RADIO TEST REPORT

Test Report No. : 11017362H-C-R2

Applicant	:	**CASIO COMPUTER CO., LTD.**
Type of Equipment	:	**Handheld Printer Terminal**
Model No.	:	**IT-9000-MC25E-C**
FCC ID	:	**BBQIT9000C**
Test regulation	:	**FCC Part 15 Subpart C: 2015** ***WLAN part**
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. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11017362H-C-R1. 11017362H-C-R1 is replaced with this report.

Date of test: November 24 to December 8, 2015

Representative test engineer:

Shinichi Miyazono
Engineer
Consumer Technology Division

Approved by:

Takahiro Hatakeda
Leader
Consumer Technology Division

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

REVISION HISTORY

Original Test Report No.: 11017362H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11017362H-C	January 13, 2016	-	-
1	11017362H-C-R1	January 22, 2016	P.5, 11, 13	Update of KDB version
2	11017362H-C-R2	January 22, 2016	P.5	Correction of inner power supply

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	CASIO COMPUTER CO., LTD.
Address	:	2951-5, Ishikawa-Machi, Hachioji-shi Tokyo 192-8556, Japan
Telephone Number	:	+81-42-639-5188
Facsimile Number	:	+81-42-639-5046
Contact Person	:	KATSUMASA MOTOKI

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

2.1 Identification of E.U.T.

Type of Equipment	:	Handheld Printer Terminal
Model No.	:	IT-9000-MC25E-C
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	Li-ion battery DC7.4V 2000mAh/15Wh, M/N:HA-G20BAT
Receipt Date of Sample	:	October 17, 2015
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: IT-9000-MC25E-C (referred to as the EUT in this report) is Handheld Printer Terminal.

Model No.: IT-9000-MC25E-C has a variant model: IT-9000-C25E-C.
The difference of them is that only IT-9000-MC25E-C has a magnetic card reader.
Except for it they are completely identical in electronic characteristics.
Therefore the test was performed with IT-9000-MC25E-C as a representative.

Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Antenna Gain	2.34dBi

BT

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Antenna Gain	2.34dBi

RFID

Equipment Type	Transceiver
Frequency of Operation	13.56MHz
Type of Modulation	ASK

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on November 23, 2015 *Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.
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 **IC:** RSS-Gen 8.8	**FCC:** Section 15.207 **IC:** RSS-Gen 8.8	**QP** 18.5 dB, 0.23211 MHz, N 0.23317 MHz, L **AV** 18.4 dB, 0.23317 MHz, L	Complied	-
6dB Bandwidth	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04 **IC:** -	**FCC:** Section 15.247(a)(2) **IC:** RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04 **IC:** RSS-Gen 6.12	**FCC:** Section 15.247(b)(3) **IC:** RSS-247 5.4(4)		Complied	Conducted
Power Density	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04 **IC:** -	**FCC:** Section 15.247(e) **IC:** RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04 **IC:** RSS-Gen 6.13	**FCC:** Section15.247(d) **IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	1.9 dB 2390.000 MHz, AV, Hori	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r04 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 RF Part 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.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	**IC:** RSS-Gen 6.6	**IC:** -	N/A	-	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.

Ise EMC Lab.

Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz -3 GHz	3 GHz -18 GHz	18 GHz -26.5 GHz	26.5 GHz -40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Frequency range	Conducted emission using AMN(LISN) (±dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

Test distance	Radiated emission (±dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(±dB)		(10 m*)(±dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(±dB)		(1 m*)(±dB)	(0.5 m*)(±dB)	(10 m*)(±dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

*Measurement distance

Conducted Emission test

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

Radiated emission test

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

3.5 Test Location

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

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

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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.

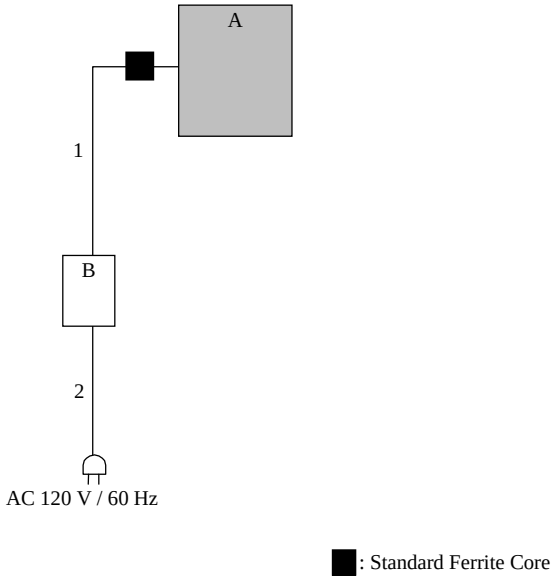
Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 0 (Long GI), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: 11b (2412 MHz: 12500, 2437 MHz: 12500, 2462 MHz: 12500) 11g (2412 MHz: 12500, 2437 MHz: 25000, 2462 MHz: 12500) 11n-20 (2412 MHz: 12500, 2437 MHz: 25000, 2462 MHz: 12500) Software: WL127X_TOOL *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
Conducted Emission *1)	11n-20 Tx	2437 MHz
Spurious Emission above 1 GHz (Radiated)	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
Spurious Emission below 1 GHz (Radiated) *1)	11n-20 Tx	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
Spurious Emission (Conducted) *1)	11n-20 Tx	2437 MHz

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.

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	Handheld Printer Terminal	IT-9000-MC25E-C	11CGM L75B00007IAAA1 *1) 11CGM L75B00016IAA1 *2)	CASIO COMPUTER CO., LTD.	EUT
B	AC Adapter	AD-S42120C	0915C	CASIO COMPUTER CO., LTD.	-

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

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	AC Cable	2.0	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector	**: QP and CISPR AV**
Measurement range	**: 0.15 MHz – 30 MHz**
Test data	**: APPENDIX**
Test result	**: Pass**

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r04".

[For below 1GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]
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 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: 12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	3 m (below 10 GHz), 1 m *2) (above 10 GHz)		3 m (below 10 GHz), 1 m *2) (above 10 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r04"
*2) Distance Factor: 20 x log (3.0 m / 1.0 m) = 9.5 dB

- The carrier level and noise levels were confirmed at each position of X, Y, and Z axes of EUT and EUT on the cradle 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

SECTION 7: 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	20 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: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 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	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".
*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 = 9.1 kHz)

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

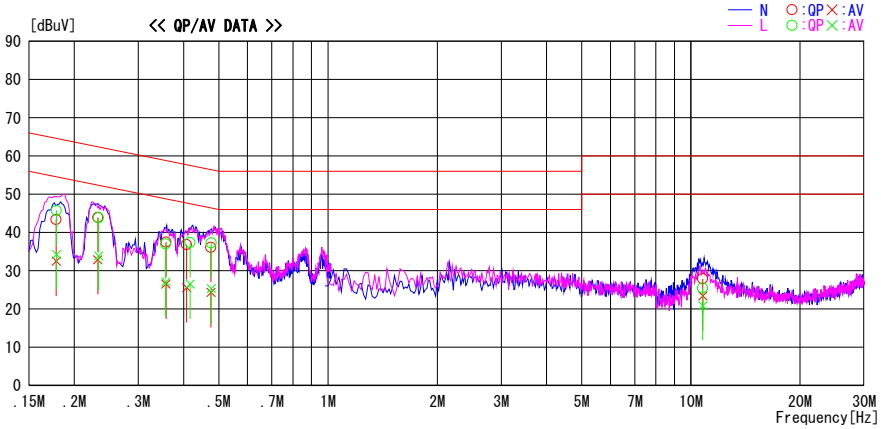
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/12/08

Report No. : 11017362H

Temp./Humi. : 20deg. C / 31% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 11n20 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase
	QP	AV	Factor	QP	AV	QP	AV	QP	AV	
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.17823	30.2	19.3	13.2	43.4	32.5	64.6	54.6	21.2	22.1	N
0.23211	30.6	19.6	13.3	43.9	32.9	62.4	52.4	18.5	19.5	N
0.35752	24.2	13.2	13.3	37.5	26.5	58.8	48.8	21.3	22.3	N
0.40783	23.5	12.3	13.3	36.8	25.6	57.7	47.7	20.9	22.1	N
0.47558	22.8	11.0	13.3	36.1	24.3	56.4	46.4	20.3	22.1	N
10.77620	13.4	8.9	14.5	27.9	23.4	60.0	50.0	32.1	26.6	N
0.17855	32.5	21.0	13.2	45.7	34.2	64.6	54.6	18.9	20.4	L
0.23317	30.5	20.6	13.3	43.8	33.9	62.3	52.3	18.5	18.4	L
0.35708	23.7	13.8	13.3	37.0	27.1	58.8	48.8	21.8	21.7	L
0.41684	24.1	13.2	13.3	37.4	26.5	57.5	47.5	20.1	21.0	L
0.47698	24.0	12.0	13.3	37.3	25.3	56.4	46.4	19.1	21.1	L
10.77680	11.0	6.4	14.5	25.5	20.9	60.0	50.0	34.5	29.1	L

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

6dB Bandwidth

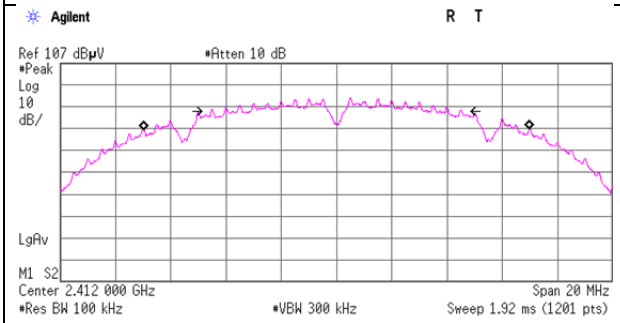
Test place	Ise EMC Lab. No.6 Measurement Room	
Report No.	11017362H	
Date	November 27, 2015	December 7, 2015
Temperature / Humidity	21 deg. C / 32 % RH	22 deg. C / 37 % RH
Engineer	Hironobu Ohnishi	Shinichi Miyazono
Mode	Tx	

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.076	> 500
	2437	10.002	> 500
	2462	9.082	> 500
11g	2412	15.152	> 500
	2437	15.143	> 500
	2462	15.106	> 500
11n-20	2412	15.121	> 500
	2437	15.093	> 500
	2462	15.143	> 500

