



RADIO TEST REPORT

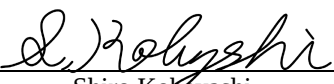
Test Report No. : 14011702S-B

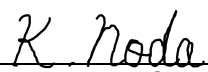
Applicant : Sony Corporation Japan & Sony Group Companies
Type of EUT : AV Receiver
Model Number of EUT : XAV-AX4000
FCC ID : AK8XAVAX4000
Test regulation : FCC Part 15 Subpart E: 2021

Test result : **Complied (Refer to SECTION 3)**

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

Date of test: October 25 to November 4, 2021

Representative test engineer: 
Shiro Kobayashi
Engineer

Approved by: 
Kazuya Noda
Leader



CERTIFICATE 1266.03

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

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 14011702S-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14011702S-B	November 24, 2021	-	-

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Reference: Abbreviations (Including words undescribed in this report)

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

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (EUT).....	5
SECTION 3: Test specification, procedures & results.....	7
SECTION 4: Operation of EUT during testing.....	10
SECTION 5: Radiated Spurious Emission and Band Edge Compliance.....	15
SECTION 6: Antenna Terminal Conducted Tests.....	18
APPENDIX 1: Test data	19
99 % Occupied Bandwidth	19
6 dB Bandwidth	22
Maximum Conducted Output Power	25
Maximum Power Spectral Density	30
Radiated Spurious Emission	35
Conducted Spurious Emission	49
APPENDIX 2: Test instruments	50
APPENDIX 3: Photographs of test setup	52
Radiated Spurious Emission	52
Antenna Terminal Conducted Tests.....	53

SECTION 1: Customer information

Company Name	: Sony Corporation Japan & Sony Group Companies
Address	: 700/402 Moo. 7, Amata City Chonburi Industrial Estate, Don Hua Roh, Muang Chonburi, Chonburi 20000, Thailand
Telephone Number	: +66 38 214900 17 Ext : 1932
Contact Person	: Jumroen Phaoenchoke

The information provided from the customer is as follows;

- Applicant, Type 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
- 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

Type	: AV Receiver
Model Number	: XAV-AX4000
Serial Number	: Refer to SECTION 4.2
Receipt Date	: October 8, 2021
Condition	: Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	: No Modification by the test lab.

2.2 Product Description

Model: XAV-AX4000 (referred to as the EUT in this report) is an AV Receiver.

General Specification

Rating	: DC 12 V
Clock frequency (ies) in the system	: 32.768 kHz (GPS), 32.768 kHz (MCU), 32.768 kHz (PMIC), 28.6363630 MHz (Video Decoder), 24 MHz (SoC), 9.25 MHz (MCU), 12 MHz (FM/AM Tuner), 26 MHz (GPS) 6.144 MHz (Audio I2S), 12.288 MHz (DSP), 12.288 MHz (DAC_PCM), 48 MHz (WiFi/BTModule), 1600 MHz (SoC CPU), 1500 Mz (DDR4), 200 MHz (MIPI), 240 MHz (USB), 200 MHz (SDIO, eMMC)

Radio Specification

Bluetooth (BDR / EDR function)

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS, GFSK
Antenna type	:	Monopole antenna
Antenna Gain	:	2.0 dBi (Peak), -3.7 dBi (Average)
Operating Temperature	:	0 deg. C to +40 deg. C
Clock frequency	:	48 MHz

Wireless LAN

Radio Type	:	Transceiver
Frequency of Operation	:	5745 MHz - 5825 MHz
Modulation	:	OFDM
Antenna type	:	Monopole antenna
Antenna Gain	:	3.2 dBi (Peak), -7.2 dBi (Average)
Operating Temperature	:	0 deg. C to +40 deg. C
Clock frequency	:	48 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart E
Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 ISED: RSS-Gen 8.8	FCC: 15.407 (b) (6) / 15.207 ISED: RSS-Gen 8.8	N/A	N/A	*1)
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: -	See data	N/A	*2)
Maximum Conducted Output Power	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1		Complied a)	Conducted
Maximum Power Spectral Density	FCC: KDB Publication Number 789033 ISED: -	FCC : 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1		Complied b)	Conducted
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033 ISED: -	FCC: 15.407 (b), 15.205 and 15.209 ISED: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2	6.5 dB 276.127 MHz, QP, Hori. Tx 11a 5745 MHz	Complied c) / d)	Conducted (< 30 MHz) / Radiated (> 30 MHz) *3)
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 ISED: -	FCC: 15.407 (e) ISED: RSS-247 6.2.4.1	See data	Complied e)	Conducted
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. *1) The test is not applicable since the EUT does not have AC Mains. *2) The test is not applicable since the EUT support 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 Bandwidth) Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.					

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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.

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	- f)	Conducted
f) 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

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

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

Shonan EMC Lab.

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-30 MHz	2.9 dB	2.9 dB	3.0 dB	2.7 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.1 dB	3.1 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.1 dB	6.1 dB	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-
	6 GHz-18 GHz	5.2 dB	5.3 dB	5.3 dB	-
	18 GHz-40 GHz	5.4 dB	5.5 dB	5.5 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-
	18 GHz-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 1GHz	0.93 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.92 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.3 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-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 %

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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, Facsimile: +81 463 50 6401

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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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)	18 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 5, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	MCS 7, 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 settings: 14 Software: myftm, Version: 1.0 (Date: 2021.10.25, Storage location: Driven by connected PC)	
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operation mode(s)

Test Item	Operating Mode	Tested Frequency
		Upper Band
6 dB Bandwidth	11a Tx	5745 MHz
99 % Occupied Bandwidth,	11n-20 Tx	5785 MHz
Maximum Conducted Output Power,	11ac-20 Tx	5825 MHz
Maximum Power Spectral Density		
Radiated Spurious Emission (Below 1 GHz)	11a Tx *1)	5745 MHz
Conducted Spurious Emission		
Radiated Spurious Emission (Above 1 GHz)	11a Tx	5745 MHz
		5785 MHz
		5825 MHz
	11n-20 Tx	5745 MHz
	11ac-20 Tx	5825 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		

Facsimile : +81 463 50 6401

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	AV Receiver	XAV-AX4000	282	SONY	EUT
B	DC Power Supply	PAN60-10A	NL002383	Kikusui	-
C	Speaker	TS-F1030	V44QAH2	Pioneer	-
D	Speaker	TS-F1030	V44QAH2	Pioneer	-
E	Speaker	TS-F1030	V44QBA1	Pioneer	-
F	Speaker	TS-F1030	V44QBA1	Pioneer	-
G	Amplifier	XM-GS4	0000052	SONY	-
H	Video Camera	HC-W585M	DM7LA002009	Panasonic	-
I	USB Memory	RUF3-AC32G-YE	P00316	BUFFALO	-
J	Microphone	-	-	SONY	-
K	Wired Remote Controller	RM-X4S	-	SONY	-
L	GPS Antenna	-	-	SONY	-
M	Universal Radio Replacement And Steering Wheel Interface	ADS-MRR	-	Maestro	-
N	Sirius XM Tuner	SXV300	1VH90D08	SiriusXM Radio	-
O	Antenna	NGVA3	1624A	SiriusXM Radio	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC	0.15+2.8	Unshielded	Unshielded	ACC, B+, GND
2	Speaker	0.15+2.0+0.15	Unshielded	Unshielded	Front-L (+/-)
3	Speaker	0.15+2.0+0.15	Unshielded	Unshielded	Front-R (+/-)
4	Speaker	0.15+2.0+0.15	Unshielded	Unshielded	Rear-L (+/-)
5	Speaker	0.15+2.0+0.15	Unshielded	Unshielded	Rear-R (+/-)
6	ILL	0.15+1.0	Unshielded	Unshielded	-
7	REM OUT	0.15+1.5+0.3	Unshielded	Unshielded	-
8	SPEED IN	0.15+1.0	Unshielded	Unshielded	-
9	REVERSE IN	0.15+1.0	Unshielded	Unshielded	-
10	Parking Brake	2.0	Unshielded	Unshielded	-
11	AUDIO OUT 1	0.15+3.6	Shielded	Shielded	L/R
12	AUDIO OUT 2	0.15+3.6	Shielded	Shielded	L/R
13	DC	1.4	Unshielded	Unshielded	-
14	REAR CAMERA IN	0.15+2.0	Shielded	Shielded	-
15	SUB OUT	0.15+1.5	Shielded	Shielded	-
16	USB	1.5	Shielded	Shielded	-
17	Microphone	3.5	Shielded	Shielded	-
18	Wired Remote Controller	1.9	Shielded	Shielded	-
19	GPS Antenna	3.0	Shielded	Shielded	-
20	Data Link	0.45	Unshielded	Unshielded	-
21	AM/FM Antenna	2.0	Shielded	Shielded	-
22	Audio	3.0	Shielded	Shielded	-
23	Sirius XM	0.65	Shielded	Shielded	-
24	Antenna	7.0	Shielded	Shielded	-
25	AC	2.9	Unshielded	Unshielded	-

UL Japan, Inc.

