



RADIO TEST REPORT

Test Report No. : 11173913S-R1

Applicant : MITSUMI ELECTRIC CO., LTD.
Type of Equipment : WIFI MODULE
Model No. : DWM-W052
FCC ID : EW4DWMW052
Test regulation : FCC Part 15 Subpart E: 2015
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 11173913S. 11173913S is replaced with this report.

Date of test: April 4 to 15, 2016

Representative test engineer:

T. Suzuki

Takahiro Suzuki
Engineer
Consumer Technology Division

Approved by:

T. Imamura

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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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11173913S

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SECTION 1: Customer information

Company Name	:	MITSUMI ELECTRIC CO., LTD.
Address	:	2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567, JAPAN
Telephone Number	:	+81-42-310-4823
Facsimile Number	:	+81-42-310-5598
Contact Person	:	Katsunori Kobari

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

2.1 Identification of E.U.T.

Type of Equipment	:	WIFI MODULE
Model No.	:	DWM-W052
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample	:	April 4, 2016
Country of Mass-production	:	Phillipines
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: DWM-W052 (referred to as the EUT in this report) is a WIFI MODULE.

General Specification

Clock frequency(ies) in the system	:	20 MHz
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	5745 MHz - 5825 MHz
Modulation	:	OFDM
Antenna type	:	PIFA
Antenna Gain	:	1.23 dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E: 2015, final revised on November 23, 2015

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

*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013	FCC: 15.407 (b) (6) / 15.207	2.2 dB, 0.30791 MHz, N AV, Tx IEEE 802.11n-20 5745 MHz MIMO	Complied	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)	See data	N/A	Conducted
Maximum Conducted Output Power	IC: -	IC: -		Complied	Conducted
	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)			
Maximum Power Spectral Density	IC: -	IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)		Complied	Conducted
	FCC: KDB Publication Number 789033	FCC : 15.407 (a) (1) (2) (3)			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033	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)	3.5 dB 5725.000 MHz, PK, Horizontal Tx IEEE802.11n-20 5745 MHz MIMO	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
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 RF Module is constantly provided the stable voltage (DC 3.3 V) from the host device. Therefore, this EUT complies with the requirement.

FCC Part 15.203 / 212

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

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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 report meets the limits unless the uncertainty is taken into consideration.

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)

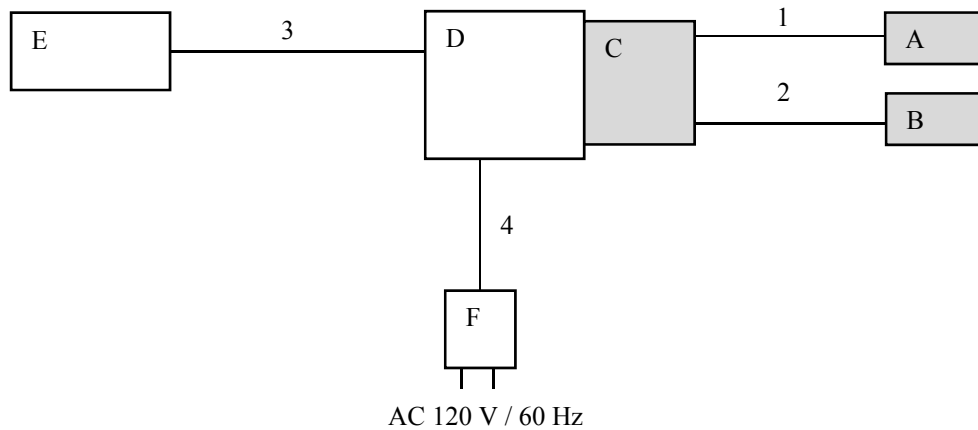
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals -” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11n SISO 20 MHz BW (11n-20 SISO)	MCS 0, PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20 MIMO)	MCS 8 (2 Streams), PN9
*The worst antenna (Ant: 0) and condition was determined based on the test result of Maximum Conducted Output Power.	
*Power of the EUT was set by the software as follows; Power settings: Fixed Software: wl.exe *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

The details of Operation mode(s)

Test Item	Operating Mode	Tested Antenna	Tested Frequency
Conducted emission	11n-20 MIMO Tx	0-1 (Multi Input)	5825 MHz
Maximum Conducted Output Power, Maximum Power Spectral Density	11n-20 SISO Tx	0	5745 MHz
	11n-20 MIMO Tx	0-1 (Multi Input)	5785 MHz 5825 MHz
99 % Occupied Bandwidth, 6 dB Bandwidth	11n-20 SISO Tx 11n-20 MIMO Tx	0	5745 MHz 5785 MHz 5825 MHz
Radiated Spurious Emission (Below 1 GHz)	11n-20 MIMO Tx	0-1 (Multi Input)	5825 MHz
Radiated Spurious Emission (Above 1 GHz)	11n-20 Tx	0-1 (Multi Input)	5745 MHz 5785 MHz 5825 MHz
Conducted Spurious Emission	11n-20 Tx	0-1 (Multi Input)	5745 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	Antenna 0	Red ANT	-	MITSUMI ELECTRIC CO., LTD.	EUT
B	Antenna 1	Gray ANT	-	MITSUMI ELECTRIC CO., LTD.	EUT
C	WIFI Module	DWM-W052	9CE63513AE97	MITSUMI ELECTRIC CO., LTD.	EUT
D	Test Jig	-	-	MITSUMI ELECTRIC CO., LTD.	-
E	Test Jig	-	-	MITSUMI ELECTRIC CO., LTD.	-
F	AC Adapter	HK-C113-A05	EPS050250UPS-P 5P-KH	V-INFINITY	-

List of cables used

No.	Cable Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna 0	0.20	Unshielded	Unshielded	-
2	Antenna 1	0.30	Unshielded	Unshielded	-
3	Signal	0.44	Unshielded	Unshielded	-
4	DC	1.75	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 rear of tabletop was located 40 cm 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 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via AC adaptor in a Shielded room.

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 1 GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 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 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. ^{*}) or

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

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 300 MHz	300 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 AD *1) RBW: 1 MHz VBW: Duty $\geq$ 98 % VBW is 10 Hz Duty < 98 % VBW is 1 / burst time
Test Distance	3 m	3 m (below 1 GHz), 3 m*2) (1 GHz – 13GHz), 1 m*3) (13 GHz – 40 GHz),	

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules 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: $20 \times \log (3.9 \text{ m}/3.0 \text{ m}) = 2.3 \text{ dB}$

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

*4) Distance Factor: $20 \times \log (0.5 \text{ m}/3.0 \text{ m}) = -15.6 \text{ dB}$

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.

Combinations of the worst case

- Module: Horizontal X-axis, Vertical X-axis
- Antenna: Horizontal Z-axis, Vertical X-axis

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

Measurement range : 30 MHz-40 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
99 % Occupied Bandwidth	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: 40 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 : 2016/04/15

