



RADIO TEST REPORT

Test Report No. : 11191143S

Applicant : Canon Inc.
Type of Equipment : Wireless LAN Module
Model No. : BM70659
FCC ID : AZDBM70659
Test regulation : FCC Part 15 Subpart E: 2015
W58 (5745 MHz - 5825 MHz Band) only
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: March 29 to April 26, 2016

Representative test engineer:

Hiroyuki Morikawa
Engineer
Consumer Technology Division

Approved by:

Toyokazu Imamura
Leader
Consumer Technology Division



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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11191143S

[illegible]

CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Conducted Emission.....	9
SECTION 6: Radiated Spurious Emission and Band Edge Compliance	10
SECTION 7: Antenna Terminal Conducted Tests.....	12
APPENDIX 1: Test data	13
Conducted Emission	13
99 % Occupied Bandwidth.....	14
6 dB Bandwidth	17
Maximum Conducted Output Power	20
Maximum Power Spectral Density	27
Radiated Spurious Emission	32
Conducted Spurious Emission	47
APPENDIX 2: Test instruments	48
APPENDIX 3: Photographs of test setup	50
Conducted Emission	50
Radiated Spurious Emission	51
Worst Case Position	52

SECTION 1: Customer information

Company Name	:	Canon Inc.
Address	:	9-1, Imaikami-cho, Nakahara-ku, Kawasaki, Kanagawa, 211-8501 JAPAN
Telephone Number	:	+81-44-739-6537
Facsimile Number	:	+81-44-739-5495
Contact Person	:	Tatsuya Yamazaki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless LAN Module
Model No.	:	BM70659
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.5 V
Receipt Date of Sample	:	March 15, 2016
Country of Mass-production	:	Japan
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: BM70659 (referred to as the EUT in this report) is a Wireless LAN Module.

General Specification

Clock frequency(ies) in the system	:	38.4 MHz
------------------------------------	---	----------

Radio Specification

Equipment type	:	Transceiver
Frequency of operation	:	IEEE 802.11b/g: 2412 MHz-2462 MHz IEEE 802.11n-20: 2412 MHz-2462 MHz, 5180 MHz-5240 MHz, 5745 MHz-5825 MHz IEEE 802.11n-40: 2422 MHz-2452 MHz, 5190 MHz-5230 MHz, 5755 MHz-5795 MHz IEEE 802.11a: 5180 MHz-5240 MHz, 5745 MHz-5825 MHz
Bandwidth & channel spacing	:	IEEE 802.11b/g/n-20: 20 MHz & 5 MHz IEEE 802.11n-40: 40 MHz & 5 MHz IEEE 802.11a: 18 MHz & 20 MHz
Type of modulation	:	IEEE 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11b: DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna type	:	Planar Inverted F Antenna
Antenna gain with cable loss	:	2400 MHz-2500 MHz: -3.790 dBi 5000 MHz-6000 MHz: +3.714 dBi
Antenna connector type	:	U.FL
ITU code	:	D1D, G1D
Operation temperature range	:	0 deg.C. to 45 deg.C.

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 IC: RSS-Gen 8.8	FCC: 15.407 (b) (6) / 15.207 IC: RSS-Gen 8.8	28.1 dB, 0.20287 MHz, N QP	Complied	-
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 IC: -	FCC: 15.407 (a) (1) (2) (3) IC: -	See data	N/A	Conducted
Maximum Conducted Output Power	FCC: KDB Publication Number 789033 IC: -	FCC: 15.407 (a) (1) (2) (3) IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)		Complied	Conducted
Maximum Power Spectral Density	FCC: KDB Publication Number 789033 IC: -	FCC : 15.407 (a) (1) (2) (3) IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)		Complied	Conducted
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033 IC: -	FCC: 15.407 (b), 15.205 and 15.209 IC: RSS-247 6.2.1 (2) 6.2.2 (2) 6.2.3 (2) 6.2.4 (2)	0.8 dB 11570.0 MHz, AV, Vertical Tx 11a 5785 MHz 0.8 dB 5715.0 MHz, PK, Horizontal Tx 11n-40 5755 MHz	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 IC: -	FCC: 15.407 (e) IC: RSS-247 6.2.4 (1)	See data	Complied	Conducted

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

*1) Radiated test was selected over 30 MHz based on section FCC 15.407 (b) and KDB 789033 D02 G.3.b).

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

FCC Part 15.31 (e)

The Wireless LAN Module is provided with stable power supply DC 3.5 V from the host device and has power supply regulator which provides DC 3.0 V and DC 1.8 V, therefore, the equipment complies power supply regulation.

FCC Part 15.203 Antenna requirement

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	RSS-Gen 6.6	IC: -	N/A	N/A	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.1 dB	2.1 dB	2.6 dB	2.2 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

Conducted Emission test

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

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

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

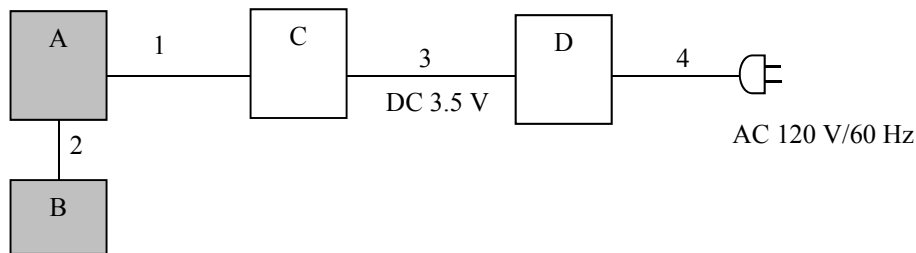
Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission, Radiated emission (below 1 GHz)	Transmitting IEEE 802.11n-40	5795 MHz	11 dBm	MCS0, PN9
Other items	Transmitting IEEE 802.11a	5745 MHz, 5785 MHz, 5825 MHz	11 dBm	6 Mbps, PN9
	Transmitting IEEE 802.11n-20	5745 MHz, 5785 MHz, 5825 MHz	11 dBm	MCS2, PN9
	Transmitting IEEE 802.11n-40	5755 MHz, 5795 MHz	11 dBm	MCS0, PN9

*1) Software: Dut Wlan BT lab tool ver. 1.0.7.18

*2) The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)

* Transmitting duty was 100 % on all tests.

4.2 Configuration and peripherals



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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN Module	BM70659	2C058C *1) 2H222C *2)	CANON	EUT
B	Antenna	PADCAN-002		IIDA	EUT
C	Test jig	-	-	CANON	-
D	DC Power Supply	PAN35-10A	NA000955	Kikusui	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted emission test and Radiated emission test

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Ribbon	0.06	Unshielded	Unshielded
2	Antenna	0.06	Shielded	Shielded
3	DC	2.4	Unshielded	Unshielded
4	DC	1.8	Unshielded	Unshielded

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

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT 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 platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The 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:

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

Test Antennas are used as below;

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

Frequency	Below 1 GHz	Above 1 GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method AD *1) RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: ≥ 100 traces If duty cycle was less than 98%, a duty factor was added to the results. Detector: Power Averaging (Linear voltage) Trace: ≥ 100 traces Duty factor was added to the results.
Test Distance	3 m	3 m*2) (1 GHz – 13 GHz), 1 m*2) (13 GHz – 40 GHz),	

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

*2) Distance Factor: Refer to the data.

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

Band Edge: (Antenna) Horizontal: Z, Vertical: Y, (Module) Horizontal: Z, Vertical: Y

Below 1 GHz: (Antenna) Horizontal: Z Vertical: X, (Module) Horizontal: X, Vertical: X

1 GHz -13 GHz: (Antenna) Horizontal: X, Vertical: X, (Module) Horizontal: Z, Vertical: Z

13 GHz -18 GHz: (Antenna) Horizontal: X, Vertical: X, (Module) Horizontal: Y, Vertical: Y

18 GHz -26.5 GHz: (Antenna) Horizontal: Z Vertical: Z, (Module) Horizontal: X, Vertical: Y

26.5 GHz -40 GHz: (Antenna) Horizontal: Z Vertical: Z, (Module) Horizontal: X, Vertical: Y

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	pan	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
26 dB Bandwidth	Enough to capture the emission	Close to 1 % of EBW	> RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 160 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	100 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)	9 kHz – 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz – 30 MHz	10 kHz	30 kHz				

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

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

*2) 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.

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

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

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

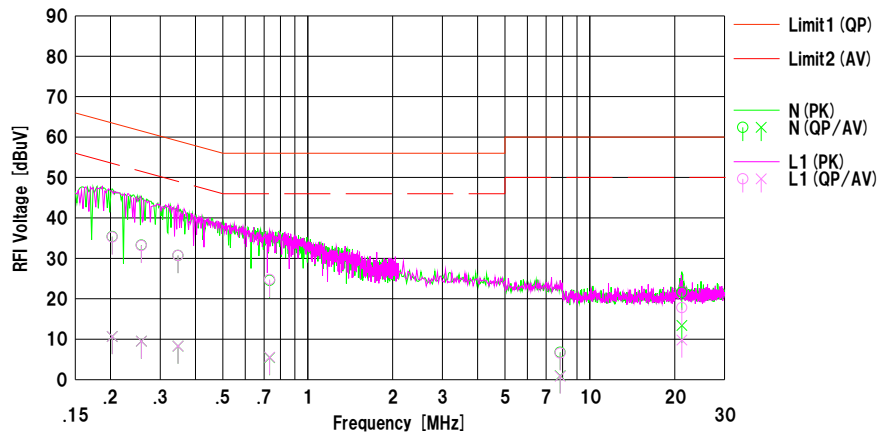
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2016/04/26

Mode : Tx 11n (40HT) 5795MHz MCS0
Report No. : 11191143S
Temp./Humi. : 23 deg.C / 48 %RH

Remarks : -

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

Engineer : Hiroyuki Morikawa



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	0.20287	22.80	-1.90	12.58	35.38	10.68	63.49	53.49	28.1	42.8	N	
2	0.25719	20.70	-3.10	12.59	33.29	9.49	61.52	51.52	28.2	42.0	N	
3	0.34696	18.10	-4.30	12.61	30.71	8.31	59.03	49.03	28.3	40.7	N	
4	0.73297	11.90	-7.20	12.66	24.56	5.46	56.00	46.00	31.4	40.5	N	
5	7.84836	-6.30	-12.10	13.06	6.76	0.96	60.00	50.00	53.2	49.0	N	
6	21.18380	8.00	-0.20	13.59	21.59	13.39	60.00	50.00	38.4	36.6	N	
7	0.20287	22.70	-1.90	12.58	35.28	10.68	63.49	53.49	28.2	42.8	L1	
8	0.25719	20.60	-3.10	12.59	33.19	9.49	61.52	51.52	28.3	42.0	L1	
9	0.34696	18.10	-4.30	12.61	30.71	8.31	59.03	49.03	28.3	40.7	L1	
10	0.73297	12.10	-7.10	12.66	24.76	5.56	56.00	46.00	31.2	40.4	L1	
11	7.84836	-6.50	-12.20	13.06	6.56	0.86	60.00	50.00	53.4	49.1	L1	
12	21.18380	4.20	-3.80	13.59	17.79	9.79	60.00	50.00	42.2	40.2	L1	

