RADIO TEST REPORT

Test Report No. 14581758S-C

Customer	**PIONEER CORPORATION**
Description of EUT	**RDS AV RECEIVER**
Model Number of EUT	**DMH-WT3800NEX**
FCC ID	**AJDK122**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**November 24, 2022**
Remarks	**WLAN (5 GHz band) part**

Representative Test Engineer	**Approved By**
T. Kawakami	K. Takeyama
Takahiro Kawakami Engineer	Kazutaka Takeyama Leader

CERTIFICATE 1266.03

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☒ There is no testing item of "Non-accreditation".

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- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14581758S-C

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14581758S-C	November 24, 2022	-

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	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	RDS AV RECEIVER
Model Number	DMH-WT3800NEX
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	July 7, 2022
Test Date	July 12 to September 5, 2022

2.2 Product Description

General Specification

Rating	DC 14.4 V (DC 10.8 V to 15.1 V)
Operating temperature	-10 deg. C to +60 deg. C

Radio Specification

WLAN (IEEE802.11b/11g/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Gain	-1.40 dBi

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	OFDM	
Antenna Gain	0.81 dBi	

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	FHSS (GFSK, π/4 DQPSK, 8 DPSK)
Antenna Gain	-1.01 dBi

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
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
Conducted Emission	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (b) (6) / 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
26 dB Emission Bandwidth	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)	See data	N/A	*2)
	ISED: -	**ISED:** -			
Maximum Conducted Output Power	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)		Complied a)	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Maximum Power Spectral Density	**FCC:** KDB Publication Number 789033	**FCC :** 15.407 (a) (1) (2) (3)		Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Spurious Emission Restricted Band Edge	**FCC:** ANSI C63.10-2013 KDB Publication Number 789033	**FCC:** 15.407 (b), 15.205 and 15.209	1.5 dB 933.004 MHz, QP, Vert. Mode: Tx 11a 5745 MHz	Complied c) / d)	Conducted (< 30 MHz) / Radiated (> 30 MHz) *3)
	ISED: -	**ISED:** RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2			
6 dB Emission Bandwidth	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (e)	See data	Complied e)	Conducted
	ISED: -	**ISED:** RSS-247 6.2.4.1			

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

*1) The test is not applicable since the EUT does not have AC Mains.
*2) The test is not applicable since the EUT supports only U-NII-3 band.
*3) 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 Maximum Conducted Output Power)
b) Refer to APPENDIX 1 (data of Maximum Power Spectral Density)
c) Refer to APPENDIX 1 (data of Radiated Spurious Emission)
d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
e) Refer to APPENDIX 1 (data of 6 dB Emission Bandwidth)

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

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

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99 % Occupied Bandwidth	**ISED:** RSS-Gen 6.7	**ISED:** -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 99 % Occupied Bandwidth)					

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

3.4 Uncertainty

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

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz to 30 MHz	2.9 dB	2.9 dB	3.0 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.2 dB	3.1 dB	3.1 dB	-
	30 MHz to 200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz to 1 GHz	6.0 dB	6.1 dB	6.1 dB	-
	1 GHz to 6 GHz	4.7 dB	4.7 dB	4.7 dB	-
	6 GHz to 18 GHz	5.2 dB	5.3 dB	5.3 dB	-
	18 GHz to 40 GHz	5.4 dB	5.5 dB	5.5 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz to 18 GHz	5.6 dB	5.6 dB	5.6 dB	-
	18 GHz to 40 GHz	5.8 dB	5.8 dB	5.8 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector) SPM-06	1.2 dB
Power Measurement above 1 GHz (Peak Detector) SPM-06	2.0 dB
Power Measurement above 1 GHz (Average Detector) SPM-07	1.2 dB
Power Measurement above 1 GHz (Peak Detector) SPM-07	1.3 dB
Power Measurement above 1 GHz (Average Detector) SPM-13	1.3 dB
Power Measurement above 1 GHz (Peak Detector) SPM-13	1.3 dB
Spurious emission (Conducted) below 1 GHz	0.93 dB
Conducted emissions Power Density Measurement 1 GHz to 3 GHz	0.92 dB
Conducted emissions Power Density Measurement 3 GHz to 18 GHz	2.3 dB
Spurious emission (Conducted) 18 GHz to 26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz to 40 GHz	2.3 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.93 deg. C.
Humidity_SCH-01	4.1 %
Temperature_SCH-02	2.0 deg. C.
Humidity_SCH-02	6.6 %
Voltage	0.97 %

3.5 Test Location

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

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

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)	48 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 6, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	MCS 6, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 7, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	MCS 4, PN9
IEEE 802.11ac 80 MHz BW (11ac-80)	MCS 6, PN9
*The worst condition was determined based on the test result of Maximum Conducted Output Power.	

*Power of the EUT was set by the software as follows;

Power Setting:	11a	:13
	11n-20	:12
	11n-40/11ac-40/11ac-80	:9
Software:	SOC: 0.020300	
	(Date: 2022.05 24, 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.

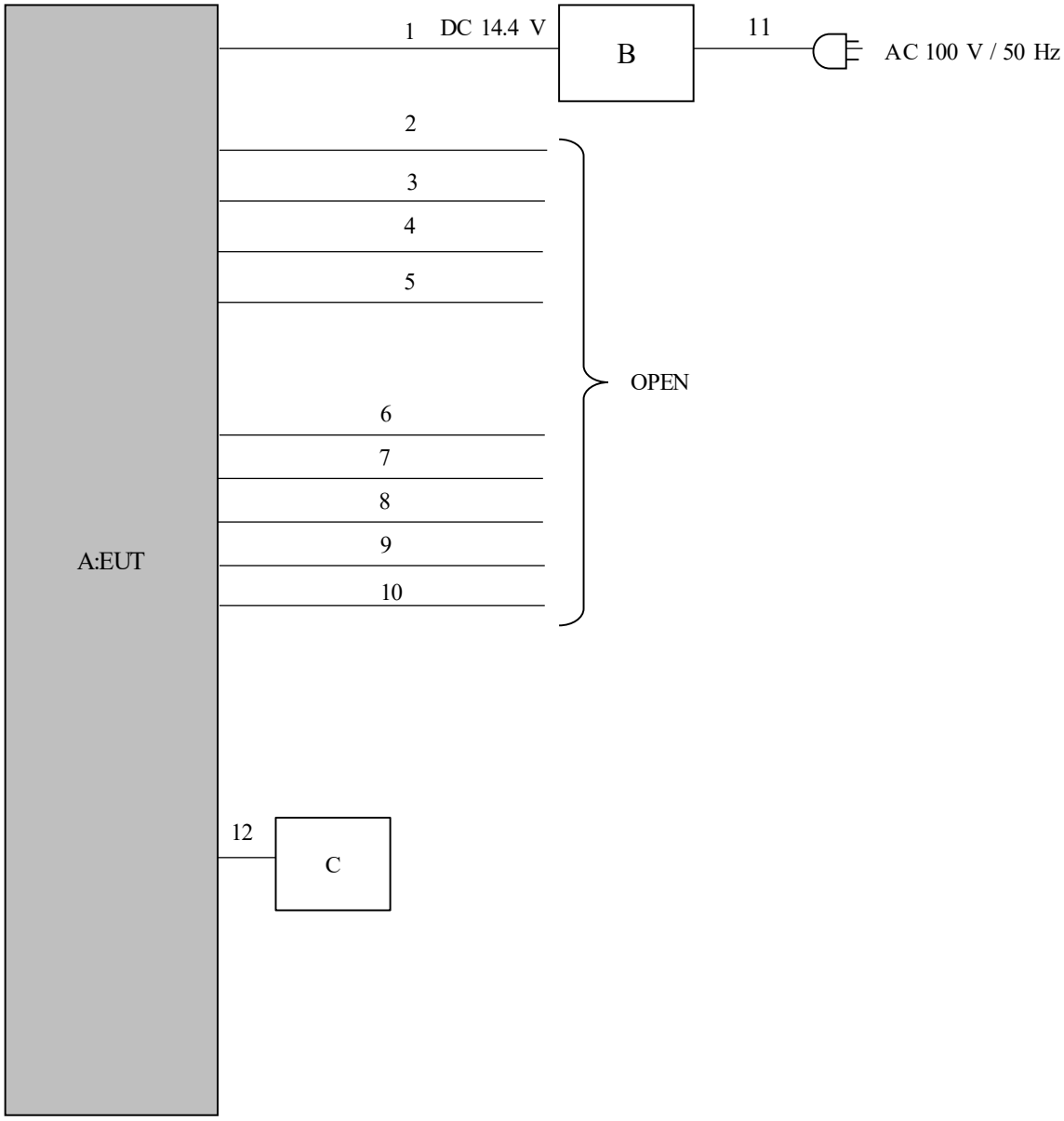
*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Frequency			
		Lower Band	Middle Band	Additional Band	Upper Band
99 % Occupied Bandwidth, 6 dB Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density	Tx 11a Tx 11n-20 Tx 11ac-20	-	-	-	5745 MHz
	Tx 11n-40 Tx 11ac-40	-	-	-	5755 MHz
	Tx 11ac-80	-	-	-	5775 MHz
Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	Tx 11a *1)	-	-	-	5745 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx 11a Tx 11n-20 *2) Tx 11ac-20	-	-	-	5745 MHz
	Tx 11n-40 Tx 11ac-40 *3)	-	-	-	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.
*2) Since 11n-20 and 11ac-20 have the same modulation method and power setting, only band edge tests were conducted for 11n-20.
*3) Since 11n-40 and 11ac-40 have the same modulation method and power setting, only band edge tests were conducted for 11ac-40.

4.2 Configuration and Peripherals

[Antenna Terminal Conducted test]



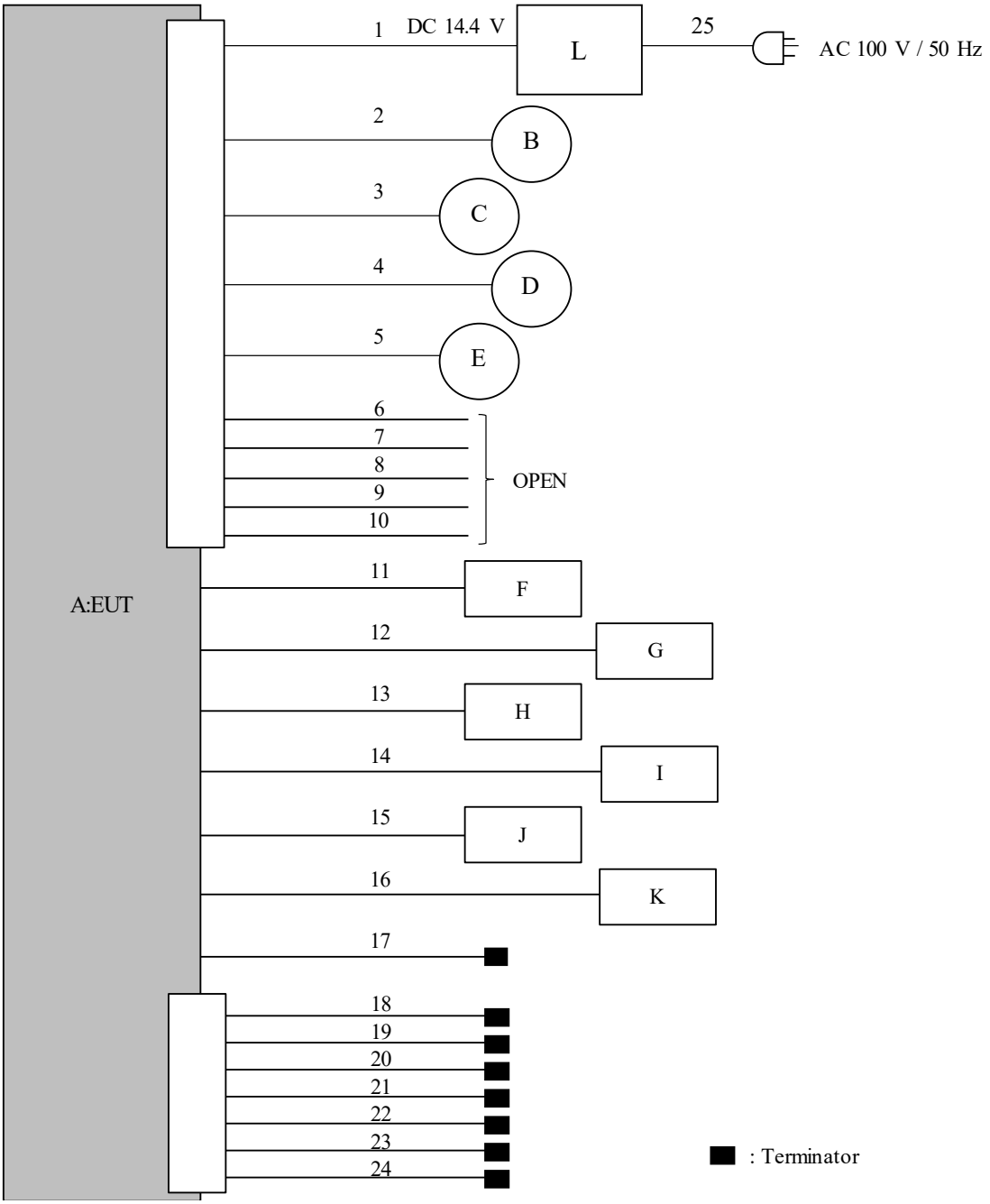
Description of EUT and Support Equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RDS AV RECEIVER	DMH-WT3800NEX	BFTM000017UC	PIONEER	EUT
B	Power Supply (DC)	PAN35-10A	ML002085	KIKUSUI	-
C	Jig board	-	-	-	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	0.2 + 0.1 + 1.5	Unshielded	Unshielded	-
2	Speaker	0.2	Unshielded	Unshielded	-
3	Speaker	0.2	Unshielded	Unshielded	-
4	Speaker	0.2	Unshielded	Unshielded	-
5	Speaker	0.2	Unshielded	Unshielded	-
6	ILLUMINATION	0.2	Unshielded	Unshielded	-
7	ANTENNA CONTROL	0.2	Unshielded	Unshielded	-
8	REVERSE	2.0	Unshielded	Unshielded	-
9	CARSPEED	2.0	Unshielded	Unshielded	-
10	PARKING BRAKE	2.0	Unshielded	Unshielded	-
11	AC	3.0	Unshielded	Unshielded	-
12	Signal	0.15	Unshielded	Unshielded	-

