RADIO TEST REPORT

Test Report No. : 10689818H-A-R2

Applicant	:	**Murata Manufacturing Company, Ltd.**
Type of Equipment	:	**Communication Module**
Model No.	:	**LBEE5ZZ1EN**
FCC ID	:	**VPYLB1EN**
Test regulation	:	**FCC Part 15 Subpart C: 2015** ***WLAN, Bluetooth (Low Energy) 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.
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6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 10689818H-A-R1. 10689818H-A-R1 is replaced with this report.

Date of test: January 29 to June 3, 2015

Representative test engineer:
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NVLAP LAB CODE: 200572-0

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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

REVISION HISTORY

Original Test Report No.: 10689818H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10689818H-A	June 17, 2015	-	-
1	10689818H-A-R1	June 22, 2015	P.10	Addition of explanatory note for tested antenna
2	10689818H-A-R2	June 26, 2015	P.10	Correction of explanatory note for tested antenna

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SECTION 1: Customer information

Company Name	:	Murata Manufacturing Company, Ltd.
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Facsimile Number	:	+81-75-955-6634
Contact Person	:	Motoo Hayashi

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

2.1 Identification of E.U.T.

Type of Equipment	:	Communication Module
Model No.	:	LBEE5ZZ1EN
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	Typ. 3.3V, Min.3.0V, Max.3.6V
Receipt Date of Sample	:	January 19, 2015
Country of Mass-production	:	Japan
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system	:	40 MHz (Crystal)
Operating temperature	:	-30 deg. C to +85 deg. C

Radio Specification

Radio Type : Transceiver
Power Supply (inner) : DC 3.3V

Specification of Wireless LAN (IEEE802.11b/g/a/n-20/n-40/11ac-20/11ac-40/11ac-80)

Type of radio	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation	2412-2462MHz *	2412-2462MHz *	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5190-5230MHz 5270-5310MHz 5510-5670MHz 5755-5795MHz	5210MHz 5290MHz 5530-5610MHz 5775MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5MHz		20MHz	40MHz	80MHz
Antenna type	Antenna 1: Dipole Antenna Antenna 2: Dipole Antenna				
Antenna Gain	2.4GHz: 3.5 dBi 5GHz: 5.0 dBi				

Specification of Bluetooth (BR/EDR) / Bluetooth (Low Energy: LE)*

	Bluetooth Ver.4.1 with EDR function
Frequency of operation	2402-2480MHz
Type of modulation	BT: FHSS (GFSK, π/4-DQPSK, 8-DPSK) LE: GFSK
Channel spacing	BT: 1MHz LE: 2MHz
Antenna type	Antenna 2: Dipole Antenna *1)
Antenna Gain	3.5 dBi

*1) The EUT can use only Antenna 2 for Bluetooth part.

* This test report applies to Wireless LAN (2.4GHz Band) 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

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** 28.7 dB, 0.15697 MHz, N **AV** 33.3 dB, 0.36445 MHz, L	Complied	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(1)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	**IC:** RSS-247 5.4(4)			
Power Density	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(e)		Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(2)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section15.247(d)	0.1 dB 2483.500 MHz, Horizontal, AV	Complied	Conducted (below 30MHz)/ Radiated (above 30MHz) *1)
	IC: RSS-Gen 6.13	**IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r03 12.2.7.

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

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

The EUT has a unique antenna connector (U.FL on the Module and Reverse SMA for Antenna itself). Therefore the equipment complies with the requirement of Section 15.203/212.

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	3.6dB
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	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

*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

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	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 Data of EMI, 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 20MHz BW (11n-20) (2.4GHz)	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.	
*Power of the EUT was set by the software as follows; Power Setting: Refer to the following table. Software: WLAN / BT Labtool ver.2.0.0.38 *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.	

[Power Settings for WLAN]

Mode	ch1	ch2	ch3	ch4	ch5	ch6	ch7	ch8	ch9	ch10	ch11
11b	17dBm	17dBm	17dBm	17dBm	17dBm	17dBm	17dBm	17dBm	17dBm	17dBm	15dBm
11g	12dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	13dBm	13dBm
11n-20 (SISO)	12dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	14dBm	13dBm	12dBm
11n-20 (MIMO)	9dBm	11dBm	11dBm	11dBm	11dBm	11dBm	11dBm	11dBm	11dBm	10dBm	9dBm

[Power Settings for BT LE]

Mode	ch0
BT LE	7dBm

*Details of Operating mode for WLAN

Test Item	Operating Mode	Tested Antenna *2)	Tested frequency
Conducted Emission, Conducted Spurious Emission, Radiated Spurious Emission (Below 1GHz)	11g Tx *1)	Antenna 1	2437MHz *1)
Radiated Spurious Emission (Above 1GHz)	11b Tx 11g Tx 11n-20 Tx	Antenna 1	2412MHz 2437MHz 2462MHz
6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	Antenna 1	2412MHz 2437MHz 2462MHz
Band Edge confirmation	11b Tx 11g Tx 11n-20 Tx	Antenna 1	2412MHz 2462MHz

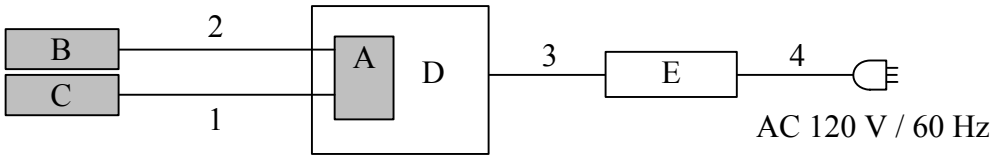
*1) The operating mode and tested frequency were tested as a representative, because it had the highest power at antenna terminal test.
*2) After the comparison between SISO and MIMO, test was performed on SISO mode had the worst case. Because MIMO mode was reduced the power 3dB less than SISO mode.

*Details of Operating mode for BT LE

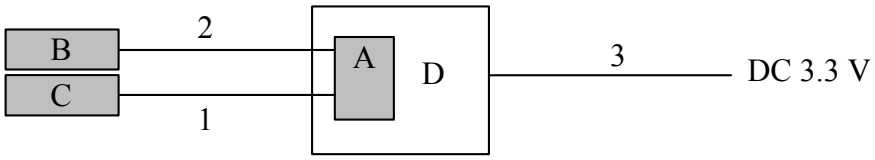
Test Item	Operating Mode	Tested Antenna	Tested frequency
Conducted Emission, 6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth, Spurious Emission (Radiated / Conducted)	Tx BT LE	Antenna 2	2402MHz 2440MHz 2480MHz
Band Edge confirmation	Tx BT LE	Antenna 2	2402MHz 2480MHz

4.2 Configuration and peripherals

For Conducted Emission test



For all tests other than Conducted Emission test



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	LBEE5ZZ1EN	26 for AT* 24 for other tests	Murata Manufacturing Company, Ltd.	EUT
B	Antenna	GW.71.5153	3	Murata Manufacturing Company, Ltd.	EUT
C	Antenna	GW.71.5153	4	Murata Manufacturing Company, Ltd.	EUT
D	Jig	-	-	Murata Manufacturing Company, Ltd.	-
E	DC Power Supply	PMC35-2A	13090501	KIKUSUI	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.05	Shielded	Shielded	-
2	Antenna Cable	0.05	Shielded	Shielded	-
3	DC Cable	0.4	Unshielded	Unshielded	-
4	AC Cable	1.8	Unshielded	Unshielded	-

*AT: Antenna Terminal Conducted Tests

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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 v03r03".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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: 12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results. Integration Method: 13.3.1 RBW: 100kHz VBW: 300kHz Span: 2MHz Band Power: 1MHz Detector: Power Averaging (RMS) Trace: 100 traces	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 "KDB 558074 D01 DTS Meas Guidance v03r03"
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

- The carrier level and noise levels were confirmed at each position of X1, X2, Y1, Y2, Z1 and Z2 axes (0deg., 90deg.) of Antenna, X, Y and Z 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	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 80 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3) *4)
Conducted Spurious Emission *5)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				
Band Edge confirmation *2)	40 MHz / 20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r03".
*4) The test was not performed at RBW:3 kHz however the measurement is to be performed with RBW:3kHz in the regulation, because, the measurement value with RBW:3 kHz is less than the value of RBW:30 kHz and the test data met the limit with RBW:30 kHz.
*5) 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.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

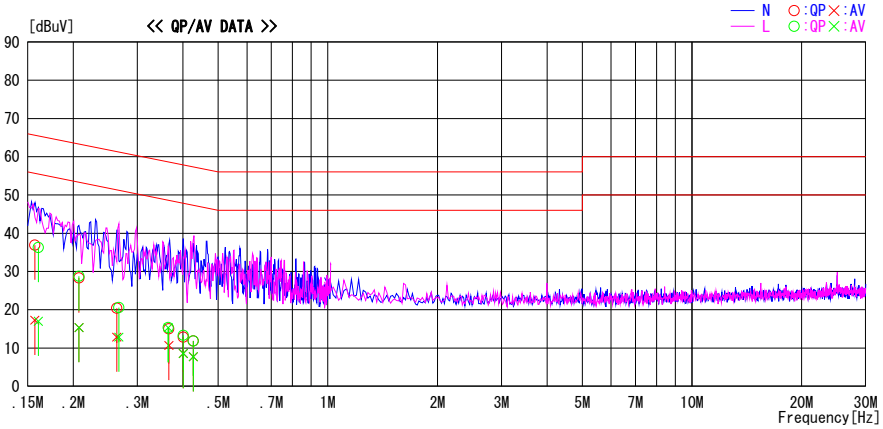
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/04/20

Report No. : 10689818H

Temp./Humi. : 26deg. C / 57% RH
Engineer : Keisuke Kawamura

Mode / Remarks : WLAN 11g 1Mbps Ant:1 2437MHz

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]		
0.15697	23.6	4.0	13.3	36.9	17.3	65.6	55.6	28.7	38.3	N	
0.20754	15.0	2.0	13.3	28.3	15.3	63.3	53.3	35.0	38.0	N	
0.26333	7.1	-0.5	13.3	20.4	12.8	61.3	51.3	40.9	38.5	N	
0.36619	1.7	-2.6	13.3	15.0	10.7	58.6	48.6	43.6	37.9	N	
0.40106	-0.5	-4.7	13.3	12.8	8.6	57.8	47.8	45.0	39.2	N	
0.42722	-1.5	-5.6	13.3	11.8	7.7	57.3	47.3	45.5	39.6	N	
0.16046	23.0	3.7	13.3	36.3	17.0	65.4	55.4	29.1	38.4	L	
0.20754	15.4	2.0	13.3	28.7	15.3	63.3	53.3	34.6	38.0	L	
0.26681	7.3	-0.5	13.3	20.6	12.8	61.2	51.2	40.6	38.4	L	
0.36445	2.0	2.0	13.3	15.3	15.3	58.6	48.6	43.3	33.3	L	
0.40106	0.0	-4.7	13.3	13.3	8.6	57.8	47.8	44.5	39.2	L	
0.42722	-1.5	-5.6	13.3	11.8	7.7	57.3	47.3	45.5	39.6	L	

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

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

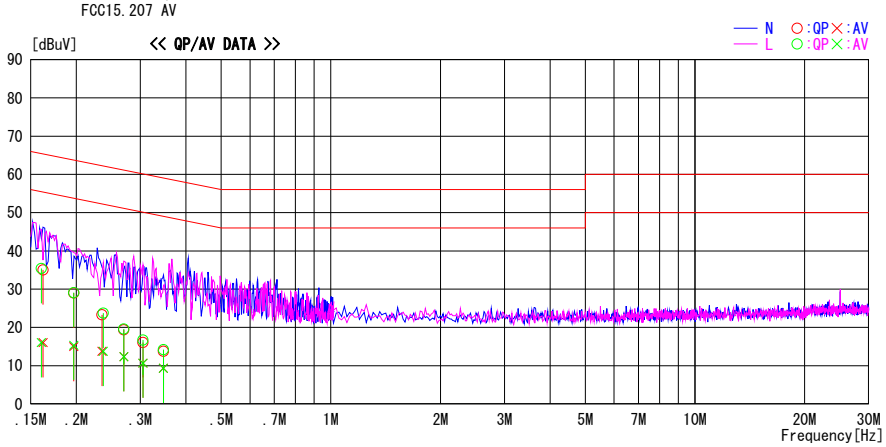
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/04/20