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

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

99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1	Shonan EMC Lab. No.5
	Measurement Room	Shielded Room
Report No.	11191143S	
Date	March 29, 2016	April 5, 2016
Temperature / Humidity	23 deg. C / 50 % RH	24 deg. C / 41 % RH
Engineer	Hikaru Shirasawa	Wataru Kojima
Mode	Tx	

11a

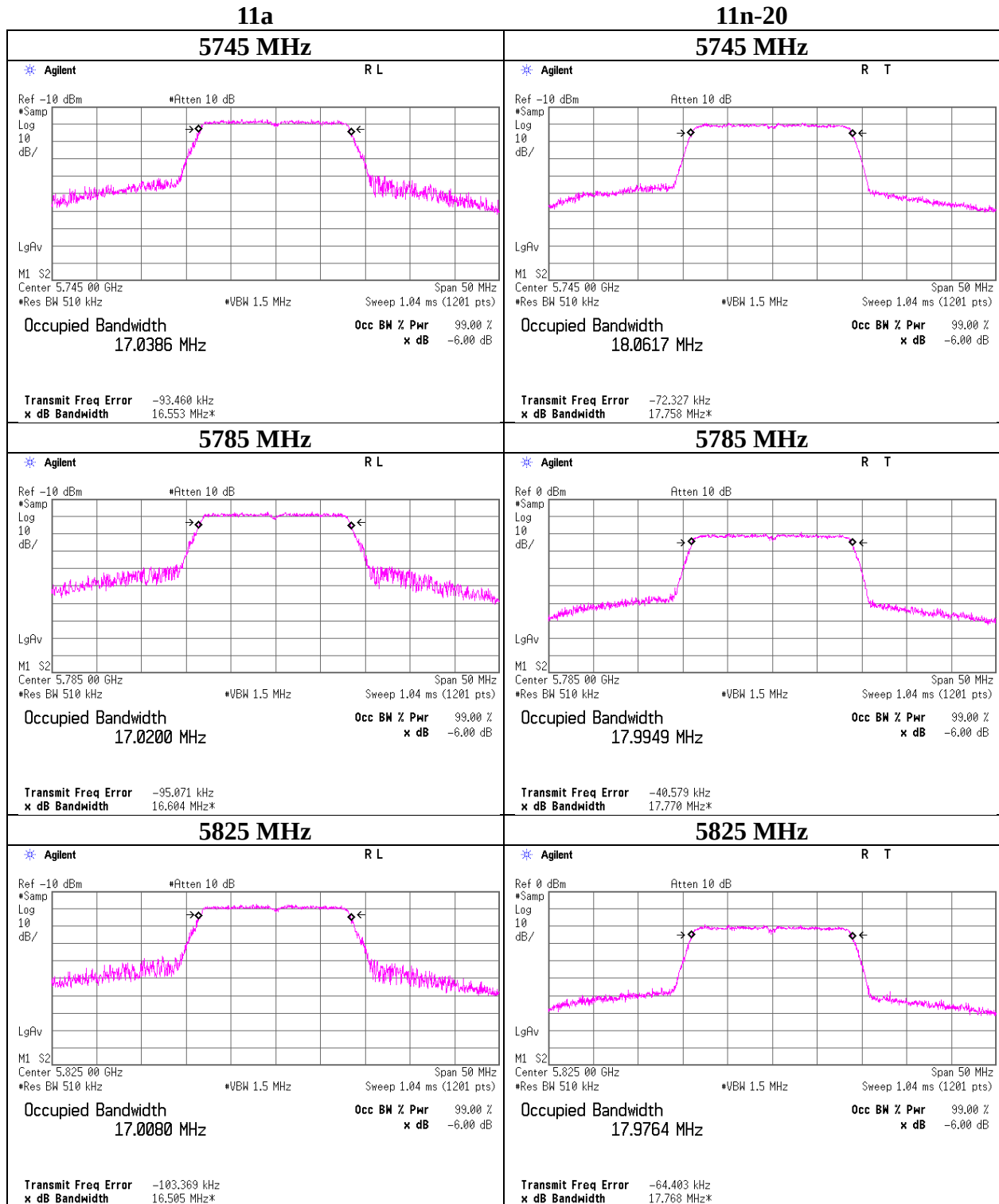
Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5745	17.039	-
5785	17.020	-
5825	17.008	-

11n-20

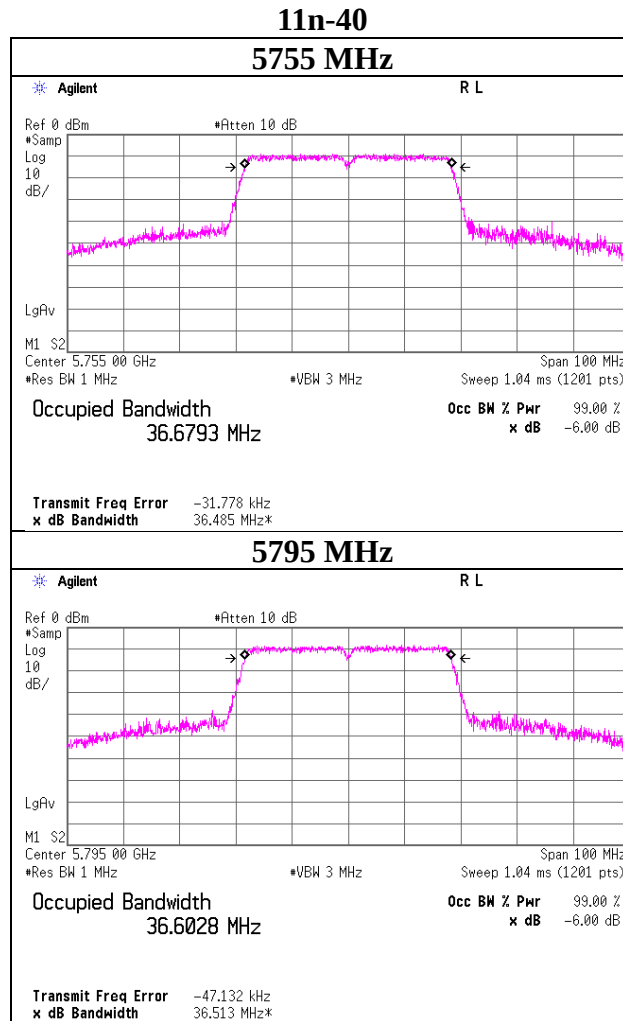
Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5745	18.062	-
5785	17.995	-
5825	17.976	-

Tested Frequency [MHz]	99 % Occupied Bandwidth [MHz]	Limit [MHz]
5755	36.679	-
-	-	-
5795	36.603	-

99 % Occupied Bandwidth



99 % Occupied Bandwidth



6 dB Bandwidth

Test place	Shonan EMC Lab. No.1	Shonan EMC Lab. No.5
	Measurement Room	Shielded Room
Report No.	11191143S	
Date	March 29, 2016	April 5, 2016
Temperature / Humidity	23 deg. C / 50 % RH	24 deg. C / 41 % RH
Engineer	Hikaru Shirasawa	Wataru Kojima
Mode	Tx	

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	16.585	> 500
5785	16.587	> 500
5825	16.607	> 500

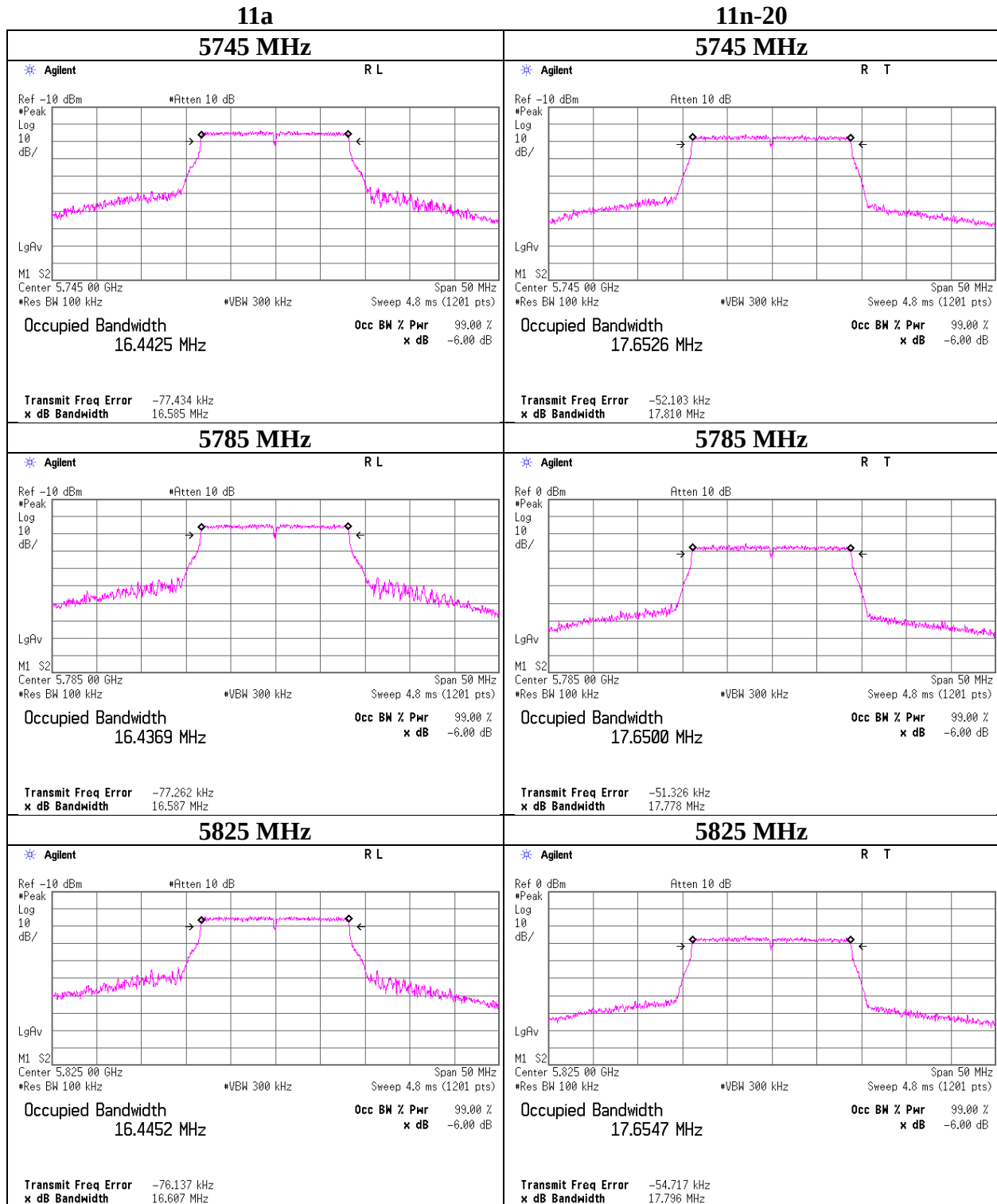
11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	17.810	> 500
5785	17.778	> 500
5825	17.796	> 500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5755	36.618	> 500
-	-	-
5795	36.601	> 500

6 dB Bandwidth



UL Japan, Inc.

