



RADIO TEST REPORT

Test Report No. : 12069762H-A-R1

Applicant : **Komatsu Ltd.**
Type of Equipment : **KOMTRAX Terminal**
Model No. : **KDTG200**
FCC ID : **X4QKDTG200**
Test regulation : **FCC Part 15 Subpart C: 2018**
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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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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. The all test items in this test report are conducted by UL Japan, Inc. Kashima EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. This report is a revised version of 12069762H-A. 12069762H-A is replaced with this report.

Date of test: October 16 - 20, 2018

**Representative
test operator:**

K. Ando

Kazuhiro Ando
Engineer
Consumer Technology Division

Approved by :

T. Yamashita

Tomoyuki Yamashita
Leader
Consumer Technology Division



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

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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.: 12069762H-A

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SECTION 1: Customer information

Company Name : Komatsu Ltd.
Address : 3-25-1 Shinomiya, Hiratsuka-Shi, Kanagawa-Ken, 254-8555 Japan
Telephone Number : +81-463-22-8758
Facsimile Number : +81-463-22-8586
Contact Person : Takashi Itoi

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

2.1 Identification of E.U.T.

Type of Equipment : KOMTRAX Terminal
Model No. : KDTG200
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12 V or 24 V
Receipt Date of Sample : October 15, 2018
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: KDTG200 (referred to as the EUT in this report) is a KOMTRAX Terminal.

Radio Specification

Specification of Wireless LAN (IEEE802.11b/g/n-20)

Type of radio	IEEE802.11b	IEEE802.11g/n (20 M band)
Radio Type	Transceiver	
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)
Channel spacing	5 MHz	
Antenna type	Pattern Antenna	
Antenna Gain	4.08 dBi	
Clock frequency(ies) in the system	26 MHz	

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	N/A *1)	N/A	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	IC: RSS-247 5.2(a)			
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	IC: RSS-247 5.4(d)			
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(e)		Complied	Conducted
	IC: -	IC: RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section15.247(d)	2.5 dB 2483.50 MHz, AV, Vert.	Complied#	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

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 ports.

*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

FCC Part 15.31 (e)

This EUT provides the stable voltage constantly to RF Module regardless of input voltage. 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.

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Kashima EMC Lab.

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

Telephone : +81 478 88 6500

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	IC: -	N/A	Complied	Conducted

Other than above, 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 $k=2$.

Conducted emission

Frequency range	Required Uncertainty (+/-)	Uncertainty (+/-)
0.15 MHz to 30 MHz	3.4 dB	3.2dB

Radiated emission

Measurement distance	Frequency range	Required Uncertainty (+/-)	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	Not Defined	3.0 dB
	30 MHz to 200 MHz	6.3 dB	5.2 dB
	200 MHz to 1000 MHz		6.2 dB
	1 GHz to 6 GHz	5.2 dB	4.7 dB
	6 GHz to 18 GHz	5.5 dB	5.1 dB
	18 GHz to 40 GHz	Not Defined	5.4 dB
1 m	1 GHz to 18 GHz	Not Defined	5.2 dB
	18 GHz to 40 GHz		5.5 dB

Antenna Terminal test

Test Item	Required Uncertainty (+/-)	Uncertainty (+/-)
6 dB Bandwidth / 99 % Occupied Bandwidth	Not Defined	1.6 %
Maximum Peak Output Power	0.75 dB	0.74 dB
Average Output Power		0.74 dB
Burst Rate	Not Defined	0.012 %
Power Density	4 dB	2.2 dB
Conducted Spurious Emission (9 kHz to 30 MHz)	4 dB	2.2 dB

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 / FCC Test Firm Registration Number: 910230

Test site	ISED Certification 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.

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

4.1 Operating Mode(s)

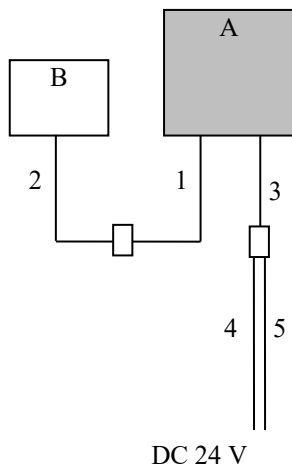
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 0, 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 ; Power settings: Fixed Software: Tera Term Ver 4.9.9 *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
Radiated Spurious Emission (Above 1 GHz)	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
Radiated Spurious Emission (Below 1 GHz)	11n-20 Tx *1)	2437 MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		

4.2 Configuration and peripherals



□ : Connector

* 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	KOMTRAX terminal	KDTG200	2104 *1) 2105 *2)	Komatsu Ltd.	EUT
B	Iridium Antenna	8A13-10-6100	none	Komatsu Ltd.	-

*1) Used for Antenna Terminal conducted test

*2) Used for Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.2	Shielded	Shielded	-
2	Antenna Cable	0.15	Shielded	Shielded	-
3	DC and Signal Cable	0.2	Unshielded	Unshielded	-
4	DC Cable	3.0	Unshielded	Unshielded	-
5	Ethernet Cable	3.0	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]

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

[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	Below 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 5 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 7 of RSS-Gen 8.10 (ISED).

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	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

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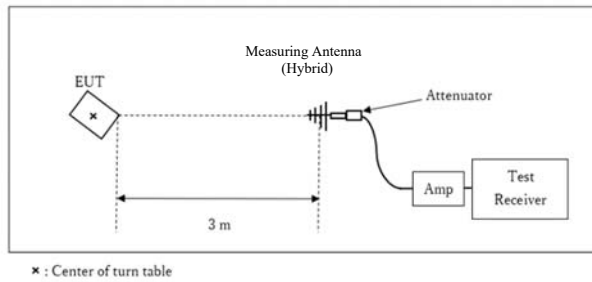
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Telephone : +81 478 88 6500

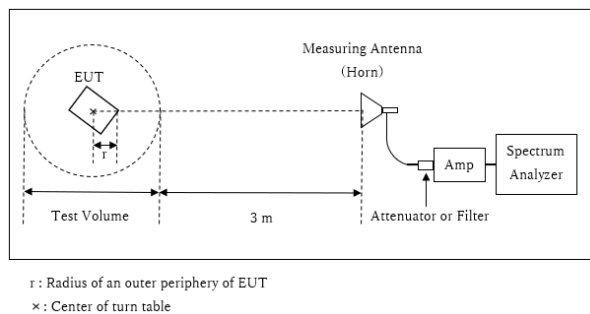
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Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



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

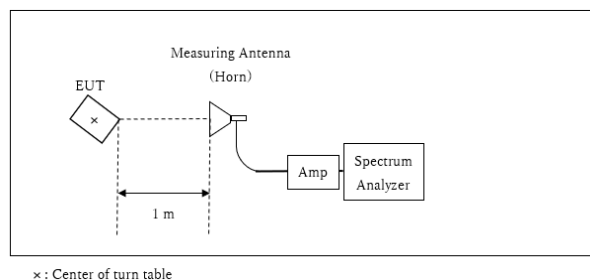
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.95 \text{ m}$

Test Volume: 2 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

r = 0.05 m

10 GHz - 26.5 GHz



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

*Test Distance: 1 m

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

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SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	50 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	10 kHz	30 kHz				
*1) Peak hold was applied as Worst-case measurement. *2) Reference data *3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013". *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)							

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

Test data	: APPENDIX
Test result	: Pass

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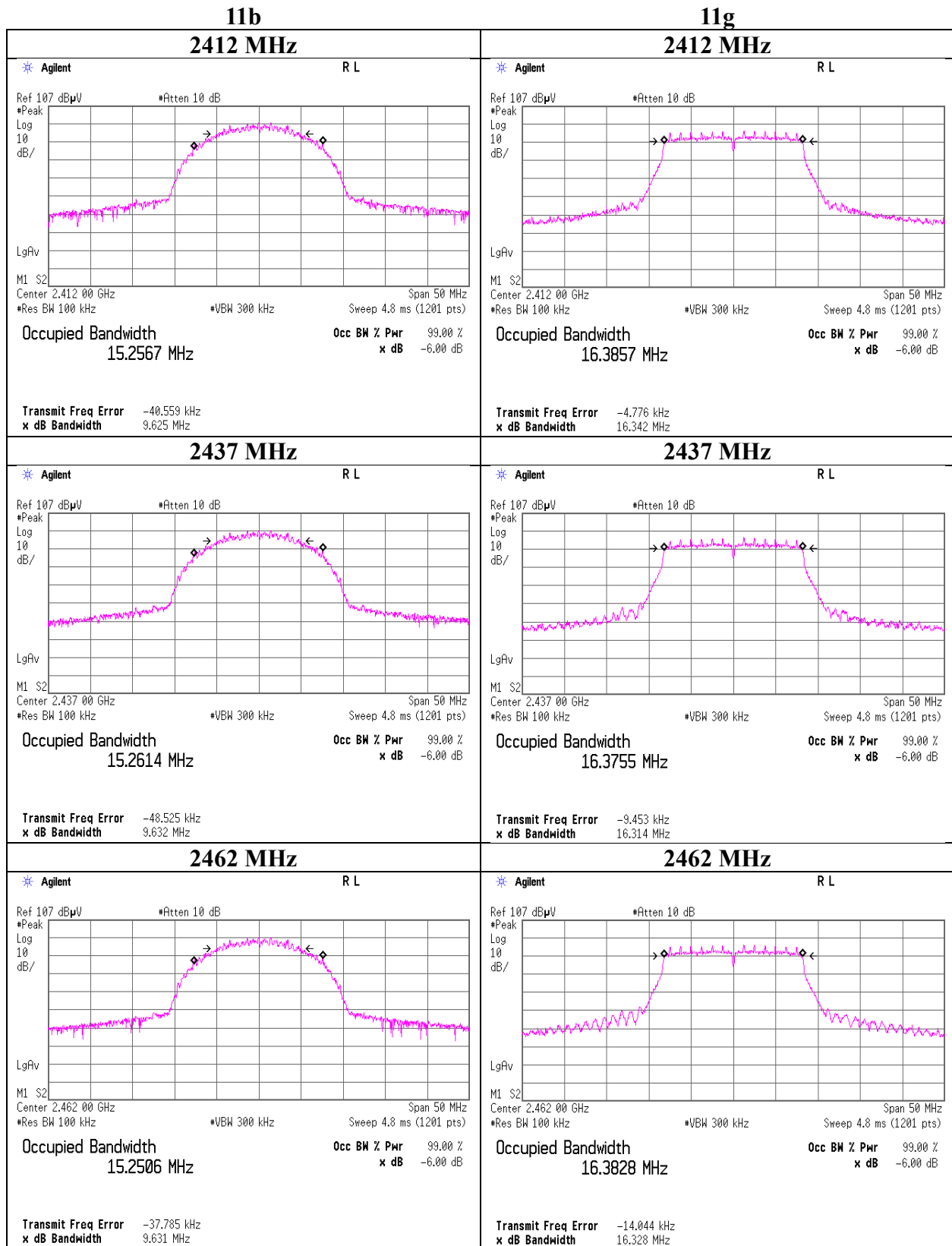
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	15395.1	9.625	> 0.5000
	2437	15410.3	9.632	> 0.5000
	2462	15433.8	9.631	> 0.5000
11g	2412	17115.2	16.342	> 0.5000
	2437	17152.0	16.314	> 0.5000
	2462	17173.7	16.328	> 0.5000
11n-20	2412	17893.3	16.990	> 0.5000
	2437	17896.6	16.993	> 0.5000
	2462	17906.5	17.023	> 0.5000

