RADIO TEST REPORT

Test Report No. 15457916H-B-R3

Customer	**Sony Group Corporation**
Description of EUT	**Digital Wireless Microphone**
Model Number of EUT	**DWM-30**
FCC ID	**AK8DWM30**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**December 24, 2024**
Remarks	**Radio microphone part**

Representative test engineer	Approved by
	
Nachi Konegawa Engineer	Akihiko Maeda Leader

CERTIFICATE 5107.02

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

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

ANNOUNCEMENT

- This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
- The results in this report apply only to the sample tested. (Laboratory was not involved in sampling.)
- This sample tested is in compliance with the limits of the above regulation.
- The test results in this test report are traceable to the national or international standards.
- This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
- This test report covers Radio technical requirements.
  It does not cover administrative issues such as Manual or non-Radio test related Requirements.
  (if applicable)
- The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided from the customer for this report is identified in SECTION 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 15457916H-B

This report is a revised version of 15457916H-B-R2. 15457916H-B-R2 is replaced with this report .

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15457916H-B	October 24, 2024	-
1	15457916H-B-R1	December 18, 2024	Section 2.1 Modified receipt date. September 5, 2024: Antenna Terminal Conducted test sample October 2, 2024: Radiated emissions test sample → September 5, 2024: Other test sample except Emission Mask test October 7, 2024: Emission Mask test sample
			Section 3.2 Modified test procedure for Emission Mask and Field strength of spurious radiation. <u>Emission Mask</u> EN 300 422-1 V1.4.2 Clause 8.3 → EN 300 422-1 V2.2.1 Clause 5.4.3 <u>Field strength of spurious radiation</u> EN 300 422-1 V1.4.2 Clause 8.4 → EN 300 422-1 V2.2.1 Clause 5.4.4
			Section 5 -Replaced of table of “Test Antennas for radiated method are used” and “Measured setting”. -Modified measurement range. Figure 2: Test Setup [25 MHz to 1 GHz] → [30 MHz to 1 GHz] Measurement range 25 MHz to 6 GHz → 30 MHz to 6 GHz
			Section 6 Modified test procedure for Emission Mask. The spectrum mask was measured in accordance with section 8.3.2 of EN 300 422-1.→ The spectrum mask was measured in accordance with section 5.4.3 of EN 300 422-1.
			APPENDIX 1 Replaced of test data of Emission Mask and Field strength of spurious radiation.
2	15457916H-B-R2	December 23, 2024	Section 3.2 Modified specification for Occupied Bandwidth and Frequency Tolerance. <u>Occupied Bandwidth</u> FCC: Section 15.236 (f) (1) (2) → FCC: Section 15.236 (f) (1) (i) (ii) <u>Frequency Tolerance</u> FCC: Section 15.236 (f) (3) → FCC: Section 15.236 (f) (ii)
			APPENDIX 1: Test data Occupied Bandwidth Modified test frequency in chart. 670.875 MHz→607.875 MHz
3	15457916H-B-R3	December 24, 2024	Section 3.2 Modified specification for Frequency Tolerance. <u>Frequency Tolerance</u> FCC: Section 15.236 (f) (ii) → FCC: Section 15.236 (f) (1) (iii)

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 5
SECTION 2: Equipment Under Test (EUT) 5
SECTION 3: Test specification, procedures & results 7
SECTION 4: Operation of EUT during testing 10
SECTION 5: Field strength of spurious radiation 13
SECTION 6: Antenna Terminal Tests 15
APPENDIX 1: Test data 16
RF Output Power 16
Occupied Bandwidth 17
Emission Mask 23
Field strength of spurious radiation 28
Frequency Tolerance 35
APPENDIX 2: Test instruments 39
APPENDIX 3: Photographs of test setup 41
Field strength of spurious radiation 41
Worst Case Position 42
Antenna terminals Conducted 43

SECTION 1: Customer Information

Company Name	Sony Global Manufacturing & Operations Corporation
Address	Kisarazu Site 8-4 Shiomi, Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number	+81-438-37-4704
Contact Person	Youhei Hisano

*Remarks:
Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Group Corporation.

The information provided from 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

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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Digital Wireless Microphone
Model Number	DWM-30
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	September 5, 2024: Other test sample except Emission Mask test October 7, 2024: Emission Mask test sample
Test Date	September 6 to October 10, 2024

2.2 Product Description

General Specification

Rating	DC 3.0 V
Operating temperature	0 deg. C to 50 deg. C

Radio Specification

<Radio microphone part>

Radio type	Transmitter
Modulation type	π/4 shift QPSK
Emission designator	192KG1D, 192KG1E
Channel spacing	25 kHz
Frequency of Operation	470.125 MHz to 607.875 MHz 614.125 MHz to 615.875 MHz
RF power	470.125 MHz to 607.875 MHz : 25 mW, 10 mW, 2 mW 614.125 MHz to 615.875 MHz : 10 mW, 2 mW
Antenna Gain [a)]	1.05 dBi
AF Specification	20 Hz to 22000 Hz, Maximum input: -16 dBu (MIC level, ATT 0 dB)

<RF remote part>

Radio Type	Transceiver
Modulation type	DSSS
Frequency of Operation	2405 MHz to 2475 MHz
Channel spacing	5 MHz
Method of frequency generation	Synthesizer
Antenna Gain	-8.27 dBi max

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 15.236 Operation of wireless microphones in the bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-698 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	ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	-	N/A	*1)
RF Output Power	ANSI C63.10:2013 Clause 11.9.2.3	FCC: Section 15.236 (d) (1) (2)	See data.	Complied	Conducted
Occupied Bandwidth	ANSI C63.10:2013 Clause 6.9	FCC: Section 15.236 (f) (1) (i) (ii)	See data.	Complied	Conducted
Emission Mask	EN 300 422-1 V2.2.1 Clause 5.4.3 KDB 206256 IV (d)	FCC: Section 15.236 (g)	See data.	Complied	Conducted
Field strength of spurious radiation	EN 300 422-1 V2.2.1 Clause 5.4.4 KDB 206256 IV (d)	FCC: Section 15.236 (g)	7.3 dB 1617.00 MHz, Horizontal	Complied	Radiated
Frequency Tolerance	ANSI C63.10:2013 Clause 6.8	FCC: Section 15.236 (f) (1) (iii)	See data.	Complied	Conducted

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 operates in RF mode only by battery and not by USB power supply.

FCC Part 15.31 (e)

The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests. However, frequency tolerance test was performed according to section 15.236.

3.3 Addition to standard

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.

Field strength of spurious radiation (EUT height: 1.5 m) (Measurement Distance 3 m)	Unit	Calculated Uncertainty (+/-)
25 MHz to 200 MHz	dB	6.0
200 MHz to 1000 MHz	dB	3.9
1 GHz to 12.75 GHz	dB	4.7

Antenna Terminal Conducted tests

Item	Unit	Calculated Uncertainty (+/-)
Antenna terminated conducted emission / Power density / Burst power	dB	3.47
Adjacent channel power (ACP)	dB	2.28
Bandwidth (OBW)	%	0.96
Time readout (time span upto 100 msec)	%	0.11
Time readout (time span upto 1000 msec)	%	0.11
Time readout (time span upto 60 sec)	%	0.02
Power measurement (Power meter < 8 GHz)	dB	1.46
Power measurement (Call box < 6 GHz)	dB	1.69
Frequency readout (Frequency counter)	ppm	0.67
Frequency readout (Spectrum analyzer frequency readout function)	ppm	2.13
Temperature (constant temperature bath)	deg.C	0.69
Humidity (constant temperature bath)	%RH	2.98
Modulation characteristics	%	6.93
Frequency for mobile	ppm	0.08
Contention-based protocol	dB	2.26

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan
Telephone: +81-596-24-8999
*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919
ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

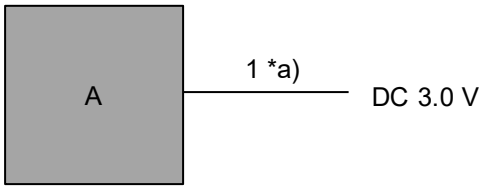
4.1 Operating Mode(s)

Mode	Remarks*
Transmitting (Tx), Power setting: 2 mW	Typ. 2 mW
Transmitting (Tx), Power setting: 10 mW	Typ. 10 mW
Transmitting (Tx), Power setting: 25 mW	Typ. 25 mW
*Transmitting duty was 100 % on all tests.	
*Power of the EUT was set by the software as follows;	
Power Setting: 470.125 MHz to 607.875 MHz : 25 mW, 10 mW, 2 mW 614.125 MHz to 615.875 MHz : 10 mW, 2 mW Software: V0.20 (Date: July 9, 2024, Storage location: EUT memory) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.	

*The details of Operating mode(s)

Test Item	Tested frequency		Power setting	Modulation	Remarks
RF power output	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	-
	614.125 MHz 615.000 MHz 615.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW		
Occupied Bandwidth	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	-
	614.125 MHz 615.000 MHz 615.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW		
Emission Mask	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	-
	614.125 MHz 615.000 MHz 615.875 MHz	(Low) (Mid) (High)	2 mW, 10 mW		
Field strength of spurious radiation	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	25 mW	Digital modulation (PN9 data packet)	-
	614.125 MHz 615.000 MHz 615.875 MHz	(Low) (Mid) (High)	10 mW		
Frequency Tolerance	539.000 MHz	(Mid)	25 mW	No modulation	*1)
	615.000 MHz	(Mid)	10 mW		
*1) There is no difference in frequency generating method on each frequency. Therefore the test was performed on Mid channel as a representative.					

4.2 Configuration and peripherals



*a) This cable was attached only for Antenna terminal conducted tests, and it is not installed the end product. Also, the attachment of this cable does not affect the RF performance.
* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* Field strength of spurious radiation test was performed using a new battery.