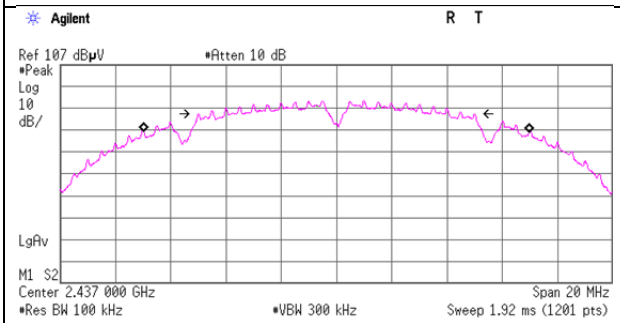
6dB Bandwidth

11b

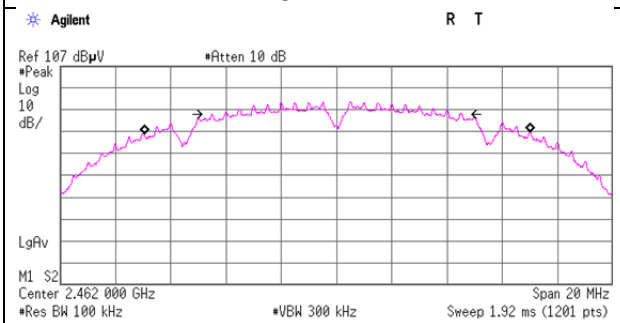
2412 MHz



2437 MHz

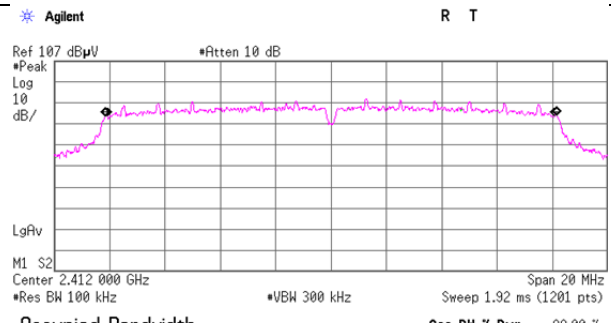


2462 MHz

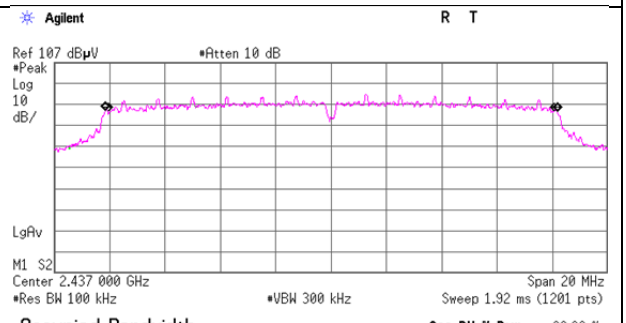


11g

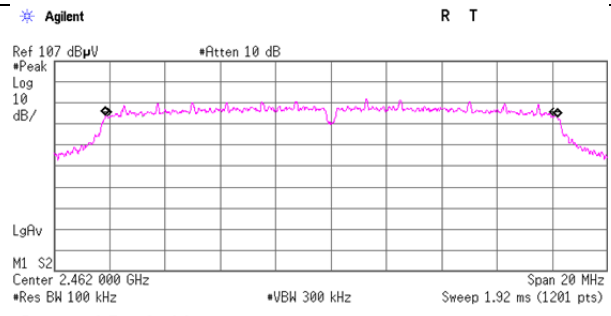
2412 MHz



2437 MHz



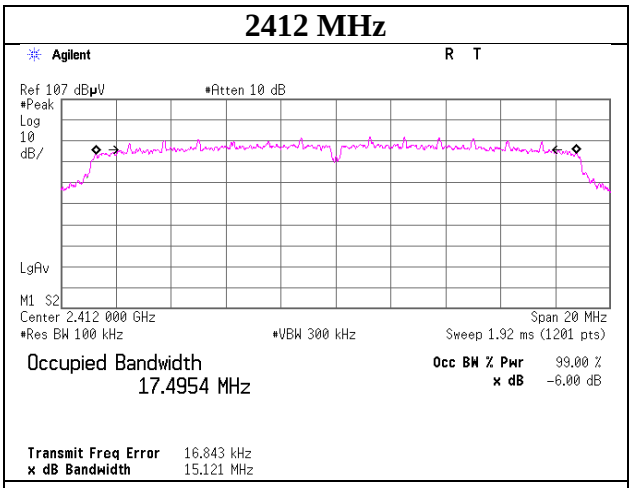
2462 MHz



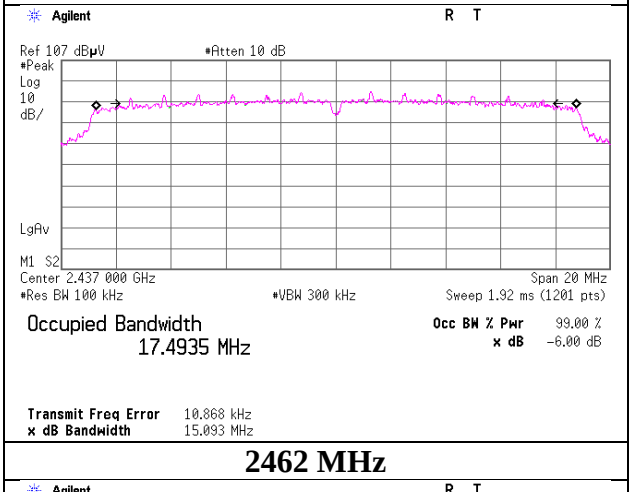
6dB Bandwidth

11n-20

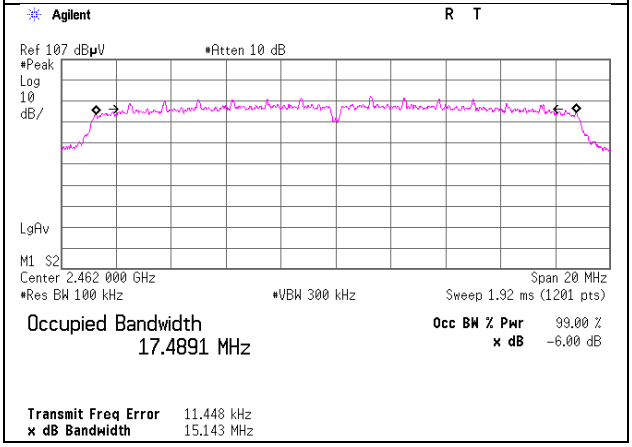
2412 MHz



2437 MHz



2462 MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 and 6 Measurement Room	
Report No.	11017362H	
Date	November 24, 2015	December 7, 2015
Temperature / Humidity	24 deg. C / 34 % RH	22 deg. C / 37 % RH
Engineer	Shinichi Miyazono	Shinichi Miyazono
Mode	Tx 11b	

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	-5.51	0.67	19.74	14.90	30.90	30.00	1000	15.10
2437	-5.46	0.67	19.74	14.95	31.26	30.00	1000	15.05
2462	-5.53	0.67	19.74	14.88	30.76	30.00	1000	15.12

Sample Calculation:
Result = Reading + Cable Loss (including the cable customer supplied) + Attenuator Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-5.46	*
2	-5.55	
5.5	-5.83	
11	-5.83	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 and 6 Measurement Room	
Report No.	11017362H	
Date	November 24, 2015	December 7, 2015
Temperature / Humidity	24 deg. C / 34 % RH	22 deg. C / 37 % RH
Engineer	Shinichi Miyazono	Shinichi Miyazono
Mode	Tx 11g	

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	1.35	0.67	19.74	21.76	149.97	30.00	1000	8.24
2437	2.53	0.67	19.74	22.94	196.79	30.00	1000	7.06
2462	1.67	0.67	19.74	22.08	161.44	30.00	1000	7.92

Sample Calculation:
Result = Reading + Cable Loss (including the cable customer supplied) + Attenuator Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	2.53	*
9	2.49	
12	2.44	
18	2.43	
24	2.29	
36	2.25	
48	2.22	
54	2.12	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 and 6 Measurement Room	
Report No.	11017362H	
Date	November 24, 2015	November 27, 2015
Temperature / Humidity	24 deg. C / 34 % RH	21 deg. C / 32 % RH
Engineer	Shinichi Miyazono	Hironobu Ohnishi
Mode	Tx 11n-20	

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	1.42	0.67	19.74	21.83	152.41	30.00	1000	8.17
2437	2.63	0.67	19.74	23.04	201.37	30.00	1000	6.96
2462	1.73	0.67	19.74	22.14	163.68	30.00	1000	7.86

Sample Calculation:
Result = Reading + Cable Loss (including the cable customer supplied) + Attenuator Loss

*The equipment and cables were not used for factor 0.0 dB of the data sheets.

2437 MHz, Long GI

MCS Number	Reading [dBm]	Remark
0	12.21	*
1	12.17	
2	12.11	
3	11.95	
4	11.98	
5	12.15	
6	11.87	
7	11.50	

* Worst MCS

MCS Number	Reading [dBm]	GI	Remark
0	12.21	Long	*
0	12.15	Short	

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

*Difference between worst rate check data and formal test result is due to the different test condition.

Average Output Power
(Reference data)

Test place	Ise EMC Lab. No. 6 Measurement Room	
Report No.	11017362H	
Date	November 27, 2015	December 7, 2015
Temperature / Humidity	21 deg. C / 32 % RH	22 deg. C / 37 % RH
Engineer	Hironobu Ohnishi	Shinichi Miyazono
Mode	Tx	

11b **1 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-7.90	0.67	19.74	12.51	17.82	0.01	12.52	17.85
2437	-7.89	0.67	19.74	12.52	17.86	0.01	12.53	17.89
2462	-7.86	0.67	19.74	12.55	17.99	0.01	12.56	18.01

11g **6 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-8.06	0.67	19.74	12.35	17.18	0.09	12.44	17.53
2437	-5.13	0.67	19.74	15.28	33.73	0.09	15.37	34.43
2462	-8.13	0.67	19.74	12.28	16.90	0.09	12.37	17.25

11n-20 **MCS 0**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-8.08	0.67	19.74	12.33	17.10	0.10	12.43	17.48
2437	-5.18	0.67	19.74	15.23	33.34	0.10	15.33	34.08
2462	-8.27	0.67	19.74	12.14	16.37	0.10	12.24	16.73

Sample Calculation:
Result (Frame power) = Reading + Cable Loss (including the cable customer supplied) + Attenuator
Result (Burst power) = Frame power + Duty factor

*The equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power (Reference data)

Test place	Ise EMC Lab. No. 6 Measurement Room	
Report No.	11017362H	
Date	November 27, 2015	December 7, 2015
Temperature / Humidity	21 deg. C / 32 % RH	22 deg. C / 37 % RH
Engineer	Hironobu Ohnishi	Shinichi Miyazono
Mode	Tx	

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	-7.89	0.01	-7.88	*
	2	-7.92	0.01	-7.91	
	5.5	-7.95	0.05	-7.90	
	11	-8.00	0.09	-7.91	
11g	6	-5.13	0.09	-5.04	*
	9	-5.19	0.10	-5.09	
	12	-5.68	0.16	-5.52	
	18	-5.76	0.23	-5.53	
	24	-7.71	0.31	-7.40	
	36	-7.82	0.47	-7.35	
	48	-7.94	0.61	-7.33	
	54	-7.99	0.65	-7.34	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

2437 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-5.18	0.10	-5.08	*
	1	-5.79	0.18	-5.61	
	2	-5.81	0.24	-5.57	
	3	-7.69	0.32	-7.37	
	4	-7.87	0.47	-7.40	
	5	-8.02	0.59	-7.43	
	6	-8.05	0.63	-7.42	
	7	-8.90	0.68	-8.22	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

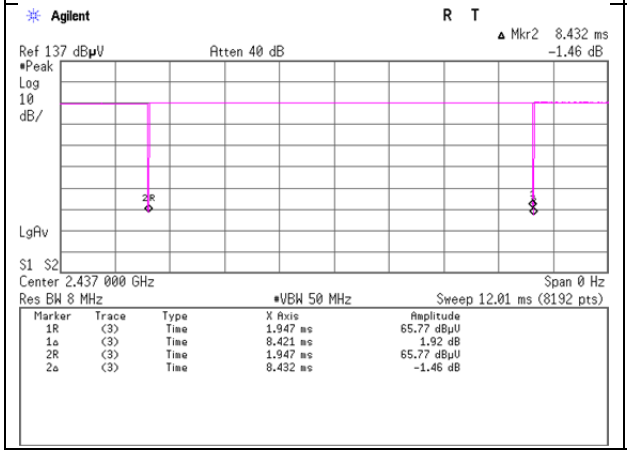
All comparison were carried out on same frequency and measurement factors.

