RADIO TEST REPORT

Test Report No. 15196051S-A-R2

Customer	**PIONEER CORPORATION**
Description of EUT	**RDS AV RECEIVER**
Model Number of EUT	**DMH-WT6000NEX**
FCC ID	**AJDK125**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied**
Issue Date	**May 28, 2024**
Remarks	**WLAN (5 GHz band) part** **Antenna Terminal Conducted Tests**

Representative Test Engineer	Approved By
Hiromasa Sato Engineer	Kazutaka Takeyama Leader

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.

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

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

ANNOUNCEMENT

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

REVISION HISTORY

Original Test Report No. 15196051S-A

This report is a revised version of 15196051S-A-R1. 15196051S-A-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15196051S-A	April 24, 2024	-
1	15196051S-A-R1	May 9, 2024	Page 8 Corrected specifications listed in Clause 3.2 from RSS-247 6.2.4.1 to 6.2.4.2 for Maximum Conducted Output Power, Maximum Power Spectral Density and 6dB Emission Bandwidth tests, and from RSS-247 6.2.4.2 to 6.2.4.3 for Spurious Emission test.
2	15196051S-A-R2	May 28, 2024	Page 6 Deleted the list of Supported GNSS and GNSS signals. Page 14 Corrected the value of 11n-20 to match the waveform data. Page 28 Removed unnecessary text. *2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

Reference: Abbreviations (Including words undescribed in this report)

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

CONTENTS **PAGE**

SECTION 1: Customer Information

Company Name	PIONEER CORPORATION
Address	25-1, Yamada, Kawagoe-shi, Saitama, 350-8555, JAPAN
Telephone Number	+81-49-228-6346
Contact Person	Takafumi Ida

The information provided by the customer is as follows;
- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	RDS AV RECEIVER
Model Number	DMH-WT6000NEX
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	March 1, 2024
Test Date	March 8 to April 9, 2024

2.2 Product Description

General Specification

Rating	DC 14.4 V, 10 A
Operating temperature	-10 deg. C to 60 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked “a)” in the table below.

WLAN (IEEE802.11a/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 [a)]:	4.47 dBi	

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	BT: FHSS (GFSK, π/4 DQPSK, 8 DPSK) BT LE: GFSK
Antenna Gain [a)]	-0.83 dBi

2.3 Variant model(s)

The EUT has following variant models.

Product description	Model number	Feature								
		Display LCD size	Movable display structure	Bluetooth	Wi-Fi	GNSS	FM/AM	HD Radio	BSD	Guard Cam
RDS AV RECEIVER *	DMH-WT6000NEX	10.1"	Type A	A	A	A	A	A	A	A
RDS AV RECEIVER	DMH-WT5000NEX	9.0"	Type B	A	A	A	A	A	NA	NA

*Tested model A: Applied NA: Not applied

Model DMH-WT6000NEX* and DMH-WT5000NEX contain the same RF module.
The differences between 2 models are above contents and do not affect wireless performance.

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 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	*1)
	ISED: -	**ISED:** -			
Maximum Conducted Output Power	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.2			
Maximum Power Spectral Density	**FCC:** KDB Publication Number 789033	**FCC :** 15.407 (a) (1) (2) (3)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.2			
Spurious Emission	**FCC:** ANSI C63.10-2013 KDB Publication Number 789033	**FCC:** 15.407 (b), 15.205 and 15.209	27.8 dB 150.00 kHz, Tx 11a 5745 MHz	Complied	Conducted (< 30 MHz)
	ISED: -	**ISED:** RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.3			
6 dB Emission Bandwidth	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (e)	See data	Complied	Conducted
	ISED: -	**ISED:** RSS-247 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) The test is not applicable since the EUT does not have AC mains.

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 Band Width	**ISED:** RSS-Gen 6.7	**ISED:** -	N/A	-	Conducted

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

3.4 Uncertainty

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

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

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector) SPM-06	1.1 dB
Power Measurement above 1 GHz (Peak Detector) SPM-06	1.8 dB
Power Measurement above 1 GHz (Average Detector) SPM-07	1.0 dB
Power Measurement above 1 GHz (Peak Detector) SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector) SPM-13	0.81 dB
Power Measurement above 1 GHz (Peak Detector) SPM-13	1.1 dB
Spurious Emission (Conducted) below 1 GHz	0.91 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	1.3 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	2.5 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.6 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.96 deg.C.
Humidity_SCH-01	4.0 %
Temperature_SCH-02	2.2 deg.C.
Voltage	0.74 %