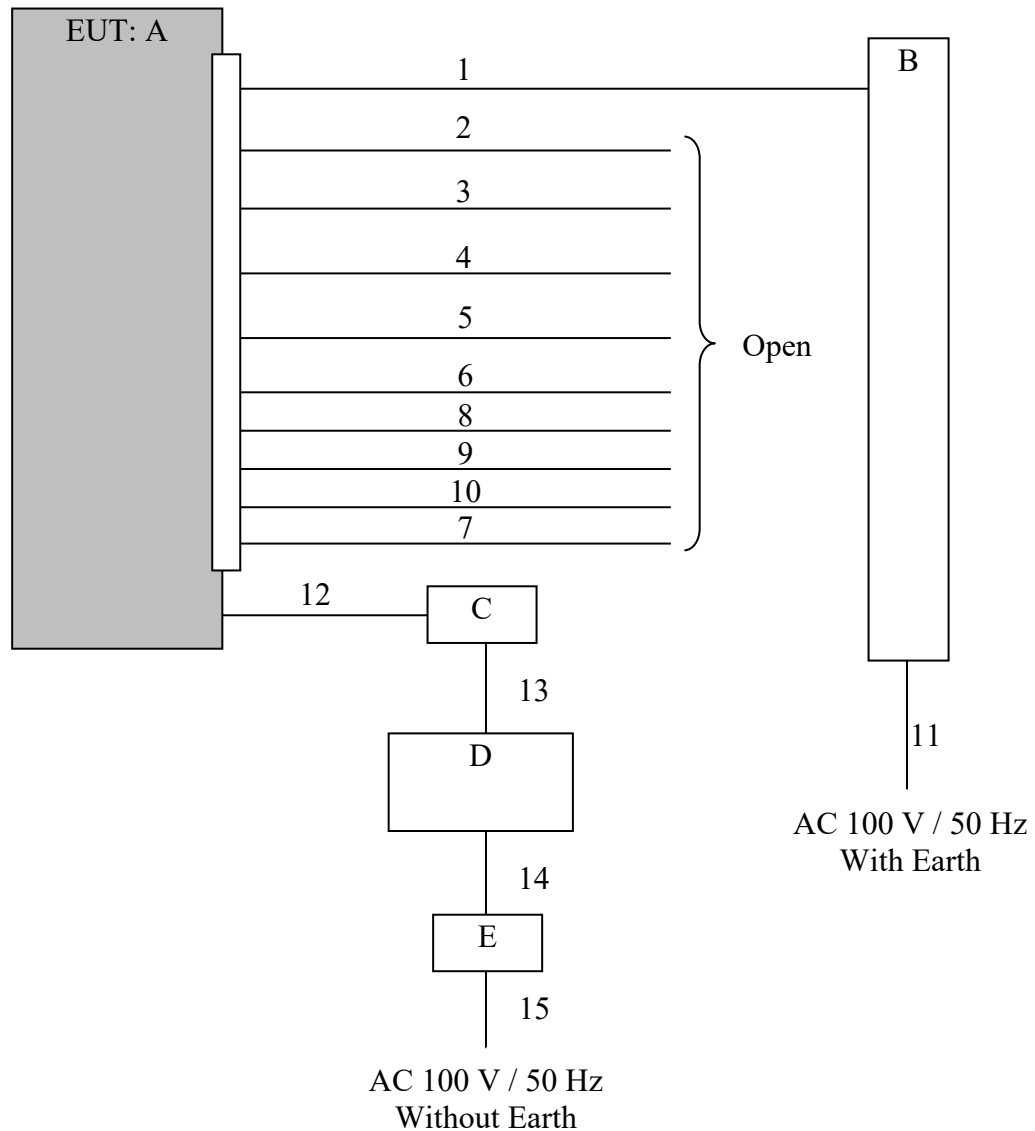
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

<For Antenna Terminated conducted emission>



* 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	AV Receiver	XAV-AX4000	279	SONY	EUT
B	DC Power Supply	PAN60-10A	NL002383	Kikusui	-
C	USB-LAN Converter	EDC-GUA3-W	08L168701192A	ELECOM	-
D	Laptop PC	7666-77J	LV-B8PVT 08/05	Lenovo	-
E	AC Adapter	42T4422	11S42T4422Z1ZF3 D9BV4XN	Lenovo	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC	0.15+2.8	Unshielded	Unshielded	ACC, B+, GND
2	Speaker	0.15	Unshielded	Unshielded	Front-L (+/-)
3	Speaker	0.15	Unshielded	Unshielded	Front-R (+/-)
4	Speaker	0.15	Unshielded	Unshielded	Rear-L (+/-)
5	Speaker	0.15	Unshielded	Unshielded	Rear-R (+/-)
6	ILL	0.15	Unshielded	Unshielded	-
7	REM OUT	0.15	Unshielded	Unshielded	-
8	SPEED IN	0.15	Unshielded	Unshielded	-
9	REVERSE IN	0.15	Unshielded	Unshielded	-
10	Parking Brake	2.0	Unshielded	Unshielded	-
11	AC	2.9	Unshielded	Unshielded	-
12	USB	0.1	Shielded	Shielded	-
13	LAN	3.0	Unshielded	Unshielded	-
14	DC	1.8	Unshielded	Unshielded	-
15	AC	0.9	Unshielded	Unshielded	-

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 5: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1 GHz >

EUT was placed on a urethane platform of nominal size, 2.0 m by 1.0 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 1 GHz >

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

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 1 GHz >

The result also satisfied with the general limits specified in section 15.209 (a).

< Above 1 GHz >

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:

$$E = \frac{1000000 \sqrt{30P}}{3} \text{ (uV/m)} \quad : P \text{ is the e.i.r.p. (Watts)}$$

Test Antennas are used as below;

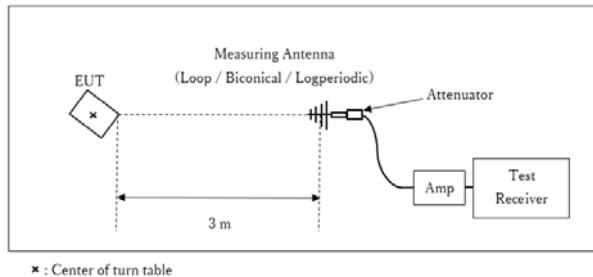
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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".

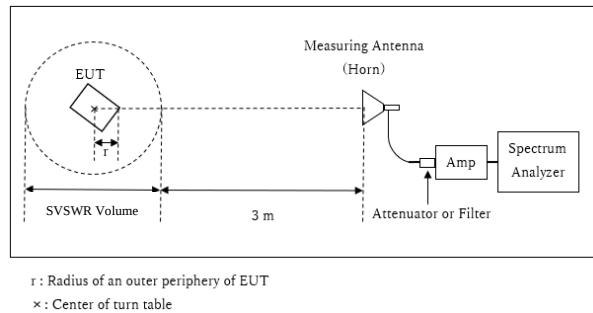
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

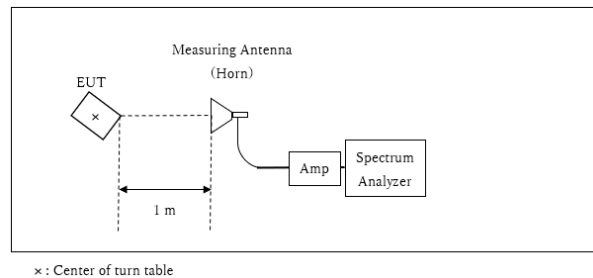
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.1 \text{ m}$

10 GHz - 40 GHz



Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg and 30 deg of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)	Spurious (26.5 GHz - 40 GHz)
Horizontal	30 deg.	0 deg.	30 deg.	0 deg.	30 deg.	0 deg.	0 deg.
Vertical	30 deg.	0 deg.	30 deg.	0 deg.	30 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 - 40 GHz

Test data : APPENDIX

Test result : Pass

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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 *5)	-	Power Meter (Sensor: 160 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *2)	≥ 3 RBW	Auto	RMS *5) Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)*4)	9 kHz – 150 kHz 150 kHz – 30 MHz	200 Hz 10 kHz	620 Hz 30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

* 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-5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor ($10 \log(500 \text{ kHz} / 100 \text{ kHz})$) 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-150 kHz: RBW = 200 Hz, 150 kHz-30 MHz: RBW = 10 kHz)

*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. 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.

*5) Power was measured with using the gate function.

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

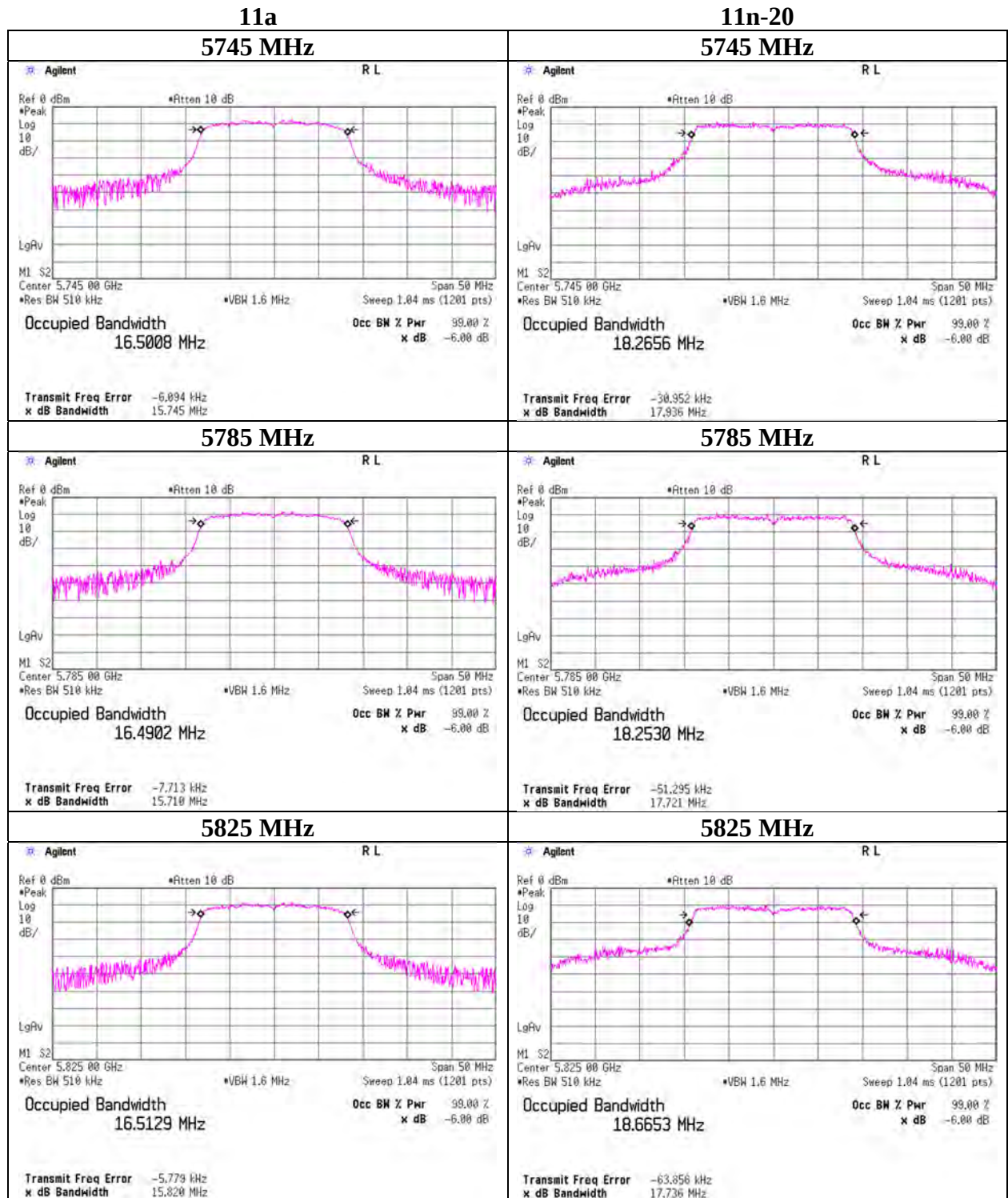
APPENDIX 1: Test data

99 % Occupied Bandwidth

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 23 deg. C / 35 % RH
Engineer Takahiro Kawakami
Mode Tx

