



RADIO TEST REPORT

Test Report No. : 11922904M-B-R2

Applicant : PIONEER CORPORATION
Type of Equipment : MULTIMEDIA NAVIGATION RECEIVER
Model No. : AVIC-W8400NEX
FCC ID : AJDK103
Test regulation : FCC Part 15 Subpart C: 2017
(*Wireless LAN part)
Test items : Radiated emission tests
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11922904M-B-R1. 11922904M-B-R1 is replaced with this report.

Date of test: September 2 – 6 , 2017

**Representative
test operator:**

K. Ando

Kazuhiro Ando
Engineer

Consumer Technology Division

Approved by :

T. Yamashita

Tomoyuki Yamashita
Engineer

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.

Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

REVISION HISTORY

Original Test Report No.: 1192294M-B

[illegible]

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SECTION 1: Customer information

Company Name	:	PIONEER CORPORATION
Address	:	25-1, Yamada, Kawagoe-shi, Saitama, 350-8555, Japan
Telephone Number	:	+81-49-228-7787
Facsimile Number	:	+81-49-228-6493
Contact Person	:	Hiroshi Fuse

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

2.1 Identification of E.U.T.

Type of Equipment	:	MULTIMEDIA NAVIGATION RECEIVER
Model No.	:	AVIC-W8400NEX
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 14.4 V
Receipt Date of Sample	:	August 23, 2017
Country of Mass-production	:	Thailand
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

General Specification

Model: AVIC-W8400NEX (referred to as the EUT in this report) is a MULTIMEDIA NAVIGATION RECEIVER.

Clock frequency(ies) in the system	:	Bluetooth Wi-Fi module 37.4 MHz LPO clock for Bluetooth Wi-Fi module 32.768 kHz DC-DCCONVERTER 1000 kHz/ 700.5 kHz, 2.29 MHz, 2.17 MHz, 767.25 kHz/ 699.05 kHz, 767.25 kHz/ 699.05 kHz, 436.907 kHz/ 383.625 kHz, 436.907 kHz/ 383.625 kHz FM/AM TUNER 9.216 MHz (VCO: 5.9904 GHz/ 6.2208 GHz) TMC TUNER 9.216 MHz (VCO: 5.9904 GHz/ 6.2208 GHz) MAIN PROCESSER 24 MHz, 32.768 kHz, 11.2896 MHz SYSTEM MICRO COMPUTER 3.93216 MHz DVD DRIVER 27 MHz, 121.5 MHz, 36.864 MHz/ 33.8688 MHz LCD BACK LIGHT 436.907 kHz/ 383.625 kHz ELECTRONIC VOLUME 18.432 MHz FPGA 14.7456 MHz ECHO CANCELLER 12.288 MHz HDMI RECEIVER 27 MHz DISPLAY CONTROLLER 32 MHz VIDEO DECODER 32 MHz MICRO COMPUTER 10 MHz WWR UNIT 24 MHz GPS 26 MHz
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2.4 GHz: 2402 MHz -2480 MHz (Bluetooth BDR/EDR) 2412 MHz -2462 MHz (IEEE 802.11b/g/n) W58: 5745MHz - 5825 MHz (IEEE 802.11a/n) 5755 MHz - 5795 MHz (IEEE 802.11n/ac) 5775 MHz (IEEE 802.11ac)
Modulation	:	DSSS (IEEE 802.11b), OFDM (IEEE 802.11g/n/a/ac) FHSS (Bluetooth BDR/EDR)
Power Supply (inner)	:	DC 3.3 V/1.8 V
Antenna type	:	Monopole Antenna
Antenna Gain	:	2.4 GHz: -8.0 dBi (Bluetooth BDR/EDR) -4.7 dBi (Wireless LAN) 5 GHz: -3.0 dBi
Operating Temperature	:	-10 deg. C to +60 deg. C

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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on September 20, 2017 and effective October 20, 2017

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

* The revision on September 20, 2017, 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 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	-	N/A *1)	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	-	N/A *2)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d)		N/A *2)	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		N/A *2)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.9 dB 404.998 MHz, QP, Hori.	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *3)

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

*1) The test is not applicable since the EUT does not have AC power ports.

*2) For other than the Radiated spurious emission tests, refer to test report No 11922902S-B-R2.

*3) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v04 12.2.7.

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

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V / 1.8 V) constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, Therefore this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

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Facsimile : +81 478 82 3373

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 $k=2$.

Item	Frequency range	Uncertainty (+/-)
Radiated emission (Measurement distance: 3 m)	30 MHz - 200 MHz	4.5 dB
	200 MHz - 1 GHz	5.8 dB
	1 GHz - 6 GHz	5.1 dB
	6 GHz - 18 GHz	5.4 dB
Radiated emission (Measurement distance: 1 m)	18 GHz - 26.5 GHz	5.4 dB

Radiated emission test

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

3.5 Test Location

UL Japan, Inc. Kashima EMC Lab.
1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN
Telephone: +81 478 88 6500, Facsimile: +81 478 82 3373
JAB Accreditation No. : RTL02610

Test site	ISED Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Open site	4659A-1	6.0 x 5.5 x 2.5	20 x 40	10 m
No.2 Open site	4659A-2	4.4 x 4.4 x 2.15	18 x 20	10 m
No.5 Open site	4659A-5	8.6 x 7.1 x 2.4	18 x 23	10 m
No.1 Shielded room	4659A-1	5.4 x 4.5 x 2.3	-	-
No.2 Shielded room	4659A-2	3.6 x 2.7 x 2.3	-	-
No.3 Shielded room	-	5.4 x 3.6 x 2.3	-	-
No.4 Shielded Room	-	6.1 x 6.1 x 3.1	-	-
No.5 Shielded Room	4659A-5	4.2 x 3.1 x 2.5	-	-
No.3 Fully Anechoic Chamber	-	7.0 x 3.5 x 3.5	-	-
No.6 Semi-anechoic Chamber	4659A-6	8.5 x 5.5 x 5.2	-	3 m
No.10 Semi-anechoic Chamber	4659A-10	18.4 x 9.9 x 7.7	-	10 m
No.11 Semi-anechoic Chamber	4659A-7	9.0 x 6.5 x 5.2	-	3 m
No.1 Measurement room	-	5.0 x 3.7 x 2.6	-	-
No.2 Measurement room	-	4.3 x 4.4 x 2.7	-	-
No.3 Measurement room	-	4.3 x 4.4 x 2.7	-	-

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)

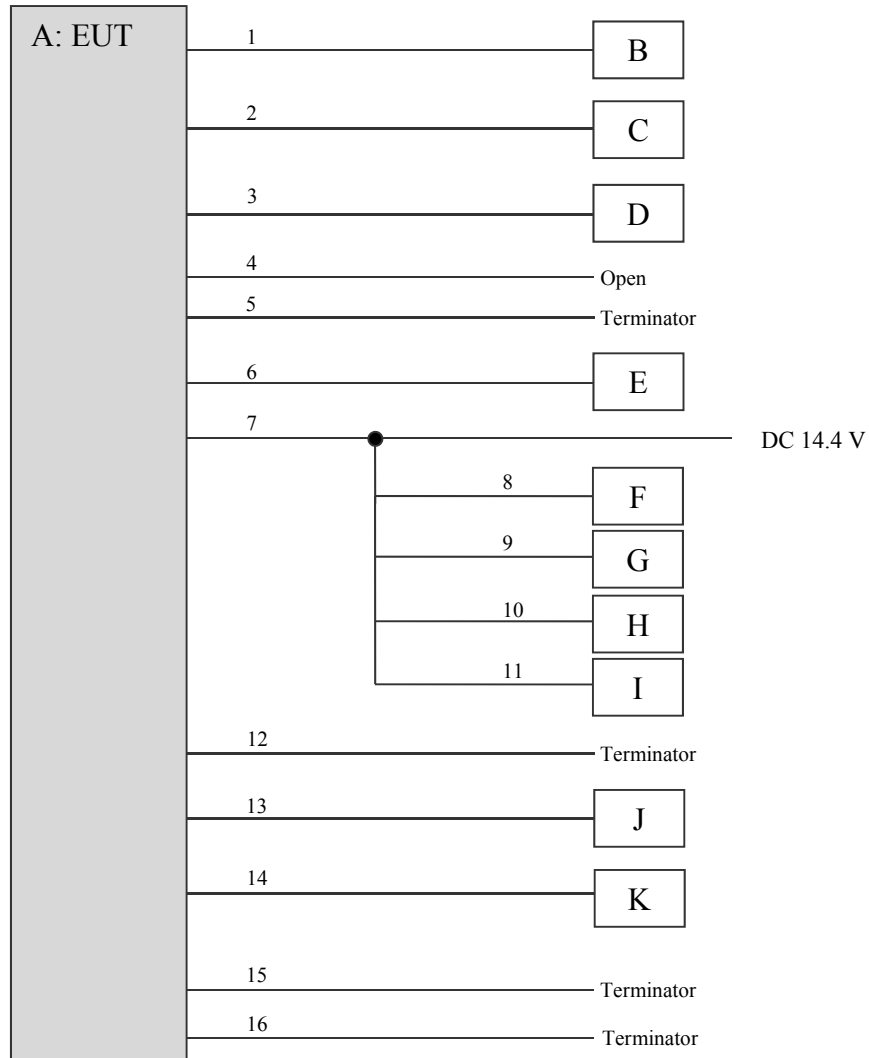
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009 also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Power setting	Remarks*
IEEE 802.11b (11b)	14	11 Mbps, PN9
IEEE 802.11g (11g)	12	48 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	11	MCS 5, SGI:OFF, PN9
*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; Software: SoC: Ver0.041100 System uCom: Ver7.07		
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission (Radiated) (Below 1 GHz)	11g Tx *1)	2437 MHz
Spurious Emission (Radiated) (Above 1 GHz)	11b Tx	2412 MHz
	11g Tx	2437 MHz
	11n-20 Tx	2462 MHz
*1) The test was performed with the antenna that had higher power as a representative.		