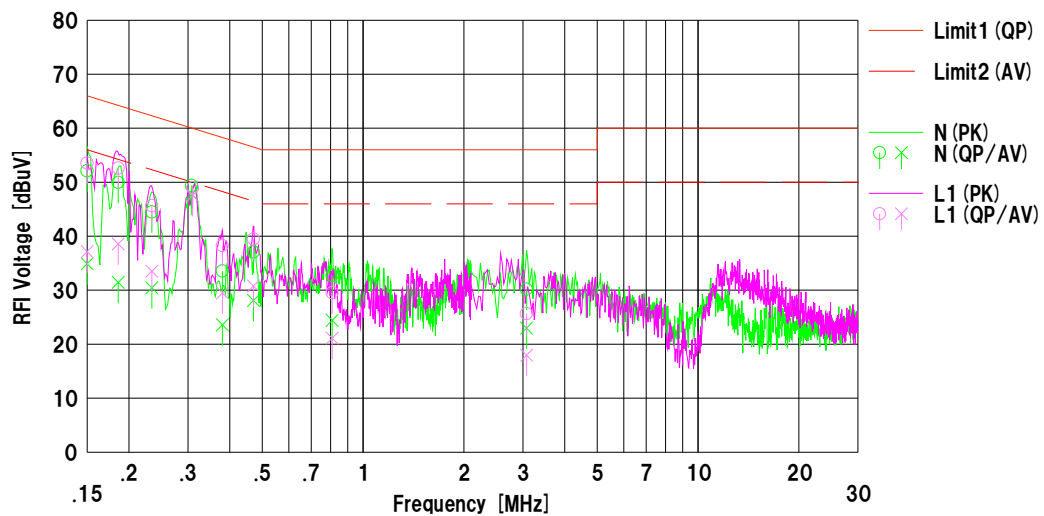
Mode : IEEE 802.11n-20 5745 MHz MIMO

Power : DC5 V
Temp./Humi. : 24 deg.C / 36 %RH

Remarks : -

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

Engineer : Takahiro Suzuki



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	39.61	22.39	12.51	52.12	34.90	66.00	56.00	13.8	21.1	N	
2	0.18586	37.46	18.93	12.51	49.97	31.44	64.22	54.22	14.2	22.7	N	
3	0.23412	31.95	17.92	12.53	44.48	30.45	62.30	52.30	17.8	21.8	N	
4	0.30791	36.87	35.25	12.52	49.39	47.77	60.03	50.03	10.6	2.2	N	
5	0.38027	21.03	11.06	12.53	33.56	23.59	58.27	48.27	24.7	24.6	N	
6	0.47048	24.52	15.57	12.54	37.06	28.11	56.51	46.51	19.4	18.4	N	
7	0.80878	20.14	11.83	12.59	32.73	24.42	56.00	46.00	23.2	21.5	N	
8	3.07647	17.38	10.18	12.80	30.18	22.98	56.00	46.00	25.8	23.0	N	
9	0.15000	41.03	24.63	12.51	53.54	37.14	66.00	56.00	12.4	18.8	L1	
10	0.18586	40.13	26.08	12.51	52.64	38.59	64.22	54.22	11.5	15.6	L1	
11	0.23412	33.11	20.98	12.53	45.64	33.51	62.30	52.30	16.6	18.7	L1	
12	0.31001	36.45	35.03	12.52	48.97	47.55	59.97	49.97	11.0	2.4	L1	
13	0.38027	25.72	16.95	12.53	38.25	29.48	58.27	48.27	20.0	18.7	L1	
14	0.47048	26.94	18.26	12.54	39.48	30.80	56.51	46.51	17.0	15.7	L1	
15	0.80878	16.95	8.53	12.59	29.54	21.12	56.00	46.00	26.4	24.8	L1	
16	3.07647	12.84	5.17	12.80	25.64	17.97	56.00	46.00	30.3	28.0	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-02

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26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11173913S-R1
Date : April 5, 2016
Temperature / Humidity : 25deg. C / 42 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11n-20 SISO

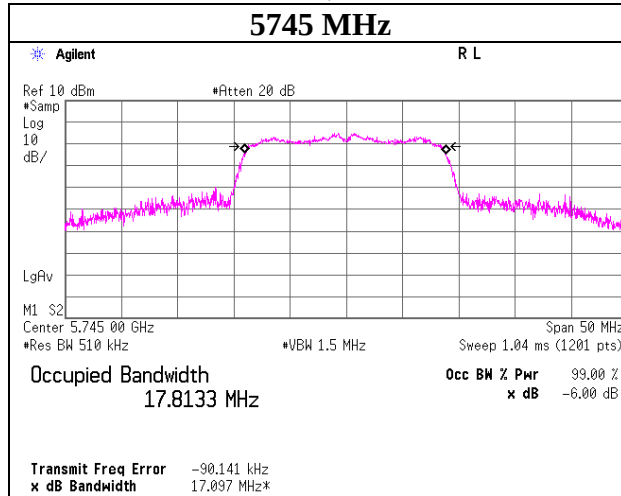
Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
Antenna 0	5745	-	17.813	-
	5785	-	17.719	-
	5825	-	17.808	-

11n-20 MIMO

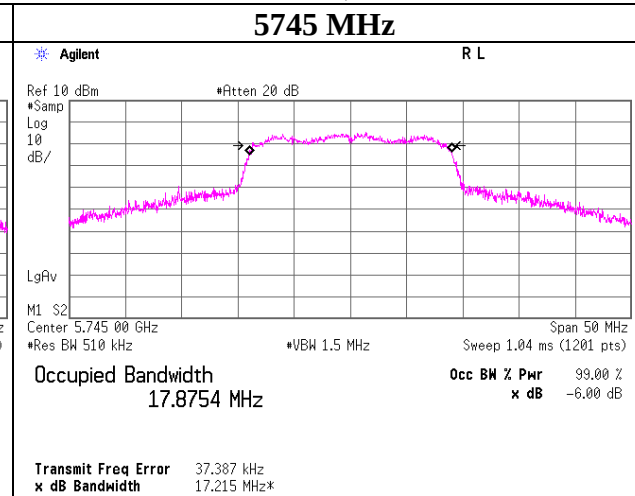
Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
Antenna 0	5745	-	17.875	-
	5785	-	18.235	-
	5825	-	17.876	-