Description of EUT

No.	Item	Model number	Serial Number	Manufacturer	Remark
A	Digital Wireless Microphone	DWM-30	1011	Sony Group Corporation	EUT

List of Cables Used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-

SECTION 5: Field strength of spurious radiation

Test Procedure

1) EUT was placed on a platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The Radiated Electric Field Strength has been measured in semi anechoic chamber at a distance of 3 m.
The measuring antenna height was varied between 1 to 4 m and the turn table 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.
2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1).
The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna.
The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4 m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.
3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Test Antennas for radiated method are used as below;

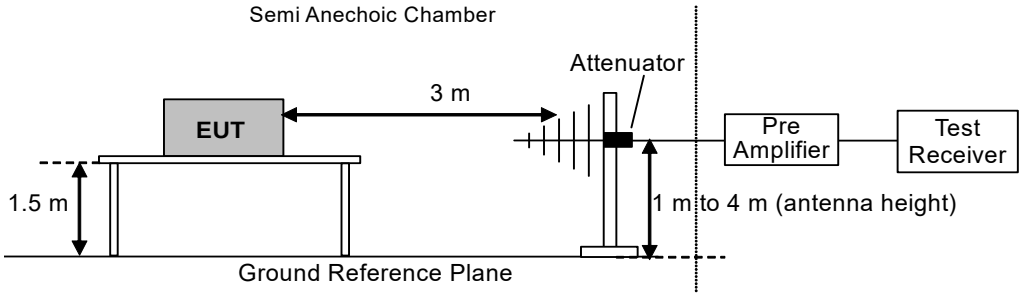
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

Measured setting

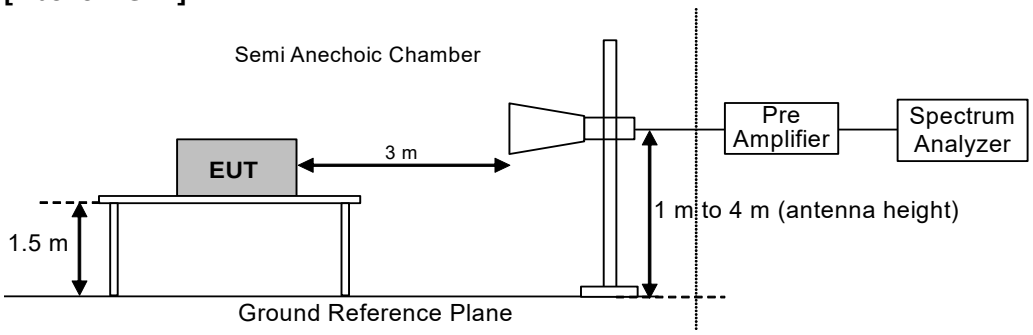
Frequency	Instrument used	Detector	RBW	Test Distance
30 MHz to 1 GHz Except below ranges	Spectrum Analyzer	RMS	fc + 2,5 B ≤ f ≤ fc + 4 B: 1 kHz fc + 4 B < f ≤ fc + 10 B: 10 kHz f > fc + 10 B: 100 kHz f < fc - 10 B: 100 kHz fc - 10 B ≤ f < fc - 4 B: 10 kHz fc - 4 B ≤ f ≤ fc - 2,5 B: 1 kHz	3 m
47 MHz to 74 MHz 87,5 MHz to 118 MHz	Spectrum Analyzer	RMS	100 kHz	3 m
174 MHz to 230 MHz 470 MHz to 862 MHz	Spectrum Analyzer	RMS	fc + 2,5 B ≤ f ≤ fc + 4 B: 1 kHz fc + 4 B < f ≤ fc + 10 B: 10 kHz f > fc + 10 B: 100 kHz f < fc - 10 B: 100 kHz fc - 10 B ≤ f < fc - 4 B: 10 kHz fc - 4 B ≤ f ≤ fc - 2,5 B: 1 kHz	3 m
Above 1 GHz	Spectrum Analyzer	RMS	fc + 2,5 B ≤ f ≤ fc + 10 B: 30 kHz fc + 10 B < f ≤ fc + 12 B: 300 kHz f > fc + 12 B: 1 MHz f < fc - 12 B: 1 MHz fc - 12 B ≤ f < fc - 10 B: 300 kHz fc - 10 B ≤ f ≤ fc - 2,5 B: 30 kHz	3 m

Figure 2: Test Setup

[30 MHz to 1 GHz]



[Above 1 GHz]



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.

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

Measurement range : 30 MHz to 6 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Antenna Terminal 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
RF power output	-	-	-	Auto	Average	-	Power Meter
Occupied Bandwidth	Enough width to display emission skirts	1 to 5% of Occupied bandwidth	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
*1) Peak hold was applied as Worst-case measurement.							

[Emission mask]
The EUT was modulated with PN9 audio data packet.
The spectrum mask was measured in accordance with section 5.4.3 of EN 300 422-1.
The measurements were made under normal condition.

[Frequency Tolerance]
The power supply set to 100 % nominal setting of the EUT.
The frequency of the EUT was recorded over a temperature variation of +50 deg. C to -20 deg. C by 10 deg. C step.
For Battery End Point, test was performed at the voltage just before the battery has run out.

EUT power supply was varied between 85 % and 115 % of nominal and the frequency of the EUT was recorded when temperature is 20 deg.C.

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

RF Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 11, 2024
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Nachi Konegawa
Mode	Tx 470.125 MHz to 607.875 MHz / 614.125 MHz to 615.875 MHz

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dB]	Result [EIRP] [dBm]	Result [EIRP] [mW]	Limit [EIRP] [mW]	Margin [dB]	Remarks
2 mW	Low	470.125	-17.55	1.20	19.66	1.05	4.36	2.73	50	12.63	
	Mid	539.000	-17.53	1.17	19.66	1.05	4.35	2.72	50	12.64	
	High	607.875	-17.61	1.14	19.68	1.05	4.26	2.67	50	12.73	
10 mW	Low	470.125	-11.47	1.20	19.66	1.05	10.44	11.07	50	6.55	
	Mid	539.000	-11.34	1.17	19.66	1.05	10.54	11.32	50	6.45	
	High	607.875	-11.50	1.14	19.68	1.05	10.37	10.89	50	6.62	
25 mW	Low	470.125	-6.41	1.20	19.66	1.05	15.50	35.48	50	1.49	
	Mid	539.000	-6.39	1.17	19.66	1.05	15.49	35.40	50	1.50	
	High	607.875	-6.56	1.14	19.68	1.05	15.31	33.96	50	1.68	

Calculation formula: Result = Reading + Cable Loss + Atten. Loss + Ant Gain

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dB]	Result [EIRP] [dBm]	Result [EIRP] [mW]	Limit [EIRP] [mW]	Margin [dB]	Remarks
2 mW	Low	614.125	-17.48	1.14	19.68	1.05	4.39	2.75	20	8.62	
	Mid	615.000	-17.41	1.14	19.68	1.05	4.46	2.79	20	8.55	
	High	615.875	-17.44	1.14	19.68	1.05	4.43	2.77	20	8.58	
10 mW	Low	614.125	-11.38	1.14	19.68	1.05	10.49	11.19	20	2.52	
	Mid	615.000	-11.32	1.14	19.68	1.05	10.55	11.35	20	2.46	
	High	615.875	-11.37	1.14	19.68	1.05	10.50	11.22	20	2.51	

Calculation formula: Result = Reading + Cable Loss + Atten. Loss + Ant Gain

Occupied Bandwidth

Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power Setting	Channel	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	470.125	159.6120	200	40.3880
	Mid	539.000	160.1354	200	39.8646
	High	607.875	159.8871	200	40.1129
10 mW	Low	470.125	160.8461	200	39.1539
	Mid	539.000	159.6236	200	40.3764
	High	607.875	160.8777	200	39.1223
25 mW	Low	470.125	160.3778	200	39.6222
	Mid	539.000	161.1306	200	38.8694
	High	607.875	161.1165	200	38.8835

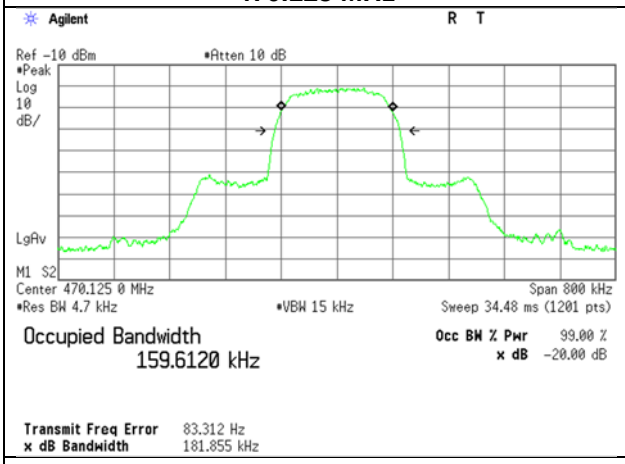
Power Setting	Channel	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	614.125	160.3340	200	39.6660
	Mid	615.000	160.3015	200	39.6985
	High	615.875	161.4722	200	38.5278
10 mW	Low	614.125	161.0151	200	38.9849
	Mid	615.000	161.8354	200	38.1646
	High	615.875	160.3463	200	39.6537

Occupied Bandwidth

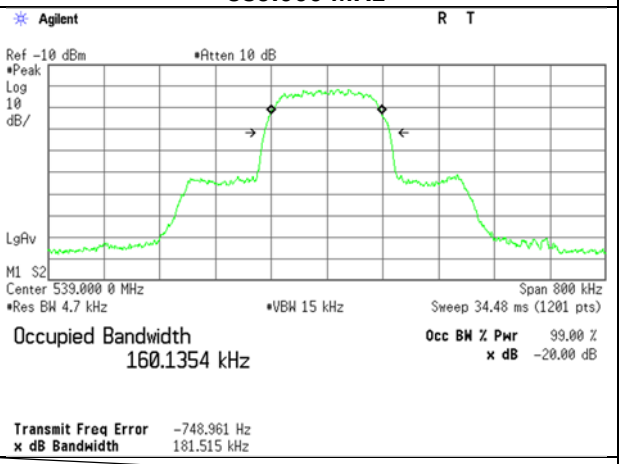
Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power setting: 2 mW

