RADIO TEST REPORT

Test Report No. : 11284471S-D-R1

Applicant	:	**Alpine Electronics, Inc.**
Type of Equipment	:	**Display and audio unit**
Model No.	:	**iLX-107**
FCC ID	:	**A269ZUA148**
Test regulation	:	**FCC Part 15 Subpart E: 2016**
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 11284471S-D. 11284471S-D is replaced with this report.

Date of test: July 21 to September 6, 2016

Representative test engineer:
Yosuke Ishikawa
Engineer
Consumer Technology Division

Approved by:
Akio Hayashi
Leader
Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

RTL02610

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

REVISION HISTORY

Original Test Report No.: 11284471S-D

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11284471S-D	January 30, 2017	-	-
1	11284471S-D-R1	January 31, 2017	5,8,11	Correction about FCC Part 15.203(P5), Addition of the explanation about power settings(P8), Correction of the limits(P11)

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	Alpine Electronics, Inc.
Address	:	20-1 Yoshima-Kogyodanchi, Iwaki-shi, Fukushima, 970-1192 Japan
Telephone Number	:	+81-246-36-4111
Facsimile Number	:	+81-246-36-6492
Contact Person	:	Mitsuru Yoshida

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

2.1 Identification of E.U.T.

Type of Equipment	:	Display and audio unit
Model No.	:	iLX-107
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	July 21, 2016
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: iLX-107 (referred to as the EUT in this report) is a Display and audio unit.

General Specification

Clock frequency(ies) in the system	:	37.4 MHz (RF Module)

Radio Specification

Wireless LAN 5 GHz band

Radio Type	:	Transceiver
Frequency of Operation	:	W52 (5180 MHz or 5190 MHz only)
Modulation	:	DSSS
Power Supply (radio part input)	:	DC 3.3 V / 1.8 V
Antenna type	:	Chip
Antenna Gain (without cable loss)	:	3.3 dBi
Antenna Cable	:	0.22 dB

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart E FCC Part 15 final revised on November 14, 2016 and effective December 14, 2016
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

* The revision on November 14, 2016, does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (b) (6) / 15.207	-	-	N/A *1)
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
Maximum Conducted Output Power	**FCC:** KDB Publication Number 789033	**FCC:** 15.407 (a) (1) (2) (3)	See data	Complied	Conducted
	IC: -	**IC:** RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)			
Maximum Power Spectral Density	**FCC:** KDB Publication Number 789033	**FCC :** 15.407 (a) (1) (2) (3)		Complied	Conducted
	IC: -	**IC:** RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)			
Spurious Emission Restricted Band Edge	**FCC:** ANSI C63.10-2013 KDB Publication Number 789033	**FCC:** 15.407 (b), 15.205 and 15.209	2.0 dB 5150.000 MHz, AV, Horizontal. Tx 5190 MHz, 11n HT40	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *2)
	IC: -	**IC:** RSS-247 6.2.1 (2) 6.2.2 (2) 6.2.3 (2) 6.2.4 (2)			
6 dB Emission Bandwidth	**FCC:** ANSI C63.10-2013	**FCC:** 15.407 (e)	See data	-	N/A *3)
	IC: -	**IC:** RSS-247 6.2.4 (1)			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT has no AC mains.
*2) Radiated test was selected over 30 MHz based on section FCC 15.407 (b) and KDB 789033 D02 G.3.b).
* DFS test is not applicable since the EUT does not operate in the 5.25 GHz -5.35 GHz and 5.47 GHz -5.725 GHz bands.
*3) The test is not applicable since the EUT operates in W52 only.

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

FCC Part 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC 3.3 V/ 1.8 V). Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the product. Therefore, the EUT complies with the requirement.

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 %

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	10m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
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.

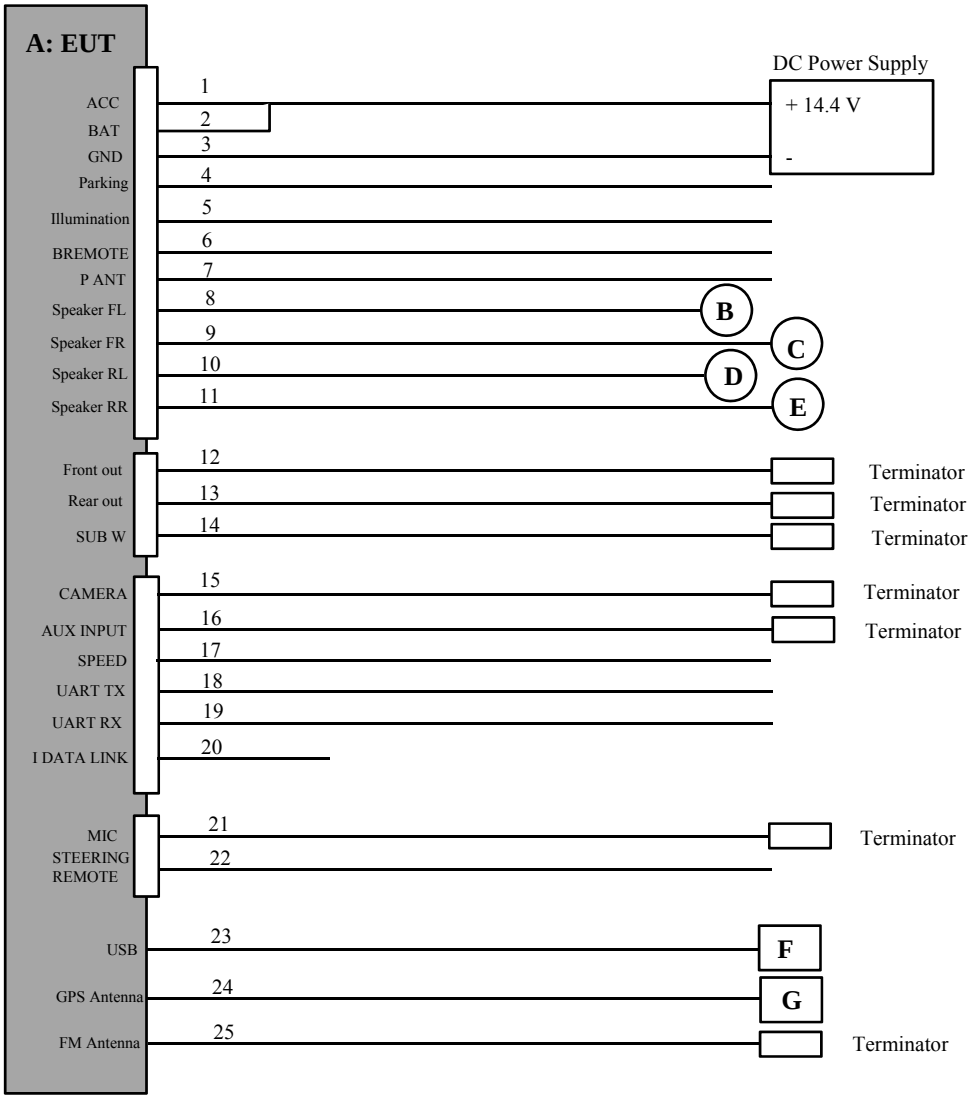
SECTION 4: Operation of E.U.T. during testing