99 % Occupied Bandwidth

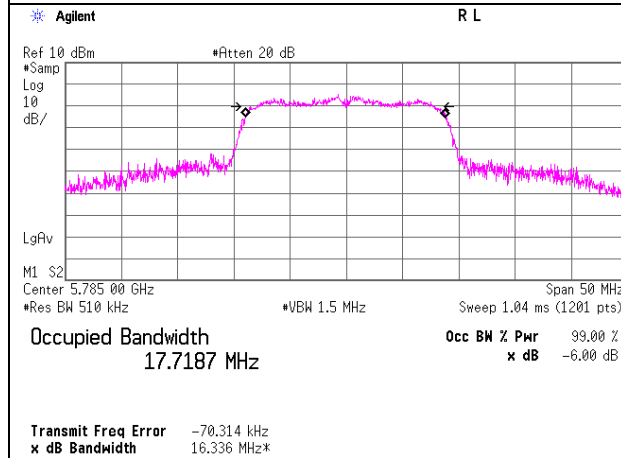
11n-20 SISO, Antenna 0



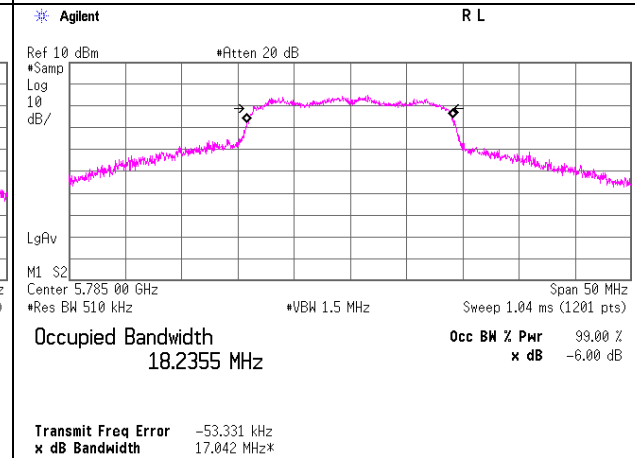
11n-20 MIMO, Antenna 0



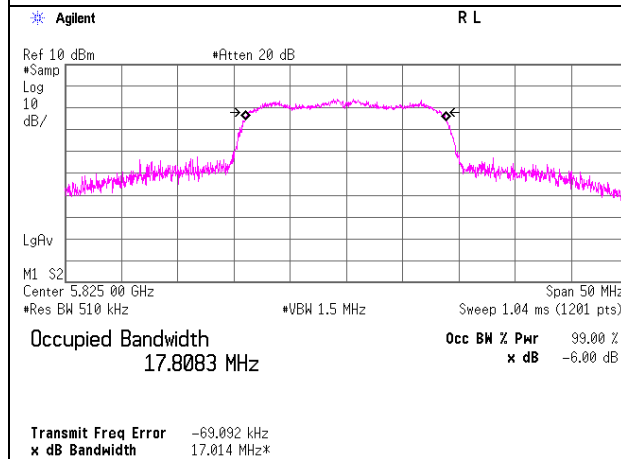
5785 MHz



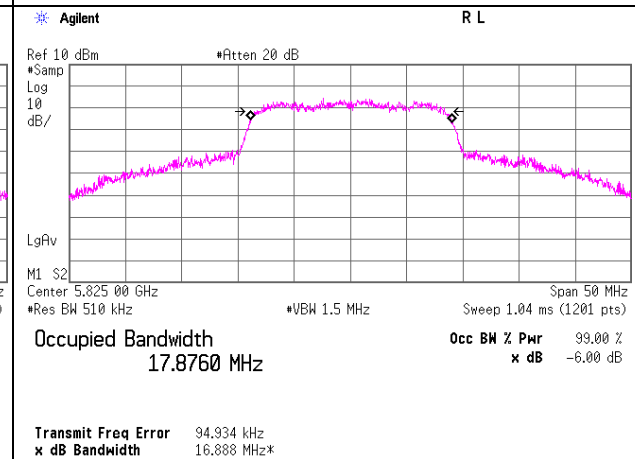
5785 MHz



5825 MHz



5825 MHz



6 dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11173913S-R1
Date April 5, 2016
Temperature / Humidity 25deg. C / 42 % RH
Engineer Yosuke Ishikawa
Mode Tx

11n-20 SISO

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
Antenna 0	5745	14.868	> 500
	5785	15.094	> 500
	5825	15.135	> 500

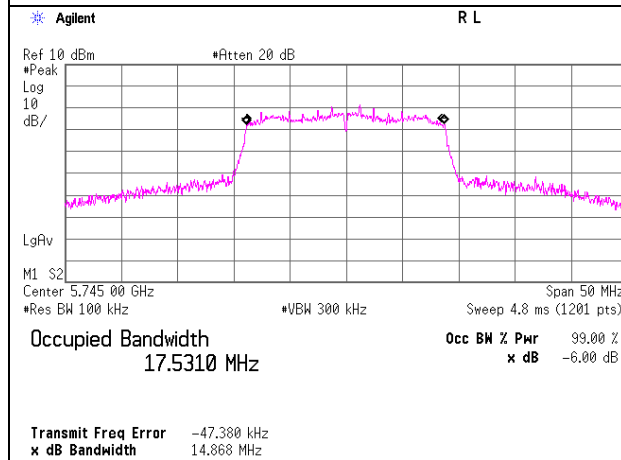
11n-20 MIMO

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
Antenna 0	5745	14.861	> 500
	5785	15.319	> 500
	5825	15.133	> 500

6 dB Bandwidth

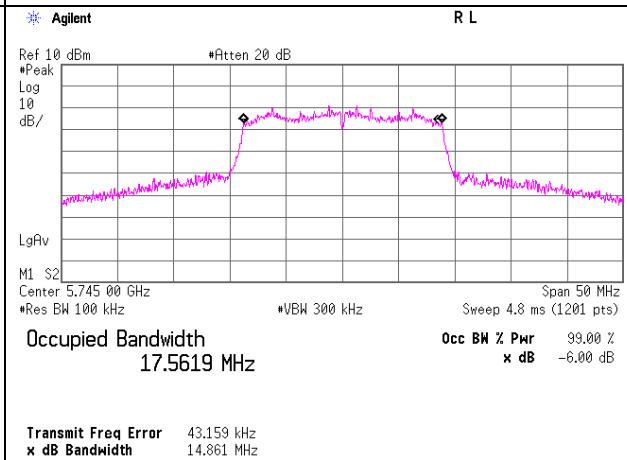
11n-20 SISO, Antenna 0

5745 MHz

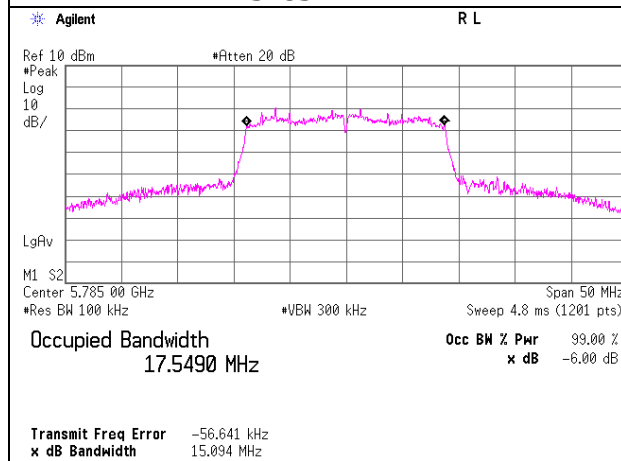


11n-20 MIMO, Antenna 0

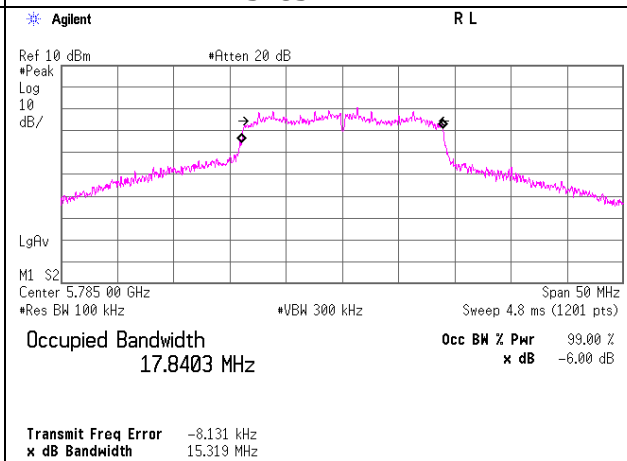
5745 MHz



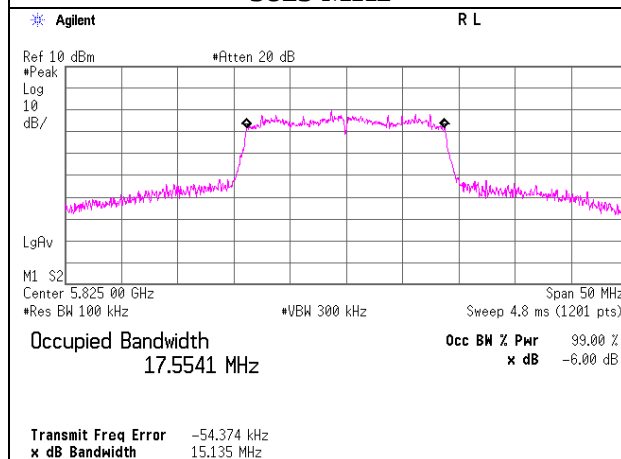
5785 MHz



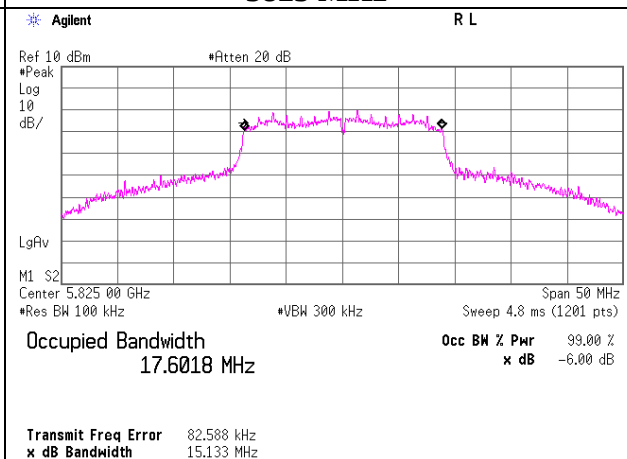
5785 MHz



5825 MHz



5825 MHz



Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11173913S-R1
Date : April 4, 2016
Temperature / Humidity : 25deg. C / 52 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11n-20 SISO, Antenna 0

