RADIO TEST REPORT

Test Report No. 15263628S-B-R1

Customer	**Panasonic Automotive Systems Co., Ltd.**
Description of EUT	**Car AV Control Unit for CDC**
Model Number of EUT	**AM2301**
FCC ID	**ACJ932AM2301**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**January 27, 2025**
Remarks	**Bluetooth (BR / EDR) parts**

Representative Test Engineer	Approved By
M. Ikudome	S. Takano
Miku Ikudome 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".

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REVISION HISTORY

Original Test Report No.: 15263628S-B

This report is a revised version of 15263628S-B. 15263628S-B is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15263628S-B	December 20, 2024	-
1	15263628S-B-R1	January 27, 2025	P.13 Correction of “r” From “1.1” to “0.11” Correction of position comment. From “-30, 0dg and -30 deg” To “-30, 0 deg. and +30 deg.” Correction of position table. From “30 deg.” To “+30 deg.”
			P.39 Addition of Reference Plot for band-edge.
			P.52 Addition of Pre-Check Worst Case Position photos.

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	Panasonic Automotive Systems Co., Ltd. *1)
Address	4261, Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-8520, Japan
Telephone Number	+81-80-7194-8870
Contact Person	Minoru Osada

*1) The Grantee name in the FCC application is “Panasonic Corporation of North America”.

The Information provided by the customer is as follows;
- Customer, Description of EUT, Model Number of EUT 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
- APPENDIX 4: Variant models list

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Car AV Control Unit for CDC
Model Number	AM2301
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	For Antenna Terminal Conducted test: April 26, 2024 For Radiated Emission test: August 2, 2024
Test Date	May 7 to September 3, 2024

2.2 Product Description

General Specification

Rating	DC 13.2 V
Operating temperature	-30 deg. C to +60 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-20/11ax-20)

Equipment Type	Transceiver	
Frequency of Operation	2412 MHz to 2462 MHz	
Type of Modulation	DSSS, OFDM	
	OFDMA: (20 MHz band): 26/52/106/242-tone RU	
Antenna Gain a)	1st Antenna:	4.0 dBi
	2nd Antenna:	4.0 dBi

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	BT: FHSS (GFSK, π/4 DQPSK, 8 DPSK) BT LE: GFSK
Antenna Gain [a)]	4.0 dBi

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

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band:	5745 MHz to 5825 MHz
	40 MHz Band:	5755 MHz to 5795 MHz
	80 MHz Band:	5775 MHz
Type of Modulation	OFDM, OFDMA	
	OFDMA (IEEE802.11ax only)	(20 MHz band): 26/52/106/242-tone RU
		(40 MHz band): 26/52/106/242/484-tone RU
		(80 MHz band): 26/52/106/242/484/996-tone RU
Antenna Gain [a)]	1st Antenna:	6.0 dBi
	2nd Antenna:	6.0 dBi

[FM]

Equipment Type	Receiver
Frequency of Operation	87.75 MHz to 107.9 MHz
Type of Modulation	FM
Antenna Connector Type	Car manufacturer original
Impedance	75 ohm

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

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
Carrier Frequency Separation	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)	See data.	Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (b)			
20 dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (a)			
Number of Hopping Frequency	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(iii)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (d)			
Dwell time	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(iii)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (d)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(b)(1)		Complied	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4 (b)			
Spurious Emission & Band Edge Compliance	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	9.1dB, 403.732MHz, Hori, Mode: Tx 3DH5 2402MHz with Tx 11ax-20 OFDM 5825 MHz	Complied	Conducted/ Radiated (above 30 MHz) *2)
	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) The test is not applicable since the EUT does not have AC Mains.
*2) Radiated test was selected over 30 MHz based on section 15.247(d).

FCC Part 15.31 (e)

The EUT provides stable voltage constantly to the RF Part regardless of input voltage.
Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users. 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) SPM-06	1.1 dB
Power Measurement above 1 GHz (Peak Detector) SPM-06	1.8 dB
Power Measurement above 1 GHz (Average Detector) SPM-07	1.0 dB
Power Measurement above 1 GHz (Peak Detector) SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector) SPM-13	0.81 dB
Power Measurement above 1 GHz (Peak Detector) SPM-13	1.1 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_SCH-01	0.96 deg.C.
Humidity_SCH-01	4.0 %
Temperature_SCH-02	2.2 deg.C.
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*
Bluetooth (BT)	BR / EDR, Payload: PRBS9

*EUT has the power settings by the software as follows;
Power Setting: 9 (Setting Value)
Software: mcdc_bluetooth_serial Version: 1
(Date: 2024.04.26, 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.

Details of Operating Mode(s)

Test Item	Mode	Hopping	Tested Frequency
Radiated Spurious Emission (Below 1 GHz)	Tx 3DH5 *1)	Off	2402 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx DH5 Tx 3DH5 Tx 3DH5 2402 MHz with 11ax-20 (OFDM) 5825 MHz	Off	2402 MHz 2441 MHz 2480 MHz
	Tx, Hopping Off, 3DH5 with Tx 11ax-20 OFDM 5825 MHz	Off	2402 MHz
Conducted Spurious Emission	Tx DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx DH5 Tx 3DH5	On	2402 MHz 2441 MHz 2480 MHz
20 dB Bandwidth	Tx DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx DH5 Tx 3DH5	On	-
Dwell time	Tx DH1, DH3, DH5 Tx 3DH1, 3DH3, 3DH5	On	-
Maximum Peak Output Power	Tx DH5 Tx 2DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5 Tx 3DH5	On Off	2402 MHz 2480 MHz
99 % Occupied Bandwidth	Tx DH5 Tx 3DH5	On Off	2402 MHz 2441 MHz 2480 MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
*It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification.

*1) Spurious emissions for frequencies below 1 GHz were limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands.

4.2 Configuration and Peripherals

This page has been submitted for separate exhibit (refer to APPENDIX 4).

SECTION 5: Radiated Spurious Emission

Test Procedure

[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	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

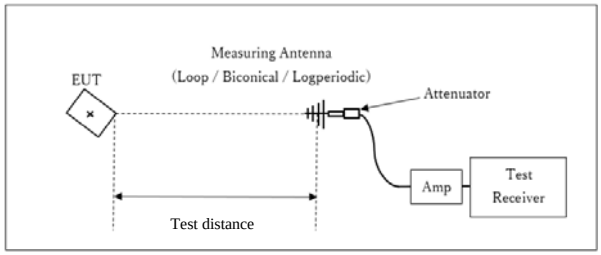
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 1/T (T: burst length, refer to Burst rate confirmation sheet) Detector: Peak	RBW: 100 kHz VBW: 300 kHz

Figure 2: Test Setup

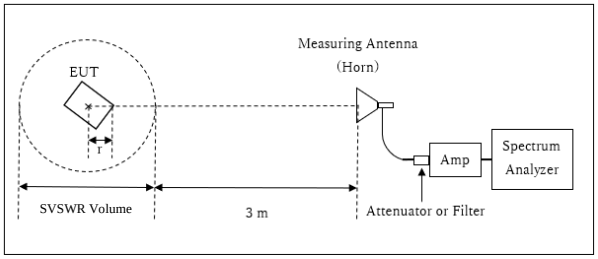
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

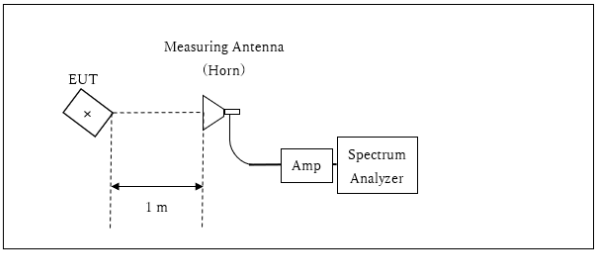


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.89 m / 3.0 m) = 2.26 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.89 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.11 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 -30, 0 deg. and +30 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test Range	Horizontal	Vertical
Below 1 GHz	0 deg.	0 deg.
1 GHz to 2.8 GHz	-30 deg.	-30 deg.
2.8 GHz to 10 GHz	+30 deg.	+30 deg.
10 GHz to 18 GHz	0 deg.	0 deg.
18 GHz to 26.5 GHz	+30 deg.	+30 deg.

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
20 dB Bandwidth	3 MHz	30 kHz	100 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: 50MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)
*4) 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

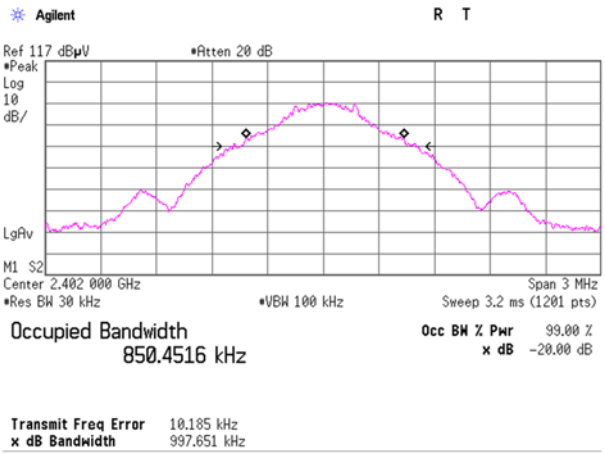
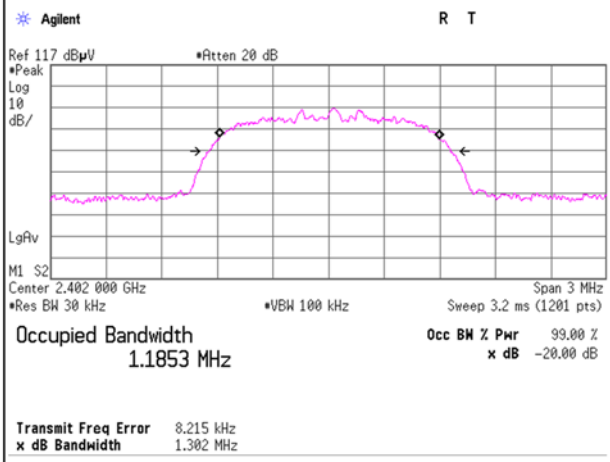
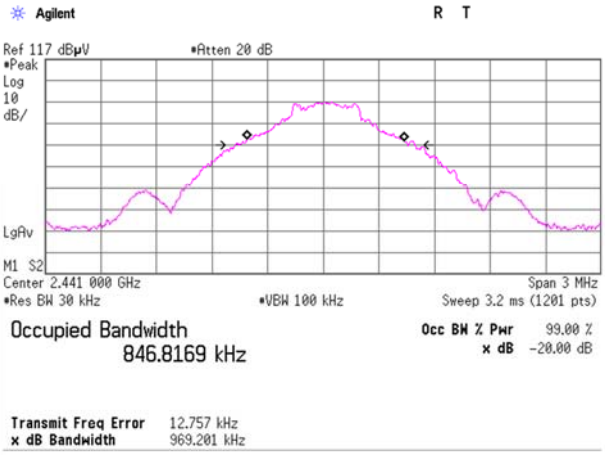
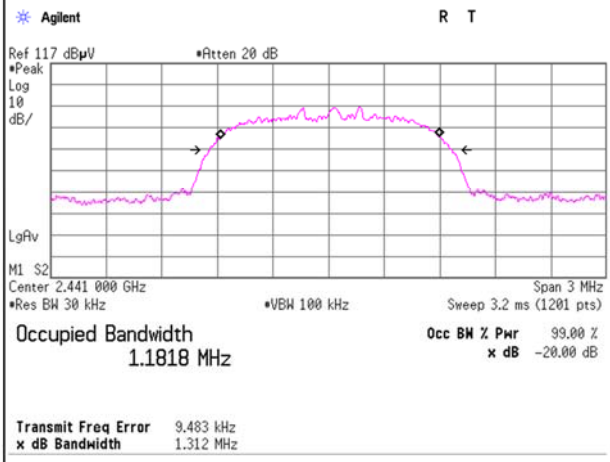
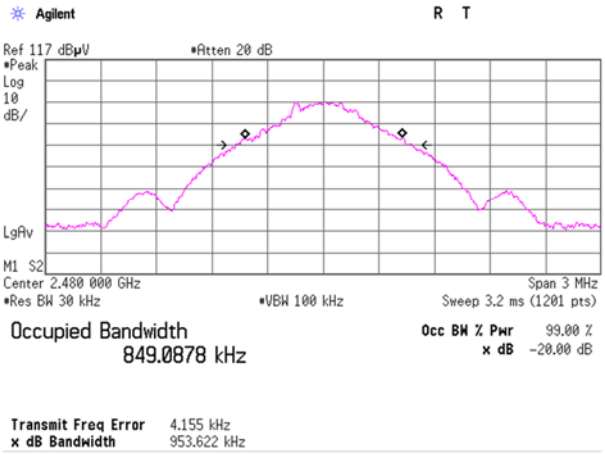
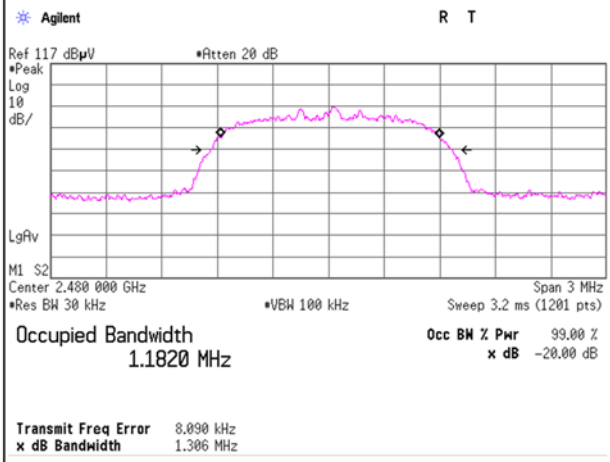
20 dB Bandwidth, 99 %Occupied Bandwidth and Carrier Frequency Separation

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	May 7, 2024	May 8, 2024
Temperature / Humidity	26 deg. C / 37 % RH	25 deg. C / 47 % RH
Engineer	Miku Ikudome	Miku Ikudome
Mode	Tx, Hopping Off, Tx, Hopping On	

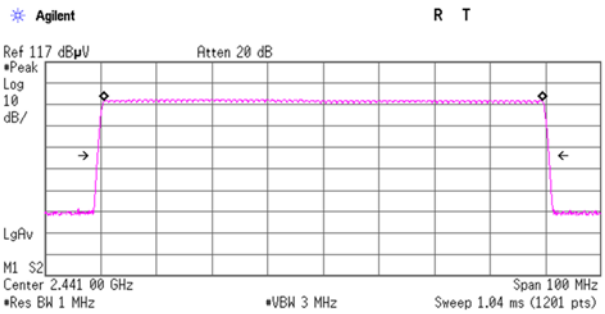
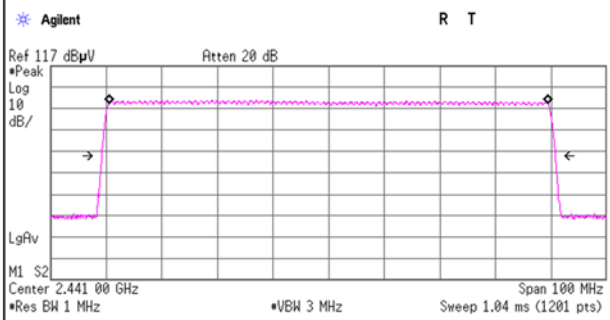
Mode	Freq. [MHz]	20 dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.998	850.5	1.000	>= 0.665
DH5	2441.0	0.969	846.8	1.000	>= 0.646
DH5	2480.0	0.954	849.1	1.000	>= 0.636
DH5	Hopping On	-	78629.8	-	-
3DH5	2402.0	1.302	1185.3	1.000	>= 0.868
3DH5	2441.0	1.312	1181.8	1.000	>= 0.875
3DH5	2480.0	1.306	1182.0	1.000	>= 0.871
3DH5	Hopping On	-	78767.1	-	-

Limit: Two-thirds of 20 dB Bandwidth or 25 kHz (whichever is greater).
No limit applies to 20 dB Bandwidth.