Shonan EMC Lab.

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

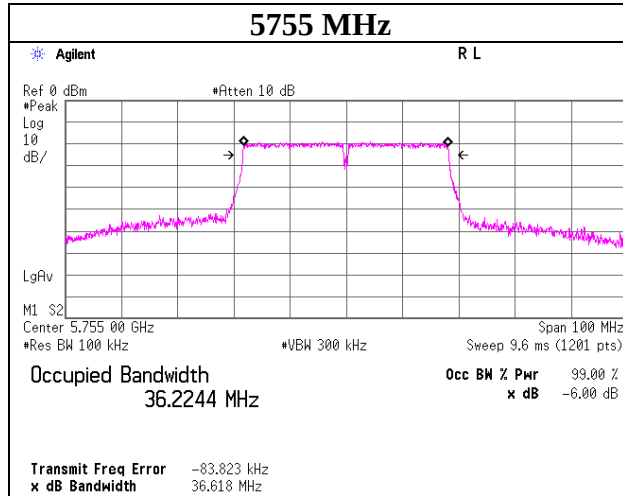
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

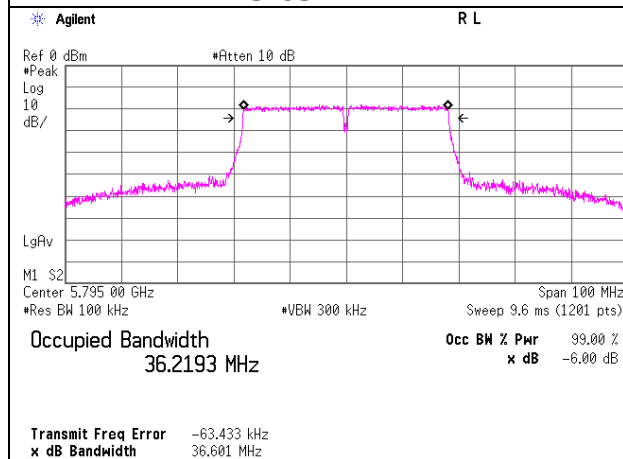
6 dB Bandwidth

11n-40

5755 MHz



5795 MHz



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.1 Measurement Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
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				e.i.r.p.			
								Result		Limit	Margin	Result		Limit	Margin
								[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-10.71	2.24	19.91	0.00	3.7	-	-	11.44	13.93	30.00	18.56	15.15	32.73	36.00	20.85
5785	-10.60	2.24	19.91	0.00	3.7	-	-	11.55	14.29	30.00	18.45	15.26	33.57	36.00	20.74
5825	-10.52	2.27	19.91	0.00	3.7	-	-	11.66	14.66	30.00	18.34	15.37	34.43	36.00	20.63

Sample Calculation:

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

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
Mode : Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for 1C) [MHz]	Conducted Power				e.i.r.p.			
								Result	Limit	Margin		Result	Limit	Margin	
								[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5745	-10.81	2.24	19.91	0.00	3.7	-	-	11.34	13.61	30.00	18.66	15.05	31.99	36.00	20.95
5785	-10.73	2.24	19.91	0.00	3.7	-	-	11.42	13.87	30.00	18.58	15.13	32.58	36.00	20.87
5825	-10.69	2.27	19.91	0.00	3.7	-	-	11.49	14.09	30.00	18.51	15.20	33.11	36.00	20.80

Sample Calculation:

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

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
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 1C)	Conducted Power				e.i.r.p.			
								Result		Limit	Margin	Result		Limit	Margin
								[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBi]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5755	-10.50	2.24	19.91	0.00	3.7	-	-	11.65	14.62	30.00	18.35	15.36	34.36	36.00	20.64
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5795	-10.48	2.24	19.91	0.00	3.7	-	-	11.67	14.69	30.00	18.33	15.38	34.51	36.00	20.62

Sample Calculation:

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

Maximum Conducted Output Power

Test place : Shonan EMC Lab. No.1 Measurement Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
Mode : Tx 11a

5785 MHz

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	11.55	0.00	11.55	*
	9	11.54	0.00	11.54	
	12	11.38	0.00	11.38	
	18	11.49	0.00	11.49	
	24	11.47	0.00	11.47	
	36	11.42	0.00	11.42	
	48	11.36	0.00	11.36	
	54	11.39	0.00	11.39	

* 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.1 Measurement Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
Mode : Tx 11n-20

5785 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	11.32	0.00	11.32	
	1	11.33	0.00	11.33	
	2	11.42	0.00	11.42	*
	3	11.27	0.00	11.27	
	4	11.27	0.00	11.27	
	5	11.34	0.00	11.34	
	6	11.41	0.00	11.41	
	7	11.40	0.00	11.40	

* 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.1 Measurement Room
Report No. : 11191143S
Date : March 29, 2016
Temperature / Humidity : 23 deg. C / 50 % RH
Engineer : Hikaru Shirasawa
Mode : Tx 11n-40

5755 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-40	0	11.65	0.00	11.65	*
	1	11.53	0.00	11.53	
	2	11.59	0.00	11.59	
	3	11.62	0.00	11.62	
	4	11.64	0.00	11.64	
	5	11.59	0.00	11.59	
	6	11.62	0.00	11.62	
	7	11.56	0.00	11.56	

* Worst rate

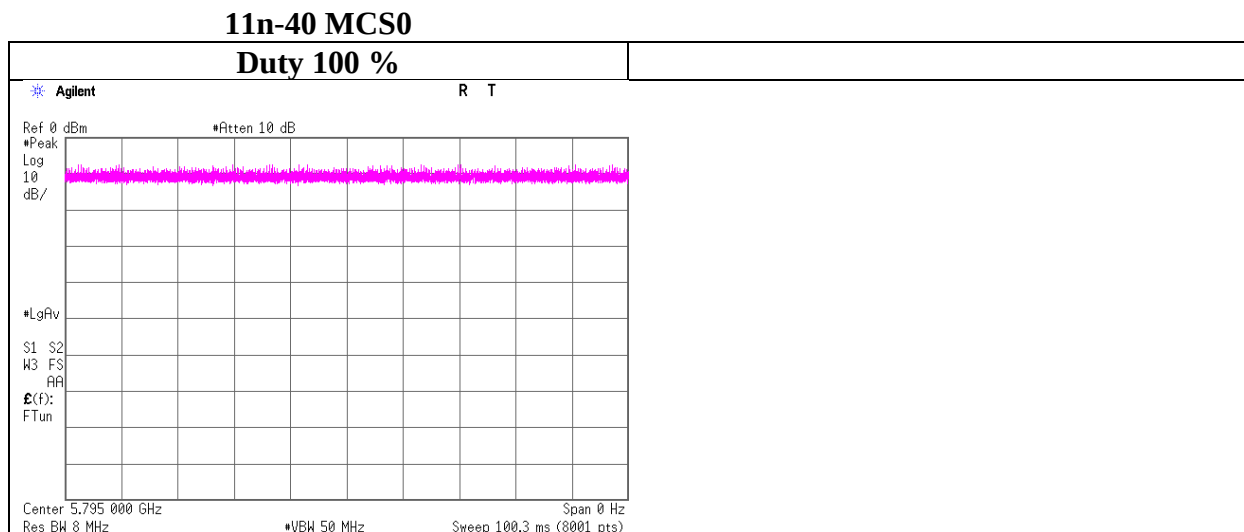
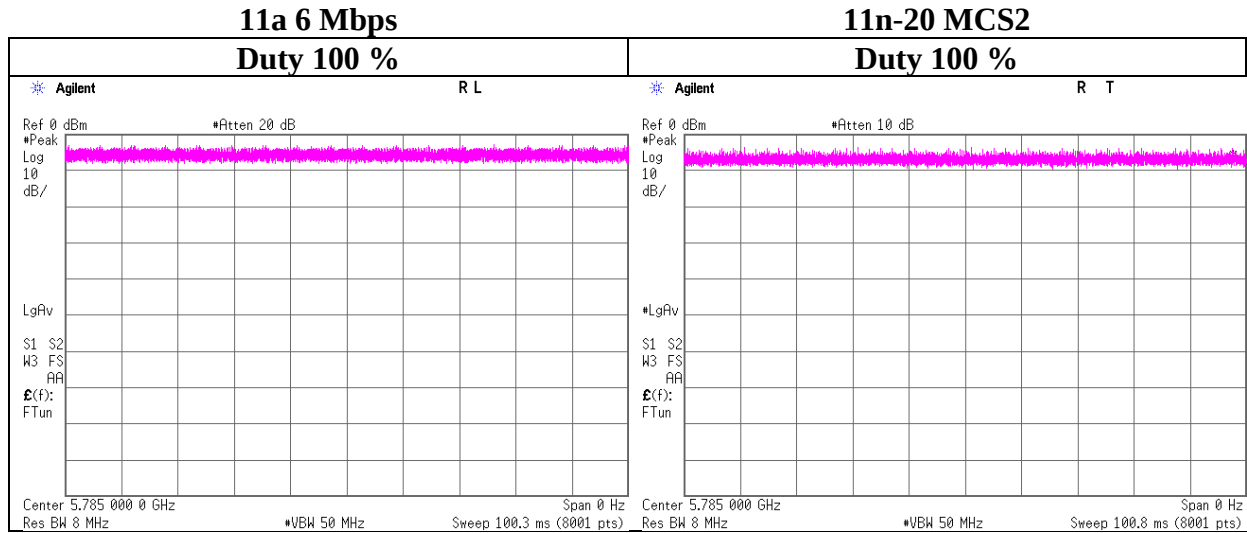
Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Burst rate confirmation

Test place	Shonan EMC Lab. No.1	Shonan EMC Lab. No.5
	Measurement Room	Shielded Room
Report No.	11191143S	
Date	March 29, 2016	April 5, 2016
Temperature / Humidity	23 deg. C / 50 % RH	24 deg. C / 41 % RH
Engineer	Hikaru Shirasawa	Wataru Kojima
Mode	Tx	



Maximum Power Spectral Density

Test place Shonan EMC Lab. No.1 Measurement Room
Report No. 11191143S
Date March 29, 2016
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Hikaru Shirasawa
Mode Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-30.24	2.24	19.91	0.00	3.7	6.99	-1.10	30.00	31.10	2.61	36.00	33.39
5785	-29.80	2.24	19.91	0.00	3.7	6.99	-0.66	30.00	30.66	3.05	36.00	32.95
5825	-30.17	2.27	19.91	0.00	3.7	6.99	-1.00	30.00	31.00	2.71	36.00	33.29

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11191143S
Date : April 5, 2016
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Wataru Kojima
Mode : Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5745	-32.01	3.19	19.91	0.00	3.7	6.99	-1.92	30.00	31.92	1.79	36.00	34.21
5785	-33.09	3.20	19.91	0.00	3.7	6.99	-2.99	30.00	32.99	0.72	36.00	35.28
5825	-32.12	3.54	19.91	0.00	3.7	6.99	-1.68	30.00	31.68	2.03	36.00	33.97

Sample Calculation:

PSD: Power Spectral Density

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

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

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

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

Maximum Power Spectral Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11191143S
Date : April 5, 2016
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Wataru Kojima
Mode : Tx 11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5755	-34.92	3.19	19.91	0.00	3.7	6.99	-4.83	30.00	34.83	-1.12	36.00	37.12
-	-	-	-	-	-	-	-	-	-	-	-	-
5895	-35.07	3.21	19.91	0.00	3.7	6.99	-4.96	30.00	34.96	-1.25	36.00	37.25

Sample Calculation:

PSD: Power Spectral Density

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

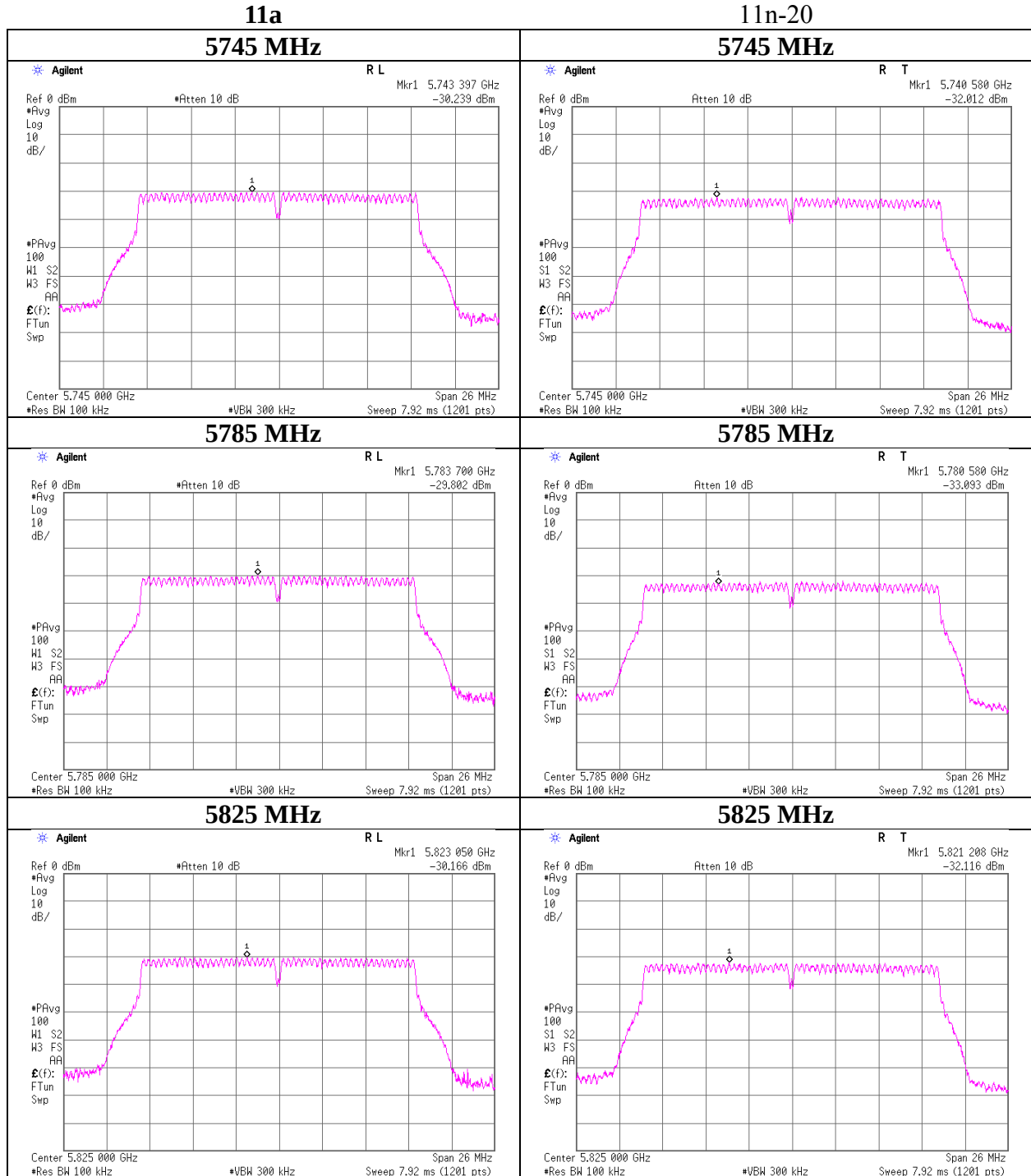
RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

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

Maximum Power Spectral Density

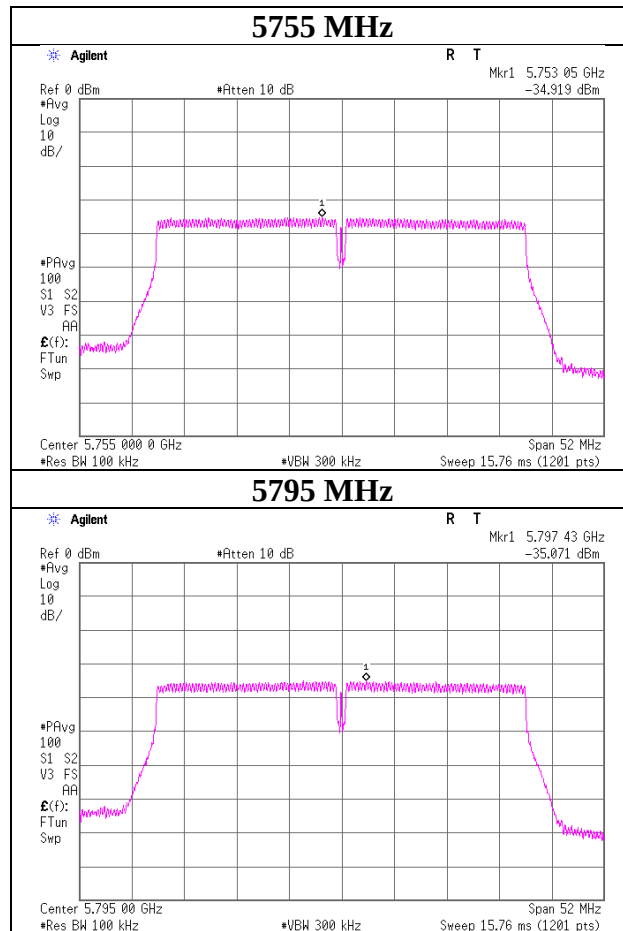
Test place	Shonan EMC Lab. No.1	Shonan EMC Lab. No.5
	Measurement Room	Shielded Room
Report No.	11191143S	
Date	March 29, 2016	April 5, 2016
Temperature / Humidity	23 deg. C / 50 % RH	24 deg. C / 41 % RH
Engineer	Hikaru Shirasawa	Wataru Kojima
Mode	Tx	



Maximum Power Spectral Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11191143S
Date April 5, 2016
Temperature / Humidity 24 deg. C / 41 % RH
Engineer Wataru Kojima
Mode Tx

11n-40



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-13 GHz) (AC2)	Wataru Kojima (13 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (18 GHz-40 GHz) (AC2)
Mode	Tx 11a 5745 MHz		

(* 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.	11490.0	PK	47.5	39.9	8.9	33.8	2.4	64.9	73.9	9.0	390.0	69.0	
Hori.	17235.0	PK	50.1	42.0	10.7	39.3	-9.5	54.0	73.9	19.9	132.0	133.0	
Hori.	22980.0	PK	42.9	40.3	14.5	46.9	-9.5	41.3	73.9	32.6	150.0	0.0	
Hori.	28725.0	PK	58.4	43.2	15.7	68.3	-9.5	39.5	73.9	34.4	150.0	0.0	
Hori.	11490.0	AV	35.4	39.9	8.9	33.8	2.4	52.8	53.9	1.1	390.0	69.0	VBW:10Hz
Hori.	17235.0	AV	36.0	42.0	10.7	39.3	-9.5	39.9	53.9	14.0	132.0	133.0	VBW:10Hz
Hori.	22980.0	AV	31.1	40.3	14.5	46.9	-9.5	29.5	53.9	24.4	150.0	0.0	VBW:10Hz
Hori.	28725.0	AV	46.7	43.2	15.7	68.3	-9.5	27.8	53.9	26.1	150.0	0.0	VBW:10Hz
Vert.	11490.0	PK	47.6	39.9	8.9	33.8	2.4	65.0	73.9	8.9	298.0	141.0	
Vert.	17235.0	PK	44.8	42.0	10.7	39.3	-9.5	48.7	73.9	25.2	136.0	141.0	
Vert.	22980.0	PK	42.5	40.3	14.5	46.9	-9.5	40.9	73.9	33.0	150.0	0.0	
Vert.	28725.0	PK	57.4	43.2	15.7	68.3	-9.5	38.5	73.9	35.4	150.0	0.0	
Vert.	11490.0	AV	34.4	39.9	8.9	33.8	2.4	51.8	53.9	2.1	298.0	141.0	VBW:10Hz
Vert.	17235.0	AV	35.1	42.0	10.7	39.3	-9.5	39.0	53.9	14.9	136.0	141.0	VBW:10Hz
Vert.	22980.0	AV	31.2	40.3	14.5	46.9	-9.5	29.6	53.9	24.3	150.0	0.0	VBW:10Hz
Vert.	28725.0	AV	46.1	43.2	15.7	68.3	-9.5	27.2	53.9	26.7	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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	43.6	32.6	16.4	33.8	2.4	61.2	-34.0	-27.0	7.0			
Hori.	5725.0	PK	51.6	32.6	16.4	33.8	2.4	69.2	-26.0	-17.0	9.0			
Vert.	5715.0	PK	43.3	32.6	16.4	33.8	2.4	60.9	-34.3	-27.0	7.3			
Vert.	5725.0	PK	49.6	32.6	16.4	33.8	2.4	67.2	-28.0	-17.0	11.0			

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

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

*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 : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

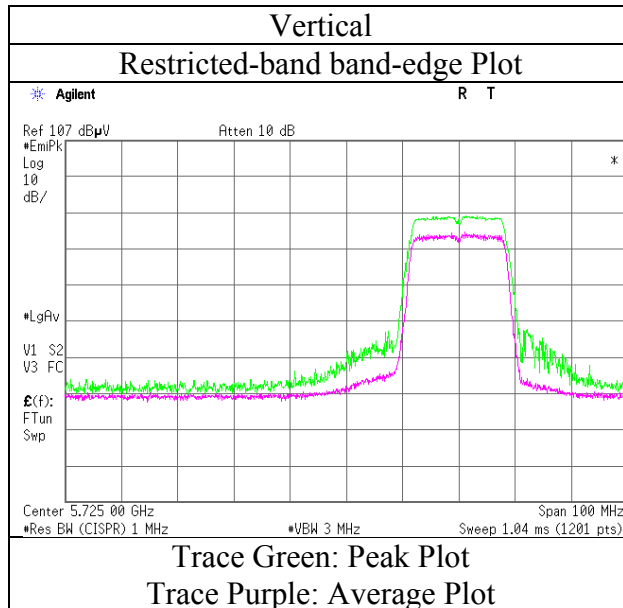
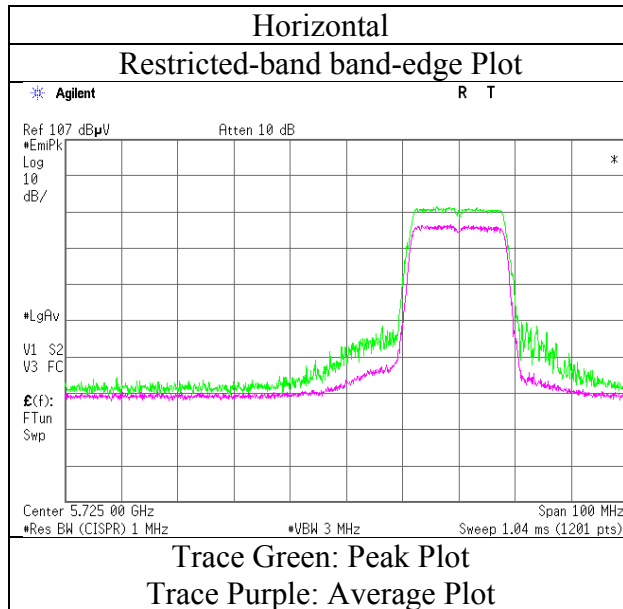
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11191143S
Date : April 23, 2016
Temperature / Humidity : 23 deg. C / 53 % RH
Engineer : Yasumasa Owaki
Mode : Tx 11a 5745 MHz



