



# RADIO TEST REPORT

**Test Report No. : 11294467S-A-R4**

**Applicant** : CANON INC.  
**Type of Equipment** : Wireless Module  
**Model No.** : CH9-1214  
**FCC ID** : AZD215  
**Test regulation** : FCC Part 15 Subpart E: 2016  
W58 (5745 MHz - 5825 MHz Band) only  
**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 11294467S-A-R3. 11294467S-A-R3 is replaced with this report.

**Date of test:** May 26 to June 23, 2016

**Representative test engineer:**

Hiroyuki Morikawa  
Engineer

Consumer Technology Division

**Approved by:**

Toyokazu Imamura

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".

**UL Japan, Inc.**  
**Shonan EMC Lab.**

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## **SECTION 1: Customer information**

Company Name : CANON INC.  
Address : 30-2, Shimomaruko, 3-chome, Ohta-ku, Tokyo, 146-8501 Japan  
Telephone Number : +81 3 3757 6798  
Facsimile Number : +81 3 3757 8431  
Contact Person : Kiyoshi Sahoyama

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

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

Type of Equipment : Wireless Module  
Model No. : CH9-1214  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 3.3 V  
Receipt Date of Sample : May 25, 2016  
Country of Mass-production : Japan  
Condition of EUT : Production prototype  
Modification of EUT : (Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

Model: CH9-1214 (referred to as the EUT in this report) is a Wireless Module.

### **General Specification**

Clock frequency(ies) in the system : 38.4 MHz, 32.768 kHz

### **Radio Specification**

Equipment type : Transceiver  
Antenna type : Planar Inverted F Antenna  
Antenna connector type : U.FL  
Operation temperature range : -20 to +70 deg.C.

### **Bluetooth\*1)**

Frequency of operation : 2402-2480 MHz  
Bandwidth / Channel spacing : 79 MHz & 1 MHz  
Type of modulation : FHSS  
Antenna gain with cable loss : 1.95 dBi  
ITU code : F1D, G1D

### **Wireless LAN**

Frequency of operation : 2412-2462 MHz (IEEE 802.11b, 11g, 11n-HT20)  
2422-2452 MHz (IEEE 802.11n-HT40)  
5180-5320 MHz (IEEE 802.11a, 11n-HT20)  
5190-5310 MHz (IEEE 802.11n-HT40)  
5745-5825 MHz (IEEE 802.11a, 11n-HT20)  
5755-5795 MHz (IEEE 802.11n-HT40)  
Bandwidth & channel spacing : 20 MHz (IEEE 802.11b, 11g, 11a, 11n-HT20), 40MHz (IEEE 802.11n-HT40)  
Channel spacing :  
5 MHz (2.4 GHz), 20 MHz (5 GHz)  
Type of modulation : DSSS (IEEE 802.11b)  
OFDM (IEEE 802.11a/g/n)  
Antenna gain with cable loss : +1.95 dBi (2400/2450/2500 MHz)  
-1.32 dBi (5160/5250/5340 MHz)  
-0.43 dBi (5725/5785/5845 MHz)  
ITU code : D1D, G1D

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## **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 IC: RSS-Gen 8.8	FCC: 15.407 (b) (6) / 15.207 IC: RSS-Gen 8.8	15.4 dB, 0.62723 MHz, L1 AV	Complied	-
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 IC: -	FCC: 15.407 (a) (1) (2) (3) IC: -	See data	N/A	Conducted
Maximum Conducted Output Power	FCC: KDB Publication Number 789033 IC: -	FCC: 15.407 (a) (1) (2) (3) IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)		Complied	Conducted
Maximum Power Spectral Density	FCC: KDB Publication Number 789033 IC: -	FCC : 15.407 (a) (1) (2) (3) IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)		Complied	Conducted
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033 IC: -	FCC: 15.407 (b), 15.205 and 15.209 IC: RSS-247 6.2.1 (2) 6.2.2 (2) 6.2.3 (2) 6.2.4 (2)		7.6 dB 203.2 MHz, QP, Horizontal Tx 11n-40 5795 MHz	Complied
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 IC: -	FCC: 15.407 (e) IC: RSS-247 6.2.4 (1)	See data	Complied	Conducted

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 Wireless Module is provided with stable power supply DC 3.3V from the host device and has power supply regulator which provides DC 2.85V and DC 1.8V, therefore, the equipment complies power supply regulation.

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

The EUT has a unique coupling/antenna connector (U.FL). Therefore the equipment complies with the requirement of 15.203.

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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

#### EMI

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 test report has enough margin, more than the site margin.

### 3.5 Test Location

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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

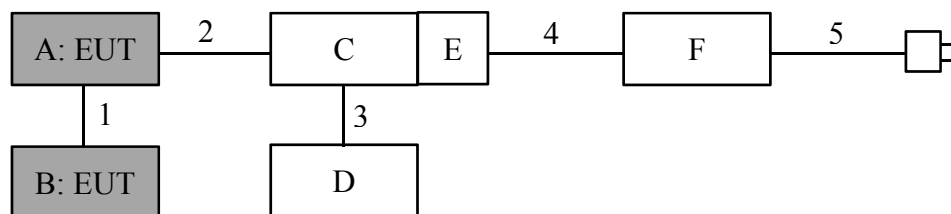
### 4.1 Operating Mode(s)

Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission Radiated emission (below 1GHz) *2)	Transmitting (Tx) IEEE 802.11n (40HT)	5795 MHz	13 dBm	MCS1, PN9
Other items	Transmitting (Tx) IEEE 802.11a	5745 MHz, 5785 MHz, 5825 MHz	13 dBm	18 Mbps, PN9
	Transmitting (Tx) IEEE 802.11n (20HT)	5745 MHz, 5785 MHz, 5825 MHz	13 dBm	MCS2, PN9
	Transmitting (Tx) IEEE 802.11n (40HT)	5755 MHz, 5795 MHz	13 dBm	MCS1, PN9

\*1) Software used for the test: Tera Term Ver. 4.80  
\*2) The worst condition was determined based on the test result of Maximum Conducted Output Power.

**Justification:** The system was configured in typical fashion (as customer would normally use it) for testing.

### 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	Wireless Module	CH9-1214	1	Canon	EUT
B	Antenna	Dual Band WLAN Antenna Cable Assembly 2011	1	Tyco Electronics	EUT
C	Wireless file transmitter	WFT-E7B	0029900136	Canon	-
D	DEBUG PWB	K321	-	-	-
E	DC Coupler	DR-E6	-	Canon	-
F	AC Adapter	AC-E6	-	Canon	-

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.025	Unshielded	Unshielded	-
2	Signal / DC	0.14	Unshielded	Unshielded	-
3	Signal / DC	0.08	Unshielded	Unshielded	-
4	DC	2.5	Unshielded	Unshielded	-
5	AC	2.0	Unshielded	Unshielded	-



## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

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 in a Semi Anechoic Chamber.

The EUT 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 1GHz >

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 1GHz >

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

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

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

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

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

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

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

< Below 1GHz >

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

< Above 1GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

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

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

105.2 dBuV/m, 3 m (10 dBm e.i.r.p.\* ) or 110.8 dBuV/m, 3 m (15.6 dBm e.i.r.p.\* ) or

122.2 dBuV/m, 3 m (27 dBm e.i.r.p.\* ) in the Section 15.407 (b) (4).

Restricted band edge:

Apply to limit in the Section 15.209 (a).

Since this limit is severer than the limit of the inside of restricted bands.

\*Electric field strength to e.i.r.p. conversion:

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

**Test Antennas are used as below;**

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

Frequency	Below 1 GHz	Above 1 GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method VB *1) RBW: 1 MHz VBW: 10 Hz  Detector: Peak Trace: Maxhold
Test Distance	3 m	3 m*2) (1 GHz – 13 GHz), 1 m*2) (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: Refer to the data.

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.

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>
26 dB Bandwidth	Enough to capture the emission	Close to 1 % of EBW	> RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 50 MHz BW) (Method PM)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)	9 kHz – 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz – 30 MHz	10 kHz	30 kHz				

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

\*1) Peak hold was applied as Worst-case measurement.

\*2) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz-5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor ( $10 \log(500 \text{ kHz} / 100 \text{ kHz})$ ) was added to the test result.