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 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Frequency	Remarks*
IEEE 802.11a (11a)	5180 MHz	9 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	5180 MHz	MCS0, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	5180 MHz	MCS1, PN9
IEEE 802.11n 40 MHz BW (11n-40)	5190 MHz	MCS0, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	5190 MHz	MCS0, PN9
*Transmitting duty was 100 % on all tests. *The worst condition was determined based on the test result of Maximum Conducted Output Power.		
*Power of the EUT was set by the software as follows; Power settings: 13 dBm (MCS8 and 9 of 11ac is 9 dBm) *1) Software: DutApi_w8887_BridgeEth.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. *1) Power setting value in software is 13dBm but specification value is 9dBm in this EUT.		

4.2 Configuration and peripherals



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

* The testing was performed with DC 14.4 V. As the stable voltage (DC 3.3 V/ 1.8 V) is provided to RF module, it does not influence on the test result.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Display and audio unit	iLX-107	39 *1) B60610006A*2)	Alpine Electronics, Inc.	EUT
B	Speaker	KFC-RS160	-	KENWOOD	-
C	Speaker	KFC-RS160	-	KENWOOD	-
D	Speaker	KFC-RS160	-	KENWOOD	-
E	Speaker	KFC-RS160	-	KENWOOD	-
F	USB Memory	USM4GU	-	Sony	-
G	GPS Antenna	-	-	Alpine Electronics, Inc.	-

*1) Used for Antenna Terminal conducted test
*2) Used for Radiated Emission test

List of cables used

No.	Cable Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	ACC	1.6	Unshielded	Unshielded	-
2	BAT	0.3	Unshielded	Unshielded	-
3	GND	1.6	Unshielded	Unshielded	-
4	Parking	2.0	Unshielded	Unshielded	-
5	Illumination	2.0	Unshielded	Unshielded	-
6	REMOTE	1.7	Unshielded	Unshielded	-
7	P ANT	1.7	Unshielded	Unshielded	-
8	Speaker FL	2.2	Unshielded	Unshielded	-
9	Speaker FR	2.2	Unshielded	Unshielded	-
10	Speaker RL	2.2	Unshielded	Unshielded	-
11	Speaker RR	2.2	Unshielded	Unshielded	-
12	Front out	1.7	Shielded	Shielded	-
13	Rear out	1.8	Shielded	Shielded	-
14	SUB W	1.6	Shielded	Shielded	-
15	CAMERA	2.1	Shielded	Shielded	-
16	AUX In	3.1	Shielded	Shielded	-
17	SPEED	1.6	Unshielded	Unshielded	-
18	UART TX	2.0	Unshielded	Unshielded	-
19	UART RX	2.0	Unshielded	Unshielded	-
20	I DATA LINK	0.15	Unshielded	Unshielded	-
21	MIC	3.2	Shielded	Shielded	-
22	STEERING REMOTE	3.1	Unshielded	Unshielded	-
23	USB	1.5	Shielded	Shielded	-
24	GPS Antenna	2.47	Shielded	Shielded	-
25	FM Antenna	2.1	Shielded	Shielded	-

SECTION 5: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1 GHz >
EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
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.*) in the Section 15.407 (b) (1) (2) (3).
Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.*) or
78.2 dBuV/m, 3 m (-17 dBm e.i.r.p.*) in the Section 15.407 (b).

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:

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

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: 10 Hz Detector: Video Averaging (CISPR Peak)
Test Distance	3 m	3 m (below 1 GHz), 3 m*2) (1 GHz – 13 GHz), 1 m*3) (13GHz – 40 GHz)	

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r03 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on August 22, 2016)".
*2) Distance Factor: 20 x log (3.87 m/3.0 m) = 2.21 dB
*3) Distance Factor: 20 x log (1.0 m/3.0 m) = -9.54 dB

The carrier level and noise levels were confirmed at an angle of 0 deg. to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Below 1 GHz	1 GHz -13 GHz	13 GHz -18 GHz	18 GHz -40 GHz
Horizontal	0 deg.	0 deg.	0 deg.	30 deg.
Vertical	0 deg.	30 deg.	0 deg.	30 deg.

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

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

SECTION 6: 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: 160 MHz BW) (Method PM)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 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 v01r03 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on August 22, 2016)".

