



# RADIO TEST REPORT


Test Report No. : 11280518S-R1

**Applicant** : Japan Radio Co., Ltd.  
**Type of Equipment** : Wireless LAN Module  
**Model No.** : CMN-851A  
**FCC ID** : CKECMN851A  
**Test regulation** : FCC Part 15 Subpart E: 2016  
W58 (5745 MHz - 5825 MHz Band) only  
**Test Result** : Complied

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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 11280518S. 11280518S is replaced with this report.

**Date of test:** May 16 to 25, 2016

**Representative test engineer:**   
Yosuke Ishikawa  
Engineer  
Consumer Technology Division

**Approved by:**   
Tatsuya Arai  
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



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## **SECTION 1: Customer information**

Company Name : Japan Radio Co., Ltd.  
Address : 1-1, Shimorenjaku 5-chome, Mitaka-shi, Tokyo, 181-8510 Japan  
Telephone Number : +81 422 45 9311  
Facsimile Number : +81 422 45 9956  
Contact Person : Shinsuke Miyazaki

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

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

Type of Equipment : Wireless LAN Module  
Model No. : CMN-851A  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 3.3 V  
Receipt Date of Sample : May 11, 2016  
Country of Mass-production : Japan  
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: CMN-851A (referred to as the EUT in this report) is a Wireless LAN Module.

### **General Specification**

Clock frequency(ies) in the system : 40 MHz

### **Radio Specification**

Equipment type : Transceiver  
Frequency of operation : 2.4 GHz: 2412 MHz-2462 MHz (IEEE 802.11b, 11g, 11n-20)  
2422 MHz-2452 MHz (IEEE 802.11n-40)  
W52: 5180 MHz-5240 MHz (IEEE 802.11a, 11n-20)  
5190 MHz-5230 MHz (IEEE 802.11n-40)  
W53: 5260 MHz-5320 MHz (IEEE 802.11a, 11n-20)  
5270 MHz-5310 MHz (IEEE 802.11n-40)  
W56: 5500 MHz-5700 MHz (IEEE 802.11a, 11n-20)  
5510 MHz-5670 MHz (IEEE 802.11n-40)  
W58: 5745 MHz-5825 MHz (IEEE 802.11a, 11n-20)  
5755 MHz-5795 MHz (IEEE 802.11n-40)  
Bandwidth : 20 MHz (IEEE 802.11a/b/g/n), 40 MHz (IEEE 802.11n)  
Channel spacing : 5 MHz (2.4 GHz),  
20 MHz (11a, (11n-20, 5 GHz)), 40 MHz (11n-40, 5 GHz)  
Type of modulation : DSSS, OFDM  
Antenna type : Dual (2.4 GHz band: Planar patch, 5 GHz band: Inverted F)  
Antenna gain with cable loss : 2.4 GHz band: 0.58 dBi  
3.73 dBi (Antenna gain) – 3.15 dB (cable loss(18 ft))  
5 GHz band: -0.98 dBi  
4.06 dBi (Antenna gain) – 5.04 dB (cable loss(18 ft))  
Antenna connector type : Module side: U.FL  
Antenna side: RP-SMA  
ITU code : D1D, G1D

\* The EUT does not perform simultaneous transmission of 2.4 GHz and 5 GHz Wireless LAN.

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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 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart E  
FCC Part 15 final revised on April 6, 2016

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

### **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	14.7 dB	Complied	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8	Tx, 11n-20(MIMO), 5785 MHz 0.50726 MHz AV, L1		
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		1.2 dB	Complied
	IC: -	IC: RSS-247 6.2.1 (2) 6.2.2 (2) 6.2.3 (2) 6.2.4 (2)	Tx, 11n-40(MIMO), 5755MHz 5725.000 MHz, PK, Vertical		
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) Radiated test was selected over 30 MHz based on section 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 host device provides stable voltage (DC 3.3 V) constantly to the EUT regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

The EUT has a unique coupling/antenna connector. Therefore the equipment complies with the requirement.

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

Telephone : +81 463 50 6400

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### 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

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.1 dB	2.1 dB	2.6 dB	2.2 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 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	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

#### Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

#### 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

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.

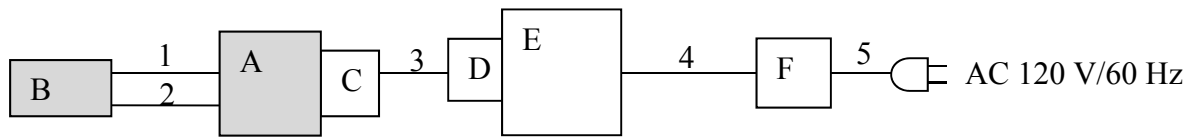
<b>Mode</b>	<b>Remarks*</b>	<b>Power setting</b>
Transmitting (Tx), IEEE 802.11a (11a)	48 Mbps, PN9	13
Transmitting (Tx), IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 2, PN9	10.5
Transmitting (Tx), IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 13 (2 Streams), PN9	10.5
Transmitting (Tx), IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 4, PN9	10
Transmitting (Tx), IEEE 802.11n MIMO 40 MHz BW (11n-40)	MCS 13 (2 Streams), PN9	10
The EUT has the power settings by the software: ART v0.9 b34		
*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)

<b>Test Item</b>	<b>Operating Mode *1)</b>	<b>Tested Antenna *2)</b>	<b>Tested Frequency</b>
Conducted emission Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	Tx, 11n-20 MIMO	1+2	5785 MHz
Maximum Conducted Output Power, Maximum Power Spectral Density	Tx, 11a	2	5745 MHz
	Tx, 11n-20 SISO		5785 MHz
	Tx, 11n-20 MIMO	1+2	5825 MHz
	Tx, 11n-40 SISO	2	5755 MHz
99 % Occupied Bandwidth, 6 dB Bandwidth	Tx, 11n-40 MIMO	1+2	5795 MHz
	Tx, 11a	2	5745 MHz
	Tx, 11n-20 SISO		5785 MHz
	Tx, 11n-20 MIMO		5825 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx, 11n-40 SISO	2	5755 MHz
	Tx, 11n-40 MIMO	1+2	5795 MHz
	Tx, 11a	2	5745 MHz
	Tx, 11n-20 MIMO	1+2	5785 MHz
	Tx, 11n-40 MIMO	1+2	5755 MHz
			5795 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.			
*2) The test was performed with the antenna that had higher power as a representative.			



## 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 and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN Module	CMN-851A	983109021212	Japan Radio Co., Ltd.	EUT
B	AP-Double WiFi Antenna	APP-WW	-	Antenna Plus LLC	EUT
C	Jig (mPCIe passive adapter)	PE-MINI-FLEX8-FH (E204460 D1 94V-0)	-	-	-
D	PC Card	-	-	-	-
E	PC	Latitude E5440	HXJ7H12	DELL	-
F	AC/DC Adapter	LA65NM130	CN-0JNKWD-72438-45S-1D37-A01	DELL	-

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Coaxial	5.5	Shielded	Shielded	-
2	Coaxial	5.5	Shielded	Shielded	-
3	HDMI	0.55	Shielded	Shielded	-
4	DC	1.8	Unshielded	Unshielded	-
5	AC	0.85	Unshielded	Unshielded	-

## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via host equipment in a shielded room.

The EUT via host equipment was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

**Detector** : QP and CISPR Average  
**Measurement range** : 0.15 MHz-30 MHz  
**Test data** : APPENDIX  
**Test result** : Pass

## **SECTION 6: Radiated Spurious Emission and Band Edge Compliance**

### **Test Procedure**

< Below 1 GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

< Above 1 GHz >

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

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

The height of the measuring antenna varied between 1 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 1 GHz >

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

< Above 1 GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

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

Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.\* ) or

78.2 dBuV/m, 3 m (-17 dBm e.i.r.p.\* ) in the Section 15.407 (b)(4)

Band edge:

Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.\* ) or

78.2 dBuV/m, 3 m (-17 dBm e.i.r.p.\* ) in the Section 15.407 (b)(4)

\*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: 10 Hz (duty > 98 %)  RBW: 1 MHz VBW: 1/T (*T = transmission duration) (duty < 98 %)
Test Distance	3 m	4.3 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 40 GHz)	

\*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r02 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on April 8, 2016)".

\*2) Distance Factor:  $20 \times \log((4.5 - 0.2) \text{ m}/3.0 \text{ m}) = 3.2 \text{ dB}$

\*3) Distance Factor:  $20 \times \log(1.0 \text{ m}/3.0 \text{ m}) = -9.5 \text{ dB}$

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Subject	Antenna polarization	Carrier	Spurious (Below 1 GHz)	Spurious (Above 1 GHz)
Module	Horizontal	X	X	X
Antenna		Z	Y	Z
Module	Vertical	X	X	X
Antenna		X	Y	X

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.

<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	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: 160 MHz BW) (Method PM)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *1)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*2)	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 v01r02 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on April 8, 2016)".

\*1) FCC standard 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  $10\log(500\text{ kHz}/100\text{ kHz})$  was added to the test result.

\*2) 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

**APPENDIX 1: Test data**

**Conducted Emission**

**DATA OF CONDUCTED EMISSION TEST**

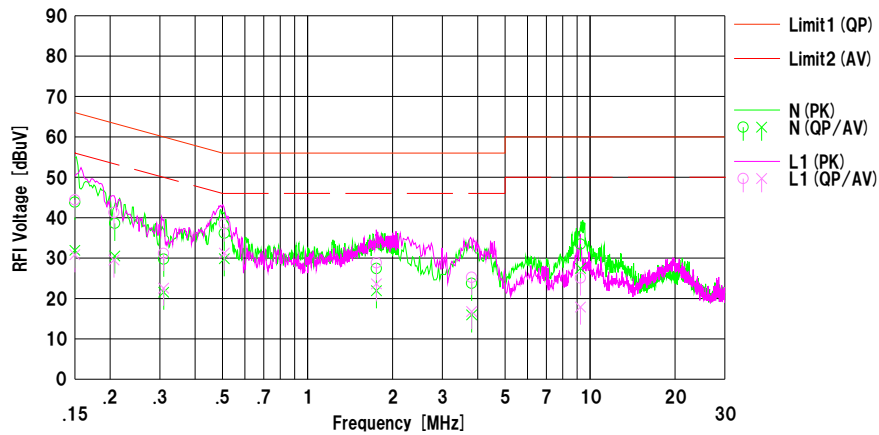
UL Japan,Inc. Shonan EMC Lab. No.3 Shielded Room  
Date : 2016/05/25

Mode : Tx 11n (HT20) 5785 MHz  
Order No. : 11280518S  
Temp./Humi. : 24 deg.C / 46 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Hikaru Shirasawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	31.40	19.50	12.42	43.82	31.92	66.00	56.00	22.1	24.0	N	
2	0.20770	26.20	18.10	12.41	38.61	30.51	63.30	53.30	24.6	22.7	N	
3	0.30949	17.30	9.10	12.43	29.73	21.53	59.98	49.98	30.2	28.4	N	
4	0.50710	23.70	17.40	12.44	36.14	29.84	56.00	46.00	19.8	16.1	N	
5	1.75279	14.90	9.40	12.52	27.42	21.92	56.00	46.00	28.5	24.0	N	
6	3.80790	11.10	3.30	12.64	23.74	15.94	56.00	46.00	32.2	30.0	N	
7	9.24467	20.60	14.60	12.86	33.46	27.46	60.00	50.00	26.5	22.5	N	
8	0.15000	32.00	18.40	12.42	44.42	30.82	66.00	56.00	21.5	25.1	L1	
9	0.20632	28.90	17.10	12.41	41.31	29.51	63.35	53.35	22.0	23.8	L1	
10	0.30932	18.70	10.10	12.43	31.13	22.53	59.99	49.99	28.8	27.4	L1	
11	0.50726	26.00	18.80	12.44	38.44	31.24	56.00	46.00	17.5	14.7	L1	
12	1.75290	16.30	11.10	12.52	28.82	23.62	56.00	46.00	27.1	22.3	L1	
13	3.80780	12.60	4.10	12.64	25.24	16.74	56.00	46.00	30.7	29.2	L1	
14	9.24596	12.20	5.00	12.86	25.06	17.86	60.00	50.00	34.9	32.1	L1	