Report No. : 10689818H

Temp./Humi. : 26deg. C / 57% RH
Engineer : Keisuke Kawamura

Mode / Remarks : BT LE 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



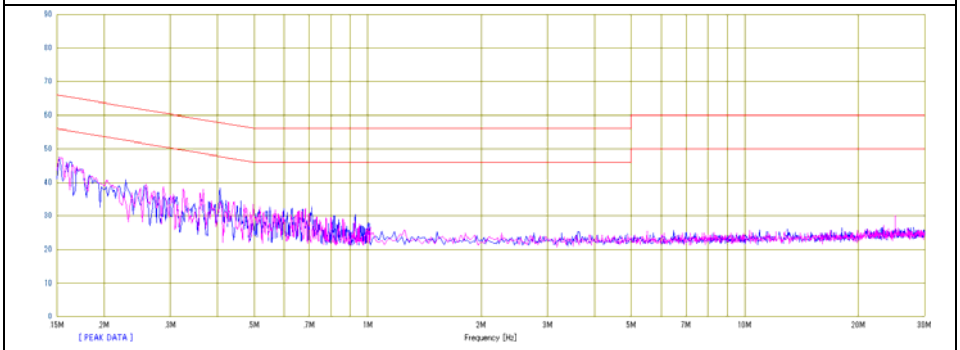
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16221	21.7	2.7	13.3	35.0	16.0	65.4	55.4	30.4	39.4	N	
0.19707	15.7	1.7	13.3	29.0	15.0	63.7	53.7	34.8	38.7	N	
0.23543	10.0	0.5	13.3	23.3	13.8	62.3	52.3	39.0	38.5	N	
0.27031	6.0	-1.0	13.3	19.3	12.3	61.1	51.1	41.8	38.8	N	
0.30517	2.7	-2.6	13.3	16.0	10.7	60.1	50.1	44.1	39.4	N	
0.34701	0.5	-4.0	13.3	13.8	9.3	59.0	49.0	45.2	39.7	N	
0.16046	22.1	2.7	13.3	35.4	16.0	65.4	55.4	30.0	39.4	L	
0.19707	15.8	2.0	13.3	29.1	15.3	63.7	53.7	34.6	38.4	L	
0.23717	10.4	0.5	13.3	23.7	13.8	62.2	52.2	38.5	38.4	L	
0.27031	6.3	-1.0	13.3	19.6	12.3	61.1	51.1	41.5	38.8	L	
0.30517	3.4	-2.6	13.3	16.7	10.7	60.1	50.1	43.4	39.4	L	
0.34701	0.9	-4.0	13.3	14.2	9.3	59.0	49.0	44.8	39.7	L	

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

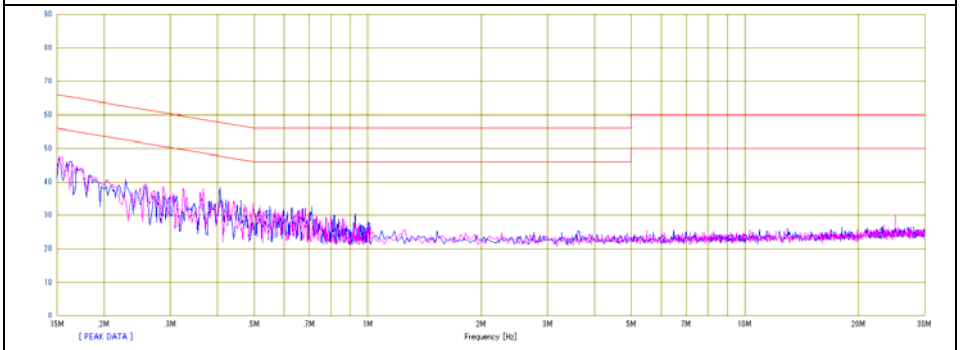
Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10689818H
Date	04/20/2015
Temperature/ Humidity	26 deg. C / 57% RH
Engineer	Keisuke Kawamura
Mode	Tx BT LE

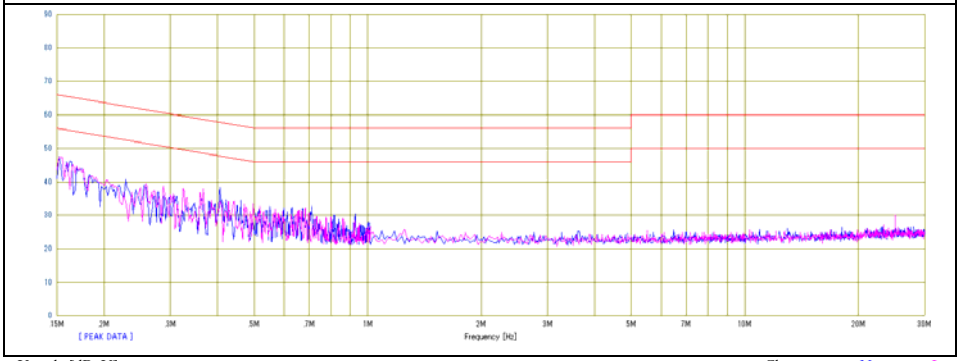
2402MHz



2440MHz



2480MHz



Y scale [dBuV] Chart — N — L

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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
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6dB Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/24/2015
Temperature/ Humidity	24 deg. C / 43% RH
Engineer	Shinichi Miyazono
Mode	Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	10.090	>500
2437	10.087	>500
2462	10.094	>500

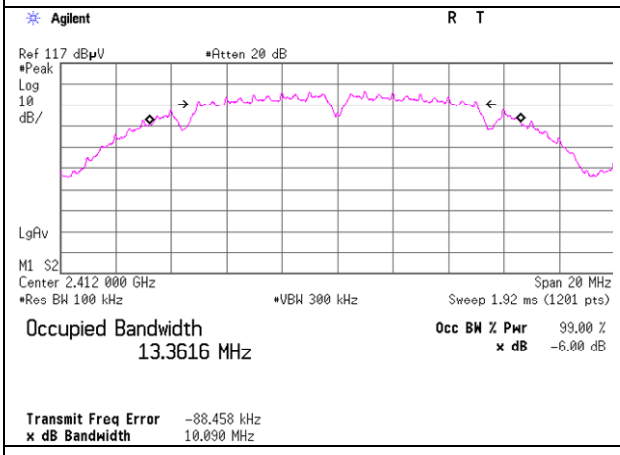
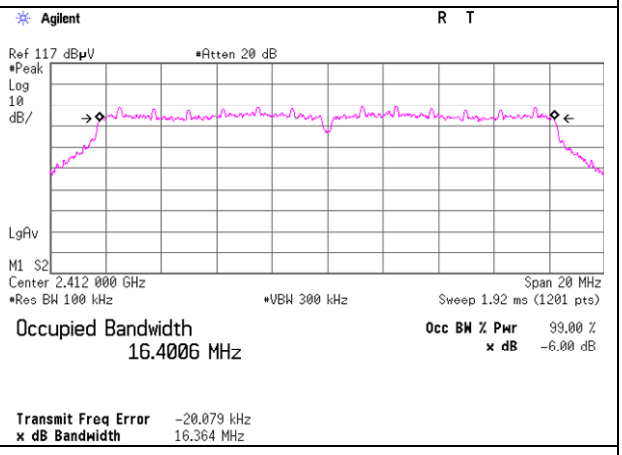
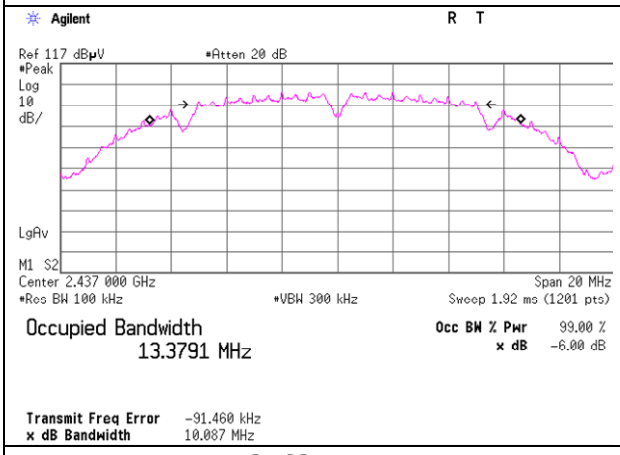
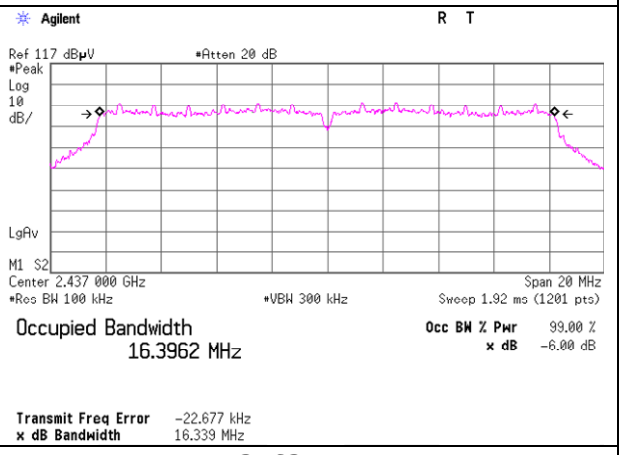
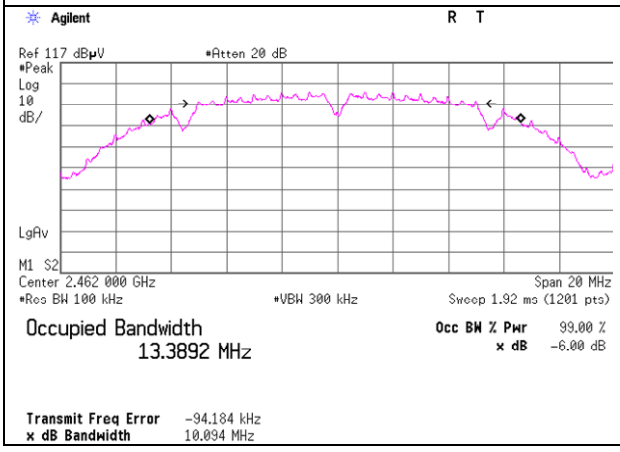
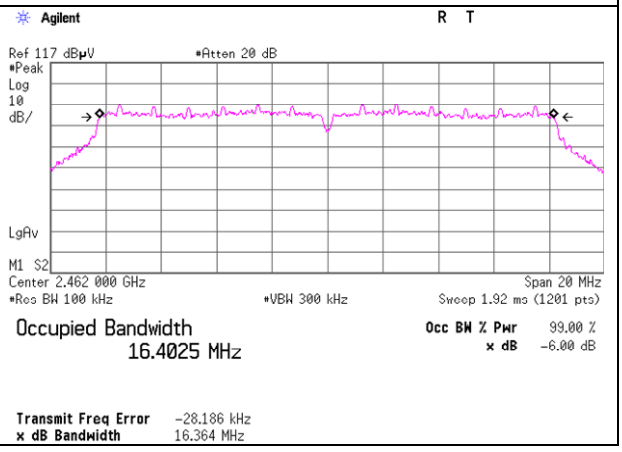
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	16.364	>500
2437	16.339	>500
2462	16.364	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	17.322	>500
2437	17.345	>500
2462	17.356	>500