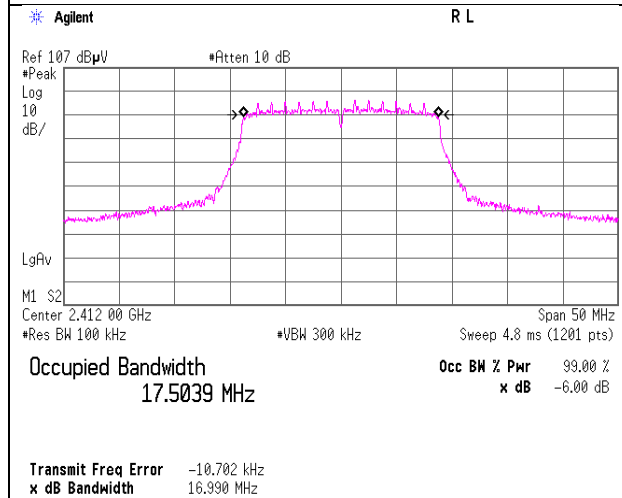
6dB Bandwidth



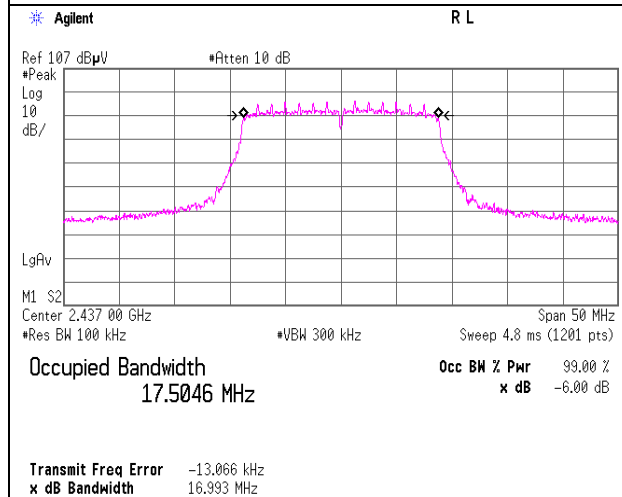
6dB Bandwidth

11n-20

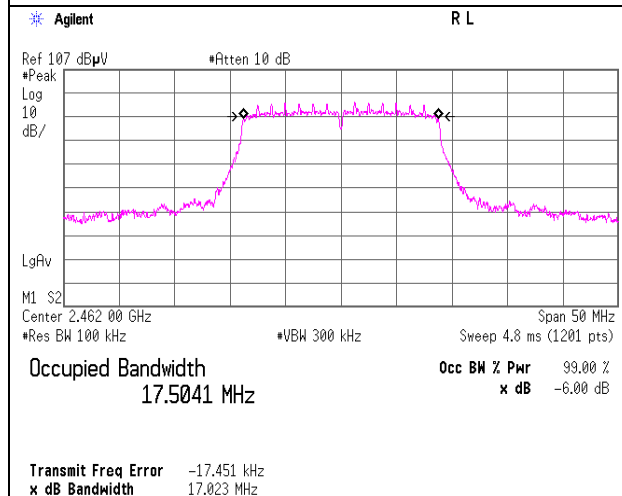
2412 MHz



2437 MHz



2462 MHz



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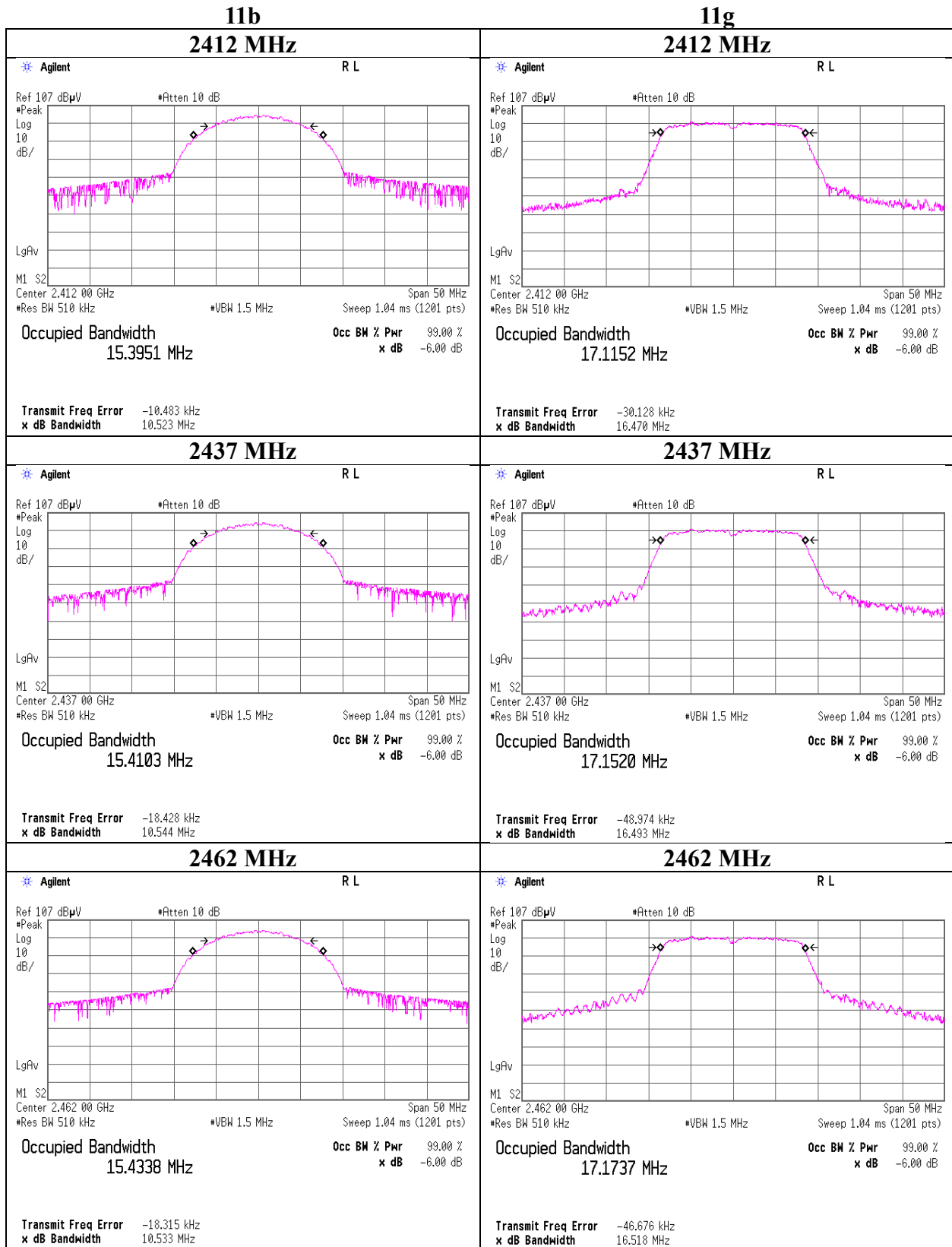
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1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

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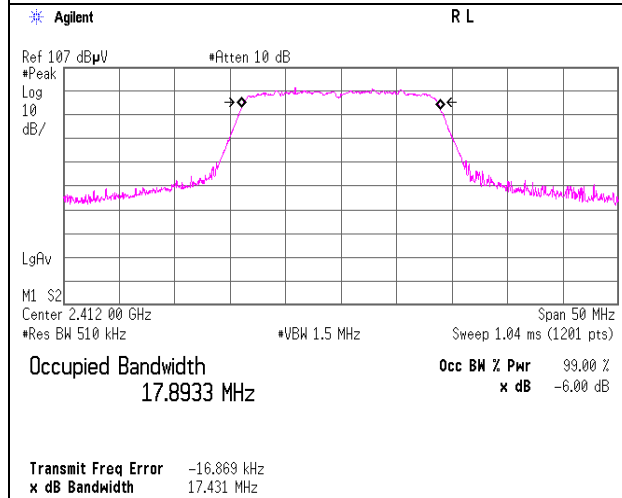
99% Occupied Bandwidth



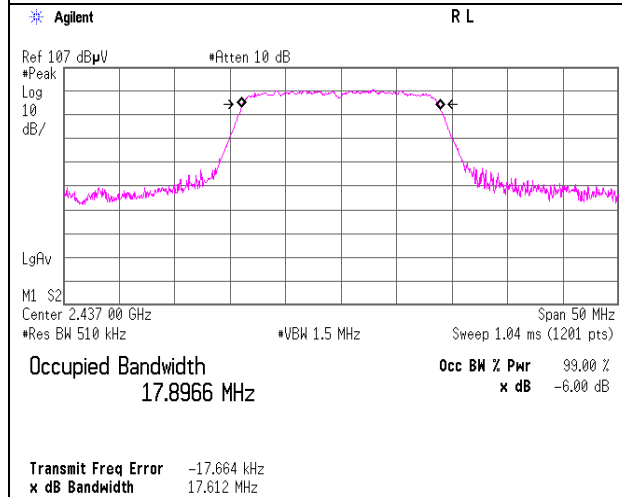
99% Occupied Bandwidth

11n-20

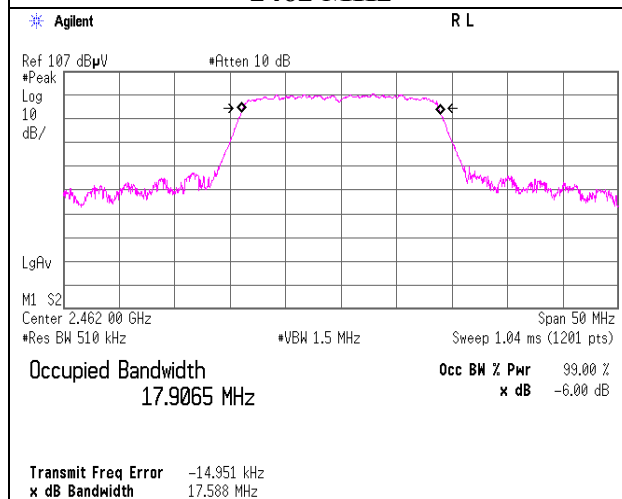
2412 MHz



2437 MHz



2462 MHz



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

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Maximum Peak Output Power

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	2.26	1.91	10.04	14.21	26.36	30.00	1000	15.79	4.08	18.29	67.45	36.02	4000	17.73
2437	2.24	2.18	10.05	14.47	27.99	30.00	1000	15.53	4.08	18.55	71.61	36.02	4000	17.47
2462	2.14	2.29	10.05	14.48	28.05	30.00	1000	15.52	4.08	18.56	71.78	36.02	4000	17.46

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	2.18	
2	2.23	
5.5	2.21	
11	2.24	*

*: Worst Rate

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

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Maximum Peak Output Power

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	8.16	1.91	10.04	20.11	102.57	30.00	1000	9.89	4.08	24.19	262.42	36.02	4000	11.83
2437	8.06	2.18	10.05	20.29	106.91	30.00	1000	9.71	4.08	24.37	273.53	36.02	4000	11.65
2462	7.75	2.29	10.05	20.09	102.09	30.00	1000	9.91	4.08	24.17	261.22	36.02	4000	11.85

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	8.06	*
9	8.05	
12	7.97	
18	7.74	
24	8.00	
36	7.86	
48	7.89	
54	7.97	

*: Worst Rate

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

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Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx 11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	8.48	1.91	10.04	20.43	110.41	30.00	1000	9.57	4.08	24.51	282.49	36.02	4000	11.51
2437	8.37	2.18	10.05	20.60	114.82	30.00	1000	9.40	4.08	24.68	293.76	36.02	4000	11.34
2462	8.01	2.29	10.05	20.35	108.39	30.00	1000	9.65	4.08	24.43	277.33	36.02	4000	11.59