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

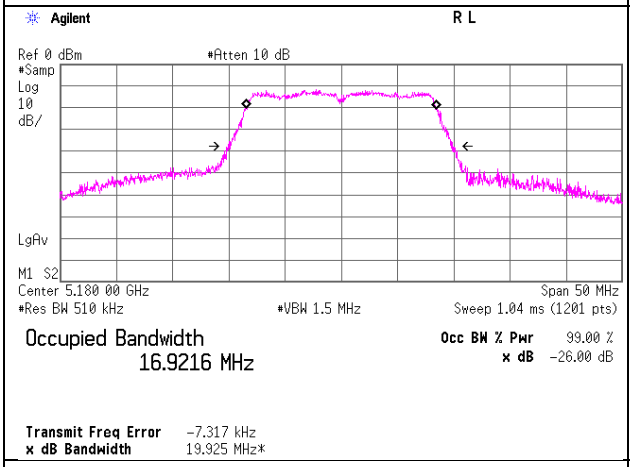
99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
Mode	Tx	

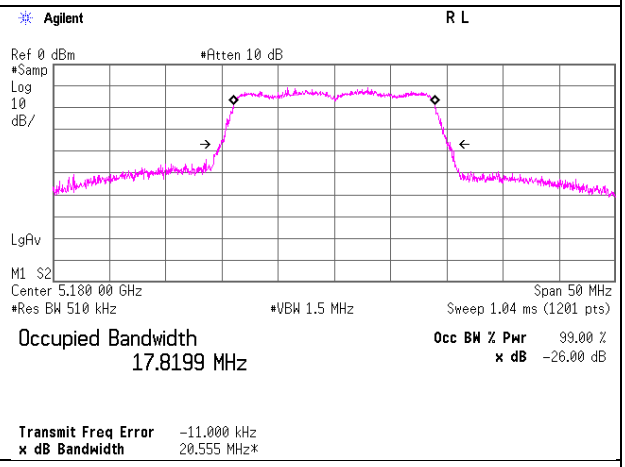
Mode	Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
11a	5180	16.922	-
11n-20	5180	17.820	-
11ac-20	5180	17.794	-
11n-40	5190	36.225	-
11ac-40	5190	36.237	-

99 % Occupied Bandwidth

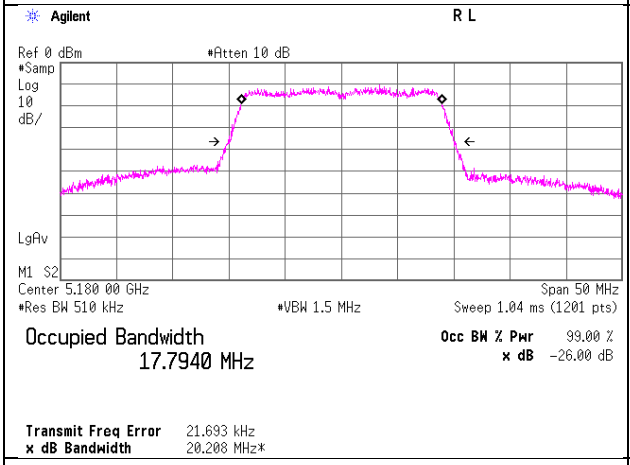
11a 5180 MHz



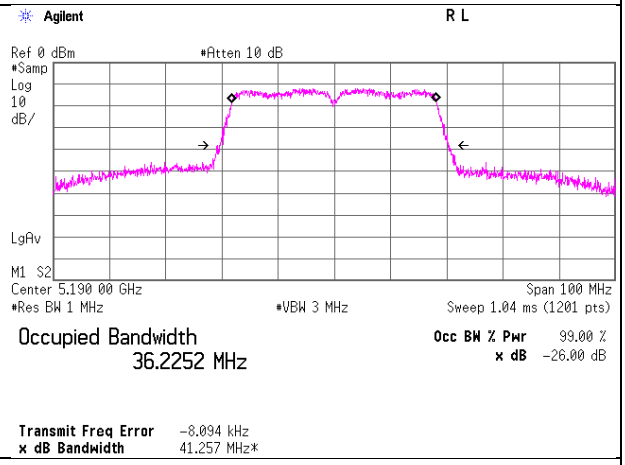
11n-20 5180 MHz



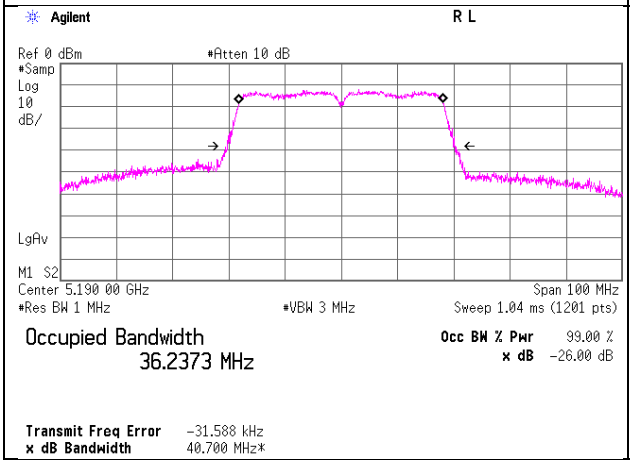
11ac-20 5180 MHz



11n-40 5190 MHz



11ac-40 5190 MHz



Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5180	-4.54	2.48	10.12	0.00	3.08	-	16.922	8.06	6.40	23.97	15.91	11.14	13.00	29.97	18.83

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5180	-4.47	2.57	10.13	0.00	3.08	-	17.820	8.23	6.65	23.97	15.74	11.31	13.52	29.97	18.66

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power				e.i.r.p.			
								Result		Limit	Margin	Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5180	-4.32	2.57	10.13	0.00	3.08	-	17.794	8.38	6.89	23.97	15.59	11.46	14.00	29.97	18.51

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5190	-5.46	2.57	10.13	0.00	3.08	-	36.255	7.24	5.30	23.97	16.73	10.32	10.76	29.97	19.65

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power Result		Limit	Margin	e.i.r.p. Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5190	-5.41	2.57	10.13	0.00	3.08	-	36.337	7.29	5.36	23.97	16.68	10.37	10.89	29.97	19.60

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

5180 MHz

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	-4.57	0.00	-4.57	
	9	-4.54	0.00	-4.54	*
	12	-4.55	0.00	-4.55	
	18	-4.55	0.00	-4.55	
	24	-4.64	0.00	-4.64	
	36	-4.55	0.00	-4.55	
	48	-4.55	0.00	-4.55	
	54	-4.56	0.00	-4.56	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