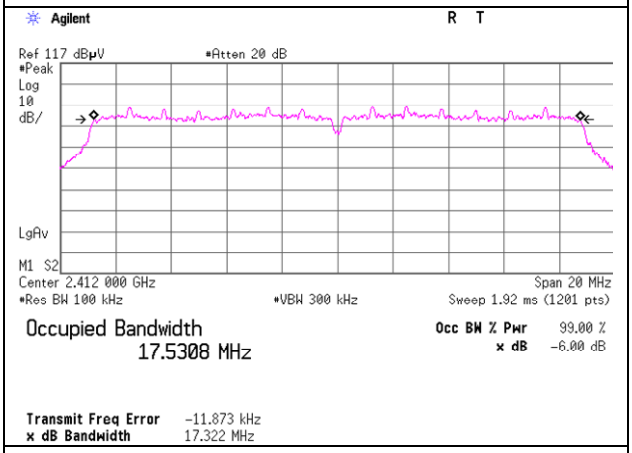
6dB Bandwidth

11b	11g
2412MHz	**2412MHz**
	
2437MHz	**2437MHz**
	
2462MHz	**2462MHz**
	

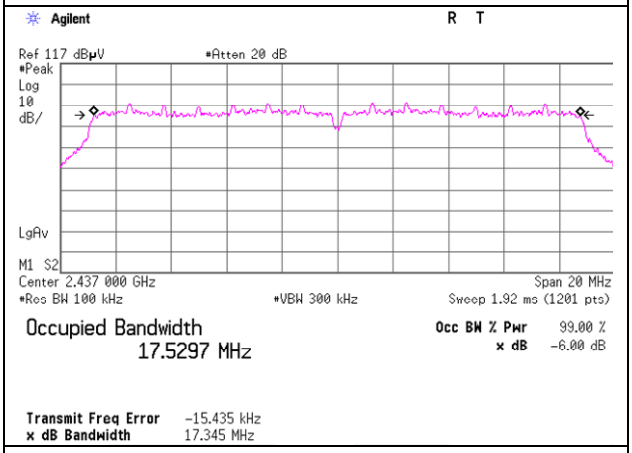
6dB Bandwidth

11n-20

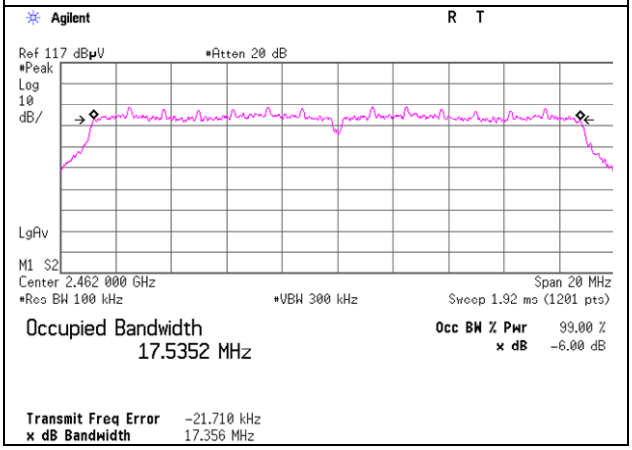
2412MHz



2437MHz



2462MHz



6dB Bandwidth

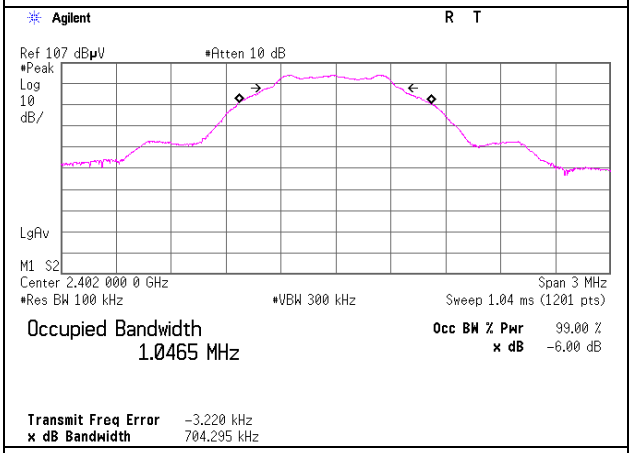
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.704	>500
2440	0.720	>500
2480	0.721	>500

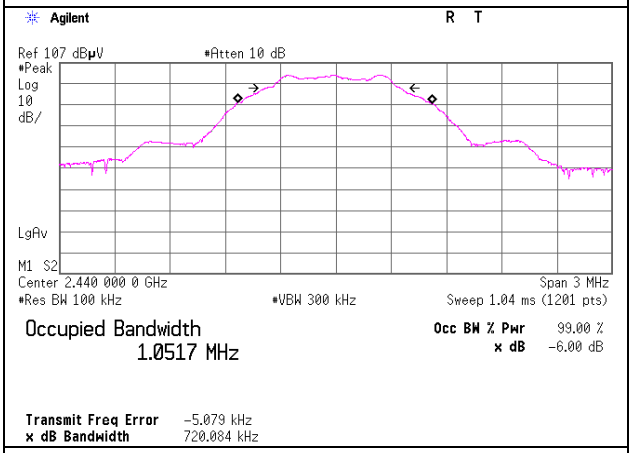
6dB Bandwidth

BT LE

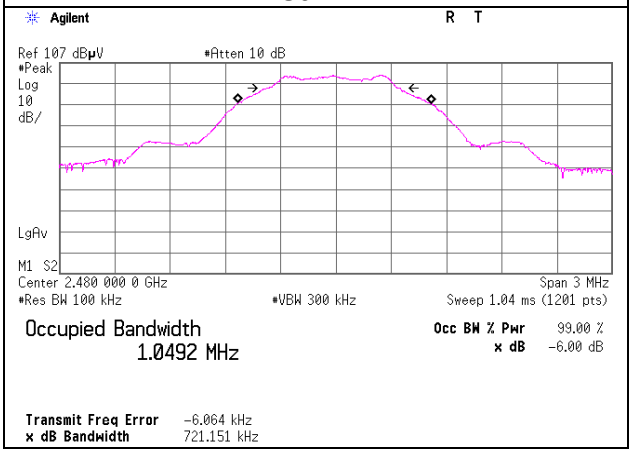
2402MHz



2440MHz



2480MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room	
Report No.	10689818H	
Date	01/29/2015	04/21/2015
Temperature/ Humidity	26 deg. C / 46% RH	25 deg. C / 34% RH
Engineer	Satofumi Matsuyama	Shinichi Miyazono
Mode	Tx 11b	

Antenna 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	9.16	1.65	9.98	20.79	119.95	30.00	1000	9.21
2437	9.19	1.66	9.98	20.83	121.06	30.00	1000	9.17
2462	7.22	1.66	9.98	18.86	76.91	30.00	1000	11.14

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412MHz

Rate [Mbps]	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Remark
1	11.07	10.91	*
2	10.94	-	
5.5	10.15	-	
11	10.25	-	

*: Worst Rate
All comparizon 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.11 Measurement Room	
Report No.	10689818H	
Date	01/29/2015	04/21/2015
Temperature/ Humidity	26 deg. C / 46% RH	25 deg. C / 34% RH
Engineer	Satofumi Matsuyama	Shinichi Miyazono
Mode	Tx 11g	

Antenna 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	10.61	1.65	9.98	22.24	167.49	30.00	1000	7.76
2437	12.72	1.66	9.98	24.36	272.90	30.00	1000	5.64
2462	12.15	1.66	9.98	23.79	239.33	30.00	1000	6.21

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412MHz

Rate [Mbps]	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Remark
6	14.22	14.12	*
9	13.63	-	
12	13.38	-	
18	13.04	-	
24	13.88	-	
36	13.74	-	
48	13.53	-	
54	13.35	-	

*: 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.11 Measurement Room	
Report No.	10689818H	
Date	01/29/2015	04/21/2015
Temperature/ Humidity	26 deg. C / 46% RH	25 deg. C / 34% RH
Engineer	Satofumi Matsuyama	Shinichi Miyazono
Mode	Tx 11n-20	

Antenna 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	10.29	1.65	9.98	21.92	155.60	30.00	1000	8.08
2437	12.51	1.66	9.98	24.15	260.02	30.00	1000	5.85
2462	10.86	1.66	9.98	22.50	177.83	30.00	1000	7.50

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412MHz

MCS Index	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Total [dBm]	Ramark
0	14.35	13.29	-	*
1	14.10	-	-	
2	13.59	-	-	
3	13.71	-	-	
4	13.61	-	-	
5	13.41	-	-	
6	13.29	-	-	
7	13.17	-	-	
8	9.84	11.09	13.52	
9	10.13	10.95	13.57	
10	9.59	11.60	13.72	
11	10.31	11.13	13.75	
12	10.51	10.94	13.74	
13	10.32	11.72	14.09	
14	10.25	11.59	13.98	
15	10.16	11.47	13.87	

*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.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

Antenna 2

Freq.	P/M(PK) Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	6.03	0.78	0.00	6.81	4.80	30.00	1000	23.19
2440	5.94	0.79	0.00	6.73	4.71	30.00	1000	23.27
2480	5.84	0.80	0.00	6.64	4.61	30.00	1000	23.36

Sample Calculation:
Result = Reading + Cable Loss

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

Average Output Power (Reference data)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/21/2015
Temperature/ Humidity	25 deg. C / 34% RH
Engineer	Shinichi Miyazono
Mode	Tx 11b

[AV]
Antenna 1

Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Duty Factor [dB]	Result (Cond.) [dBm]	Result (Cond.) [mW]	Result (e.i.r.p) [dBm]	Result (e.i.r.p) [mW]
2412	6.06	1.65	9.98	3.50	0.13	17.82	60.53	21.32	135.52
2437	5.98	1.66	9.98	3.50	0.13	17.75	59.57	21.25	133.35
2462	3.43	1.66	9.98	3.50	0.13	15.20	33.11	18.70	74.13

Result(Cond.) = Reading + Cable Loss + Attenuator Loss + Duty Factor
Result(e.i.r.p.) = Reading + Cable Loss + Attenuator Loss + Antenna Gain + Duty Factor

2412MHz

Rate [Mbps]	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Remark
1	6.06	5.71	*
2	5.82	-	
5.5	5.19	-	
11	5.08	-	

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

Average Output Power (Reference data)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/21/2015
Temperature/ Humidity	25 deg. C / 34% RH
Engineer	Shinichi Miyazono
Mode	Tx 11g

[AV]
Antenna 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Duty Factor [dB]	Result (Cond.) [dBm]	Result (Cond.) [mW]	Result (e.i.r.p) [dBm]	Result (e.i.r.p) [mW]
2412	-0.55	1.65	9.98	3.50	0.85	11.93	15.60	15.43	34.91
2437	1.41	1.66	9.98	3.50	0.85	13.90	24.55	17.40	54.95
2462	0.32	1.66	9.98	3.50	0.85	12.81	19.10	16.31	42.76

Result(Cond.) = Reading + Cable Loss + Attenuator Loss + Duty factor
Result(e.i.r.p.) = Reading + Cable Loss + Attenuator Loss + Antenna Gain + Duty Factor

2412MHz

Rate [Mbps]	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Remark
6	-0.55	-0.79	*
9	-1.14	-	
12	-1.33	-	
18	-1.62	-	
24	-1.92	-	
36	-2.29	-	
48	-2.40	-	
54	-2.44	-	

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

Average Output Power (Reference data)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/21/2015
Temperature/ Humidity	25 deg. C / 34% RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-20

[AV]
Antenna 1

Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Duty Factor [dB]	Result (Cond.) [dBm]	Result (Cond.) [mW]	Result (e.i.r.p.) [dBm]	Result (e.i.r.p.) [mW]
2412	-0.79	1.65	9.98	3.50	0.80	11.64	14.59	15.14	32.66
2437	1.28	1.66	9.98	3.50	0.80	13.72	23.55	17.22	52.72
2462	-0.90	1.66	9.98	3.50	0.80	11.54	14.26	15.04	31.92

Result(Cond.) = Reading + Cable Loss + Attenuator Loss + Duty factor
Result(e.i.r.p.) = Reading + Cable Loss + Attenuator Loss + Antenna Gain + Duty Factor

2412MHz

MCS Index	Reading Antenna1 [dBm]	Reading Antenna2 [dBm]	Total [dBm]	Ramark
0	-0.79	-0.92	-	*
1	-1.37	-	-	
2	-1.56	-	-	
3	-1.76	-	-	
4	-1.90	-	-	
5	-2.00	-	-	
6	-2.05	-	-	
7	-2.26	-	-	
8	-4.00	-3.83	-0.90	
9	-4.35	-4.11	-1.22	
10	-4.48	-4.32	-1.39	
11	-4.53	-4.42	-1.46	
12	-4.64	-4.58	-1.60	
13	-4.75	-4.69	-1.71	
14	-4.85	-4.77	-1.80	
15	-4.91	-4.82	-1.85	

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

Average Output Power (Reference data)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

[AV]
Antenna 2

Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Duty Factor [dB]	Result (Cond.) [dBm]	Result (Cond.) [mW]	Result (e.i.r.p) [dBm]	Result (e.i.r.p) [mW]
2402	3.84	0.78	0.00	3.50	2.01	6.63	4.60	10.13	10.30
2440	3.75	0.79	0.00	3.50	2.01	6.55	4.52	10.05	10.12
2480	3.64	0.80	0.00	3.50	2.01	6.45	4.42	9.95	9.89

Result(Cond.) = Reading + Cable Loss + Attenuator Loss + Duty Factor
Result(e.i.r.p.) = Reading + Cable Loss + Attenuator Loss + Antenna Gain + Duty Factor

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

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 10689818H
Date 04/16/2015
Temperature/ Humidity 22 deg. C / 38% RH
Engineer Tomoki Matsui
Mode Tx 11b 2412MHz