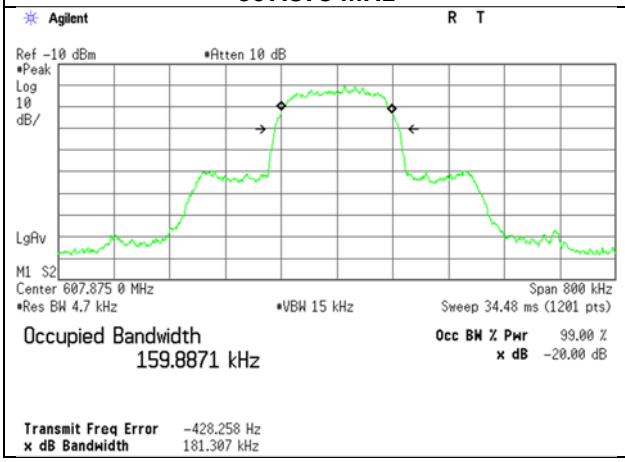
470.125 MHz



539.000 MHz



607.875 MHz

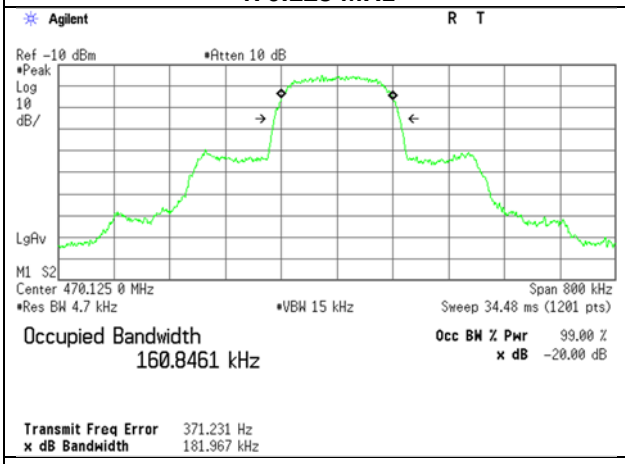


Occupied Bandwidth

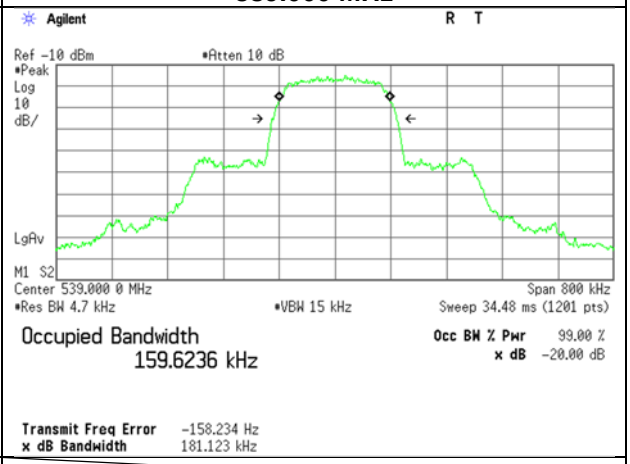
Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power setting: 10 mW

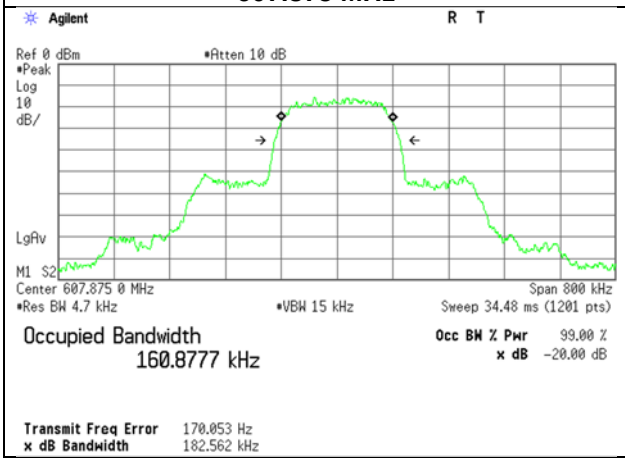
470.125 MHz



539.000 MHz



607.875 MHz

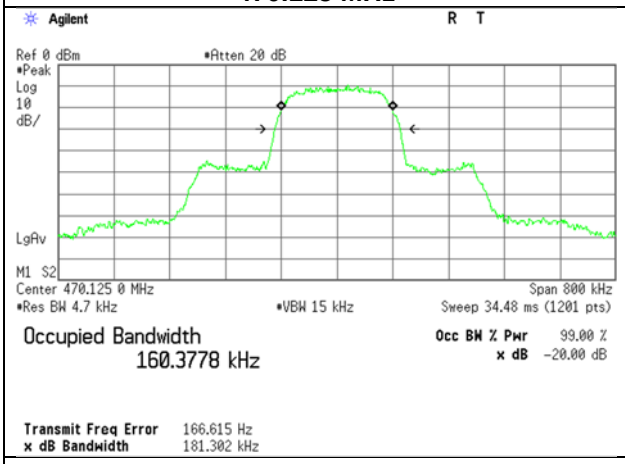


Occupied Bandwidth

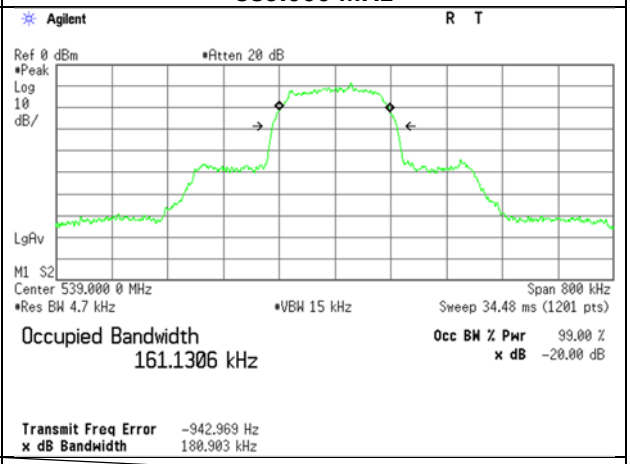
Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power setting: 25 mW

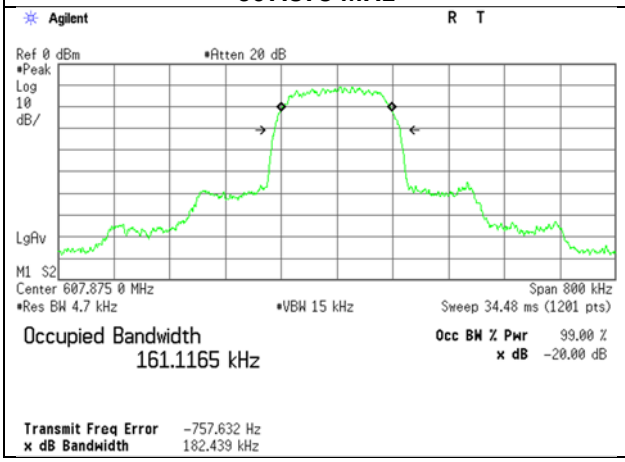
470.125 MHz



539.000 MHz



607.875 MHz

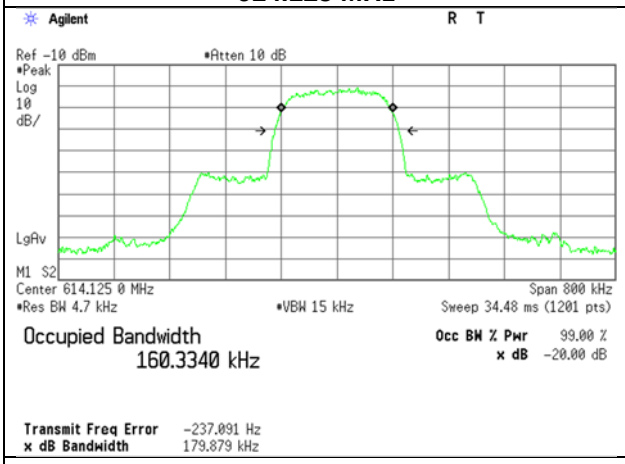


Occupied Bandwidth

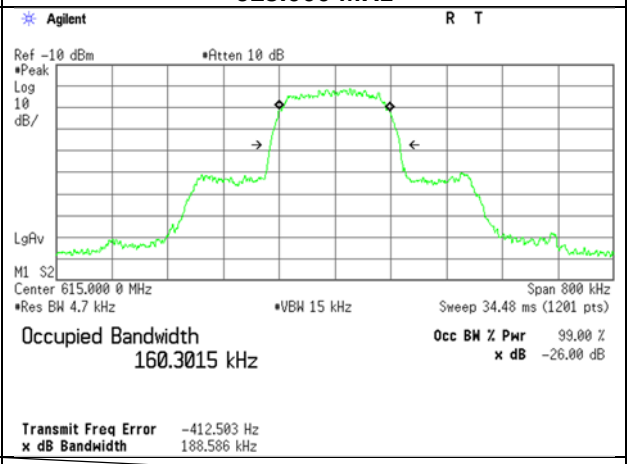
Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power setting: 2 mW

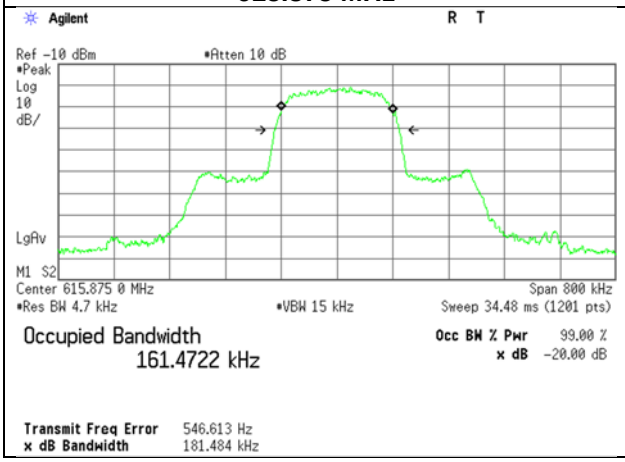
614.125 MHz



615.000 MHz



615.875 MHz

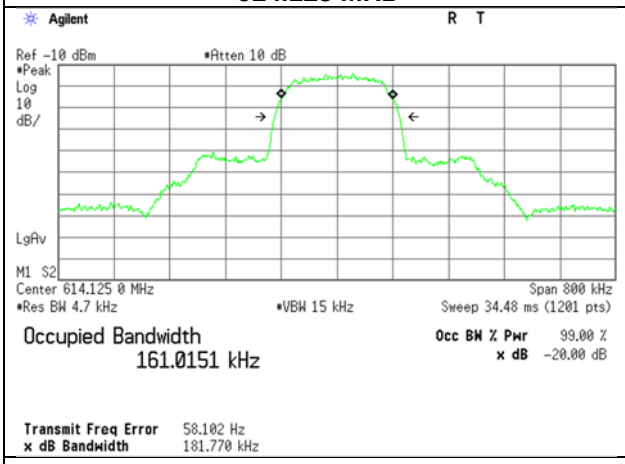


Occupied Bandwidth

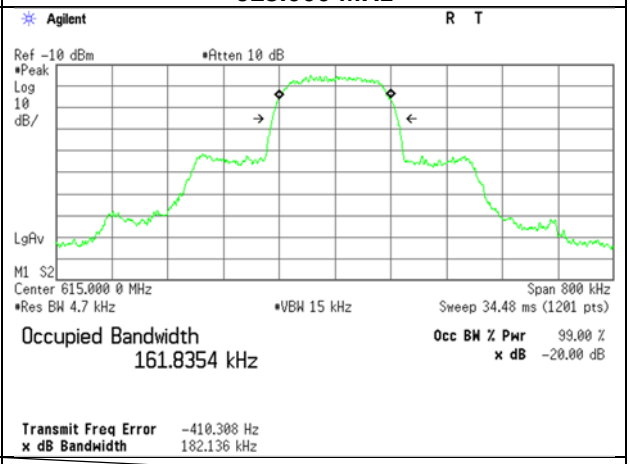
Test place	Ise EMC Lab. No.8 Measurement Room
Date	September 19, 2024
Temperature/ Humidity	23 deg. C / 61 % RH
Engineer	Junki Nagatomi
Mode	Tx

