



RADIO TEST REPORT

Test Report No. : 12021807S-E-R2

Applicant : JVC KENWOOD Corporation
Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX995S
FCC ID : IOMJ5175
Test regulation : FCC Part 15 Subpart E: 2018
Test Result : Complied

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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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. This report is a revised version of 12021807S-E-R1. 12021807S-E-R1 is replaced with this report.

Date of test: November 9 to 16, 2017

Representative test engineer:

Makoto Hosaka
Engineer
Consumer Technology Division

Approved by:

Akira Sato
Engineer
Consumer Technology Division



- 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

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Radiated Spurious Emission and Band Edge Compliance	11
SECTION 7: Antenna Terminal Conducted Tests.....	13
APPENDIX 1: Test data	14
99 % Occupied Bandwidth.....	14
6 dB Bandwidth	18
Maximum Conducted Output Power	21
Average Output Power	25
Burst rate confirmation	26
Maximum Power Spectral Density	27
Radiated Spurious Emission	33
Conducted Spurious Emission	48
APPENDIX 2: Test instruments	49
APPENDIX 3: Photographs of test setup	50
Radiated Spurious Emission	50

SECTION 1: Customer information

Company Name : JVC KENWOOD Corporation
Address : 2967-3, Ishikawa-machi, Hachioji, Tokyo 192-8525 Japan
Telephone Number : +81-42-646-5525
Facsimile Number : +81-42-646-1440
Contact Person : Seigo Tsutsumi

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX995S
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12 V
Receipt Date of Sample : November 6, 2017
Country of Mass-production : Indonesia
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: DNX995S (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

General Specification

Clock frequency in the system (Maximum) : 6.3 GHz

Radio Specification

Type of radio	Bluetooth (BDR/EDR)	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2402 - 2480 MHz	2412 - 2462 MHz	2412 - 2462 MHz	5745 - 5805 MHz	2412 - 2462 MHz 5745 - 5805 MHz	5755 - 5795 MHz
Type of modulation	FHSS	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	1 MHz	5 MHz		20 MHz	2.4 GHz band 5 MHz 5 GHz band 20 MHz	2.4 GHz band 5 MHz 5 GHz band 40 MHz

Antenna type	Chip Antenna
Antenna Gain	-5.9 dBi (2.4 GHz), -5.2 dBi (5 GHz)
Power Supply (radio art input)	DC 3.6 V/ 3.3 V
Clock frequency (Maximum)	37.4 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

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on January 2, 2018 and effective February 1, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart E
Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

* The revision on January 2, 2018, does not affect the test specification applied to the EUT.

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	N/A*1)	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)	See data	N/A	Conducted
	IC: -	IC: -			
Maximum Conducted Output Power	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)		Complied	Conducted
	IC: -	IC: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Maximum Power Spectral Density	FCC: KDB Publication Number 789033	FCC : 15.407 (a) (1) (2) (3)		Complied	Conducted
	IC: -	IC: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033	FCC: 15.407 (b), 15.205 and 15.209	5.3 dB 960.281 MHz, QP, Hori. (Tx, 11a, 5805 MHz)	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *2)
	IC: -	IC: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2			
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013	FCC: 15.407 (e)	See data	Complied	Conducted
	IC: -	IC: RSS-247 6.2.4.1			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* DFS test is not applicable since the EUT does not operate in the 5.25 GHz -5.35 GHz and 5.47 GHz -5.725 GHz bands.

*1) The test is not applicable since the EUT has no AC mains.

*2) Radiated test was selected over 30 MHz based on FCC 15.407 (b) and KDB 789033 D02 G.3.b).

* 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 (DC 3.6 V/ 3.3 V) 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.

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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	RSS-Gen 6.6	IC: -	N/A	N/A	Conducted

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

3.4 Uncertainty

EMI

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

		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.3 dB	4.3 dB	4.3 dB	-	-
	200 MHz-1 GHz	5.9 dB	5.9 dB	5.9 dB	-	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-
Radiated emission (Measurement distance: 1 m)	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 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	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Spurious emission (Conducted) below 1GHz	1.8 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.5 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.7 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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
JAB Accreditation No. RTL02610
FCC Test Firm Registration Number: 839876

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. 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.

Mode	Remarks*
IEEE 802.11a (11a)	6 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 3, PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 0, 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: Fixed Firmware: Version 1.0 *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
99 % Occupied Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density 6 dB Bandwidth Radiated Spurious Emission (Above 1 GHz)	11a Tx	5745 MHz
	11n-20 Tx	5785 MHz
	11n-40 Tx	5755 MHz
Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	11a Tx	5795 MHz

UL Japan, Inc.

Shonan EMC Lab.

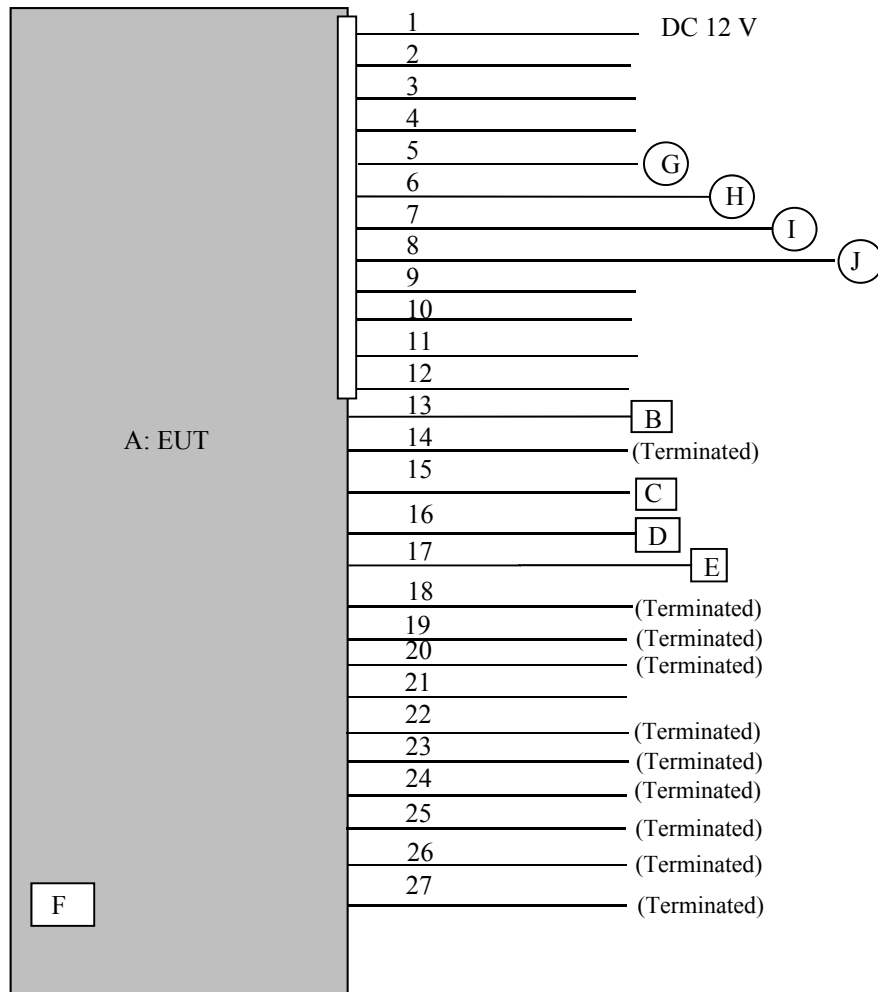
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

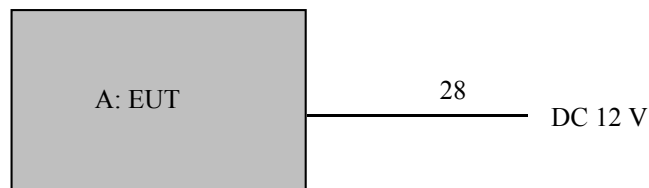
Facsimile : +81 463 50 6401

4.2 Configuration and peripherals

Radiated Emission test



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	GPS NAVIGATION SYSTEM	DNX995S	PK-X0045 *1) PK-X0046 *2)	JVC KENWOOD Corporation	EUT
B	GPS Antenna	-	-	JVC KENWOOD Corporation	-
C	USB Memory	Data Traveler	-	Kingston	-
D	USB Memory	SDK-USM1GL	-	Sony	-
E	Mic	-	-	JVC KENWOOD Corporation	-
F	micro SDHC Card	-	-	TDK	-
G	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
H	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
I	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-
J	Speaker	KFC-RS160	-	JVC KENWOOD Corporation	-

*1) Used for Radiated Emission test

*2) Used for Antenna Terminal conducted test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	0.6 + 1.0	Unshielded	Unshielded	-
2	REMOTE CONT	0.1 + 1.0	Unshielded	Unshielded	-
3	MUTE	0.1 + 1.0	Unshielded	Unshielded	-
4	ANT. CONT	0.1 + 1.0	Unshielded	Unshielded	-
5	Speaker Front L	2.0 + 1.9	Unshielded	Unshielded	-
6	Speaker Front R	2.0 + 1.9	Unshielded	Unshielded	-
7	Speaker Rear L	2.0 + 1.9	Unshielded	Unshielded	-
8	Speaker Rear R	2.0 + 1.9	Unshielded	Unshielded	-
9	P. CONT	0.1 + 1.0	Unshielded	Unshielded	-
10	PRK SW	0.1 + 1.0	Unshielded	Unshielded	-
11	REVERSE	0.1 + 1.0	Unshielded	Unshielded	-
12	ILLUMI	0.1 + 1.0	Unshielded	Unshielded	-
13	GPS ANT	3.5	Shielded	Shielded	-
14	iDatalink I/F	0.7	Shielded	Shielded	-
15	USB	0.2 + 1.0	Shielded	Shielded	-
16	USB	0.2 + 1.0	Shielded	Shielded	-
17	MIC	3.0	Shielded	Shielded	-
18	FRONT AUDIO	1.0	Shielded	Shielded	-
19	REAR AUDIO	2.0	Shielded	Shielded	-
20	SW	2.0	Shielded	Shielded	-
21	I/F EXT	1.0	Unshielded	Unshielded	-
22	AV-IN	1.5	Shielded	Shielded	-
23	AV-OUT	1.5	Shielded	Shielded	-
24	VIDEO OUT	0.2 + 1.0	Shielded	Shielded	-
25	REAR VIEW CAMERA	0.2 + 1.0	Shielded	Shielded	-
26	FRONT VIEW CAMERA	0.2 + 1.0	Shielded	Shielded	-
27	ANT	0.1 + 3.0	Shielded	Shielded	-
28	DC	1.0	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 1GHz >

EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.

< Above 1GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

< Below 1GHz >

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

< Above 1GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

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

For W58 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 (*T = transmission duration)
Test Distance	3 m	3.88 m*2) (1 GHz – 13GHz), 1 m*3) (13 GHz – 40 GHz)	

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r03 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E".

*2) Distance Factor: $20 \times \log(3.88 \text{ m}/3.0 \text{ m}) = 2.24 \text{ dB}$

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

The carrier level and noise levels were confirmed at angle of 0 deg. to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (below 1 GHz: 0 deg., above 1GHz:30 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

SECTION 7: 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: 80 MHz BW) (Method PM)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)	9 kHz – 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz – 30 MHz	10 kHz	30 kHz				

* The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r04 "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 kHz / 100 kHz)) was added to the test result.