Mode	Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
11a	5745	16500.8
	5785	16490.2
	5825	16512.9
11n-20	5745	18265.6
	5785	18253.0
	5825	18665.3
11ac-20	5745	18279.2
	5785	18364.8
	5825	18605.1

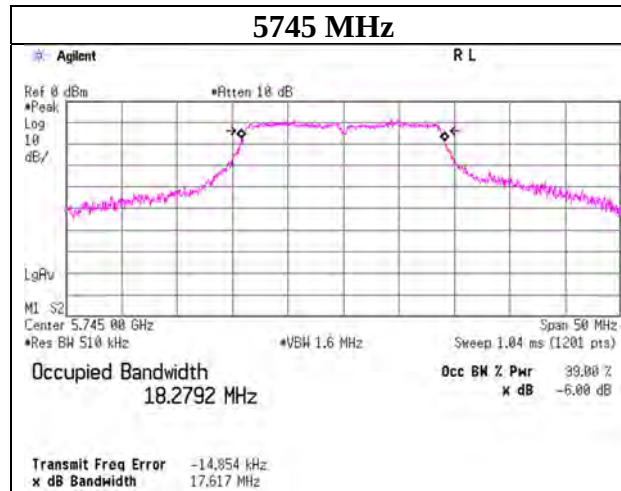
99 % Occupied Bandwidth



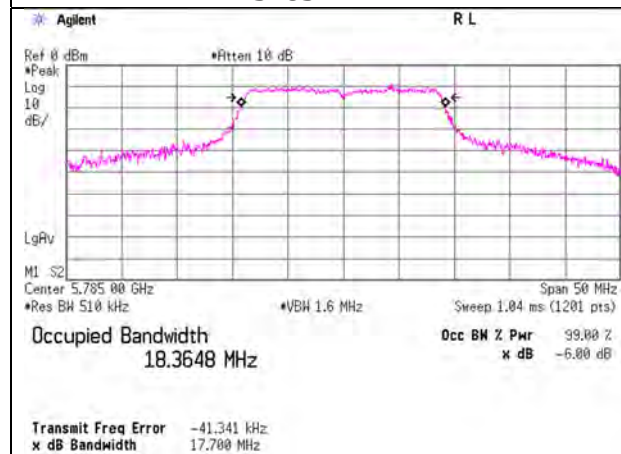
99 % Occupied Bandwidth

11ac-20

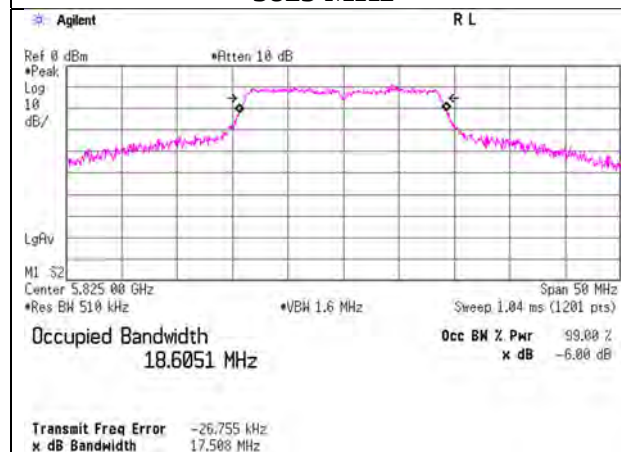
5745 MHz



5785 MHz



5825 MHz



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

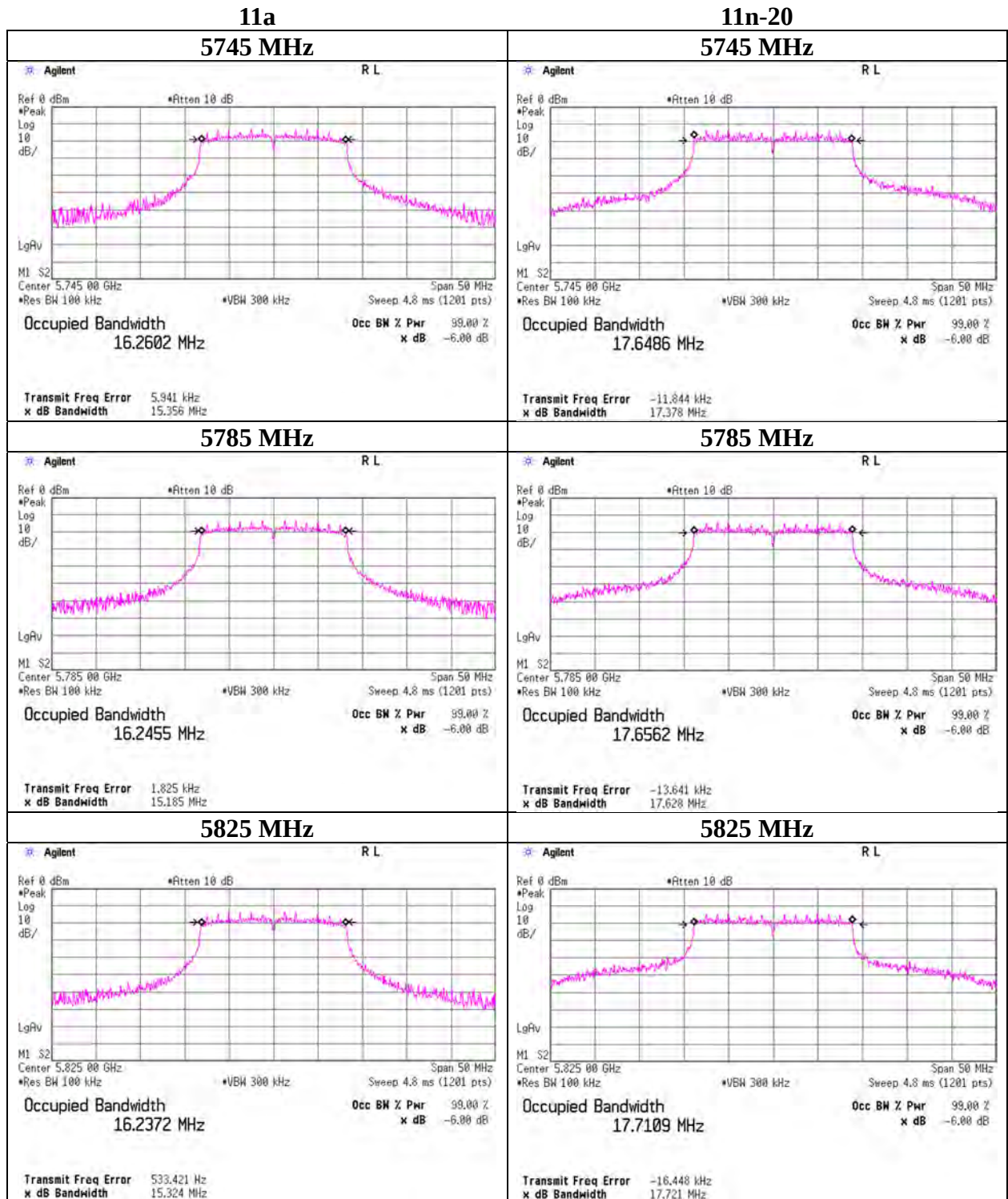
Facsimile : +81 463 50 6401

6 dB Bandwidth

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 23 deg. C / 35 % RH
Engineer Takahiro Kawakami
Mode Tx

Mode	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
11a	5745	15.356	> 0.500
	5785	15.185	> 0.500
	5825	15.324	> 0.500
11n-20	5745	17.378	> 0.500
	5785	17.628	> 0.500
	5825	17.721	> 0.500
11ac-20	5745	17.639	> 0.500
	5785	17.508	> 0.500
	5825	17.670	> 0.500

6 dB Bandwidth



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

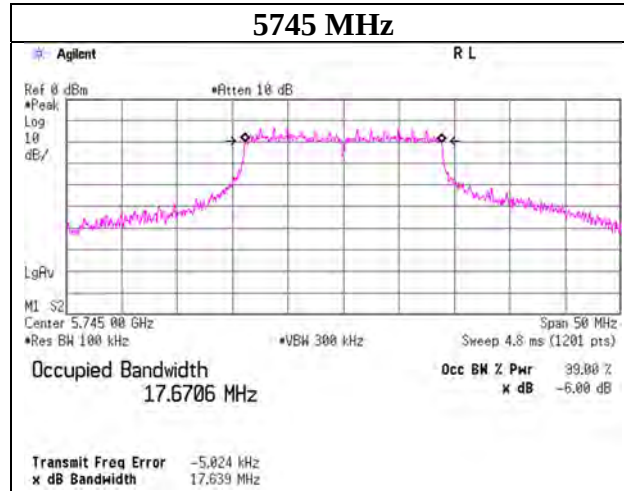
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

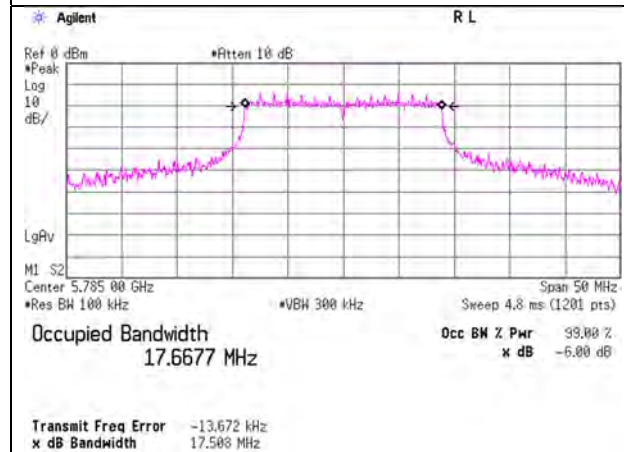
6 dB Bandwidth

11ac-20

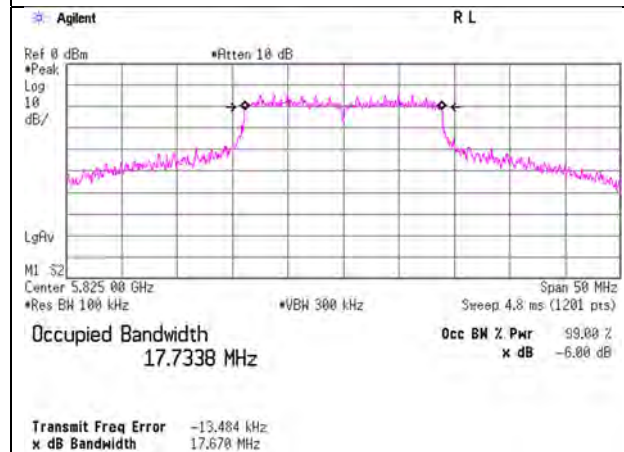
5745 MHz



5785 MHz



5825 MHz



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Conducted Output Power

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021 October 25, 2021
Temperature / Humidity 22 deg. C / 35 % RH 23 deg. C / 35 % RH
Engineer Miku Ikudome Takahiro Kawakami
Mode Tx