3.5 Test Location

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

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11a (11a)	36 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 0, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	MCS 0, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 5, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	MCS 9, PN9
IEEE 802.11ac 80 MHz BW (11ac-80)	MCS 9, 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:	10
	11n-20:	9
	11ac-20:	9
	11n-40:	9
	11ac-40:	9
	11ac-80:	9
Software:	0.03 (Date: 2024.03.02, Storage location: EUT memory)	

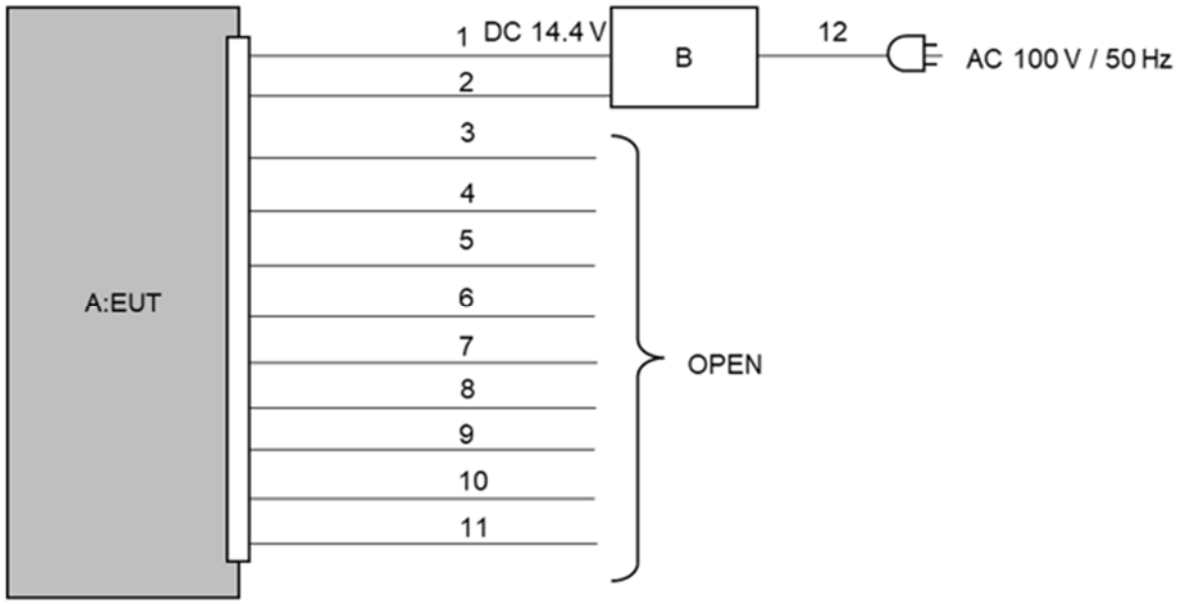
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*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
Conducted Spurious Emission	Tx 11a	-	-	-	5745 MHz

4.2 Configuration and Peripherals

[Antenna terminal conducted 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-WT6000NEX	DATM000007EU	PIONEER CORPORATION	EUT
B	Power Supply (DC)	PW16-5ADP	19100034	GW Instek	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	ACC, +B	0.1 + 2.3	Unshielded	Unshielded	-
2	GND	0.1 + 2.3	Unshielded	Unshielded	-
3	Speaker	0.1	Unshielded	Unshielded	-
4	Speaker	0.1	Unshielded	Unshielded	-
5	Speaker	0.1	Unshielded	Unshielded	-
6	Speaker	0.1	Unshielded	Unshielded	-
7	Antenna/System Control	0.1	Unshielded	Unshielded	-
8	Car Speed signal Input	0.1	Unshielded	Unshielded	-
9	Reverse Gear Singal Input	2.0	Unshielded	Unshielded	-
10	Parking Brake	2.0	Unshielded	Unshielded	-
11	ILL +	2.0	Unshielded	Unshielded	-
12	AC	1.6	Unshielded	Unshielded	-

SECTION 5: 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-G)
Maximum Power Spectral Density	Encompass the entire EBW	470 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				

*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 / 470 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.

