RADIO TEST REPORT

Test Report No. 14219577M-C-R1

Customer	**PIONEER CORPORATION**
Description of EUT	**Display Audio**
Model Number of EUT	**AVH-0239ZT**
FCC ID	**AJDK120**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**July 1, 2022**
Remarks	**Radiated Spurious Emission only**

Representative Test Engineer	**Approved By**
Hiromitsu Tanabe Engineer	Kenichi Suda Manager

CERTIFICATE 1266.01

☐ 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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- The information provided from the applicant for this report is identified in Section 1.
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REVISION HISTORY

Original Test Report No.: 14219577M-C

This report is a revised version of 14219577M-C. 14219577M-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14219577M-C	June 15, 2022	-
1	14219577M-C-R1	July 1, 2022	**Radio Specification in Clause 2.2** Deleted note about transmit simultaneously: * WLAN and Bluetooth do not transmit simultaneously.
1	14219577M-C-R1	July 1, 2022	**Clause 3.2** - Corrected the Worst Margin and Mode: Worst Margin: 1.6 dB → 9.5 dB Mode: Tx 11n-40 5190 MHz → Tx 11n-40 5755 MHz - Corrected Results: Complied# →Complied

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 **9**
SECTION 5: Radiated Spurious Emission and Band Edge Compliance **12**
APPENDIX 1: Test Data **16**
APPENDIX 2: Test Instruments **31**
APPENDIX 3: Photographs of Test Setup **32**
Radiated Spurious Emission 32
Worst Case Position 34

SECTION 1: Customer Information

Company Name	PIONEER CORPORATION
Address	25-1 Yamada, Kawagoe-shi, Saitama-ken 350-8555, Japan
Telephone Number	+81-49-228-7787
Contact Person	Shigeru Yoshida

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	Display Audio
Model Number	AVH-0239ZT
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab.
Receipt Date	February 28, 2022
Test Date	May 10 to 25, 2022

The EUT has following similar models.

Product description	Model number	Feature							
		Bluetooth	WiFi	GNSS	steering position of vehicle	type of vehicle	voice recognition	premium sound	destination
Display Audio*	AVH-0239ZT	A	A	A	Left	B	A	NA	South America
Display Audio	AVH-0039ZT	A	A	A	Left	B	A	NA	Southeast Asia
Display Audio	AVH-0139ZT	A	A	A	Right	B	A	NA	Southeast Asia
Display Audio	AVH-0339ZT	A	A	A	Right	B	NA	NA	Malaysia
Display Audio	AVH-0439ZT	A	A	A	Right	B	A	NA	South America
Display Audio	AVH-0539ZT	A	A	A	Right	B	A	NA	Indonesia
Display Audio	AVH-0639ZT	A	A	A	Right	B	A	A	Thailand
Display Audio	AVH-0639ZT	A	A	A	Right	B	A	A	Thailand
Display Audio	AVH-0739ZT	A	A	A	Left	B	A	A	Southeast Asia
Display Audio	AVH-0939ZY	A	A	A	Right	B	NA	NA	Southeast Asia
Display Audio	AVH-1039ZY	A	A	A	Right	B	NA	NA	Asia
Display Audio	AVH-1139ZY	A	A	A	Left	B	NA	NA	South America
Display Audio	AVH-1239ZY	A	A	A	Right	B	NA	NA	Southeast Asia
Display Audio	AVH-0539ZY	A	A	A	Right	C	NA	NA	Southeast Asia
Display Audio	AVH-0639ZY	A	A	A	Left	C	NA	NA	Southeast Asia
Display Audio	AVH-0739ZY	A	A	A	Left	C	NA	NA	South America
Display Audio	AVH-0839ZY	A	A	A	Right	C	NA	NA	South America

* Tested model, A: Applicable, NA: Not Applicable

2.2 Product Description

General Specification

Rating	DC 13.2 V（DC 10.5 V to 16 V）
Operating temperature	-20 deg. C to +65 deg. C

Radio Specification

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

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band:	5745 MHz
	40 MHz Band:	5755 MHz
	80 MHz Band:	5775 MHz
Type of Modulation	DSSS, OFDM	
Antenna Type	Internal Antenna	
Antenna Gain: G_{ANT}	-3.77 dBi	

Bluetooth (BR / EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	GFSK, π/4- DQPSK , 8DPSK
Antenna Type	Internal Antenna
Antenna Gain	-3.60 dBi

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E FCC Part 15 final revised on April 1, 2022 and effective May 2, 2022
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

*The customer has declared that the EUT has complies with FCC Part 15 Subpart B as SDoC.

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Spurious Emission Restricted Band Edge	**FCC:** ANSI C63.10-2013 KDB Publication Number 789033	**FCC:** 15.407 (b), 15.205 and 15.209	9.5 dB 5925.000 MHz, PK, Horizontal Mode: Tx 11n-40 5755 MHz	Complied a)	Radiated (> 30 MHz) *1)
	ISED: -	**ISED:** RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2			
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred. *1) Radiated test was selected over 30 MHz based on FCC 15.407 (b) and KDB 789033 D02 G.3.b).					
a) Refer to APPENDIX 1 (data of Radiated Spurious Emission)					
Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration					

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to Standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

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

Radiated emission

Measurement distance	Frequency range	Required Uncertainty (+/-)	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	Not Defined	2.9 dB
	30 MHz to 200 MHz	6.3 dB	6.1 dB
	200 MHz to 1000 MHz		6.2 dB
	1 GHz to 6 GHz	5.2 dB	5.0 dB
	6 GHz to 18 GHz	5.5 dB	5.4 dB
	18 GHz to 40 GHz	Not Defined	5.5 dB
1 m	1 GHz to 18 GHz	Not Defined	5.4 dB
	18 GHz to 40 GHz		5.6 dB
0.5 m	26.5 GHz to 40 GHz	Not Defined	5.9 dB

3.5 Test Location

UL Japan, Inc. Kashima EMC Lab.
1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN
Telephone: +81 478 88 6500, Facsimile: +81 478 82 3373
A2LA Certificate Number: 1266.01 / FCC Test Firm Registration Number: 910230
ISED Lab Company Number: 4659A / CAB identifier: JP0006

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Open site	6.0 x 5.5 x 2.5	20 x 40	10 m
No.5 Open site	8.6 x 7.1 x 2.4	18 x 23	10 m
No.1 Shielded room	5.4 x 4.5 x 2.3	-	-
No.5 Shielded Room	4.2 x 3.1 x 2.5	-	-
No.9 Shielded Room	6.1 x 3.6 x 2.8	-	-
No.6 Semi-anechoic Chamber	8.5 x 5.5 x 5.2	-	3 m
No.10 Semi-anechoic Chamber	18.4 x 9.9 x 7.7	-	10 m
No.11 Semi-anechoic Chamber	9.0 x 6.5 x 5.2	-	3 m
No.1 Measurement room	5.0 x 3.7 x 2.6	-	-
No.2 Measurement room	4.3 x 4.4 x 2.7	-	-
No.3 Measurement room	4.5 x 5.3 x 2.7	-	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

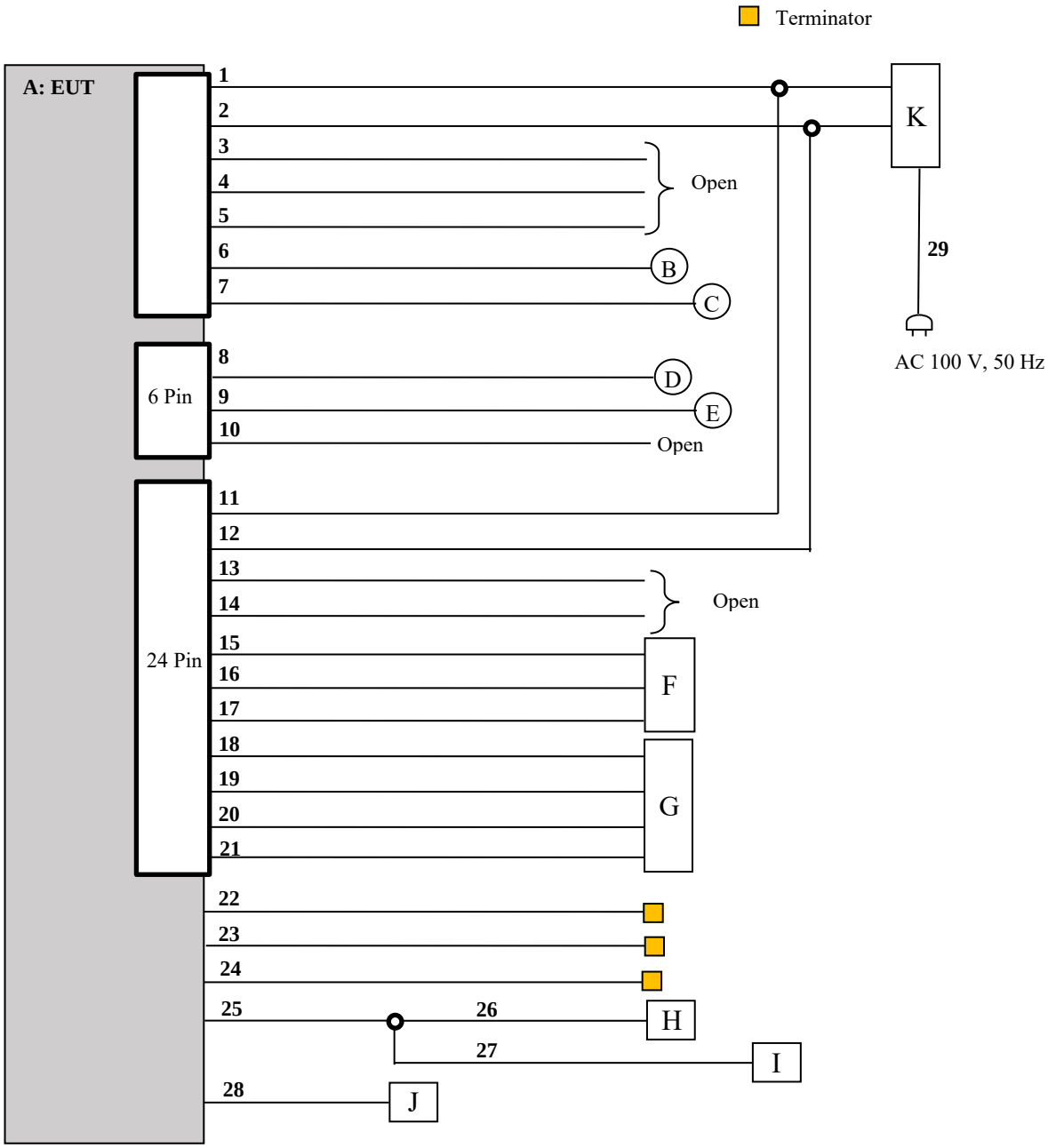
Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals -" of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Remarks*
IEEE 802.11a (11a)	9 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 3, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	MCS 2, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 0, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	MCS 5, PN9
IEEE 802.11ac 80 MHz BW (11ac-80)	MCS 3, PN9
*The worst condition was determined based on the test result of Maximum Conducted Output Power. Refer to the test report of Antenna terminal conducted tests.	
*Power of the EUT was set by the software as follows; Power Setting: 11a/11n-20:14 dBm , 11n-40:13 dBm , 11ac-20/11ac-40/11ac-80:8 dBm Software: LabTool Version: 2.0.0.89 (Date: 2021.03 19, 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. In addition, end users cannot change the settings of the output power of the product.	