Power setting: 10 mW

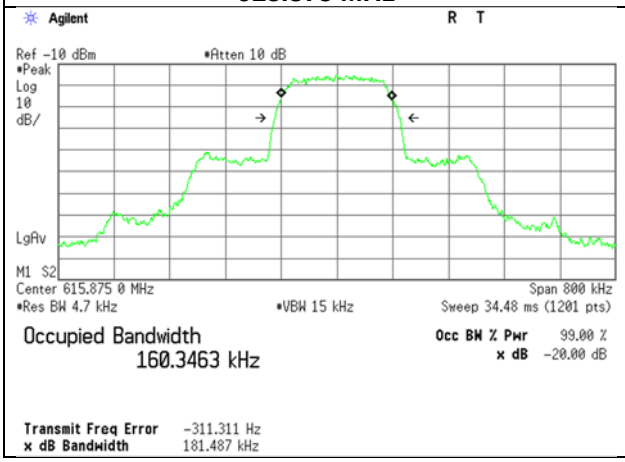
614.125 MHz



615.000 MHz

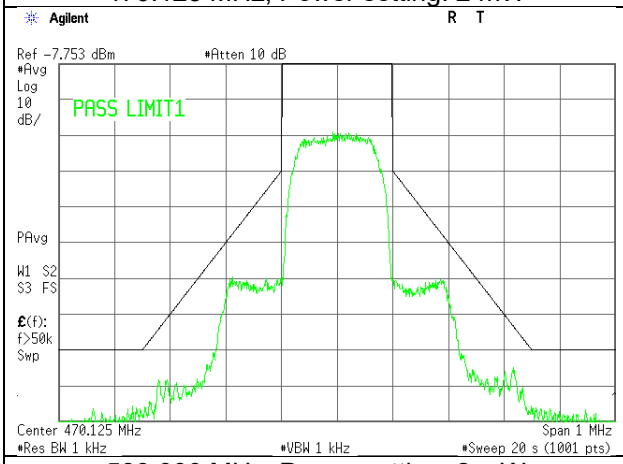
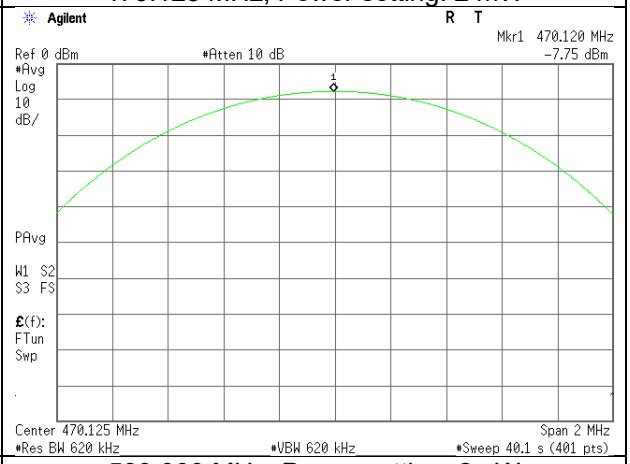
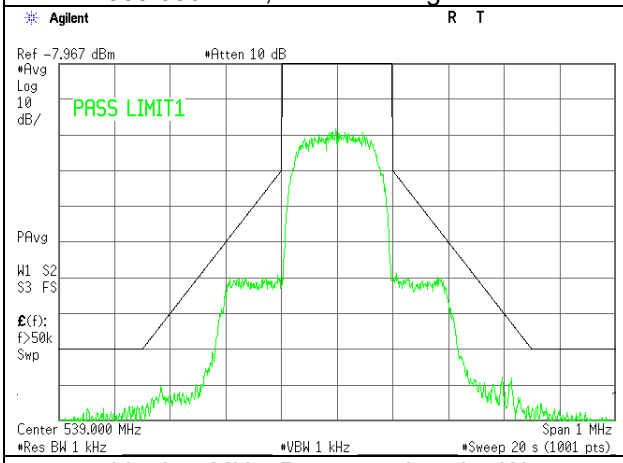
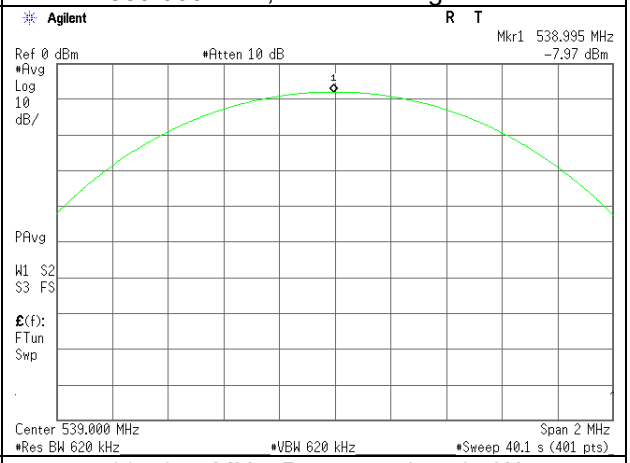
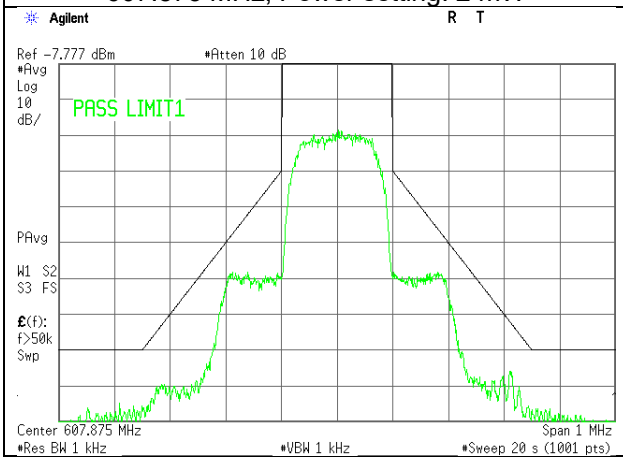
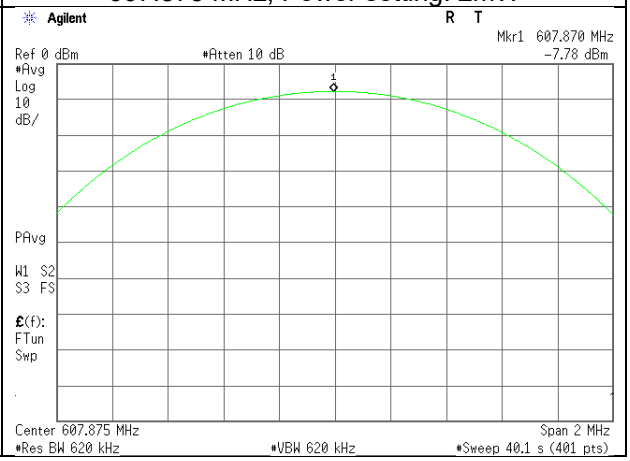


