.12	38.27	12.38	41.90	0.29	-9.54	37.62	53.9	16.2	-
Vert.	14772.000	AV	37.32	39.43	13.83	40.95	0.29	-9.54	40.38	53.9	13.5	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)
*2) This noise has the same duty cycle as the carrier.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	July 27, 2024
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Yosuke Murakami
Mode	Tx 11n-20 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

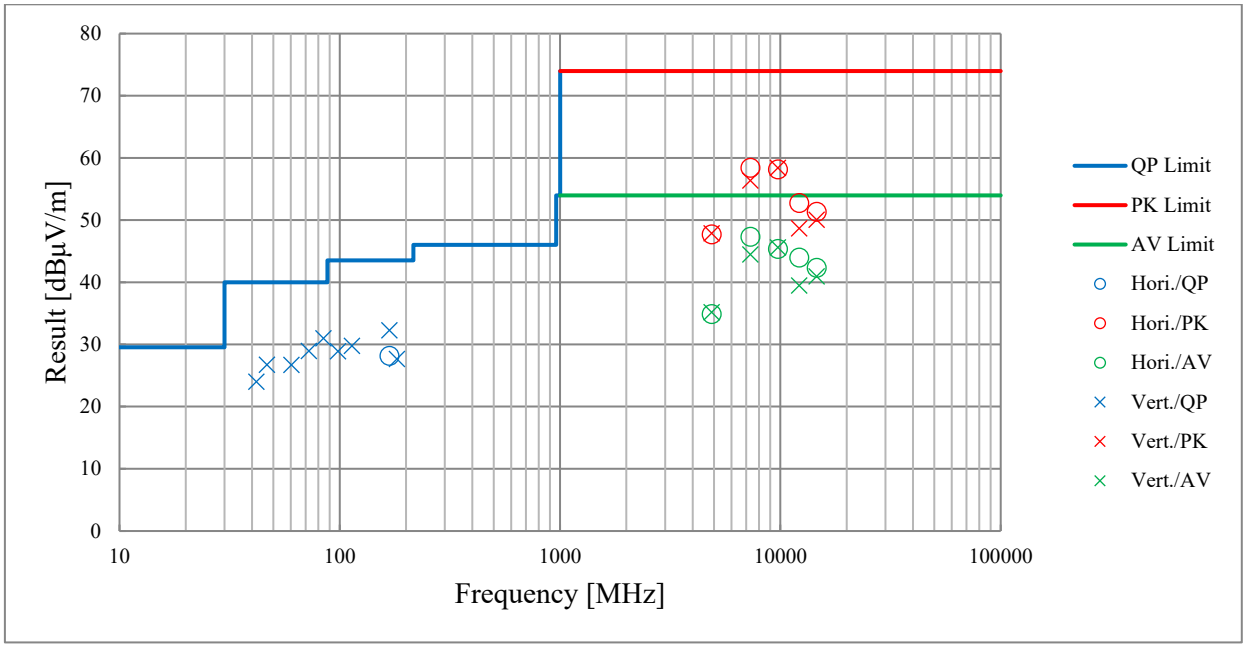
* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case mode for Maximum Peak Output Power)

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	SAC 1	SAC 3	SAC 3
Date	July 30, 2024	July 26, 2024	July 26, 2024
Temperature / Humidity	24 deg. C / 51 % RH	22 deg. C / 49 % RH	21 deg. C / 45 % RH
Engineer	Yosuke Murakami	Yuta Shiba	Yosuke Murakami
	(Below 30 MHz) (30 MHz-to 1,000 MHz)	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)

SAC 3	SAC 3
July 23, 2024	July 24, 2024
24 deg. C / 39 % RH	24 deg. C / 39 % RH
Yuta Shiba	Yuta Shiba
(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)

Mode Tx 11g 2437 MHz

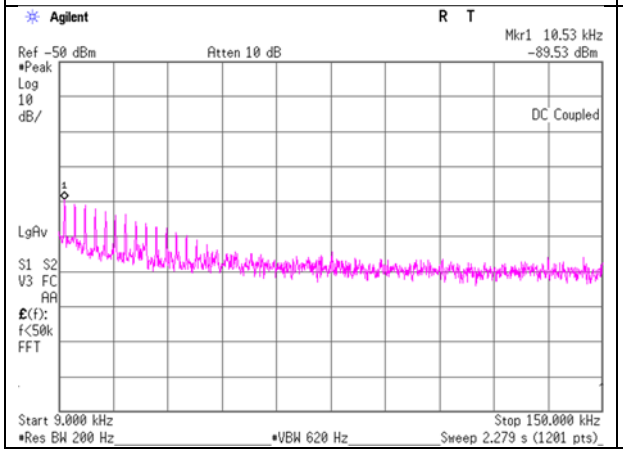


*These plots data contain sufficient number to show the trend of characteristic features for EUT.