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

2437 MHz

Rate	Reading	Remark
[MCS]	[dBm]	
0	8.37	*
1	7.97	
2	8.18	
3	8.22	
4	8.12	
5	7.27	
6	7.62	
7	7.13	

*: Worst Rate

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

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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Average Output Power
(Reference data for RF Exposure)

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.07	1.91	10.04	11.88	15.42	0.00	11.88	15.42
2437	-0.13	2.18	10.05	12.10	16.22	0.00	12.10	16.22
2462	-0.21	2.29	10.05	12.13	16.33	0.00	12.13	16.33

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.13	1.91	10.04	9.82	9.59	0.05	9.87	9.71
2437	-2.04	2.18	10.05	10.19	10.45	0.05	10.24	10.57
2462	-2.04	2.29	10.05	10.30	10.72	0.05	10.35	10.84

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.06	1.91	10.04	9.89	9.75	0.05	9.94	9.86
2437	-2.20	2.18	10.05	10.03	10.07	0.05	10.08	10.19
2462	-2.13	2.29	10.05	10.21	10.50	0.05	10.26	10.62

Sample Calculation:

Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

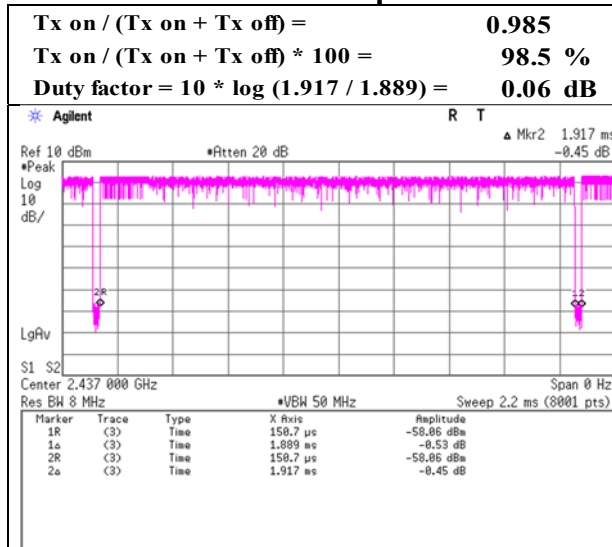
Result (Burst power average) = Time average + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

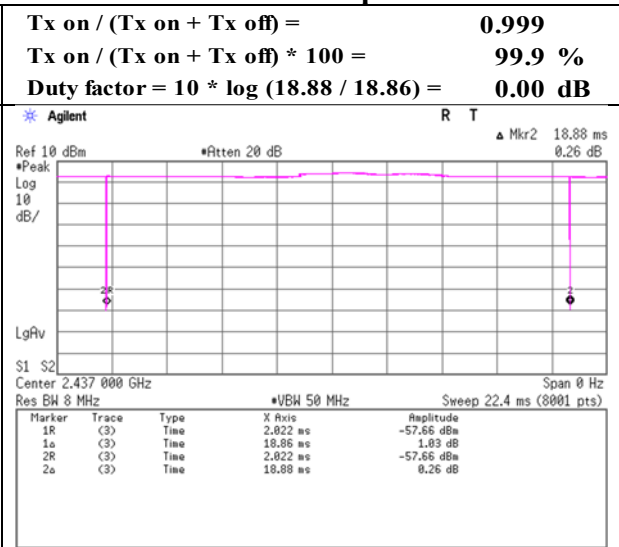
Burst rate confirmation

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx

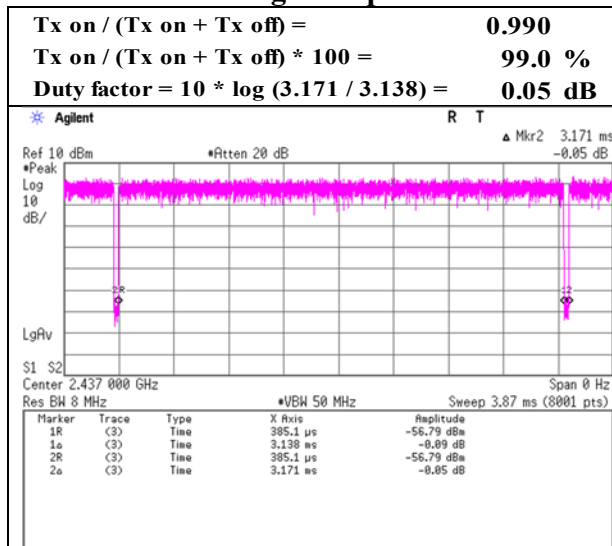
11b 11 Mbps



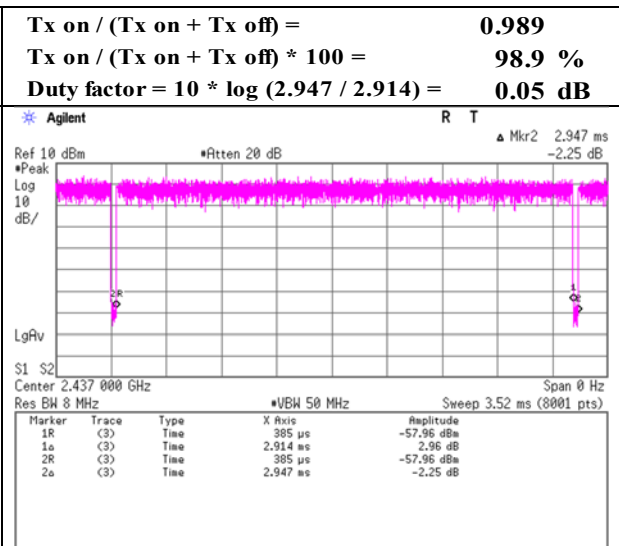
11b 1 Mbps



11g 6 Mbps



11n-20 MCS 0



* 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.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 17, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2390.000	PK	68.10	27.60	13.80	44.50	2.40	67.40	73.90	6.5	158	28	Floor noise
Hori.	4824.000	PK	58.50	32.70	5.90	46.10	2.40	53.40	73.90	20.5	202	302	
Hori.	7236.000	PK	50.20	37.20	7.30	44.60	2.40	52.50	73.90	21.4	100	235	
Hori.	9648.000	PK	49.60	38.10	8.30	42.60	2.40	55.80	73.90	18.1	235	336	
Hori.	19296.000	PK	46.50	40.40	6.60	44.50	-9.50	39.50	73.90	34.4	155	60	Floor noise
Hori.	2390.000	AV	49.10	27.60	13.80	44.50	2.40	48.40	53.90	5.5	158	28	
Hori.	4824.000	AV	49.70	32.70	5.90	46.10	2.40	44.60	53.90	9.3	202	302	
Hori.	7236.000	AV	38.30	37.20	7.30	44.60	2.40	40.60	53.90	13.3	100	235	
Hori.	9648.000	AV	40.00	38.10	8.30	42.60	2.40	46.20	53.90	7.7	235	336	Floor noise
Hori.	19296.000	AV	40.60	40.40	6.60	44.50	-9.50	33.60	53.90	20.3	155	60	
Vert.	2390.000	PK	68.30	27.60	13.80	44.50	2.40	67.60	73.90	6.3	281	18	
Vert.	4824.000	PK	57.30	32.70	5.90	46.10	2.40	52.20	73.90	21.7	204	4	
Vert.	7236.000	PK	51.00	37.20	7.30	44.60	2.40	53.30	73.90	20.6	100	235	Floor noise
Vert.	9648.000	PK	49.50	38.10	8.30	42.60	2.40	55.70	73.90	18.2	316	48	
Vert.	19296.000	PK	48.30	40.40	6.60	44.50	-9.50	41.30	73.90	32.6	198	111	
Vert.	2390.000	AV	49.70	27.60	13.80	44.50	2.40	49.00	53.90	4.9	281	18	
Vert.	4824.000	AV	47.10	32.70	5.90	46.10	2.40	42.00	53.90	11.9	204	4	Floor noise
Vert.	7236.000	AV	38.20	37.20	7.30	44.60	2.40	40.50	53.90	13.4	100	235	
Vert.	9648.000	AV	39.70	38.10	8.30	42.60	2.40	45.90	53.90	8.0	316	48	
Vert.	19296.000	AV	42.80	40.40	6.60	44.50	-9.50	35.80	53.90	18.1	198	111	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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	97.20	27.70	13.80	44.50	2.40	96.60	-	-	Carrier
Hori.	2400.000	PK	55.40	27.60	13.80	44.50	2.40	54.70	76.60	21.9	Carrier
Vert.	2412.000	PK	98.50	27.70	13.80	44.50	2.40	97.90	-	-	
Vert.	2400.000	PK	55.00	27.60	13.80	44.50	2.40	54.30	77.90	23.6	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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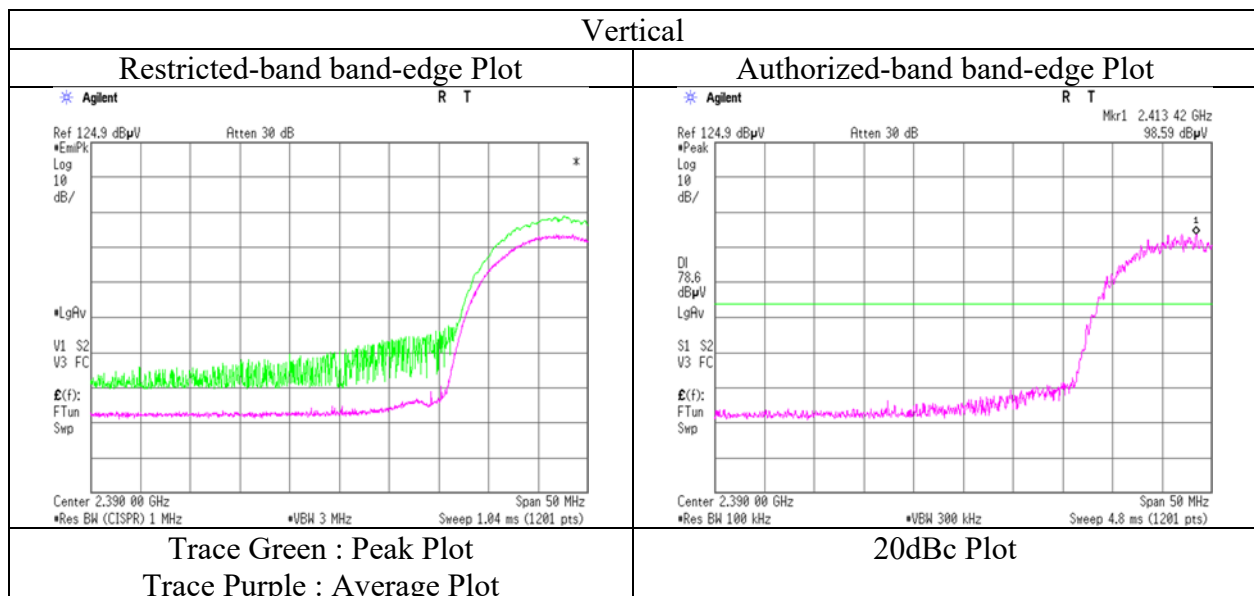
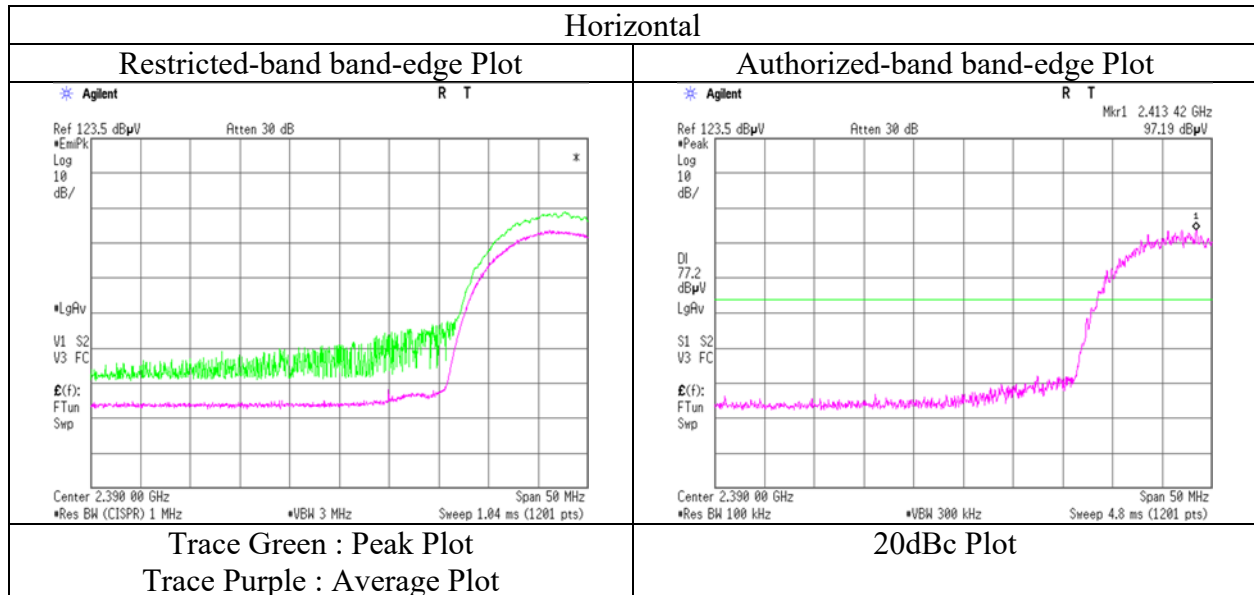
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 17, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz - 10 GHz)
Mode	Tx 11b 2412 MHz