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-13 GHz) (AC2)	Wataru Kojima (13 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (18 GHz-40 GHz) (AC2)
Mode	Tx 11a 5785 MHz		

(* 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	48.6	39.9	8.9	33.9	2.4	65.9	73.9	8.0	292.0	229.0	
Hori.	17355.0	PK	54.1	42.4	10.7	39.2	-9.5	58.5	73.9	15.4	122.0	129.0	
Hori.	23140.0	PK	42.4	40.3	14.6	46.7	-9.5	41.1	73.9	32.8	150.0	0.0	
Hori.	28925.0	PK	57.3	43.1	15.7	68.4	-9.5	38.2	73.9	35.7	150.0	0.0	
Hori.	11570.0	AV	35.7	39.9	8.9	33.9	2.4	53.0	53.9	0.9	292.0	229.0	VBW:10Hz
Hori.	17355.0	AV	41.3	42.4	10.7	39.2	-9.5	45.7	53.9	8.2	122.0	129.0	VBW:10Hz
Hori.	23140.0	AV	30.2	40.3	14.6	46.7	-9.5	28.9	53.9	25.0	150.0	0.0	VBW:10Hz
Hori.	28925.0	AV	46.5	43.1	15.7	68.4	-9.5	27.4	53.9	26.5	150.0	0.0	VBW:10Hz
Vert.	11570.0	PK	48.9	39.9	8.9	33.9	2.4	66.2	73.9	7.7	280.0	213.0	
Vert.	17355.0	PK	44.7	42.4	10.7	39.2	-9.5	49.1	73.9	24.8	142.0	152.0	
Vert.	23140.0	PK	41.6	40.3	14.6	46.7	-9.5	40.3	73.9	33.6	150.0	0.0	
Vert.	28925.0	PK	58.3	43.1	15.7	68.4	-9.5	39.2	73.9	34.7	150.0	0.0	
Vert.	11570.0	AV	35.8	39.9	8.9	33.9	2.4	53.1	53.9	0.8	280.0	213.0	VBW:10Hz
Vert.	17355.0	AV	33.8	42.4	10.7	39.2	-9.5	38.2	53.9	15.7	142.0	152.0	VBW:10Hz
Vert.	23140.0	AV	30.2	40.3	14.6	46.7	-9.5	28.9	53.9	25.0	150.0	0.0	VBW:10Hz
Vert.	28925.0	AV	46.4	43.1	15.7	68.4	-9.5	27.3	53.9	26.6	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-6.4 GHz) (AC2)	Wataru Kojima (6.4 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (18 GHz-40 GHz) (AC2)
Mode	Tx 11a 5825 MHz		

(* 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	51.8	39.9	8.5	39.0	3.4	64.6	73.9	9.3	177.0	297.0	
Hori.	17475.0	PK	52.8	42.8	10.7	39.1	-9.5	57.7	73.9	16.2	118.0	136.0	
Hori.	23300.0	PK	41.0	40.2	14.7	46.6	-9.5	39.8	73.9	34.1	150.0	0.0	
Hori.	29125.0	PK	57.9	43.1	15.8	68.4	-9.5	38.9	73.9	35.0	150.0	0.0	
Hori.	11650.0	AV	39.9	39.9	8.5	39.0	3.4	52.7	53.9	1.2	177.0	297.0	VBW:10Hz
Hori.	17475.0	AV	38.8	42.8	10.7	39.1	-9.5	43.7	53.9	10.2	118.0	136.0	VBW:10Hz
Hori.	23300.0	AV	30.0	40.2	14.7	46.6	-9.5	28.8	53.9	25.1	150.0	0.0	VBW:10Hz
Hori.	29125.0	AV	46.9	43.1	15.8	68.4	-9.5	27.9	53.9	26.0	150.0	0.0	VBW:10Hz
Vert.	11650.0	PK	49.8	39.9	8.5	39.0	3.4	62.6	73.9	11.3	153.0	28.0	
Vert.	17475.0	PK	46.2	42.8	10.7	39.1	-9.5	51.1	73.9	22.8	124.0	128.0	
Vert.	23300.0	PK	41.7	40.2	14.7	46.6	-9.5	40.5	73.9	33.4	150.0	0.0	
Vert.	29125.0	PK	58.6	43.1	15.8	68.4	-9.5	39.6	73.9	34.3	150.0	0.0	
Vert.	11650.0	AV	38.0	39.9	8.5	39.0	3.4	50.8	53.9	3.1	153.0	28.0	VBW:10Hz
Vert.	17475.0	AV	33.7	42.8	10.7	39.1	-9.5	38.6	53.9	15.3	124.0	128.0	VBW:10Hz
Vert.	23300.0	AV	30.0	40.2	14.7	46.6	-9.5	28.8	53.9	25.1	150.0	0.0	VBW:10Hz
Vert.	29125.0	AV	46.8	43.1	15.8	68.4	-9.5	27.8	53.9	26.1	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 6.4 GHz : 20log (3.95 m / 3.0 m) = 2.4 dB

6.4 GHz - 13 GHz : 20log (4.45 m / 3.0 m) = 3.4 dB

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5850.0	PK	45.6	32.9	16.4	33.8	2.4	63.5	-31.7	-17.0	14.7			
Hori.	5860.0	PK	43.1	32.9	16.4	33.8	2.4	61.0	-34.2	-27.0	7.2			
Vert.	5850.0	PK	44.1	32.9	16.4	33.8	2.4	62.0	-33.2	-17.0	16.2			
Vert.	5860.0	PK	42.5	32.9	16.4	33.8	2.4	60.4	-34.8	-27.0	7.8			

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 - 6.4 GHz : 20log (3.95 m / 3.0 m) = 2.4 dB

6.4 GHz - 13 GHz : 20log (4.45 m / 3.0 m) = 3.4 dB

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

UL Japan, Inc.

Shonan EMC Lab.

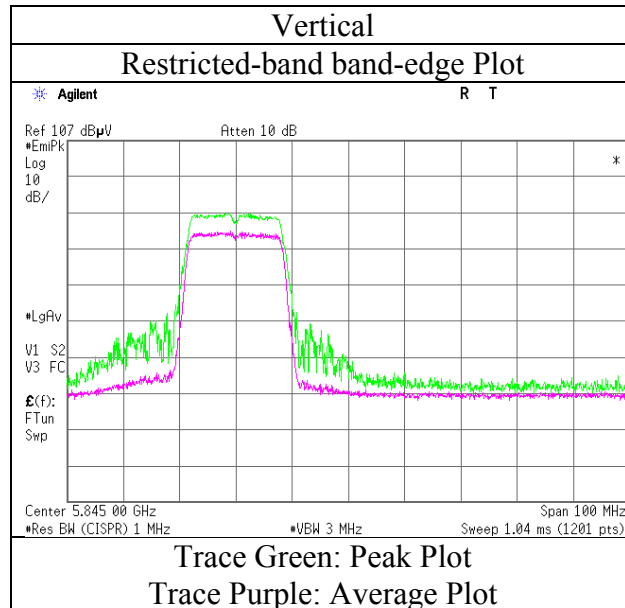
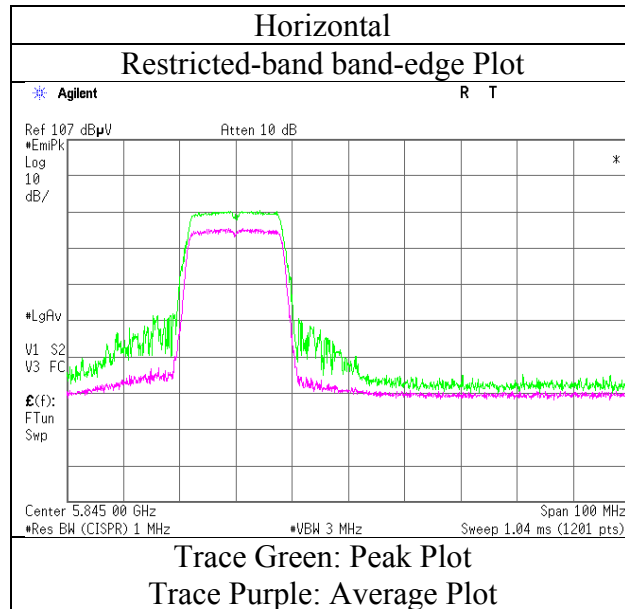
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11191143S
Date : April 22, 2016
Temperature / Humidity : 23deg. C / 53 % RH
Engineer : Yasumasa Owaki
Mode : Tx 11a 5825 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. : 11191143S
Date : April 23, 2016 April 25, 2016 April 25, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 22 deg. C / 44 % RH 23 deg. C / 48 % RH
Engineer : Yasumasa Owaki Wataru Kojima Hiroyuki Morikawa
 (1 GHz-13 GHz) (13 GHz-18 GHz) (18 GHz-40 GHz)
 (AC2) (AC3) (AC2)
Mode : Tx 11n-20 5745 MHz