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MULTIMEDIA NAVIGATION RECEIVER	AVIC-W8400NEX	QFTM000025UC	PIONEER	EUT
B	GPS Antenna	CXE5736	-	QFN	-
C	USB Memory	RUF2-HSCLTVA5	P0000015377	BUFFALO	-
D	USB Memory	RUF2-HSCLTVA5	P0000015378	BUFFALO	-
E	Mic	-	-	-	-
F	Speaker	KFC-RS101	-	KENWOOD	-
G	Speaker	KFC-RS101	-	KENWOOD	-
H	Speaker	KFC-RS101	-	KENWOOD	-
I	Speaker	KFC-RS101	-	KENWOOD	-
J	Smartphone	SO-01C	-	Sony Ericsson	-
K	Vehicle Tuner	SXV200	-	SiriusXM	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	GPS Antenna	3.5	Unshielded	Unshielded	-
2	USB	1.5	Shielded	Shielded	-
3	USB	1.5	Shielded	Shielded	-
4	Steering Wheel Control	1.0	Unshielded	Unshielded	-
5	R. Audio Out	1.3	Unshielded	Unshielded	-
6	Mic	3.0	Unshielded	Unshielded	-
7	Wire Harness Set (DC)	0.4 + 1.5	Unshielded	Unshielded	-
8	Speaker	0.2 + 1.0	Unshielded	Unshielded	-
9	Speaker	0.2 + 1.0	Unshielded	Unshielded	-
10	Speaker	0.2 + 1.0	Unshielded	Unshielded	-
11	Speaker	0.2 + 1.0	Unshielded	Unshielded	-
12	iDATA	1.6	Unshielded	Unshielded	-
13	HDMI	2.0	Shielded	Shielded	-
14	Vehicle Tuner	0.65	Shielded	Shielded	-
15	Wire Harness Set	0.2 + 1.5	Unshielded	Unshielded	-
16	FM Antenna	2.0	Shielded	Shielded	-

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Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

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Facsimile : +81 478 82 3373

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The 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 1 GHz	Above 1 GHz
Antenna Type	Hybrid	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	Hybrid	Horn		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	4.38 m *2) (1 GHz – 10 GHz), 1 m *3) (10 GHz – 26 GHz)		4.38 m *2) (1 GHz – 10 GHz),

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

*2) Distance Factor: $20 \times \log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

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

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

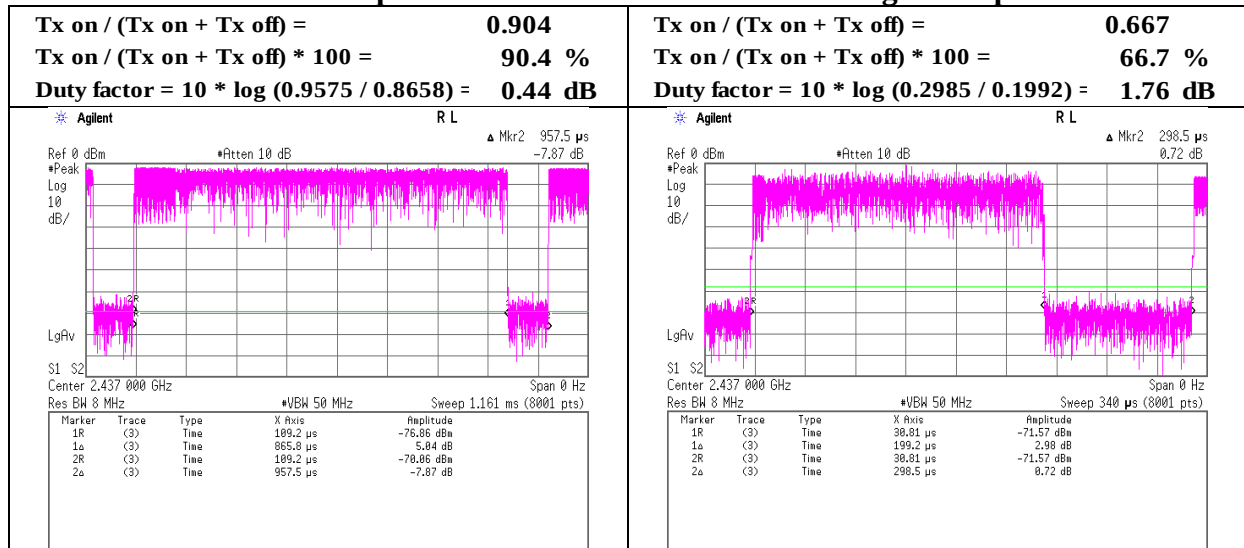
Measurement range	: 30 MHz - 26 GHz
Test data	: APPENDIX
Test result	: Pass

APPENDIX 1: Test data

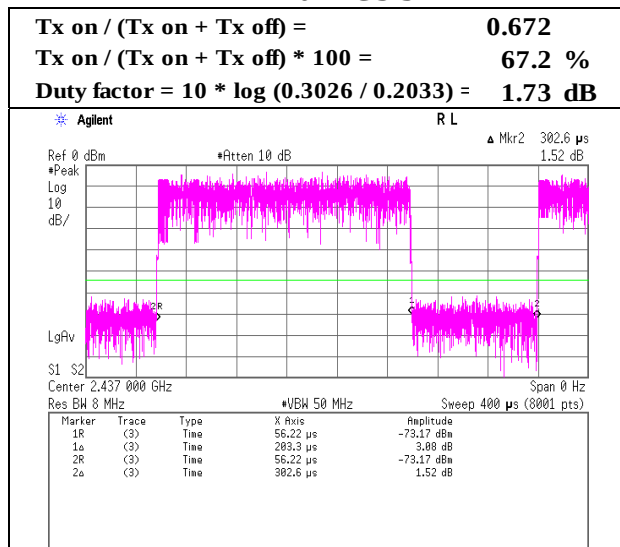
Burst rate confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11922902S-B
Date : September 4, 2017
Temperature / Humidity : 26 deg. C / 48 % RH
Engineer : Makoto Hosaka
Mode : Tx

11b 11 Mbps



11n-20 MCS 5



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

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1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 2, 2017 September 5, 2017
Temperature / Humidity 23 deg. C / 48 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11b 2412 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.	1920.166	PK	49.70	27.10	13.30	42.20	3.30	51.20	73.90	22.7	109	189	
Hori.	2390.000	PK	47.70	27.60	13.60	42.10	3.30	50.10	73.90	23.8	137	184	
Hori.	3168.000	PK	51.10	29.50	5.20	42.10	3.30	47.00	73.90	26.9	144	86	
Hori.	4824.000	PK	45.90	32.60	5.60	41.90	3.30	45.50	73.90	28.4	100	0	Floor noise
Hori.	7236.000	PK	45.40	37.20	7.00	40.90	3.30	52.00	73.90	21.9	100	0	Floor noise
Hori.	1920.166	AV	41.70	27.10	13.30	42.20	3.30	43.20	53.90	10.7	109	189	
Hori.	3168.000	AV	45.60	29.50	5.20	42.10	3.30	41.50	53.90	12.4	144	86	
Vert.	1920.169	PK	49.20	27.10	13.30	42.20	3.30	50.70	73.90	23.2	147	184	
Vert.	2390.000	PK	48.80	27.60	13.60	42.10	3.30	51.20	73.90	22.7	127	42	
Vert.	3168.000	PK	49.50	29.50	5.20	42.10	3.30	45.40	73.90	28.5	241	211	
Vert.	4824.000	PK	45.50	32.60	5.60	41.90	3.30	45.10	73.90	28.8	100	0	Floor noise
Vert.	7236.000	PK	45.10	37.20	7.00	40.90	3.30	51.70	73.90	22.2	100	0	Floor noise
Vert.	1920.169	AV	40.90	27.10	13.30	42.20	3.30	42.40	53.90	11.5	147	184	
Vert.	3168.000	AV	42.50	29.50	5.20	42.10	3.30	38.40	53.90	15.5	241	211	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.40	27.60	13.60	42.10	0.44	3.30	41.24	53.90	12.7	*1)
Hori.	4824.000	AV	37.20	32.60	5.60	41.90	0.44	3.30	37.24	53.90	16.7	Floor noise
Hori.	7236.000	AV	36.30	37.20	7.00	40.90	0.44	3.30	43.34	53.90	10.6	Floor noise
Vert.	2390.000	AV	38.90	27.60	13.60	42.10	0.44	3.30	41.74	53.90	12.2	*1)
Vert.	4824.000	AV	36.80	32.60	5.60	41.90	0.44	3.30	36.84	53.90	17.1	Floor noise
Vert.	7236.000	AV	36.10	37.20	7.00	40.90	0.44	3.30	43.14	53.90	10.8	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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]	Remark
Hori.	2412.000	PK	88.90	27.60	13.60	42.10	3.30	91.30	-	-	Carrier
Hori.	2398.417	PK	44.80	27.60	13.60	42.10	3.30	47.20	71.30	24.1	
Hori.	2400.000	PK	41.90	27.60	13.60	42.10	3.30	44.30	71.30	27.0	
Vert.	2412.000	PK	92.80	27.60	13.60	42.10	3.30	95.20	-	-	Carrier
Vert.	2398.458	PK	46.50	27.60	13.60	42.10	3.30	48.90	75.20	26.3	
Vert.	2400.000	PK	44.50	27.60	13.60	42.10	3.30	46.90	75.20	28.3	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

