RADIO TEST REPORT

Test Report No. : 10724035H-C-R1

Applicant	:	**Sony Computer Entertainment Inc.**
Type of Equipment	:	**Computer Entertainment System**
Model No.	:	**CUH-1215A**
FCC ID	:	**AK8CUH120Z1**
Test regulation	:	**FCC Part 15 Subpart C: 2015** ***WLAN, Bluetooth (LE) Part**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 10724035H-C. 10724035H-C is replaced with this report.

Date of test: March 17 to April 14, 2015

Representative test engineer:
T. Shimada
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
M. Nishiyama
Masanori Nishiyama
Manager
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://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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

REVISION HISTORY

Original Test Report No.: 10724035H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10724035H-C	April 15, 2015	-	-
1	10724035H-C-R1	April 30, 2015	P6	Correction of Remarks for Spurious Emission & Band Edge Compliance test.

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SECTION 1: Customer information

Company Name	Sony Computer Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-3-6748-6333
Facsimile Number	+81-3-6748-6383
Contact Person	Kiyoto Sasaki

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

2.1 Identification of E.U.T.

Type of Equipment	Computer Entertainment System
Model No	CUH-1215A
Serial No	Refer to Clause 4.2
Country of Manufacture	China/Japan
Receipt Date of Sample	March 12, 2015
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

CUH-1215A is the Computer Entertainment System.

List of Model No.:

Model No.	Product Name	HDD capacity
CUH-1215A*	Computer Entertainment System	500GB
CUH-1215B	Computer Entertainment System	1TB
DUH-T1200AA	Testing Kit	500GB

*Tested model

Product Specification

Maximum clock frequency in the system	2.75GHz
Clock frequency in the system (radio part)	40MHz
Operating Temperature	5-35 deg. C
Power Supply	AC 100-240V, 50Hz/60Hz
Size	275 x 53x 305 mm
Weight	Approx. 2.5kg

Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	Less than 20MHz & 5MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3V/1.8V
Antenna Type	IFA (Antenna A/B)
Antenna Gain: G_{ANT}	4.0dBi (Antenna A/B)
Directional Gain	7.01dBi (Antenna A/B)

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, π/4DQPSK, 8DPSK)
Bandwidth & Channel spacing	79MHz & 1MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3V/1.8V
Antenna Type	PIFA
Antenna Gain	5.6dBi (peak)

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	GFSK
Bandwidth & Channel spacing	1MHz & 2MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3V/1.8V
Antenna Type	PIFA
Antenna Gain	5.6dBi (peak)

This test report applies to WLAN and Bluetooth (Low Energy).

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on January 21, 2015
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

* The EUT complies with FCC Part 15 Subpart B: 2015, final revised on January 21, 2015.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4:2009 7. AC powerline Conducted Emission measurements	**FCC:** Section 15.207	**QP** 7.3dB, 0.15435MHz, L **AV** 8.0dB, 0.20002MHz, N	Complied	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	**IC:** RSS-210 A8.2(a)			
Maximum Peak Output Power	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	**IC:** RSS-210 A8.4(4)			
Power Density	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247 (e)		Complied	Conducted
	IC: -	**IC:** RSS-210 A8.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section15.247(d)	1.0dB 2483.500MHz, AV, Vert.	Complied	Conducted (below 30MHz)/ Radiated (above 30MHz)
	IC: RSS-Gen 6.13	**IC:** RSS-210 A8.5 RSS-Gen 8.9 RSS-Gen 8.10			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.					

* In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.

FCC 15.31 (e)
This EUT provides stable voltage (DC 3.3V/1.8V) 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.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.4dB
No.4	3.5dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.5dB	6.3dB	5.5dB	5.8dB	5.8dB	4.3dB
No.2	4.2dB	5.4dB	6.3dB	5.4dB	5.7dB	5.9dB	5.6dB
No.3	4.4dB	5.4dB	6.4dB	5.2dB	5.5dB	5.8dB	5.5dB
No.4	4.7dB	5.6dB	6.4dB	5.3dB	5.7dB	5.9dB	5.5dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density (±dB)			**Antenna terminal conducted emission (±dB)**		**Channel power (±dB)**
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Conducted Emission test

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

Radiated emission test (3m)

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

	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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)	1Mbps, PN9
IEEE 802.11g (11g)	6Mbps, PN9
IEEE 802.11n MIMO 20MHz BW (11n-20)	MCS 0, PN9
Bluetooth Low Energy(BT LE)	Maximum Packet Size, PRBS9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) *WLAN antennas (Antenna A and B) transmit simultaneously. Bluetooth antenna also transmits simultaneously with WLAN antennas, and the antennas are not common. There is no correlation between WLAN antennas and Bluetooth antenna.	
*Power of the EUT was set by the software as follows; Power settings: WLAN 9(dBm) Bluetooth (LE) Same as production model Software: COpro_DOS_Labtool_Ver2.0.0.68 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*Details of Operating mode for WLAN

Test Item	Operating Mode	Used Antenna	Tested frequency
Conducted Emission	11n-20 Tx *1) *2)	Antenna A+B	2462MHz
Spurious Emission (Conducted)	11n-20 Tx *1)	Antenna B	2462MHz
6dB Bandwidth, 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	Antenna A, Antenna B	2412MHz 2437MHz 2462MHz
Maximum Peak Output Power, Power Density	11b Tx 11g Tx 11n-20 Tx	Antenna A+B, Antenna A, Antenna B	2412MHz 2437MHz 2462MHz
Spurious Emission (Radiated)	11b Tx *2) 11n-20 Tx *2) *3)	Antenna A+B	2412MHz 2437MHz 2462MHz
*1) The test was performed on the mode as a representative, because it had the highest power at antenna terminal test. *2) The test was performed for both of Power Supply: Chicony and DELTA. *3) The test was performed on 11n-20 Tx mode according to "Section 1 of 6 802.11 a/b/g/n testing-Managing Complex Regulatory Approvals - " of TCB Council Workshop October 2009, as the 11n-20 Tx mode had higher power than 11g mode at antenna terminal test.			

*Details of Operating mode for BT LE

Test Item	Operating Mode	Tested frequency
Conducted Emission *1), 6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth, Spurious Emission (Radiated *1)/Conducted)	BT LE	2402MHz 2440MHz 2480MHz
*1) The test was performed for both of Power Supply: Chicony and DELTA.		

4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

SECTION 5: Conducted Emission

Test Procedure and conditions

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

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 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm 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 : 0.15-30MHz
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 v03r02 (Issued on June 5, 2014)".

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m 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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc 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 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120kHz	RBW: 1MHz VBW: 3MHz	Average Power Method: WLAN: 12.2.5.1 RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: 100 traces BT(LE): 12.2.5.2 Average Power Method: Alternative 1 *1) RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results. Noise other than RF part RBW: 1MHz VBW: 10Hz	RBW: 100kHz VBW: 300kHz
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)"
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

- The carrier level and noise levels were confirmed at each position of X and Y 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 : 30M-26.5GHz
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	20MHz / 3MHz	100kHz	300kHz	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: 50MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3kHz	10kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)".
*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 low enough as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

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
(Power Supply: Chicony)

DATA OF CONDUCTED EMISSION TEST

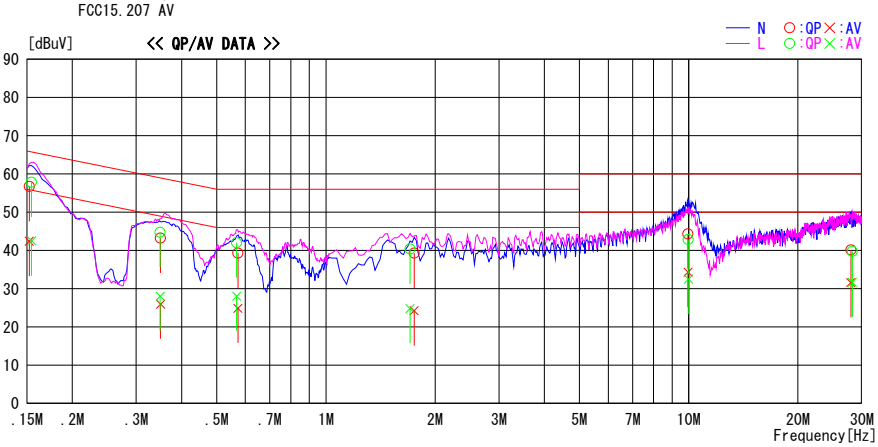
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2015/04/03

Report No. : 10724035H

Temp./Humi. : 24deg. C / 44% RH
Engineer : Yuta Moriya

Mode / Remarks : 11n-20 Tx 2462MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15218	43.5	29.2	13.2	56.7	42.4	65.9	55.9	9.2	13.5	N	
0.35010	29.9	12.7	13.3	43.2	26.0	59.0	49.0	15.8	23.0	N	
0.57195	26.0	11.6	13.3	39.3	24.9	56.0	46.0	16.7	21.1	N	
1.75095	25.9	10.8	13.4	39.3	24.2	56.0	46.0	16.7	21.8	N	
9.95927	30.3	20.3	14.0	44.3	34.3	60.0	50.0	15.7	15.7	N	
27.99504	25.3	16.8	14.8	40.1	31.6	60.0	50.0	19.9	18.4	N	
0.15435	44.6	29.3	13.2	57.8	42.5	65.8	55.8	8.0	13.3	L	
0.34930	31.4	14.8	13.3	44.7	28.1	59.0	49.0	14.3	20.9	L	
0.56760	28.7	14.8	13.3	42.0	28.1	56.0	46.0	14.0	17.9	L	
1.70560	27.0	11.4	13.4	40.4	24.8	56.0	46.0	15.6	21.2	L	
9.98195	28.8	18.5	14.0	42.8	32.5	60.0	50.0	17.2	17.5	L	
28.24567	24.8	16.8	14.9	39.7	31.7	60.0	50.0	20.3	18.3	L	

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

Conducted Emission

(Power Supply: Chicony)

DATA OF CONDUCTED EMISSION TEST

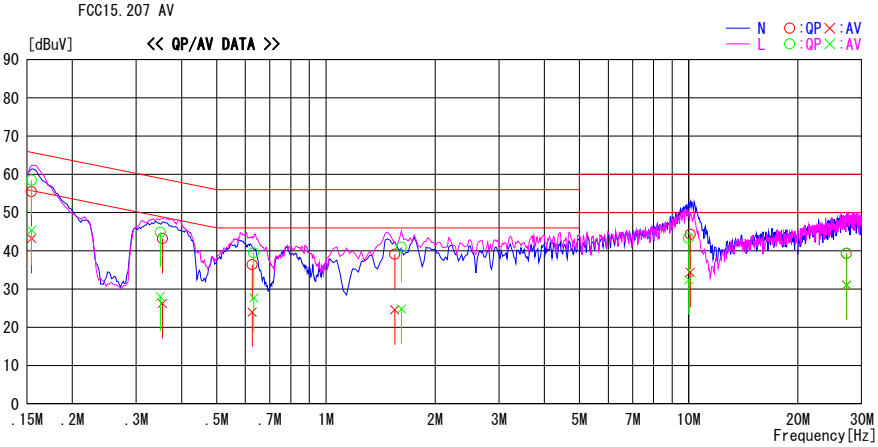
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2015/04/03

Report No. : 10724035H

Temp./Humi. : 24deg. C / 44% RH
Engineer : Yuta Moriya

Mode / Remarks : BT LE Tx 2440MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15435	42.3	30.0	13.2	55.5	43.2	65.8	55.8	10.3	12.6	N	
0.35445	29.9	12.9	13.3	43.2	26.2	58.9	48.9	15.7	22.7	N	
0.62630	23.1	10.7	13.3	36.4	24.0	56.0	46.0	19.6	22.0	N	
1.54688	25.7	11.2	13.4	39.1	24.6	56.0	46.0	16.9	21.4	N	
10.10038	30.3	20.4	14.0	44.3	34.4	60.0	50.0	15.7	15.6	N	
27.24317	24.5	16.3	14.8	39.3	31.1	60.0	50.0	20.7	18.9	N	
0.15435	45.3	32.2	13.2	58.5	45.4	65.8	55.8	7.3	10.4	L	
0.34980	31.5	14.8	13.3	44.8	28.1	59.0	49.0	14.2	20.9	L	
0.63265	26.2	14.4	13.3	39.5	27.7	56.0	46.0	16.5	18.3	L	
1.61490	27.5	11.4	13.4	40.9	24.8	56.0	46.0	15.1	21.2	L	
10.00012	29.3	18.4	14.0	43.3	32.4	60.0	50.0	16.7	17.6	L	
27.29329	24.6	16.3	14.8	39.4	31.1	60.0	50.0	20.6	18.9	L	

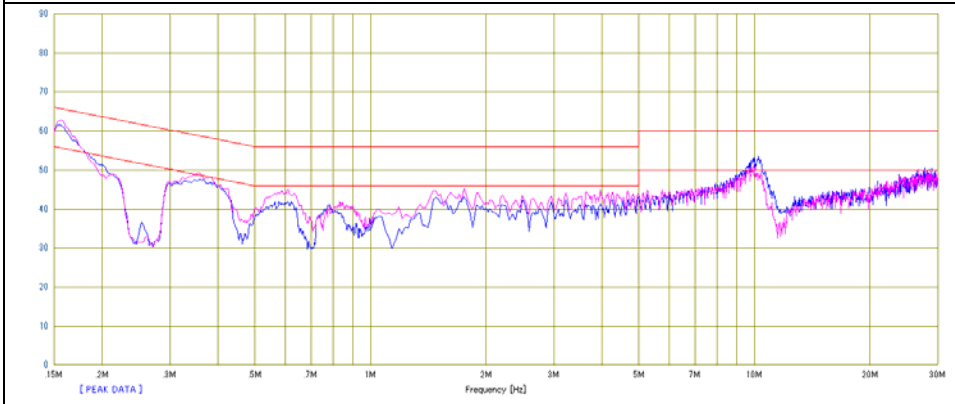
CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

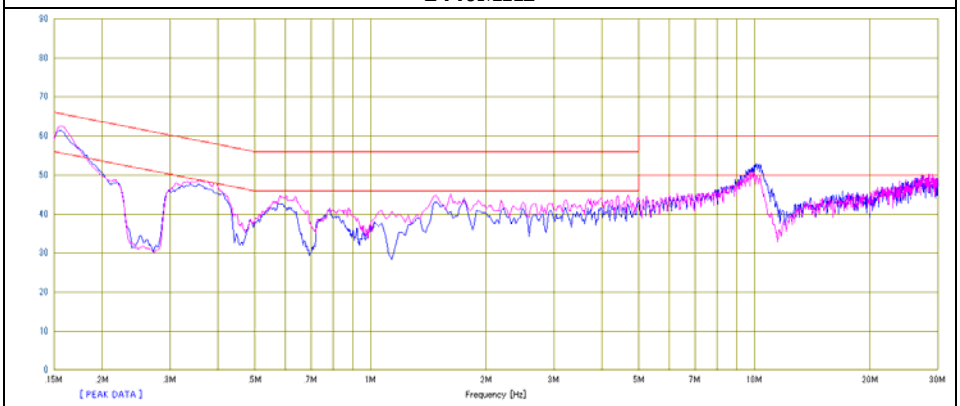
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/03/2015
Temperature/ Humidity	24deg. C / 40% RH
Engineer	Yuta Moriya
Mode	BT LE Tx

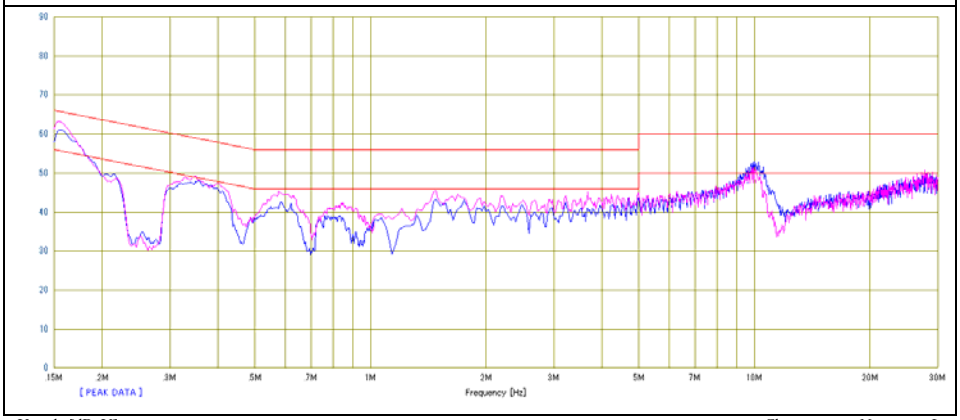
2402MHz



2440MHz



2480MHz



Y scale [dBuV] Chart — N — L

Conducted Emission
(Power Supply: DELTA)

DATA OF CONDUCTED EMISSION TEST

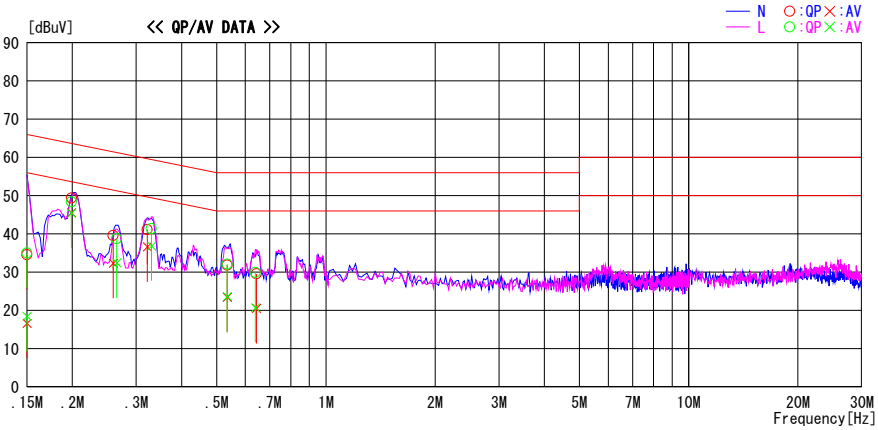
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2015/04/03

Report No. : 10724035H

Temp./Humi. : 24deg. C / 44% RH
Engineer : Yuta Moriya

Mode / Remarks : 11n-20 Tx 2462MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	21.4	3.4	13.2	34.6	16.6	66.0	56.0	31.4	39.4	N	
0.19891	36.2	32.3	13.2	49.4	45.5	63.7	53.7	14.3	8.2	N	
0.25941	26.3	19.0	13.3	39.6	32.3	61.5	51.5	21.9	19.2	N	
0.32183	27.8	23.3	13.3	41.1	36.6	59.7	49.7	18.6	13.1	N	
0.53468	18.5	10.1	13.3	31.8	23.4	56.0	46.0	24.2	22.6	N	
0.64372	16.3	7.2	13.3	29.6	20.5	56.0	46.0	26.4	25.5	N	
0.15000	21.8	5.2	13.2	35.0	18.4	66.0	56.0	31.0	37.6	L	
0.19891	35.2	32.2	13.2	48.4	45.4	63.7	53.7	15.3	8.3	L	
0.26528	25.4	19.1	13.3	38.7	32.4	61.3	51.3	22.6	18.9	L	
0.33053	28.1	23.5	13.3	41.4	36.8	59.4	49.4	18.0	12.6	L	
0.53498	18.8	10.3	13.3	32.1	23.6	56.0	46.0	23.9	22.4	L	
0.63937	16.6	7.4	13.3	29.9	20.7	56.0	46.0	26.1	25.3	L	

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

Conducted Emission
(Power Supply: DELTA)

DATA OF CONDUCTED EMISSION TEST

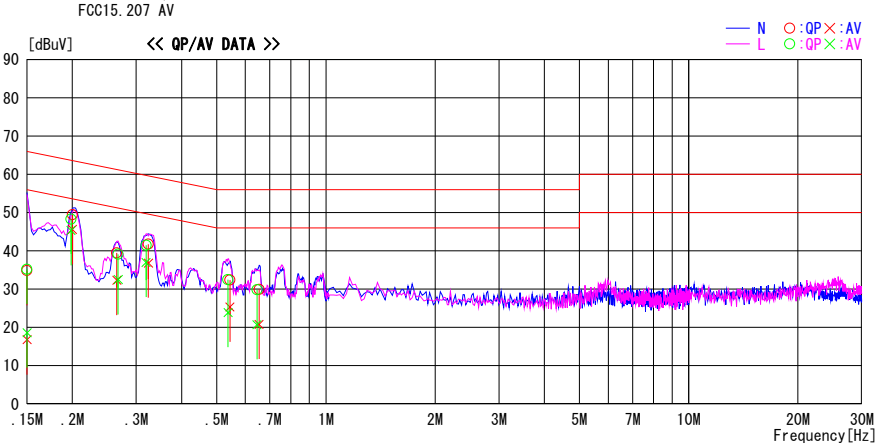
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2015/04/03

Report No. : 10724035H

Temp./Humi. : 24deg. C / 44% RH
Engineer : Yuta Moriya

Mode / Remarks : BT LE Tx 2440MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