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

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx

11a

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	16943.8

11n-20

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	18424.6

11ac-20

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5745	18352.4

11n-40

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5755	36393.4

11ac-40

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5755	36801.5

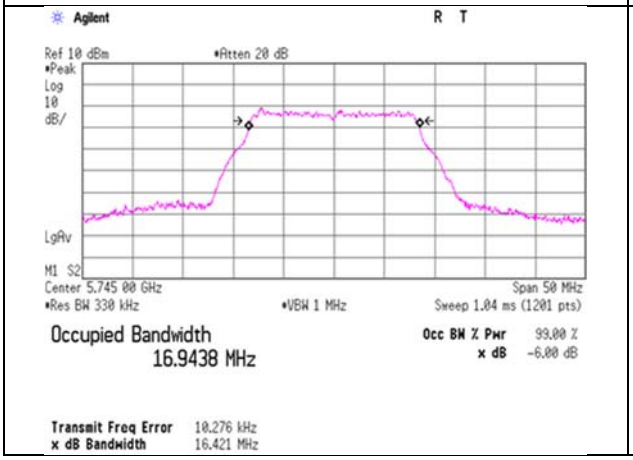
11ac-80

Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5775	75913.5

99 % Occupied Bandwidth

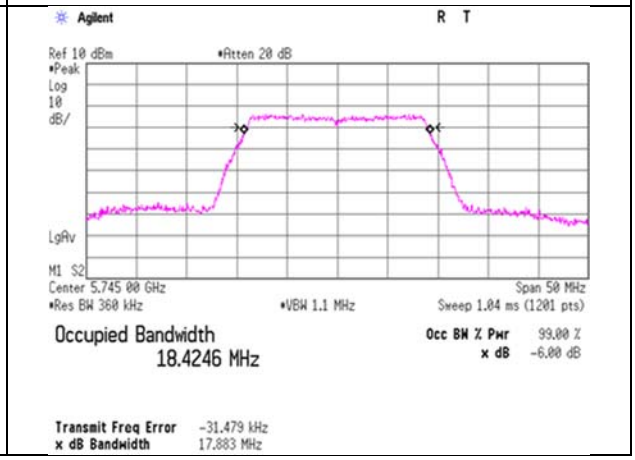
11a

5745 MHz



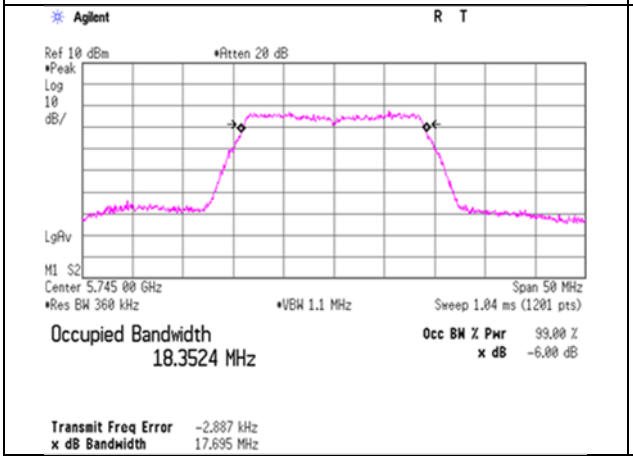
11n-20

5745 MHz



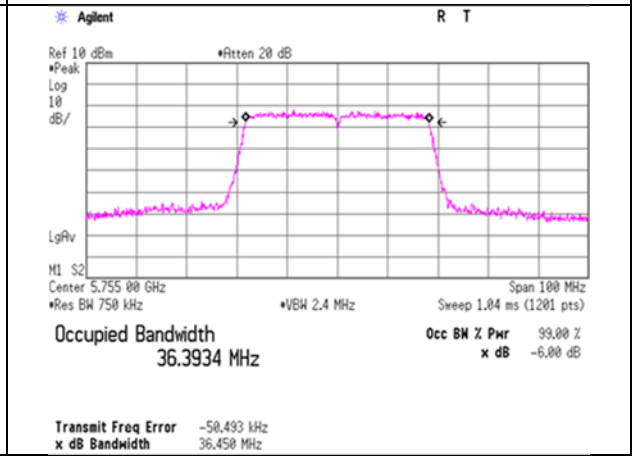
11ac-20

5745 MHz



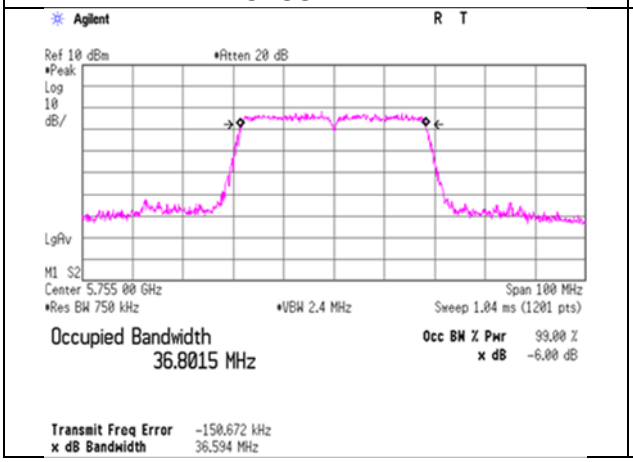
11n-40

5755 MHz



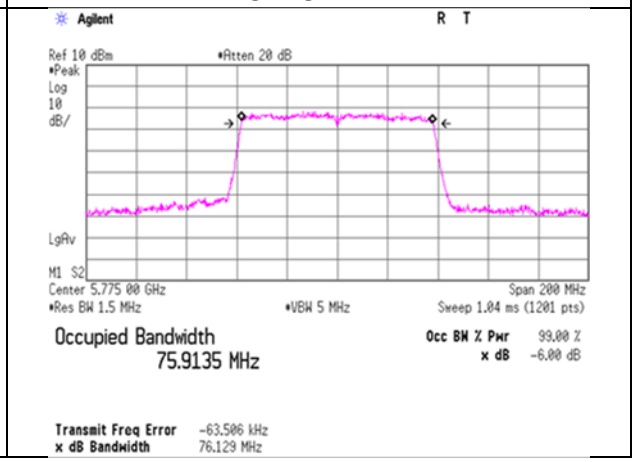
11ac-40

5755 MHz



11ac-80

5775 MHz



6 dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	16.484	> 0.500

11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.647	> 0.500

11ac-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.683	> 0.500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.519	> 0.500