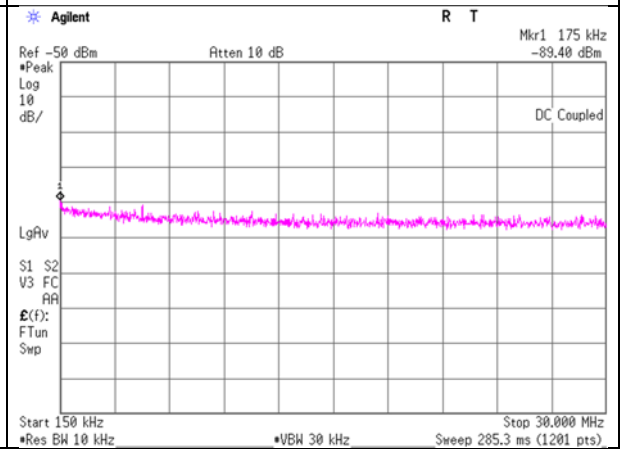
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 18, 2024
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11g 2437 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
10.53	-89.5	0.24	20.21	2.51	1	-66.6	300	6.0	-5.3	47.1	52.4	-
175.00	-89.4	0.24	20.21	2.51	1	-66.4	300	6.0	-5.2	22.7	27.9	-

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

Power Density

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	June 18, 2024	July 23, 2024
Temperature / Humidity	25 deg. C / 54 % RH	26 deg. C / 39 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi
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	-21.70	1.00	20.24	***-0.46***	8.00	8.46
2437	-21.87	1.00	20.24	-0.63	8.00	8.63
2462	-22.17	1.01	20.25	-0.91	8.00	8.91