Burst rate confirmation

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 26, 2015
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Shinichi Miyazono
Mode	Tx

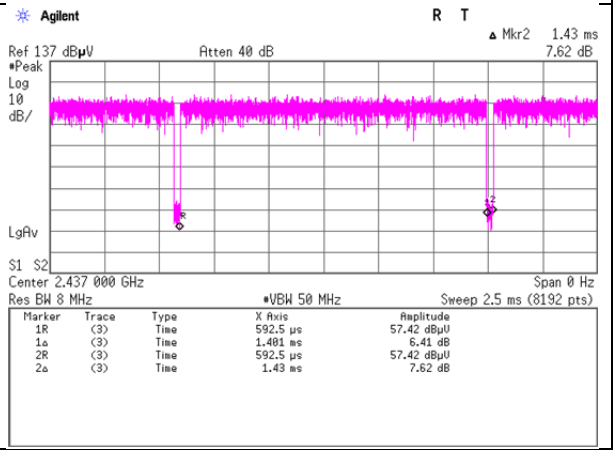
11b 1 Mbps

Tx on / (Tx on + Tx off) = 0.999
Tx on / (Tx on + Tx off) * 100 = 99.9 %
Duty factor = 10 * log (8.432 / 8.421) = 0.01 dB



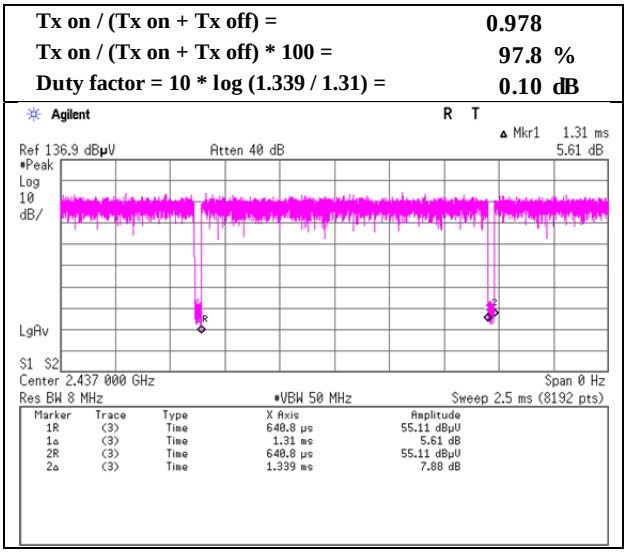
11g 6 Mbps

Tx on / (Tx on + Tx off) = 0.980
Tx on / (Tx on + Tx off) * 100 = 98.0 %
Duty factor = 10 * log (1.43 / 1.401) = 0.09 dB



11n-20 MCS 0

Tx on / (Tx on + Tx off) = 0.978
Tx on / (Tx on + Tx off) * 100 = 97.8 %
Duty factor = 10 * log (1.339 / 1.31) = 0.10 dB



Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono
	(1 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2386.556	PK	53.0	26.9	3.3	32.0	-	51.2	73.9	22.7	
Hori	2390.000	PK	50.3	26.9	3.3	32.0	-	48.5	73.9	25.4	
Hori	2814.013	PK	47.9	27.9	3.6	31.7	-	47.7	73.9	26.2	
Hori	4824.000	PK	46.2	31.8	4.7	31.3	-	51.4	73.9	22.5	
Hori	7236.000	PK	41.4	36.0	6.7	32.0	-	52.1	73.9	21.8	Floor Noise
Hori	9648.000	PK	43.7	38.2	7.5	32.4	-	57.0	73.9	16.9	
Hori	2386.556	AV	46.0	26.9	3.3	32.0	-	44.2	53.9	9.7	
Hori	2390.000	AV	42.6	26.9	3.3	32.0	-	40.8	53.9	13.1	
Hori	2814.013	AV	44.4	27.9	3.6	31.7	-	44.2	53.9	9.7	
Hori	4824.000	AV	42.2	31.8	5.5	31.3	-	48.2	53.9	5.7	
Hori	7236.000	AV	31.2	36.0	6.7	32.0	-	41.9	53.9	12.0	Floor Noise
Hori	9648.000	AV	34.5	38.2	7.5	32.4	-	47.8	53.9	6.1	
Vert	2386.075	PK	50.0	26.9	3.3	32.0	-	48.2	73.9	25.7	
Vert	2390.000	PK	47.8	26.9	3.3	32.0	-	46.0	73.9	27.9	
Vert	2814.020	PK	49.5	27.9	3.6	31.7	-	49.3	73.9	24.6	
Vert	4824.000	PK	50.7	31.8	5.5	31.3	-	56.7	73.9	17.2	
Vert	7236.000	PK	41.3	36.0	6.7	32.0	-	52.0	73.9	21.9	Floor Noise
Vert	9648.000	PK	43.6	38.2	7.5	32.4	-	56.9	73.9	17.0	
Vert	2386.075	AV	42.7	26.9	3.3	32.0	-	40.9	53.9	13.0	
Vert	2390.000	AV	39.8	26.9	3.3	32.0	-	38.0	53.9	15.9	
Vert	2814.020	AV	45.9	27.9	3.6	31.7	-	45.7	53.9	8.2	
Vert	4824.000	AV	45.5	31.8	5.5	31.3	-	51.5	53.9	2.4	
Vert	7236.000	AV	33.0	36.0	6.7	32.0	-	43.7	53.9	10.2	Floor Noise
Vert	9648.000	AV	36.8	38.2	7.5	32.4	-	50.1	53.9	3.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

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

Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

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

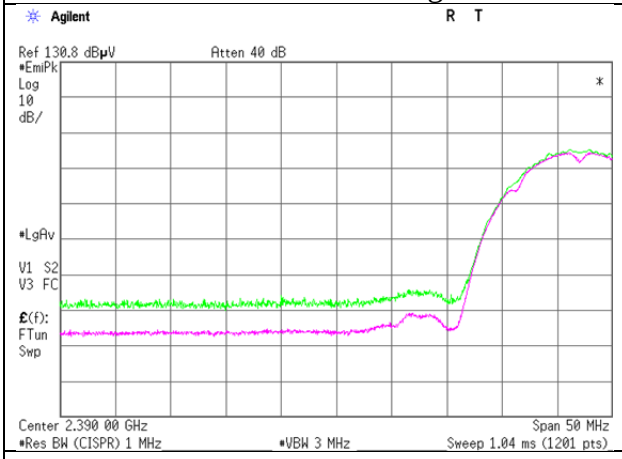
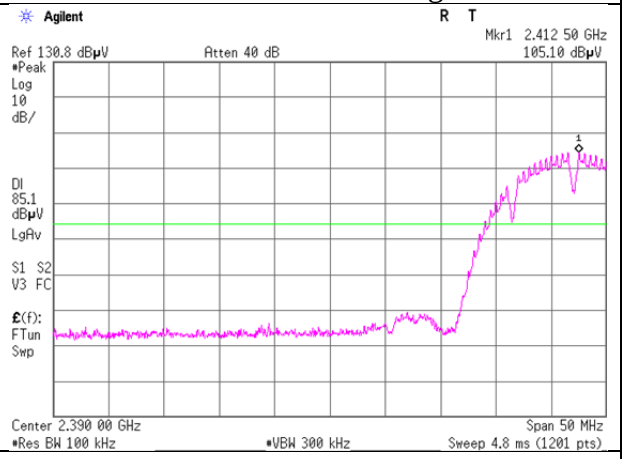
20dBc Data Sheet

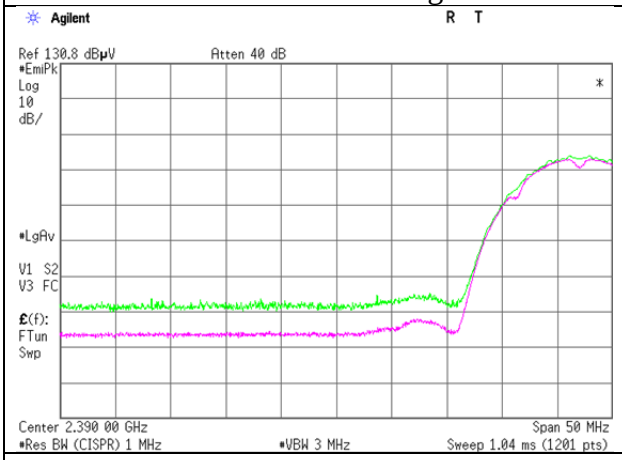
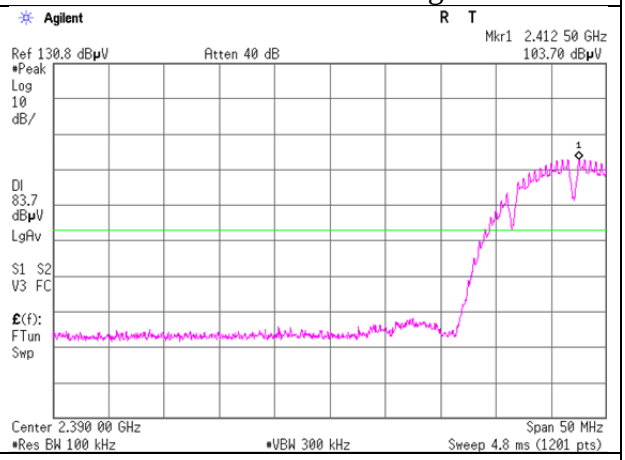
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	105.1	26.9	3.3	32.0	103.3	-	-	Carrier
Hori	2397.000	PK	59.1	26.9	3.3	32.0	57.3	83.3	26.0	
Hori	2400.000	PK	50.0	26.9	3.3	32.0	48.2	83.3	35.1	
Vert	2412.000	PK	103.7	26.9	3.3	32.0	101.9	-	-	Carrier
Vert	2397.000	PK	55.7	26.9	3.3	32.0	53.9	81.9	28.0	
Vert	2400.000	PK	47.8	26.9	3.3	32.0	46.0	81.9	35.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11b 2412 MHz	

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono
	(1 GHz - 26.5 GHz)
Mode	Tx 11b 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2843.187	PK	46.3	27.9	3.6	31.7	-	46.1	73.9	27.8	
Hori	4874.000	PK	45.2	31.9	5.5	31.3	-	51.3	73.9	22.6	
Hori	7311.000	PK	41.2	36.0	6.8	32.0	-	52.0	73.9	21.9	Floor Noise
Hori	9748.000	PK	44.0	38.2	7.5	32.4	-	57.3	73.9	16.6	
Hori	2843.187	AV	42.1	27.9	3.6	31.7	-	41.9	53.9	12.0	
Hori	4874.000	AV	40.2	31.9	5.5	31.3	-	46.3	53.9	7.6	
Hori	7311.000	AV	31.3	36.0	6.8	32.0	-	42.1	53.9	11.8	Floor Noise
Hori	9748.000	AV	37.2	38.2	7.5	32.4	-	50.5	53.9	3.4	
Vert	2843.175	PK	48.0	27.9	3.6	31.7	-	47.8	73.9	26.1	
Vert	4874.000	PK	48.0	31.9	4.7	31.3	-	53.3	73.9	20.6	
Vert	7311.000	PK	41.7	36.0	6.8	32.0	-	52.5	73.9	21.4	Floor Noise
Vert	9748.000	PK	42.6	38.2	7.5	32.4	-	55.9	73.9	18.0	
Vert	2843.175	AV	44.3	27.9	3.6	31.7	-	44.1	53.9	9.8	
Vert	4874.000	AV	45.3	31.9	5.5	31.3	-	51.4	53.9	2.5	
Vert	7311.000	AV	33.4	36.0	6.8	32.0	-	44.2	53.9	9.7	Floor Noise
Vert	9748.000	AV	36.4	38.2	7.5	32.4	-	49.7	53.9	4.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