Applied limit: 15.407, access point

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	Limit	Margin		Result	Limit	Margin	
5745	1.57	1.21	9.97	0.30	1.23	-	-	13.05	20.18	30.00	16.95	14.28	26.79	36.00	21.72
5785	1.25	1.21	9.97	0.30	1.23	-	-	12.73	18.75	30.00	17.27	13.96	24.89	36.00	22.04
5825	1.25	1.24	9.97	0.30	1.23	-	-	12.76	18.88	30.00	17.24	13.99	25.06	36.00	22.01

Sample Calculation:

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

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

11n-20 MIMO, Antenna 0+1

Applied limit: 15.407, access point

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted power						e.i.r.p.					
			1	2	Sum	Result	Limit	Margin	1	2	Sum	Result	Limit	Margin
5745	-	-	20.89	18.62	39.51	15.97	30.00	14.03	27.73	24.72	52.45	17.20	36.00	18.80
5785	-	-	19.91	17.42	37.32	15.72	30.00	14.28	26.42	23.12	49.54	16.95	36.00	19.05
5825	-	-	19.45	15.67	35.12	15.46	30.00	14.54	25.82	20.80	46.62	16.69	36.00	19.31

		Antenna 0						Antenna 1					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	
						Cond. Power	e.i.r.p.					Cond. Power	e.i.r.p.
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]
5745	0.56	1.46	1.21	9.97	1.23	13.20	14.43	0.96	1.21	9.97	1.23	12.70	13.93
5785	0.56	1.25	1.21	9.97	1.23	12.99	14.22	0.67	1.21	9.97	1.23	12.41	13.64
5825	0.56	1.12	1.24	9.97	1.23	12.89	14.12	0.18	1.24	9.97	1.23	11.95	13.18

Sample Calculation:

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

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

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11173913S-R1
Date	April 4, 2016
Temperature / Humidity	25deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11n-20 SISO, Antenna 0, 5785 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n	0	1.25	0.30	1.55	*
	1	0.90	0.55	1.45	
	2	0.69	0.79	1.48	
	3	0.44	0.99	1.43	
	4	0.03	1.38	1.41	
	5	-0.20	1.68	1.48	
	6	-0.41	1.88	1.47	
	7	-0.50	2.03	1.53	

* 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.

11n-20 MIMO, Antenna 0+1, 5785 MHz

Mode	MCS Number	Reading (timed average)						Duty factor	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-20	8	1.25	0.67	1.33	1.17	2.50	3.99	0.56	-	-	4.55	*
	9	0.80	0.20	1.20	1.05	2.25	3.52	1.02	-	-	4.54	
	10	0.37	-0.29	1.09	0.94	2.02	3.06	1.41	-	-	4.47	
	11	0.04	-0.64	1.01	0.86	1.87	2.72	1.72	-	-	4.44	
	12	-0.69	-1.32	0.85	0.74	1.59	2.02	2.20	-	-	4.22	
	13	-1.11	-1.77	0.77	0.67	1.44	1.58	2.61	-	-	4.19	
	14	-1.23	-1.92	0.75	0.64	1.40	1.45	2.77	-	-	4.22	
	15	-1.30	-2.19	0.74	0.60	1.35	1.29	2.92	-	-	4.21	

* 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.	11173913S-R1
Date	April 4, 2016
Temperature / Humidity	25deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11n-20 SISO, Antenna 0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)	
				[dBm]	[mW]
5745	1.57	1.21	9.97	12.75	18.84
5785	1.25	1.21	9.97	12.43	17.50
5825	1.25	1.24	9.97	12.46	17.62

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.

11n-20 MIMO, Antenna 0+1

Antenna 0					Antenna 1				Antenna 0+1			
Tested Frequency [MHz]	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	1+2	
									[mW]	[mW]	[mW]	[dBm]
5745	1.46	1.21	9.97	12.64	0.96	1.21	9.97	12.14	18.37	16.37	34.73	15.41
5785	1.25	1.21	9.97	12.43	0.67	1.21	9.97	11.85	17.50	15.31	32.81	15.16
5825	1.12	1.24	9.97	12.33	0.18	1.24	9.97	11.39	17.10	13.77	30.87	14.90

Sample Calculation:

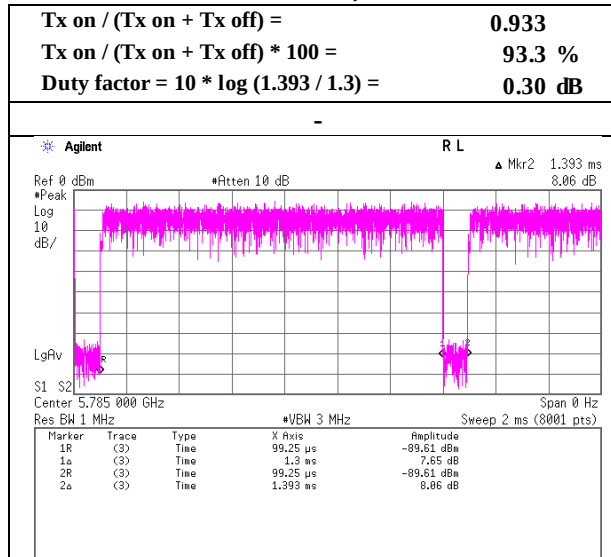
Result (Timed average) = Reading + Cable Loss + Atten. Loss

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

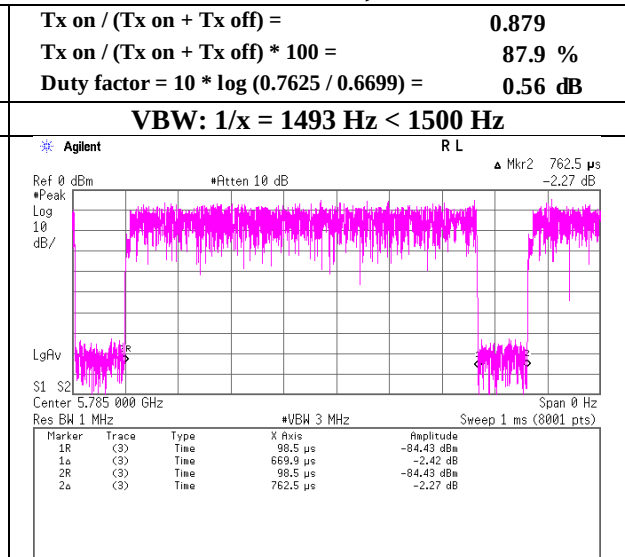
Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11173913S-R1
Date	April 4, 2016
Temperature / Humidity	25deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11n-20 SISO, MCS0



11n-20 MIMO, MCS8



Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11173913S-R1
Date : April 5, 2016
Temperature / Humidity : 25deg. C / 42 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11n-20 SISO, Antenna 0

Applied limit: 15.407, access point

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	-10.00	-17.99	2.43	9.97	1.23	6.99	-8.60	30.00	38.60	-7.37	36.00	43.37
5785	-10.00	-18.44	2.44	9.97	1.23	6.99	-9.04	30.00	39.04	-7.81	36.00	43.81
5825	-10.00	-18.86	2.48	9.97	1.23	6.99	-9.42	30.00	39.42	-8.19	36.00	44.19