*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Frequency			
		Lower Band	Middle Band	Additional Band	Upper Band
Radiated Spurious Emission (Below 1 GHz)	Tx 11a *1)	-	-	-	5745 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx 11a Tx 11n-20 Tx 11ac-20	-	-	-	5745 MHz
	Tx 11n-40 Tx 11ac-40	-	-	-	5755 MHz
	Tx 11ac-80	-	-	-	5775 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.					

4.2 Configuration and Peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Display Audio	AVH-0239ZT	K1BA009	PIONEER CORPORATION	EUT
B	Speaker	KFC-RS101	482C	JVC KENWOOD	-
C	Speaker	KFC-RS101	482C	JVC KENWOOD	-
D	Speaker	KFC-RS101	492C	JVC KENWOOD	-
E	Speaker	KFC-RS101	492C	JVC KENWOOD	-
F	Steering switch	-	-	PIONEER CORPORATION	-
G	Camera	22DA-BC-030	-	PIONEER CORPORATION	-
H	Smartphone	ANE-LX2J	SCV7N18508005047	HUAWEI	-
I	USB Memory	RUF-C/U2	P2051100245	BUFFALO	-
J	GPS Antenna	86860-B2120-H	0010233	PIONEER CORPORATION	-
K	DC Power Supply	GSV3000	2010221559	DIAMOND ANTENNA	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC (+B, ACC)	1.3	Unshielded	Unshielded	-
2	DC (GND)	1.3	Unshielded	Unshielded	-
3	ILL +	1.0 + 1.0	Unshielded	Unshielded	-
4	AMP	1.0 + 1.0	Unshielded	Unshielded	-
5	TMU	1.0 + 1.0	Unshielded	Unshielded	-
6	Speaker Front Left	1.0 + 1.0	Unshielded	Unshielded	-
7	Speaker Front Right	1.0 + 1.0	Unshielded	Unshielded	-
8	Speaker Rear Left	1.0 + 1.0	Unshielded	Unshielded	-
9	Speaker Rear Right	1.0 + 1.0	Unshielded	Unshielded	-
10	ILL -	1.0 + 1.0	Unshielded	Unshielded	-
11	DC (+B)	1.3	Unshielded	Unshielded	-
12	DC (GND)	1.3	Unshielded	Unshielded	-
13	Signal (MIN+, MIN-, MACC, SGND)	1.0 + 1.0	Unshielded	Unshielded	-
14	Signal (IG, NC, NC, NC, SPD, SNS2, REV, CANH, CANL, PKB, SGND/SDEI)	1.0 + 1.0	Unshielded	Unshielded	-
15	STSW1	1.5	Unshielded	Unshielded	-
16	STSW2	1.5	Unshielded	Unshielded	-
17	SWG	1.5	Unshielded	Unshielded	-
18	V +	1.5	Unshielded	Unshielded	-
19	V -	1.5	Unshielded	Unshielded	-
20	CA +	1.5	Unshielded	Unshielded	-
21	CGND	1.5	Unshielded	Unshielded	-
22	RCA	2.0	Shielded	Shielded	-
23	Audio mini	2.0	Shielded	Shielded	-
24	Antenna	0.3 + 2.0 + 1.0 + 1.0	Shielded	Shielded	-
25	USB	0.75	Shielded	Shielded	-
26	USB (Type C)	1.5	Shielded	Shielded	-
27	USB (Type A)	1.5	Shielded	Shielded	-
28	GPS	0.3	Shielded	Shielded	-
29	AC Cable	1.8	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1GHz >
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.

< Above 1GHz >
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

< Below 1GHz >
The result also satisfied with the general limits specified in section 15.209 (a).

< Above 1GHz >
Inside of restricted bands (Section 15.205):
Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:
Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.*) in the Section 15.407 (b) (1) (2) (3).

For U-NII-3 Bandedge
-27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge in the section 15.407(b)(4)(i).

Restricted band edge:
Apply to limit in the Section 15.209 (a).
Since this limit is severer than the limit of the inside of restricted bands.

*Electric field strength to e.i.r.p. conversion:

$$E = \frac{1000000\sqrt{30P}}{3} \text{ (uV/m)}$$

:P is the e.i.r.p. (Watts)

Test Antennas are used as below;

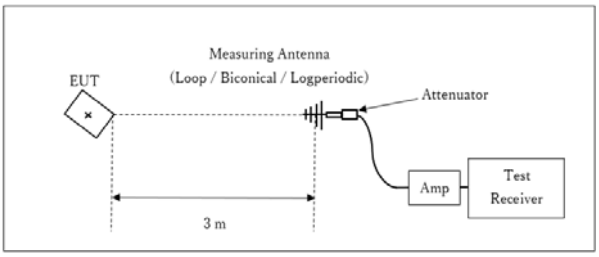
Frequency	Below 1 GHz	Above 1 GHz
Antenna Type	Hybrid	Horn

Frequency	Below 1 GHz	Above 1 GHz	
Instrument Used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method VB *1) RBW: 1 MHz VBW: 1/T MHz (T: Burst length, refer to Appendix) Detector: Peak Trace mode: Max hold

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E".

Figure 1: Test Setup

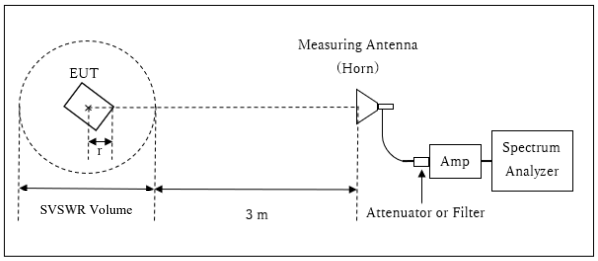
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

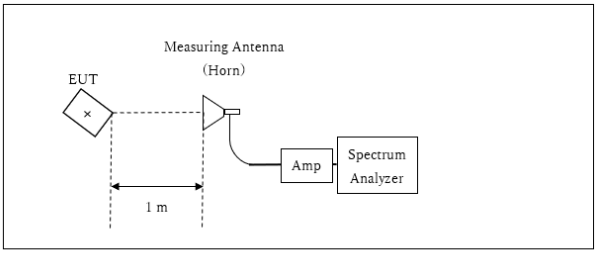


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (4.36 m / 3.0 m) = 3.25 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 4.36 m

SVSWR Volume : 3.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.14 m

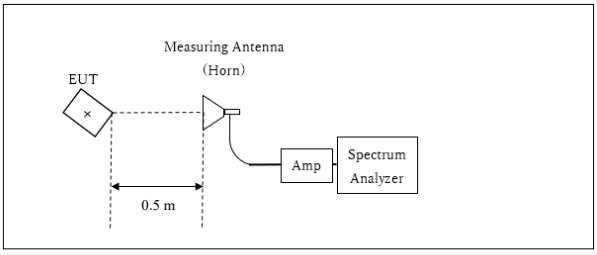
10 GHz to 26.5 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 dB
*Test Distance: 1 m

26.5 GHz to 40 GHz



× : Center of turn table

Distance Factor: 20 x log (0.5 m / 3.0 m) = -15.56 dB
*Test Distance: 0.5 m

- The carrier level and noise levels were confirmed at each position of 5 deg., 6 deg. and 10 deg. axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz – 2.8 GHz)	Spurious (2.8 GHz – 10 GHz)	Spurious (10 GHz – 18 GHz)	Spurious (18 GHz – 26.5 GHz)	Spurious (26.5GHz – 40 GHz)
Horizontal	10 deg.	5 deg.	10 deg	10 deg	10 deg	10 deg	10 deg
Vertical	10 deg.	5 deg.	10 deg.	10 deg	10 deg	10 deg	10 deg

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

Measurement Range : **30 MHz to 40 GHz**
Test Data : **APPENDIX**
Test Result : **Pass**

APPENDIX 1: Test Data

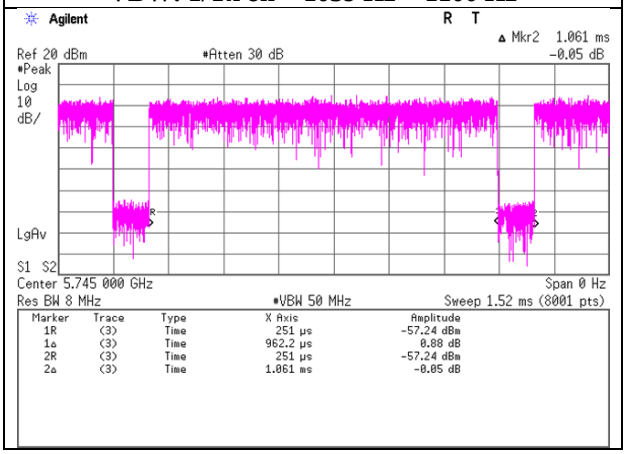
Burst rate confirmation

Test place	Kashima EMC Lab. No.10 Semi Anechoic Chamber
Date	May 10, 2022
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiromitsu Tanabe
Mode	Tx