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

Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 11017362H
Date November 27, 2015
Temperature / Humidity 24 deg. C / 30 % RH
Engineer Shinichi Miyazono
(1 GHz - 26.5 GHz)
Mode Tx 11b 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	50.6	26.9	3.3	32.0	-	48.8	73.9	25.1	
Hori	2872.375	PK	45.0	28.0	3.6	31.6	-	45.0	73.9	28.9	
Hori	4924.000	PK	44.2	32.0	5.4	31.3	-	50.3	73.9	23.6	
Hori	7386.000	PK	41.7	36.0	6.7	32.1	-	52.3	73.9	21.6	Floor Noise
Hori	9848.000	PK	43.3	38.2	7.6	32.5	-	56.6	73.9	17.3	
Hori	2483.500	AV	42.5	26.9	3.3	32.0	-	40.7	53.9	13.2	
Hori	2872.375	AV	40.5	28.0	3.6	31.6	-	40.5	53.9	13.4	
Hori	4924.000	AV	40.2	32.0	4.7	31.3	-	45.6	53.9	8.3	
Hori	7386.000	AV	33.3	36.0	6.7	32.1	-	43.9	53.9	10.0	Floor Noise
Hori	9848.000	AV	37.6	38.2	7.6	32.5	-	50.9	53.9	3.0	
Vert	2483.500	PK	49.0	26.9	3.3	32.0	-	47.2	73.9	26.7	
Vert	2872.378	PK	47.0	28.0	3.6	31.6	-	47.0	73.9	26.9	
Vert	4924.000	PK	49.3	32.0	5.4	31.3	-	55.4	73.9	18.5	
Vert	7386.000	PK	41.2	36.0	6.7	32.1	-	51.8	73.9	22.1	Floor Noise
Vert	9848.000	PK	42.5	38.2	7.6	32.5	-	55.8	73.9	18.1	
Vert	2483.500	AV	40.6	26.9	3.3	32.0	-	38.8	53.9	15.1	
Vert	2872.378	AV	41.8	28.0	3.6	31.6	-	41.8	53.9	12.1	
Vert	4924.000	AV	45.5	32.0	5.4	31.3	-	51.6	53.9	2.3	
Vert	7386.000	AV	33.2	36.0	6.7	32.1	-	43.8	53.9	10.1	Floor Noise
Vert	9848.000	AV	35.7	38.2	7.6	32.5	-	49.0	53.9	4.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

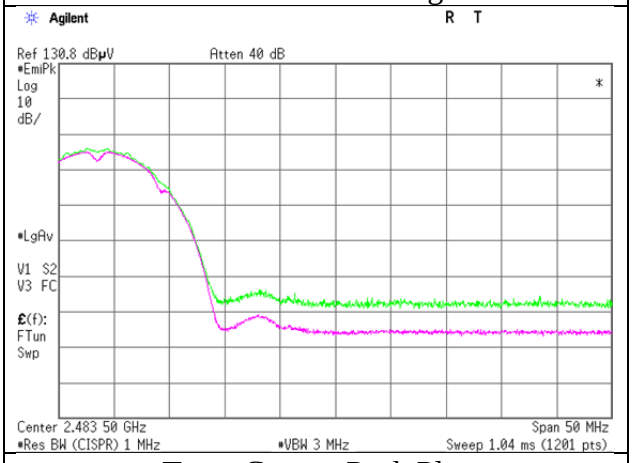
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11b 2462 MHz	

Horizontal

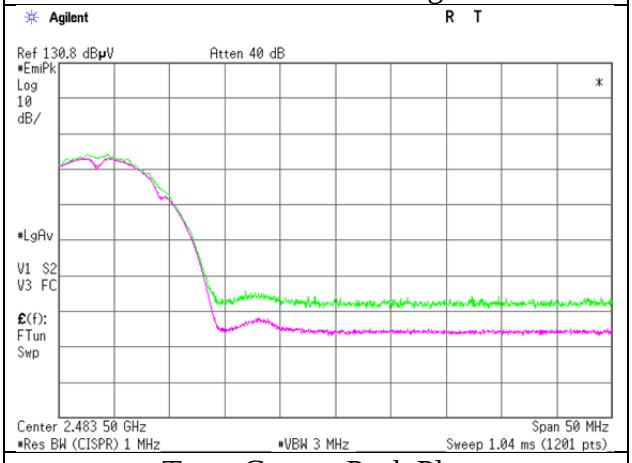
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono
	(1 GHz - 26.5 GHz)
Mode	Tx 11g 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	73.0	26.9	3.3	32.0	-	71.2	73.9	2.7	
Hori	2814.028	PK	51.2	27.9	3.6	31.7	-	51.0	73.9	22.9	
Hori	4824.000	PK	47.3	31.8	5.5	31.3	-	53.3	73.9	20.6	
Hori	7236.000	PK	41.7	36.0	6.7	32.0	-	52.4	73.9	21.5	Floor Noise
Hori	9648.000	PK	43.5	38.2	7.5	32.4	-	56.8	73.9	17.1	
Hori	2390.000	AV	53.7	26.9	3.3	32.0	0.1	52.0	53.9	1.9	*1)
Hori	2814.028	AV	49.0	27.9	3.6	31.7	0.1	48.9	53.9	5.0	
Hori	4824.000	AV	36.8	31.8	5.5	31.3	0.1	42.9	53.9	11.0	
Hori	7236.000	AV	30.8	36.0	6.7	32.0	-	41.5	53.9	12.4	Floor Noise
Hori	9648.000	AV	34.0	38.2	7.5	32.4	0.1	47.4	53.9	6.5	
Vert	2390.000	PK	72.5	26.9	3.3	32.0	-	70.7	73.9	3.2	
Vert	2814.003	PK	51.5	27.9	3.6	31.7	-	51.3	73.9	22.6	
Vert	4824.000	PK	51.5	31.8	5.5	31.3	-	57.5	73.9	16.4	
Vert	7236.000	PK	41.7	36.0	6.7	32.0	-	52.4	73.9	21.5	Floor Noise
Vert	9648.000	PK	43.8	38.2	7.5	32.4	-	57.1	73.9	16.8	
Vert	2390.000	AV	53.4	26.9	3.3	32.0	0.1	51.7	53.9	2.2	*1)
Vert	2814.003	AV	49.0	27.9	3.6	31.7	0.1	48.9	53.9	5.0	
Vert	4824.000	AV	42.1	31.8	5.5	31.3	0.1	48.2	53.9	5.7	
Vert	7236.000	AV	32.8	36.0	6.7	32.0	-	43.5	53.9	10.4	Floor Noise
Vert	9648.000	AV	36.1	38.2	7.5	32.4	0.1	49.5	53.9	4.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

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

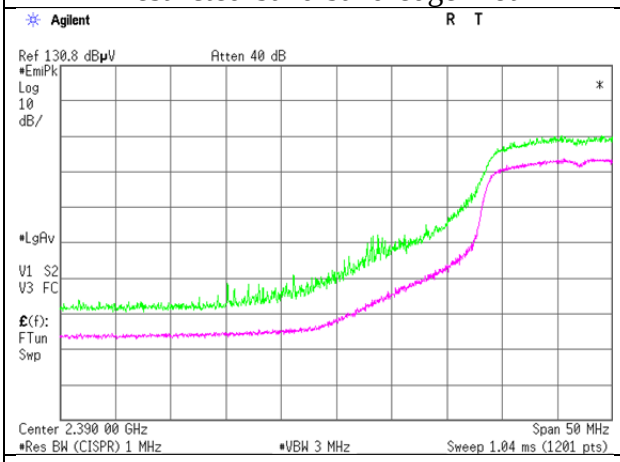
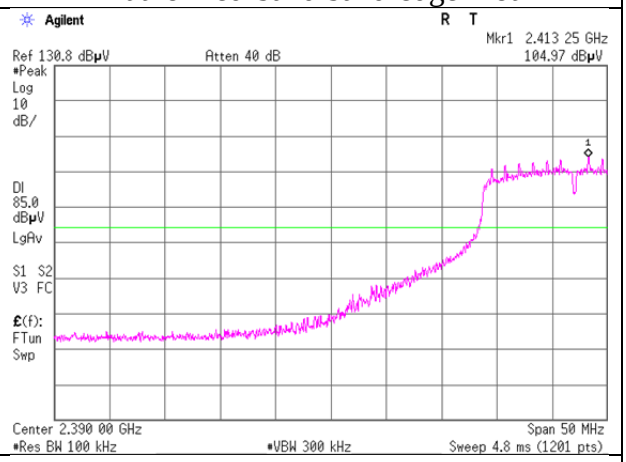
20dBc Data Sheet

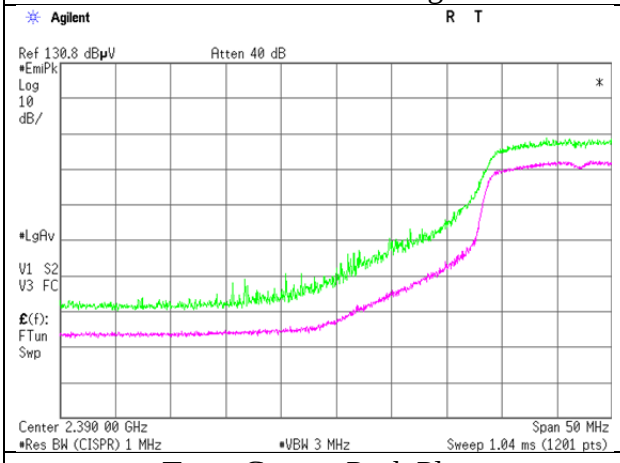
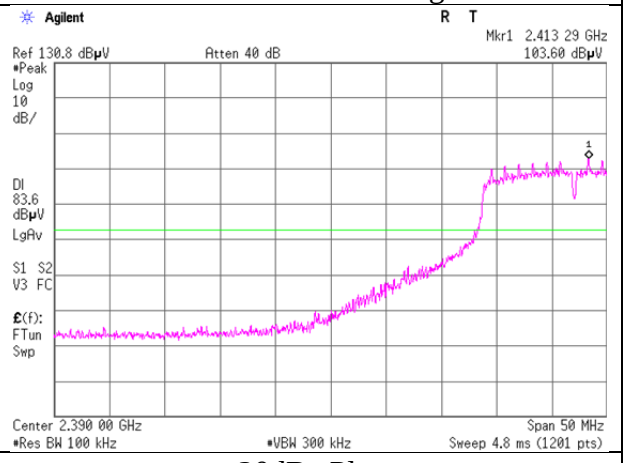
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	105.0	26.9	3.3	32.0	103.2	-	-	Carrier
Hori	2400.000	PK	75.7	26.9	3.3	32.0	73.9	83.2	9.3	
Vert	2412.000	PK	103.6	26.9	3.3	32.0	101.8	-	-	Carrier
Vert	2400.000	PK	75.1	26.9	3.3	32.0	73.3	81.8	8.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11g 2412 MHz	