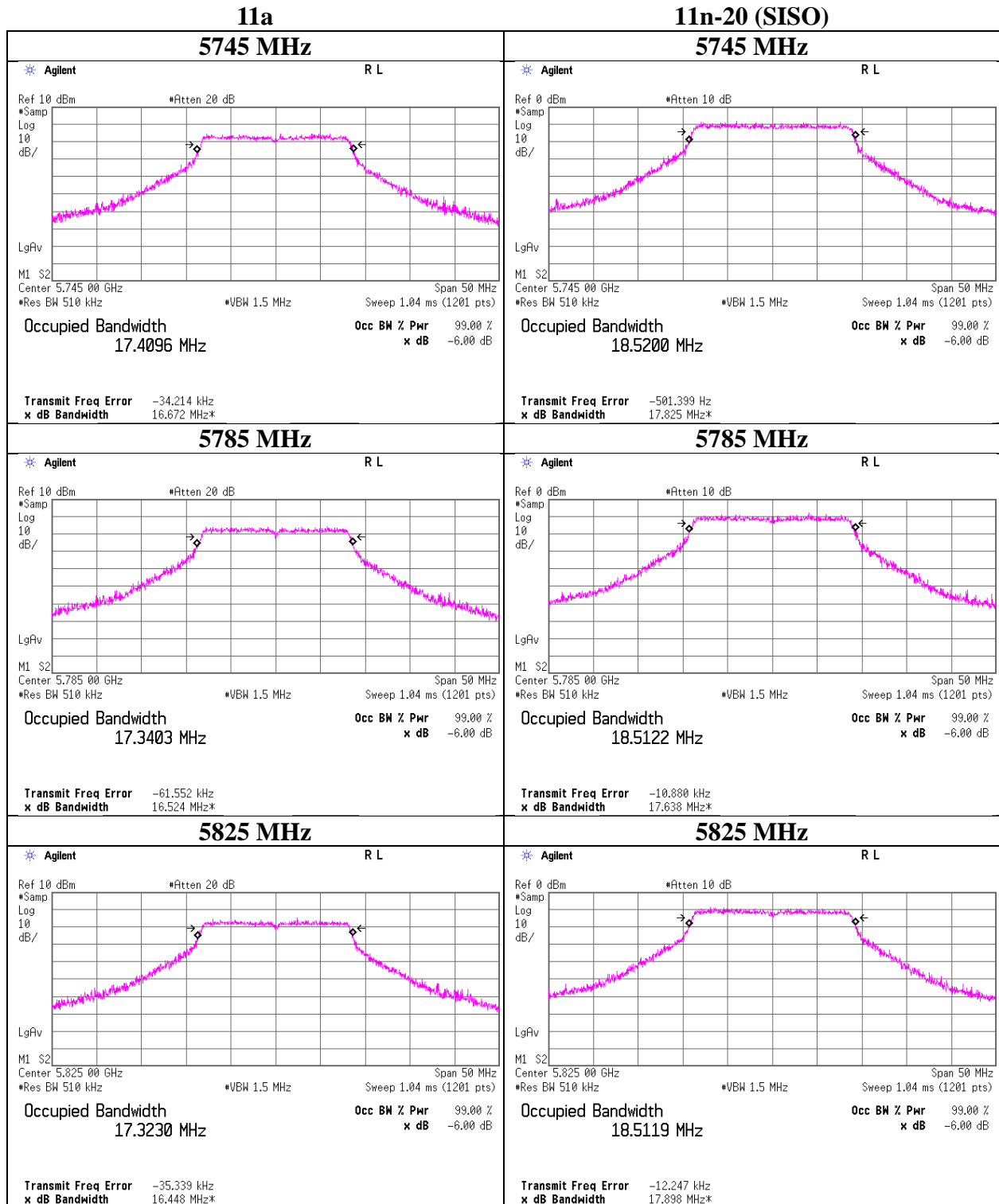
Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+ATT+Cable) [dB]  
LISN: SLS-01

## 99 % Occupied Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 11280518S-R1  
Date May 18, 2016  
Temperature / Humidity 25deg. C / 41 % RH  
Engineer Yosuke Ishikawa  
Mode Tx

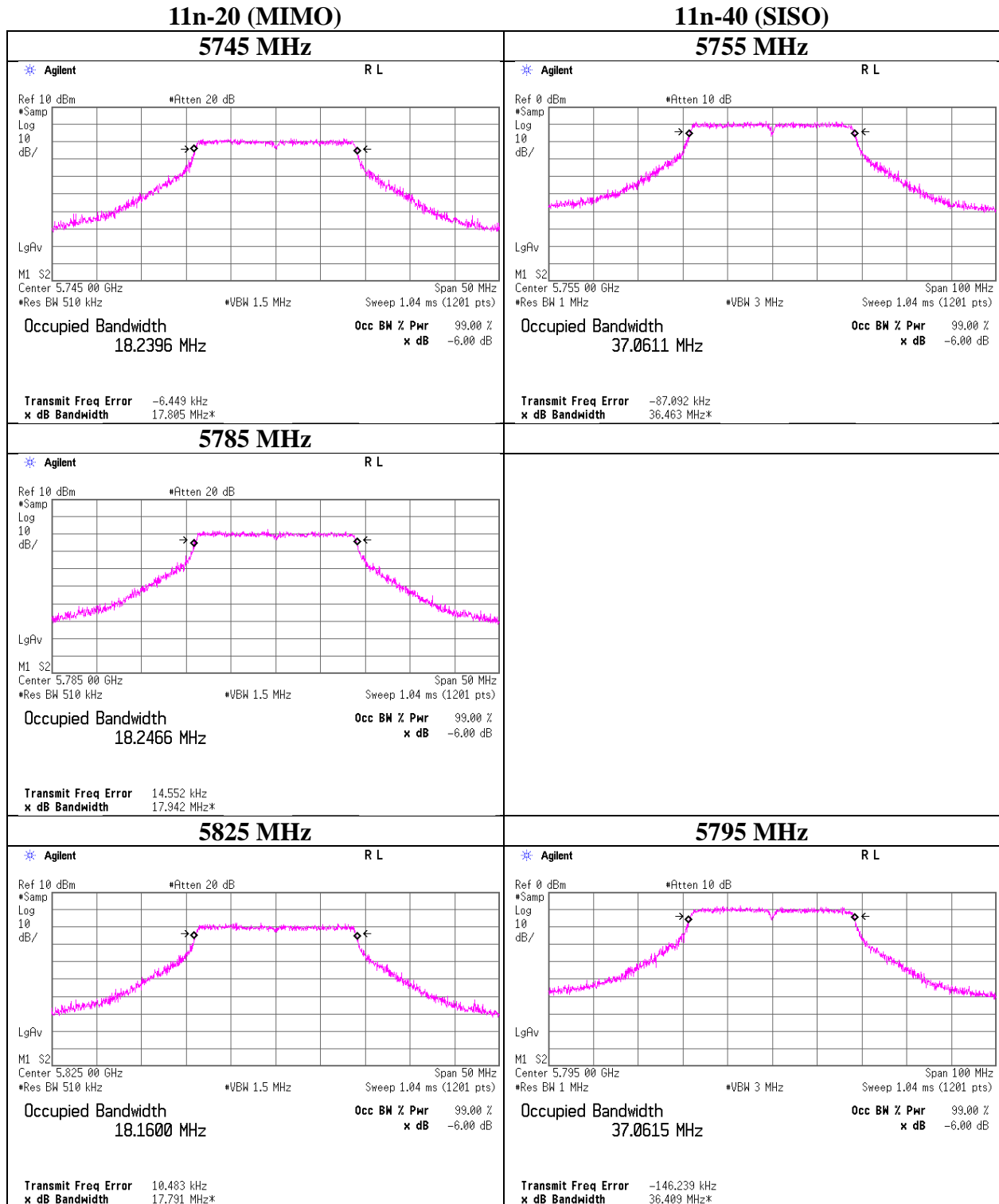
Mode	Antenna	Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
11a	2	5745	17.410	-
		5785	17.340	-
		5825	17.323	-
11n-20 (SISO)	2	5745	18.520	-
		5785	18.512	-
		5825	18.512	-
11n-20 (MIMO)	2	5745	18.240	-
		5785	18.247	-
		5825	18.160	-
11n-40 (SISO)	2	5755	37.061	-
		-	-	-
		5795	37.062	-
11-40 (MIMO)	2	5755	37.010	-
		-	-	-
		5795	37.818	-