(* 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.	11490.0	PK	46.1	39.9	8.9	33.8	2.4	63.5	73.9	10.4	145.0	92.0	
Hori.	17235.0	PK	49.9	42.0	10.7	39.3	-9.5	53.8	73.9	20.1	133.0	134.0	
Hori.	22980.0	PK	42.5	40.3	14.5	46.9	-9.5	40.9	73.9	33.0	150.0	0.0	
Hori.	28725.0	PK	58.9	43.2	15.7	68.3	-9.5	40.0	73.9	33.9	150.0	0.0	
Hori.	11490.0	AV	34.2	39.9	8.9	33.8	2.4	51.6	53.9	2.3	145.0	92.0	VBW:10Hz
Hori.	17235.0	AV	35.2	42.0	10.7	39.3	-9.5	39.1	53.9	14.8	133.0	134.0	VBW:10Hz
Hori.	22980.0	AV	31.2	40.3	14.5	46.9	-9.5	29.6	53.9	24.3	150.0	0.0	VBW:10Hz
Hori.	28725.0	AV	46.6	43.2	15.7	68.3	-9.5	27.7	53.9	26.2	150.0	0.0	VBW:10Hz
Vert.	11490.0	PK	47.8	39.9	8.9	33.8	2.4	65.2	73.9	8.7	283.0	162.0	
Vert.	17235.0	PK	44.0	42.0	10.7	39.3	-9.5	47.9	73.9	26.0	132.0	111.0	
Vert.	22980.0	PK	42.8	40.3	14.5	46.9	-9.5	41.2	73.9	32.7	150.0	0.0	
Vert.	28725.0	PK	57.6	43.2	15.7	68.3	-9.5	38.7	73.9	35.2	150.0	0.0	
Vert.	11490.0	AV	33.7	39.9	8.9	33.8	2.4	51.1	53.9	2.8	283.0	162.0	VBW:10Hz
Vert.	17235.0	AV	32.9	42.0	10.7	39.3	-9.5	36.8	53.9	17.1	132.0	111.0	VBW:10Hz
Vert.	22980.0	AV	31.2	40.3	14.5	46.9	-9.5	29.6	53.9	24.3	150.0	0.0	VBW:10Hz
Vert.	28725.0	AV	46.1	43.2	15.7	68.3	-9.5	27.2	53.9	26.7	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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	44.4	32.6	16.4	33.8	2.4	62.0	-33.2	-27.0	6.2			
Hori.	5725.0	PK	51.3	32.6	16.4	33.8	2.4	68.9	-26.3	-17.0	9.3			
Vert.	5715.0	PK	42.9	32.6	16.4	33.8	2.4	60.5	-34.7	-27.0	7.7			
Vert.	5725.0	PK	50.7	32.6	16.4	33.8	2.4	68.3	-26.9	-17.0	9.9			

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

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

*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 : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

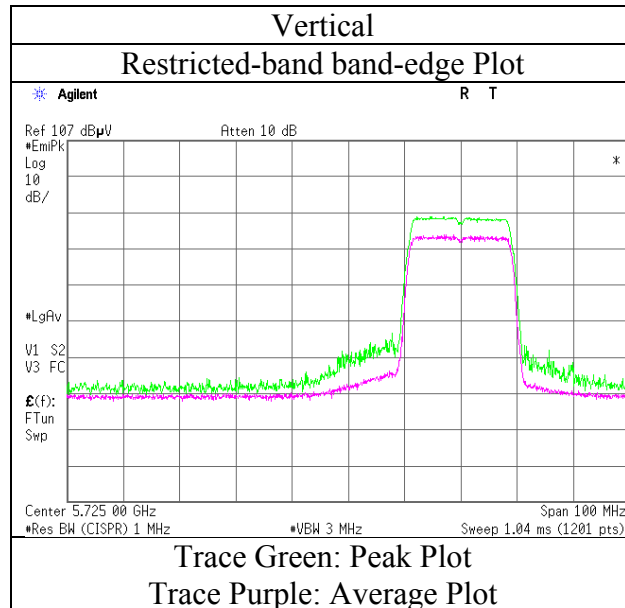
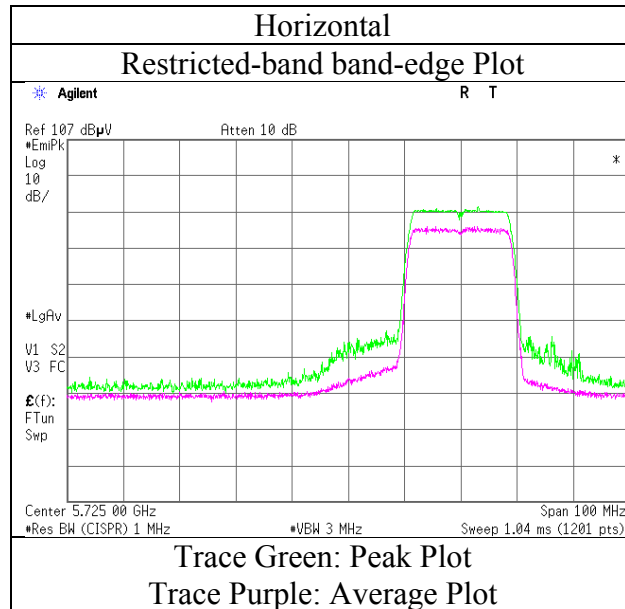
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11191143S
Date	April 22, 2016
Temperature / Humidity	23deg. C / 53 % RH
Engineer	Yasumasa Owaki
Mode	Tx 11n-20 5745 MHz



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-6.4 GHz) (AC2)	Wataru Kojima (6.4 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (18 GHz-40 GHz) (AC2)
Mode	Tx 11n-20 5785 MHz		

(* 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	52.1	39.9	8.5	38.9	3.4	65.0	73.9	8.9	214.0	291.0	
Hori.	17355.0	PK	52.6	42.4	10.7	39.2	-9.5	57.0	73.9	16.9	126.0	131.0	
Hori.	23140.0	PK	41.7	40.3	14.6	46.7	-9.5	40.4	73.9	33.5	150.0	0.0	
Hori.	28925.0	PK	57.8	43.1	15.7	68.4	-9.5	38.7	73.9	35.2	150.0	0.0	
Hori.	11570.0	AV	38.7	39.9	8.5	38.9	3.4	51.6	53.9	2.3	214.0	291.0	VBW:10Hz
Hori.	17355.0	AV	38.1	42.4	10.7	39.2	-9.5	42.5	53.9	11.4	126.0	131.0	VBW:10Hz
Hori.	23140.0	AV	30.2	40.3	14.6	46.7	-9.5	28.9	53.9	25.0	150.0	0.0	VBW:10Hz
Hori.	28925.0	AV	46.5	43.1	15.7	68.4	-9.5	27.4	53.9	26.5	150.0	0.0	VBW:10Hz
Vert.	11570.0	PK	50.4	39.9	8.5	38.9	3.4	63.3	73.9	10.6	162.0	157.0	
Vert.	17355.0	PK	45.3	42.4	10.7	39.2	-9.5	49.7	73.9	24.2	139.0	145.0	
Vert.	23140.0	PK	42.0	40.3	14.6	46.7	-9.5	40.7	73.9	33.2	150.0	0.0	
Vert.	28925.0	PK	58.2	43.1	15.7	68.4	-9.5	39.1	73.9	34.8	150.0	0.0	
Vert.	11570.0	AV	38.2	39.9	8.5	38.9	3.4	51.1	53.9	2.8	162.0	157.0	VBW:10Hz
Vert.	17355.0	AV	34.1	42.4	10.7	39.2	-9.5	38.5	53.9	15.4	139.0	145.0	VBW:10Hz
Vert.	23140.0	AV	30.2	40.3	14.6	46.7	-9.5	28.9	53.9	25.0	150.0	0.0	VBW:10Hz
Vert.	28925.0	AV	46.5	43.1	15.7	68.4	-9.5	27.4	53.9	26.5	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 6.4 GHz : 20log(3.95 m / 3.0 m) = 2.4 dB

6.4 GHz - 13 GHz : 20log(4.45 m / 3.0 m) = 3.4 dB

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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-6.4 GHz) (AC2)	Wataru Kojima (6.4 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (18 GHz-40 GHz) (AC2)
Mode	Tx 11n-20 5825 MHz		

(* 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	51.7	39.9	8.5	39.0	3.4	64.5	73.9	9.4	195.0	287.0	
Hori.	17475.0	PK	54.5	42.8	10.7	39.1	-9.5	59.4	73.9	14.5	123.0	130.0	
Hori.	23300.0	PK	40.9	40.2	14.7	46.6	-9.5	39.7	73.9	34.2	150.0	0.0	
Hori.	29125.0	PK	58.9	43.1	15.8	68.4	-9.5	39.9	73.9	34.0	150.0	0.0	
Hori.	11650.0	AV	39.0	39.9	8.5	39.0	3.4	51.8	53.9	2.1	195.0	287.0	VBW:10Hz
Hori.	17475.0	AV	39.7	42.8	10.7	39.1	-9.5	44.6	53.9	9.3	123.0	130.0	VBW:10Hz
Hori.	23300.0	AV	30.0	40.2	14.7	46.6	-9.5	28.8	53.9	25.1	150.0	0.0	VBW:10Hz
Hori.	29125.0	AV	46.8	43.1	15.8	68.4	-9.5	27.8	53.9	26.1	150.0	0.0	VBW:10Hz
Vert.	11650.0	PK	51.3	39.9	8.5	39.0	3.4	64.1	73.9	9.8	156.0	31.0	
Vert.	17475.0	PK	44.5	42.8	10.7	39.1	-9.5	49.4	73.9	24.5	147.0	107.0	
Vert.	23300.0	PK	41.6	40.2	14.7	46.6	-9.5	40.4	73.9	33.5	150.0	0.0	
Vert.	29125.0	PK	58.5	43.1	15.8	68.4	-9.5	39.5	73.9	34.4	150.0	0.0	
Vert.	11650.0	AV	39.1	39.9	8.5	39.0	3.4	51.9	53.9	2.0	156.0	31.0	VBW:10Hz
Vert.	17475.0	AV	33.0	42.8	10.7	39.1	-9.5	37.9	53.9	16.0	147.0	107.0	VBW:10Hz
Vert.	23300.0	AV	30.0	40.2	14.7	46.6	-9.5	28.8	53.9	25.1	150.0	0.0	VBW:10Hz
Vert.	29125.0	AV	46.8	43.1	15.8	68.4	-9.5	27.8	53.9	26.1	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 6.4 GHz : 20log (3.95 m / 3.0 m) = 2.4 dB

6.4 GHz - 13 GHz : 20log (4.45 m / 3.0 m) = 3.4 dB

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5850.0	PK	44.8	32.9	16.4	33.8	2.4	62.7	-32.5	-17.0	15.5			
Hori.	5860.0	PK	41.6	32.9	16.4	33.8	2.4	59.5	-35.7	-27.0	8.7			
Vert.	5850.0	PK	43.1	32.9	16.4	33.8	2.4	61.0	-34.2	-17.0	17.2			
Vert.	5860.0	PK	42.7	32.9	16.4	33.8	2.4	60.6	-34.6	-27.0	7.6			

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 - 6.4 GHz : 20log (3.95 m / 3.0 m) = 2.4 dB

6.4 GHz - 13 GHz : 20log (4.45 m / 3.0 m) = 3.4 dB

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

UL Japan, Inc.

Shonan EMC Lab.

