



# RADIO TEST REPORT

Test Report No. : 11922902S-C-R2

**Applicant** : PIONEER CORPORATION  
**Type of Equipment** : MULTIMEDIA NAVIGATION RECEIVER  
**Model No.** : AVIC-W8400NEX  
**FCC ID** : AJDK103  
**Test regulation** : FCC Part 15 Subpart E: 2017  
(\*Wireless LAN part)  
**Test items** : Other than radiated emission tests  
**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 11922902S-C-R1. 11922902S-C-R1 is replaced with this report.

**Date of test:** September 4, 2017

**Representative test engineer:**

*M. Hosaka*

Makoto Hosaka  
Engineer  
Consumer Technology Division

**Approved by:**

*A. Hayashi*

Akio Hayashi  
Leader  
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".

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**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

## REVISION HISTORY

### Original Test Report No.: 11922902S-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11922902S-C	September 29, 2017	-	-
1	11922902S-C-R1	October 6, 2017	1, 5	Addition of remarks Update of Radio specification
2	11922902S-C-R2	December 5, 2017	4, 5	Modification of the Clock frequency Update of Radio specification

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## **SECTION 1: Customer information**

Company Name : PIONEER CORPORATION  
Address : 25-1, Yamada, Kawagoe-shi, Saitama, 350-8555, Japan  
Telephone Number : +81-49-228-7787  
Facsimile Number : +81-49-228-6493  
Contact Person : Hiroshi Fuse

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

### **2.1 Identification of E.U.T.**

Type of Equipment : MULTIMEDIA NAVIGATION RECEIVER  
Model No. : AVIC-W8400NEX  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 14.4 V  
Receipt Date of Sample : August 23, 2017  
Country of Mass-production : Thailand  
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: AVIC-W8400NEX (referred to as the EUT in this report) is a MULTIMEDIA NAVIGATION RECEIVER.

### **General Specification**

Clock frequency(ies) in the system : Bluetooth Wi-Fi module: 37.4 MHz  
LPO clock for Bluetooth Wi-Fi module: 32.768 kHz  
DC-DC CONVERTER: 1000 kHz/ 700.5 kHz/ 2.29 MHz/ 2.17 MHz/  
767.25 kHz/ 699.05 kHz/ 767.25 kHz/ 699.05 kHz/ 436.907 kHz/  
383.625 kHz/ 436.907 kHz/ 383.625 kHz  
FM/AM TUNER: 9.216 MHz (VCO: 5.9904 GHz/ 6.2208 GHz)  
TMC TUNER: 9.216 MHz (VCO: 5.9904 GHz/ 6.2208 GHz)  
MAIN PROCESSOR: 24 MHz/ 32.768 kHz/ 11.2896 MHz  
SYSTEM MICRO COMPUTER: 3.93216 MHz  
DVD DRIVER: 27 MHz/ 121.5 MHz/ 36.864 MHz/ 33.8688 MHz  
LCD BACK LIGHT: 436.907 kHz/ 383.625 kHz  
ELECTRONIC VOLUME: 18.432 MHz  
FPGA: 14.7456 MHz  
ECHO CANCELLER: 12.288 MHz  
HDMI RECEIVER: 27 MHz  
DISPLAY CONTROLLER: 32 MHz  
VIDEO DECODER: 32 MHz  
MICRO COMPUTER: 10 MHz  
WWR UNIT: 24 MHz  
GPS: 26 MHz

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Facsimile : +81 463 50 6401

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 2.4 GHz: 2402 MHz - 2480 MHz (Bluetooth BDR/EDR)  
2412 MHz - 2462 MHz (IEEE 802.11b/g/n)  
W58: 5745 MHz - 5825 MHz (IEEE 802.11a/n)  
5755 MHz - 5795 MHz (IEEE 802.11n/ac)  
5775 MHz (IEEE 802.11ac)  
Modulation : DSSS (IEEE 802.11b), OFDM (IEEE 802.11g/n/a/ac)  
FHSS (Bluetooth BDR/EDR)  
Power Supply (inner) : DC 3.3 V/1.8 V  
Antenna type : Monopole Antenna  
Antenna Gain : 2.4 GHz: -8.0 dBi (Bluetooth BDR/EDR)  
-4.7 dBi (IEEE 802.11b/g/n)  
5 GHz: -3.0 dBi  
Operating Temperature : -10 deg. C to +60 deg. C

Remarks: This Wireless Module consists of 1 chip each of 5 GHz band.

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on September 20, 2017 and effective October 20, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

\* The revision on September 20, 2017, does not affect the test specification applied to the EUT.

### **3.2 Procedures and results**

Item *3)	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	N/A	N/A	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.

\*1) The test is not applicable since the EUT does not have AC power ports.

\*2) For the Radiated spurious emission test, refer to test report No 11922904M-C-R2

\*3) 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.

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

#### **FCC Part 15.31 (e)**

This EUT provides stable voltage (DC 3.3 V / 1.8 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 this 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 Bandwidth	IC: RSS-Gen 6.6	IC: -	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  $k=2$ .  
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Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

### 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

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.

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### 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 E.U.T. during testing**

### **4.1 Operating Mode(s)**

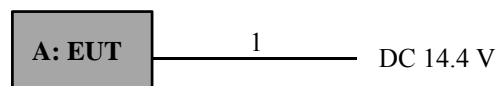
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals -” of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Power setting	Remarks*
IEEE 802.11a (11a)	11	6 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	11	MCS 2, SGI:OFF, PN9
IEEE 802.11n 40 MHz BW (11n-40)	10	MCS 0, SGI:OFF, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	9	MCS 5, SGI:OFF, PN9
IEEE 802.11ac 80 MHz BW (11ac-80)	8	MCS 3, SGI:OFF, PN9
*Power of the EUT was set by the software as follows; Software: SoC: Ver0.041100 System uCom: Ver7.07 *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 99 % Occupied Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density	11a Tx	5745 MHz
	11n-20 Tx	5785 MHz
		5825 MHz
	11n-40 Tx	5755 MHz
	11ac-40 Tx	5795 MHz
	11ac-80 Tx	5775 MHz
Conducted Spurious Emission	11a Tx *1)	5785 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		

### **4.2 Configuration and peripherals**



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

#### **Description of EUT**

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MULTIMEDIA NAVIGATION RECEIVER	AVIC-W8400NEX	QFTM000026UC	Pioneer Corporation	EUT

#### **List of cables used**

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Power Supply Cable	0.3 + 1.5	Unshielded	Unshielded	-

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

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Facsimile : +81 463 50 6401



## **SECTION 5: Antenna Terminal Conducted Tests**

### **Test Procedure**

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

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used and Test method</b>
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Sample	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				
<p>* 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".</p> <p>*1) Max hold was applied as Worst-case measurement.</p> <p>*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 (<math>10 \log(500 \text{ kHz} / 100 \text{ kHz})</math>) was added to the test result.</p> <p>*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)</p>							