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

Radiated Spurious Emission

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	4874.000	PK	57.30	32.70	6.00	46.10	2.40	52.30	73.90	21.6	168	53	
Hori.	7311.000	PK	49.60	37.30	7.30	44.50	2.40	52.10	73.90	21.8	100	0	Floor noise
Hori.	9748.000	PK	49.50	38.10	8.30	42.50	2.40	55.80	73.90	18.1	138	6	
Hori.	19495.890	PK	46.90	40.40	6.60	44.50	-9.50	39.90	73.90	34.0	120	310	
Hori.	4874.000	AV	51.10	32.70	6.00	46.10	2.40	46.10	53.90	7.8	168	53	
Hori.	7311.000	AV	40.50	37.30	7.30	44.50	2.40	43.00	53.90	10.9	100	0	Floor noise
Hori.	9748.000	AV	40.80	38.10	8.30	42.50	2.40	47.10	53.90	6.8	138	6	
Hori.	19495.890	AV	40.40	40.40	6.60	44.50	-9.50	33.40	53.90	20.5	120	310	
Vert.	4874.000	PK	57.10	32.70	6.00	46.10	2.40	52.10	73.90	21.8	142	358	
Vert.	7311.000	PK	49.50	37.30	7.30	44.50	2.40	52.00	73.90	21.9	100	0	Floor noise
Vert.	9748.000	PK	49.80	38.10	8.30	42.50	2.40	56.10	73.90	17.8	100	355	
Vert.	19495.890	PK	48.80	40.40	6.60	44.50	-9.50	41.80	73.90	32.1	200	112	
Vert.	4874.000	AV	50.90	32.70	6.00	46.10	2.40	45.90	53.90	8.0	142	358	
Vert.	7311.000	AV	40.50	37.30	7.30	44.50	2.40	43.00	53.90	10.9	100	0	Floor noise
Vert.	9748.000	AV	40.40	38.10	8.30	42.50	2.40	46.70	53.90	7.2	100	355	
Vert.	19495.890	AV	43.80	40.40	6.60	44.50	-9.50	36.80	53.90	17.1	200	112	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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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.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 17, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2483.500	PK	67.30	27.90	13.90	44.50	2.40	67.00	73.90	6.9	180	160	Floor noise
Hori.	4924.000	PK	56.00	32.70	6.00	46.20	2.40	50.90	73.90	23.0	166	302	
Hori.	7386.000	PK	50.60	37.40	7.40	44.40	2.40	53.40	73.90	20.5	100	138	
Hori.	9848.000	PK	50.70	38.20	8.40	42.40	2.40	57.30	73.90	16.6	138	356	
Hori.	19695.870	PK	47.10	40.30	6.70	44.60	-9.50	40.00	73.90	33.9	118	310	Floor noise
Hori.	2483.500	AV	51.00	27.90	13.90	44.50	2.40	50.70	53.90	3.2	180	160	
Hori.	4924.000	AV	46.20	32.70	6.00	46.20	2.40	41.10	53.90	12.8	166	302	
Hori.	7386.000	AV	40.80	37.40	7.40	44.40	2.40	43.60	53.90	10.3	100	138	
Hori.	9848.000	AV	41.30	38.20	8.40	42.40	2.40	47.90	53.90	6.0	138	356	Floor noise
Hori.	19695.870	AV	40.70	40.30	6.70	44.60	-9.50	33.60	53.90	20.3	118	310	
Vert.	2483.500	PK	70.80	27.90	13.90	44.50	2.40	70.50	73.90	3.4	202	237	
Vert.	4924.000	PK	55.40	32.70	6.00	46.20	2.40	50.30	73.90	23.6	160	353	
Vert.	7386.000	PK	50.70	37.40	7.40	44.40	2.40	53.50	73.90	20.4	100	138	Floor noise
Vert.	9848.000	PK	51.40	38.20	8.40	42.40	2.40	58.00	73.90	15.9	185	331	
Vert.	19695.870	PK	49.20	40.30	6.70	44.60	-9.50	42.10	73.90	31.8	197	112	
Vert.	2483.500	AV	51.70	27.90	13.90	44.50	2.40	51.40	53.90	2.5	202	237	
Vert.	4924.000	AV	45.10	32.70	6.00	46.20	2.40	40.00	53.90	13.9	160	353	Floor noise
Vert.	7386.000	AV	40.60	37.40	7.40	44.40	2.40	43.40	53.90	10.5	100	138	
Vert.	9848.000	AV	40.40	38.20	8.40	42.40	2.40	47.00	53.90	6.9	185	331	
Vert.	19695.870	AV	44.70	40.30	6.70	44.60	-9.50	37.60	53.90	16.3	197	112	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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Kashima EMC Lab.

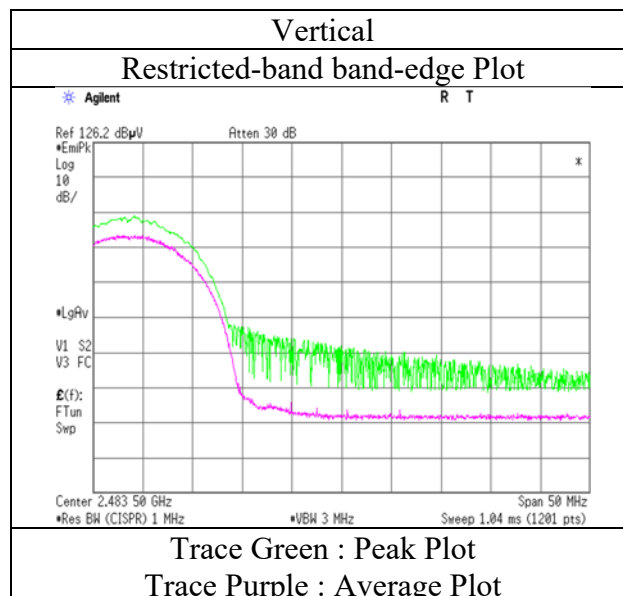
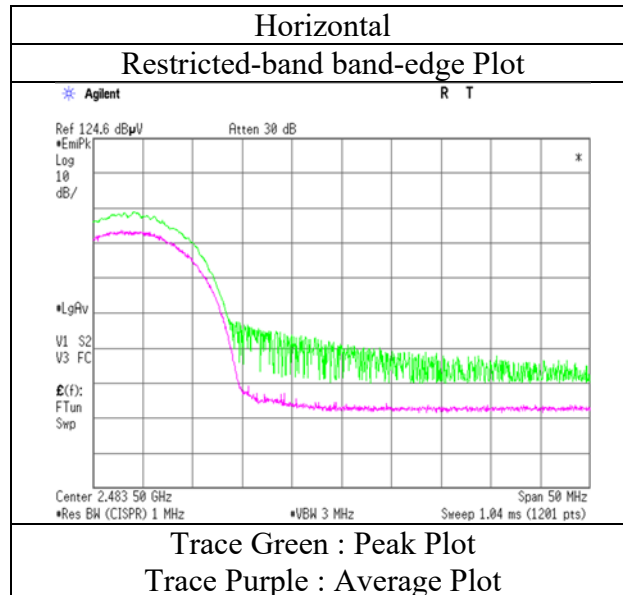
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

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Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 17, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz - 10 GHz)
Mode	Tx 11b 2462 MHz