## 99 % Occupied Bandwidth





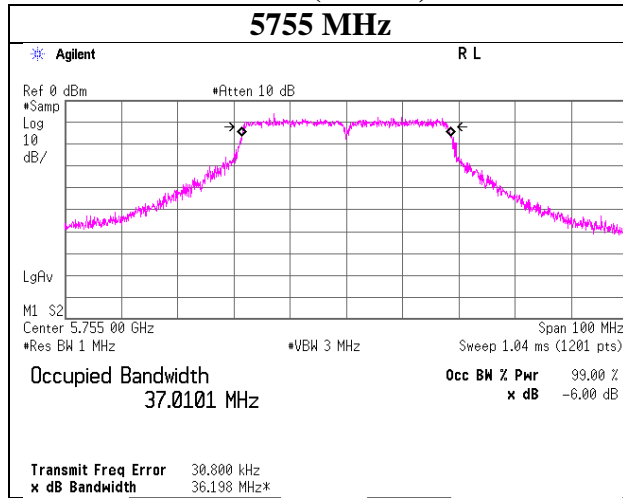
**99 % Occupied Bandwidth**



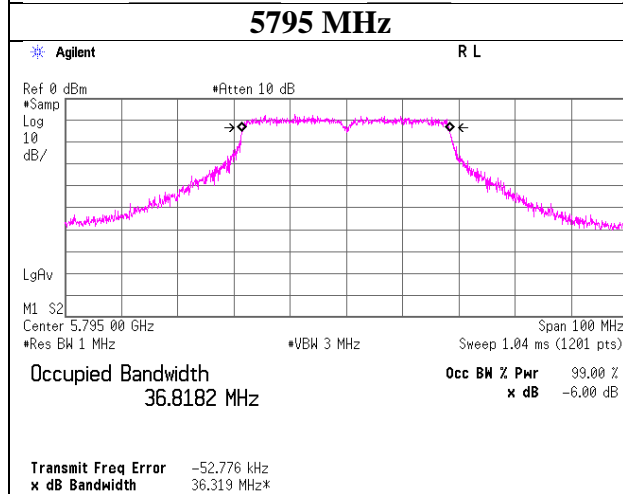
## 99 % Occupied Bandwidth

### 11n-40 (MIMO)

#### 5755 MHz



#### 5795 MHz

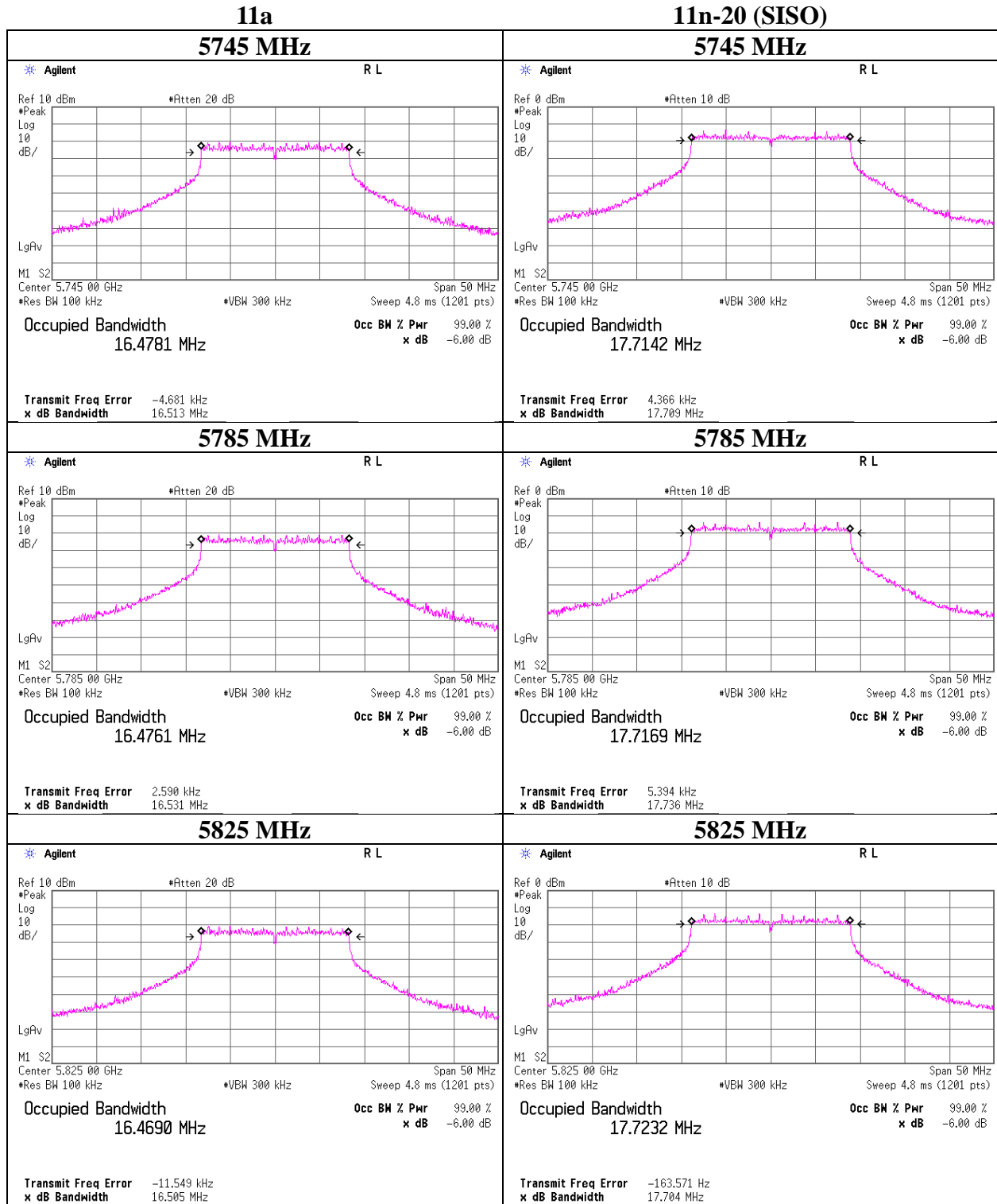


## 6 dB Bandwidth

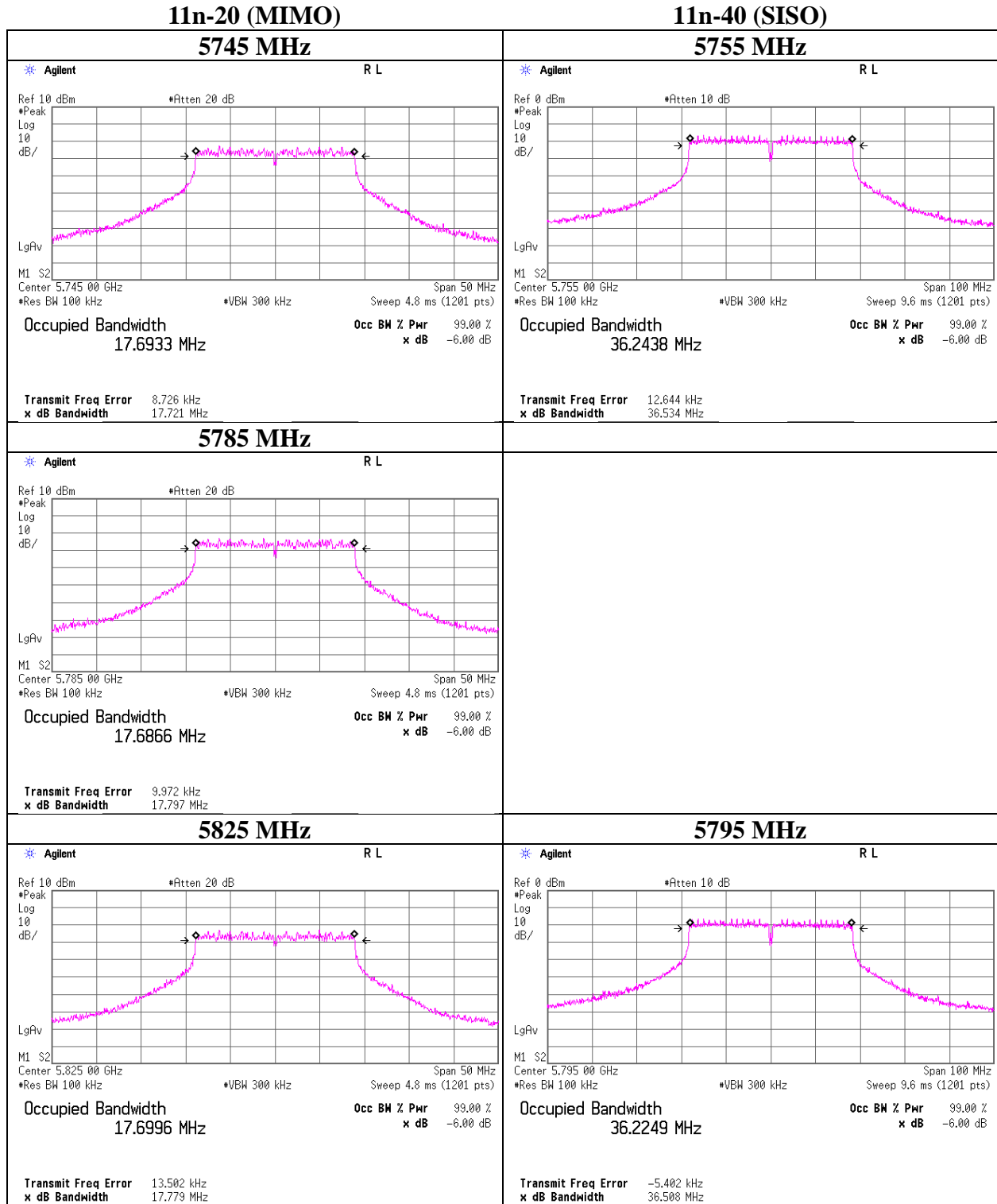
Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 11280518S-R1  
Date May 18, 2016  
Temperature / Humidity 25deg. C / 41 % RH  
Engineer Yosuke Ishikawa  
Mode Tx

Mode	Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
11a	2	5745	16.513	> 500
		5785	16.531	> 500
		5825	16.505	> 500
11n-20 (SISO)	2	5745	17.709	> 500
		5785	17.736	> 500
		5825	17.704	> 500
11n-20 (MIMO)	2	5745	17.721	> 500
		5785	17.797	> 500
		5825	17.779	> 500
11n-40 (SISO)	2	5755	36.534	> 500
		-	-	> 500
		5795	36.508	> 500
11-40 (MIMO)	2	5755	36.519	> 500
		-	-	> 500
		5795	36.401	> 500

### 6 dB Bandwidth

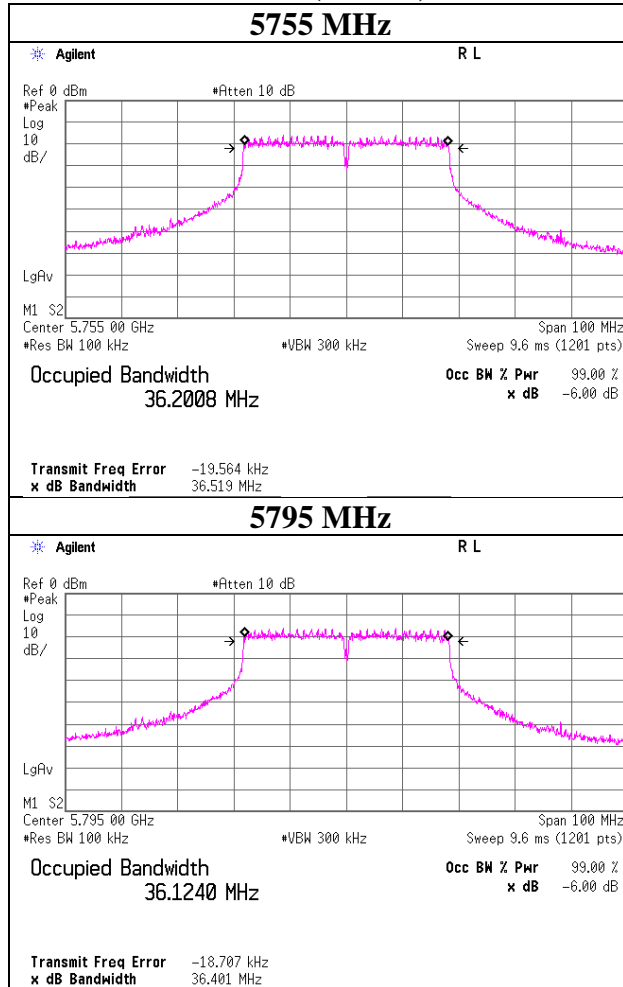


### 6 dB Bandwidth



## 6 dB Bandwidth

### 11n-40 (MIMO)





## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 18, 2016  
Temperature / Humidity : 25deg. C / 41 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

### 11n-20 (MIMO), Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW [MHz]	99% OBW [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5745	-	-	11.04	12.22	23.26	13.67	30.00	16.33	8.81	9.75	18.56	12.69	36.00	23.31
5785	-	-	11.61	12.08	23.69	13.75	30.00	16.25	9.27	9.64	18.91	12.77	36.00	23.23
5825	-	-	10.84	11.86	22.70	13.56	30.00	16.44	8.65	9.46	18.11	12.58	36.00	23.42

Antenna 1								Antenna 2					
Tested Frequency [MHz]	Duty Factor [dB]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result	
						Cond. Power [dBm]	e.i.r.p. [dBm]					Cond. Power [dBm]	e.i.r.p. [dBm]
5745	0.39	-2.68	2.56	10.16	-0.98	10.43	9.45	-2.24	2.56	10.16	-0.98	10.87	9.89
5785	0.39	-2.48	2.58	10.16	-0.98	10.65	9.67	-2.31	2.58	10.16	-0.98	10.82	9.84
5825	0.39	-2.81	2.61	10.16	-0.98	10.35	9.37	-2.42	2.61	10.16	-0.98	10.74	9.76

### 11n-40 (MIMO), Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW [MHz]	99% OBW [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5755	-	-	11.09	11.72	22.81	13.58	30.00	16.42	8.85	9.35	18.21	12.60	36.00	23.40
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5795	-	-	10.81	11.72	22.54	13.53	30.00	16.47	8.63	9.35	17.98	12.55	36.00	23.45

Antenna 1								Antenna 2					
Tested Frequency [MHz]	Duty Factor [dB]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result	
						Cond. Power [dBm]	e.i.r.p. [dBm]					Cond. Power [dBm]	e.i.r.p. [dBm]
5755	0.53	-2.80	2.56	10.16	-0.98	10.45	9.47	-2.56	2.56	10.16	-0.98	10.69	9.71
-	-	-	-	-	-	-	-	-	-	-	-	-	-
5795	0.53	-2.93	2.58	10.16	-0.98	10.34	9.36	-2.58	2.58	10.16	-0.98	10.69	9.71

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + 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





## Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 18, 2016  
Temperature / Humidity : 25deg. C / 41 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

### 5755 MHz

Mode	MCS Number	Reading (timed average)						Duty factor [dB]	Burst power			Remarks
		Antenna							Antenna			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	1+2 [mW]	1+2 [dBm]		1 [dBm]	2 [dBm]	1+2 [dBm]	
11n-40	0	-2.48	-2.17	-	-	-	-	0.03	-2.45	-2.14	-	
	1	-2.56	-2.04	-	-	-	-	0.12	-2.44	-1.92	-	
	2	-2.64	-2.07	-	-	-	-	0.17	-2.47	-1.90	-	
	3	-2.67	-2.05	-	-	-	-	0.22	-2.45	-1.83	-	
	4	-2.65	-2.08	-	-	-	-	0.31	-2.34	-1.77	-	* 1 TX
	5	-2.80	-2.50	-	-	-	-	0.40	-2.40	-2.10	-	
	6	-6.73	-6.44	-	-	-	-	0.41	-6.32	-6.03	-	
	7	-6.75	-6.31	-	-	-	-	0.45	-6.30	-5.86	-	
	8	-2.53	-2.06	0.56	0.62	1.18	0.72	0.06	-	-	0.78	
	9	-2.48	-2.28	0.56	0.59	1.16	0.63	0.12	-	-	0.75	
	10	-2.58	-2.37	0.55	0.58	1.13	0.54	0.27	-	-	0.81	
	11	-2.67	-2.48	0.54	0.56	1.11	0.44	0.33	-	-	0.77	
	12	-2.71	-2.58	0.54	0.55	1.09	0.37	0.46	-	-	0.83	
	13	-2.80	-2.56	0.52	0.55	1.08	0.33	0.53	-	-	0.86	* 2 TX
	14	-6.99	-6.87	0.20	0.21	0.41	-3.92	0.54	-	-	-3.38	
15	-6.97	-6.82	0.20	0.21	0.41	-3.88	0.61	-	-	-3.27		

\* 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.

**Average Output Power**  
**(Reference data for RF Exposure)**

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 16, 2016  
Temperature / Humidity : 25 deg. C / 42 % RH  
Engineer : Wataru Kojima  
Mode : Tx  
May 18, 2016  
25deg. C / 41 % RH  
Yosuke Ishikawa

**11a, 48 Mbps, Antenna 2**

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5745	-9.35	2.64	20.10	13.39	21.83
5785	-9.22	2.66	20.11	13.55	22.65
5825	-9.29	2.69	20.12	13.52	22.49

**11n-20 (SISO), MCS2, Antenna 2**

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5745	-2.00	2.67	10.16	10.83	12.11
5785	-2.06	2.69	10.16	10.79	11.99
5825	-2.20	2.72	10.16	10.68	11.69

**11n-40 (SISO), MCS1, Antenna 2**

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5755	-2.04	2.56	10.16	10.68	11.69
-	-	-	-	-	-
5795	-2.12	2.58	10.16	10.62	11.53

**11n-20 (MIMO), MCS8, Antenna 1+2**

Tested Frequency [MHz]	Antenna 1				Antenna 2				Antenna 1+2			
	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	Result (Timed average) Antenna		Sum 1+2	
									[mW]	[mW]	[mW]	[dBm]
5745	-2.35	2.67	10.16	10.48	-2.14	2.67	10.16	10.69	11.17	11.72	22.89	13.60
5785	-2.38	2.69	10.16	10.47	-2.01	2.69	10.16	10.84	11.14	12.13	23.28	13.67
5825	-2.47	2.72	10.16	10.41	-2.15	2.72	10.16	10.73	10.99	11.83	22.82	13.58

**11n-40 (MIMO), MCS8, Antenna 1+2**

Tested Frequency [MHz]	Antenna 1				Antenna 2				Antenna 1+2			
	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	Result (Timed average) Antenna		Sum 1+2	
									[mW]	[mW]	[mW]	[dBm]
5755	-2.53	2.56	10.16	10.19	-2.06	2.56	10.16	10.66	10.45	11.64	22.09	13.44
-	-	-	-	-	-	-	-	-	-	-	-	-
5795	-2.35	2.58	10.16	10.39	-2.10	2.58	10.16	10.64	10.94	11.59	22.53	13.53

Sample Calculation:

Result (Timed average) = Reading + Cable Loss + Atten. Loss

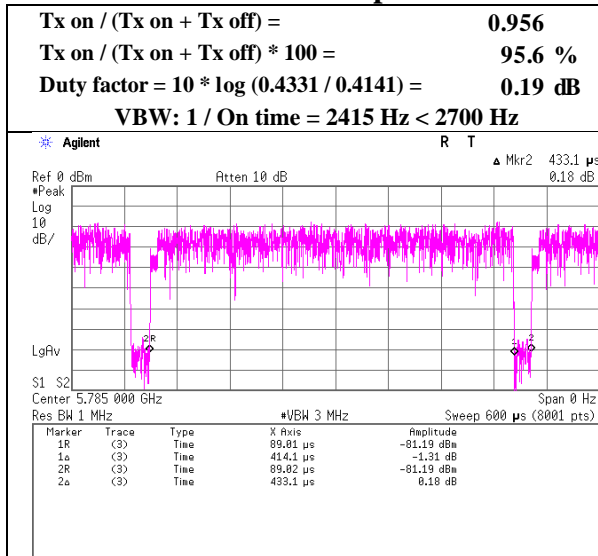
\*The equipment and cables were not used for factor 0 dB of the data sheets.