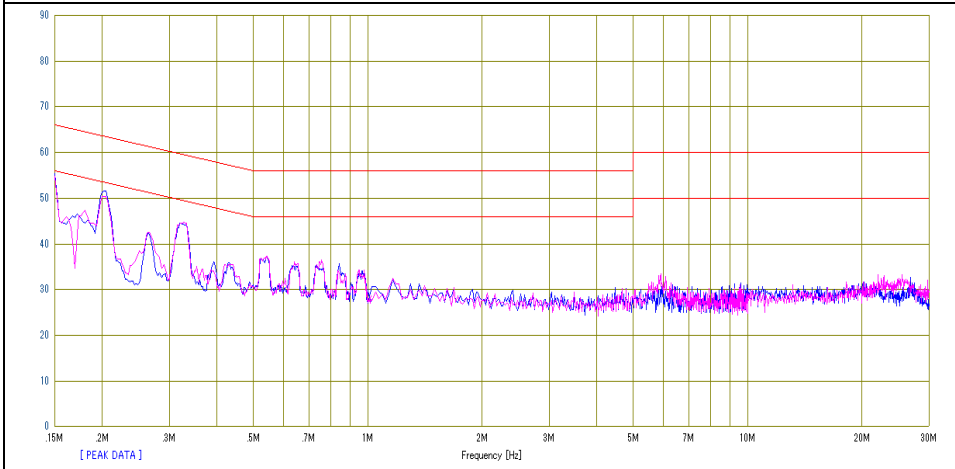
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	21.6	3.6	13.2	34.8	16.8	66.0	56.0	31.2	39.3	N	
0.20002	36.2	32.3	13.3	49.5	45.6	63.6	53.6	14.1	8.0	N	
0.26528	26.2	19.0	13.3	39.5	32.3	61.3	51.3	21.8	19.0	N	
0.32400	28.4	23.5	13.3	41.7	36.8	59.6	49.6	17.9	12.8	N	
0.54368	19.1	12.0	13.3	32.4	25.3	56.0	46.0	23.6	20.7	N	
0.65460	16.6	7.5	13.3	29.9	20.8	56.0	46.0	26.1	25.2	N	
0.15000	22.0	5.4	13.2	35.2	18.6	66.0	56.0	30.8	37.4	L	
0.19843	35.1	32.1	13.2	48.3	45.3	63.7	53.7	15.4	8.4	L	
0.26745	25.8	19.2	13.3	39.1	32.5	61.2	51.2	22.1	18.7	L	
0.31965	28.2	23.7	13.3	41.5	37.0	59.7	49.7	18.2	12.7	L	
0.53715	19.2	10.6	13.3	32.5	23.9	56.0	46.0	23.5	22.1	L	
0.64590	16.5	7.4	13.3	29.8	20.7	56.0	46.0	26.2	25.3	L	

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

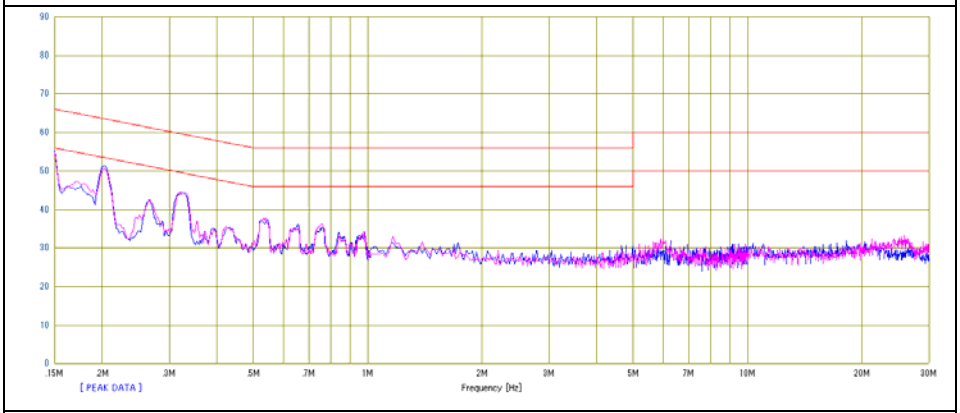
Conducted Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/03/2015
Temperature/ Humidity	24deg. C / 40% RH
Engineer	Yuta Moriya
Mode	BT LE Tx

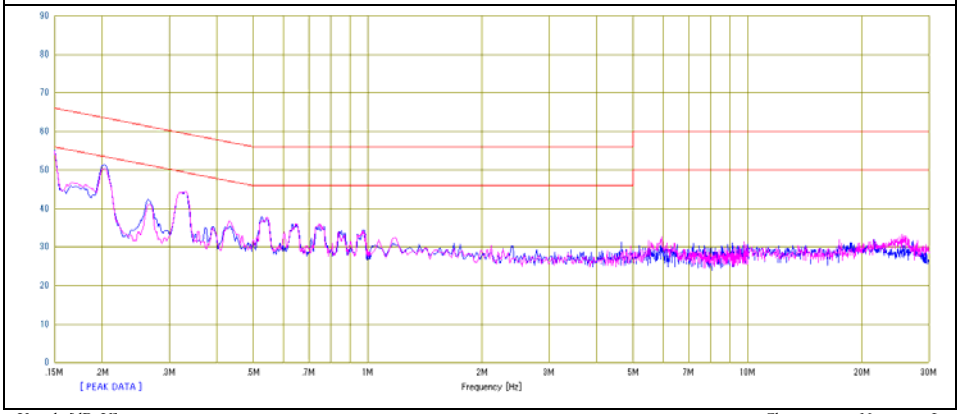
2402MHz



2440MHz



2480MHz



Y scale [dBuV] Chart — N — L

6dB Bandwidth

Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	Tx

11b

Antenna	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
A	2412	10.029	>500
	2437	9.597	>500
	2462	9.803	>500
B	2412	9.892	>500
	2437	10.056	>500
	2462	10.061	>500

11g

Antenna	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
A	2412	16.356	>500
	2437	16.396	>500
	2462	16.386	>500
B	2412	16.395	>500
	2437	16.376	>500
	2462	16.388	>500

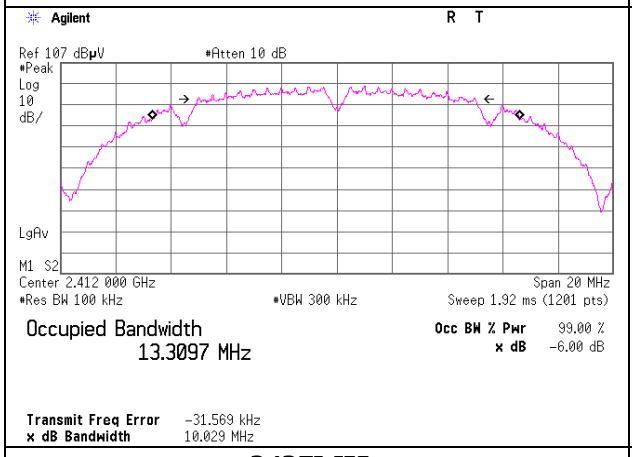
11n-20

Antenna	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
A	2412	17.546	>500
	2437	17.319	>500
	2462	17.568	>500
B	2412	17.588	>500
	2437	17.577	>500
	2462	17.585	>500

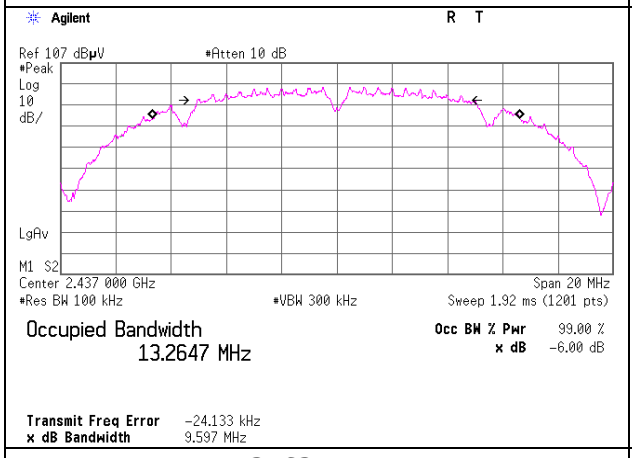
6dB Bandwidth

11b Antenna A

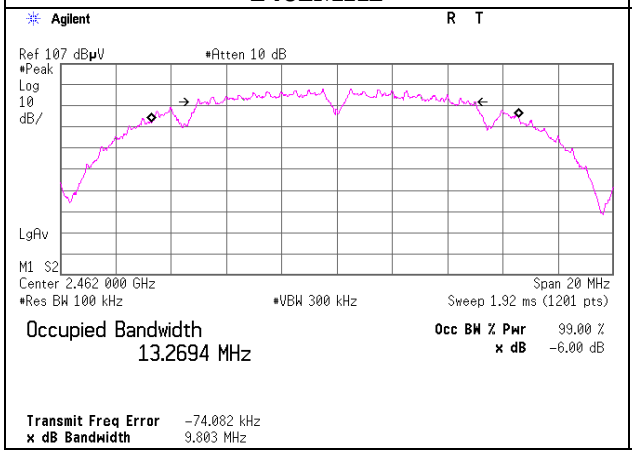
2412MHz



2437MHz

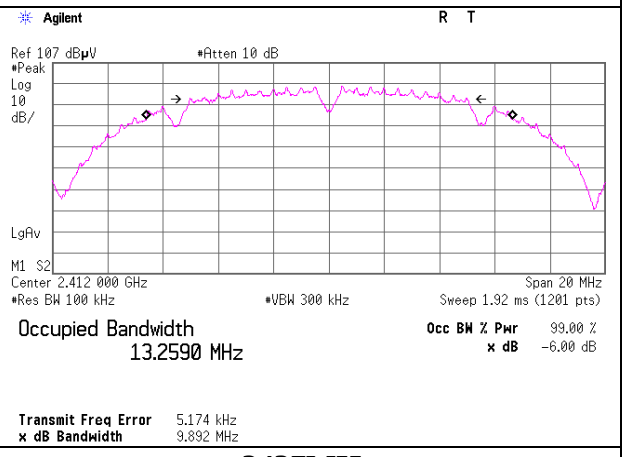


2462MHz

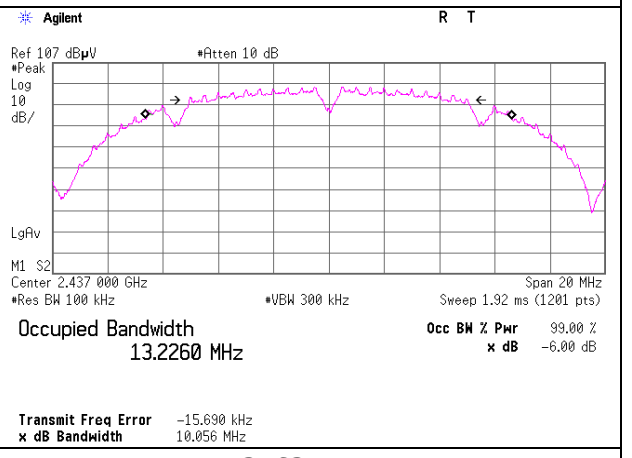


11b Antenna B

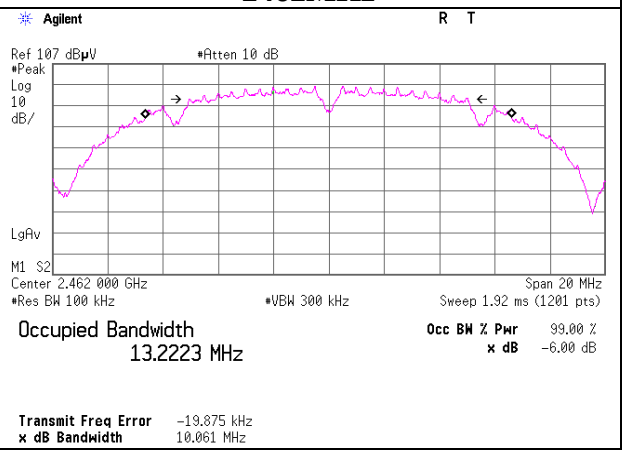
2412MHz



2437MHz



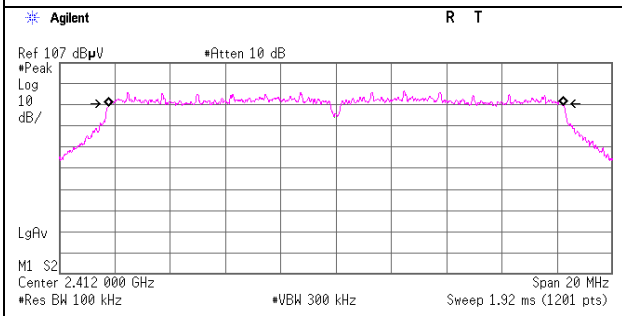
2462MHz



6dB Bandwidth

11g Antenna A

2412MHz

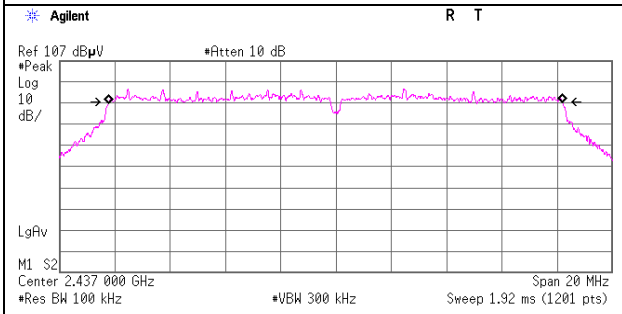


Occupied Bandwidth
16.4312 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -2.298 kHz
x dB Bandwidth 16.356 MHz

2437MHz

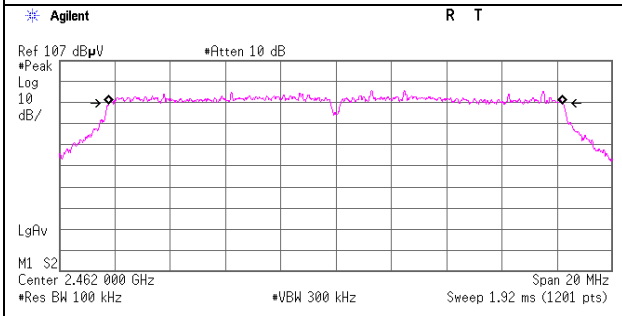


Occupied Bandwidth
16.4179 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -13.669 kHz
x dB Bandwidth 16.396 MHz

2462MHz



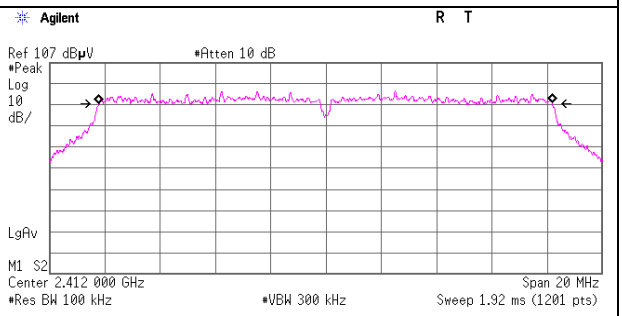
Occupied Bandwidth
16.4306 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -14.233 kHz
x dB Bandwidth 16.386 MHz

11g Antenna B

2412MHz

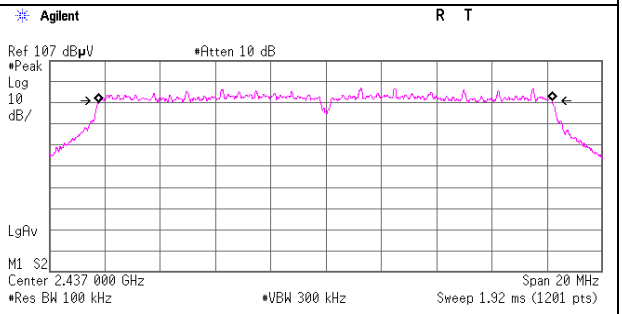


Occupied Bandwidth
16.3995 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -14.336 kHz
x dB Bandwidth 16.395 MHz

2437MHz

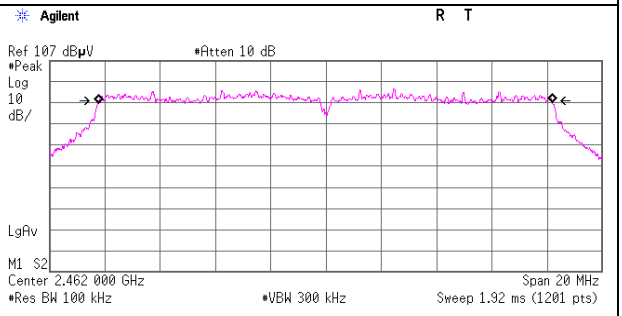


Occupied Bandwidth
16.3943 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -16.683 kHz
x dB Bandwidth 16.376 MHz

2462MHz



Occupied Bandwidth
16.4269 MHz

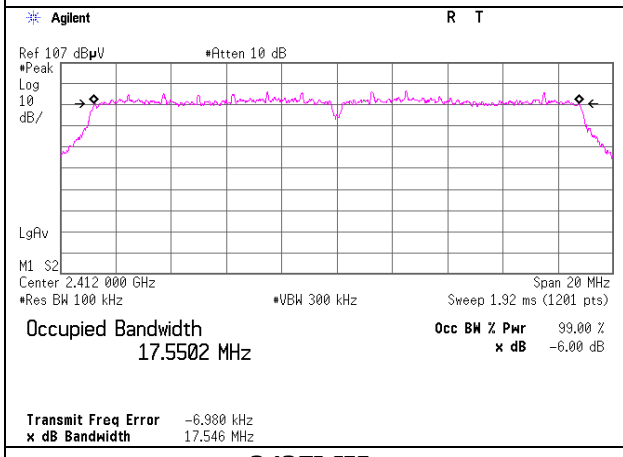
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -21.013 kHz
x dB Bandwidth 16.388 MHz

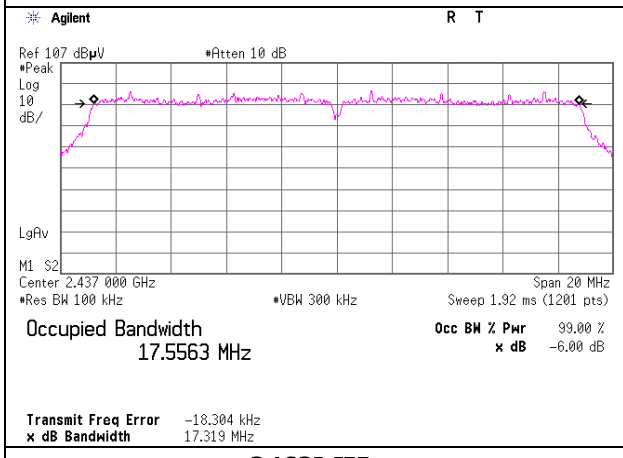
6dB Bandwidth

11n-20 Antenna A

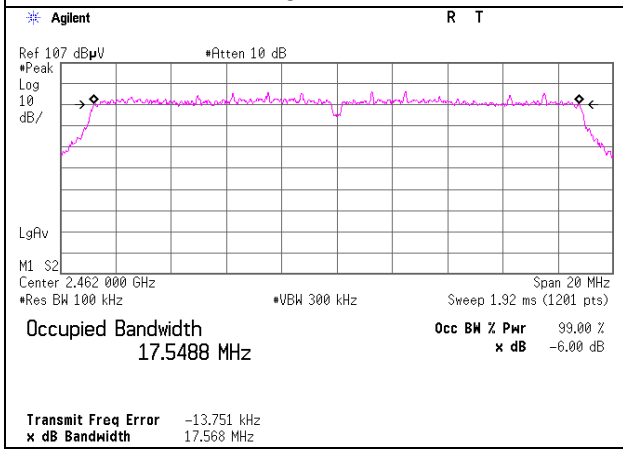
2412MHz



2437MHz

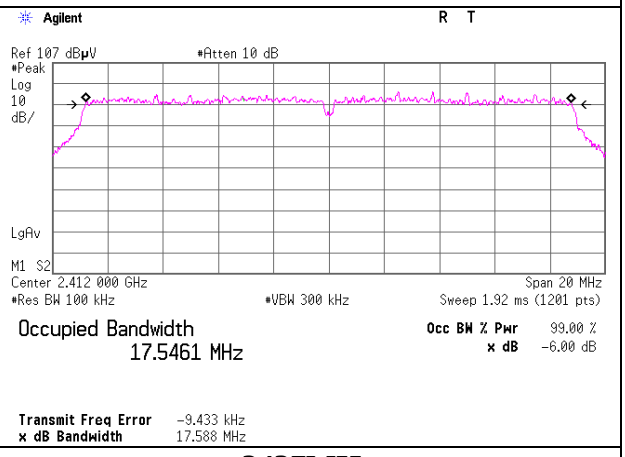


2462MHz

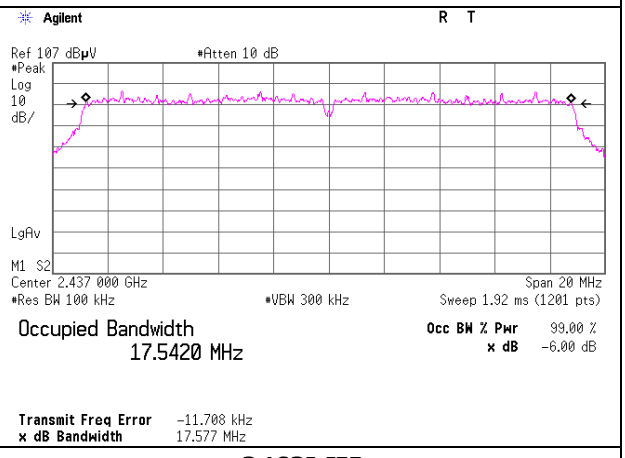


11n-20 Antenna B

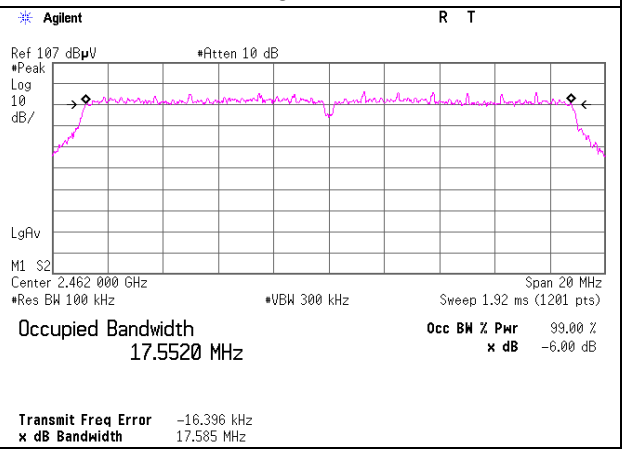
2412MHz



2437MHz



2462MHz



6dB Bandwidth

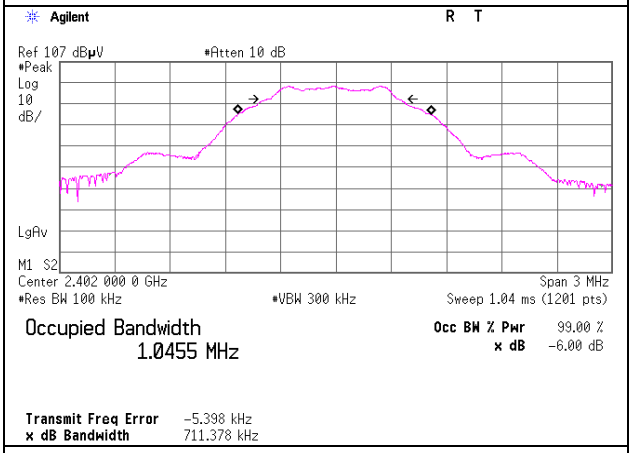
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE Tx