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

**Test data** : APPENDIX  
**Test result** : Pass

## APPENDIX 1: Test data

### 6 dB Bandwidth and 99 % Occupied Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 11922902S-C-R2  
Date September 4, 2017  
Temperature / Humidity 26 deg. C / 48 % RH  
Engineer Makoto Hosaka  
Mode Tx

#### 11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit (6dB BW) [MHz]
5745	16.464	17.571	>0.5
5785	16.425	17.543	>0.5
5825	16.397	17.584	>0.5

#### 11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit (6dB BW) [MHz]
5745	17.687	18.300	>0.5
5785	17.612	18.287	>0.5
5825	17.733	18.258	>0.5

#### 11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit (6dB BW) [MHz]
5755	36.342	36.604	>0.5
5795	36.357	36.552	>0.5

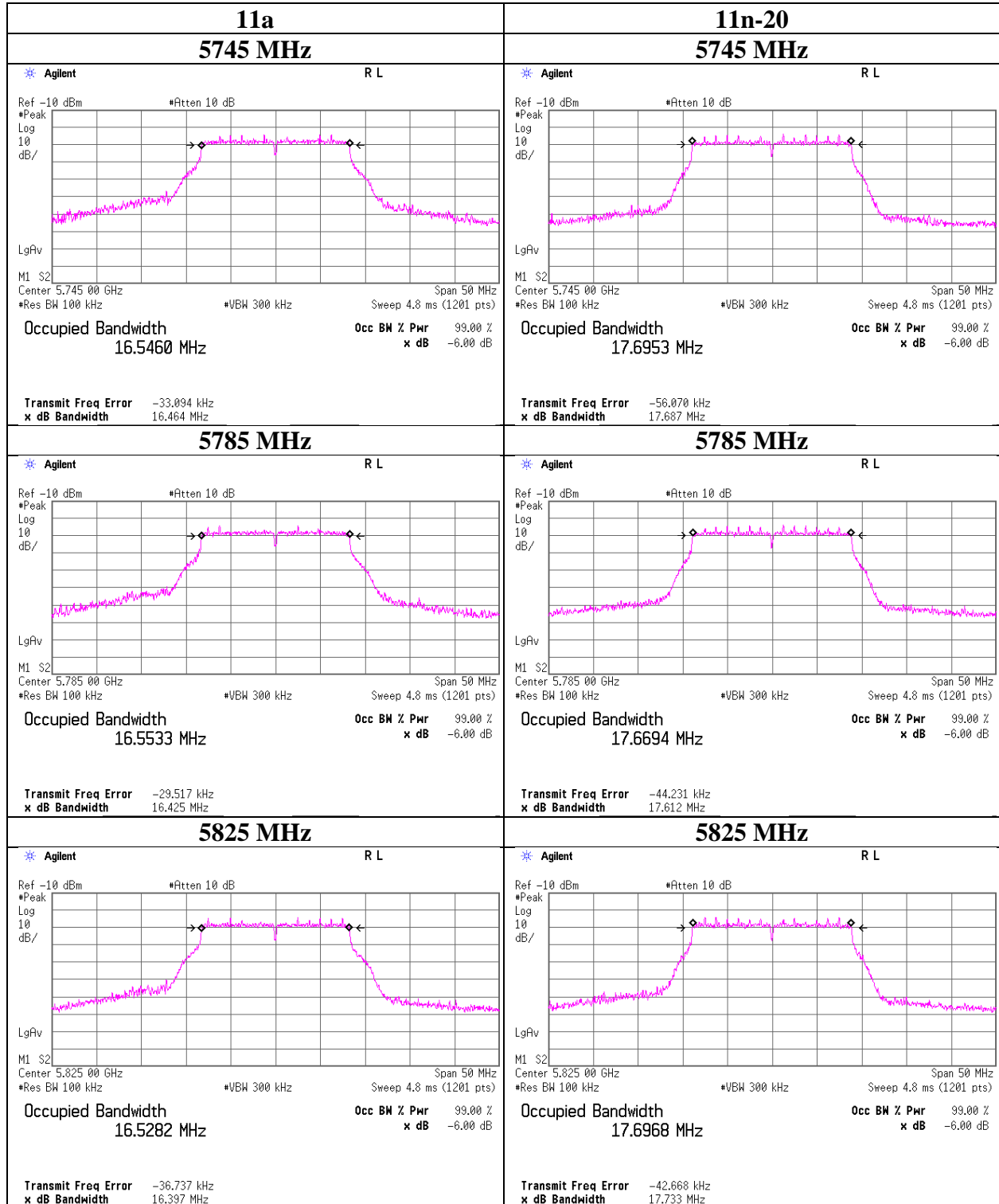
#### 11ac-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit (6dB BW) [MHz]
5755	36.445	36.549	>0.5
5795	36.420	36.554	>0.5

#### 11ac-80

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit (6dB BW) [MHz]
5775	76.151	76.315	>0.5