11g

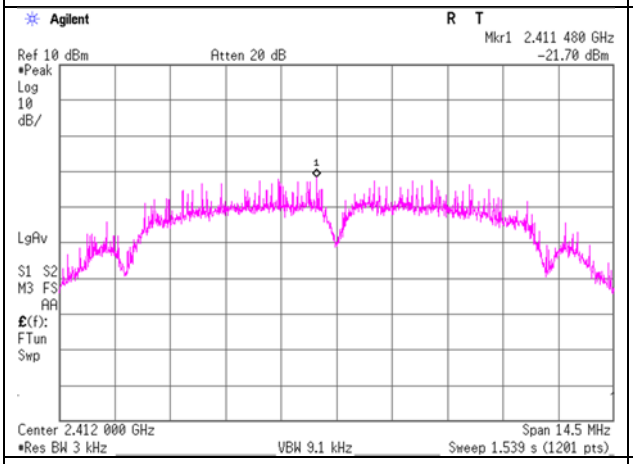
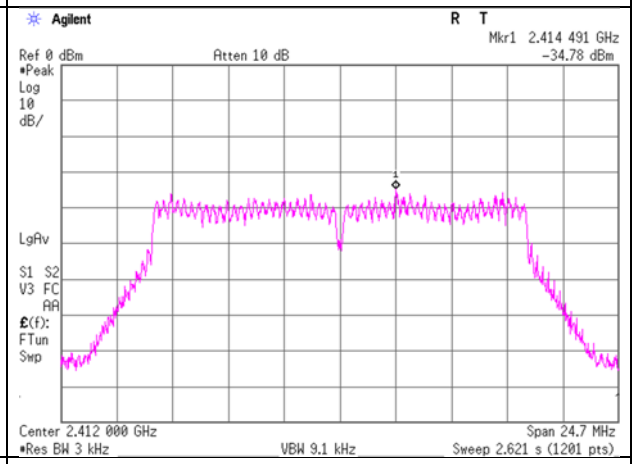
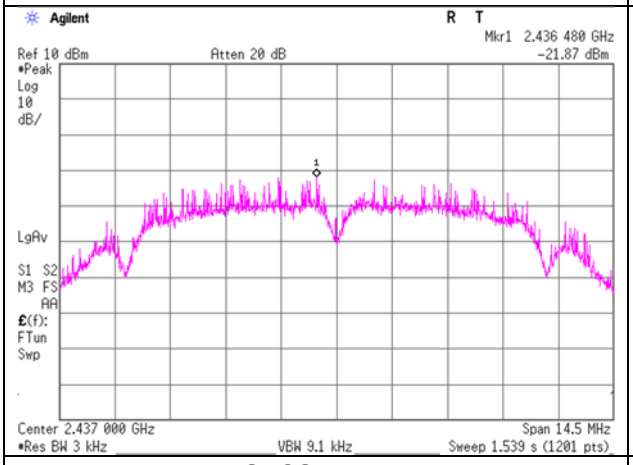
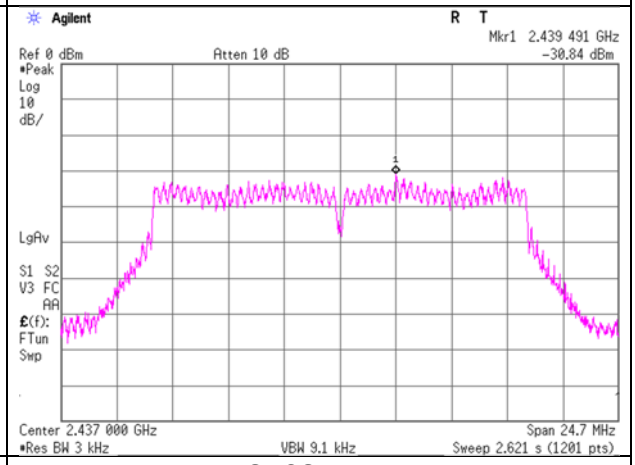
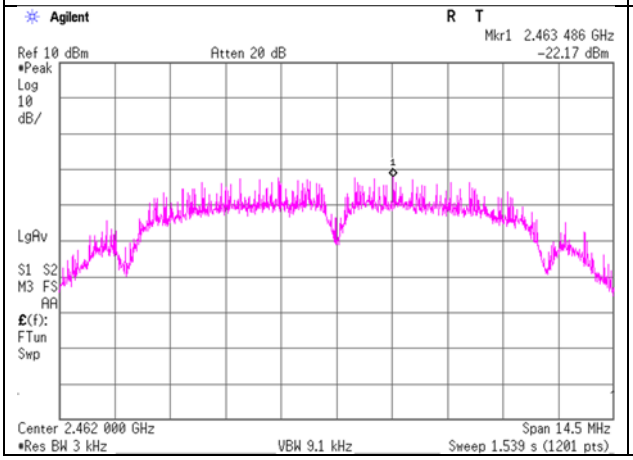
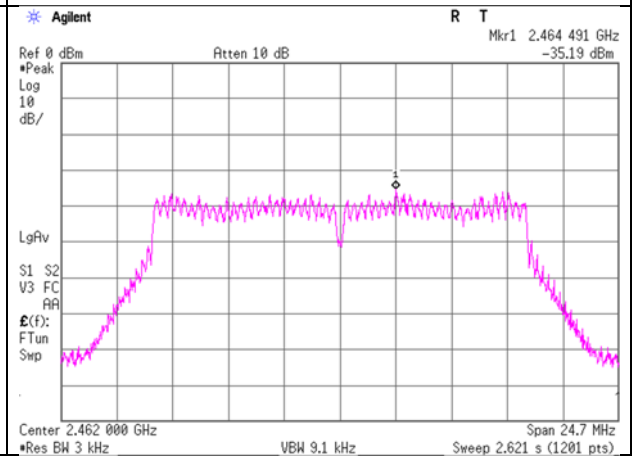
Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2412	-34.78	1.00	20.24	-13.54	8.00	21.54
2437	-30.84	1.00	20.24	***-9.60***	8.00	17.60
2462	-35.19	1.01	20.25	-13.93	8.00	21.93

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	-35.51	1.00	20.24	-14.27	8.00	22.27
2437	-31.35	1.00	20.24	**-10.11**	8.00	18.11
2462	-35.76	1.01	20.25	-14.50	8.00	22.50