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

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

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**

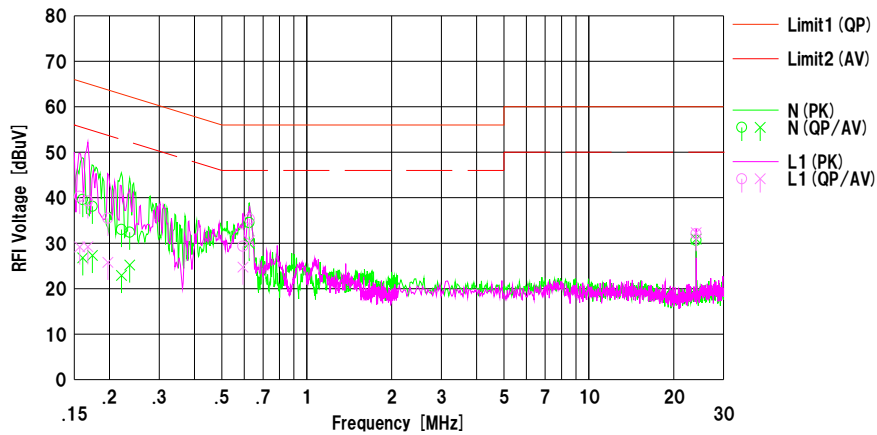
UL Japan,Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2016/06/03

Mode : Tx 11n (40HT) 5795MHz  
Report No. : 11294467S

Remarks : ..... Temp./Humi. : 20 deg.C / 55 %RH

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

Engineer : Hiroyuki Morikawa



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]	<QP> [dB]	<AV> [dB]		
1	0.16067	27.20	14.40	12.39	39.59	26.79	65.43	55.43	25.8	28.6	N	
2	0.17396	25.70	14.90	12.40	38.10	27.30	64.77	54.77	26.6	27.4	N	
3	0.22058	20.60	10.50	12.39	32.99	22.89	62.80	52.80	29.8	29.9	N	
4	0.23588	20.00	12.80	12.40	32.40	25.20	62.24	52.24	29.8	27.0	N	
5	0.62513	22.10	17.50	12.43	34.53	29.93	56.00	46.00	21.4	16.0	N	
6	24.00028	17.20	17.50	13.41	30.61	30.91	60.00	50.00	29.3	19.0	N	
7	0.15681	27.90	16.80	12.39	40.29	29.19	65.63	55.63	25.3	26.4	L1	
8	0.16754	26.90	16.80	12.40	39.30	29.20	65.08	55.08	25.7	25.8	L1	
9	0.19734	23.10	13.40	12.38	35.48	25.78	63.72	53.72	28.2	27.9	L1	
10	0.59428	16.90	12.30	12.43	29.33	24.73	56.00	46.00	26.6	21.2	L1	
11	0.62723	22.90	18.10	12.43	35.33	30.53	56.00	46.00	20.6	15.4	L1	
12	24.00012	18.70	18.90	13.41	32.11	32.31	60.00	50.00	27.8	17.6	L1	

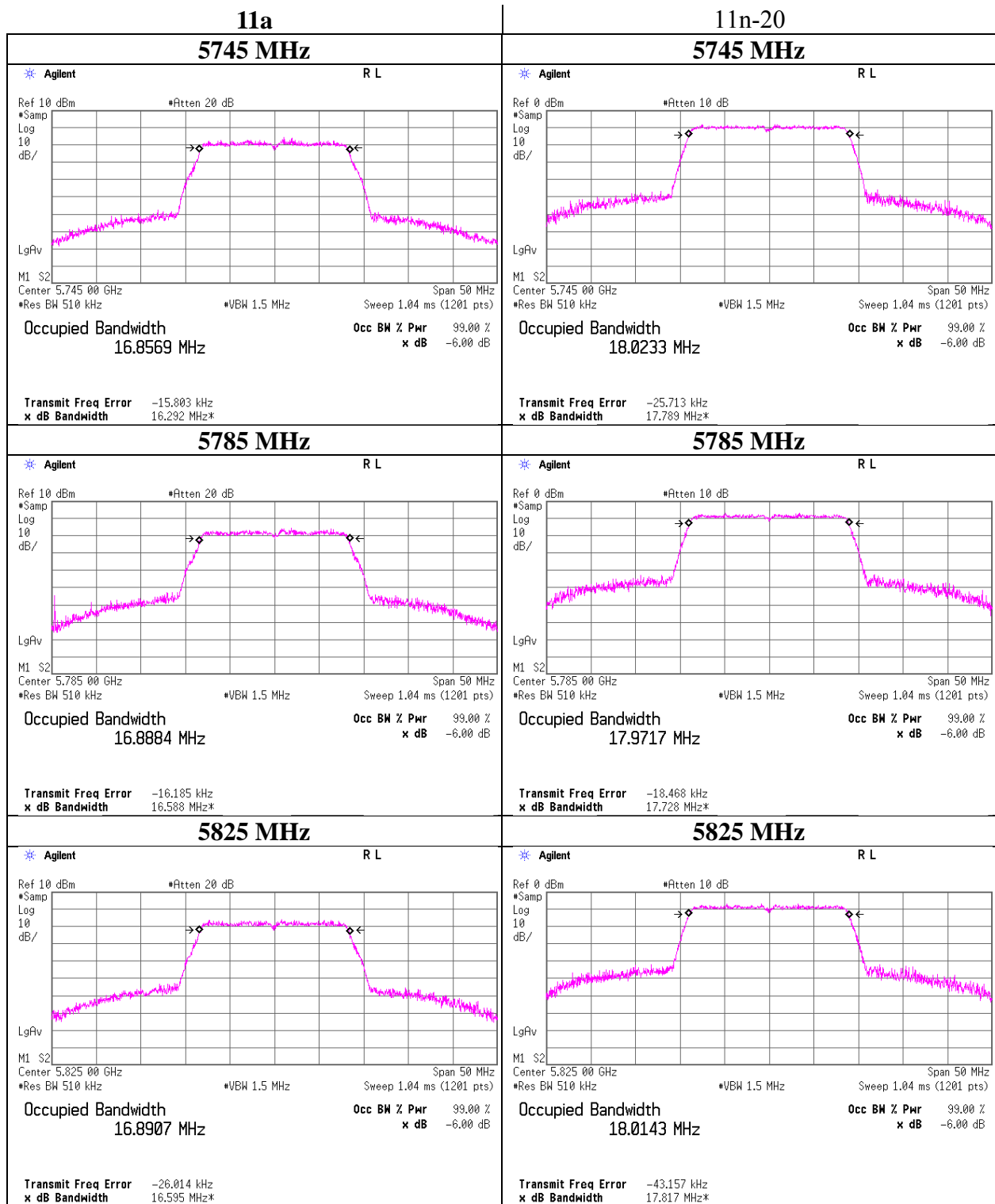
Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+ATT+Cable) [dB]  
LISN: SLS-05

## 26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place                      Shonan EMC Lab. No.6 Shielded Room  
Report No.                      11294467S-A-R4  
Date                              May 26, 2016  
Temperature / Humidity        28deg. C / 53 % RH  
Engineer                        Hiroyuki Morikawa  
Mode                              Tx

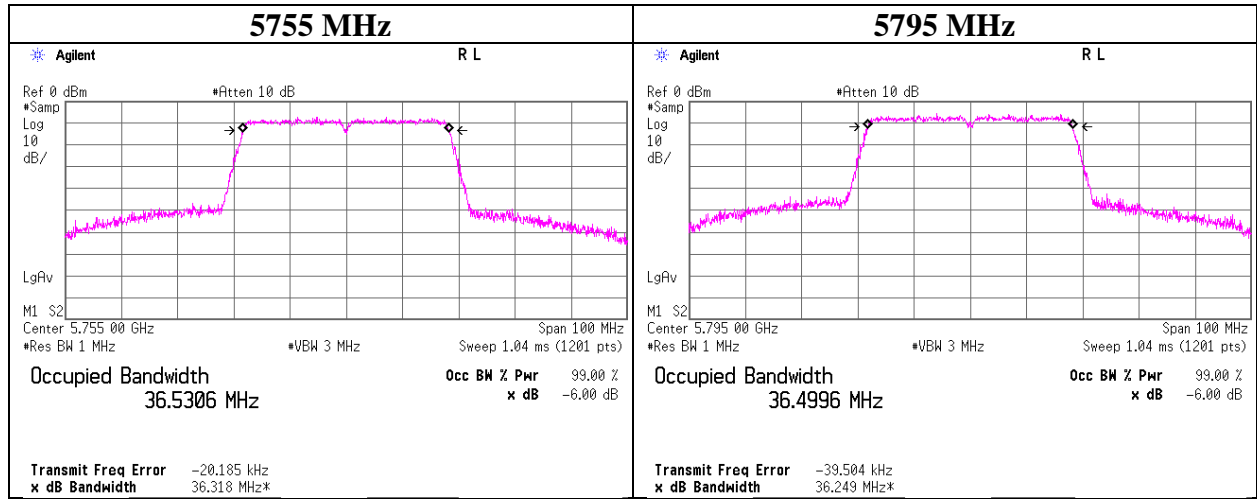
Mode	Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
11a	5745	16.857	-
	5785	16.888	-
	5825	16.891	-
11n-20	5745	18.023	-
	5785	17.972	-
	5825	18.014	-
11n-40	5755	36.531	-
	-	-	-
	5795	36.500	-

### 99 % Occupied Bandwidth



**99 % Occupied Bandwidth**

**11n-40**





### 6 dB Bandwidth

Test place                   Shonan EMC Lab. No.6 Shielded Room  
Report No.                 11294467S-A-R4  
Date                         May 26, 2016  
Temperature / Humidity   28deg. C / 53 % RH  
Engineer                  Hiroyuki Morikawa  
Mode                        Tx