[Radiated Emission test]



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

Description of EUT and Support Equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RDS AV RECEIVER	DMH-WT3800NEX	BFTM000016UC	PIONEER	EUT
B	Speaker	TS-F1030	V44QAH2	PIONEER	-
C	Speaker	TS-F1030	V44QAH2	PIONEER	-
D	Speaker	TS-F1030	V44QBA1	PIONEER	-
E	Speaker	TS-F1030	V44QBA1	PIONEER	-
F	Steering SW (dummy load)	-	-	-	-
G	Sirius XM	SXV200	ZX8N0442	-	-
H	USB Memory	SDDDC2-064G-G46	-	SanDisk	-
I	Mic	CPM1127	-	ZHEJIANG YUESUI ELECTRON STOCK CO.,LTD.	-
J	GPS	CXF1333	-	MITSUMI ELECTRIC CO., LTD.	-
K	iData Link (dummy load)	-	-	-	-
L	Power Supply (DC)	PAN35-10A	BP002287	KIKUSUI	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	3.0	Unshielded	Unshielded	-
2	Speaker (FR)	1.3	Unshielded	Unshielded	-
3	Speaker (FL)	1.3	Unshielded	Unshielded	-
4	Speaker (RR)	1.3	Unshielded	Unshielded	-
5	Speaker (RL)	1.3	Unshielded	Unshielded	-
6	PARKING BRAKE	2.0	Unshielded	Unshielded	-
7	REVERSE	2.0	Unshielded	Unshielded	-
8	CARSPEED	2.0	Unshielded	Unshielded	-
9	Antenna Control	2.0	Unshielded	Unshielded	-
10	Signal	1.1	Unshielded	Unshielded	-
11	Signal	0.9	Unshielded	Unshielded	-
12	Sirius XM	0.6	Shielded	Shielded	-
13	USB	1.4	Shielded	Shielded	-
14	Mic	3.0	Unshielded	Unshielded	-
15	GPS	3.4	Shielded	Shielded	-
16	iData Link	1.0	Unshielded	Unshielded	-
17	FM	2.1	Shielded	Shielded	-
18	Rear Out	1.6	Unshielded	Unshielded	-
19	Front Out	1.6	Unshielded	Unshielded	-
20	Sub Woofer Out	1.6	Unshielded	Unshielded	-
21	Rear View Camera IN	1.7	Unshielded	Unshielded	-
22	Rear Monitor Out	1.7	Unshielded	Unshielded	-
23	AUX IN	1.7	Unshielded	Unshielded	-
24	Mute	1.5	Unshielded	Unshielded	-
25	AC	2.0	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 2.0 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;

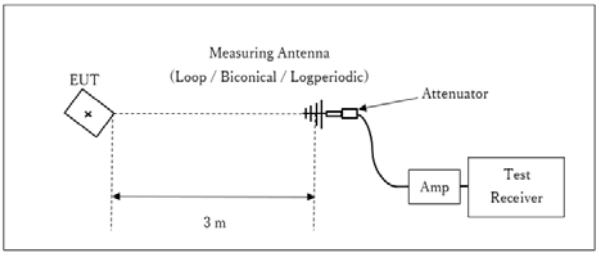
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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 2: Test Setup

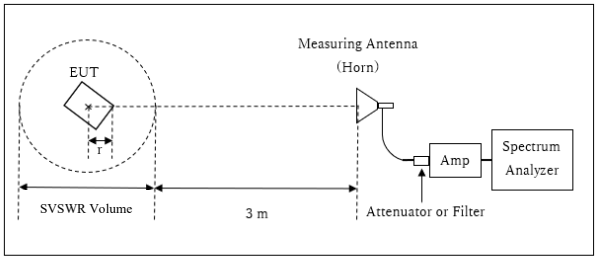
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

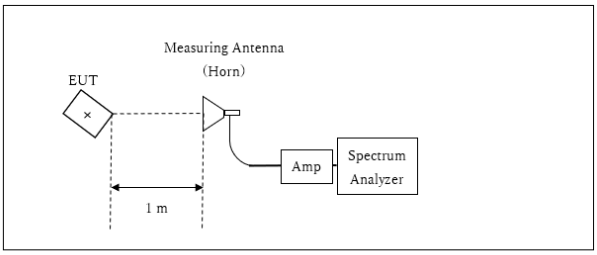


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.86 m / 3.0 m) = 2.19 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.86 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.14 m

10 GHz to 40 GHz



× : Center of turn table

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

The carrier level and noise levels were confirmed at each position of 0 deg. and 40 deg. 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 - 6.4 GHz)	Spurious (6.4 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)	Spurious (26.5 GHz - 40 GHz)
Horizontal	40 deg.	0 deg.	40 deg.	40 deg.	0 deg.	0 deg.	0 deg.
Vertical	40 deg.	0 deg.	40 deg.	40 deg.	0 deg.	0 deg.	0 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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 160 MHz BW) (Method PM)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

* 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".

*1) Peak hold was applied as Worst-case measurement.
*2) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz to 5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor (10 log(500 kHz / 100 kHz)) was added to the test result.
*3) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz to 150 kHz: RBW = 200 Hz, 150 kHz to 30 MHz: RBW = 10 kHz)
*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx

11a

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	16968.2

11n-20

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	18169.7

11ac-20

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	18140.4

11n-40

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5755	36488.4

11ac-40

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5755	36498.7

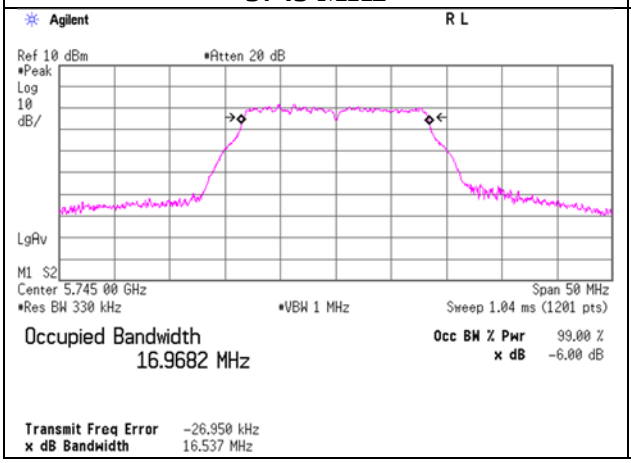
11ac-80

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5775	75934.4

99 % Occupied Bandwidth

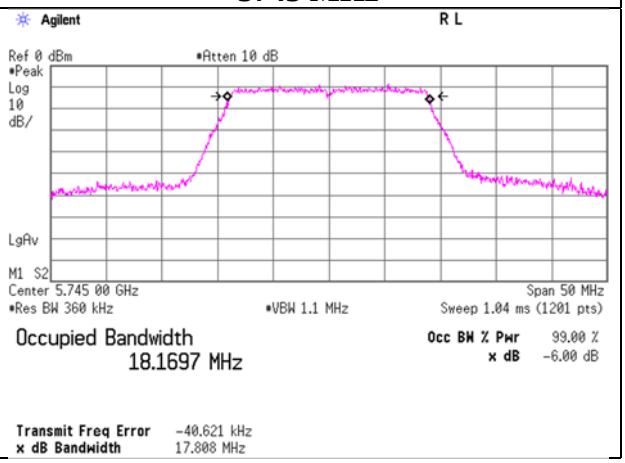
11a

5745 MHz



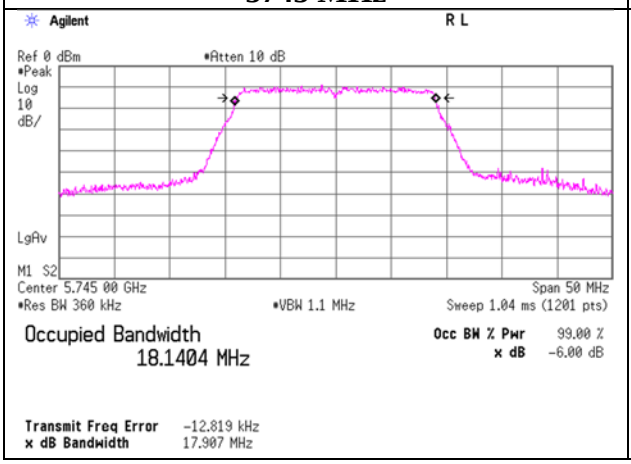
11n-20

5745 MHz



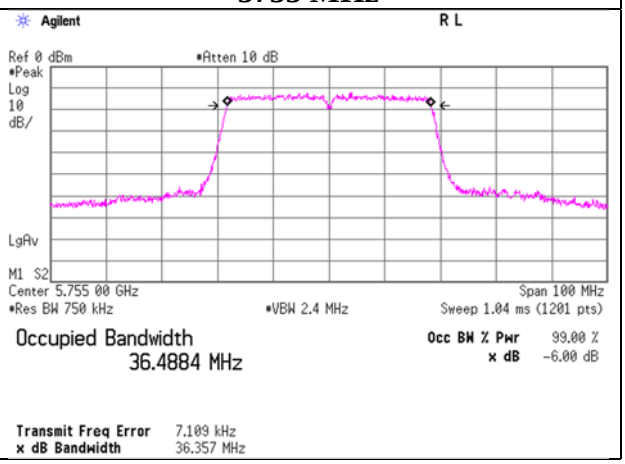
11ac-20

5745 MHz



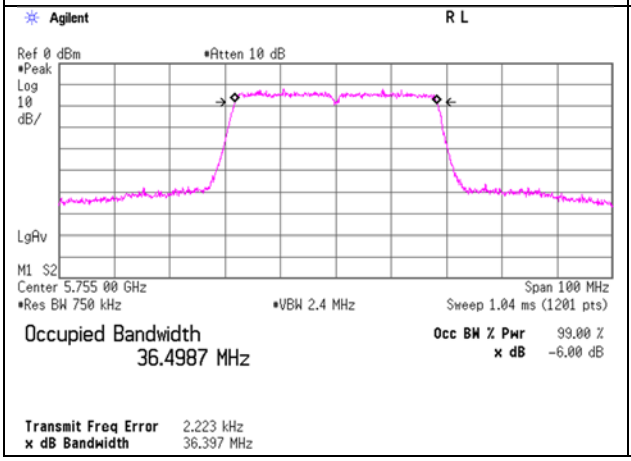
11n-40

5755 MHz



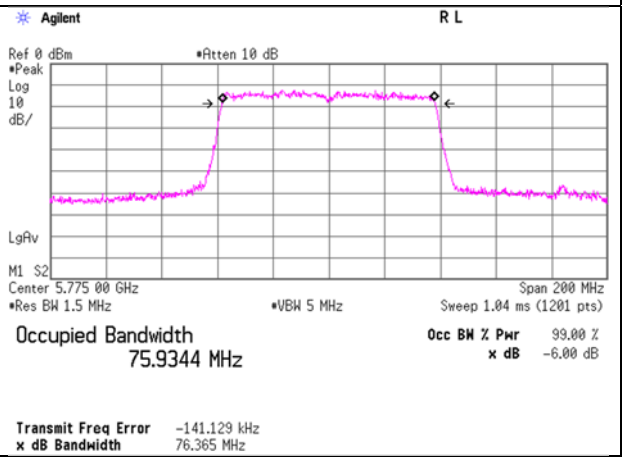
11ac-40

5755 MHz



11ac-80

5775 MHz



6 dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	16.473	> 0.500

11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.751	> 0.500

11ac-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.736	> 0.500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.544	> 0.500