**The test was performed with condition that obtained the maximum frame power in pre-check.**

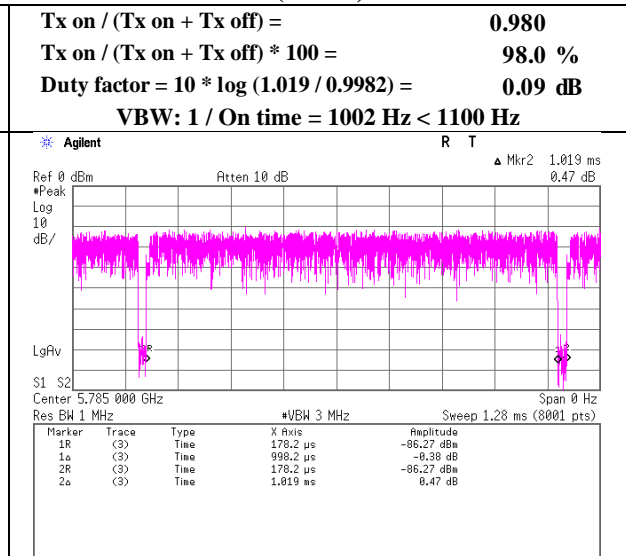
### Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 16, 2016
Temperature / Humidity	25 deg. C / 42 % RH
Engineer	Wataru Kojima
Mode	Tx

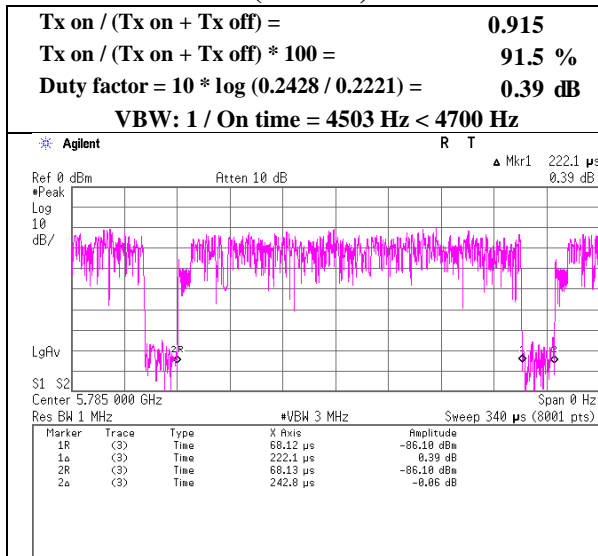
#### 11a 48 Mbps



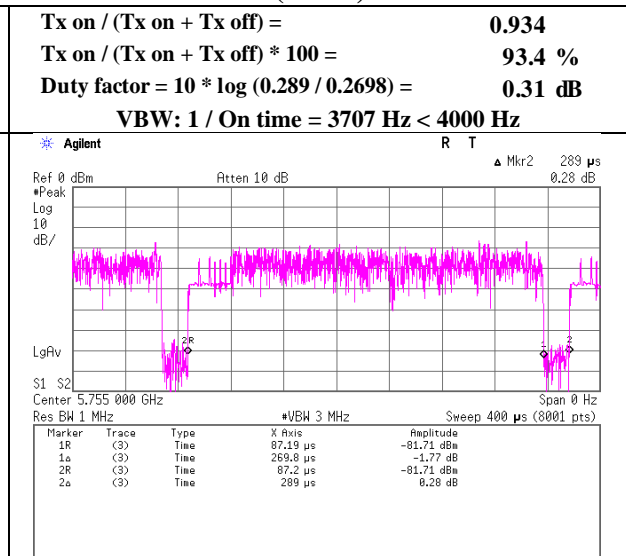
#### 11n-20 (SISO) MCS2



#### 11n-20 (MIMO) MCS13



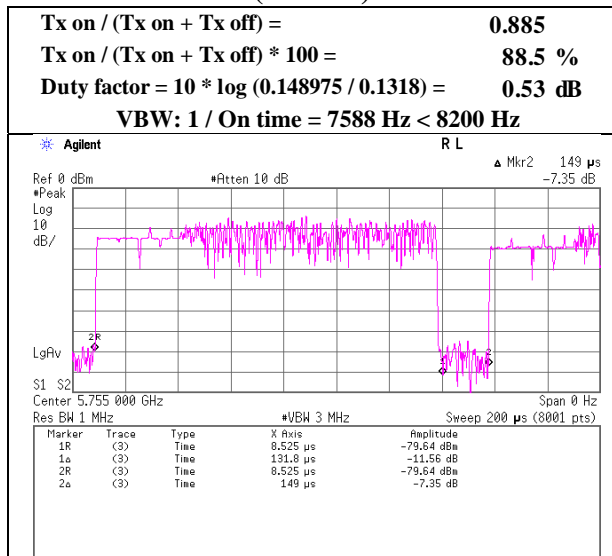
#### 11n-40 (SISO) MCS4



### Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 16, 2016
Temperature / Humidity	25 deg. C / 42 % RH
Engineer	Wataru Kojima
Mode	Tx

### 11n-40 (MIMO) MCS13



## Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 18, 2016  
Temperature / Humidity : 25deg. C / 41 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

### 11a, Antenna 2

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	-18.85	2.56	10.16	0.19	-0.98	6.99	1.05	30.00	28.95	0.07	36.00	35.93
5785	-19.01	2.58	10.16	0.19	-0.98	6.99	0.91	30.00	29.09	-0.07	36.00	36.07
5825	-19.01	2.61	10.16	0.19	-0.98	6.99	0.94	30.00	29.06	-0.04	36.00	36.04

### 11n-20 (SISO), Antenna 2

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	-21.83	2.56	10.16	0.09	-0.98	6.99	-2.03	30.00	32.03	-3.01	36.00	39.01
5785	-22.32	2.58	10.16	0.09	-0.98	6.99	-2.50	30.00	32.50	-3.48	36.00	39.48
5825	-22.30	2.61	10.16	0.09	-0.98	6.99	-2.45	30.00	32.45	-3.43	36.00	39.43

### 11n-40 (SISO), Antenna 2

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	-24.70	2.56	10.16	0.31	-0.98	6.99	-4.68	30.00	34.68	-5.66	36.00	41.66
-	-	-	-	-	-	-	-	-	-	-	-	-
5795	-24.84	2.58	10.16	0.31	-0.98	6.99	-4.80	30.00	34.80	-5.78	36.00	41.78

Sample Calculation:

PSD: Power Spectral Density

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

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

PSD Result (Conducted) = Reading + Cable Loss + Atten. Loss + Duty Factor + RBW Correction Factor

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

## Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 18, 2016  
Temperature / Humidity : 25deg. C / 41 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

**11n-20 (MIMO), Antenna 1+2** Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD (Conducted)						PSD (e.i.r.p.)					
	Antenna			Result	Limit	Margin	Antenna			Result	Limit	Margin
	1	2	Sum				1	2	Sum			
5745	0.72	0.83	1.54	1.89	30.00	28.11	0.57	0.66	1.23	0.91	36.00	35.09
5785	0.77	0.87	1.63	2.13	30.00	27.87	0.61	0.69	1.30	1.15	36.00	34.85
5825	0.67	0.75	1.42	1.52	30.00	28.48	0.54	0.60	1.13	0.54	36.00	35.46

Tested Frequency [MHz]	Duty Factor [dB]	RBW Correction Factor [dB]	Antenna 1				Antenna 2				PSD Result			
			PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Cond. [dBm/MHz]	PSD e.i.r.p. [dBm/MHz]	PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Cond. [dBm/MHz]	PSD e.i.r.p. [dBm/MHz]
5745	0.39	6.99	-21.54	2.56	10.16	-0.98	-1.44	-2.42	-20.93	2.56	10.16	-0.98	-0.83	-1.81
5785	0.39	6.99	-21.27	2.58	10.16	-0.98	-1.15	-2.13	-20.74	2.58	10.16	-0.98	-0.62	-1.60
5825	0.39	6.99	-21.88	2.61	10.16	-0.98	-1.73	-2.71	-21.42	2.61	10.16	-0.98	-1.27	-2.25

**11n-40 (MIMO), Antenna 1+2** Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD (Conducted)						PSD (e.i.r.p.)					
	Antenna			Result	Limit	Margin	Antenna			Result	Limit	Margin
	1	2	Sum				1	2	Sum			
5755	0.44	0.39	0.83	-0.81	30.00	30.81	0.35	0.31	0.66	-1.79	36.00	37.79
-	-	-	-	-	-	-	-	-	-	-	-	-
5795	0.42	0.46	0.89	-0.51	30.00	30.51	0.34	0.37	0.71	-1.49	36.00	37.49

Tested Frequency [MHz]	Duty Factor [dB]	RBW Correction Factor [dB]	Antenna 1				Antenna 2				PSD Result			
			PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Cond. [dBm/MHz]	PSD e.i.r.p. [dBm/MHz]	PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Cond. [dBm/MHz]	PSD e.i.r.p. [dBm/MHz]
5755	0.53	6.99	-23.78	2.56	10.16	-0.98	-3.54	-4.52	-24.37	2.56	10.16	-0.98	-4.13	-5.11
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5795	0.53	6.99	-23.98	2.58	10.16	-0.98	-3.72	-4.70	-23.59	2.58	10.16	-0.98	-3.33	-4.31

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 + Atten. Loss + Duty Factor + RBW Correction Factor

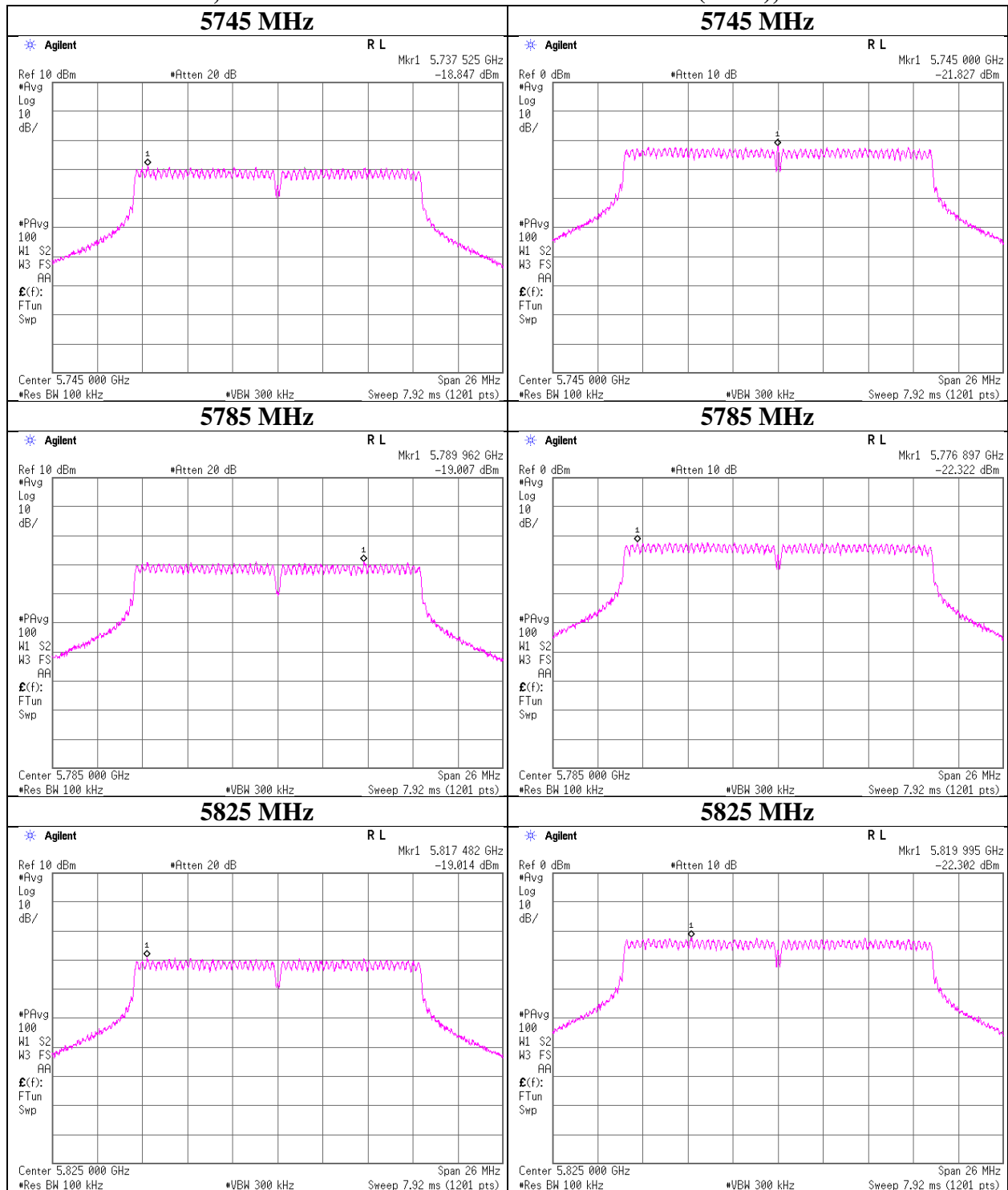
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

### Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 18, 2016
Temperature / Humidity	25deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

**11a, Antenna 2**

**11n-20 (SISO), Antenna 2**



**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

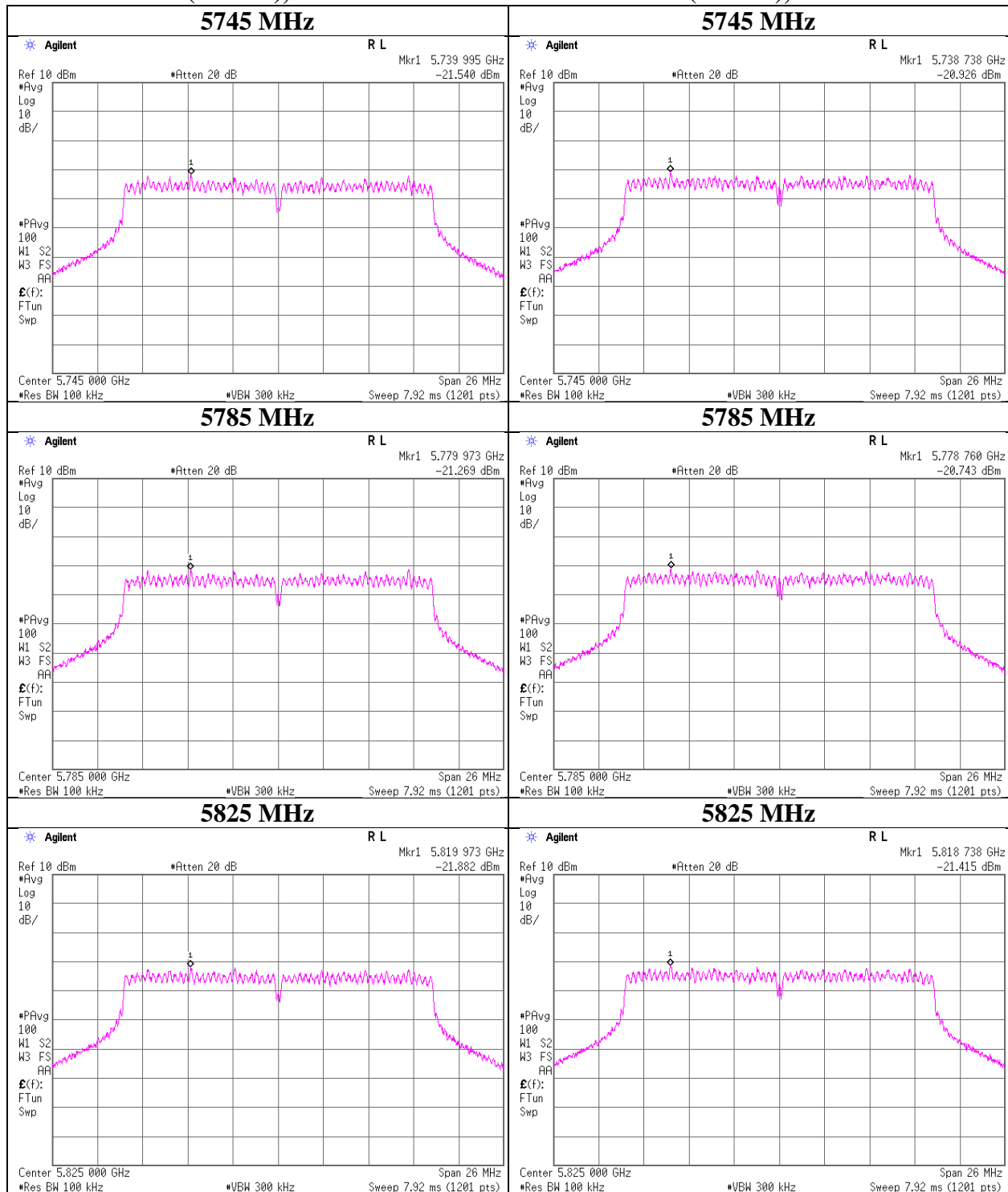


### Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 18, 2016
Temperature / Humidity	25deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

#### 11n-20 (MIMO), Antenna 1

#### 11n-20 (MIMO), Antenna 2



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**Shonan EMC Lab.**

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

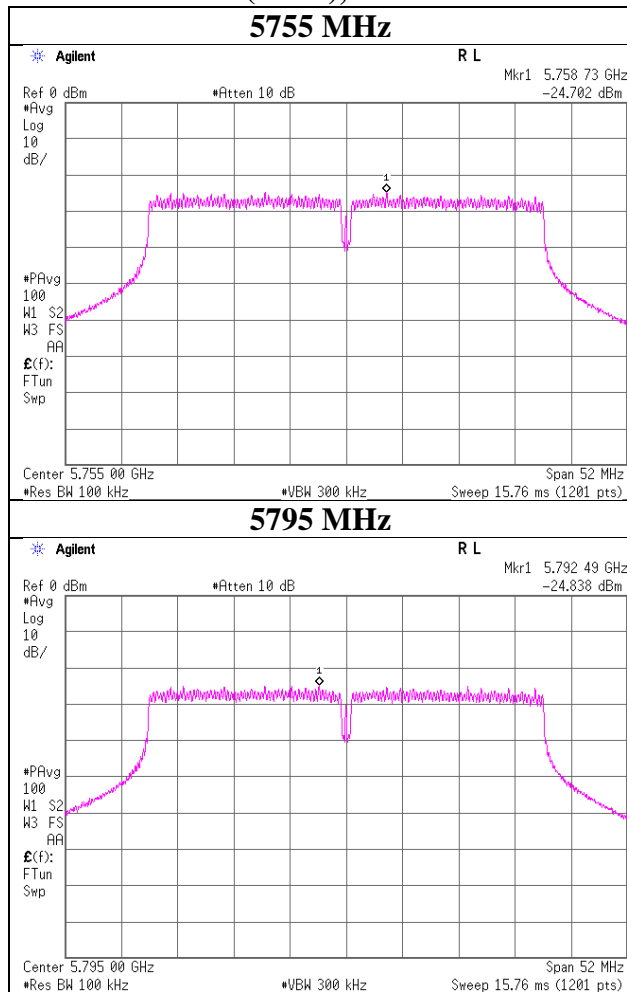
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room  
Report No. : 11280518S-R1  
Date : May 18, 2016  
Temperature / Humidity : 25deg. C / 41 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx

#### 11n-40 (SISO), Antenna 2

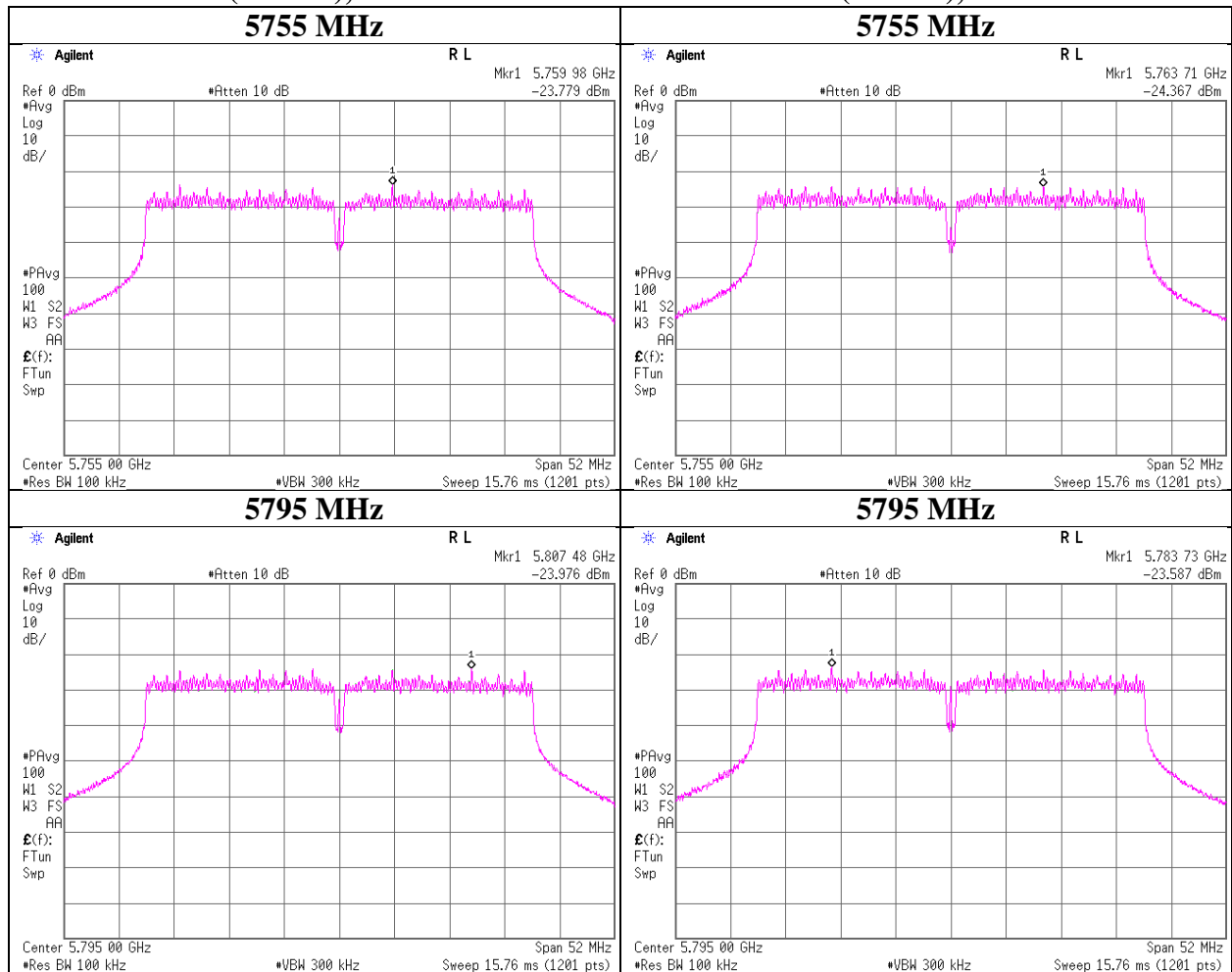


### Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 18, 2016
Temperature / Humidity	25deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

**11n-40 (MIMO), Antenna 1**

**11n-40 (MIMO), Antenna 2**



**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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH                      24deg. C / 42 % RH                      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
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.	3830.0	PK	44.7	28.9	14.7	36.8	3.2	54.7	73.9	19.2	143	23	
Hori.	7660.0	PK	45.6	37.2	7.0	36.7	3.2	56.3	73.9	17.6	151	196	
Hori.	11490.0	PK	44.5	40.0	8.4	36.0	3.2	60.1	73.9	13.8	153	195	
Hori.	3830.0	AV	35.2	28.9	14.7	36.8	3.2	45.2	53.9	8.7	143	23	VBW:2.7 kHz
Hori.	7660.0	AV	35.3	37.2	7.0	36.7	3.2	46.0	53.9	7.9	151	196	VBW:2.7 kHz
Hori.	11490.0	AV	34.3	40.0	8.4	36.0	3.2	49.9	53.9	4.0	153	195	VBW:2.7 kHz
Vert.	3830.0	PK	44.5	28.9	14.7	36.8	3.2	54.5	73.9	19.4	186	196	
Vert.	7660.0	PK	45.3	37.2	7.0	36.7	3.2	56.0	73.9	17.9	120	263	
Vert.	11490.0	PK	44.6	40.0	8.4	36.0	3.2	60.2	73.9	13.7	148	194	
Vert.	3830.0	AV	35.1	28.9	14.7	36.8	3.2	45.1	53.9	8.8	186	196	VBW:2.7 kHz
Vert.	7660.0	AV	34.8	37.2	7.0	36.7	3.2	45.5	53.9	8.4	120	263	VBW:2.7 kHz
Vert.	11490.0	AV	34.4	40.0	8.4	36.0	3.2	50.0	53.9	3.9	148	194	VBW:2.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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.	5725.0	PK	47.3	32.6	15.8	36.4	3.2	62.5	-32.7	-27.0	5.7	185	56	*1
Vert.	5725.0	PK	47.2	32.6	15.8	36.4	3.2	62.4	-32.8	-27.0	5.8	194	10	*1

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 3rd harmonic was not seen so the result was its base noise level.