#### 11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	16.567	> 500
5785	16.572	> 500
5825	16.581	> 500

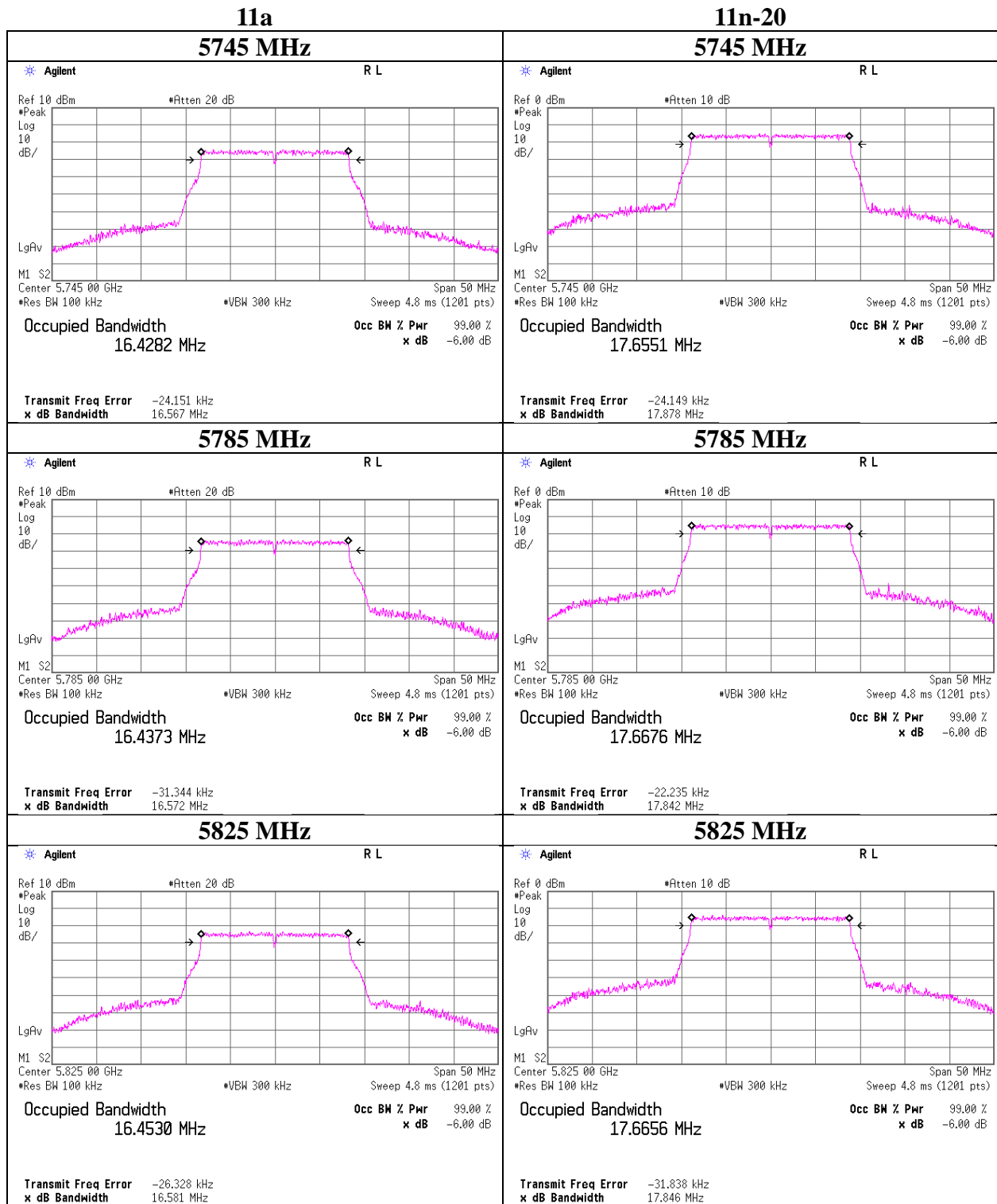
#### 11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	17.878	> 500
5785	17.842	> 500
5825	17.846	> 500

#### 11n-40

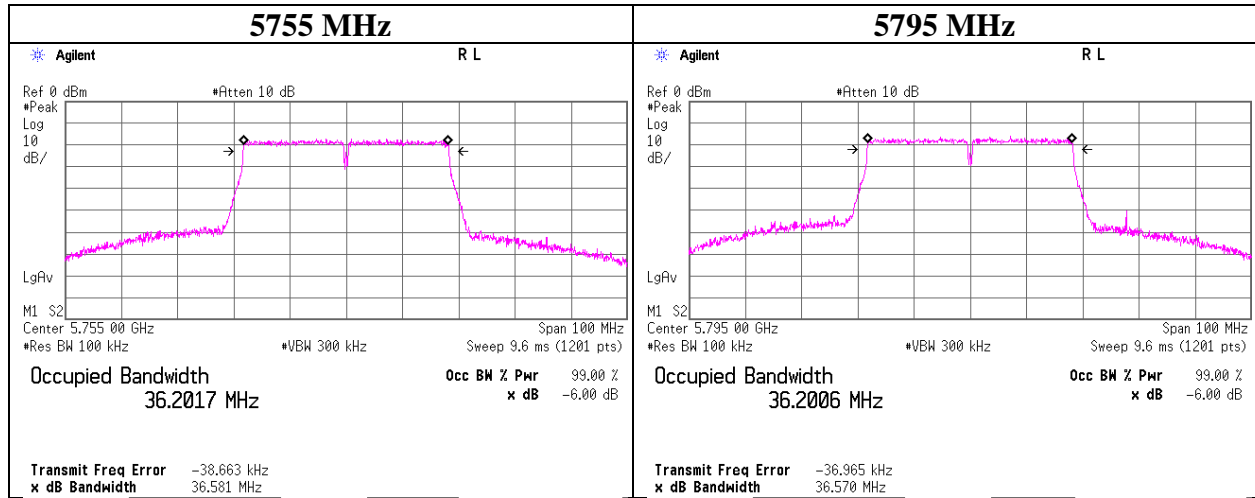
Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5755	36.581	> 500
-	-	> 500
5795	36.570	> 500

### 6 dB Bandwidth



**6 dB Bandwidth**

**11n-40**



## Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11294467S-A-R4
Date	May 26, 2016
Temperature / Humidity	28deg. C / 53 % RH
Engineer	Hiroyuki Morikawa
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]	Result [mW]	Limit [dBm]
5745	-0.43	2.56	9.99	0.00	-0.4	-	-	12.12	16.29	30.00	17.88	11.69	14.76	36.00	24.31
5785	0.63	2.58	9.99	0.00	-0.4	-	-	13.20	20.89	30.00	16.80	12.77	18.92	36.00	23.23
5825	0.45	2.61	9.98	0.00	-0.4	-	-	13.04	20.14	30.00	16.96	12.61	18.24	36.00	23.39

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + Atten. Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

### Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11294467S-A-R4
Date	May 26, 2016
Temperature / Humidity	28deg. C / 53 % RH
Engineer	Hiroyuki Morikawa
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	-0.47	2.56	9.99	0.00	-0.4	-	-	12.08	16.14	30.00	17.92	11.65	14.62	36.00	24.35
5785	0.65	2.58	9.99	0.00	-0.4	-	-	13.22	20.99	30.00	16.78	12.79	19.01	36.00	23.21
5825	0.44	2.61	9.98	0.00	-0.4	-	-	13.03	20.09	30.00	16.97	12.60	18.20	36.00	23.40

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + Atten. Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

### Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11294467S-A-R4
Date	May 26, 2016
Temperature / Humidity	28deg. C / 53 % RH
Engineer	Hiroyuki Morikawa
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]		
5755	-0.41	2.56	9.99	0.00	-0.4	-	-	12.14	16.37	30.00	17.86	11.71	14.83	36.00	24.29
5795	0.69	2.58	9.99	0.00	-0.4	-	-	13.26	21.18	30.00	16.74	12.83	19.19	36.00	23.17

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + Atten. Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

### Maximum Conducted Output Power

Test place                      Shonan EMC Lab. No.6 Shielded Room  
Report No.                      11294467S-A-R4  
Date                              May 26, 2016  
Temperature / Humidity      28deg. C / 53 % RH  
Engineer                        Hiroyuki Morikawa  
Mode                              Tx

**5785 MHz**

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	0.56	0.00	0.56	
	9	0.57	0.00	0.57	
	12	0.62	0.00	0.62	
	18	0.63	0.00	0.63	*
	24	0.59	0.00	0.59	
	36	0.53	0.00	0.53	
	48	0.54	0.00	0.54	
	54	0.55	0.00	0.55	

\* Worst rate

Sample Calculation:

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

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

**5785 MHz**

Mode	Rate MCS	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	0.61	0.00	0.61	
	1	0.61	0.00	0.61	
	2	0.65	0.00	0.65	*
	3	0.64	0.00	0.64	
	4	0.63	0.00	0.63	
	5	0.60	0.00	0.60	
	6	0.61	0.00	0.61	
	7	0.62	0.00	0.62	

\* 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.

### Maximum Conducted Output Power

Test place                   Shonan EMC Lab. No.6 Shielded Room  
Report No.                 11294467S-A-R4  
Date                         May 26, 2016  
Temperature / Humidity    28deg. C / 53 % RH  
Engineer                  Hiroyuki Morikawa  
Mode                        Tx

#### **5755 MHz**

Mode	Rate MCS	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-40	0	-0.45	0.00	-0.45	
	1	-0.41	0.00	-0.41	*
	2	-0.45	0.00	-0.45	
	3	-0.49	0.00	-0.49	
	4	-0.45	0.00	-0.45	
	5	-0.49	0.00	-0.49	
	6	-0.43	0.00	-0.43	
	7	-0.47	0.00	-0.47	

\* 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.6 Shielded Room  
Report No.                      11294467S-A-R4  
Date                              May 26, 2016  
Temperature / Humidity        28deg. C / 53 % RH  
Engineer                        Hiroyuki Morikawa  
Mode                              Tx

Mode	Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
					[dBm]	[mW]
11a	5745	-0.43	2.56	9.99	12.12	16.29
	5785	0.63	2.58	9.99	13.20	20.89
	5825	0.45	2.61	9.98	13.04	20.14
11n-20	5745	-0.47	2.56	9.99	12.08	16.14
	5785	0.65	2.58	9.99	13.22	20.99
	5825	0.44	2.61	9.98	13.03	20.09
11n-40	5755	-0.41	2.56	9.99	12.14	16.37
	-	-	-	-	-	-
	5795	0.69	2.58	9.99	13.26	21.18

