



RADIO TEST REPORT

Test Report No. : 11653099H-B

Applicant : Sony Interactive Entertainment Inc.
Type of Equipment : Wireless communication module
Model No. : AW-CB262
FCC ID : AK8M16DAM2
Test regulation : FCC Part 15 Subpart C: 2016
Class II Permissive Change
*WLAN, Bluetooth Low Energy parts
(Radiated Spurious Emission test only)
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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: February 15 to 25, 2017

Representative test engineer:

T. Matsui

Tomoki Matsui

Engineer

Consumer Technology Division

Approved by:

Takayuki S.

Takayuki Shimada

Engineer

Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

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UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11653099H-B

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SECTION 1: Customer information

Company Name	Sony Interactive Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-50-3807-5639
Facsimile Number	+81-50-3807-9594
Contact Person	Kiyoto Sasaki

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

2.1 Identification of E.U.T.

Type of Equipment	Wireless communication module
Model No	AW-CB262
Serial No	Refer to Clause 4.2
Country of Manufacture	China/Japan
Receipt Date of Sample	February 9, 2017
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

AW-CB262 is the Wireless communication module.

Product Specification

Clock frequency in the system (radio part)	40MHz
Operating Temperature	-10 - +85 deg. C
Power Supply	DC 3.3 V / DC 1.8 V
Size	20 x 18 x 3.0mm , 55pin LGA

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Radio Specification

WLAN (IEEE802.11b/g/n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz - 2462 MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	Less than 20 MHz & 5 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3 V / DC 1.8 V / DC 1.1 V
Antenna Type	PIFA (Antenna port WA for 2.4 GHz), IFA (Antenna port WB for 2.4 GHz)
Antenna Gain: G _{ANT}	5.6 dBi (Antenna port WA for 2.4 GHz), 4.2 dBi (Antenna port WB for 2.4 GHz)
Directional Gain *1)	7.93 dBi

WLAN (IEEE802.11a/11n-20/11ac-20/11n-40/11ac-40/11ac-80)

Equipment Type	Transceiver
Frequency of Operation	W52: 5180 MHz - 5240 MHz W53: 5260 MHz - 5320 MHz W56: 5500 MHz - 5700 MHz W58: 5745 MHz - 5825 MHz
Type of Modulation	OFDM
Bandwidth & Channel spacing	Less than 20 MHz / 40 MHz / 80 MHz & 20 MHz / 40 MHz / 80 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3 V / DC 1.8 V / DC 1.1 V
Antenna Type	PIFA (Antenna port WA for 5 GHz / Antenna port WC for 5 GHz)
Antenna Gain: G _{ANT}	5.0 dBi (Antenna port WA for 5 GHz) 3.5 dBi (Antenna port WC for 5 GHz)
Directional Gain *1)	7.29 dBi

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	79 MHz & 1 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3 V / DC 1.8 V / DC 1.1 V
Antenna Type	PIFA (Antenna port WC for 2.4 GHz)
Antenna Gain	6.4 dBi (Antenna port WC for 2.4 GHz)

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Type of Modulation	GFSK
Bandwidth & Channel spacing	1 MHz & 2 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3 V / DC 1.8 V / DC 1.1 V
Antenna Type	PIFA (Antenna port WC for 2.4 GHz)
Antenna Gain	6.4 dBi (Antenna port WC for 2.4 GHz)

*1) Directional antenna gain = $10 \log \left(\frac{G_{ANT1}}{(10^{-20} + 10^{-20})^2 / 2} \right)$

*This test report applies to WLAN (2.4 GHz band) and Bluetooth Low Energy.

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Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

<Contents of the change from original model>

Test Report Number of original model is 11240438H-B-R1 (issued by UL Japan, Inc.).

Specification was changed from the original model as follows:

Antenna of the EUT was modified.

The radio specification is identical to the original.

Therefore only Radiated Spurious Emission test were performed in this report.

Additionally, only the information of modified antenna is described in this report.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on November 14, 2016 and effective December 14, 2016

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r05 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	4.5 dB 2483.500 MHz, Vertical, AV	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)

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

*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r05 12.2.7.

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

FCC Part 15.31 (e)

The EUT has the power supply regulator. However one of the input voltages to RF part doesn't go through the regulator. The stable voltage will be supplied by the end product, which will be required to have a power supply regulator. Therefore, the EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has unique coupling/antenna connectors (U.FL) for antenna ports WA and WC and also has a pattern antenna (Antenna port WB) that is not removable from the EUT.

Therefore the equipment complies with the requirement of 15.203/212.

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.
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Polarity	Radiated emission (Below 1GHz)			
	(3 m*) (+/-)		(10 m*) (+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	4.7 dB	5.9 dB	5.0 dB	5.1 dB

Radiated emission (Above 1GHz)				
(3 m*) (+/-)		(1 m*) (+/-)		(10 m*) (+/-)
1 GHz - 6GHz	6 GHz - 18GHz	10 GHz - 26.5 GHz	26.5 GHz - 40GHz	1 GHz - 18 GHz
5.2 dB	5.4 dB	5.5 dB	5.5 dB	5.4 dB

*Measurement distance

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. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

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

4.1 Operating Mode(s)

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

Mode	Remarks*
IEEE 802.11b (11b)	1Mbps, PN9
IEEE 802.11n MIMO 20MHz BW (11n-20)	MCS 0, PN9
Bluetooth Low Energy(BT LE)	Maximum Packet Size, PRBS9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: WLAN 8(dBm) Bluetooth (LE) Same as production model Software: Opro_DOS_Labtool_Ver2.0.0.84 *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.	

*Details of Operating mode for WLAN

Test Item	Operating Mode	Used Antenna port	Tested frequency
Radiated Spurious Emission (Below 1 GHz)	11n-20 Tx *1)	WA + WB	2462MHz
Radiated Spurious Emission (Above 1 GHz)	11b Tx 11n-20 Tx *2)	WA + WB	2412MHz 2437MHz 2462MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test. *2) The test was performed on 11n-20 Tx mode according to “Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009, as the 11n-20 Tx mode had higher power than 11g mode at antenna terminal test.			

*Details of Operating mode for BT LE

Test Item	Operating Mode	Tested frequency
Radiated Spurious Emission	BT LE	2402MHz 2440MHz 2480MHz

*Simultaneously transmission

Test Item	Mode *1)
Radiated Spurious Emission	Tx BT LE 2402 MHz + 11a 5180 MHz Tx BT LE 2440 MHz + 11a 5180 MHz Tx BT LE 2480 MHz + 11a 5180 MHz
*1) The test was performed on the mode as a representative, because it had the highest power of 5GHz band at antenna terminal test.	

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r05".

[For below 1 GHz]

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

[For 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.

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

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: 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.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.7 m / 3.75 m *2) (1 GHz – 10 GHz), 1 m *3) (10 GHz – 26.5 GHz)		3.7 m / 3.75 m *2) (1 GHz – 10 GHz), 1 m *3) (10 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r05".

*2) Distance Factor: $20 \times \log(3.7 \text{ m} / 3.0 \text{ m}) = 1.83 \text{ dB}$ (for WLAN),
Distance Factor: $20 \times \log(3.75 \text{ m} / 3.0 \text{ m}) = 1.94 \text{ dB}$ (for BT LE, WLAN + BT LE)

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

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Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

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

Measurement range	: 30 MHz - 26.5 GHz
Test data	: APPENDIX
Test result	: Pass

APPENDIX 1: Test data

Radiated Spurious Emission

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. 11653099H
Date February 15, 2017 February 24, 2017
Temperature / Humidity 23 deg. C / 33 % RH 23 deg. C / 32 % RH
Engineer Takumi Shimada Takumi Shimada
(1 GHz -10 GHz) (10 GHz -26.5 GHz)
Mode Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	47.0	27.6	4.8	34.6	-	44.8	73.9	29.1	
Hori	4824.000	PK	44.7	31.6	7.5	33.8	-	50.0	73.9	23.9	
Hori	7236.000	PK	42.2	36.2	8.3	33.9	-	52.8	73.9	21.1	Floor noise
Hori	9648.000	PK	43.6	38.5	9.2	34.5	-	56.8	73.9	17.1	Floor noise
Hori	2390.000	AV	39.2	27.6	4.8	34.6	-	37.0	53.9	16.9	
Hori	4824.000	AV	38.4	31.6	7.5	33.8	-	43.7	53.9	10.2	
Hori	7236.000	AV	33.4	36.2	8.3	33.9	-	44.0	53.9	9.9	Floor noise
Hori	9648.000	AV	35.4	38.5	9.2	34.5	-	48.6	53.9	5.3	Floor noise
Vert	2390.000	PK	46.0	27.6	4.8	34.6	-	43.8	73.9	30.1	
Vert	4824.000	PK	46.8	31.6	7.5	33.8	-	52.1	73.9	21.8	
Vert	7236.000	PK	42.1	36.2	8.3	33.9	-	52.7	73.9	21.2	Floor noise
Vert	9648.000	PK	44.4	38.5	9.2	34.5	-	57.6	73.9	16.3	Floor noise
Vert	2390.000	AV	38.7	27.6	4.8	34.6	-	36.5	53.9	17.4	
Vert	4824.000	AV	41.0	31.6	7.5	33.8	-	46.3	53.9	7.6	
Vert	7236.000	AV	33.5	36.2	8.3	33.9	-	44.1	53.9	9.8	Floor noise
Vert	9648.000	AV	35.2	38.5	9.2	34.5	-	48.4	53.9	5.5	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (3.7 m / 3.0 m) = 1.83 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