**6 dB Bandwidth**



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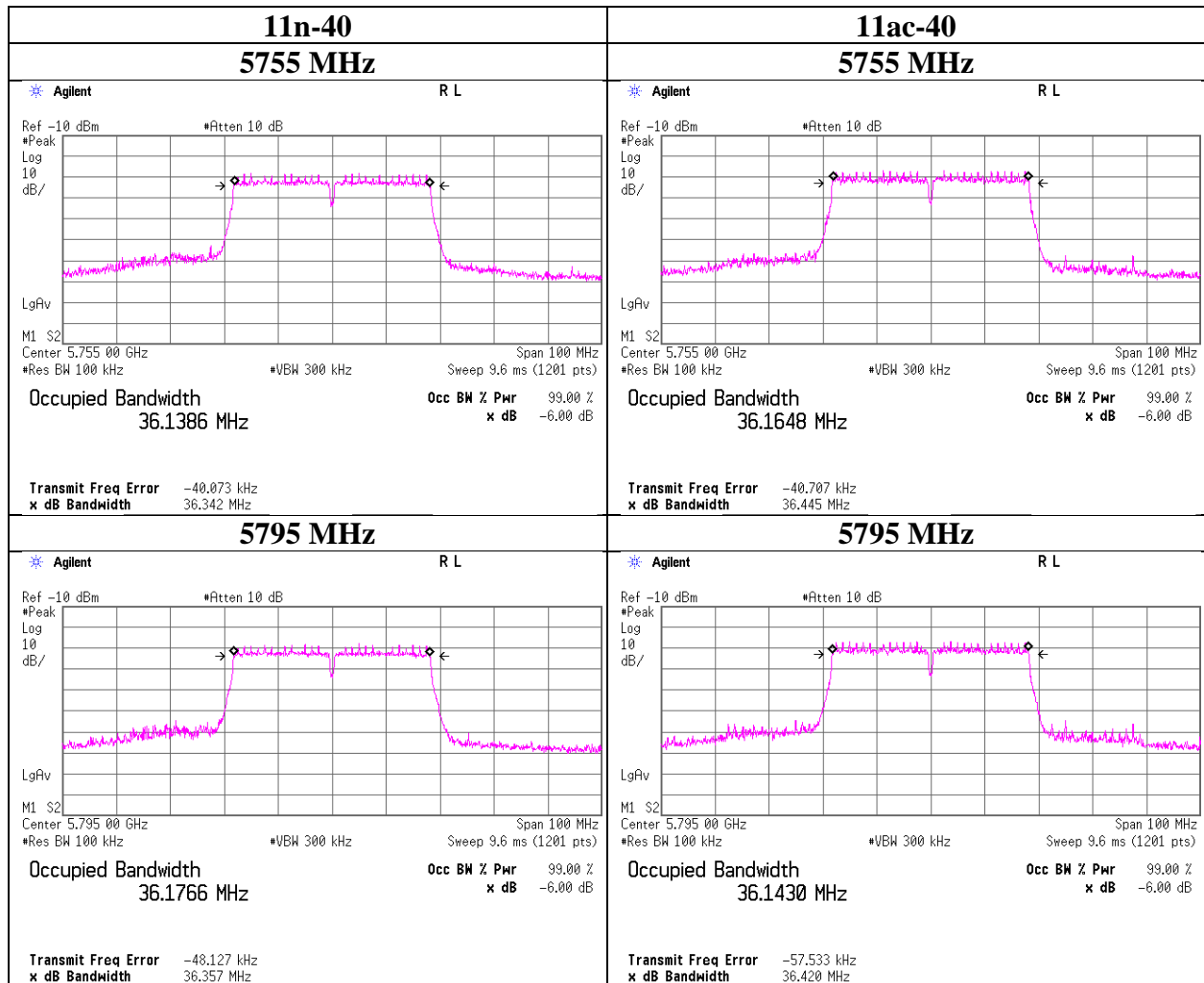
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### 6 dB Bandwidth



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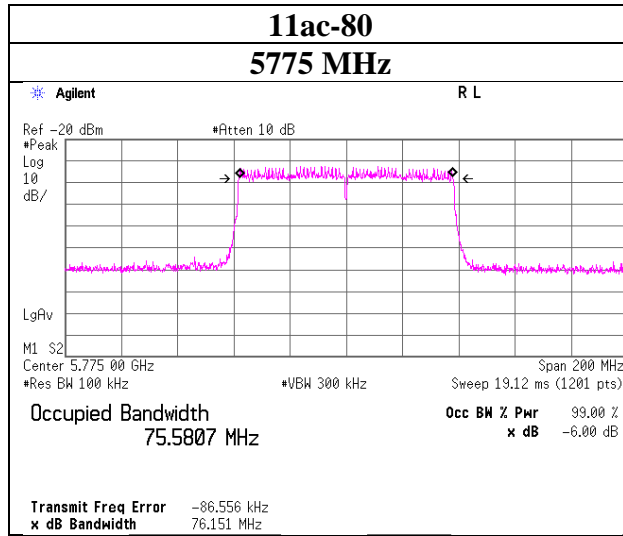
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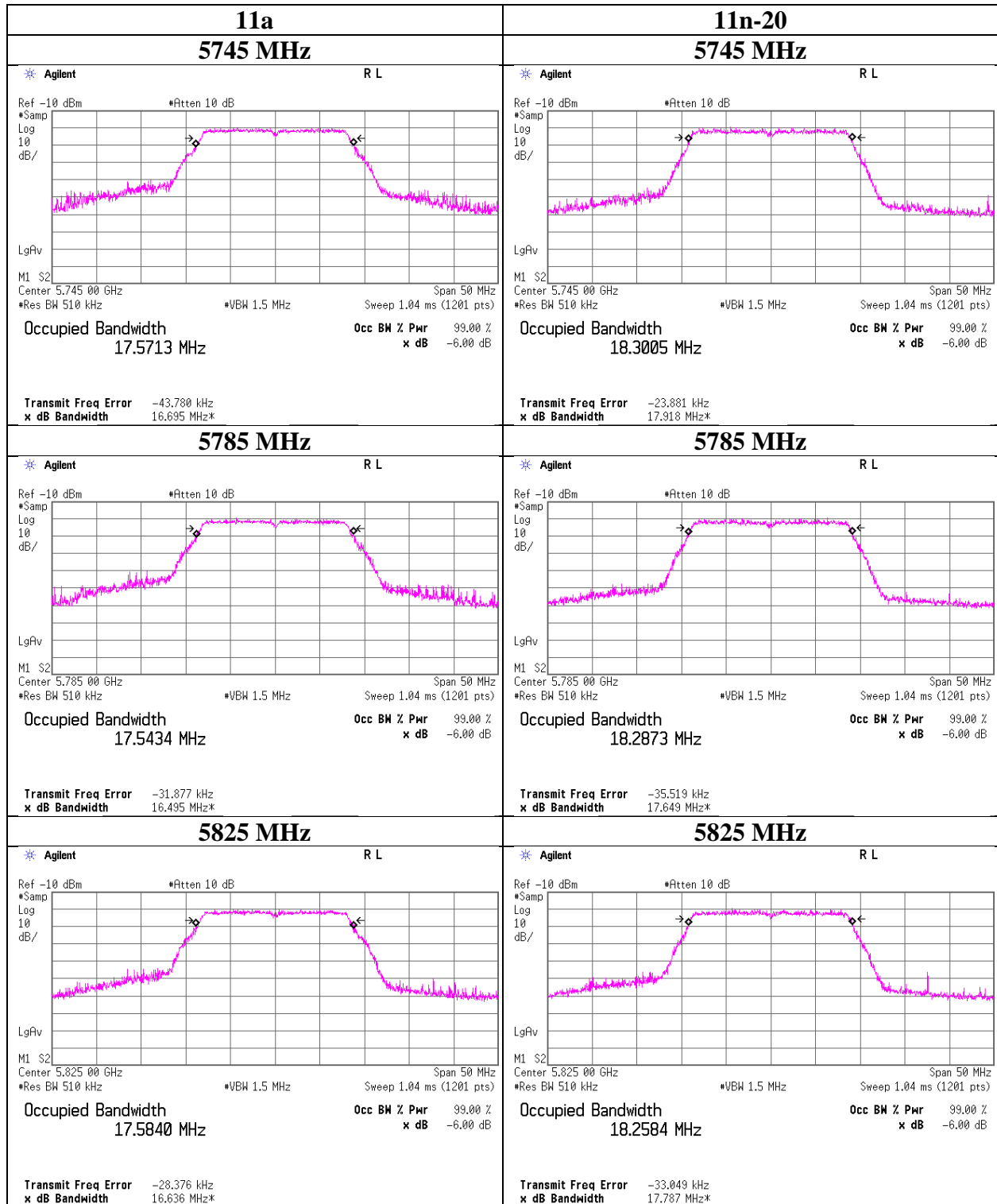
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### 6 dB Bandwidth