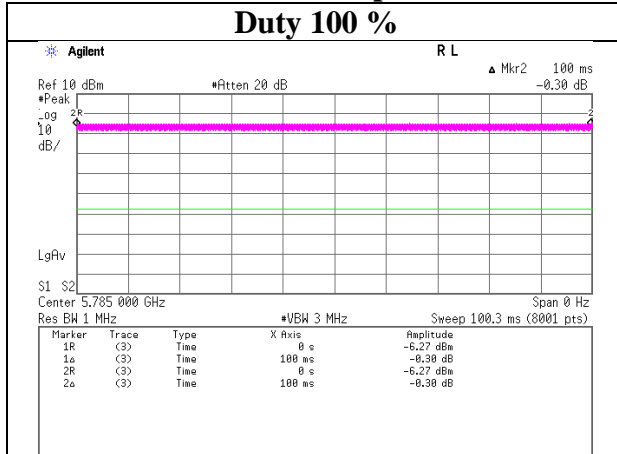
Sample Calculation:

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

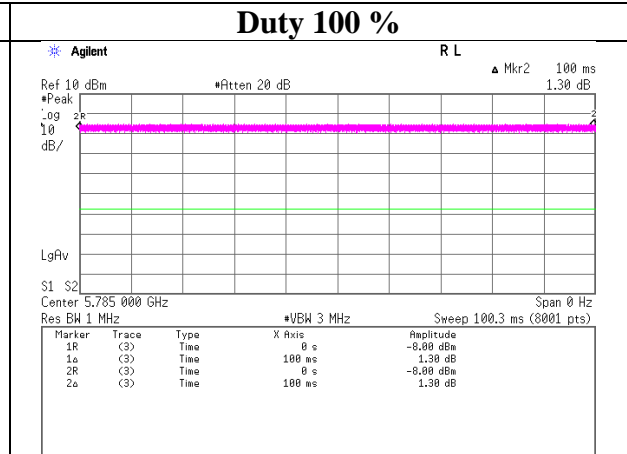
**Burst rate confirmation**

Test place : Shonan EMC Lab. No.6 Shielded Room  
 Report No. : 11294467S-A-R4  
 Date : May 26, 2016  
 Temperature / Humidity : 28deg. C / 53 % RH  
 Engineer : Hiroyuki Morikawa  
 Mode : Tx

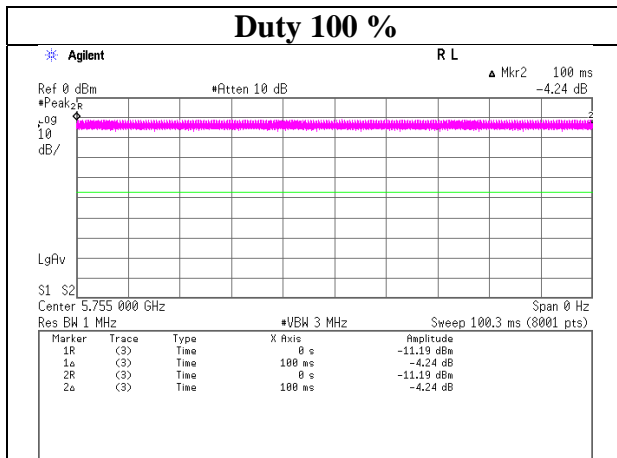
**11a 18 Mbps  
Duty 100 %**



**11n-20 MCS2  
Duty 100 %**



**11n-40 MCS1  
Duty 100 %**



### Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11294467S-A-R4  
Date : May 26, 2016  
Temperature / Humidity : 28deg. C / 53 % RH  
Engineer : Hiroyuki Morikawa  
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	-19.77	2.56	9.99	0.00	-0.4	6.99	-0.23	30.00	30.23	-0.66	36.00	36.66
5785	-19.07	2.58	9.99	0.00	-0.4	6.99	0.49	30.00	29.51	0.06	36.00	35.94
5825	-18.53	2.61	9.98	0.00	-0.4	6.99	1.05	30.00	28.95	0.62	36.00	35.38

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

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### Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11294467S-A-R4  
Date : May 26, 2016  
Temperature / Humidity : 28deg. C / 53 % RH  
Engineer : Hiroyuki Morikawa  
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	-20.04	2.56	9.99	0.00	-0.4	6.99	-0.50	30.00	30.50	-0.93	36.00	36.93
5785	-19.42	2.58	9.99	0.00	-0.4	6.99	0.15	30.00	29.86	-0.29	36.00	36.29
5825	-19.43	2.61	9.98	0.00	-0.4	6.99	0.15	30.00	29.85	-0.28	36.00	36.28

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 + 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.6 Shielded Room  
Report No. : 11294467S-A-R4  
Date : May 26, 2016  
Temperature / Humidity : 28deg. C / 53 % RH  
Engineer : Hiroyuki Morikawa  
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	-23.41	2.56	9.99	0.00	-0.4	6.99	-3.87	30.00	33.87	-4.30	36.00	40.30
5795	-22.13	2.58	9.99	0.00	-0.4	6.99	-2.57	30.00	32.57	-3.00	36.00	39.00

Sample Calculation:

PSD: Power Spectral Density

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

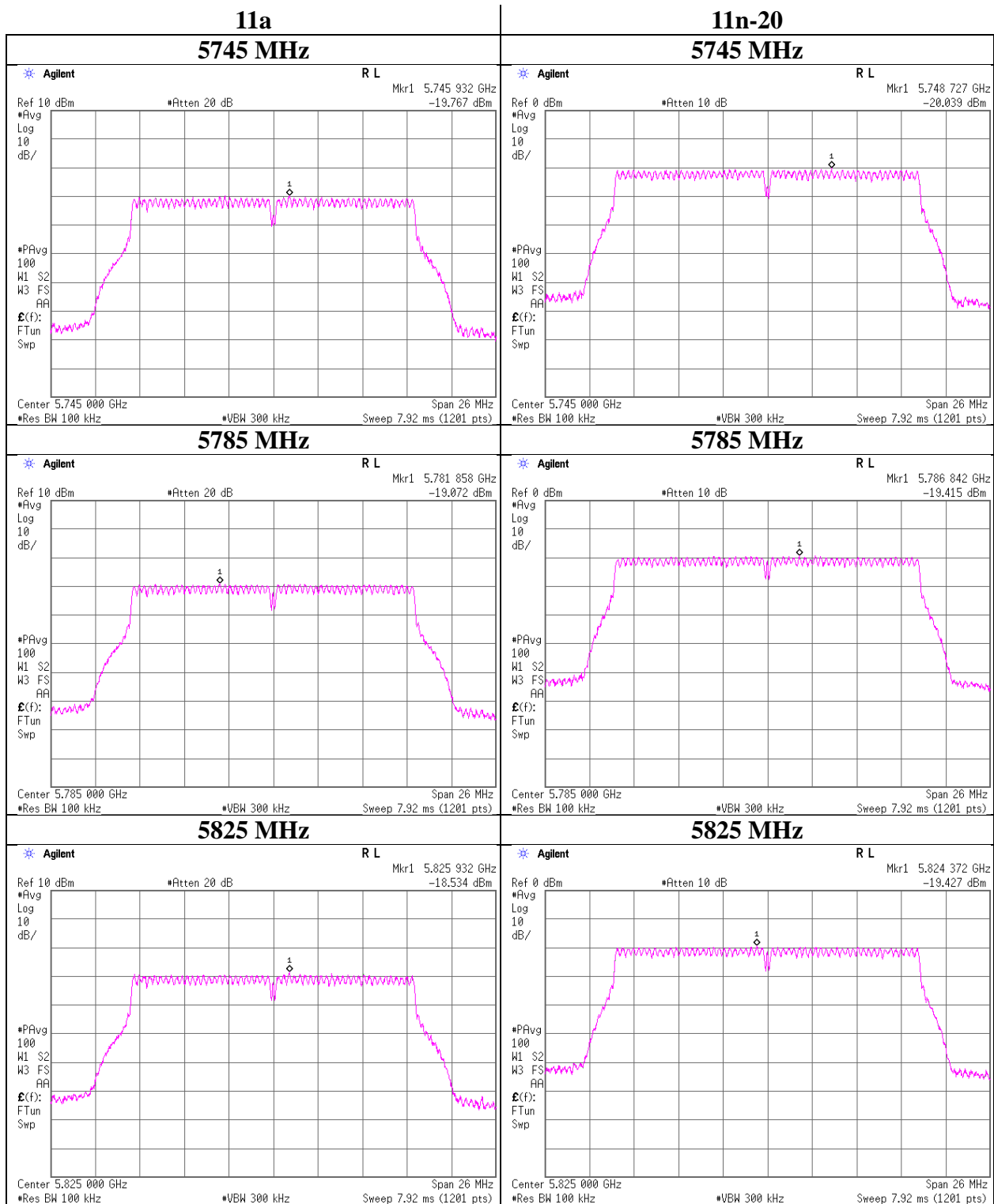
RBW Correction Factor =  $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