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.711	>500
2440	0.713	>500
2480	0.724	>500

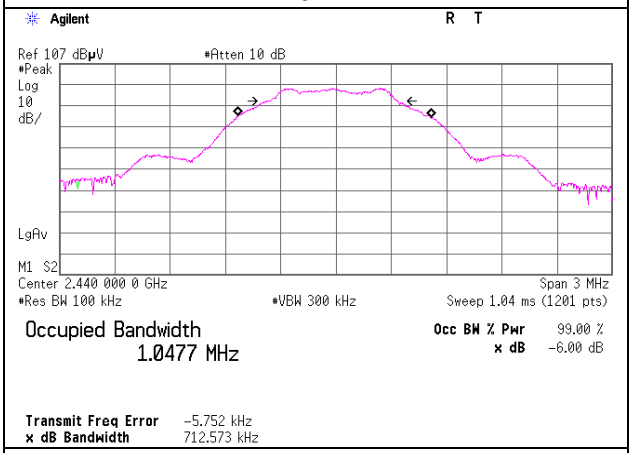
6dB Bandwidth

BT LE

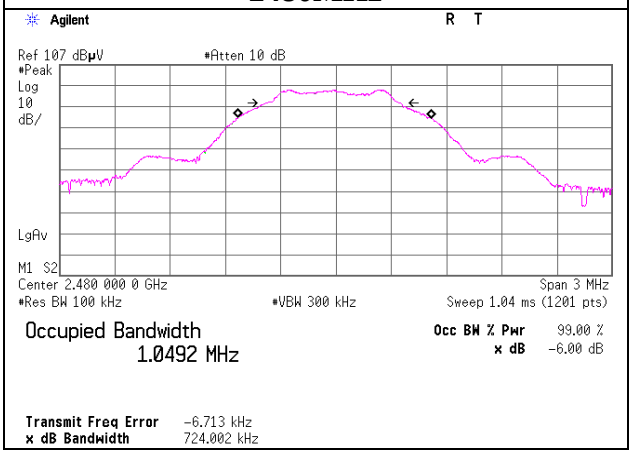
2402MHz



2440MHz



2480MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 Preparation Room	
Report No.	10724035H	
Date	03/16/2015	03/18/2015
Temperature/ Humidity	23deg. C / 33% RH	26deg. C / 45% RH
Engineer	Shinya Watanabe	Yuta Moriya
Mode	11b Tx	

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	18.28	16.11	15.36	34.39	29.00	794.32	13.64
2437	17.14	17.38	15.38	34.52	29.00	794.32	13.62
2462	16.75	15.56	15.09	32.31	29.00	794.32	13.91

Sample Calculation:
Result = Antenna A + B
*This Limit was reduced by 1dB for directional gain of the antenna/antenna array exceeding 6 dBi.

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	0.85	1.66	10.11	12.62	18.28
2437	0.56	1.67	10.11	12.34	17.14
2462	0.46	1.67	10.11	12.24	16.75

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	0.30	1.66	10.11	12.07	16.11
2437	0.62	1.67	10.11	12.40	17.38
2462	0.14	1.67	10.11	11.92	15.56

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

Rate [Mbps]	Antenna A Reading Peak [dBm]	Antenna A Reading Peak [mW]	Antenna B Reading Peak [dBm]	Antenna B Reading Peak [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark [dB]
1	1.63	1.46	1.71	1.48	4.68	2.94	*
2	1.50	1.41	1.53	1.42	4.53	2.83	
5.5	1.33	1.36	1.39	1.38	4.37	2.74	
11	1.37	1.37	1.42	1.39	4.41	2.76	

*: Worst Rate
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.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 Preparation Room	
Report No.	10724035H	
Date	03/16/2015	03/18/2015
Temperature/ Humidity	23deg. C / 33% RH	26deg. C / 45% RH
Engineer	Shinya Watanabe	Yuta Moriya
Mode	11g Tx	

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	95.28	97.72	22.86	193.00	29.00	794.32	6.14
2437	89.95	104.47	22.89	194.42	29.00	794.32	6.11
2462	98.63	96.16	22.90	194.79	29.00	794.32	6.10

Sample Calculation:
Result = Antenna A + B
*This Limit was reduced by 1dB for directional gain of the antenna/antenna array exceeding 6 dBi.

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	8.02	1.66	10.11	19.79	95.28
2437	7.76	1.67	10.11	19.54	89.95
2462	8.16	1.67	10.11	19.94	98.63

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	8.13	1.66	10.11	19.90	97.72
2437	8.41	1.67	10.11	20.19	104.47
2462	8.05	1.67	10.11	19.83	96.16

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

Rate [Mbps]	Antenna A Reading Peak [dBm]	Antenna A Reading Peak [mW]	Antenna B Reading Peak [dBm]	Antenna B Reading Peak [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark [dB]
6	9.21	8.34	9.73	9.40	12.49	17.73	*
9	8.92	7.80	9.32	8.55	12.13	16.35	
12	8.54	7.14	9.11	8.15	11.84	15.29	
18	8.83	7.64	9.48	8.87	12.18	16.51	
24	8.32	6.79	9.02	7.98	11.69	14.77	
36	7.90	6.17	8.53	7.13	11.24	13.29	
48	8.56	7.18	9.18	8.28	11.89	15.46	
54	8.56	7.18	9.23	8.38	11.92	15.55	

*: Worst Rate
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.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 Preparation Room	
Report No.	10724035H	
Date	03/16/2015	03/18/2015
Temperature/ Humidity	23deg. C / 33% RH	26deg. C / 45% RH
Engineer	Shinya Watanabe	Yuta Moriya
Mode	11n-20 Tx	

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	103.51	114.55	23.39	218.06	29.00	794.32	5.61
2437	100.93	104.95	23.14	205.88	29.00	794.32	5.86
2462	102.33	119.12	23.45	221.45	29.00	794.32	5.55

Sample Calculation:
Result = Antenna A + B
*This Limit was reduced by 1dB for directional gain of the antenna/antenna array exceeding 6 dBi.

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	8.38	1.66	10.11	20.15	103.51
2437	8.26	1.67	10.11	20.04	100.93
2462	8.32	1.67	10.11	20.10	102.33

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	8.82	1.66	10.11	20.59	114.55
2437	8.43	1.67	10.11	20.21	104.95
2462	8.98	1.67	10.11	20.76	119.12

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

MCS Number	Antenna A Reading Peak [dBm]	Antenna A Reading Peak [mW]	Antenna B Reading Peak [dBm]	Antenna B Reading Peak [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark
0	9.89	9.75	10.02	10.05	12.97	19.80	*
1	9.12	8.17	9.41	8.73	12.28	16.90	
2	8.54	7.14	8.77	7.53	11.67	14.68	
3	8.55	7.16	8.74	7.48	11.66	14.64	
4	8.24	6.67	8.39	6.90	11.33	13.57	
5	8.88	7.73	9.03	8.00	11.97	15.73	
6	8.80	7.59	9.06	8.05	11.94	15.64	
7	8.11	6.47	8.41	6.93	11.27	13.41	
8	8.58	7.21	8.72	7.45	11.66	14.66	
9	8.32	6.79	8.49	7.06	11.42	13.86	
10	8.33	6.81	8.53	7.13	11.44	13.94	
11	8.82	7.62	8.98	7.91	11.91	15.53	
12	8.28	6.73	8.63	7.29	11.47	14.02	
13	8.18	6.58	8.33	6.81	11.27	13.38	
14	8.18	6.58	8.41	6.93	11.31	13.51	
15	8.94	7.83	9.26	8.43	12.11	16.27	

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

Maximum Average Output Power (Reference data for RF EXposure)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	04/14/2015
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	11b Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]
2412	9.12	9.98	12.81	19.10
2437	9.04	9.93	12.78	18.97
2462	9.02	10.00	12.79	19.02

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-1.26	0.80	10.06	9.60	9.12
2437	-1.30	0.80	10.06	9.56	9.04
2462	-1.31	0.80	10.06	9.55	9.02

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-0.87	0.80	10.06	9.99	9.98
2437	-0.89	0.80	10.06	9.97	9.93
2462	-0.86	0.80	10.06	10.00	10.00

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

Rate [Mbps]	Antenna A Reading Average [dBm]	Antenna A Reading Average [mW]	Antenna B Reading Average [dBm]	Antenna B Reading Average [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark [dB]
1	-1.30	0.74	-0.89	0.81	1.92	1.56	*
2	-1.32	0.74	-0.95	0.80	1.88	1.54	
5.5	-1.33	0.74	-0.88	0.82	1.91	1.55	
11	-1.33	0.74	-0.90	0.81	1.90	1.55	

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

*The test was conducted by the use of Gate function.

Maximum Average Output Power (Reference data for RF EXposure)

Test place	Ise EMC Lab. No. 6 Measurement Room
Report No.	10724035H
Date	04/14/2015
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	11g Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]
2412	8.04	8.49	12.18	16.53
2437	8.49	8.77	12.37	17.26
2462	7.71	8.18	12.01	15.89

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-1.81	0.80	10.06	9.05	8.04
2437	-1.57	0.80	10.06	9.29	8.49
2462	-1.99	0.80	10.06	8.87	7.71

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-1.57	0.80	10.06	9.29	8.49
2437	-1.43	0.80	10.06	9.43	8.77
2462	-1.73	0.80	10.06	9.13	8.18

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

Rate [Mbps]	Antenna A Reading Average [dBm]	Antenna A Reading Average [mW]	Antenna B Reading Average [dBm]	Antenna B Reading Average [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark [dB]
6	-1.64	0.69	-1.49	0.71	1.45	1.40	
9	-1.69	0.68	-1.53	0.70	1.40	1.38	
12	-1.65	0.68	-1.52	0.70	1.43	1.39	
18	-1.57	0.70	-1.43	0.72	1.51	1.42	*
24	-1.92	0.64	-1.44	0.72	1.34	1.36	
36	-1.89	0.65	-1.46	0.71	1.34	1.36	
48	-1.86	0.65	-1.48	0.71	1.34	1.36	
54	-1.77	0.67	-1.49	0.71	1.38	1.37	

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

*The test was conducted by the use of Gate function.

Maximum Average Output Power (Reference data for RF EXposure)

Test place	Ise EMC Lab. No. 6 Measurement Room
Report No.	10724035H
Date	04/14/2015
Temperature/ Humidity	24deg. C / 48% RH
Engineer	Takumi Shimada
Mode	11n-20 Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]
2412	8.07	8.67	12.24	16.74
2437	8.18	8.57	12.24	16.76
2462	8.13	8.47	12.20	16.60

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-1.79	0.80	10.06	9.07	8.07
2437	-1.73	0.80	10.06	9.13	8.18
2462	-1.76	0.80	10.06	9.10	8.13

Antenna B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2412	-1.48	0.80	10.06	9.38	8.67
2437	-1.53	0.80	10.06	9.33	8.57
2462	-1.58	0.80	10.06	9.28	8.47

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

MCS Number	Antenna A Reading Average [dBm]	Antenna A Reading Average [mW]	Antenna B Reading Average [dBm]	Antenna B Reading Average [mW]	Total Reading Power [dBm]	Total Reading Power [mW]	Remark
0	-1.73	0.67	-1.53	0.70	1.38	1.37	*
1	-1.75	0.67	-1.61	0.69	1.33	1.36	
2	-1.96	0.64	-1.56	0.70	1.25	1.34	
3	-1.93	0.64	-1.58	0.70	1.26	1.34	
4	-1.81	0.66	-1.59	0.69	1.31	1.35	
5	-1.76	0.67	-1.55	0.70	1.36	1.37	
6	-1.76	0.67	-1.59	0.69	1.34	1.36	
7	-1.74	0.67	-1.63	0.69	1.33	1.36	
8	-1.83	0.66	-1.66	0.68	1.27	1.34	
9	-1.75	0.67	-1.63	0.69	1.32	1.36	
10	-1.75	0.67	-1.62	0.69	1.33	1.36	
11	-1.66	0.68	-1.67	0.68	1.35	1.36	
12	-1.77	0.67	-1.69	0.68	1.28	1.34	
13	-1.97	0.64	-1.79	0.66	1.13	1.30	
14	-1.98	0.63	-1.96	0.64	1.04	1.27	
15	-2.00	0.63	-1.91	0.64	1.06	1.28	

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

*The test was conducted by the use of Gate function.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 42% RH
Engineer	Ken Fujita
Mode	BT LE Tx

Freq.	Reading Peak	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-11.06	2.07	10.02	1.03	1.27	30.00	1000	28.97
2440	-11.13	2.08	10.02	0.97	1.25	30.00	1000	29.03
2480	-11.22	2.09	10.02	0.89	1.23	30.00	1000	29.11

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

Average Power

(For reporting purpose only)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 42% RH
Engineer	Ken Fujita
Mode	BT LE Tx

Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
2402	-13.40	2.07	10.02	-1.31	0.74
2440	-13.47	2.08	10.02	-1.37	0.73
2480	-13.61	2.09	10.02	-1.50	0.71

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

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/02/2015
Temperature/ Humidity	21deg. C / 44% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	48.7	26.8	3.2	32.0	46.7	73.9	27.2	
Hori	2728.875	PK	67.8	27.1	3.4	31.8	66.5	73.9	7.4	
Hori	4824.000	PK	40.7	30.6	5.3	31.3	45.3	73.9	28.6	Floor Noise
Hori	7236.000	PK	43.0	35.9	6.6	32.0	53.5	73.9	20.4	Floor Noise
Hori	9648.000	PK	42.7	38.5	7.0	32.4	55.8	73.9	18.1	Floor Noise
Hori	2390.000	AV	40.8	26.8	3.2	32.0	38.8	53.9	15.1	
Hori	2728.875	AV	44.3	27.1	3.4	31.8	43.0	53.9	10.9	RBW: 1MHz / VBW: 10Hz
Hori	4824.000	AV	33.8	30.6	5.3	31.3	38.4	53.9	15.5	Floor Noise
Hori	7236.000	AV	34.8	35.9	6.6	32.0	45.3	53.9	8.6	Floor Noise
Hori	9648.000	AV	34.9	38.5	7.0	32.4	48.0	53.9	5.9	Floor Noise
Vert	2390.000	PK	46.0	26.8	3.2	32.0	44.0	73.9	29.9	
Vert	2728.950	PK	60.5	27.1	3.4	31.8	59.2	73.9	14.7	
Vert	4824.000	PK	40.9	30.6	5.3	31.3	45.5	73.9	28.4	Floor Noise
Vert	7236.000	PK	41.8	35.9	6.6	32.0	52.3	73.9	21.6	Floor Noise
Vert	9648.000	PK	42.3	38.5	7.0	32.4	55.4	73.9	18.5	Floor Noise
Vert	2390.000	AV	38.6	26.8	3.2	32.0	36.6	53.9	17.3	
Vert	2728.950	AV	38.2	27.1	3.4	31.8	36.9	53.9	17.0	RBW: 1MHz / VBW: 10Hz
Vert	4824.000	AV	33.6	30.6	5.3	31.3	38.2	53.9	15.7	Floor Noise
Vert	7236.000	AV	34.9	35.9	6.6	32.0	45.4	53.9	8.5	Floor Noise
Vert	9648.000	AV	35.0	38.5	7.0	32.4	48.1	53.9	5.8	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	102.7	26.8	3.2	32.0	100.7	-	-	Carrier
Hori	2396.967	PK	54.8	26.8	3.2	32.0	52.8	80.7	27.9	
Hori	2400.000	PK	45.4	26.8	3.2	32.0	43.4	80.7	37.3	
Vert	2412.000	PK	98.9	26.8	3.2	32.0	96.9	-	-	Carrier
Vert	2397.487	PK	52.3	26.8	3.2	32.0	50.3	76.9	26.6	
Vert	2400.000	PK	39.7	26.8	3.2	32.0	37.7	76.9	39.2	