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	2385.983	PK	60.9	27.4	3.2	32.3	-	59.2	73.9	14.7	
Hori	2390.000	PK	56.8	27.4	3.2	32.3	-	55.1	73.9	18.8	
Hori	3215.987	PK	46.3	28.7	3.7	32.0	-	46.7	73.9	27.2	
Hori	4824.000	PK	51.5	31.6	5.4	31.6	-	56.9	73.9	17.0	
Hori	7236.000	PK	45.7	36.9	6.5	32.8	-	56.3	73.9	17.6	
Hori	9648.000	PK	41.9	38.8	7.3	33.2	-	54.8	73.9	19.1	Floor Noise
Hori	2385.983	AV	55.2	27.4	3.2	32.3	0.1	53.6	53.9	0.3	
Hori	2390.000	AV	48.2	27.4	3.2	32.3	0.1	46.6	53.9	7.3	Integration Method *1)
Hori	3215.987	AV	41.6	28.7	3.7	32.0	0.1	42.1	53.9	11.8	
Hori	4824.000	AV	47.9	31.6	5.4	31.6	0.1	53.4	53.9	0.5	
Hori	7236.000	AV	38.1	36.9	6.5	32.8	0.1	48.8	53.9	5.1	
Hori	9648.000	AV	33.3	38.8	7.3	33.2	-	46.2	53.9	7.7	Floor Noise
Vert	2385.875	PK	55.1	27.4	3.2	32.3	-	53.4	73.9	20.5	
Vert	2390.000	PK	51.1	27.4	3.2	32.3	-	49.4	73.9	24.5	
Vert	3215.976	PK	46.2	28.7	3.7	32.0	-	46.6	73.9	27.3	
Vert	4824.000	PK	49.2	31.6	5.4	31.6	-	54.6	73.9	19.3	
Vert	7236.000	PK	45.6	36.9	6.5	32.8	-	56.2	73.9	17.7	
Vert	9648.000	PK	41.7	38.8	7.3	33.2	-	54.6	73.9	19.3	Floor Noise
Vert	2385.875	AV	51.6	27.4	3.2	32.3	0.1	50.0	53.9	3.9	
Vert	2390.000	AV	43.8	27.4	3.2	32.3	0.1	42.2	53.9	11.7	Integration Method *1)
Vert	3215.976	AV	40.5	28.7	3.7	32.0	0.1	41.0	53.9	12.9	
Vert	4824.000	AV	45.5	31.6	5.4	31.6	0.1	51.0	53.9	2.9	
Vert	7236.000	AV	39.2	36.9	6.5	32.8	0.1	49.9	53.9	4.0	
Vert	9648.000	AV	33.3	38.8	7.3	33.2	-	46.2	53.9	7.7	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	2412.000	PK	110.8	27.4	3.2	32.3	109.1	-	-	Carrier
Hori	2397.009	PK	76.2	27.4	3.2	32.3	74.5	89.1	14.6	
Hori	2400.000	PK	69.1	27.4	3.2	32.3	67.4	89.1	21.7	
Vert	2412.000	PK	107.0	27.4	3.2	32.3	105.3	-	-	Carrier
Vert	2396.992	PK	71.5	27.4	3.2	32.3	69.8	85.3	15.5	
Vert	2400.000	PK	65.0	27.4	3.2	32.3	63.3	85.3	22.0	

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10689818H
Date	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH
Engineer	Tomoki Matsui
Mode	Tx 11b 2437MHz

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	3249.463	PK	46.7	28.8	3.8	32.0	-	47.3	73.9	26.6	
Hori	4874.000	PK	49.3	31.7	5.5	31.6	-	54.9	73.9	19.0	
Hori	7311.000	PK	45.2	37.0	6.5	32.8	-	55.9	73.9	18.0	
Hori	9748.000	PK	41.1	38.9	7.4	33.3	-	54.1	73.9	19.8	Floor Noise
Hori	3249.463	AV	42.0	28.8	3.8	32.0	0.1	42.7	53.9	11.2	
Hori	4874.000	AV	45.6	31.7	5.5	31.6	0.1	51.3	53.9	2.6	
Hori	7311.000	AV	38.0	37.0	6.5	32.8	0.1	48.8	53.9	5.1	
Hori	9748.000	AV	32.8	38.9	7.4	33.3	-	45.8	53.9	8.1	Floor Noise
Vert	3249.279	PK	46.7	28.8	3.8	32.0	-	47.3	73.9	26.6	
Vert	4874.000	PK	49.7	31.7	5.5	31.6	-	55.3	73.9	18.6	
Vert	7311.000	PK	46.3	37.0	6.5	32.8	-	57.0	73.9	16.9	
Vert	9748.000	PK	41.1	38.9	7.4	33.3	-	54.1	73.9	19.8	Floor Noise
Vert	3249.279	AV	41.7	28.8	3.8	32.0	0.1	42.4	53.9	11.5	
Vert	4874.000	AV	46.2	31.7	5.5	31.6	0.1	51.9	53.9	2.0	
Vert	7311.000	AV	40.6	37.0	6.5	32.8	0.1	51.4	53.9	2.5	
Vert	9748.000	AV	32.8	38.9	7.4	33.3	-	45.8	53.9	8.1	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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10689818H
Date	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH
Engineer	Tomoki Matsui
Mode	Tx 11b 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	48.4	27.6	3.3	32.3	-	47.0	73.9	26.9	
Hori	2488.200	PK	51.7	27.6	3.3	32.3	-	50.3	73.9	23.6	
Hori	3282.569	PK	46.7	28.8	3.8	32.0	-	47.3	73.9	26.6	
Hori	4924.000	PK	49.2	31.9	5.5	31.6	-	55.0	73.9	18.9	
Hori	7386.000	PK	43.6	37.1	6.5	32.9	-	54.3	73.9	19.6	
Hori	9848.000	PK	41.0	38.9	7.4	33.3	-	54.0	73.9	19.9	Floor Noise
Hori	2483.500	AV	38.0	27.6	3.3	32.3	0.1	36.7	53.9	17.2	Integration Method *1)
Hori	2488.200	AV	45.8	27.6	3.3	32.3	0.1	44.5	53.9	9.4	
Hori	3282.569	AV	42.9	28.8	3.8	32.0	0.1	43.6	53.9	10.3	
Hori	4924.000	AV	46.5	31.9	5.5	31.6	0.1	52.4	53.9	1.5	
Hori	7386.000	AV	36.4	37.1	6.5	32.9	0.1	47.2	53.9	6.7	
Hori	9848.000	AV	33.0	38.9	7.4	33.3	-	46.0	53.9	7.9	Floor Noise
Vert	2483.500	PK	47.5	27.6	3.3	32.3	-	46.1	73.9	27.8	
Vert	2488.342	PK	49.1	27.6	3.3	32.3	-	47.7	73.9	26.2	
Vert	3282.711	PK	46.8	28.8	3.8	32.0	-	47.4	73.9	26.5	
Vert	4924.000	PK	50.4	31.9	5.5	31.6	-	56.2	73.9	17.7	
Vert	7386.000	PK	43.2	37.1	6.5	32.9	-	53.9	73.9	20.0	
Vert	9848.000	PK	41.1	38.9	7.4	33.3	-	54.1	73.9	19.8	Floor Noise
Vert	2483.500	AV	36.8	27.6	3.3	32.3	0.1	35.5	53.9	18.4	Integration Method *1)
Vert	2488.342	AV	44.0	27.6	3.3	32.3	0.1	42.7	53.9	11.2	
Vert	3282.711	AV	42.4	28.8	3.8	32.0	0.1	43.1	53.9	10.8	
Vert	4924.000	AV	47.6	31.9	5.5	31.6	0.1	53.5	53.9	0.4	
Vert	7386.000	AV	36.1	37.1	6.5	32.9	0.1	46.9	53.9	7.0	
Vert	9848.000	AV	33.0	38.9	7.4	33.3	-	46.0	53.9	7.9	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

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10689818H	
Date	04/16/2015	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH
Engineer	Ken Fujita	Tomoki Matsui
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11g 2412MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	56.1	27.4	12.5	32.3	-	63.7	73.9	10.2	
Hori	3213.842	PK	46.0	28.7	3.7	32.0	-	46.4	73.9	27.5	
Hori	4824.000	PK	41.8	31.6	4.5	31.6	-	46.3	73.9	27.6	Floor Noise
Hori	7236.000	PK	40.2	36.9	5.7	32.8	-	50.0	73.9	23.9	Floor Noise
Hori	9648.000	PK	40.2	38.8	6.4	33.2	-	52.2	73.9	21.7	Floor Noise
Hori	2390.000	AV	43.1	27.4	12.5	32.3	0.9	51.6	53.9	2.3	Integration Method *1)
Hori	3213.842	AV	40.1	28.7	3.7	32.0	0.9	41.4	53.9	12.6	
Hori	4824.000	AV	32.4	31.6	4.5	31.6	-	36.9	53.9	17.0	Floor Noise
Hori	7236.000	AV	33.1	36.9	5.7	32.8	-	42.9	53.9	11.0	Floor Noise
Hori	9648.000	AV	32.3	38.8	6.4	33.2	-	44.3	53.9	9.6	Floor Noise
Vert	2390.000	PK	53.1	27.4	12.5	32.3	-	60.7	73.9	13.2	
Vert	3213.842	PK	47.6	28.7	3.7	32.0	-	48.0	73.9	25.9	
Vert	4824.000	PK	42.5	31.6	4.5	31.6	-	47.0	73.9	26.9	Floor Noise
Vert	7236.000	PK	43.6	36.9	5.7	32.8	-	53.4	73.9	20.5	Floor Noise
Vert	9648.000	PK	43.2	38.8	6.4	33.2	-	55.2	73.9	18.7	Floor Noise
Vert	2390.000	AV	39.0	27.4	12.5	32.3	0.9	47.5	53.9	6.4	Integration Method *1)
Vert	3213.842	AV	40.7	28.7	3.7	32.0	0.9	42.0	53.9	12.0	
Vert	4824.000	AV	33.0	31.6	4.5	31.6	-	37.5	53.9	16.4	Floor Noise
Vert	7236.000	AV	33.8	36.9	5.7	32.8	-	43.6	53.9	10.3	Floor Noise
Vert	9648.000	AV	33.5	38.8	6.4	33.2	-	45.5	53.9	8.4	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)

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	96.6	27.4	12.5	32.3	104.2	-	-	Carrier
Hori	2400.000	PK	52.4	27.4	12.5	32.3	60.0	84.2	24.2	
Vert	2412.000	PK	90.3	27.4	12.5	32.3	97.9	-	-	Carrier
Vert	2400.000	PK	47.6	27.4	12.5	32.3	55.2	77.9	22.7	

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10689818H		
Date	04/16/2015	04/16/2015	04/20/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH	23 deg. C / 52% RH
Engineer	Ken Fujita	Tomoki Matsui	Takafumi Noguchi
	(1-10GHz)	(Above 10GHz)	(Below 1GHz)
Mode	Tx 11g 2437MHz		

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	40.003	QP	23.2	14.2	7.3	28.5	-	16.2	40.0	23.8	
Hori	62.561	QP	23.0	7.0	7.6	28.4	-	9.2	40.0	30.8	
Hori	80.051	QP	22.9	6.8	7.9	28.4	-	9.2	40.0	30.8	
Hori	123.478	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Hori	129.845	QP	22.9	13.6	8.5	28.1	-	16.9	43.5	26.6	
Hori	252.021	QP	21.7	17.3	9.5	27.6	-	20.9	46.0	25.1	
Hori	3250.843	PK	45.6	28.8	3.8	32.0	-	46.2	73.9	27.7	
Hori	4874.000	PK	42.3	31.7	4.6	31.6	-	47.0	73.9	26.9	Floor Noise
Hori	7311.000	PK	42.1	37.0	5.7	32.8	-	52.0	73.9	21.9	Floor Noise
Hori	9748.000	PK	43.0	38.9	6.5	33.3	-	55.1	73.9	18.8	Floor Noise
Hori	3250.843	AV	40.1	28.8	3.8	32.0	0.9	41.6	53.9	12.3	
Hori	4874.000	AV	33.4	31.7	4.6	31.6	-	38.1	53.9	15.8	Floor Noise
Hori	7311.000	AV	33.4	37.0	5.7	32.8	-	43.3	53.9	10.6	Floor Noise
Hori	9748.000	AV	33.6	38.9	6.5	33.3	-	45.7	53.9	8.2	Floor Noise
Vert	42.819	QP	23.3	13.1	7.3	28.5	-	15.2	40.0	24.8	
Vert	59.802	QP	23.3	7.4	7.6	28.4	-	9.9	40.0	30.1	
Vert	79.603	QP	23.1	6.7	7.9	28.4	-	9.3	40.0	30.7	
Vert	123.422	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Vert	129.729	QP	22.9	13.6	8.5	28.1	-	16.9	43.5	26.6	
Vert	249.728	QP	21.6	17.1	9.5	27.6	-	20.6	46.0	25.4	
Vert	3250.843	PK	45.9	28.8	3.8	32.0	-	46.5	73.9	27.4	
Vert	4874.000	PK	41.6	31.7	4.6	31.6	-	46.3	73.9	27.6	Floor Noise
Vert	7311.000	PK	41.1	37.0	5.7	32.8	-	51.0	73.9	22.9	Floor Noise
Vert	9748.000	PK	41.0	38.9	6.5	33.3	-	53.1	73.9	20.8	Floor Noise
Vert	3250.843	AV	39.5	28.8	3.8	32.0	0.9	41.0	53.9	12.9	
Vert	4874.000	AV	33.2	31.7	4.6	31.6	-	37.9	53.9	16.0	Floor Noise
Vert	7311.000	AV	33.1	37.0	5.7	32.8	-	43.0	53.9	10.9	Floor Noise
Vert	9748.000	AV	32.8	38.9	6.5	33.3	-	44.9	53.9	9.0	Floor Noise