11a 9 Mbps

Tx on / (Tx on + Tx off) =	0.907
Tx on / (Tx on + Tx off) * 100 =	90.7 %
Duty factor = 10 * log (1.061 / 0.962) =	0.43 dB

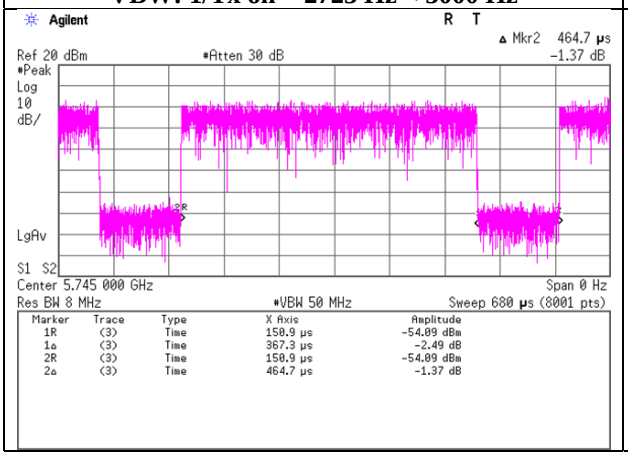
VBW: 1/Tx on = 1039 Hz < 1100 Hz



11n-20 MCS 3

Tx on / (Tx on + Tx off) =	0.789
Tx on / (Tx on + Tx off) * 100 =	78.9 %
Duty factor = 10 * log (0.465 / 0.367) =	1.02 dB

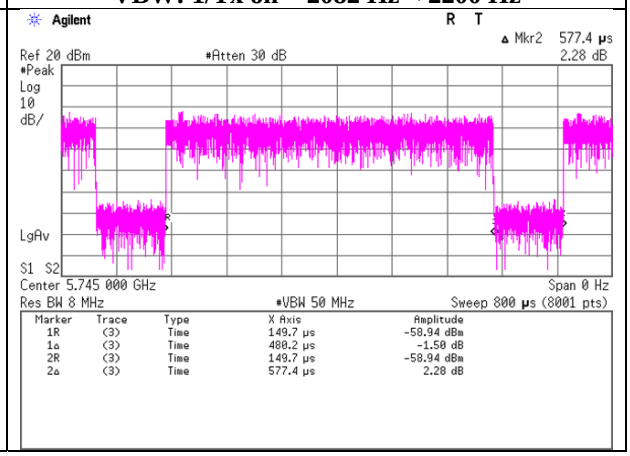
VBW: 1/Tx on = 2723 Hz < 3000 Hz



11ac-20 MCS 2

Tx on / (Tx on + Tx off) =	0.832
Tx on / (Tx on + Tx off) * 100 =	83.2 %
Duty factor = 10 * log (0.577 / 0.48) =	0.80 dB

VBW: 1/Tx on = 2082 Hz < 2200 Hz



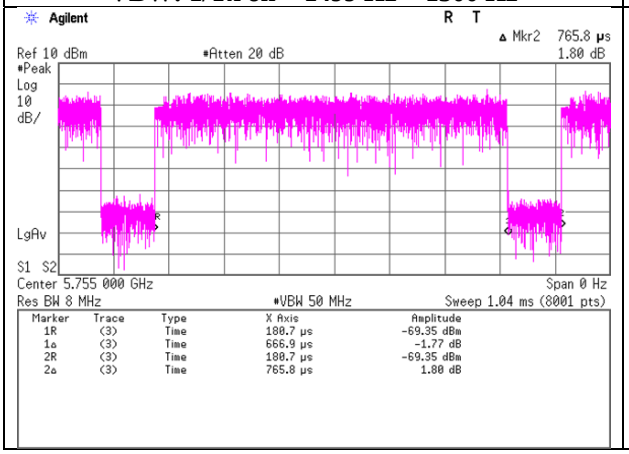
Burst rate confirmation

Test place	Kashima EMC Lab. No.10 Semi Anechoic Chamber
Date	May 10, 2022
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiromitsu Tanabe
Mode	Tx

11n-40 MCS 0

Tx on / (Tx on + Tx off) =	**0.871**
Tx on / (Tx on + Tx off) * 100 =	**87.1 %**
Duty factor = 10 * log (0.766 / 0.667) =	**0.60 dB**

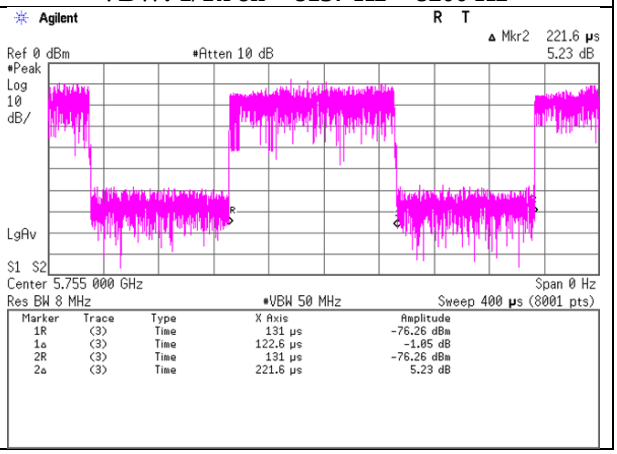
VBW: 1/Tx on = 1499 Hz < 1500 Hz



11ac-40 MCS 5

Tx on / (Tx on + Tx off) =	**0.554**
Tx on / (Tx on + Tx off) * 100 =	**55.4 %**
Duty factor = 10 * log (0.222 / 0.123) =	**2.57 dB**

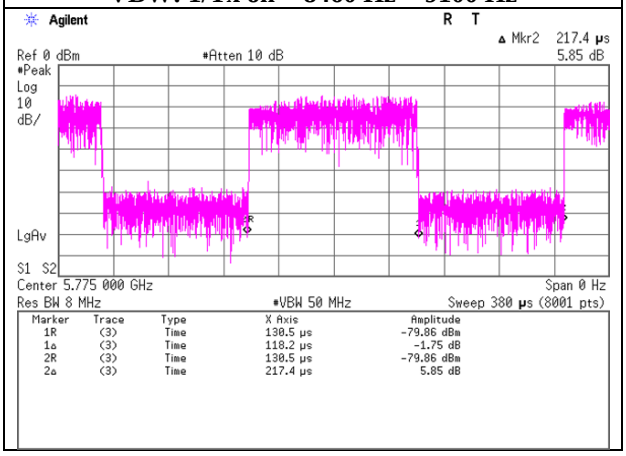
VBW: 1/Tx on = 8157 Hz < 8200 Hz



11ac-80 MCS 3

Tx on / (Tx on + Tx off) =	**0.544**
Tx on / (Tx on + Tx off) * 100 =	**54.4 %**
Duty factor = 10 * log (0.217 / 0.118) =	**2.65 dB**

VBW: 1/Tx on = 8460 Hz < 9100 Hz



Radiated Spurious Emission

Test place	Kashima EMC Lab.				
Semi Anechoic Chamber	No.10	No.10	No.10	No.6	No.11
Date	May 12, 2022	May 18, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	20 deg. C / 45 % RH	22 deg. C / 50 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe (80 MHz to 1000 MHz)	Hiromitsu Tanabe (1 GHz to 6.4 GHz)	Hiromitsu Tanabe (6.4 GHz to 10 GHz)	Hiromitsu Tanabe (10 GHz to 18 GHz)	Hiromitsu Tanabe (18 GHz to 40 GHz)
Mode	Tx 11a 5745 MHz				

(below 1 GHz and above 1 GHz Inside of the restricted band)

(* 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.	143.780	QP	32.40	13.14	7.32	31.42	0.00	21.44	43.5	22.0	230	160	
Hori.	261.673	QP	36.40	12.13	8.37	31.32	0.00	25.58	46.0	20.4	130	140	
Hori.	270.339	QP	37.10	12.57	8.44	31.31	0.00	26.80	46.0	19.2	130	120	
Hori.	479.281	QP	30.40	17.46	10.09	31.18	0.00	26.77	46.0	19.2	100	325	
Hori.	958.340	QP	27.50	23.99	12.30	30.79	0.00	33.00	46.0	13.0	100	105	
Hori.	11490.000	PK	52.17	38.60	7.54	42.79	-9.54	45.98	73.9	27.9	147	274	
Hori.	11490.000	AV	42.68	38.60	7.54	42.79	-9.54	36.49	53.9	17.4	147	274	VBW:1.1kHz
Vert.	62.269	QP	31.10	12.79	6.39	31.58	0.00	18.70	40.0	21.3	100	240	
Vert.	143.780	QP	33.90	13.14	7.32	31.42	0.00	22.94	43.5	20.5	100	120	
Vert.	257.148	QP	35.30	11.95	8.33	31.32	0.00	24.26	46.0	21.7	100	355	
Vert.	958.340	QP	25.80	23.99	12.30	30.79	0.00	31.30	46.0	14.7	100	185	
Vert.	11490.000	PK	52.26	38.60	7.54	42.79	-9.54	46.07	73.9	27.8	150	163	
Vert.	11490.000	AV	41.85	38.60	7.54	42.79	-9.54	35.66	53.9	18.2	150	163	VBW:1.1kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