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

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/02/2015
Temperature/ Humidity	21deg. C / 44% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2728.877	PK	67.5	27.1	3.4	31.8	66.2	73.9	7.7	
Hori	4874.000	PK	41.4	30.7	5.3	31.3	46.1	73.9	27.8	Floor Noise
Hori	7311.000	PK	42.7	35.9	6.5	32.0	53.1	73.9	20.8	Floor Noise
Hori	9748.000	PK	42.0	38.7	7.1	32.4	55.4	73.9	18.5	Floor Noise
Hori	2728.877	AV	43.2	27.1	3.4	31.8	41.9	53.9	12.0	RBW: 1MHz / VBW: 10Hz
Hori	4874.000	AV	33.3	30.7	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7311.000	AV	34.3	35.9	6.5	32.0	44.7	53.9	9.2	Floor Noise
Hori	9748.000	AV	34.6	38.7	7.1	32.4	48.0	53.9	5.9	Floor Noise
Vert	2728.950	PK	61.2	27.1	3.4	31.8	59.9	73.9	14.0	
Vert	4874.000	PK	40.8	30.7	5.3	31.3	45.5	73.9	28.4	Floor Noise
Vert	7311.000	PK	42.2	35.9	6.5	32.0	52.6	73.9	21.3	Floor Noise
Vert	9748.000	PK	42.8	38.7	7.1	32.4	56.2	73.9	17.7	Floor Noise
Vert	2728.950	AV	38.7	27.1	3.4	31.8	37.4	53.9	16.5	RBW: 1MHz / VBW: 10Hz
Vert	4874.000	AV	33.6	30.7	5.3	31.3	38.3	53.9	15.6	Floor Noise
Vert	7311.000	AV	34.3	35.9	6.5	32.0	44.7	53.9	9.2	Floor Noise
Vert	9748.000	AV	34.9	38.7	7.1	32.4	48.3	53.9	5.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/02/2015
Temperature/ Humidity	21deg. C / 44% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	50.0	26.9	3.2	32.0	48.1	73.9	25.8	
Hori	2728.877	PK	66.8	27.1	3.4	31.8	65.5	73.9	8.4	
Hori	4924.000	PK	41.4	30.8	5.3	31.3	46.2	73.9	27.7	Floor Noise
Hori	7386.000	PK	42.3	35.9	6.5	32.1	52.6	73.9	21.3	Floor Noise
Hori	9848.000	PK	42.5	38.8	7.1	32.5	55.9	73.9	18.0	Floor Noise
Hori	2483.500	AV	42.3	26.9	3.2	32.0	40.4	53.9	13.5	
Hori	2728.877	AV	43.0	27.1	3.4	31.8	41.7	53.9	12.2	RBW: 1MHz / VBW: 10Hz
Hori	4924.000	AV	33.3	30.8	5.3	31.3	38.1	53.9	15.8	Floor Noise
Hori	7386.000	AV	34.9	35.9	6.5	32.1	45.2	53.9	8.7	Floor Noise
Hori	9848.000	AV	34.5	38.8	7.1	32.5	47.9	53.9	6.0	Floor Noise
Vert	2483.500	PK	46.8	26.9	3.2	32.0	44.9	73.9	29.0	
Vert	2728.950	PK	61.1	27.1	3.4	31.8	59.8	73.9	14.1	
Vert	4924.000	PK	40.4	30.8	5.3	31.3	45.2	73.9	28.7	Floor Noise
Vert	7386.000	PK	42.7	35.9	6.5	32.1	53.0	73.9	20.9	Floor Noise
Vert	9848.000	PK	42.4	38.8	7.1	32.5	55.8	73.9	18.1	Floor Noise
Vert	2483.500	AV	38.7	26.9	3.2	32.0	36.8	53.9	17.1	
Vert	2728.950	AV	38.7	27.1	3.4	31.8	37.4	53.9	16.5	RBW: 1MHz / VBW: 10Hz
Vert	4924.000	AV	33.6	30.8	5.3	31.3	38.4	53.9	15.5	Floor Noise
Vert	7386.000	AV	34.6	35.9	6.5	32.1	44.9	53.9	9.0	Floor Noise
Vert	9848.000	AV	34.2	38.8	7.1	32.5	47.6	53.9	6.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10724035H	
Date	03/26/2015	04/02/2015
Temperature/ Humidity	21deg. C / 30% RH	21deg. C / 44% RH
Engineer	Keisuke Kawamura (Band edge)	Yuta Moriya (1-10GHz)
Mode	11n-20 Tx 2412MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	64.5	26.8	3.2	32.0	62.5	73.9	11.4	
Hori	2728.899	PK	67.4	27.1	3.4	31.8	66.1	73.9	7.8	
Hori	4824.000	PK	41.4	30.6	5.3	31.3	46.0	73.9	27.9	Floor Noise
Hori	7236.000	PK	42.3	35.9	6.6	32.0	52.8	73.9	21.1	Floor Noise
Hori	9648.000	PK	42.0	38.5	7.0	32.4	55.1	73.9	18.8	Floor Noise
Hori	2390.000	AV	51.5	26.8	3.2	32.0	49.5	53.9	4.4	
Hori	2728.899	AV	43.6	27.1	3.4	31.8	42.3	53.9	11.6	RBW: 1MHz / VBW: 10Hz
Hori	4824.000	AV	33.4	30.6	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7236.000	AV	34.9	35.9	6.6	32.0	45.4	53.9	8.5	Floor Noise
Hori	9648.000	AV	34.3	38.5	7.0	32.4	47.4	53.9	6.5	Floor Noise
Vert	2390.000	PK	69.1	26.8	3.2	32.0	67.1	73.9	6.8	
Vert	2728.890	PK	60.4	27.1	3.4	31.8	59.1	73.9	14.8	
Vert	4824.000	PK	40.5	30.6	5.3	31.3	45.1	73.9	28.8	Floor Noise
Vert	7236.000	PK	42.4	35.9	6.6	32.0	52.9	73.9	21.0	Floor Noise
Vert	9648.000	PK	42.2	38.5	7.0	32.4	55.3	73.9	18.6	Floor Noise
Vert	2390.000	AV	50.8	26.8	3.2	32.0	48.8	53.9	5.1	
Vert	2728.890	AV	38.3	27.1	3.4	31.8	37.0	53.9	16.9	RBW: 1MHz / VBW: 10Hz
Vert	4824.000	AV	33.3	30.6	5.3	31.3	37.9	53.9	16.0	Floor Noise
Vert	7236.000	AV	34.1	35.9	5.6	32.0	43.6	53.9	10.3	Floor Noise
Vert	9648.000	AV	34.2	38.5	7.0	32.4	47.3	53.9	6.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	104.2	26.8	3.2	32.0	102.2	-	-	Carrier
Hori	2400.000	PK	58.8	26.8	3.2	32.0	56.8	82.2	25.4	
Vert	2412.000	PK	102.8	26.8	3.2	32.0	100.8	-	-	Carrier
Vert	2400.000	PK	60.4	26.8	3.2	32.0	58.4	80.8	22.4	

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

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/02/2015
Temperature/ Humidity	21deg. C / 44% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11n-20 Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2728.899	PK	67.6	27.1	3.4	31.8	66.3	73.9	7.6	
Hori	4874.000	PK	41.2	30.7	5.3	31.3	45.9	73.9	28.0	Floor Noise
Hori	7311.000	PK	42.2	35.9	6.5	32.0	52.6	73.9	21.3	Floor Noise
Hori	9748.000	PK	42.1	38.7	7.1	32.4	55.5	73.9	18.4	Floor Noise
Hori	2728.899	AV	43.7	27.1	3.4	31.8	42.4	53.9	11.5	RBW: 1MHz / VBW: 10Hz
Hori	4874.000	AV	33.3	30.7	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7311.000	AV	34.7	35.9	6.5	32.0	45.1	53.9	8.8	Floor Noise
Hori	9748.000	AV	34.6	38.7	7.1	32.4	48.0	53.9	5.9	Floor Noise
Vert	2728.968	PK	61.4	27.1	3.4	31.8	60.1	73.9	13.8	
Vert	4874.000	PK	41.0	30.7	5.3	31.3	45.7	73.9	28.2	Floor Noise
Vert	7311.000	PK	42.2	35.9	6.5	32.0	52.6	73.9	21.3	Floor Noise
Vert	9748.000	PK	42.1	38.7	7.1	32.4	55.5	73.9	18.4	Floor Noise
Vert	2728.968	AV	38.9	27.1	3.4	31.8	37.6	53.9	16.3	RBW: 1MHz / VBW: 10Hz
Vert	4874.000	AV	33.8	30.7	5.3	31.3	38.5	53.9	15.4	Floor Noise
Vert	7311.000	AV	34.2	35.9	6.5	32.0	44.6	53.9	9.3	Floor Noise
Vert	9748.000	AV	34.2	38.7	7.1	32.4	47.6	53.9	6.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/26/2015	03/28/2015	04/02/2015
Temperature/ Humidity	21deg. C / 30% RH	20deg. C / 35% RH	21deg. C / 44% RH
Engineer	Keisuke Kawamura (Band edge)	Takafumi Noguchi (below 1GHz)	Yuta Moriya (1-26.5GHz)
Mode	11n-20 Tx 2462MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	69.425	QP	48.5	6.2	7.6	32.1	30.2	40.0	9.8	
Hori	148.512	QP	41.5	14.9	8.6	32.2	32.8	43.5	10.7	
Hori	281.412	QP	43.2	18.8	9.8	32.0	39.8	46.0	6.2	
Hori	301.718	QP	43.3	14.7	10.0	32.0	36.0	46.0	10.0	
Hori	499.998	QP	38.9	18.2	11.2	32.1	36.2	46.0	9.8	
Hori	742.544	QP	39.4	21.2	12.6	31.9	41.3	46.0	4.7	
Hori	2483.500	PK	65.0	26.9	3.2	32.0	63.1	73.9	10.8	
Hori	2728.899	PK	66.7	27.1	3.4	31.8	65.4	73.9	8.5	
Hori	4924.000	PK	41.5	30.8	5.3	31.3	46.3	73.9	27.6	Floor Noise
Hori	7386.000	PK	42.1	35.9	6.5	32.1	52.4	73.9	21.5	Floor Noise
Hori	9848.000	PK	42.1	38.8	7.1	32.5	55.5	73.9	18.4	Floor Noise
Hori	2483.500	AV	50.5	26.9	3.2	32.0	48.6	53.9	5.3	
Hori	2728.899	AV	43.4	27.1	3.4	31.8	42.1	53.9	11.8	RBW: 1MHz / VBW: 10Hz
Hori	4924.000	AV	33.2	30.8	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7386.000	AV	34.7	35.9	6.5	32.1	45.0	53.9	8.9	Floor Noise
Hori	9848.000	AV	34.2	38.8	7.1	32.5	47.6	53.9	6.3	Floor Noise
Vert	47.582	QP	47.0	11.5	7.3	32.2	33.6	40.0	6.4	
Vert	104.340	QP	45.8	10.7	8.1	32.3	32.3	43.5	11.2	
Vert	148.506	QP	44.0	14.9	8.6	32.2	35.3	43.5	8.2	
Vert	297.017	QP	39.3	19.6	9.9	32.0	36.8	46.0	9.2	
Vert	499.994	QP	37.4	18.2	11.2	32.1	34.7	46.0	11.3	
Vert	742.485	QP	41.4	21.2	12.6	31.9	43.3	46.0	2.7	
Vert	2483.500	PK	62.0	26.9	3.2	32.0	60.1	73.9	13.8	
Vert	2728.890	PK	61.1	27.1	3.4	31.8	59.8	73.9	14.1	
Vert	4924.000	PK	40.4	30.8	5.3	31.3	45.2	73.9	28.7	Floor Noise
Vert	7386.000	PK	42.6	35.9	6.5	32.1	52.9	73.9	21.0	Floor Noise
Vert	9848.000	PK	42.1	38.8	7.1	32.5	55.5	73.9	18.4	Floor Noise
Vert	2483.500	AV	49.2	26.9	3.2	32.0	47.3	53.9	6.6	
Vert	2728.890	AV	38.5	27.1	3.4	31.8	37.2	53.9	16.7	RBW: 1MHz / VBW: 10Hz
Vert	4924.000	AV	33.2	30.8	5.3	31.3	38.0	53.9	15.9	Floor Noise
Vert	7386.000	AV	34.1	35.9	6.5	32.1	44.4	53.9	9.5	Floor Noise
Vert	9848.000	AV	34.0	38.8	7.1	32.5	47.4	53.9	6.5	Floor Noise

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

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

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

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/28/2015	04/02/2015	04/02/2015
Temperature/ Humidity	20deg. C / 35% RH	21deg. C / 44% RH	20deg. C / 41% RH
Engineer	Takafumi Noguchi (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2402MHz		

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	69.423	QP	48.2	6.2	7.6	32.1	-	29.9	40.0	10.1	
Hori	148.512	QP	42.0	14.9	8.6	32.2	-	33.3	43.5	10.2	
Hori	281.503	QP	42.4	18.8	9.8	32.0	-	39.0	46.0	7.0	
Hori	301.718	QP	43.3	14.7	10.0	32.0	-	36.0	46.0	10.0	
Hori	499.996	QP	38.8	18.2	11.2	32.1	-	36.1	46.0	9.9	
Hori	742.484	QP	37.4	21.2	12.6	31.9	-	39.3	46.0	6.7	
Hori	2390.000	PK	54.4	26.8	3.2	32.0	-	52.4	73.9	21.5	
Hori	2728.875	PK	66.8	27.1	3.4	31.8	-	65.5	73.9	8.4	
Hori	4804.000	PK	40.4	30.6	5.2	31.3	-	44.9	73.9	29.0	Floor Noise
Hori	7206.000	PK	42.1	35.9	6.6	32.0	-	52.6	73.9	21.3	Floor Noise
Hori	9608.000	PK	42.6	38.4	7.0	32.4	-	55.6	73.9	18.3	Floor Noise
Hori	2390.000	AV	41.1	26.8	3.2	32.0	2.0	41.1	53.9	12.8	*1)
Hori	2728.875	AV	42.6	27.1	3.4	31.8	-	41.3	53.9	12.6	RBW: 1MHz / VBW: 10Hz
Hori	4804.000	AV	33.7	30.6	5.2	31.3	-	38.2	53.9	15.7	Floor Noise
Hori	7206.000	AV	34.5	35.9	6.6	32.0	-	45.0	53.9	8.9	Floor Noise
Hori	9608.000	AV	34.7	38.4	7.0	32.4	-	47.7	53.9	6.2	Floor Noise
Vert	47.584	QP	46.8	11.5	7.3	32.2	-	33.4	40.0	6.6	
Vert	104.432	QP	45.9	10.7	8.1	32.3	-	32.4	43.5	11.1	
Vert	148.499	QP	44.0	14.9	8.6	32.2	-	35.3	43.5	8.2	
Vert	297.020	QP	39.4	19.6	9.9	32.0	-	36.9	46.0	9.1	
Vert	499.998	QP	37.2	18.2	11.2	32.1	-	34.5	46.0	11.5	
Vert	742.518	QP	40.4	21.2	12.6	31.9	-	42.3	46.0	3.7	
Vert	2390.000	PK	62.0	26.8	3.2	32.0	-	60.0	73.9	13.9	
Vert	2728.893	PK	61.7	27.1	3.4	31.8	-	60.4	73.9	13.5	
Vert	4804.000	PK	40.4	30.6	5.2	31.3	-	44.9	73.9	29.0	Floor Noise
Vert	7206.000	PK	41.9	35.9	6.6	32.0	-	52.4	73.9	21.5	Floor Noise
Vert	9608.000	PK	43.0	38.4	7.0	32.4	-	56.0	73.9	17.9	Floor Noise
Vert	2390.000	AV	47.3	26.8	3.2	32.0	2.0	47.3	53.9	6.6	*1)
Vert	2728.893	AV	39.5	27.1	3.4	31.8	-	38.2	53.9	15.7	RBW: 1MHz / VBW: 10Hz
Vert	4804.000	AV	33.4	30.6	5.2	31.3	-	37.9	53.9	16.0	Floor Noise
Vert	7206.000	AV	34.4	35.9	6.6	32.0	-	44.9	53.9	9.0	Floor Noise
Vert	9608.000	AV	35.0	38.4	7.0	32.4	-	48.0	53.9	5.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
*1) Not Out of Band emission (Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	98.3	26.8	3.2	32.0	96.3	-	-	Carrier
Hori	2400.000	PK	53.7	26.8	3.2	32.0	51.7	76.3	24.6	
Vert	2402.000	PK	106.0	26.8	3.2	32.0	104.0	-	-	Carrier
Vert	2400.000	PK	61.4	26.8	3.2	32.0	59.4	84.0	24.6	

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

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/28/2015	04/02/2015	04/02/2015
Temperature/ Humidity	20deg. C / 35% RH	21deg. C / 44% RH	20deg. C / 41% RH
Engineer	Takafumi Noguchi (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2440MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	69.425	QP	48.3	6.2	7.6	32.1	30.0	40.0	10.0	
Hori	148.525	QP	41.8	14.9	8.6	32.2	33.1	43.5	10.4	
Hori	281.453	QP	42.5	18.8	9.8	32.0	39.1	46.0	6.9	
Hori	301.723	QP	43.2	14.7	10.0	32.0	35.9	46.0	10.1	
Hori	499.998	QP	38.8	18.2	11.2	32.1	36.1	46.0	9.9	
Hori	742.501	QP	39.9	21.2	12.6	31.9	41.8	46.0	4.2	
Hori	2728.867	PK	67.4	27.1	3.4	31.8	66.1	73.9	7.8	
Hori	4880.000	PK	40.9	30.8	5.3	31.3	45.7	73.9	28.2	Floor Noise
Hori	7320.000	PK	42.0	35.9	6.5	32.0	52.4	73.9	21.5	Floor Noise
Hori	9760.000	PK	42.0	38.7	7.1	32.5	55.3	73.9	18.6	Floor Noise
Hori	2728.867	AV	43.4	27.1	3.4	31.8	42.1	53.9	11.9	RBW: 1MHz / VBW: 10Hz
Hori	4880.000	AV	33.3	30.8	5.3	31.3	38.1	53.9	15.8	Floor Noise
Hori	7320.000	AV	34.1	35.9	6.5	32.0	44.5	53.9	9.4	Floor Noise
Hori	9760.000	AV	34.6	38.7	7.1	32.5	47.9	53.9	6.1	Floor Noise
Vert	47.590	QP	46.7	11.5	7.3	32.2	33.3	40.0	6.7	
Vert	104.402	QP	45.6	10.7	8.1	32.3	32.1	43.5	11.4	
Vert	148.501	QP	43.9	14.9	8.6	32.2	35.2	43.5	8.3	
Vert	297.020	QP	39.4	19.6	9.9	32.0	36.9	46.0	9.1	
Vert	499.994	QP	37.3	18.2	11.2	32.1	34.6	46.0	11.4	
Vert	742.540	QP	40.3	21.2	12.6	31.9	42.2	46.0	3.8	
Vert	2728.893	PK	60.8	27.1	3.4	31.8	59.5	73.9	14.5	
Vert	4880.000	PK	40.5	30.8	5.3	31.3	45.3	73.9	28.6	Floor Noise
Vert	7320.000	PK	41.8	35.9	6.5	32.0	52.2	73.9	21.7	Floor Noise
Vert	9760.000	PK	42.8	38.7	7.1	32.5	56.1	73.9	17.8	Floor Noise
Vert	2728.893	AV	38.4	27.1	3.4	31.8	37.1	53.9	16.8	RBW: 1MHz / VBW: 10Hz
Vert	4880.000	AV	33.3	30.8	5.3	31.3	38.1	53.9	15.8	Floor Noise
Vert	7320.000	AV	34.5	35.9	6.5	32.0	44.9	53.9	9.0	Floor Noise
Vert	9760.000	AV	34.7	38.7	7.1	32.5	48.0	53.9	5.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: Chicony)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/28/2015	04/02/2015	04/02/2015
Temperature/ Humidity	20deg. C / 35% RH	21deg. C / 44% RH	20deg. C / 41% RH
Engineer	Takafumi Noguchi (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2480MHz		

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	69.431	QP	48.1	6.2	7.6	32.1	-	29.8	40.0	10.2	
Hori	148.507	QP	41.8	14.9	8.6	32.2	-	33.1	43.5	10.4	
Hori	281.436	QP	42.5	18.8	9.8	32.0	-	39.1	46.0	6.9	
Hori	301.720	QP	43.2	14.7	10.0	32.0	-	35.9	46.0	10.1	
Hori	499.995	QP	38.9	18.2	11.2	32.1	-	36.2	46.0	9.8	
Hori	742.500	QP	37.6	21.2	12.6	31.9	-	39.5	46.0	6.5	
Hori	2483.500	PK	65.9	26.9	3.2	32.0	-	64.0	73.9	9.9	
Hori	2728.845	PK	67.2	27.1	3.4	31.8	-	65.9	73.9	8.0	
Hori	4960.000	PK	40.4	30.9	5.2	31.2	-	45.3	73.9	28.6	Floor Noise
Hori	7440.000	PK	42.4	35.9	6.6	32.1	-	52.8	73.9	21.1	Floor Noise
Hori	9920.000	PK	41.8	38.9	7.1	32.5	-	55.3	73.9	18.6	Floor Noise
Hori	2483.500	AV	51.3	26.9	3.2	32.0	2.0	51.4	53.9	2.5	*1)
Hori	2728.845	AV	43.1	27.1	3.4	31.8	-	41.8	53.9	12.1	RBW: 1MHz / VBW: 10Hz
Hori	4960.000	AV	33.2	30.9	5.2	31.2	-	38.1	53.9	15.8	Floor Noise
Hori	7440.000	AV	34.1	35.9	6.6	32.1	-	44.5	53.9	9.4	Floor Noise
Hori	9920.000	AV	34.3	38.9	7.1	32.5	-	47.8	53.9	6.1	Floor Noise
Vert	47.588	QP	46.9	11.5	7.3	32.2	-	33.5	40.0	6.5	
Vert	104.356	QP	45.8	10.7	8.1	32.3	-	32.3	43.5	11.2	
Vert	148.513	QP	43.9	14.9	8.6	32.2	-	35.2	43.5	8.3	
Vert	297.014	QP	39.3	19.6	9.9	32.0	-	36.8	46.0	9.2	
Vert	499.998	QP	37.2	18.2	11.2	32.1	-	34.5	46.0	11.5	
Vert	742.473	QP	40.8	21.2	12.6	31.9	-	42.7	46.0	3.3	
Vert	2483.500	PK	70.6	26.9	3.2	32.0	-	68.7	73.9	5.2	
Vert	2728.893	PK	60.3	27.1	3.4	31.8	-	59.0	73.9	14.9	
Vert	4960.000	PK	40.5	30.9	5.2	31.2	-	45.4	73.9	28.5	Floor Noise
Vert	7440.000	PK	41.7	35.9	6.6	32.1	-	52.1	73.9	21.8	Floor Noise
Vert	9920.000	PK	42.7	38.9	7.1	32.5	-	56.2	73.9	17.7	Floor Noise
Vert	2483.500	AV	52.8	26.9	3.2	32.0	2.0	52.9	53.9	1.0	*1)
Vert	2728.893	AV	38.4	27.1	3.4	31.8	-	37.1	53.9	16.8	RBW: 1MHz / VBW: 10Hz
Vert	4960.000	AV	33.2	30.9	5.2	31.2	-	38.1	53.9	15.8	Floor Noise
Vert	7440.000	AV	34.4	35.9	6.6	32.1	-	44.8	53.9	9.1	Floor Noise
Vert	9920.000	AV	34.5	38.9	7.1	32.5	-	48.0	53.9	5.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
*1) Not Out of Band emission (Leakage Power)