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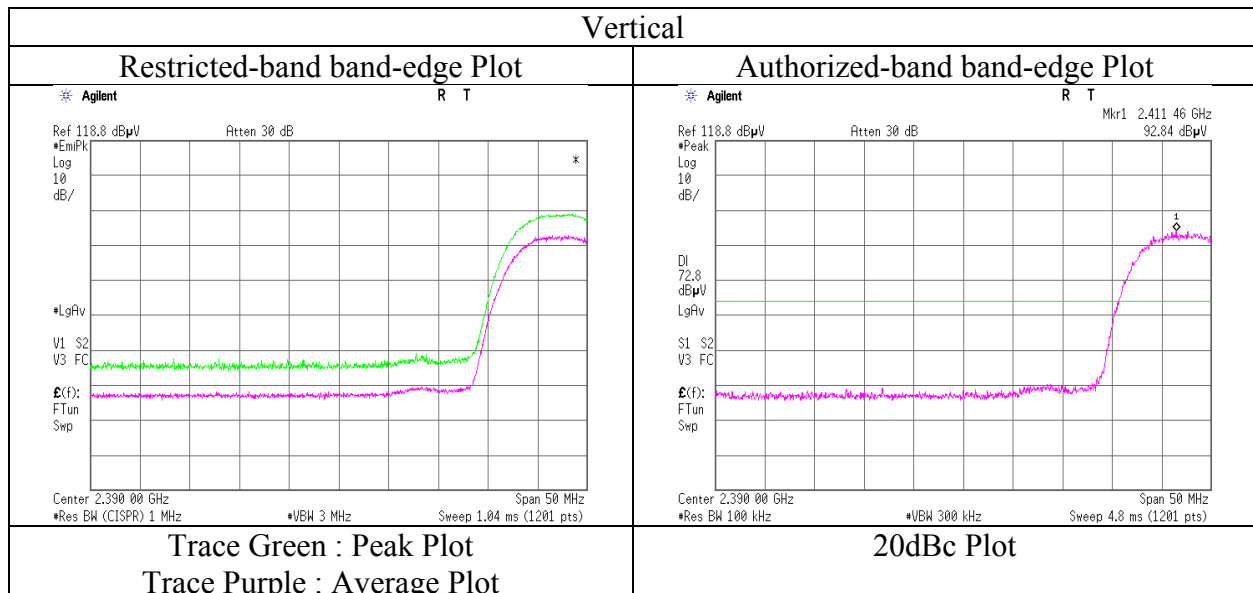
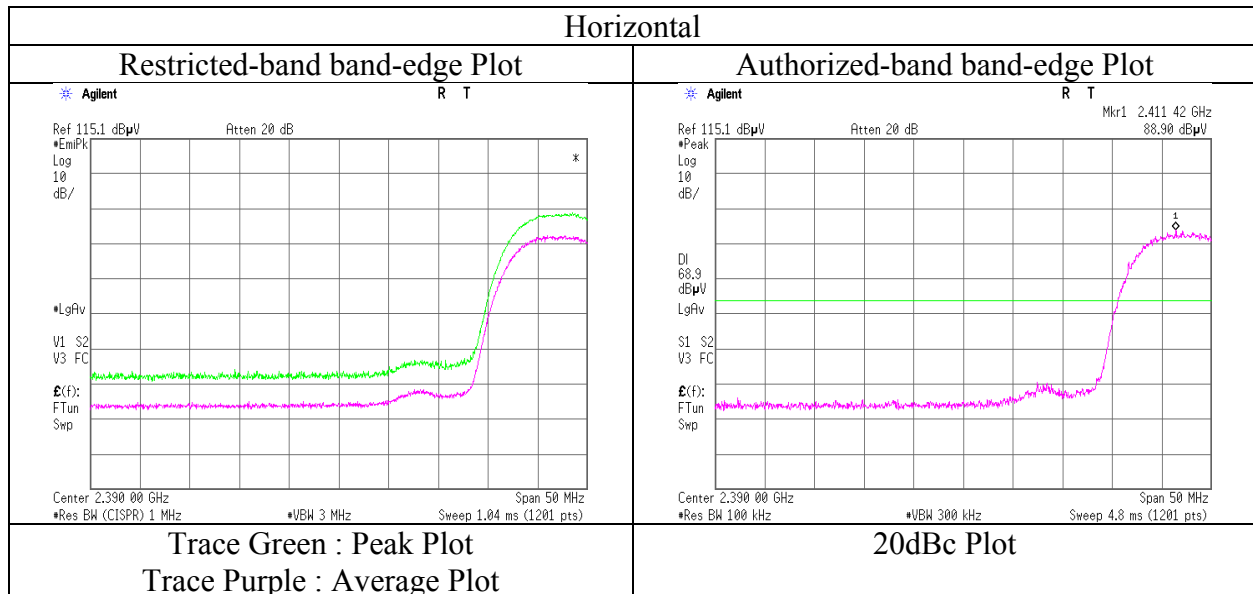
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11922904M-B	No.10
Test place	Kashima EMC Lab.	September 5, 2017
Semi Anechoic Chamber	No.10	23 deg. C / 52 % RH
Date	September 2, 2017	Hiromitsu Tanabe
Temperature / Humidity	23 deg. C / 48 % RH	(1 GHz -10 GHz)
Engineer	Hiromitsu Tanabe	(10 GHz -26 GHz)
Mode	Tx 11b 2412 MHz	