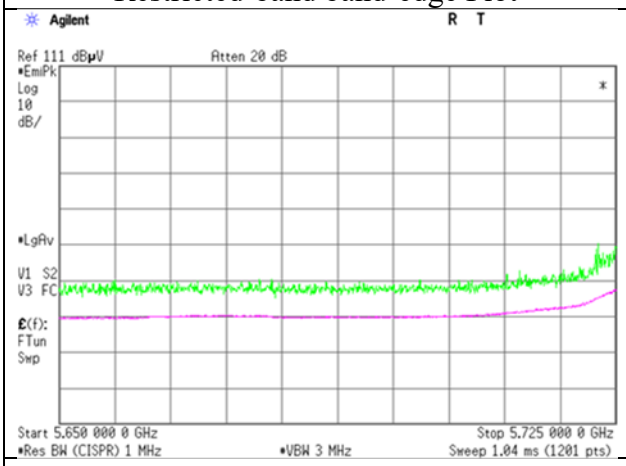
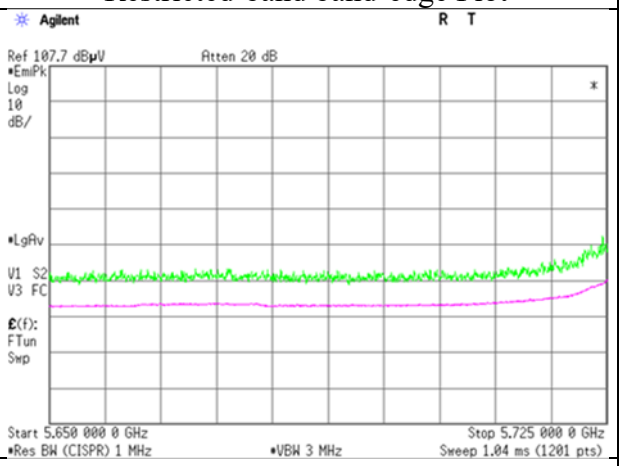
(* PK: Peak, AV: Average, QP: Quasi-Peak)

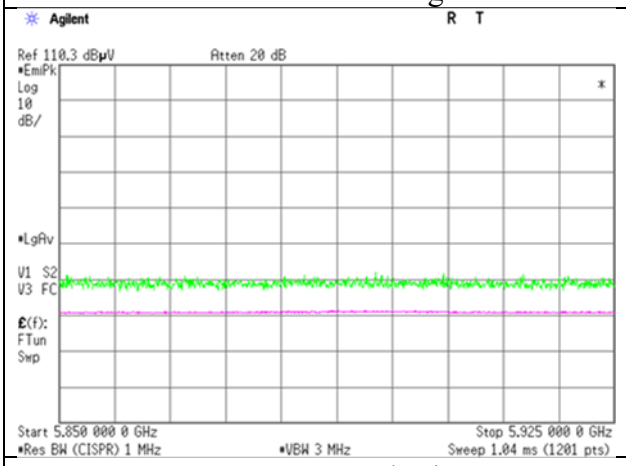
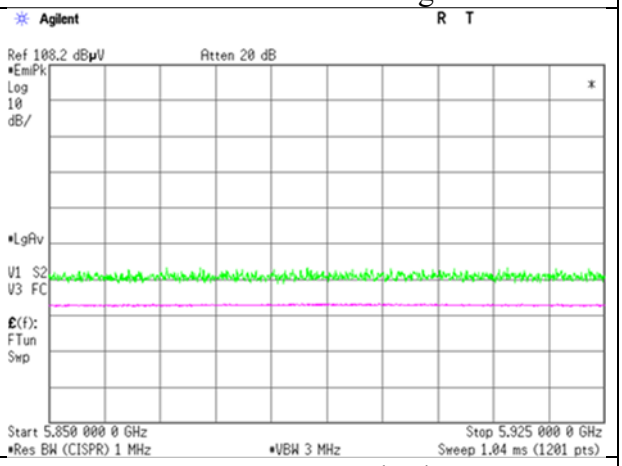
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result(EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	51.44	33.54	15.04	45.45	3.25	57.82	-37.40	-27.0	10.4	142	140	
Hori.	5700.000	PK	51.03	33.59	15.07	45.42	3.25	57.52	-37.70	10.0	47.7	142	140	
Hori.	5720.000	PK	54.19	33.66	15.08	45.41	3.25	60.77	-34.45	15.6	50.0	142	140	
Hori.	5725.000	PK	61.87	33.68	15.08	45.41	3.25	68.47	-26.75	27.0	53.7	142	140	
Hori.	5850.000	PK	50.30	34.22	15.12	45.36	3.25	57.53	-37.69	27.0	64.6	142	140	
Hori.	5855.000	PK	50.75	34.26	15.12	45.36	3.25	58.02	-37.20	15.6	52.8	142	140	
Hori.	5875.000	PK	50.01	34.41	15.15	45.34	3.25	57.48	-37.74	10.0	47.7	142	140	
Hori.	5925.000	PK	49.89	34.68	15.18	45.30	3.25	57.70	-37.52	-27.0	10.5	142	140	
Hori.	17235.000	PK	52.03	41.21	9.50	44.94	-9.54	48.26	-46.96	-27.0	19.9	150	0	
Vert.	5650.000	PK	50.77	33.54	15.04	45.45	3.25	57.15	-38.07	-27.0	11.0	142	162	
Vert.	5700.000	PK	50.69	33.59	15.07	45.42	3.25	57.18	-38.04	10.0	48.0	142	162	
Vert.	5720.000	PK	52.76	33.66	15.08	45.41	3.25	59.34	-35.88	15.6	51.4	142	162	
Vert.	5725.000	PK	60.57	33.68	15.08	45.41	3.25	67.17	-28.05	27.0	55.0	142	162	
Vert.	5850.000	PK	50.29	34.22	15.12	45.36	3.25	57.52	-37.70	27.0	64.7	142	162	
Vert.	5855.000	PK	50.71	34.26	15.12	45.36	3.25	57.98	-37.24	15.6	52.8	142	162	
Vert.	5875.000	PK	50.22	34.41	15.15	45.34	3.25	57.69	-37.53	10.0	47.5	142	162	
Vert.	5925.000	PK	50.16	34.68	15.18	45.30	3.25	57.97	-37.25	-27.0	**10.2**	142	162	
Vert.	17235.000	PK	52.10	41.21	9.50	44.94	-9.54	48.33	-46.89	-27.0	19.8	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG((({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 18, 2022
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Hiromitsu Tanabe (1 GHz to 6.4 GHz)
Mode	Tx 11a 5745 MHz

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.10	No.6	No.11
Date	May 18, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 6.4 GHz)	(6.4 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 40 GHz)
Mode	Tx 11n-20 5745 MHz			

(above 1 GHz Inside of the restricted band)

(* 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.	11490.000	PK	51.87	38.60	7.54	42.79	-9.54	45.68	73.9	28.2	150	179	
Hori.	11490.000	AV	41.91	38.60	7.54	42.79	-9.54	35.72	53.9	18.1	150	179	VBW:3kHz
Vert.	11490.000	PK	52.27	38.60	7.54	42.79	-9.54	46.08	73.9	27.8	148	161	
Vert.	11490.000	AV	42.96	38.60	7.54	42.79	-9.54	36.77	53.9	17.1	148	161	VBW:3kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

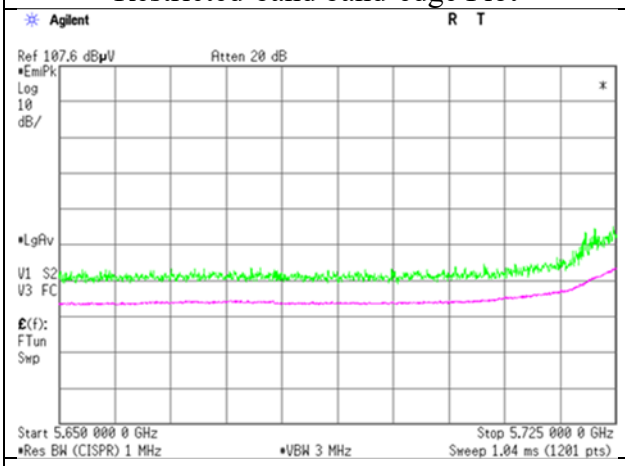
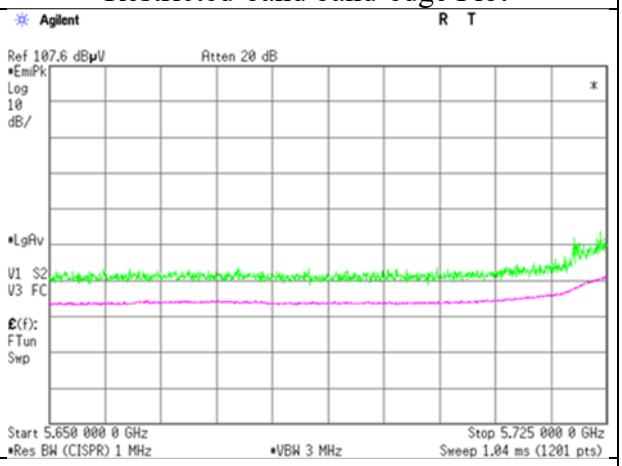
(* PK: Peak, AV: Average, QP: Quasi-Peak)