Applied limit: 15.407, mobile and portable client device

Mode	Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor *1)	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for ISED)	Conducted Power				e.i.r.p.			
									Result		Limit	Margin	Result		Limit	Margin
	[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
11a	5745	-3.03	1.69	10.22	0.00	3.2	-	16.501	8.88	7.73	30.00	21.12	12.08	16.15	36.00	23.92
	5785	-3.61	1.69	10.22	0.00	3.2	-	16.490	8.30	6.77	30.00	21.70	11.50	14.14	36.00	24.50
	5825	-3.86	1.71	10.22	0.00	3.2	-	16.513	8.07	6.41	30.00	21.93	11.27	13.39	36.00	24.73
11n-20	5745	-3.21	1.69	10.22	0.00	3.2	-	18.266	8.70	7.42	30.00	21.30	11.90	15.50	36.00	24.10
	5785	-3.67	1.69	10.22	0.00	3.2	-	18.253	8.24	6.68	30.00	21.76	11.44	13.95	36.00	24.56
	5825	-4.02	1.71	10.22	0.00	3.2	-	18.665	7.91	6.18	30.00	22.09	11.11	12.91	36.00	24.89
11ac-20	5745	-3.17	1.69	10.22	0.00	3.2	-	18.279	8.74	7.49	30.00	21.26	11.94	15.64	36.00	24.06
	5785	-3.72	1.69	10.22	0.00	3.2	-	18.365	8.19	6.60	30.00	21.81	11.39	13.79	36.00	24.61
	5825	-3.89	1.71	10.22	0.00	3.2	-	18.605	8.04	6.36	30.00	21.96	11.24	13.30	36.00	24.76

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

*1) Power was measured with using the gate function of power meter.

Maximum Conducted Output Power

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 22 deg. C / 35 % RH
Engineer Miku Ikudome
Mode Tx 11a

5745 MHz

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor *1) [dB]	Burst power [dBm]	Remarks
11a	6	-3.19	0.00	-3.19	-
	9	-3.23	0.00	-3.23	-
	12	-3.25	0.00	-3.25	-
	18	-3.03	0.00	-3.03	*
	24	-3.40	0.00	-3.40	-
	36	-3.30	0.00	-3.30	-
	48	-3.20	0.00	-3.20	-
	54	-3.22	0.00	-3.22	-

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

*1) Power was measured with using the gate function of power meter.

Maximum Conducted Output Power

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 22 deg. C / 35 % RH
Engineer Miku Ikudome
Mode Tx 11n-20

5745 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor *1) [dB]	Burst power [dBm]	Remarks
11n-20	0	-3.32	0.00	-3.32	-
	1	-3.53	0.00	-3.53	-
	2	-3.34	0.00	-3.34	-
	3	-3.38	0.00	-3.38	-
	4	-3.23	0.00	-3.23	-
	5	-3.21	0.00	-3.21	*
	6	-3.25	0.00	-3.25	-
	7	-3.24	0.00	-3.24	-

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

*1) Power was measured with using the gate function of power meter.

Maximum Conducted Output Power

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 22 deg. C / 35 % RH
Engineer Miku Ikudome
Mode Tx 11ac-20

5745 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor *1) [dB]	Burst power [dBm]	Remarks
11ac-20	0	-3.41	0.00	-3.41	-
	1	-3.48	0.00	-3.48	-
	2	-3.24	0.00	-3.24	-
	3	-3.30	0.00	-3.30	-
	4	-3.31	0.00	-3.31	-
	5	-3.26	0.00	-3.26	-
	6	-3.21	0.00	-3.21	-
	7	-3.17	0.00	-3.17	*
	8	-3.22	0.00	-3.22	-

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

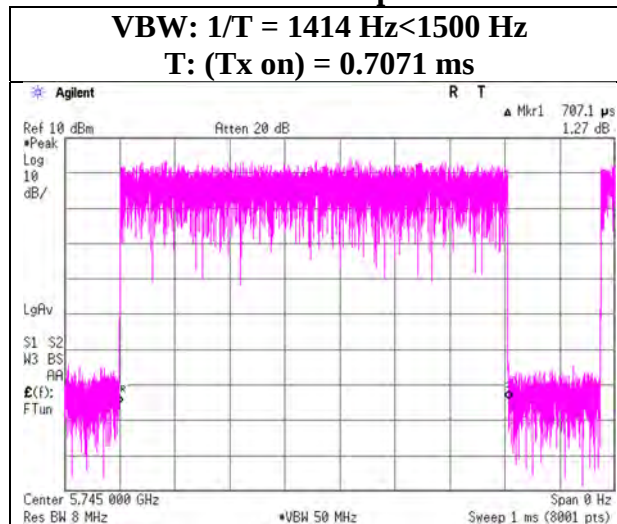
All comparison were carried out on same frequency and measurement factors.

*1) Power was measured with using the gate function of power meter.

Burst rate confirmation

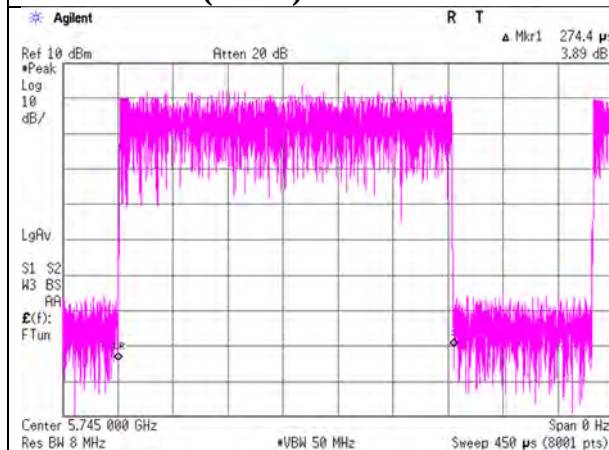
Report No.	14011702S-B
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 25, 2021
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx

11a 18 Mbps



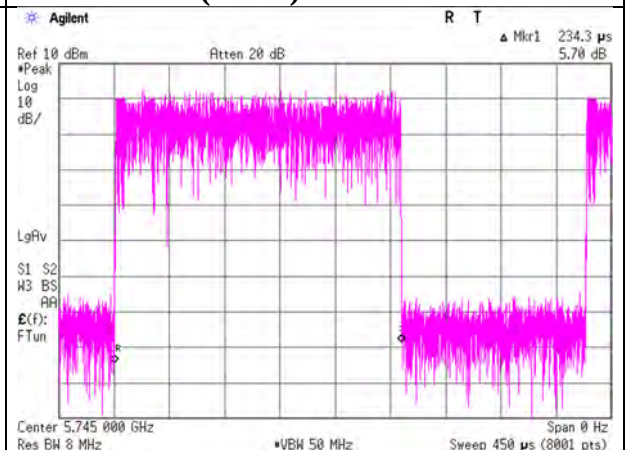
11n-20 MCS 5

VBW: $1/T = 3644 \text{ Hz} < 3900 \text{ Hz}$
T: (Tx on) = 0.2744 ms



11ac-20 MCS 7

VBW: $1/T = 4268 \text{ Hz} < 4300 \text{ Hz}$
T: (Tx on) = 0.2343 ms



Maximum Power Spectral Density

Report No.	14011702S-B
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 25, 2021
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /100 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor *1) [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]	Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]
5745	-21.90	1.69	10.22	0.00	3.2	6.99	-3.00	30.00	33.00	0.20	36.00	35.80
5785	-22.43	1.69	10.22	0.00	3.2	6.99	-3.53	30.00	33.53	-0.33	36.00	36.33
5825	-22.69	1.71	10.22	0.00	3.2	6.99	-3.77	30.00	33.77	-0.57	36.00	36.57

Sample Calculation:

PSD: Power Spectral Density

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

RBW Correction Factor = $10 \cdot \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

*1) Power was measured with using the gate function of Spectrum Analyzer.

Maximum Power Spectral Density

Report No.	14011702S-B
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 25, 2021
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /100 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor *1) [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]	Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]
5745	-19.33	1.69	10.22	0.00	3.2	6.99	-0.43	30.00	30.43	2.77	36.00	33.23
5785	-20.42	1.69	10.22	0.00	3.2	6.99	-1.52	30.00	31.52	1.68	36.00	34.32
5825	-21.38	1.71	10.22	0.00	3.2	6.99	-2.46	30.00	32.46	0.74	36.00	35.26

Sample Calculation:

PSD: Power Spectral Density

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

RBW Correction Factor = $10 \cdot \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

*1) Power was measured with using the gate function of Spectrum Analyzer.