615.875 MHz

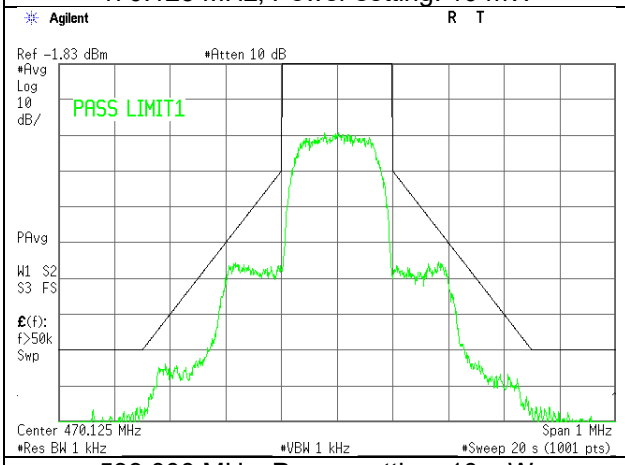
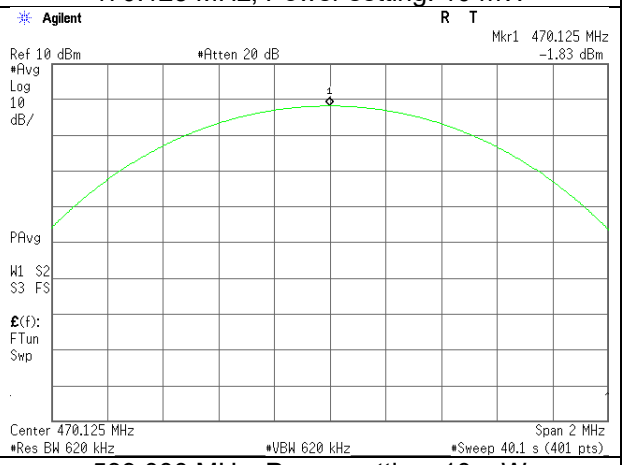
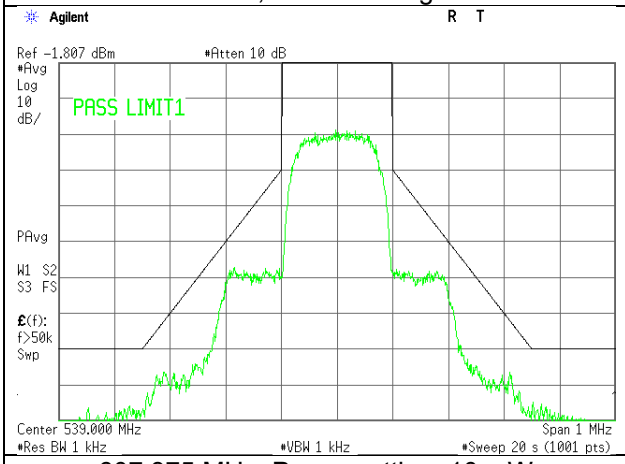
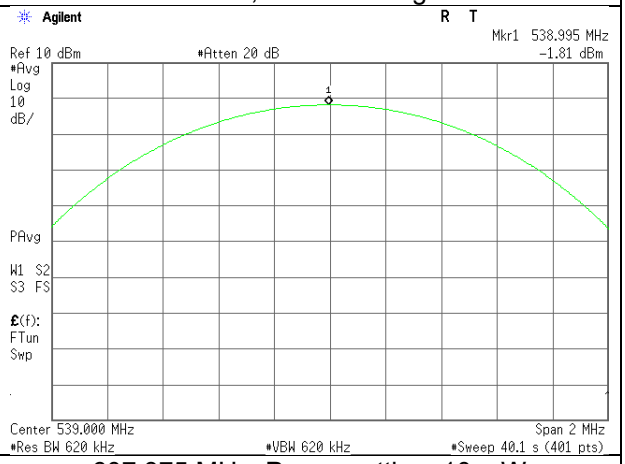
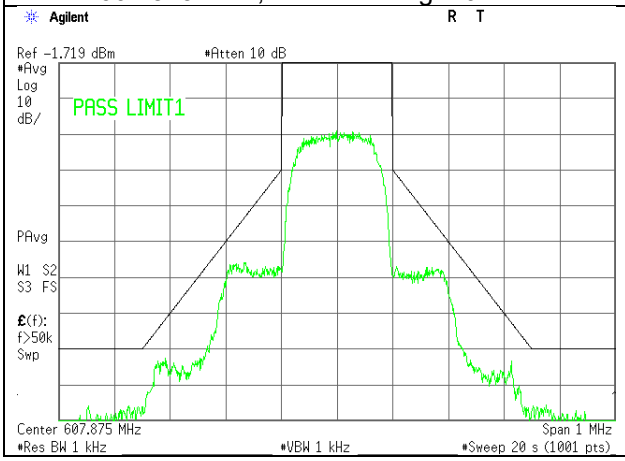
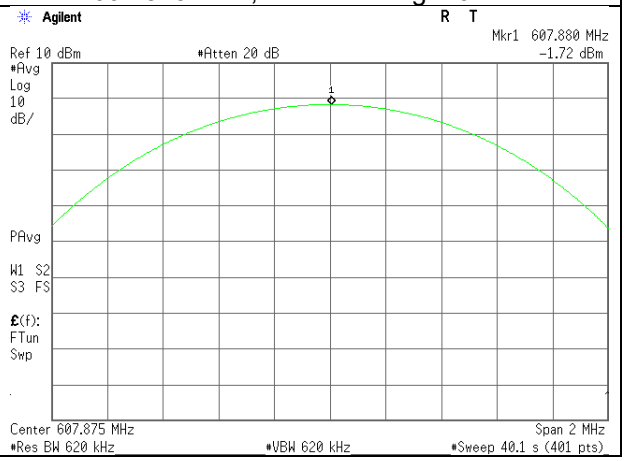


Emission Mask

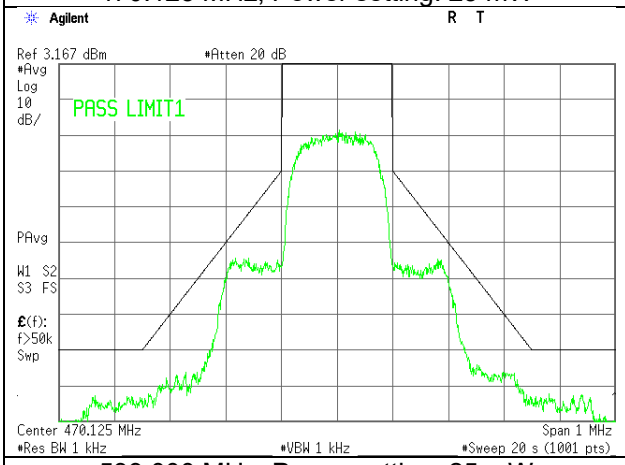
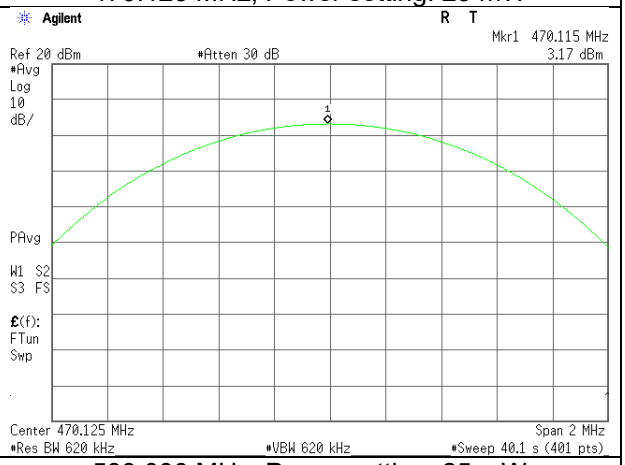
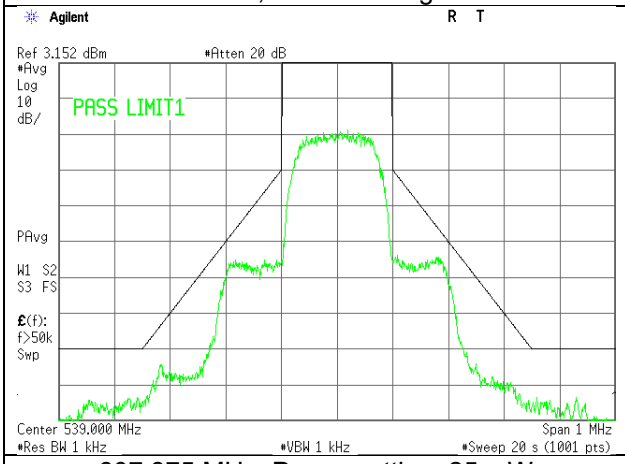
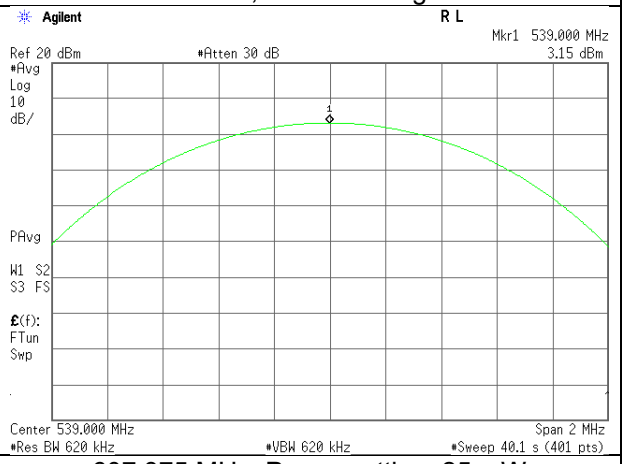
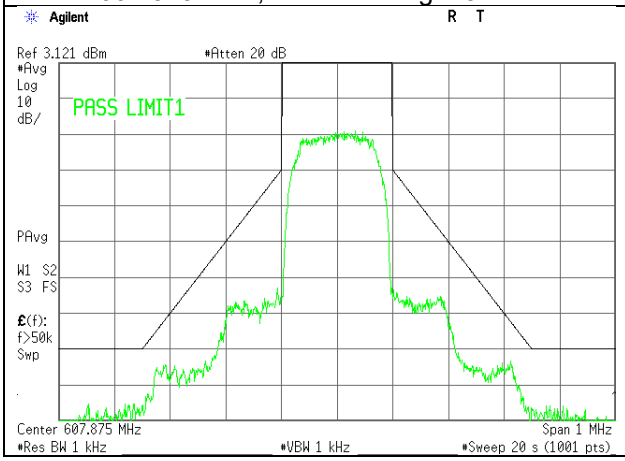
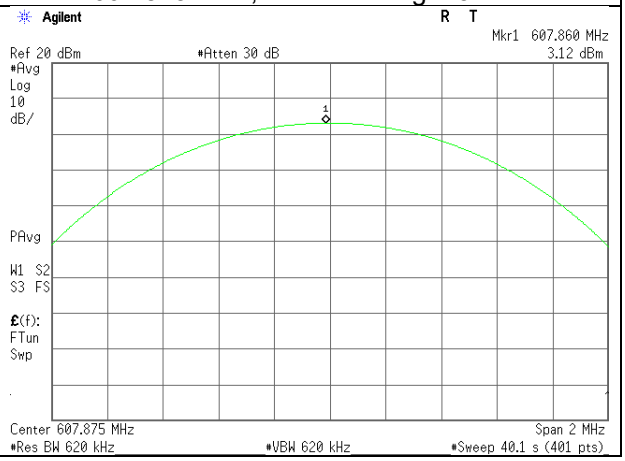
Test place	Ise EMC Lab. No.6Measurement Room
Date	October 10, 2024
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx

Measured data	Reference data
470.125 MHz, Power setting: 2 mW	470.125 MHz, Power setting: 2 mW
	