11ac-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.468	> 0.500

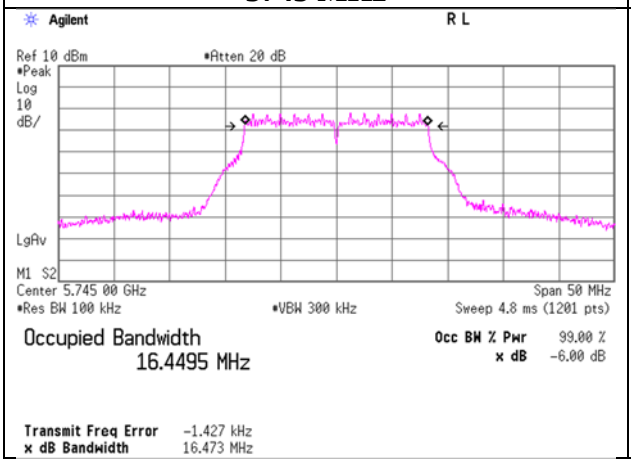
11ac-80

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5775	76.102	> 0.500

6 dB Bandwidth

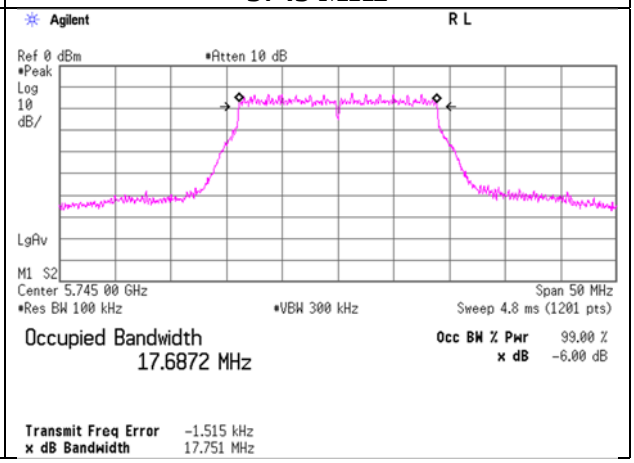
11a

5745 MHz



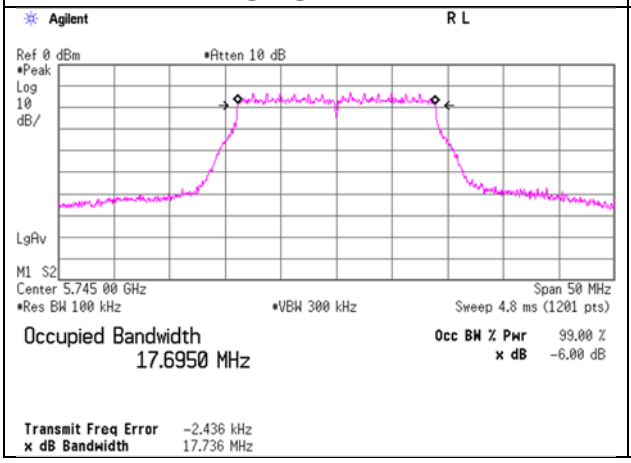
11n-20

5745 MHz



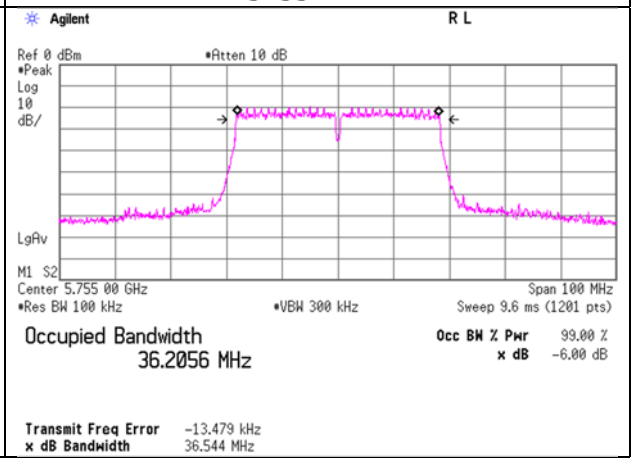
11ac-20

5745 MHz



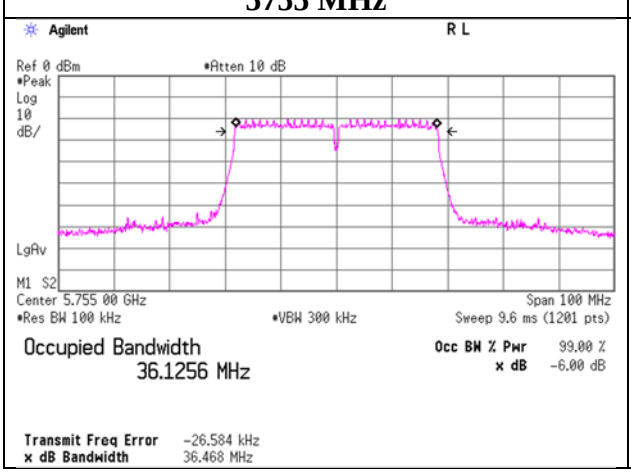
11n-40

5755 MHz



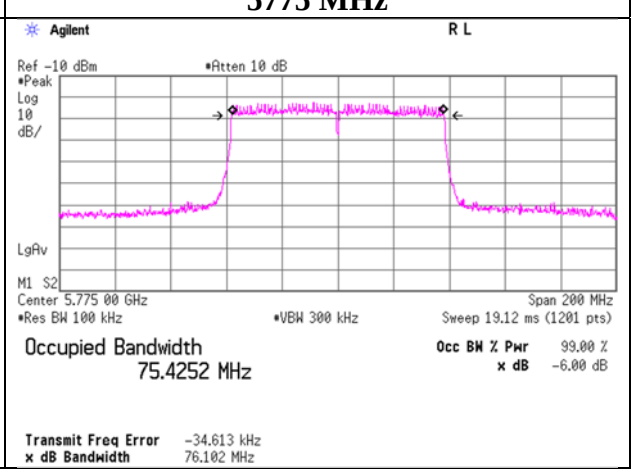
11ac-40

5755 MHz



11ac-80

5775 MHz



Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11a

11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99 % OBW (B for ISED) [MHz]	Conducted Power Result [dBm]	Conducted Power Result [mW]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	e.i.r.p. Result [dBm]	e.i.r.p. Result [mW]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
5745	-3.10	2.53	9.98	1.70	0.81	-	16.968	11.11	12.91	30.00	18.89	11.92	15.56	36.00	24.08

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5745 MHz

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	-2.13	0.28	-1.85	-
	9	-2.26	0.40	-1.86	-
	12	-2.25	0.53	-1.72	-
	18	-2.52	0.74	-1.78	-
	24	-2.58	0.97	-1.61	-
	36	-2.85	1.35	-1.50	-
	48	-3.10	1.70	-1.40	*
	54	-3.34	1.81	-1.53	-

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-20

11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Conducted Power Limit	Conducted Power Margin	e.i.r.p. Result		e.i.r.p. Limit	e.i.r.p. Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-4.20	2.53	9.98	1.82	0.81	-	18.170	10.13	10.30	30.00	19.87	10.94	12.41	36.00	25.06

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5745 MHz

Mode	MCS Index	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-3.15	0.30	-2.85	-
	1	-3.45	0.56	-2.89	-
	2	-3.66	0.80	-2.86	-
	3	-3.51	1.00	-2.51	-
	4	-3.85	1.36	-2.49	-
	5	-4.16	1.70	-2.46	-
	6	-4.20	1.82	-2.38	*
	7	-4.36	1.93	-2.43	-

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-20

11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99 % OBW (B for ISED) [MHz]	Conducted Power Result [dBm]	Conducted Power Result [mW]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	e.i.r.p. Result [dBm]	e.i.r.p. Result [mW]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
5745	-4.29	2.53	9.98	1.94	0.81	-	18.140	10.16	10.37	30.00	19.84	10.97	12.50	36.00	25.03

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5745 MHz

Mode	MCS Index	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-20	0	-3.32	0.33	-2.99	-
	1	-3.41	0.61	-2.80	-
	2	-3.77	0.90	-2.87	-
	3	-3.52	1.10	-2.42	-
	4	-3.86	1.50	-2.36	-
	5	-4.16	1.79	-2.37	-
	6	-4.29	1.94	-2.35	*
	7	-4.70	2.05	-2.65	-
	8	-4.67	2.30	-2.37	-

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-40

11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Conducted Power Limit	Conducted Power Margin	e.i.r.p. Result		e.i.r.p. Limit	e.i.r.p. Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5755	-8.65	2.53	9.98	2.82	0.81	-	36.488	6.68	4.66	30.00	23.32	7.49	5.61	36.00	28.51

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5755 MHz

Mode	MCS Index	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-40	0	-6.55	0.58	-5.97	-
	1	-7.13	1.03	-6.10	-
	2	-7.50	1.39	-6.11	-
	3	-7.68	1.70	-5.98	-
	4	-8.15	2.17	-5.98	-
	5	-8.53	2.54	-5.99	-
	6	-8.67	2.68	-5.99	-
	7	-8.65	2.82	-5.83	*

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-40

11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99 % OBW (B for ISED) [MHz]	Conducted Power Result [dBm]	Conducted Power Result [mW]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	e.i.r.p. Result [dBm]	e.i.r.p. Result [mW]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
5755	-8.28	2.53	9.98	2.29	0.81	-	36.499	6.52	4.49	30.00	23.48	7.33	5.41	36.00	28.67

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5755 MHz

Mode	MCS Index	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-40	0	-6.68	0.64	-6.04	-
	1	-7.43	1.14	-6.29	-
	2	-7.81	1.50	-6.31	-
	3	-7.79	1.78	-6.01	-
	4	-8.28	2.29	-5.99	*
	5	-8.71	2.62	-6.09	-
	6	-8.85	2.82	-6.03	-
	7	-9.20	2.94	-6.26	
	8	-9.19	3.07	-6.12	-
	9	-9.35	3.23	-6.12	-

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 16, 2022
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-80

11ac-80

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99 % OBW (B for ISED) [MHz]	Conducted Power Result [dBm]	Conducted Power Result [mW]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	e.i.r.p. Result [dBm]	e.i.r.p. Result [mW]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
5775	-10.13	2.54	9.98	3.64	0.81	-	75.934	6.03	4.01	30.00	23.97	6.84	4.83	36.00	29.16

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

5775 MHz

Mode	MCS Index	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-80	0	-7.85	1.20	-6.65	-
	1	-8.70	1.92	-6.78	-
	2	-9.13	2.38	-6.75	-
	3	-9.38	2.75	-6.63	-
	4	-9.79	3.15	-6.64	-
	5	-10.06	3.42	-6.64	-
	6	-10.13	3.64	-6.49	*
	7	-10.37	3.73	-6.64	
	8	-10.48	3.84	-6.64	-
	9	-10.59	3.97	-6.62	-

* Worst rate
Sample Calculation:
Burst power = Reading (timed average) + Duty factor
All comparison were carried out on same frequency and measurement factors.