11ac-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.494	> 0.500

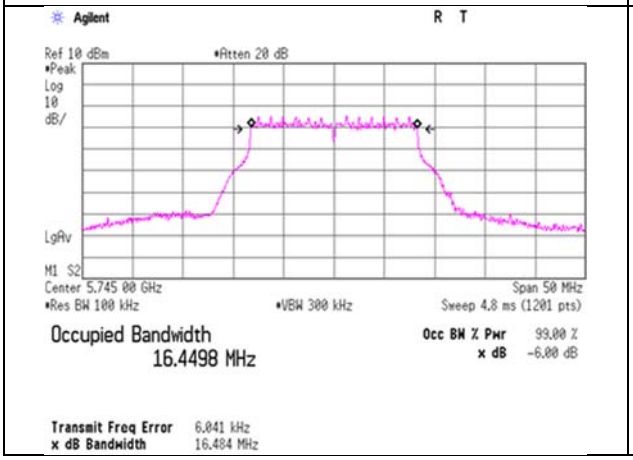
11ac-80

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5775	75.872	> 0.500

6 dB Bandwidth

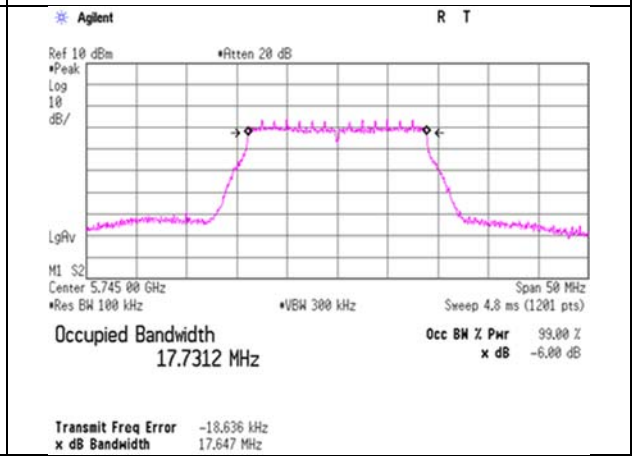
11a

5745 MHz



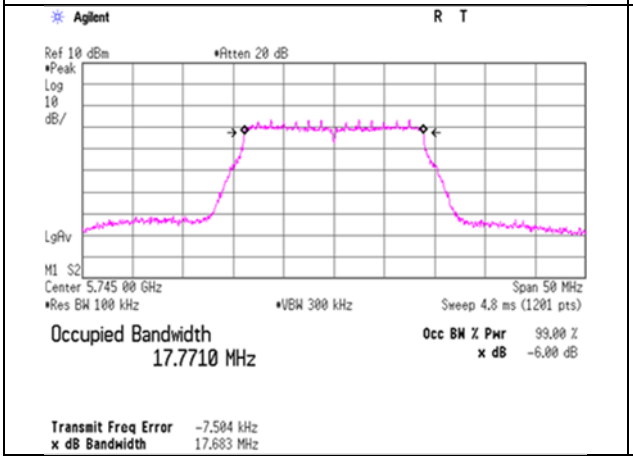
11n-20

5745 MHz



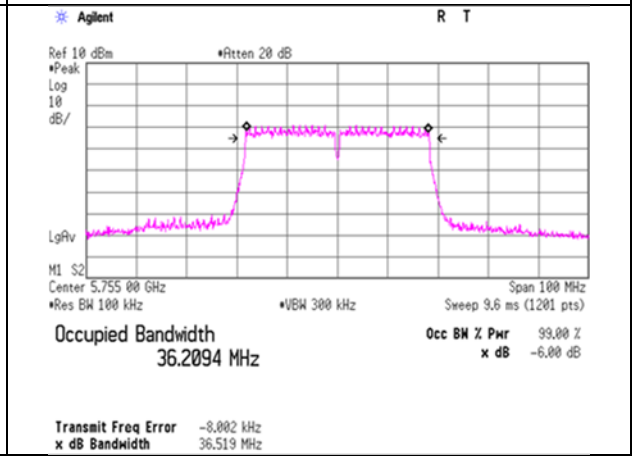
11ac-20

5745 MHz



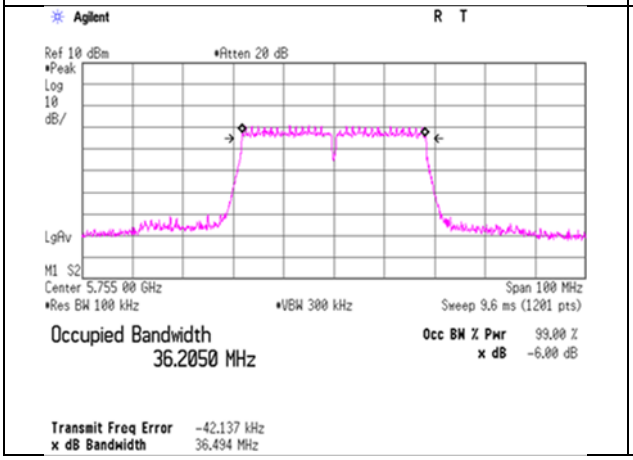
11n-40

5755 MHz



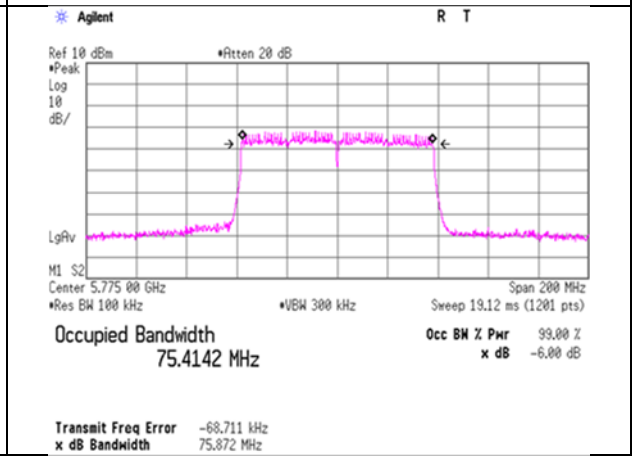
11ac-40

5755 MHz



11ac-80

5775 MHz



Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	March 8, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx 11a

11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-4.14	2.84	9.99	4.47	-	16.944	8.69	7.40	30.00	21.31	13.16	20.70	36.00	22.84

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

5745 MHz

Mode	Rate	Reading	Remarks
	Mbps	[dBm]	
11a	6	-4.84	-
	9	-4.86	-
	12	-4.61	-
	18	-4.55	-
	24	-4.22	-
	36	-4.14	*
	48	-6.72	-
	54	-7.05	-

* Worst rate
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	March 8, 2024	April 9, 2024
Temperature / Humidity	23 deg. C / 42 % RH	24 deg. C / 35 % RH
Engineer	Miku Ikudome	Miku Ikudome
Mode	Tx 11n-20	

11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-5.99	2.84	9.99	4.47	-	18.425	6.84	4.83	30.00	23.16	11.31	13.52	36.00	24.69