### 99 % Occupied Bandwidth



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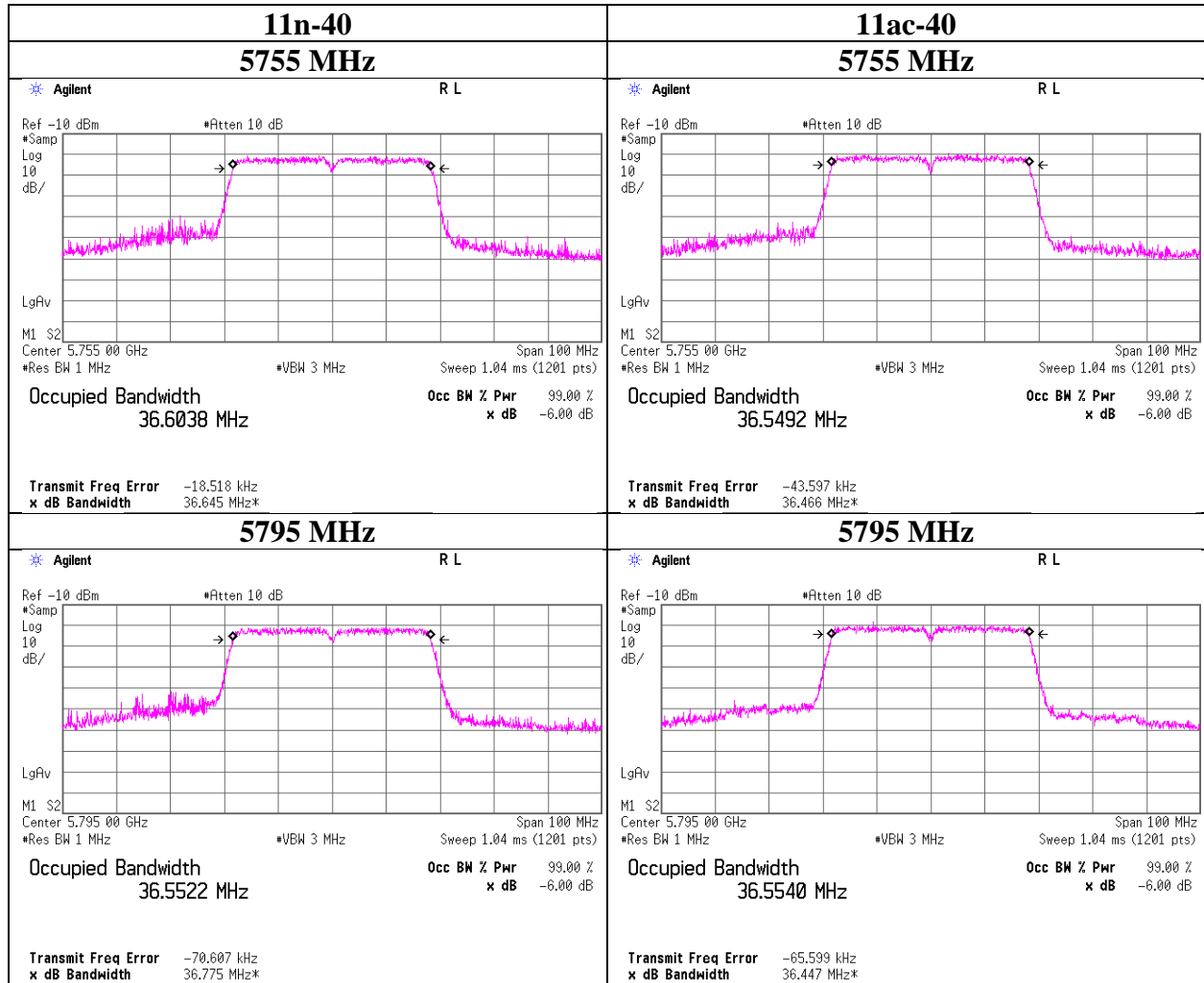
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**99 % Occupied Bandwidth**



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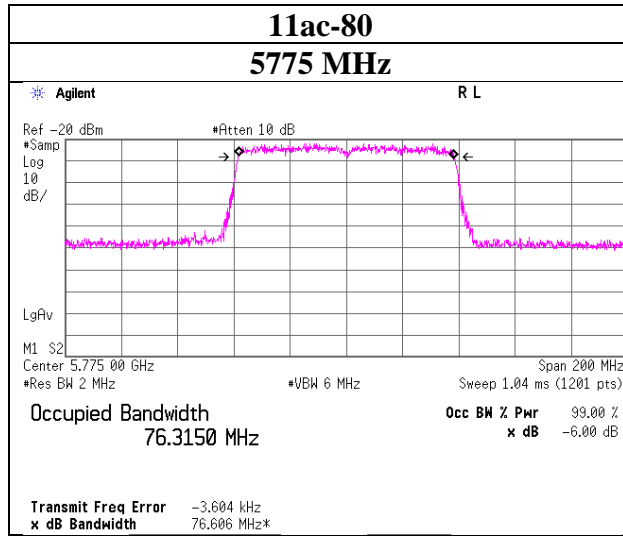
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## 99 % Occupied Bandwidth





## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5745	-13.23	4.00	20.01	0.29	-3.0	-	17.571	11.07	12.79	30.00	18.93	8.07	6.41	36.00	27.93
5785	-13.02	4.01	20.01	0.29	-3.0	-	17.543	11.29	13.46	30.00	18.71	8.29	6.75	36.00	27.71
5825	-13.26	4.02	20.00	0.29	-3.0	-	17.584	11.05	12.74	30.00	18.95	8.05	6.38	36.00	27.95

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 (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Result [mW]	Limit [dBm]
5745	-13.42	4.00	20.01	0.84	-3.0	-	18.300	11.43	13.89	30.00	18.57	8.43	6.96	36.00	27.57
5785	-13.58	4.01	20.01	0.84	-3.0	-	18.287	11.27	13.41	30.00	18.73	8.27	6.72	36.00	27.73
5825	-13.69	4.02	20.00	0.84	-3.0	-	18.258	11.17	13.10	30.00	18.83	8.17	6.56	36.00	27.83