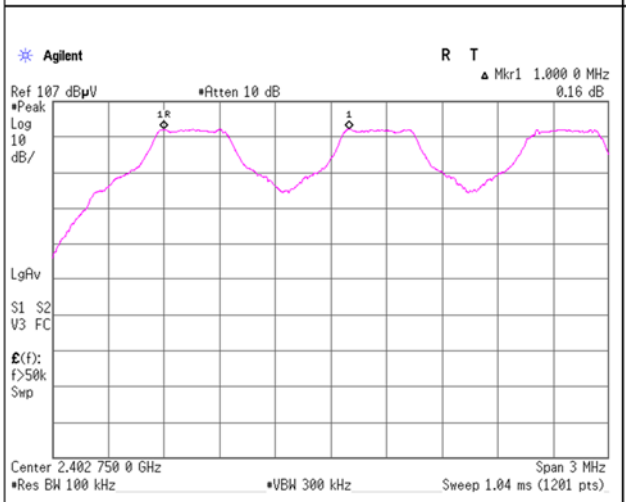
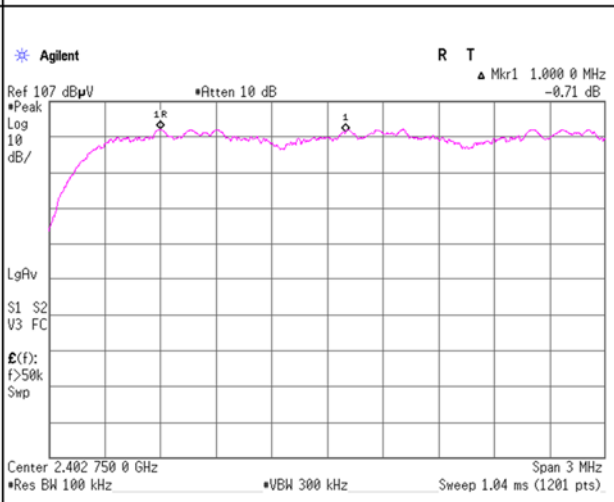
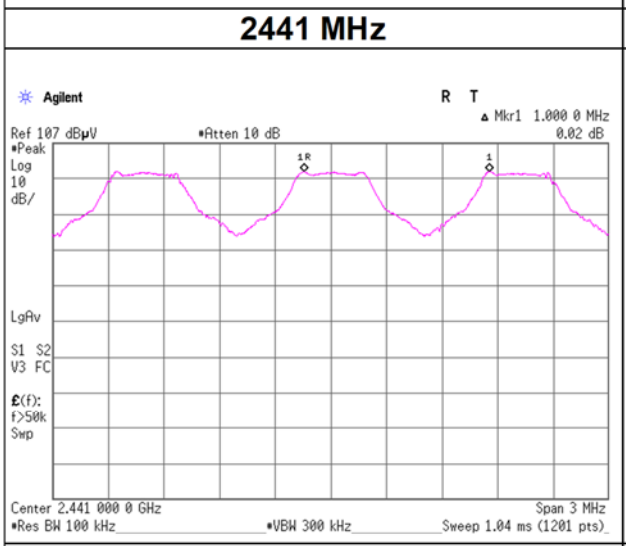
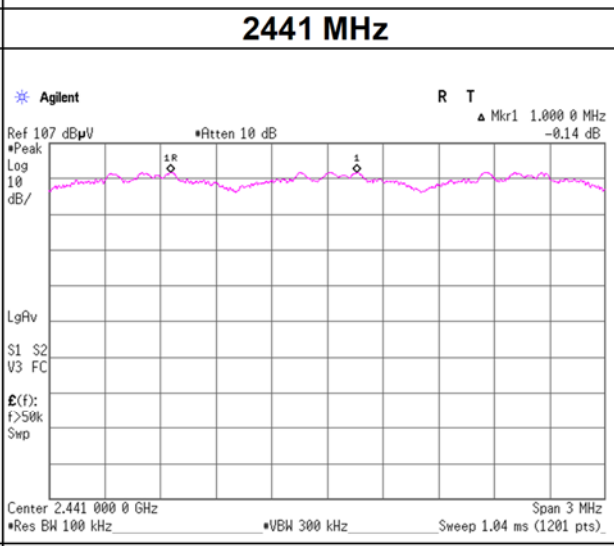
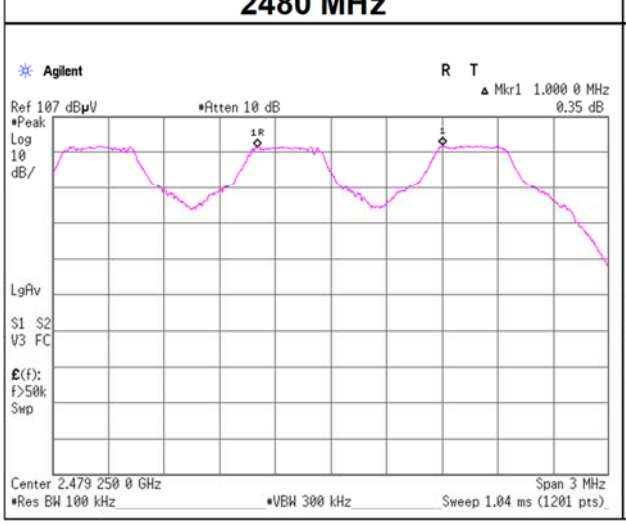
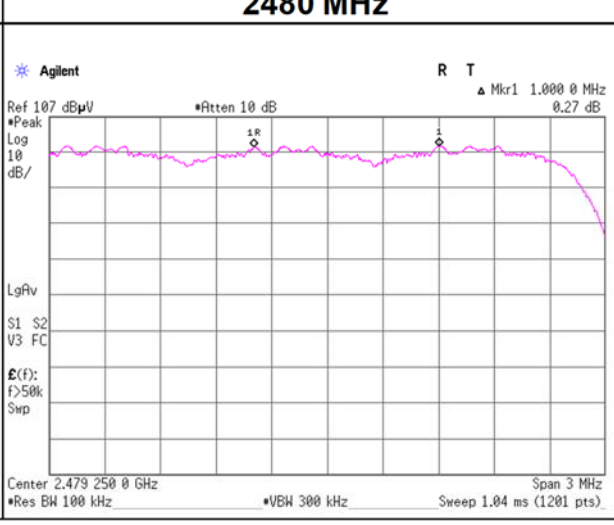
20dB Bandwidth and 99% Occupied Bandwidth

DH5	3DH5
2402 MHz	**2402 MHz**
	
2441 MHz	**2441 MHz**
	
2480 MHz	**2480 MHz**
	

20dB Bandwidth and 99% Occupied Bandwidth

DH5	3DH5
Hopping On	Hopping On
	

Carrier Frequency Separation

DH5	3DH5
2402 MHz	2402 MHz
	
2441 MHz	2441 MHz
	
2480 MHz	2480 MHz
	

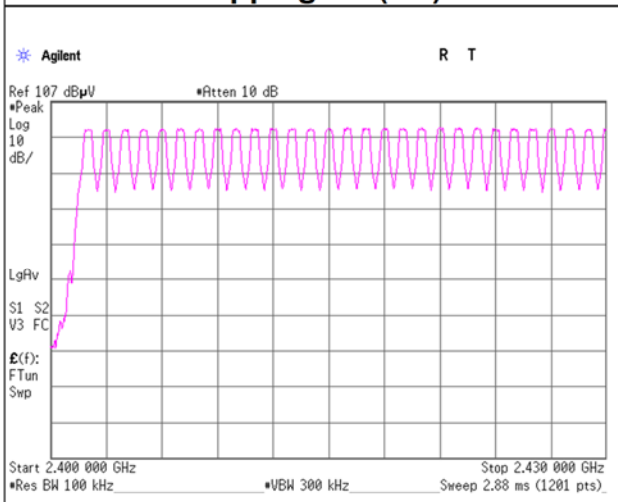
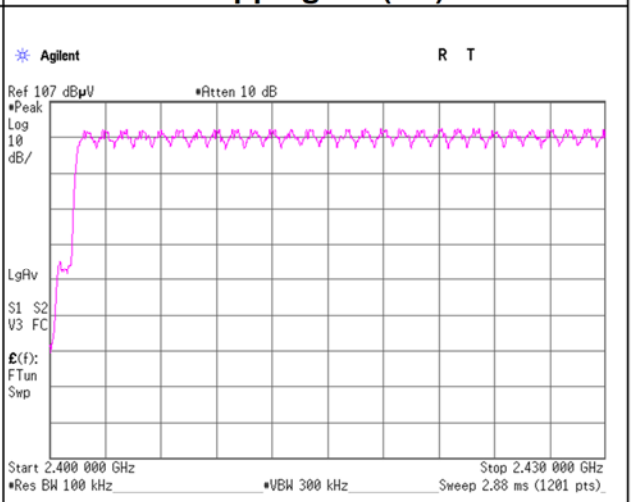
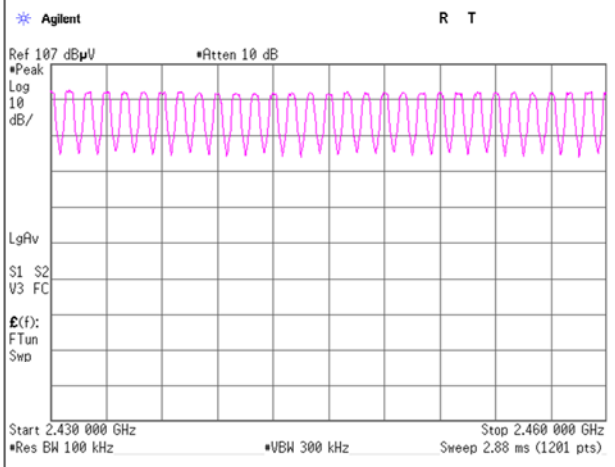
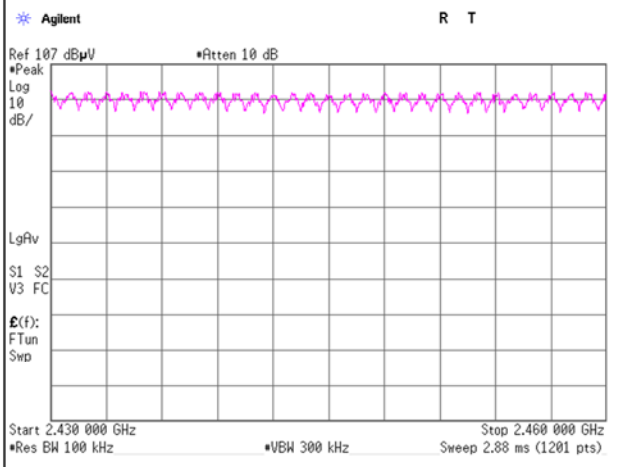
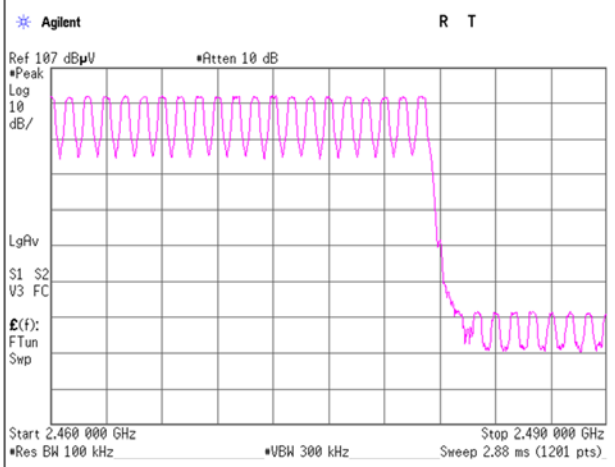
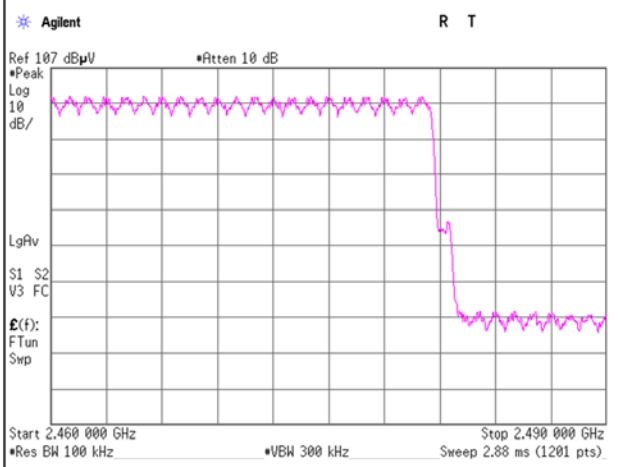
Number of Hopping Frequency

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	>= 15
3DH5	79	>= 15

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

Number of Hopping Frequency

DH5	3DH5
Hopping On (1/3)	Hopping On (1/3)
	
Hopping On (2/3)	Hopping On (2/3)
	
Hopping On (3/3)	Hopping On (3/3)
	

Dwell time

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping On

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4)	Length of transmission [ms]	Result [ms]	Limit [ms]
DH1	51.0 times / 5 s x 31.6 s = 323 times	0.411	133	400
DH3	28.6 times / 5 s x 31.6 s = 181 times	1.680	304	400
DH5	19.6 times / 5 s x 31.6 s = 124 times	2.930	363	400
3DH1	50.8 times / 5 s x 31.6 s = 322 times	0.417	134	400
3DH3	29.0 times / 5 s x 31.6 s = 184 times	1.680	309	400
3DH5	19.6 times / 5 s x 31.6 s = 124 times	2.927	363	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	51	51	51	52	51
DH3	28	27	30	28	30	28.6
DH5	20	19	22	19	18	19.6
3DH1	50	51	51	51	51	50.8
3DH3	26	30	28	31	30	29
3DH5	22	20	18	19	19	19.6

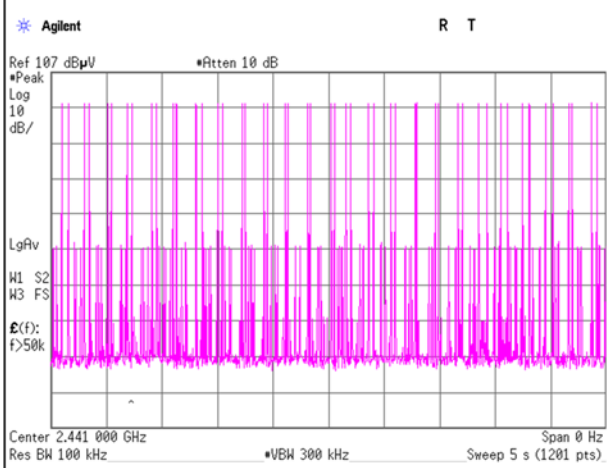
Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

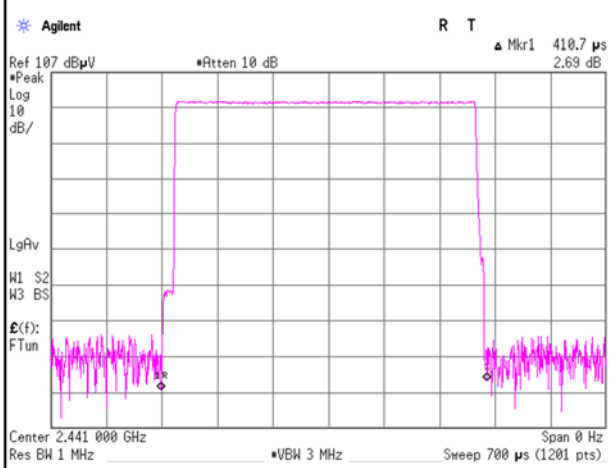
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4 s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4 s regardless of packet size. This is confirmed in the test report for N = 79.