5180 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-4.47	0.00	-4.47	*
	1	-4.52	0.00	-4.52	
	2	-4.58	0.00	-4.58	
	3	-4.50	0.00	-4.50	
	4	-4.48	0.00	-4.48	
	5	-4.51	0.00	-4.51	
	6	-4.50	0.00	-4.50	
	7	-4.51	0.00	-4.51	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + 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.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

5180 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-20	0	-4.34	0.00	-4.34	
	1	-4.32	0.00	-4.32	*
	2	-4.34	0.00	-4.34	
	3	-4.34	0.00	-4.34	
	4	-4.33	0.00	-4.33	
	5	-4.34	0.00	-4.34	
	6	-4.35	0.00	-4.35	
	7	-4.35	0.00	-4.35	
	8	-8.28	0.00	-8.28	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

5190 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-40	0	-5.46	0.00	-5.46	*
	1	-5.48	0.00	-5.48	
	2	-5.48	0.00	-5.48	
	3	-5.50	0.00	-5.50	
	4	-5.49	0.00	-5.49	
	5	-5.50	0.00	-5.50	
	6	-5.51	0.00	-5.51	
	7	-5.51	0.00	-5.51	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + 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.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

5190 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-40	0	-5.41	0.00	-5.41	*
	1	-5.42	0.00	-5.42	
	2	-5.44	0.00	-5.44	
	3	-5.45	0.00	-5.45	
	4	-5.47	0.00	-5.47	
	5	-5.45	0.00	-5.45	
	6	-5.43	0.00	-5.43	
	7	-5.42	0.00	-5.42	
	8	-9.02	0.00	-9.02	
	9	-9.09	0.00	-9.09	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + 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.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11a

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	[mW]
5180	-4.54	2.48	10.12	8.06	6.40

Sample Calculation:
Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

11n-20

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	[mW]
5180	-4.47	2.57	10.13	8.23	6.65

Sample Calculation:
Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

11ac-20

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average) [dBm]	[mW]
5180	-4.32	2.57	10.13	8.38	6.89

Sample Calculation:
Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 5, 2016
Temperature / Humidity	25 deg. C / 43 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11n-40

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Result (Timed average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
5190	-5.46	2.57	10.13	7.24	5.30

Sample Calculation:
Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

11ac-40

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Result (Timed average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
5190	-5.41	2.57	10.13	7.29	5.36

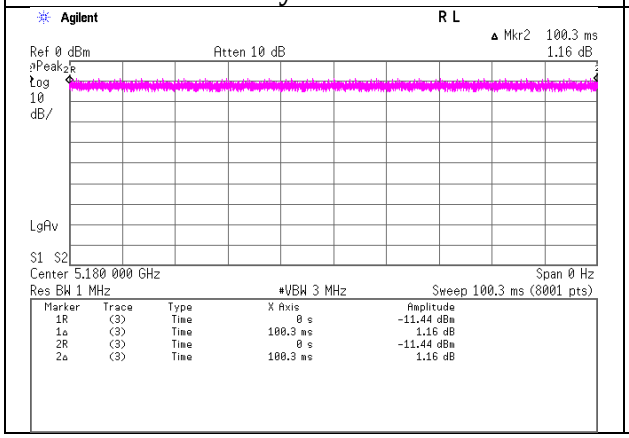
Sample Calculation:
Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst rate confirmation

Test place	Shonan EMC Lab. No.3 Shielded Room
Report No.	11284471S-D-R1
Date	July 21, 2016
Temperature / Humidity	25deg. C / 53 % RH
Engineer	Hikaru Shirasawa
Mode	Tx