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

Radiated Spurious Emission

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2390.000	PK	60.10	27.60	13.80	44.50	2.40	59.40	73.90	14.5	276	39	Floor noise
Hori.	4824.000	PK	55.50	32.70	5.90	46.10	2.40	50.40	73.90	23.5	280	28	
Hori.	7236.000	PK	49.90	37.20	7.30	44.60	2.40	52.20	73.90	21.7	100	0	
Hori.	9648.000	PK	49.10	38.10	8.30	42.60	2.40	55.30	73.90	18.6	100	5	
Hori.	19296.000	PK	47.00	40.40	6.60	44.50	-9.50	40.00	73.90	33.9	159	60	Floor noise
Hori.	2390.000	AV	48.70	27.60	13.80	44.50	2.40	48.00	53.90	5.9	276	39	
Hori.	4824.000	AV	46.00	32.70	5.90	46.10	2.40	40.90	53.90	13.0	280	28	
Hori.	7236.000	AV	40.50	37.20	7.30	44.60	2.40	42.80	53.90	11.1	100	0	
Hori.	9648.000	AV	40.00	38.10	8.30	42.60	2.40	46.20	53.90	7.7	100	5	Floor noise
Hori.	19296.000	AV	41.00	40.40	6.60	44.50	-9.50	34.00	53.90	19.9	159	60	
Vert.	2390.000	PK	59.30	27.60	13.80	44.50	2.40	58.60	73.90	15.3	240	44	
Vert.	4824.000	PK	55.30	32.70	5.90	46.10	2.40	50.20	73.90	23.7	186	6	
Vert.	7236.000	PK	49.50	37.20	7.30	44.60	2.40	51.80	73.90	22.1	100	0	Floor noise
Vert.	9648.000	PK	48.70	38.10	8.30	42.60	2.40	54.90	73.90	19.0	102	0	
Vert.	19296.000	PK	48.40	40.40	6.60	44.50	-9.50	41.40	73.90	32.5	198	112	
Vert.	2390.000	AV	48.60	27.60	13.80	44.50	2.40	47.90	53.90	6.0	240	44	
Vert.	4824.000	AV	45.60	32.70	5.90	46.10	2.40	40.50	53.90	13.4	186	6	Floor noise
Vert.	7236.000	AV	40.50	37.20	7.30	44.60	2.40	42.80	53.90	11.1	100	0	
Vert.	9648.000	AV	40.10	38.10	8.30	42.60	2.40	46.30	53.90	7.6	102	0	
Vert.	19296.000	AV	43.50	40.40	6.60	44.50	-9.50	36.50	53.90	17.4	198	112	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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	96.90	27.70	13.80	44.50	2.40	96.30	-	-	Carrier
Hori.	2400.000	PK	59.00	27.60	13.80	44.50	2.40	58.30	76.30	18.0	Carrier
Vert.	2412.000	PK	95.20	27.70	13.80	44.50	2.40	94.60	-	-	
Vert.	2400.000	PK	57.20	27.60	13.80	44.50	2.40	56.50	74.60	18.1	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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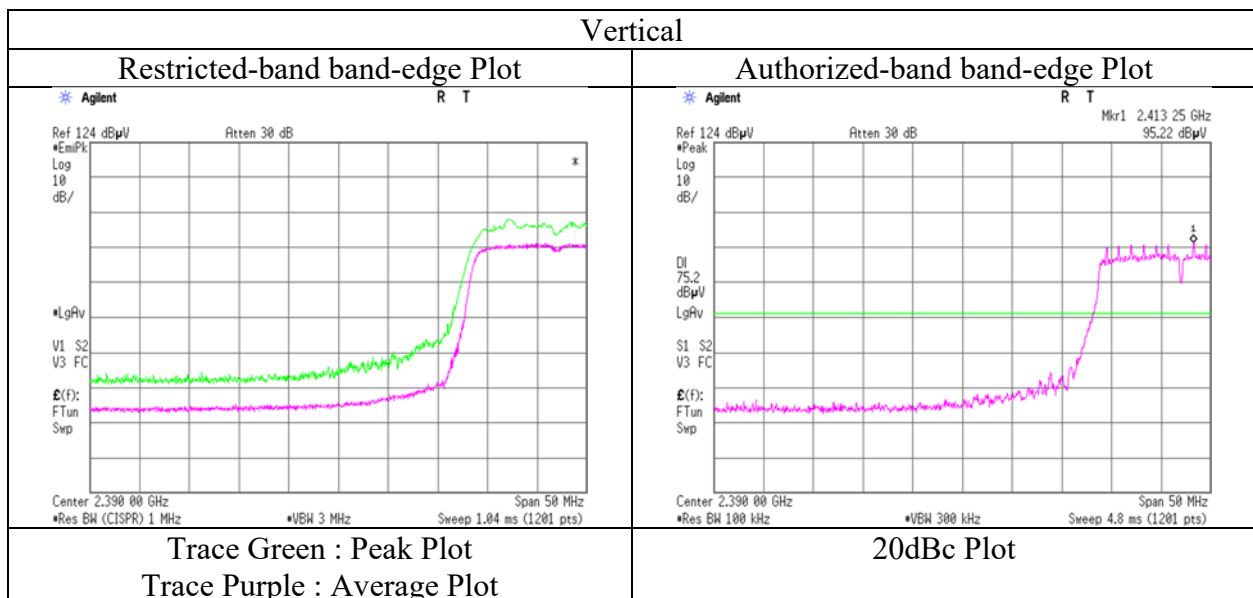
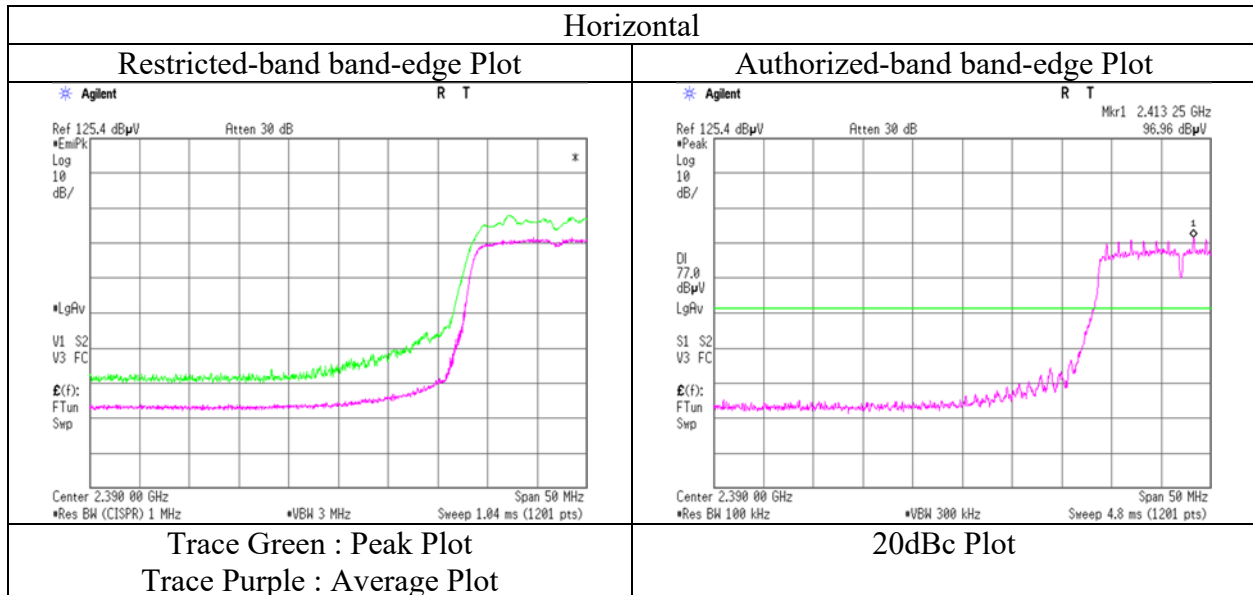
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 18, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Kazuhiro Ando
	(1 GHz - 10 GHz)
Mode	Tx 11g 2412 MHz



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

Radiated Spurious Emission

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	4874.000	PK	54.50	32.70	6.00	46.10	2.40	49.50	73.90	24.4	118	63	
Hori.	7311.000	PK	49.00	37.30	7.30	44.50	2.40	51.50	73.90	22.4	100	0	Floor noise
Hori.	9748.000	PK	49.10	38.10	8.30	42.50	2.40	55.40	73.90	18.5	100	8	
Hori.	19495.890	PK	46.50	40.40	6.60	44.50	-9.50	39.50	73.90	34.4	169	285	
Hori.	4874.000	AV	44.90	32.70	6.00	46.10	2.40	39.90	53.90	14.0	118	63	
Hori.	7311.000	AV	40.60	37.30	7.30	44.50	2.40	43.10	53.90	10.8	100	0	Floor noise
Hori.	9748.000	AV	40.40	38.10	8.30	42.50	2.40	46.70	53.90	7.2	100	8	
Hori.	19495.890	AV	40.20	40.40	6.60	44.50	-9.50	33.20	53.90	20.7	169	285	
Vert.	4874.000	PK	53.60	32.70	6.00	46.10	2.40	48.60	73.90	25.3	212	0	
Vert.	7311.000	PK	49.50	37.30	7.30	44.50	2.40	52.00	73.90	21.9	100	0	Floor noise
Vert.	9748.000	PK	49.00	38.10	8.30	42.50	2.40	55.30	73.90	18.6	100	6	
Vert.	19495.890	PK	49.00	40.40	6.60	44.50	-9.50	42.00	73.90	31.9	202	113	
Vert.	4874.000	AV	44.00	32.70	6.00	46.10	2.40	39.00	53.90	14.9	212	0	
Vert.	7311.000	AV	40.20	37.30	7.30	44.50	2.40	42.70	53.90	11.2	100	0	Floor noise
Vert.	9748.000	AV	40.30	38.10	8.30	42.50	2.40	46.60	53.90	7.3	100	6	
Vert.	19495.890	AV	43.60	40.40	6.60	44.50	-9.50	36.60	53.90	17.3	202	113	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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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

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2483.500	PK	63.00	27.90	13.90	44.50	2.40	62.70	73.90	11.2	189	340	Floor noise
Hori.	4924.000	PK	54.40	32.70	6.00	46.20	2.40	49.30	73.90	24.6	116	63	
Hori.	7386.000	PK	49.60	37.40	7.40	44.40	2.40	52.40	73.90	21.5	100	0	
Hori.	9848.000	PK	49.50	38.20	8.40	42.40	2.40	56.10	73.90	17.8	176	336	
Hori.	19695.870	PK	47.50	40.30	6.70	44.60	-9.50	40.40	73.90	33.5	167	285	
Hori.	2483.500	AV	50.40	27.90	13.90	44.50	2.40	50.10	53.90	3.8	189	340	Floor noise
Hori.	4924.000	AV	44.80	32.70	6.00	46.20	2.40	39.70	53.90	14.2	116	63	
Hori.	7386.000	AV	40.70	37.40	7.40	44.40	2.40	43.50	53.90	10.4	100	0	
Hori.	9848.000	AV	40.80	38.20	8.40	42.40	2.40	47.40	53.90	6.5	176	336	
Hori.	19695.870	AV	41.10	40.30	6.70	44.60	-9.50	34.00	53.90	19.9	167	285	
Vert.	2483.500	PK	62.80	27.90	13.90	44.50	2.40	62.50	73.90	11.4	238	33	Floor noise
Vert.	4924.000	PK	52.90	32.70	6.00	46.20	2.40	47.80	73.90	26.1	187	352	
Vert.	7386.000	PK	49.80	37.40	7.40	44.40	2.40	52.60	73.90	21.3	100	0	
Vert.	9848.000	PK	49.30	38.20	8.40	42.40	2.40	55.90	73.90	18.0	105	4	
Vert.	19695.870	PK	49.70	40.30	6.70	44.60	-9.50	42.60	73.90	31.3	196	111	
Vert.	2483.500	AV	50.30	27.90	13.90	44.50	2.40	50.00	53.90	3.9	238	33	Floor noise
Vert.	4924.000	AV	43.70	32.70	6.00	46.20	2.40	38.60	53.90	15.3	187	352	
Vert.	7386.000	AV	40.90	37.40	7.40	44.40	2.40	43.70	53.90	10.2	100	0	
Vert.	9848.000	AV	40.60	38.20	8.40	42.40	2.40	47.20	53.90	6.7	105	4	
Vert.	19695.870	AV	44.60	40.30	6.70	44.60	-9.50	37.50	53.90	16.4	196	111	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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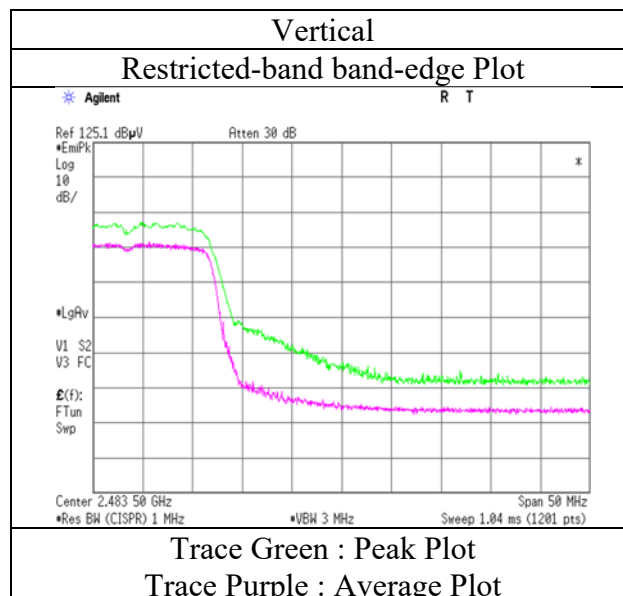
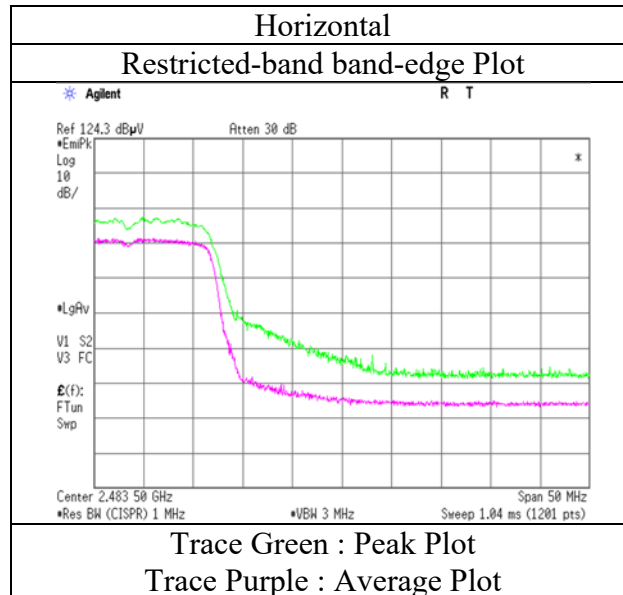
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 18, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Kazuhiro Ando
	(1 GHz - 10 GHz)
Mode	Tx 11g 2462 MHz