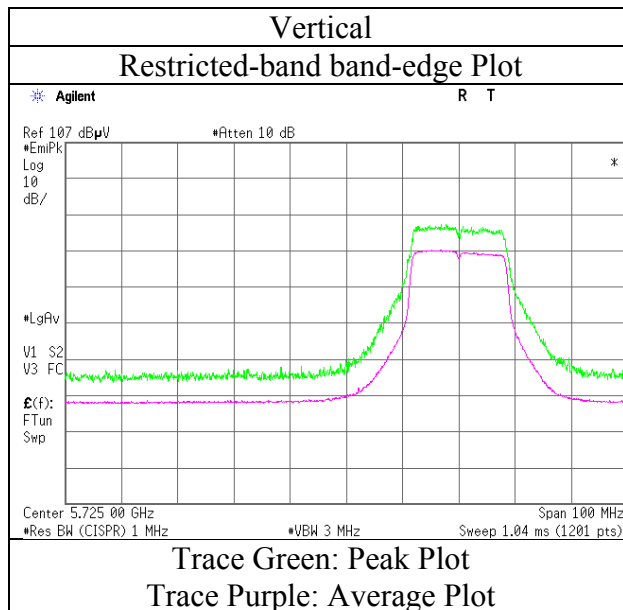
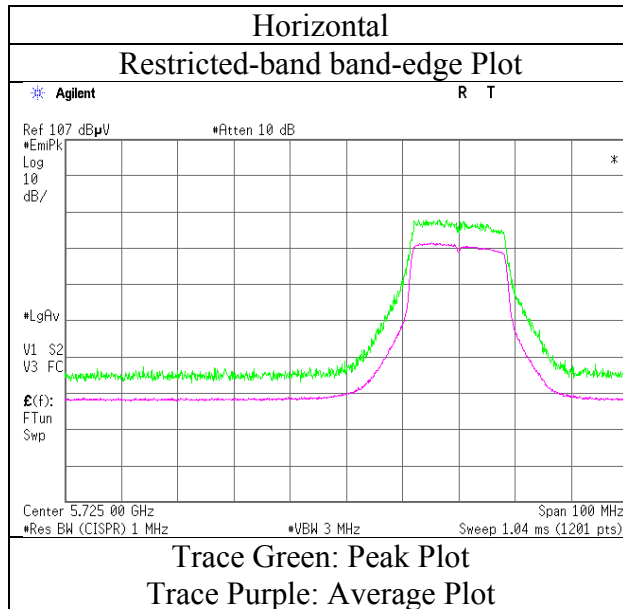
Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

\*1) Max value in 5650 MHz - 5725 MHz. The strictest limit in 5650 MHz - 5725 MHz: -27 dBm/MHz was applied.

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
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

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11280518S-R1		
Date	May 19, 2016	May 20, 2016	May 25, 2016
Temperature / Humidity	24deg. C / 42 % RH	24deg. C / 42 % RH	24deg. C / 46 % RH
Engineer	Kenichi Adachi	Kenichi Adachi	Hikaru Shirasawa
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.	3856.7	PK	44.6	28.9	14.7	36.8	3.2	54.6	73.9	19.3	142	21	
Hori.	7713.3	PK	46.0	37.3	7.0	36.7	3.2	56.8	73.9	17.1	187	178	
Hori.	11570.0	PK	44.5	39.9	8.5	36.0	3.2	60.1	73.9	13.8	153	196	
Hori.	3856.7	AV	34.9	28.9	14.7	36.8	3.2	44.9	53.9	9.0	142	21	VBW:2.7 kHz
Hori.	7713.3	AV	36.2	37.3	7.0	36.7	3.2	47.0	53.9	6.9	187	178	VBW:2.7 kHz
Hori.	11570.0	AV	34.4	39.9	8.5	36.0	3.2	50.0	53.9	3.9	153	196	VBW:2.7 kHz
Vert.	3856.7	PK	44.3	28.9	14.7	36.8	3.2	54.3	73.9	19.6	188	198	
Vert.	7713.3	PK	45.6	37.3	7.0	36.7	3.2	56.4	73.9	17.5	118	261	
Vert.	11570.0	PK	44.6	39.9	8.5	36.0	3.2	60.2	73.9	13.7	150	192	
Vert.	3856.7	AV	34.8	28.9	14.7	36.8	3.2	44.8	53.9	9.1	188	198	VBW:2.7 kHz
Vert.	7713.3	AV	35.8	37.3	7.0	36.7	3.2	46.6	53.9	7.3	118	261	VBW:2.7 kHz
Vert.	11570.0	AV	34.5	39.9	8.5	36.0	3.2	50.1	53.9	<b>3.8</b>	150	192	VBW:2.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz :  $20\log(4.30\text{ m} / 3.0\text{ m}) = 3.2\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016      May 20, 2016      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi      Kenichi Adachi      Hikaru Shirasawa  
Mode : Tx 11a 5825 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.	3883.3	PK	44.8	28.9	14.7	36.8	3.2	54.8	73.9	19.1	144	26	
Hori.	7766.7	PK	45.9	37.4	6.9	36.7	3.2	56.7	73.9	17.2	187	54	
Hori.	11650.0	PK	44.7	39.9	8.6	36.0	3.2	60.4	73.9	13.5	149	191	
Hori.	3883.3	AV	35.6	28.9	14.7	36.8	3.2	45.6	53.9	8.3	144	26	VBW:2.7 kHz
Hori.	7766.7	AV	35.8	37.4	6.9	36.7	3.2	46.6	53.9	7.3	187	54	VBW:2.7 kHz
Hori.	11650.0	AV	34.3	39.9	8.6	36.0	3.2	50.0	53.9	3.9	149	191	VBW:2.7 kHz
Vert.	3883.3	PK	44.7	28.9	14.7	36.8	3.2	54.7	73.9	19.2	185	201	
Vert.	7766.7	PK	45.5	37.4	6.9	36.7	3.2	56.3	73.9	17.6	117	266	
Vert.	11650.0	PK	44.6	39.9	8.6	36.0	3.2	60.3	73.9	13.6	150	194	
Vert.	3883.3	AV	35.4	28.9	14.7	36.8	3.2	45.4	53.9	8.5	185	201	VBW:2.7 kHz
Vert.	7766.7	AV	35.6	37.4	6.9	36.7	3.2	46.4	53.9	7.5	117	266	VBW:2.7 kHz
Vert.	11650.0	AV	34.1	39.9	8.6	36.0	3.2	49.8	53.9	4.1	150	194	VBW:2.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 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.	5850.0	PK	45.2	32.9	15.9	36.4	3.2	60.8	-34.4	-27.0	7.4	187	54	*1
Vert.	5850.0	PK	45.1	32.9	15.9	36.4	3.2	60.7	-34.5	-27.0	7.5	191	12	*1

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 3rd harmonic was not seen so the result was its base noise level.

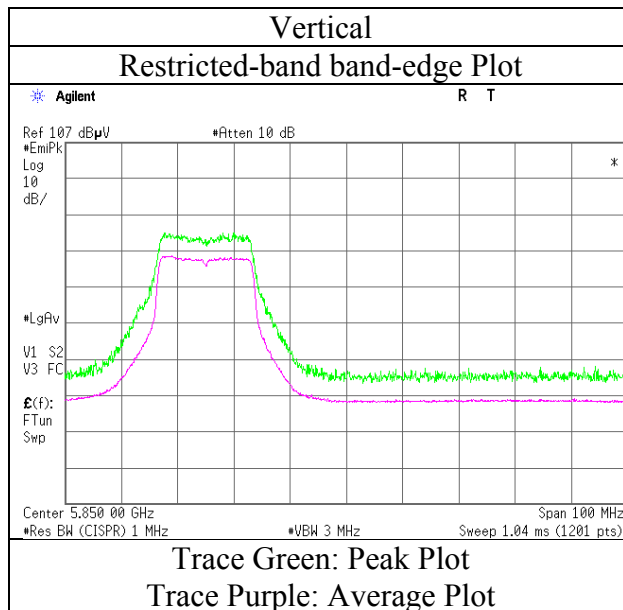
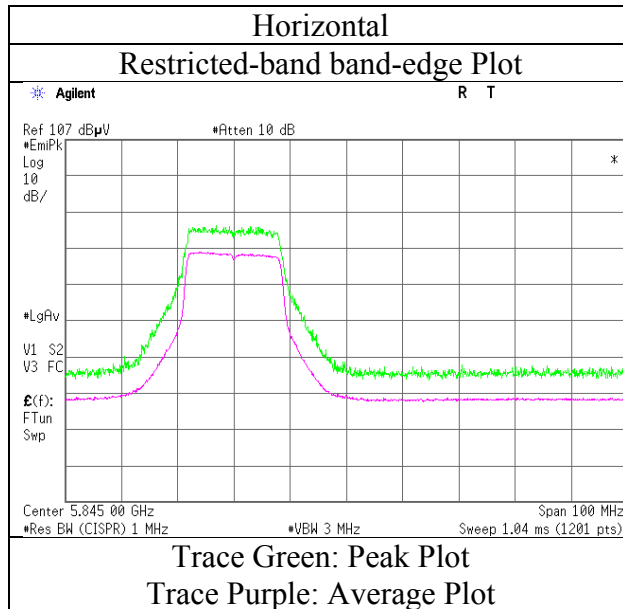
Distance factor : 1 GHz - 13 GHz : 20log(4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

\*1) No noise was detected in 5850 MHz - 5925 MHz. The strictest limit in 5850 MHz - 5925 MHz: -27 dBm/MHz was applied.

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
Mode	Tx 11a 5825 MHz



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



## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
Mode : Tx 11n-20(MIMO) 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.	3830.0	PK	44.7	28.9	14.7	36.8	3.2	54.7	73.9	19.2	146	22	
Hori.	7660.0	PK	45.6	37.2	7.0	36.7	3.2	56.3	73.9	17.6	177	182	
Hori.	11490.0	PK	44.7	40.0	8.4	36.0	3.2	60.3	73.9	13.6	152	193	
Hori.	3830.0	AV	35.5	28.9	14.7	36.8	3.2	45.5	53.9	8.4	146	22	VBW:4.7 kHz
Hori.	7660.0	AV	35.5	37.2	7.0	36.7	3.2	46.2	53.9	7.7	177	182	VBW:4.7 kHz
Hori.	11490.0	AV	34.5	40.0	8.4	36.0	3.2	50.1	53.9	3.8	152	193	VBW:4.7 kHz
Vert.	3830.0	PK	44.5	28.9	14.7	36.8	3.2	54.5	73.9	19.4	184	195	
Vert.	7660.0	PK	45.4	37.2	7.0	36.7	3.2	56.1	73.9	17.8	122	264	
Vert.	11490.0	PK	44.8	40.0	8.4	36.0	3.2	60.4	73.9	13.5	146	197	
Vert.	3830.0	AV	35.3	28.9	14.7	36.8	3.2	45.3	53.9	8.6	184	195	VBW:4.7 kHz
Vert.	7660.0	AV	35.1	37.2	7.0	36.7	3.2	45.8	53.9	8.1	122	264	VBW:4.7 kHz
Vert.	11490.0	AV	34.4	40.0	8.4	36.0	3.2	50.0	53.9	3.9	146	197	VBW:4.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 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.	5725.0	PK	44.8	32.6	15.8	36.4	3.2	60.0	-35.2	-27.0	8.2	186	52	*1
Vert.	5725.0	PK	45.1	32.6	15.8	36.4	3.2	60.3	-34.9	-27.0	7.9	220	195	*1

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 3rd harmonic was not seen so the result was its base noise level.