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

11n-20 MIMO, Antenna 0+1

Applied limit: 15.407, access point

Tested Frequency [MHz]	PSD (Conducted)						PSD (e.i.r.p.)					
	Antenna 1 [mW/MHz]	Antenna 2 [mW/MHz]	Sum [mW/MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Antenna 1 [mW/MHz]	Antenna 2 [mW/MHz]	Sum [mW/MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]
5745	1.39	1.29	2.68	4.28	30.00	25.72	1.85	1.71	3.56	5.51	36.00	30.49
5785	1.57	1.46	3.03	4.81	30.00	25.19	2.08	1.94	4.02	6.04	36.00	29.96
5825	1.26	1.12	2.38	3.76	30.00	26.24	1.67	1.48	3.15	4.99	36.00	31.01

Tested Frequency [MHz]	Antenna 0							Antenna 1						
	Duty Factor [dB]	RBW Correction Factor [dB]	PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Result Cond. [dBm/MHz]	PSD Result e.i.r.p. [dBm/MHz]	PSD Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	PSD Result Cond. [dBm/MHz]	PSD Result e.i.r.p. [dBm/MHz]
5745	0.56	6.99	-18.51	2.43	9.97	1.23	1.44	2.67	-18.86	2.43	9.97	1.23	1.09	2.32
5785	0.56	6.99	-18.00	2.44	9.97	1.23	1.96	3.19	-18.32	2.44	9.97	1.23	1.64	2.87
5825	0.56	6.99	-19.00	2.48	9.97	1.23	1.00	2.23	-19.52	2.48	9.97	1.23	0.48	1.71

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

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

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Shonan EMC Lab.

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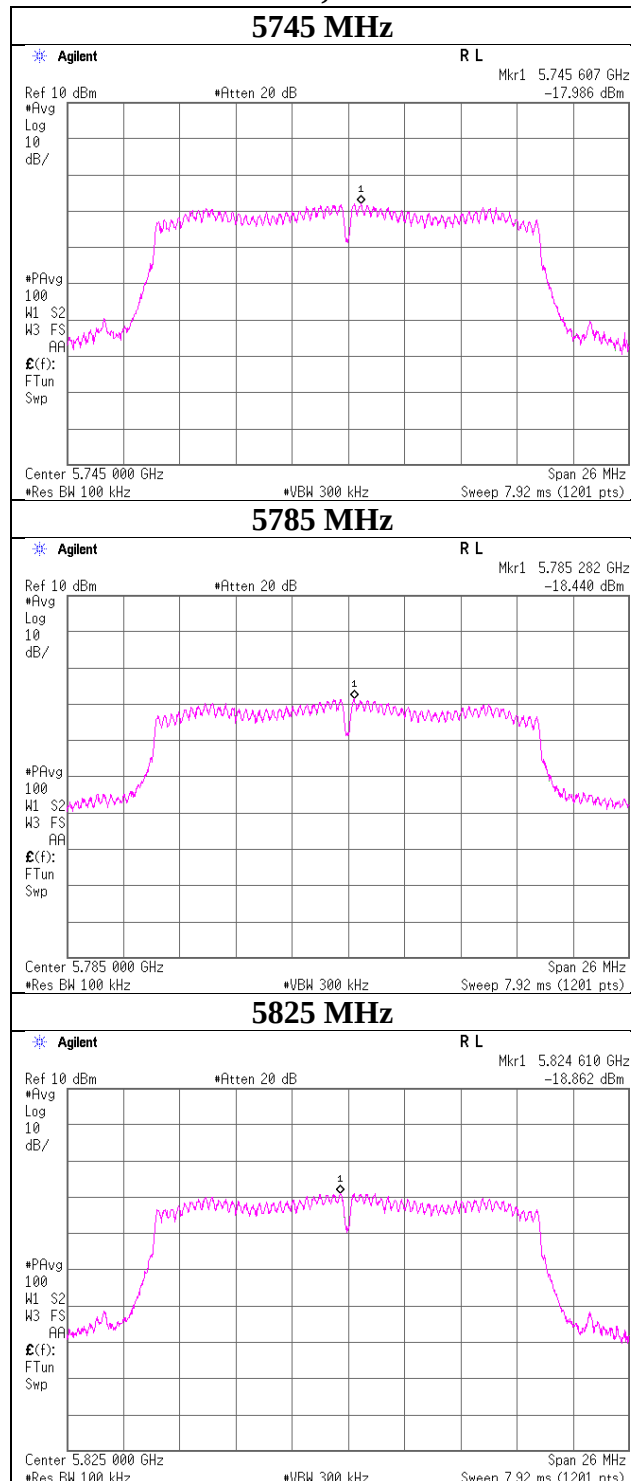
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11173913S-R1
Date : April 5, 2016
Temperature / Humidity : 25deg. C / 42 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11-20 SISO, Antenna 0



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Shonan EMC Lab.

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

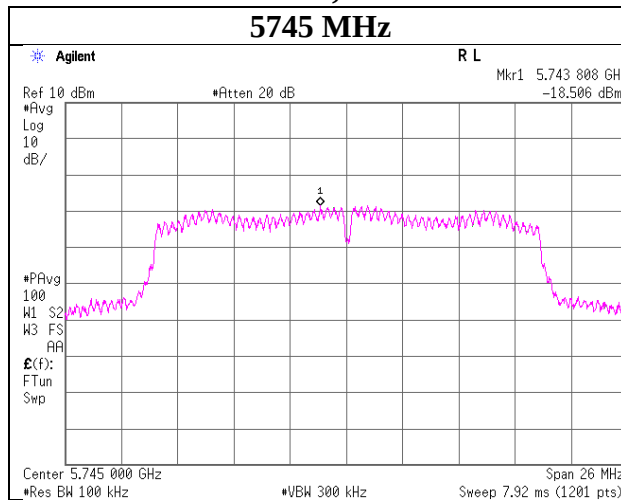
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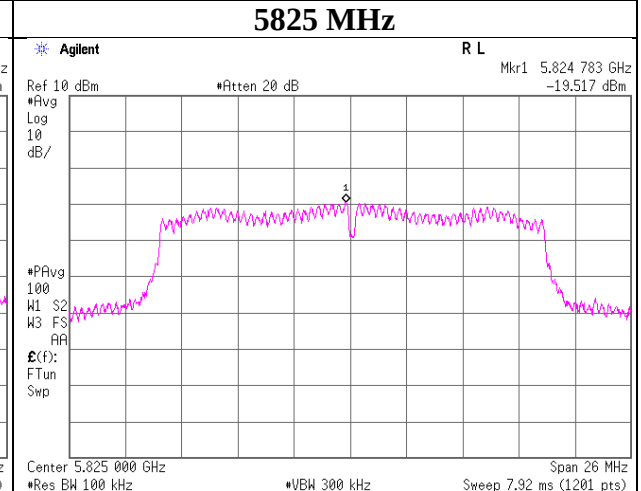
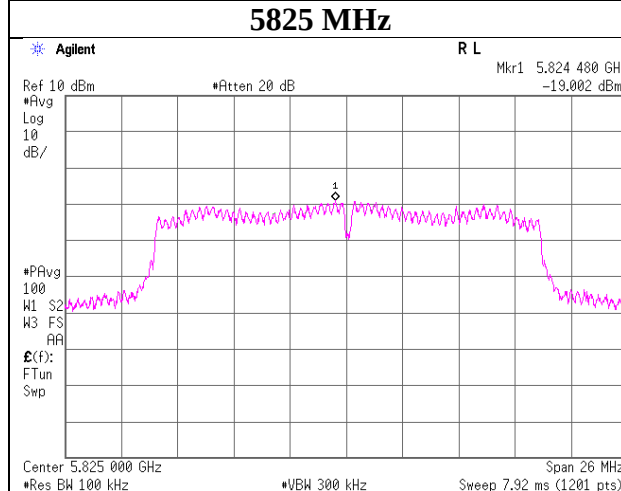
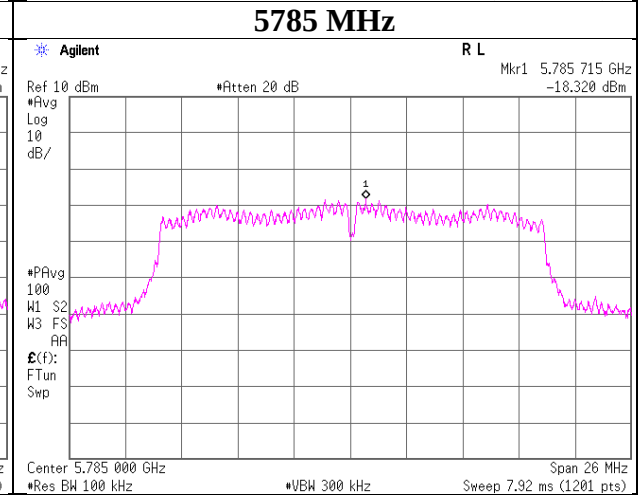
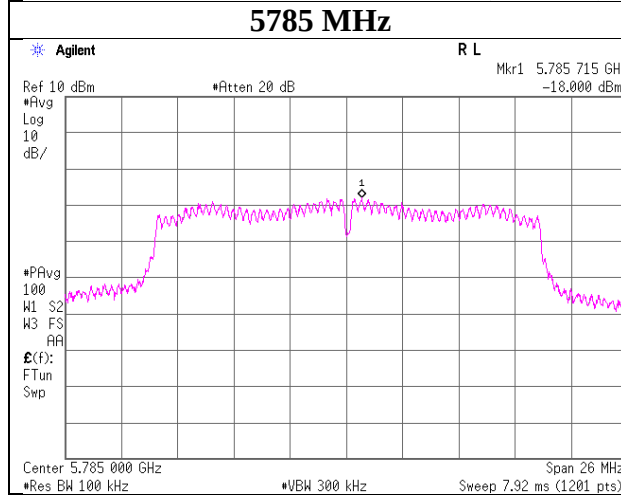
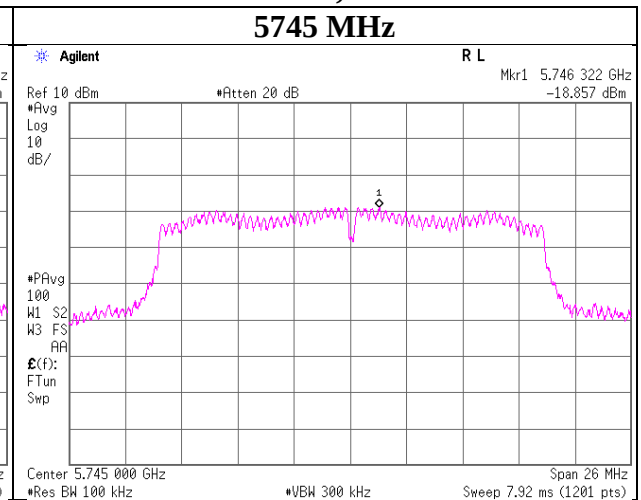
Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11173913S-R1
Date : April 5, 2016
Temperature / Humidity : 25deg. C / 42 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11-20 MIMO, Antenna 0