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono
	(1 GHz - 26.5 GHz)
Mode	Tx 11g 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2843.190	PK	49.1	27.9	3.6	31.7	-	48.9	73.9	25.0	
Hori	4874.000	PK	45.2	31.9	5.5	31.3	-	51.3	73.9	22.6	
Hori	7311.000	PK	41.3	36.0	6.8	32.0	-	52.1	73.9	21.8	Floor Noise
Hori	9748.000	PK	42.1	38.2	7.5	32.4	-	55.4	73.9	18.5	
Hori	2843.190	AV	45.9	27.9	3.6	31.7	0.1	45.8	53.9	8.1	
Hori	4874.000	AV	35.2	31.9	5.5	31.3	0.1	41.4	53.9	12.5	
Hori	7311.000	AV	31.2	36.0	6.8	32.0	-	42.0	53.9	11.9	Floor Noise
Hori	9748.000	AV	32.8	38.2	7.5	32.4	0.1	46.2	53.9	7.7	
Vert	2843.179	PK	49.9	27.9	3.6	31.7	-	49.7	73.9	24.2	
Vert	4874.000	PK	51.8	31.9	5.5	31.3	-	57.9	73.9	16.0	
Vert	7311.000	PK	41.9	36.0	6.8	32.0	-	52.7	73.9	21.2	Floor Noise
Vert	9748.000	PK	42.8	38.2	7.5	32.4	-	56.1	73.9	17.8	
Vert	2843.179	AV	46.8	27.9	3.6	31.7	0.1	46.7	53.9	7.2	
Vert	4874.000	AV	42.4	31.9	5.5	31.3	0.1	48.6	53.9	5.3	
Vert	7311.000	AV	33.5	36.0	6.8	32.0	-	44.3	53.9	9.6	Floor Noise
Vert	9748.000	AV	35.1	38.2	7.5	32.4	0.1	48.5	53.9	5.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor

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

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

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 11017362H
Date November 27, 2015
Temperature / Humidity 24 deg. C / 30 % RH
Engineer Shinichi Miyazono
(1 GHz - 26.5 GHz)
Mode Tx 11g 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	71.5	26.9	3.3	32.0	-	69.7	73.9	4.2	
Hori	2872.341	PK	46.6	28.0	3.6	31.6	-	46.6	73.9	27.3	
Hori	4924.000	PK	43.3	32.0	5.4	31.3	-	49.4	73.9	24.5	
Hori	7386.000	PK	41.2	36.0	6.7	32.1	-	51.8	73.9	22.1	Floor Noise
Hori	9848.000	PK	42.1	38.2	7.6	32.5	-	55.4	73.9	18.5	Floor Noise
Hori	2483.500	AV	51.6	26.9	3.3	32.0	0.1	49.9	53.9	4.0	*1)
Hori	2872.341	AV	41.9	28.0	3.6	31.6	0.1	42.0	53.9	11.9	
Hori	4924.000	AV	31.4	32.0	5.4	31.3	0.1	37.6	53.9	16.3	
Hori	7386.000	AV	33.1	36.0	6.7	32.1	-	43.7	53.9	10.2	Floor Noise
Hori	9848.000	AV	33.7	38.2	7.6	32.5	-	47.0	53.9	6.9	Floor Noise
Vert	2483.500	PK	69.7	26.9	3.3	32.0	-	67.9	73.9	6.0	
Vert	2872.328	PK	46.7	28.0	3.6	31.6	-	46.7	73.9	27.2	
Vert	4924.000	PK	47.8	32.0	5.4	31.3	-	53.9	73.9	20.0	
Vert	7386.000	PK	41.7	36.0	6.7	32.1	-	52.3	73.9	21.6	Floor Noise
Vert	9848.000	PK	42.4	38.2	7.6	32.5	-	55.7	73.9	18.2	Floor Noise
Vert	2483.500	AV	52.9	26.9	3.3	32.0	0.1	51.2	53.9	2.7	*1)
Vert	2872.328	AV	42.6	28.0	3.6	31.6	0.1	42.7	53.9	11.2	
Vert	4924.000	AV	38.3	32.0	5.4	31.3	0.1	44.5	53.9	9.4	
Vert	7386.000	AV	33.3	36.0	6.7	32.1	-	43.9	53.9	10.0	Floor Noise
Vert	9848.000	AV	33.5	38.2	7.6	32.5	-	46.8	53.9	7.1	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

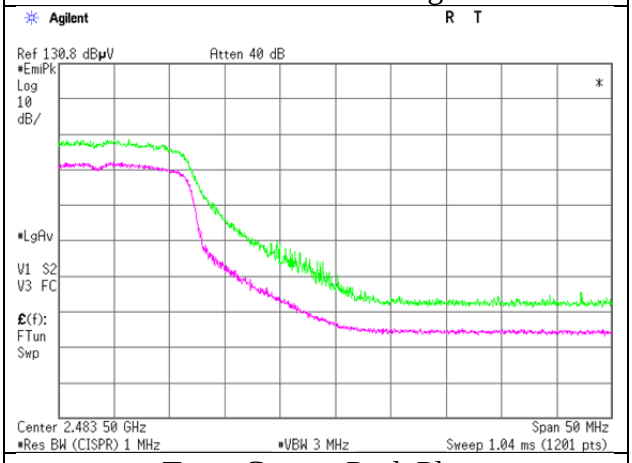
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11g 2462 MHz	

Horizontal

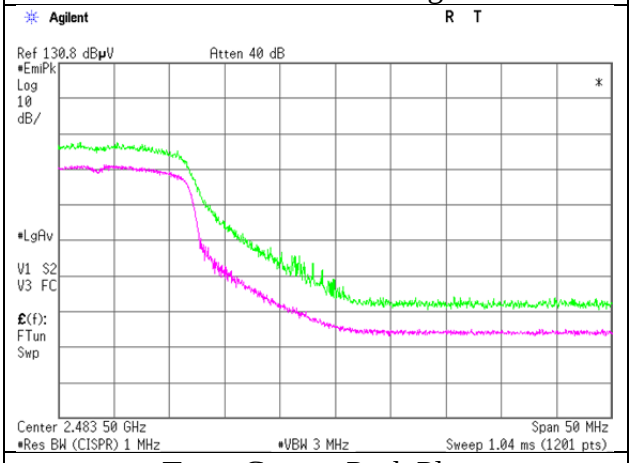
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono
	(1 GHz - 26.5 GHz)
Mode	Tx 11n-20 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	70.5	26.9	3.3	32.0	-	68.7	73.9	5.2	
Hori	2814.000	PK	48.2	27.9	3.6	31.7	-	48.0	73.9	25.9	
Hori	4824.000	PK	44.6	31.8	5.5	31.3	-	50.6	73.9	23.3	
Hori	7236.000	PK	41.3	36.0	6.7	32.0	-	52.0	73.9	21.9	Floor Noise
Hori	9648.000	PK	43.0	38.2	7.5	32.4	-	56.3	73.9	17.6	
Hori	2390.000	AV	52.5	26.9	3.3	32.0	0.1	50.8	53.9	3.1	*1)
Hori	2814.000	AV	44.4	27.9	3.6	31.7	0.1	44.3	53.9	9.6	
Hori	4824.000	AV	33.5	31.8	5.5	31.3	0.1	39.6	53.9	14.3	
Hori	7236.000	AV	31.0	36.0	6.7	32.0	-	41.7	53.9	12.2	Floor Noise
Hori	9648.000	AV	33.9	38.2	7.5	32.4	0.1	47.3	53.9	6.6	
Vert	2390.000	PK	69.3	26.9	3.3	32.0	-	67.5	73.9	6.4	
Vert	2814.000	PK	50.3	27.9	3.6	31.7	-	50.1	73.9	23.8	
Vert	4824.000	PK	49.3	31.8	5.5	31.3	-	55.3	73.9	18.6	
Vert	7236.000	PK	40.6	36.0	6.7	32.0	-	51.3	73.9	22.6	Floor Noise
Vert	9648.000	PK	42.8	38.2	7.5	32.4	-	56.1	73.9	17.8	
Vert	2390.000	AV	53.5	26.9	3.3	32.0	0.1	51.8	53.9	2.1	*1)
Vert	2814.000	AV	46.4	27.9	3.6	31.7	0.1	46.3	53.9	7.6	
Vert	4824.000	AV	36.3	31.8	5.5	31.3	0.1	42.4	53.9	11.5	
Vert	7236.000	AV	31.0	36.0	6.7	32.0	-	41.7	53.9	12.2	Floor Noise
Vert	9648.000	AV	33.9	38.2	7.5	32.4	0.1	47.3	53.9	6.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

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

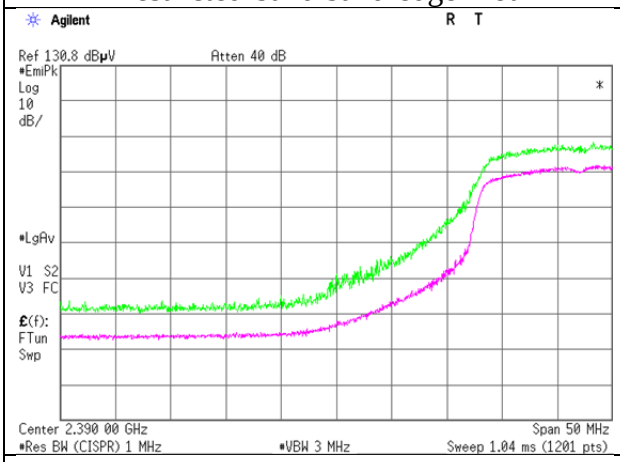
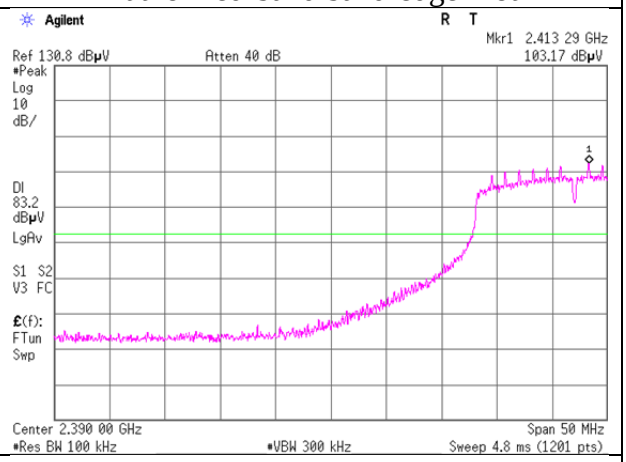
20dBc Data Sheet

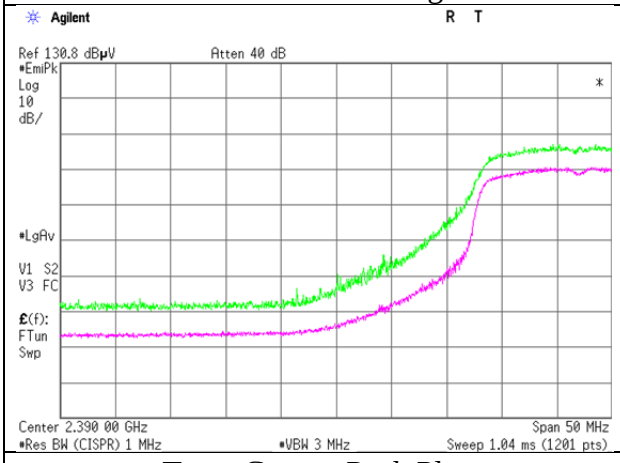
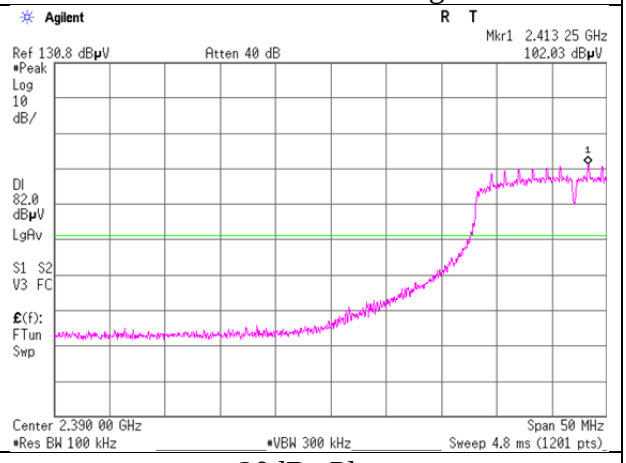
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	103.2	26.9	3.3	32.0	101.4	-	-	Carrier
Hori	2400.000	PK	72.7	26.9	3.3	32.0	70.9	81.4	10.5	
Vert	2412.000	PK	102.0	26.9	3.3	32.0	100.2	-	-	Carrier
Vert	2400.000	PK	72.5	26.9	3.3	32.0	70.7	80.2	9.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11n-20 2412 MHz	