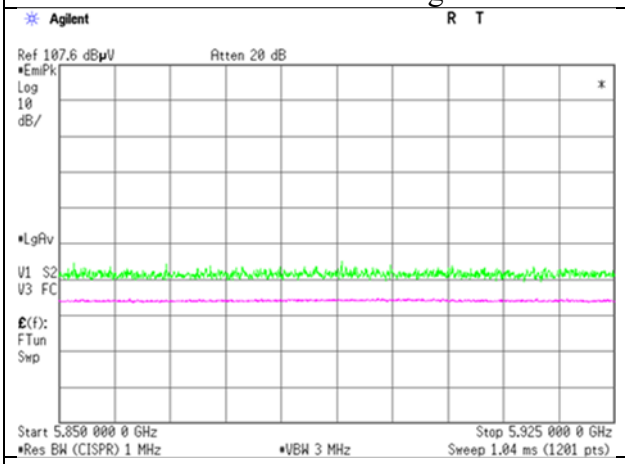
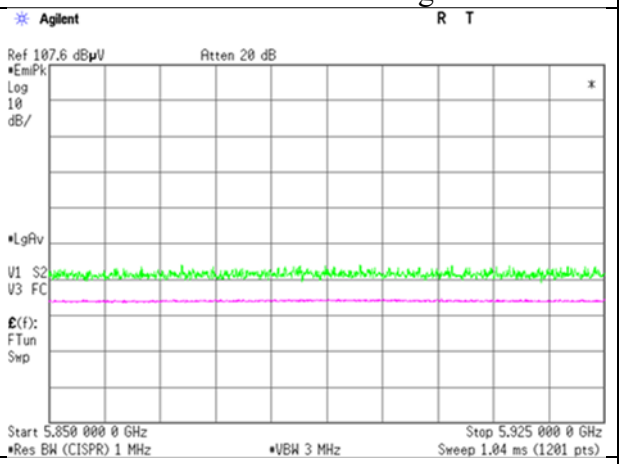
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result(EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	51.55	33.54	15.04	45.45	3.25	57.93	-37.29	-27.0	10.2	117	141	
Hori.	5700.000	PK	50.70	33.59	15.07	45.42	3.25	57.19	-38.03	10.0	48.0	117	141	
Hori.	5720.000	PK	57.40	33.66	15.08	45.41	3.25	63.98	-31.24	15.6	46.8	117	141	
Hori.	5725.000	PK	65.31	33.68	15.08	45.41	3.25	71.91	-23.31	27.0	50.3	117	141	
Hori.	5850.000	PK	50.64	34.22	15.12	45.36	3.25	57.87	-37.35	27.0	64.3	117	141	
Hori.	5855.000	PK	50.94	34.26	15.12	45.36	3.25	58.21	-37.01	15.6	52.6	117	141	
Hori.	5875.000	PK	50.44	34.41	15.15	45.34	3.25	57.91	-37.31	10.0	47.3	117	141	
Hori.	5925.000	PK	50.06	34.68	15.18	45.30	3.25	57.87	-37.35	-27.0	10.3	117	141	
Hori.	17235.000	PK	51.67	41.21	9.50	44.94	-9.54	47.90	-47.32	-27.0	20.3	150	0	
Vert.	5650.000	PK	51.15	33.54	15.04	45.45	3.25	57.53	-37.69	-27.0	10.6	138	162	
Vert.	5700.000	PK	50.80	33.59	15.07	45.42	3.25	57.29	-37.93	10.0	47.9	138	162	
Vert.	5720.000	PK	54.06	33.66	15.08	45.41	3.25	60.64	-34.58	15.6	50.1	138	162	
Vert.	5725.000	PK	62.38	33.68	15.08	45.41	3.25	68.98	-26.24	27.0	53.2	138	162	
Vert.	5850.000	PK	50.59	34.22	15.12	45.36	3.25	57.82	-37.40	27.0	64.4	138	162	
Vert.	5855.000	PK	50.51	34.26	15.12	45.36	3.25	57.78	-37.44	15.6	53.0	138	162	
Vert.	5875.000	PK	50.04	34.41	15.15	45.34	3.25	57.51	-37.71	10.0	47.7	138	162	
Vert.	5925.000	PK	50.33	34.68	15.18	45.30	3.25	58.14	-37.08	-27.0	**10.0**	138	162	
Vert.	17235.000	PK	52.24	41.21	9.50	44.94	-9.54	48.47	-46.75	-27.0	19.7	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 18, 2022
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Hiromitsu Tanabe (1 GHz to 6.4 GHz)
Mode	Tx 11n-20 5745 MHz

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.10	No.6	No.11
Date	May 18, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 6.4 GHz)	(6.4 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 40 GHz)
Mode	Tx 11ac-20 5745 MHz			

(above 1 GHz Inside of the restricted band)

(* 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.	11490.000	PK	51.10	38.60	7.54	42.79	-9.54	44.91	73.9	28.9	146	274	
Hori.	11490.000	AV	42.20	38.60	7.54	42.79	-9.54	36.01	53.9	17.8	146	274	VBW:2.2kHz
Vert.	11490.000	PK	51.30	38.60	7.54	42.79	-9.54	45.11	73.9	28.7	143	160	
Vert.	11490.000	AV	42.85	38.60	7.54	42.79	-9.54	36.66	53.9	17.2	143	160	VBW:2.2kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

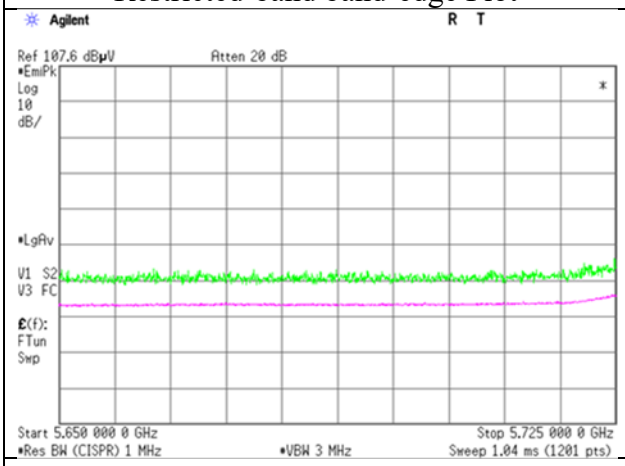
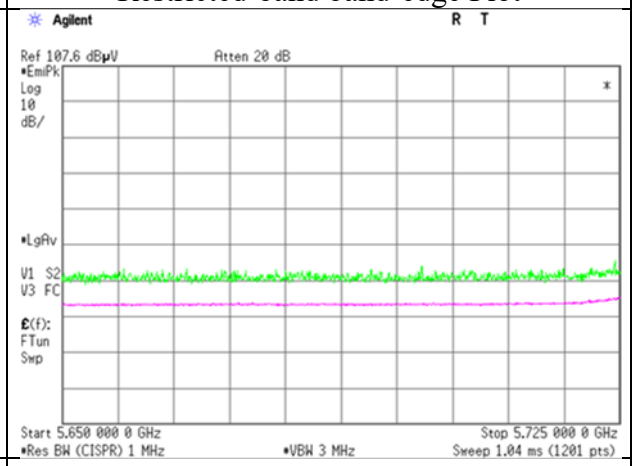
(* PK: Peak, AV: Average, QP: Quasi-Peak)

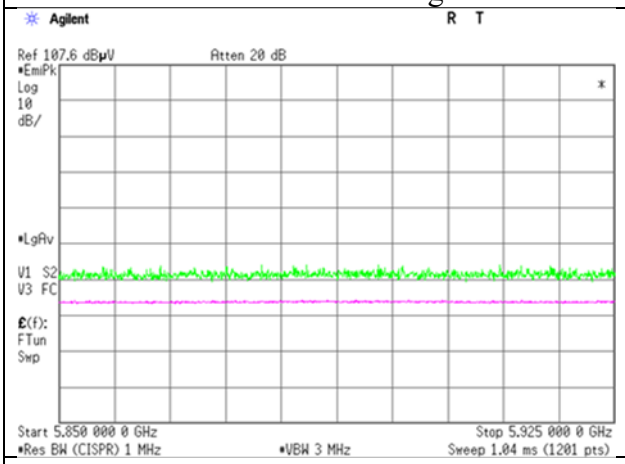
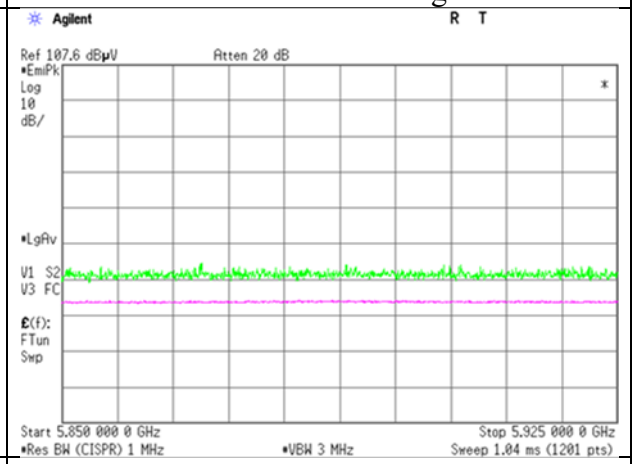
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result(EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	50.85	33.54	15.04	45.45	3.25	57.23	-37.99	-27.0	10.9	112	140	
Hori.	5700.000	PK	50.69	33.59	15.07	45.42	3.25	57.18	-38.04	10.0	48.0	112	140	
Hori.	5720.000	PK	51.04	33.66	15.08	45.41	3.25	57.62	-37.60	15.6	53.2	112	140	
Hori.	5725.000	PK	54.94	33.68	15.08	45.41	3.25	61.54	-33.68	27.0	60.6	112	140	
Hori.	5850.000	PK	50.34	34.22	15.12	45.36	3.25	57.57	-37.65	27.0	64.6	112	140	
Hori.	5855.000	PK	50.50	34.26	15.12	45.36	3.25	57.77	-37.45	15.6	53.0	112	140	
Hori.	5875.000	PK	50.14	34.41	15.15	45.34	3.25	57.61	-37.61	10.0	47.6	112	140	
Hori.	5925.000	PK	49.68	34.68	15.18	45.30	3.25	57.49	-37.73	-27.0	**10.7**	112	140	
Hori.	17235.000	PK	52.02	41.21	9.50	44.94	-9.54	48.25	-46.97	-27.0	19.9	150	0	
Vert.	5650.000	PK	50.87	33.54	15.04	45.45	3.25	57.25	-37.97	-27.0	10.9	191	160	
Vert.	5700.000	PK	50.45	33.59	15.07	45.42	3.25	56.94	-38.28	10.0	48.2	191	160	
Vert.	5720.000	PK	51.03	33.66	15.08	45.41	3.25	57.61	-37.61	15.6	53.2	191	160	
Vert.	5725.000	PK	53.29	33.68	15.08	45.41	3.25	59.89	-35.33	27.0	62.3	191	160	
Vert.	5850.000	PK	51.33	34.22	15.12	45.36	3.25	58.56	-36.66	27.0	63.6	191	160	
Vert.	5855.000	PK	50.98	34.26	15.12	45.36	3.25	58.25	-36.97	15.6	52.5	191	160	
Vert.	5875.000	PK	50.45	34.41	15.15	45.34	3.25	57.92	-37.30	10.0	47.3	191	160	
Vert.	5925.000	PK	49.56	34.68	15.18	45.30	3.25	57.37	-37.85	-27.0	10.8	191	160	
Vert.	17235.000	PK	52.11	41.21	9.50	44.94	-9.54	48.34	-46.88	-27.0	19.8	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 18, 2022
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Hiromitsu Tanabe (1 GHz to 6.4 GHz)
Mode	Tx 11ac-20 5745 MHz