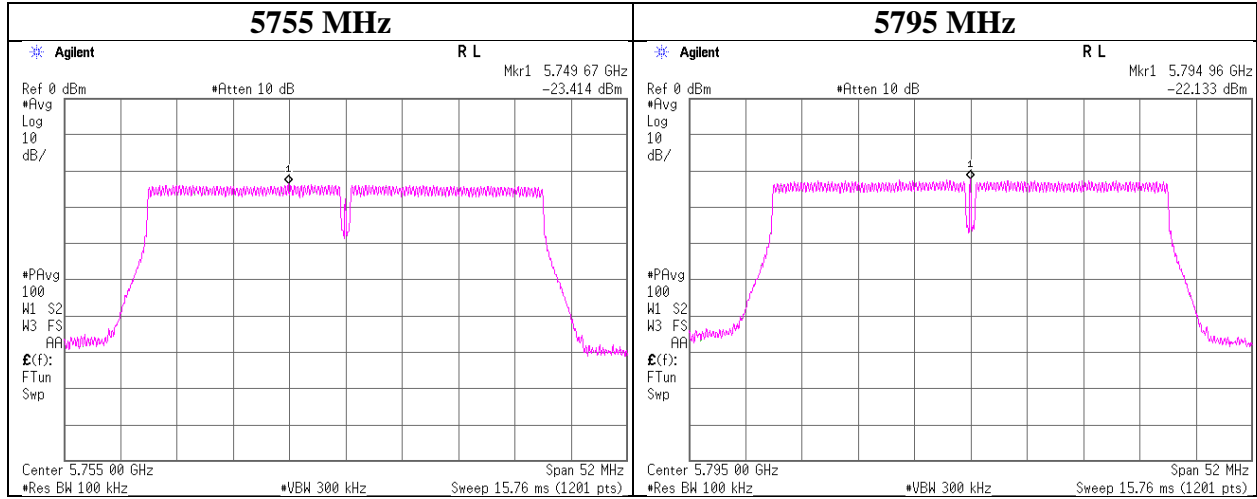
Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11294467S-A-R4
Date	May 26, 2016
Temperature / Humidity	28deg. C / 53 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx



### Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11294467S-A-R4  
Date : May 26, 2016  
Temperature / Humidity : 28deg. C / 53 % RH  
Engineer : Hiroyuki Morikawa  
Mode : Tx

#### 11n-40



## Radiated Spurious Emission

Test place Shonan EMC Lab. No.1, 3 Semi Anechoic Chamber  
Report No. 11294467S-A-R4  
Date May 31, 2016 June 1, 2016 June 2, 2016 June 23, 2016  
Temperature / Humidity 25deg. C / 51 % RH 20deg. C / 55 % RH 20deg. C / 52 % RH 20deg. C / 55 % RH  
Engineer Hiroyuki Morikawa Hiroyuki Morikawa Hiroyuki Morikawa Hiroyuki Morikawa  
(18 GHz-40 GHz) (1 GHz-13 GHz) (13 GHz-18 GHz) (1 GHz-6.4 GHz)  
(3AC) (3AC) (3AC) (1AC)  
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.	7660.0	PK	46.2	37.2	7.2	41.5	3.5	52.6	73.9	21.3	150.0	0.0	
Hori.	11490.0	PK	44.2	40.0	8.6	40.3	3.5	56.0	73.9	17.9	150.0	0.0	
Hori.	14362.5	PK	47.1	41.1	9.8	40.8	-9.5	47.7	73.9	26.2	150.0	0.0	
Hori.	17235.0	PK	43.0	42.0	10.9	40.0	-9.5	46.4	73.9	27.5	150.0	0.0	
Hori.	7660.0	AV	34.8	37.2	7.2	41.5	3.5	41.2	53.9	12.7	150.0	0.0	VBW:10Hz
Hori.	11490.0	AV	32.2	40.0	8.6	40.3	3.5	44.0	53.9	9.9	150.0	0.0	VBW:10Hz
Hori.	14362.5	AV	35.3	41.1	9.8	40.8	-9.5	35.9	53.9	18.0	150.0	0.0	VBW:10Hz
Hori.	17235.0	AV	32.2	42.0	10.9	40.0	-9.5	35.6	53.9	18.3	150.0	0.0	VBW:10Hz
Vert.	7660.0	PK	46.3	37.2	7.2	41.5	3.5	52.7	73.9	21.2	150.0	0.0	
Vert.	11490.0	PK	44.4	40.0	8.6	40.3	3.5	56.2	73.9	17.7	150.0	0.0	
Vert.	14362.5	PK	47.0	41.1	9.8	40.8	-9.5	47.6	73.9	26.3	150.0	0.0	
Vert.	17235.0	PK	43.5	42.0	10.9	40.0	-9.5	46.9	73.9	27.0	150.0	0.0	
Vert.	7660.0	AV	34.8	37.2	7.2	41.5	3.5	41.2	53.9	12.7	150.0	0.0	VBW:10Hz
Vert.	11490.0	AV	32.6	40.0	8.6	40.3	3.5	44.4	53.9	9.5	150.0	0.0	VBW:10Hz
Vert.	14362.5	AV	35.3	41.1	9.8	40.8	-9.5	35.9	53.9	18.0	150.0	0.0	VBW:10Hz
Vert.	17235.0	AV	32.4	42.0	10.9	40.0	-9.5	35.8	53.9	18.1	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : 20log(4.47 m / 3.0 m) = 3.5 dB (3AC), 20log(3.97 m / 3.0 m) = 2.5 dB (1AC)

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.	5650.0	PK	48.7	32.4	16.0	40.7	2.5	58.9	-36.3	-27.0	9.3			
Hori.	5700.0	PK	48.1	32.5	16.0	40.6	2.5	58.5	-36.7	10.0	46.7			
Hori.	5720.0	PK	47.7	32.6	16.0	40.6	2.5	58.2	-37.0	15.6	52.6			
Hori.	5725.0	PK	51.3	32.6	16.0	40.6	2.5	61.8	-33.4	27.0	60.4			
Vert.	5650.0	PK	47.8	32.4	16.0	40.7	2.5	58.0	-37.2	-27.0	10.2			
Vert.	5700.0	PK	47.4	32.5	16.0	40.6	2.5	57.8	-37.4	10.0	47.4			
Vert.	5720.0	PK	46.8	32.6	16.0	40.6	2.5	57.3	-37.9	15.6	53.5			
Vert.	5725.0	PK	49.5	32.6	16.0	40.6	2.5	60.0	-35.2	27.0	62.2			

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

Result(EIRP[dBm])=10\*LOG (({(10^( Electric Field Strength [dBuV/m] / 20 ) \* 10^(-6) \* Distance:3[m] )^2 } / 30) \*10^3)

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

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

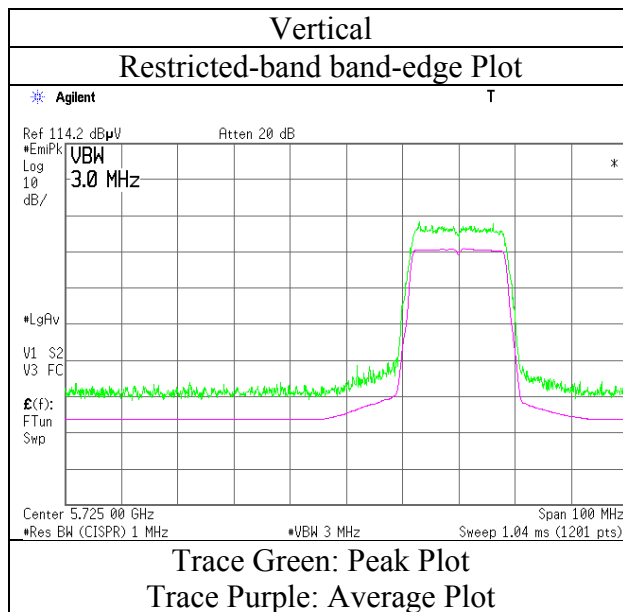
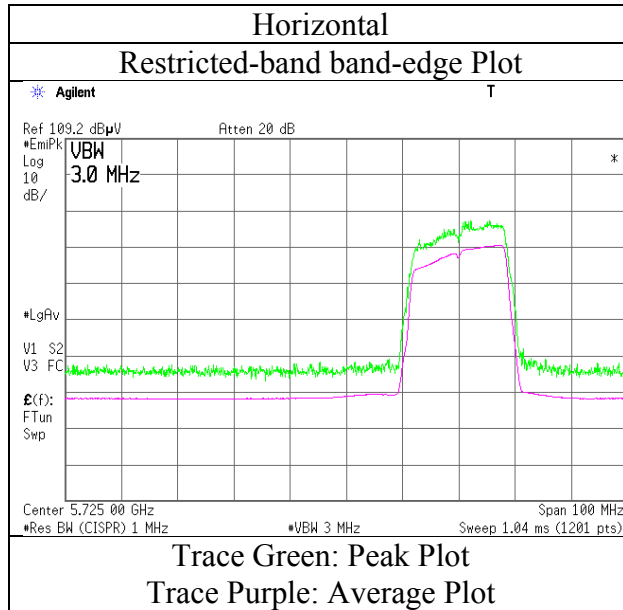
Distance factor : 1 GHz - 13 GHz : 20log(4.47 m / 3.0 m) = 3.5 dB (3AC), 20log(3.97 m / 3.0 m) = 2.5 dB (1AC)

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



## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11a 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.	11294467S-A-R4		
Date	May 31, 2016	June 1, 2016	June 2, 2016
Temperature / Humidity	25deg. C / 51 % RH	20deg. C / 55 % RH	20deg. C / 52 % RH
Engineer	Hiroyuki Morikawa (18 GHz-40 GHz)	Hiroyuki Morikawa (1 GHz-13 GHz)	Hiroyuki Morikawa (13 GHz-18 GHz)
Mode	Tx 11a 5785 MHz		