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

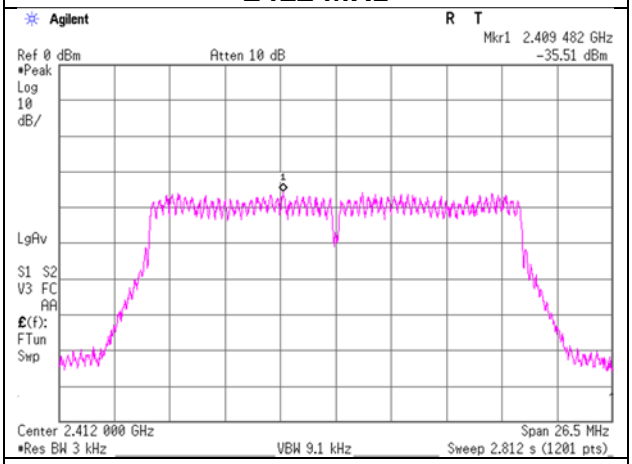
Power Density

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

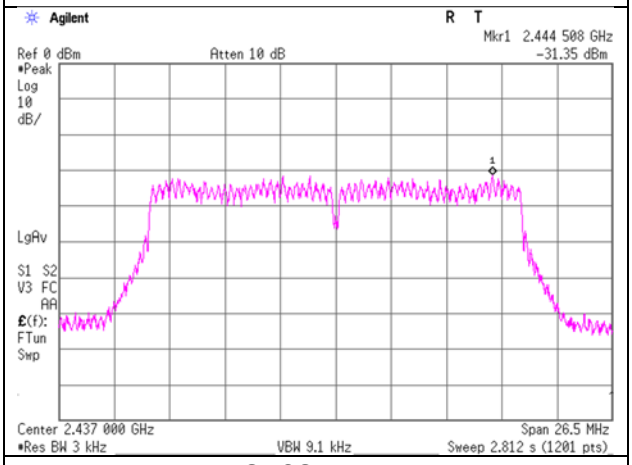
Power Density

11n-20

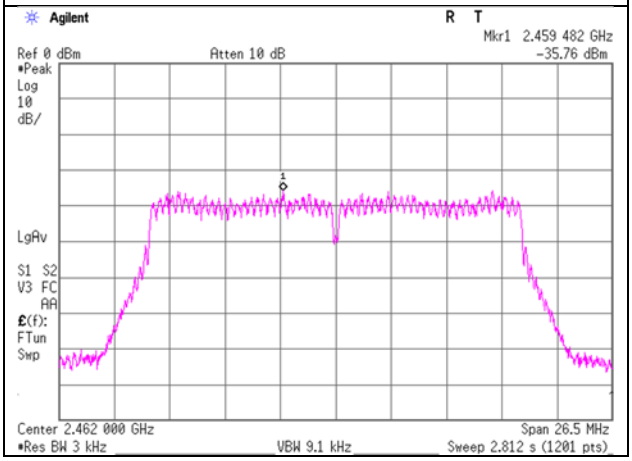
2412 MHz



2437 MHz



2462 MHz



APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145040	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	2024/03/07	12
AT	145111	Digital Tester	SANWA	PC500	7019232	2023/09/25	12
AT	145155	Attenuator	Weinschel Corp.	54A-20	31484	2024/04/04	12
AT	146247	Power Meter	Keysight Technologies Inc	8990B	MY51000272	2024/05/14	12
AT	146310	Power sensor	Keysight Technologies Inc	N1923A	MY5326009	2024/05/14	12
AT	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2023/12/29	12
AT	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2023/09/28	12
AT	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2023/09/28	12
AT	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/07	12
AT	235604	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY45300743	2024/05/23	12
CE	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS 4906	-/0901-271(RF Selector)	2024/04/01	12
CE	145538	LISN	Rohde & Schwarz	ENV216	100511	2024/02/06	12
CE	145542	LISN	Rohde & Schwarz	ENV216	100516	2024/02/06	12
CE	145762	Terminator	TME	CT-01 BP	-	2023/12/08	12
CE	146294	Humidity Indicator	A&D Company	AD-5681	4062118	-	-
CE	199786	Attenuator	JFW	50HF-006N	-	2024/06/14	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	-	-
RE	144899	Attenuator	Inmet	18N-6dB	-	2023/12/08	12
RE	144938	Highpass Filter	Micro-Tronics	HPM50112	7	2023/10/11	12
RE	144959	Attenuator	JFW	50HF-003N	-	2023/08/22	12
RE	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2024/04/01	12
RE	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2024/04/01	12
RE	145003	Pre Amplifier	SONOMA	310N	290211	2024/02/13	12
RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	2046104	2024/02/16	12
RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2024/03/05	12
RE	145161	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032664	2024/04/10	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	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2024/03/20	12
RE	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2024/06/20	12
RE	145536	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	2024/04/10	12
RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2024/05/23	12
RE	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2022/12/24	24

Test Equipment (2/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2024/04/16	12
RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2024/04/19	12
RE	145792	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997812	2023/09/25	12
RE	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2024/05/09	12
RE	167096	Attenuator	JFW	50HF-006N	-	2024/02/13	12
RE	168300	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800375/4A	-	-
RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2024/03/05	12
RE	191837	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/03	12
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/03	12
RE	194601	Coaxial Cable	Fjikura	5D-2W	-	2023/12/08	12
RE	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2024/03/20	12
RE	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2024/06/05	12
RE	207279	Tape Measure	ASKUL	-	-	-	-
RE	236416	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VULP 9118 B	00974	2024/07/03	12
RE	243217	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-9.0m	49306-01-04	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