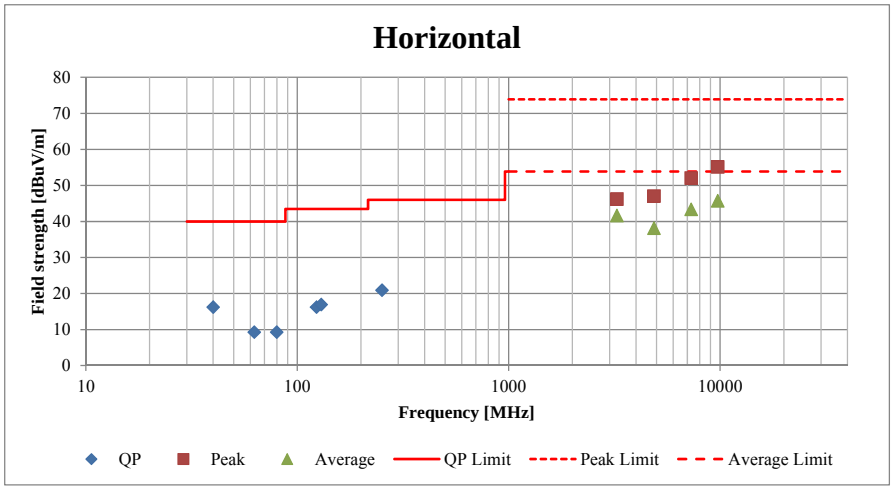
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty factor

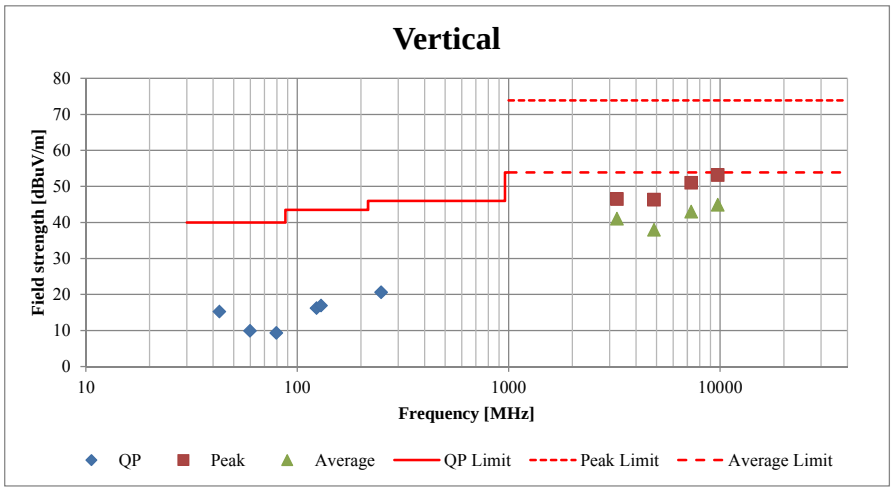
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10689818H		
Date	04/16/2015	04/16/2015	04/20/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH	23 deg. C / 52% RH
Engineer	Ken Fujita (1-10GHz)	Tomoki Matsui (Above 10GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx 11g 2437MHz		





*These plots data contains sufficient number to show the trend of characteristic features for EUT.
ANSI C63.10:2013 Clause 6.3.4 states “For radiated emission test data reporting, both plots and tabular data shall be included”.

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10689818H	
Date	04/16/2015	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH
Engineer	Ken Fujita	Tomoki Matsui
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11g 2462MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	62.1	27.6	12.6	32.3	-	70.0	73.9	3.9	
Hori	3281.676	PK	46.9	28.8	3.8	32.0	-	47.5	73.9	26.4	
Hori	4924.000	PK	43.3	31.9	4.6	31.6	-	48.2	73.9	25.7	Floor Noise
Hori	7386.000	PK	43.0	37.1	5.7	32.9	-	52.9	73.9	21.0	Floor Noise
Hori	9848.000	PK	43.3	38.9	6.5	33.3	-	55.4	73.9	18.5	Floor Noise
Hori	2483.500	AV	44.5	27.6	12.6	32.3	0.9	53.3	53.9	0.7	Integration Method *1)
Hori	3281.676	AV	42.3	28.8	3.8	32.0	0.9	43.8	53.9	10.2	
Hori	4924.000	AV	32.7	31.9	4.6	31.6	-	37.6	53.9	16.3	Floor Noise
Hori	7386.000	AV	32.3	37.1	5.7	32.9	-	42.2	73.9	31.7	Floor Noise
Hori	9848.000	AV	32.1	38.9	6.5	33.3	-	44.2	53.9	9.7	Floor Noise
Vert	2483.500	PK	56.3	27.6	12.6	32.3	-	64.2	73.9	9.7	
Vert	3281.676	PK	47.5	28.8	3.8	32.0	-	48.1	73.9	25.8	
Vert	4924.000	PK	42.9	31.9	4.6	31.6	-	47.8	73.9	26.1	Floor Noise
Vert	7386.000	PK	42.5	37.1	5.7	32.9	-	52.4	73.9	21.5	Floor Noise
Vert	9848.000	PK	42.5	38.9	6.5	33.3	-	54.6	73.9	19.3	Floor Noise
Vert	2483.500	AV	40.8	27.6	12.6	32.3	0.9	49.6	53.9	4.3	Integration Method *1)
Vert	3281.676	AV	42.6	28.8	3.8	32.0	0.9	44.1	53.9	9.8	
Vert	4924.000	AV	32.6	31.9	4.6	31.6	-	37.5	53.9	16.4	Floor Noise
Vert	7386.000	AV	31.9	37.1	5.7	32.9	-	41.8	53.9	12.1	Floor Noise
Vert	9848.000	AV	32.0	38.9	6.5	33.3	-	44.1	73.9	29.8	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

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10689818H	
Date	04/16/2015	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH
Engineer	Ken Fujita	Tomoki Matsui
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11n-20 2412MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	59.8	27.4	12.5	32.3	-	67.4	73.9	6.5	
Hori	3215.983	PK	47.8	28.7	3.7	32.0	-	48.2	73.9	25.7	
Hori	4824.000	PK	40.6	31.6	5.4	31.6	-	46.0	73.9	27.9	Floor Noise
Hori	7236.000	PK	42.3	36.9	6.5	32.8	-	52.9	73.9	21.0	Floor Noise
Hori	9648.000	PK	41.6	38.8	7.3	33.2	-	54.5	73.9	19.4	Floor Noise
Hori	2390.000	AV	43.5	27.4	12.5	32.3	0.8	51.9	53.9	2.0	Integration Method *1)
Hori	3215.983	AV	42.8	28.7	3.7	32.0	0.8	44.0	53.9	9.9	
Hori	4824.000	AV	32.4	31.6	5.4	31.6	-	37.8	53.9	16.1	Floor Noise
Hori	7236.000	AV	34.1	36.9	6.5	32.8	-	44.7	53.9	9.2	Floor Noise
Hori	9648.000	AV	33.6	38.8	7.3	33.2	-	46.5	53.9	7.4	Floor Noise
Vert	2390.000	PK	56.1	27.4	12.5	32.3	-	63.7	73.9	10.2	
Vert	3216.010	PK	47.7	28.7	3.7	32.0	-	48.1	73.9	25.8	
Vert	4824.000	PK	41.9	31.6	5.4	31.6	-	47.3	73.9	26.6	Floor Noise
Vert	7236.000	PK	41.7	36.9	6.5	32.8	-	52.3	73.9	21.6	Floor Noise
Vert	9648.000	PK	41.9	38.8	7.3	33.2	-	54.8	73.9	19.1	Floor Noise
Vert	2390.000	AV	38.9	27.4	12.5	32.3	0.8	47.3	53.9	6.6	Integration Method *1)
Vert	3216.010	AV	42.4	28.7	3.7	32.0	0.8	43.6	53.9	10.3	
Vert	4824.000	AV	32.5	31.6	5.4	31.6	-	37.9	53.9	16.0	Floor Noise
Vert	7236.000	AV	33.5	36.9	6.5	32.8	-	44.1	53.9	9.8	Floor Noise
Vert	9648.000	AV	33.8	38.8	7.3	33.2	-	46.7	53.9	7.2	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	2412.000	PK	95.8	27.4	12.5	32.3	103.4	-	-	Carrier
Hori	2400.000	PK	54.3	27.4	12.5	32.3	61.9	83.4	21.5	
Vert	2412.000	PK	90.3	27.4	12.5	32.3	97.9	-	-	Carrier
Vert	2400.000	PK	47.8	27.4	12.5	32.3	55.4	77.9	22.5	

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10689818H	
Date	04/16/2015	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH
Engineer	Ken Fujita	Tomoki Matsui
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11n-20 2437MHz	

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	3249.406	PK	48.0	28.8	3.8	32.0	-	48.6	73.9	25.3	
Hori	4874.000	PK	40.7	31.7	5.5	31.6	-	46.3	73.9	27.6	Floor Noise
Hori	7311.000	PK	44.7	37.0	6.5	32.8	-	55.4	73.9	18.5	Floor Noise
Hori	9748.000	PK	42.2	38.9	7.4	33.3	-	55.2	73.9	18.7	Floor Noise
Hori	3249.406	AV	43.0	28.8	3.8	32.0	0.8	44.4	53.9	9.5	
Hori	4874.000	AV	32.4	31.7	5.5	31.6	-	38.0	53.9	15.9	Floor Noise
Hori	7311.000	AV	34.0	37.0	6.5	32.8	-	44.7	53.9	9.2	Floor Noise
Hori	9748.000	AV	33.1	38.9	7.4	33.3	-	46.1	53.9	7.8	Floor Noise
Vert	3249.220	PK	46.6	28.8	3.8	32.0	-	47.2	73.9	26.7	
Vert	4874.000	PK	42.2	31.7	5.5	31.6	-	47.8	73.9	26.1	Floor Noise
Vert	7311.000	PK	42.0	37.0	6.5	32.8	-	52.7	73.9	21.2	Floor Noise
Vert	9748.000	PK	41.0	38.9	7.4	33.3	-	54.0	73.9	19.9	Floor Noise
Vert	3249.220	AV	41.3	28.8	3.8	32.0	0.8	42.7	53.9	11.2	
Vert	4874.000	AV	33.4	31.7	5.5	31.6	-	39.0	53.9	14.9	Floor Noise
Vert	7311.000	AV	33.4	37.0	6.5	32.8	-	44.1	53.9	9.8	Floor Noise
Vert	9748.000	AV	32.8	38.9	7.4	33.3	-	45.8	53.9	8.1	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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10689818H	
Date	04/16/2015	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH	22 deg. C / 38% RH
Engineer	Ken Fujita	Tomoki Matsui
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11n-20 2462MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	63.0	27.6	12.6	32.3	-	70.9	73.9	3.0	
Hori	3282.700	PK	47.4	28.8	3.8	32.0	-	48.0	73.9	25.9	
Hori	4924.000	PK	40.1	31.9	5.5	31.6	-	45.9	73.9	28.0	Floor Noise
Hori	7386.000	PK	44.8	37.1	6.5	32.9	-	55.5	73.9	18.4	Floor Noise
Hori	9848.000	PK	42.0	38.9	7.4	33.3	-	55.0	73.9	18.9	Floor Noise
Hori	2483.500	AV	45.1	27.6	12.6	32.3	0.8	53.8	53.9	0.1	Integration Method *1)
Hori	3282.700	AV	43.0	28.8	3.8	32.0	0.8	44.4	53.9	9.5	
Hori	4924.000	AV	31.9	31.9	5.5	31.6	-	37.7	53.9	16.2	Floor Noise
Hori	7386.000	AV	33.5	37.1	6.5	32.9	-	44.2	53.9	9.7	Floor Noise
Hori	9848.000	AV	33.0	38.9	7.4	33.3	-	46.0	53.9	7.9	Floor Noise
Vert	2483.500	PK	56.3	27.6	12.6	32.3	-	64.2	73.9	9.7	
Vert	3282.649	PK	47.7	28.8	3.8	32.0	-	48.3	73.9	25.6	
Vert	4924.000	PK	40.3	31.9	5.5	31.6	-	46.1	73.9	27.8	Floor Noise
Vert	7386.000	PK	42.0	37.1	6.5	32.9	-	52.7	73.9	21.2	Floor Noise
Vert	9848.000	PK	41.4	38.9	7.4	33.3	-	54.4	73.9	19.5	Floor Noise
Vert	2483.500	AV	40.0	27.6	12.6	32.3	0.8	48.7	53.9	5.2	Integration Method *1)
Vert	3282.649	AV	42.6	28.8	3.8	32.0	0.8	44.0	53.9	9.9	
Vert	4924.000	AV	31.9	31.9	5.5	31.6	-	37.7	53.9	16.2	Floor Noise
Vert	7386.000	AV	33.3	37.1	6.5	32.9	-	44.0	53.9	9.9	Floor Noise
Vert	9848.000	AV	33.0	38.9	7.4	33.3	-	46.0	53.9	7.9	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