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 (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Result [mW]	Limit [dBm]
5755	-14.20	4.01	20.01	0.60	-3.0	-	36.604	10.42	11.03	30.00	19.58	7.42	5.53	36.00	28.58
5795	-14.73	4.02	20.01	0.60	-3.0	-	36.552	9.90	9.78	30.00	20.10	6.90	4.90	36.00	29.10

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 (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Result [mW]	Limit [mW]
5755	-17.49	4.01	20.01	2.68	-3.0	-	36.549	9.21	8.34	30.00	20.79	6.21	4.18	36.00	29.79
5795	-17.68	4.02	20.01	2.68	-3.0	-	36.554	9.03	8.00	30.00	20.97	6.03	4.01	36.00	29.97

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 (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-80

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
								Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5775	-18.31	4.01	20.01	2.88	-3.0	-	76.315	8.59	7.23	30.00	21.41	5.59	3.62	36.00	30.41

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 (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11a

### 5785 MHz

Mode	Rate Mbps	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11a	6	-13.02	4.01	20.01	0.29	11.29	*
	9	-13.17	4.01	20.01	0.43	11.28	
	12	-13.44	4.01	20.01	0.56	11.13	
	18	-13.60	4.01	20.01	0.72	11.14	
	24	-13.98	4.01	20.01	0.92	10.96	
	36	-14.25	4.01	20.01	1.41	11.18	
	48	-14.79	4.01	20.01	1.74	10.97	
	54	-14.71	4.01	20.01	1.86	11.17	

\* Worst rate

Sample Calculation:

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

## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-20

### 5785 MHz SGI off

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11n-20	0	-13.10	4.01	20.01	0.31	11.23	
	1	-13.36	4.01	20.01	0.59	11.24	
	2	-13.58	4.01	20.01	0.84	11.27	*
	3	-13.89	4.01	20.01	1.04	11.17	
	4	-14.21	4.01	20.01	1.41	11.22	
	5	-14.65	4.01	20.01	1.76	11.13	
	6	-14.63	4.01	20.01	1.86	11.25	
	7	-14.75	4.01	20.01	1.99	11.26	

### 5785 MHz SGI on

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11n-20	0	-13.17	4.01	20.01	0.34	11.19	
	1	-13.57	4.01	20.01	0.64	11.09	
	2	-13.70	4.01	20.01	0.91	11.23	
	3	-14.14	4.01	20.01	1.15	11.03	
	4	-14.48	4.01	20.01	1.15	10.69	
	5	-14.72	4.01	20.01	1.84	11.14	
	6	-14.87	4.01	20.01	2.00	11.15	
	7	-15.23	4.01	20.01	2.15	10.94	

\* Worst rate

Sample Calculation:

$$\text{Result} = \text{Reading} + \text{Cable Loss (including the cable(s) customer supplied)} + \text{Atten. Loss} + \text{Duty factor}$$

## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-40

### 5755 MHz SGI off

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11n-40	0	-13.22	4.01	20.01	0.60	11.40	*
	1	-14.75	4.01	20.01	0.97	10.24	
	2	-15.15	4.01	20.01	1.46	10.33	
	3	-15.57	4.01	20.01	1.76	10.21	
	4	-15.85	4.01	20.01	2.04	10.21	
	5	-16.34	4.01	20.01	2.63	10.31	
	6	-16.40	4.01	20.01	2.75	10.37	
	7	-16.65	4.01	20.01	2.91	10.28	

### 5755 MHz SGI on

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11n-40	0	-13.88	4.01	20.01	0.66	10.80	
	1	-14.06	4.01	20.01	1.28	11.24	
	2	-15.38	4.01	20.01	1.57	10.21	
	3	-15.45	4.01	20.01	1.92	10.49	
	4	-15.79	4.01	20.01	2.34	10.57	
	5	-15.97	4.01	20.01	2.81	10.86	
	6	-16.00	4.01	20.01	2.96	10.98	
	7	-16.33	4.01	20.01	3.10	10.79	

\* Worst rate

Sample Calculation:

$$\text{Result} = \text{Reading} + \text{Cable Loss (including the cable(s) customer supplied)} + \text{Atten. Loss} + \text{Duty factor}$$



## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-40

### 5755 MHz SGI off

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11ac-40	0	-15.48	4.01	20.01	0.66	9.20	
	1	-16.14	4.01	20.01	1.15	9.03	
	2	-16.57	4.01	20.01	1.57	9.02	
	3	-16.77	4.01	20.01	1.84	9.09	
	4	-17.21	4.01	20.01	2.34	9.15	
	5	-17.49	4.01	20.01	2.68	9.21	*
	6	-17.97	4.01	20.01	2.88	8.93	
	7	-18.02	4.01	20.01	3.03	9.03	
	8	-18.12	4.01	20.01	3.25	9.15	
9	-18.48	4.01	20.01	3.25	8.79		

### 5755 MHz SGI on

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11ac-40	0	-15.81	4.01	20.01	0.66	8.87	
	1	-16.50	4.01	20.01	1.15	8.67	
	2	-16.67	4.01	20.01	1.57	8.92	
	3	-17.17	4.01	20.01	1.84	8.69	
	4	-17.67	4.01	20.01	2.34	8.69	
	5	-17.78	4.01	20.01	2.71	8.95	
	6	-18.25	4.01	20.01	2.96	8.73	
	7	-18.33	4.01	20.01	3.04	8.73	
	8	-18.50	4.01	20.01	3.25	8.77	
9	-18.68	4.01	20.01	3.25	8.59		

\* Worst rate

Sample Calculation:

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

## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-80

### 5775 MHz SGI off

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11ac-80	0	-16.84	4.01	20.01	1.11	8.29	
	1	-17.52	4.01	20.01	1.92	8.42	
	2	-18.06	4.01	20.01	2.48	8.44	
	3	-17.40	4.01	20.01	2.88	9.50	*
	4	-18.78	4.01	20.01	3.25	8.49	
	5	-19.14	4.01	20.01	3.52	8.40	
	6	-19.27	4.01	20.01	3.71	8.46	
	7	-19.36	4.01	20.01	3.83	8.49	
	8	-19.53	4.01	20.01	3.85	8.34	
9	-19.73	4.01	20.01	4.52	8.81		

### 5775 MHz SGI on

Mode	Rate MCS	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result [dBm]	Remarks
11ac-80	0	-16.72	4.01	20.01	1.21	8.51	
	1	-17.56	4.01	20.01	1.92	8.38	
	2	-17.99	4.01	20.01	2.48	8.51	
	3	-18.17	4.01	20.01	2.83	8.68	
	4	-18.56	4.01	20.01	3.25	8.71	
	5	-18.85	4.01	20.01	3.52	8.69	
	6	-19.56	4.01	20.01	3.69	8.15	
	7	-19.79	4.01	20.01	3.83	8.06	
	8	-19.93	4.01	20.01	3.85	7.94	
9	-20.20	4.01	20.01	4.52	8.34		