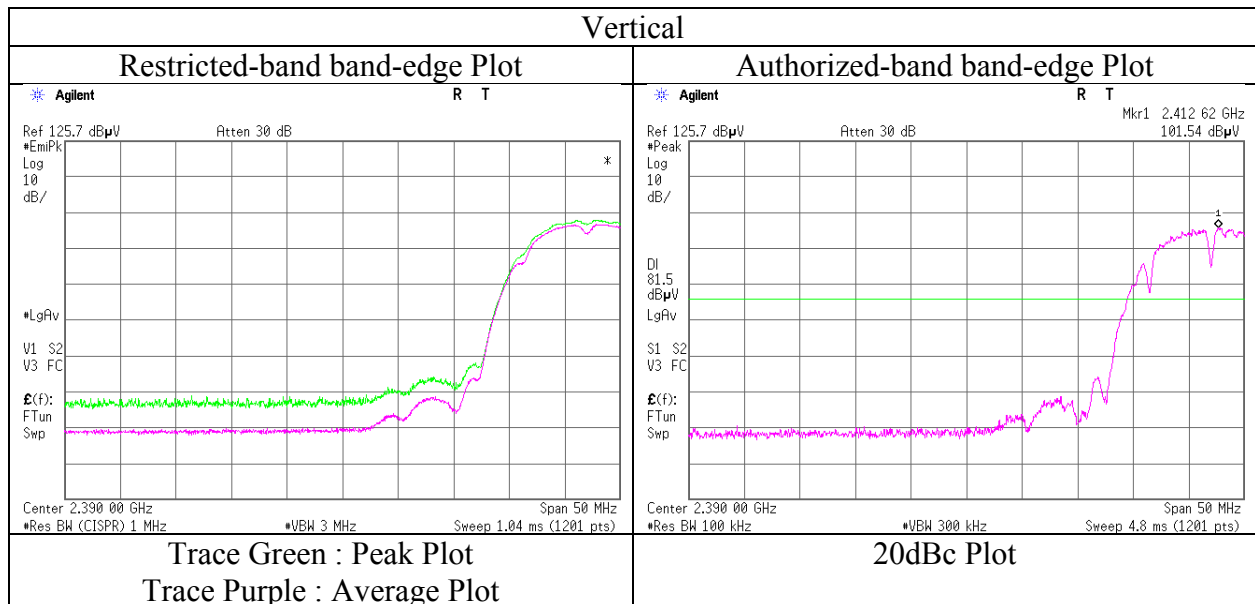
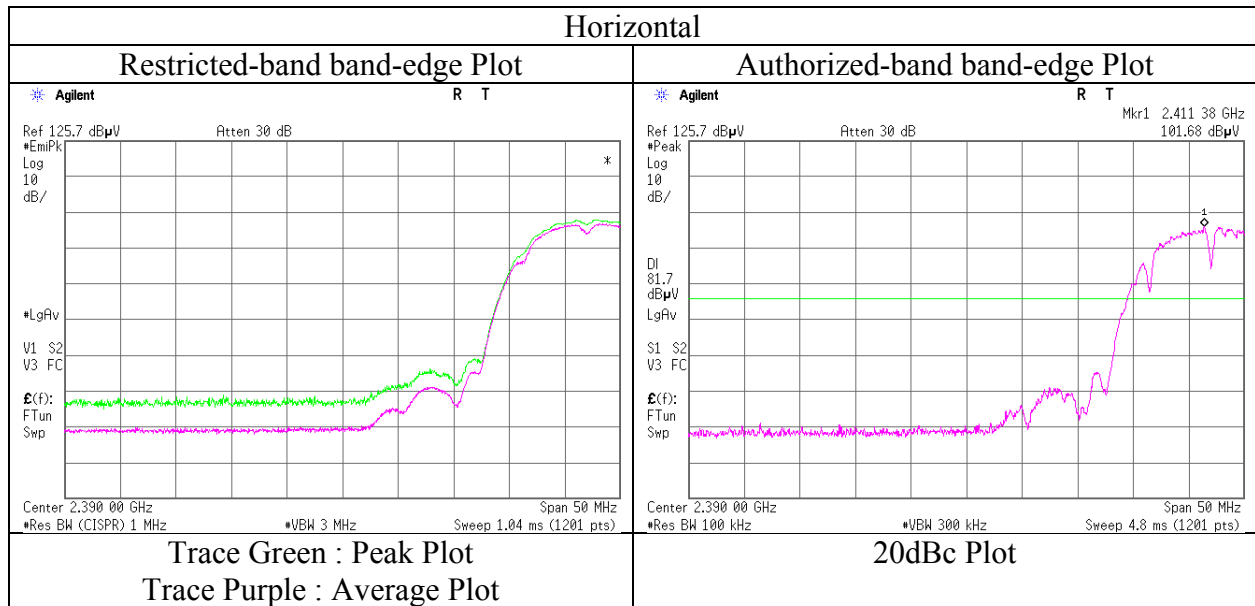
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	101.7	27.6	5.0	34.6	99.7	-	-	Carrier
Hori	2400.000	PK	47.9	27.6	4.9	34.6	45.8	79.7	33.9	
Vert	2412.000	PK	101.5	27.6	5.0	34.6	99.5	-	-	Carrier
Vert	2400.000	PK	45.7	27.6	4.9	34.6	43.6	79.5	35.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 15, 2017
Temperature / Humidity	23 deg. C / 33 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)
Mode	Tx 11b 2412 MHz



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

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Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11653099H	
Date	February 15, 2017	February 24, 2017
Temperature / Humidity	23 deg. C / 33 % RH	23 deg. C / 32 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)
Mode	Tx 11b 2437 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	45.6	31.7	7.5	33.8	-	51.0	73.9	22.9	
Hori	7311.000	PK	41.9	36.3	8.4	33.9	-	52.7	73.9	21.2	Floor noise
Hori	9748.000	PK	43.8	38.5	9.1	34.5	-	56.9	73.9	17.0	Floor noise
Hori	4874.000	AV	40.9	31.7	7.5	33.8	-	46.3	53.9	7.6	
Hori	7311.000	AV	33.5	36.3	8.4	33.9	-	44.3	53.9	9.6	Floor noise
Hori	9748.000	AV	34.3	38.5	9.1	34.5	-	47.4	53.9	6.5	Floor noise
Vert	4874.000	PK	44.3	31.7	7.5	33.8	-	49.7	73.9	24.2	
Vert	7311.000	PK	42.0	36.3	8.4	33.9	-	52.8	73.9	21.1	Floor noise
Vert	9748.000	PK	43.0	38.5	9.1	34.5	-	56.1	73.9	17.8	Floor noise
Vert	4874.000	AV	38.6	31.7	7.5	33.8	-	44.0	53.9	9.9	
Vert	7311.000	AV	33.8	36.3	8.4	33.9	-	44.6	53.9	9.3	Floor noise
Vert	9748.000	AV	34.2	38.5	9.1	34.5	-	47.3	53.9	6.6	Floor noise

$$\text{Result} = \text{Reading} + \text{Ant Factor} + \text{Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz))} - \text{Gain(Amplifier)}$$

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

Distance factor:

1 GHz - 10 GHz	$20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
10 GHz - 26.5 GHz	$20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11653099H	
Date	February 15, 2017	February 24, 2017
Temperature / Humidity	23 deg. C / 33 % RH	23 deg. C / 32 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx 11b 2462 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	45.6	27.7	5.0	34.6	-	43.7	73.9	30.2	
Hori	4924.000	PK	44.1	31.9	7.4	33.8	-	49.6	73.9	24.3	
Hori	7386.000	PK	42.3	36.4	8.4	34.0	-	53.1	73.9	20.8	Floor noise
Hori	9848.000	PK	43.5	38.5	9.1	34.5	-	56.6	73.9	17.3	Floor noise
Hori	2483.500	AV	37.8	27.7	5.0	34.6	-	35.9	53.9	18.0	
Hori	4924.000	AV	38.3	31.9	7.4	33.8	-	43.8	53.9	10.1	
Hori	7386.000	AV	33.2	36.4	8.4	34.0	-	44.0	53.9	9.9	Floor noise
Hori	9848.000	AV	34.5	38.5	9.1	34.5	-	47.6	53.9	6.3	Floor noise
Vert	2483.500	PK	45.4	27.7	5.0	34.6	-	43.5	73.9	30.4	
Vert	4924.000	PK	44.1	31.9	7.4	33.8	-	49.6	73.9	24.3	
Vert	7386.000	PK	42.2	36.4	8.4	34.0	-	53.0	73.9	20.9	Floor noise
Vert	9848.000	PK	43.1	38.5	9.1	34.5	-	56.2	73.9	17.7	Floor noise
Vert	2483.500	AV	37.9	27.7	5.0	34.6	-	36.0	53.9	17.9	
Vert	4924.000	AV	38.7	31.9	7.4	33.8	-	44.2	53.9	9.7	
Vert	7386.000	AV	33.5	36.4	8.4	34.0	-	44.3	53.9	9.6	Floor noise
Vert	9848.000	AV	34.3	38.5	9.1	34.5	-	47.4	53.9	6.5	Floor noise

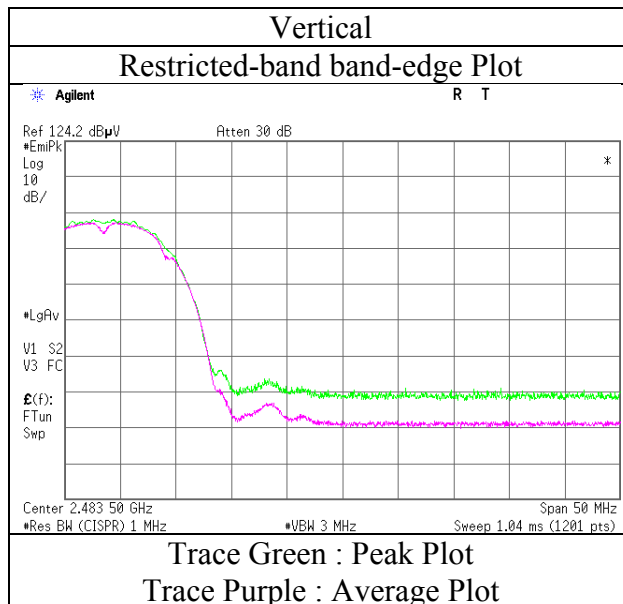
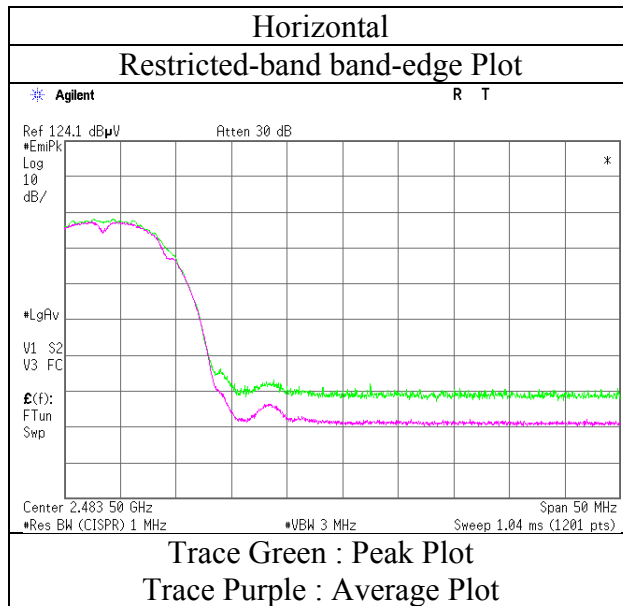
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 15, 2017
Temperature / Humidity	23 deg. C / 33 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)
Mode	Tx 11b 2462 MHz



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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11653099H	
Date	February 15, 2017	February 24, 2017
Temperature / Humidity	23 deg. C / 33 % RH	23 deg. C / 32 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)
Mode	Tx 11n-20 2412 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	61.6	27.6	4.8	34.6	-	59.4	73.9	14.5	
Hori	4824.000	PK	42.1	31.6	7.5	33.8	-	47.4	73.9	26.5	Floor noise
Hori	7236.000	PK	41.8	36.2	8.3	33.9	-	52.4	73.9	21.5	Floor noise
Hori	9648.000	PK	43.5	38.5	9.2	34.5	-	56.7	73.9	17.2	Floor noise
Hori	2390.000	AV	49.5	27.6	4.8	34.6	-	47.3	53.9	6.6	
Hori	4824.000	AV	33.6	31.6	7.5	33.8	-	38.9	53.9	15.0	Floor noise
Hori	7236.000	AV	33.2	36.2	8.3	33.9	-	43.8	53.9	10.1	Floor noise
Hori	9648.000	AV	35.0	38.5	9.2	34.5	-	48.2	53.9	5.7	Floor noise
Vert	2390.000	PK	63.6	27.6	4.8	34.6	-	61.4	73.9	12.5	
Vert	4824.000	PK	41.9	31.6	7.5	33.8	-	47.2	73.9	26.7	Floor noise
Vert	7236.000	PK	42.6	36.2	8.3	33.9	-	53.2	73.9	20.7	Floor noise
Vert	9648.000	PK	44.3	38.5	9.2	34.5	-	57.5	73.9	16.4	Floor noise
Vert	2390.000	AV	48.9	27.6	4.8	34.6	-	46.7	53.9	7.2	
Vert	4824.000	AV	33.7	31.6	7.5	33.8	-	39.0	53.9	14.9	Floor noise
Vert	7236.000	AV	33.1	36.2	8.3	33.9	-	43.7	53.9	10.2	Floor noise
Vert	9648.000	AV	34.6	38.5	9.2	34.5	-	47.8	53.9	6.1	Floor noise

$$\text{Result} = \text{Reading} + \text{Ant Factor} + \text{Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz))} - \text{Gain(Amplifier)}$$

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

Distance factor:

1 GHz - 10 GHz	$20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
10 GHz - 26.5 GHz	$20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

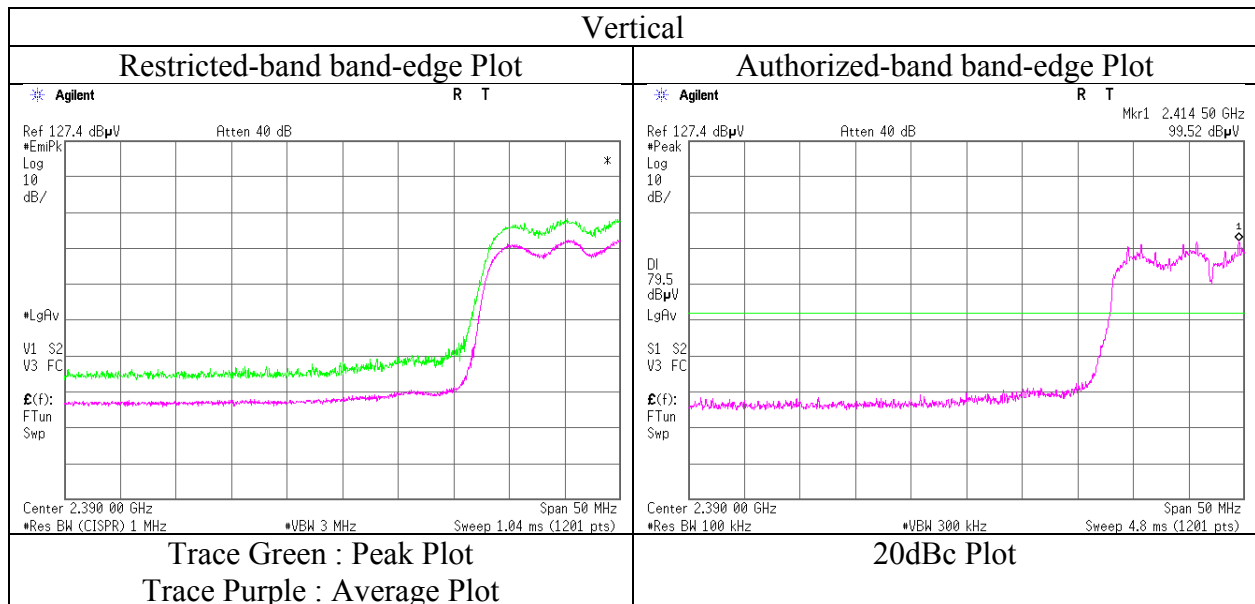
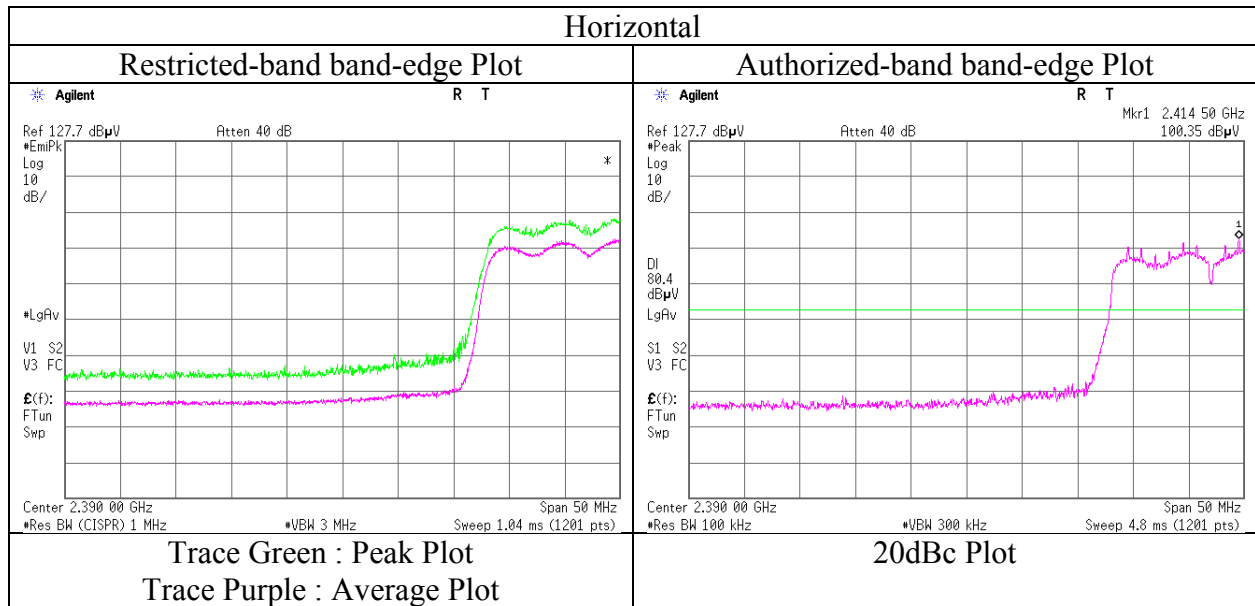
20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2412.000	PK	100.4	27.6	5.0	34.6	98.4	-	-	Carrier
Hori	2400.000	PK	58.4	27.6	4.9	34.6	56.3	78.4	22.1	
Vert	2412.000	PK	99.5	27.6	5.0	34.6	97.5	-	-	Carrier
Vert	2400.000	PK	58.4	27.6	4.9	34.6	56.3	77.5	21.2	