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

Radiated Spurious Emission

Report No.	11922904M-B	
Test place	Kashima EMC Lab.	
Semi Anechoic Chamber	No.10	No.10
Date	September 2, 2017	September 5, 2017
Temperature / Humidity	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11b 2437 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.	1920.166	PK	48.80	27.10	13.30	42.20	3.30	50.30	73.90	23.6	144	209	
Hori.	3168.000	PK	50.80	29.50	5.20	42.10	3.30	46.70	73.90	27.2	149	86	
Hori.	4874.000	PK	45.60	32.50	5.60	41.90	3.30	45.10	73.90	28.8	100	0	Floor noise
Hori.	7311.000	PK	44.40	37.30	7.00	40.90	3.30	51.10	73.90	22.8	100	0	Floor noise
Hori.	1920.166	AV	40.80	27.10	13.30	42.20	3.30	42.30	53.90	11.6	144	209	
Hori.	3168.000	AV	45.20	29.50	5.20	42.10	3.30	41.10	53.90	12.8	149	86	
Vert.	1920.169	PK	49.00	27.10	13.30	42.20	3.30	50.50	73.90	23.4	146	182	
Vert.	3168.000	PK	49.80	29.50	5.20	42.10	3.30	45.70	73.90	28.2	244	183	
Vert.	4874.000	PK	46.00	32.50	5.60	41.90	3.30	45.50	73.90	28.4	100	0	Floor noise
Vert.	7311.000	PK	44.70	37.30	7.00	40.90	3.30	51.40	73.90	22.5	100	0	Floor noise
Vert.	1920.169	AV	40.60	27.10	13.30	42.20	3.30	42.10	53.90	11.8	146	182	
Vert.	3168.000	AV	42.50	29.50	5.20	42.10	3.30	38.40	53.90	15.5	244	183	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.70	32.50	5.60	41.90	0.44	3.30	36.64	53.90	17.3	Floor noise
Hori.	7311.000	AV	35.50	37.30	7.00	40.90	0.44	3.30	42.64	53.90	11.3	Floor noise
Vert.	4874.000	AV	36.80	32.50	5.60	41.90	0.44	3.30	36.74	53.90	17.2	Floor noise
Vert.	7311.000	AV	35.40	37.30	7.00	40.90	0.44	3.30	42.54	53.90	11.4	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 2, 2017 September 5, 2017
Temperature / Humidity 23 deg. C / 48 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11b 2462 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.	1920.170	PK	49.00	27.10	13.30	42.20	3.30	50.50	73.90	23.4	147	207	
Hori.	2483.500	PK	47.70	27.90	13.70	42.10	3.30	50.50	73.90	23.4	160	255	
Hori.	3168.000	PK	51.30	29.50	5.20	42.10	3.30	47.20	73.90	26.7	148	86	
Hori.	4924.000	PK	46.10	32.60	5.60	41.90	3.30	45.70	73.90	28.2	100	0	Floor noise
Hori.	7386.000	PK	44.60	37.40	7.10	40.90	3.30	51.50	73.90	22.4	100	0	Floor noise
Hori.	1920.170	AV	40.70	27.10	13.30	42.20	3.30	42.20	53.90	11.7	147	207	
Hori.	3168.000	AV	45.40	29.50	5.20	42.10	3.30	41.30	53.90	12.6	148	86	
Vert.	1920.167	PK	49.30	27.10	13.30	42.20	3.30	50.80	73.90	23.1	166	179	
Vert.	2483.500	PK	49.70	27.90	13.70	42.10	3.30	52.50	73.90	21.4	130	48	
Vert.	3168.000	PK	49.40	29.50	5.20	42.10	3.30	45.30	73.90	28.6	249	179	
Vert.	4924.000	PK	45.70	32.60	5.60	41.90	3.30	45.30	73.90	28.6	100	0	Floor noise
Vert.	7386.000	PK	44.70	37.40	7.10	40.90	3.30	51.60	73.90	22.3	100	0	Floor noise
Vert.	1920.167	AV	40.70	27.10	13.30	42.20	3.30	42.20	53.90	11.7	166	179	
Vert.	3168.000	AV	42.40	29.50	5.20	42.10	3.30	38.30	53.90	15.6	249	179	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	38.80	27.90	13.70	42.10	0.44	3.30	42.04	53.90	11.9	*1)
Hori.	4924.000	AV	37.00	32.60	5.60	41.90	0.44	3.30	37.04	53.90	16.9	Floor noise
Hori.	7386.000	AV	35.70	37.40	7.10	40.90	0.44	3.30	43.04	53.90	10.9	Floor noise
Vert.	2483.500	AV	40.40	27.90	13.70	42.10	0.44	3.30	43.64	53.90	10.3	*1)
Vert.	4924.000	AV	37.10	32.60	5.60	41.90	0.44	3.30	37.14	53.90	16.8	Floor noise
Vert.	7386.000	AV	35.80	37.40	7.10	40.90	0.44	3.30	43.14	53.90	10.8	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

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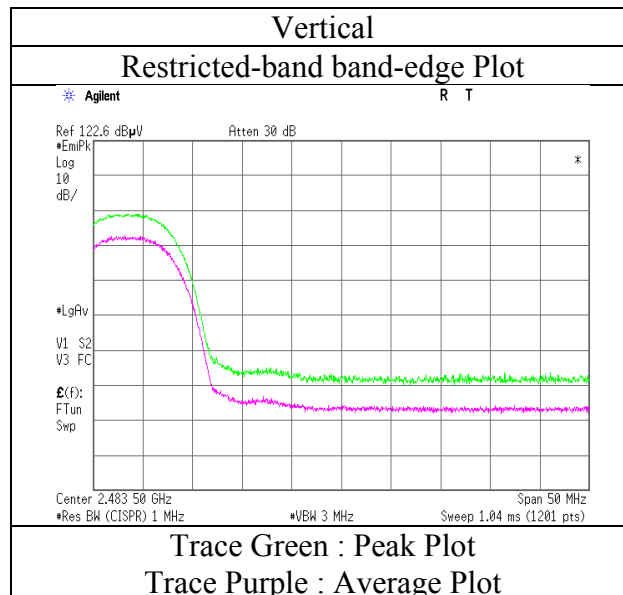
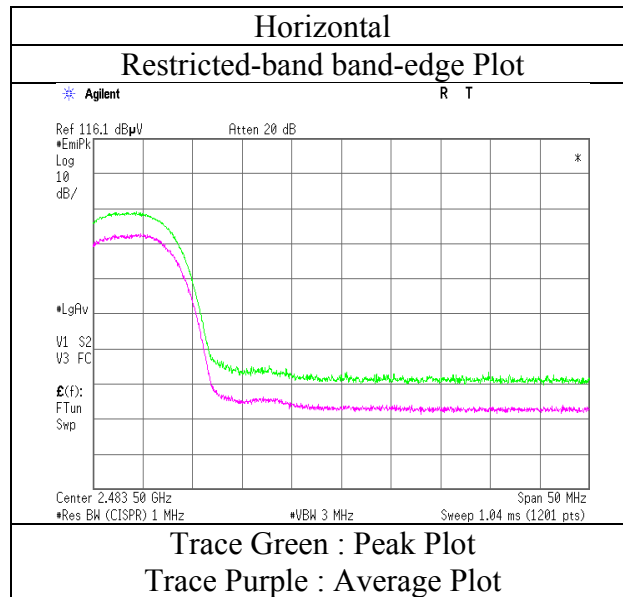
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11922904M-B	
Test place	Kashima EMC Lab.	
Semi Anechoic Chamber	No.10	No.10
Date	September 2, 2017	September 5, 2017
Temperature / Humidity	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11b 2462 MHz	



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

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 2, 2017 September 5, 2017
Temperature / Humidity 23 deg. C / 48 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11g 2412 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.	1920.166	PK	49.30	27.10	13.30	42.20	3.30	50.80	73.90	23.1	117	192	
Hori.	2390.000	PK	50.30	27.60	13.60	42.10	3.30	52.70	73.90	21.2	132	186	
Hori.	3168.000	PK	51.30	29.50	5.20	42.10	3.30	47.20	73.90	26.7	140	85	
Hori.	4824.000	PK	45.80	32.60	5.60	41.90	3.30	45.40	73.90	28.5	100	0	Floor noise
Hori.	7236.000	PK	44.40	37.20	7.00	40.90	3.30	51.00	73.90	22.9	100	0	Floor noise
Hori.	1920.166	AV	41.80	27.10	13.30	42.20	3.30	43.30	53.90	10.6	117	192	
Hori.	3168.000	AV	45.40	29.50	5.20	42.10	3.30	41.30	53.90	12.6	140	85	
Vert.	1920.169	PK	49.30	27.10	13.30	42.20	3.30	50.80	73.90	23.1	133	185	
Vert.	2390.000	PK	51.20	27.60	13.60	42.10	3.30	53.60	73.90	20.3	127	48	
Vert.	3168.000	PK	49.90	29.50	5.20	42.10	3.30	45.80	73.90	28.1	241	183	
Vert.	4824.000	PK	45.70	32.60	5.60	41.90	3.30	45.30	73.90	28.6	100	0	Floor noise
Vert.	7236.000	PK	44.50	37.20	7.00	40.90	3.30	51.10	73.90	22.8	100	0	Floor noise
Vert.	1920.169	AV	41.10	27.10	13.30	42.20	3.30	42.60	53.90	11.3	133	185	
Vert.	3168.000	AV	42.70	29.50	5.20	42.10	3.30	38.60	53.90	15.3	241	183	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	39.20	27.60	13.60	42.10	1.76	3.30	43.36	53.90	10.5	*1)
Hori.	4824.000	AV	36.90	32.60	5.60	41.90	1.76	3.30	38.26	53.90	15.6	Floor noise
Hori.	7236.000	AV	35.40	37.20	7.00	40.90	1.76	3.30	43.76	53.90	10.1	Floor noise
Vert.	2390.000	AV	40.10	27.60	13.60	42.10	1.76	3.30	44.26	53.90	9.6	*1)
Vert.	4824.000	AV	37.00	32.60	5.60	41.90	1.76	3.30	38.36	53.90	15.5	Floor noise
Vert.	7236.000	AV	35.40	37.20	7.00	40.90	1.76	3.30	43.76	53.90	10.1	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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]	Remark
Hori.	2412.000	PK	83.10	27.60	13.60	42.10	3.30	85.50	-	-	Carrier
Hori.	2397.885	PK	41.50	27.60	13.60	42.10	3.30	43.90	65.50	21.6	
Hori.	2400.000	PK	42.80	27.60	13.60	42.10	3.30	45.20	65.50	20.3	
Vert.	2412.000	PK	87.80	27.60	13.60	42.10	3.30	90.20	-	-	Carrier
Vert.	2397.608	PK	43.80	27.60	13.60	42.10	3.30	46.20	70.20	24.0	
Vert.	2400.000	PK	45.00	27.60	13.60	42.10	3.30	47.40	70.20	22.8	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