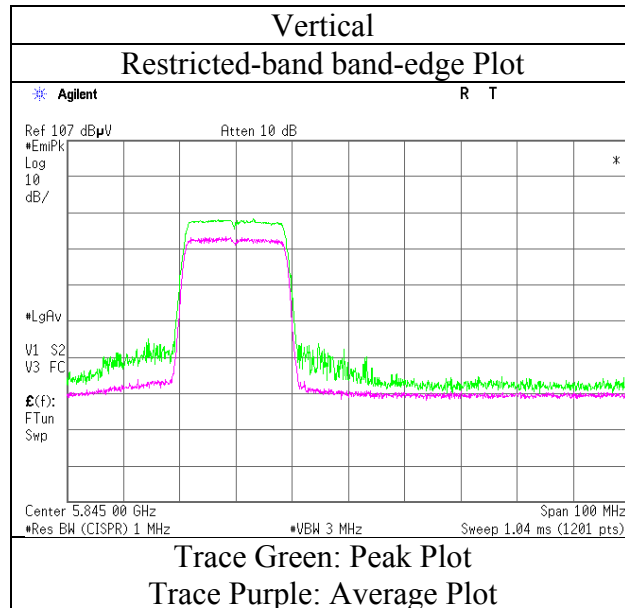
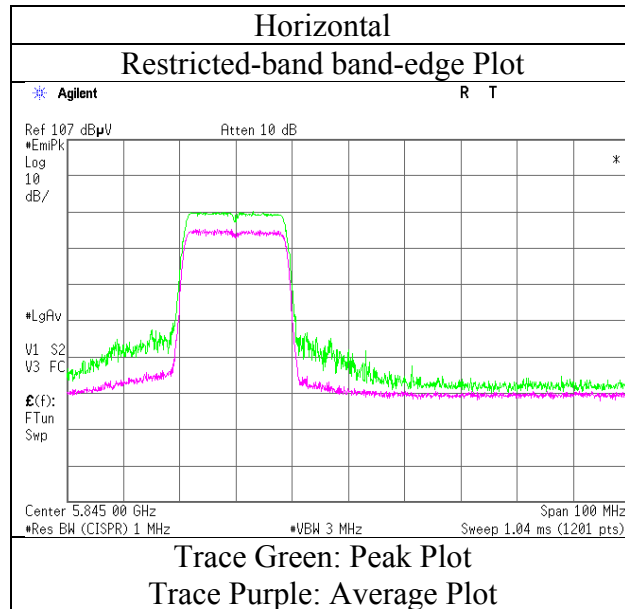
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11191143S
Date	April 22, 2016
Temperature / Humidity	23deg. C / 53 % RH
Engineer	Yasumasa Owaki
Mode	Tx 11n-20 5825 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. : 11191143S
Date : April 23, 2016 April 25, 2016 April 25, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 22 deg. C / 44 % RH 23 deg. C / 48 % RH
Engineer : Yasumasa Owaki Wataru Kojima Hiroyuki Morikawa
(1 GHz-13 GHz) (13 GHz-18 GHz) (18 GHz-40 GHz)
(AC2) (AC3) (AC2)
Mode : Tx 11n-40 5755 MHz

(* 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.	11510.0	PK	46.6	39.9	8.9	33.8	2.4	64.0	73.9	9.9	377.0	281.0	
Hori.	17265.0	PK	46.0	42.1	10.7	39.3	-9.5	50.0	73.9	23.9	129.0	131.0	
Hori.	23120.0	PK	41.3	40.3	14.6	46.8	-9.5	39.9	73.9	34.0	150.0	0.0	
Hori.	28775.0	PK	57.5	43.1	15.7	68.3	-9.5	38.5	73.9	35.4	150.0	0.0	
Hori.	11510.0	AV	33.0	39.9	8.9	33.8	2.4	50.4	53.9	3.5	377.0	281.0	VBW:10Hz
Hori.	17265.0	AV	34.9	42.1	10.7	39.3	-9.5	38.9	53.9	15.0	129.0	131.0	VBW:10Hz
Hori.	23120.0	AV	30.4	40.3	14.6	46.8	-9.5	29.0	53.9	24.9	150.0	0.0	VBW:10Hz
Hori.	28775.0	AV	46.2	43.1	15.7	68.3	-9.5	27.2	53.9	26.7	150.0	0.0	VBW:10Hz
Vert.	11510.0	PK	45.5	39.9	8.9	33.8	2.4	62.9	73.9	11.0	304.0	203.0	
Vert.	17265.0	PK	44.3	42.1	10.7	39.3	-9.5	48.3	73.9	25.6	137.0	146.0	
Vert.	23120.0	PK	42.5	40.3	14.6	46.8	-9.5	41.1	73.9	32.8	150.0	0.0	
Vert.	28775.0	PK	58.0	43.1	15.7	68.3	-9.5	39.0	73.9	34.9	150.0	0.0	
Vert.	11510.0	AV	32.8	39.9	8.9	33.8	2.4	50.2	53.9	3.7	304.0	203.0	VBW:10Hz
Vert.	17265.0	AV	35.3	42.1	10.7	39.3	-9.5	39.3	53.9	14.6	137.0	146.0	VBW:10Hz
Vert.	23120.0	AV	30.3	40.3	14.6	46.8	-9.5	28.9	53.9	25.0	150.0	0.0	VBW:10Hz
Vert.	28775.0	AV	46.1	43.1	15.7	68.3	-9.5	27.1	53.9	26.8	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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	49.8	32.6	16.4	33.8	2.4	67.4	-27.8	-27.0	0.8			
Hori.	5725.0	PK	52.4	32.6	16.4	33.8	2.4	70.0	-25.2	-17.0	8.2			
Vert.	5715.0	PK	49.2	32.6	16.4	33.8	2.4	66.8	-28.4	-27.0	1.4			
Vert.	5725.0	PK	50.2	32.6	16.4	33.8	2.4	67.8	-27.4	-17.0	10.4			

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

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

*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 : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

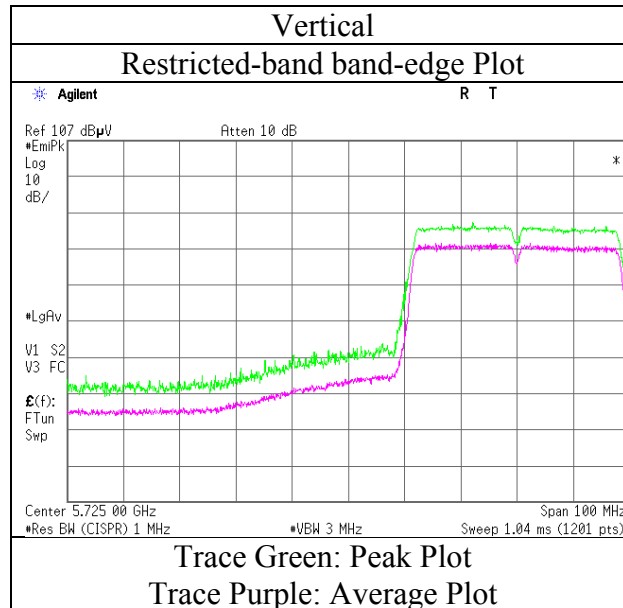
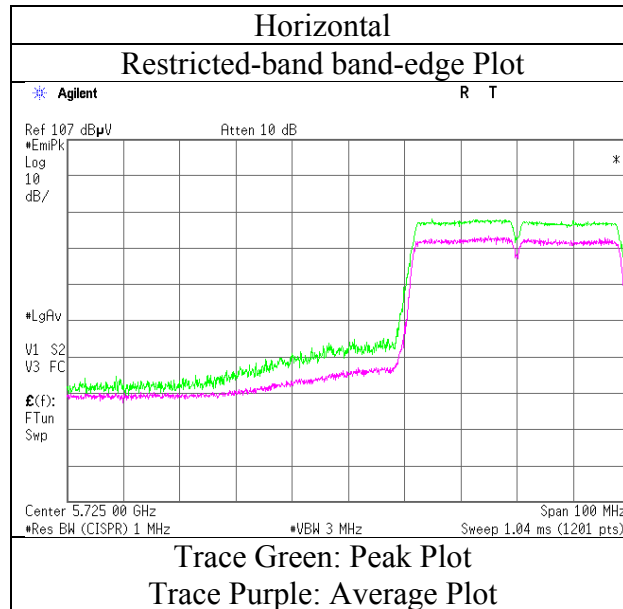
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11191143S
Date	April 22, 2016
Temperature / Humidity	23deg. C / 53 % RH
Engineer	Yasumasa Owaki
Mode	Tx 11n-40 5755 MHz



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-13 GHz) (AC2)	Wataru Kojima (13 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (30 MHz-1 GHz, 18 GHz-40 GHz) (AC2)
Mode	Tx 11n-40 5795 MHz		

(* 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.	480.0	QP	31.7	17.3	7.7	31.6	0.0	25.1	46.0	20.9	100.0	173.0	
Hori.	578.6	QP	22.0	18.6	8.2	31.6	0.0	17.2	46.0	28.8	100.0	0.0	
Hori.	653.5	QP	21.7	19.7	8.6	31.6	0.0	18.4	46.0	27.6	100.0	0.0	
Hori.	11590.0	PK	46.7	39.9	8.9	33.9	2.4	64.0	73.9	9.9	342.0	229.0	
Hori.	17385.0	PK	48.8	42.5	10.7	39.2	-9.5	53.3	73.9	20.6	126.0	129.0	
Hori.	23180.0	PK	41.8	40.3	14.6	46.7	-9.5	40.5	73.9	33.4	150.0	0.0	
Hori.	28975.0	PK	58.5	43.1	15.7	68.4	-9.5	39.4	73.9	34.5	150.0	0.0	
Hori.	34770.0	PK	56.7	43.2	17.5	68.1	-9.5	39.8	73.9	34.1	150.0	0.0	
Hori.	11590.0	AV	33.7	39.9	8.9	33.9	2.4	51.0	53.9	2.9	342.0	229.0	VBW:10Hz
Hori.	17385.0	AV	36.7	42.5	10.7	39.2	-9.5	41.2	53.9	12.7	126.0	129.0	VBW:10Hz
Hori.	23180.0	AV	30.1	40.3	14.6	46.7	-9.5	28.8	53.9	25.1	150.0	0.0	VBW:10Hz
Hori.	28975.0	AV	46.7	43.1	15.7	68.4	-9.5	27.6	53.9	26.3	150.0	0.0	VBW:10Hz
Hori.	34770.0	AV	45.2	43.2	17.5	68.1	-9.5	28.3	53.9	25.6	150.0	0.0	VBW:10Hz
Vert.	480.0	QP	32.6	17.3	7.7	31.6	0.0	26.0	46.0	20.0	100.0	188.0	
Vert.	564.6	QP	21.9	18.4	8.2	31.6	0.0	16.9	46.0	29.1	100.0	0.0	
Vert.	903.4	QP	21.2	22.1	9.8	30.8	0.0	22.3	46.0	23.7	100.0	0.0	
Vert.	11590.0	PK	46.9	39.9	8.9	33.9	2.4	64.2	73.9	9.7	124.0	19.0	
Vert.	17385.0	PK	44.0	42.5	10.7	39.2	-9.5	48.5	73.9	25.4	127.0	128.0	
Vert.	23180.0	PK	42.0	40.3	14.6	46.7	-9.5	40.7	73.9	33.2	150.0	0.0	
Vert.	28975.0	PK	57.7	43.1	15.7	68.4	-9.5	38.6	73.9	35.3	150.0	0.0	
Vert.	34770.0	PK	56.9	43.2	17.5	68.1	-9.5	40.0	73.9	33.9	150.0	0.0	
Vert.	11590.0	AV	33.5	39.9	8.9	33.9	2.4	50.8	53.9	3.1	124.0	19.0	VBW:10Hz
Vert.	17385.0	AV	32.7	42.5	10.7	39.2	-9.5	37.2	53.9	16.7	127.0	128.0	VBW:10Hz
Vert.	23180.0	AV	30.0	40.3	14.6	46.7	-9.5	28.7	53.9	25.2	150.0	0.0	VBW:10Hz
Vert.	28975.0	AV	46.6	43.1	15.7	68.4	-9.5	27.5	53.9	26.4	150.0	0.0	VBW:10Hz
Vert.	34770.0	AV	45.2	43.2	17.5	68.1	-9.5	28.3	53.9	25.6	150.0	0.0	VBW:10Hz