*3) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz-150 kHz: RBW = 200 Hz, 150 kHz-30 MHz: RBW = 10 kHz)

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

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

APPENDIX 1: Test data

99 % Occupied Bandwidth

Test place	Shonan EMC Lab.	
Shielded Room	No.5	No.6
Report No.	12021807S-E-R2	
Date	November 9, 2017	November 13, 2017
Temperature / Humidity	24deg. C / 46 % RH	26deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda
Mode	Tx	

11a

Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5745	16.843	-
5785	16.778	-
5805	16.780	-

11n-20

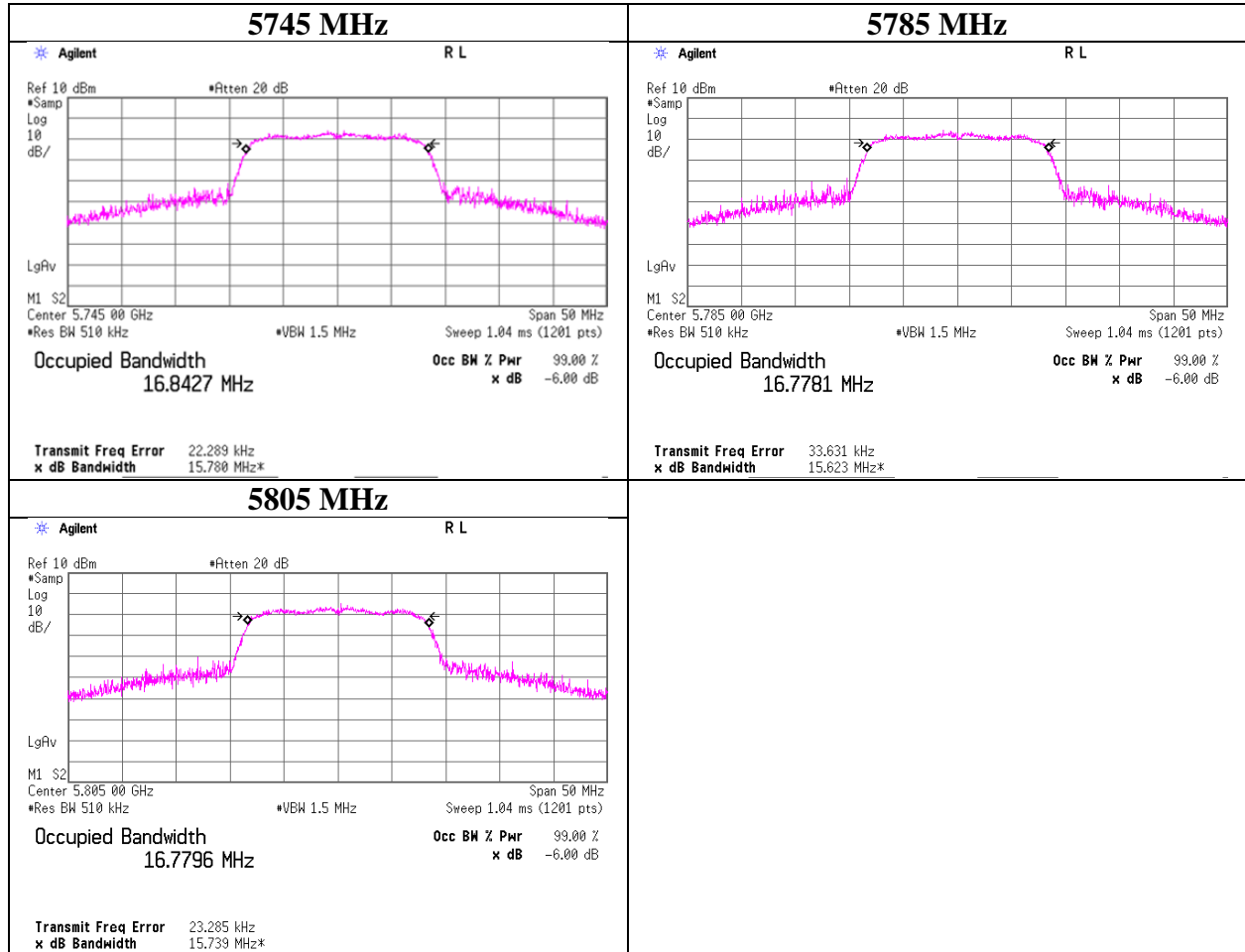
Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5745	17.711	-
5785	17.691	-
5805	17.675	-

11n-40

Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5755	36.192	-
5795	36.111	-

99 % Occupied Bandwidth

11a



UL Japan, Inc.

Shonan EMC Lab.

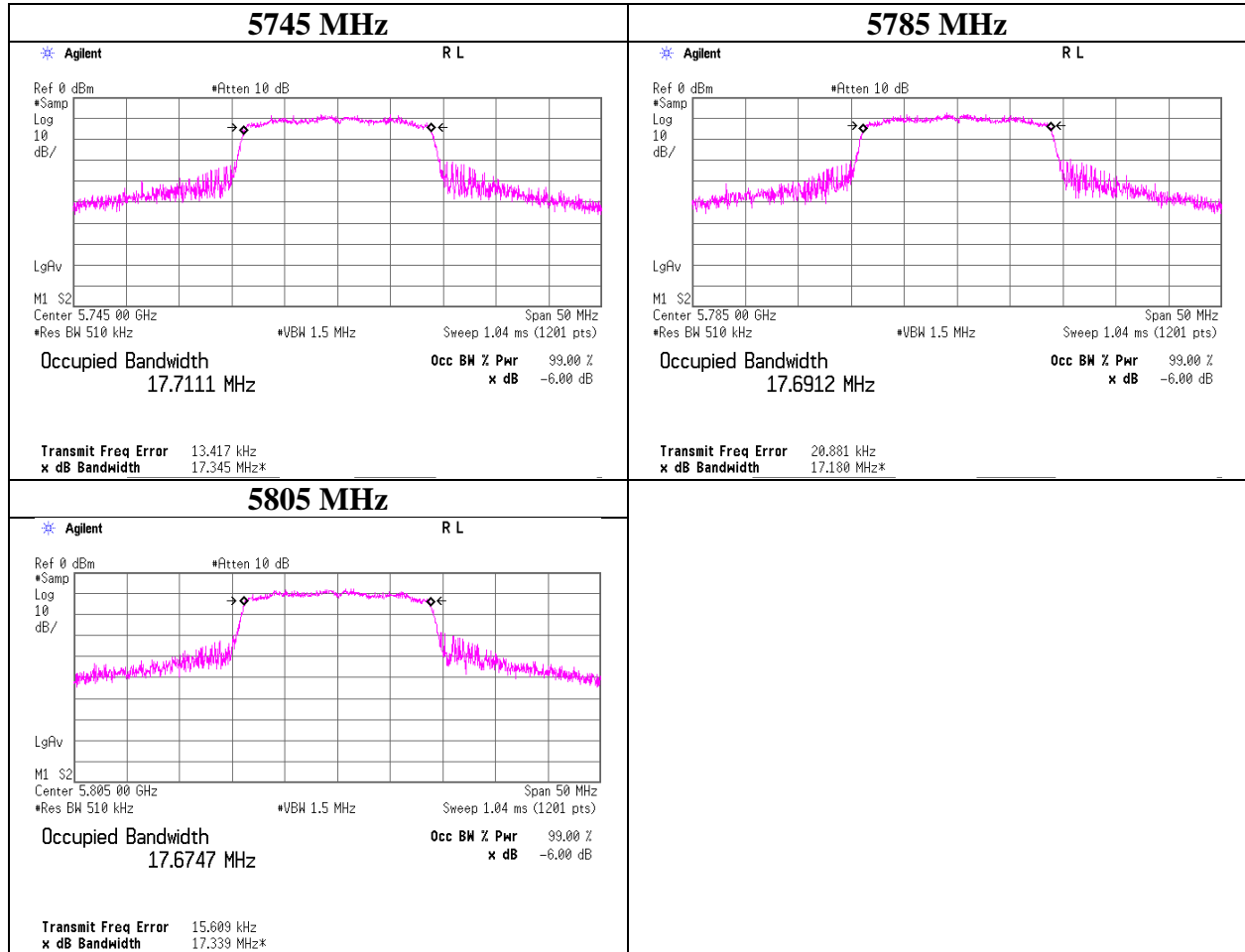
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

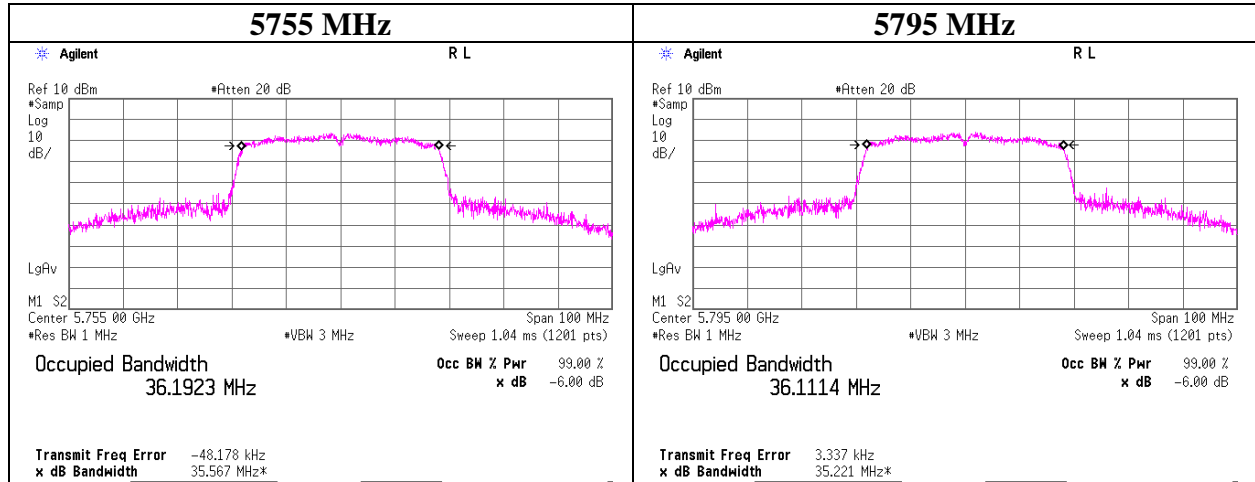
99 % Occupied Bandwidth

11n-20



99 % Occupied Bandwidth

11n-40



6 dB Bandwidth

Test place	Shonan EMC Lab.	
Shielded Room	No.5	No.6
Report No.	12021807S-E-R2	
Date	November 9, 2017	November 13, 2017
Temperature / Humidity	24deg. C / 46 % RH	26deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda
Mode	Tx	

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	15.089	> 500
5785	14.657	> 500
5805	15.346	> 500