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	7713.3	PK	47.1	37.3	7.1	41.5	3.5	53.5	73.9	20.4	150.0	0.0	
Hori.	11490.0	PK	44.7	40.0	8.6	40.3	3.5	56.5	73.9	17.4	150.0	0.0	
Hori.	14462.5	PK	47.1	41.1	9.8	40.8	-9.5	47.7	73.9	26.2	150.0	0.0	
Hori.	17355.0	PK	44.0	42.4	10.9	40.0	-9.5	47.8	73.9	26.1	150.0	0.0	
Hori.	7713.3	AV	35.9	37.3	7.1	41.5	3.5	42.3	53.9	11.6	150.0	0.0	VBW:10Hz
Hori.	11490.0	AV	32.5	40.0	8.6	40.3	3.5	44.3	53.9	9.6	150.0	0.0	VBW:10Hz
Hori.	14462.5	AV	35.5	41.1	9.8	40.8	-9.5	36.1	53.9	17.8	150.0	0.0	VBW:10Hz
Hori.	17355.0	AV	32.6	42.4	10.9	40.0	-9.5	36.4	53.9	17.5	150.0	0.0	VBW:10Hz
Vert.	7713.3	PK	47.8	37.3	7.1	41.5	3.5	54.2	73.9	19.7	150.0	0.0	
Vert.	11490.0	PK	44.1	40.0	8.6	40.3	3.5	55.9	73.9	18.0	150.0	0.0	
Vert.	14462.5	PK	46.5	41.1	9.8	40.8	-9.5	47.1	73.9	26.8	150.0	0.0	
Vert.	17355.0	PK	43.8	42.4	10.9	40.0	-9.5	47.6	73.9	26.3	150.0	0.0	
Vert.	7713.3	AV	35.9	37.3	7.1	41.5	3.5	42.3	53.9	11.6	150.0	0.0	VBW:10Hz
Vert.	11490.0	AV	32.5	40.0	8.6	40.3	3.5	44.3	53.9	9.6	150.0	0.0	VBW:10Hz
Vert.	14462.5	AV	35.5	41.1	9.8	40.8	-9.5	36.1	53.9	17.8	150.0	0.0	VBW:10Hz
Vert.	17355.0	AV	32.6	42.4	10.9	40.0	-9.5	36.4	53.9	17.5	150.0	0.0	VBW:10Hz

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

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

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

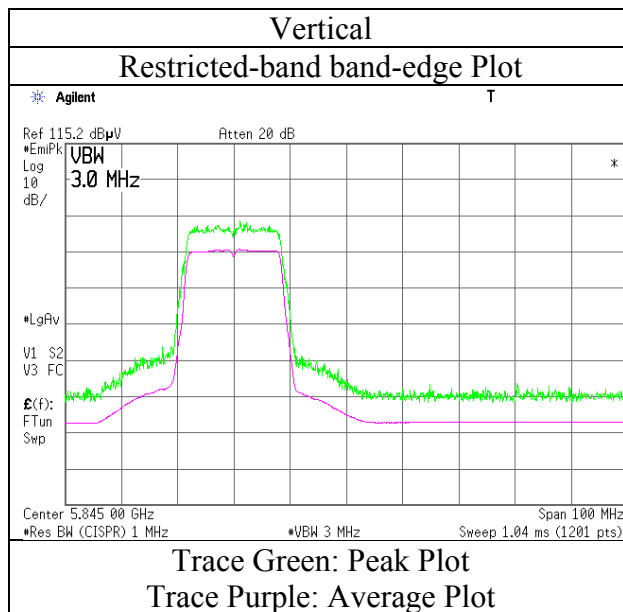
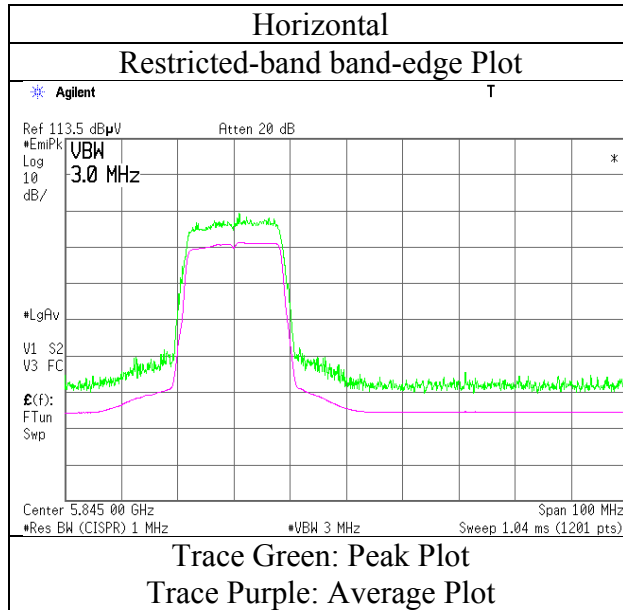
Distance factor : 1 GHz - 13 GHz :  $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

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.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11a 5825 MHz

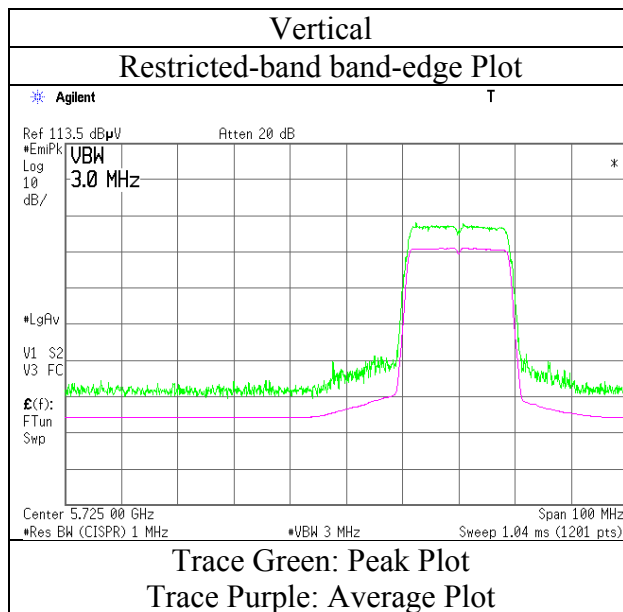
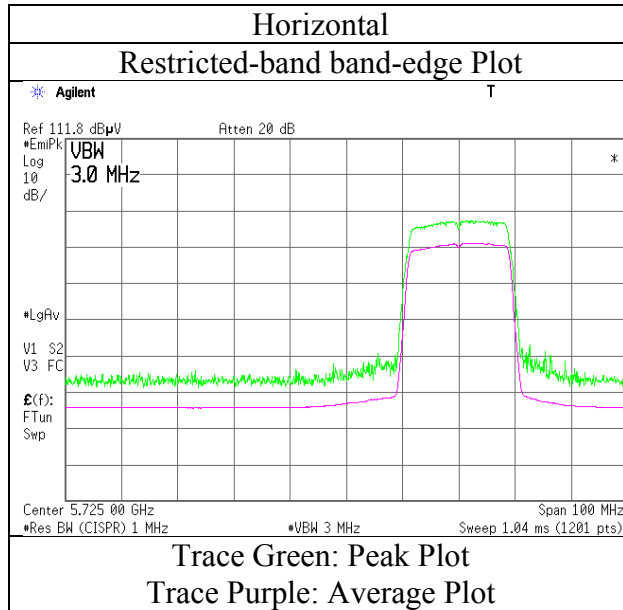


\* Final result of restricted band edge was shown in tabular data.



### Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11n-20 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.	11294467S-A-R4		
Date	May 31, 2016	June 1, 2016	June 2, 2016
Temperature / Humidity	25deg. C / 51 % RH	20deg. C / 55 % RH	20deg. C / 52 % RH
Engineer	Hiroyuki Morikawa (18 GHz-40 GHz)	Hiroyuki Morikawa (1 GHz-6.4 GHz)	Hiroyuki Morikawa (6.4 GHz-18 GHz)
Mode	Tx 11n-20 5785 MHz		

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	7713.3	PK	47.7	37.3	7.1	41.5	3.5	54.1	73.9	19.8	150.0	0.0	
Hori.	11570.0	PK	43.8	39.9	8.6	40.3	3.5	55.5	73.9	18.4	150.0	0.0	
Hori.	14462.5	PK	47.9	41.1	9.8	40.8	-9.5	48.5	73.9	25.4	150.0	0.0	
Hori.	17355.0	PK	43.9	42.4	10.9	40.0	-9.5	47.7	73.9	26.2	150.0	0.0	
Hori.	7713.3	AV	35.9	37.3	7.1	41.5	3.5	42.3	53.9	11.6	150.0	0.0	VBW:10Hz
Hori.	11570.0	AV	32.0	39.9	8.6	40.3	3.5	43.7	53.9	<b>10.2</b>	150.0	0.0	VBW:10Hz
Hori.	14462.5	AV	35.6	41.1	9.8	40.8	-9.5	36.2	53.9	17.7	150.0	0.0	VBW:10Hz
Hori.	17355.0	AV	32.7	42.4	10.9	40.0	-9.5	36.5	53.9	17.4	150.0	0.0	VBW:10Hz
Vert.	7713.3	PK	48.5	37.3	7.1	41.5	3.5	54.9	73.9	19.0	150.0	0.0	
Vert.	11570.0	PK	43.6	39.9	8.6	40.3	3.5	55.3	73.9	18.6	150.0	0.0	
Vert.	14462.5	PK	47.4	41.1	9.8	40.8	-9.5	48.0	73.9	25.9	150.0	0.0	
Vert.	17355.0	PK	44.2	42.4	10.9	40.0	-9.5	48.0	73.9	25.9	150.0	0.0	
Vert.	7713.3	AV	36.0	37.3	7.1	41.5	3.5	42.4	53.9	11.5	150.0	0.0	VBW:10Hz
Vert.	11570.0	AV	32.0	39.9	8.6	40.3	3.5	43.7	53.9	<b>10.2</b>	150.0	0.0	VBW:10Hz
Vert.	14462.5	AV	35.5	41.1	9.8	40.8	-9.5	36.1	53.9	17.8	150.0	0.0	VBW:10Hz
Vert.	17355.0	AV	32.8	42.4	10.9	40.0	-9.5	36.6	53.9	17.3	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz :  $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