\* Worst rate

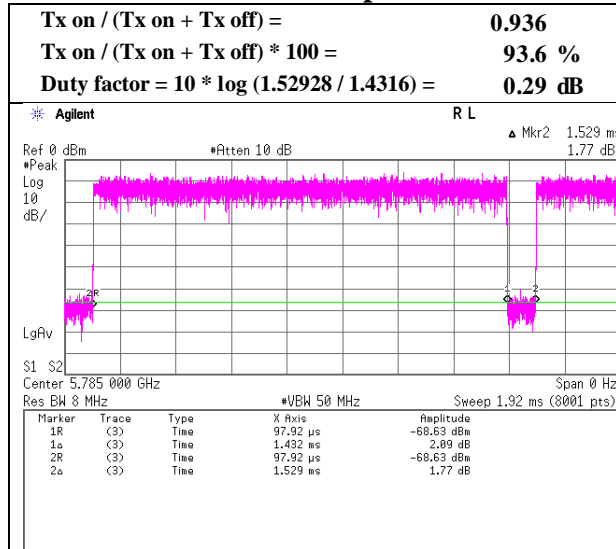
Sample Calculation:

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

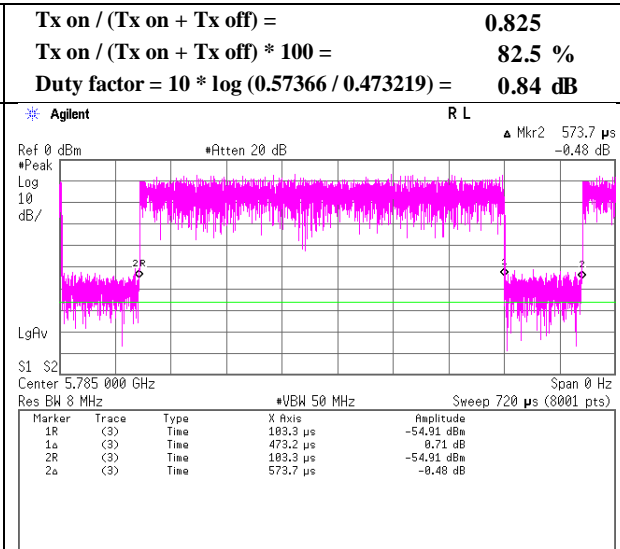
### Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11922902S-C-R2
Date	September 4, 2017
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Makoto Hosaka
Mode	Tx

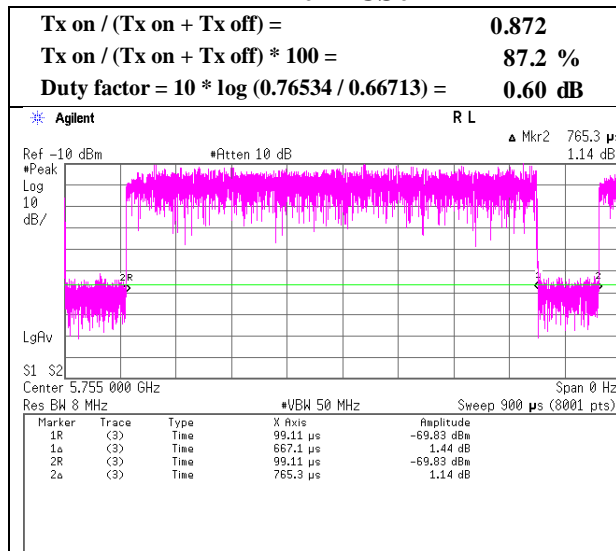
#### 11a 6Mbps



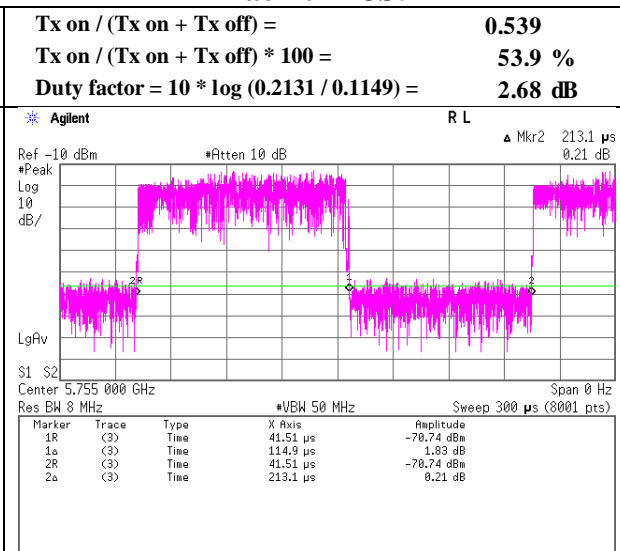
#### 11n-20 MCS2



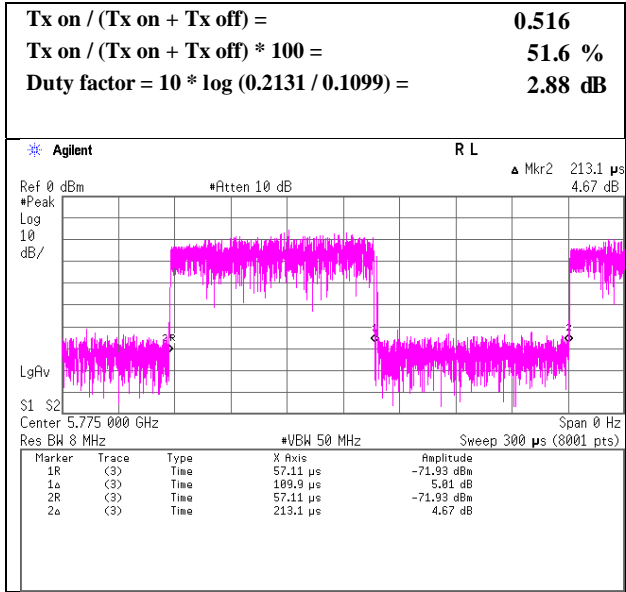
#### 11n-40 MCS0



#### 11ac-40 MCS5



### 11n-80 MCS3



**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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-32.38	4.00	20.01	0.29	-3.0	6.99	-1.09	30.00	31.09	-4.09	36.00	40.09
5785	-32.77	4.01	20.01	0.29	-3.0	6.99	-1.47	30.00	31.47	-4.47	36.00	40.47
5825	-32.74	4.02	20.00	0.29	-3.0	6.99	-1.44	30.00	31.44	-4.44	36.00	40.44