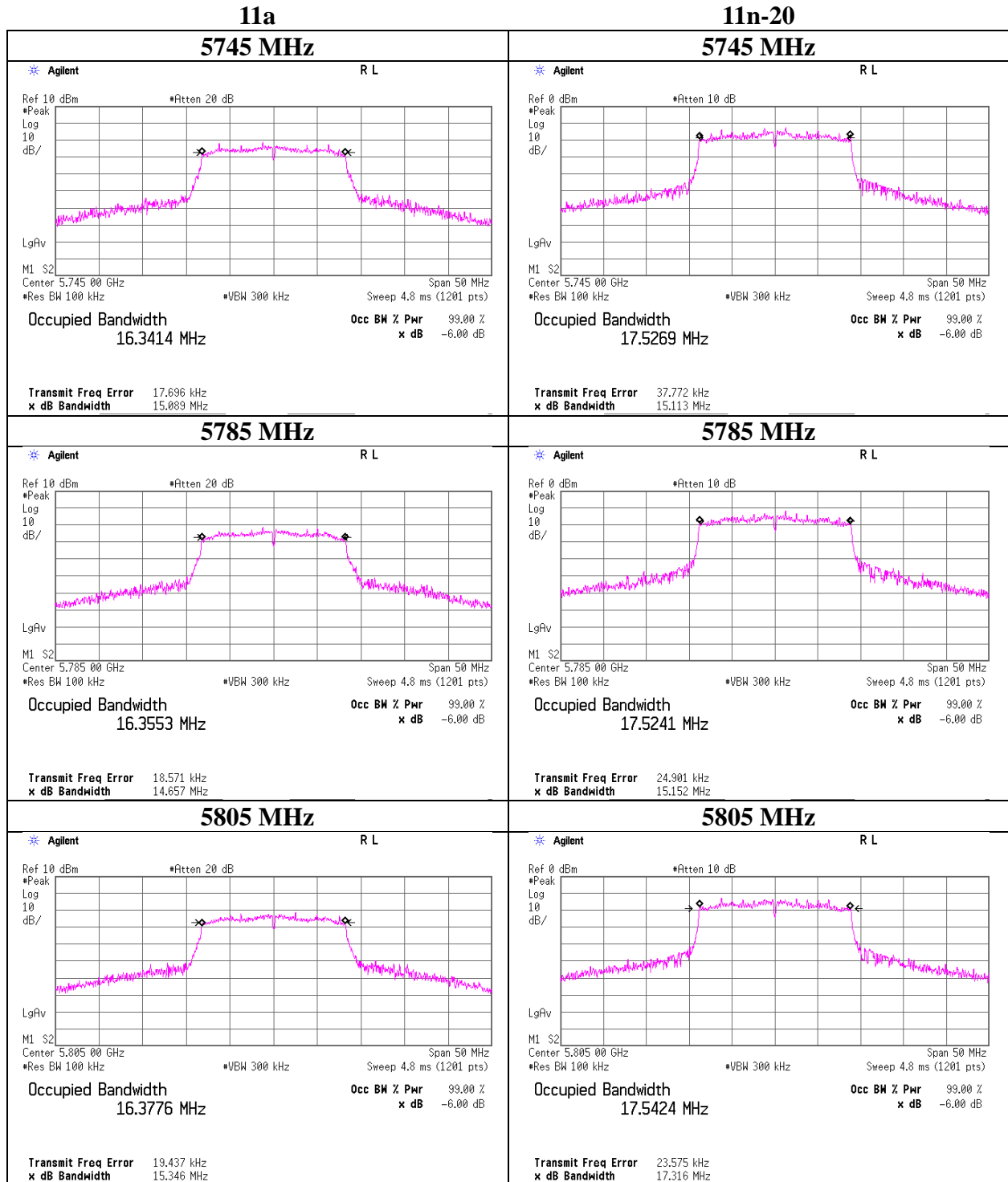
11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	15.113	> 500
5785	15.152	> 500
5805	17.316	> 500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5755	34.145	> 500
5795	34.864	> 500

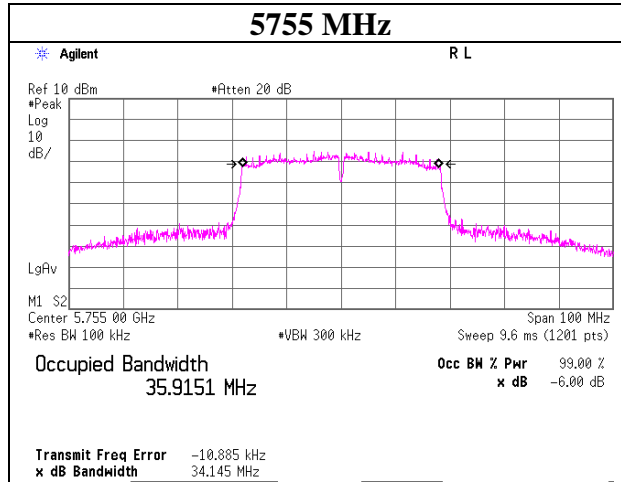
6 dB Bandwidth



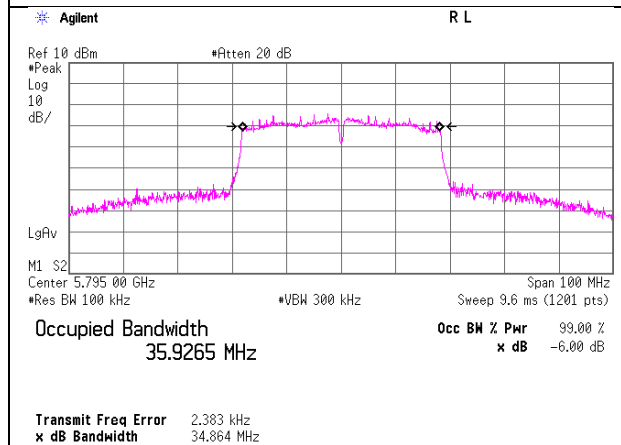
6 dB Bandwidth

11n-40

5755 MHz



5795 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

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12021807S-E-R2
Date : November 14, 2017
Temperature / Humidity : 26deg. C / 36 % RH
Engineer : Kazuya Noda
Mode : Tx 11a

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power				e.i.r.p.			
								Result [dBm]	[mW]	Limit [dBm]	Margin [dB]	Result [dBm]	[mW]	Limit [dBm]	Margin [dB]
5745	-0.36	2.12	9.93	0.16	-5.20	-	16.843	11.85	15.31	30.00	18.15	6.65	4.62	36.00	29.35
5785	-0.11	2.12	9.94	0.16	-5.20	-	16.778	12.11	16.26	30.00	17.89	6.91	4.91	36.00	29.09
5805	-0.05	2.13	9.94	0.16	-5.20	-	16.780	12.18	16.52	30.00	17.82	6.98	4.99	36.00	29.02

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

The conducted power limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725-5850MHz for IC)

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12021807S-E-R2
Date : November 9, 2017
Temperature / Humidity : 24deg. C / 46 % RH
Engineer : Makoto Hosaka
Mode : Tx 11n-20

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power				e.i.r.p.			
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5745	-2.87	3.15	10.03	0.67	-5.20	-	17.711	10.98	12.53	30.00	19.02	5.78	3.78	36.00	30.22
5785	-2.55	3.16	10.02	0.67	-5.20	-	17.691	11.30	13.49	30.00	18.70	6.10	4.07	36.00	29.90
5805	-2.37	3.16	10.02	0.67	-5.20	-	17.675	11.48	14.06	30.00	18.52	6.28	4.25	36.00	29.72

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

The conducted power limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725-5850MHz for IC)

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12021807S-E-R2
Date : November 14, 2017
Temperature / Humidity : 26deg. C / 36 % RH
Engineer : Kazuya Noda
Mode : Tx 11n-40

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5755	-1.12	2.12	9.94	0.33	-5.20	-	36.192	11.27	13.40	30.00	18.73	6.07	4.05	36.00	29.93
5795	-0.85	2.13	9.94	0.33	-5.20	-	36.111	11.55	14.29	30.00	18.45	6.35	4.32	36.00	29.65

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

The conducted power limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725-5850MHz for IC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab.	
Shielded Room	No.5	No.6
Report No.	12021807S-E-R2	
Date	November 9, 2017	November 13, 2017
Temperature / Humidity	24deg. C / 46 % RH	26deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda
Mode	Tx	

5785 MHz

Mode	Rate	Reading (timed average)	Duty factor	Burst power	Remarks
	Mbps	[dBm]	[dB]	[dBm]	
11a	6	-0.11	0.16	0.05	*
	9	-0.24	0.23	-0.01	
	12	-0.46	0.30	-0.16	
	18	-0.55	0.44	-0.11	
	24	-1.41	0.57	-0.84	
	36	-1.77	0.91	-0.86	
	48	-1.92	1.10	-0.82	
	54	-2.08	1.18	-0.90	

* 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.

5785 MHz

Mode	MCS Number	Reading (timed average)	Duty factor	Burst power	Remarks
		[dBm]	[dB]	[dBm]	
11n-20	0	-2.14	0.17	-1.97	
	1	-2.27	0.32	-1.95	
	2	-2.43	0.52	-1.91	
	3	-2.55	0.67	-1.88	*
	4	-2.86	0.84	-2.02	
	5	-3.91	1.18	-2.73	
	6	-4.04	1.23	-2.81	
	7	-4.13	1.33	-2.80	

* 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.

5755 MHz

Mode	MCS Number	Reading (timed average)	Duty factor	Burst power	Remarks
		[dBm]	[dB]	[dBm]	
11n-40	0	-1.12	0.33	-0.79	*
	1	-1.49	0.69	-0.80	
	2	-1.81	0.97	-0.84	
	3	-2.09	1.21	-0.88	
	4	-2.47	1.63	-0.84	
	5	-3.63	1.76	-1.87	
	6	-3.67	2.01	-1.66	
	7	-3.86	2.10	-1.76	

* 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.

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

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab.	
Shielded Room	No.5	No.6
Report No.	12021807S-E-R2	
Date	November 9, 2017	November 13, 2017
Temperature / Humidity	24deg. C / 46 % RH	26deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda
Mode	Tx	

11a 6 Mbps

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5745	-0.36	2.12	9.93	11.69	14.76
5785	-0.11	2.12	9.94	11.95	15.67
5805	-0.05	2.13	9.94	12.02	15.92

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

11n-20 MCS 0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5745	-2.44	3.15	10.03	10.74	11.86
5785	-2.14	3.16	10.02	11.04	12.71
5805	-1.85	3.16	10.02	11.33	13.58

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

11n-40 MCS 0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5755	-1.12	2.12	9.94	10.94	12.42
5795	-0.85	2.13	9.94	11.22	13.24

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

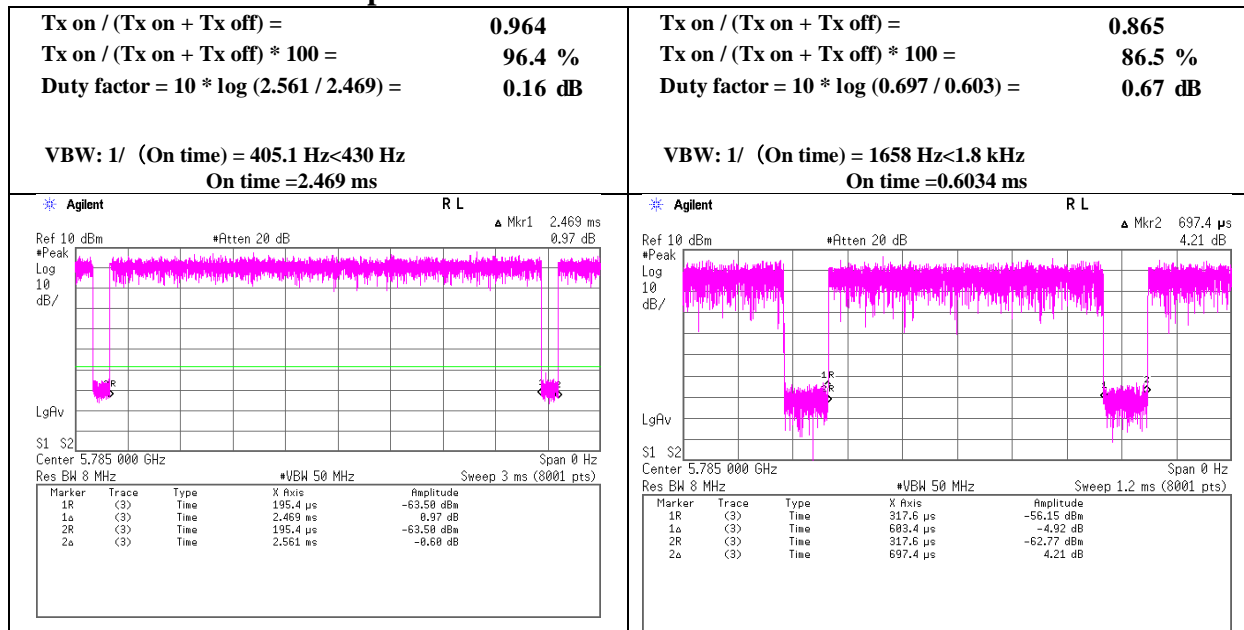
Burst rate confirmation

Test place	Shonan EMC Lab.	
Shielded Room	No.5	No.6
Report No.	12021807S-E-R2	
Date	November 9, 2017	November 13, 2017
Temperature / Humidity	24deg. C / 46 % RH	26deg. C / 36 % RH
Engineer	Makoto Hosaka	Kazuya Noda
Mode	Tx	