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place	Ise EMC Lab. No.1 and No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 27, 2015	December 8, 2015
Temperature / Humidity	24 deg. C / 30 % RH	20 deg. C / 31 % RH
Engineer	Shinichi Miyazono	Takafumi Noguchi
	(1 GHz - 26.5 GHz)	(30 MHz - 1 GHz)
Mode	Tx 11n-20 2437 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	83.567	QP	44.5	7.3	8.2	38.8	-	21.2	40.0	18.8	
Hori	125.231	QP	45.0	13.2	8.8	38.8	-	28.2	43.5	15.3	
Hori	221.542	QP	39.9	17.1	9.9	38.9	-	28.0	46.0	18.0	
Hori	337.876	QP	38.2	15.6	10.8	38.7	-	25.9	46.0	20.1	
Hori	441.683	QP	35.4	17.8	11.6	38.4	-	26.4	46.0	19.6	
Hori	493.587	QP	35.8	18.0	11.9	38.2	-	27.5	46.0	18.5	
Hori	2843.190	PK	49.4	27.9	3.6	31.7	-	49.2	73.9	24.7	
Hori	4874.000	PK	45.1	31.9	5.5	31.3	-	51.2	73.9	22.7	
Hori	7311.000	PK	41.5	36.0	6.8	32.0	-	52.3	73.9	21.6	Floor Noise
Hori	9748.000	PK	41.8	38.2	7.5	32.4	-	55.1	73.9	18.8	Floor Noise
Hori	2843.190	AV	46.4	27.9	3.6	31.7	0.1	46.3	53.9	7.6	
Hori	4874.000	AV	36.1	31.9	5.5	31.3	0.1	42.3	53.9	11.6	
Hori	7311.000	AV	33.4	36.0	6.8	32.0	-	44.2	53.9	9.7	Floor Noise
Hori	9748.000	AV	33.8	38.2	7.5	32.4	-	47.1	53.9	6.8	Floor Noise
Vert	39.739	QP	42.7	14.4	7.5	38.8	-	25.8	40.0	14.2	
Vert	87.355	QP	44.6	8.0	8.3	38.8	-	22.1	40.0	17.9	
Vert	124.148	QP	41.0	13.1	8.8	38.8	-	24.1	43.5	19.4	
Vert	520.240	QP	36.1	18.4	12.1	38.1	-	28.5	46.0	17.5	
Vert	566.533	QP	39.1	19.0	12.4	38.1	-	32.4	46.0	13.6	
Vert	584.770	QP	37.1	19.2	12.5	38.1	-	30.7	46.0	15.3	
Vert	2843.173	PK	50.6	27.9	3.6	31.7	-	50.4	73.9	23.5	
Vert	4874.000	PK	51.9	31.9	5.5	31.3	-	58.0	73.9	15.9	
Vert	7311.000	PK	41.7	36.0	6.8	32.0	-	52.5	73.9	21.4	Floor Noise
Vert	9748.000	PK	42.2	38.2	7.5	32.4	-	55.5	73.9	18.4	
Vert	2843.173	AV	46.7	27.9	3.6	31.7	0.1	46.6	53.9	7.3	
Vert	4874.000	AV	42.5	31.9	5.5	31.3	0.1	48.7	53.9	5.2	
Vert	7311.000	AV	33.1	36.0	6.8	32.0	-	43.9	53.9	10.0	Floor Noise
Vert	9748.000	AV	35.3	38.2	7.5	32.4	0.1	48.7	53.9	5.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 11017362H
Date November 27, 2015
Temperature / Humidity 24 deg. C / 30 % RH
Engineer Shinichi Miyazono
(1 GHz - 26.5 GHz)
Mode Tx 11n-20 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	68.6	26.9	3.3	32.0	-	66.8	73.9	7.1	
Hori	2872.355	PK	47.0	28.0	3.6	31.6	-	47.0	73.9	26.9	
Hori	4924.000	PK	40.4	32.0	5.4	31.3	-	46.5	73.9	27.4	
Hori	7386.000	PK	41.8	36.0	6.7	32.1	-	52.4	73.9	21.5	Floor Noise
Hori	9848.000	PK	42.0	38.2	7.6	32.5	-	55.3	73.9	18.6	Floor Noise
Hori	2483.500	AV	53.6	26.9	3.3	32.0	0.1	51.9	53.9	2.0	*1)
Hori	2872.355	AV	42.6	28.0	3.6	31.6	0.1	42.7	53.9	11.2	
Hori	4924.000	AV	30.7	32.0	5.4	31.3	0.1	36.9	53.9	17.0	
Hori	7386.000	AV	31.2	36.0	6.7	32.1	-	41.8	53.9	12.1	Floor Noise
Hori	9848.000	AV	31.6	38.2	7.6	32.5	-	44.9	53.9	9.0	Floor Noise
Vert	2483.500	PK	66.0	26.9	3.3	32.0	-	64.2	73.9	9.7	
Vert	2872.352	PK	47.0	28.0	3.6	31.6	-	47.0	73.9	26.9	
Vert	4924.000	PK	46.3	32.0	5.4	31.3	-	52.4	73.9	21.5	
Vert	7386.000	PK	41.9	36.0	6.7	32.1	-	52.5	73.9	21.4	Floor Noise
Vert	9848.000	PK	42.0	38.2	7.6	32.5	-	55.3	73.9	18.6	Floor Noise
Vert	2483.500	AV	52.1	26.9	3.3	32.0	0.1	50.4	53.9	3.5	*1)
Vert	2872.352	AV	42.5	28.0	3.6	31.6	0.1	42.6	53.9	11.3	
Vert	4924.000	AV	33.3	32.0	5.4	31.3	0.1	39.5	53.9	14.4	
Vert	7386.000	AV	31.1	36.0	6.7	32.1	-	41.7	53.9	12.2	Floor Noise
Vert	9848.000	AV	31.6	38.2	7.6	32.5	-	44.9	53.9	9.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

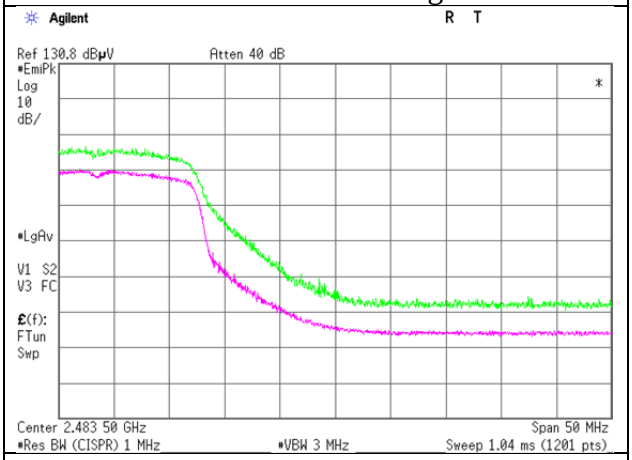
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB
26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 26, 2015	November 27, 2015
Temperature / Humidity	23 deg. C / 36 % RH	24 deg. C / 30 % RH
Engineer	Shinichi Miyazono (1 GHz -10 GHz)	Shinichi Miyazono (1 GHz -10 GHz)
Mode	Tx 11n-20 2462 MHz	

Horizontal

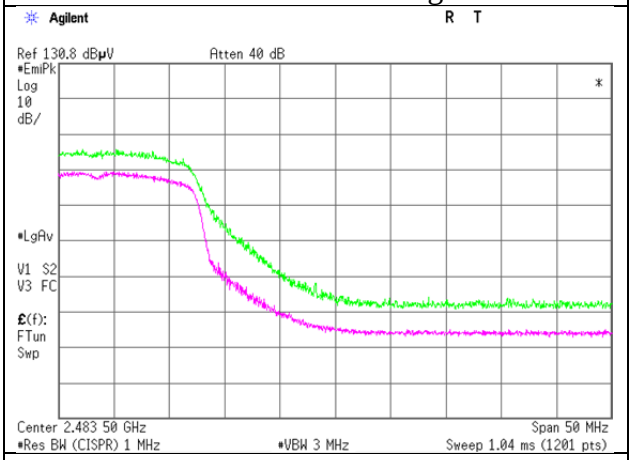
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

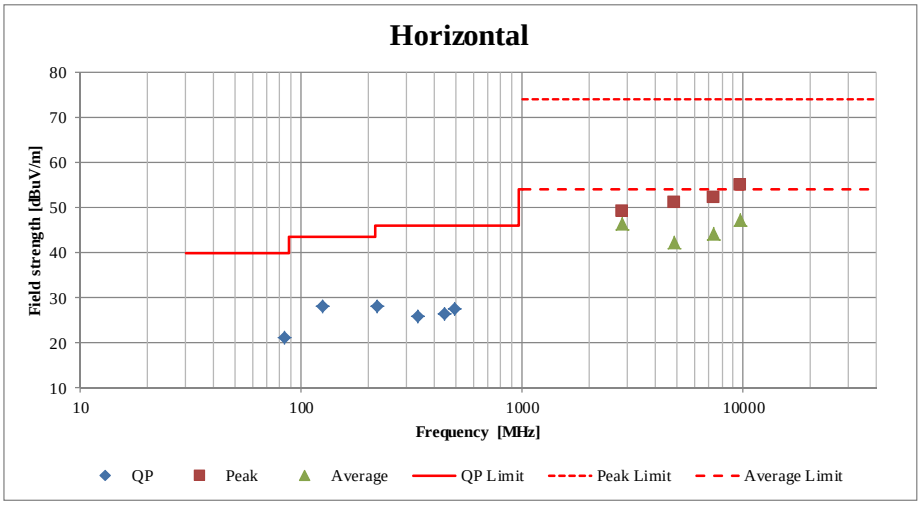


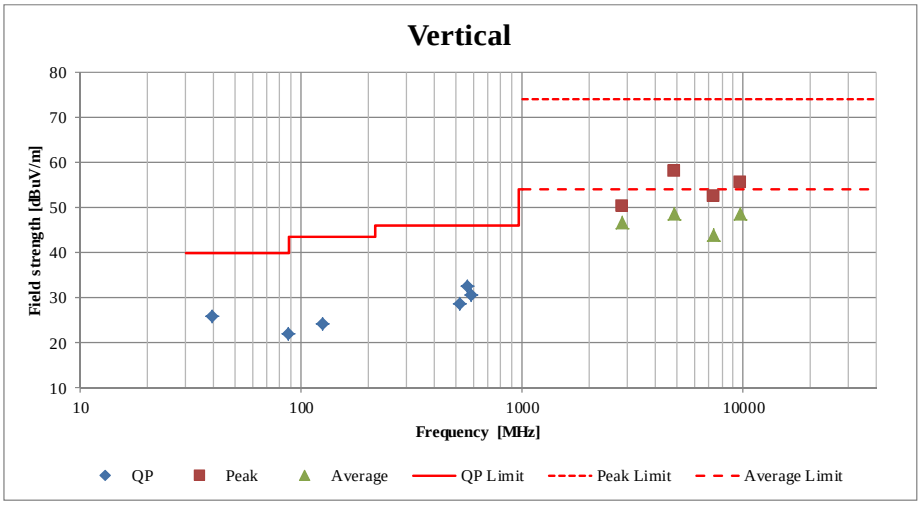
Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.1 and No.3 Semi Anechoic Chamber	
Report No.	11017362H	
Date	November 27, 2015	December 8, 2015
Temperature / Humidity	24 deg. C / 30 % RH	20 deg. C / 31 % RH
Engineer	Shinichi Miyazono	Takafumi Noguchi
	(1 GHz - 26.5 GHz)	(30 MHz - 1 GHz)
Mode	Tx 11n-20 2437 MHz	