539.000 MHz, Power setting: 2 mW	539.000 MHz, Power setting: 2mW
	
607.875 MHz, Power setting: 2 mW	607.875 MHz, Power setting: 2mW
	

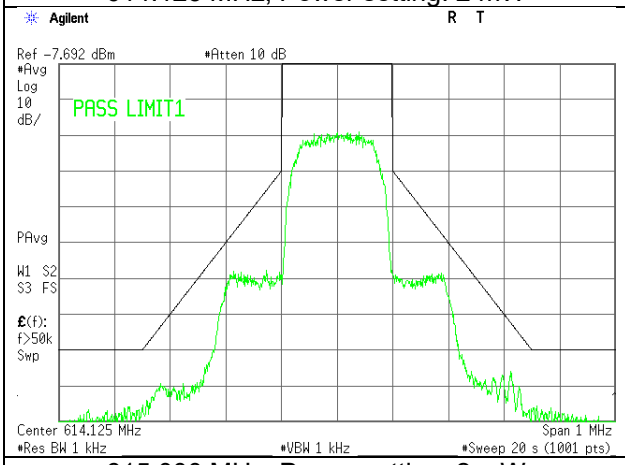
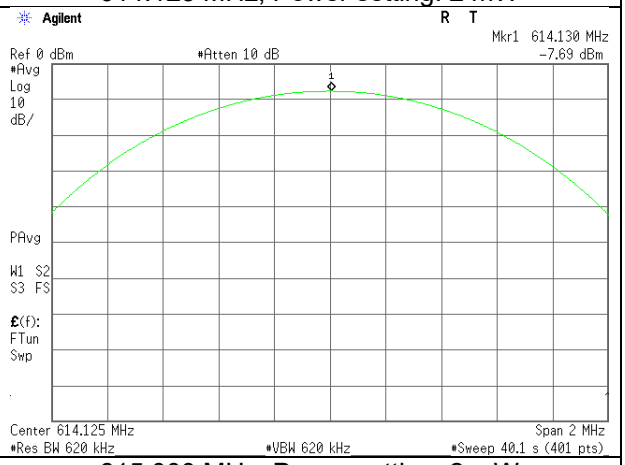
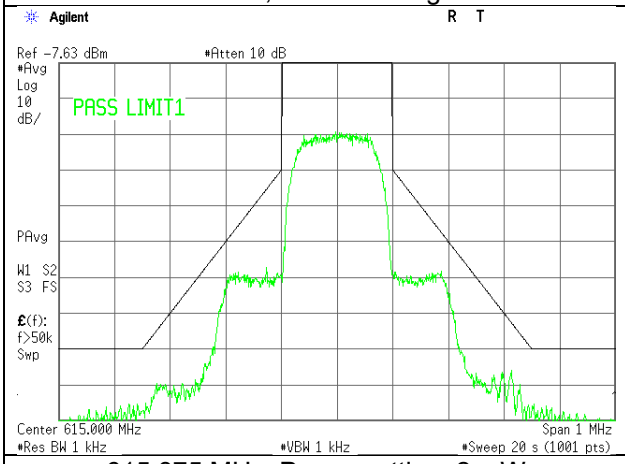
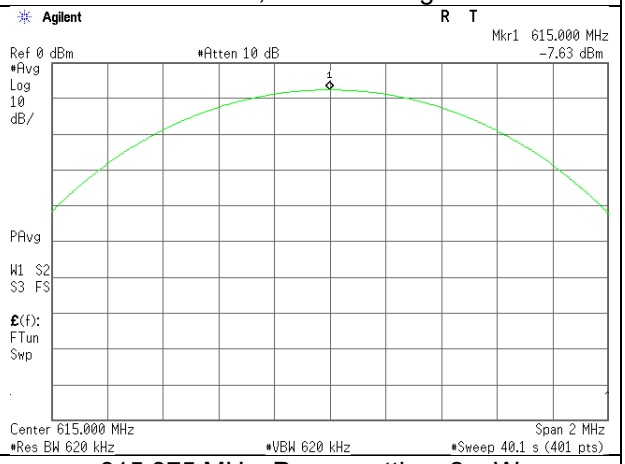
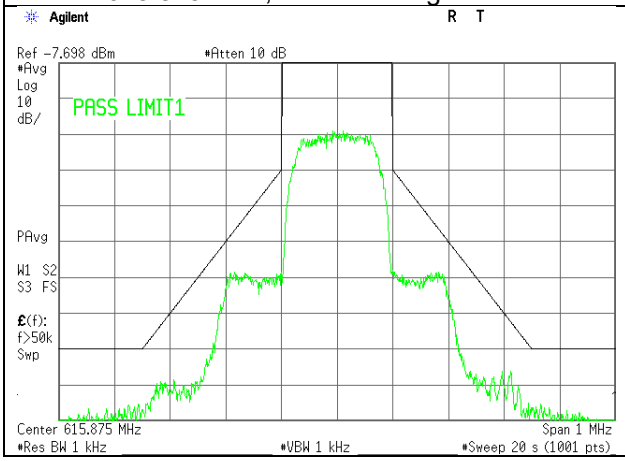
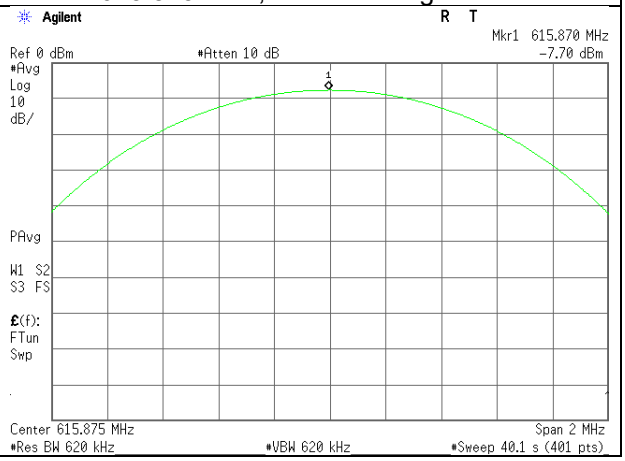
Emission Mask

Measured data	Reference data
470.125 MHz, Power setting: 10 mW	470.125 MHz, Power setting: 10 mW
	
539.000 MHz, Power setting: 10 mW	539.000 MHz, Power setting: 10 mW
	
607.875 MHz, Power setting: 10 mW	607.875 MHz, Power setting: 10 mW
	

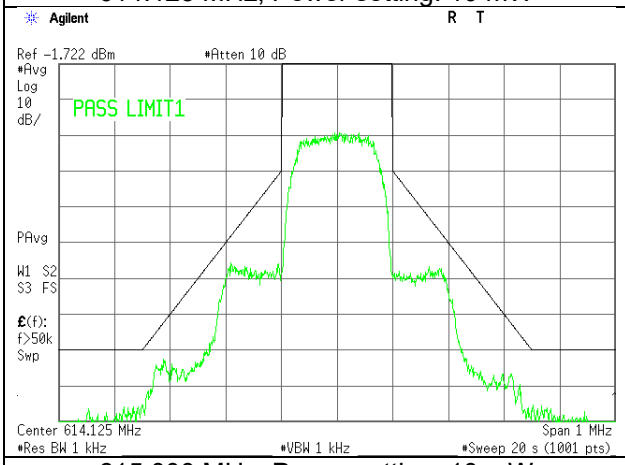
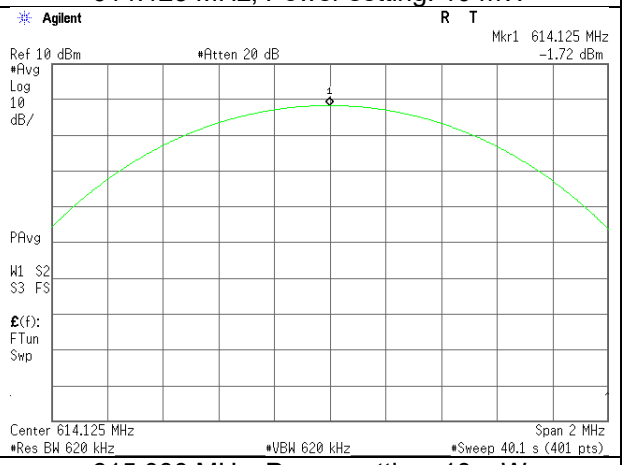
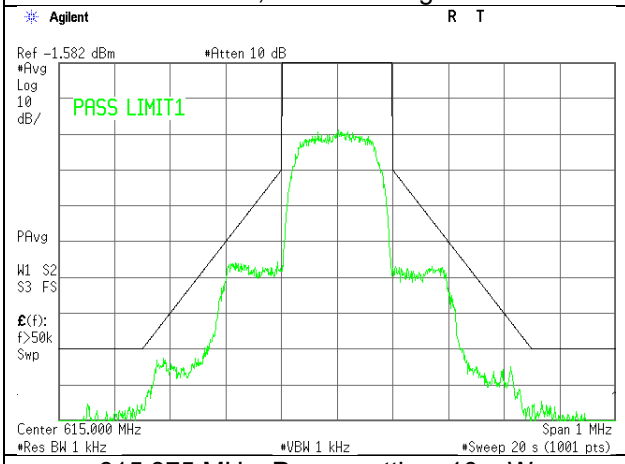
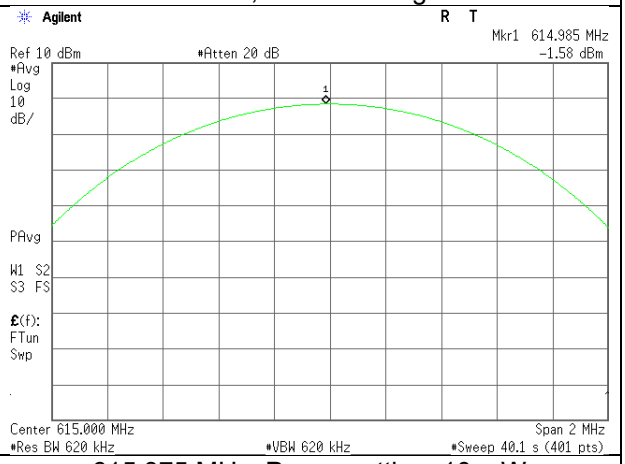
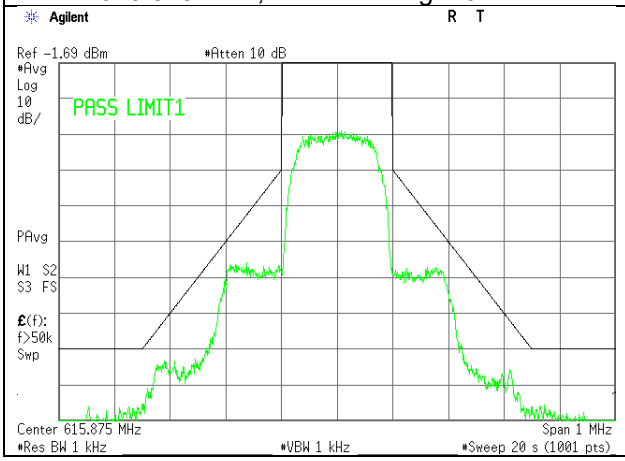
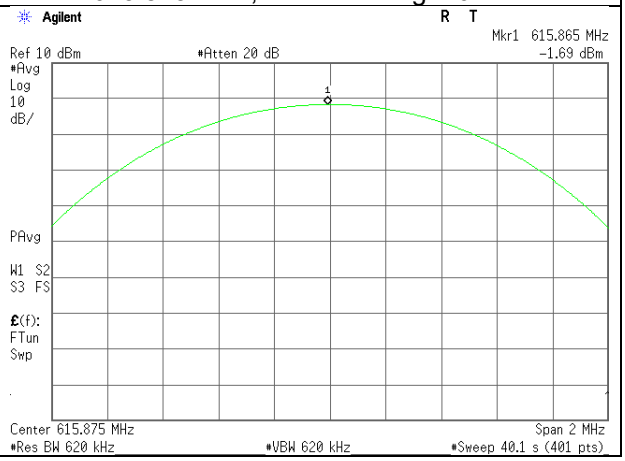
Emission Mask