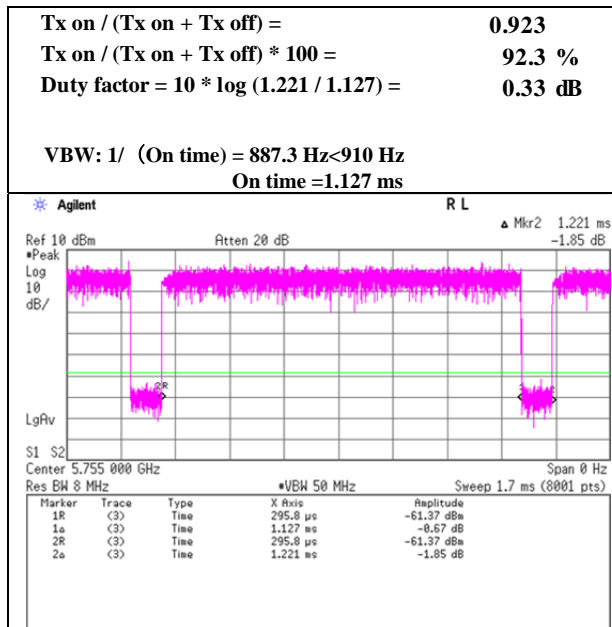
Worst power Rate

11a 6 Mbps

11n-20 MCS 3



11n-40 MCS 0



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12021807S-E-R2
Date : November 14, 2017
Temperature / Humidity : 26deg. C / 36 % RH
Engineer : Kazuya Noda
Mode : Tx 11a

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-19.17	2.12	9.93	0.16	-5.20	6.99	0.03	30.00	29.97	-5.17	36.00	41.17
5785	-18.80	2.12	9.94	0.16	-5.20	6.99	0.41	30.00	29.59	-4.79	36.00	40.79
5805	-17.98	2.13	9.94	0.16	-5.20	6.99	1.24	30.00	28.76	-3.96	36.00	39.96

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

The conducted PSD limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725 MHz-5850 MHz for IC)

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12021807S-E-R2
Date : November 9, 2017
Temperature / Humidity : 24deg. C / 46 % RH
Engineer : Makoto Hosaka
Mode : Tx 11n-20

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-21.49	3.15	10.03	0.67	-5.20	6.99	-0.65	30.00	30.65	-5.85	36.00	41.85
5785	-21.29	3.16	10.02	0.67	-5.20	6.99	-0.45	30.00	30.45	-5.65	36.00	41.65
5805	-21.41	3.16	10.02	0.67	-5.20	6.99	-0.57	30.00	30.57	-5.77	36.00	41.77

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

The conducted PSD limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725 MHz-5850 MHz for IC)

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12021807S-E-R2
Date : November 14, 2017
Temperature / Humidity : 26deg. C / 36 % RH
Engineer : Kazuya Noda
Mode : Tx 11n-40

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5755	-22.86	2.12	9.94	0.33	-5.20	6.99	-3.48	30.00	33.48	-8.68	36.00	44.68
5795	-22.52	2.13	9.94	0.33	-5.20	6.99	-3.13	30.00	33.13	-8.33	36.00	44.33

Sample Calculation:

PSD: Power Spectral Density

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

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

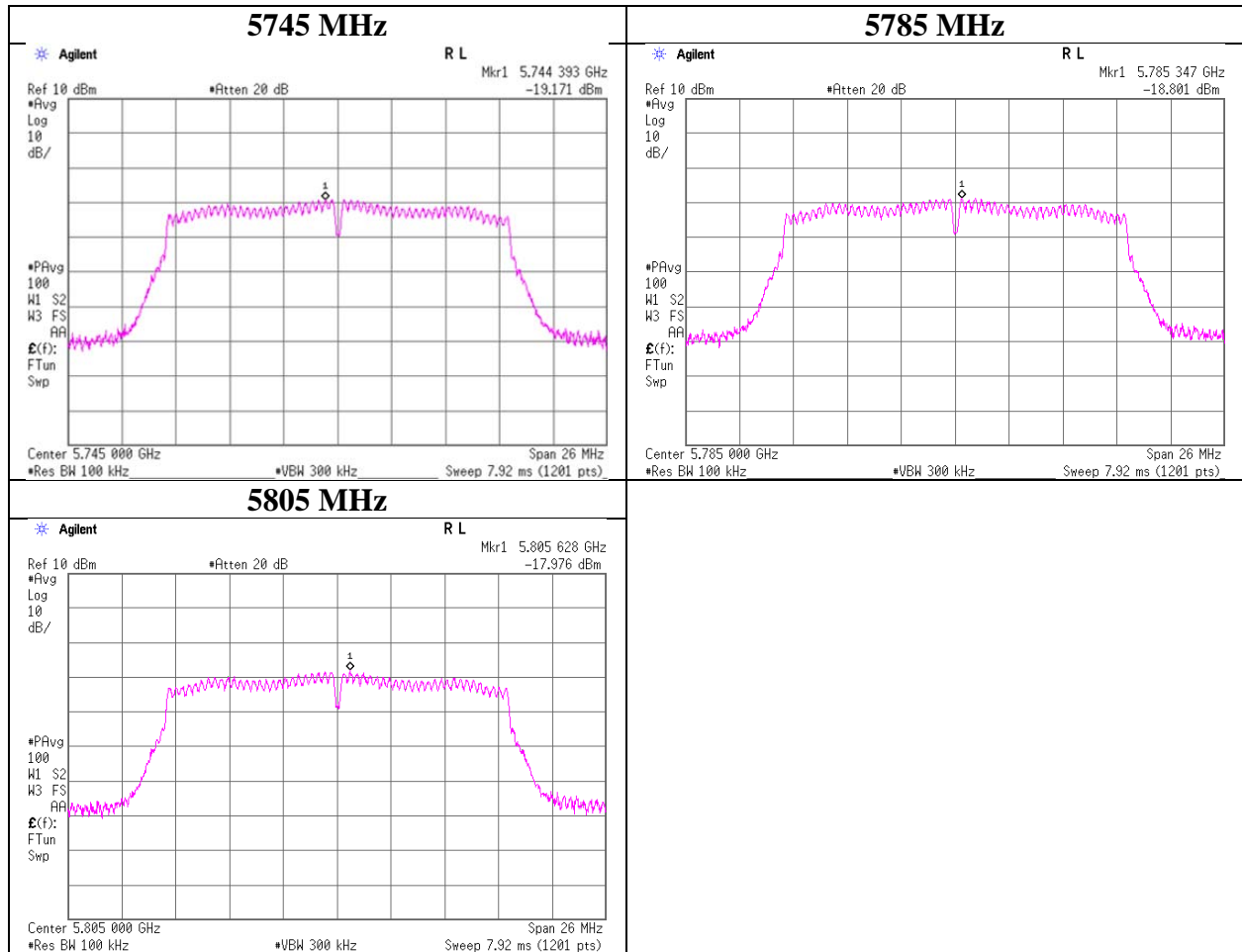
PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction

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

The conducted PSD limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725 MHz-5850 MHz for IC)

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	12021807S-E-R2
Date	November 14, 2017
Temperature / Humidity	26deg. C / 36 % RH
Engineer	Kazuya Noda
Mode	Tx 11a



UL Japan, Inc.

Shonan EMC Lab.

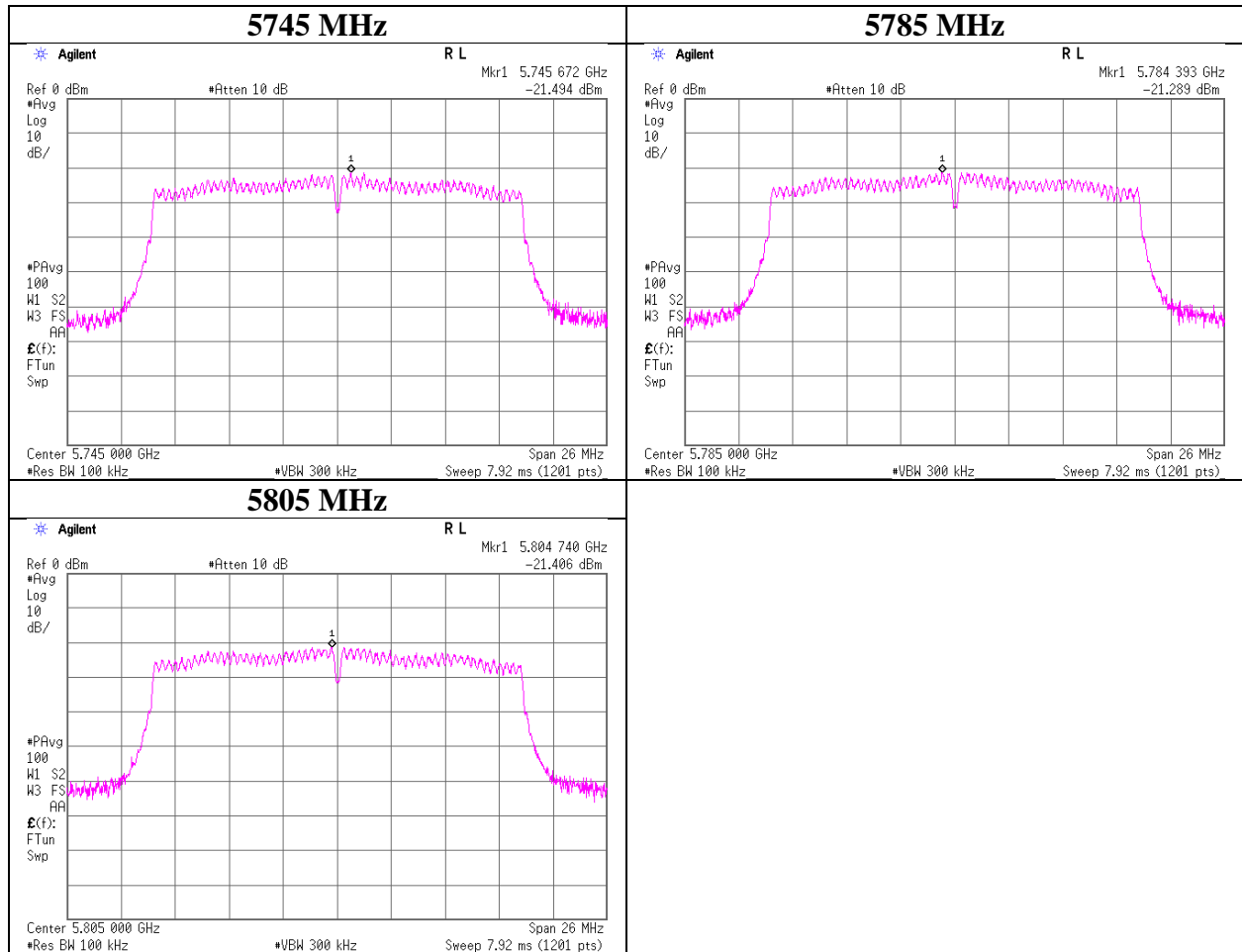
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