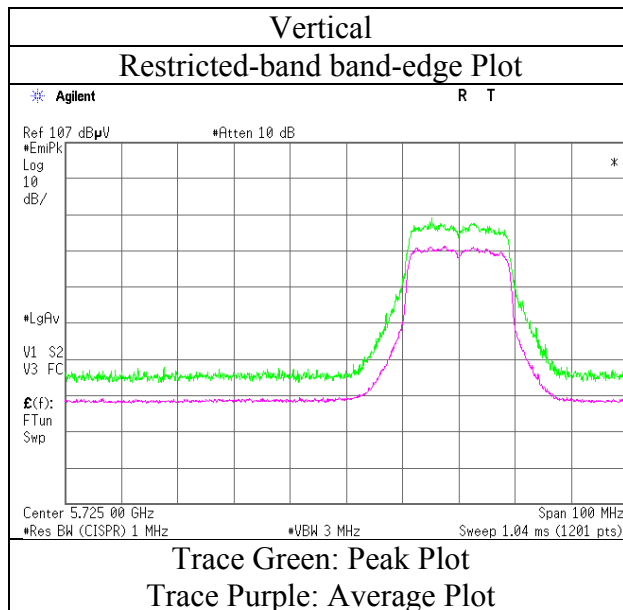
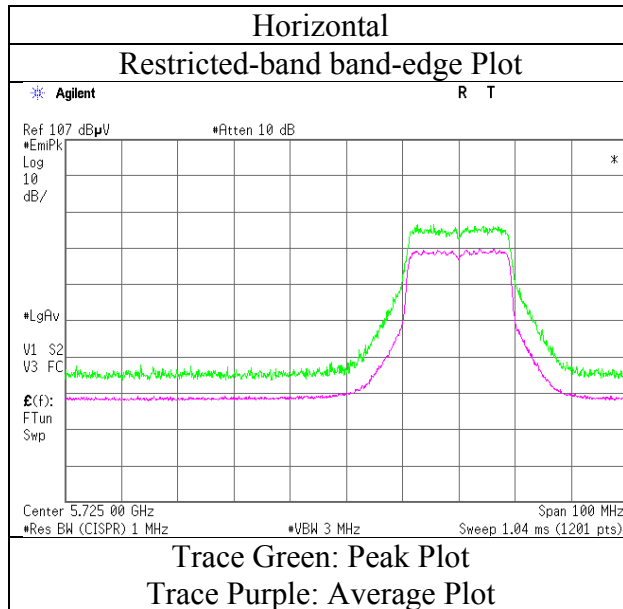
Distance factor : 1 GHz - 13 GHz : 20log(4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

\*1) Max value in 5650 MHz - 5725 MHz. The strictest limit in 5650 MHz - 5725 MHz: -27 dBm/MHz was applied.

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-20(MIMO) 5745 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
Mode : Tx 11n-20(MIMO) 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.	72.0	QP	30.5	5.9	7.1	32.2	0.0	11.3	40.0	28.7	259	236	
Hori.	120.0	QP	32.6	12.6	7.4	32.1	0.0	20.5	43.5	23.0	319	298	
Hori.	185.4	QP	31.1	16.0	7.9	32.1	0.0	22.9	43.5	20.6	147	346	
Hori.	279.2	QP	39.4	18.3	8.6	32.0	0.0	34.3	46.0	11.7	112	342	
Hori.	540.3	QP	33.5	18.0	9.7	32.0	0.0	29.2	46.0	16.8	100	115	
Hori.	815.4	QP	35.6	21.2	10.7	31.5	0.0	36.0	46.0	10.0	111	225	
Hori.	982.2	QP	31.3	22.8	11.3	30.4	0.0	35.0	53.9	18.9	100	14	
Hori.	3856.7	PK	44.8	28.9	14.7	36.8	3.2	54.8	73.9	19.1	148	26	
Hori.	7713.3	PK	46.0	37.3	7.0	36.7	3.2	56.8	73.9	17.1	175	184	
Hori.	11570.0	PK	44.9	39.9	8.5	36.0	3.2	60.5	73.9	13.4	152	191	
Hori.	3856.7	AV	35.7	28.9	14.7	36.8	3.2	45.7	53.9	8.2	148	26	VBW:4.7 kHz
Hori.	7713.3	AV	36.7	37.3	7.0	36.7	3.2	47.5	53.9	6.4	175	184	VBW:4.7 kHz
Hori.	11570.0	AV	34.6	39.9	8.5	36.0	3.2	50.2	53.9	3.7	152	191	VBW:4.7 kHz
Vert.	281.1	QP	38.6	18.4	8.6	32.0	0.0	33.6	46.0	12.4	100	175	
Vert.	558.4	QP	28.6	18.3	9.8	32.0	0.0	24.7	46.0	21.3	100	209	
Vert.	3856.7	PK	44.8	28.9	14.7	36.8	3.2	54.8	73.9	19.1	185	196	
Vert.	7713.3	PK	45.9	37.3	7.0	36.7	3.2	56.7	73.9	17.2	127	262	
Vert.	11570.0	PK	44.8	39.9	8.5	36.0	3.2	60.4	73.9	13.5	147	198	
Vert.	3856.7	AV	35.5	28.9	14.7	36.8	3.2	45.5	53.9	8.4	185	196	VBW:4.7 kHz
Vert.	7713.3	AV	36.4	37.3	7.0	36.7	3.2	47.2	53.9	6.7	127	262	VBW:4.7 kHz
Vert.	11570.0	AV	34.5	39.9	8.5	36.0	3.2	50.1	53.9	3.8	147	198	VBW:4.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz :  $20\log(4.30\text{ m} / 3.0\text{ m}) = 3.2\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
Mode : Tx 11n-20(MIMO) 5825 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.	3883.3	PK	44.8	28.9	14.7	36.8	3.2	54.8	73.9	19.1	145	24	
Hori.	7766.7	PK	45.4	37.4	6.9	36.7	3.2	56.2	73.9	17.7	177	187	
Hori.	11650.0	PK	44.6	39.9	8.6	36.0	3.2	60.3	73.9	13.6	149	194	
Hori.	3883.3	AV	35.7	28.9	14.7	36.8	3.2	45.7	53.9	8.2	145	24	VBW:4.7 kHz
Hori.	7766.7	AV	35.9	37.4	6.9	36.7	3.2	46.7	53.9	7.2	177	187	VBW:4.7 kHz
Hori.	11650.0	AV	34.4	39.9	8.6	36.0	3.2	50.1	53.9	3.8	149	194	VBW:4.7 kHz
Vert.	3883.3	PK	44.6	28.9	14.7	36.8	3.2	54.6	73.9	19.3	182	197	
Vert.	7766.7	PK	45.2	37.4	6.9	36.7	3.2	56.0	73.9	17.9	123	258	
Vert.	11650.0	PK	44.7	39.9	8.6	36.0	3.2	60.4	73.9	13.5	149	197	
Vert.	3883.3	AV	35.7	28.9	14.7	36.8	3.2	45.7	53.9	8.2	182	197	VBW:4.7 kHz
Vert.	7766.7	AV	35.7	37.4	6.9	36.7	3.2	46.5	53.9	7.4	123	258	VBW:4.7 kHz
Vert.	11650.0	AV	34.5	39.9	8.6	36.0	3.2	50.2	53.9	3.7	149	197	VBW:4.7 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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.	5850.0	PK	45.4	32.9	15.9	36.4	3.2	61.0	-34.2	-27.0	7.2	188	51	*1
Vert.	5850.0	PK	45.2	32.9	15.9	36.4	3.2	60.8	-34.4	-27.0	7.4	224	189	*1

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 3rd harmonic was not seen so the result was its base noise level.

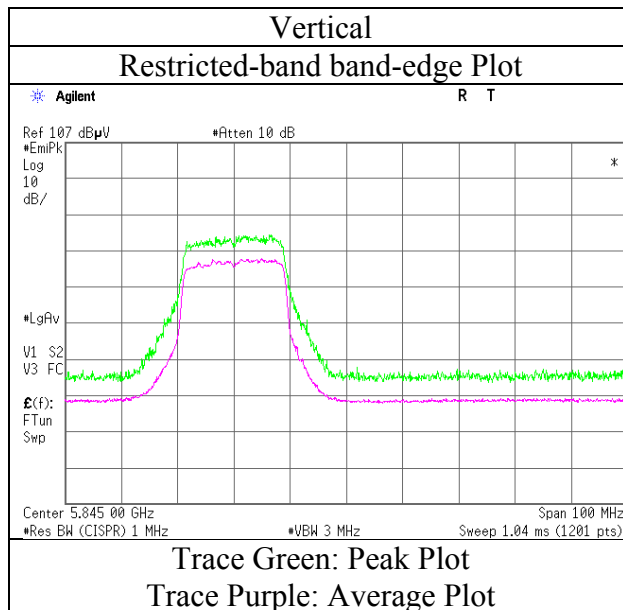
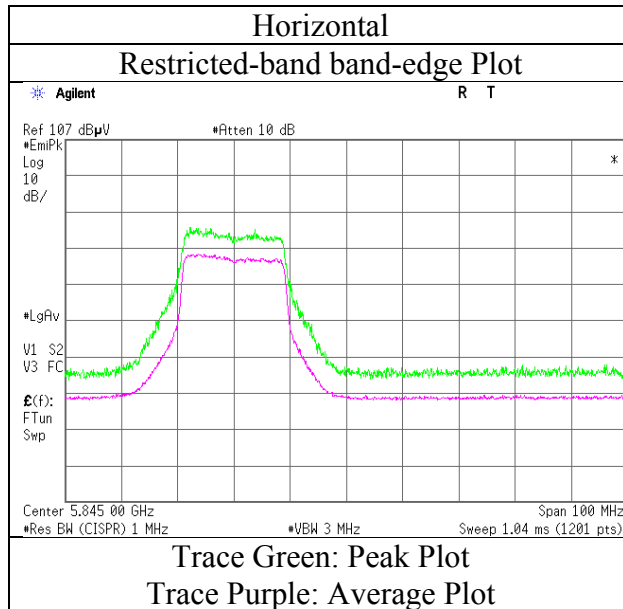
Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

\*1) No noise was detected in 5850 MHz - 5925 MHz. The strictest limit in 5850 MHz - 5925 MHz: -27 dBm/MHz was applied.

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-20(MIMO) 5825 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
Mode : Tx 11n-40(MIMO) 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.	3836.7	PK	45.7	28.9	14.7	36.8	3.2	55.7	73.9	18.2	146	26	
Hori.	7673.4	PK	45.6	37.3	7.0	36.7	3.2	56.4	73.9	17.5	171	181	
Hori.	11510.0	PK	44.3	40.0	8.5	36.0	3.2	60.0	73.9	13.9	153	197	
Hori.	3836.7	AV	35.9	28.9	14.7	36.8	3.2	45.9	53.9	8.0	146	26	VBW:8.2 kHz
Hori.	7673.4	AV	36.9	37.3	7.0	36.7	3.2	47.7	53.9	6.2	171	181	VBW:8.2 kHz
Hori.	11510.0	AV	34.2	40.0	8.5	36.0	3.2	49.9	53.9	4.0	153	197	VBW:8.2 kHz
Vert.	3836.7	PK	45.0	28.9	14.7	36.8	3.2	55.0	73.9	18.9	211	279	
Vert.	7673.4	PK	45.2	37.3	7.0	36.7	3.2	56.0	73.9	17.9	219	349	
Vert.	11510.0	PK	44.2	40.0	8.5	36.0	3.2	59.9	73.9	14.0	148	194	
Vert.	3836.7	AV	35.7	28.9	14.7	36.8	3.2	45.7	53.9	8.2	211	279	VBW:8.2 kHz
Vert.	7673.4	AV	36.6	37.3	7.0	36.7	3.2	47.4	53.9	6.5	219	349	VBW:8.2 kHz
Vert.	11510.0	AV	34.1	40.0	8.5	36.0	3.2	49.8	53.9	4.1	148	194	VBW:8.2 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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.	5725.0	PK	49.8	32.6	15.8	36.4	3.2	65.0	-30.2	-27.0	3.2	185	301	*1
Vert.	5725.0	PK	51.8	32.6	15.8	36.4	3.2	67.0	-28.2	-27.0	1.2	223	13	*1

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 3rd harmonic was not seen so the result was its base noise level.

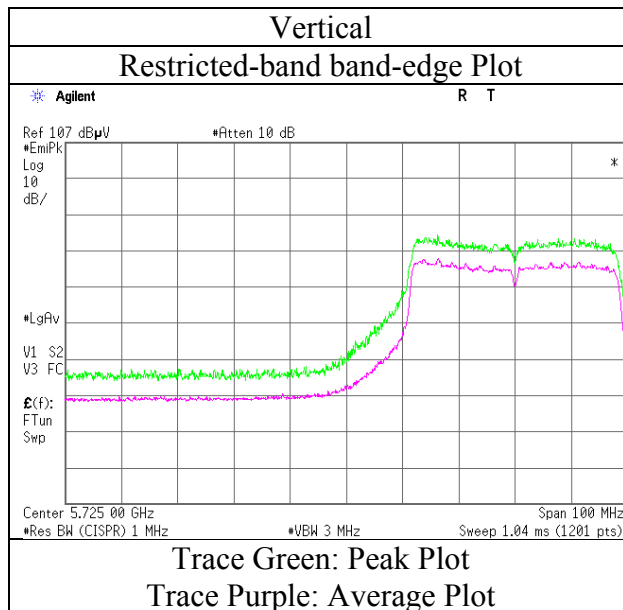
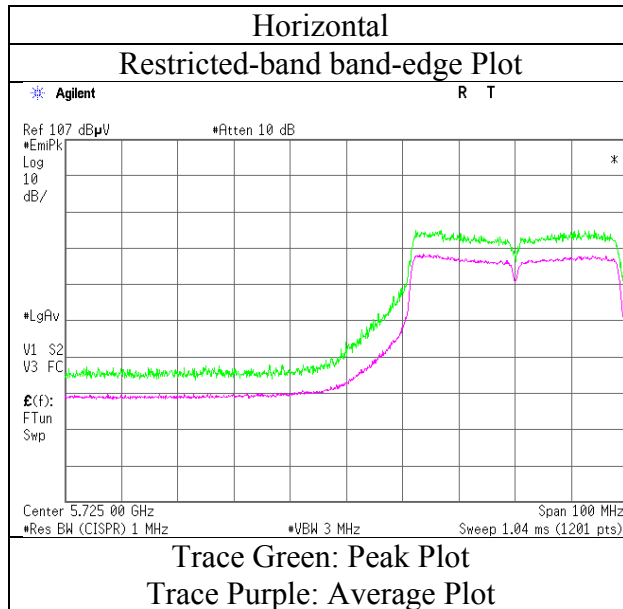
Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

\*1) Max value in 5650 MHz - 5725 MHz. The strictest limit in 5650 MHz - 5725 MHz: -27 dBm/MHz was applied.