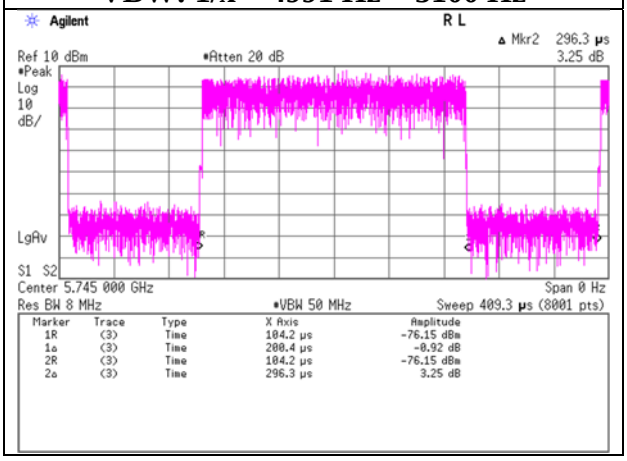
Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	July 12, 2022	July 13, 2022
Temperature / Humidity	26 deg. C / 35 % RH	24 deg. C / 54 % RH
Engineer	Miku Ikudome	Yusuke Tanikawara
Mode	Tx	

11a 48 Mbps

Tx on / (Tx on + Tx off) =	**0.676**
Tx on / (Tx on + Tx off) * 100 =	**67.6 %**
Duty factor = 10 * log (0.2963 / 0.2004) =	**1.70 dB**

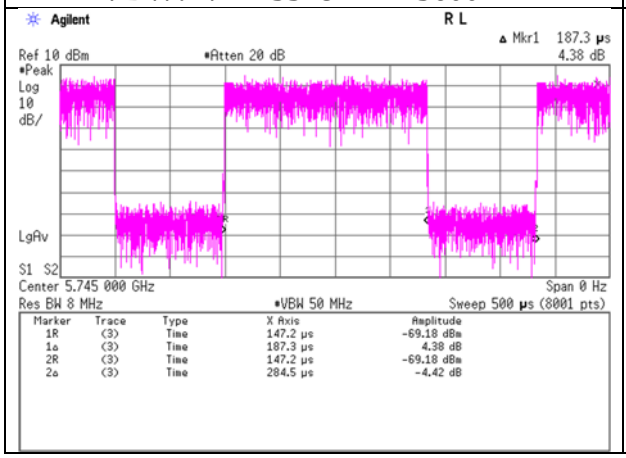
VBW: 1/x = 4991 Hz < 5100 Hz



11n-20 MCS 6

Tx on / (Tx on + Tx off) =	**0.658**
Tx on / (Tx on + Tx off) * 100 =	**65.8 %**
Duty factor = 10 * log (0.2845 / 0.1873) =	**1.82 dB**

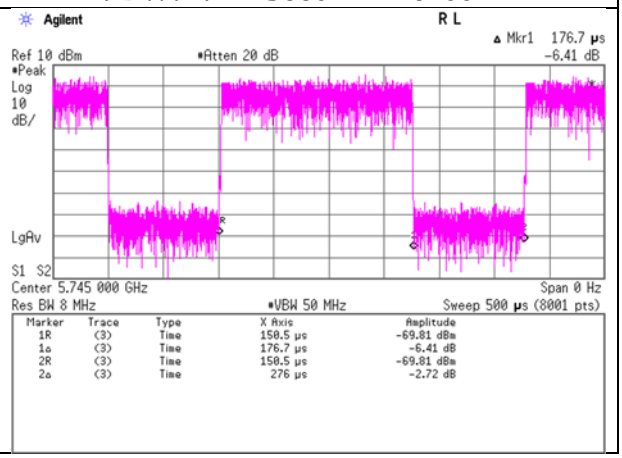
VBW: 1/x = 5348 Hz < 5600 Hz



11ac-20 MCS6

Tx on / (Tx on + Tx off) =	**0.640**
Tx on / (Tx on + Tx off) * 100 =	**64.0 %**
Duty factor = 10 * log (0.276 / 0.1767) =	**1.94 dB**

VBW: 1/x = 5660 Hz < 6200 Hz



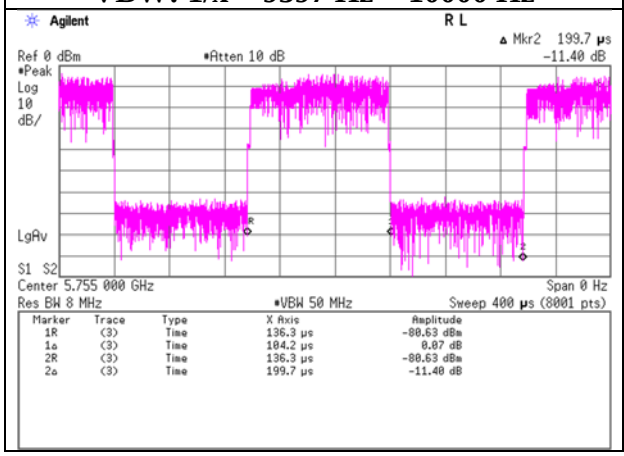
Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 13, 2022
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Yusuke Tanikawara
Mode	Tx

11n-40 MCS 7

Tx on / (Tx on + Tx off) =	0.522
Tx on / (Tx on + Tx off) * 100 =	52.2 %
Duty factor = 10 * log (0.1997 / 0.1042) =	2.82 dB

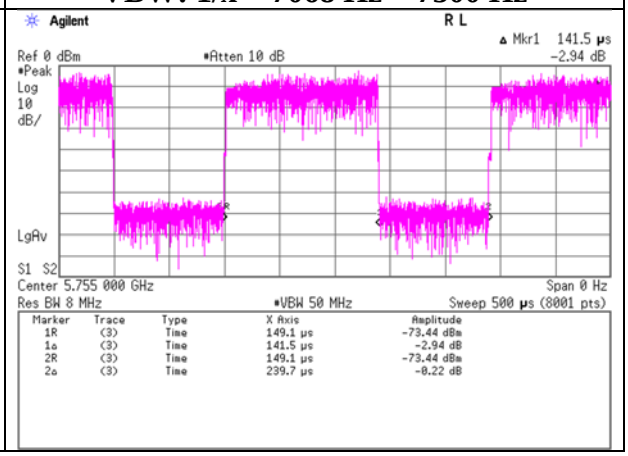
VBW: 1/x = 9597 Hz < 10000 Hz



11ac-40 MCS 4

Tx on / (Tx on + Tx off) =	0.590
Tx on / (Tx on + Tx off) * 100 =	59.0 %
Duty factor = 10 * log (0.2397 / 0.1415) =	2.29 dB

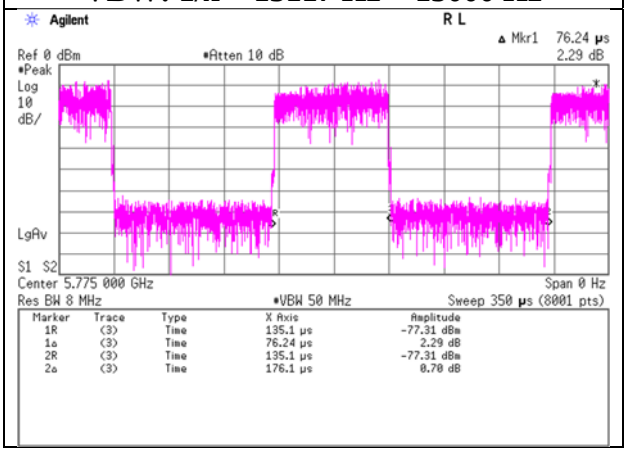
VBW: 1/x = 7068 Hz < 7500 Hz



11ac-80 MCS 6

Tx on / (Tx on + Tx off) =	0.433
Tx on / (Tx on + Tx off) * 100 =	43.3 %
Duty factor = 10 * log (0.1761 / 0.07624) =	3.64 dB

VBW: 1/x = 13117 Hz < 15000 Hz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11a

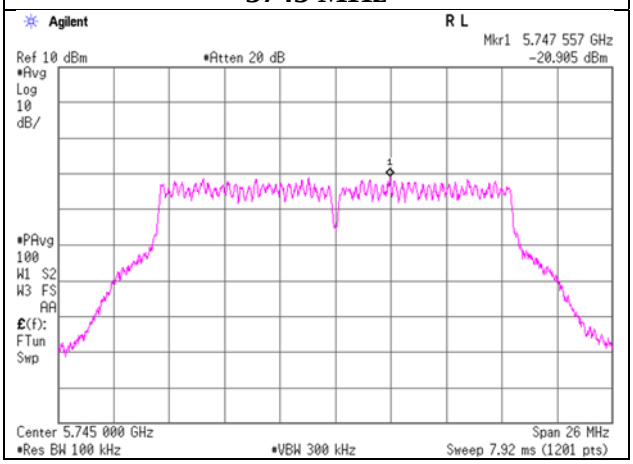
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5745	-20.91	2.53	9.98	1.70	0.81	6.99	0.29	30.00	29.71	1.10	36.00	34.90

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11a

5745 MHz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11n-20

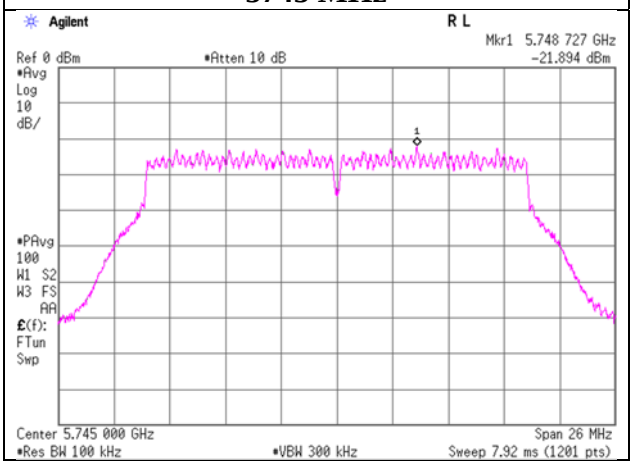
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5745	-21.89	2.53	9.98	1.82	0.81	6.99	-0.58	30.00	30.58	0.23	36.00	35.77

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11n-20

5745 MHz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11ac-20

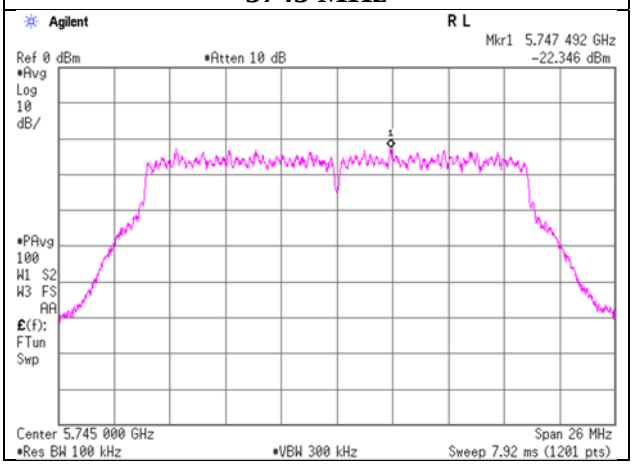
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5745	-22.35	2.53	9.98	1.94	0.81	6.99	-0.91	30.00	30.91	-0.10	36.00	36.10

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11ac-20

5745 MHz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11n-40

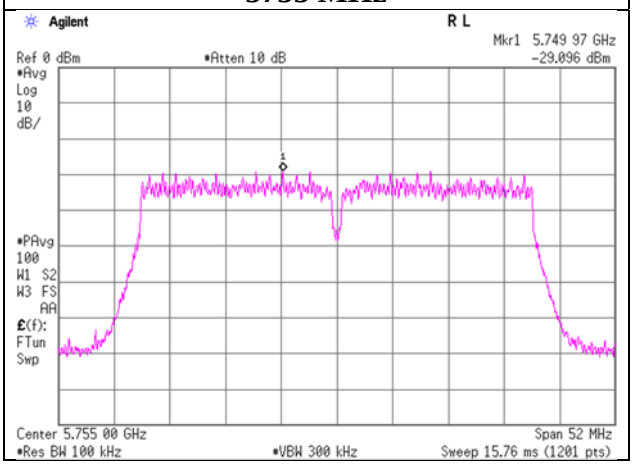
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5755	-29.10	2.53	9.98	2.82	0.81	6.99	-6.78	30.00	36.78	-5.97	36.00	41.97

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11n-40

5755 MHz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11ac-40

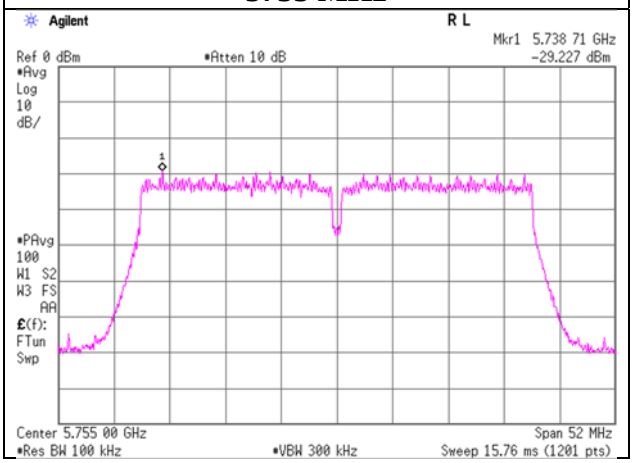
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5755	-29.23	2.53	9.98	2.29	0.81	6.99	-7.44	30.00	37.44	-6.63	36.00	42.63

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11ac-40

5755 MHz



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11ac-80

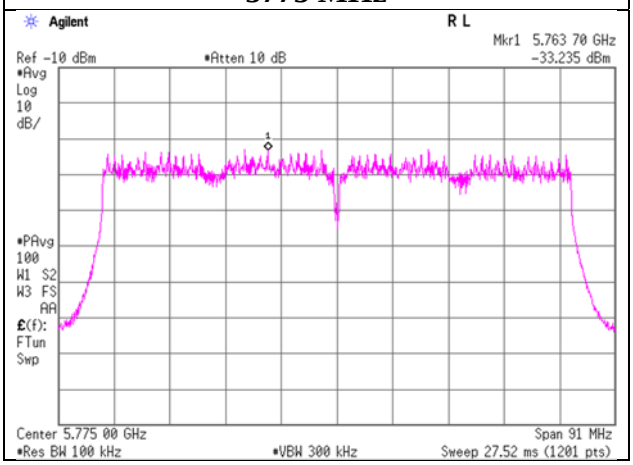
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5775	-33.24	2.54	9.98	3.64	0.81	6.99	-10.09	30.00	40.09	-9.28	36.00	45.28