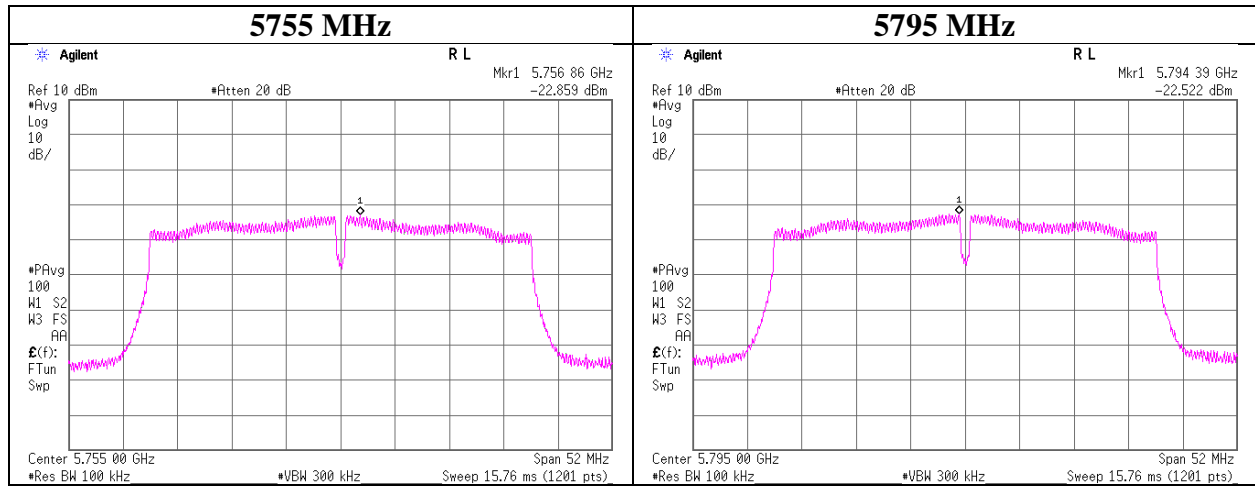
Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	12021807S-E-R2
Date	November 9, 2017
Temperature / Humidity	24deg. C / 46 % RH
Engineer	Makoto Hosaka
Mode	Tx 11n-20



Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12021807S-E-R2
Date : November 14, 2017
Temperature / Humidity : 26deg. C / 36 % RH
Engineer : Kazuya Noda
Mode : Tx 11n-40



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. 12021807S-E-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 14, 2017 November 15, 2017
Temperature / Humidity 25 deg. C / 42 % RH 24 deg. C / 41 % RH
Engineer Kazuya Noda Kazuya Noda
(1 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode Tx 11a 5745 MHz

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	11490.000	PK	48.33	40.13	8.63	43.29	2.24	56.04	73.90	17.8	150	0	
Hori.	17235.000	PK	49.90	41.96	10.78	41.50	-9.54	51.60	73.90	22.3	165	58	
Hori.	11490.000	AV	35.33	40.13	8.63	43.29	2.24	43.04	53.90	10.8	150	0	VBW :430Hz
Hori.	17235.000	AV	37.35	41.96	10.78	41.50	-9.54	39.05	53.90	14.8	165	58	VBW :430Hz
Vert.	11490.000	PK	48.81	40.13	8.63	43.29	2.24	56.52	73.90	17.3	150	0	
Vert.	17235.000	PK	48.71	41.96	10.78	41.50	-9.54	50.41	73.90	23.4	149	128	
Vert.	11490.000	AV	35.35	40.13	8.63	43.29	2.24	43.06	53.90	10.8	150	0	VBW :430Hz
Vert.	17235.000	AV	36.26	41.96	10.78	41.50	-9.54	37.96	53.90	15.9	149	128	VBW :430Hz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	49.62	32.41	15.54	44.88	2.24	54.93	-40.27	-27.00	13.3	118	67	
Hori.	5700.000	PK	55.16	32.49	15.57	44.88	2.24	60.58	-34.62	10.00	44.6	118	67	
Hori.	5720.000	PK	65.45	32.53	15.58	44.87	2.24	70.93	-24.27	15.60	39.9	118	67	
Hori.	5725.000	PK	67.53	32.53	15.58	44.87	2.24	73.01	-22.19	27.00	49.2	118	67	
Vert.	5650.000	PK	50.89	32.41	15.54	44.88	2.24	56.20	-39.00	-27.00	12.0	168	190	
Vert.	5700.000	PK	55.30	32.49	15.57	44.88	2.24	60.72	-34.48	10.00	44.5	168	190	
Vert.	5720.000	PK	67.15	32.53	15.58	44.87	2.24	72.63	-22.57	15.60	38.2	168	190	
Vert.	5725.000	PK	69.80	32.53	15.58	44.87	2.24	75.28	-19.92	27.00	46.9	168	190	

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

UL Japan, Inc.

Shonan EMC Lab.

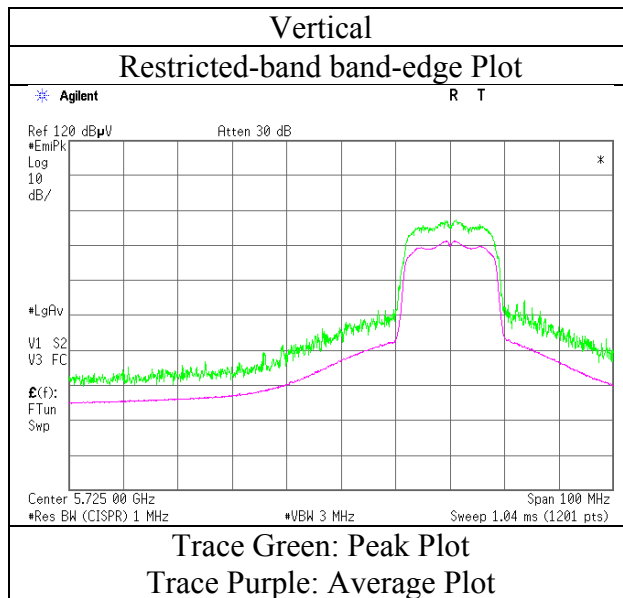
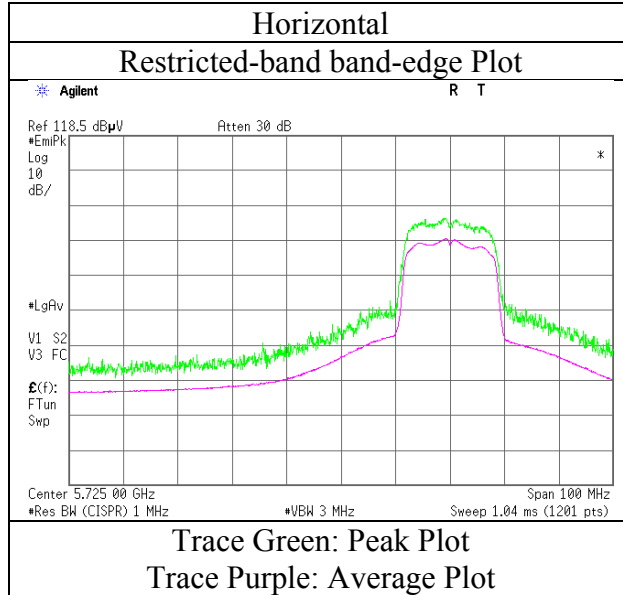
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	12021807S-E-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 14, 2017
Temperature / Humidity	25 deg. C / 42 % RH
Engineer	Kazuya Noda
Mode	Tx 11a 5745 MHz



* 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.	12021807S-E-R2	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	3	3
Date	November 14, 2017	November 15, 2017
Temperature / Humidity	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazuya Noda
	(1 GHz - 18 GHz)	(18 GHz - 40 GHz)
Mode	Tx 11a 5785 MHz	

(below 1GHz and above 1GHz 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	48.41	40.01	8.69	43.29	2.24	56.06	73.90	17.8	150	0	
Hori.	17355.000	PK	48.69	42.88	10.84	41.45	-9.54	51.42	73.90	22.4	172	62	
Hori.	11570.000	AV	36.99	40.01	8.69	43.29	2.24	44.64	53.90	9.2	150	0	VBW:430Hz
Hori.	17355.000	AV	36.56	42.88	10.84	41.45	-9.54	39.29	53.90	14.6	172	62	VBW:430Hz
Vert.	11570.000	PK	48.14	40.01	8.69	43.29	2.24	55.79	73.90	18.1	150	0	
Vert.	17355.000	PK	47.22	42.88	10.84	41.45	-9.54	49.95	73.90	23.9	148	131	
Vert.	11570.000	AV	37.06	40.01	8.69	43.29	2.24	44.71	53.90	9.1	150	0	VBW:430Hz
Vert.	17355.000	AV	36.37	42.88	10.84	41.45	-9.54	39.10	53.90	14.8	148	131	VBW:430Hz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Report No.	12021807S-E-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 16, 2017	November 14, 2017	November 15, 2017
Temperature / Humidity	20 deg. C / 40 % RH	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Kazutaka Takeyama (30 MHz - 1 GHz)	Kazuya Noda (1 GHz - 18 GHz)	Kazuya Noda (18 GHz - 40 GHz)
Mode	Tx 11a 5805 MHz		