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-40(MIMO) 5755 MHz



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

## Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 11280518S-R1  
Date : May 19, 2016                      May 20, 2016                      May 25, 2016  
Temperature / Humidity : 24deg. C / 42 % RH      24deg. C / 42 % RH      24deg. C / 46 % RH  
Engineer : Kenichi Adachi                      Kenichi Adachi                      Hikaru Shirasawa  
Mode : Tx 11n-40(MIMO) 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.	3863.4	PK	45.7	28.9	14.7	36.8	3.2	55.7	73.9	18.2	145	24	
Hori.	7726.7	PK	45.5	37.3	7.0	36.7	3.2	56.3	73.9	17.6	174	183	
Hori.	11590.0	PK	44.4	39.9	8.5	36.0	3.2	60.0	73.9	13.9	151	193	
Hori.	3863.4	AV	35.8	28.9	14.7	36.8	3.2	45.8	53.9	8.1	145	24	VBW:8.2 kHz
Hori.	7726.7	AV	36.4	37.3	7.0	36.7	3.2	47.2	53.9	6.7	174	183	VBW:8.2 kHz
Hori.	11590.0	AV	34.2	39.9	8.5	36.0	3.2	49.8	53.9	4.1	151	193	VBW:8.2 kHz
Vert.	3863.4	PK	45.3	28.9	14.7	36.8	3.2	55.3	73.9	18.6	209	281	
Vert.	7726.7	PK	45.3	37.3	7.0	36.7	3.2	56.1	73.9	17.8	217	346	
Vert.	11590.0	PK	44.3	39.9	8.5	36.0	3.2	59.9	73.9	14.0	148	195	
Vert.	3863.4	AV	35.4	28.9	14.7	36.8	3.2	45.4	53.9	8.5	209	281	VBW:8.2 kHz
Vert.	7726.7	AV	36.0	37.3	7.0	36.7	3.2	46.8	53.9	7.1	217	346	VBW:8.2 kHz
Vert.	11590.0	AV	34.3	39.9	8.5	36.0	3.2	49.9	53.9	4.0	148	195	VBW:8.2 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

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

\*The 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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.	5850.0	PK	45.4	32.9	15.9	36.4	3.2	61.0	-34.2	-27.0	7.2	183	298	*1
Vert.	5850.0	PK	45.5	32.9	15.9	36.4	3.2	61.1	-34.1	-27.0	7.1	222	11	*1

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 3rd harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log (4.30 m / 3.0 m) = 3.2 dB

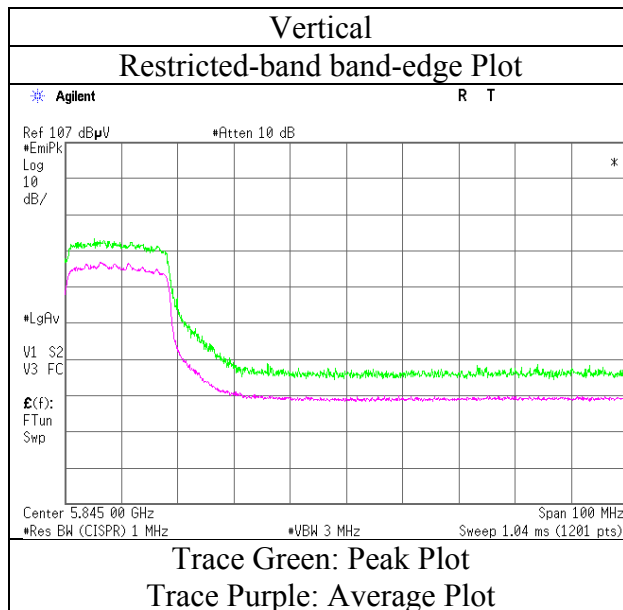
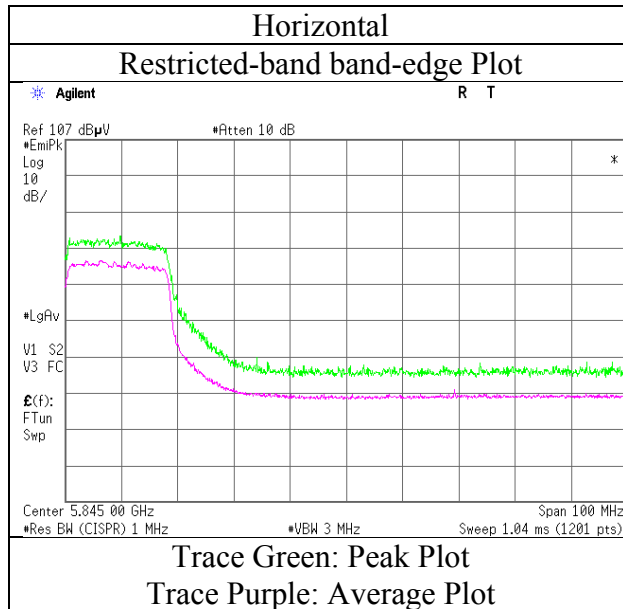
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

\*1) No noise was detected in 5850 MHz - 5925 MHz. The strictest limit in 5850 MHz - 5925 MHz: -27 dBm/MHz was applied.



## Radiated Spurious Emission

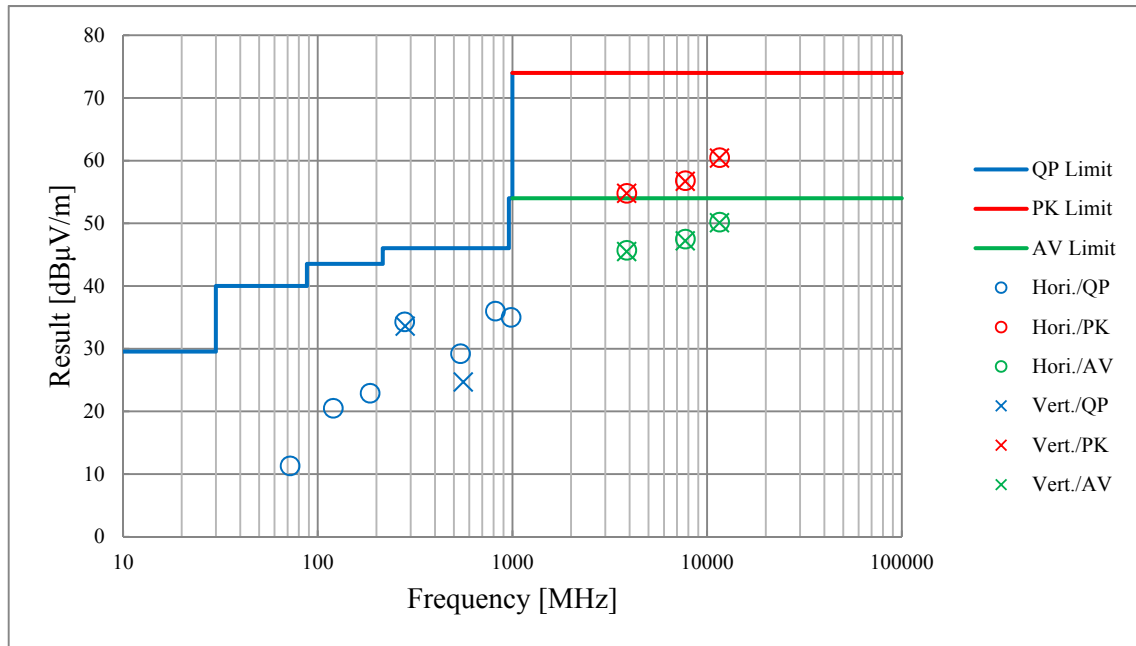
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11280518S-R1
Date	May 19, 2016
Temperature / Humidity	24deg. C / 42 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-40(MIMO) 5795 MHz



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

**Radiated Spurious Emission**  
**(Plot data, Worst case)**

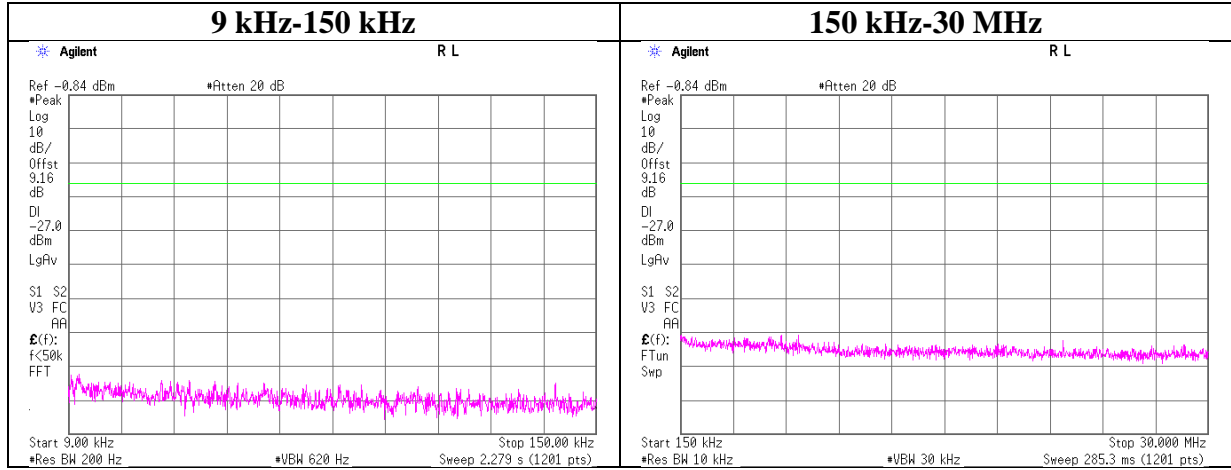
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11280518S-R1		
Date	May 19, 2016	May 20, 2016	May 25, 2016
Temperature / Humidity	24deg. C / 42 % RH	24deg. C / 42 % RH	24deg. C / 46 % RH
Engineer	Kenichi Adachi	Kenichi Adachi	Hikaru Shirasawa
Mode	Tx 11n-20(MIMO) 5785 MHz		



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

## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11280518S-R1
Date	May 18, 2016
Temperature / Humidity	25deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11n-20 (MIMO) 5785 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

## APPENDIX 2: Test instruments

### Test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SCC-H13	Microwave cable	RS Pro	R-132G7210 100CO	-	AT(port1)	2016/04/18 * 12
SCC-H15	Microwave cable	RS Pro	R-132G7210 100CO	-	AT(port2)	2016/04/18 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2016/03/23 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2016/04/01 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2016/04/01 * 12
SAT20-07	Attenuator	Weinschel Corp.	54A-20	31484	AT	2016/04/18 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
STM-G5	Terminator	Weinschel	M1459A	U6594	AT	2015/07/14 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2016/03/23 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2015/11/04 * 12
SCC-H11	Microwave cable	RS Pro	R-132G7210 100CO	-	AT	2016/04/18 * 12
SCC-H12	Microwave cable	RS Pro	R-132G7210 100CO	-	AT	2016/04/18 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12
SAEC-03(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2015/08/28 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2015/06/08 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2015/11/04 * 12
KFL-15	Highpass Filter	MICRO-TRONICS	HPM50112	007	RE	2015/11/04 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	3008A01268	RE	2016/04/22 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2015/05/19 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/03/28 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE,CE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE,CE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE,CE	2015/11/18 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2016/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2016/03/23 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	RE	2016/04/18 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SHA-06	Horn Antenna	ETS LINDGREN	3160-10	LM3459	RE	2016/03/24 * 12
SAF-10	Pre Amplifier	TOYO Corporation	HAP26-40W	00000010	RE	2016/03/23 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2015/07/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2015/10/11 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2015/10/11 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2015/08/31 * 12

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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

**Test equipment (2/2)**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2016/04/22 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2016/02/25 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2016/03/28 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2016/04/22 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2016/02/08 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2015/08/31 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2015/12/07 * 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:**  
**CE: Conducted Emission**  
**RE: Radiated Emission**  
**AT: Antenna Terminal Conducted test**

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