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	47.1	26.8	3.2	32.0	45.1	73.9	28.8	
Hori	2728.653	PK	62.3	27.1	3.4	31.8	61.0	73.9	12.9	
Hori	4824.000	PK	40.8	30.6	5.3	31.3	45.4	73.9	28.5	Floor Noise
Hori	7236.000	PK	41.3	35.9	6.6	32.0	51.8	73.9	22.1	Floor Noise
Hori	9648.000	PK	41.8	38.5	7.0	32.4	54.9	73.9	19.0	Floor Noise
Hori	2390.000	AV	40.3	26.8	3.2	32.0	38.3	53.9	15.6	
Hori	2728.653	AV	40.2	27.1	3.4	31.8	38.9	53.9	15.0	RBW: 1MHz / VBW: 10Hz
Hori	4824.000	AV	34.1	30.6	5.3	31.3	38.7	53.9	15.2	Floor Noise
Hori	7236.000	AV	34.9	35.9	6.6	32.0	45.4	53.9	8.5	Floor Noise
Hori	9648.000	AV	34.8	38.5	7.0	32.4	47.9	53.9	6.0	Floor Noise
Vert	2390.000	PK	47.1	26.8	3.2	32.0	45.1	73.9	28.8	
Vert	2728.653	PK	60.6	27.1	3.4	31.8	59.3	73.9	14.6	
Vert	4824.000	PK	41.1	30.6	5.3	31.3	45.7	73.9	28.2	Floor Noise
Vert	7236.000	PK	41.6	35.9	6.6	32.0	52.1	73.9	21.8	Floor Noise
Vert	9648.000	PK	41.9	38.5	7.0	32.4	55.0	73.9	18.9	Floor Noise
Vert	2390.000	AV	39.4	26.8	3.2	32.0	37.4	53.9	16.5	
Vert	2728.653	AV	38.6	27.1	3.4	31.8	37.3	53.9	16.6	RBW: 1MHz / VBW: 10Hz
Vert	4824.000	AV	33.4	30.6	5.3	31.3	38.0	53.9	15.9	Floor Noise
Vert	7236.000	AV	34.1	35.9	6.6	32.0	44.6	53.9	9.3	Floor Noise
Vert	9648.000	AV	34.5	38.5	7.0	32.4	47.6	53.9	6.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	102.7	26.8	3.2	32.0	100.7	-	-	Carrier
Hori	2396.967	PK	59.7	26.8	3.2	32.0	57.7	80.7	23.0	
Hori	2400.000	PK	45.2	26.8	3.2	32.0	43.2	80.7	37.5	
Vert	2412.000	PK	100.0	26.8	3.2	32.0	98.0	-	-	Carrier
Vert	2396.967	PK	57.3	26.8	3.2	32.0	55.3	78.0	22.7	
Vert	2400.000	PK	43.0	26.8	3.2	32.0	41.0	78.0	37.0	

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

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2728.940	PK	59.5	27.1	3.4	31.8	58.2	73.9	15.7	
Hori	4874.000	PK	40.4	30.7	5.3	31.3	45.1	73.9	28.8	Floor Noise
Hori	7311.000	PK	41.4	35.9	6.5	32.0	51.8	73.9	22.1	Floor Noise
Hori	9748.000	PK	42.3	38.7	7.1	32.4	55.7	73.9	18.2	Floor Noise
Hori	2728.940	AV	38.0	27.1	3.4	31.8	36.7	53.9	17.2	RBW: 1MHz / VBW: 10Hz
Hori	4874.000	AV	33.3	30.7	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7311.000	AV	33.9	35.9	6.5	32.0	44.3	53.9	9.6	Floor Noise
Hori	9748.000	AV	33.9	38.7	7.1	32.4	47.3	53.9	6.6	Floor Noise
Vert	2728.903	PK	60.4	27.1	3.4	31.8	59.1	73.9	14.8	
Vert	4874.000	PK	41.1	30.7	5.3	31.3	45.8	73.9	28.1	Floor Noise
Vert	7311.000	PK	42.5	35.9	6.5	32.0	52.9	73.9	21.0	Floor Noise
Vert	9748.000	PK	42.0	38.7	7.1	32.4	55.4	73.9	18.5	Floor Noise
Vert	2728.903	AV	38.3	27.1	3.4	31.8	37.0	53.9	16.9	RBW: 1MHz / VBW: 10Hz
Vert	4874.000	AV	33.1	30.7	5.3	31.3	37.8	53.9	16.1	Floor Noise
Vert	7311.000	AV	34.9	35.9	6.5	32.0	45.3	53.9	8.6	Floor Noise
Vert	9748.000	AV	34.2	38.7	7.1	32.4	47.6	53.9	6.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	50.1	26.9	3.2	32.0	48.2	73.9	25.7	
Hori	2729.038	PK	59.0	27.1	3.4	31.8	57.7	73.9	16.3	
Hori	4924.000	PK	41.0	30.8	5.3	31.3	45.8	73.9	28.1	Floor Noise
Hori	7386.000	PK	41.2	35.9	6.5	32.1	51.5	73.9	22.4	Floor Noise
Hori	9848.000	PK	42.4	38.8	7.1	32.5	55.8	73.9	18.2	Floor Noise
Hori	2483.500	AV	46.9	26.9	3.2	32.0	45.0	53.9	8.9	
Hori	2729.038	AV	37.8	27.1	3.4	31.8	36.5	53.9	17.4	RBW: 1MHz / VBW: 10Hz
Hori	4924.000	AV	33.3	30.8	5.3	31.3	38.1	53.9	15.8	Floor Noise
Hori	7386.000	AV	33.9	35.9	6.5	32.1	44.2	53.9	9.7	Floor Noise
Hori	9848.000	AV	33.9	38.8	7.1	32.5	47.3	53.9	6.6	Floor Noise
Vert	2483.500	PK	49.0	26.9	3.2	32.0	47.1	73.9	26.8	
Vert	2728.936	PK	61.1	27.1	3.4	31.8	59.8	73.9	14.1	
Vert	4924.000	PK	41.1	30.8	5.3	31.3	45.9	73.9	28.0	Floor Noise
Vert	7386.000	PK	42.3	35.9	6.5	32.1	52.6	73.9	21.3	Floor Noise
Vert	9848.000	PK	42.1	38.8	7.1	32.5	55.5	73.9	18.4	Floor Noise
Vert	2483.500	AV	41.9	26.9	3.2	32.0	40.0	53.9	13.9	
Vert	2728.936	AV	38.1	27.1	3.4	31.8	36.8	53.9	17.1	RBW: 1MHz / VBW: 10Hz
Vert	4924.000	AV	33.4	30.8	5.3	31.3	38.2	53.9	15.7	Floor Noise
Vert	7386.000	AV	34.5	35.9	6.5	32.1	44.8	53.9	9.1	Floor Noise
Vert	9848.000	AV	34.9	38.8	7.1	32.5	48.3	53.9	5.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10724035H	
Date	03/26/2015	04/01/2015
Temperature/ Humidity	21deg. C / 30% RH	20deg. C / 55% RH
Engineer	Keisuke Kawamura (Band edge)	Yuta Moriya (1-10GHz)
Mode	11n-20 Tx 2412MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	61.6	26.8	3.2	32.0	59.6	73.9	14.3	
Hori	2729.038	PK	58.0	27.1	3.4	31.8	56.7	73.9	17.2	
Hori	4824.000	PK	40.2	30.6	5.3	31.3	44.8	73.9	29.1	Floor Noise
Hori	7236.000	PK	41.7	35.9	6.6	32.0	52.2	73.9	21.7	Floor Noise
Hori	9648.000	PK	42.3	38.5	7.0	32.4	55.4	73.9	18.5	Floor Noise
Hori	2390.000	AV	49.5	26.8	3.2	32.0	47.5	53.9	6.4	
Hori	2729.038	AV	38.1	27.1	3.4	31.8	36.8	53.9	17.1	RBW: 1MHz / VBW: 10Hz
Hori	4824.000	AV	33.3	30.6	5.3	31.3	37.9	53.9	16.0	Floor Noise
Hori	7236.000	AV	34.0	35.9	6.6	32.0	44.5	53.9	9.4	Floor Noise
Hori	9648.000	AV	33.9	38.5	7.0	32.4	47.0	53.9	6.9	Floor Noise
Vert	2390.000	PK	59.1	26.8	3.2	32.0	57.1	73.9	16.8	
Vert	2728.779	PK	58.6	27.1	3.4	31.8	57.3	73.9	16.6	
Vert	4824.000	PK	40.0	30.6	5.3	31.3	44.6	73.9	29.3	Floor Noise
Vert	7236.000	PK	42.2	35.9	6.6	32.0	52.7	73.9	21.2	Floor Noise
Vert	9648.000	PK	42.2	38.5	7.0	32.4	55.3	73.9	18.6	Floor Noise
Vert	2390.000	AV	48.3	26.8	3.2	32.0	46.3	53.9	7.6	
Vert	2728.779	AV	37.2	27.1	3.4	31.8	35.9	53.9	18.0	RBW: 1MHz / VBW: 10Hz
Vert	4824.000	AV	33.9	30.6	5.3	31.3	38.5	53.9	15.4	Floor Noise
Vert	7236.000	AV	34.1	35.9	6.6	32.0	44.6	53.9	9.3	Floor Noise
Vert	9648.000	AV	34.9	38.5	7.0	32.4	48.0	53.9	5.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	100.6	26.8	3.2	32.0	98.6	-	-	Carrier
Hori	2400.000	PK	55.9	26.8	3.2	32.0	53.9	78.6	24.7	
Vert	2412.000	PK	99.7	26.8	3.2	32.0	97.7	-	-	Carrier
Vert	2400.000	PK	53.0	26.8	3.2	32.0	51.0	77.7	26.7	

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

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya (1-10GHz)
Mode	11n-20 Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2728.910	PK	60.7	27.1	3.4	31.8	59.4	73.9	14.5	
Hori	4874.000	PK	40.2	30.7	5.3	31.3	44.9	73.9	29.0	Floor Noise
Hori	7311.000	PK	41.7	35.9	6.5	32.0	52.1	73.9	21.8	Floor Noise
Hori	9748.000	PK	42.1	38.7	7.1	32.4	55.5	73.9	18.4	Floor Noise
Hori	2728.910	AV	38.5	27.1	3.4	31.8	37.2	53.9	16.7	RBW: 1MHz / VBW: 10Hz
Hori	4874.000	AV	33.4	30.7	5.3	31.3	38.1	53.9	15.8	Floor Noise
Hori	7311.000	AV	34.1	35.9	5.6	32.0	43.6	53.9	10.3	Floor Noise
Hori	9748.000	AV	33.9	38.7	7.1	32.4	47.3	53.9	6.6	Floor Noise
Vert	2728.752	PK	58.8	27.1	3.4	31.8	57.5	73.9	16.4	
Vert	4874.000	PK	40.4	30.7	5.3	31.3	45.1	73.9	28.8	Floor Noise
Vert	7311.000	PK	42.3	35.9	6.5	32.0	52.7	73.9	21.2	Floor Noise
Vert	9748.000	PK	42.1	38.7	7.1	32.4	55.5	73.9	18.4	Floor Noise
Vert	2728.752	AV	36.3	27.1	3.4	31.8	35.0	53.9	18.9	RBW: 1MHz / VBW: 10Hz
Vert	4874.000	AV	33.2	30.7	5.3	31.3	37.9	53.9	16.0	Floor Noise
Vert	7311.000	AV	34.0	35.9	6.5	32.0	44.4	53.9	9.5	Floor Noise
Vert	9748.000	AV	34.3	38.7	7.1	32.4	47.7	53.9	6.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/26/2015	03/29/2015	04/01/2015
Temperature/ Humidity	21deg. C / 30% RH	21deg. C / 38% RH	20deg. C / 55% RH
Engineer	Keisuke Kawamura (Band edge)	Tomoki Matsui (below 1GHz)	Yuta Moriya (1-26.5GHz)
Mode	11n-20 Tx 2462MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	70.036	QP	45.6	6.1	7.7	32.1	27.3	40.0	12.7	
Hori	132.056	QP	42.3	13.8	8.4	32.2	32.3	43.5	11.2	
Hori	148.502	QP	38.6	14.9	8.6	32.2	29.9	43.5	13.6	
Hori	283.548	QP	42.2	18.9	9.8	32.0	38.9	46.0	7.1	
Hori	300.055	QP	40.4	14.7	10.0	32.0	33.1	46.0	12.9	
Hori	405.007	QP	34.8	17.6	10.6	32.0	31.0	46.0	15.0	
Hori	499.995	QP	39.5	18.2	11.2	32.1	36.8	46.0	9.2	
Hori	742.495	QP	40.6	21.2	12.6	31.9	42.5	46.0	3.5	
Hori	810.021	QP	31.7	22.2	12.9	31.5	35.3	46.0	10.7	
Hori	2483.500	PK	66.1	26.9	3.2	32.0	64.2	73.9	9.7	
Hori	2729.038	PK	58.6	27.1	3.4	31.8	57.3	73.9	16.6	
Hori	4924.000	PK	40.1	30.8	5.3	31.3	44.9	73.9	29.0	Floor Noise
Hori	7386.000	PK	41.6	35.9	6.5	32.1	51.9	73.9	22.0	Floor Noise
Hori	9848.000	PK	42.3	38.8	6.5	32.5	55.1	73.9	18.8	Floor Noise
Hori	2483.500	AV	52.1	26.9	3.2	32.0	50.2	53.9	3.7	
Hori	2729.038	AV	37.5	27.1	3.4	31.8	36.2	53.9	17.7	RBW: 1MHz / VBW: 10Hz
Hori	4924.000	AV	33.2	30.8	5.3	31.3	38.0	53.9	15.9	Floor Noise
Hori	7386.000	AV	34.1	35.9	6.5	32.1	44.4	53.9	9.5	Floor Noise
Hori	9848.000	AV	33.8	38.8	7.1	32.5	47.2	53.9	6.7	Floor Noise
Vert	42.770	QP	42.0	13.2	7.2	32.2	30.2	40.0	9.8	
Vert	73.980	QP	47.2	6.4	7.7	32.1	29.2	40.0	10.8	
Vert	101.620	QP	46.7	10.3	8.1	32.3	32.8	43.5	10.7	
Vert	148.500	QP	39.5	14.9	8.6	32.2	30.8	43.5	12.7	
Vert	405.004	QP	35.7	17.6	10.6	32.0	31.9	46.0	14.1	
Vert	499.997	QP	38.4	18.2	11.2	32.1	35.7	46.0	10.3	
Vert	664.660	QP	33.2	20.1	12.2	32.2	33.3	46.0	12.7	
Vert	742.498	QP	40.8	21.2	12.6	31.9	42.7	46.0	3.3	
Vert	810.018	QP	32.5	22.2	12.9	31.5	36.1	46.0	9.9	
Vert	2483.500	PK	66.7	26.9	3.2	32.0	64.8	73.9	9.1	
Vert	2728.775	PK	60.0	27.1	3.4	31.8	58.7	73.9	15.2	
Vert	4924.000	PK	40.1	30.8	5.3	31.3	44.9	73.9	29.0	Floor Noise
Vert	7386.000	PK	42.1	35.9	6.5	32.1	52.4	73.9	21.5	Floor Noise
Vert	9848.000	PK	42.1	38.8	7.1	32.5	55.5	73.9	18.4	Floor Noise
Vert	2483.500	AV	51.5	26.9	3.2	32.0	49.6	53.9	4.3	
Vert	2728.775	AV	37.6	27.1	3.4	31.8	36.3	53.9	17.6	RBW: 1MHz / VBW: 10Hz
Vert	4924.000	AV	33.8	30.8	5.3	31.3	38.6	53.9	15.3	Floor Noise
Vert	7386.000	AV	34.0	35.9	6.5	32.1	44.3	53.9	9.6	Floor Noise
Vert	9848.000	AV	34.9	38.8	7.1	32.5	48.3	53.9	5.6	Floor Noise

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

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

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

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/29/2015	04/01/2015	04/02/2015
Temperature/ Humidity	21deg. C / 38% RH	20deg. C / 55% RH	20deg. C / 41% RH
Engineer	Tomoki Matsui (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2402MHz		

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	70.012	QP	46.2	6.1	7.7	32.1	-	27.9	40.0	12.1	
Hori	132.042	QP	42.5	13.8	8.4	32.2	-	32.5	43.5	11.0	
Hori	148.503	QP	38.7	14.9	8.6	32.2	-	30.0	43.5	13.5	
Hori	178.750	QP	40.4	16.2	8.9	32.2	-	33.3	43.5	10.2	
Hori	283.568	QP	41.7	18.9	9.8	32.0	-	38.4	46.0	7.6	
Hori	300.035	QP	39.9	14.7	10.0	32.0	-	32.6	46.0	13.4	
Hori	405.010	QP	36.7	17.6	10.6	32.0	-	32.9	46.0	13.1	
Hori	445.512	QP	34.6	17.9	10.8	32.1	-	31.2	46.0	14.8	
Hori	500.002	QP	39.0	18.2	11.2	32.1	-	36.3	46.0	9.7	
Hori	742.472	QP	40.3	21.2	12.6	31.9	-	42.2	46.0	3.8	
Hori	810.020	QP	31.5	22.2	12.9	31.5	-	35.1	46.0	10.9	
Hori	2390.000	PK	55.7	26.8	3.2	32.0	-	53.7	73.9	20.2	
Hori	2728.922	PK	59.5	27.1	3.4	31.8	-	58.2	73.9	15.7	
Hori	4804.000	PK	40.9	30.6	5.2	31.3	-	45.4	73.9	28.5	Floor Noise
Hori	7206.000	PK	41.6	35.9	6.6	32.0	-	52.1	73.9	21.8	Floor Noise
Hori	9608.000	PK	42.1	38.4	7.0	32.4	-	55.1	73.9	18.8	Floor Noise
Hori	2390.000	AV	40.9	26.8	3.2	32.0	2.0	40.9	53.9	13.0	*1)
Hori	2728.922	AV	37.2	27.1	3.4	31.8	-	35.9	53.9	18.0	RBW: 1MHz / VBW: 10Hz
Hori	4804.000	AV	33.0	30.6	5.2	31.3	-	37.5	53.9	16.4	Floor Noise
Hori	7206.000	AV	34.3	35.9	6.6	32.0	-	44.8	53.9	9.1	Floor Noise
Hori	9608.000	AV	34.0	38.4	7.0	32.4	-	47.0	53.9	6.9	Floor Noise
Vert	46.610	QP	42.3	11.7	7.3	32.2	-	29.1	40.0	10.9	
Vert	73.480	QP	46.3	6.3	7.7	32.1	-	28.2	40.0	11.8	
Vert	101.764	QP	48.8	10.4	8.1	32.3	-	35.0	43.5	8.5	
Vert	148.495	QP	41.3	14.9	8.6	32.2	-	32.6	43.5	10.9	
Vert	405.016	QP	38.0	17.6	10.6	32.0	-	34.2	46.0	11.8	
Vert	499.998	QP	37.3	18.2	11.2	32.1	-	34.6	46.0	11.4	
Vert	664.725	QP	33.8	20.1	12.2	32.2	-	33.9	46.0	12.1	
Vert	742.503	QP	40.6	21.2	12.6	31.9	-	42.5	46.0	3.5	
Vert	810.022	QP	31.0	22.2	12.9	31.5	-	34.6	46.0	11.4	
Vert	2390.000	PK	62.5	26.8	3.2	32.0	-	60.5	73.9	13.4	
Vert	2728.955	PK	57.4	27.1	3.4	31.8	-	56.1	73.9	17.8	
Vert	4804.000	PK	40.6	30.6	5.2	31.3	-	45.1	73.9	28.8	Floor Noise
Vert	7206.000	PK	42.6	35.9	6.6	32.0	-	53.1	73.9	20.8	Floor Noise
Vert	9608.000	PK	42.1	38.4	7.0	32.4	-	55.1	73.9	18.8	Floor Noise
Vert	2390.000	AV	46.4	26.8	3.2	32.0	2.0	46.4	53.9	7.5	*1)
Vert	2728.955	AV	36.0	27.1	3.4	31.8	-	34.7	53.9	19.2	RBW: 1MHz / VBW: 10Hz
Vert	4804.000	AV	32.9	30.6	5.2	31.3	-	37.4	53.9	16.5	Floor Noise
Vert	7206.000	AV	34.5	35.9	6.6	32.0	-	45.0	53.9	8.9	Floor Noise
Vert	9608.000	AV	34.7	38.4	7.0	32.4	-	47.7	53.9	6.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)+Duty Factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
*1) Not Out of Band emission (Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	99.5	26.8	3.2	32.0	97.5	-	-	Carrier
Hori	2400.000	PK	55.0	26.8	3.2	32.0	53.0	77.5	24.5	
Vert	2402.000	PK	105.9	26.8	3.2	32.0	103.9	-	-	Carrier
Vert	2400.000	PK	61.5	26.8	3.2	32.0	59.5	83.9	24.4	