Test place	Ise EMC Lab.		
Report No.	10689818H		
Semi Anechoic Chamber	No.2	No.4	No.4
Date	03/29/2015	04/20/2015	04/21/2015
Temperature/ Humidity	23 deg. C / 30% RH	23 deg. C /52% RH	22 deg. C /53% RH
Engineer	Yuta Moriya (1-10GHz)	Takafumi Noguchi (Below 1GHz)	Ken Fujita (Above 10GHz)
Mode	Tx BT LE 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	39.710	QP	23.3	14.3	7.3	28.5	-	16.4	40.0	23.6	
Hori	62.158	QP	23.1	7.1	7.6	28.4	-	9.4	40.0	30.6	
Hori	80.121	QP	23.0	6.8	7.9	28.4	-	9.3	40.0	30.7	
Hori	123.509	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Hori	129.726	QP	23.0	13.6	8.5	28.1	-	17.0	43.5	26.5	
Hori	251.702	QP	21.7	17.2	9.5	27.6	-	20.8	46.0	25.2	
Hori	2390.000	PK	68.9	29.3	3.5	35.0	-	66.7	73.9	7.2	
Hori	4804.000	PK	43.7	32.7	5.8	34.2	-	48.0	73.9	25.9	
Hori	7206.000	PK	43.5	36.8	7.2	34.1	-	53.4	73.9	20.5	
Hori	9608.000	PK	42.2	38.9	8.1	34.7	-	54.5	73.9	19.4	Floor Noise
Hori	2390.000	AV	53.1	29.3	3.5	35.0	2.0	52.9	53.9	1.0	*1)
Hori	4804.000	AV	35.8	32.7	5.8	34.2	2.0	42.1	53.9	11.8	
Hori	7206.000	AV	34.9	36.8	7.2	34.1	2.0	46.8	53.9	7.1	
Hori	9608.000	AV	35.6	38.9	8.1	34.7	-	47.9	53.9	6.0	Floor Noise
Vert	42.388	QP	23.3	13.3	7.3	28.5	-	15.4	40.0	24.6	
Vert	59.548	QP	23.7	7.5	7.6	28.4	-	10.4	40.0	29.6	
Vert	79.554	QP	23.2	6.7	7.9	28.4	-	9.4	40.0	30.6	
Vert	123.661	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Vert	129.700	QP	23.0	13.6	8.5	28.1	-	17.0	43.5	26.5	
Vert	249.719	QP	21.7	17.1	9.5	27.6	-	20.7	46.0	25.3	
Vert	2390.000	PK	67.7	29.3	3.5	35.0	-	65.5	73.9	8.4	
Vert	4804.000	PK	43.6	32.7	5.8	34.2	-	47.9	73.9	26.0	
Vert	7206.000	PK	43.5	36.8	7.2	34.1	-	53.4	73.9	20.5	
Vert	9608.000	PK	42.5	38.9	8.1	34.7	-	54.8	73.9	19.1	Floor Noise
Vert	2390.000	AV	51.8	29.3	3.5	35.0	2.0	51.6	53.9	2.3	*1)
Vert	4804.000	AV	34.7	32.7	5.8	34.2	2.0	41.0	53.9	12.9	
Vert	7206.000	AV	34.9	36.8	7.2	34.1	2.0	46.8	53.9	7.1	
Vert	9608.000	AV	35.1	38.9	8.1	34.7	-	47.4	53.9	6.5	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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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

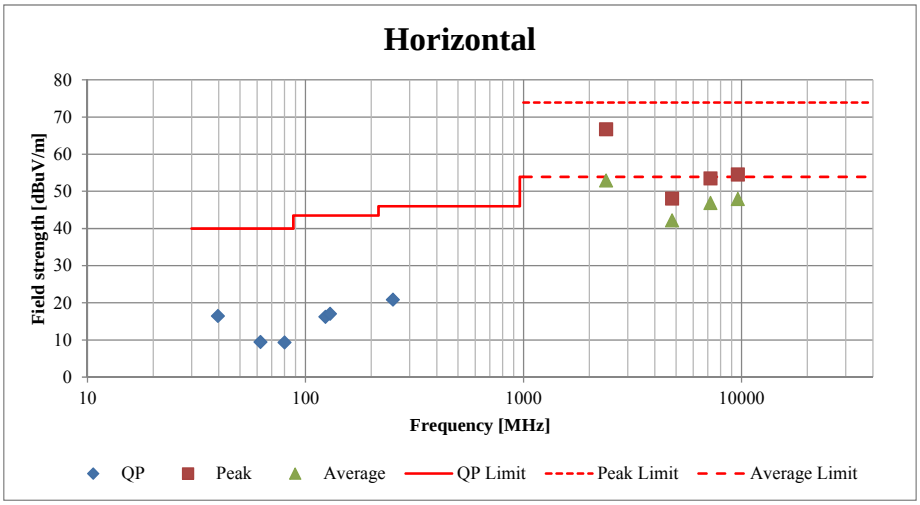
20dBc Data Sheet

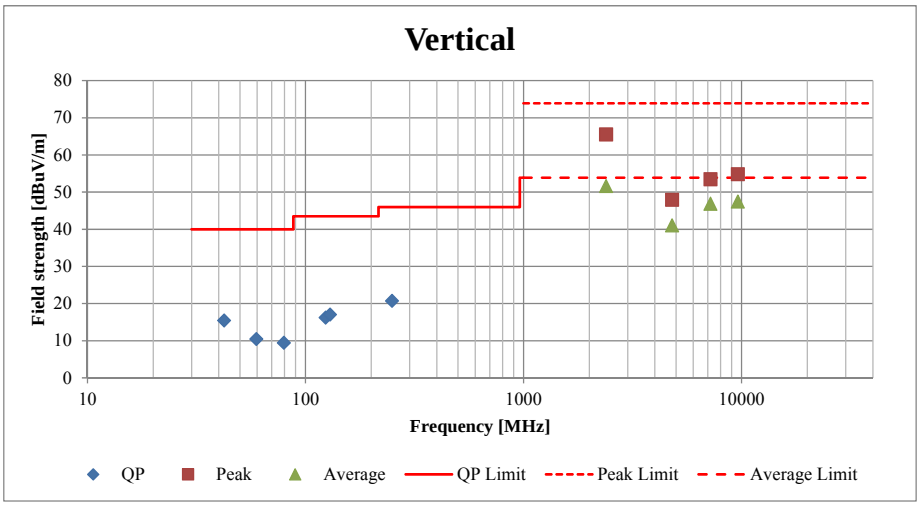
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	112.6	29.3	3.5	35.0	110.4	-	-	Carrier
Hori	2400.000	PK	68.6	29.3	3.5	35.0	66.4	90.4	24.0	
Vert	2402.000	PK	111.0	29.3	3.5	35.0	108.8	-	-	Carrier
Vert	2400.000	PK	67.2	29.3	3.5	35.0	65.0	88.8	23.8	

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab.		
Report No.	10689818H		
Semi Anechoic Chamber	No.2	No.4	No.4
Date	03/29/2015	04/20/2015	04/21/2015
Temperature/ Humidity	23 deg. C / 30% RH	23 deg. C /52% RH	22 deg. C /53% RH
Engineer	Yuta Moriya (1-10GHz)	Takafumi Noguchi (Below 1GHz)	Ken Fujita (Above 10GHz)
Mode	Tx BT LE 2402MHz		





*These plots data contains sufficient number to show the trend of characteristic features for EUT.
ANSI C63.10:2013 Clause 6.3.4 states “For radiated emission test data reporting, both plots and tabular data shall be included”.

Radiated Spurious Emission

Test place	Ise EMC Lab.		
Report No.	10689818H		
Semi Anechoic Chamber	No.2	No.4	No.4
Date	03/29/2015	04/20/2015	04/21/2015
Temperature/ Humidity	23 deg. C / 30% RH	23 deg. C /52% RH	22 deg. C /53% RH
Engineer	Yuta Moriya (1-10GHz)	Takafumi Noguchi (Below 1GHz)	Ken Fujita (Above 10GHz)
Mode	Tx BT LE 2440MHz		

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	39.793	QP	23.3	14.3	7.3	28.5	-	16.4	40.0	23.6	
Hori	62.246	QP	23.2	7.1	7.6	28.4	-	9.5	40.0	30.5	
Hori	80.276	QP	23.0	6.8	7.9	28.4	-	9.3	40.0	30.7	
Hori	123.511	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Hori	129.846	QP	23.1	13.6	8.5	28.1	-	17.1	43.5	26.4	
Hori	251.839	QP	21.7	17.3	9.5	27.6	-	20.9	46.0	25.1	
Hori	4880.000	PK	43.1	32.8	5.9	34.2	-	47.6	73.9	26.3	
Hori	7320.000	PK	42.3	36.8	7.1	34.1	-	52.1	73.9	21.8	
Hori	9760.000	PK	42.5	39.0	7.2	34.7	-	54.0	73.9	19.9	Floor Noise
Hori	4880.000	AV	35.8	32.8	5.9	34.2	2.0	42.3	53.9	11.6	
Hori	7320.000	AV	34.5	36.8	7.1	34.1	2.0	46.3	53.9	7.6	
Hori	9760.000	AV	34.3	39.0	7.2	34.7	-	45.8	53.9	8.1	Floor Noise
Vert	42.638	QP	23.4	13.2	7.3	28.5	-	15.4	40.0	24.6	
Vert	59.546	QP	23.6	7.5	7.6	28.4	-	10.3	40.0	29.7	
Vert	79.574	QP	23.1	6.7	7.9	28.4	-	9.3	40.0	30.7	
Vert	123.499	QP	23.0	13.0	8.4	28.1	-	16.3	43.5	27.2	
Vert	129.581	QP	23.0	13.5	8.5	28.1	-	16.9	43.5	26.6	
Vert	249.624	QP	21.7	17.1	9.5	27.6	-	20.7	46.0	25.3	
Vert	4880.000	PK	43.1	32.8	5.9	34.2	-	47.6	73.9	26.3	
Vert	7320.000	PK	42.3	36.8	7.1	34.1	-	52.1	73.9	21.8	
Vert	9760.000	PK	42.3	39.0	8.1	34.7	-	54.7	73.9	19.2	Floor Noise
Vert	4880.000	AV	35.0	32.8	5.9	34.2	2.0	41.5	53.9	12.4	
Vert	7320.000	AV	34.9	36.8	7.1	34.1	2.0	46.7	53.9	7.2	
Vert	9760.000	AV	34.2	39.0	8.1	34.7	-	46.6	53.9	7.3	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