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 Factor

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-33.17	4.00	20.01	0.84	-3.0	6.99	-1.33	30.00	31.33	-4.33	36.00	40.33
5785	-33.49	4.01	20.01	0.84	-3.0	6.99	-1.64	30.00	31.64	-4.64	36.00	40.64
5825	-33.07	4.02	20.00	0.84	-3.0	6.99	-1.22	30.00	31.22	-4.22	36.00	40.22

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 Factor

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5755	-37.78	4.01	20.01	0.60	-3.0	6.99	-6.17	30.00	36.17	-9.17	36.00	45.17
5795	-37.73	4.02	20.01	0.60	-3.0	6.99	-6.11	30.00	36.11	-9.11	36.00	45.11

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5755	-36.56	4.01	20.01	2.68	-3.0	6.99	-2.87	30.00	32.87	-5.87	36.00	41.87
5795	-37.60	4.02	20.01	2.68	-3.0	6.99	-3.90	30.00	33.90	-6.90	36.00	42.90

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx 11ac-80

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5775	-43.10	4.01	20.01	2.81	-3.0	6.99	-9.28	30.00	39.28	-12.28	36.00	48.28

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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)

**UL Japan, Inc.**

**Shonan EMC Lab.**

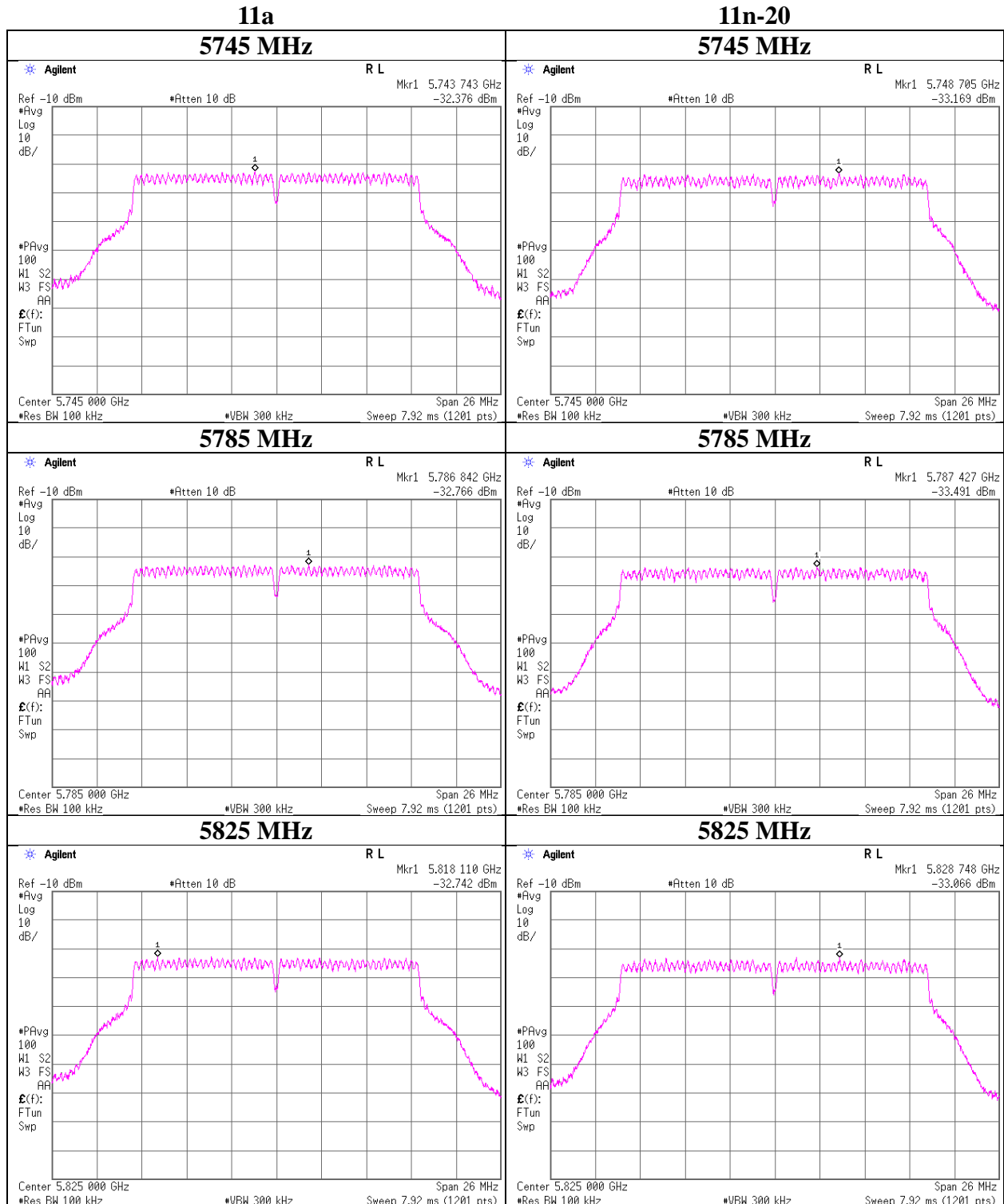
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