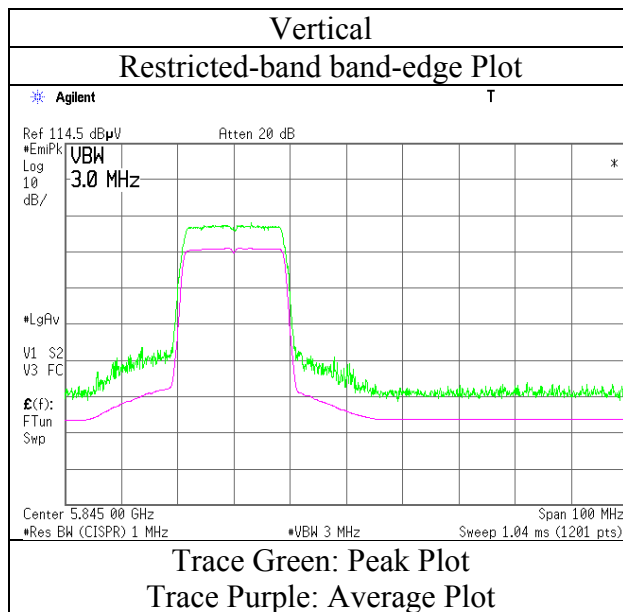
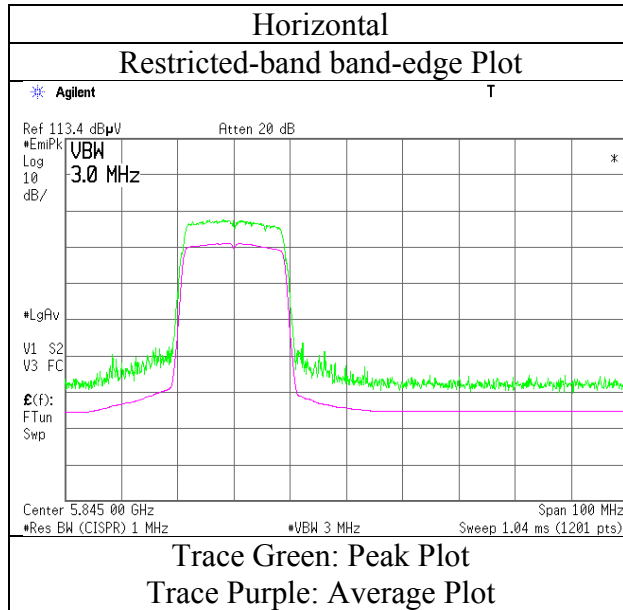
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$





### Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11n-20 5825 MHz



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

## Radiated Spurious Emission

Test place Shonan EMC Lab. No.1, 3 Semi Anechoic Chamber  
Report No. 11294467S-A-R4  
Date May 31, 2016 June 1, 2016 June 2, 2016 June 23, 2016  
Temperature / Humidity 25deg. C / 51 % RH 20deg. C / 55 % RH 20deg. C / 52 % RH 20deg. C / 55 % RH  
Engineer Hiroyuki Morikawa Hiroyuki Morikawa Hiroyuki Morikawa Hiroyuki Morikawa  
(18 GHz-40 GHz) (1 GHz-6.4 GHz) (6.4 GHz-18 GHz) (1 GHz-6.4 GHz)  
(3AC) (3AC) (3AC) (1AC)  
Mode Tx 11n-40 5755 MHz

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	7673.3	PK	47.5	37.3	7.2	41.5	3.5	54.0	73.9	19.9	150.0	0.0	
Hori.	11510.0	PK	44.6	40.0	8.6	40.3	3.5	56.4	73.9	17.5	150.0	0.0	
Hori.	14387.5	PK	46.5	41.1	9.8	40.8	-9.5	47.1	73.9	26.8	150.0	0.0	
Hori.	17265.0	PK	43.6	42.1	10.9	40.0	-9.5	47.1	73.9	26.8	150.0	0.0	
Hori.	7673.3	AV	35.2	37.3	7.2	41.5	3.5	41.7	53.9	12.2	150.0	0.0	VBW:10Hz
Hori.	11510.0	AV	32.7	40.0	8.6	40.3	3.5	44.5	53.9	9.4	150.0	0.0	VBW:10Hz
Hori.	14387.5	AV	35.4	41.1	9.8	40.8	-9.5	36.0	53.9	17.9	150.0	0.0	VBW:10Hz
Hori.	17265.0	AV	32.4	42.1	10.9	40.0	-9.5	35.9	53.9	18.0	150.0	0.0	VBW:10Hz
Vert.	7673.3	PK	46.4	37.3	7.2	41.5	3.5	52.9	73.9	21.0	150.0	0.0	
Vert.	11510.0	PK	44.7	40.0	8.6	40.3	3.5	56.5	73.9	17.4	150.0	0.0	
Vert.	14387.5	PK	46.6	41.1	9.8	40.8	-9.5	47.2	73.9	26.7	150.0	0.0	
Vert.	17265.0	PK	43.3	42.1	10.9	40.0	-9.5	46.8	73.9	27.1	150.0	0.0	
Vert.	7673.3	AV	35.2	37.3	7.2	41.5	3.5	41.7	53.9	12.2	150.0	0.0	VBW:10Hz
Vert.	11510.0	AV	32.8	40.0	8.6	40.3	3.5	44.6	53.9	9.3	150.0	0.0	VBW:10Hz
Vert.	14387.5	AV	35.3	41.1	9.8	40.8	-9.5	35.9	53.9	18.0	150.0	0.0	VBW:10Hz
Vert.	17265.0	AV	32.4	42.1	10.9	40.0	-9.5	35.9	53.9	18.0	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : 20log(4.47 m / 3.0 m) = 3.5 dB (3AC), 20log(3.97 m / 3.0 m) = 2.5 dB (1AC)

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.	5650.0	PK	47.3	32.4	16.0	40.7	2.5	57.5	-37.7	-27.0	10.7			
Hori.	5700.0	PK	47.6	32.5	16.0	40.6	2.5	58.0	-37.2	10.0	47.2			
Hori.	5720.0	PK	51.9	32.6	16.0	40.6	2.5	62.4	-32.8	15.6	48.4			
Hori.	5725.0	PK	52.0	32.6	16.0	40.6	2.5	62.5	-32.7	27.0	59.7			
Vert.	5650.0	PK	47.7	32.4	16.0	40.7	2.5	57.9	-37.3	-27.0	<b>10.3</b>			
Vert.	5700.0	PK	46.9	32.5	16.0	40.6	2.5	57.3	-37.9	10.0	47.9			
Vert.	5720.0	PK	49.6	32.6	16.0	40.6	2.5	60.1	-35.1	15.6	50.7			
Vert.	5725.0	PK	49.7	32.6	16.0	40.6	2.5	60.2	-35.0	27.0	62.0			

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

Result(EIRP[dBm])=10\*LOG ((10^( Electric Field Strength [dBuV/m] / 20 ) \* 10^(-6) \* Distance:3[m] )^2 / 30) \*10^3)

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

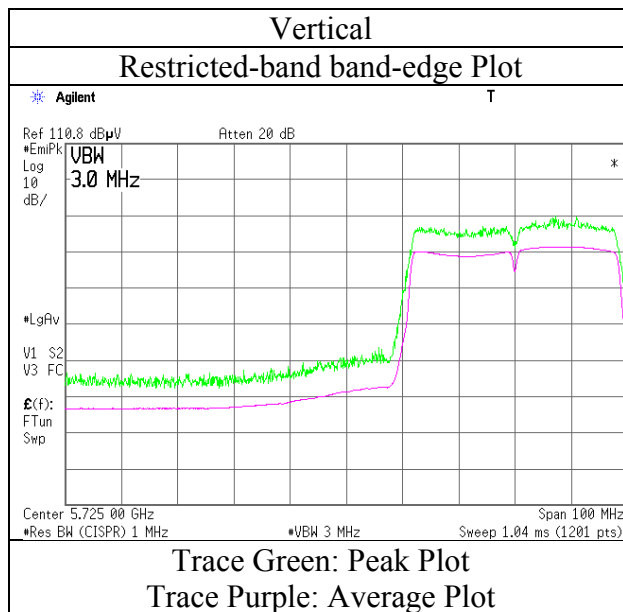
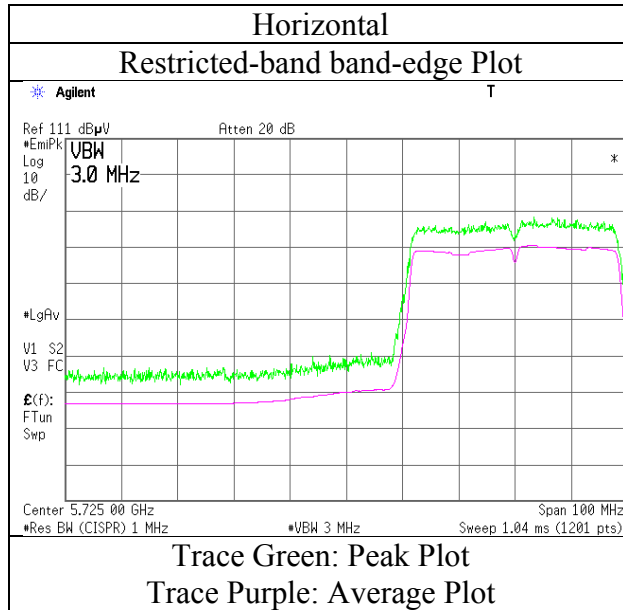
\*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : 20log(4.47 m / 3.0 m) = 3.5 dB (3AC), 20log(3.97 m / 3.0 m) = 2.5 dB (1AC)