Sample Calculation:
PSD: Power Spectral Density
The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11ac-80

5775 MHz



Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	2	3
Date	September 5, 2022	July 17, 2022	July 19, 2022
Temperature / Humidity	24 deg.C, 38 %RH	22 deg.C, 67 %RH	25 deg.C, 52 %RH
Engineer	Yosuke Murakami	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -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.	147.454	QP	45.50	14.70	7.74	32.07	0.00	35.87	43.5	7.6	226	90	-
Hori.	165.886	QP	37.20	15.40	7.87	32.05	0.00	28.42	43.5	15.0	190	276	-
Hori.	540.003	QP	36.20	17.72	9.68	31.94	0.00	31.66	46.0	14.3	100	208	-
Hori.	655.227	QP	27.90	19.15	10.11	31.88	0.00	25.28	46.0	20.7	148	164	-
Hori.	900.005	QP	34.40	22.06	10.95	30.96	0.00	36.45	46.0	9.5	114	149	-
Hori.	933.004	QP	39.40	21.97	11.06	30.77	0.00	41.66	46.0	4.3	100	164	-
Hori.	11490.000	PK	51.33	38.19	10.40	42.44	-9.54	47.94	73.9	25.9	154	158	-
Hori.	11490.000	AV	40.02	38.19	10.40	42.44	-9.54	36.63	53.9	17.2	154	158	VBW:5.1 kHz
Vert.	147.454	QP	37.80	14.70	7.74	32.07	0.00	28.17	43.5	15.3	100	20	-
Vert.	675.965	QP	25.90	19.55	10.20	31.86	0.00	23.79	46.0	22.2	100	0	-
Vert.	705.614	QP	30.80	19.93	10.32	31.83	0.00	29.22	46.0	16.7	100	339	-
Vert.	728.058	QP	29.60	20.19	10.39	31.76	0.00	28.42	46.0	17.5	100	0	-
Vert.	900.005	QP	32.80	22.06	10.95	30.96	0.00	34.85	46.0	11.1	100	49	-
Vert.	933.004	QP	42.20	21.97	11.06	30.77	0.00	44.46	46.0	**1.5**	100	357	-
Vert.	11490.000	PK	51.47	38.19	10.40	42.44	-9.54	48.08	73.9	25.8	152	223	-
Vert.	11490.000	AV	41.78	38.19	10.40	42.44	-9.54	38.39	53.9	15.5	152	223	VBW:5.1 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + 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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

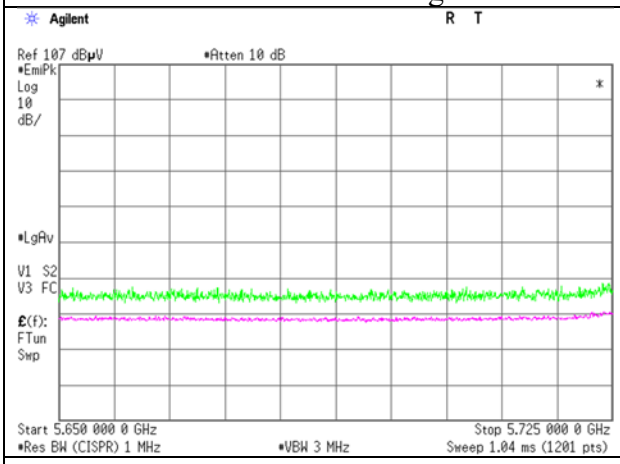
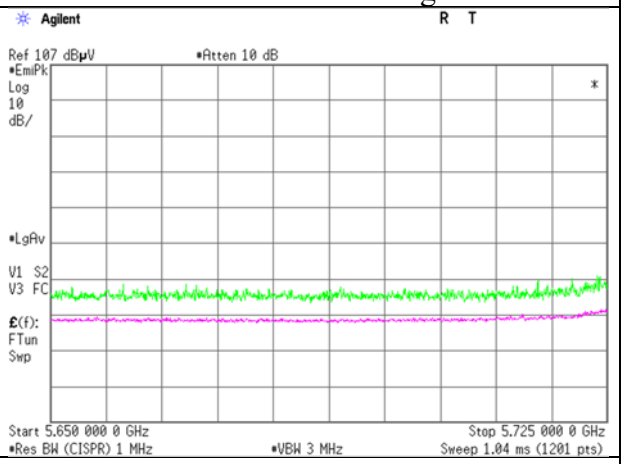
(* PK: Peak, AV: Average, QP: Quasi-Peak)

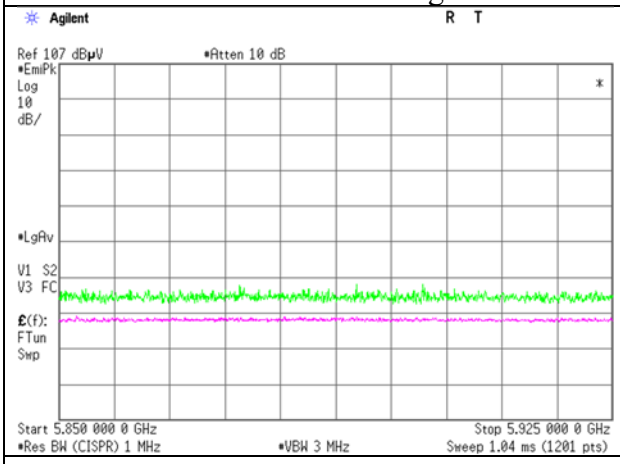
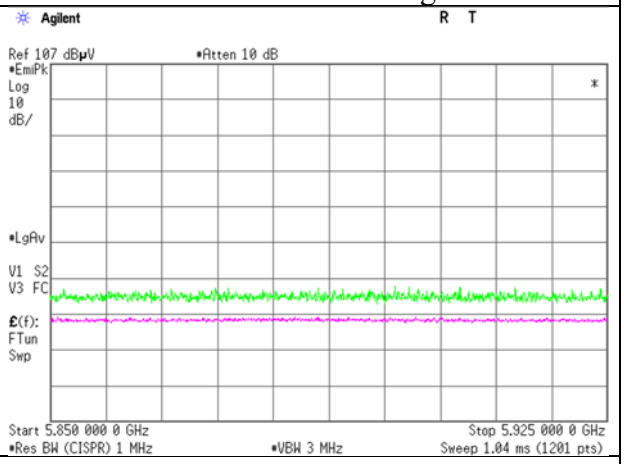
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	44.00	32.90	16.64	39.00	2.19	56.73	-38.50	-27.0	11.5	137	136	-
Hori.	5700.000	PK	44.18	33.05	16.67	39.01	2.19	57.08	-38.15	10.0	48.1	137	136	-
Hori.	5720.000	PK	45.15	33.12	16.68	39.01	2.19	58.13	-37.10	15.6	52.7	137	136	-
Hori.	5725.000	PK	46.73	33.14	16.68	39.01	2.19	59.73	-35.50	27.0	62.5	137	136	-
Hori.	5850.000	PK	44.10	33.53	16.77	39.02	2.19	57.57	-37.66	27.0	64.6	137	136	-
Hori.	5855.000	PK	45.38	33.54	16.77	39.02	2.19	58.86	-36.37	15.6	51.9	137	136	-
Hori.	5875.000	PK	44.28	33.58	16.79	39.02	2.19	57.82	-37.41	10.0	47.4	137	136	-
Hori.	5925.000	PK	44.42	33.64	16.81	39.02	2.19	58.04	-37.19	-27.0	10.1	137	136	-
Hori.	17235.000	PK	46.78	39.88	13.16	40.46	-9.54	49.82	-45.41	-27.0	18.4	150	0	-
Vert.	5650.000	PK	44.96	32.90	16.64	39.00	2.19	57.69	-37.54	-27.0	10.5	255	179	-
Vert.	5700.000	PK	45.71	33.05	16.67	39.01	2.19	58.61	-36.62	10.0	46.6	255	179	-
Vert.	5720.000	PK	46.42	33.12	16.68	39.01	2.19	59.40	-35.83	15.6	51.4	255	179	-
Vert.	5725.000	PK	47.80	33.14	16.68	39.01	2.19	60.80	-34.43	27.0	61.4	255	179	-
Vert.	5850.000	PK	44.38	33.53	16.77	39.02	2.19	57.85	-37.38	27.0	64.3	255	179	-
Vert.	5855.000	PK	43.95	33.54	16.77	39.02	2.19	57.43	-37.80	15.6	53.4	255	179	-
Vert.	5875.000	PK	44.97	33.58	16.79	39.02	2.19	58.51	-36.72	10.0	46.7	255	179	-
Vert.	5925.000	PK	44.74	33.64	16.81	39.02	2.19	58.36	-36.87	-27.0	9.8	255	179	-
Vert.	17235.000	PK	47.01	39.88	13.16	40.46	-9.54	50.05	-45.18	-27.0	18.1	150	0	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
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	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato (1 GHz -6.4 GHz)
Mode	Tx 11n-20 5745 MHz

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

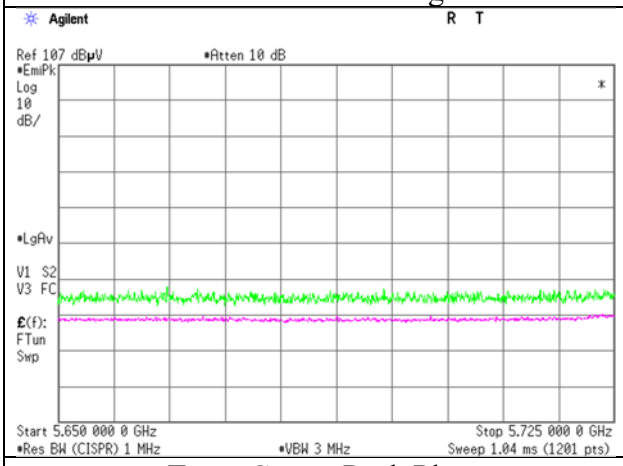
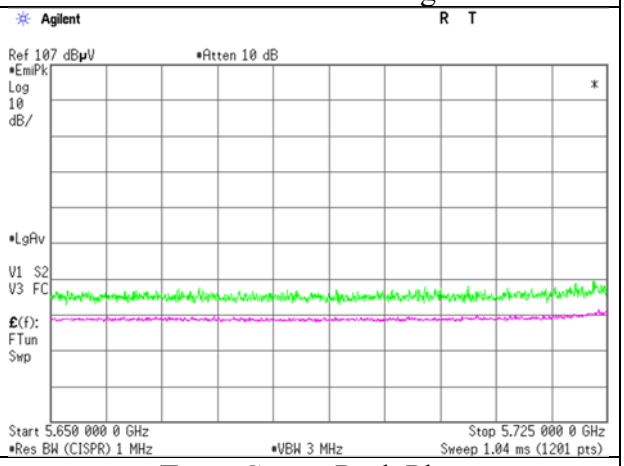
(* PK: Peak, AV: Average, QP: Quasi-Peak)