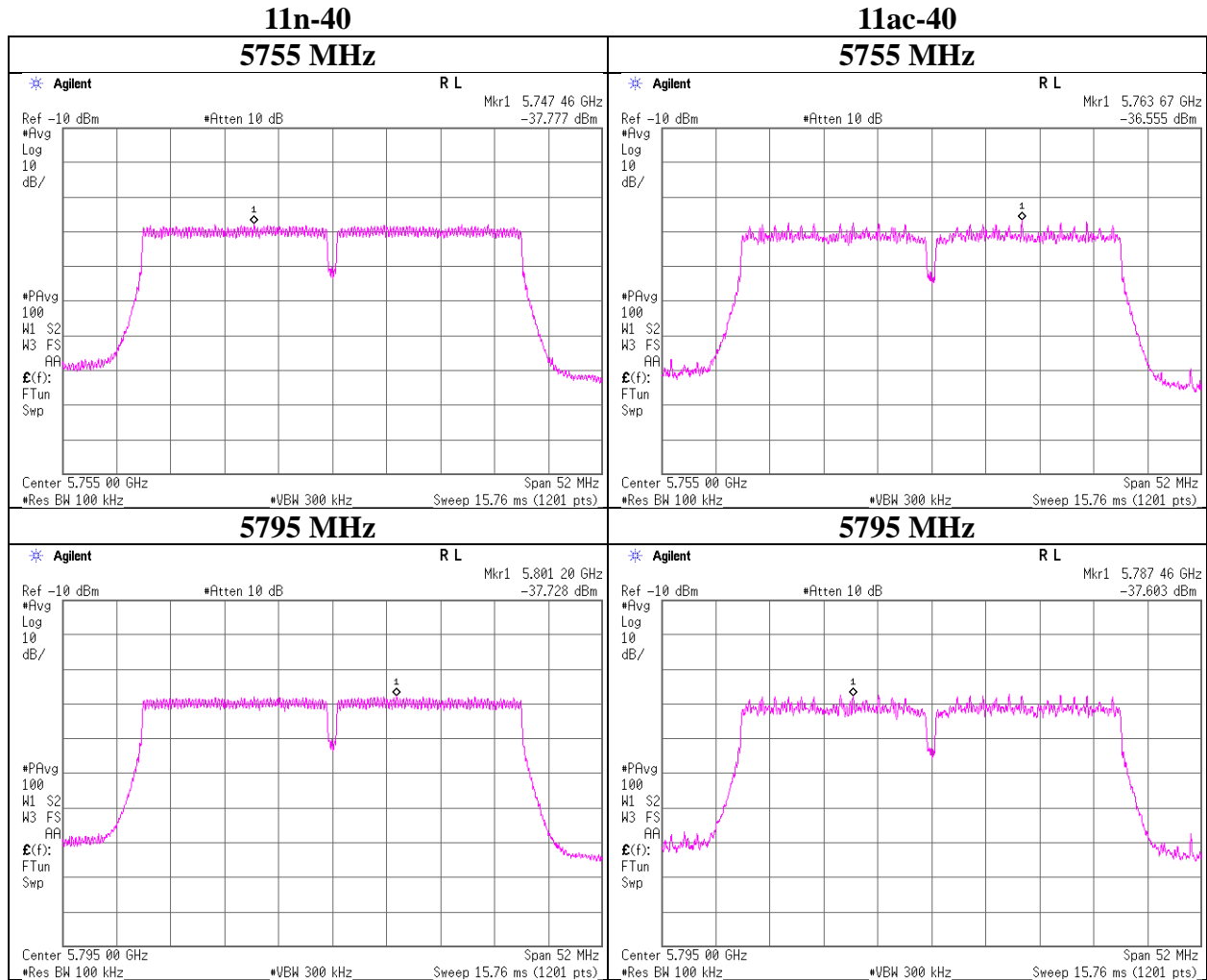
### Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11922902S-C-R2
Date	September 4, 2017
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Makoto Hosaka
Mode	Tx



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**UL Japan, Inc.**

**Shonan EMC Lab.**

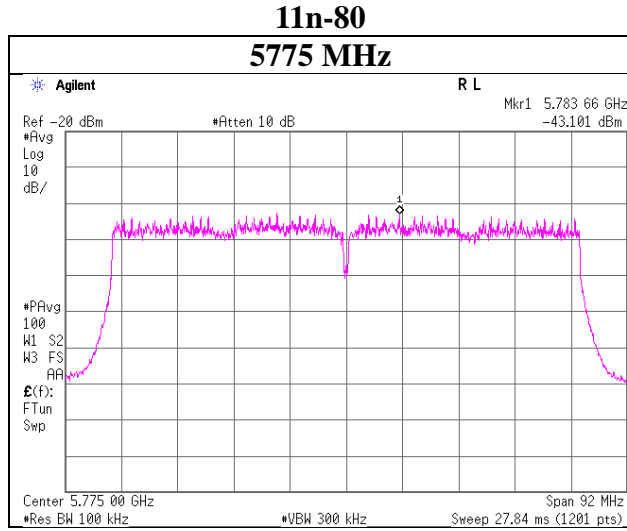
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

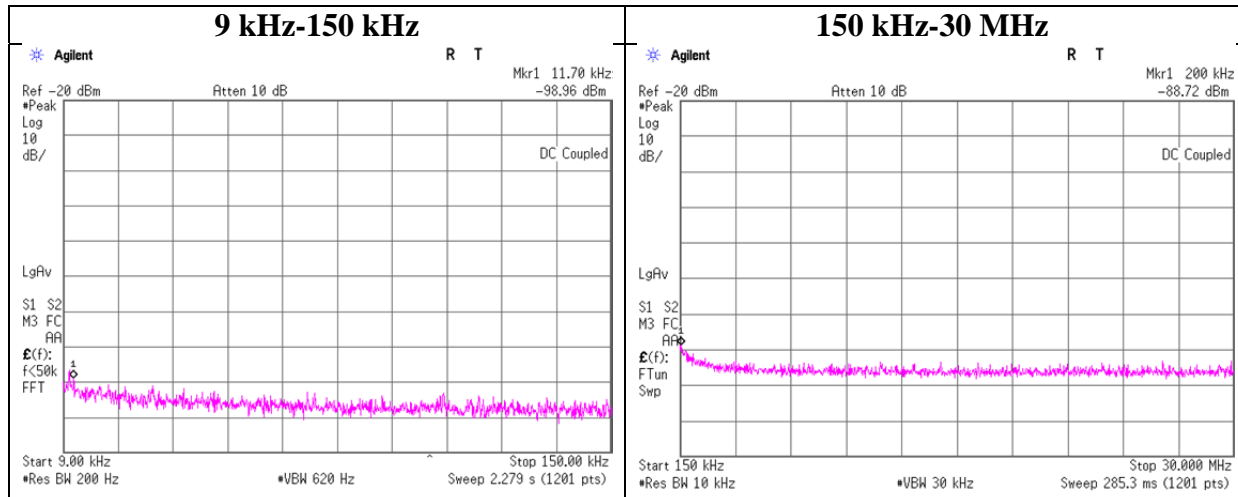
### Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11922902S-C-R2  
Date : September 4, 2017  
Temperature / Humidity : 26 deg. C / 48 % RH  
Engineer : Makoto Hosaka  
Mode : Tx



### Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11922902S-C-R2
Date	September 4, 2017
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Makoto Hosaka
Mode	Tx 11a 5785 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
11.70	-99.0	1.82	0.0	2.0	1	-95.1	300	6.0	-33.9	46.2	80.1	
200.00	-88.7	1.82	0.0	2.0	1	-84.9	300	6.0	-23.6	21.5	45.1	

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

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

N: Number of output

\*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

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## **APPENDIX 2: Test instruments**

### **Test equipment**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Serial No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
SCC-G32	Coaxial Cable	Junkosha	MWX241-02 000KMSKMS	OCT-09-13-00 5	AT	2016/11/07 * 12
SAT20-06	Attenuator	Weinschel Corp.	54A-20	31506	AT	2017/04/20 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2017/05/01 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2016/10/17 * 12
SRENT-10	Spectrum Analyzer	Agilent	E4440A	US41421511	AT	2016/12/05 * 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: AT: Antenna Terminal Conducted test**