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
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]	Remarks
11n-20	0	-5.99	*
	1	-7.49	-
	2	-7.18	-
	3	-6.96	-
	4	-6.86	-
	5	-6.89	-
	6	-6.89	-
	7	-7.86	-

* Worst rate
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	March 8, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx 11ac-20

11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-5.92	2.84	9.99	4.47	-	18.352	6.91	4.91	30.00	23.09	11.38	13.74	36.00	24.62

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
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]	Remarks
11ac-20	0	-5.92	*
	1	-7.40	-
	2	-7.37	-
	3	-6.96	-
	4	-6.80	-
	5	-6.79	-
	6	-6.96	-
	7	-8.32	-
	8	-6.93	-

* Worst rate
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	March 8, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx 11n-40

11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5755	-5.38	2.84	9.99	4.47	-	36.393	7.45	5.56	30.00	22.55	11.92	15.56	36.00	24.08

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
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]	Remarks
11n-40	0	-5.67	-
	1	-5.79	-
	2	-5.70	-
	3	-5.66	-
	4	-5.56	-
	5	-5.38	*
	6	-5.56	-
	7	-5.55	-

* Worst rate
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	March 8, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx 11ac-40

11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5755	-5.56	2.84	9.99	4.47	-	36.802	7.27	5.33	30.00	22.73	11.74	14.93	36.00	24.26

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
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]	Remarks
11ac-40	0	-5.72	-
	1	-5.86	-
	2	-5.76	-
	3	-5.65	-
	4	-5.60	-
	5	-5.69	-
	6	-5.63	-
	7	-5.62	-
	8	-5.59	-
	9	-5.56	*

* Worst rate
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	March 8, 2024
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx 11ac-80

11ac-80

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	26 dB EBW (B for FCC)	99 % OBW (B for ISED)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5775	-5.84	2.85	9.99	4.47	-	75.914	7.00	5.01	30.00	23.00	11.47	14.03	36.00	24.53

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
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]	Remarks
11ac-80	0	-6.14	-
	1	-6.15	-
	2	-6.19	-
	3	-6.05	-
	4	-6.01	-
	5	-5.92	-
	6	-5.88	-
	7	-5.91	-
	8	-5.84	-
	9	-5.84	*

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

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5745	5740.515	-17.08	2.84	9.99	4.47	0.27	-3.98	30.00	33.98	0.49	36.00	35.51

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

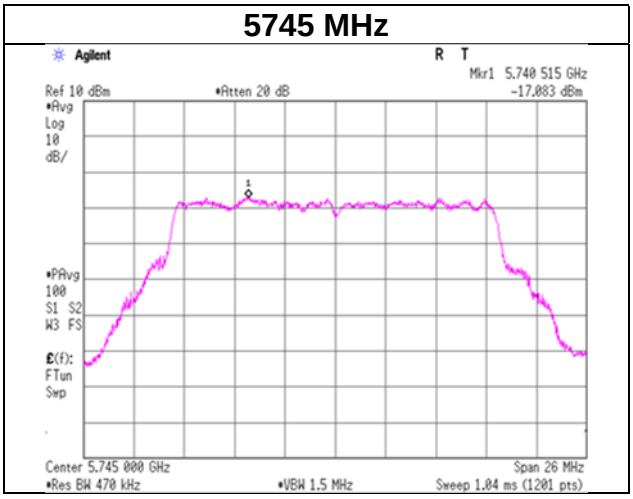
RBW Correction Factor = 10 x log (500 [kHz] / 470 [kHz])

PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 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	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5745	5752.388	-19.68	2.84	9.99	4.47	0.27	-6.58	30.00	36.58	-2.11	36.00	38.11

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

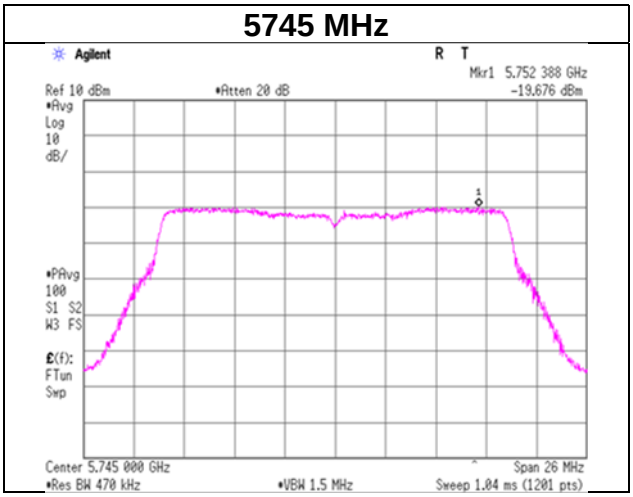
RBW Correction Factor = 10 x log (500 [kHz] / 470 [kHz])

PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 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	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5745	5738.998	-19.78	2.84	9.99	4.47	0.27	-6.68	30.00	36.68	-2.21	36.00	38.21

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

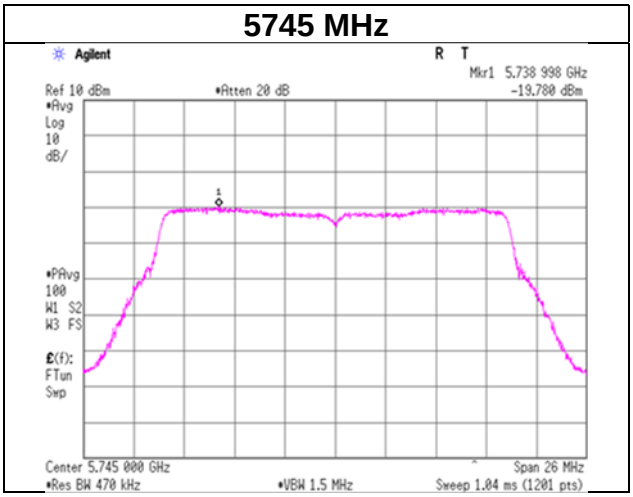
RBW Correction Factor = 10 x log (500 [kHz] / 470 [kHz])

PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 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	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11n-40

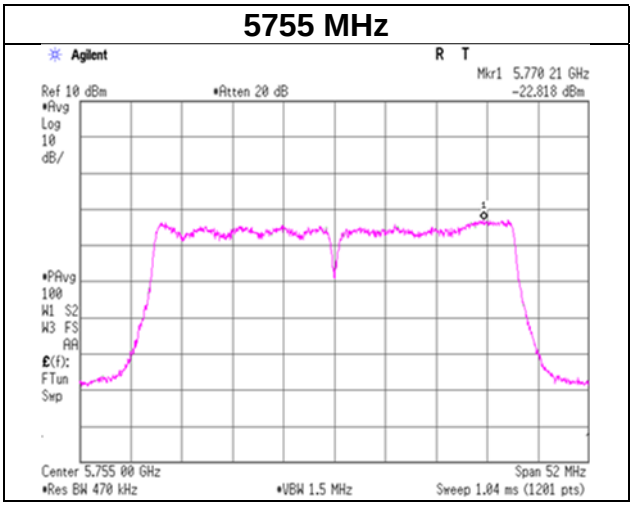
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5755	5770.21	-22.82	2.84	9.99	4.47	0.27	-9.72	30.00	39.72	-5.25	36.00	41.25

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 x log (500 [kHz] / 470 [kHz])
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 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	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11ac-40

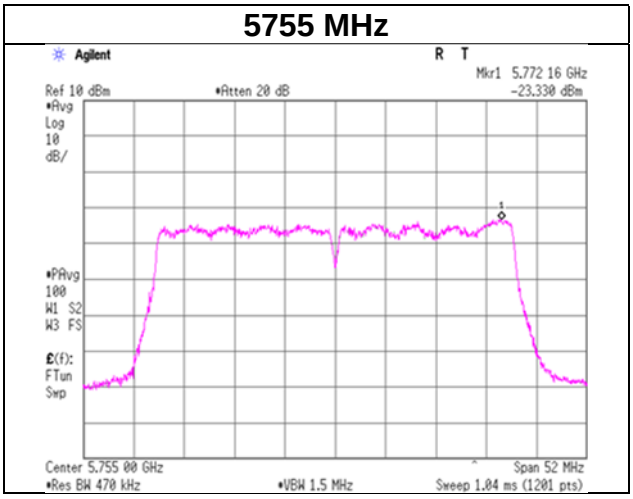
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5755	5772.16	-23.33	2.84	9.99	4.47	0.27	-10.23	30.00	40.23	-5.76	36.00	41.76

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 x log (500 [kHz] / 470 [kHz])
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + 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	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
Mode	Tx 11ac-80