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

## Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11n-40 5755 MHz

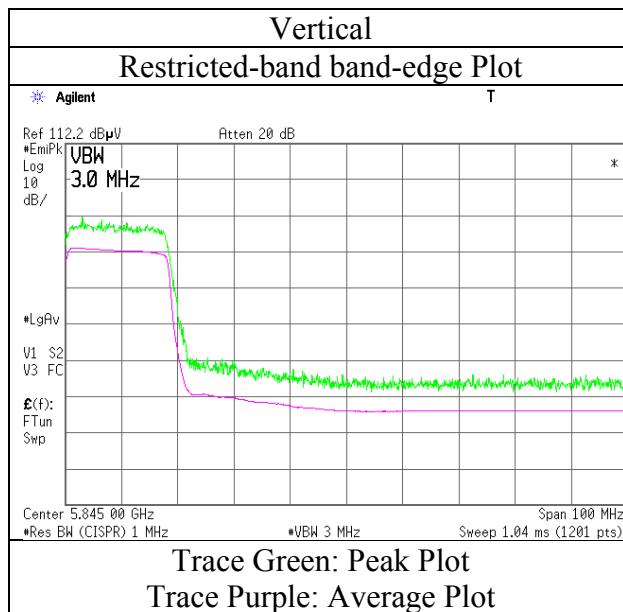
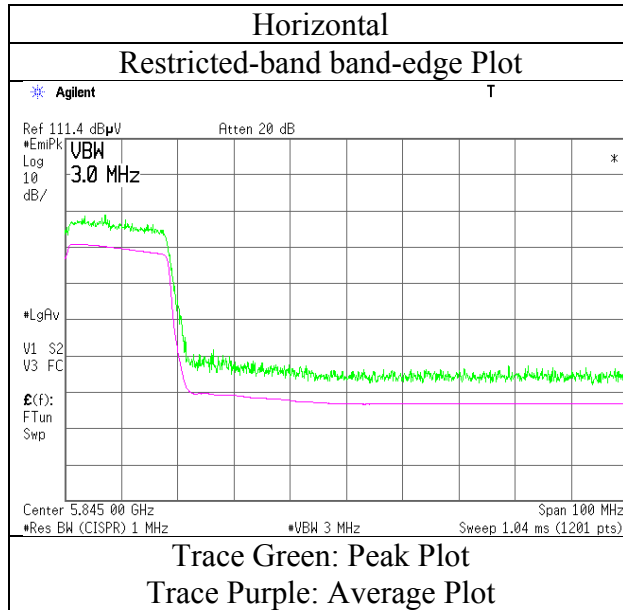


\* Final result of restricted band edge was shown in tabular data.



## Radiated Spurious Emission

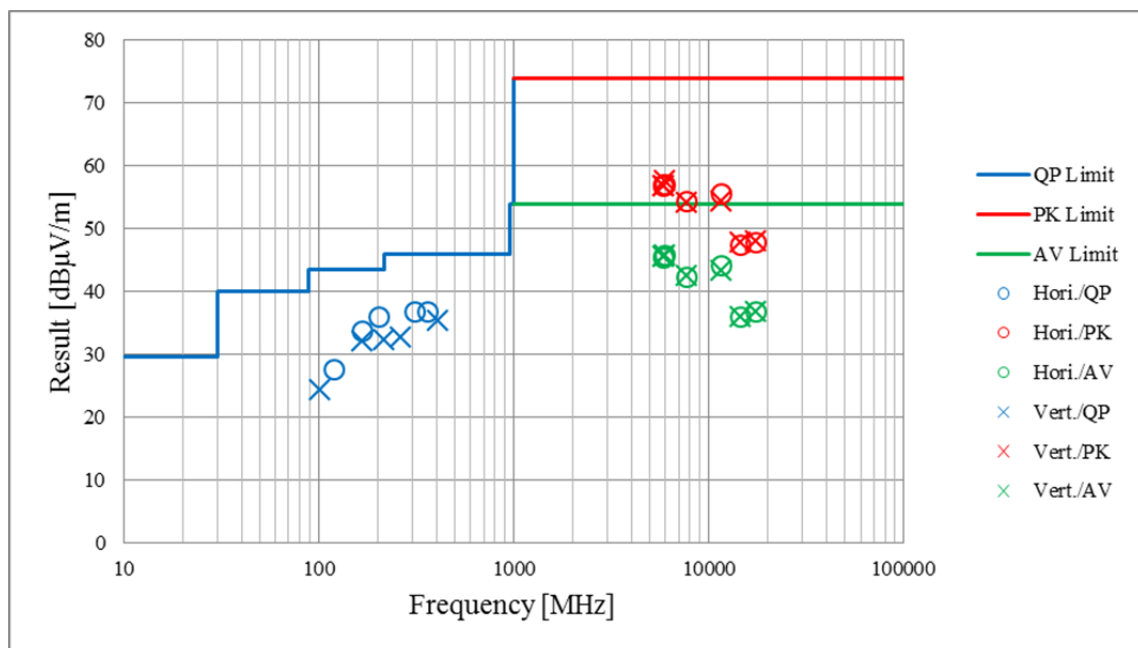
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11294467S-A-R4
Date	June 1, 2016
Temperature / Humidity	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11n-40 5795 MHz



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

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

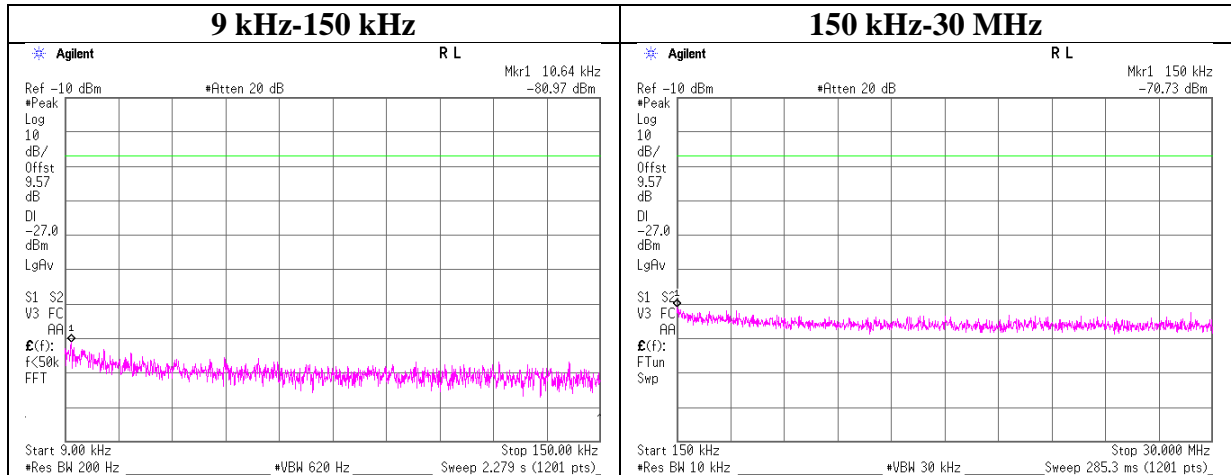
Test place	Shonan EMC Lab. No.1, 3 Semi Anechoic Chamber			
Report No.	11294467S-A-R4			
Date	May 31, 2016	June 1, 2016	June 2, 2016	June 3, 2016
Temperature / Humidity	25deg. C / 51 % RH	20deg. C / 55 % RH	20deg. C / 52 % RH	20deg. C / 55 % RH
Engineer	Hiroyuki Morikawa (18 GHz-40 GHz) (3AC)	Hiroyuki Morikawa (1 GHz-6.4 GHz) (3AC)	Hiroyuki Morikawa (6.4 GHz-18 GHz) (3AC)	Hiroyuki Morikawa (30 MHz-1 GHz) (3AC)
	June 23, 2016			
	20deg. C / 55 % RH			
	Hiroyuki Morikawa (1 GHz-6.4 GHz) (1AC)			
Mode	Tx 11n-40 5795 MHz			



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

### Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11294467S-A-R4
Date	May 26, 2016
Temperature / Humidity	28deg. C / 53 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11n-40 5795 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
10.64	-81.0	0.02	9.8	2.0	1	-69.1	300	6.0	-7.9	47.0	54.9	
150.00	-70.7	0.02	9.8	2.0	1	-58.9	300	6.0	2.4	24.0	21.6	

$E = \text{EIRP} - 20 \cdot \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$   
 $\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain} + 10 \cdot \log(N)$

## APPENDIX 2: Test instruments

Test equipment Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2016/03/28 * 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
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2016/03/23 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2016/04/18 * 12
SCC-H11	Microwave cable	RS Pro	R-132G7210 100CO	-	AT	2016/04/18 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2016/03/22 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2015/10/22 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	RE	2015/09/16 * 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
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-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE, CE	-
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2016/03/22 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2015/06/08 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2016/05/11 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2016/03/23 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVS WR)	3	RE	2015/08/28 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE, CE	-
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
SCC-C1/C2/C3/C4/C5/C10/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/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/S RSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2016/04/22 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2016/02/09 * 12



SAT3-07	Attenuator	JFW	50HF-003N	-	CE	2015/09/18 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2015/12/07 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2016/06/14 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2016/05/11 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2015/08/10 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2015/10/22 * 12
SJM-16	Measure	ASKUL	-	-	RE	-
SAEC-01(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-01(SVS WR)	1	RE	2015/07/08 * 12
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2015/11/18 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2015/11/04 * 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**