Dwell time

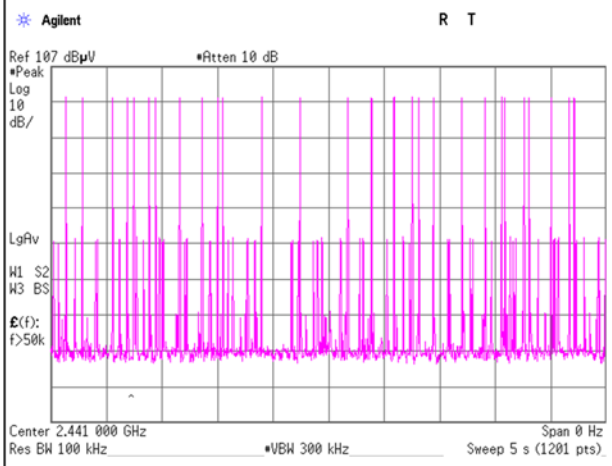
DH1 (1/2)
(Representative chart)



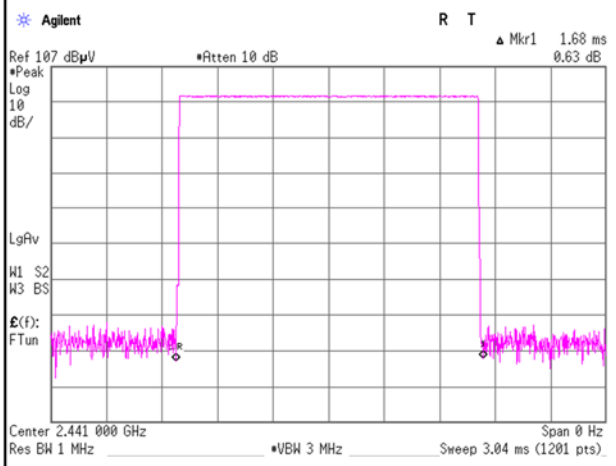
DH1 (2/2)



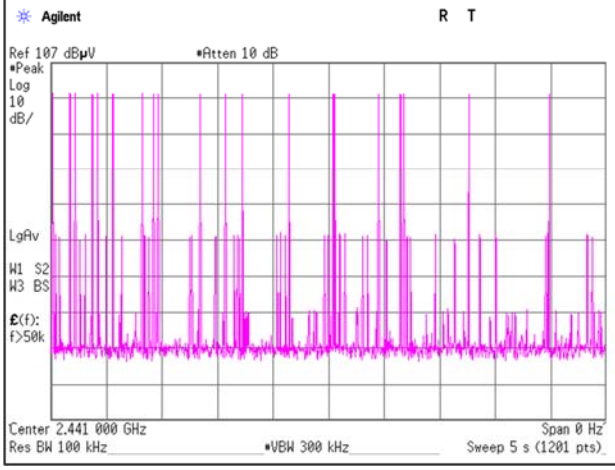
DH3 (1/2)
(Representative chart)



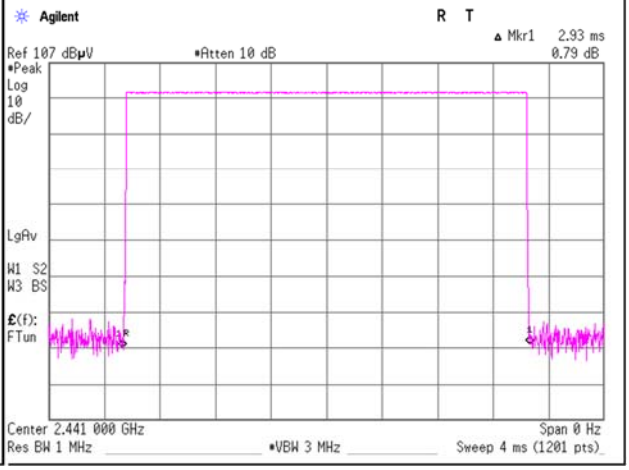
DH3 (2/2)



DH5 (1/2)
(Representative chart)

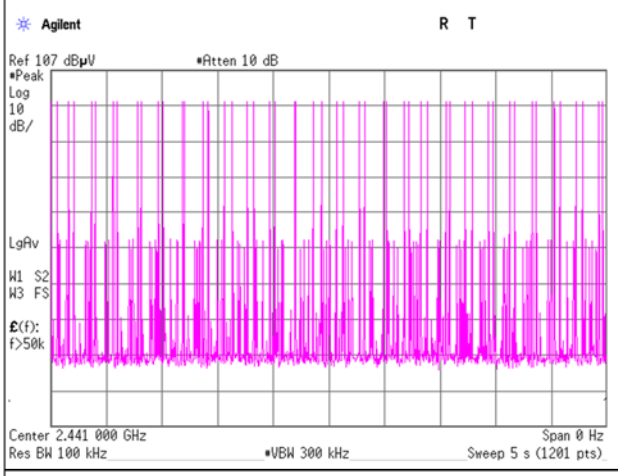


DH5 (2/2)

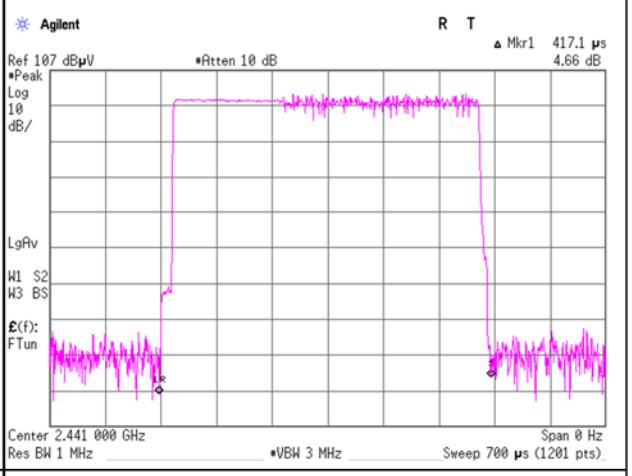


Dwell time

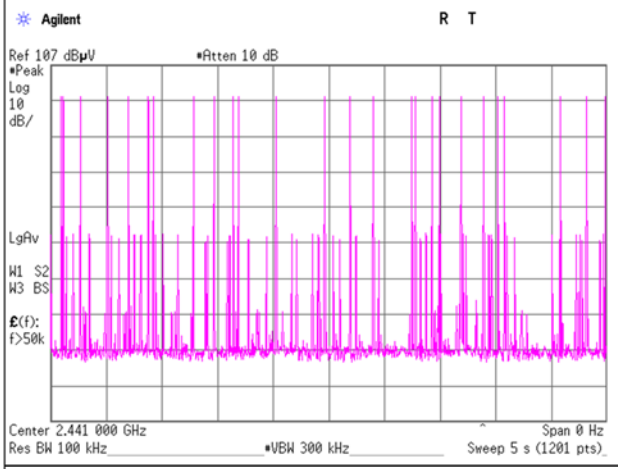
3DH1 (1/2)
(Representative chart)



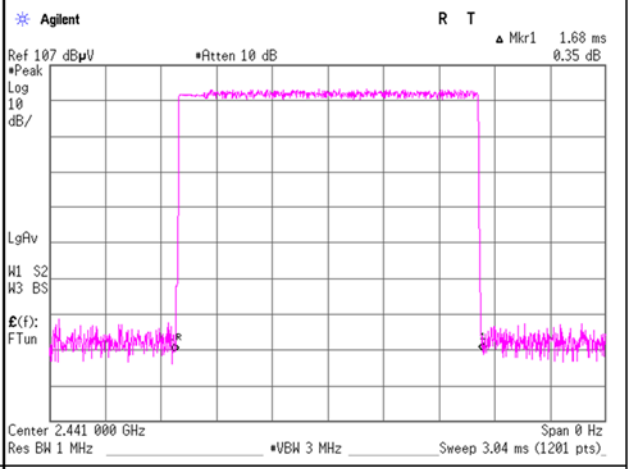
3DH1 (2/2)



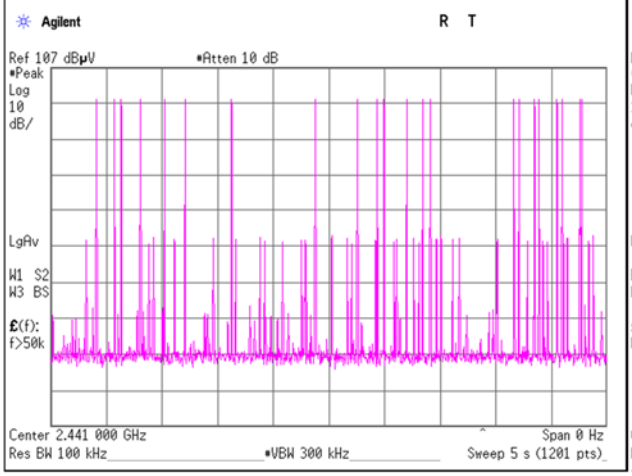
3DH3 (1/2)
(Representative chart)



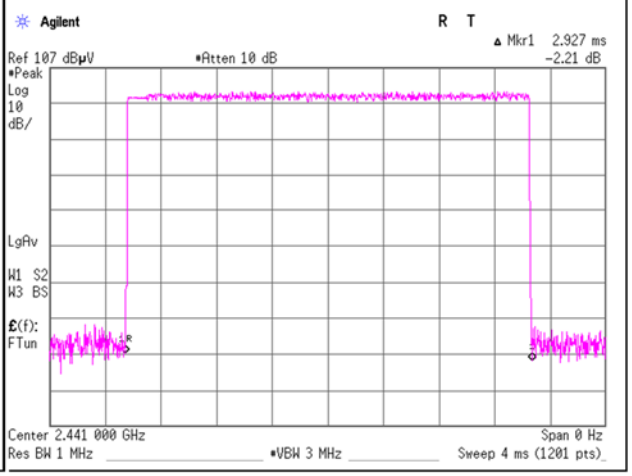
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 7, 2024
Temperature / Humidity	26 deg. C / 37 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off

					Conducted Power					e.i.r.p. for RSS-247					
Mode	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]
DH5	2402	-7.89	2.35	9.95	4.41	2.76	20.97	125	16.56	4.00	8.41	6.93	36.02	4000	27.61
DH5	2441	-8.27	2.36	9.95	4.04	2.54	20.97	125	16.93	4.00	8.04	6.37	36.02	4000	27.98
DH5	2480	-8.18	2.37	9.95	4.14	2.59	20.97	125	16.83	4.00	8.14	6.52	36.02	4000	27.88
2DH5	2402	-6.37	2.35	9.95	5.93	3.92	20.97	125	15.04	4.00	9.93	9.84	36.02	4000	26.09
2DH5	2441	-6.71	2.36	9.95	5.60	3.63	20.97	125	15.37	4.00	9.60	9.12	36.02	4000	26.42
2DH5	2480	-6.67	2.37	9.95	5.65	3.67	20.97	125	15.32	4.00	9.65	9.23	36.02	4000	26.37
3DH5	2402	-5.90	2.35	9.95	6.40	4.37	20.97	125	14.57	4.00	10.40	10.96	36.02	4000	25.62
3DH5	2441	-6.21	2.36	9.95	6.10	4.07	20.97	125	14.87	4.00	10.10	10.23	36.02	4000	25.92
3DH5	2480	-6.16	2.37	9.95	6.16	4.13	20.97	125	14.81	4.00	10.16	10.38	36.02	4000	25.86

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

Test was not performed at AFH mode, because the decrease of number of channel (min: 20 ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
As this device had AFH mode and frequency separation could not meet the requirement of over 20 dB BW without 2/3 relaxation, 125 mW power limit was applied to it.

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 7, 2024
Temperature / Humidity	26 deg. C / 37 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
DH5	2402	-9.45	2.35	9.95	2.85	1.93	1.12	3.97	2.49
DH5	2441	-9.86	2.36	9.95	2.45	1.76	1.12	3.57	2.27
DH5	2480	-9.77	2.37	9.95	2.55	1.80	1.12	3.67	2.33
2DH5	2402	-9.96	2.35	9.95	2.34	1.71	1.12	3.46	2.22
2DH5	2441	-10.35	2.36	9.95	1.96	1.57	1.12	3.08	2.03
2DH5	2480	-10.24	2.37	9.95	2.08	1.61	1.12	3.20	2.09
3DH5	2402	-9.95	2.35	9.95	2.35	1.72	1.12	3.47	2.22
3DH5	2441	-10.33	2.36	9.95	1.98	1.58	1.12	3.10	2.04
3DH5	2480	-10.18	2.37	9.95	2.14	1.64	1.12	3.26	2.12

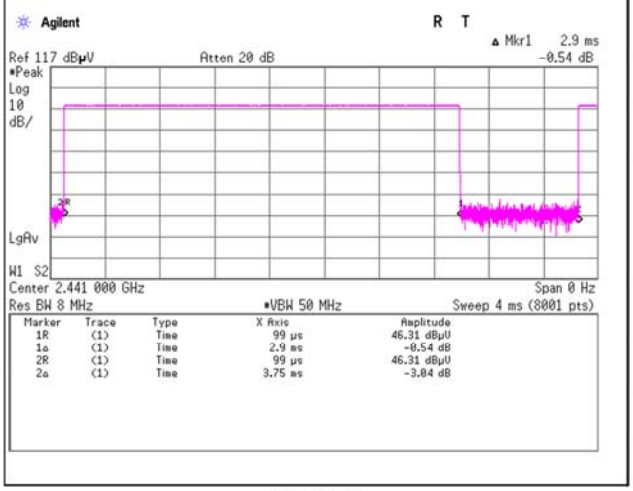
Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Result (Time average) + Duty factor

Burst Rate Confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 7, 2024
Temperature / Humidity	26 deg. C / 37 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off

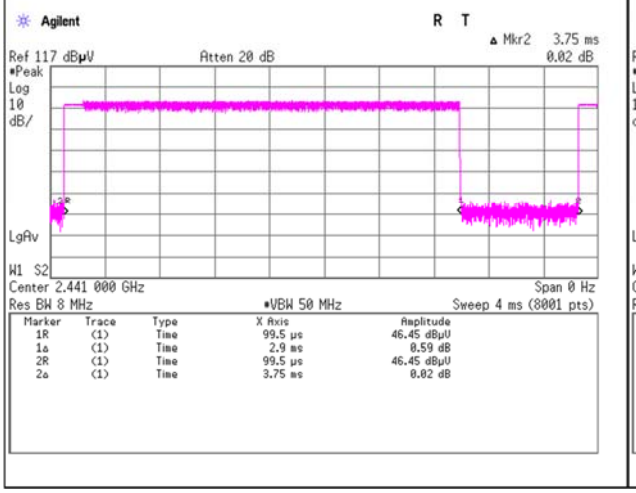
DH5

Tx on / (Tx on + Tx off) =	0.773
Tx on / (Tx on + Tx off) * 100 =	77.3 %
Duty factor = 10 * log (3.75 / 2.9) =	1.12 dB
VBW: 1 / on time = 344.83 Hz <	500.00 Hz