$$\text{Result} = \text{Reading} + \text{Ant Factor} + \text{Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz))} - \text{Gain(Amplifier)}$$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 15, 2017
Temperature / Humidity	23 deg. C / 33 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)
Mode	Tx 11n-20 2412 MHz



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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11653099H
Date : February 15, 2017 February 24, 2017
Temperature / Humidity : 23 deg. C / 33 % RH 23 deg. C / 32 % RH
Engineer : Takumi Shimada Takumi Shimada
(1 GHz -10 GHz) (10 GHz -26.5 GHz)
Mode : Tx 11n-20 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	41.3	31.7	7.5	33.8	-	46.7	73.9	27.2	Floor noise
Hori	7311.000	PK	42.8	36.3	8.4	33.9	-	53.6	73.9	20.3	Floor noise
Hori	9748.000	PK	44.1	38.5	9.1	34.5	-	57.2	73.9	16.7	Floor noise
Hori	4874.000	AV	33.2	31.7	7.5	33.8	-	38.6	53.9	15.3	Floor noise
Hori	7311.000	AV	33.9	36.3	8.4	33.9	-	44.7	53.9	9.2	Floor noise
Hori	9748.000	AV	34.6	38.5	9.1	34.5	-	47.7	53.9	6.2	Floor noise
Vert	4874.000	PK	42.1	31.7	7.5	33.8	-	47.5	73.9	26.4	Floor noise
Vert	7311.000	PK	42.5	36.3	8.4	33.9	-	53.3	73.9	20.6	Floor noise
Vert	9748.000	PK	43.3	38.5	9.1	34.5	-	56.4	73.9	17.5	Floor noise
Vert	4874.000	AV	33.7	31.7	7.5	33.8	-	39.1	53.9	14.8	Floor noise
Vert	7311.000	AV	33.8	36.3	8.4	33.9	-	44.6	53.9	9.3	Floor noise
Vert	9748.000	AV	34.7	38.5	9.1	34.5	-	47.8	53.9	6.1	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 15, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	23 deg. C / 33 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Takumi Shimada	Takumi Shimada	Tomoki Matsui
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)	(Below 1 GHz)
Mode	Tx 11n-20 2462 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.370	QP	25.3	14.6	6.8	28.2	-	18.5	40.0	21.5	
Hori	49.147	QP	25.4	11.1	7.0	28.1	-	15.4	40.0	24.6	
Hori	88.000	QP	24.6	8.0	7.3	28.0	-	11.9	40.0	28.1	
Hori	103.600	QP	26.3	10.6	7.5	27.9	-	16.5	43.5	27.0	
Hori	112.100	QP	26.5	11.8	7.5	27.9	-	17.9	43.5	25.6	
Hori	368.560	QP	28.4	15.1	9.3	27.6	-	25.2	46.0	20.8	
Hori	2483.500	PK	64.1	27.7	5.0	34.6	-	62.2	73.9	11.7	
Hori	4924.000	PK	42.6	31.9	7.4	33.8	-	48.1	73.9	25.8	Floor noise
Hori	7386.000	PK	42.1	36.4	8.4	34.0	-	52.9	73.9	21.0	Floor noise
Hori	9848.000	PK	43.8	38.5	9.1	34.5	-	56.9	73.9	17.0	Floor noise
Hori	2483.500	AV	50.4	27.7	5.0	34.6	-	48.5	53.9	5.4	
Hori	4924.000	AV	33.8	31.9	7.4	33.8	-	39.3	53.9	14.6	Floor noise
Hori	7386.000	AV	33.8	36.4	8.4	34.0	-	44.6	53.9	9.3	Floor noise
Hori	9848.000	AV	34.7	38.5	9.1	34.5	-	47.8	53.9	6.1	Floor noise
Vert	37.600	QP	31.6	14.9	6.8	28.2	-	25.1	40.0	14.9	
Vert	49.147	QP	31.1	11.1	7.0	28.1	-	21.1	40.0	18.9	
Vert	88.000	QP	28.4	8.0	7.3	28.0	-	15.7	40.0	24.3	
Vert	103.000	QP	28.9	10.5	7.5	27.9	-	19.0	43.5	24.5	
Vert	112.100	QP	28.3	11.8	7.5	27.9	-	19.7	43.5	23.8	
Vert	368.560	QP	25.0	15.1	9.3	27.6	-	21.8	46.0	24.2	
Vert	2483.500	PK	68.5	27.7	5.0	34.6	-	66.6	73.9	7.3	
Vert	4924.000	PK	41.9	31.9	7.4	33.8	-	47.4	73.9	26.5	Floor noise
Vert	7386.000	PK	42.3	36.4	8.4	34.0	-	53.1	73.9	20.8	Floor noise
Vert	9848.000	PK	43.2	38.5	9.1	34.5	-	56.3	73.9	17.6	Floor noise
Vert	2483.500	AV	51.3	27.7	5.0	34.6	-	49.4	53.9	4.5	
Vert	4924.000	AV	33.5	31.9	7.4	33.8	-	39.0	53.9	14.9	Floor noise
Vert	7386.000	AV	33.5	36.4	8.4	34.0	-	44.3	53.9	9.6	Floor noise
Vert	9848.000	AV	34.5	38.5	9.1	34.5	-	47.6	53.9	6.3	Floor noise