11-20 MIMO, Antenna 1



Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.2 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11173913S-R1			
Date	April 4, 2016	April 11, 2016	April 12, 2016	April 14, 2016
Temperature / Humidity	23 deg. C / 51 % RH	22 deg. C / 49 % RH	23 deg. C / 37 % RH	23 deg. C / 45 % RH
Engineer	Makoto Hosaka (1 GHz-13 GHz)	Takahiro Suzuki (30MHz-1000MHz)	Takahiro Suzuki (13 GHz-26.5 GHz)	Takahiro Suzuki (26.5 GHz-40 GHz)
Mode	Tx 5745 MHz Tx, IEEE802.11n HT20, MIMO, MCS8, PN9			

(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.	45.1	QP	32.3	12.6	7.2	31.9	0.0	20.2	40.0	19.8	358.0	356.0	
Hori.	104.2	QP	32.9	10.7	7.9	31.9	0.0	19.6	43.5	23.9	295.0	160.0	
Hori.	11490.0	PK	44.5	40.1	10.3	40.3	2.3	56.9	73.9	17.0	150.0	0.0	
Hori.	17235.0	PK	45.9	42.0	10.7	39.3	-9.5	49.8	73.9	24.1	151.0	29.0	
Hori.	11490.0	AV	33.9	40.1	10.3	40.3	2.3	46.3	53.9	7.6	150.0	0.0	VBW:1.5kHz
Hori.	17235.0	AV	34.2	42.0	10.7	39.3	-9.5	38.1	53.9	15.8	151.0	29.0	VBW:1.5kHz
Vert.	43.1	QP	45.4	13.3	7.1	31.9	0.0	33.9	40.0	6.1	100.0	196.0	
Vert.	44.9	QP	46.1	12.6	7.1	31.9	0.0	33.9	40.0	6.1	100.0	77.0	
Vert.	51.1	QP	43.1	10.4	7.2	31.9	0.0	28.8	40.0	11.2	100.0	160.0	
Vert.	58.6	QP	43.5	8.2	7.1	31.9	0.0	26.9	40.0	13.1	100.0	123.0	
Vert.	80.6	QP	39.8	6.3	8.1	31.9	0.0	22.3	40.0	17.7	100.0	62.0	
Vert.	96.3	QP	38.9	9.4	8.0	31.9	0.0	24.4	43.5	19.1	100.0	348.0	
Vert.	102.6	QP	37.3	10.5	8.0	31.9	0.0	23.9	43.5	19.6	100.0	356.0	
Vert.	11490.0	PK	45.9	40.1	10.3	40.3	2.3	58.3	73.9	15.6	150.0	0.0	
Vert.	17235.0	PK	46.2	42.0	10.7	39.3	-9.5	50.1	73.9	23.8	148.0	7.0	
Vert.	11490.0	AV	33.9	40.1	10.3	40.3	2.3	46.3	53.9	7.6	150.0	0.0	VBW:1.5kHz
Vert.	17235.0	AV	34.4	42.0	10.7	39.3	-9.5	38.3	53.9	15.6	148.0	7.0	VBW:1.5kHz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

(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.	5715.0	PK	52.6	32.6	17.4	40.6	2.3	64.3	-30.9	-27.0	3.9	151.0	93.0	
Hori.	5725.0	PK	63.0	32.6	17.4	40.6	2.3	74.7	-20.5	-17.0	3.5	151.0	93.0	
Vert.	5715.0	PK	49.8	32.6	17.4	40.6	2.3	61.5	-33.7	-27.0	6.7	150.0	74.0	
Vert.	5725.0	PK	59.7	32.6	17.4	40.6	2.3	71.4	-23.8	-17.0	6.8	150.0	74.0	

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 : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$
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.