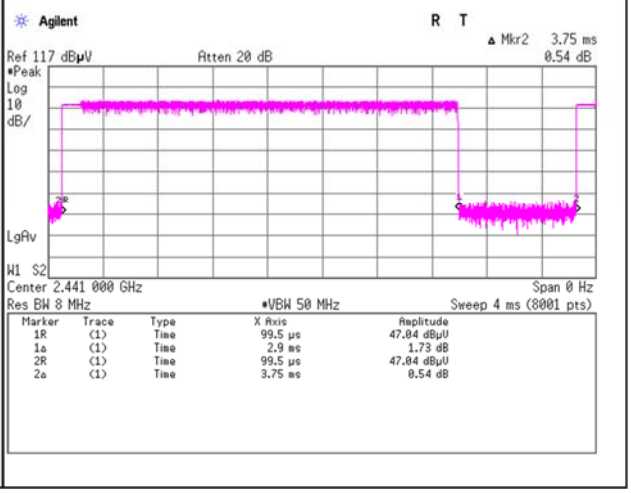
2DH5

Tx on / (Tx on + Tx off) =	0.773
Tx on / (Tx on + Tx off) * 100 =	77.3 %
Duty factor = 10 * log (3.75 / 2.9) =	1.12 dB
VBW: 1 / on time = 344.83 Hz <	500.00 Hz



3DH5

Tx on / (Tx on + Tx off) =	0.773
Tx on / (Tx on + Tx off) * 100 =	77.3 %
Duty factor = 10 * log (3.75 / 2.9) =	1.12 dB
VBW: 1 / on time = 344.83 Hz <	500.00 Hz



Radiated Spurious Emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	WAC1	WAC1	WAC1	WAC1
Date	August 6, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	23 deg. C / 52 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Yosuke Murakami	Akihiro Oda	Akihiro Oda	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, Hopping Off, DH5 2402 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.	2359.494	PK	47.15	27.76	-28.24	-	2.26	48.93	73.9	24.9	150	57	-
Hori.	2390.000	PK	47.04	27.85	-28.23	-	2.26	48.92	73.9	24.9	150	57	-
Hori.	2786.167	PK	48.85	27.63	-27.87	-	2.26	50.87	73.9	23.0	156	360	-
Hori.	4804.000	PK	45.43	31.97	-35.72	-	2.26	43.94	73.9	29.9	134	19	-
Hori.	7206.000	PK	45.43	36.23	-34.12	-	2.26	49.80	73.9	24.1	150	0	-
Hori.	9608.000	PK	44.86	37.93	-31.67	-	2.26	53.38	73.9	20.5	150	0	-
Hori.	2359.494	AV	33.66	27.76	-28.24	-	2.26	35.44	53.9	18.4	150	57	VBW: 500 Hz
Hori.	2390.000	AV	33.16	27.85	-28.23	-	2.26	35.04	53.9	18.8	150	57	VBW: 500 Hz
Hori.	2786.167	AV	38.96	27.63	-27.87	-	2.26	40.98	53.9	12.9	156	360	VBW: 500 Hz
Hori.	4804.000	AV	32.30	31.97	-35.72	-	2.26	30.81	53.9	23.0	134	19	VBW: 500 Hz
Hori.	7206.000	AV	31.83	36.23	-34.12	-	2.26	36.20	53.9	17.7	150	0	VBW: 500 Hz, floor noise
Hori.	9608.000	AV	31.28	37.93	-31.67	-	2.26	39.80	53.9	14.1	150	0	VBW: 500 Hz, floor noise
Vert.	2354.015	PK	47.75	27.75	-28.25	-	2.26	49.51	73.9	24.3	186	25	-
Vert.	2390.000	PK	47.65	27.85	-28.23	-	2.26	49.53	73.9	24.3	186	25	-
Vert.	2786.167	PK	49.47	27.63	-27.87	-	2.26	51.49	73.9	22.4	135	337	-
Vert.	4804.000	PK	45.93	31.97	-35.72	-	2.26	44.44	73.9	29.4	153	188	-
Vert.	7206.000	PK	46.42	36.23	-34.12	-	2.26	50.79	73.9	23.1	150	0	-
Vert.	9608.000	PK	44.91	37.93	-31.67	-	2.26	53.43	73.9	20.4	150	0	-
Vert.	2354.015	AV	34.81	27.75	-28.25	-	2.26	36.57	53.9	17.3	186	25	VBW: 500 Hz
Vert.	2390.000	AV	33.43	27.85	-28.23	-	2.26	35.31	53.9	18.5	186	25	VBW: 500 Hz
Vert.	2786.167	AV	39.81	27.63	-27.87	-	2.26	41.83	53.9	**12.0**	135	337	VBW: 500 Hz
Vert.	4804.000	AV	32.54	31.97	-35.72	-	2.26	31.05	53.9	22.8	153	188	VBW: 500 Hz
Vert.	7206.000	AV	31.63	36.23	-34.12	-	2.26	36.00	53.9	17.9	150	0	VBW: 500 Hz, floor noise
Vert.	9608.000	AV	31.00	37.93	-31.67	-	2.26	39.52	53.9	14.3	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

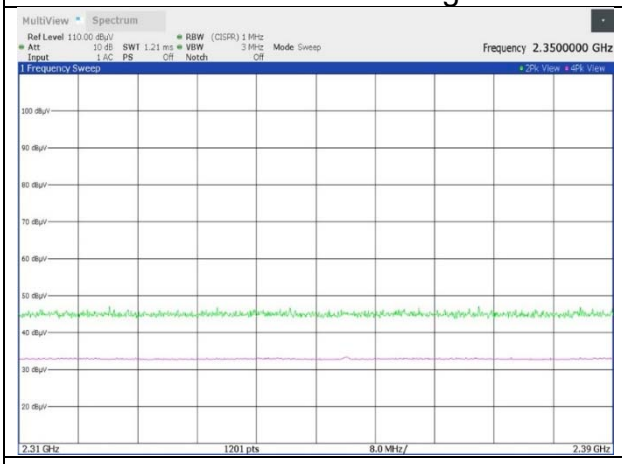
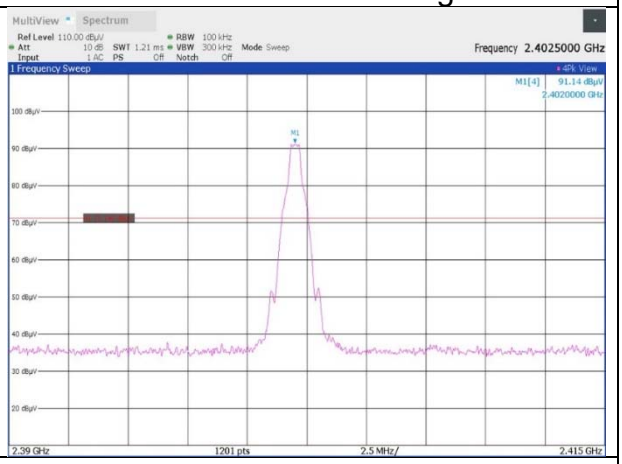
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

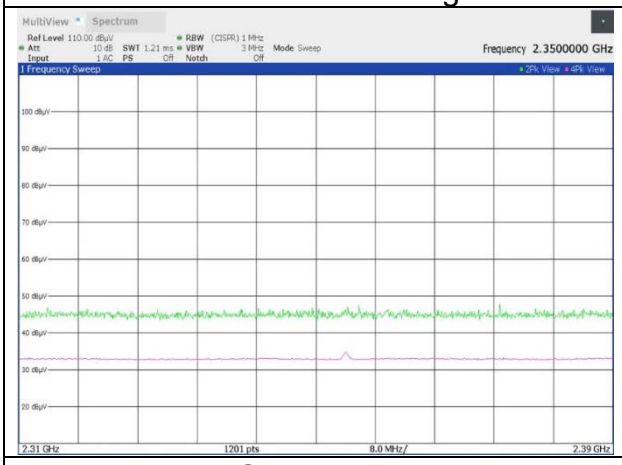
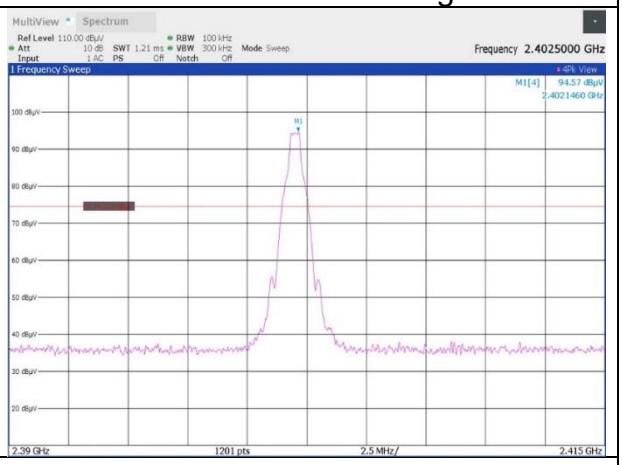
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.14	27.89	-28.22	-	2.26	93.07	-	-	Carrier
Hori.	2400.000	PK	38.31	27.89	-28.22	-	2.26	40.24	73.0	32.7	-
Vert.	2402.000	PK	94.57	27.89	-28.22	-	2.26	96.50	-	-	Carrier
Vert.	2400.000	PK	39.43	27.89	-28.22	-	2.26	41.36	76.5	35.1	-

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1
Date	August 6, 2024
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yosuke Murakami
	(1 GHz to 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2402 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	WAC1	WAC1	WAC1	WAC1
Date	August 6, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	23 deg. C / 52 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Yosuke Murakami	Akihiro Oda	Akihiro Oda	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, Hopping Off, DH5 2441 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.	4882.000	PK	45.76	32.34	-35.80	-	2.26	44.56	73.9	29.3	144	2	-
Hori.	7323.000	PK	45.68	36.63	-33.90	-	2.26	50.67	73.9	23.2	150	0	-
Hori.	9764.000	PK	44.76	37.93	-31.49	-	2.26	53.46	73.9	20.4	150	0	-
Hori.	4882.000	AV	32.53	32.34	-35.80	-	2.26	31.33	53.9	22.5	144	2	VBW: 500 Hz
Hori.	7323.000	AV	32.00	36.63	-33.90	-	2.26	36.99	53.9	16.9	150	0	VBW: 500 Hz, floor noise
Hori.	9764.000	AV	32.35	37.93	-31.49	-	2.26	41.05	53.9	**12.8**	150	0	VBW: 500 Hz, floor noise
Vert.	4882.000	PK	45.73	32.34	-35.80	-	2.26	44.53	73.9	29.3	187	297	-
Vert.	7323.000	PK	46.52	36.63	-33.90	-	2.26	51.51	73.9	22.3	150	0	-
Vert.	9764.000	PK	44.87	37.93	-31.49	-	2.26	53.57	73.9	20.3	150	0	-
Vert.	4882.000	AV	32.66	32.34	-35.80	-	2.26	31.46	53.9	22.4	187	297	VBW: 500 Hz
Vert.	7323.000	AV	32.03	36.63	-33.90	-	2.26	37.02	53.9	16.8	150	0	VBW: 500 Hz, floor noise
Vert.	9764.000	AV	31.43	37.93	-31.49	-	2.26	40.13	53.9	13.7	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1	WAC1	WAC1	WAC1
Date	August 6, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	23 deg. C / 52 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Yosuke Murakami	Akihiro Oda	Akihiro Oda	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, Hopping Off, DH5 2480 MHz			

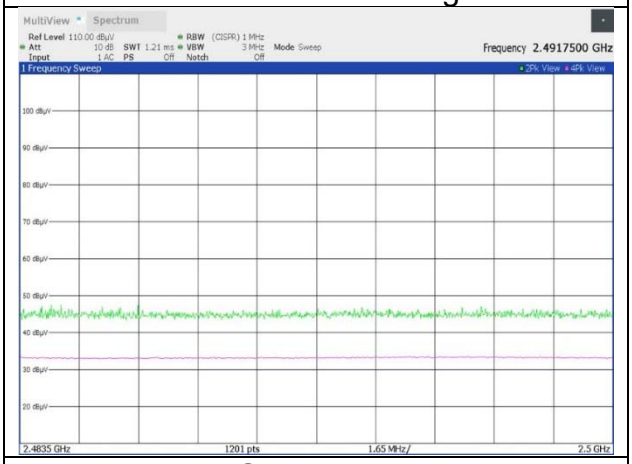
(* PK: Peak, AV: Average, QP: Quasi-Peak)