Measured data	Reference data
470.125 MHz, Power setting: 25 mW	470.125 MHz, Power setting: 25 mW
	
539.000 MHz, Power setting: 25 mW	539.000 MHz, Power setting: 25 mW
	
607.875 MHz, Power setting: 25 mW	607.875 MHz, Power setting: 25 mW
	

Emission Mask

Measured data	Reference data
614.125 MHz, Power setting: 2 mW	614.125 MHz, Power setting: 2 mW
	
615.000 MHz, Power setting: 2 mW	615.000 MHz, Power setting: 2 mW
	
615.875 MHz, Power setting: 2 mW	615.875 MHz, Power setting: 2 mW
	

Emission Mask

Measured data	Reference data
614.125 MHz, Power setting: 10 mW	614.125 MHz, Power setting: 10 mW
	
615.000 MHz, Power setting: 10 mW	615.000 MHz, Power setting: 10 mW
	
615.875 MHz, Power setting: 10 mW	615.875 MHz, Power setting: 10 mW
	

Field strength of spurious radiation

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 470.125 MHz, 25 mW	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
940.25	NS	NS	-	-	-	-	-	-	-36.0	-	-	150	70	130	278	
1410.38	39.3	38.9	-64.6	-67.2	3.3	7.4	-62.7	-65.3	-30.0	32.7	35.3	108	215	349	172	
1880.50	38.6	36.0	-66.7	-73.1	3.8	10.2	-62.5	-68.9	-30.0	***32.5***	38.9	102	205	272	177	
2350.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
2820.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3290.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3761.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4231.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4701.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 539 MHz, 25 mW	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
1078.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
1617.00	41.1	38.7	-65.3	-69.9	2.8	33.0	-37.3	-41.9	-30.0	***7.3***	11.9	119	140	264	173	
2156.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
2695.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3234.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3773.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4312.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4851.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
5390.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 607.875 MHz, 25 mW	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
1215.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
1823.63	51.3	47.2	-52.9	-58.7	3.7	10.1	-48.6	-54.4	-30.0	***18.6***	24.4	127	141	339	117	
2431.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3039.38	37.1	NS	-65.0	-	4.8	11.3	-60.7	-	-30.0	30.7	-	112	141	150	0	
3647.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4255.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4863.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
5470.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
6078.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 614.125 MHz, 10 mW	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
1228.25	41.3	39.1	-64.6	-67.1	3.1	6.4	-63.4	-66.0	-30.0	33.4	36.0	126	135	296	186	
1842.38	53.7	48.9	-51.1	-57.0	3.7	10.2	-46.8	-52.7	-30.0	***16.8***	22.7	103	142	326	171	
2456.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3070.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3684.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4298.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4913.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
5527.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
6141.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615 MHz, 10 mW	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
1230.00	39.7	40.4	-65.0	-66.1	3.1	6.4	-63.8	-65.0	-30.0	33.8	35.0	177	219	293	181	
1845.00	53.7	49.2	-51.1	-56.6	3.7	10.2	-46.8	-52.3	-30.0	***16.8***	22.3	126	218	289	183	
2460.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3075.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3690.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4305.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4920.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
5535.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
6150.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation

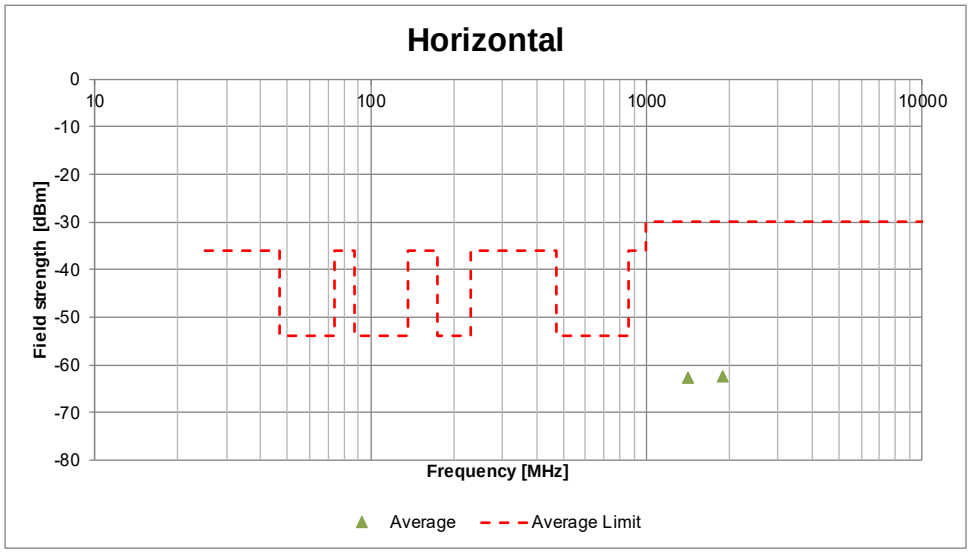
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615.875 MHz, 10 mW	

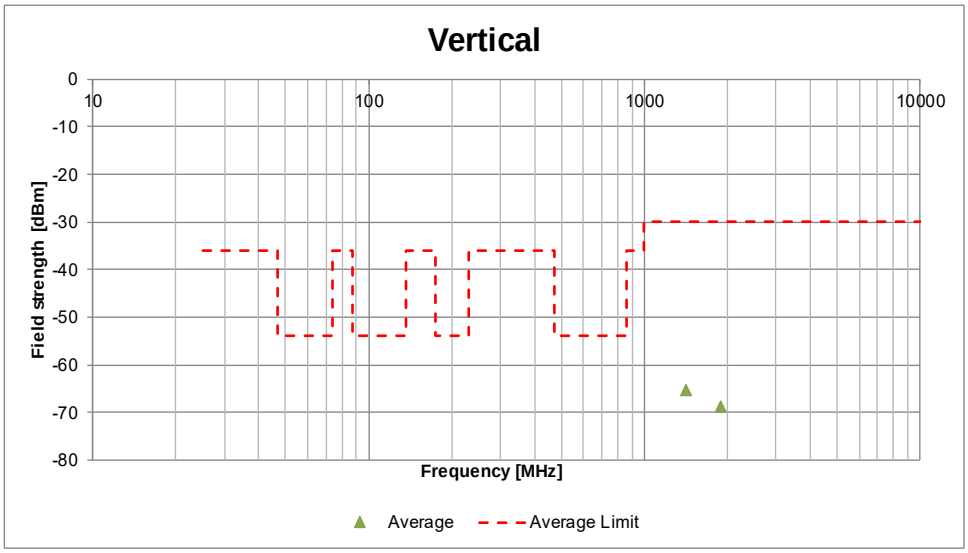
Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	Hori.	Vert.	Hori.	Vert.	[dB]	[dBi]	Hori.	Vert.		Hori.	Vert.	[cm]	[deg.]	[cm]	[deg.]	
1231.75	41.7	40.0	-64.1	-66.3	3.1	6.4	-62.9	-65.2	-30.0	32.9	35.2	100	227	290	289	
1847.63	52.6	48.9	-52.2	-57.0	3.7	10.2	-47.9	-52.8	-30.0	***17.9***	22.8	102	148	289	179	
2463.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3079.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
3695.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4311.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
4927.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
5542.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	
6158.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	150	0	150	0	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.