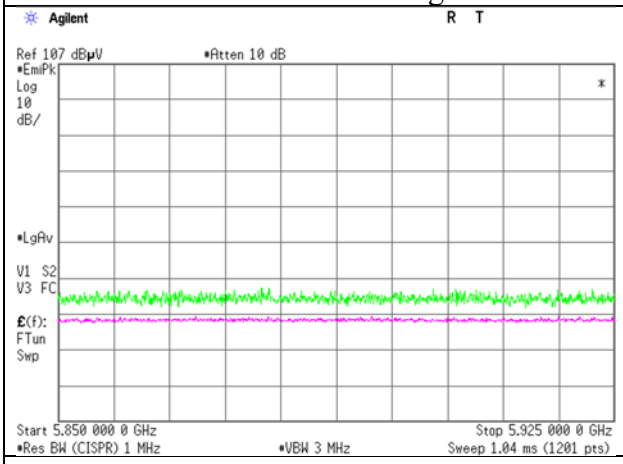
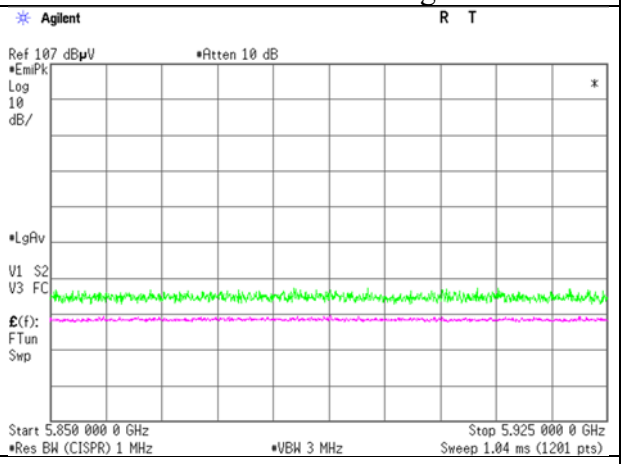
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	44.15	32.90	16.64	39.00	2.19	56.88	-38.35	-27.0	11.3	144	139	-
Hori.	5700.000	PK	44.08	33.05	16.67	39.01	2.19	56.98	-38.25	10.0	48.2	144	139	-
Hori.	5720.000	PK	45.10	33.12	16.68	39.01	2.19	58.08	-37.15	15.6	52.7	144	139	-
Hori.	5725.000	PK	46.82	33.14	16.68	39.01	2.19	59.82	-35.41	27.0	62.4	144	139	-
Hori.	5850.000	PK	44.75	33.53	16.77	39.02	2.19	58.22	-37.01	27.0	64.0	144	139	-
Hori.	5855.000	PK	44.07	33.54	16.77	39.02	2.19	57.55	-37.68	15.6	53.2	144	139	-
Hori.	5875.000	PK	44.05	33.58	16.79	39.02	2.19	57.59	-37.64	10.0	47.6	144	139	-
Hori.	5925.000	PK	44.27	33.64	16.81	39.02	2.19	57.89	-37.34	-27.0	**10.3**	144	139	-
Vert.	5650.000	PK	44.47	32.90	16.64	39.00	2.19	57.20	-38.03	-27.0	11.0	257	181	-
Vert.	5700.000	PK	44.87	33.05	16.67	39.01	2.19	57.77	-37.46	10.0	47.4	257	181	-
Vert.	5720.000	PK	45.79	33.12	16.68	39.01	2.19	58.77	-36.46	15.6	52.0	257	181	-
Vert.	5725.000	PK	46.79	33.14	16.68	39.01	2.19	59.79	-35.44	27.0	62.4	257	181	-
Vert.	5850.000	PK	43.84	33.53	16.77	39.02	2.19	57.31	-37.92	27.0	64.9	257	181	-
Vert.	5855.000	PK	44.34	33.54	16.77	39.02	2.19	57.82	-37.41	15.6	53.0	257	181	-
Vert.	5875.000	PK	44.54	33.58	16.79	39.02	2.19	58.08	-37.15	10.0	47.1	257	181	-
Vert.	5925.000	PK	44.16	33.64	16.81	39.02	2.19	57.78	-37.45	-27.0	10.4	257	181	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
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	Shonan EMC Lab.	
Semi Anechoic Chamber	2	3
Date	July 17, 2022	July 19, 2022
Temperature / Humidity	22 deg.C, 67 %RH	25 deg.C, 52 %RH
Engineer	Hiromasa Sato (1 GHz -10 GHz)	Hiromasa Sato (10 GHz -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	50.05	38.19	10.40	42.44	-9.54	46.66	73.9	27.2	244	188	-
Hori.	11490.000	AV	40.52	38.19	10.40	42.44	-9.54	37.13	53.9	16.7	244	188	VBW:6.2 kHz
Vert.	11490.000	PK	49.55	38.19	10.40	42.44	-9.54	46.16	73.9	27.7	157	91	-
Vert.	11490.000	AV	39.34	38.19	10.40	42.44	-9.54	35.95	53.9	17.9	157	91	VBW:6.2 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + 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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

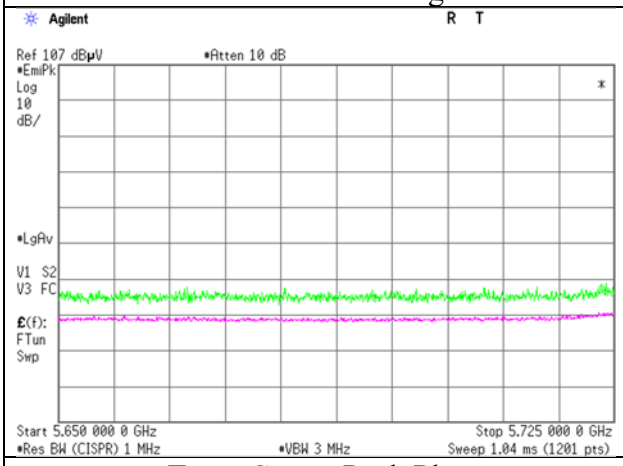
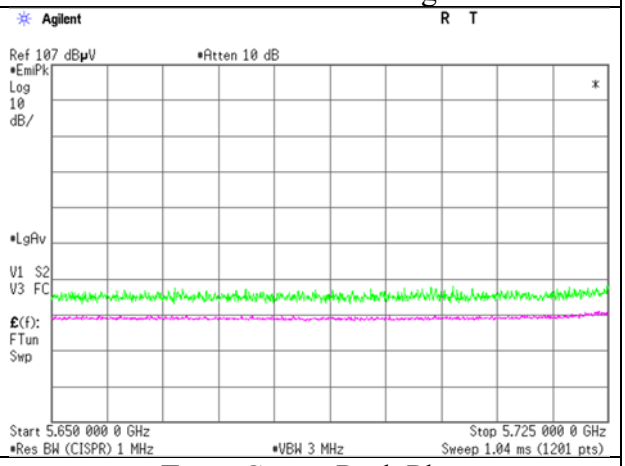
(* PK: Peak, AV: Average, QP: Quasi-Peak)

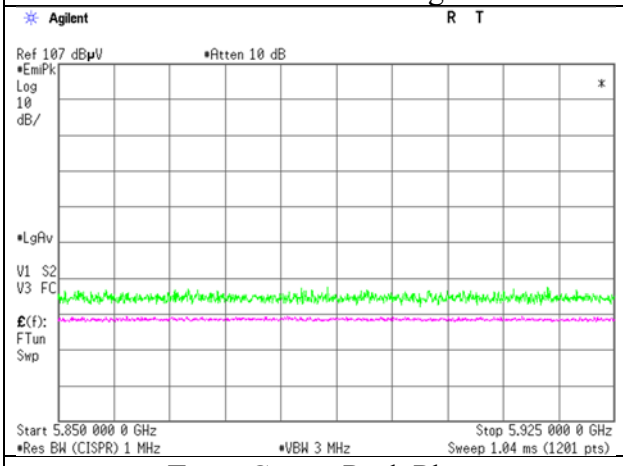
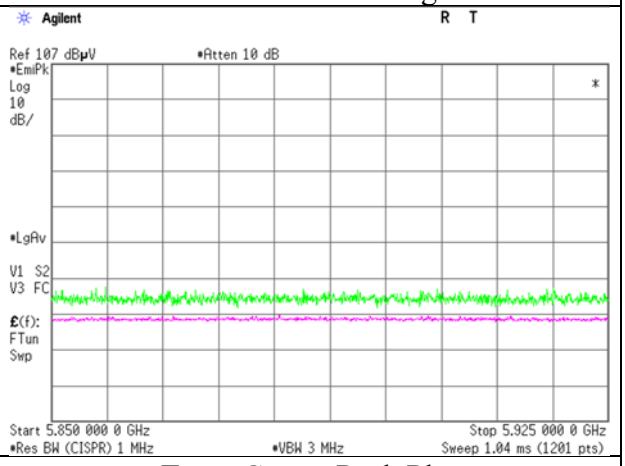
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	43.18	32.90	16.64	39.00	2.19	55.91	-39.32	-27.0	12.3	338	152	-
Hori.	5700.000	PK	44.09	33.05	16.67	39.01	2.19	56.99	-38.24	10.0	48.2	338	152	-
Hori.	5720.000	PK	45.34	33.12	16.68	39.01	2.19	58.32	-36.91	15.6	52.5	338	152	-
Hori.	5725.000	PK	45.79	33.14	16.68	39.01	2.19	58.79	-36.44	27.0	63.4	338	152	-
Hori.	5850.000	PK	43.54	33.53	16.77	39.02	2.19	57.01	-38.22	27.0	65.2	338	152	-
Hori.	5855.000	PK	44.53	33.54	16.77	39.02	2.19	58.01	-37.22	15.6	52.8	338	152	-
Hori.	5875.000	PK	44.51	33.58	16.79	39.02	2.19	58.05	-37.18	10.0	47.1	338	152	-
Hori.	5925.000	PK	43.85	33.64	16.81	39.02	2.19	57.47	-37.76	-27.0	10.7	338	152	-
Hori.	17235.000	PK	46.73	39.88	13.16	40.46	-9.54	49.77	-45.46	-27.0	18.4	150	0	-
Vert.	5650.000	PK	44.21	32.90	16.64	39.00	2.19	56.94	-38.29	-27.0	11.2	253	177	-
Vert.	5700.000	PK	43.23	33.05	16.67	39.01	2.19	56.13	-39.10	10.0	49.1	253	177	-
Vert.	5720.000	PK	45.37	33.12	16.68	39.01	2.19	58.35	-36.88	15.6	52.4	253	177	-
Vert.	5725.000	PK	45.42	33.14	16.68	39.01	2.19	58.42	-36.81	27.0	63.8	253	177	-
Vert.	5850.000	PK	44.23	33.53	16.77	39.02	2.19	57.70	-37.53	27.0	64.5	253	177	-
Vert.	5855.000	PK	44.62	33.54	16.77	39.02	2.19	58.10	-37.13	15.6	52.7	253	177	-
Vert.	5875.000	PK	44.03	33.58	16.79	39.02	2.19	57.57	-37.66	10.0	47.6	253	177	-
Vert.	5925.000	PK	44.57	33.64	16.81	39.02	2.19	58.19	-37.04	-27.0	**10.0**	253	177	-
Vert.	17235.000	PK	46.62	39.88	13.16	40.46	-9.54	49.66	-45.57	-27.0	18.5	150	0	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
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	Shonan EMC Lab.	
Semi Anechoic Chamber	2	3
Date	July 17, 2022	July 19, 2022
Temperature / Humidity	22 deg.C, 67 %RH	25 deg.C, 52 %RH
Engineer	Hiromasa Sato (1 GHz -10 GHz)	Hiromasa Sato (10 GHz -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	47.83	38.21	10.40	42.43	-9.54	44.47	73.9	29.4	204	164	-
Hori.	11510.000	AV	38.06	38.21	10.40	42.43	-9.54	34.70	53.9	19.2	204	164	VBW:10 kHz
Vert.	11510.000	PK	47.30	38.21	10.40	42.43	-9.54	43.94	73.9	29.9	165	102	-
Vert.	11510.000	AV	37.54	38.21	10.40	42.43	-9.54	34.18	53.9	19.7	165	102	VBW:10 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + 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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

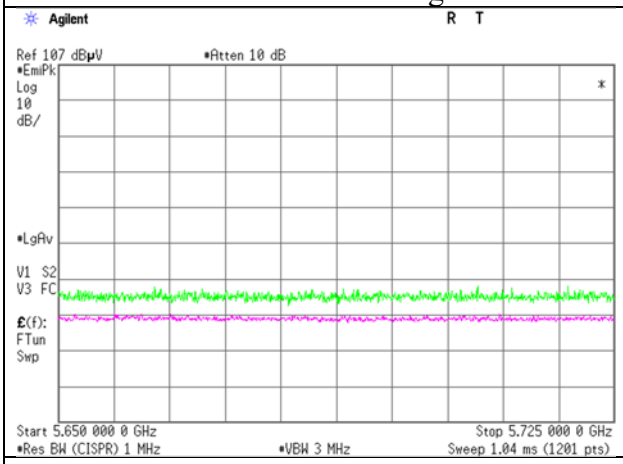
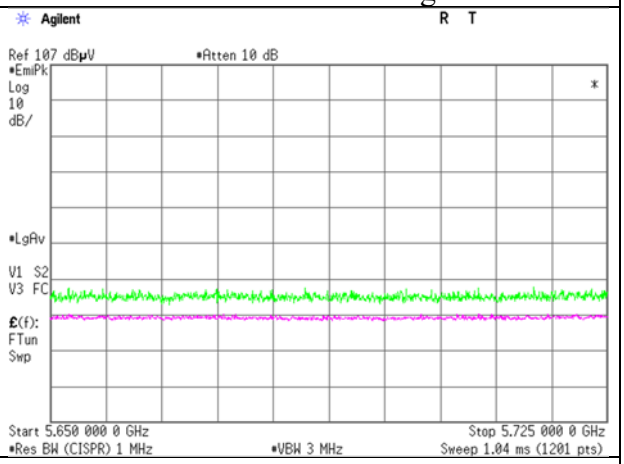
(* PK: Peak, AV: Average, QP: Quasi-Peak)