Maximum Power Spectral Density

Report No.	14011702S-B
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 25, 2021
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /100 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor *1) [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]	Result [dBm /500 kHz]	Limit [dBm /500 kHz]	Margin [dB]
5745	-18.97	1.69	10.22	0.00	3.2	6.99	-0.07	30.00	30.07	3.13	36.00	32.87
5785	-18.46	1.69	10.22	0.00	3.2	6.99	0.44	30.00	29.56	3.64	36.00	32.36
5825	-19.90	1.71	10.22	0.00	3.2	6.99	-0.98	30.00	30.98	2.22	36.00	33.78

Sample Calculation:

PSD: Power Spectral Density

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

RBW Correction Factor = $10 \cdot \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

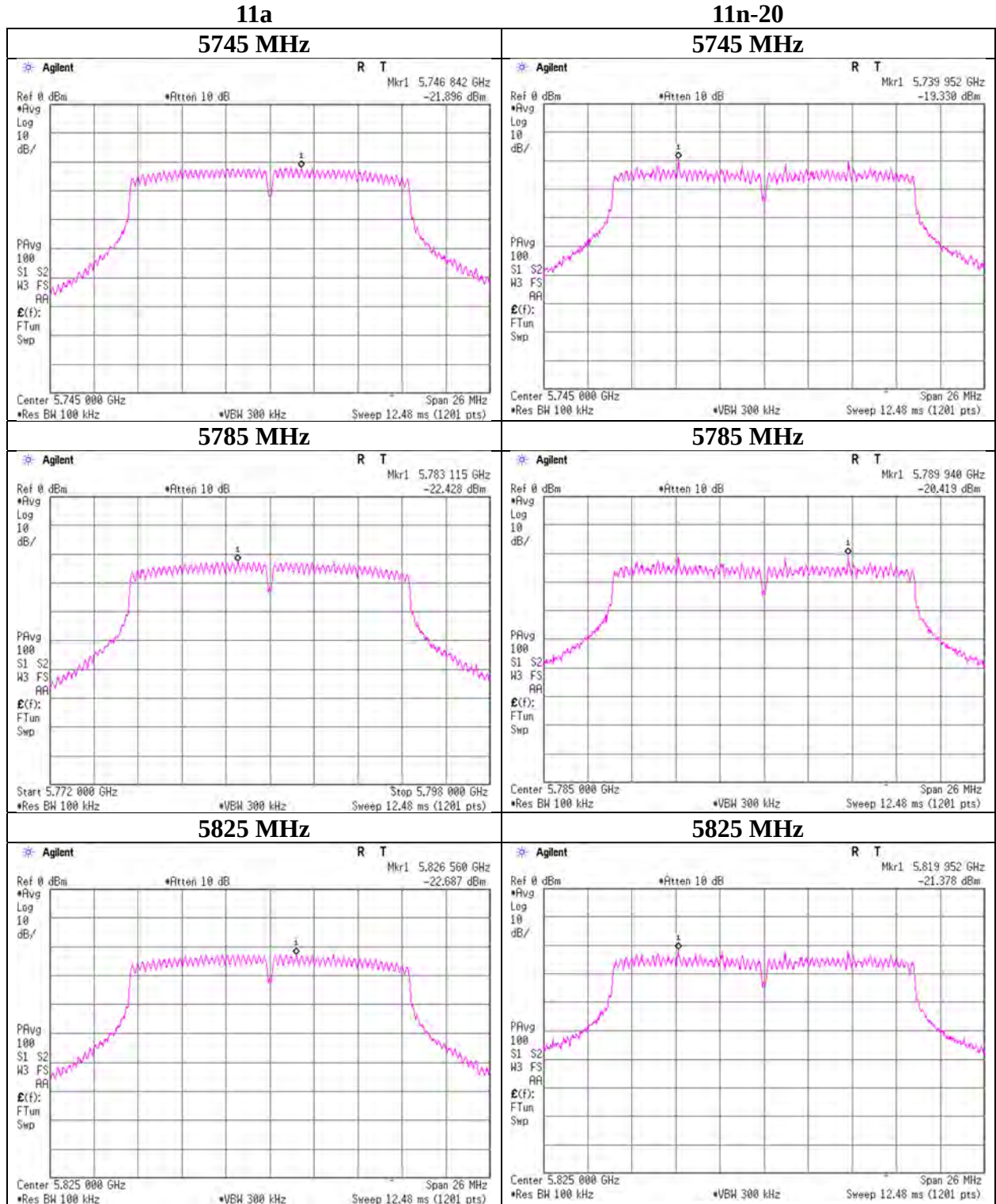
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

*1) Power was measured with using the gate function of Spectrum Analyzer.

Maximum Power Spectral Density

Report No.	14011702S-B
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 25, 2021
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

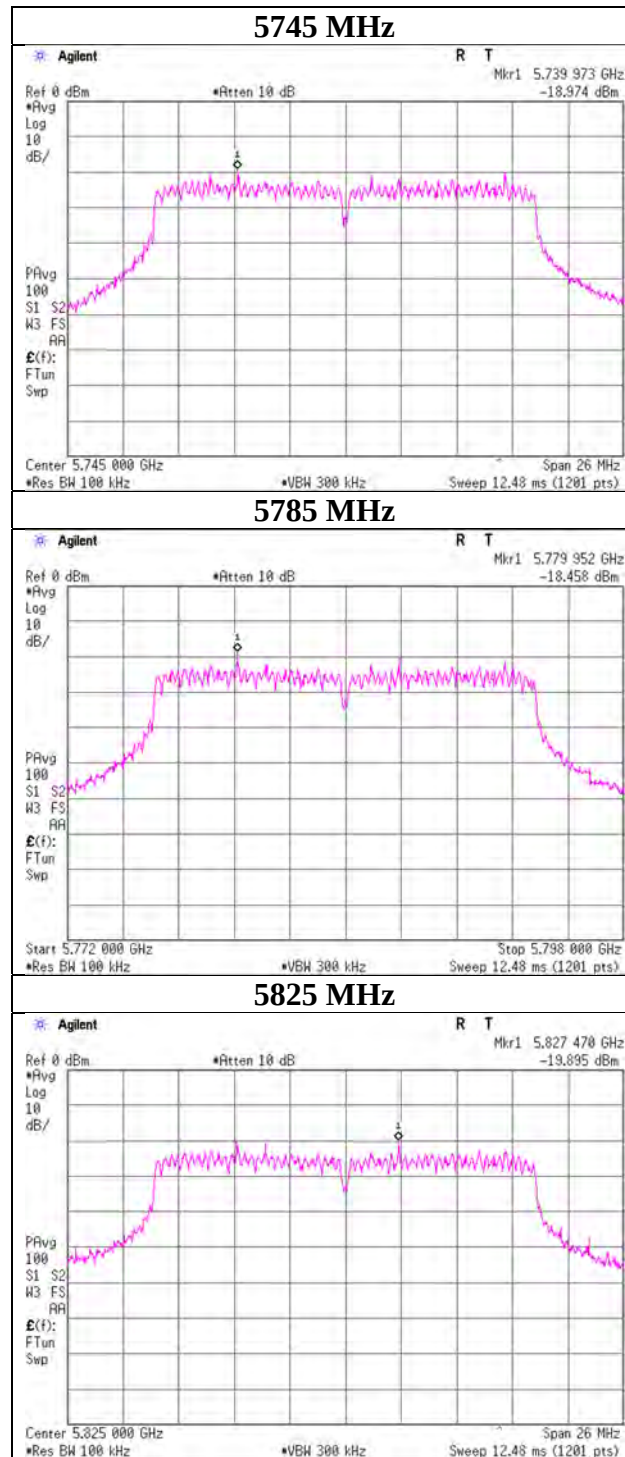
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Power Spectral Density

Report No. 14011702S-B
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 25, 2021
Temperature / Humidity 23 deg. C / 35 % RH
Engineer Takahiro Kawakami
Mode Tx

11ac-20



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	November 4, 2021	October 29, 2021	October 30, 2021	October 31, 2021
Temperature / Humidity	24 deg.C, 41 %RH	23 deg.C, 37 %RH	21 deg.C, 32 %RH	21 deg.C, 37 %RH
Engineer	Hiromasa Sato	Takahiro Kawakami	Yosuke Murakami	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -6.4 GHz)	(6.4 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.	86.016	QP	47.57	7.38	8.42	31.80	0.00	31.57	40.0	8.4	341	138	-
Hori.	159.744	QP	39.78	15.23	8.93	31.78	0.00	32.16	43.5	11.3	207	132	-
Hori.	276.127	QP	51.58	13.22	6.37	31.76	0.00	39.41	46.0	6.5	139	149	-
Hori.	442.366	QP	45.33	16.34	7.51	31.88	0.00	37.30	46.0	8.7	100	298	-
Hori.	454.654	QP	44.72	16.66	7.58	31.89	0.00	37.07	46.0	8.9	100	288	-
Hori.	599.998	QP	43.06	19.27	8.35	32.03	0.00	38.65	46.0	7.3	100	194	-
Hori.	999.997	QP	44.49	22.66	10.34	30.67	0.00	46.82	53.9	7.0	135	329	-
Hori.	11490.000	PK	44.73	37.89	11.01	39.65	-9.54	44.44	73.9	29.4	150	0	-
Hori.	11490.000	AV	33.33	37.89	11.01	39.65	-9.54	33.04	53.9	20.8	150	0	VBW: 1.5 kHz
Vert.	33.614	QP	35.16	17.27	7.12	31.83	0.00	27.72	40.0	12.2	100	358	-
Vert.	49.869	QP	38.24	11.26	7.47	31.81	0.00	25.16	40.0	14.8	100	4	-
Vert.	265.204	QP	48.70	12.55	6.29	31.75	0.00	35.79	46.0	10.2	100	1	-
Vert.	599.998	QP	41.41	19.27	8.35	32.03	0.00	37.00	46.0	9.0	100	122	-
Vert.	999.997	QP	44.30	22.66	10.34	30.67	0.00	46.63	53.9	7.2	151	344	-
Vert.	11490.000	PK	45.20	37.89	11.01	39.65	-9.54	44.91	73.9	28.9	166	192	-
Vert.	11490.000	AV	34.19	37.89	11.01	39.65	-9.54	33.90	53.9	20.0	166	192	VBW: 1.5 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 (3.90 m / 3.0 m) = 2.28 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	45.15	31.95	17.54	39.87	2.28	57.05	-38.18	-27.0	11.1	232	320	-
Hori.	5700.000	PK	46.14	32.07	17.57	39.89	2.28	58.17	-37.06	10.0	47.0	232	320	-
Hori.	5720.000	PK	45.31	32.12	17.58	39.89	2.28	57.40	-37.83	15.6	53.4	232	320	-
Hori.	5725.000	PK	46.24	32.14	17.59	39.89	2.28	58.36	-36.87	27.0	63.8	232	320	-
Hori.	17235.000	PK	45.13	40.12	14.11	38.80	-9.54	51.02	-44.21	-27.0	17.2	150	0	-
Vert.	5650.000	PK	46.84	31.95	17.54	39.87	2.28	58.74	-36.49	-27.0	9.4	129	182	-
Vert.	5700.000	PK	45.88	32.07	17.57	39.89	2.28	57.91	-37.32	10.0	47.3	129	182	-
Vert.	5720.000	PK	47.53	32.12	17.58	39.89	2.28	59.62	-35.61	15.6	51.2	129	182	-
Vert.	5725.000	PK	50.29	32.14	17.59	39.89	2.28	62.41	-32.82	27.0	59.8	129	182	-
Vert.	17235.000	PK	45.50	40.12	14.11	38.80	-9.54	51.39	-43.84	-27.0	16.8	100	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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