Field strength of spurious radiation
(Plot data, Worst case)

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.2
Date	September 6, 2024	September 8, 2024
Temperature / Humidity	22 deg. C / 65 % RH	23 deg. C / 63 % RH
Engineer	Ken Fujita	Ken Fujita
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 470.125 MHz, 25 mW	





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

Frequency Tolerance

Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 11, 2024
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Nachi Konegawa
Mode	Tx 539.000 MHz, 25 mW

Varying Temperature

Test condition		Tested	Measured	Frequency	Result		Limit
Temp.	Voltage	timing	frequency	error			
[deg. C]	[V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
50	3.00	Power on	538.999962	-0.000038	-0.00001	-0.1	0.005
		+ 2 min.	538.999983	-0.000017	0.00000	0.0	0.005
		+ 5 min.	538.999990	-0.000010	0.00000	0.0	0.005
		+ 10 min.	538.999993	-0.000007	0.00000	0.0	0.005
40	3.00	Power on	538.999962	-0.000038	-0.00001	-0.1	0.005
		+ 2 min.	538.999951	-0.000049	-0.00001	-0.1	0.005
		+ 5 min.	538.999950	-0.000050	-0.00001	-0.1	0.005
		+ 10 min.	538.999952	-0.000048	-0.00001	-0.1	0.005
30	3.00	Power on	539.000950	0.000950	0.00018	1.8	0.005
		+ 2 min.	539.000787	0.000787	0.00015	1.5	0.005
		+ 5 min.	539.000073	0.000073	0.00001	0.1	0.005
		+ 10 min.	539.000072	0.000072	0.00001	0.1	0.005
20	3.00	Power on	539.000187	0.000187	0.00003	0.3	0.005
		+ 2 min.	539.000193	0.000193	0.00004	0.4	0.005
		+ 5 min.	539.000195	0.000195	0.00004	0.4	0.005
		+ 10 min.	539.000194	0.000194	0.00004	0.4	0.005
10	3.00	Power on	539.000241	0.000241	0.00004	0.4	0.005
		+ 2 min.	539.000249	0.000249	0.00005	0.5	0.005
		+ 5 min.	539.000250	0.000250	0.00005	0.5	0.005
		+ 10 min.	539.000250	0.000249	0.00005	0.5	0.005
0	3.00	Power on	539.000172	0.000172	0.00003	0.3	0.005
		+ 2 min.	539.000134	0.000134	0.00002	0.2	0.005
		+ 5 min.	539.000127	0.000127	0.00002	0.2	0.005
		+ 10 min.	539.000122	0.000122	0.00002	0.2	0.005
-10	3.00	Power on	539.000040	0.000040	0.00001	0.1	0.005
		+ 2 min.	539.000050	0.000050	0.00001	0.1	0.005
		+ 5 min.	539.000055	0.000055	0.00001	0.1	0.005
		+ 10 min.	539.000060	0.000060	0.00001	0.1	0.005
-20	3.00	Power on	539.000053	0.000053	0.00001	0.1	0.005
		+ 2 min.	539.000076	0.000076	0.00001	0.1	0.005
		+ 5 min.	539.000175	0.000175	0.00003	0.3	0.005
		+ 10 min.	539.000226	0.000226	0.00004	0.4	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Frequency Tolerance

Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 11, 2024
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Nachi Konegawa
Mode	Tx 539.000 MHz, 25 mW

Varying Supply Voltage

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	3.00	Power on	539.000187	0.000187	0.00003	0.3	0.005
		+ 2 min.	539.000193	0.000193	0.00004	0.4	0.005
		+ 5 min.	539.000195	0.000195	0.00004	0.4	0.005
		+ 10 min.	539.000194	0.000194	0.00004	0.4	0.005
20	2.55 (3.0 V -15 %)	Power on	539.000180	0.000180	0.00003	0.3	0.005
		+ 2 min.	539.000181	0.000181	0.00003	0.3	0.005
		+ 5 min.	539.000180	0.000180	0.00003	0.3	0.005
		+ 10 min.	539.000178	0.000178	0.00003	0.3	0.005
20	3.45 (3.0 V +15 %)	Power on	539.000178	0.000178	0.00003	0.3	0.005
		+ 2 min.	539.000186	0.000186	0.00003	0.3	0.005
		+ 5 min.	539.000188	0.000188	0.00003	0.3	0.005
		+ 10 min.	539.000187	0.000187	0.00003	0.3	0.005
20	2.38 (Battery end point)	Power on	539.000161	0.000160	0.00003	0.3	0.005
		+ 2 min.	539.000170	0.000169	0.00003	0.3	0.005
		+ 5 min.	539.000170	0.000170	0.00003	0.3	0.005
		+ 10 min.	539.000169	0.000169	0.00003	0.3	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Frequency Tolerance

Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 11, 2024
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Nachi Konegawa
Mode	Tx 615.000 MHz, 10 mW

Varying Temperature

Test condition		Tested timing	Measured frequency	Frequency error	Result		Limit
Temp. [deg. C]	Voltage [V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
50	3.00	Power on	614.999978	-0.000022	0.00000	0.0	0.005
		+ 2 min.	614.999980	-0.000020	0.00000	0.0	0.005
		+ 5 min.	614.999984	-0.000016	0.00000	0.0	0.005
		+ 10 min.	614.999986	-0.000014	0.00000	0.0	0.005
40	3.00	Power on	614.999959	-0.000041	-0.00001	-0.1	0.005
		+ 2 min.	614.999945	-0.000055	-0.00001	-0.1	0.005
		+ 5 min.	614.999943	-0.000057	-0.00001	-0.1	0.005
		+ 10 min.	614.999944	-0.000056	-0.00001	-0.1	0.005
30	3.00	Power on	615.000079	0.000079	0.00001	0.1	0.005
		+ 2 min.	615.000078	0.000078	0.00001	0.1	0.005
		+ 5 min.	615.000078	0.000078	0.00001	0.1	0.005
		+ 10 min.	615.000077	0.000077	0.00001	0.1	0.005
20	3.00	Power on	615.000266	0.000266	0.00004	0.4	0.005
		+ 2 min.	615.000263	0.000263	0.00004	0.4	0.005
		+ 5 min.	615.000261	0.000261	0.00004	0.4	0.005
		+ 10 min.	615.000260	0.000260	0.00004	0.4	0.005
10	3.00	Power on	615.000284	0.000284	0.00005	0.5	0.005
		+ 2 min.	615.000284	0.000284	0.00005	0.5	0.005
		+ 5 min.	615.000282	0.000282	0.00005	0.5	0.005
		+ 10 min.	615.000280	0.000280	0.00005	0.5	0.005
0	3.00	Power on	615.000144	0.000144	0.00002	0.2	0.005
		+ 2 min.	615.000145	0.000145	0.00002	0.2	0.005
		+ 5 min.	615.000145	0.000145	0.00002	0.2	0.005
		+ 10 min.	615.000144	0.000144	0.00002	0.2	0.005
-10	3.00	Power on	615.000073	0.000073	0.00001	0.1	0.005
		+ 2 min.	615.000051	0.000051	0.00001	0.1	0.005
		+ 5 min.	615.000052	0.000052	0.00001	0.1	0.005
		+ 10 min.	615.000065	0.000065	0.00001	0.1	0.005
-20	3.00	Power on	615.000173	0.000173	0.00003	0.3	0.005
		+ 2 min.	615.000202	0.000202	0.00003	0.3	0.005
		+ 5 min.	615.000262	0.000261	0.00004	0.4	0.005
		+ 10 min.	615.000275	0.000275	0.00004	0.4	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Frequency Tolerance

Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 11, 2024
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Nachi Konegawa
Mode	Tx 615.000 MHz, 10 mW

Varying Supply Voltage

Test condition		Tested	Measured	Frequency	Result		Limit
Temp.	Voltage	timing	frequency	error			
[deg. C]	[V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
20	3.00	Power on	615.000266	0.000266	0.00004	0.4	0.005
		+ 2 min.	615.000263	0.000263	0.00004	0.4	0.005
		+ 5 min.	615.000261	0.000261	0.00004	0.4	0.005
		+ 10 min.	615.000260	0.000260	0.00004	0.4	0.005
20	2.55	Power on	615.000250	0.000250	0.00004	0.4	0.005
	(3.0 V -15 %)	+ 2 min.	615.000251	0.000251	0.00004	0.4	0.005
		+ 5 min.	615.000250	0.000250	0.00004	0.4	0.005
		+ 10 min.	615.000248	0.000248	0.00004	0.4	0.005
20	3.45	Power on	615.000253	0.000253	0.00004	0.4	0.005
	(3.0 V +15 %)	+ 2 min.	615.000257	0.000257	0.00004	0.4	0.005
		+ 5 min.	615.000257	0.000257	0.00004	0.4	0.005
		+ 10 min.	615.000256	0.000256	0.00004	0.4	0.005
20	2.38	Power on	615.002367	0.002367	0.00038	3.8	0.005
	(Battery end point)	+ 2 min.	615.000242	0.000242	0.00004	0.4	0.005
		+ 5 min.	615.000244	0.000244	0.00004	0.4	0.005
		+ 10 min.	615.000245	0.000245	0.00004	0.4	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

APPENDIX 2: Test instruments

Test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/17/2023	12
AT	141171	Attenuator(20dB)_ DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	12/06/2023	12
AT	141244	Attenuator(10dB)	Weinschel - API Technologies Corp	WA8-10-34	A198	02/17/2024	12
AT	141327	Coaxial Cable	UL Japan	-	-	02/09/2024	12
AT	141429	Temperature and Humidity Chamber	Espec	PL-2KP	14015723	08/23/2024	12
AT	141558	Digital Tester(TRUE RMS MULTIMETER)	Fluke Corporation	115	17930030	05/17/2024	12
AT	141809	Power Meter	Anritsu Corporation	ML2495A	825002	05/22/2024	12
AT	141830	Power sensor	Anritsu Corporation	MA2411B	738285	05/22/2024	12
AT	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	05/09/2024	12
AT	141902	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187105	05/30/2024	12
AT	141903	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186390	01/26/2024	12
AT	244712	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202106	01/25/2024	12
RE	141232	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	09/13/2024	12
RE	141265	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-190	07/10/2024	12
RE	141317	Coaxial Cable	UL Japan	-	-	09/11/2024	12
RE	141427	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103B+BBA9106	08031	07/30/2024	12
RE	141512	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	254	10/17/2023	12
RE	141514	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	01611	06/25/2024	12
RE	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/06/2024	12
RE	141579	Pre Amplifier	Keysight Technologies Inc	8449B	3008A02142	02/17/2024	12
RE	141594	Pre Amplifier	Keysight Technologies Inc	8447D	2944A10150	02/17/2024	12
RE	141903	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186390	01/26/2024	12
RE	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	05/17/2024	12
RE	141978	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180899	05/09/2024	12
RE	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	12/12/2023	24
RE	142228	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	213581	Signal Generator	Rohde & Schwarz	SMW200A	107688	02/17/2024	12
RE	214065	Microwave cable	Huber+Suhner	SF-126E/11PC35/11PC35/10000	550489/126E	01/22/2024	12
RE	220646	Attenuator	Huber+Suhner	6806_N-50-1	-	03/12/2024	12
RE	238713	Double Ridge Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	688	09/02/2024	12
RE	240023	Microwave Cable	Huber+Suhner	SF126E/11PC35/11PC35/1000MM, 5000MM	537060/126E / 537075/126E	-	-
RE	242978	High Pass Filter 1-13 GHz	Pasternak	PE87FL1018	D.C. 2215	02/02/2024	12
RE	244707	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202102	01/25/2024	12

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

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:

RE: Field strength of spurious radiation
AT: Antenna Terminal Conducted