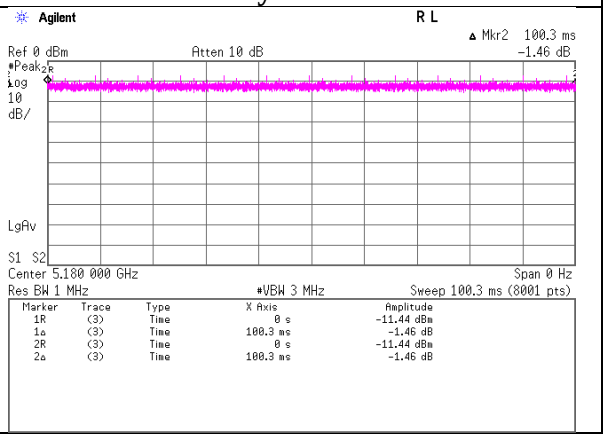
11a 9Mbps

Duty > 98 %



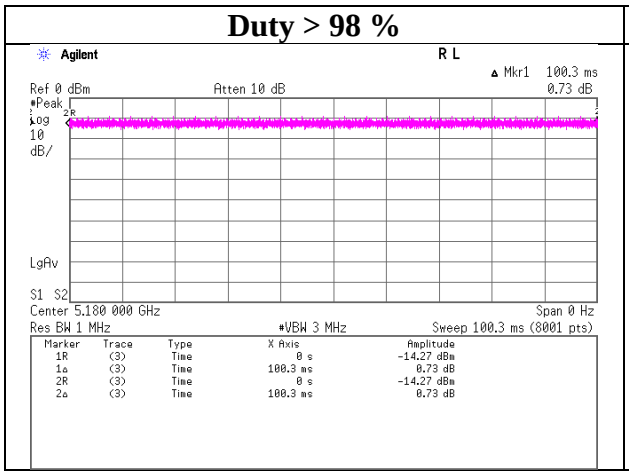
11n-20 MCS0

Duty > 98 %



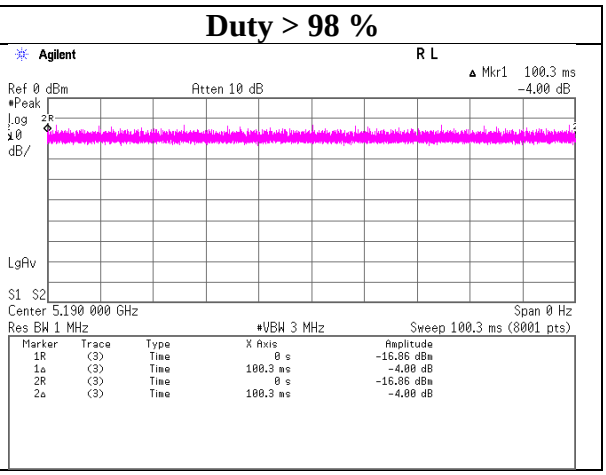
11ac-20 MCS1

Duty > 98 %



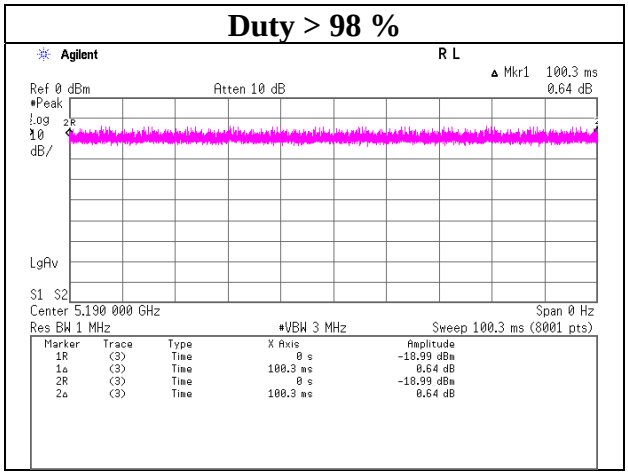
11n-40 MCS0

Duty > 98 %



11ac-40 MCS0

Duty > 98 %



Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
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) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5180	-15.57	2.48	10.12	0.00	3.08	0.00	-2.97	11.00	13.97	0.11	17.00	16.89

Sample Calculation:

PSD: Power Spectral Density

RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

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

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
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) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5180	-15.41	2.57	10.13	0.00	3.08	0.00	-2.71	11.00	13.71	0.37	17.00	16.63

Sample Calculation:

PSD: Power Spectral Density

RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

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

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
Mode	Tx 11ac-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) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5180	-15.68	2.57	10.13	0.00	3.08	0.00	-2.98	11.00	13.98	0.10	17.00	16.90

Sample Calculation:

PSD: Power Spectral Density

RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

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

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
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) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5190	-19.06	2.57	10.13	0.00	3.08	0.00	-6.36	11.00	17.36	-3.28	17.00	20.28

Sample Calculation:

PSD: Power Spectral Density

RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

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

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
Mode	Tx 11ac-40	

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted) Result [dBm /MHz]	PSD (Conducted) Limit [dBm /MHz]	PSD (Conducted) Margin [dB]	PSD (e.i.r.p.) Result [dBm /MHz]	PSD (e.i.r.p.) Limit [dBm /MHz]	PSD (e.i.r.p.) Margin [dB]
5190	-19.09	2.57	10.13	0.00	3.08	0.00	-6.39	11.00	17.39	-3.31	17.00	20.31

Sample Calculation:

PSD: Power Spectral Density

RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

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

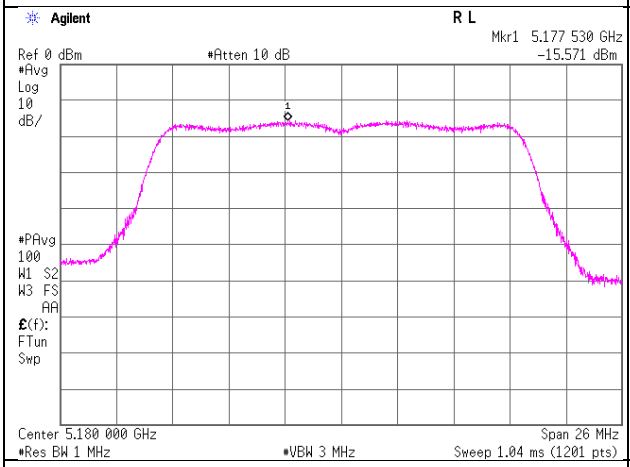
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

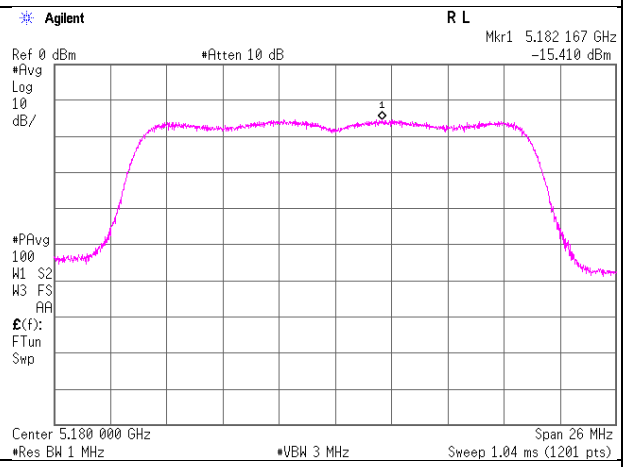
Maximum Power Spectral Density

Test place	Shonan EMC Lab. No.6 Shielded Room	
Report No.	11284471S-D-R1	
Date	September 5, 2016	September 6, 2016
Temperature / Humidity	25 deg. C / 43 % RH	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa
Mode	Tx	