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

Radiated Spurious Emission

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2390.000	PK	63.40	27.60	13.80	44.50	2.40	62.70	73.90	11.2	277	41	Floor noise
Hori.	4824.000	PK	55.70	32.70	5.90	46.10	2.40	50.60	73.90	23.3	251	64	
Hori.	7236.000	PK	49.40	37.20	7.30	44.60	2.40	51.70	73.90	22.2	100	0	
Hori.	9648.000	PK	48.70	38.10	8.30	42.60	2.40	54.90	73.90	19.0	100	9	
Hori.	19295.860	PK	46.80	40.40	6.60	44.50	-9.50	39.80	73.90	34.1	194	60	Floor noise
Hori.	2390.000	AV	49.30	27.60	13.80	44.50	2.40	48.60	53.90	5.3	277	41	
Hori.	4824.000	AV	45.20	32.70	5.90	46.10	2.40	40.10	53.90	13.8	251	64	
Hori.	7236.000	AV	40.30	37.20	7.30	44.60	2.40	42.60	53.90	11.3	100	0	
Hori.	9648.000	AV	39.70	38.10	8.30	42.60	2.40	45.90	53.90	8.0	100	9	Floor noise
Hori.	19295.860	AV	40.80	40.40	6.60	44.50	-9.50	33.80	53.90	20.1	194	60	
Vert.	2390.000	PK	64.20	27.60	13.80	44.50	2.40	63.50	73.90	10.4	285	35	
Vert.	4824.000	PK	55.30	32.70	5.90	46.10	2.40	50.20	73.90	23.7	189	9	
Vert.	7236.000	PK	49.20	37.20	7.30	44.60	2.40	51.50	73.90	22.4	100	0	Floor noise
Vert.	9648.000	PK	49.00	38.10	8.30	42.60	2.40	55.20	73.90	18.7	100	3	
Vert.	19295.860	PK	48.60	40.40	6.60	44.50	-9.50	41.60	73.90	32.3	199	111	
Vert.	2390.000	AV	49.50	27.60	13.80	44.50	2.40	48.80	53.90	5.1	285	35	
Vert.	4824.000	AV	44.90	32.70	5.90	46.10	2.40	39.80	53.90	14.1	189	9	Floor noise
Vert.	7236.000	AV	40.60	37.20	7.30	44.60	2.40	42.90	53.90	11.0	100	0	
Vert.	9648.000	AV	40.30	38.10	8.30	42.60	2.40	46.50	53.90	7.4	100	3	
Vert.	19295.860	AV	44.20	40.40	6.60	44.50	-9.50	37.20	53.90	16.7	199	111	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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	96.80	27.70	13.80	44.50	2.40	96.20	-	-	Carrier
Hori.	2400.000	PK	55.70	27.60	13.80	44.50	2.40	55.00	76.20	21.2	Carrier
Vert.	2412.000	PK	96.20	27.70	13.80	44.50	2.40	95.60	-	-	
Vert.	2400.000	PK	56.00	27.60	13.80	44.50	2.40	55.30	75.60	20.3	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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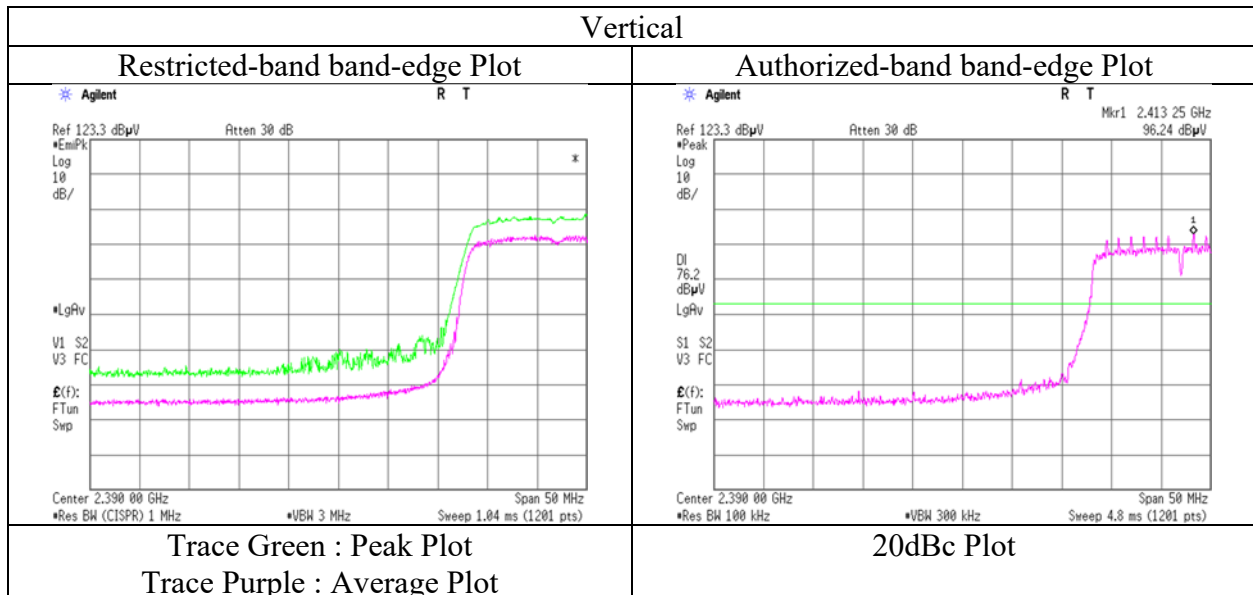
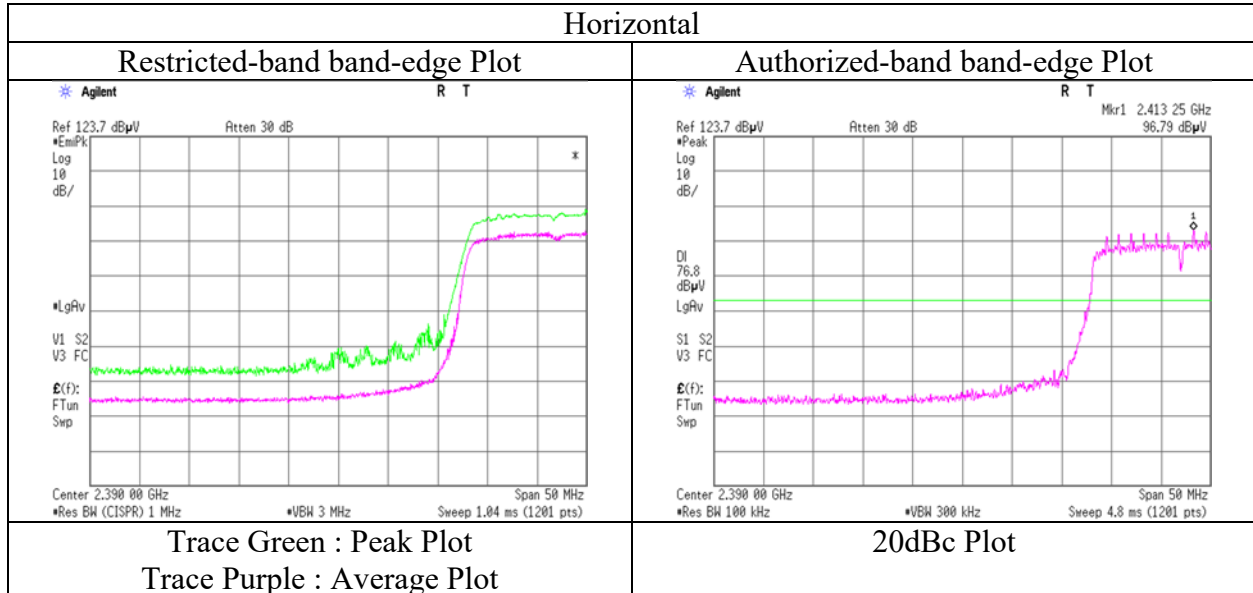
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 18, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Kazuhiro Ando
	(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.	12069762H-A-R1			
Test place	Kashima EMC Lab.			
Semi Anechoic Chamber	No.10	No.11	No.10	No.10
Date	October 19, 2018	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	24 deg. C / 53 % RH	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Hiromitsu Tanabe	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz - 1000 MHz)	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	204.746	QP	38.50	9.90	6.50	26.20	0.00	28.70	43.50	14.8	155	100	
Hori.	264.376	QP	46.40	12.30	7.10	26.00	0.00	39.80	46.00	6.2	125	260	
Hori.	273.300	QP	40.80	12.80	7.20	26.00	0.00	34.80	46.00	11.2	127	275	
Hori.	4874.000	PK	54.80	32.70	6.00	46.10	2.40	49.80	73.90	24.1	111	62	
Hori.	7311.000	PK	49.60	37.30	7.30	44.50	2.40	52.10	73.90	21.8	100	0	Floor noise
Hori.	9748.000	PK	48.40	38.10	8.30	42.50	2.40	54.70	73.90	19.2	171	340	
Hori.	19495.890	PK	46.90	40.40	6.60	44.50	-9.50	39.90	73.90	34.0	113	310	
Hori.	4874.000	AV	45.10	32.70	6.00	46.10	2.40	40.10	53.90	13.8	111	62	
Hori.	7311.000	AV	40.70	37.30	7.30	44.50	2.40	43.20	53.90	10.7	100	0	Floor noise
Hori.	9748.000	AV	40.20	38.10	8.30	42.50	2.40	46.50	53.90	7.4	171	340	
Hori.	19495.890	AV	40.20	40.40	6.60	44.50	-9.50	33.20	53.90	20.7	113	310	
Vert.	204.746	QP	33.50	9.90	6.50	26.20	0.00	23.70	43.50	19.8	230	90	
Vert.	264.376	QP	43.80	12.30	7.10	26.00	0.00	37.20	46.00	8.8	100	325	
Vert.	273.300	QP	41.00	12.80	7.20	26.00	0.00	35.00	46.00	11.0	100	240	
Vert.	4874.000	PK	52.80	32.70	6.00	46.10	2.40	47.80	73.90	26.1	201	0	
Vert.	7311.000	PK	49.30	37.30	7.30	44.50	2.40	51.80	73.90	22.1	100	0	Floor noise
Vert.	9748.000	PK	48.90	38.10	8.30	42.50	2.40	55.20	73.90	18.7	100	5	
Vert.	19495.890	PK	48.70	40.40	6.60	44.50	-9.50	41.70	73.90	32.2	209	110	
Vert.	4874.000	AV	43.90	32.70	6.00	46.10	2.40	38.90	53.90	15.0	201	0	
Vert.	7311.000	AV	40.40	37.30	7.30	44.50	2.40	42.90	53.90	11.0	100	0	Floor noise
Vert.	9748.000	AV	41.10	38.10	8.30	42.50	2.40	47.40	53.90	6.5	100	5	
Vert.	19495.890	AV	44.00	40.40	6.60	44.50	-9.50	37.00	53.90	16.9	209	110	

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

Distance factor : 1 GHz - 10 GHz : 20log(3.95 m / 3.0 m) = 2.4 dB

10 GHz - 26.5 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

UL Japan, Inc.