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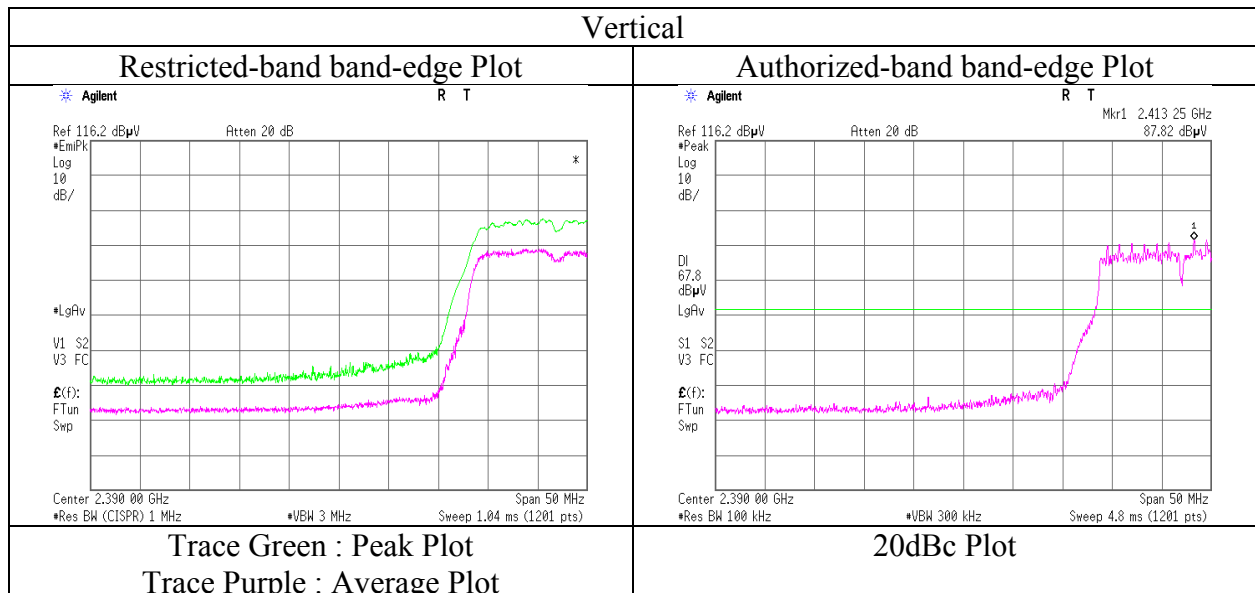
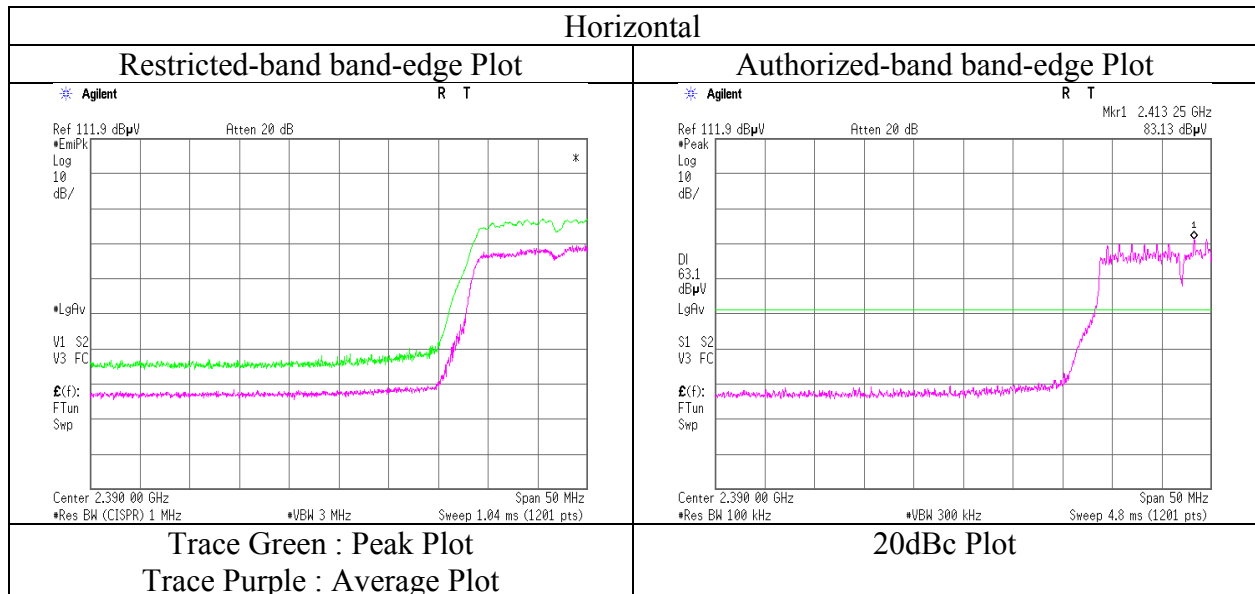
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11922904M-B	No.10
Test place	Kashima EMC Lab.	September 5, 2017
Semi Anechoic Chamber	No.10	23 deg. C / 52 % RH
Date	September 2, 2017	Hiromitsu Tanabe
Temperature / Humidity	23 deg. C / 48 % RH	(10 GHz -26 GHz)
Engineer	Hiromitsu Tanabe	
Mode	(1 GHz -10 GHz)	
	Tx 11g 2412 MHz	



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

Radiated Spurious Emission

Report No.	11922904M-B		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.10	No.10	No.10
Date	September 6, 2017	September 2, 2017	September 5, 2017
Temperature / Humidity	22 deg. C / 52 % RH	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11g 2437 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.	85.931	QP	51.10	8.00	4.50	32.20	0.00	31.40	40.00	8.6	230	195	
Hori.	95.138	QP	54.60	8.20	4.60	32.20	0.00	35.20	43.50	8.3	230	195	
Hori.	107.416	QP	51.40	10.00	4.70	32.20	0.00	33.90	43.50	9.6	150	100	
Hori.	404.998	QP	49.80	15.70	6.60	32.00	0.00	40.10	46.00	5.9	100	150	
Hori.	458.997	QP	44.70	17.30	6.90	32.00	0.00	36.90	46.00	9.1	100	255	
Hori.	593.996	QP	44.80	19.80	7.40	32.10	0.00	39.90	46.00	6.1	170	345	
Hori.	1920.166	PK	48.70	27.10	13.30	42.20	3.30	50.20	73.90	23.7	146	206	
Hori.	3168.000	PK	50.80	29.50	5.20	42.10	3.30	46.70	73.90	27.2	162	89	
Hori.	4874.000	PK	45.90	32.50	5.60	41.90	3.30	45.40	73.90	28.5	100	0	Floor noise
Hori.	7311.000	PK	44.70	37.30	7.00	40.90	3.30	51.40	73.90	22.5	100	0	Floor noise
Hori.	1920.166	AV	40.70	27.10	13.30	42.20	3.30	42.20	53.90	11.7	146	206	
Hori.	3168.000	AV	45.00	29.50	5.20	42.10	3.30	40.90	53.90	13.0	162	89	
Vert.	105.879	QP	48.20	9.80	4.60	32.20	0.00	30.40	43.50	13.1	100	100	
Vert.	146.544	QP	47.90	13.40	5.00	32.20	0.00	34.10	43.50	9.4	100	70	
Vert.	458.997	QP	44.10	17.30	6.90	32.00	0.00	36.30	46.00	9.7	120	165	
Vert.	593.996	QP	43.50	19.80	7.40	32.10	0.00	38.60	46.00	7.4	200	170	
Vert.	1920.169	PK	49.30	27.10	13.30	42.20	3.30	50.80	73.90	23.1	142	185	
Vert.	3168.000	PK	48.90	29.50	5.20	42.10	3.30	44.80	73.90	29.1	236	216	
Vert.	4874.000	PK	45.80	32.50	5.60	41.90	3.30	45.30	73.90	28.6	100	0	Floor noise
Vert.	7311.000	PK	44.40	37.30	7.00	40.90	3.30	51.10	73.90	22.8	100	0	Floor noise
Vert.	1920.169	AV	40.90	27.10	13.30	42.20	3.30	42.40	53.90	11.5	142	185	
Vert.	3168.000	AV	41.50	29.50	5.20	42.10	3.30	37.40	53.90	16.5	236	216	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.70	32.50	5.60	41.90	1.76	3.30	37.96	53.90	15.9	Floor noise
Hori.	7311.000	AV	35.40	37.30	7.00	40.90	1.76	3.30	43.86	53.90	10.0	Floor noise
Vert.	4874.000	AV	36.80	32.50	5.60	41.90	1.76	3.30	38.06	53.90	15.8	Floor noise
Vert.	7311.000	AV	35.40	37.30	7.00	40.90	1.76	3.30	43.86	53.90	10.0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission

Report No.	11922904M-B	No.10
Test place	Kashima EMC Lab.	
Semi Anechoic Chamber		
Date	September 2, 2017	September 5, 2017
Temperature / Humidity	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11g 2462 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.	1920.170	PK	49.10	27.10	13.30	42.20	3.30	50.60	73.90	23.3	161	205	
Hori.	2483.500	PK	48.60	27.90	13.70	42.10	3.30	51.40	73.90	22.5	162	255	
Hori.	3168.000	PK	51.20	29.50	5.20	42.10	3.30	47.10	73.90	26.8	144	85	
Hori.	4924.000	PK	45.70	32.60	5.60	41.90	3.30	45.30	73.90	28.6	100	0	Floor noise
Hori.	7386.000	PK	44.80	37.40	7.10	40.90	3.30	51.70	73.90	22.2	100	0	Floor noise
Hori.	1920.170	AV	40.80	27.10	13.30	42.20	3.30	42.30	53.90	11.6	161	205	
Hori.	3168.000	AV	45.50	29.50	5.20	42.10	3.30	41.40	53.90	12.5	144	85	
Vert.	1920.167	PK	49.50	27.10	13.30	42.20	3.30	51.00	73.90	22.9	144	183	
Vert.	2483.500	PK	52.90	27.90	13.70	42.10	3.30	55.70	73.90	18.2	121	49	
Vert.	3168.000	PK	49.70	29.50	5.20	42.10	3.30	45.60	73.90	28.3	220	0	
Vert.	4924.000	PK	46.00	32.60	5.60	41.90	3.30	45.60	73.90	28.3	100	0	Floor noise
Vert.	7386.000	PK	44.60	37.40	7.10	40.90	3.30	51.50	73.90	22.4	100	0	Floor noise
Vert.	1920.167	AV	40.70	27.10	13.30	42.20	3.30	42.20	53.90	11.7	144	183	
Vert.	3168.000	AV	42.70	29.50	5.20	42.10	3.30	38.60	53.90	15.3	220	0	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	39.00	27.90	13.70	42.10	1.76	3.30	43.56	53.90	10.3	*1)
Hori.	4924.000	AV	36.90	32.60	5.60	41.90	1.76	3.30	38.26	53.90	15.6	Floor noise
Hori.	7386.000	AV	35.70	37.40	7.10	40.90	1.76	3.30	44.36	53.90	9.5	Floor noise
Vert.	2483.500	AV	40.80	27.90	13.70	42.10	1.76	3.30	45.36	53.90	8.5	*1)
Vert.	4924.000	AV	37.00	32.60	5.60	41.90	1.76	3.30	38.36	53.90	15.5	Floor noise
Vert.	7386.000	AV	35.70	37.40	7.10	40.90	1.76	3.30	44.36	53.90	9.5	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

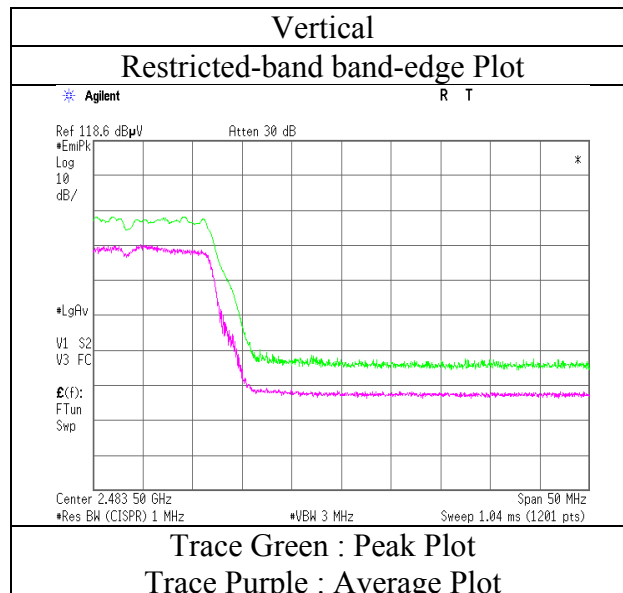
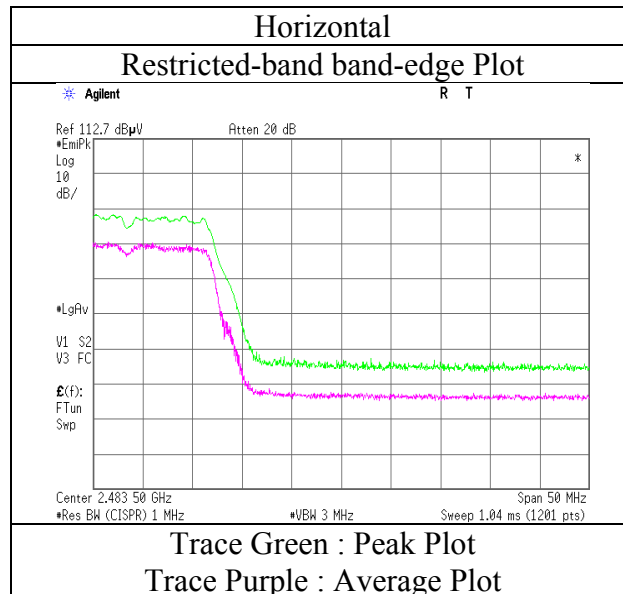
Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11922904M-B	
Test place	Kashima EMC Lab.	
Semi Anechoic Chamber	No.10	No.10
Date	September 2, 2017	September 5, 2017
Temperature / Humidity	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11g 2462 MHz	



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

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 4, 2017 September 5, 2017
Temperature / Humidity 22 deg. C / 52 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11n-20 2412 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.	1920.173	PK	49.50	27.10	13.30	42.20	3.30	51.00	73.90	22.9	100	234	
Hori.	2390.000	PK	49.20	27.60	13.60	42.10	3.30	51.60	73.90	22.3	113	192	
Hori.	3168.000	PK	50.70	29.50	5.20	42.10	3.30	46.60	73.90	27.3	160	87	
Hori.	4824.000	PK	45.20	32.60	5.60	41.90	3.30	44.80	73.90	29.1	100	0	Floor noise
Hori.	7236.000	PK	44.30	37.20	7.00	40.90	3.30	50.90	73.90	23.0	100	0	Floor noise
Hori.	1920.173	AV	41.00	27.10	13.30	42.20	3.30	42.50	53.90	11.4	100	234	
Hori.	3168.000	AV	44.70	29.50	5.20	42.10	3.30	40.60	53.90	13.3	160	87	
Vert.	1920.161	PK	48.60	27.10	13.30	42.20	3.30	50.10	73.90	23.8	100	185	
Vert.	2390.000	PK	51.80	27.60	13.60	42.10	3.30	54.20	73.90	19.7	128	45	
Vert.	3168.000	PK	48.50	29.50	5.20	42.10	3.30	44.40	73.90	29.5	170	212	
Vert.	4824.000	PK	45.50	32.60	5.60	41.90	3.30	45.10	73.90	28.8	100	0	Floor noise
Vert.	7236.000	PK	44.20	37.20	7.00	40.90	3.30	50.80	73.90	23.1	100	0	Floor noise
Vert.	1920.161	AV	39.70	27.10	13.30	42.20	3.30	41.20	53.90	12.7	100	185	
Vert.	3168.000	AV	40.30	29.50	5.20	42.10	3.30	36.20	53.90	17.7	170	212	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.30	27.60	13.60	42.10	1.73	3.30	42.43	53.90	11.5	*1)
Hori.	4824.000	AV	36.20	32.60	5.60	41.90	1.73	3.30	37.53	53.90	16.4	Floor noise
Hori.	7236.000	AV	34.80	37.20	7.00	40.90	1.73	3.30	43.13	53.90	10.8	Floor noise
Vert.	2390.000	AV	39.20	27.60	13.60	42.10	1.73	3.30	43.33	53.90	10.6	*1)
Vert.	4824.000	AV	36.30	32.60	5.60	41.90	1.73	3.30	37.63	53.90	16.3	Floor noise
Vert.	7236.000	AV	34.70	37.20	7.00	40.90	1.73	3.30	43.03	53.90	10.9	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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]	Remark
Hori.	2412.000	PK	82.96	27.60	13.60	42.10	3.30	85.36	-	-	Carrier
Hori.	2397.909	PK	40.40	27.60	13.60	42.10	3.30	42.80	65.36	22.6	
Hori.	2400.000	PK	42.50	27.60	13.60	42.10	3.30	44.90	65.36	20.5	
Vert.	2412.000	PK	86.90	27.60	13.60	42.10	3.30	89.30	-	-	Carrier
Vert.	2398.233	PK	42.30	27.60	13.60	42.10	3.30	44.70	69.30	24.6	
Vert.	2400.000	PK	44.80	27.60	13.60	42.10	3.30	47.20	69.30	22.1	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

UL Japan, Inc.

Kashima EMC Lab.