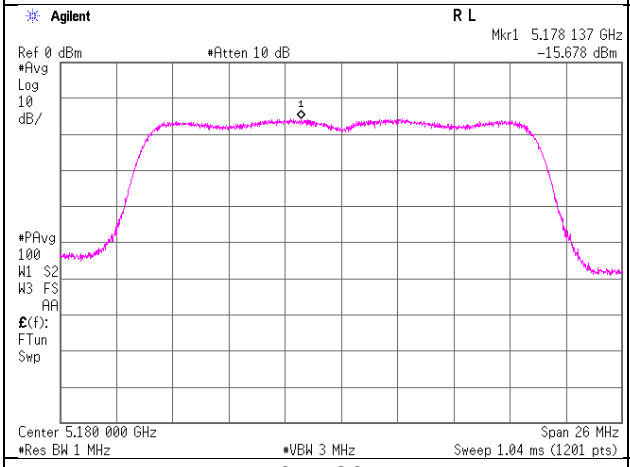
11a 5180 MHz



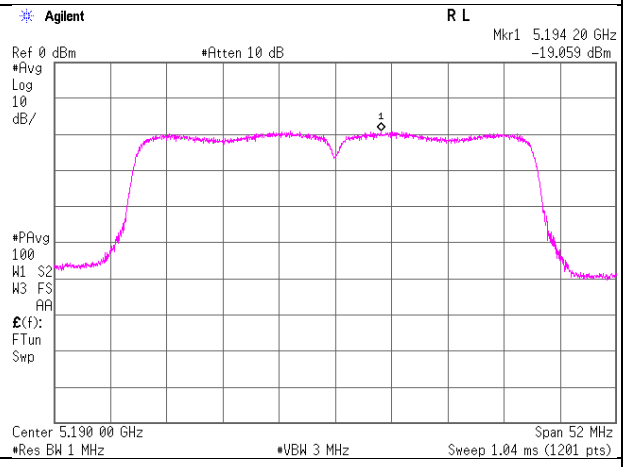
11n-20 5180 MHz



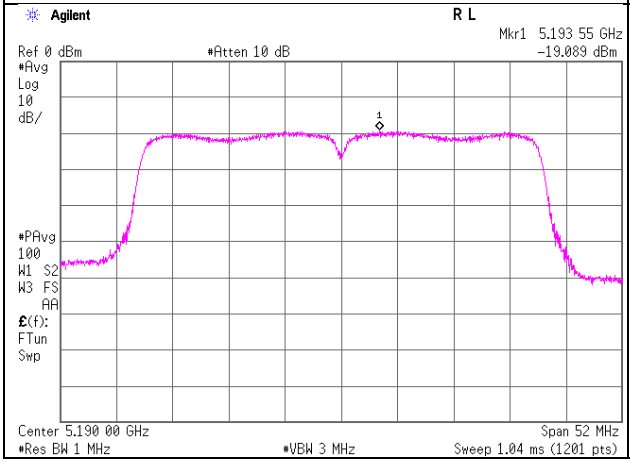
11ac-20 5180 MHz



11n-40 5190 MHz



11ac-40 5190 MHz



Radiated Spurious Emission

Test Place(AC No)	3	3	3
Date	July 30 .2016	August 3, 2016	August 5, 2016
Temperature / Humidity	24 deg. C / 54 % RH	25 deg. C / 53 % RH	25 deg. C / 48 % RH
Engineer	Kazutaka Takeyama	Hiroyuki Morikawa	Makoto Hosaka
Mode	Tx, IEEE802.11n HT20, 5180 MHz		

(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.	2798.437	PK	44.37	28.08	14.15	36.92	2.21	51.89	73.90	22.0	147	145	
Hori.	5150.000	PK	47.17	32.17	15.66	37.26	2.21	59.95	73.90	13.9	319	48	
Hori.	15540.000	PK	43.55	39.93	10.64	38.70	-9.54	45.88	73.90	28.0	150	0	
Hori.	20720.000	PK	53.19	40.12	13.89	46.74	-9.54	50.92	73.90	22.9	149	175	
Hori.	2798.437	AV	34.99	28.08	14.15	36.92	2.21	42.51	53.90	11.3	147	145	VBW:10Hz
Hori.	5150.000	AV	33.46	32.17	15.66	37.26	2.21	46.24	53.90	7.6	319	48	VBW:10Hz
Hori.	15540.000	AV	32.00	39.93	10.64	38.70	-9.54	34.33	53.90	19.5	150	0	VBW:10Hz
Hori.	20720.000	AV	51.29	40.12	13.89	46.74	-9.54	49.02	53.90	4.8	149	175	VBW:10Hz
Vert.	2798.488	PK	46.26	28.08	14.15	36.92	2.21	53.78	73.90	20.1	157	162	
Vert.	5150.000	PK	48.40	32.17	15.66	37.26	2.21	61.18	73.90	12.7	142	167	
Vert.	15540.000	PK	43.89	39.93	10.64	38.70	-9.54	46.22	73.90	27.6	150	0	
Vert.	20720.000	PK	54.13	40.12	13.89	46.74	-9.54	51.86	73.90	22.0	153	174	
Vert.	2798.488	AV	39.85	28.08	14.15	36.92	2.21	47.37	53.90	6.5	157	162	VBW:10Hz
Vert.	5150.000	AV	34.13	32.17	15.66	37.26	2.21	46.91	53.90	6.9	142	167	VBW:10Hz
Vert.	15540.000	AV	32.02	39.93	10.64	38.70	-9.54	34.35	53.90	19.5	150	0	VBW:10Hz
Vert.	20720.000	AV	52.51	40.12	13.89	46.74	-9.54	50.24	53.90	**3.6**	153	174	VBW:10Hz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).
*The 4th harmonic was not seen so the result was its base noise level.
Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

(Calculation) (above 1GHz Outside of the restricted band)

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

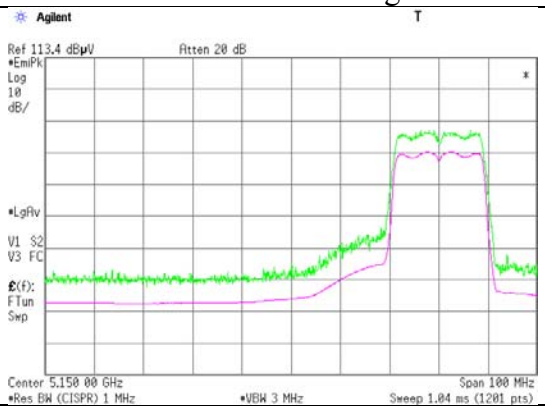
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	10360.000	PK	46.63	39.52	8.21	39.32	2.21	57.25	-37.95	-27.00	11.0	186	202	
Vert.	10360.000	PK	47.59	39.52	8.21	39.32	2.21	58.21	-36.99	-27.00	**10.0**	184	166	

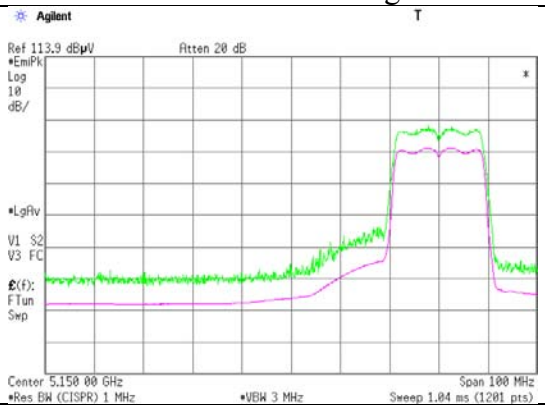
Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG（({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).
*The 4th harmonic was not seen so the result was its base noise level.
Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

* The test was carried out in worst mode by precheck of radiated emission.