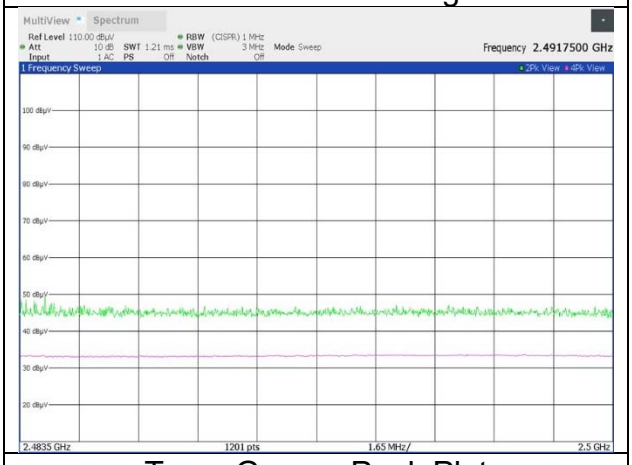
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	48.58	27.96	-28.18	-	2.26	50.62	73.9	23.2	116	2	-
Hori.	2528.000	PK	48.73	27.88	-28.14	-	2.26	50.73	73.9	23.1	100	356	-
Hori.	4960.000	PK	45.42	32.62	-35.89	-	2.26	44.41	73.9	29.4	134	77	-
Hori.	7440.000	PK	46.52	36.69	-33.68	-	2.26	51.79	73.9	22.1	150	0	-
Hori.	9920.000	PK	46.21	37.93	-31.31	-	2.26	55.09	73.9	18.8	218	0	-
Hori.	2483.500	AV	33.23	27.96	-28.18	-	2.26	35.27	53.9	18.6	116	2	VBW: 500 Hz
Hori.	2528.000	AV	37.93	27.88	-28.14	-	2.26	39.93	53.9	13.9	100	356	VBW: 500 Hz
Hori.	4960.000	AV	32.85	32.62	-35.89	-	2.26	31.84	53.9	22.0	134	77	VBW: 500 Hz
Hori.	7440.000	AV	32.72	36.69	-33.68	-	2.26	37.99	53.9	15.9	150	0	VBW: 500 Hz, floor noise
Hori.	9920.000	AV	31.67	37.93	-31.31	-	2.26	40.55	53.9	13.3	218	0	VBW: 500 Hz, floor noise
Vert.	2483.500	PK	50.09	27.96	-28.18	-	2.26	52.13	73.9	21.7	150	345	-
Vert.	2528.000	PK	49.00	27.88	-28.14	-	2.26	51.00	73.9	22.9	118	340	-
Vert.	4960.000	PK	45.90	32.62	-35.89	-	2.26	44.89	73.9	29.0	201	133	-
Vert.	7440.000	PK	45.72	36.69	-33.68	-	2.26	50.99	73.9	22.9	150	0	-
Vert.	9920.000	PK	45.10	37.93	-31.31	-	2.26	53.98	73.9	19.9	150	0	-
Vert.	2483.500	AV	33.26	27.96	-28.18	-	2.26	35.30	53.9	18.6	150	345	VBW: 500 Hz
Vert.	2528.000	AV	38.35	27.88	-28.14	-	2.26	40.35	53.9	13.5	118	340	VBW: 500 Hz
Vert.	4960.000	AV	32.62	32.62	-35.89	-	2.26	31.61	53.9	22.2	201	133	VBW: 500 Hz
Vert.	7440.000	AV	31.67	36.69	-33.68	-	2.26	36.94	53.9	16.9	150	0	VBW: 500 Hz, floor noise
Vert.	9920.000	AV	32.10	37.93	-31.31	-	2.26	40.98	53.9	**12.9**	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for bandto edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	WAC1
Date	August 6, 2024
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yosuke Murakami
	(1 GHz to 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2480 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	WAC2	WAC1	WAC1	WAC1	WAC1
Date	September 2, 2024	August 21, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	23 deg. C / 51 % RH	25 deg. C / 50 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Yuta Shiba	Yuta Shiba	Akihiro Oda	Akihiro Oda	Yuta Shiba
	(Below 1 GHz)	(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, Hopping Off, 3DH5 2402 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.	57.105	QP	44.80	9.62	6.43	33.12	0.00	27.73	40.0	12.2	400	349	-
Hori.	193.574	QP	43.10	14.18	7.19	33.07	0.00	31.40	43.5	12.1	168	12	-
Hori.	207.667	QP	42.30	11.38	7.25	33.04	0.00	27.89	43.5	15.6	167	16	-
Hori.	215.984	QP	41.90	11.24	7.28	33.02	0.00	27.40	43.5	16.1	150	115	-
Hori.	252.186	QP	47.00	11.93	7.40	32.92	0.00	33.41	46.0	12.5	126	22	-
Hori.	266.513	QP	44.90	12.67	7.44	32.89	0.00	32.12	46.0	13.8	116	20	-
Hori.	410.100	QP	43.80	16.04	7.86	32.49	0.00	35.21	46.0	**10.7**	100	353	-
Hori.	793.219	QP	35.10	20.81	8.74	30.98	0.00	33.67	46.0	12.3	151	72	-
Hori.	825.588	QP	31.40	20.99	8.79	30.83	0.00	30.35	46.0	15.6	137	192	-
Hori.	2354.013	PK	47.32	27.75	-28.25	-	2.26	49.08	73.9	24.8	163	345	-
Hori.	2390.000	PK	48.11	27.85	-28.23	-	2.26	49.99	73.9	23.9	163	345	-
Hori.	2786.121	PK	48.93	27.63	-27.87	-	2.26	50.95	73.9	22.9	181	337	-
Hori.	4804.000	PK	45.14	31.97	-35.72	-	2.26	43.65	73.9	30.2	189	208	-
Hori.	7206.000	PK	45.75	36.23	-34.12	-	2.26	50.12	73.9	23.7	150	0	-
Hori.	9608.000	PK	44.19	37.93	-31.67	-	2.26	52.71	73.9	21.1	150	0	-
Hori.	2354.013	AV	34.45	27.75	-28.25	-	2.26	36.21	53.9	17.6	163	345	VBW: 500 Hz
Hori.	2390.000	AV	34.25	27.85	-28.23	-	2.26	36.13	53.9	17.7	163	345	VBW: 500 Hz
Hori.	2786.121	AV	34.54	27.63	-27.87	-	2.26	36.56	53.9	17.3	181	337	VBW: 500 Hz
Hori.	4804.000	AV	32.36	31.97	-35.72	-	2.26	30.87	53.9	23.0	189	208	VBW: 500 Hz
Hori.	7206.000	AV	32.20	36.23	-34.12	-	2.26	36.57	53.9	17.3	150	0	VBW: 500 Hz, floor noise
Hori.	9608.000	AV	31.39	37.93	-31.67	-	2.26	39.91	53.9	13.9	150	0	VBW: 500 Hz, floor noise
Vert.	401.861	QP	38.60	15.90	7.84	32.51	0.00	29.83	46.0	16.1	127	180	-
Vert.	793.212	QP	32.10	20.81	8.74	30.98	0.00	30.67	46.0	15.3	149	181	-
Vert.	2354.013	PK	48.45	27.75	-28.25	-	2.26	50.21	73.9	23.6	139	25	-
Vert.	2390.000	PK	48.34	27.85	-28.23	-	2.26	50.22	73.9	23.6	139	25	-
Vert.	2786.121	PK	47.61	27.63	-27.87	-	2.26	49.63	73.9	24.2	142	326	-
Vert.	4804.000	PK	45.15	31.97	-35.72	-	2.26	43.66	73.9	30.2	133	207	-
Vert.	7206.000	PK	45.29	36.23	-34.12	-	2.26	49.66	73.9	24.2	150	0	-
Vert.	9608.000	PK	44.70	37.93	-31.67	-	2.26	53.22	73.9	20.6	150	0	-
Vert.	2354.013	AV	35.18	27.75	-28.25	-	2.26	36.94	53.9	16.9	139	25	VBW: 500 Hz
Vert.	2390.000	AV	34.24	27.85	-28.23	-	2.26	36.12	53.9	17.7	139	25	VBW: 500 Hz
Vert.	2786.121	AV	35.14	27.63	-27.87	-	2.26	37.16	53.9	16.7	142	326	VBW: 500 Hz
Vert.	4804.000	AV	32.46	31.97	-35.72	-	2.26	30.97	53.9	22.9	133	207	VBW: 500 Hz
Vert.	7206.000	AV	32.44	36.23	-34.12	-	2.26	36.81	53.9	17.0	150	0	VBW: 500 Hz, floor noise
Vert.	9608.000	AV	31.34	37.93	-31.67	-	2.26	39.86	53.9	14.0	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

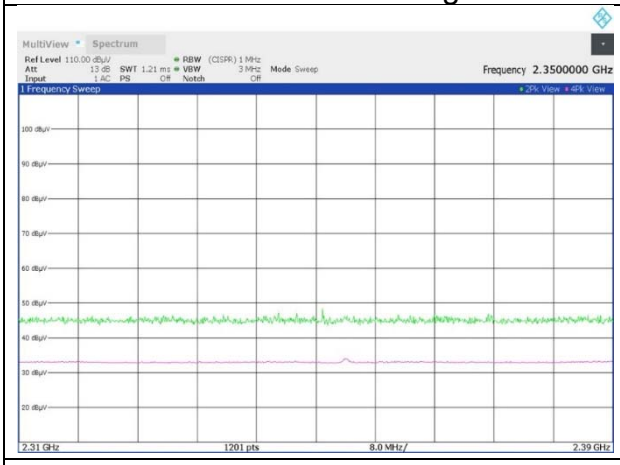
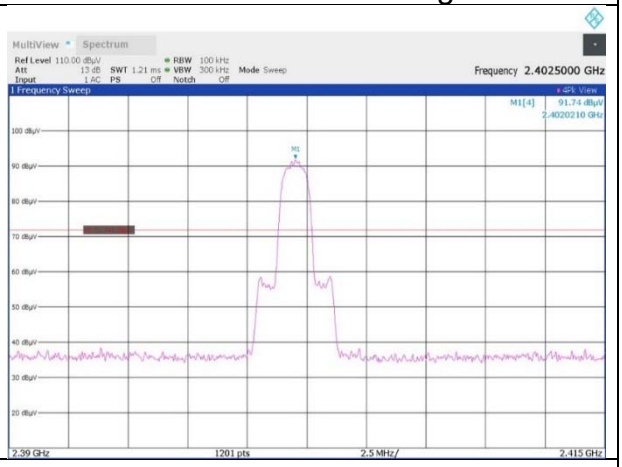
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

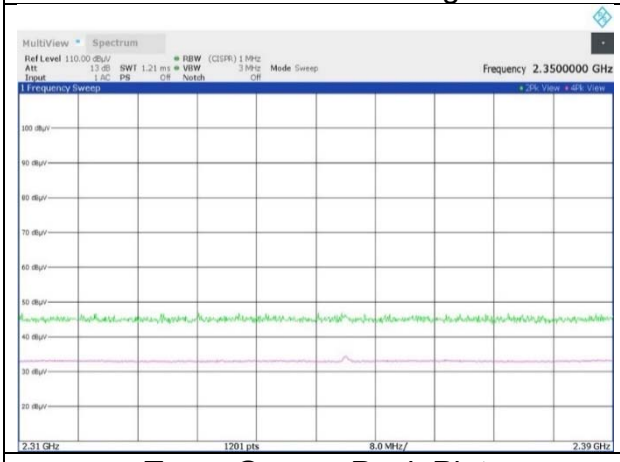
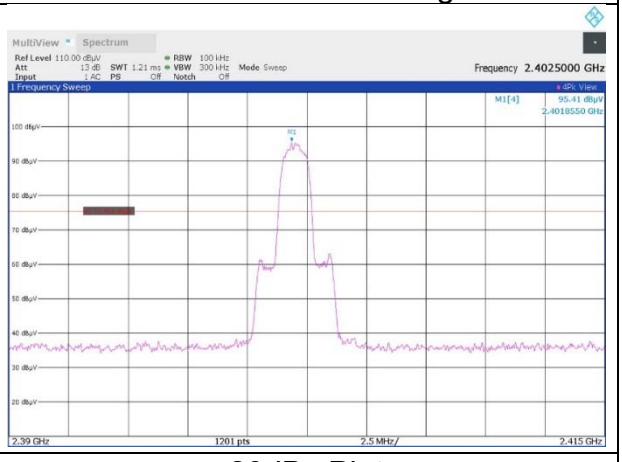
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.74	27.89	-28.22	-	2.26	93.67	-	-	Carrier
Hori.	2400.000	PK	37.76	27.89	-28.22	-	2.26	39.69	73.6	33.9	-
Vert.	2402.000	PK	95.41	27.89	-28.22	-	2.26	97.34	-	-	Carrier
Vert.	2400.000	PK	37.84	27.89	-28.22	-	2.26	39.77	77.3	37.5	-

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1
Date	August 21, 2024
Temperature / Humidity	25 deg. C / 50 % RH
Engineer	Yuta Shiba
	(1 GHz to 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 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	WAC1	WAC1	WAC1	WAC1
Date	August 10, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	22 deg. C / 55 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Takahiro Suzuki	Akihiro Oda	Akihiro Oda	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, Hopping Off, 3DH5 2441 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.	4882.000	PK	45.33	32.34	-35.80	-	2.26	44.13	73.9	29.7	192	28	-
Hori.	7323.000	PK	45.60	36.63	-33.90	-	2.26	50.59	73.9	23.3	150	0	-
Hori.	9764.000	PK	45.23	37.93	-31.49	-	2.26	53.93	73.9	19.9	150	0	-
Hori.	4882.000	AV	32.68	32.34	-35.80	-	2.26	31.48	53.9	22.4	192	28	VBW: 500 Hz
Hori.	7323.000	AV	32.38	36.63	-33.90	-	2.26	37.37	53.9	16.5	150	0	VBW: 500 Hz, floor noise
Hori.	9764.000	AV	31.83	37.93	-31.49	-	2.26	40.53	53.9	**13.3**	150	0	VBW: 500 Hz, floor noise
Vert.	4882.000	PK	45.59	32.34	-35.80	-	2.26	44.39	73.9	29.5	221	96	-
Vert.	7323.000	PK	45.87	36.63	-33.90	-	2.26	50.86	73.9	23.0	150	0	-
Vert.	9764.000	PK	46.02	37.93	-31.49	-	2.26	54.72	73.9	19.1	150	0	-
Vert.	4882.000	AV	32.45	32.34	-35.80	-	2.26	31.25	53.9	22.6	221	96	VBW: 500 Hz
Vert.	7323.000	AV	32.32	36.63	-33.90	-	2.26	37.31	53.9	16.5	150	0	VBW: 500 Hz, floor noise
Vert.	9764.000	AV	31.30	37.93	-31.49	-	2.26	40.00	53.9	13.9	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1	WAC1	WAC1	WAC1
Date	August 10, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	22 deg. C / 55 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Takahiro Suzuki	Akihiro Oda	Akihiro Oda	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, Hopping Off, 3DH5 2480 MHz			

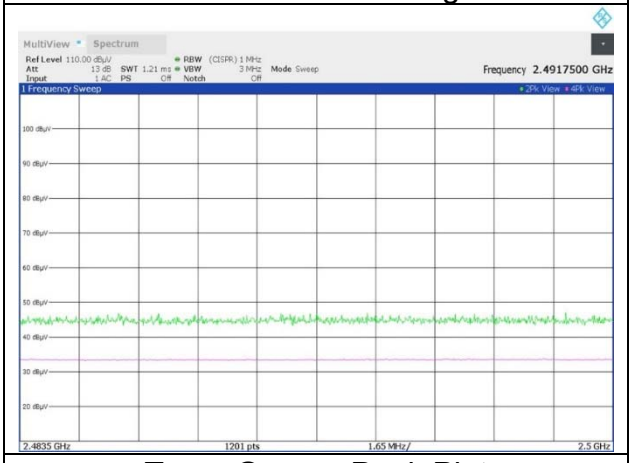
(* PK: Peak, AV: Average, QP: Quasi-Peak)

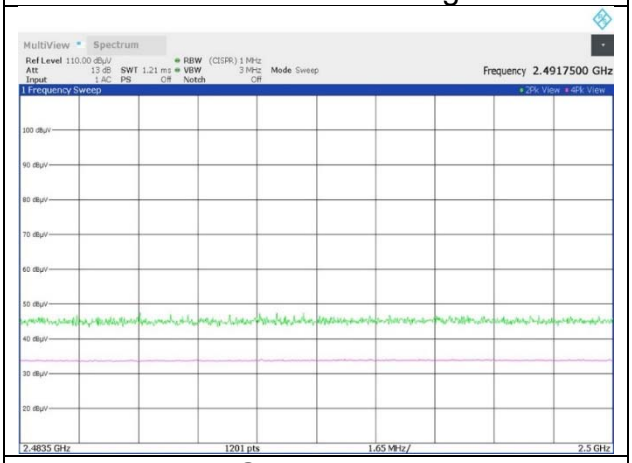
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	48.51	27.96	-28.18	-	2.26	50.55	73.9	23.3	145	41	-
Hori.	2528.000	PK	48.65	27.88	-28.14	-	2.26	50.65	73.9	23.2	115	343	-
Hori.	4960.000	PK	46.24	32.62	-35.89	-	2.26	45.23	73.9	28.6	150	43	-
Hori.	7440.000	PK	46.13	36.69	-33.68	-	2.26	51.40	73.9	22.5	150	0	-
Hori.	9920.000	PK	46.02	37.93	-31.31	-	2.26	54.90	73.9	19.0	150	0	-
Hori.	2483.500	AV	34.38	27.96	-28.18	-	2.26	36.42	53.9	17.4	145	41	VBW: 500 Hz
Hori.	2528.000	AV	38.13	27.88	-28.14	-	2.26	40.13	53.9	13.7	115	343	VBW: 500 Hz
Hori.	4960.000	AV	32.76	32.62	-35.89	-	2.26	31.75	53.9	22.1	150	43	VBW: 500 Hz
Hori.	7440.000	AV	32.73	36.69	-33.68	-	2.26	38.00	53.9	15.9	150	0	VBW: 500 Hz, floor noise
Hori.	9920.000	AV	31.85	37.93	-31.31	-	2.26	40.73	53.9	13.1	150	0	VBW: 500 Hz, floor noise
Vert.	2483.500	PK	48.09	27.96	-28.18	-	2.26	50.13	73.9	23.7	138	345	-
Vert.	2528.000	PK	48.10	27.88	-28.14	-	2.26	50.10	73.9	23.8	146	326	-
Vert.	4960.000	PK	46.30	32.62	-35.89	-	2.26	45.29	73.9	28.6	153	129	-
Vert.	7440.000	PK	46.55	36.69	-33.68	-	2.26	51.82	73.9	22.0	150	0	-
Vert.	9920.000	PK	45.00	37.93	-31.31	-	2.26	53.88	73.9	20.0	150	0	-
Vert.	2483.500	AV	34.72	27.96	-28.18	-	2.26	36.76	53.9	17.1	138	345	VBW: 500 Hz
Vert.	2528.000	AV	39.45	27.88	-28.14	-	2.26	41.45	53.9	**12.4**	146	326	VBW: 500 Hz
Vert.	4960.000	AV	32.78	32.62	-35.89	-	2.26	31.77	53.9	22.1	153	129	VBW: 500 Hz
Vert.	7440.000	AV	33.28	36.69	-33.68	-	2.26	38.55	53.9	15.3	150	0	VBW: 500 Hz, floor noise
Vert.	9920.000	AV	31.37	37.93	-31.31	-	2.26	40.25	53.9	13.6	150	0	VBW: 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1
Date	August 10, 2024
Temperature / Humidity	22 deg. C / 55 % RH
Engineer	Takahiro Suzuki
	(1 GHz to 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz