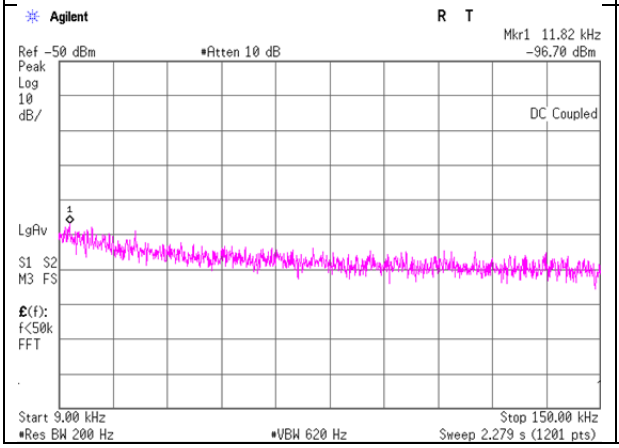
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

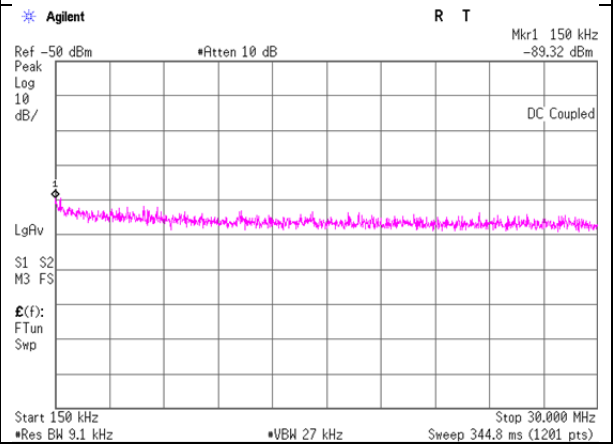
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11017362H
Date	December 7, 2015
Temperature / Humidity	22 deg. C / 37 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-20 2437 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator 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
11.82	-96.7	0.67	20.0	2.34	1	-73.7	300	6.0	-12.4	46.1	58.5	
150.00	-89.3	0.67	20.0	2.34	1	-66.3	300	6.0	-5.1	24.0	29.1	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

EIRP = Reading + Cable Loss + Attenator Loss + Antenna Gain + 10 * log (N)

Power Density

Test place	Ise EMC Lab. No.6 Measurement Room	
Report No.	11017362H	
Date	November 27, 2015	December 7, 2015
Temperature / Humidity	21 deg. C / 32 % RH	22 deg. C / 37 % RH
Engineer	Hironobu Ohnishi	Shinichi Miyazono
Mode	Tx	

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-30.52	0.67	19.74	-10.11	8.00	18.11
2437.00	-30.41	0.67	19.74	-10.00	8.00	18.00
2462.00	-30.11	0.67	19.74	-9.70	8.00	17.70

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-32.76	0.67	19.74	-12.35	8.00	20.35
2437.00	-29.85	0.67	19.74	-9.44	8.00	17.44
2462.00	-32.78	0.67	19.74	-12.37	8.00	20.37

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-32.45	0.67	19.74	-12.04	8.00	20.04
2437.00	-29.02	0.67	19.74	-8.61	8.00	16.61
2462.00	-32.11	0.67	19.74	-11.70	8.00	19.70

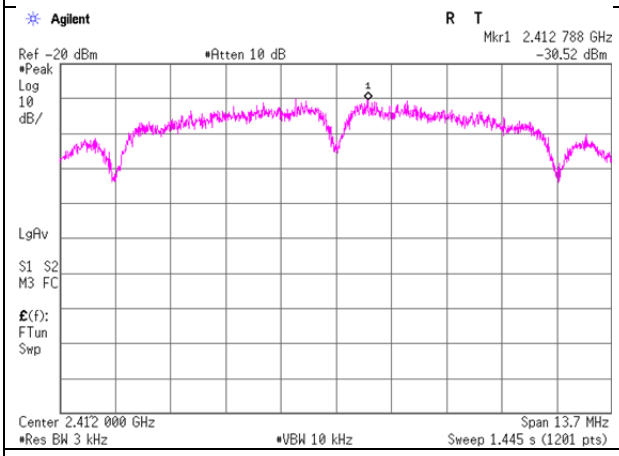
Sample Calculation:
Result = Reading + Cable Loss (including the cable customer supplied) + Attenuator

*The equipment and cables were not used for factor 0 dB of the data sheets.