Radiated Spurious Emission

Test Place(AC No)	3	
Date	August 3, 2016	
Temperature / Humidity	25 deg. C / 53 % RH	
Engineer	Hiroyuki Morikawa	
Mode	Tx, IEEE802.11n HT20, 5180 MHz	

Horizontal
Restricted-band band-edge Plot

Trace Green: Peak Plot Trace Purple: Average Plot

Vertical
Restricted-band band-edge Plot

Trace Green: Peak Plot Trace Purple: Average Plot

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

Radiated Spurious Emission

Test Place(AC No)	3	3
Date	August 3, 2016	August 5, 2016
Temperature / Humidity	25 deg. C / 53 % RH	25 deg. C / 48 % RH
Engineer	Hiroyuki Morikawa	Makoto Hosaka
Mode	Tx, IEEE802.11n HT40, 5190 MHz	

(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.	2798.419	PK	44.65	28.08	14.15	36.92	2.21	52.17	73.90	21.7	163	112	
Hori.	5150.000	PK	52.41	32.17	15.66	37.26	2.21	65.19	73.90	8.7	235	50	
Hori.	15570.000	PK	43.73	39.88	10.65	38.68	-9.54	46.04	73.90	27.8	150	0	
Hori.	20760.000	PK	48.97	40.11	13.88	46.73	-9.54	46.69	73.90	27.2	156	161	
Hori.	2798.419	AV	33.35	28.08	14.15	36.92	2.21	40.87	53.90	13.0	163	112	VBW:10Hz
Hori.	5150.000	AV	39.12	32.17	15.66	37.26	2.21	51.90	53.90	**2.0**	235	50	VBW:10Hz
Hori.	15570.000	AV	32.19	39.88	10.65	38.68	-9.54	34.50	53.90	19.4	150	0	VBW:10Hz
Hori.	20760.000	AV	46.41	40.11	13.88	46.73	-9.54	44.13	53.90	9.7	156	161	VBW:10Hz
Vert.	2798.491	PK	46.52	28.08	14.15	36.92	2.21	54.04	73.90	19.8	193	166	
Vert.	5150.000	PK	52.32	32.17	15.66	37.26	2.21	65.10	73.90	8.8	164	174	
Vert.	15570.000	PK	43.16	39.88	10.65	38.68	-9.54	45.47	73.90	28.4	150	0	
Vert.	20760.000	PK	51.21	40.11	13.88	46.73	-9.54	48.93	73.90	24.9	153	176	
Vert.	2798.491	AV	37.83	28.08	14.15	36.92	2.21	45.35	53.90	8.5	193	166	VBW:10Hz
Vert.	5150.000	AV	38.00	32.17	15.66	37.26	2.21	50.78	53.90	3.1	164	174	VBW:10Hz
Vert.	15570.000	AV	32.21	39.88	10.65	38.68	-9.54	34.52	53.90	19.3	150	0	VBW:10Hz
Vert.	20760.000	AV	48.55	40.11	13.88	46.73	-9.54	46.27	53.90	7.6	153	176	VBW:10Hz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).
*The 4th harmonic was not seen so the result was its base noise level.
Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

(Calculation) (above 1GHz Outside of the restricted band)

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

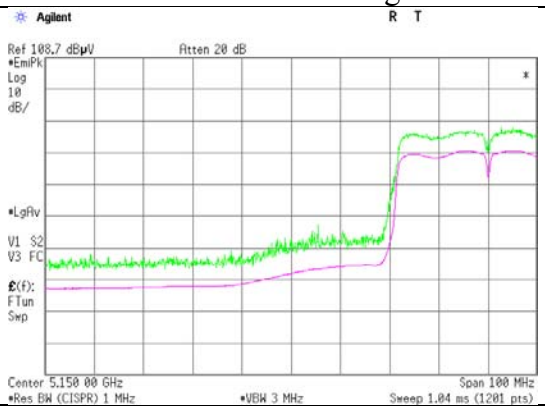
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	10380.000	PK	46.12	39.58	8.21	39.32	2.21	56.80	-38.40	-27.00	11.4	144	190	
Vert.	10380.000	PK	46.35	39.58	8.21	39.32	2.21	57.03	-38.17	-27.00	**11.2**	141	189	

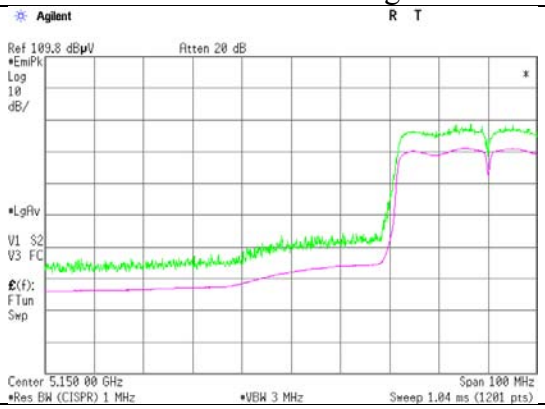
Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Resrult(EIRP[dBm])=10*LOG〔({ 10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance:3[m]) ^ 2 } / 30) *10^3)
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).
*The 4th harmonic was not seen so the result was its base noise level.
Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

* The test was carried out in worst mode by precheck of radiated emission.