Kashima EMC Lab.

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

Telephone : +81 478 88 6500

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Radiated Spurious Emission

Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 18, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Kazuhiro Ando	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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.	2483.500	PK	64.70	27.90	13.90	44.50	2.40	64.40	73.90	9.5	270	40	Floor noise
Hori.	4924.000	PK	53.90	32.70	6.00	46.20	2.40	48.80	73.90	25.1	114	59	
Hori.	7386.000	PK	50.00	37.40	7.40	44.40	2.40	52.80	73.90	21.1	100	0	
Hori.	9848.000	PK	49.30	38.20	8.40	42.40	2.40	55.90	73.90	18.0	100	7	
Hori.	19695.890	PK	47.20	40.30	6.70	44.60	-9.50	40.10	73.90	33.8	114	311	Floor noise
Hori.	2483.500	AV	50.80	27.90	13.90	44.50	2.40	50.50	53.90	3.4	270	40	
Hori.	4924.000	AV	44.50	32.70	6.00	46.20	2.40	39.40	53.90	14.5	114	59	
Hori.	7386.000	AV	41.00	37.40	7.40	44.40	2.40	43.80	53.90	10.1	100	0	
Hori.	9848.000	AV	40.80	38.20	8.40	42.40	2.40	47.40	53.90	6.5	100	7	Floor noise
Hori.	19695.890	AV	40.70	40.30	6.70	44.60	-9.50	33.60	53.90	20.3	114	311	
Vert.	2483.500	PK	63.00	27.90	13.90	44.50	2.40	62.70	73.90	11.2	244	39	
Vert.	4924.000	PK	52.60	32.70	6.00	46.20	2.40	47.50	73.90	26.4	171	355	
Vert.	7386.000	PK	50.10	37.40	7.40	44.40	2.40	52.90	73.90	21.0	100	0	Floor noise
Vert.	9848.000	PK	49.10	38.20	8.40	42.40	2.40	55.70	73.90	18.2	118	0	
Vert.	19695.890	PK	49.30	40.30	6.70	44.60	-9.50	42.20	73.90	31.7	207	111	
Vert.	2483.500	AV	49.40	27.90	13.90	44.50	2.40	49.10	53.90	4.8	244	39	
Vert.	4924.000	AV	43.50	32.70	6.00	46.20	2.40	38.40	53.90	15.5	171	355	Floor noise
Vert.	7386.000	AV	41.00	37.40	7.40	44.40	2.40	43.80	53.90	10.1	100	0	
Vert.	9848.000	AV	40.80	38.20	8.40	42.40	2.40	47.40	53.90	6.5	118	0	
Vert.	19695.890	AV	45.00	40.30	6.70	44.60	-9.50	37.90	53.90	16.0	207	111	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.4\text{ dB}$

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

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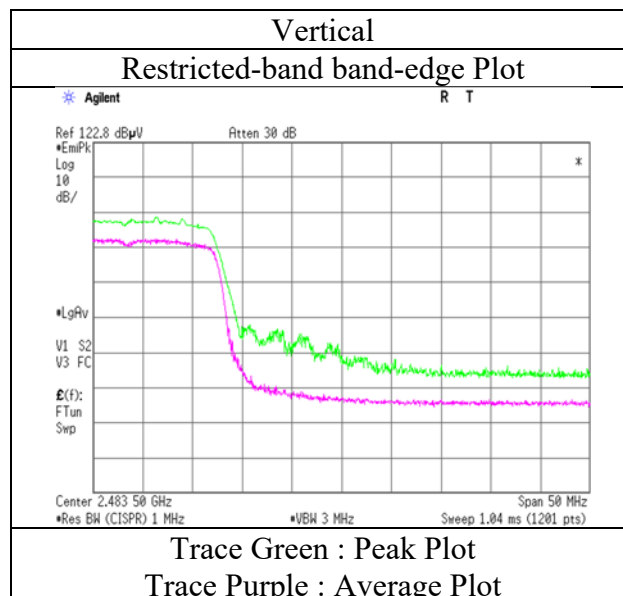
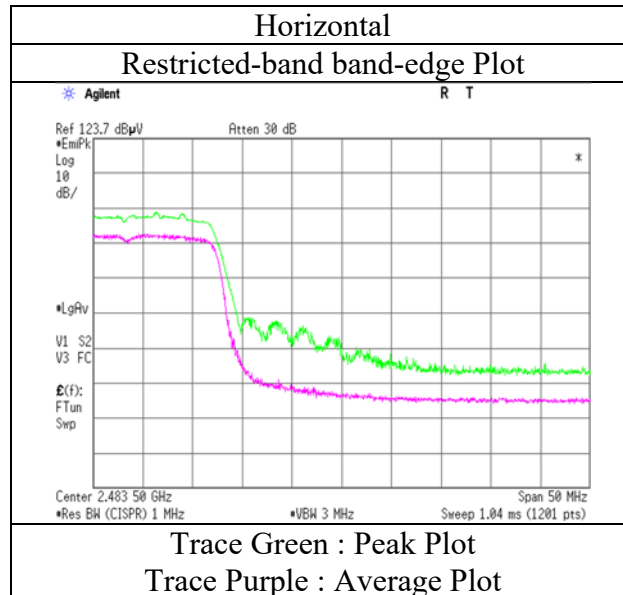
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission (Reference Plot for band-edge)

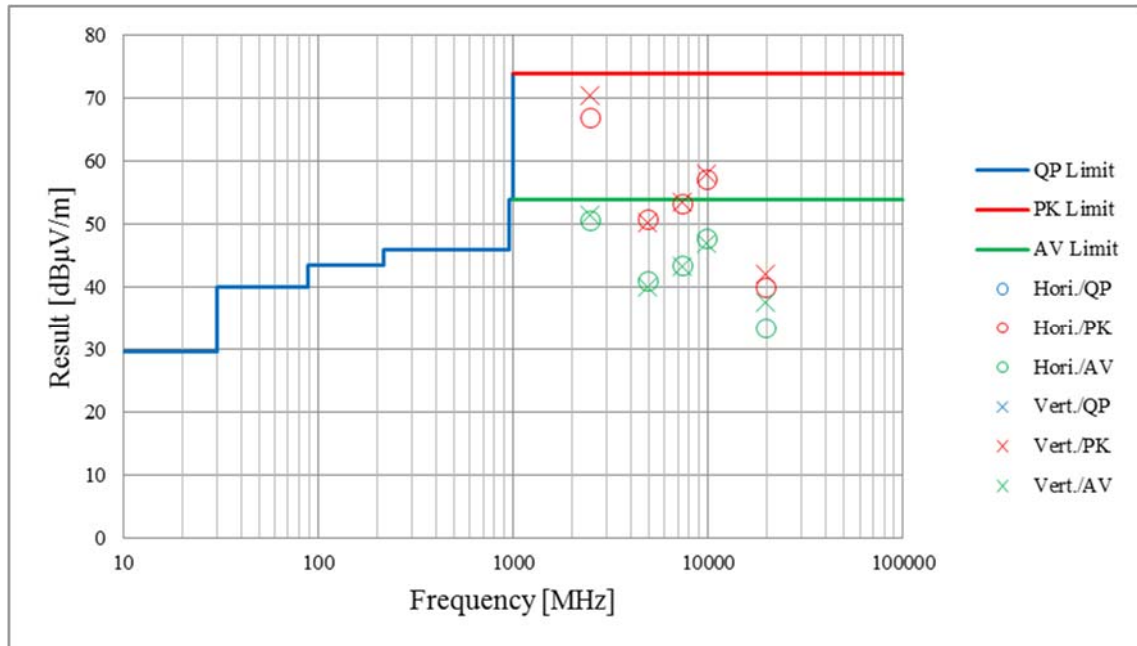
Report No.	12069762H-A-R1
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	October 18, 2018
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Kazuhiro Ando
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 2462 MHz



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

Radiated Spurious Emission (Plot data, Worst case)

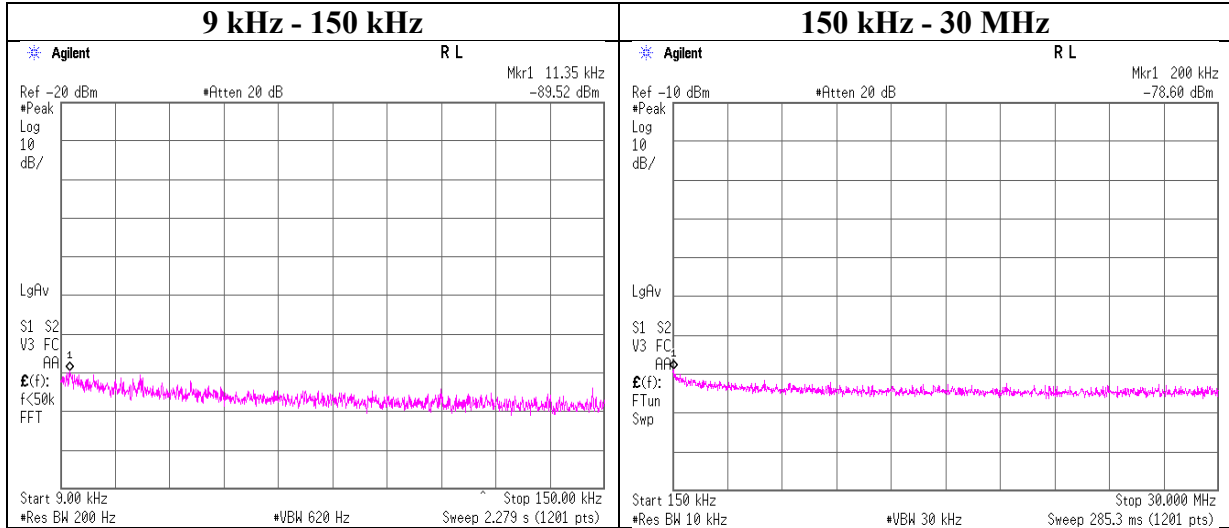
Report No.	12069762H-A-R1		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.10	No.10
Date	October 17, 2018	October 20, 2018	October 20, 2018
Temperature / Humidity	23 deg. C / 50 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11b 2462 MHz		



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

Conducted Spurious Emission

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx 11n-20 2437 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.35	-89.5	0.03	9.94	4.08	1	-75.5	300	6.0	-14.2	46.5	60.7	
200.00	-78.6	0.03	9.94	4.08	1	-64.6	300	6.0	-3.3	21.5	24.8	

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

$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Power Density

Report No. 12069762H-A-R1
Test place Kashima EMC Lab. No.2 Measurement Room
Date October 16, 2018
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Hiromitsu Tanabe
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-9.52	1.91	10.04	2.43	8.00	5.57
2437.00	-9.36	2.18	10.05	2.87	8.00	5.13
2462.00	-9.52	2.29	10.05	2.82	8.00	5.18