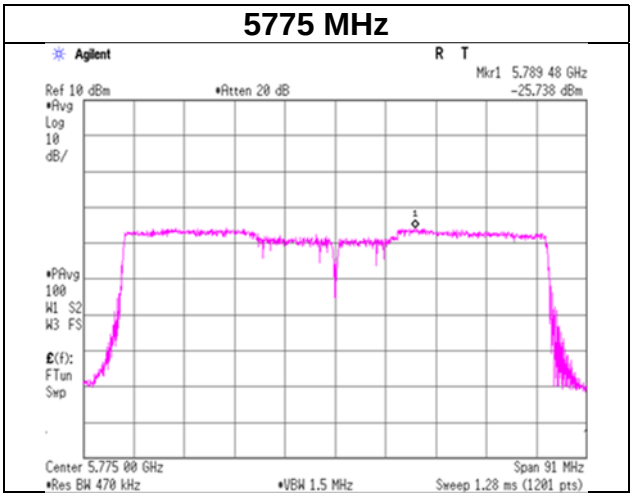
Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /500 kHz]	PSD (Conducted) Limit [dBm /500 kHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /500 kHz]	PSD (e.i.r.p.) Limit [dBm /500 kHz]	PSD (e.i.r.p.) Margin [dB]
5775	5789.48	-25.74	2.85	9.99	4.47	0.27	-12.63	30.00	42.63	-8.16	36.00	44.16

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 x log (500 [kHz] / 470 [kHz])
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + RBW Correction Factor
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

11ac-80

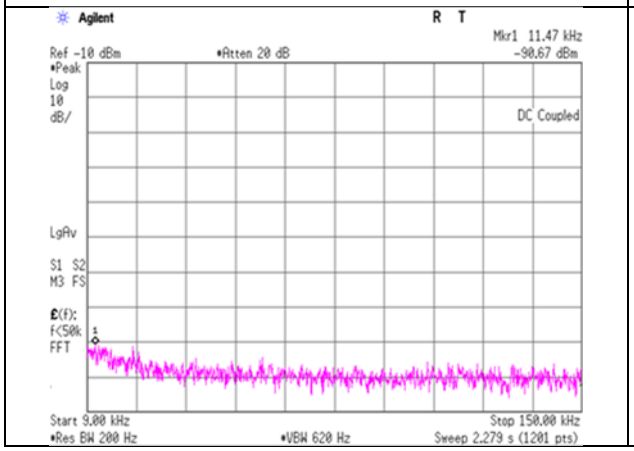
5775 MHz



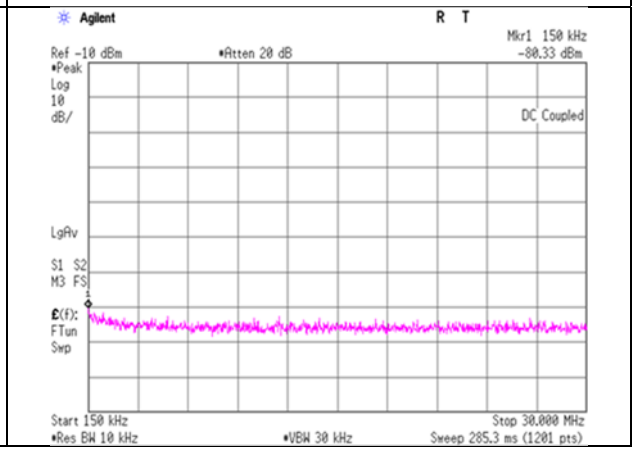
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	March 9, 2024
Temperature / Humidity	23 deg. C / 44 % RH
Engineer	Hiromasa Sato
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
11.47	-90.67	0.91	9.90	4.47	1	-75.4	300	6.0	-14.1	46.4	60.5	-
150.00	-80.33	0.91	9.90	4.47	1	-65.1	300	6.0	-3.8	24.0	27.8	-

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

APPENDIX 2: Test Instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145339	Tape Measure	ASKUL	-	-	-	-
AT	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2023/09/25	12
AT	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2023/09/28	12
AT	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2023/09/28	12
AT	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/07	12
AT	196949	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803480/2	2024/03/07	12
AT	235604	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY45300743	2023/05/18	12
AT	242067	Attenuator	Weinschel Corp.	54A-10	120523	2023/11/02	12
AT	242075	Terminator	Weinschel - API Technologies Corp	M1459A	121073	2023/11/17	12

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

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

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

Test item:

AT: Antenna Terminal Conducted test