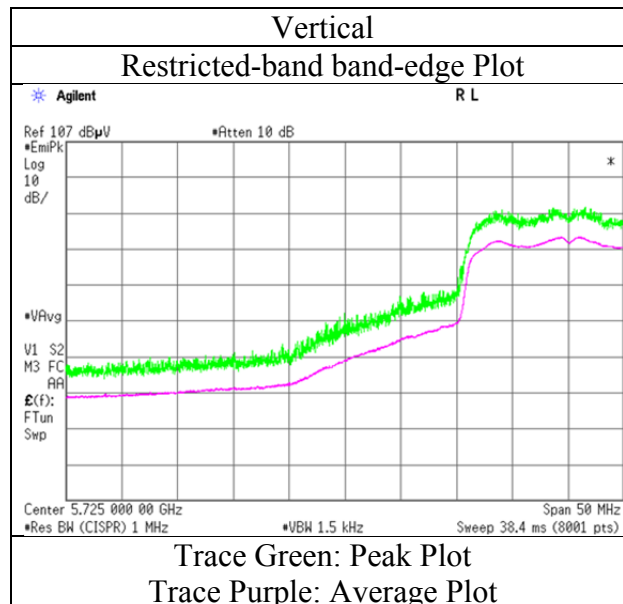
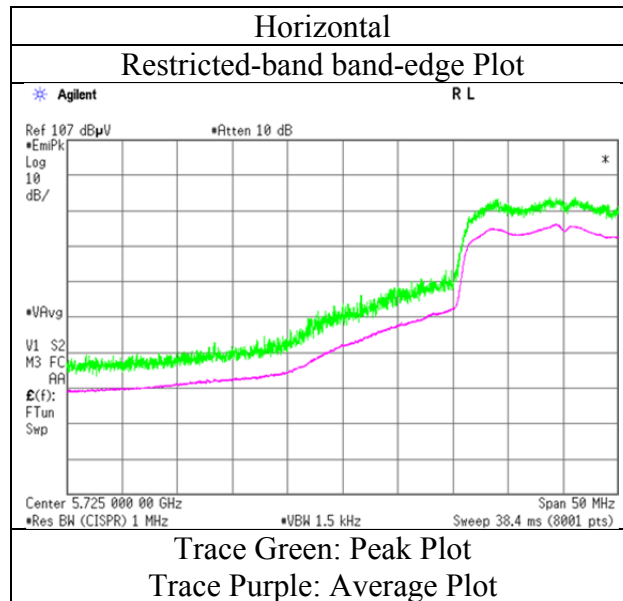
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11173913S-R1
Date	April 4, 2016
Temperature / Humidity	23 deg. C / 51 % RH
Engineer	Makoto Hosaka (1 GHz-13 GHz)
Mode	Tx 5745 MHz Tx, IEEE802.11n HT20, MIMO, MCS8, PN9



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11173913S-R1		
Date	April 4, 2016	April 12, 2016	April 14, 2016
Temperature / Humidity	23 deg. C / 51 % RH	23 deg. C / 37 % RH	23 deg. C / 45 % RH
Engineer	Makoto Hosaka (1 GHz-13 GHz)	Takahiro Suzuki (13 GHz-26.5 GHz)	Takahiro Suzuki (26.5 GHz-40 GHz)
Mode	Tx 5785 MHz Tx, IEEE802.11n HT20, MIMO, MCS8, PN9		

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	11570.0	PK	46.1	40.0	10.3	40.3	2.3	58.4	73.9	15.5	150.0	0.0	
Hori.	17355.0	PK	47.2	42.4	10.7	39.2	-9.5	51.6	73.9	22.3	149.0	86.0	
Hori.	11570.0	AV	34.4	40.0	10.3	40.3	2.3	46.7	53.9	7.2	150.0	0.0	VBW:1.5kHz
Hori.	17355.0	AV	33.9	42.4	10.7	39.2	-9.5	38.3	53.9	15.6	149.0	86.0	VBW:1.5kHz
Vert.	11570.0	PK	46.8	40.0	10.3	40.3	2.3	59.1	73.9	14.8	150.0	0.0	
Vert.	17355.0	PK	47.4	42.4	10.7	39.2	-9.5	51.8	73.9	22.1	143.0	18.0	
Vert.	11570.0	AV	34.4	40.0	10.3	40.3	2.3	46.7	53.9	7.2	150.0	0.0	VBW:1.5kHz
Vert.	17355.0	AV	34.1	42.4	10.7	39.2	-9.5	38.5	53.9	15.4	143.0	18.0	VBW:1.5kHz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

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

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Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11173913S-R1		
Date	April 4, 2016	April 12, 2016	April 14, 2016
Temperature / Humidity	23 deg. C / 51 % RH	23 deg. C / 37 % RH	23 deg. C / 45 % RH
Engineer	Makoto Hosaka (1 GHz-13 GHz)	Takahiro Suzuki (13 GHz-26.5 GHz)	Takahiro Suzuki (26.5 GHz-40 GHz)
Mode	Tx 5825 MHz Tx, IEEE802.11n HT20, MIMO, MCS8, PN9		

(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.	11650.0	PK	45.9	39.9	10.4	40.2	2.3	58.3	73.9	15.6	150.0	0.0	
Hori.	17475.0	PK	46.6	42.8	10.7	39.1	-9.5	51.5	73.9	22.4	142.0	114.0	
Hori.	11650.0	AV	34.6	39.9	10.4	40.2	2.3	47.0	53.9	6.9	150.0	0.0	VBW:1.5kHz
Hori.	17475.0	AV	33.5	42.8	10.7	39.1	-9.5	38.4	53.9	15.5	142.0	114.0	VBW:1.5kHz
Vert.	11650.0	PK	45.3	39.9	10.4	40.2	2.3	57.7	73.9	16.2	150.0	0.0	
Vert.	17475.0	PK	47.9	42.8	10.7	39.1	-9.5	52.8	73.9	21.1	154.0	53.0	
Vert.	11650.0	AV	34.4	39.9	10.4	40.2	2.3	46.8	53.9	7.1	150.0	0.0	VBW:1.5kHz
Vert.	17475.0	AV	33.6	42.8	10.7	39.1	-9.5	38.5	53.9	15.4	154.0	53.0	VBW:1.5kHz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

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

(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	52.3	32.8	17.5	40.6	2.3	64.3	-30.9	-17.0	13.9	158.0	132.0	
Hori.	5860.0	PK	49.8	32.8	17.5	40.6	2.3	61.8	-33.4	-27.0	6.4	158.0	132.0	
Vert.	5850.0	PK	50.5	32.8	17.5	40.6	2.3	62.5	-32.7	-17.0	15.7	153.0	83.0	
Vert.	5860.0	PK	49.1	32.8	17.5	40.6	2.3	61.1	-34.1	-27.0	7.1	153.0	83.0	

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

Result(EIRP[dBm])= $10\cdot\text{LOG} \{ (\{ 10^{\frac{1}{10}} \cdot (\text{Electric Field Strength [dBuV/m]} / 20) \cdot 10^{-6} \} \cdot \text{Distance}[m])^2 / 30 \} \cdot 10^3$

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

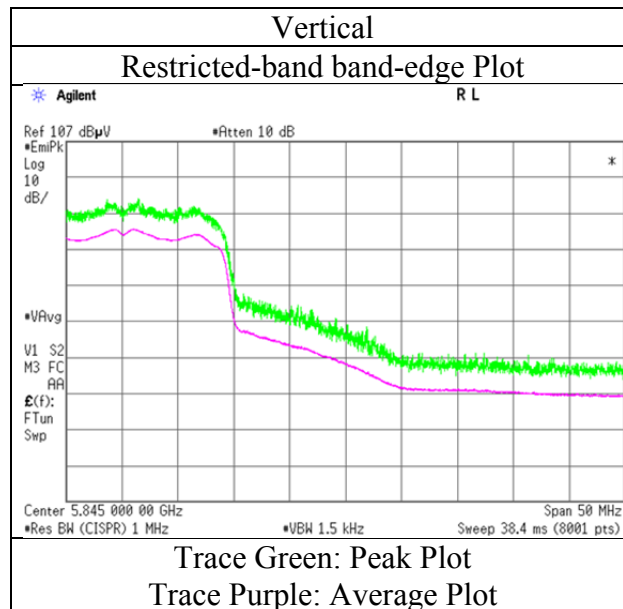
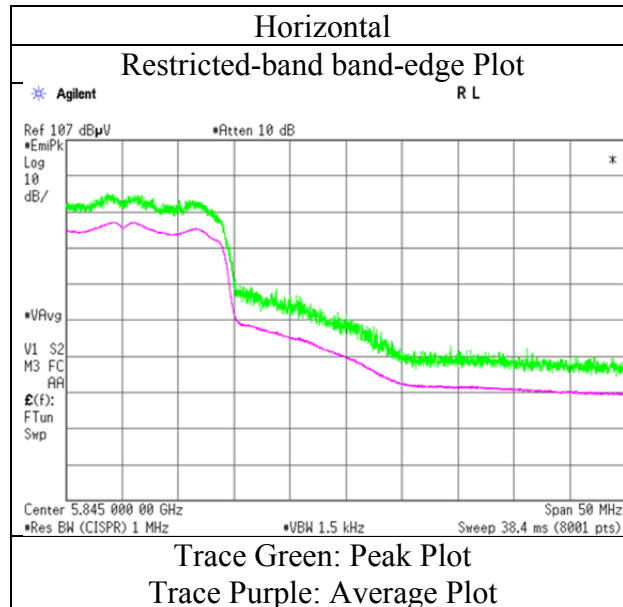
*The 4th harmonic was not seen so the result was its base noise level.