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-28.52	1.91	10.04	-16.57	8.00	24.57
2437.00	-27.89	2.18	10.05	-15.66	8.00	23.66
2462.00	-28.57	2.29	10.05	-16.23	8.00	24.23

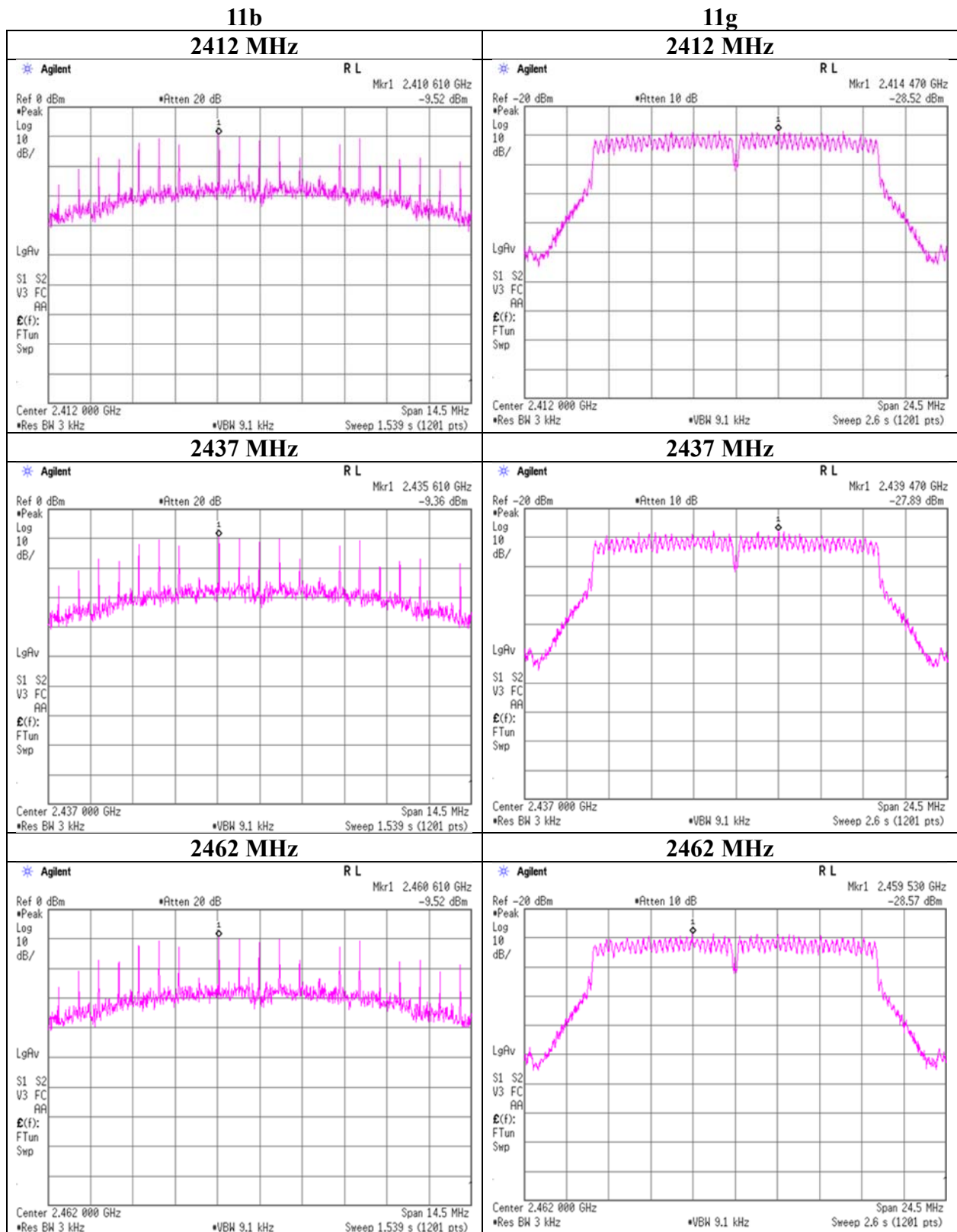
11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-27.46	1.91	10.04	-15.51	8.00	23.51
2437.00	-27.16	2.18	10.05	-14.93	8.00	22.93
2462.00	-27.42	2.29	10.05	-15.08	8.00	23.08

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

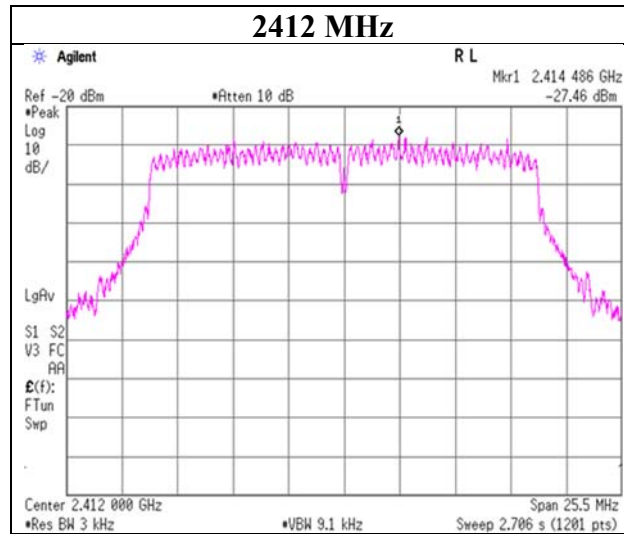
Power Density



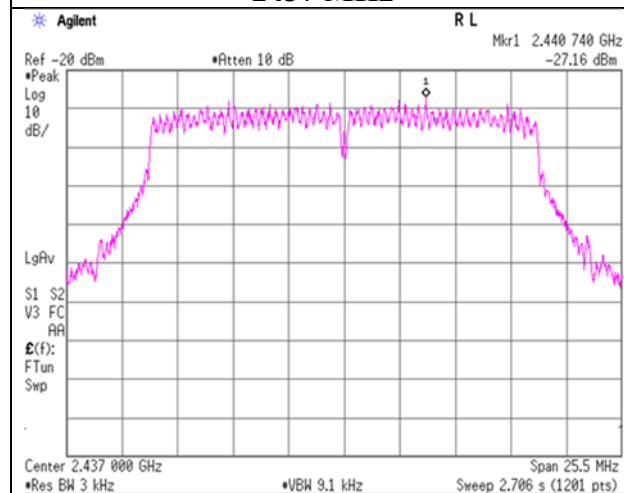
Power Density

11n-20

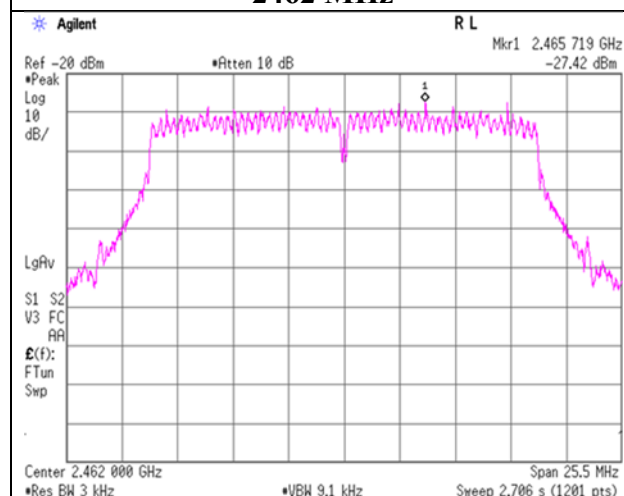
2412 MHz



2437 MHz



2462 MHz



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

APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	144199	Test Receiver	AGILENT	N9038A	MY53290016	2018/07/10	2019/07/31	12
RE	143121	LOGBICON	Schwarzbeck	VULB 9168	343	2018/04/05	2019/04/30	12
RE	143050	3dB Fixed Atten.	TAMAGAWA	UFA-01	none	2018/09/12	2019/09/30	12
RE	143165	Coaxial Cable	Fujikura,Fujikura,Agilent, Fujikura,Fujikura,Fujikura, Fujikura,Fujikura,Fujikura	5D-2W,5D-2W,8494 A,5D-2W,5D-2W,5D-2W	MY41110200(Step Att)	2018/08/29	2019/08/30	12
RE	142930	Pre-Amplifier	HEWLETT PACKARD	8447D	2944A09041	2018/08/30	2019/08/31	12
RE(GHz)	143456	Double Ridged Wave Guide	ETS-Lindgren	3115	00204573	2018/02/19	2019/02/28	12
RE(GHz)	142939	Pre-Amplifier	Micro Wave Factory	MPR-1G26.5-35	161398	2018/05/18	2019/05/31	12
RE(GHz)	142990	Micro Wave Cable	Shuner	SUCOFLEX104A	MY1477/4A	2018/05/25	2019/05/31	12
RE(GHz)	143111	Micro Wave Cable	Junkosha	MWX221	MRA-12-14-148	2018/05/25	2019/05/31	12
RE(GHz)	143016	10dB Fixed Atten.	WEINSCHTEL	54A-10	56246	2018/05/21	2019/05/31	12
RE(GHz)	143459	HPF	MICRO-TRONICS	HPM50111-02	008	2018/05/22	2019/05/31	12
RE(GHz)	143643	Spectrum Analyzer	AGILENT	E4448A	MY52490024	2018/05/23	2019/05/31	12
RE(GHz)	142908	Pre-Amplifier	TOYO	TPA0118-36	A-1001	2017/11/02	2018/11/30	12
RE(GHz)	143140	Micro Wave Cable	Junkosha	MWX221	1407S222	2017/11/02	2018/11/30	12
RE(GHz)	143149	Micro Wave Cable	Junkosha	MWX221	J12J102343-00	2017/11/02	2018/11/30	12
RE(GHz)	143438	Double Ridged Horn	ETS-Lindgren	3160-09	00166043	2018/06/26	2019/06/30	12
RE(GHz)	142937	Pre-Amplifier	TOYO	HAP18-26W	00000035	2018/06/26	2019/06/30	12
RE(GHz)	143113	Micro Wave Cable	Suhner	SUCOFLEX104	MY588/4	2018/07/10	2019/07/31	12
AT	143606	Power Sensor	AGILENT	N1923A	MY54070024	2018/06/20	2019/06/30	12
AT	143588	Peak Power Analyzer	AGILENT	8990B	MY51000276	2018/06/20	2019/06/30	12
AT	143109	Micro Wave Cable	Suhner	SUCOFLEX102	MY3662/2	2018/05/25	2019/05/31	12
AT	143643	Spectrum Analyzer	AGILENT	E4448A	MY52490024	2018/05/23	2019/05/31	12
AT	143023	10dB Fixed Atten.	WEINSCHTEL	54A-10	56251	2018/05/21	2019/05/31	12
EMI	143654	Ruler	TAJIMA	L19-55	-	-	-	-
EMI	143542	Temperature & Humidity Indicator	HIOKI	3641/9680-50	090999895/090905406	2018/05/30	2019/05/31	12
EMI	143133	Barometer	Sunoh	SBR-151	001439	2015/11/18	2018/11/30	36
EMI	142901	EMI Software	TSJ	TEPTO-DV(RE,CE, MF,PE)	Ver.3.3	-	-	-
EMI	144216	Digital Multimeter	Fluke Corporation	115	994460954	2018/10/09	2019/10/31	12

*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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
AT: Antenna Terminal Conducted test

UL Japan, Inc.

Kashima EMC Lab.

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

Telephone : +81 478 88 6500

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