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.10	No.6	No.11
Date	May 19, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	22 deg. C / 56 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 6.4 GHz)	(6.4 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 40 GHz)
Mode	Tx 11n-40 5755 MHz			

(above 1 GHz Inside of the restricted band)

(* 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.	11510.000	PK	51.17	38.61	7.54	42.84	-9.54	44.94	73.9	28.9	151	179	
Hori.	11510.000	AV	42.16	38.61	7.54	42.84	-9.54	35.93	53.9	17.9	151	179	VBW:1.5kHz
Vert.	11510.000	PK	52.12	38.61	7.54	42.84	-9.54	45.89	73.9	28.0	143	160	
Vert.	11510.000	AV	43.08	38.61	7.54	42.84	-9.54	36.85	53.9	17.0	143	160	VBW:1.5kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

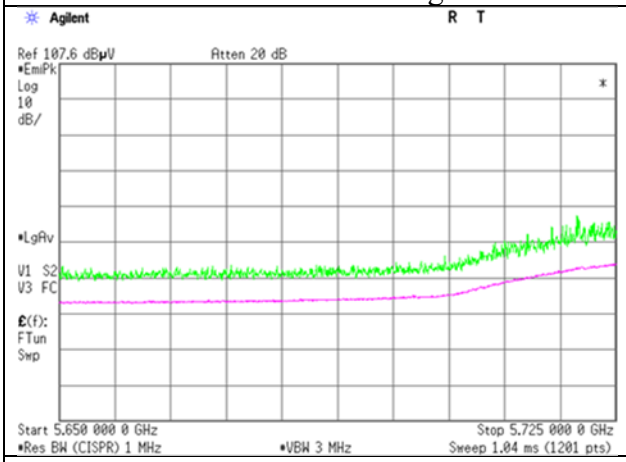
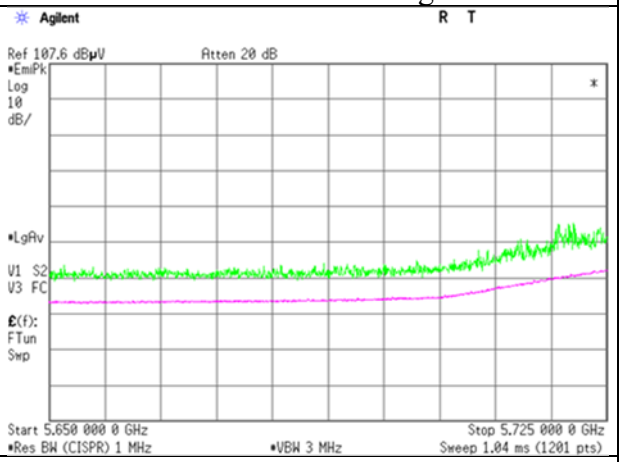
(* PK: Peak, AV: Average, QP: Quasi-Peak)

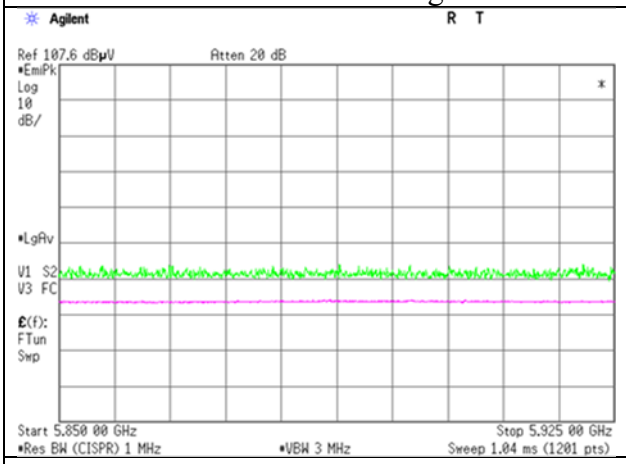
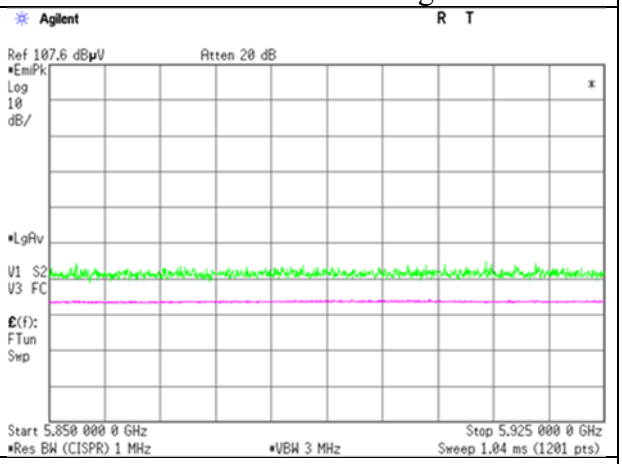
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	50.70	33.54	15.04	45.45	3.25	57.08	-38.14	-27.0	11.1	143	139	
Hori.	5700.000	PK	50.54	33.59	15.07	45.42	3.25	57.03	-38.19	10.0	48.1	143	139	
Hori.	5720.000	PK	64.55	33.66	15.08	45.41	3.25	71.13	-24.09	15.6	39.6	143	139	
Hori.	5725.000	PK	65.05	33.68	15.08	45.41	3.25	71.65	-23.57	27.0	50.5	143	139	
Hori.	5850.000	PK	50.33	34.22	15.12	45.36	3.25	57.56	-37.66	27.0	64.6	143	139	
Hori.	5855.000	PK	49.90	34.26	15.12	45.36	3.25	57.17	-38.05	15.6	53.6	143	139	
Hori.	5875.000	PK	50.14	34.41	15.15	45.34	3.25	57.61	-37.61	10.0	47.6	143	139	
Hori.	5925.000	PK	50.90	34.68	15.18	45.30	3.25	58.71	-36.51	-27.0	**9.5**	143	139	
Hori.	17265.000	PK	51.64	41.28	9.50	44.93	-9.54	47.95	-47.27	-27.0	20.2	150	0	
Vert.	5650.000	PK	51.61	33.54	15.04	45.45	3.25	57.99	-37.23	-27.0	10.2	149	157	
Vert.	5700.000	PK	51.63	33.59	15.07	45.42	3.25	58.12	-37.10	10.0	47.1	149	157	
Vert.	5720.000	PK	62.28	33.66	15.08	45.41	3.25	68.86	-26.36	15.6	41.9	149	157	
Vert.	5725.000	PK	63.07	33.68	15.08	45.41	3.25	69.67	-25.55	27.0	52.5	149	157	
Vert.	5850.000	PK	50.67	34.22	15.12	45.36	3.25	57.90	-37.32	27.0	64.3	149	157	
Vert.	5855.000	PK	50.12	34.26	15.12	45.36	3.25	57.39	-37.83	15.6	53.4	149	157	
Vert.	5875.000	PK	50.04	34.41	15.15	45.34	3.25	57.51	-37.71	10.0	47.7	149	157	
Vert.	5925.000	PK	50.34	34.68	15.18	45.30	3.25	58.15	-37.07	-27.0	10.0	149	157	
Vert.	17265.000	PK	51.60	41.28	9.50	44.93	-9.54	47.91	-47.31	-27.0	20.3	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 19, 2022
Temperature / Humidity	22 deg. C / 56 % RH
Engineer	Hiromitsu Tanabe
Mode	Tx 11n-40 5755 MHz

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.10	No.6	No.11
Date	May 19, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	22 deg. C / 56 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 6.4 GHz)	(6.4 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 40 GHz)
Mode	Tx 11ac-40 5755 MHz			

(above 1 GHz Inside of the restricted band)

(* 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.	11510.000	PK	51.24	38.61	7.54	42.84	-9.54	45.01	73.9	28.8	153	178	
Hori.	11510.000	AV	43.55	38.61	7.54	42.84	-9.54	37.32	53.9	16.5	153	178	VBW:8.2kHz
Vert.	11510.000	PK	51.83	38.61	7.54	42.84	-9.54	45.60	73.9	28.3	142	159	
Vert.	11510.000	AV	44.84	38.61	7.54	42.84	-9.54	38.61	53.9	15.2	142	159	VBW:8.2kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

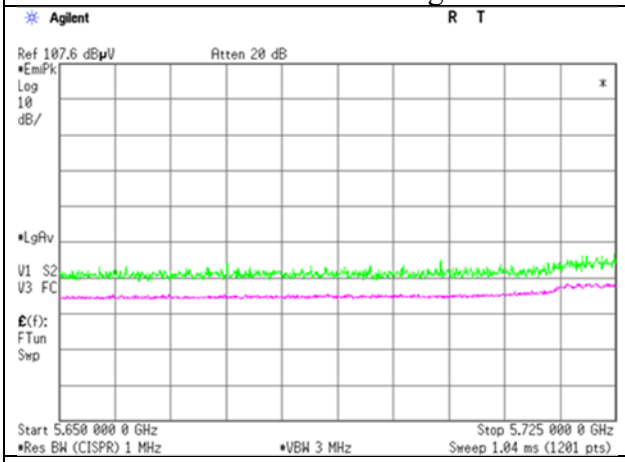
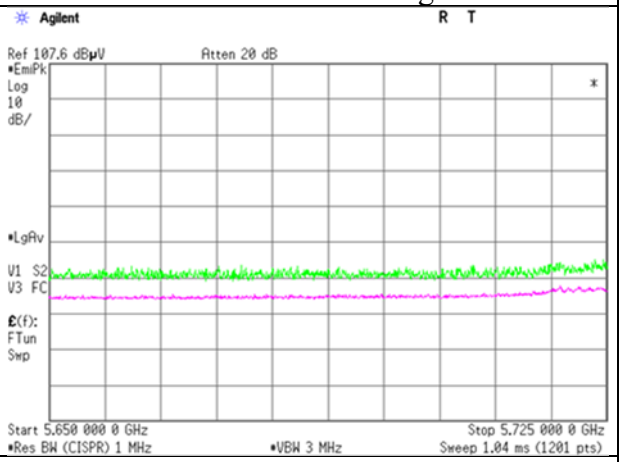
(* PK: Peak, AV: Average, QP: Quasi-Peak)