(below 1GHz and above 1GHz 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.	73.714	QP	47.70	6.21	7.26	32.10	0.00	29.07	40.00	10.9	298	77	
Hori.	110.588	QP	45.50	11.59	7.40	32.07	0.00	32.42	43.50	11.0	300	126	
Hori.	122.881	QP	44.00	13.16	7.44	32.06	0.00	32.54	43.50	10.9	300	75	
Hori.	221.181	QP	52.40	11.52	8.27	31.96	0.00	40.23	46.00	5.7	150	45	
Hori.	224.997	QP	50.80	11.54	8.29	31.96	0.00	38.67	46.00	7.3	150	45	
Hori.	466.897	QP	41.80	16.97	9.51	31.85	0.00	36.43	46.00	9.5	100	25	
Hori.	932.998	QP	35.20	22.04	11.15	30.63	0.00	37.76	46.00	8.2	100	235	
Hori.	959.929	QP	32.00	22.12	11.23	30.40	0.00	34.95	46.00	11.0	100	210	
Hori.	960.000	QP	25.40	22.12	11.23	30.40	0.00	28.35	46.00	17.6	100	210	
Hori.	960.281	QP	45.60	22.12	11.23	30.40	0.00	48.55	53.90	5.3	100	210	
Hori.	11610.000	PK	48.16	39.95	8.71	43.30	2.24	55.76	73.90	18.1	150	0	
Hori.	17415.000	PK	47.81	43.34	10.85	41.42	-9.54	51.04	73.90	22.8	173	54	
Hori.	11610.000	AV	36.56	39.95	8.71	43.30	2.24	44.16	53.90	9.7	150	0	VBW:430Hz
Hori.	17415.000	AV	35.91	43.34	10.85	41.42	-9.54	39.14	53.90	14.7	173	54	VBW:430Hz
Vert.	221.174	QP	47.80	11.52	8.27	31.96	0.00	35.63	46.00	10.3	100	315	
Vert.	933.012	QP	37.90	22.04	11.15	30.63	0.00	40.46	46.00	5.5	100	7	
Vert.	11610.000	PK	47.95	39.95	8.71	43.30	2.24	55.55	73.90	18.3	150	0	
Vert.	17415.000	PK	46.74	43.34	10.85	41.42	-9.54	49.97	73.90	23.9	153	133	
Vert.	11610.000	AV	36.65	39.95	8.71	43.30	2.24	44.25	53.90	9.6	150	0	VBW:430Hz
Vert.	17415.000	AV	35.53	43.34	10.85	41.42	-9.54	38.76	53.90	15.1	153	133	VBW:430Hz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	49.68	32.74	15.66	44.86	2.24	55.46	-39.74	27.00	66.7	119	69	
Hori.	5855.000	PK	49.93	32.75	15.67	44.86	2.24	55.73	-39.47	15.60	55.1	119	69	
Hori.	5875.000	PK	49.80	32.78	15.68	44.86	2.24	55.64	-39.56	10.00	49.6	119	69	
Hori.	5925.000	PK	48.91	32.87	15.71	44.85	2.24	54.88	-40.32	-27.00	13.3	119	69	
Vert.	5850.000	PK	54.13	32.74	15.66	44.86	2.24	59.91	-35.29	27.00	62.3	171	195	
Vert.	5855.000	PK	51.82	32.75	15.67	44.86	2.24	57.62	-37.58	15.60	53.2	171	195	
Vert.	5875.000	PK	49.64	32.78	15.68	44.86	2.24	55.48	-39.72	10.00	49.7	171	195	
Vert.	5925.000	PK	49.57	32.87	15.71	44.85	2.24	55.54	-39.66	-27.00	12.7	171	195	

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

UL Japan, Inc.

Shonan EMC Lab.

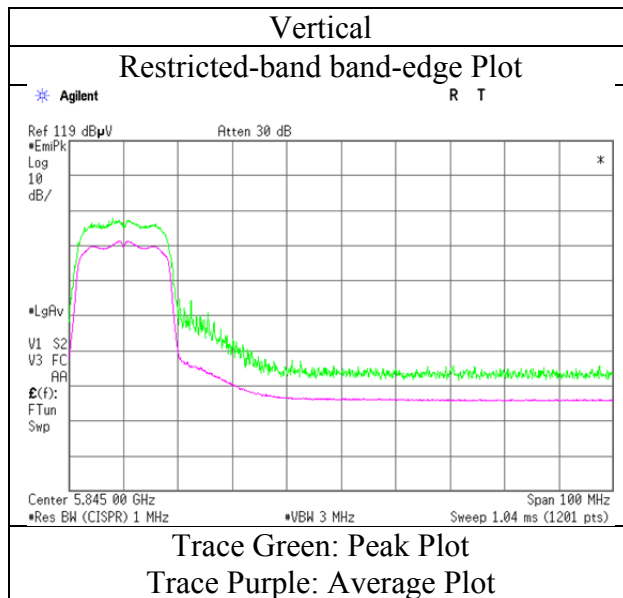
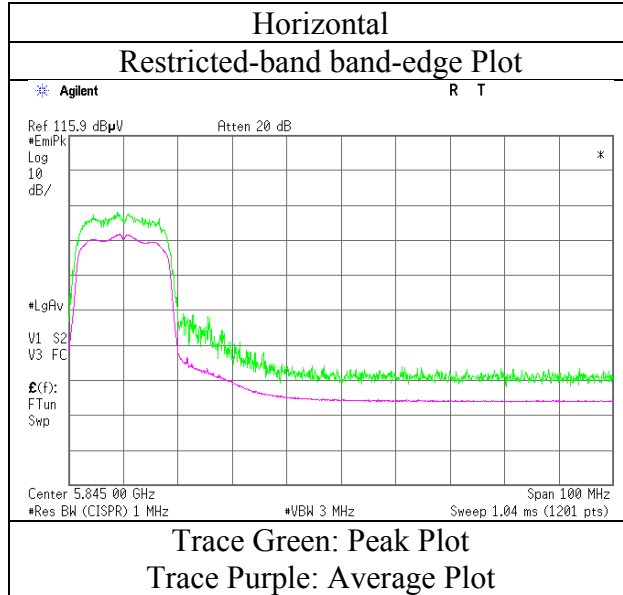
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 12021807S-E-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 14, 2017
Temperature / Humidity 25 deg. C / 42 % RH
Engineer Kazuya Noda
Mode Tx 11a 5805 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12021807S-E-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 12, 2017	November 14, 2017	November 15, 2017
Temperature / Humidity	23 deg. C / 47 % RH	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Makoto Hosaka	Kazuya Noda	Kazuya Noda
	(1 GHz - 13 GHz)	(13 GHz - 18 GHz)	(18 GHz - 40 GHz)
Mode	Tx 11n-20 5745 MHz		

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	11490.000	PK	47.41	40.13	8.63	43.29	2.24	55.12	73.97	18.8	150	0	
Hori.	17235.000	PK	48.97	41.96	10.78	41.50	-9.54	50.67	73.90	23.2	157	55	
Hori.	11490.000	AV	37.01	40.13	8.63	43.29	2.24	44.72	53.97	9.2	150	0	VBW:1.8kHz
Hori.	17235.000	AV	37.87	41.96	10.78	41.50	-9.54	39.57	53.90	14.3	157	55	VBW:1.8kHz
Vert.	11490.000	PK	47.03	40.13	8.63	43.29	2.24	54.74	73.97	19.2	150	0	
Vert.	17235.000	PK	47.79	41.96	10.78	41.50	-9.54	49.49	73.90	24.4	151	135	
Vert.	11490.000	AV	36.99	40.13	8.63	43.29	2.24	44.70	53.97	9.2	150	0	VBW:1.8kHz
Vert.	17235.000	AV	36.49	41.96	10.78	41.50	-9.54	38.19	53.90	15.7	151	135	VBW:1.8kHz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	49.89	32.41	15.54	44.88	2.24	55.20	-40.00	-27.00	13.0	124	38	
Hori.	5700.000	PK	54.51	32.49	15.57	44.88	2.24	59.93	-35.27	10.00	45.3	124	38	
Hori.	5720.000	PK	63.59	32.53	15.58	44.87	2.24	69.07	-26.13	15.60	41.7	124	38	
Hori.	5725.000	PK	66.84	32.53	15.58	44.87	2.24	72.32	-22.88	27.00	49.9	124	38	
Vert.	5650.000	PK	49.80	32.41	15.54	44.88	2.24	55.11	-40.09	-27.00	13.1	123	187	
Vert.	5700.000	PK	56.46	32.49	15.57	44.88	2.24	61.88	-33.32	10.00	43.3	123	187	
Vert.	5720.000	PK	64.90	32.53	15.58	44.87	2.24	70.38	-24.82	15.60	40.4	123	187	
Vert.	5725.000	PK	68.15	32.53	15.58	44.87	2.24	73.63	-21.57	27.00	48.6	123	187	

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 20dB).

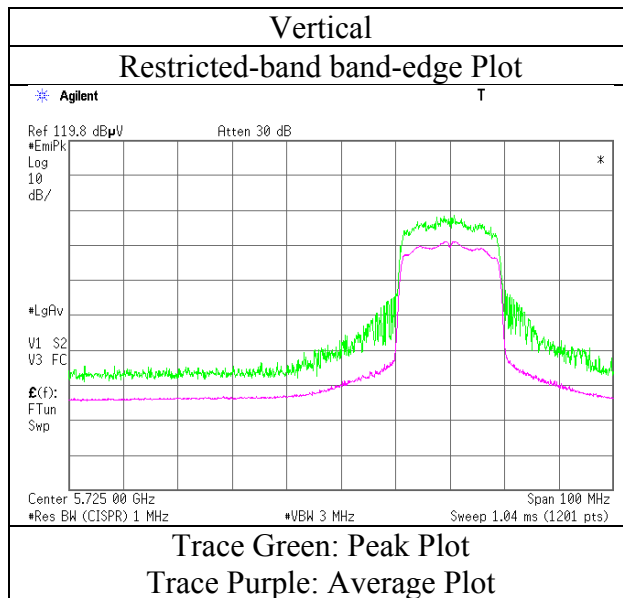
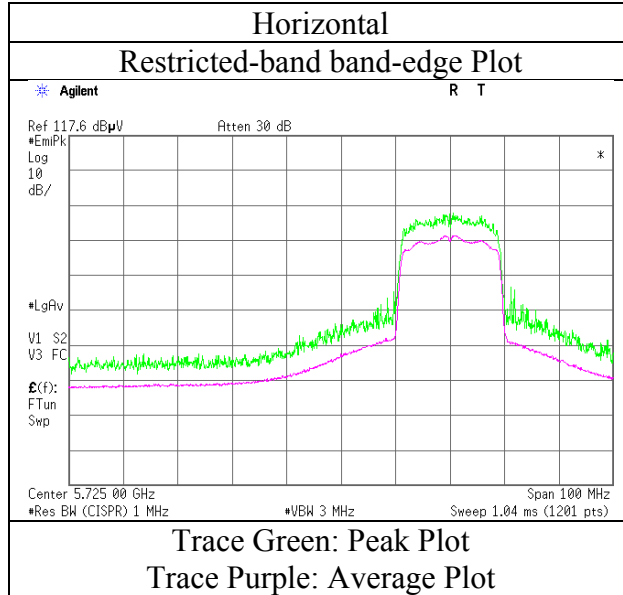
*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

Radiated Spurious Emission

Report No.	12021807S-E-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 12, 2017
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Makoto Hosaka
Mode	Tx 11n-20 5745 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12021807S-E-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 12, 2017	November 14, 2017	November 15, 2017
Temperature / Humidity	23 deg. C / 47 % RH	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Makoto Hosaka	Kazuya Noda	Kazuya Noda
	(1 GHz - 13 GHz)	(13 GHz - 18 GHz)	(18 GHz - 40 GHz)
Mode	Tx 11n-20 5785 MHz		

(below 1GHz and above 1GHz 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	47.17	40.01	8.69	43.29	2.24	54.82	73.97	19.1	150	0	
Hori.	17355.000	PK	48.35	42.88	10.84	41.45	-9.54	51.08	73.90	22.8	166	57	
Hori.	11570.000	AV	37.13	40.01	8.69	43.29	2.24	44.78	53.97	9.1	150	0	VBW:1.8kHz
Hori.	17355.000	AV	36.85	42.88	10.84	41.45	-9.54	39.58	53.90	14.3	166	57	VBW:1.8kHz
Vert.	11570.000	PK	47.31	40.01	8.69	43.29	2.24	54.96	73.97	19.0	150	0	
Vert.	17355.000	PK	48.02	42.88	10.84	41.45	-9.54	50.75	73.90	23.1	154	121	
Vert.	11570.000	AV	37.12	40.01	8.69	43.29	2.24	44.77	53.97	9.2	150	0	VBW:1.8kHz
Vert.	17355.000	AV	36.50	42.88	10.84	41.45	-9.54	39.23	53.90	14.6	154	121	VBW:1.8kHz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Report No. 12021807S-E-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3
Date November 12, 2017 November 14, 2017 November 15, 2017
Temperature / Humidity 23 deg. C / 47 % RH 25 deg. C / 42 % RH 24 deg. C / 41 % RH
Engineer Makoto Hosaka Kazuya Noda Kazuya Noda
(1 GHz - 13 GHz) (13 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode Tx 11n-20 5805 MHz