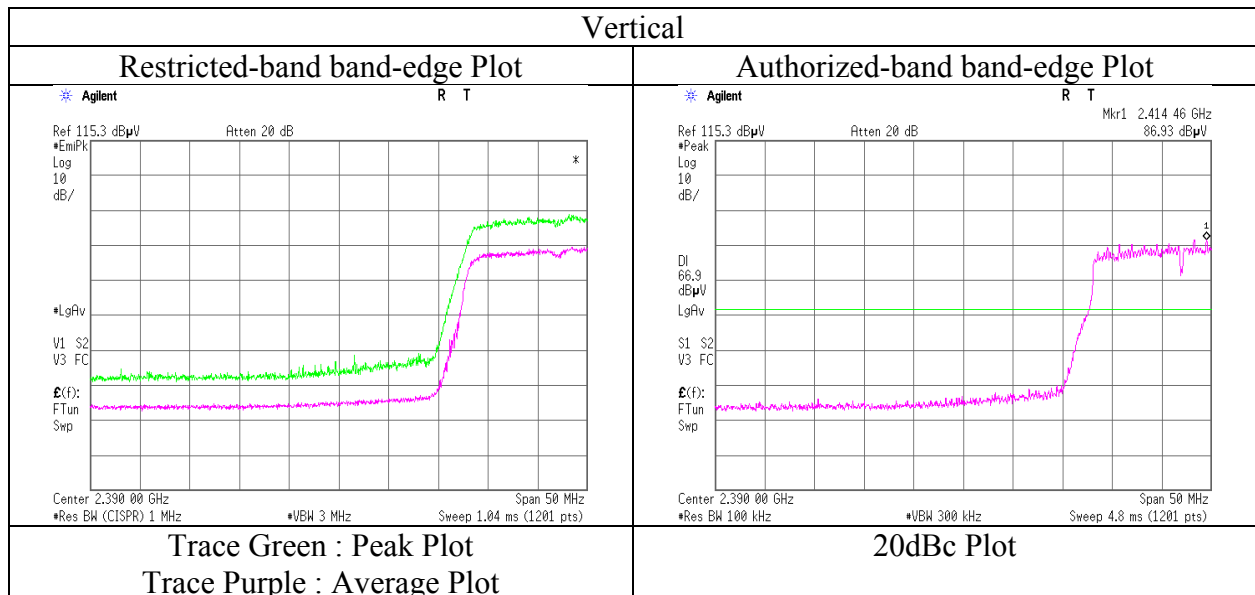
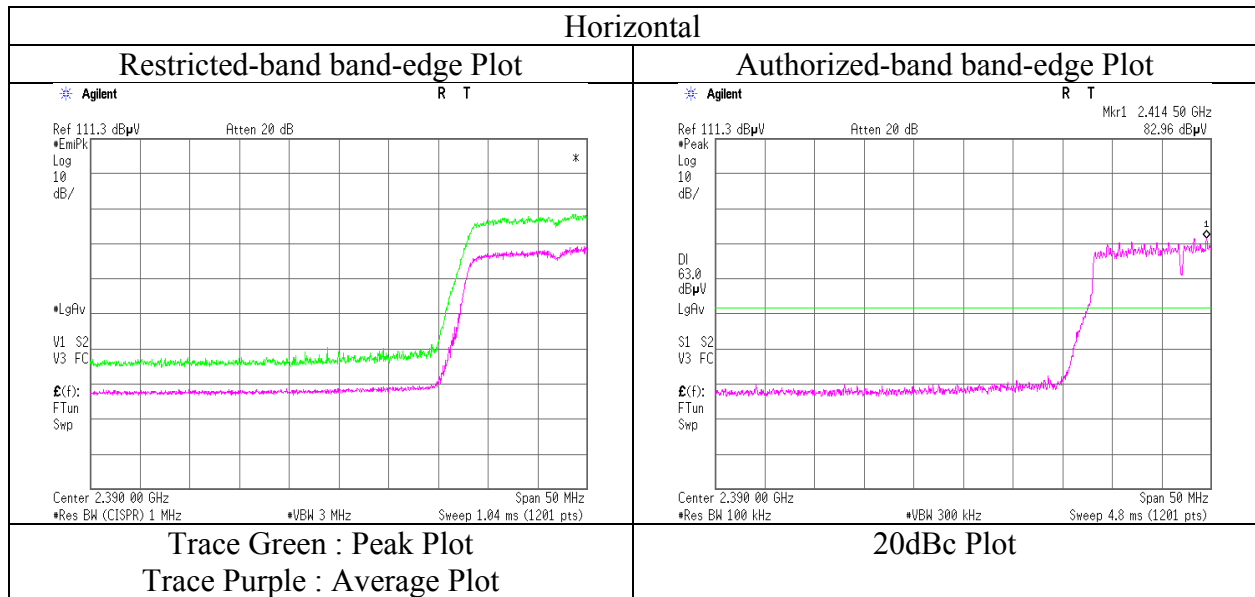
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11922904M-B	No.10
Test place	Kashima EMC Lab.	September 5, 2017
Semi Anechoic Chamber	No.10	23 deg. C / 52 % RH
Date	September 4, 2017	Hiromitsu Tanabe
Temperature / Humidity	22 deg. C / 52 % RH	(10 GHz -26 GHz)
Engineer	Hiromitsu Tanabe	(1 GHz -10 GHz)
Mode	Tx 11n-20 2412 MHz	



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

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 4, 2017 September 5, 2017
Temperature / Humidity 22 deg. C / 52 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11n-20 2437 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.	1920.164	PK	48.50	27.10	13.30	42.20	3.30	50.00	73.90	23.9	105	213	
Hori.	3168.000	PK	50.40	29.50	5.20	42.10	3.30	46.30	73.90	27.6	218	159	
Hori.	4874.000	PK	45.70	32.50	5.60	41.90	3.30	45.20	73.90	28.7	100	0	Floor noise
Hori.	7311.000	PK	44.00	37.30	7.00	40.90	3.30	50.70	73.90	23.2	100	0	Floor noise
Hori.	1920.164	AV	40.00	27.10	13.30	42.20	3.30	41.50	53.90	12.4	105	213	
Hori.	3168.000	AV	44.70	29.50	5.20	42.10	3.30	40.60	53.90	13.3	218	159	
Vert.	1920.167	PK	48.70	27.10	13.30	42.20	3.30	50.20	73.90	23.7	240	182	
Vert.	3168.000	PK	49.80	29.50	5.20	42.10	3.30	45.70	73.90	28.2	320	183	
Vert.	4874.000	PK	45.30	32.50	5.60	41.90	3.30	44.80	73.90	29.1	100	0	Floor noise
Vert.	7311.000	PK	44.10	37.30	7.00	40.90	3.30	50.80	73.90	23.1	100	0	Floor noise
Vert.	1920.167	AV	39.50	27.10	13.30	42.20	3.30	41.00	53.90	12.9	240	182	
Vert.	3168.000	AV	43.00	29.50	5.20	42.10	3.30	38.90	53.90	15.0	320	183	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.00	32.50	5.60	41.90	1.73	3.30	37.23	53.90	16.7	Floor noise
Hori.	7311.000	AV	34.70	37.30	7.00	40.90	1.73	3.30	43.13	53.90	10.8	Floor noise
Vert.	4874.000	AV	36.00	32.50	5.60	41.90	1.73	3.30	37.23	53.90	16.7	Floor noise
Vert.	7311.000	AV	34.70	37.30	7.00	40.90	1.73	3.30	43.13	53.90	10.8	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

Radiated Spurious Emission

Report No. 11922904M-B
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.10
Date September 4, 2017 September 5, 2017
Temperature / Humidity 22 deg. C / 52 % RH 23 deg. C / 52 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz -10 GHz) (10 GHz -26 GHz)
Mode Tx 11n-20 2462 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.	1920.162	PK	48.70	27.10	13.30	42.20	3.30	50.20	73.90	23.7	150	207	
Hori.	2483.500	PK	49.00	27.90	13.70	42.10	3.30	51.80	73.90	22.1	155	270	
Hori.	3168.000	PK	50.90	29.50	5.20	42.10	3.30	46.80	73.90	27.1	158	88	
Hori.	4924.000	PK	45.30	32.60	5.60	41.90	3.30	44.90	73.90	29.0	100	0	Floor noise
Hori.	7386.000	PK	44.50	37.40	7.10	40.90	3.30	51.40	73.90	22.5	100	0	Floor noise
Hori.	1920.162	AV	40.30	27.10	13.30	42.20	3.30	41.80	53.90	12.1	150	207	
Hori.	3168.000	AV	44.00	29.50	5.20	42.10	3.30	39.90	53.90	14.0	158	88	
Vert.	1920.169	PK	48.30	27.10	13.30	42.20	3.30	49.80	73.90	24.1	235	179	
Vert.	2483.500	PK	50.70	27.90	13.70	42.10	3.30	53.50	73.90	20.4	122	47	
Vert.	3168.000	PK	48.80	29.50	5.20	42.10	3.30	44.70	73.90	29.2	173	212	
Vert.	4924.000	PK	45.10	32.60	5.60	41.90	3.30	44.70	73.90	29.2	100	0	Floor noise
Vert.	7386.000	PK	43.70	37.40	7.10	40.90	3.30	50.60	73.90	23.3	100	0	Floor noise
Vert.	1920.169	AV	39.70	27.10	13.30	42.20	3.30	41.20	53.90	12.7	235	179	
Vert.	3168.000	AV	42.40	29.50	5.20	42.10	3.30	38.30	53.90	15.6	173	212	