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

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

Radiated Spurious Emission

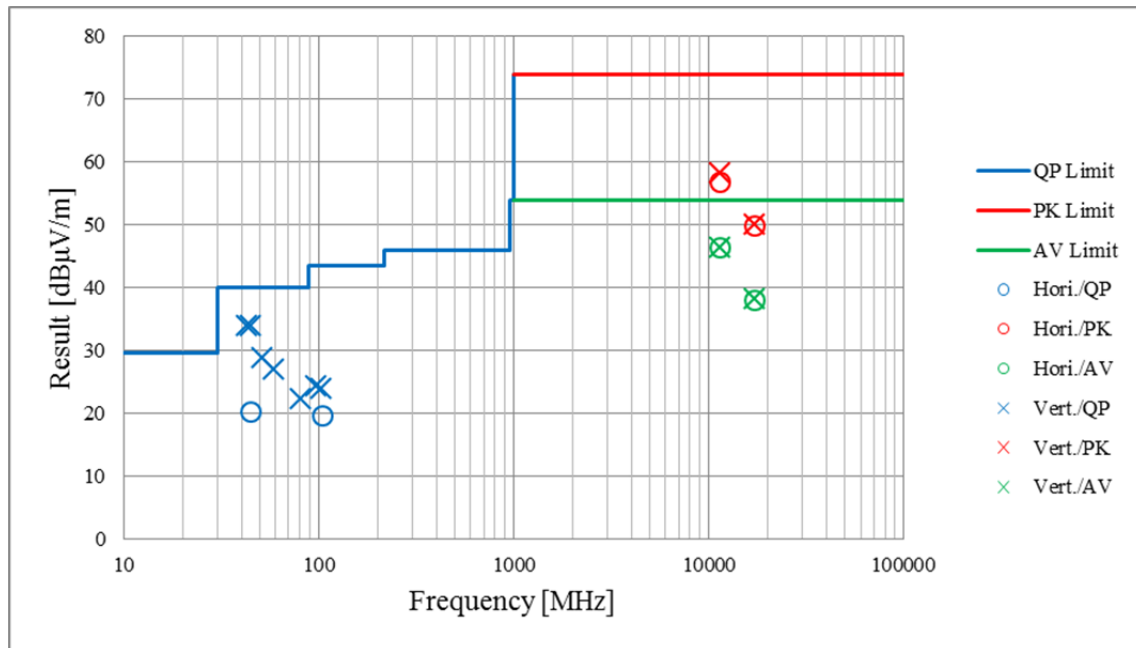
Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11173913S-R1
Date : April 4, 2016
Temperature / Humidity : 23 deg. C / 51 % RH
Engineer : Makoto Hosaka
Mode : Tx 5825 MHz
Tx, IEEE802.11n HT20, MIMO, MCS8, PN9



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

Radiated Spurious Emission (Plot data, Worst case)

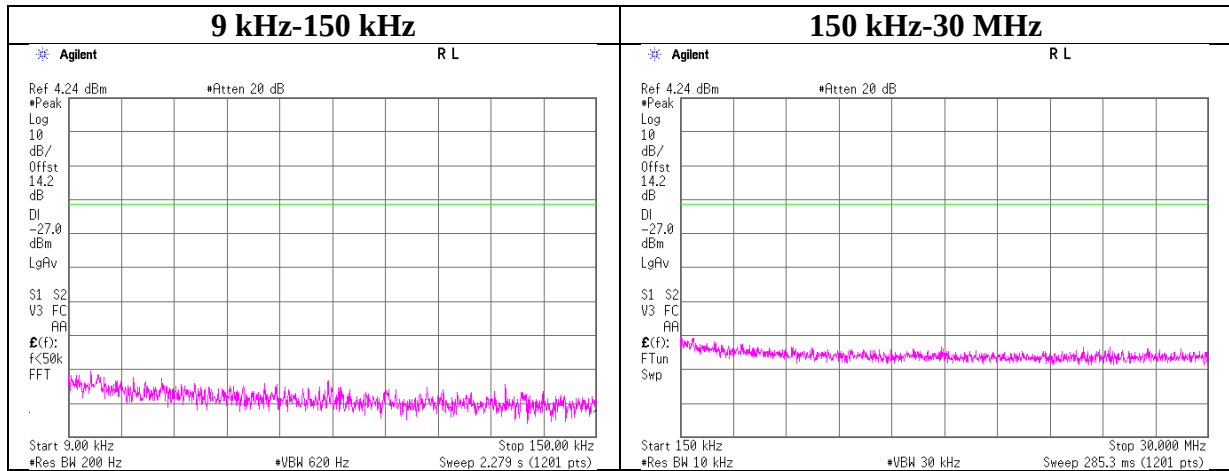
Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.2 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11173913S-R1			
Date	April 4, 2016	April 11, 2016	April 12, 2016	April 14, 2016
Temperature / Humidity	23 deg. C / 51 % RH	22 deg. C / 49 % RH	23 deg. C / 37 % RH	23 deg. C / 45 % RH
Engineer	Makoto Hosaka (1 GHz-13 GHz)	Takahiro Suzuki (30MHz-1000MHz)	Takahiro Suzuki (13 GHz-26.5 GHz)	Takahiro Suzuki (26.5 GHz-40 GHz)
Mode	Tx, IEEE802.11n HT20, MIMO, MCS8, PN9			



*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. : 11173913S-R1
Date : April 5, 2016
Temperature / Humidity : 25deg. C / 42 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11n-20 MIMO 5745 MHz



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2016/03/23 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2015/11/04 * 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
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2016/03/22 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2015/04/17 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2015/05/19 * 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
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/03/28 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-01(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-01(SVS WR)	1	RE	2015/07/08 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE ,CE,RFL,MF)	-	RE,CE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2015/11/18 * 12
KFL-15	Highpass Filter	MICRO-TRONICS	HPM50112	007	RE	2015/11/04 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	RE	2015/04/09 * 12
SAJ-01	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S001	RE	Pre Check
SHA-06	Horn Antenna	ETS LINDGREN	3160-10	LM3459	RE	2016/03/24 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SAF-10	Pre Amplifier	TOYO Corporation	HAP26-40W	00000010	RE	2016/03/23 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2015/07/13 * 12
SCC-C9/C10/SR SE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141P E/NS4906	-/0901-271(R F Selector)	CE	2015/04/17 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2016/02/08 * 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
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	CE	2016/03/28 * 12
SJM-15	Measure	ASKUL	-	-	CE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	CE	2015/11/18 * 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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Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2016/02/19 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2016/02/25 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2015/08/31 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2015/11/02 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA /141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2015/04/17 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA /141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2015/04/17 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2015/11/03 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2015/10/22 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2015/09/11 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2015/07/15 * 12
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2016/03/22 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2016/03/24 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2016/03/23 * 12
SCC-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-0 03	RE	2015/04/30 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2015/09/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2015/07/16 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2015/05/27 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-0 18	RE	2015/06/08 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2015/05/19 * 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
SJM-15	Measure	ASKUL	-	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2015/11/18 * 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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