(below 1GHz and above 1GHz 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.	11610.000	PK	48.43	39.95	8.71	43.30	2.24	56.03	73.97	17.9	150	0	
Hori.	17415.000	PK	47.73	43.34	10.85	41.42	-9.54	50.96	73.90	22.9	159	53	
Hori.	11610.000	AV	36.72	39.95	8.71	43.30	2.24	44.32	53.97	9.6	150	0	VBW:1.8kHz
Hori.	17415.000	AV	36.79	43.34	10.85	41.42	-9.54	40.02	53.90	13.8	159	53	VBW:1.8kHz
Vert.	11610.000	PK	48.40	39.95	8.71	43.30	2.24	56.00	73.97	17.9	150	0	
Vert.	17415.000	PK	47.34	43.34	10.85	41.42	-9.54	50.57	73.90	23.3	148	129	
Vert.	11610.000	AV	36.55	39.95	8.71	43.30	2.24	44.15	53.97	9.8	150	0	VBW:1.8kHz
Vert.	17415.000	AV	36.39	43.34	10.85	41.42	-9.54	39.62	53.90	14.2	148	129	VBW:1.8kHz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	52.06	32.74	15.66	44.86	2.24	57.84	-37.36	27.00	64.4	147	167	
Hori.	5855.000	PK	50.28	32.75	15.67	44.86	2.24	56.08	-39.12	15.60	54.7	147	167	
Hori.	5875.000	PK	51.04	32.78	15.68	44.86	2.24	56.88	-38.32	10.00	48.3	147	167	
Hori.	5925.000	PK	49.77	32.87	15.71	44.85	2.24	55.74	-39.46	-27.00	12.5	147	167	
Vert.	5850.000	PK	51.49	32.74	15.66	44.86	2.24	57.27	-37.93	27.00	64.9	134	192	
Vert.	5855.000	PK	51.92	32.75	15.67	44.86	2.24	57.72	-37.48	15.60	53.1	134	192	
Vert.	5875.000	PK	50.56	32.78	15.68	44.86	2.24	56.40	-38.80	10.00	48.8	134	192	
Vert.	5925.000	PK	49.76	32.87	15.71	44.85	2.24	55.73	-39.47	-27.00	12.5	134	192	

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 20dB).

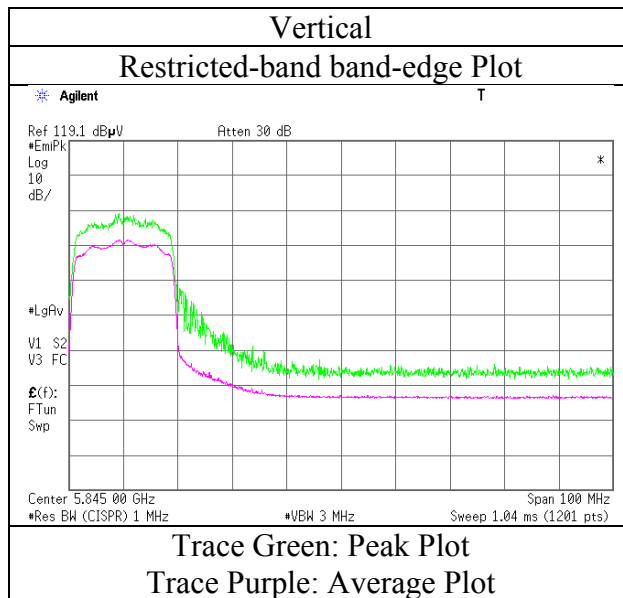
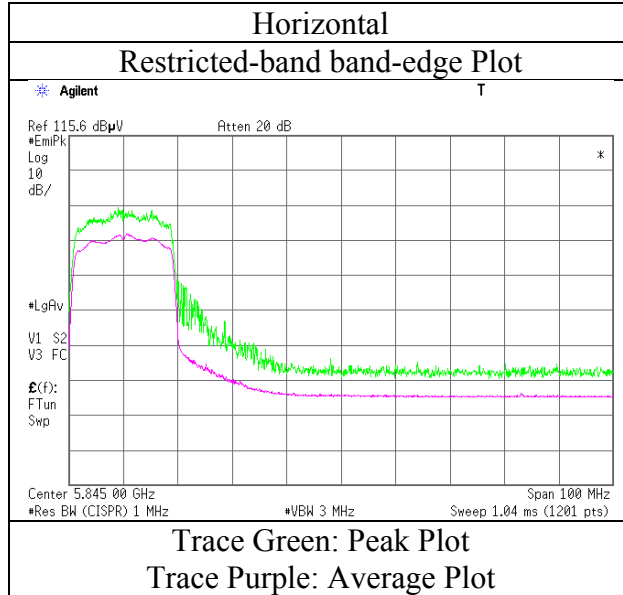
*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Radiated Spurious Emission

Report No.	12021807S-E-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 12, 2017
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Makoto Hosaka
Mode	Tx 11n-20 5805 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12021807S-E-R2	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	3	3
Date	November 14, 2017	November 15, 2017
Temperature / Humidity	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazuya Noda
	(1 GHz - 18 GHz)	(18 GHz - 40 GHz)
Mode	Tx 11n-40 5755 MHz	

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	11510.000	PK	48.59	40.11	8.64	43.28	2.24	56.30	73.90	17.6	150	0	
Hori.	17265.000	PK	48.26	42.19	10.81	41.48	-9.54	50.24	73.90	23.6	159	49	
Hori.	11510.000	AV	37.38	40.11	8.64	43.28	2.24	45.09	53.90	8.8	150	0	VBW:910Hz
Hori.	17265.000	AV	36.78	42.19	10.81	41.48	-9.54	38.76	53.90	15.1	159	49	VBW:910Hz
Vert.	11510.000	PK	48.59	40.11	8.64	43.28	2.24	56.30	73.90	17.6	150	0	
Vert.	17265.000	PK	47.72	42.19	10.81	41.48	-9.54	49.70	73.90	24.2	153	141	
Vert.	11510.000	AV	37.39	40.11	8.64	43.28	2.24	45.10	53.90	8.8	150	0	VBW:910Hz
Vert.	17265.000	AV	36.01	42.19	10.81	41.48	-9.54	37.99	53.90	15.9	153	141	VBW:910Hz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	49.80	32.41	15.54	44.88	2.24	55.11	-40.09	-27.00	13.1	114	67	
Hori.	5700.000	PK	52.36	32.49	15.57	44.88	2.24	57.78	-37.42	10.00	47.4	114	67	
Hori.	5720.000	PK	61.81	32.53	15.58	44.87	2.24	67.29	-27.91	15.60	43.5	114	67	
Hori.	5725.000	PK	64.45	32.53	15.58	44.87	2.24	69.93	-25.27	27.00	52.3	114	67	
Vert.	5650.000	PK	50.30	32.41	15.54	44.88	2.24	55.61	-39.59	-27.00	12.6	169	192	
Vert.	5700.000	PK	51.85	32.49	15.57	44.88	2.24	57.27	-37.93	10.00	47.9	169	192	
Vert.	5720.000	PK	62.48	32.53	15.58	44.87	2.24	67.96	-27.24	15.60	42.8	169	192	
Vert.	5725.000	PK	65.82	32.53	15.58	44.87	2.24	71.30	-23.90	27.00	50.9	169	192	

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

UL Japan, Inc.

Shonan EMC Lab.

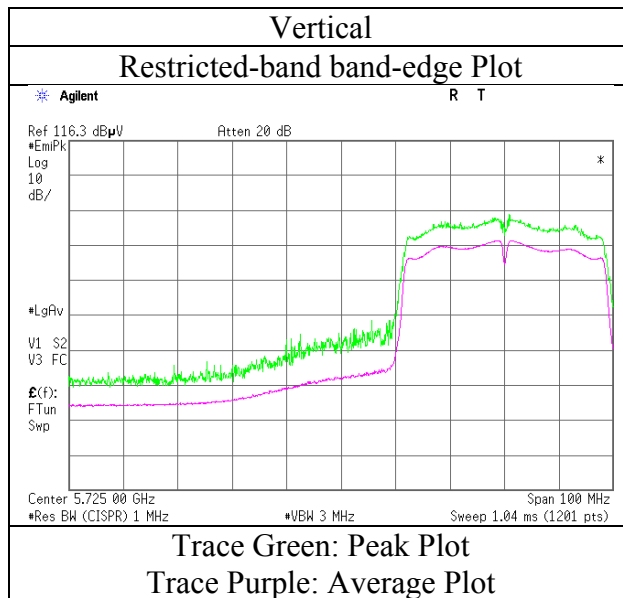
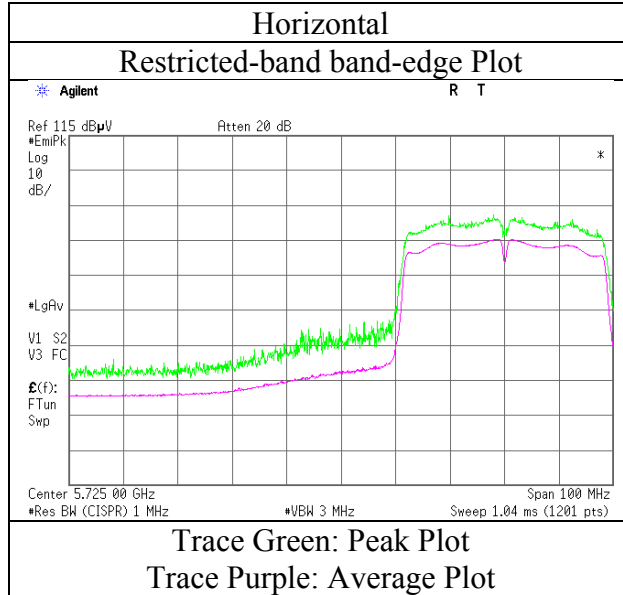
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	12021807S-E-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 14, 2017
Temperature / Humidity	25 deg. C / 42 % RH
Engineer	Kazuya Noda
Mode	Tx 11n-40 5755 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12021807S-E-R2	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	3	3
Date	November 14, 2017	November 15, 2017
Temperature / Humidity	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazuya Noda
	(1 GHz - 18 GHz)	(18 GHz - 40 GHz)
Mode	Tx 11n-40 5795 MHz	

(below 1GHz and above 1GHz 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.	11590.000	PK	48.24	39.98	8.71	43.29	2.24	55.88	73.90	18.0	150	0	
Hori.	17385.000	PK	48.42	43.11	10.84	41.44	-9.54	51.39	73.90	22.5	155	48	
Hori.	11590.000	AV	36.92	39.98	8.71	43.29	2.24	44.56	53.90	9.3	150	0	VBW:910Hz
Hori.	17385.000	AV	36.33	43.11	10.84	41.44	-9.54	39.30	53.90	14.6	155	48	VBW:910Hz
Vert.	11590.000	PK	47.77	39.98	8.71	43.29	2.24	55.41	73.90	18.4	150	0	
Vert.	17385.000	PK	48.24	43.11	10.84	41.44	-9.54	51.21	73.90	22.6	148	129	
Vert.	11590.000	AV	36.80	39.98	8.71	43.29	2.24	44.44	53.90	9.4	150	0	VBW:910Hz
Vert.	17385.000	AV	36.10	43.11	10.84	41.44	-9.54	39.07	53.90	14.8	148	129	VBW:910Hz

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 20dB).