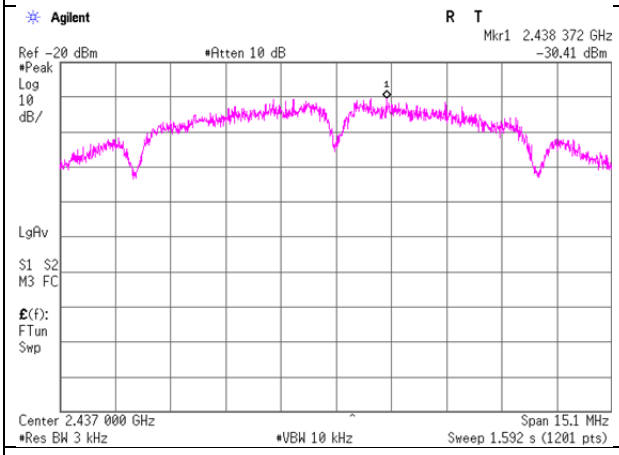
Power Density

11b

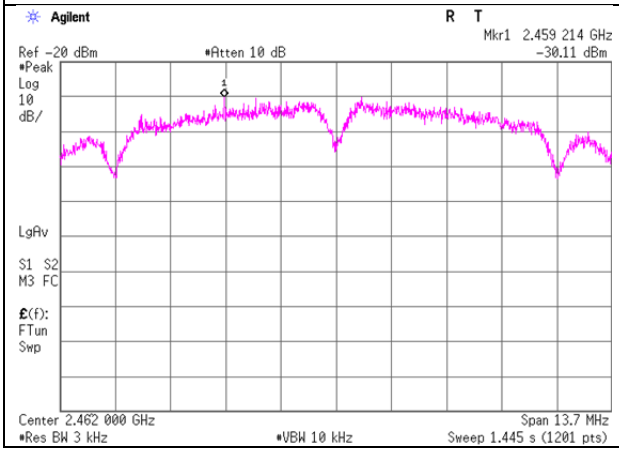
2412 MHz



2437 MHz

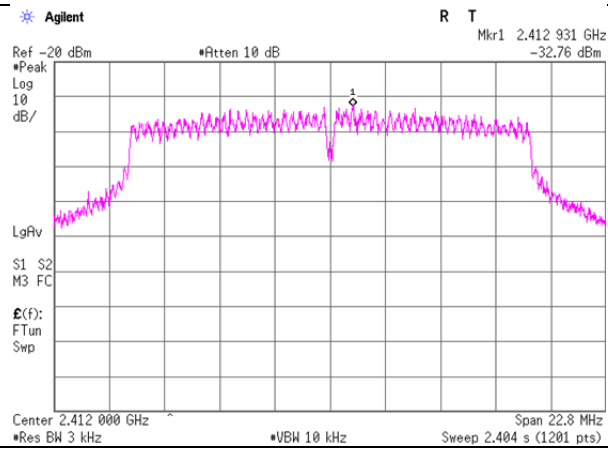


2462 MHz

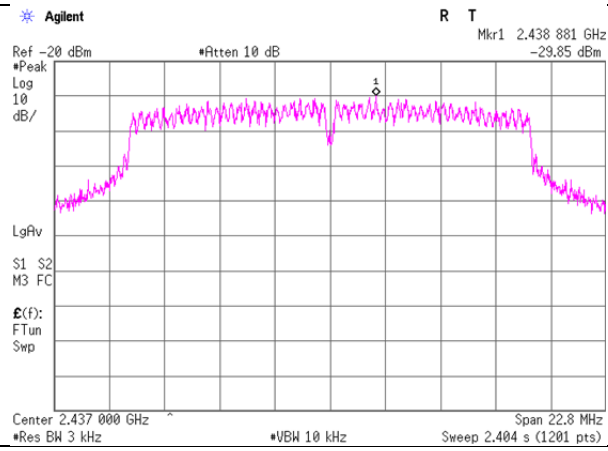


11g

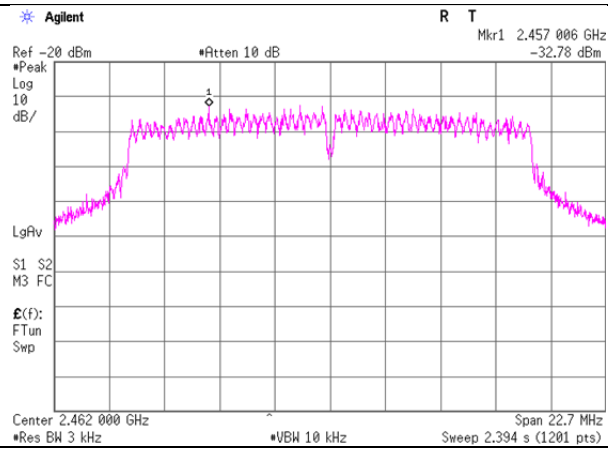
2412 MHz



2437 MHz



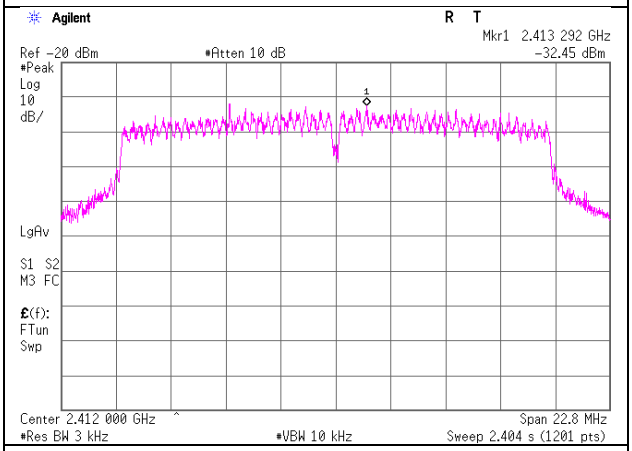
2462 MHz



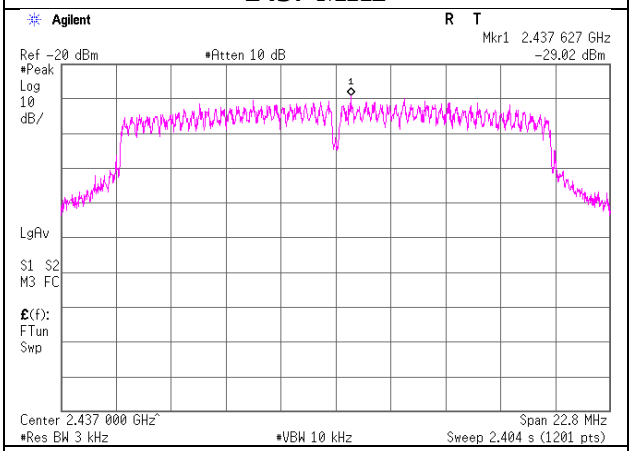
Power Density

11n-20

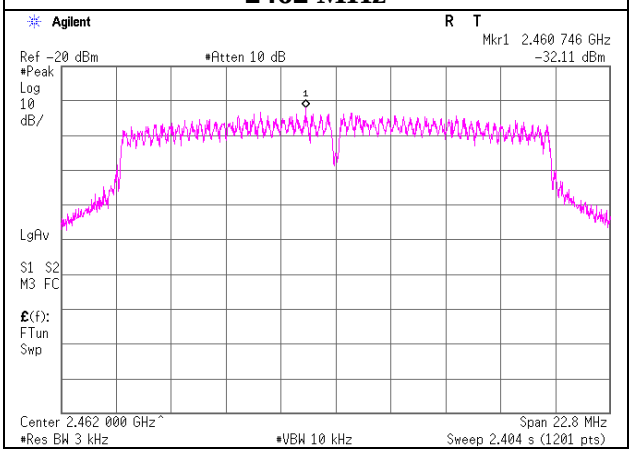
2412 MHz



2437 MHz



2462 MHz

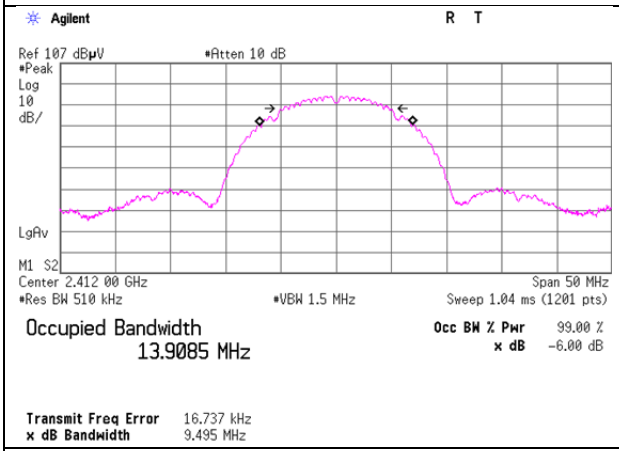


99%Occupied Bandwidth

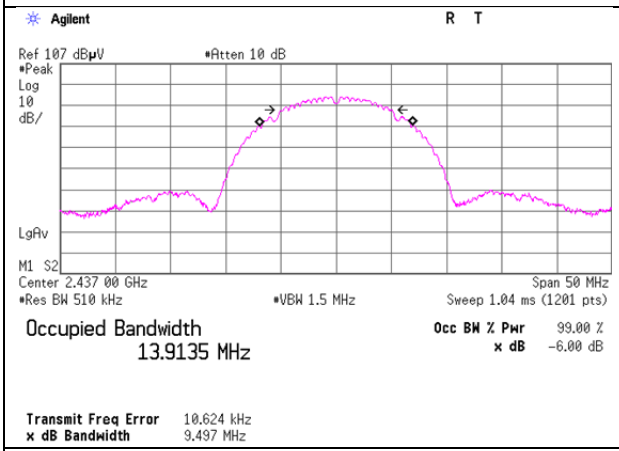
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11017362H
Date	December 7, 2015
Temperature / Humidity	22 deg. C / 37 % RH
Engineer	Shinichi Miyazono
Mode	Tx

11b

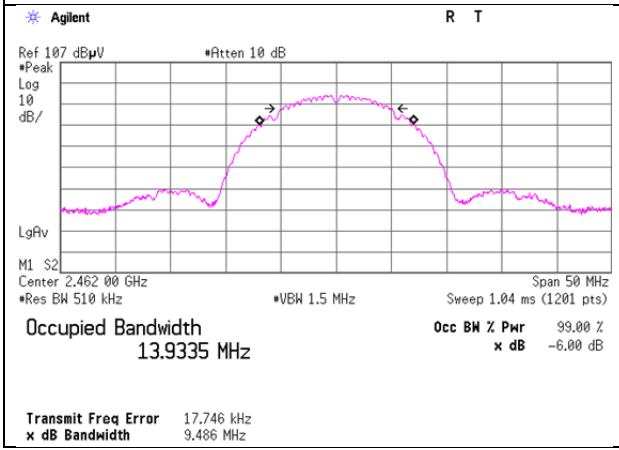
2412 MHz



2437 MHz

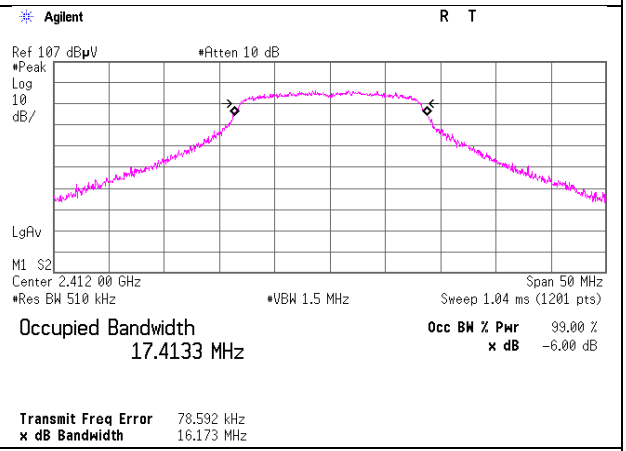


2462 MHz

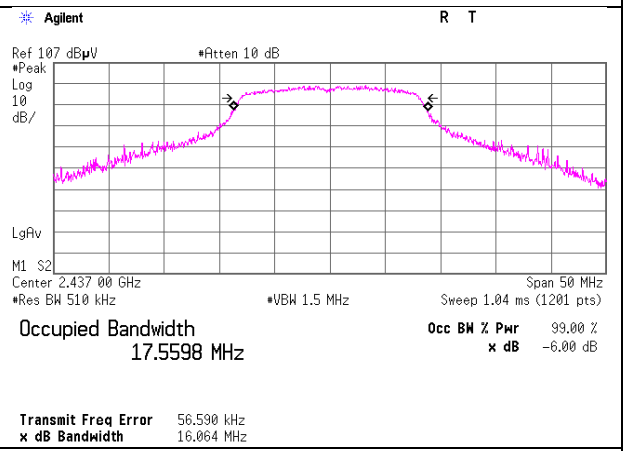


11g

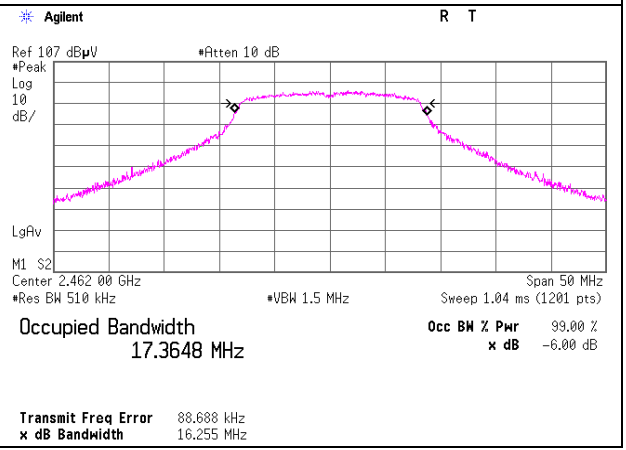
2412 MHz



2437 MHz



2462 MHz

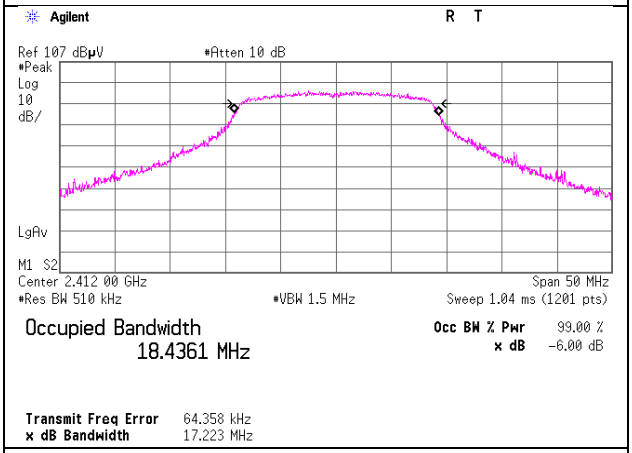


99% Occupied Bandwidth

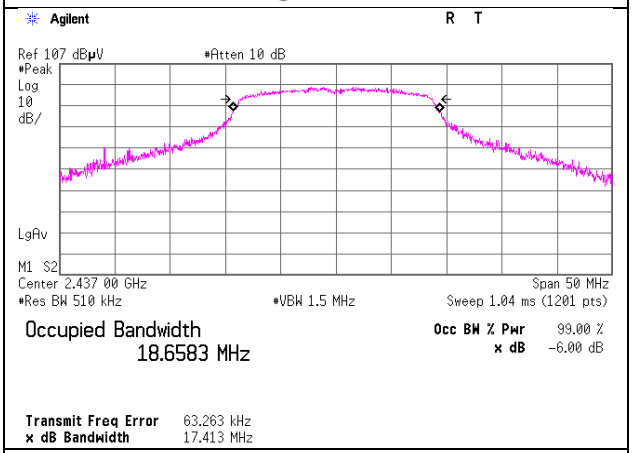
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11017362H
Date	November 27, 2015
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Hironobu Ohnishi
Mode	Tx

11n-20

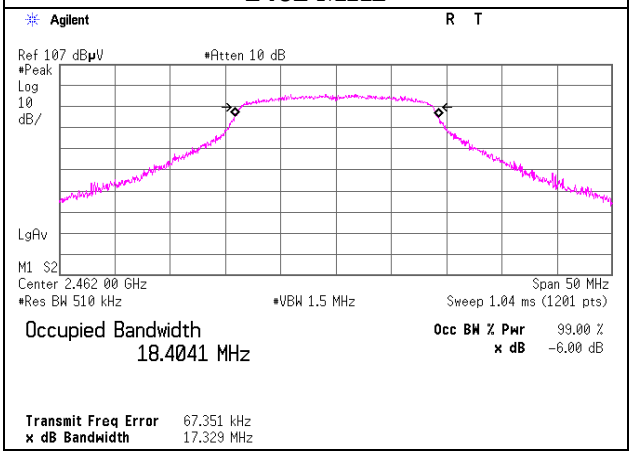
2412 MHz



2437 MHz



2462 MHz



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	CE/RE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	CE/RE	2015/01/13 * 12
MJM-25	Measure	KOMELON	KMC-36	-	CE/RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE/RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	CE/RE	2015/06/08 * 12
MLS-26	LISN(AMN)	Schwarzbeck	NSLK8127	8127-732	CE	2015/07/17 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	CE	2015/09/29 * 12
MAT-64	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	CE/RE	2015/08/19 * 12
MOS-12	Thermo-Hygrometer	Custom	CTH-180	1201	AT	2015/01/13 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2015/10/19 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2015/10/19 * 12
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2015/06/18 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	RE	2015/07/31 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2015/03/19 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2015/01/16 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2015/09/16 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2015/01/13 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2015/02/05 * 12
MPSE-22	Power sensor	Agilent	N1923A	MY54070003	AT	2015/04/01 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2015/04/01 * 12
MAT-86	Attenuator	Weinschel Associates	WA56-20	56200213	AT	2015/06/01 * 12
MOTS-MATM	Antenna Terminal Measurement Software	UL Japan	-	-	AT	-
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2015/05/19 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2015/11/02 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2015/11/03 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2015/11/10 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	RE	2015/09/29 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2015/02/03 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

Test Item: **CE: Conducted Emission test**
RE: Radiated Emission test
AT: Antenna Terminal Conducted test