Radiated Spurious Emission

Test place	Ise EMC Lab.			
Report No.	10689818H			
Semi Anechoic Chamber	No.2	No.2	No.4	No.4
Date	03/30/2015	03/31/2015	04/20/2015	04/21/2015
Temperature/ Humidity	21 deg. C / 32% RH	22 deg. C / 38% RH	23 deg. C / 52% RH	22 deg. C /53% RH
Engineer	Takafumi Noguchi (Band Edge)	Takafumi Noguchi (1-10GHz)	Takafumi Noguchi (Below 1GHz)	Ken Fujita (Above 10GHz)
Mode	Tx BT LE 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	40.043	QP	23.3	14.2	7.3	28.5	-	16.3	40.0	23.7	
Hori	62.422	QP	23.1	7.1	7.6	28.4	-	9.4	40.0	30.6	
Hori	80.112	QP	23.0	6.8	7.9	28.4	-	9.3	40.0	30.7	
Hori	123.354	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Hori	129.680	QP	22.9	13.6	8.5	28.1	-	16.9	43.5	26.6	
Hori	252.026	QP	21.7	17.3	9.5	27.6	-	20.9	46.0	25.1	
Hori	2483.500	PK	66.1	29.3	12.8	34.9	-	73.3	73.9	0.6	
Hori	4960.000	PK	45.0	33.0	4.8	34.3	-	48.5	73.9	25.4	
Hori	7440.000	PK	42.5	36.8	5.7	34.2	-	50.8	73.9	23.1	Floor Noise
Hori	9920.000	PK	44.1	39.0	7.0	34.7	-	55.4	73.9	18.5	Floor Noise
Hori	2483.500	AV	40.4	29.3	12.8	34.9	2.0	49.6	53.9	4.3	Integration Method *1)
Hori	4960.000	AV	35.5	33.0	4.8	34.3	2.0	41.0	53.9	12.9	
Hori	7440.000	AV	34.2	36.8	5.7	34.2	-	42.5	53.9	11.4	Floor Noise
Hori	9920.000	AV	34.2	39.0	7.0	34.7	-	45.5	53.9	8.4	Floor Noise
Vert	42.888	QP	23.3	13.1	7.3	28.5	-	15.2	40.0	24.8	
Vert	59.627	QP	23.3	7.5	7.6	28.4	-	10.0	40.0	30.0	
Vert	79.604	QP	23.1	6.7	7.9	28.4	-	9.3	40.0	30.7	
Vert	123.459	QP	22.9	13.0	8.4	28.1	-	16.2	43.5	27.3	
Vert	129.629	QP	23.0	13.5	8.5	28.1	-	16.9	43.5	26.6	
Vert	2483.500	PK	65.2	29.3	12.8	34.9	-	72.4	73.9	1.5	
Vert	4960.000	PK	44.4	33.0	4.8	34.3	-	47.9	73.9	26.0	
Vert	7440.000	PK	42.3	36.8	5.7	34.2	-	50.6	73.9	23.3	Floor Noise
Vert	9920.000	PK	43.4	39.0	7.0	34.7	-	54.7	73.9	19.2	Floor Noise
Vert	2483.500	AV	39.8	29.3	12.8	34.9	2.0	49.0	53.9	4.9	Integration Method *1)
Vert	4960.000	AV	35.7	33.0	4.8	34.3	2.0	41.2	53.9	12.7	
Vert	7440.000	AV	34.2	36.8	5.7	34.2	-	42.5	53.9	11.4	Floor Noise
Vert	9920.000	AV	34.2	39.0	7.0	34.7	-	45.5	53.9	8.4	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

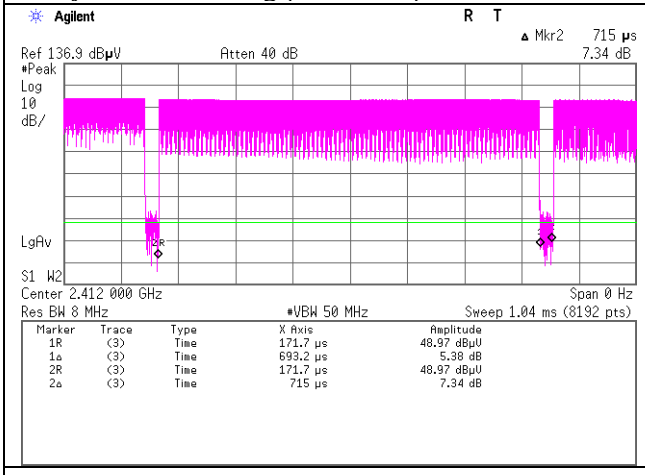
*1) Not Out of Band emission (Leakage Power)

Burst rate confirmation

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10689818H
Date	04/16/2015
Temperature/ Humidity	22 deg. C / 38% RH
Engineer	Tomoki Matsui
Mode	Tx 11b / 11g / 11n-20

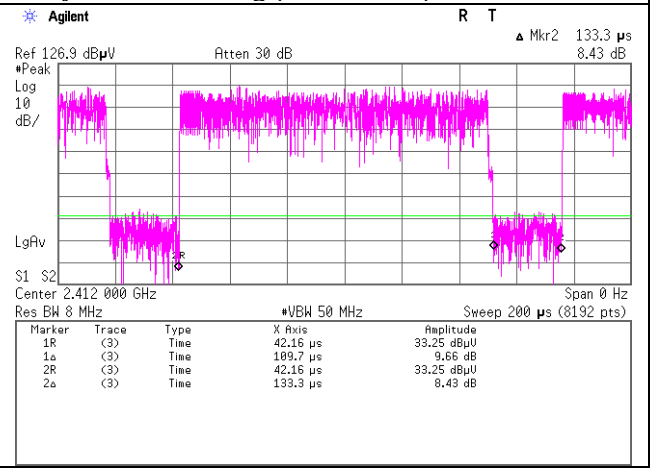
Tx 11b 1Mbps

Tx on / (Tx on + Tx off) = 0.970
Tx on / (Tx on + Tx off) * 100 = 97.0 %
Duty factor = 10 * log (715 / 693.2) = 0.13 dB



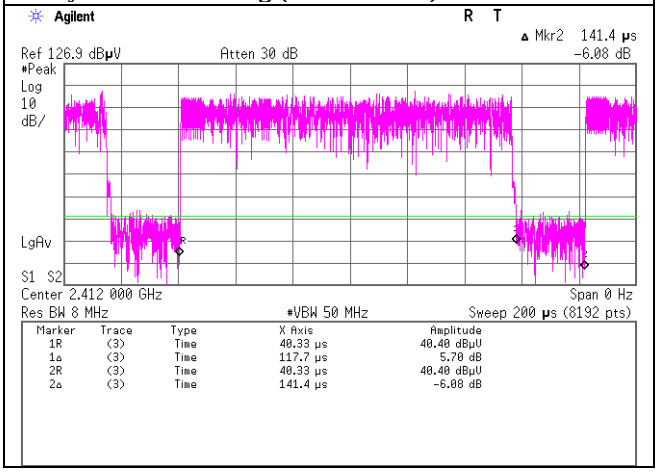
Tx 11g 6Mbps

Tx on / (Tx on + Tx off) = 0.823
Tx on / (Tx on + Tx off) * 100 = 82.3 %
Duty factor = 10 * log (133.3 / 109.7) = 0.85 dB



Tx 11n-20 MCS0

Tx on / (Tx on + Tx off) = 0.832
Tx on / (Tx on + Tx off) * 100 = 83.2 %
Duty factor = 10 * log (141.4 / 117.7) = 0.80 dB



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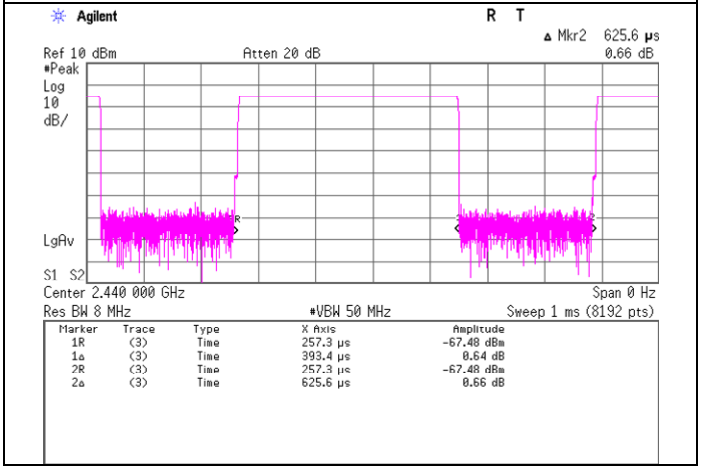
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Burst rate confirmation

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/24/2015
Temperature/ Humidity	22 deg. C / 48% RH
Engineer	Shinichi Miyazono
Mode	Tx BT LE

BT LE	
Tx on / (Tx on + Tx off) =	**0.629**
Tx on / (Tx on + Tx off) * 100 =	**62.9 %**
Duty factor = 10 * log (625.6 / 393.4) =	**2.01 dB**

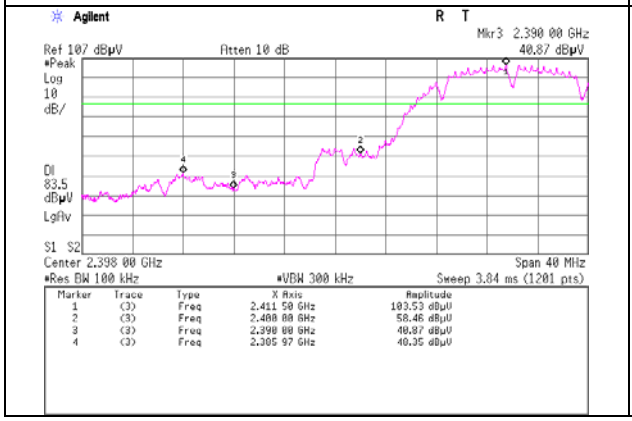


Band Edge confirmation

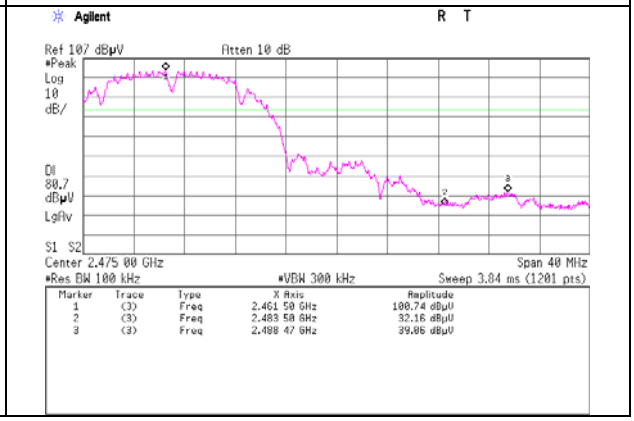
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	06/03/2015
Temperature/ Humidity	24deg. C / 55% RH
Engineer	Takafumi Noguchi
Mode	Tx 11b / 11g

11b

2412 MHz

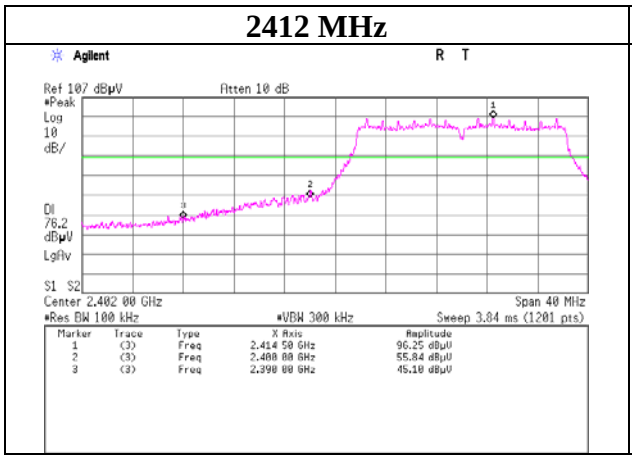


2462 MHz

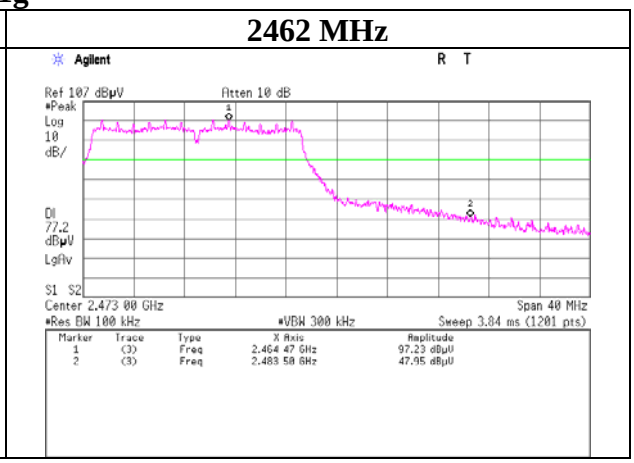


11g

2412 MHz



2462 MHz

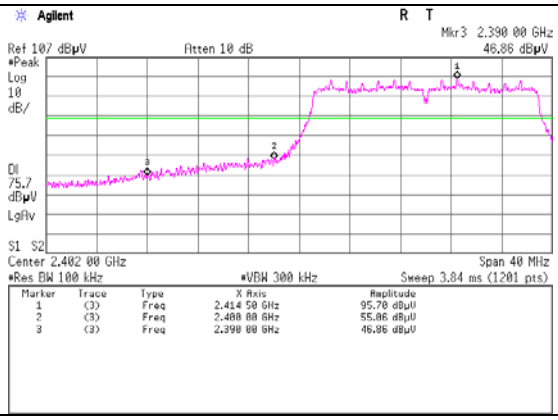
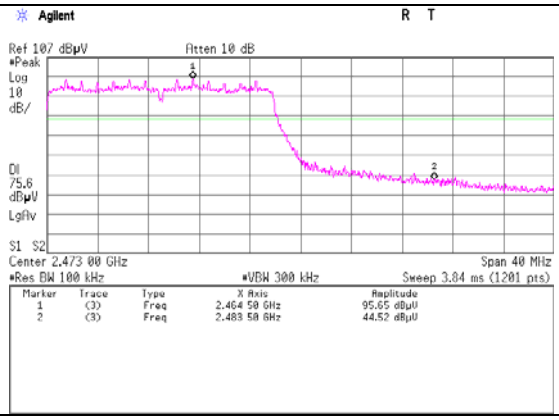


*Final result of band edge was measured as radiated spurious emission. Refer to Radiated Spurious Emission's pages.