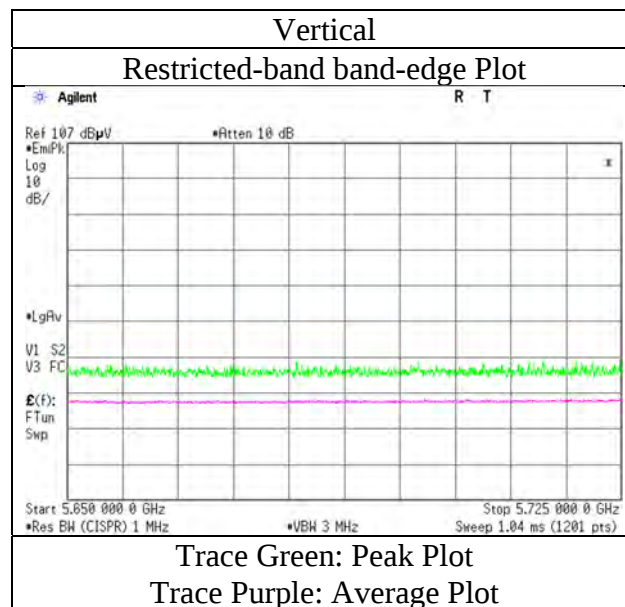
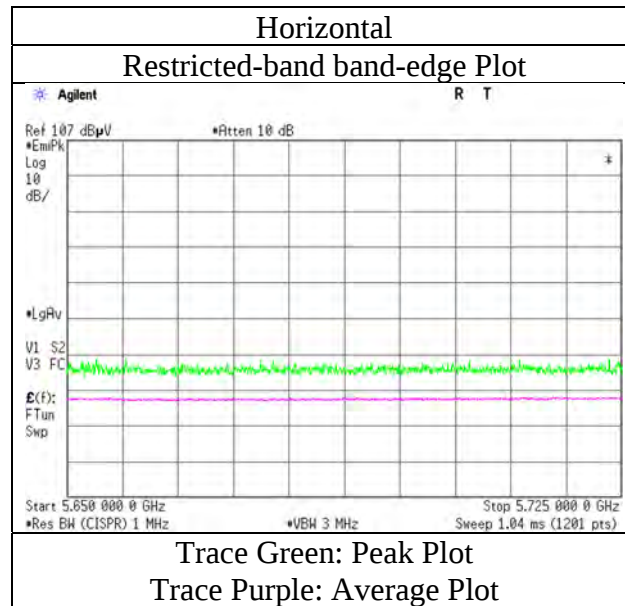
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
	(1 GHz -6.4 GHz)
Mode	Tx 11a 5745 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	October 29, 2021	October 30, 2021	October 31, 2021
Temperature / Humidity	23 deg.C, 37 %RH	21 deg.C, 32 %RH	21 deg.C, 37 %RH
Engineer	Takahiro Kawakami	Yosuke Murakami	Shiro Kobayashi
	(1 GHz -6.4 GHz)	(6.4 GHz -10 GHz)	(10 GHz -40 GHz)
Mode	Tx 11a 5785 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.	11570.000	PK	43.41	37.97	11.06	39.49	-9.54	43.41	73.9	30.4	150	0	-
Hori.	11570.000	AV	32.46	37.97	11.06	39.49	-9.54	32.46	53.9	21.4	150	0	VBW: 1.5 kHz, Floor Noise
Vert.	11570.000	PK	44.15	37.97	11.06	39.49	-9.54	44.15	73.9	29.7	157	190	-
Vert.	11570.000	AV	33.55	37.97	11.06	39.49	-9.54	33.55	53.9	20.3	157	190	VBW: 1.5 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 (3.90 m / 3.0 m) = 2.28 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.	17355.000	PK	45.21	40.26	14.16	38.54	-9.54	51.55	-43.68	-27.0	16.6	150	0	-
Vert.	17355.000	PK	45.76	40.26	14.16	38.54	-9.54	52.10	-43.13	-27.0	16.1	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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	October 29, 2021	October 30, 2021	October 31, 2021
Temperature / Humidity	23 deg.C, 37 %RH	21 deg.C, 32 %RH	21 deg.C, 37 %RH
Engineer	Takahiro Kawakami	Yosuke Murakami	Shiro Kobayashi
	(1 GHz -6.4 GHz)	(6.4 GHz -10 GHz)	(10 GHz -40 GHz)
Mode	Tx 11a 5825 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.	11650.000	PK	43.00	38.02	11.12	39.31	-9.54	43.29	73.9	30.6	150	0	-
Hori.	11650.000	AV	31.75	38.02	11.12	39.31	-9.54	32.04	53.9	21.8	150	0	VBW: 1.5 kHz, Floor Noise
Vert.	11650.000	PK	43.36	38.02	11.12	39.31	-9.54	43.65	73.9	30.2	166	189	-
Vert.	11650.000	AV	32.42	38.02	11.12	39.31	-9.54	32.71	53.9	21.1	166	189	VBW: 1.5 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 (3.90 m / 3.0 m) = 2.28 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.	5850.000	PK	46.37	32.46	17.67	39.93	2.28	58.85	-36.38	27.0	63.3	185	304	-
Hori.	5855.000	PK	46.60	32.47	17.67	39.93	2.28	59.09	-36.14	15.6	51.7	185	304	-
Hori.	5875.000	PK	46.90	32.50	17.70	39.94	2.28	59.44	-35.79	10.0	45.7	185	304	-
Hori.	5925.000	PK	46.53	32.57	17.73	39.95	2.28	59.16	-36.07	-27.0	9.0	185	304	-
Hori.	17475.000	PK	44.84	40.34	14.23	38.28	-9.54	51.59	-43.64	-27.0	16.6	150	0	-
Vert.	5850.000	PK	45.86	32.46	17.67	39.93	2.28	58.34	-36.89	27.0	63.8	120	181	-
Vert.	5855.000	PK	46.80	32.47	17.67	39.93	2.28	59.29	-35.94	15.6	51.5	120	181	-
Vert.	5875.000	PK	46.01	32.50	17.70	39.94	2.28	58.55	-36.68	10.0	46.6	120	181	-
Vert.	5925.000	PK	46.43	32.57	17.73	39.95	2.28	59.06	-36.17	-27.0	9.1	120	181	-
Vert.	17475.000	PK	45.28	40.34	14.23	38.28	-9.54	52.03	-43.20	-27.0	16.2	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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

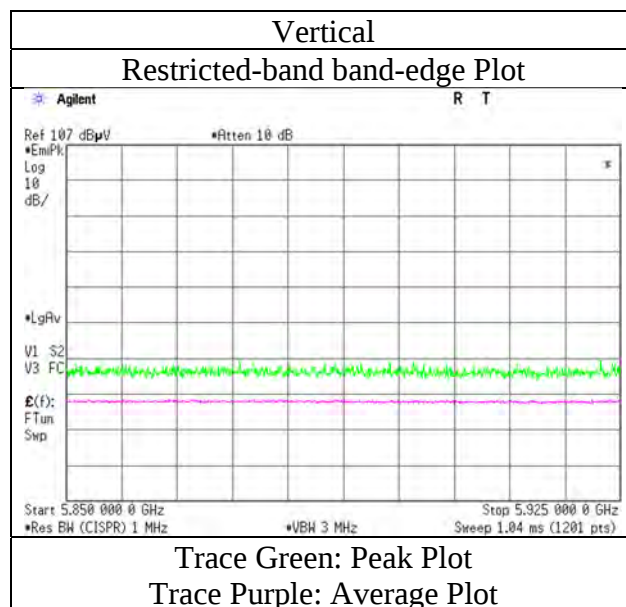
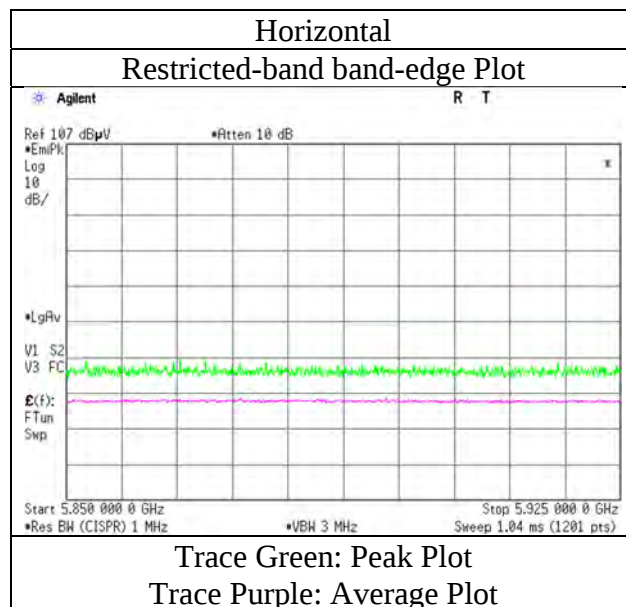
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
Mode	Tx 11a 5825 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14011702S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date October 29, 2021
Temperature / Humidity 23 deg.C, 37 %RH
Engineer Takahiro Kawakami
(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	45.68	31.95	17.54	39.87	2.28	57.58	-37.65	-27.0	10.6	217	278	-
Hori.	5700.000	PK	45.56	32.07	17.57	39.89	2.28	57.59	-37.64	10.0	47.6	217	278	-
Hori.	5720.000	PK	47.15	32.12	17.58	39.89	2.28	59.24	-35.99	15.6	51.5	217	278	-
Hori.	5725.000	PK	51.02	32.14	17.59	39.89	2.28	63.14	-32.09	27.0	59.0	217	278	-
Vert.	5650.000	PK	45.71	31.95	17.54	39.87	2.28	57.61	-37.62	-27.0	10.6	123	179	-
Vert.	5700.000	PK	46.34	32.07	17.57	39.89	2.28	58.37	-36.86	10.0	46.8	123	179	-
Vert.	5720.000	PK	48.53	32.12	17.58	39.89	2.28	60.62	-34.61	15.6	50.2	123	179	-
Vert.	5725.000	PK	53.69	32.14	17.59	39.89	2.28	65.81	-29.42	27.0	56.4	123	179	-

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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