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

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	38.50	27.90	13.70	42.10	1.73	3.30	43.03	53.90	10.9	*1)
Hori.	4924.000	AV	36.10	32.60	5.60	41.90	1.73	3.30	37.43	53.90	16.5	Floor noise
Hori.	7386.000	AV	35.00	37.40	7.10	40.90	1.73	3.30	43.63	53.90	10.3	Floor noise
Vert.	2483.500	AV	40.00	27.90	13.70	42.10	1.73	3.30	44.53	53.90	9.4	*1)
Vert.	4924.000	AV	36.30	32.60	5.60	41.90	1.73	3.30	37.63	53.90	16.3	Floor noise
Vert.	7386.000	AV	35.20	37.40	7.10	40.90	1.73	3.30	43.83	53.90	10.1	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(4.38 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

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

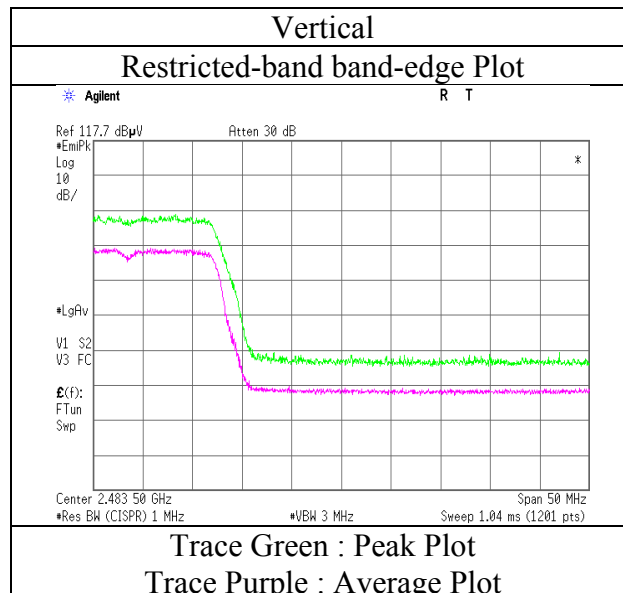
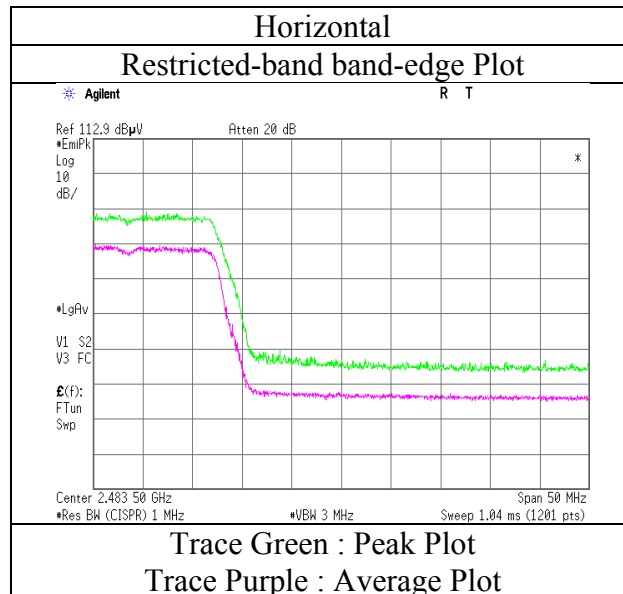
Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

Radiated Spurious Emission (Reference Plot for band-edge)

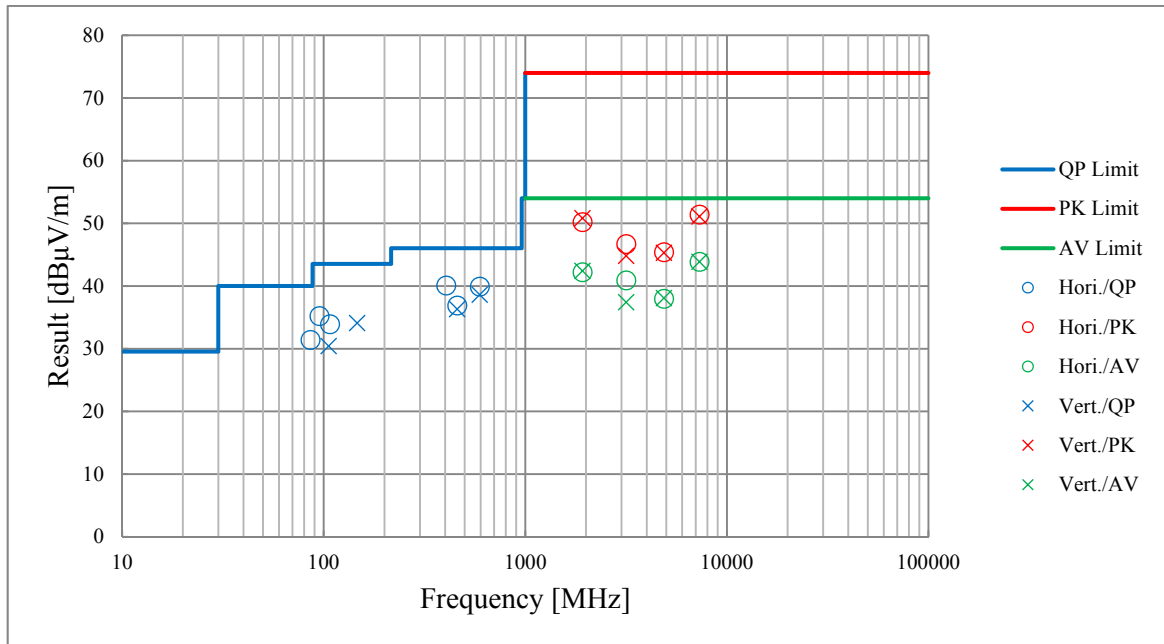
Report No.	11922904M-B	
Test place	Kashima EMC Lab.	
Semi Anechoic Chamber	No.10	No.10
Date	September 4, 2017	September 5, 2017
Temperature / Humidity	22 deg. C / 52 % RH	23 deg. C / 52 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11n-20 2462 MHz	



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

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

Report No.	11922904M-B		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.10	No.10	No.10
Date	September 6, 2017	September 2, 2017	September 5, 2017
Temperature / Humidity	22 deg. C / 52 % RH	23 deg. C / 48 % RH	23 deg. C / 52 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 GHz -26 GHz)
Mode	Tx 11g 2437 MHz		



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

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
CTR-06	Test Receiver	Rohde & Schwarz	ESCI	100107 Rev 4.32	RE	2016/09/26 * 12
CCC-S11-R (1/4/5/CAT S12-13/6/7/ 8/10)	Coaxial Cable	Fujikura,Suhner, Suhner,Agilent, Suhner,-,Suhner	5D-2W,SF106,S F104,8496B+849 4B,SF106,-,SF10 6	MY42143380,US 00431042(Step Att)	RE	2016/11/10 * 12
CAT3-07	3dB Fixed Atten.	TAMAGAWA	UFA-01	none	RE	2017/04/27 * 12
CBL-09	LOGBICON	Schwarzbeck	VULB 9168	508	RE	2017/04/10 * 12
CAF-16	Pre-Amplifier	Sonoma Instrument	310N	325015	RE	2017/05/19 * 12
CSCL-16	Ruler	Tajima	G3 gold	none	RE	-
COS-11	Temperature, Humidity & Atmospheric Logger	T&D	TR-73U	F8060468	RE	2017/05/16 * 12
CTS-13	Digital Multimeter	FLUKE	FLK-83- V	14610320	RE	2017/09/11 * 12
COTS-CEM I-02	EMI Software	TSJ	TEPTO-DV(RE, CE,MF,PE)	Ver, RE: 2.5.0131, CE: 2.5.0131, ME: 2.5.0129, PE: 2.5.0129	RE	-
CSA-07	Spectrum Analyzer	Agilent	E4448A	MY52490024 Version A.11.21	RE	2017/05/31 * 12
CHA-24	Double Ridged Wave Guide	ETS-Lindgren	3115	00204569	RE	2017/02/01 * 12
CHA-07	Double Ridged Horn	ETS-Lindgren	3160-09	00166043	RE	2017/06/27 * 12
CAF-19	Pre-Amplifier	TOYO	HAP18-26W	00000035	RE	2017/06/28 * 12
CAF-18	Pre-Amplifier	TOYO	TPA0118-36	A-1001	RE	2016/11/07 * 12
CAT10-16	10dB Fixed Atten.	Weinschel	54A-10	56246	RE	2017/05/19 * 12
CHF-03	HPF	Micro-Tronics	HPM50111-02	008	RE	2017/05/19 * 12
CCC-G09	Micro Wave Cable	Junkosha	MWX221	1407S222	RE	2016/11/25 * 12
CCC-G10	Micro Wave Cable	Junkosha	MWX221	J12J102343-00	RE	2016/11/25 * 12
CCC-W09	Micro Wave Cable	SUHNER	SUCOFLEX104	MY588/4	RE	2017/07/18 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: RE: Radiated Emission test

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373