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

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

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$
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	41.9	32.9	16.4	33.8	2.4	59.8	-35.4	-17.0	18.4			
Hori.	5860.0	PK	42.2	32.9	16.4	33.8	2.4	60.1	-35.1	-27.0	8.1			
Vert.	5850.0	PK	41.6	32.9	16.4	33.8	2.4	59.5	-35.7	-17.0	18.7			
Vert.	5860.0	PK	41.3	32.9	16.4	33.8	2.4	59.2	-36.0	-27.0	9.0			

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 : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

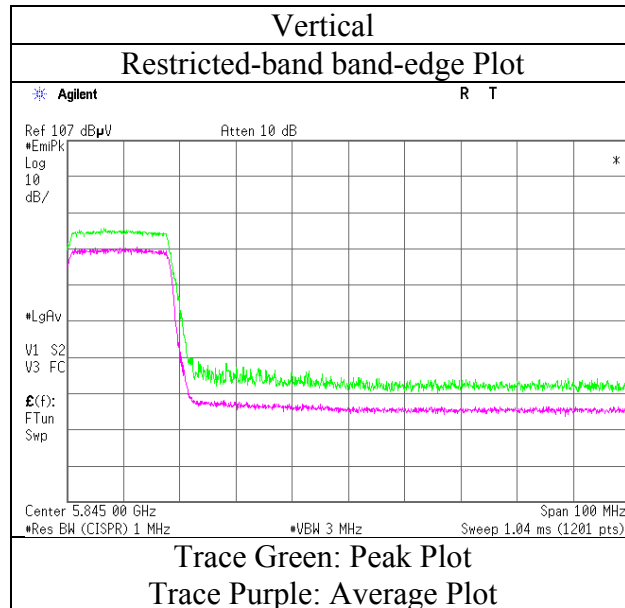
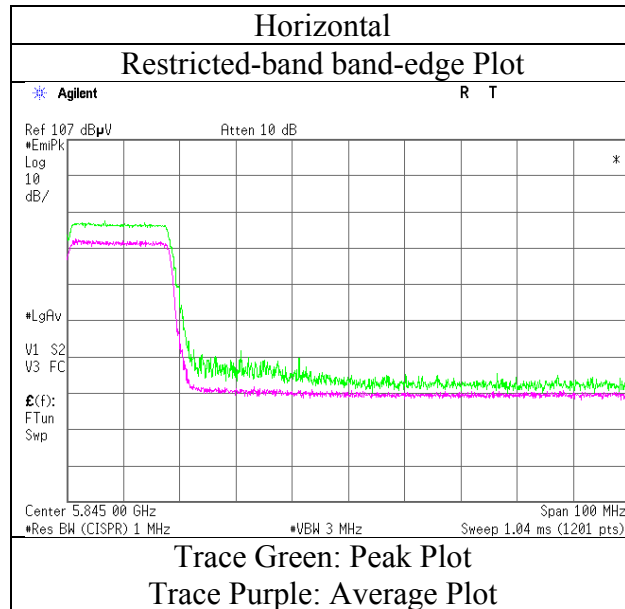
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

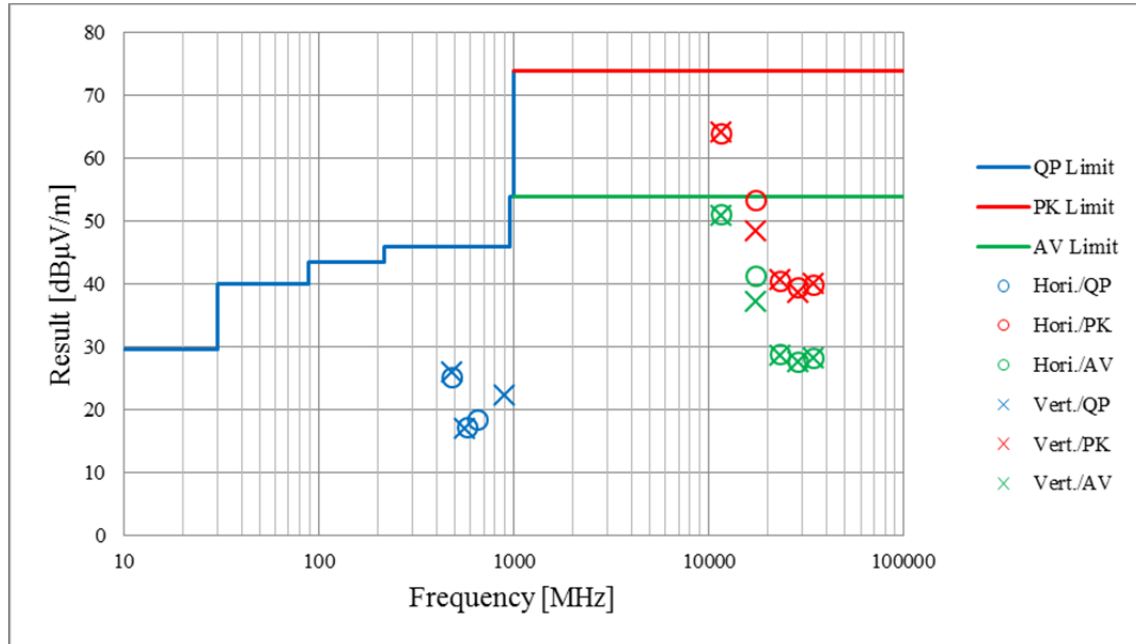
Test place : Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11191143S
Date : April 22, 2016
Temperature / Humidity : 23deg. C / 53 % RH
Engineer : Yasumasa Owaki
Mode : Tx 11n-40 5795 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

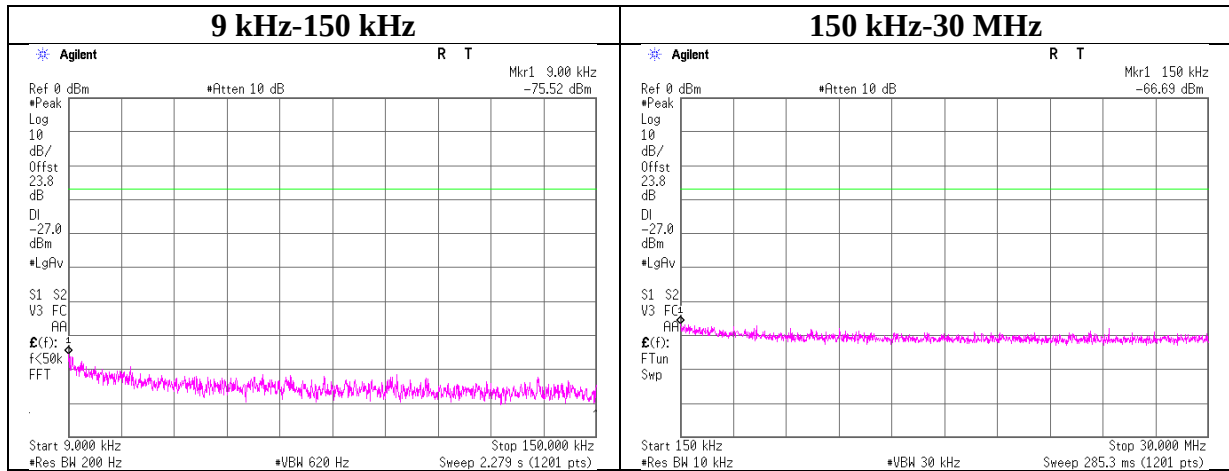
Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11191143S		
Date	April 23, 2016	April 25, 2016	April 25, 2016
Temperature / Humidity	23 deg. C / 53 % RH	22 deg. C / 44 % RH	23 deg. C / 48 % RH
Engineer	Yasumasa Owaki (1 GHz-13 GHz) (AC2)	Wataru Kojima (13 GHz-18 GHz) (AC3)	Hiroyuki Morikawa (30 MHz-1 GHz, 18 GHz-40 GHz) (AC2)
Mode	Tx 11n-40 5795 MHz		



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

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11191143S
Date : April 5, 2016
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Wataru Kojima
Mode : Tx 11n-40 5795 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-99.3	0.01	19.9	3.7	1	-75.7	300	6.0	-14.5	48.5	63.0	
150.00	-90.5	0.02	19.9	3.7	1	-66.9	300	6.0	-5.6	24.0	29.6	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain} + 10 \cdot \log(N)$

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SAT20-06	Attenuator	Weinschel Corp.	54A-20	31506	AT	2015/04/09 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	AT	2015/04/09 * 12
SCC-H1	Microwave cable	Hirose Electric	U.FL-2LP-066J 1-A-(200)	-	AT	Pre Check
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2015/12/07 * 12
KTS-08	Digital Tester	SANWA	PC500	7019224	AT	2016/03/15 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2016/03/28 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2016/03/23 * 12
SCC-H5	Microwave cable	Hirose Electric	U.FL-2LP-066J 1-A-(200)	-	AT	Pre Check
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SAT20-06	Attenuator	Weinschel Corp.	54A-20	31506	AT	2015/04/09 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	AT	2015/04/09 * 12
SCC-H1	Microwave cable	Hirose Electric	U.FL-2LP-066J 1-A-(200)	-	AT	Pre Check
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
KAF-04	Pre Amplifier	Agilent	8449B	3008A01600	RE	2016/04/22 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-0 37	RE	2015/05/11 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2015/05/19 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2015/08/10 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2015/10/22 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/03/28 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-02(SVS WR)	2	RE	2015/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE _CE,RFI,MF)	-	RE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2016/03/22 * 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
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	-
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SVS WR)	3	RE	2015/08/28 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2015/11/18 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2016/03/23 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2016/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2016/03/23 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-

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

SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	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
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/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2016/04/22 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2016/04/22 * 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-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2015/09/04 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2015/07/15 * 12
SCC-B9/B10/B11/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Fujikura/Suhner/Suhner/TOYO	RG223U/12DSFA/141PE/NS4906	-/0901-270(R F Selector)	CE	2016/04/22 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2016/02/08 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2015/08/31 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2015/12/07 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	CE	2015/09/04 * 12
SJM-09	Measure	PROMART	SEN1935	-	CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFL,MF)	-	CE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	CE	2016/03/22 * 12
SCC-B9/B10/B11/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Fujikura/Suhner/Suhner/TOYO	RG223U/12DSFA/141PE/NS4906	-/0901-270(R F Selector)	CE	2016/04/22 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2016/02/08 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2015/08/31 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2015/12/07 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	CE	2015/09/04 * 12
SJM-09	Measure	PROMART	SEN1935	-	CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFL,MF)	-	CE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	CE	2016/03/22 * 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

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