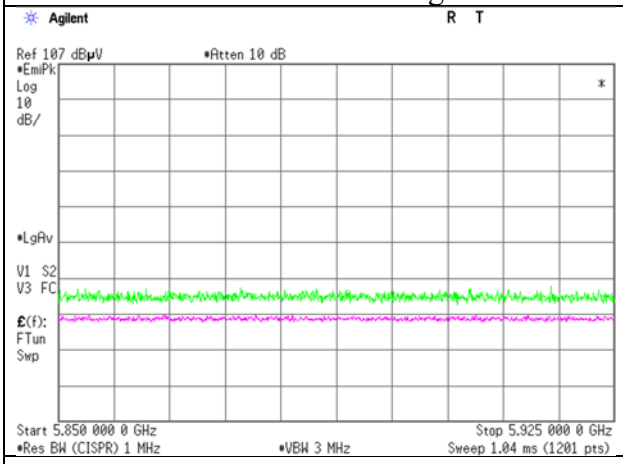
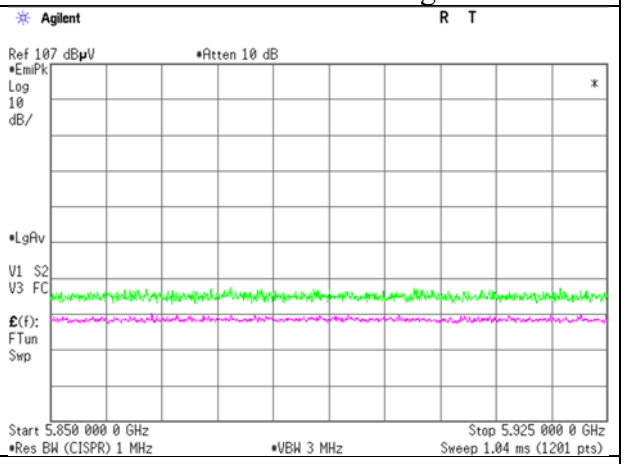
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	45.64	32.90	16.64	39.00	2.19	58.37	-36.86	-27.0	**9.8**	189	149	-
Hori.	5700.000	PK	44.93	33.05	16.67	39.01	2.19	57.83	-37.40	10.0	47.4	189	149	-
Hori.	5720.000	PK	44.91	33.12	16.68	39.01	2.19	57.89	-37.34	15.6	52.9	189	149	-
Hori.	5725.000	PK	45.13	33.14	16.68	39.01	2.19	58.13	-37.10	27.0	64.1	189	149	-
Hori.	5850.000	PK	44.66	33.53	16.77	39.02	2.19	58.13	-37.10	27.0	64.1	189	149	-
Hori.	5855.000	PK	44.72	33.54	16.77	39.02	2.19	58.20	-37.03	15.6	52.6	189	149	-
Hori.	5875.000	PK	44.85	33.58	16.79	39.02	2.19	58.39	-36.84	10.0	46.8	189	149	-
Hori.	5925.000	PK	44.48	33.64	16.81	39.02	2.19	58.10	-37.13	-27.0	10.1	189	149	-
Hori.	17265.000	PK	46.18	39.92	13.19	40.45	-9.54	49.30	-45.93	-27.0	18.9	150	0	-
Vert.	5650.000	PK	45.02	32.90	16.64	39.00	2.19	57.75	-37.48	-27.0	10.4	254	175	-
Vert.	5700.000	PK	44.27	33.05	16.67	39.01	2.19	57.17	-38.06	10.0	48.0	254	175	-
Vert.	5720.000	PK	45.24	33.12	16.68	39.01	2.19	58.22	-37.01	15.6	52.6	254	175	-
Vert.	5725.000	PK	44.62	33.14	16.68	39.01	2.19	57.62	-37.61	27.0	64.6	254	175	-
Vert.	5850.000	PK	44.59	33.53	16.77	39.02	2.19	58.06	-37.17	27.0	64.1	254	175	-
Vert.	5855.000	PK	43.94	33.54	16.77	39.02	2.19	57.42	-37.81	15.6	53.4	254	175	-
Vert.	5875.000	PK	44.83	33.58	16.79	39.02	2.19	58.37	-36.86	10.0	46.8	254	175	-
Vert.	5925.000	PK	44.33	33.64	16.81	39.02	2.19	57.95	-37.28	-27.0	10.2	254	175	-
Vert.	17265.000	PK	46.10	39.92	13.19	40.45	-9.54	49.22	-46.01	-27.0	19.0	150	0	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
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	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato (1 GHz -6.4 GHz)
Mode	Tx 11ac-40 5755 MHz

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

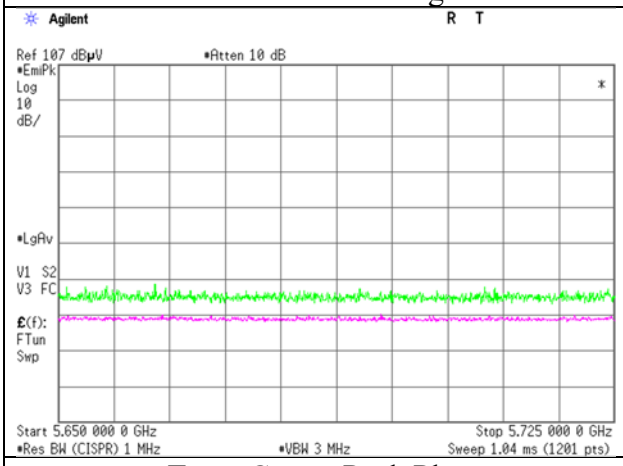
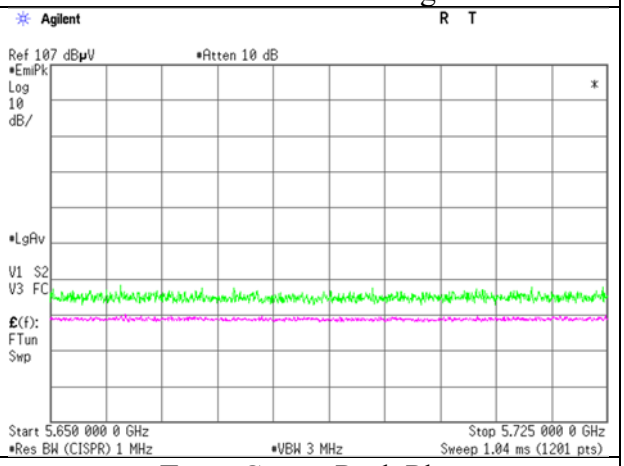
(* PK: Peak, AV: Average, QP: Quasi-Peak)

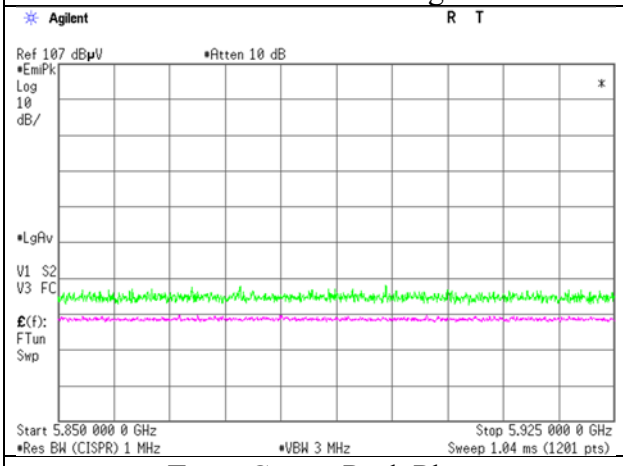
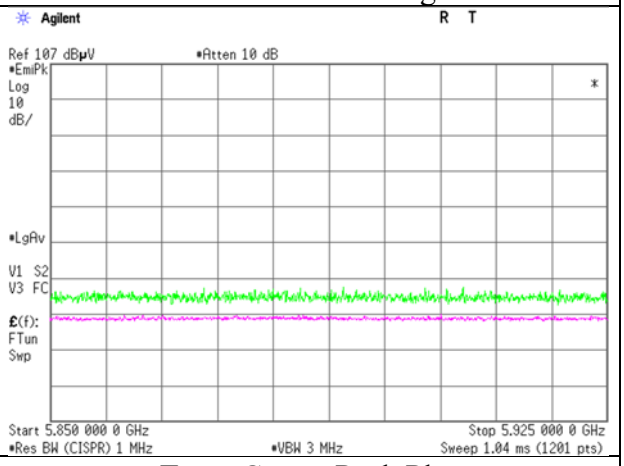
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	44.50	32.90	16.64	39.00	2.19	57.23	-38.00	-27.0	11.0	149	128	-
Hori.	5700.000	PK	44.68	33.05	16.67	39.01	2.19	57.58	-37.65	10.0	47.6	149	128	-
Hori.	5720.000	PK	44.25	33.12	16.68	39.01	2.19	57.23	-38.00	15.6	53.6	149	128	-
Hori.	5725.000	PK	44.31	33.14	16.68	39.01	2.19	57.31	-37.92	27.0	64.9	149	128	-
Hori.	5850.000	PK	43.83	33.53	16.77	39.02	2.19	57.30	-37.93	27.0	64.9	149	128	-
Hori.	5855.000	PK	43.76	33.54	16.77	39.02	2.19	57.24	-37.99	15.6	53.5	149	128	-
Hori.	5875.000	PK	44.02	33.58	16.79	39.02	2.19	57.56	-37.67	10.0	47.6	149	128	-
Hori.	5925.000	PK	44.54	33.64	16.81	39.02	2.19	58.16	-37.07	-27.0	**10.0**	149	128	-
Vert.	5650.000	PK	45.40	32.90	16.64	39.00	2.19	58.13	-37.10	-27.0	10.1	148	203	-
Vert.	5700.000	PK	44.52	33.05	16.67	39.01	2.19	57.42	-37.81	10.0	47.8	148	203	-
Vert.	5720.000	PK	44.63	33.12	16.68	39.01	2.19	57.61	-37.62	15.6	53.2	148	203	-
Vert.	5725.000	PK	45.23	33.14	16.68	39.01	2.19	58.23	-37.00	27.0	64.0	148	203	-
Vert.	5850.000	PK	44.05	33.53	16.77	39.02	2.19	57.52	-37.71	27.0	64.7	148	203	-
Vert.	5855.000	PK	43.68	33.54	16.77	39.02	2.19	57.16	-38.07	15.6	53.6	148	203	-
Vert.	5875.000	PK	44.33	33.58	16.79	39.02	2.19	57.87	-37.36	10.0	47.3	148	203	-
Vert.	5925.000	PK	43.98	33.64	16.81	39.02	2.19	57.60	-37.63	-27.0	10.6	148	203	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
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	Shonan EMC Lab.	
Semi Anechoic Chamber	2	3
Date	July 17, 2022	July 19, 2022
Temperature / Humidity	22 deg.C, 67 %RH	25 deg.C, 52 %RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -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	47.11	38.23	10.44	42.42	-9.54	43.82	73.9	30.0	193	153	-
Hori.	11550.000	AV	37.69	38.23	10.44	42.42	-9.54	34.40	53.9	19.5	193	153	VBW:15 kHz
Vert.	11550.000	PK	47.40	38.23	10.44	42.42	-9.54	44.11	73.9	29.7	154	92	-
Vert.	11550.000	AV	37.78	38.23	10.44	42.42	-9.54	34.49	53.9	19.4	154	92	VBW:15 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + 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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

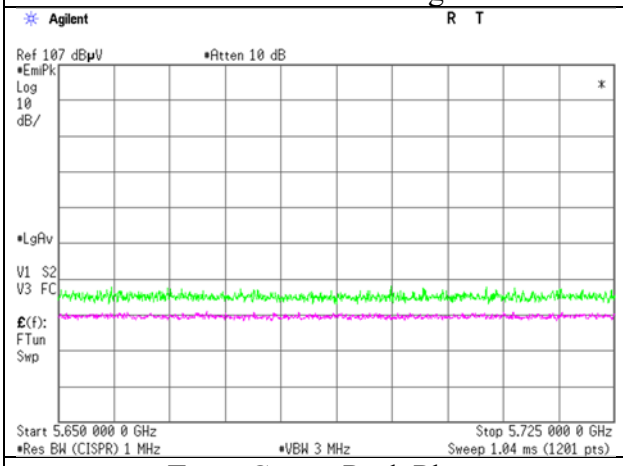
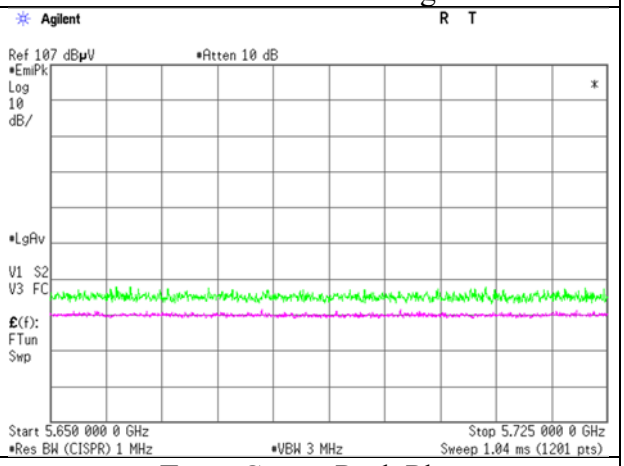
(* PK: Peak, AV: Average, QP: Quasi-Peak)