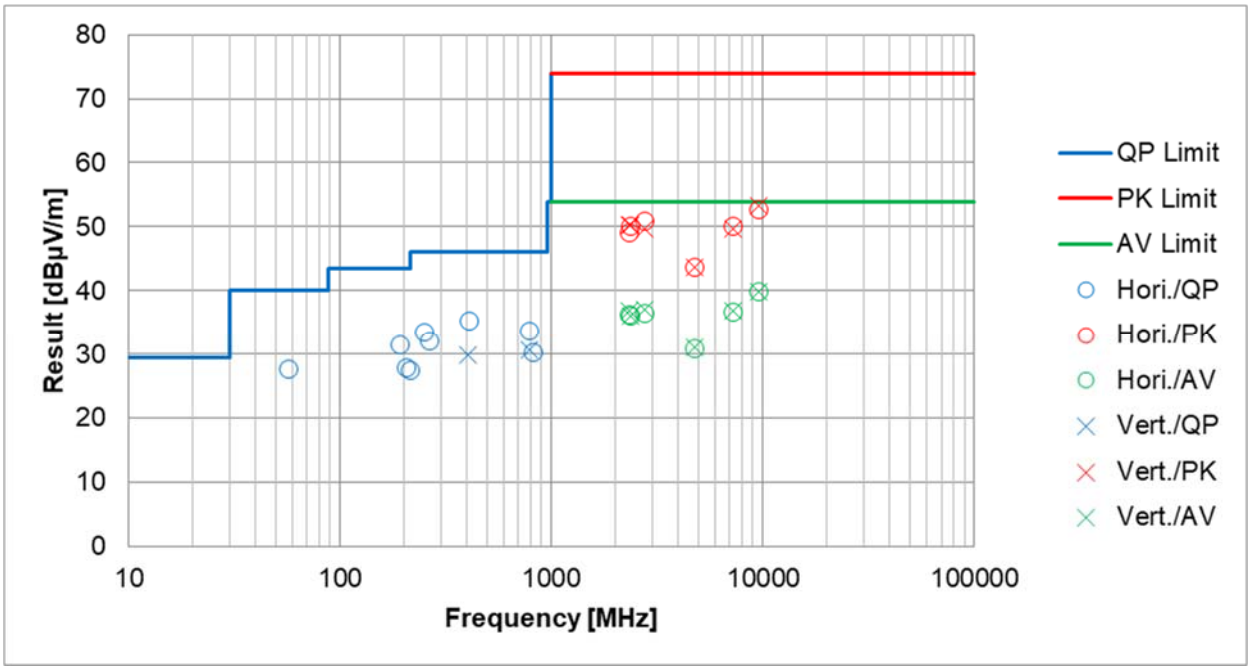
Horizontal
Restricted-band band-edge Plot

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	WAC2	WAC1	WAC1	WAC1	WAC1
Date	September 2, 2024	August 21, 2024	August 14, 2024	August 16, 2024	August 20, 2024
Temperature / Humidity	23 deg. C / 51 % RH	25 deg. C / 50 % RH	22 deg. C / 41 % RH	24 deg. C / 54 % RH	24 deg. C / 59 % RH
Engineer	Yuta Shiba	Yuta Shiba	Akihiro Oda	Akihiro Oda	Yuta Shiba
	(Below 1 GHz)	(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, Hopping Off, 3DH5 2402 MHz				



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

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC2	WAC1	WAC1
Date	September 3, 2024	August 21, 2024	August 22, 2024
Temperature / Humidity	24 deg. C / 61 % RH	25 deg. C / 50 % RH	25 deg. C / 56 % RH
Engineer	Shiro Kobayashi	Yuta Shiba	Yosuke Murakami
	(Below 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11ax-20 OFDM 5825 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.	53.777	QP	45.10	9.79	6.45	33.09	0.00	28.25	40.0	11.7	400	132	-
Hori.	192.853	QP	40.80	14.11	7.19	33.07	0.00	29.03	43.5	14.4	170	16	-
Hori.	213.754	QP	41.80	11.26	7.27	33.02	0.00	27.31	43.5	16.1	155	118	-
Hori.	240.094	QP	42.30	11.65	7.36	32.95	0.00	28.36	46.0	17.6	141	14	-
Hori.	253.475	QP	45.10	11.97	7.40	32.91	0.00	31.56	46.0	14.4	116	20	-
Hori.	266.400	QP	43.60	12.66	7.44	32.89	0.00	30.81	46.0	15.1	120	36	-
Hori.	403.732	QP	45.60	15.93	7.85	32.50	0.00	36.88	46.0	**9.1**	100	354	-
Hori.	793.220	QP	34.60	20.81	8.74	30.98	0.00	33.17	46.0	12.8	152	223	-
Hori.	2353.922	PK	46.32	27.75	-28.25	-	2.26	48.08	73.9	25.8	101	10	-
Hori.	2390.000	PK	46.88	27.85	-28.23	-	2.26	48.76	73.9	25.1	211	57	-
Hori.	2530.058	PK	46.49	27.87	-28.14	-	2.26	48.48	73.9	25.4	129	6	-
Hori.	2786.011	PK	48.00	27.63	-27.87	-	2.26	50.02	73.9	23.8	120	5	-
Hori.	4804.000	PK	48.78	31.97	-35.72	-	2.26	47.29	73.9	26.6	183	318	-
Hori.	7206.000	PK	45.90	36.23	-34.12	-	2.26	50.27	73.9	23.6	150	0	-
Hori.	9608.000	PK	45.07	37.93	-31.67	-	2.26	53.59	73.9	20.3	150	0	-
Hori.	2353.922	AV	33.62	27.75	-28.25	-	2.26	35.38	53.9	18.5	101	10	VBW : 500 Hz
Hori.	2390.000	AV	34.37	27.85	-28.23	-	2.26	36.25	53.9	17.6	211	57	VBW : 500 Hz
Hori.	2530.058	AV	36.35	27.87	-28.14	-	2.26	38.34	53.9	15.5	129	6	VBW : 500 Hz
Hori.	2786.011	AV	36.99	27.63	-27.87	-	2.26	39.01	53.9	14.8	120	5	VBW : 500 Hz
Hori.	4804.000	AV	38.44	31.97	-35.72	-	2.26	36.95	53.9	16.9	183	318	VBW : 500 Hz
Hori.	7206.000	AV	32.65	36.23	-34.12	-	2.26	37.02	53.9	16.8	150	0	VBW : 500 Hz, floor noise
Hori.	9608.000	AV	31.68	37.93	-31.67	-	2.26	40.20	53.9	13.7	150	0	VBW : 500 Hz, floor noise
Vert.	192.836	QP	38.20	14.11	7.19	33.07	0.00	26.43	43.5	17.0	100	136	-
Vert.	408.482	QP	38.50	16.02	7.86	32.50	0.00	29.88	46.0	16.1	132	157	-
Vert.	793.221	QP	35.10	20.81	8.74	30.98	0.00	33.67	46.0	12.3	151	170	-
Vert.	2353.934	PK	46.84	27.75	-28.25	-	2.26	48.60	73.9	25.3	118	35	-
Vert.	2390.000	PK	46.77	27.85	-28.23	-	2.26	48.65	73.9	25.2	210	320	-
Vert.	2530.029	PK	48.40	27.87	-28.14	-	2.26	50.39	73.9	23.5	135	30	-
Vert.	2786.323	PK	47.71	27.63	-27.87	-	2.26	49.73	73.9	24.1	136	340	-
Vert.	4804.000	PK	46.80	31.97	-35.72	-	2.26	45.31	73.9	28.5	254	114	-
Vert.	7206.000	PK	45.84	36.23	-34.12	-	2.26	50.21	73.9	23.6	150	0	-
Vert.	9608.000	PK	45.57	37.93	-31.67	-	2.26	54.09	73.9	19.8	150	0	-
Vert.	2353.934	AV	35.41	27.75	-28.25	-	2.26	37.17	53.9	16.7	118	35	VBW : 500 Hz
Vert.	2390.000	AV	33.03	27.85	-28.23	-	2.26	34.91	53.9	18.9	210	320	VBW : 500 Hz
Vert.	2530.029	AV	38.40	27.87	-28.14	-	2.26	40.39	53.9	13.5	135	30	VBW : 500 Hz
Vert.	2786.323	AV	37.67	27.63	-27.87	-	2.26	39.69	53.9	14.2	136	340	VBW : 500 Hz
Vert.	4804.000	AV	35.50	31.97	-35.72	-	2.26	34.01	53.9	19.8	254	114	VBW : 500 Hz
Vert.	7206.000	AV	32.66	36.23	-34.12	-	2.26	37.03	53.9	16.8	150	0	VBW : 500 Hz, floor noise
Vert.	9608.000	AV	31.85	37.93	-31.67	-	2.26	40.37	53.9	13.5	150	0	VBW : 500 Hz, floor noise

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

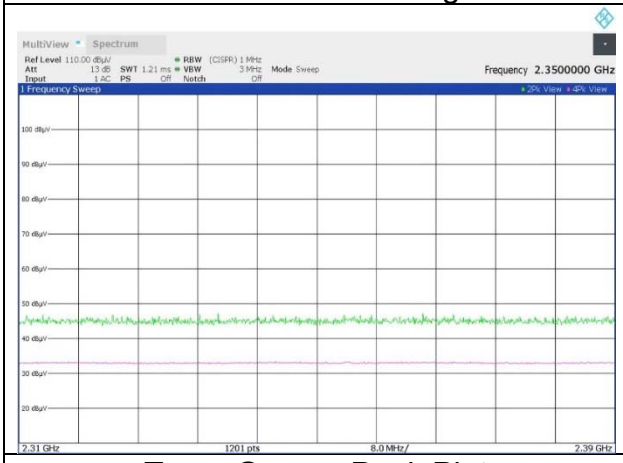
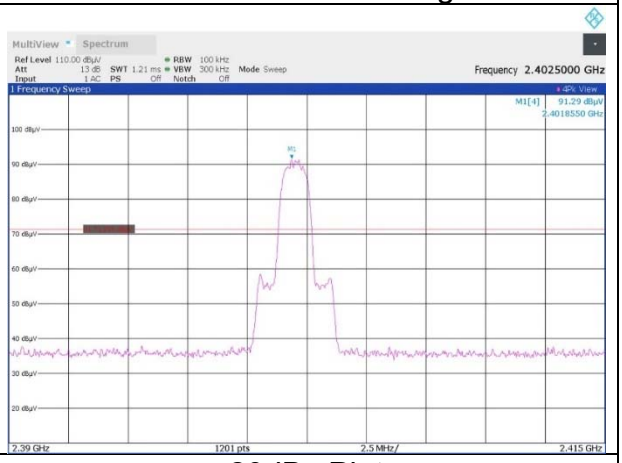
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

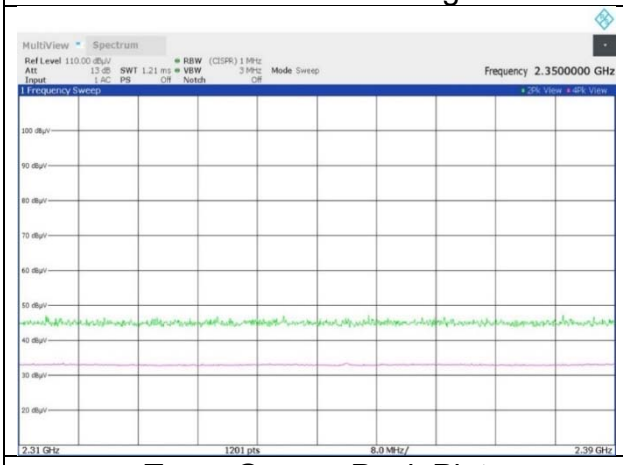
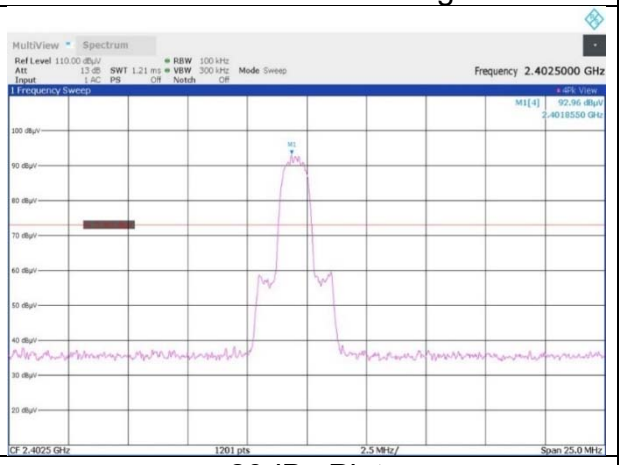
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.32	27.89	-28.22	-	2.26	93.25	-	-	Carrier
Hori.	2400.000	PK	38.01	27.89	-28.22	-	2.26	39.94	73.2	33.2	-
Vert.	2402.000	PK	92.96	27.89	-28.22	-	2.26	94.89	-	-	Carrier
Vert.	2400.000	PK	38.42	27.89	-28.22	-	2.26	40.35	74.8	34.4	-

1 GHz to 18 GHz: Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)- Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	WAC1
Date	August 21, 2024
Temperature / Humidity	25 deg. C / 50 % RH
Engineer	Yuta Shiba
	(1 GHz to 10 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11ax-20 OFDM 5825 MHz