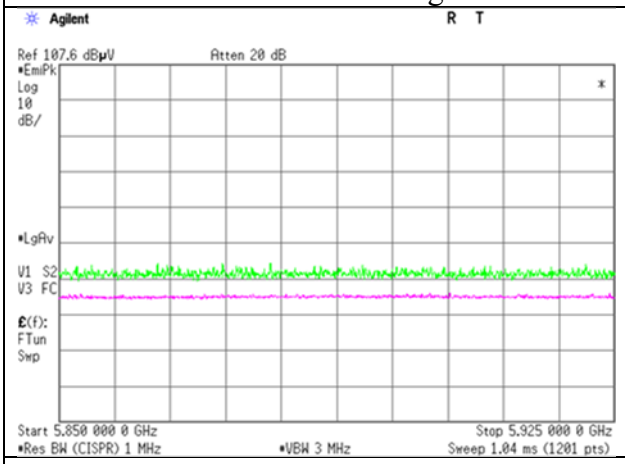
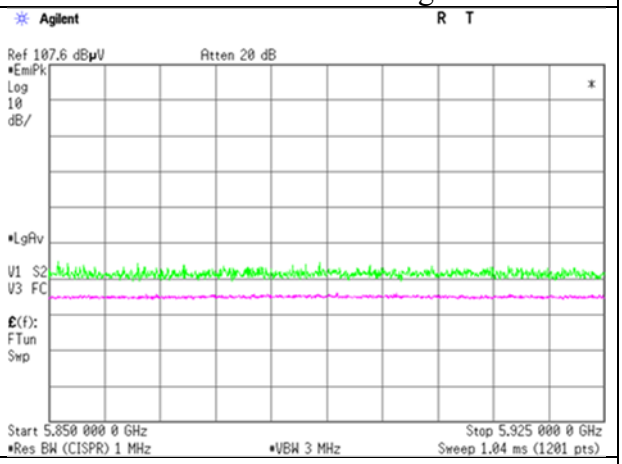
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	51.37	33.54	15.04	45.45	3.25	57.75	-37.47	-27.0	10.4	112	140	
Hori.	5700.000	PK	51.35	33.59	15.07	45.42	3.25	57.84	-37.38	10.0	47.3	112	140	
Hori.	5720.000	PK	53.24	33.66	15.08	45.41	3.25	59.82	-35.40	15.6	51.0	112	140	
Hori.	5725.000	PK	54.97	33.68	15.08	45.41	3.25	61.57	-33.65	27.0	60.6	112	140	
Hori.	5850.000	PK	50.11	34.22	15.12	45.36	3.25	57.34	-37.88	27.0	64.8	112	140	
Hori.	5855.000	PK	49.67	34.26	15.12	45.36	3.25	56.94	-38.28	15.6	53.8	112	140	
Hori.	5875.000	PK	49.91	34.41	15.15	45.34	3.25	57.38	-37.84	10.0	47.8	112	140	
Hori.	5925.000	PK	50.40	34.68	15.18	45.30	3.25	58.21	-37.01	-27.0	**10.0**	112	140	
Hori.	17265.000	PK	51.68	41.28	9.50	44.93	-9.54	47.99	-47.23	-27.0	20.2	150	0	
Vert.	5650.000	PK	51.12	33.54	15.04	45.45	3.25	57.50	-37.72	-27.0	10.7	147	163	
Vert.	5700.000	PK	50.05	33.59	15.07	45.42	3.25	56.54	-38.68	10.0	48.6	147	163	
Vert.	5720.000	PK	51.74	33.66	15.08	45.41	3.25	58.32	-36.90	15.6	52.5	147	163	
Vert.	5725.000	PK	52.93	33.68	15.08	45.41	3.25	59.53	-35.69	27.0	62.6	147	163	
Vert.	5850.000	PK	50.73	34.22	15.12	45.36	3.25	57.96	-37.26	27.0	64.2	147	163	
Vert.	5855.000	PK	49.88	34.26	15.12	45.36	3.25	57.15	-38.07	15.6	53.6	147	163	
Vert.	5875.000	PK	50.27	34.41	15.15	45.34	3.25	57.74	-37.48	10.0	47.4	147	163	
Vert.	5925.000	PK	50.11	34.68	15.18	45.30	3.25	57.92	-37.30	-27.0	10.3	147	163	
Vert.	17265.000	PK	51.75	41.28	9.50	44.93	-9.54	48.06	-47.16	-27.0	20.1	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 19, 2022
Temperature / Humidity	22 deg. C / 56 % RH
Engineer	Hiromitsu Tanabe
Mode	Tx 11ac-40 5755 MHz

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.10	No.6	No.11
Date	May 19, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	22 deg. C / 56 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 6.4 GHz)	(6.4 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 40 GHz)
Mode	Tx 11ac-80 5775 MHz			

(above 1 GHz Inside of the restricted band)

(* 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.	11550.000	PK	51.14	38.60	7.55	42.94	-9.54	44.81	73.9	29.0	140	206	
Hori.	23100.010	PK	49.62	40.40	7.20	45.49	-9.54	42.19	73.9	31.7	166	197	
Hori.	11550.000	AV	43.79	38.60	7.55	42.94	-9.54	37.46	53.9	16.4	140	206	VBW:9.1kHz
Hori.	23100.010	AV	44.13	40.40	7.20	45.49	-9.54	36.70	53.9	17.2	166	197	
Vert.	11550.000	PK	51.07	38.60	7.55	42.94	-9.54	44.74	73.9	29.1	153	157	
Vert.	23100.010	PK	48.72	40.40	7.20	45.49	-9.54	41.29	73.9	32.6	155	266	
Vert.	11550.000	AV	43.76	38.60	7.55	42.94	-9.54	37.43	53.9	16.4	153	157	VBW:9.1kHz
Vert.	23100.010	AV	42.68	40.40	7.20	45.49	-9.54	35.25	53.9	18.6	155	266	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

(Calculation) (above 1 GHz Outside of the restricted band)

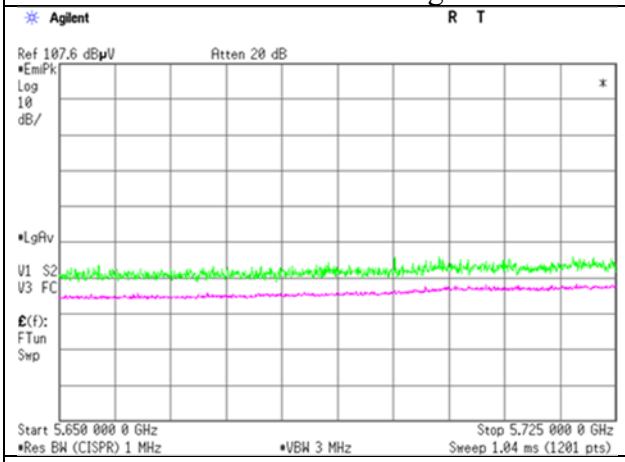
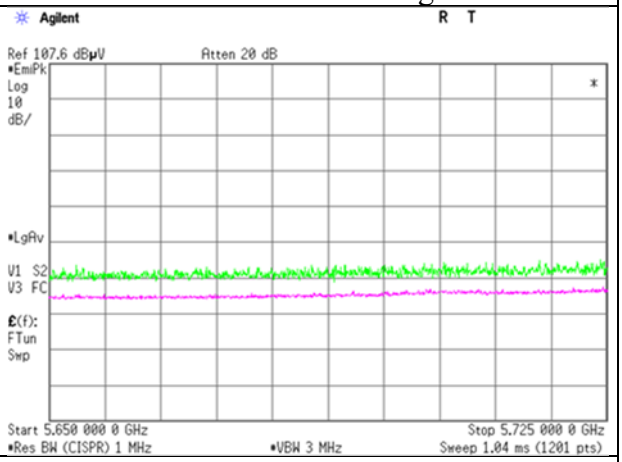
(* PK: Peak, AV: Average, QP: Quasi-Peak)