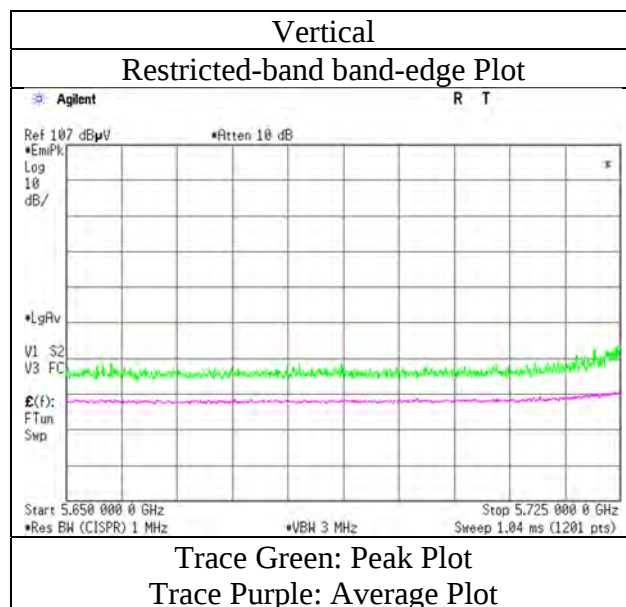
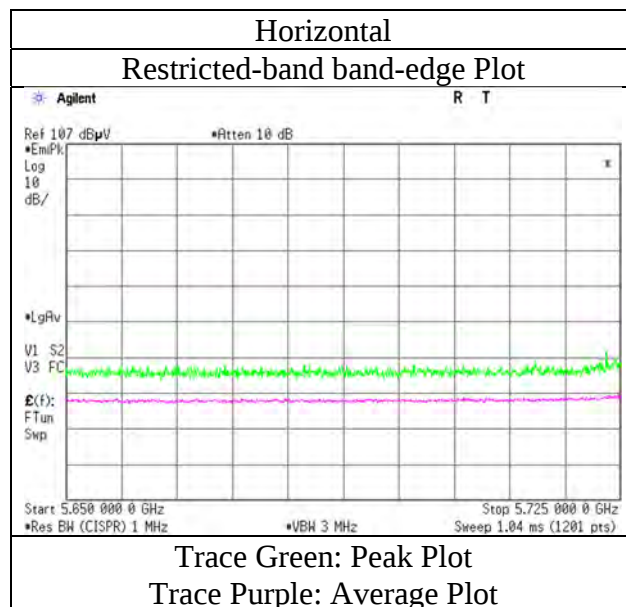
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-20 5745 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14011702S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date October 29, 2021
Temperature / Humidity 23 deg.C, 37 %RH
Engineer Takahiro Kawakami
(1 GHz -6.4 GHz)
Mode Tx 11n-20 5825 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.	5850.000	PK	46.56	32.46	17.67	39.93	2.28	59.04	-36.19	27.0	63.1	186	305	-
Hori.	5855.000	PK	46.78	32.47	17.67	39.93	2.28	59.27	-35.96	15.6	51.5	186	305	-
Hori.	5875.000	PK	46.90	32.50	17.70	39.94	2.28	59.44	-35.79	10.0	45.7	186	305	-
Hori.	5925.000	PK	46.16	32.57	17.73	39.95	2.28	58.79	-36.44	-27.0	9.4	186	305	-
Vert.	5850.000	PK	46.76	32.46	17.67	39.93	2.28	59.24	-35.99	27.0	62.9	185	132	-
Vert.	5855.000	PK	47.03	32.47	17.67	39.93	2.28	59.52	-35.71	15.6	51.3	185	132	-
Vert.	5875.000	PK	46.09	32.50	17.70	39.94	2.28	58.63	-36.60	10.0	46.6	185	132	-
Vert.	5925.000	PK	46.04	32.57	17.73	39.95	2.28	58.67	-36.56	-27.0	9.5	185	132	-

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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

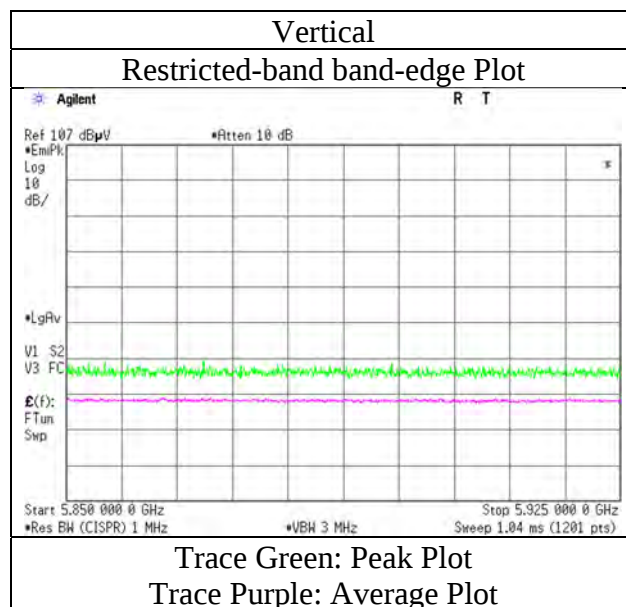
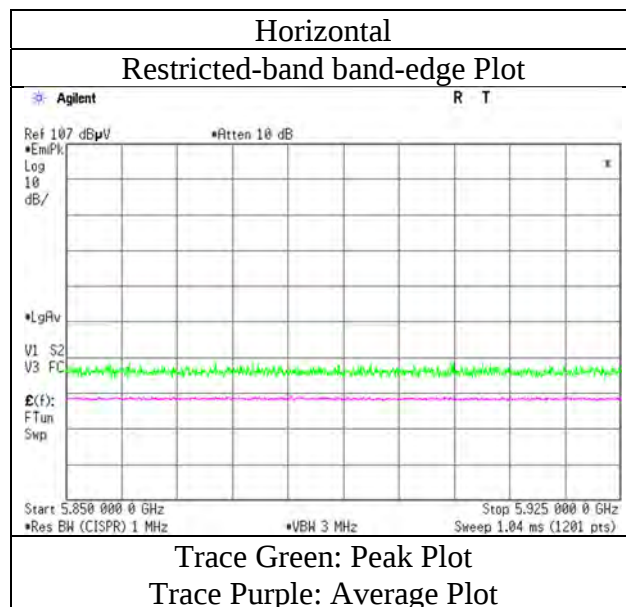
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-20 5825 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14011702S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date October 29, 2021
Temperature / Humidity 23 deg.C, 37 %RH
Engineer Takahiro Kawakami
(1 GHz -6.4 GHz)
Mode Tx 11ac-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	45.69	31.95	17.54	39.87	2.28	57.59	-37.64	-27.0	10.6	221	279	-
Hori.	5700.000	PK	45.81	32.07	17.57	39.89	2.28	57.84	-37.39	10.0	47.3	221	279	-
Hori.	5720.000	PK	47.98	32.12	17.58	39.89	2.28	60.07	-35.16	15.6	50.7	221	279	-
Hori.	5725.000	PK	49.51	32.14	17.59	39.89	2.28	61.63	-33.60	27.0	60.6	221	279	-
Vert.	5650.000	PK	45.55	31.95	17.54	39.87	2.28	57.45	-37.78	-27.0	10.7	127	181	-
Vert.	5700.000	PK	45.83	32.07	17.57	39.89	2.28	57.86	-37.37	10.0	47.3	127	181	-
Vert.	5720.000	PK	49.53	32.12	17.58	39.89	2.28	61.62	-33.61	15.6	49.2	127	181	-
Vert.	5725.000	PK	51.56	32.14	17.59	39.89	2.28	63.68	-31.55	27.0	58.5	127	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 (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

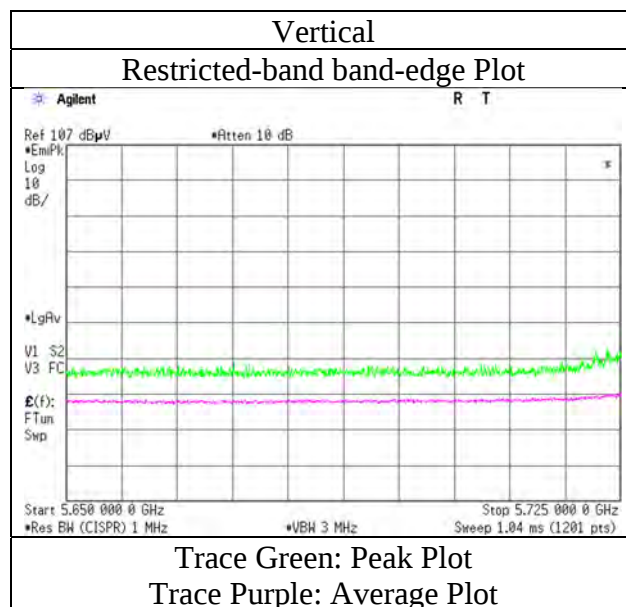
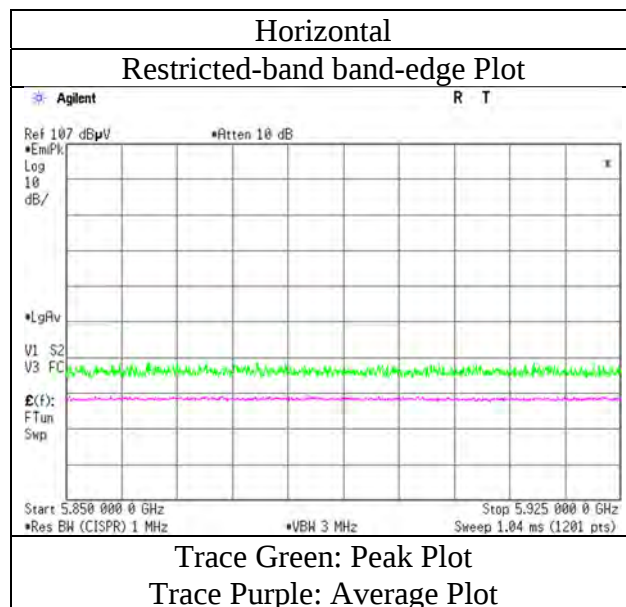
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-20 5745 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14011702S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date October 29, 2021
Temperature / Humidity 23 deg.C, 37 %RH
Engineer Takahiro Kawakami
(1 GHz -6.4 GHz)
Mode Tx 11ac-20 5825 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.	5850.000	PK	46.15	32.46	17.67	39.93	2.28	58.63	-36.60	27.0	63.6	215	278	-
Hori.	5855.000	PK	46.81	32.47	17.67	39.93	2.28	59.30	-35.93	15.6	51.5	215	278	-
Hori.	5875.000	PK	46.99	32.50	17.70	39.94	2.28	59.53	-35.70	10.0	45.7	215	278	-
Hori.	5925.000	PK	46.14	32.57	17.73	39.95	2.28	58.77	-36.46	-27.0	9.4	215	278	-
Vert.	5850.000	PK	46.26	32.46	17.67	39.93	2.28	58.74	-36.49	27.0	63.4	119	181	-
Vert.	5855.000	PK	46.46	32.47	17.67	39.93	2.28	58.95	-36.28	15.6	51.8	119	181	-
Vert.	5875.000	PK	46.17	32.50	17.70	39.94	2.28	58.71	-36.52	10.0	46.5	119	181	-
Vert.	5925.000	PK	45.71	32.57	17.73	39.95	2.28	58.34	-36.89	-27.0	9.8	119	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)