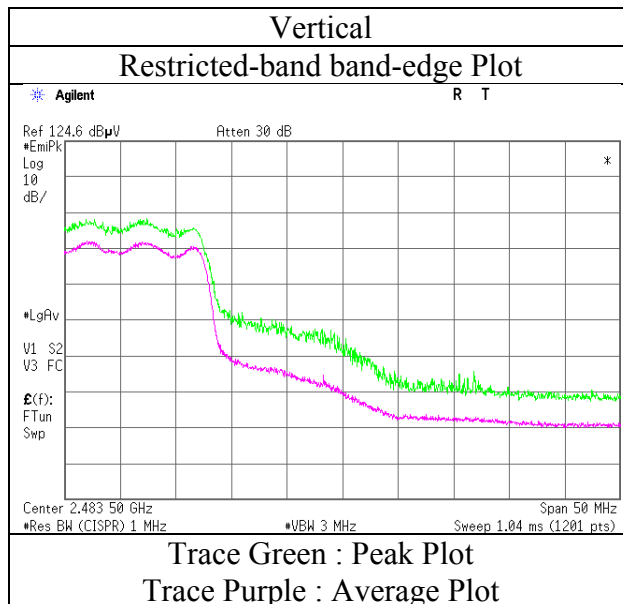
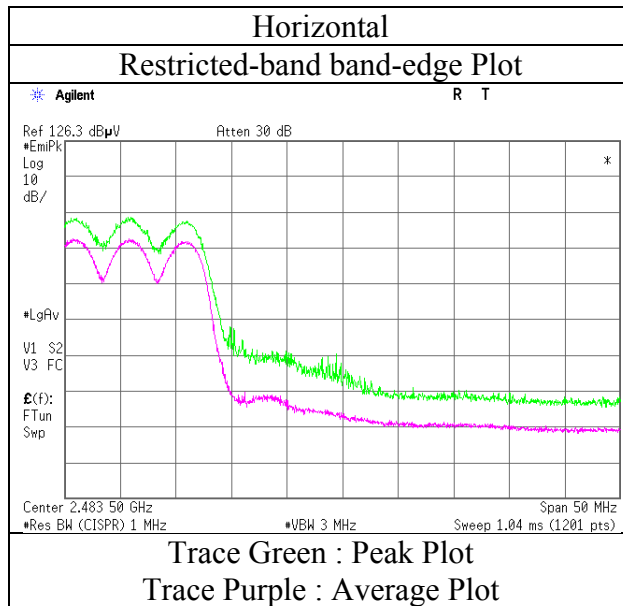
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (3.7 m / 3.0 m) = 1.83 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 15, 2017
Temperature / Humidity	23 deg. C / 33 % RH
Engineer	Takumi Shimada
	(1 GHz -10 GHz)
Mode	Tx 11n-20 2462 MHz



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

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Ise EMC Lab.

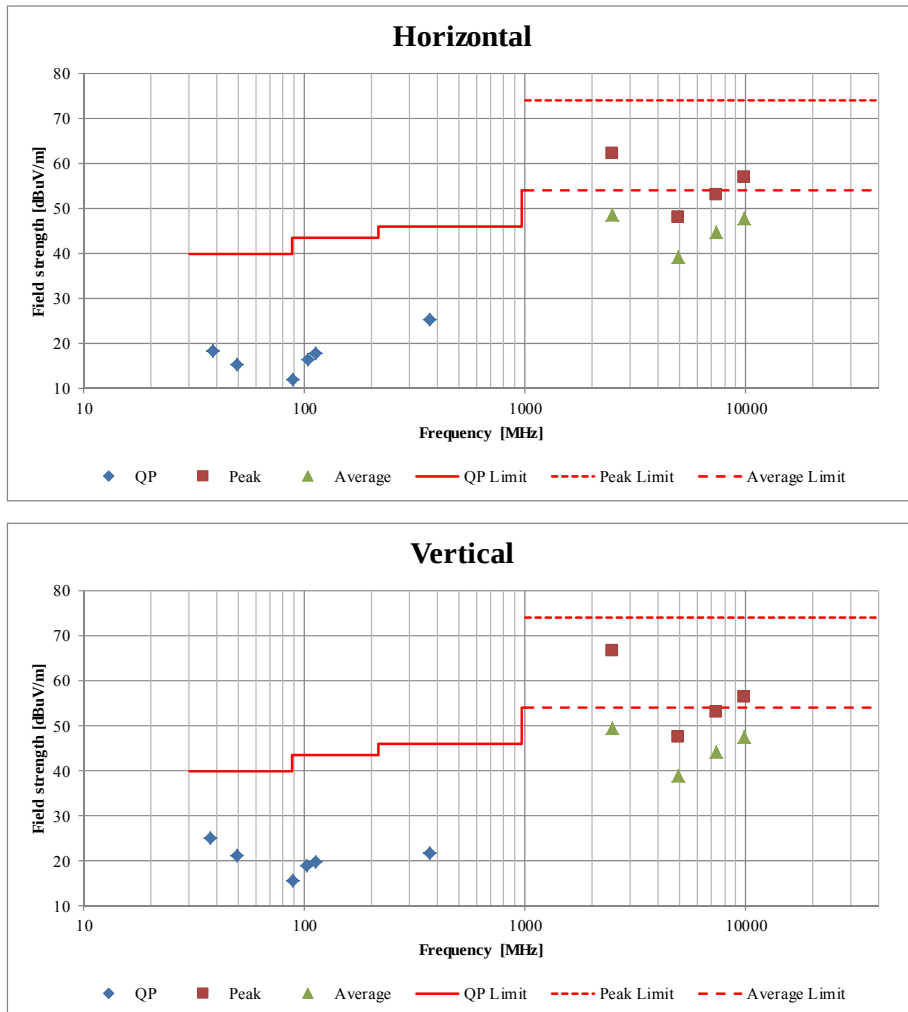
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 15, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	23 deg. C / 33 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Takumi Shimada (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)	Tomoki Matsui (Below 1 GHz)
Mode	Tx 11n-20 2462MHz		