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

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/29/2015	04/01/2015	04/02/2015
Temperature/ Humidity	21deg. C / 38% RH	20deg. C / 55% RH	20deg. C / 41% RH
Engineer	Tomoki Matsui (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2440MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	69.994	QP	46.1	6.1	7.6	32.1	27.7	40.0	12.3	
Hori	132.048	QP	42.6	13.8	8.4	32.2	32.6	43.5	10.9	
Hori	148.502	QP	38.8	14.9	8.6	32.2	30.1	43.5	13.4	
Hori	283.560	QP	41.8	18.9	9.8	32.0	38.5	46.0	7.5	
Hori	300.010	QP	39.9	14.7	10.0	32.0	32.6	46.0	13.4	
Hori	405.023	QP	35.8	17.6	10.6	32.0	32.0	46.0	14.0	
Hori	445.523	QP	34.5	17.9	10.8	32.1	31.1	46.0	14.9	
Hori	499.988	QP	38.7	18.2	11.2	32.1	36.0	46.0	10.0	
Hori	742.520	QP	39.4	21.2	12.6	31.9	41.3	46.0	4.7	
Hori	810.016	QP	31.7	22.2	12.9	31.5	35.3	46.0	10.7	
Hori	2728.840	PK	58.8	27.1	3.4	31.8	57.5	73.9	16.4	
Hori	4880.000	PK	40.2	30.8	5.3	31.3	45.0	73.9	28.9	Floor Noise
Hori	7320.000	PK	41.9	35.9	6.5	32.0	52.3	73.9	21.6	Floor Noise
Hori	9760.000	PK	42.1	38.7	7.1	32.5	55.4	73.9	18.5	Floor Noise
Hori	2728.840	AV	37.4	27.1	3.4	31.8	36.1	53.9	17.8	RBW: 1MHz / VBW: 10Hz
Hori	4880.000	AV	32.3	30.8	5.3	31.3	37.1	53.9	16.8	Floor Noise
Hori	7320.000	AV	34.7	35.9	6.5	32.0	45.1	53.9	8.8	Floor Noise
Hori	9760.000	AV	34.6	38.7	7.1	32.5	47.9	53.9	6.0	Floor Noise
Vert	43.190	QP	40.7	13.0	7.2	32.2	28.7	40.0	11.3	
Vert	73.380	QP	46.0	6.3	7.7	32.1	27.9	40.0	12.1	
Vert	101.756	QP	48.5	10.4	8.1	32.3	34.7	43.5	8.8	
Vert	148.501	QP	41.1	14.9	8.6	32.2	32.4	43.5	11.1	
Vert	405.010	QP	38.3	17.6	10.6	32.0	34.5	46.0	11.5	
Vert	499.992	QP	37.6	18.2	11.2	32.1	34.9	46.0	11.1	
Vert	664.647	QP	34.8	20.1	12.2	32.2	34.9	46.0	11.1	
Vert	742.496	QP	40.3	21.2	12.6	31.9	42.2	46.0	3.8	
Vert	810.018	QP	30.7	22.2	12.9	31.5	34.3	46.0	11.7	
Vert	2728.955	PK	59.4	27.1	3.4	31.8	58.1	73.9	15.8	
Vert	4880.000	PK	40.6	30.8	5.3	31.3	45.4	73.9	28.5	Floor Noise
Vert	7320.000	PK	42.2	35.9	6.5	32.0	52.6	73.9	21.3	Floor Noise
Vert	9760.000	PK	41.6	38.7	7.1	32.5	54.9	73.9	19.0	Floor Noise
Vert	2728.955	AV	36.8	27.1	3.4	31.8	35.5	53.9	18.4	RBW: 1MHz / VBW: 10Hz
Vert	4880.000	AV	32.4	30.8	5.3	31.3	37.2	53.9	16.7	Floor Noise
Vert	7320.000	AV	34.6	35.9	6.5	32.0	45.0	53.9	8.9	Floor Noise
Vert	9760.000	AV	34.2	38.7	7.1	32.5	47.5	53.9	6.4	Floor Noise

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

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

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

Radiated Spurious Emission
(Power Supply: DELTA)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10724035H		
Date	03/29/2015	04/01/2015	04/02/2015
Temperature/ Humidity	21deg. C / 38% RH	20deg. C / 55% RH	20deg. C / 41% RH
Engineer	Tomoki Matsui (below 1GHz)	Yuta Moriya (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	BLE Tx 2480MHz		

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	69.996	QP	46.5	6.1	7.6	32.1	-	28.1	40.0	11.9	
Hori	132.014	QP	42.4	13.8	8.4	32.2	-	32.4	43.5	11.1	
Hori	148.500	QP	38.4	14.9	8.6	32.2	-	29.7	43.5	13.8	
Hori	178.746	QP	43.5	16.2	8.9	32.2	-	36.4	43.5	7.1	
Hori	283.548	QP	41.6	18.9	9.8	32.0	-	38.3	46.0	7.7	
Hori	300.012	QP	39.8	14.7	10.0	32.0	-	32.5	46.0	13.5	
Hori	405.012	QP	36.3	17.6	10.6	32.0	-	32.5	46.0	13.5	
Hori	445.515	QP	34.7	17.9	10.8	32.1	-	31.3	46.0	14.7	
Hori	500.004	QP	38.5	18.2	11.2	32.1	-	35.8	46.0	10.2	
Hori	742.495	QP	40.0	21.2	12.6	31.9	-	41.9	46.0	4.1	
Hori	810.014	QP	31.9	22.2	12.9	31.5	-	35.5	46.0	10.5	
Hori	2483.500	PK	64.9	26.9	3.2	32.0	-	63.0	73.9	10.9	
Hori	2728.840	PK	59.1	27.1	3.4	31.8	-	57.8	73.9	16.1	
Hori	4960.000	PK	40.7	30.9	5.2	31.2	-	45.6	73.9	28.3	Floor Noise
Hori	7440.000	PK	42.3	35.9	6.6	32.1	-	52.7	73.9	21.2	Floor Noise
Hori	9920.000	PK	41.8	38.9	7.1	32.5	-	55.3	73.9	18.6	Floor Noise
Hori	2483.500	AV	50.9	26.9	3.2	32.0	2.0	51.0	53.9	2.9	*1)
Hori	2728.840	AV	38.6	27.1	3.4	31.8	-	37.3	53.9	16.6	RBW: 1MHz / VBW: 10Hz
Hori	4960.000	AV	32.6	30.9	5.2	31.2	-	37.5	53.9	16.4	Floor Noise
Hori	7440.000	AV	35.0	35.9	6.6	32.1	-	45.4	53.9	8.5	Floor Noise
Hori	9920.000	AV	34.5	38.9	7.1	32.5	-	48.0	53.9	5.9	Floor Noise
Vert	42.730	QP	41.0	13.2	7.2	32.2	-	29.2	40.0	10.8	
Vert	73.924	QP	46.2	6.4	7.7	32.1	-	28.2	40.0	11.8	
Vert	101.610	QP	49.2	10.3	8.1	32.3	-	35.3	43.5	8.2	
Vert	148.501	QP	40.4	14.9	8.6	32.2	-	31.7	43.5	11.8	
Vert	405.014	QP	38.2	17.6	10.6	32.0	-	34.4	46.0	11.6	
Vert	499.992	QP	36.9	18.2	11.2	32.1	-	34.2	46.0	11.8	
Vert	665.120	QP	36.4	20.1	12.2	32.2	-	36.5	46.0	9.5	
Vert	742.499	QP	40.9	21.2	12.6	31.9	-	42.8	46.0	3.2	
Vert	810.018	QP	31.3	22.2	12.9	31.5	-	34.9	46.0	11.1	
Vert	2483.500	PK	70.0	26.9	3.2	32.0	-	68.1	73.9	5.8	
Vert	2728.955	PK	55.6	27.1	3.4	31.8	-	54.3	73.9	19.6	
Vert	4960.000	PK	40.4	30.9	5.2	31.2	-	45.3	73.9	28.6	Floor Noise
Vert	7440.000	PK	42.8	35.9	6.6	32.1	-	53.2	73.9	20.7	Floor Noise
Vert	9920.000	PK	41.8	38.9	7.1	32.5	-	55.3	73.9	18.6	Floor Noise
Vert	2483.500	AV	52.7	26.9	3.2	32.0	2.0	52.8	53.9	1.1	*1)
Vert	2728.955	AV	35.3	27.1	3.4	31.8	-	34.0	53.9	19.9	RBW: 1MHz / VBW: 10Hz
Vert	4960.000	AV	32.4	30.9	4.4	31.2	-	36.5	53.9	17.4	Floor Noise
Vert	7440.000	AV	35.7	35.9	6.6	32.1	-	46.1	53.9	7.8	Floor Noise
Vert	9920.000	AV	34.0	38.9	7.1	32.5	-	47.5	53.9	6.4	Floor Noise

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

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

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

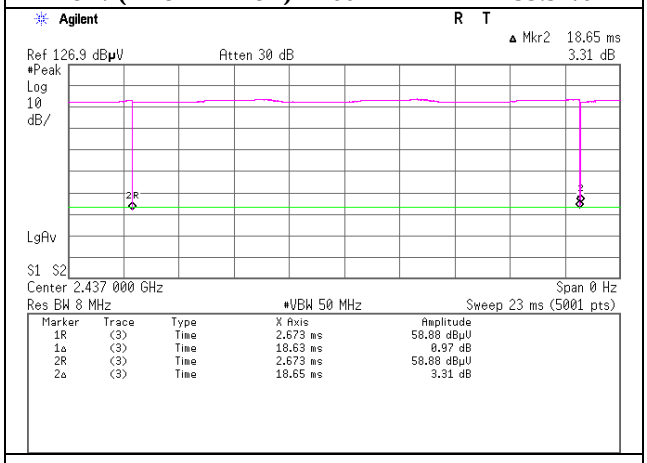
*1) Not Out of Band emission (Leakage Power)

Burst rate confirmation

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya
Mode	11b ,11g Tx

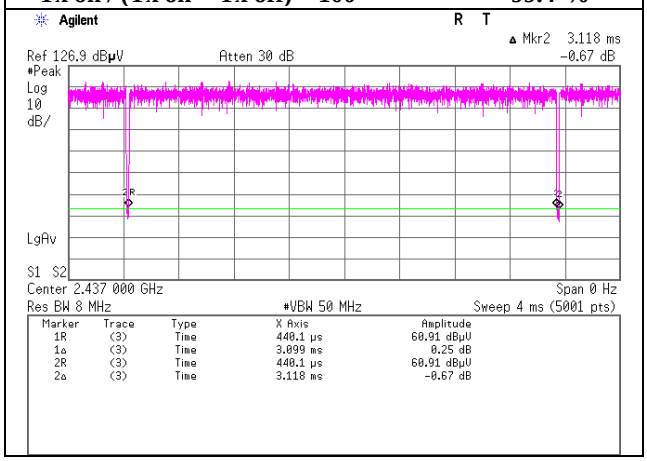
11b 1Mbps

Tx on / (Tx on + Tx off) = 0.999
Tx on / (Tx on + Tx off) * 100 = 99.9 %



11g 6Mbps

Tx on / (Tx on + Tx off) = 0.994
Tx on / (Tx on + Tx off) * 100 = 99.4 %

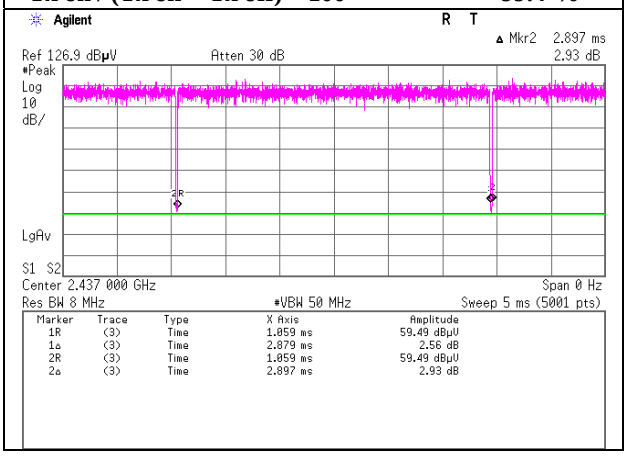


Burst rate confirmation

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10724035H
Date	04/01/2015
Temperature/ Humidity	20deg. C / 55% RH
Engineer	Yuta Moriya
Mode	11n-20 Tx

11n-20 MCS0

Tx on / (Tx on + Tx off) = 0.994
Tx on / (Tx on + Tx off) * 100 = 99.4 %

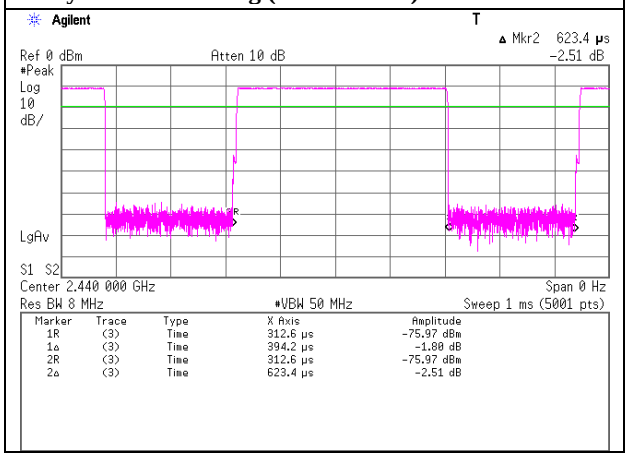


Burst rate confirmation and Dwell time factor

BT LE

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

Tx on / (Tx on + Tx off) = 0.632
Tx on / (Tx on + Tx off) * 100 = 63.2 %
Duty factor = 10 * log (623.4 / 394.2) = 1.99 dB

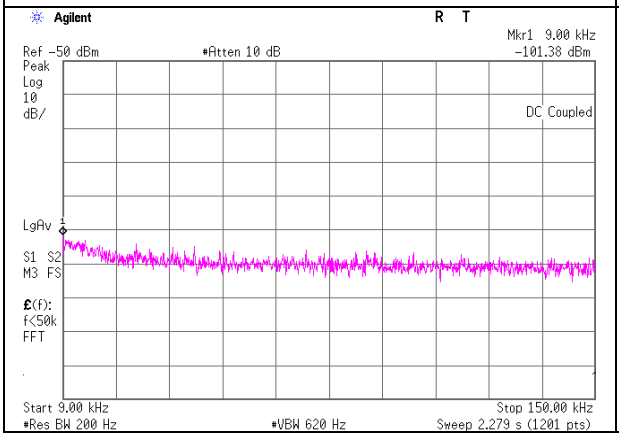


Conducted Spurious Emission

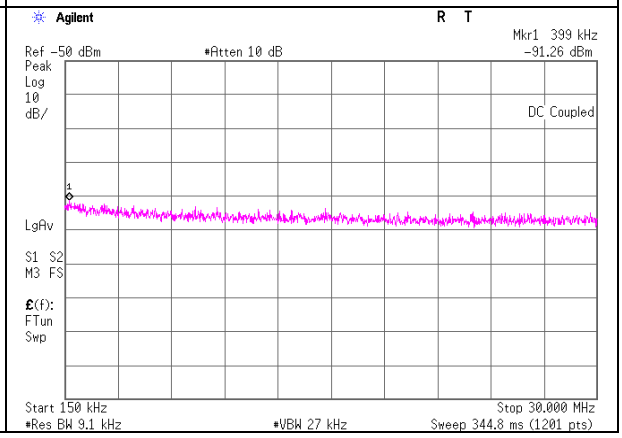
Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11n-20 Tx

11n-20 Tx 2462MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-101.4	0.80	10.1	4.0	2	-83.5	300	6.0	-22.2	48.5	70.7	
399.00	-91.3	0.80	10.1	4.0	2	-73.3	300	6.0	-12.1	15.5	27.6	

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

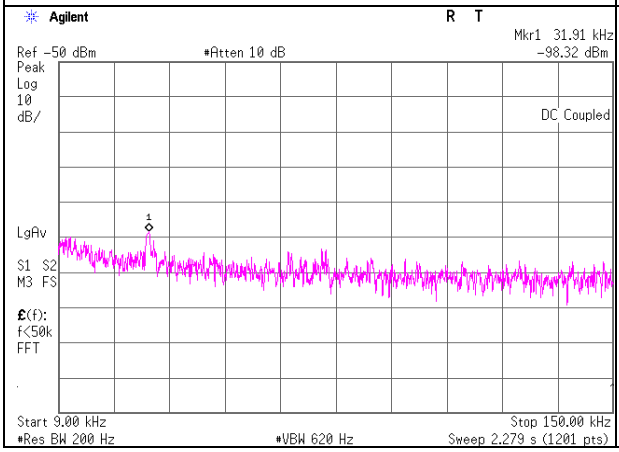
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

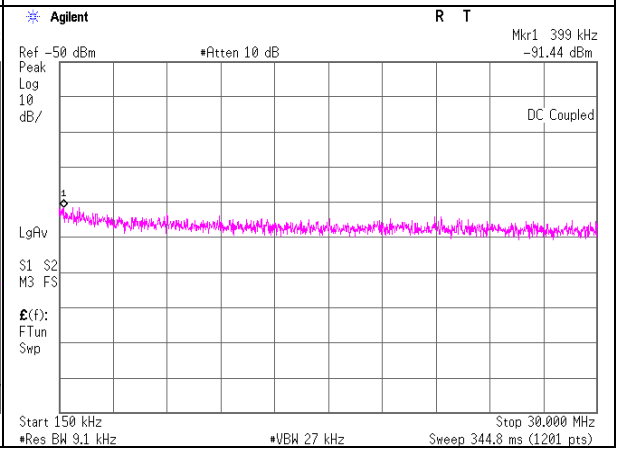
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

BT LE Tx 2402MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
31.91	-98.3	0.80	10.0	5.6	-81.9	300.0	6.0	-20.6	37.5
399	-91.4	0.80	10.0	5.6	-75.0	300.0	6.0	-13.8	15.6

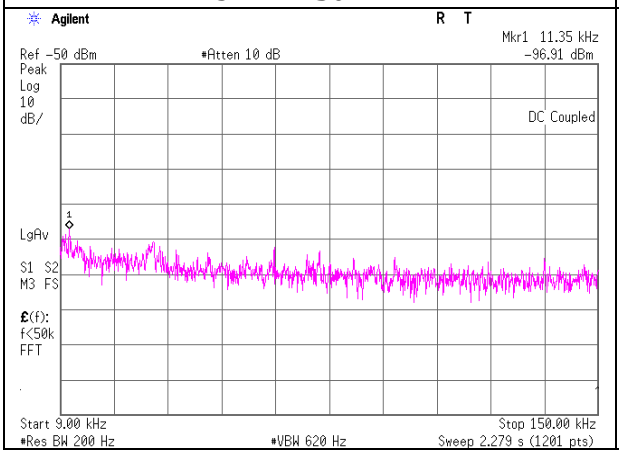
E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]
EIRP=Reading+Cable Loss+Attenator+Antenna Gain

Conducted Spurious Emission

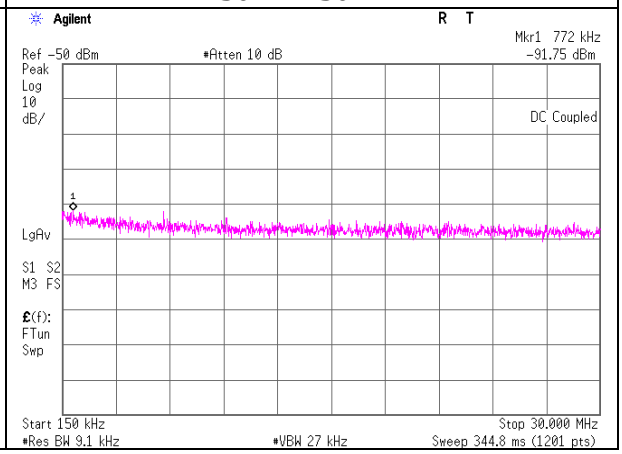
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

BT LE Tx 2440MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
11.35	-96.9	0.80	10.0	5.6	-80.5	300.0	6.0	-19.2	46.5
772	-91.8	0.80	10.0	5.6	-75.3	30.0	6.0	5.9	9.9

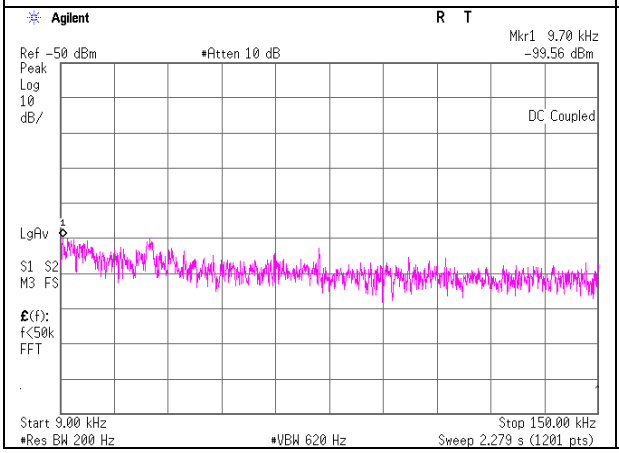
E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]
EIRP=Reading+Cable Loss+Attenator+Antenna Gain

Conducted Spurious Emission

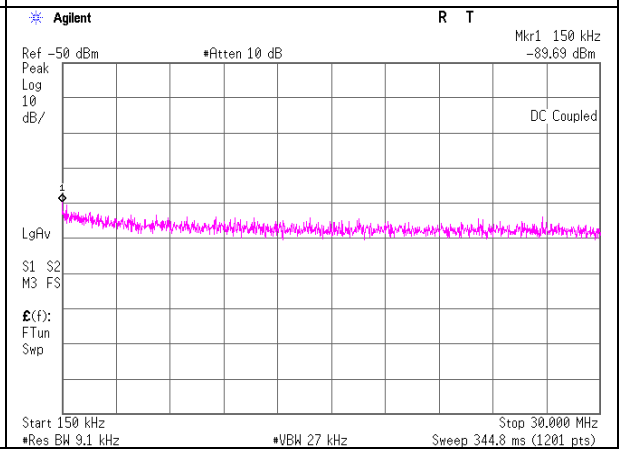
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

BT LE Tx 2480MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
9.70	-99.6	0.80	10.0	5.6	-83.1	300.0	6.0	-21.9	47.9
150	-89.7	0.80	10.0	5.6	-73.3	300.0	6.0	-12.0	44.1