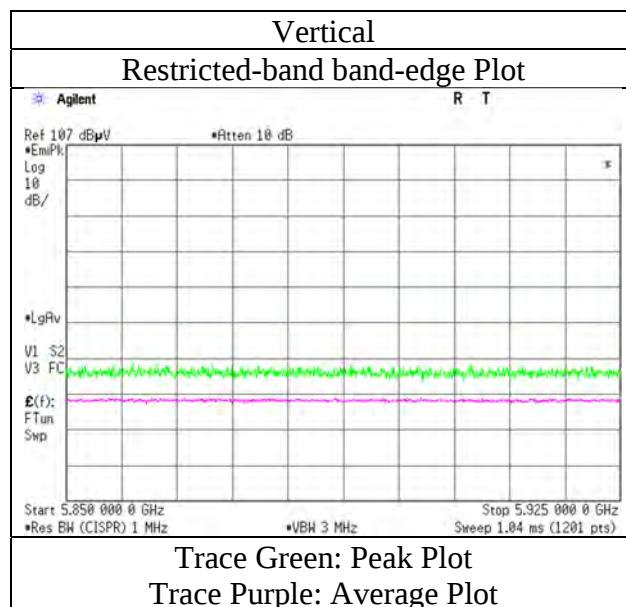
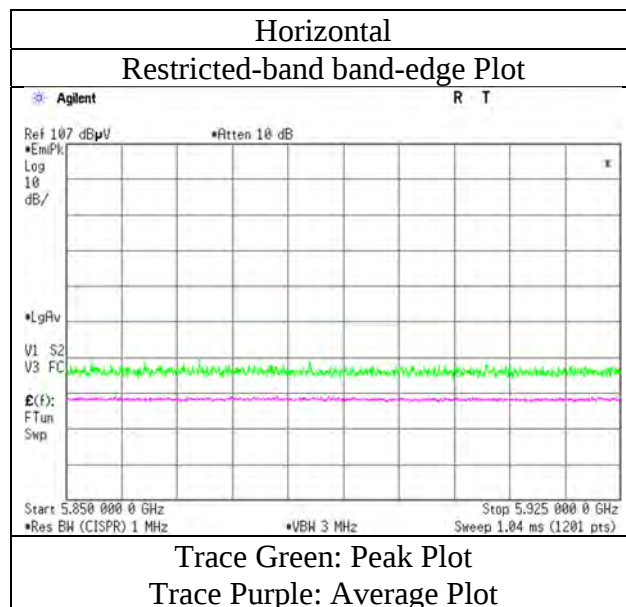
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Report No.	14011702S-B
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	October 29, 2021
Temperature / Humidity	23 deg.C, 37 %RH
Engineer	Takahiro Kawakami
Mode	Tx 11ac-20 5825 MHz



* 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.

UL Japan, Inc.

Shonan EMC Lab.

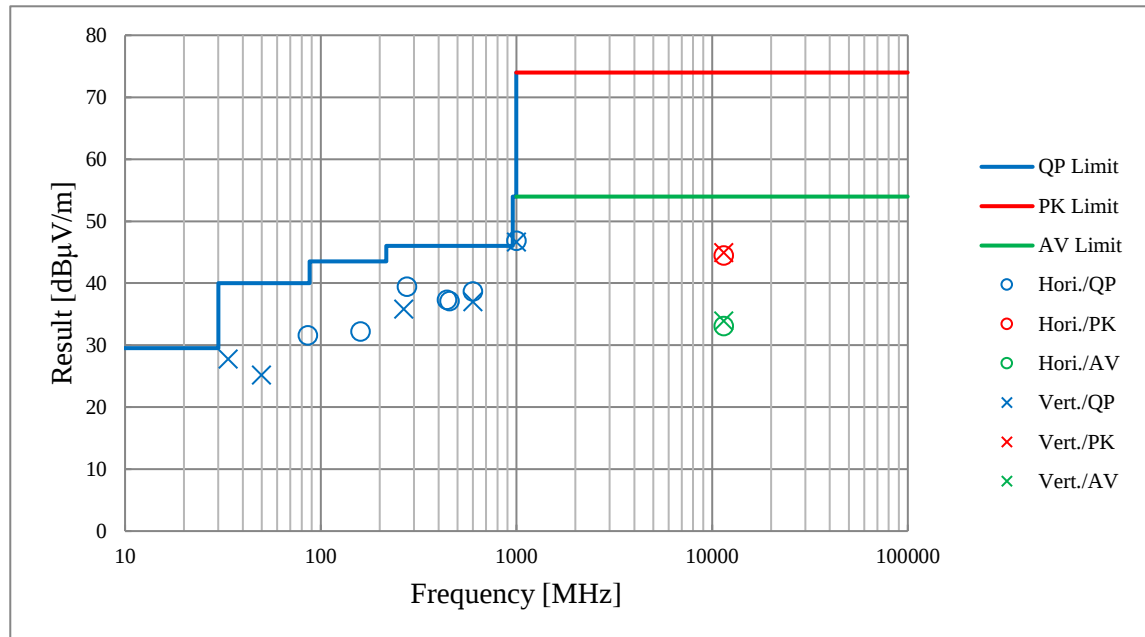
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Plot data, Worst case)

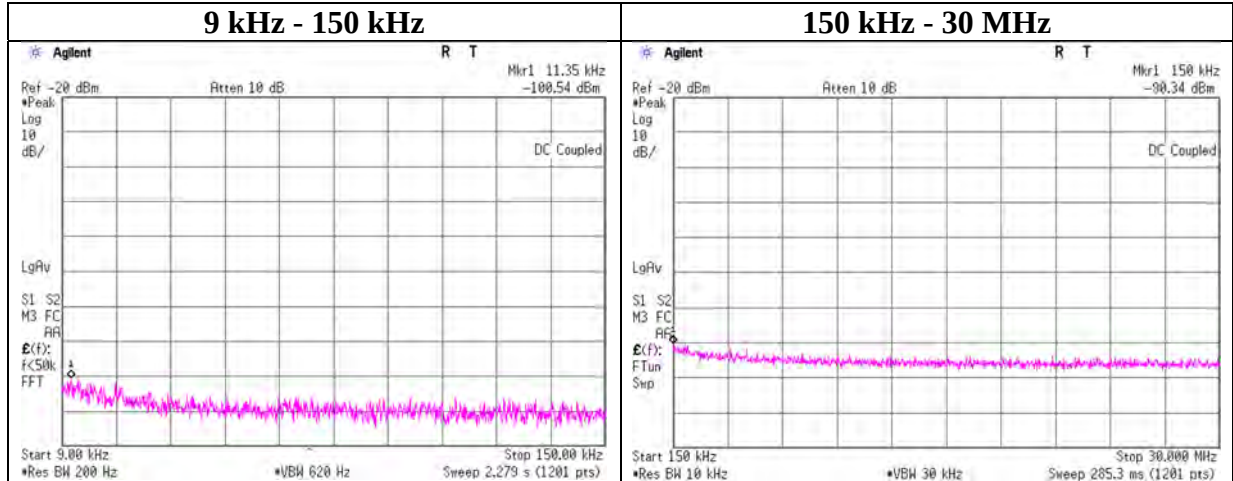
Report No.	14011702S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	November 4, 2021	October 29, 2021	October 30, 2021	October 31, 2021
Temperature / Humidity	24 deg.C, 41 %RH	23 deg.C, 37 %RH	21 deg.C, 32 %RH	21 deg.C, 37 %RH
Engineer	Hiromasa Sato (30 MHz -1 GHz)	Takahiro Kawakami (1 GHz -6.4 GHz)	Yosuke Murakami (6.4 GHz -10 GHz)	Shiro Kobayashi (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

Report No. 14011702S-B
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 25, 2021
Temperature / Humidity 23 deg. C / 35 % RH
Engineer Takahiro Kawakami
Mode Tx 11a 5745 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
11.35	-100.5	0.01	10.1	3.2	1	-87.2	300	6.0	-26.0	46.5	72.5	-
150.00	-90.3	0.01	10.1	3.2	1	-77.0	300	6.0	-15.8	24.0	39.8	-

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

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

N: Number of output

APPENDIX 2: Test instruments

Test equipment(1/2)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	SAT10-15	160493	Attenuator	Weinschel Corp.	54A-10	83406	2020/12/21	12
AT	SCC-G63	196946	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803411/2	2021/03/01	12
AT	SOS-24	191841	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/10/14	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2021/01/25	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2021/01/25	12
AT	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	12
AT	SRENT-22	202830	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250036	2020/11/24	12
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	-	-	-
RE	KAT6-04	144899	Attenuator	Inmet	18N-6dB	-	2020/12/10	12
RE	KJM-09	145929	Measure	VARIOUS	Any	-	-	-
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2021/04/30	12
RE	SAEC-01 (SVSWR)	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2021/05/09	12
RE	SAF-01	145003	Pre Amplifier	SONOMA	310N	290211	2021/02/10	12
RE	SAF-04	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2021/05/17	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAF-10	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2021/03/01	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2021/10/07	12
RE	SAT3-09	144959	Attenuator	JFW	50HF-003N	-	2021/08/16	12
RE	SBA-01	145161	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032664	2021/04/10	12
RE	SCC-A1/A3/A5/A7/A8/A13/SRSE-01	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269 (RF Selector)	2021/04/13	12
RE	SCC-A2/A4/A6/A7/A8/A13/SRSE-01	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2021/04/12	12
RE	SCC-G05	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2021/01/26	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2021/01/19	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G62	196985	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803650/2	2021/03/01	12

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test equipment(2/2)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
RE	SCC-G68	200008	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575616/4	2021/07/06	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2021/10/05	12
RE	SHA-01	145383	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-725	2021/05/20	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2021/06/14	12
RE	SHA-06	145514	Horn Antenna	ETS-Lindgren	3160-10	00092383	2021/06/14	12
RE	SHA-08	194683	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	694	2021/03/03	12
RE	SJM-21	207278	Measuring Tool, Tape Measure	ASKUL	-	-	-	-
RE	SLA-05	145527	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	193	2021/04/10	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2021/04/13	12
RE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2021/04/27	12
RE	STS-01	145792	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997812	2021/09/14	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

RE: Radiated Emission

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401