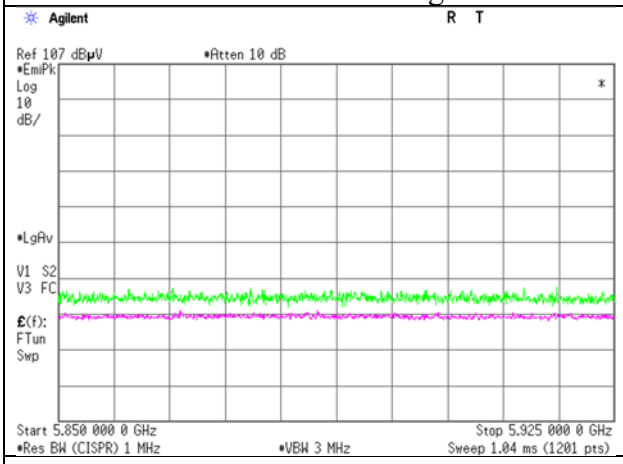
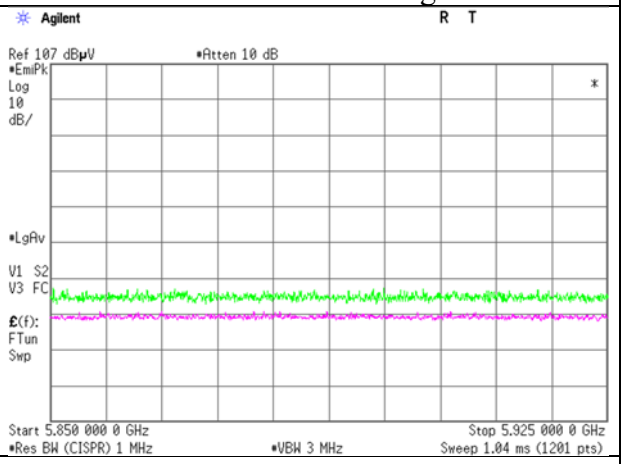
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	45.66	32.90	16.64	39.00	2.19	58.39	-36.84	-27.0	**9.8**	182	214	-
Hori.	5700.000	PK	45.15	33.05	16.67	39.01	2.19	58.05	-37.18	10.0	47.1	182	214	-
Hori.	5720.000	PK	45.47	33.12	16.68	39.01	2.19	58.45	-36.78	15.6	52.3	182	214	-
Hori.	5725.000	PK	45.38	33.14	16.68	39.01	2.19	58.38	-36.85	27.0	63.8	182	214	-
Hori.	5850.000	PK	45.18	33.53	16.77	39.02	2.19	58.65	-36.58	27.0	63.5	182	214	-
Hori.	5855.000	PK	44.48	33.54	16.77	39.02	2.19	57.96	-37.27	15.6	52.8	182	214	-
Hori.	5875.000	PK	45.43	33.58	16.79	39.02	2.19	58.97	-36.26	10.0	46.2	182	214	-
Hori.	5925.000	PK	44.49	33.64	16.81	39.02	2.19	58.11	-37.12	-27.0	10.1	182	214	-
Hori.	17325.000	PK	46.43	40.06	13.20	40.41	-9.54	49.74	-45.49	-27.0	18.4	150	0	-
Vert.	5650.000	PK	44.11	32.90	16.64	39.00	2.19	56.84	-38.39	-27.0	11.3	343	143	-
Vert.	5700.000	PK	44.48	33.05	16.67	39.01	2.19	57.38	-37.85	10.0	47.8	343	143	-
Vert.	5720.000	PK	44.79	33.12	16.68	39.01	2.19	57.77	-37.46	15.6	53.0	343	143	-
Vert.	5725.000	PK	44.56	33.14	16.68	39.01	2.19	57.56	-37.67	27.0	64.6	343	143	-
Vert.	5850.000	PK	45.10	33.53	16.77	39.02	2.19	58.57	-36.66	27.0	63.6	343	143	-
Vert.	5855.000	PK	43.87	33.54	16.77	39.02	2.19	57.35	-37.88	15.6	53.4	343	143	-
Vert.	5875.000	PK	43.85	33.58	16.79	39.02	2.19	57.39	-37.84	10.0	47.8	343	143	-
Vert.	5925.000	PK	44.30	33.64	16.81	39.02	2.19	57.92	-37.31	-27.0	10.3	343	143	-
Vert.	17325.000	PK	46.56	40.06	13.20	40.41	-9.54	49.87	-45.36	-27.0	18.3	150	0	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Result (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 (3.86 m / 3.0 m) = 2.19 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	July 17, 2022
Temperature / Humidity	22 deg.C, 67 %RH
Engineer	Hiromasa Sato
Mode	Tx 11ac-80 5775 MHz

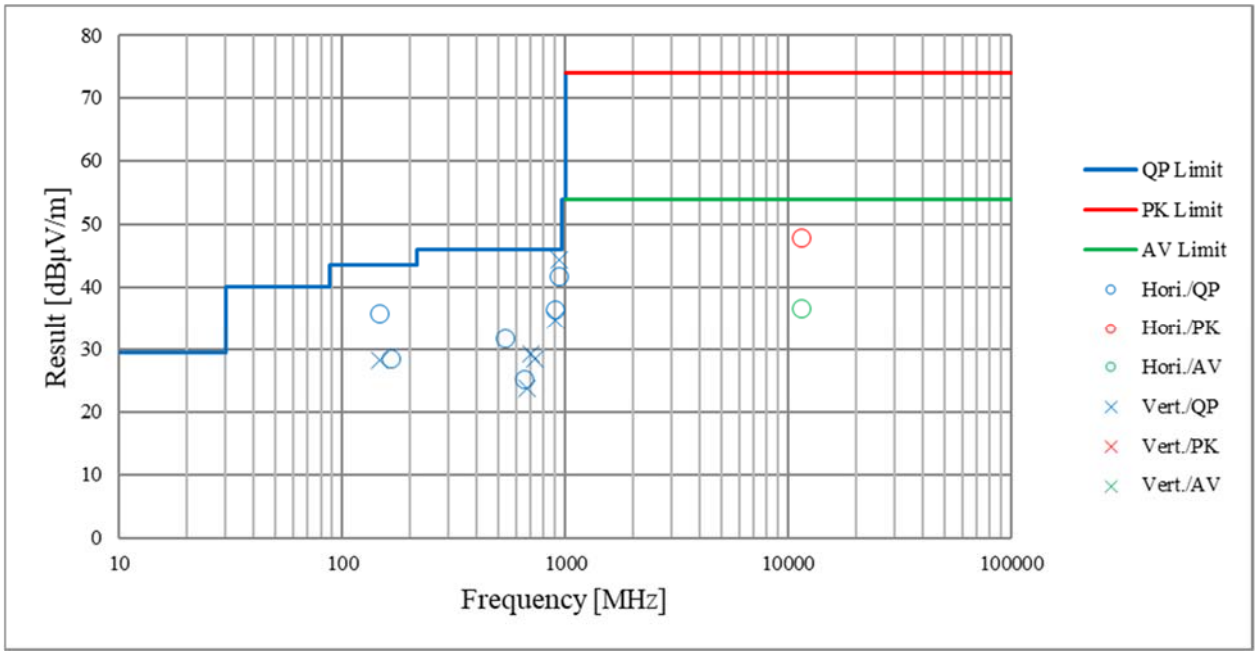
Horizontal	Vertical
Restricted-band band-edge Plot	Restricted-band band-edge Plot
	
Trace Green: Peak Plot Trace Purple: Average Plot	Trace Green: Peak Plot Trace Purple: Average Plot

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	Shonan EMC Lab.		
Semi Anechoic Chamber	3	2	3
Date	September 5, 2022	July 17, 2022	July 19, 2022
Temperature / Humidity	24 deg.C, 38 %RH	22 deg.C, 67 %RH	25 deg.C, 52 %RH
Engineer	Yosuke Murakami (30 MHz -1 GHz)	Hiromasa Sato (1 GHz -10 GHz)	Hiromasa Sato (10 GHz -40 GHz)
Mode	Tx 11a 5745 MHz		

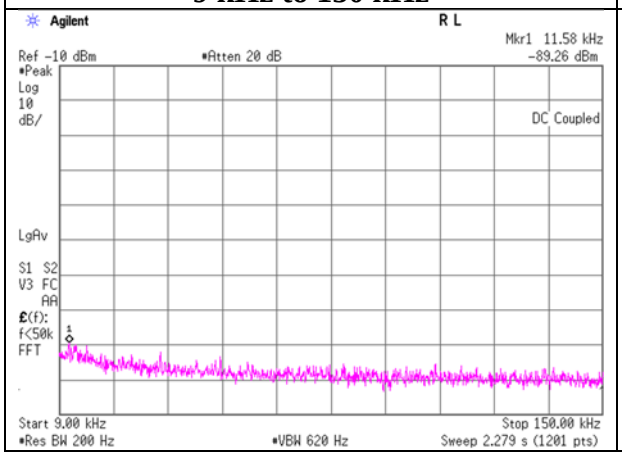


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

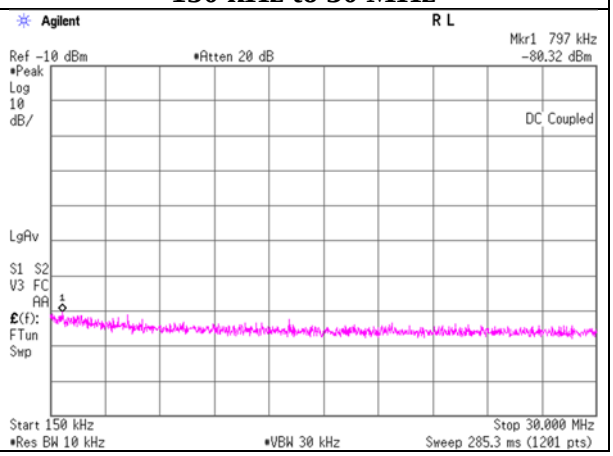
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	July 20, 2022
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11a 5745 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.580	-89.26	0.01	9.83	2.0	1	-77.4	300	6.0	-16.2	46.3	62.5	-
797.000	-80.32	0.02	9.83	2.0	1	-68.5	30	6.0	12.8	29.5	16.7	-

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

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2021/09/14	12
AT	SAT10-12	151609	Attenuator	Weinschel Corp.	54A-10	81601	2022/03/02	12
AT	SCC-G67	196949	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803480/2	2022/03/02	12
AT	SOS-27	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2022/01/25	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2022/01/25	12
AT	SRENT-22	202830	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250036	2021/12/01	12
AT	STM-G10	171617	Terminator	Weinschel - API Technologies Corp	M1459A	92420	2022/05/12	12
AT	STM-G8	171615	Terminator	Weinschel - API Technologies Corp	M1459A	88997	2022/05/20	12
AT	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2021/09/14	12
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	-	-	-
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2021/10/13	12
RE	SAEC-02 (SVSWR)	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2022/05/16	12
RE	SAEC-03 (NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2022/04/15	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2022/05/18	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2022/02/24	12
RE	SAF-05	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2022/05/12	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2022/02/04	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2022/03/03	12
RE	SAF-10	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2022/03/03	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2021/10/05	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2022/02/21	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2022/05/14	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271 (RF Selector)	2022/04/20	12

Test Equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2022/03/03	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2022/01/06	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2022/05/20	12
RE	SCC-G50	178573	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	MY13407/4E	2022/03/03	12
RE	SCC-G51	178572	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800288 /4A	2022/03/03	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2022/05/12	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2022/05/20	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2022/07/22	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2021/10/05	12
RE	SHA-02	145384	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-726	2022/03/10	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2022/03/16	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2022/06/06	12
RE	SHA-06	145514	Horn Antenna	ETS-Lindgren	3160-10	00092383	2022/06/06	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2022/03/16	12
RE	SJM-20	207277	Measuring	ASKUL	-	-	-	-
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2022/05/14	12
RE	SOS-21	191838	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
RE	SOS-23	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
RE	STR-07	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2021/09/17	12
RE	STR-09	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2022/01/17	12
RE	STS-02	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2022/04/07	12
RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	12
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2021/10/13	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: Radiated Emission
AT: Antenna Terminal Conducted test