*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

(Calculation) (above 1GHz 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	50.24	32.74	15.66	44.86	2.24	56.02	-39.18	27.00	66.2	121	70	
Hori.	5855.000	PK	50.32	32.75	15.67	44.86	2.24	56.12	-39.08	15.60	54.7	121	70	
Hori.	5875.000	PK	49.75	32.78	15.68	44.86	2.24	55.59	-39.61	10.00	49.6	121	70	
Hori.	5925.000	PK	49.05	32.87	15.71	44.85	2.24	55.02	-40.18	-27.00	13.2	121	70	
Vert.	5850.000	PK	53.96	32.74	15.66	44.86	2.24	59.74	-35.46	27.00	62.5	179	194	
Vert.	5855.000	PK	52.74	32.75	15.67	44.86	2.24	58.54	-36.66	15.60	52.3	179	194	
Vert.	5875.000	PK	51.60	32.78	15.68	44.86	2.24	57.44	-37.76	10.00	47.8	179	194	
Vert.	5925.000	PK	51.37	32.87	15.71	44.85	2.24	57.34	-37.86	-27.00	10.9	179	194	

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 20dB).

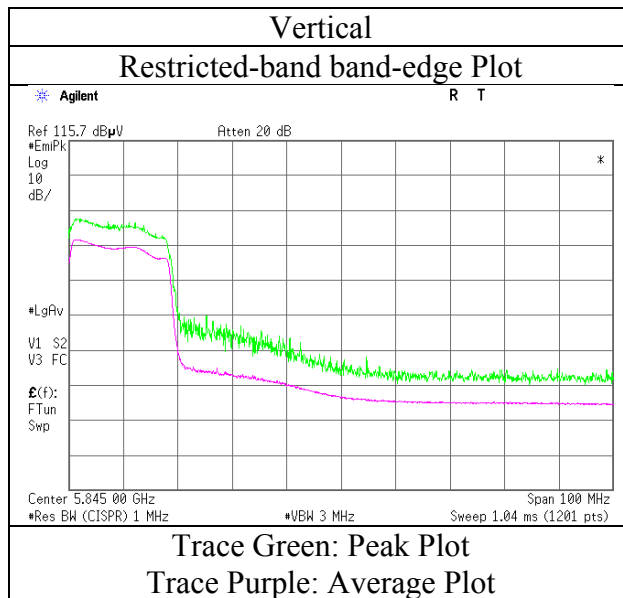
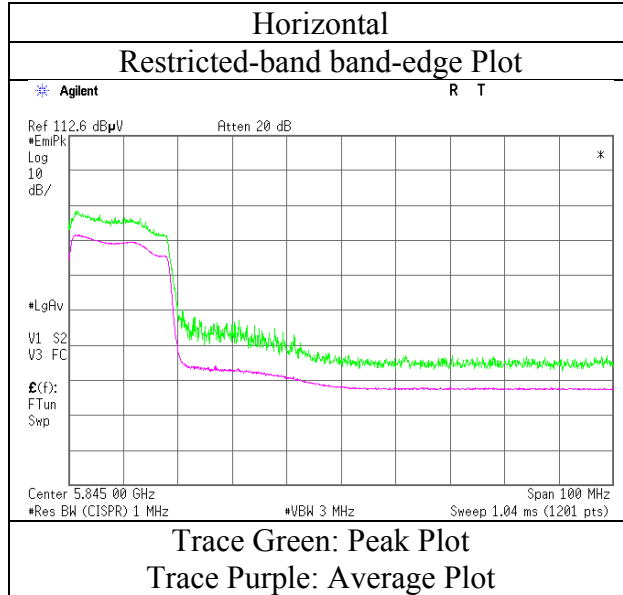
*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(3.88 m / 3.0 m) = 2.24 dB

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

Radiated Spurious Emission

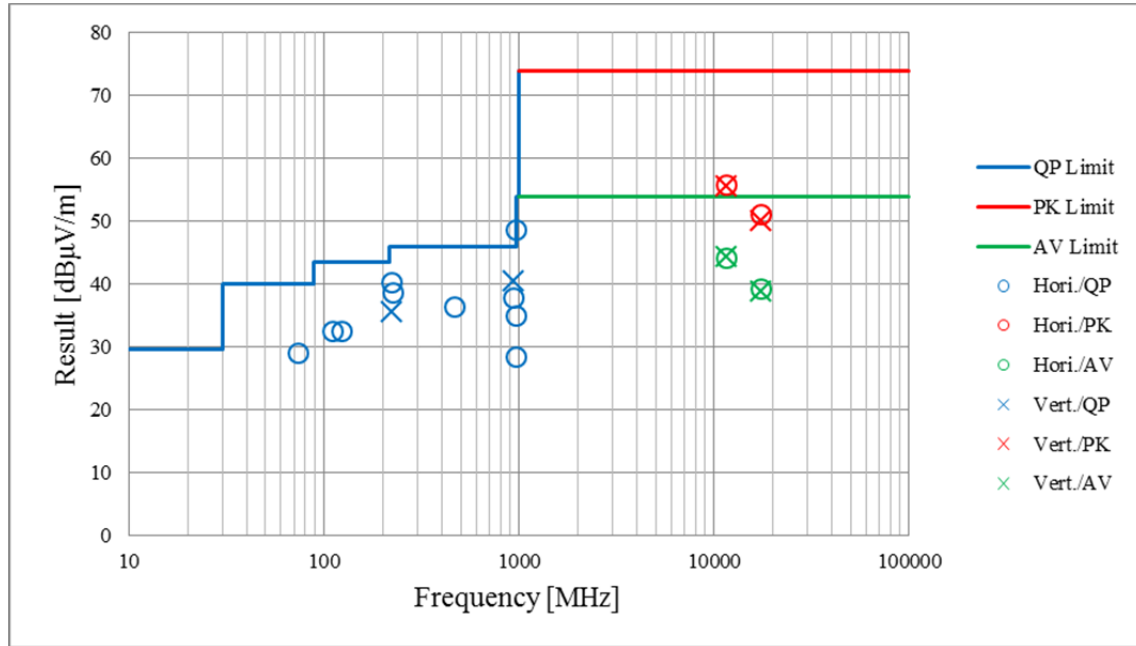
Report No.	12021807S-E-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 14, 2017
Temperature / Humidity	25 deg. C / 42 % RH
Engineer	Kazuya Noda
Mode	Tx 11n-40 5795 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

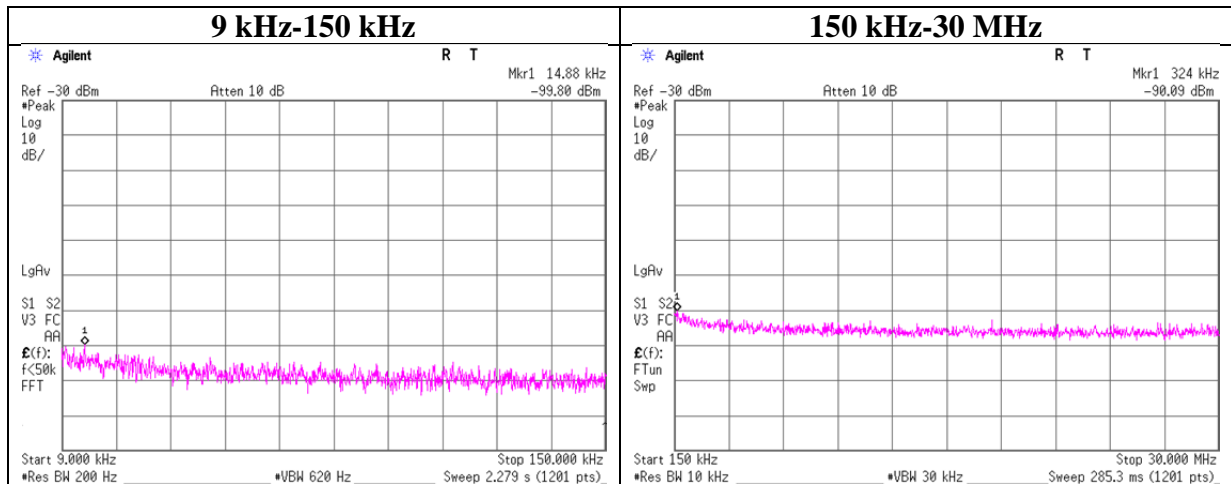
Report No.	12021807S-E-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	November 16, 2017	November 14, 2017	November 15, 2017
Temperature / Humidity	20 deg. C / 40 % RH	25 deg. C / 42 % RH	24 deg. C / 41 % RH
Engineer	Kazutaka Takeyama (30 MHz - 1 GHz)	Kazuya Noda (1 GHz - 18 GHz)	Kazuya Noda (18 GHz - 40 GHz)
Mode	Tx 11a 5805 MHz		



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

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	12021807S-E-R2
Date	November 14, 2017
Temperature / Humidity	26deg. C / 36 % RH
Engineer	Kazuya Noda
Mode	Tx 11a 5805 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
14.88	-99.80	0.01	9.74	2.00	1	-88.05	300	6.0	-26.79	44.15	70.94	
324.00	-90.09	0.01	9.70	2.00	1	-78.38	300	6.0	-17.12	17.39	34.51	

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

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

N: Number of output

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

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2017/08/20 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2017/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2017/10/16 * 12
SRENT-10	Spectrum Analyzer	Agilent	E4440A	US41421511	AT	2016/12/05 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	AT	2017/10/12 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12
SAT10-14	Attenuator	Weinschel Corp.	54A-10	81595	AT	2017/04/20 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2017/10/30 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2017/03/08 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SCC-G07	Coaxial Cable	Junkosha	J12J103316-00-R	OCT-12-17-054	RE	2017/10/23 * 12
SCC-G43	Coaxial Cable	HUBER+SUHNER	SUCOFLEX_104 E	SN MY 13406/4E	RE	2017/07/10 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2017/10/10 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2017/07/17 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,C E,RFI,MF)	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
KAT10-S2	Attenuator	Agilent	8490D 010	06036	RE	2016/11/07 * 12
KFL-15	Highpass Filter	MICRO-TRONICS	HPM50112	007	RE	2016/11/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2017/09/22 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000 KMSKMS	-	RE	2017/04/20 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SHA-06	Horn Antenna	ETS LINDGREN	3160-10	LM3459	RE	2017/03/15 * 12
SAF-10	Pre Amplifier	TOYO Corporation	HAP26-40W	00000010	RE	2017/03/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2017/10/02 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2017/08/24 * 12
SCC-C1/C2/C3/ C4/C5/C10/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/ Suhner/Suhner/Suhner/ TOYO	8D2W/12DSFA/1 41PE/141PE/141P E/141PE/NS4906	-/0901-271(RF Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2016/11/08 * 12

The expiration date of the calibration is the end of the expired month.

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

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: RE: Radiated Emission
AT: Antenna Terminal Conducted test

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