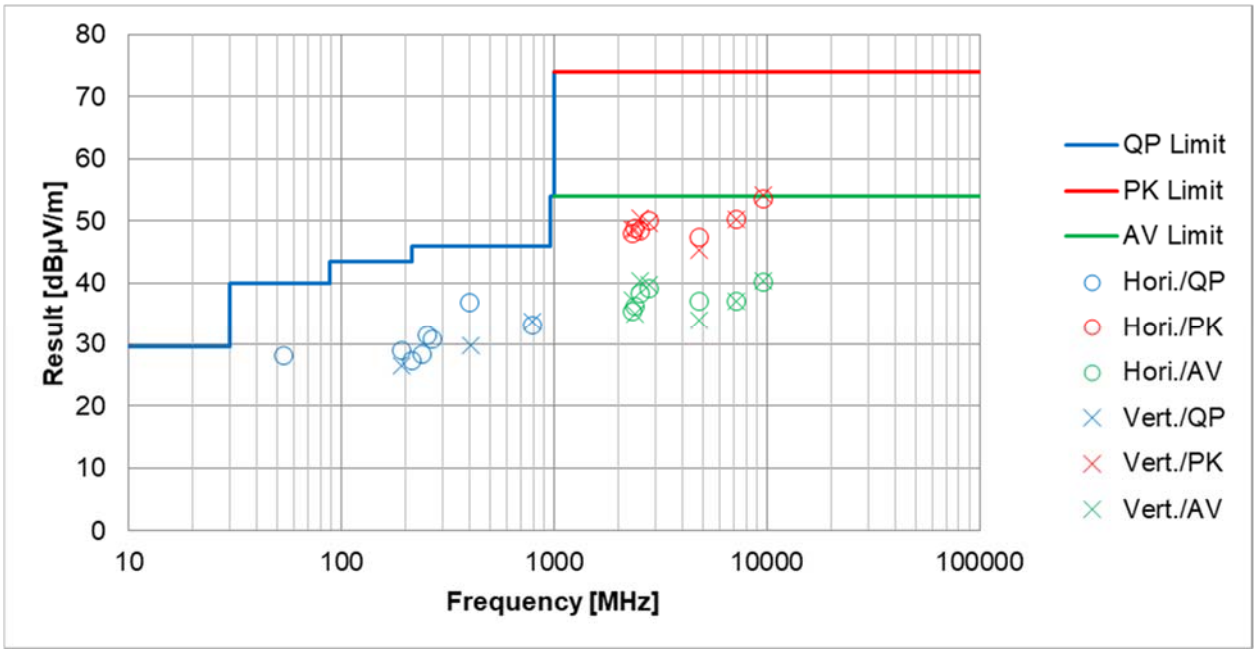
Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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 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	WAC2	WAC1	WAC1
Date	September 3, 2024	August 21, 2024	August 22, 2024
Temperature / Humidity	24 deg. C / 61 % RH	25 deg. C / 50 % RH	25 deg. C / 56 % RH
Engineer	Shiro Kobayashi	Yuta Shiba	Yosuke Murakami
	(Below 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11ax-20 OFDM 5825 MHz		



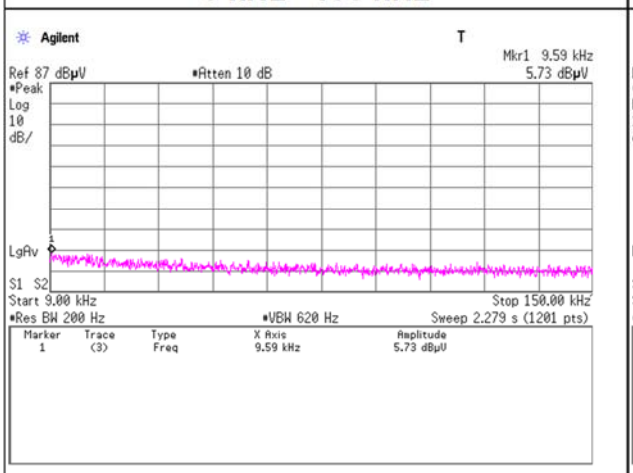
*These plots data contain sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

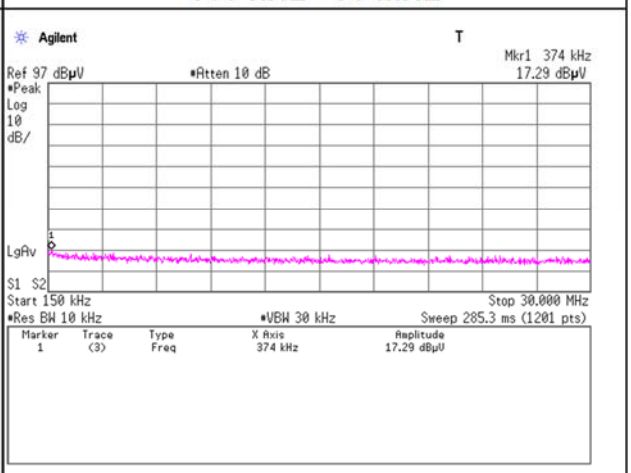
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2402 MHz

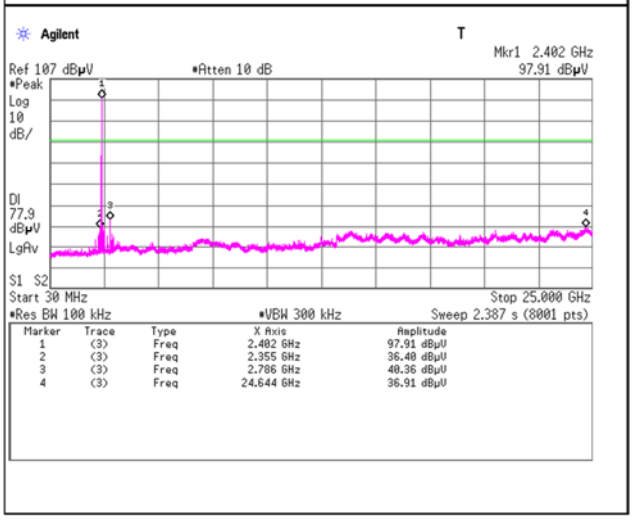
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

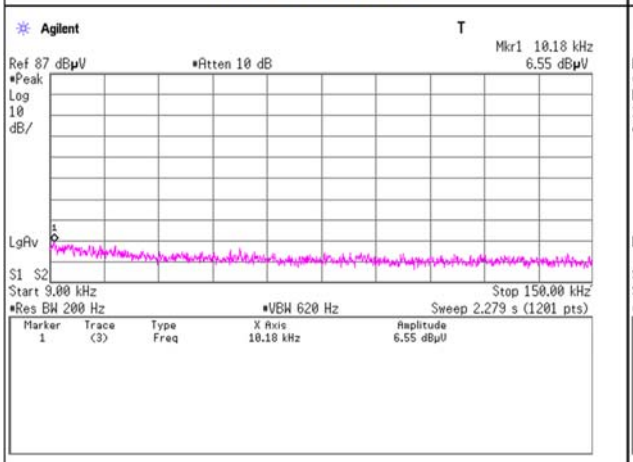


Conducted Spurious Emission

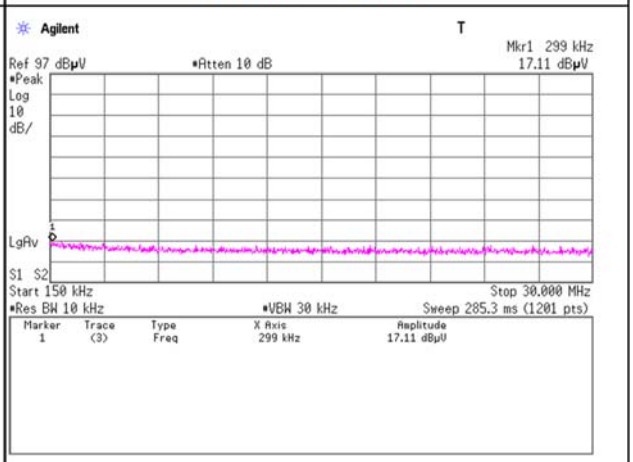
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2441 MHz

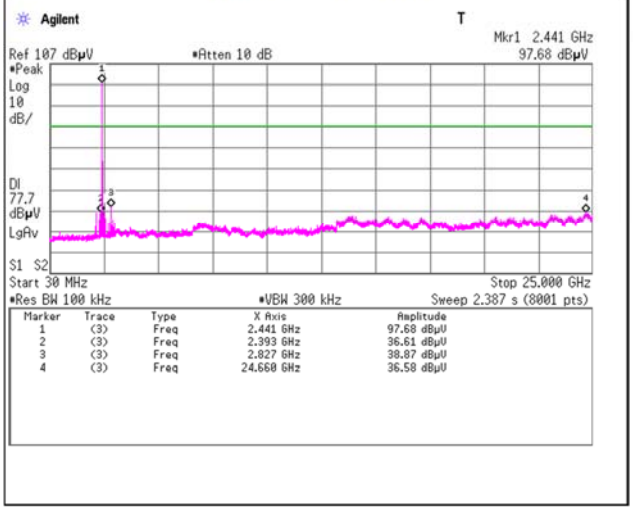
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

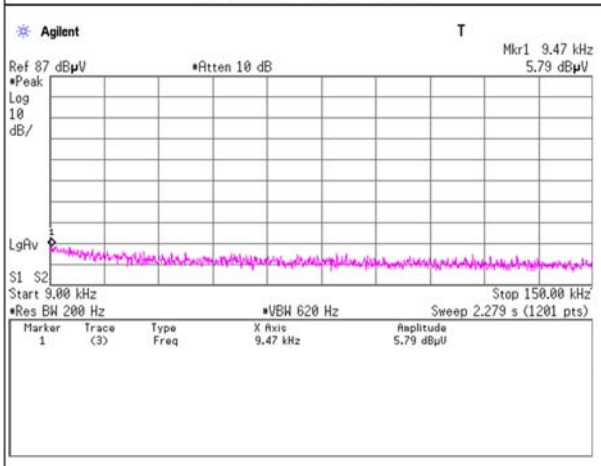


Conducted Spurious Emission

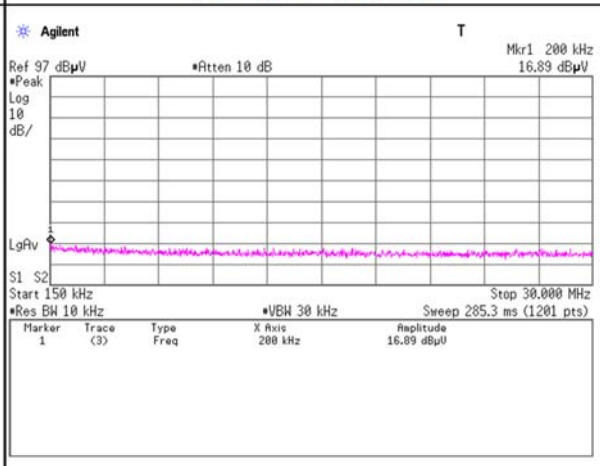
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2480 MHz

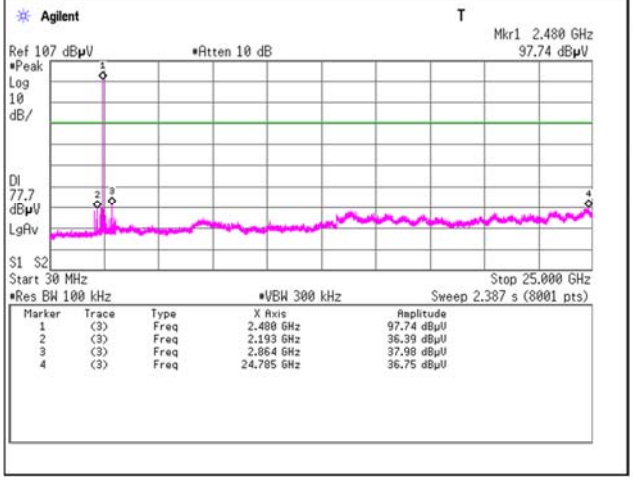
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

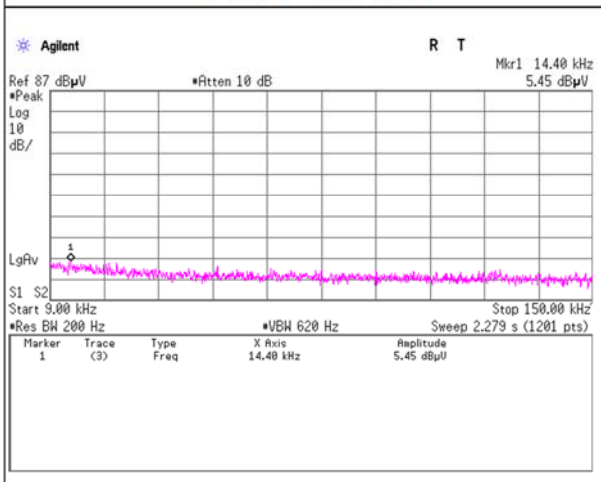


Conducted Spurious Emission

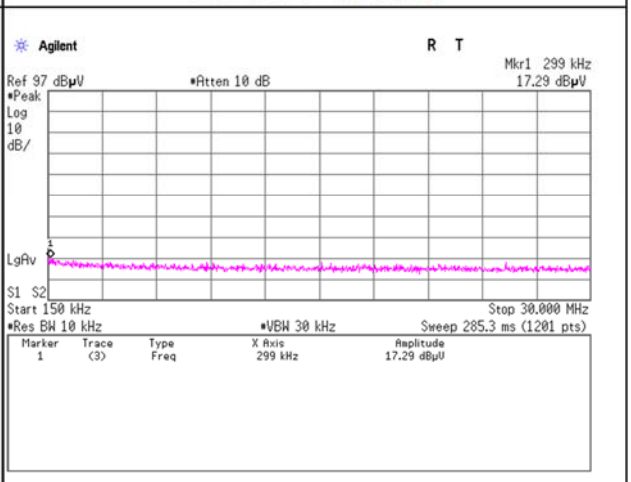
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2402 MHz

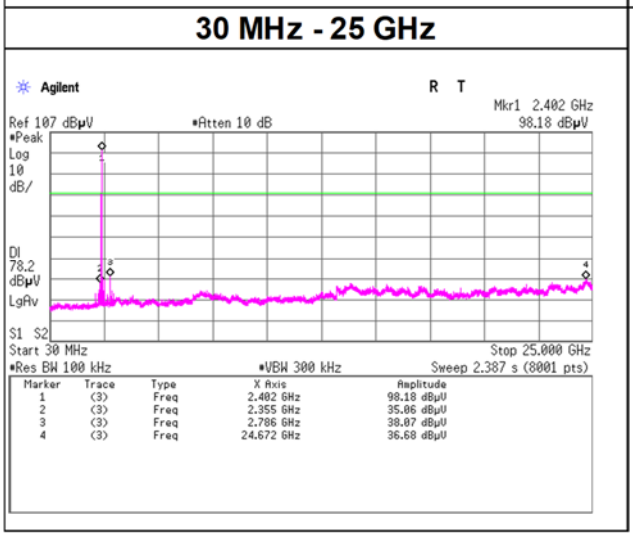
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

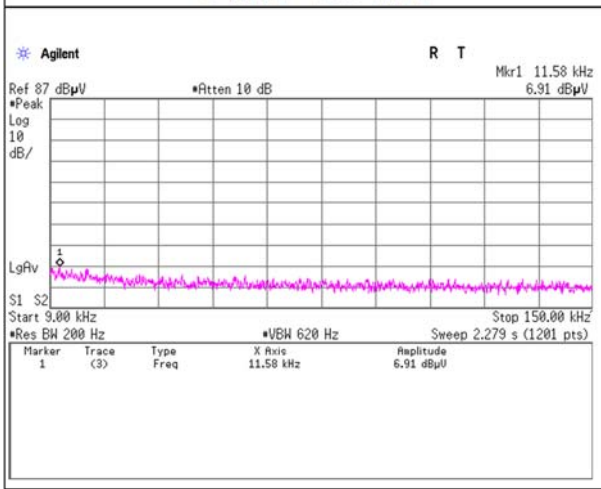


Conducted Spurious Emission

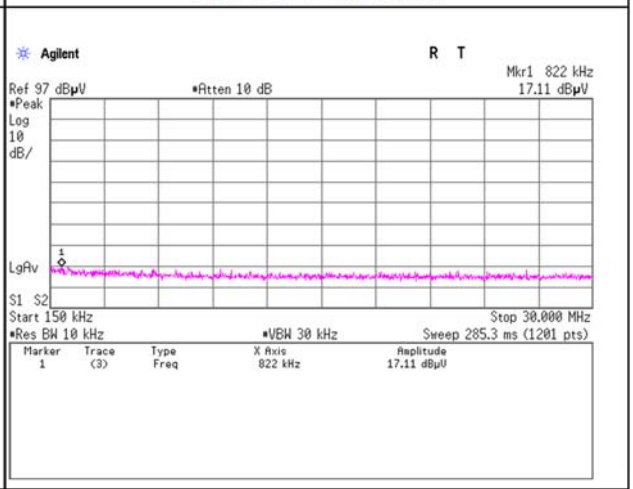
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, 3DH5