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]
EIRP=Reading+Cable Loss+Attenator+Antenna Gain

Power Density

Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11b Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	0.04	0.04	-11.23	0.08	8.00	19.23
2437.00	0.03	0.05	-11.04	0.08	8.00	19.04
2462.00	0.03	0.05	-10.97	0.08	8.00	18.97

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-26.28	1.66	10.11	-14.51	0.04	8.00	22.51
2437.00	-26.56	1.67	10.11	-14.78	0.03	8.00	22.78
2462.00	-26.42	1.67	10.11	-14.64	0.03	8.00	22.64

Antenna B

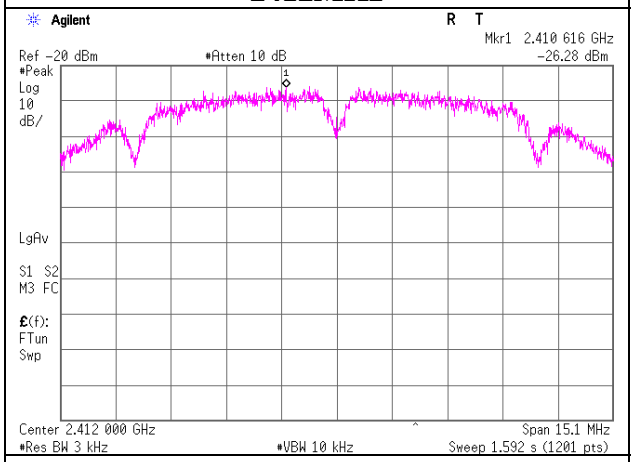
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-25.75	1.66	10.11	-13.98	0.04	8.00	21.98
2437.00	-25.21	1.67	10.11	-13.43	0.05	8.00	21.43
2462.00	-25.19	1.67	10.11	-13.41	0.05	8.00	21.41

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

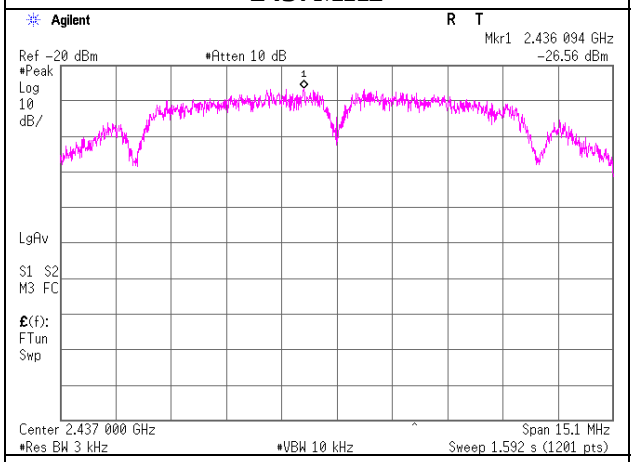
Power Density

11b Antenna A

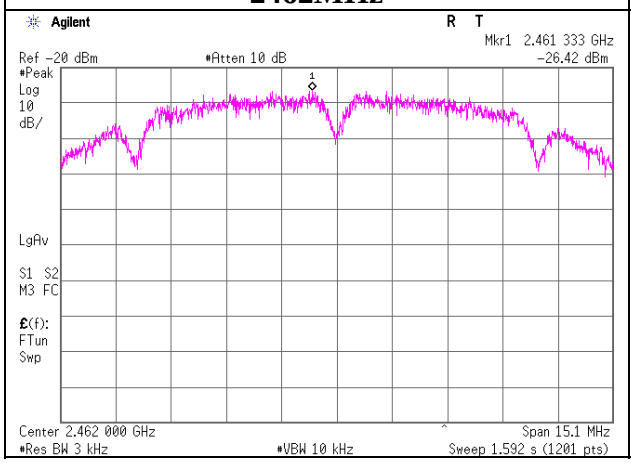
2412MHz



2437MHz

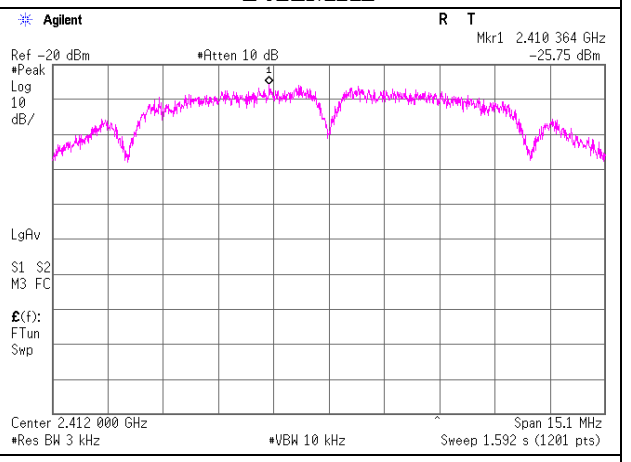


2462MHz

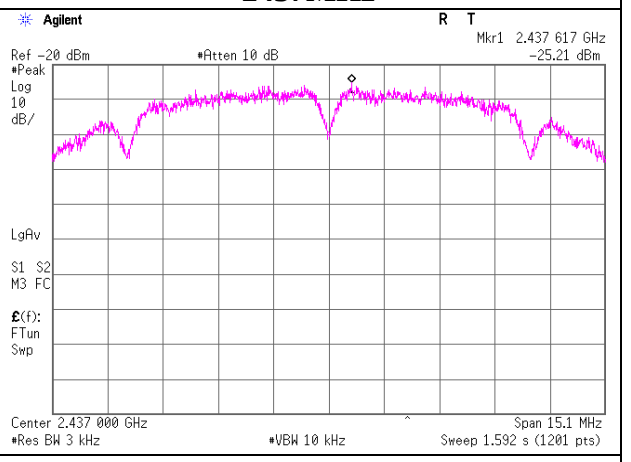


11b Antenna B

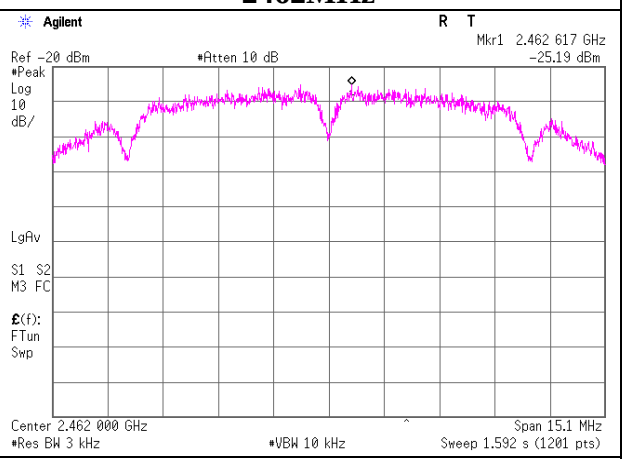
2412MHz



2437MHz



2462MHz



Power Density

Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11g Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	0.02	0.02	-13.57	0.04	8.00	21.57
2437.00	0.02	0.02	-13.38	0.05	8.00	21.38
2462.00	0.02	0.02	-13.89	0.04	8.00	21.89

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-28.21	1.66	10.11	-16.44	0.02	8.00	24.44
2437.00	-27.94	1.67	10.11	-16.16	0.02	8.00	24.16
2462.00	-29.45	1.67	10.11	-17.67	0.02	8.00	25.67

Antenna B

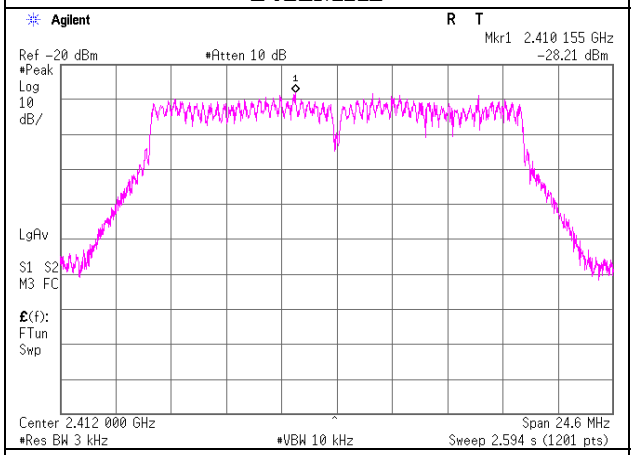
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-28.50	1.66	10.11	-16.73	0.02	8.00	24.73
2437.00	-28.41	1.67	10.11	-16.63	0.02	8.00	24.63
2462.00	-28.02	1.67	10.11	-16.24	0.02	8.00	24.24

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

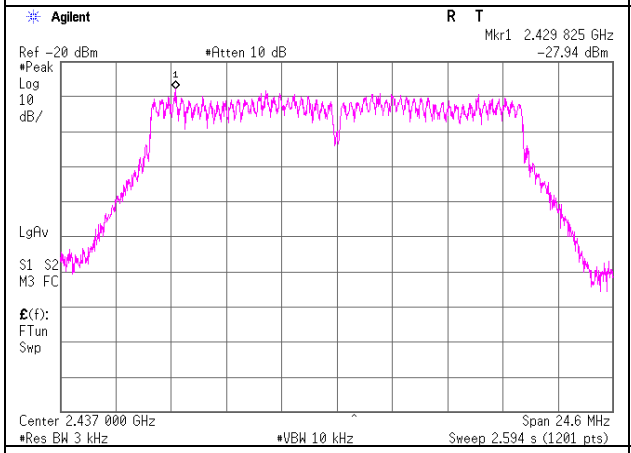
Power Density

11g Antenna A

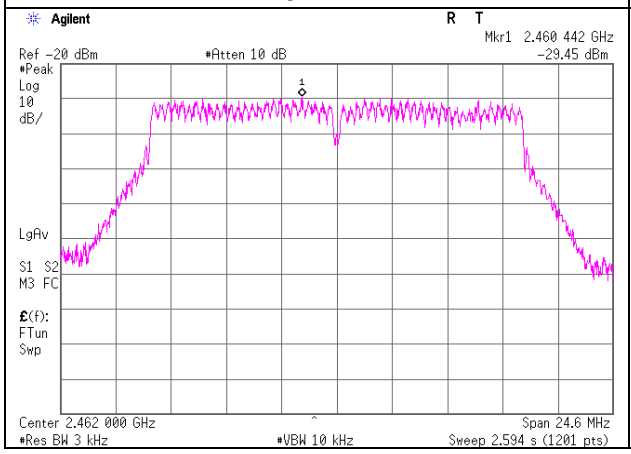
2412MHz



2437MHz

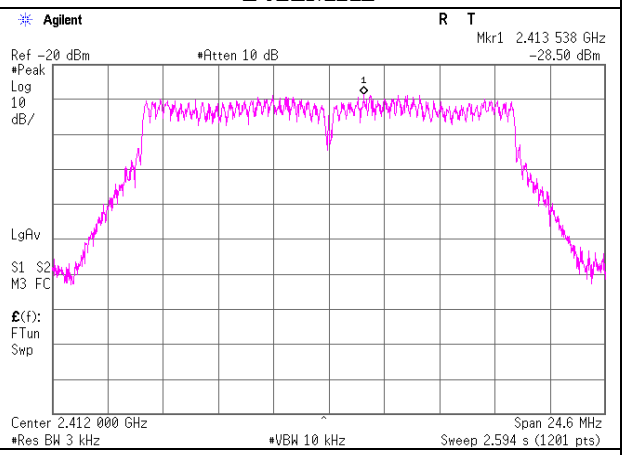


2462MHz

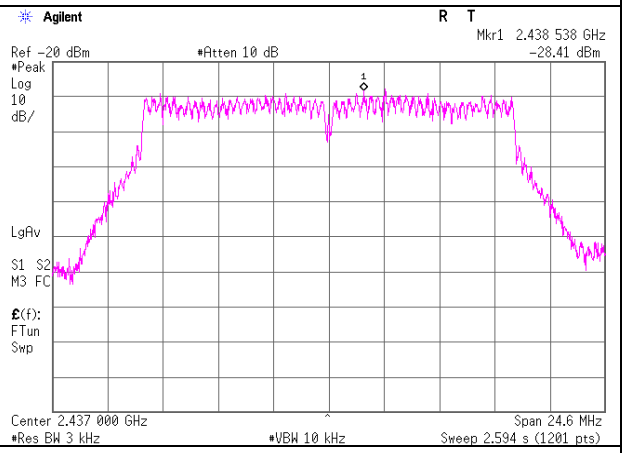


11g Antenna B

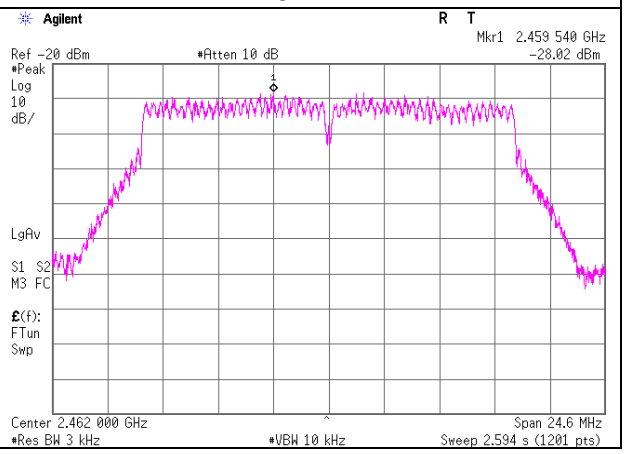
2412MHz



2437MHz



2462MHz



Power Density

Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11n-20 Tx

Antenna A + B

Freq. [MHz]	Antenna A Result [mW]	Antenna B Result [mW]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	0.02	0.02	-13.49	0.04	8.00	21.49
2437.00	0.03	0.03	-12.55	0.06	8.00	20.55
2462.00	0.02	0.03	-13.43	0.05	8.00	21.43

Sample Calculation:
Result = Antenna A + B

Antenna A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-28.14	1.66	10.11	-16.37	0.02	8.00	24.37
2437.00	-27.49	1.67	10.11	-15.71	0.03	8.00	23.71
2462.00	-28.73	1.67	10.11	-16.95	0.02	8.00	24.95

Antenna B

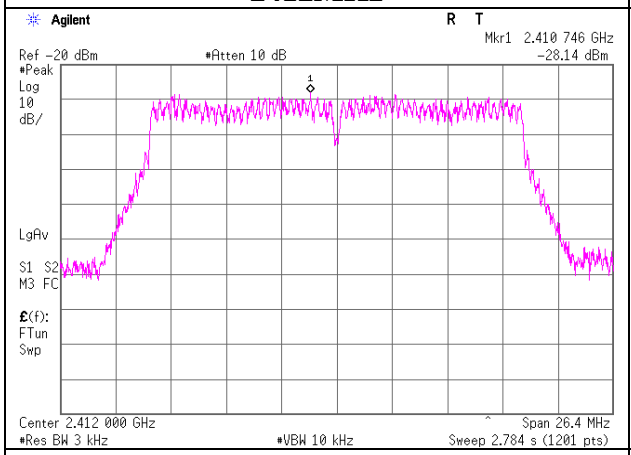
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-28.40	1.66	10.11	-16.63	0.02	8.00	24.63
2437.00	-27.20	1.67	10.11	-15.42	0.03	8.00	23.42
2462.00	-27.77	1.67	10.11	-15.99	0.03	8.00	23.99

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

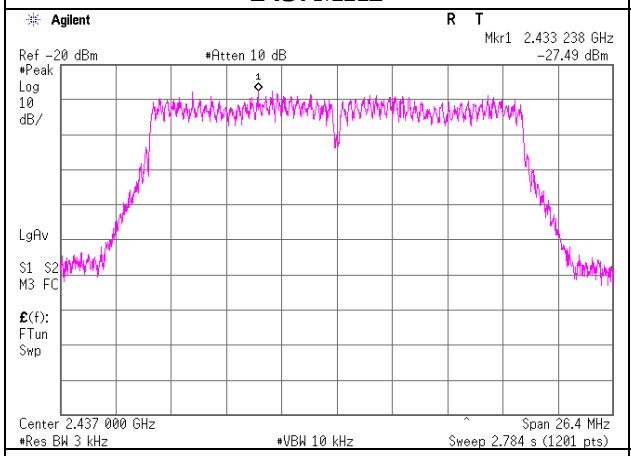
Power Density

11n-20 Antenna A

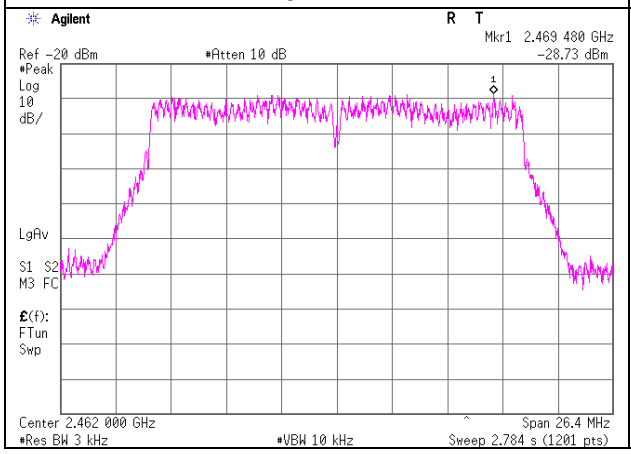
2412MHz



2437MHz

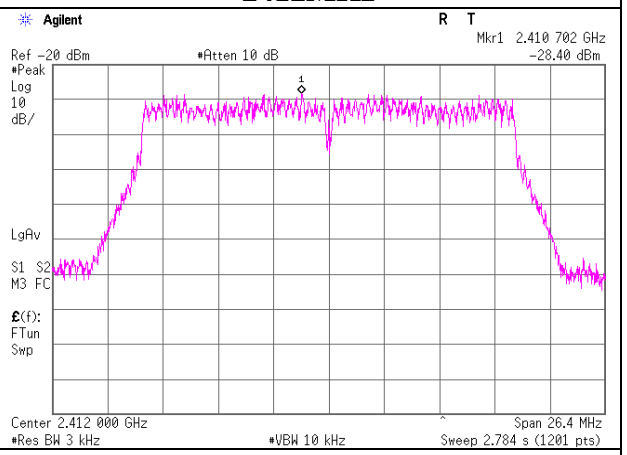


2462MHz

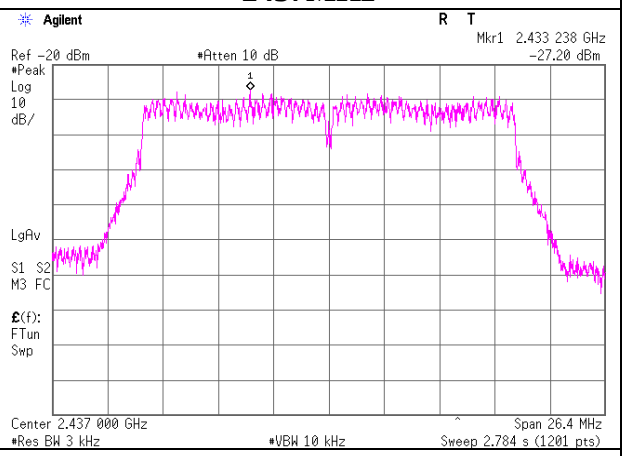


11n-20 Antenna B

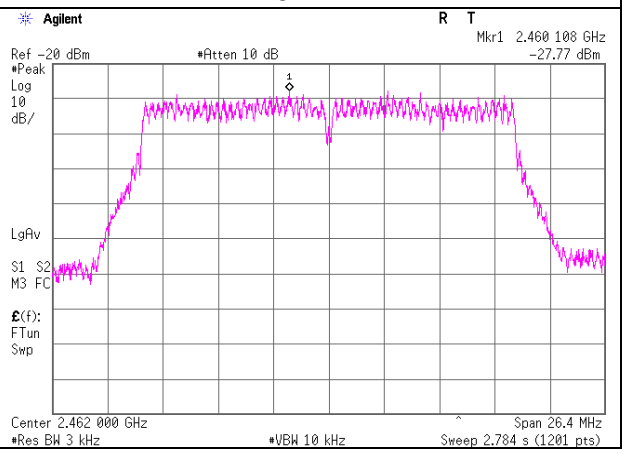
2412MHz



2437MHz



2462MHz



Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

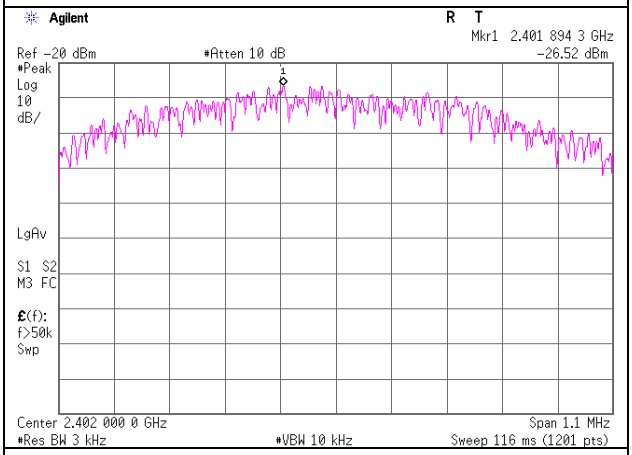
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2402	-26.52	2.07	10.02	-14.43	0.04	8.00	22.43
2440	-26.60	2.08	10.02	-14.50	0.04	8.00	22.50
2480	-26.74	2.09	10.02	-14.63	0.03	8.00	22.63