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 17, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	25 deg. C / 27 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Tomoki Matsui (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)	Tomoki Matsui (Below 1 GHz)
Mode	Tx BT LE 2402 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.370	QP	25.1	14.6	6.8	28.2	-	18.3	40.0	21.7	
Hori	49.147	QP	25.0	11.1	7.0	28.1	-	15.0	40.0	25.0	
Hori	88.000	QP	24.6	8.0	7.3	28.0	-	11.9	40.0	28.1	
Hori	100.860	QP	25.3	10.2	7.4	27.9	-	15.0	43.5	28.5	
Hori	113.500	QP	26.1	12.0	7.5	27.9	-	17.7	43.5	25.8	
Hori	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Hori	2390.000	PK	52.6	27.6	4.9	34.6	-	50.5	73.9	23.4	
Hori	4804.000	PK	42.6	31.5	7.6	33.8	-	47.9	73.9	26.0	
Hori	7206.000	PK	41.3	36.1	8.4	33.9	-	51.9	73.9	22.0	Floor noise
Hori	9608.000	PK	43.7	38.5	9.3	34.5	-	57.0	73.9	16.9	Floor noise
Hori	2390.000	AV	39.9	27.6	4.9	34.6	2.0	39.8	53.9	14.1	*1)
Hori	4804.000	AV	34.1	31.5	7.6	33.8	-	39.4	53.9	14.5	Floor noise
Hori	7206.000	AV	33.0	36.1	8.4	33.9	-	43.6	53.9	10.3	Floor noise
Hori	9608.000	AV	34.1	38.5	9.3	34.5	-	47.4	53.9	6.5	Floor noise
Vert	38.370	QP	34.3	14.6	6.8	28.2	-	27.5	40.0	12.5	
Vert	49.147	QP	33.6	11.1	7.0	28.1	-	23.6	40.0	16.4	
Vert	88.000	QP	31.3	8.0	7.3	28.0	-	18.6	40.0	21.4	
Vert	100.860	QP	29.2	10.2	7.4	27.9	-	18.9	43.5	24.6	
Vert	113.500	QP	27.4	12.0	7.5	27.9	-	19.0	43.5	24.5	
Vert	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Vert	2390.000	PK	51.4	27.6	4.9	34.6	-	49.3	73.9	24.6	
Vert	4804.000	PK	42.6	31.5	7.6	33.8	-	47.9	73.9	26.0	Floor noise
Vert	7206.000	PK	41.3	36.1	8.4	33.9	-	51.9	73.9	22.0	Floor noise
Vert	9608.000	PK	43.7	38.5	9.3	34.5	-	57.0	73.9	16.9	Floor noise
Vert	2390.000	AV	38.2	27.6	4.9	34.6	2.0	38.1	53.9	15.8	*1)
Vert	4804.000	AV	34.1	31.5	7.6	33.8	-	39.4	53.9	14.5	Floor noise
Vert	7206.000	AV	33.0	36.1	8.4	33.9	-	43.6	53.9	10.3	Floor noise
Vert	9608.000	AV	34.1	38.5	9.3	34.5	-	47.4	53.9	6.5	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	97.6	27.6	5.0	34.6	95.6	-	-	Carrier
Hori	2400.000	PK	51.8	27.6	5.0	34.6	49.8	75.6	25.8	
Vert	2402.000	PK	96.2	27.6	5.0	34.6	94.2	-	-	Carrier
Vert	2400.000	PK	49.9	27.6	5.0	34.6	47.9	74.2	26.3	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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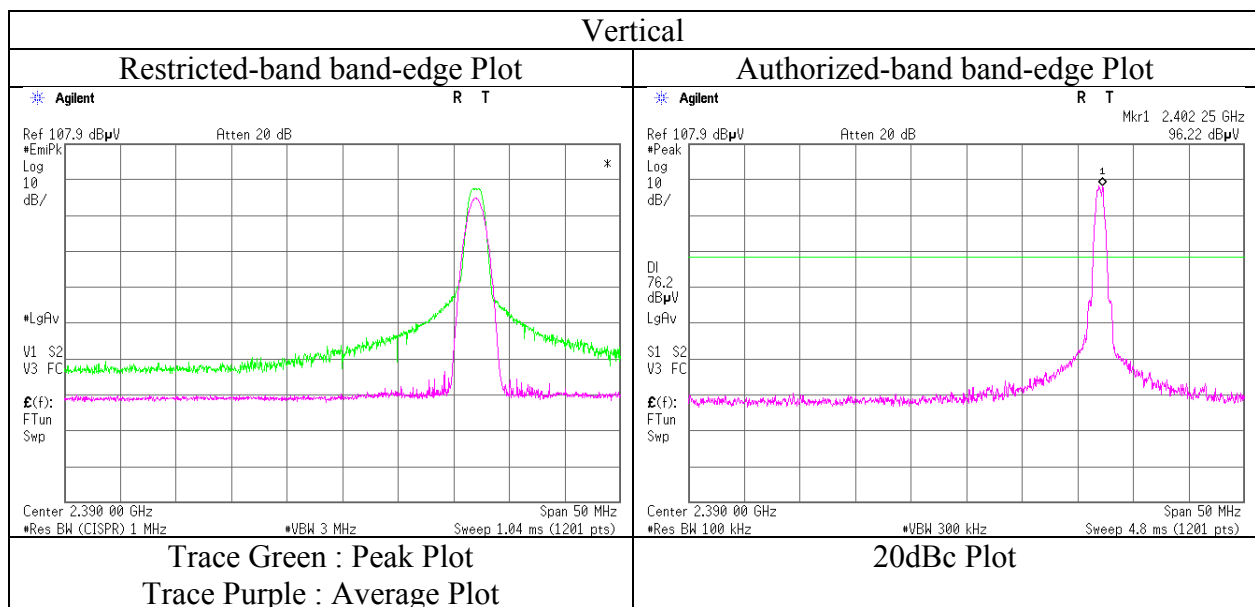
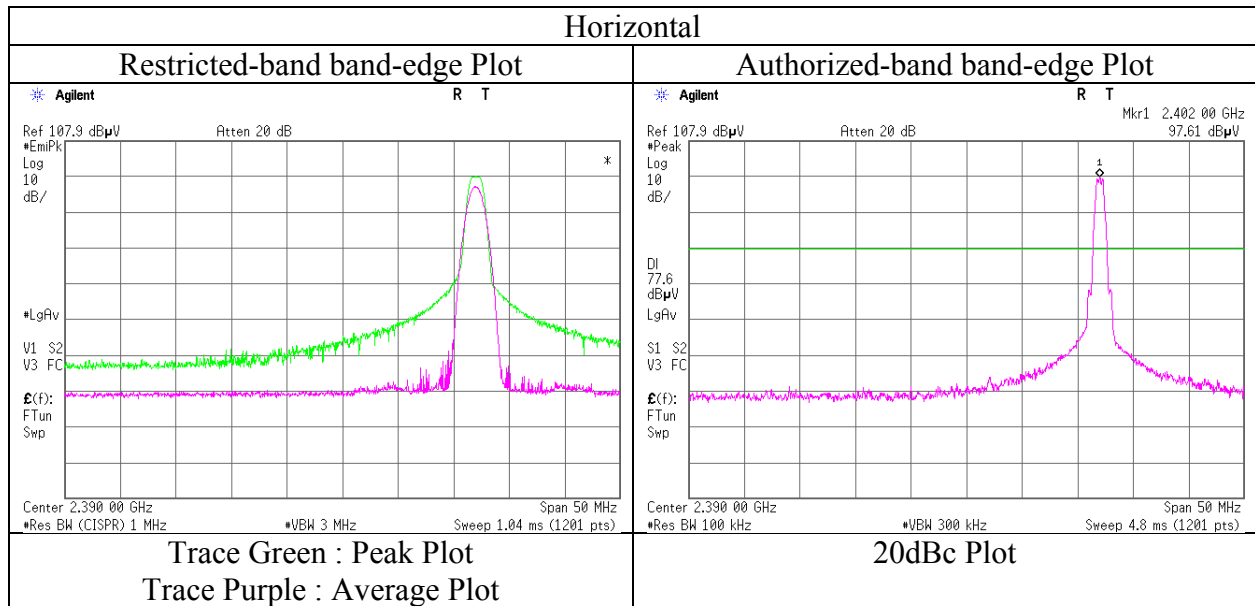
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 17, 2017
Temperature / Humidity	25 deg. C / 27 % RH
Engineer	Tomoki Matsui (1 GHz -10 GHz)
Mode	Tx BT LE 2402 MHz



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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 17, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	25 deg. C / 27 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Tomoki Matsui (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)	Tomoki Matsui (Below 1 GHz)
Mode	Tx BT LE 2440 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.370	QP	25.1	14.6	6.8	28.2	-	18.3	40.0	21.7	
Hori	49.147	QP	25.0	11.1	7.0	28.1	-	15.0	40.0	25.0	
Hori	88.000	QP	24.6	8.0	7.3	28.0	-	11.9	40.0	28.1	
Hori	98.300	QP	25.3	9.8	7.4	28.0	-	14.5	43.5	29.0	
Hori	112.100	QP	26.4	11.8	7.5	27.9	-	17.8	43.5	25.7	
Hori	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Hori	4880.000	PK	41.5	31.7	7.6	33.8	-	47.0	73.9	26.9	Floor noise
Hori	7320.000	PK	41.8	36.3	8.5	33.9	-	52.7	73.9	21.2	Floor noise
Hori	9760.000	PK	42.4	38.5	9.2	34.5	-	55.6	73.9	18.3	Floor noise
Hori	4880.000	AV	33.1	31.7	7.6	33.8	-	38.6	53.9	15.3	Floor noise
Hori	7320.000	AV	33.2	36.3	8.5	33.9	-	44.1	53.9	9.8	Floor noise
Hori	9760.000	AV	33.8	38.5	9.2	34.5	-	47.0	53.9	6.9	Floor noise
Vert	38.370	QP	34.3	14.6	6.8	28.2	-	27.5	40.0	12.5	
Vert	49.147	QP	33.6	11.1	7.0	28.1	-	23.6	40.0	16.4	
Vert	88.000	QP	31.3	8.0	7.3	28.0	-	18.6	40.0	21.4	
Vert	98.300	QP	29.5	9.8	7.4	28.0	-	18.7	43.5	24.8	
Vert	112.100	QP	27.6	11.8	7.5	27.9	-	19.0	43.5	24.5	
Vert	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Vert	4880.000	PK	41.5	31.7	7.6	33.8	-	47.0	73.9	26.9	Floor noise
Vert	7320.000	PK	41.8	36.3	8.5	33.9	-	52.7	73.9	21.2	Floor noise
Vert	9760.000	PK	42.4	38.5	9.2	34.5	-	55.6	73.9	18.3	Floor noise
Vert	4880.000	AV	33.1	31.7	7.6	33.8	-	38.6	53.9	15.3	Floor noise
Vert	7320.000	AV	33.2	36.3	8.5	33.9	-	44.1	53.9	9.8	Floor noise
Vert	9760.000	AV	33.8	38.5	9.2	34.5	-	47.0	53.9	6.9	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 17, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	25 deg. C / 27 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Tomoki Matsui (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)	Tomoki Matsui (Below 1 GHz)
Mode	Tx BT LE 2480 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.370	QP	25.1	14.6	6.8	28.2	-	18.3	40.0	21.7	
Hori	49.147	QP	25.0	11.1	7.0	28.1	-	15.0	40.0	25.0	
Hori	88.000	QP	24.6	8.0	7.3	28.0	-	11.9	40.0	28.1	
Hori	100.860	QP	25.3	10.2	7.4	27.9	-	15.0	43.5	28.5	
Hori	112.100	QP	26.3	11.8	7.5	27.9	-	17.7	43.5	25.8	
Hori	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Hori	2483.500	PK	63.2	27.7	5.1	34.6	-	61.4	73.9	12.5	
Hori	4960.000	PK	41.0	32.0	7.6	33.8	-	46.8	73.9	27.1	Floor noise
Hori	7440.000	PK	42.2	36.4	8.5	34.0	-	53.1	73.9	20.8	Floor noise
Hori	9920.000	PK	43.2	38.6	9.3	34.6	-	56.5	73.9	17.4	Floor noise
Hori	2483.500	AV	48.1	27.7	5.1	34.6	2.0	48.3	53.9	5.6	*1)
Hori	4960.000	AV	32.9	32.0	7.6	33.8	-	38.7	53.9	15.2	Floor noise
Hori	7440.000	AV	33.2	36.4	8.5	34.0	-	44.1	53.9	9.8	Floor noise
Hori	9920.000	AV	34.3	38.6	9.3	34.6	-	47.6	53.9	6.3	Floor noise
Vert	38.370	QP	34.3	14.6	6.8	28.2	-	27.5	40.0	12.5	
Vert	49.147	QP	33.6	11.1	7.0	28.1	-	23.6	40.0	16.4	
Vert	88.000	QP	31.3	8.0	7.3	28.0	-	18.6	40.0	21.4	
Vert	100.860	QP	29.2	10.2	7.4	27.9	-	18.9	43.5	24.6	
Vert	112.100	QP	27.8	11.8	7.5	27.9	-	19.2	43.5	24.3	
Vert	960.000	QP	21.9	22.4	11.4	26.5	-	29.2	46.0	16.8	
Vert	2483.500	PK	60.4	27.7	5.1	34.6	-	58.6	73.9	15.3	
Vert	4960.000	PK	41.0	32.0	7.6	33.8	-	46.8	73.9	27.1	Floor noise
Vert	7440.000	PK	42.2	36.4	8.5	34.0	-	53.1	73.9	20.8	Floor noise
Vert	9920.000	PK	43.2	38.6	9.3	34.6	-	56.5	73.9	17.4	Floor noise
Vert	2483.500	AV	47.4	27.7	5.1	34.6	2.0	47.6	53.9	6.3	*1)
Vert	4960.000	AV	32.9	32.0	7.6	33.8	-	38.7	53.9	15.2	Floor noise
Vert	7440.000	AV	33.2	36.4	8.5	34.0	-	44.1	53.9	9.8	Floor noise
Vert	9920.000	AV	34.3	38.6	9.3	34.6	-	47.6	53.9	6.3	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