Radiated Spurious Emission

Test Place(AC No)	3	
Date	August 3, 2016	
Temperature / Humidity	25 deg. C / 53 % RH	
Engineer	Hiroyuki Morikawa	
Mode	Tx, IEEE802.11n HT40, 5190 MHz	

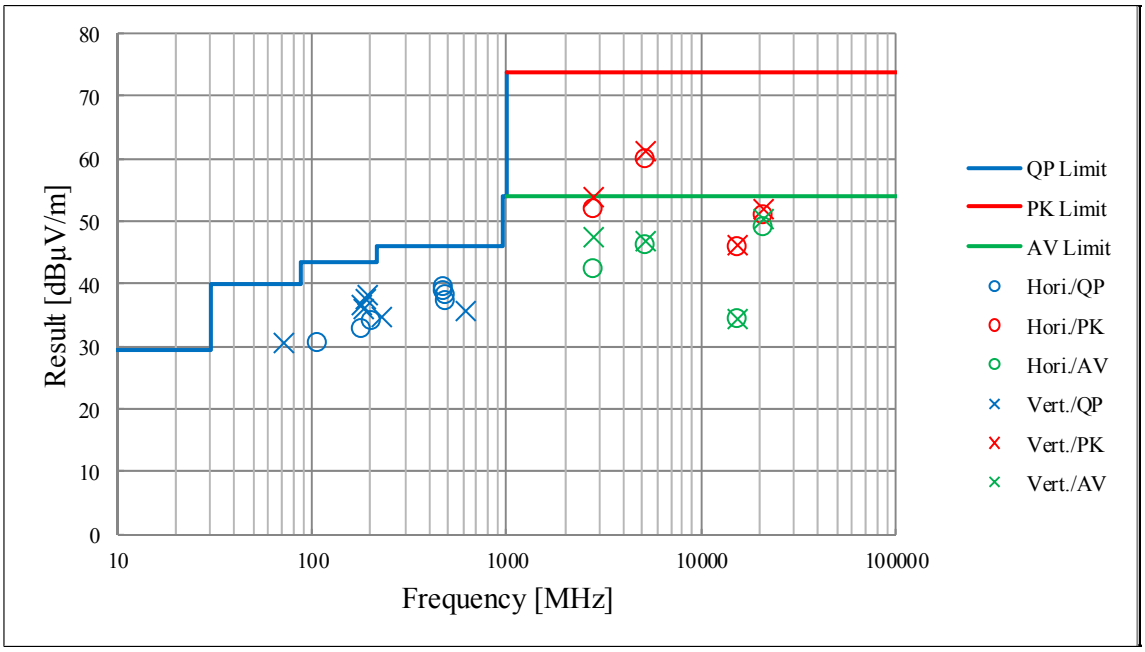
Horizontal
Restricted-band band-edge Plot

Trace Green: Peak Plot Trace Purple: Average Plot

Vertical
Restricted-band band-edge Plot

Trace Green: Peak Plot Trace Purple: Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test Place(AC No)	3	3	3
Date	July 30 .2016	August 3, 2016	August 5, 2016
Temperature / Humidity	24 deg. C / 54 % RH	25 deg. C / 53 % RH	25 deg. C / 48 % RH
Engineer	Kazutaka Takeyama	Hiroyuki Morikawa	Makoto Hosaka
Mode	Tx, IEEE802.11n HT20, 5180 MHz		

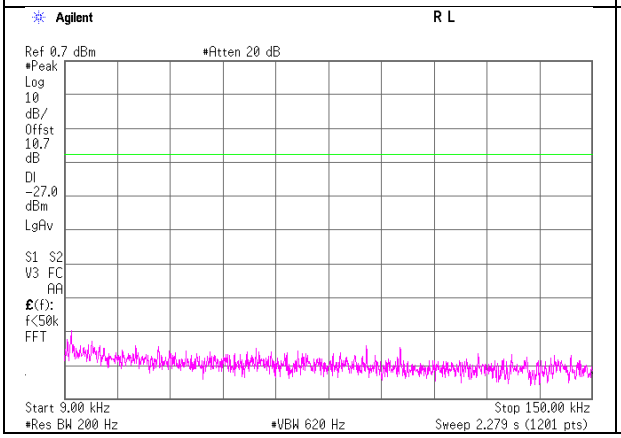


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

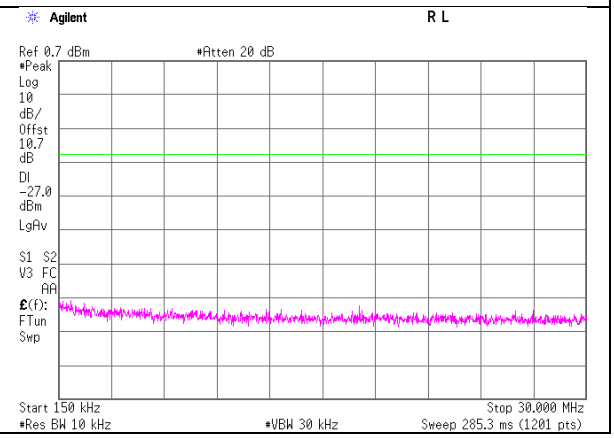
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11284471S-D-R1
Date	September 6, 2016
Temperature / Humidity	22 deg. C / 57 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11n-20 5180 MHz

9 kHz-150 kHz



150 kHz-30 MHz



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2016/04/01 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2016/04/01 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2016/03/28 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2016/03/23 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2015/11/04 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	AT	2015/12/07 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	AT,RE	2015/11/18 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT, RE	2016/03/23 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2016/03/23 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2016/02/10 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2016/06/23 * 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
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2015/08/28 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2015/11/18 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2015/11/04 * 12
SFL-03	Highpass Filter	MICRO-TRONICS	HPM50112	028	RE	2015/11/16 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2016/07/15 * 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	2016/08/04 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/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	2016/03/28 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
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
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	RE	2016/04/18 * 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
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/03/28 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2016/03/23 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2016/03/23 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	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: **RE: Radiated Emission**
AT: Antenna Terminal Conducted test