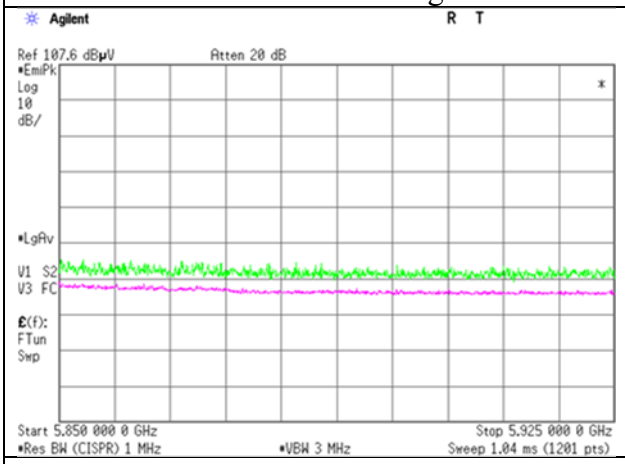
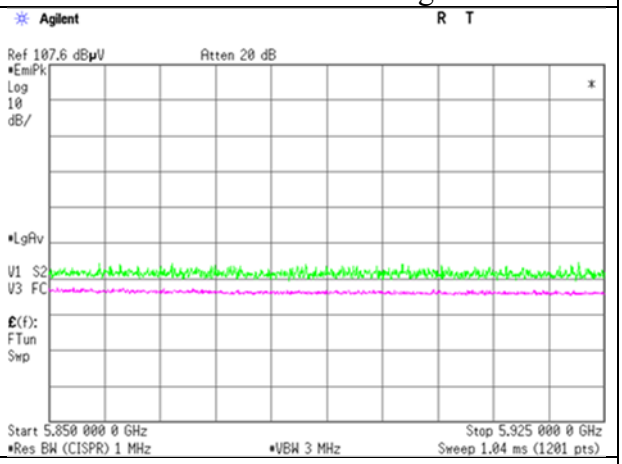
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	50.33	33.54	15.04	45.45	3.25	56.71	-38.51	-27.0	11.5	142	141	
Hori.	5700.000	PK	51.18	33.59	15.07	45.42	3.25	57.67	-37.55	10.0	47.5	142	141	
Hori.	5720.000	PK	53.08	33.66	15.08	45.41	3.25	59.66	-35.56	15.6	51.1	142	141	
Hori.	5725.000	PK	53.94	33.68	15.08	45.41	3.25	60.54	-34.68	27.0	61.6	142	141	
Hori.	5850.000	PK	52.84	34.22	15.12	45.36	3.25	60.07	-35.15	27.0	62.1	142	141	
Hori.	5855.000	PK	51.94	34.26	15.12	45.36	3.25	59.21	-36.01	15.6	51.6	142	141	
Hori.	5875.000	PK	49.74	34.41	15.15	45.34	3.25	57.21	-38.01	10.0	48.0	142	141	
Hori.	5925.000	PK	50.58	34.68	15.18	45.30	3.25	58.39	-36.83	-27.0	9.8	142	141	
Hori.	17325.000	PK	52.42	41.40	9.55	44.88	-9.54	48.95	-46.27	-27.0	19.2	150	0	
Vert.	5650.000	PK	50.07	33.54	15.04	45.45	3.25	56.45	-38.77	-27.0	11.7	149	163	
Vert.	5700.000	PK	50.33	33.59	15.07	45.42	3.25	56.82	-38.40	10.0	48.4	149	163	
Vert.	5720.000	PK	51.66	33.66	15.08	45.41	3.25	58.24	-36.98	15.6	52.5	149	163	
Vert.	5725.000	PK	52.81	33.68	15.08	45.41	3.25	59.41	-35.81	27.0	62.8	149	163	
Vert.	5850.000	PK	51.07	34.22	15.12	45.36	3.25	58.30	-36.92	27.0	63.9	149	163	
Vert.	5855.000	PK	50.57	34.26	15.12	45.36	3.25	57.84	-37.38	15.6	52.9	149	163	
Vert.	5875.000	PK	50.00	34.41	15.15	45.34	3.25	57.47	-37.75	10.0	47.7	149	163	
Vert.	5925.000	PK	50.71	34.68	15.18	45.30	3.25	58.52	-36.70	-27.0	**9.7**	149	163	
Vert.	17325.000	PK	52.49	41.40	9.55	44.88	-9.54	49.02	-46.20	-27.0	19.2	150	0	

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance factor : 1 GHz - 10 GHz : 20log (4.36 m / 3.0 m) = 3.25 dB
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
26.5 GHz - 40 GHz : 20log (0.5 m / 3.0 m) = -15.56 dB

Radiated Spurious Emission

Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.10
Date	May 19, 2022
Temperature / Humidity	22 deg. C / 56 % RH
Engineer	Hiromitsu Tanabe
Mode	Tx 11ac-80 5775 MHz

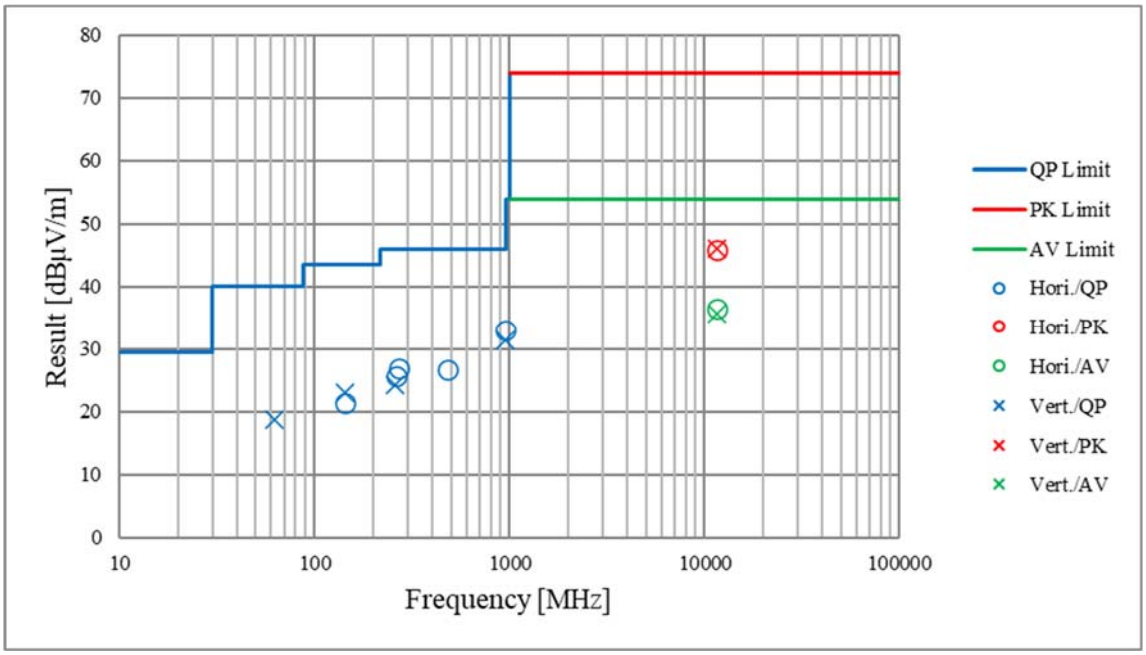
Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average 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 Conducted Output Power)

Test place	Kashima EMC Lab.				
Semi Anechoic Chamber	No.10	No.10	No.10	No.6	No.11
Date	May 12, 2022	May 18, 2022	May 20, 2022	May 25, 2022	May 16, 2022
Temperature / Humidity	20 deg. C / 45 % RH	22 deg. C / 50 % RH	22 deg. C / 49 % RH	21 deg. C / 60 % RH	20 deg. C / 60 % RH
Engineer	Hiromitsu Tanabe (80 MHz to 1000 MHz)	Hiromitsu Tanabe (1 GHz to 6.4 GHz)	Hiromitsu Tanabe (6.4 GHz to 10 GHz)	Hiromitsu Tanabe (10 GHz to 18 GHz)	Hiromitsu Tanabe (18 GHz to 40 GHz)
Mode	Tx 11a 5745 MHz				



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

APPENDIX 2: Test Instruments

Test Equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	CTR-09	144199	Test Receiver	Keysight Technologies Inc	N9038A	MY53290016	2021/07/16	12
RE	CBL-08	143121	LOGBICON	Schwarzbeck Mess-Elektronik OHG	VULB 9168	343	2022/04/18	12
RE	CAT5-03	178806	5dB Fixed Atten.	Pasternack Enterprises	PE7047-5	none	2022/04/01	12
RE	CCC-S10-R3	143165	10 Site RE 3m System	UL Japan	none	none	2021/08/10	12
RE	CAF-28	183880	Pre-Amplifier	UL Japan	ZKL-2	001	2022/04/06	12
RE	CHA-24	143455	Double Ridged Wave Guide	ETS-Lindgren (Cedar Park, Texas)	3115	00204569	2022/02/05	12
RE	CAF-22	142940	Pre-Amplifier	Micro Wave Factory	MPR-1G26.5-35	161399	2021/06/11	12
RE	CCC-G09	143140	Micro Wave Cable	Junkosha	MWX221	1407S222	2021/11/12	12
RE	CCC-G16	192243	Microwave Cable	Huber+Suhner	SF104/11N/11PC3 5/8000MM	808995/4	2022/01/18	12
RE	CAT10-17	143023	10dB Fixed Atten.	Weinschel - API Technologies Corp	54A-10	56251	2021/05/14	12
RE	CHF-05	143443	HPF	MICRO-TRONICS	HPM50112-02	006	2021/05/14	12
RE	CTR-01	144193	Test Receiver	Rohde & Schwarz	ESU40	100426	2022/04/15	12
RE	CHA-07	143438	Double Ridged Horn	ETS-Lindgren (Cedar Park, Texas)	3160-09	00166043	2021/06/05	12
RE	CAF-19	142937	Pre-Amplifier	TOYO	HAP18-26W	00000035	2021/06/23	12
RE	CCC-W09	143113	Micro Wave Cable	Suhner	SUCOFLEX104	MY588/4	2021/08/03	12
RE	TSA-01	143642	Spectrum Analyzer	Keysight Technologies Inc	N9030A	MY53310670 Version A.13.12	2021/05/24	12
RE	CHA-28	146356	Horn Antenna	ETS-Lindgren	3116	46543	2022/02/05	12
RE	KAF-06	144880	Pre Amplifier	TSJ (Techno Science Japan)	MLA-1840B02-35	-	2022/04/13	12
RE	CCC-G13	171928	Microwave Cable	Huber+Suhner	SF102/SKm /1000mm	801389/2	2021/08/03	12
RE	CCC-W10	142992	Micro Wave Cable	Suhner	SUCOFLEX102	MY010/2A	2021/08/03	12
RE	CSCL-08	143667	Ruler	TAJIMA	L25-55	none	-	-
RE	COS-06	143538	Temperature & Humidity Indicator	HIOKI E.E. CORPORATION	3641/9680-50	070727010/070799 296	2021/07/27	12
RE	CBM-06	143129	Barometer	Sanoh Co., Ltd	SBR-151	000017	2021/11/24	36
RE	CTS-07	144209	Digital Multimeter	Fluke Corporation	FLK-83-V	17610192	2021/10/20	12
RE	COTS-CEMI-03	178804	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	Ver 3.1.0484	-	-

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

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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

Test item:
RE: Radiated Emission