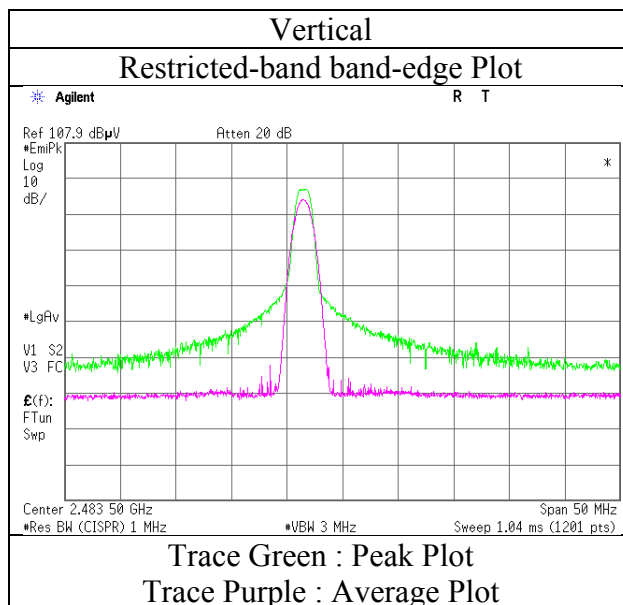
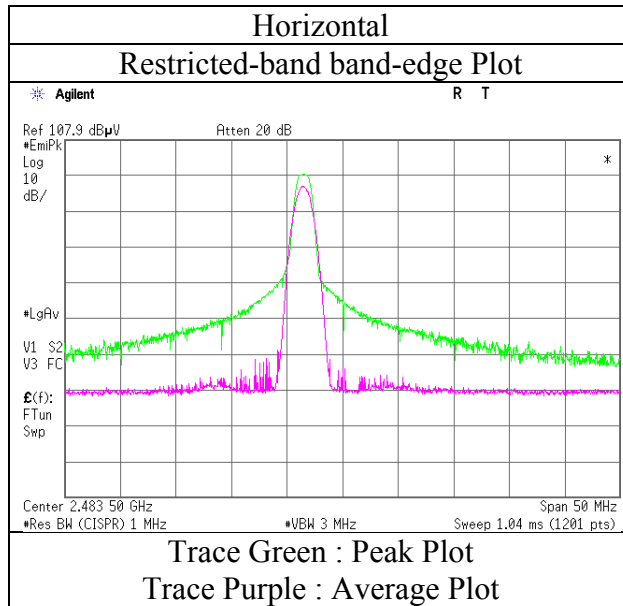
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 17, 2017
Temperature / Humidity	25 deg. C / 27 % RH
Engineer	Tomoki Matsui
	(1 GHz -10 GHz)
Mode	Tx BT LE 2480 MHz



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

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Ise EMC Lab.

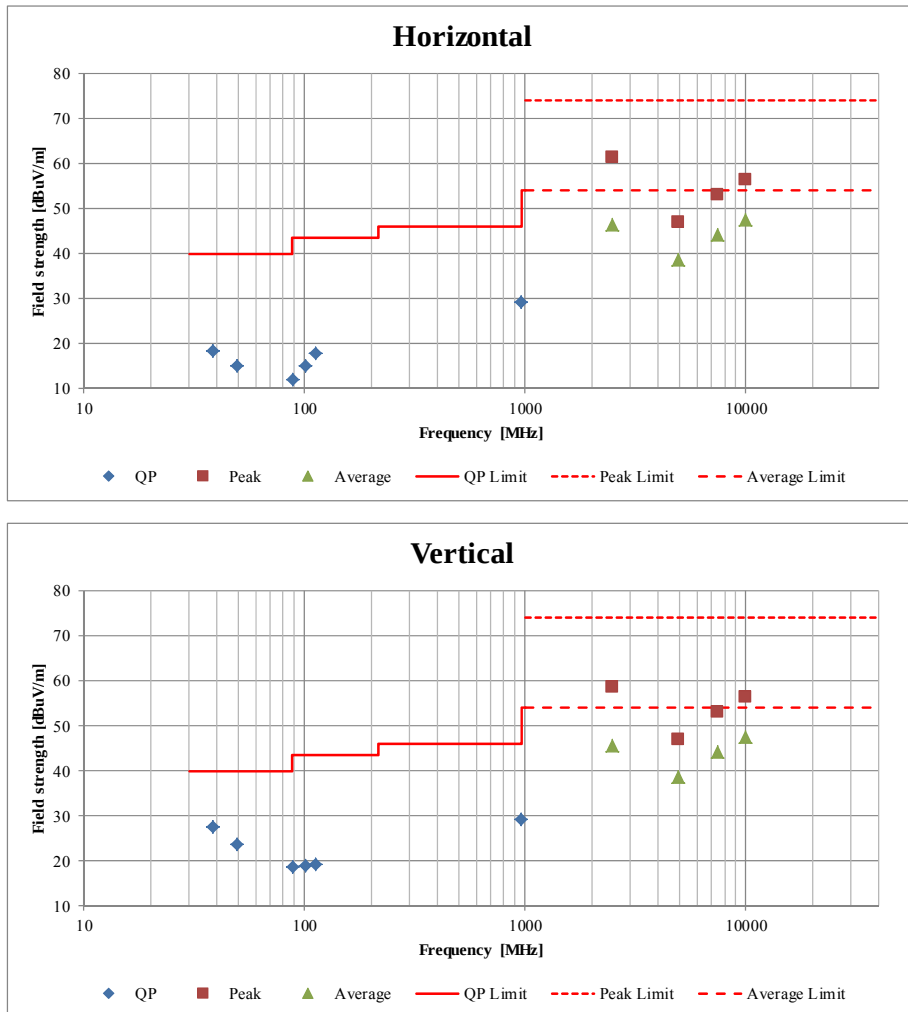
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 17, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	25 deg. C / 27 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Tomoki Matsui	Takumi Shimada	Tomoki Matsui
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)	(Below 1 GHz)
Mode	Tx BT LE 2480 MHz		