2441 MHz

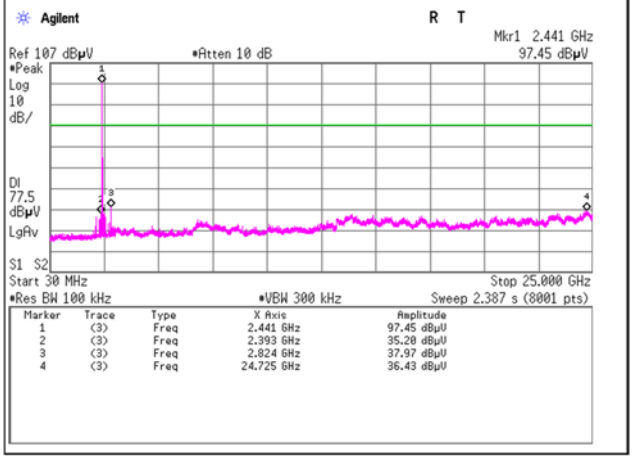
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

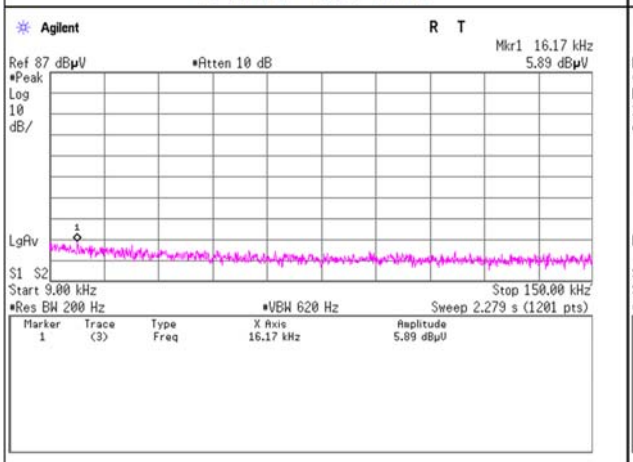


Conducted Spurious Emission

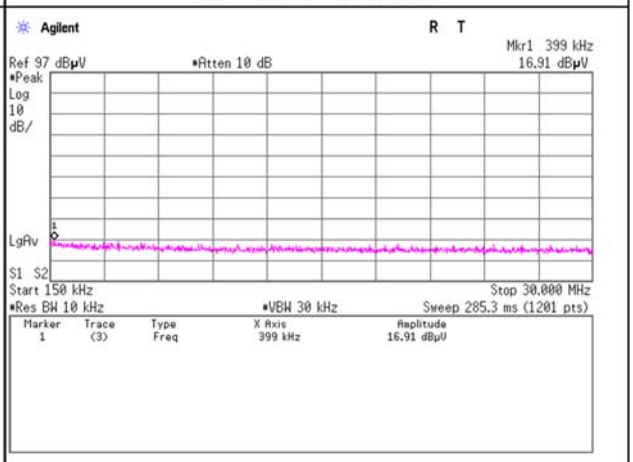
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, 3DH5

2480 MHz

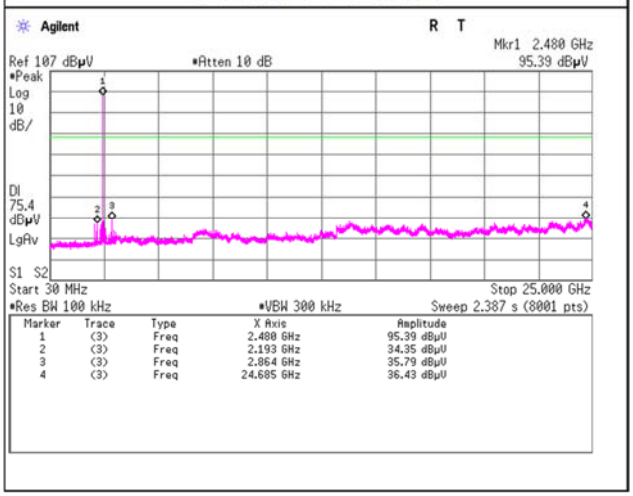
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

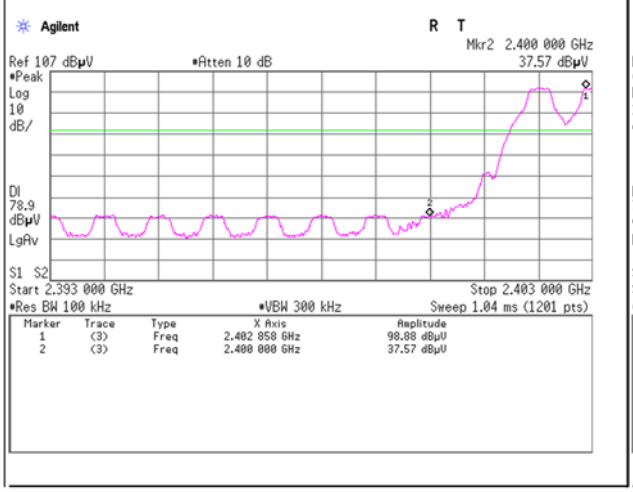


Conducted Emission Band Edge compliance

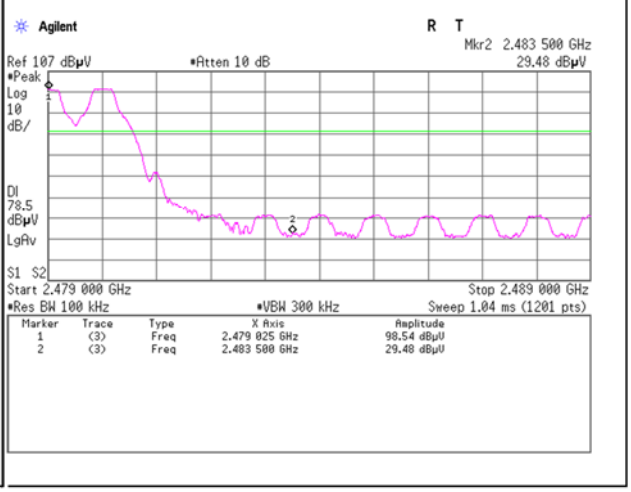
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx DH5

Hopping On

Low

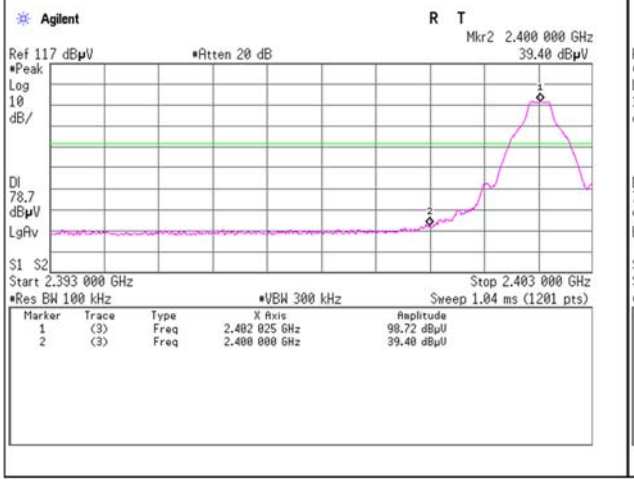


High

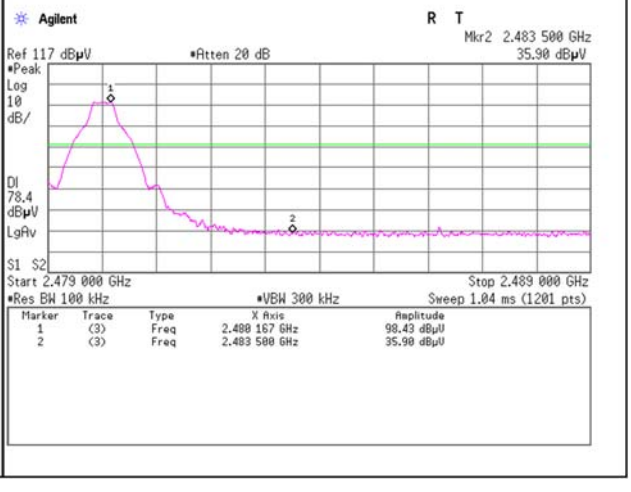


Hopping Off

Low



High

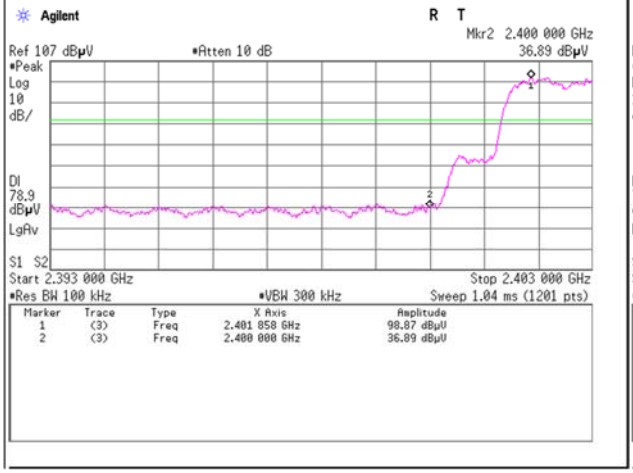


Conducted Emission Band Edge compliance

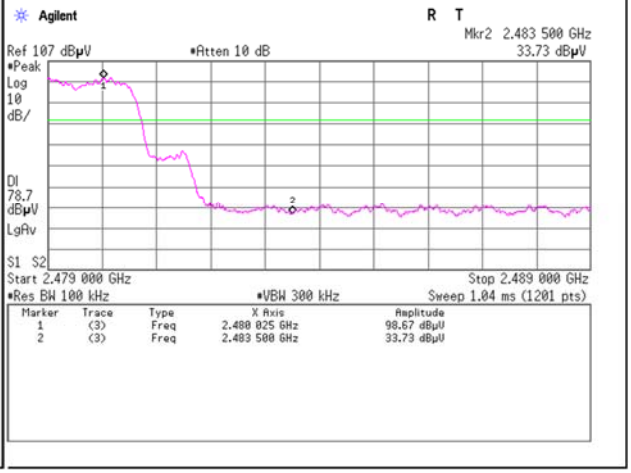
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 8, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Miku Ikudome
Mode	Tx 3DH5

Hopping On

Low

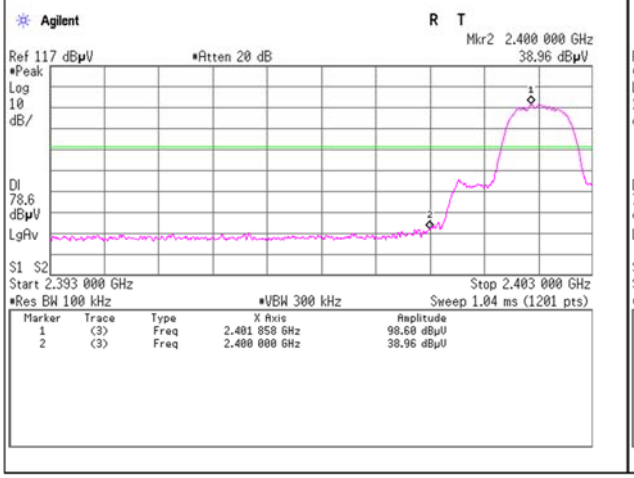


High

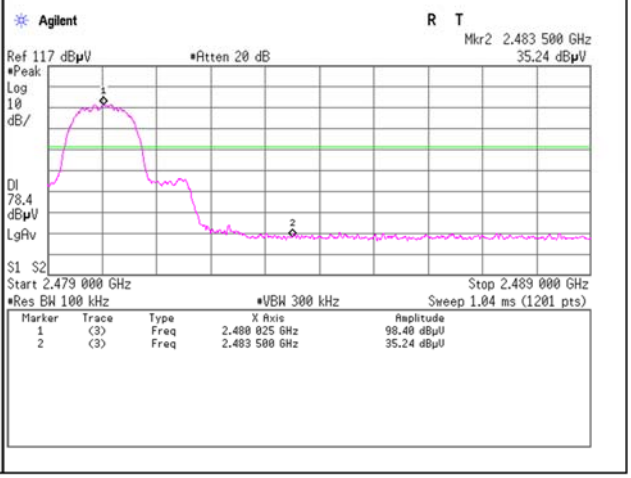


Hopping Off

Low



High



APPENDIX 2: Test Instruments

Test Equipment [1/2]

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2023/12/13	12
AT	145111	Digital Tester	SANWA	PC500	7019232	2023/09/25	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 *1)	12
AT	196947	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803478/2	2024/03/07	12
AT	242067	Attenuator	Weinschel Corp.	54A-10	120523	2023/11/02	12
AT	242077	Terminator	Weinschel - API Technologies Corp	M1459A	121108	2023/11/17	12
RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2024/08/21	12
RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2024/08/21	12
RE	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2024/06/20	12
RE	145528	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	195	2024/04/10	12
RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2024/03/05	12
RE	199783	Attenuator	JFW	50HF-006N	-	2024/06/14	12
RE	207280	Tape Measure	ASKUL	-	-	-	-
RE	207281	Tape Measure	ASKUL	-	-	-	-
RE	235267	Test Receiver	Rohde & Schwarz	ESW44	103018	2024/03/05	12
RE	235268	Test Receiver	Rohde & Schwarz	ESW44	103212	2023/12/26	12
RE	235639	DIGITAL MULTIMETER	HIOKI E.E. CORPORATION	DT4261	230313156	2024/05/29	12
RE	235640	DIGITAL MULTIMETER	HIOKI E.E. CORPORATION	DT4261	230313157	2024/05/29	12
RE	235735	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2024/04/28	12
RE	235738	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2024/04/28	12
RE	236615	Semi-Anechoic Chamber	TDK	SWAC-02(NSA)	2	2024/05/10	12
RE	236616	Semi-Anechoic Chamber	TDK	SWAC-01(SVSWR)	1	2024/06/04	12
RE	236686	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	787	2024/04/19	12
RE	236708	Coaxial Cable	Hayashi-Repic co., Ltd.	NMS079B-GL310C-SMS117B-2m	47256-02-03	2024/05/09	12
RE	236724	Coaxial Cable	Hayashi-Repic co., Ltd.	SF106(HUBER+SUHNER)/LMR400UF/GL310C/GL310C	2000430/47753-2/47256-01-04/47256-01-02	2024/05/10	12
RE	236769	Horn Antenna	AINFO Inc.	LB-8180-NF	2030013000111	2024/04/19	12
RE	236967	Pre Amplifier	TSJ (Techno Science Japan)	MLA-9K01-L01	23050010	2024/06/14	12
RE	237784	RF RELAY MATRIX with preamplifier	TSJ (Techno Science Japan)	RFM-E221261R	07795	2023/11/01	12
RE	239643	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	2306S021	2024/08/20	12

Test Equipment [2/2]

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	239787	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHBB 9124+BBA9106	01908	2024/08/10	12
RE	243209	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NFS13-1.0m	49190-01-01	2023/12/20	12
RE	243687	Coaxial Cable	Hayashi-Repic co., Ltd.	NMS079B-GL310C-NMS079B-6.0m	49373-01-01	2023/12/28	12
RE	243689	Coaxial Cable	Huber+Suhner	GL310C(Hayashi-Repic)/SF106/SF106	49373-01-01/2000781/2001160	2023/12/28	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.
The expiration*1) This test equipment was used for the tests before the expiration date of the calibration.
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
RE: Radiated Emission