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

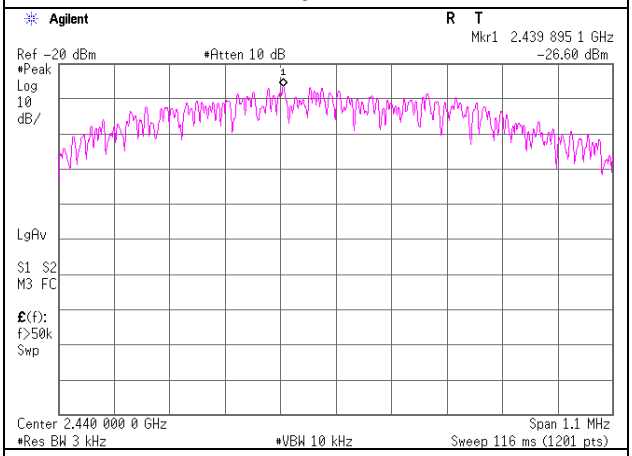
Power Density

BT LE

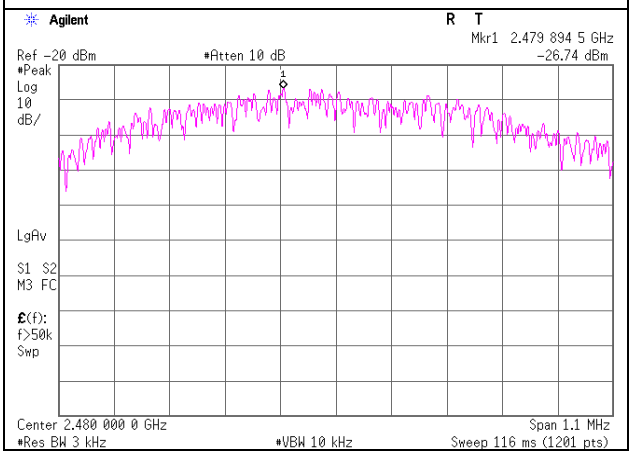
2402MHz



2440MHz



2480MHz

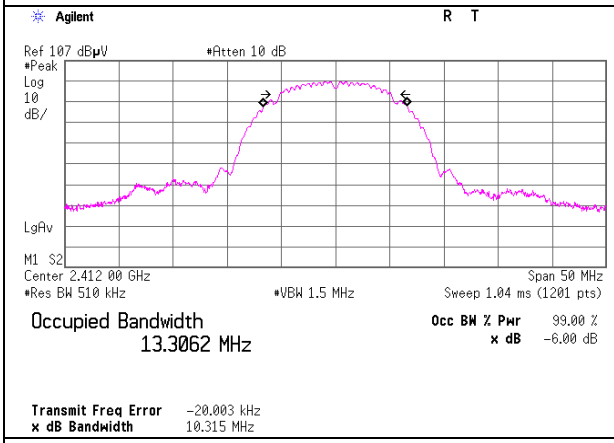


99% Occupied Bandwidth

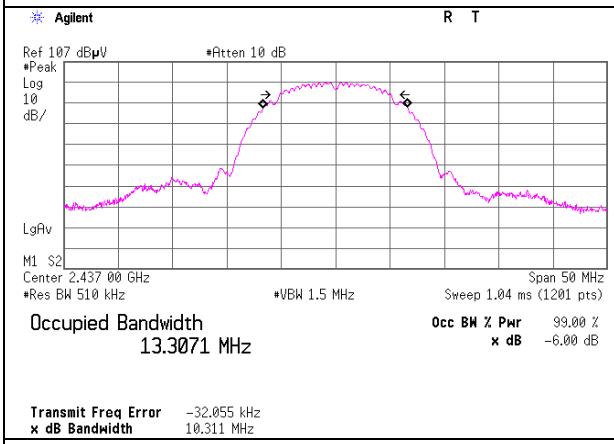
Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11b Tx

11b Antenna A

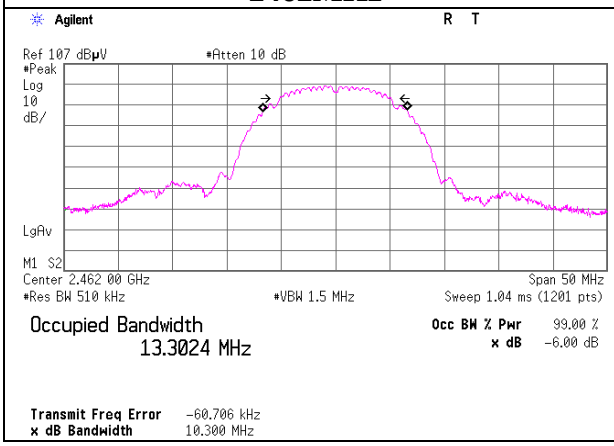
2412MHz



2437MHz

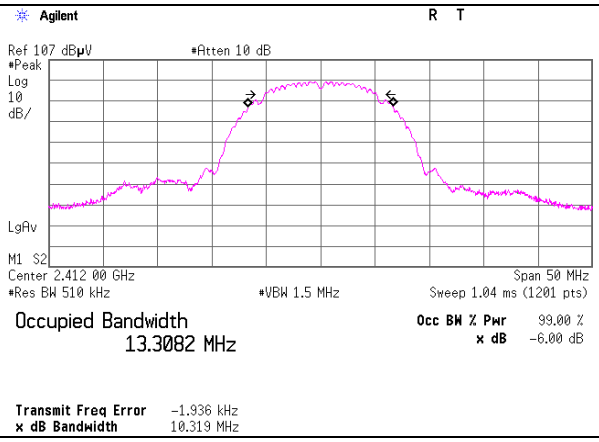


2462MHz

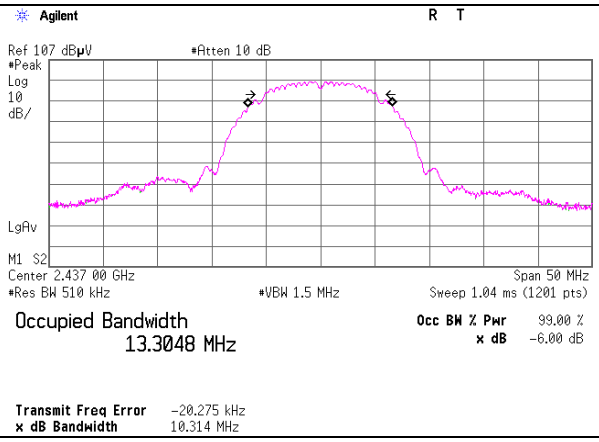


11b Antenna B

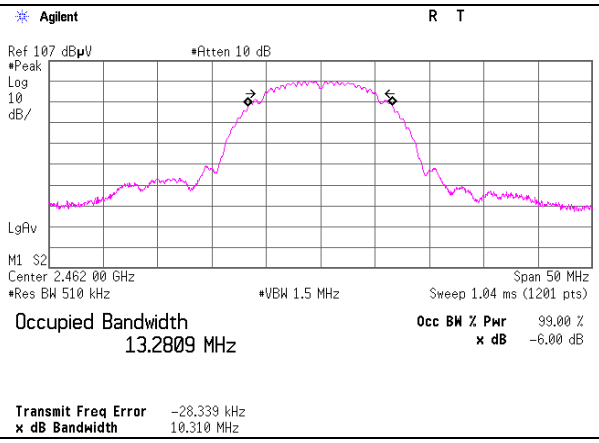
2412MHz



2437MHz



2462MHz

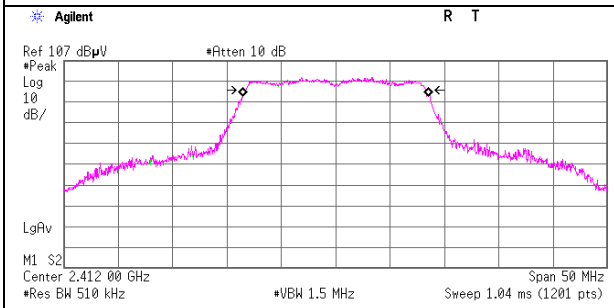


99% Occupied Bandwidth

Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11g Tx

11g Antenna A

2412MHz

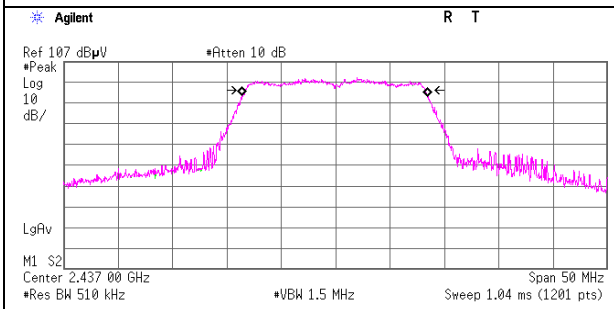


Occupied Bandwidth
17.0521 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -7.926 kHz
x dB Bandwidth 16.504 MHz

2437MHz

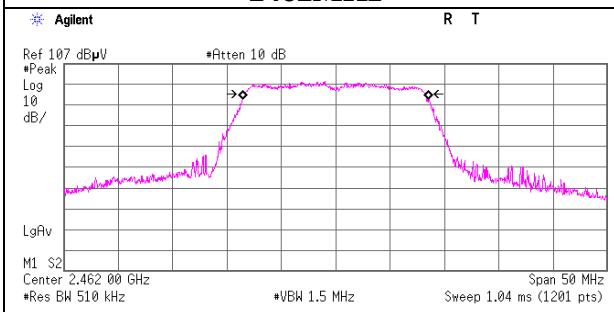


Occupied Bandwidth
17.0481 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -45.971 kHz
x dB Bandwidth 16.545 MHz

2462MHz



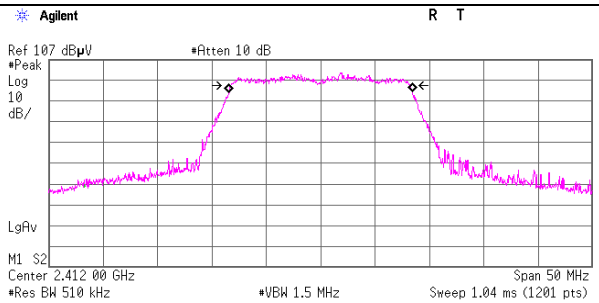
Occupied Bandwidth
17.0266 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -15.539 kHz
x dB Bandwidth 16.458 MHz

11g Antenna B

2412MHz

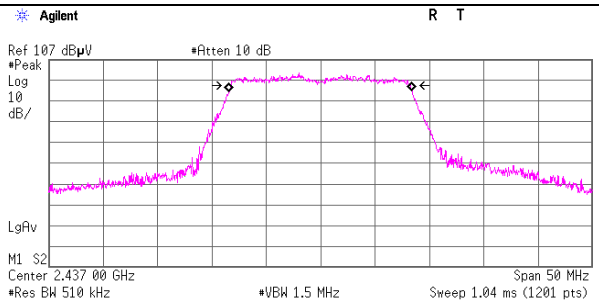


Occupied Bandwidth
16.8349 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -10.979 kHz
x dB Bandwidth 16.457 MHz

2437MHz

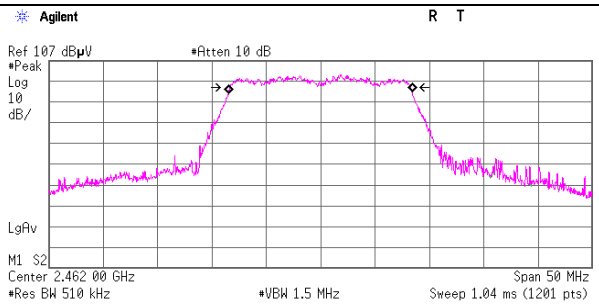


Occupied Bandwidth
16.8452 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -28.192 kHz
x dB Bandwidth 16.482 MHz

2462MHz



Occupied Bandwidth
16.8481 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

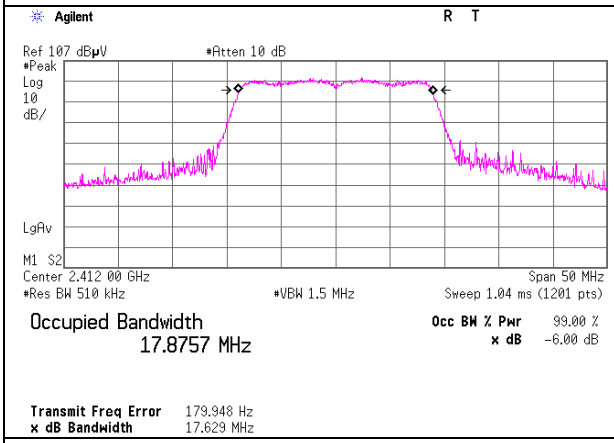
Transmit Freq Error -23.651 kHz
x dB Bandwidth 16.613 MHz

99% Occupied Bandwidth

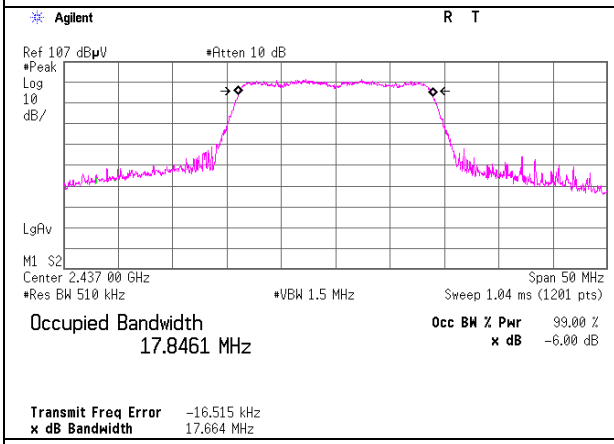
Test place	Ise EMC Lab. No.3 Preparation Room
Report No.	10724035H
Date	03/18/2015
Temperature/ Humidity	26deg. C / 45% RH
Engineer	Yuta Moriya
Mode	11n-20 Tx

11n-20 Antenna A

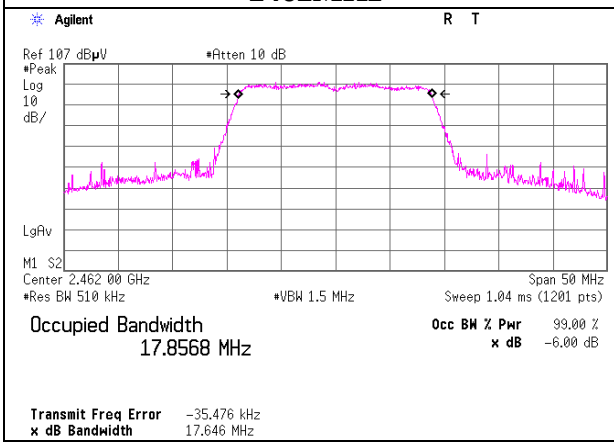
2412MHz



2437MHz

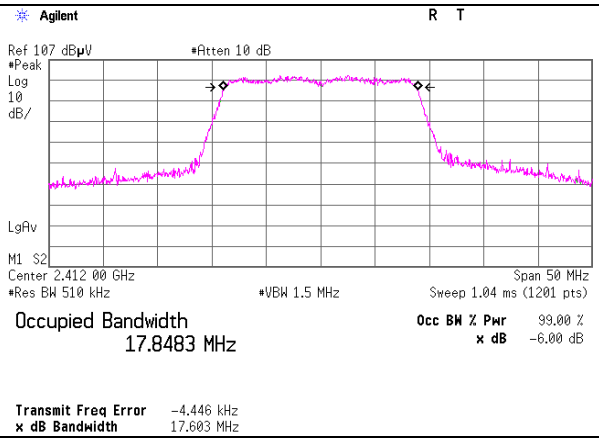


2462MHz

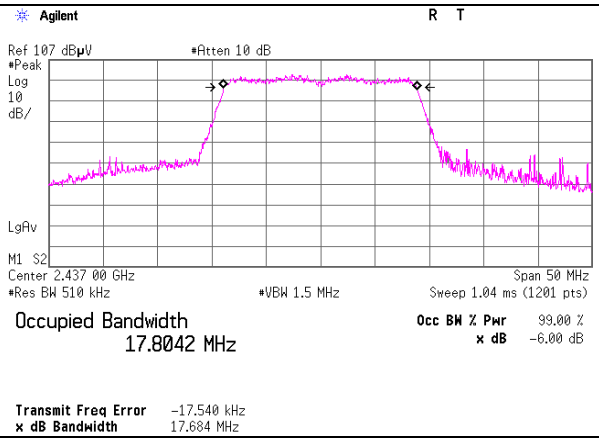


11n-20 Antenna B

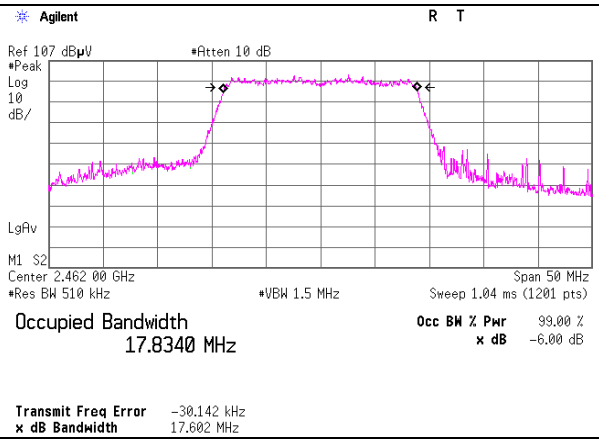
2412MHz



2437MHz



2462MHz

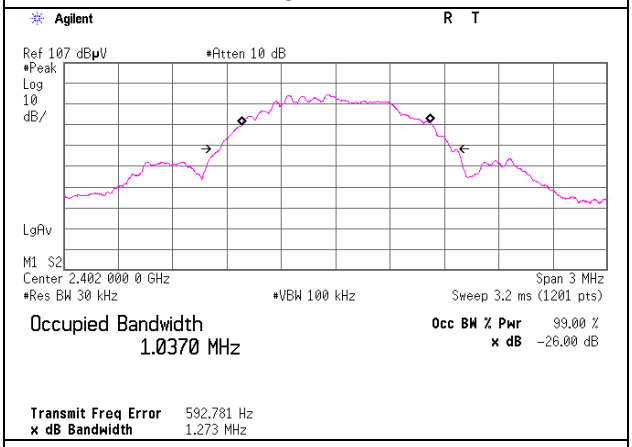


99%Occupied Bandwidth

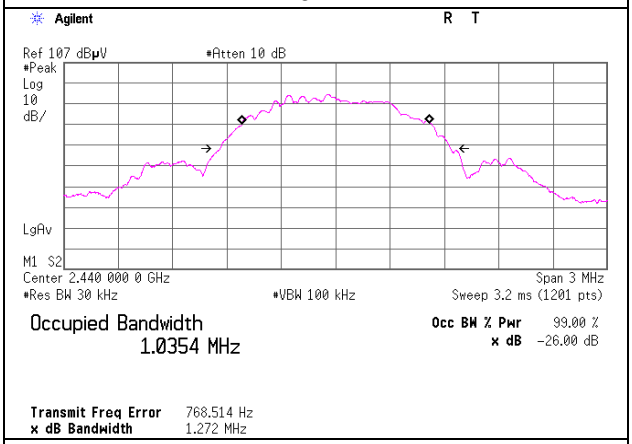
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10724035H
Date	03/23/2015
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Ken Fujita
Mode	BT LE

BT LE

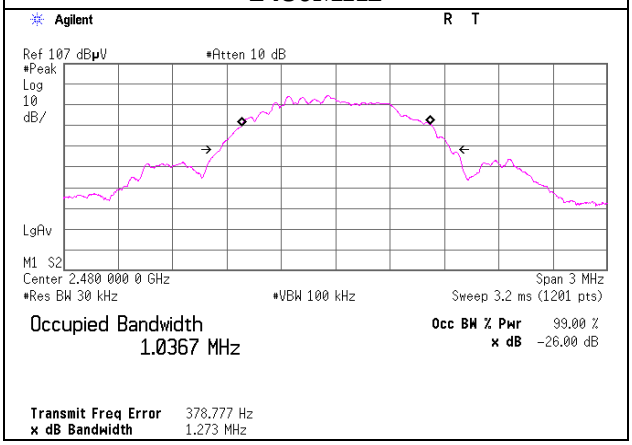
2402MHz



2440MHz



2480MHz



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2015/02/19 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE/CE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2014/04/08 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2014/05/26 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2014/05/26 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2015/03/19 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2014/09/22 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2014/05/26 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2014/08/19 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2014/10/18 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2014/10/18 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2014/07/14 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2014/04/14 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2015/03/10 * 12
MTW-03	Torque wrench	HUBER+SUHNER	74 Z-0-0-21	98142	RE	2015/01/16 * 36
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2014/07/10 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(AE)	2014/07/10 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2015/01/19 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2014/07/14 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2015/01/13 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2014/11/11 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2014/11/11 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2015/01/08 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2014/10/06 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2014/10/06 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2014/10/17 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2014/08/08 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/13 * 12
MOS-12	Thermo-Hygrometer	Custom	CTH-180	1201	AT	2015/01/13 * 12

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

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

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