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

Radiated Spurious Emission

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11653099H
Date : February 17, 2017
Temperature / Humidity : 23 deg. C / 29 % RH
Engineer : Tomoki Matsui
(1 GHz -10 GHz)
Mode : Tx BT LE 2402 MHz and 11a 5180MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	52.7	27.6	4.9	34.6	-	50.6	73.9	23.3	
Hori	2777.383	PK	49.1	28.1	5.3	34.6	-	47.9	73.9	26.0	
Hori	2390.000	AV	38.5	27.6	4.9	34.6	2.0	38.4	53.9	15.5	*1)
Hori	2777.383	AV	40.8	28.1	5.3	34.6	2.0	41.6	53.9	12.3	
Vert	2390.000	PK	49.7	27.6	4.9	34.6	-	47.6	73.9	26.3	
Vert	2777.383	PK	49.7	28.1	5.3	34.6	-	48.5	73.9	25.4	
Vert	2390.000	AV	37.1	27.6	4.9	34.6	2.0	37.0	53.9	16.9	*1)
Vert	2777.383	AV	41.6	28.1	5.3	34.6	2.0	42.4	53.9	11.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	97.2	27.6	5.0	34.6	95.2	-	-	Carrier
Hori	2400.000	PK	51.2	27.6	5.0	34.6	49.2	75.2	26.0	
Vert	2402.000	PK	94.0	27.6	5.0	34.6	92.0	-	-	Carrier
Vert	2400.000	PK	48.8	27.6	5.0	34.6	46.8	72.0	25.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11653099H		
Date	February 17, 2017	February 24, 2017	February 25, 2017
Temperature / Humidity	23 deg. C / 29 % RH	23 deg. C / 32 % RH	24 deg. C / 25 % RH
Engineer	Tomoki Matsui (1 GHz -10 GHz)	Takumi Shimada (10 GHz -26.5 GHz)	Tomoki Matsui (Below 1 GHz)
Mode	Tx BT LE 2440 MHz and 11a 5180MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	37.600	QP	25.3	14.9	6.8	28.2	-	18.8	40.0	21.2	
Hori	49.147	QP	25.5	11.1	7.0	28.1	-	15.5	40.0	24.5	
Hori	88.000	QP	25.4	8.0	7.3	28.0	-	12.7	40.0	27.3	
Hori	103.000	QP	26.0	10.5	7.5	27.9	-	16.1	43.5	27.4	
Hori	112.100	QP	26.7	11.8	7.5	27.9	-	18.1	43.5	25.4	
Hori	368.560	QP	28.9	15.1	9.3	27.6	-	25.7	46.0	20.3	
Hori	2742.420	PK	52.1	28.0	5.2	34.6	-	50.7	73.9	23.2	
Hori	4880.000	PK	41.8	31.7	6.5	33.8	-	46.2	73.9	27.7	Floor noise
Hori	7320.000	PK	42.1	36.3	7.8	33.9	-	52.3	73.9	21.6	Floor noise
Hori	9760.000	PK	43.1	38.5	8.6	34.5	-	55.7	73.9	18.2	Floor noise
Hori	2742.420	AV	44.1	28.0	5.2	34.6	2.0	44.7	53.9	9.2	
Hori	4880.000	AV	34.6	31.7	6.5	33.8	-	39.0	53.9	14.9	Floor noise
Hori	7320.000	AV	34.2	36.3	7.8	33.9	-	44.4	53.9	9.5	Floor noise
Hori	9760.000	AV	34.5	38.5	8.6	34.5	-	47.1	53.9	6.8	Floor noise
Vert	37.600	QP	31.2	14.9	6.8	28.2	-	24.7	40.0	15.3	
Vert	49.147	QP	31.0	11.1	7.0	28.1	-	21.0	40.0	19.0	
Vert	88.000	QP	29.7	8.0	7.3	28.0	-	17.0	40.0	23.0	
Vert	103.000	QP	27.8	10.5	7.5	27.9	-	17.9	43.5	25.6	
Vert	110.900	QP	26.9	11.6	7.5	27.9	-	18.1	43.5	25.4	
Vert	368.560	QP	25.2	15.1	9.3	27.6	-	22.0	46.0	24.0	
Vert	2742.420	PK	51.5	28.0	5.2	34.6	-	50.1	73.9	23.8	
Vert	4880.000	PK	41.6	31.7	6.5	33.8	-	46.0	73.9	27.9	Floor noise
Vert	7320.000	PK	41.9	36.3	7.8	33.9	-	52.1	73.9	21.8	Floor noise
Vert	9760.000	PK	42.2	38.5	8.6	34.5	-	54.8	73.9	19.1	Floor noise
Vert	2742.420	AV	43.3	28.0	5.2	34.6	2.0	43.9	53.9	10.0	
Vert	4880.000	AV	33.5	31.7	6.5	33.8	-	37.9	53.9	16.0	Floor noise
Vert	7320.000	AV	34.6	36.3	7.8	33.9	-	44.8	53.9	9.1	Floor noise
Vert	9760.000	AV	34.6	38.5	8.6	34.5	-	47.2	53.9	6.7	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 17, 2017
Temperature / Humidity	23 deg. C / 29 % RH
Engineer	Tomoki Matsui
	(1 GHz -10 GHz)
Mode	Tx BT LE 2480 MHz and 11a 5180MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	63.6	27.7	5.1	34.6	-	61.8	73.9	12.1	
Hori	2698.170	PK	51.5	28.0	5.2	34.6	-	50.1	73.9	23.8	
Hori	2483.500	AV	48.3	27.7	5.1	34.6	2.0	48.5	53.9	5.4	*1)
Hori	2698.170	AV	43.6	28.0	5.2	34.6	2.0	44.2	53.9	9.7	
Vert	2483.500	PK	60.2	27.7	5.1	34.6	-	58.4	73.9	15.5	
Vert	2698.170	PK	50.4	28.0	5.2	34.6	-	49.0	73.9	24.9	
Vert	2483.500	AV	46.3	27.7	5.1	34.6	2.0	46.5	53.9	7.4	*1)
Vert	2698.170	AV	42.8	28.0	5.2	34.6	2.0	43.4	53.9	10.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

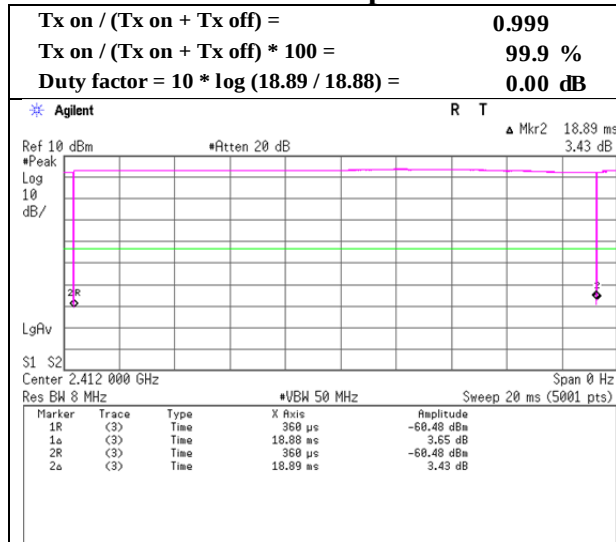
Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

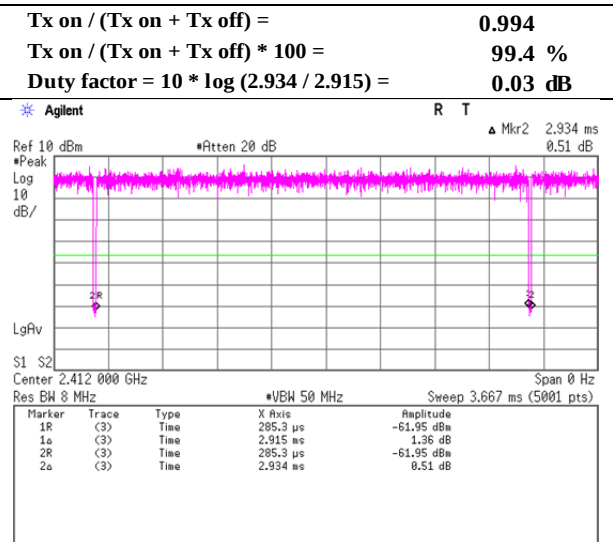
Burst rate confirmation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11653099H
Date	February 15, 2017
Temperature / Humidity	23 deg. C / 33 % RH
Engineer	Takumi Shimada
Mode	Tx

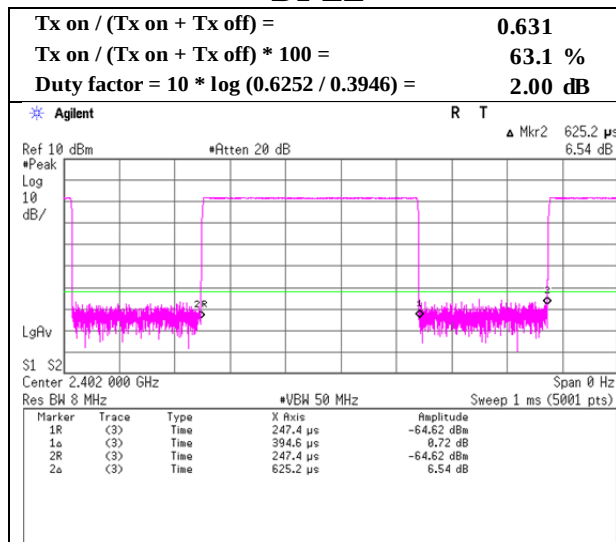
11b 1 Mbps



11n-20 MCS 0



BT LE



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2016/08/02 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	RE	2016/07/01 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2016/02/29 * 12
MCC-216	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	RE	2016/08/29 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2017/01/16 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2016/08/23 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2016/09/19 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2016/09/28 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2016/06/24 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2016/10/21 * 12
MBA-08	Biconical Antenna	Schwarzbeck	VHA9103B	08031	RE	2016/09/29 * 12
MLA-21	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2017/01/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2016/02/08 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2016/11/28 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2016/09/13 * 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 test

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124