Band Edge confirmation

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	06/03/2015
Temperature/ Humidity	24deg. C / 55% RH
Engineer	Takafumi Noguchi
Mode	Tx 11n-20

11n-20

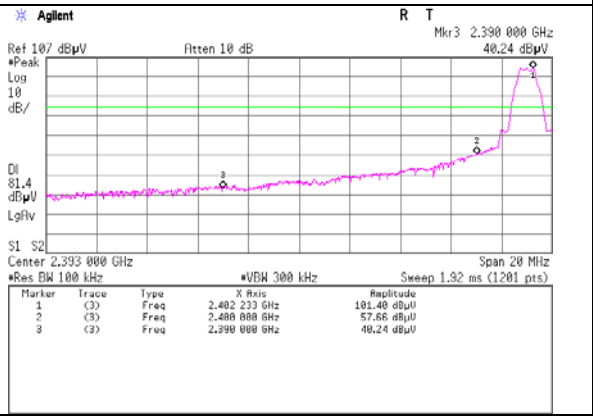
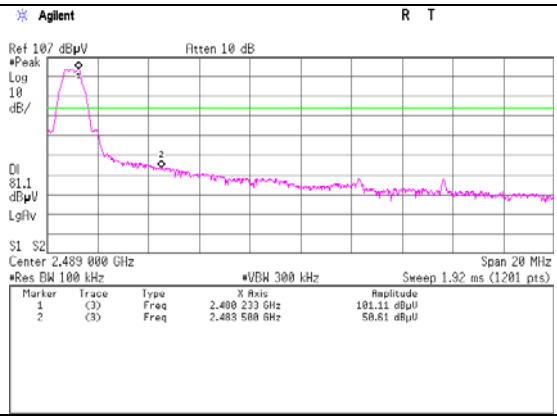
2412 MHz	2462 MHz
	

* Final result of band edge was measured as radiated spurious emission. Refer to Radiated Spurious Emission's pages.

Band Edge confirmation

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	06/03/2015
Temperature/ Humidity	24deg. C / 55% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

BT LE

2402 MHz	2480 MHz
	

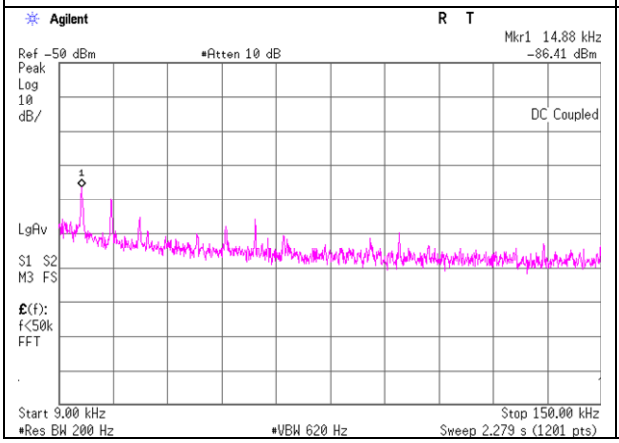
* Final result of band edge was measured as radiated spurious emission. Refer to Radiated Spurious Emission's pages.

Conducted Spurious Emission

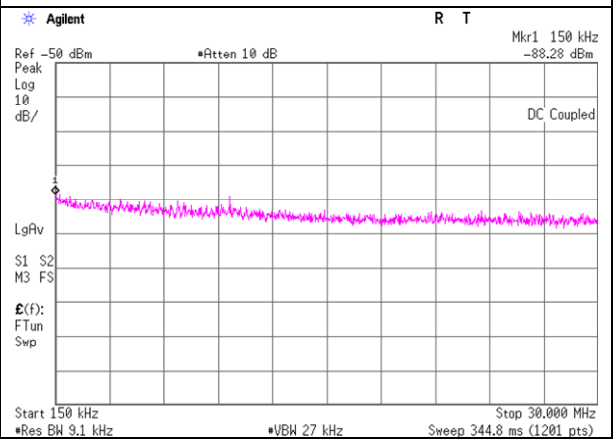
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/23/2015
Temperature/ Humidity	24 deg. C / 44% RH
Engineer	Shinichi Miyazono
Mode	Tx 11g

11g 2437MHz

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
14.88	-86.41	0.01	9.83	3.50	1	-73.1	300	6.0	-11.8	44.1	55.9	
150.00	-88.28	0.01	9.82	3.50	1	-75.0	300	6.0	-13.7	24.0	37.7	

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

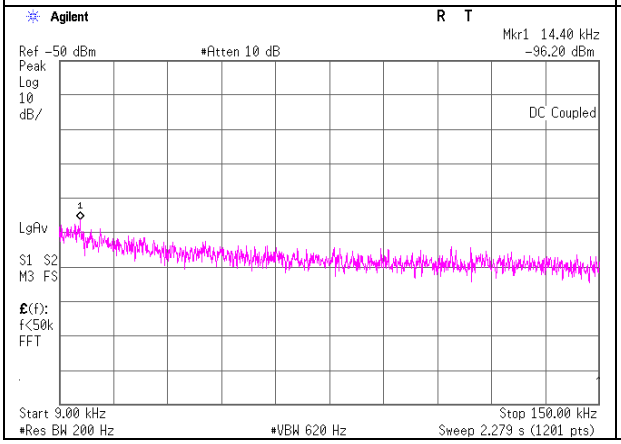
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

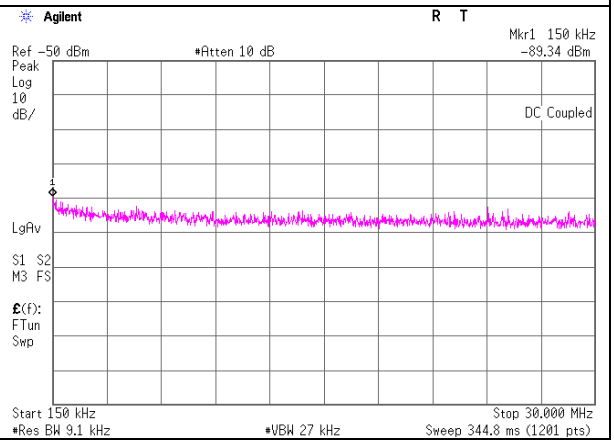
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

BT LE 2402MHz

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
14.40	-96.2	0.01	10.0	3.5	1	-82.7	300	6.0	-21.4	44.4	65.8	
150.00	-89.3	0.01	10.0	3.5	1	-75.8	300	6.0	-14.6	24.0	38.6	

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

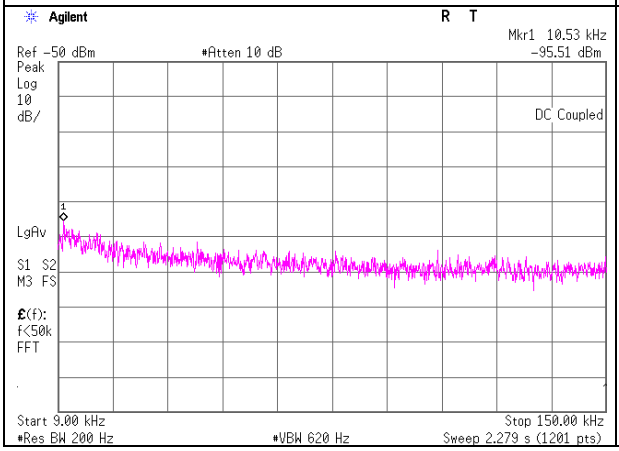
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

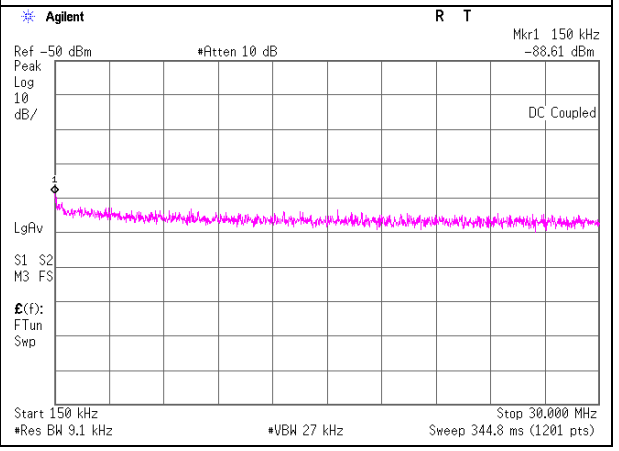
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

BT LE 2440MHz

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
10.53	-95.5	0.01	10.0	3.5	1	-82.0	300	6.0	-20.7	47.1	67.8	
150.00	-88.6	0.01	10.0	3.5	1	-75.1	300	6.0	-13.8	24.0	37.8	

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

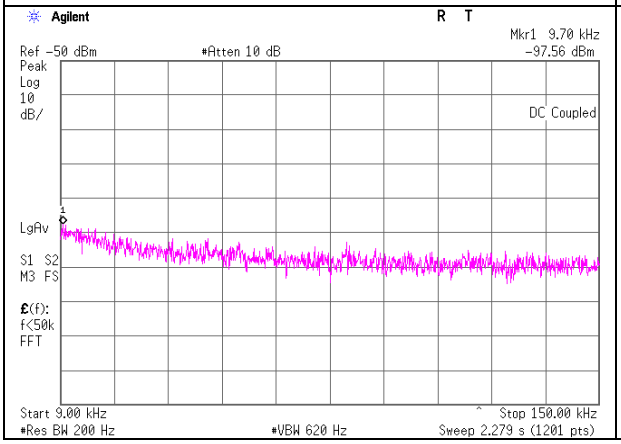
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

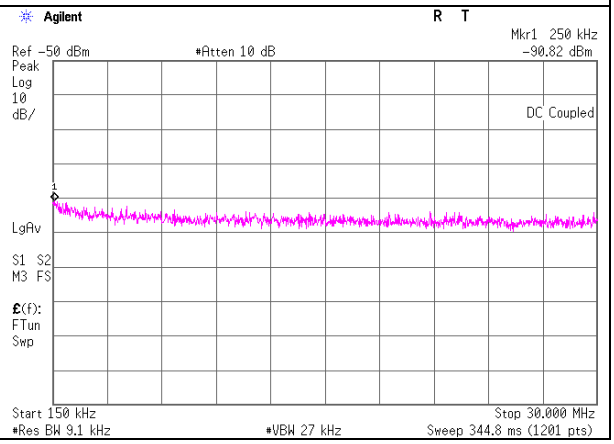
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

BT LE 2480MHz

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
9.70	-97.6	0.01	10.0	3.5	1	-84.1	300	6.0	-22.8	47.8	70.6	
250.00	-90.8	0.01	10.0	3.5	1	-77.3	300	6.0	-16.1	19.6	35.7	

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

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

Power Density

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/24/2015
Temperature/ Humidity	24 deg. C / 43% RH
Engineer	Shinichi Miyazono
Mode	Tx 11b / 11g / 11n-20

11b Antenna 1

Freq.	S/A Reading	Cable Loss	Atten. Loss	Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[dB]
2412	-18.23	1.65	9.98	-6.60	0.22	8.00	14.60
2437	-18.14	1.66	9.98	-6.50	0.22	8.00	14.50
2462	-18.25	1.66	9.98	-6.61	0.22	8.00	14.61

11g Antenna 1

Freq.	S/A Reading	Cable Loss	Atten. Loss	Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[dB]
2412	-23.50	1.65	9.98	-11.87	0.07	8.00	19.87
2437	-22.45	1.66	9.98	-10.81	0.08	8.00	18.81
2462	-23.41	1.66	9.98	-11.77	0.07	8.00	19.77

11n-20 Antenna 1

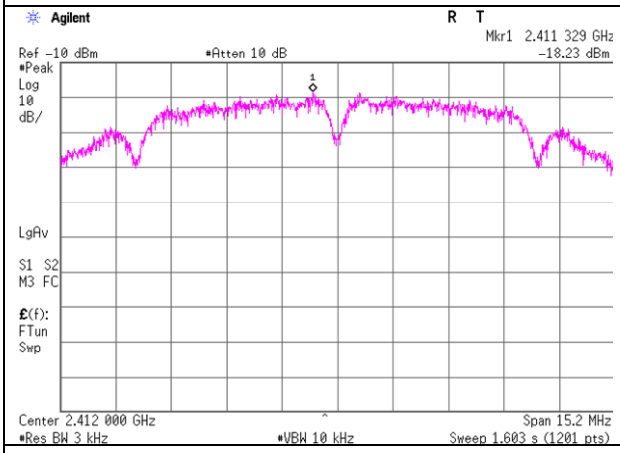
Freq.	S/A Reading	Cable Loss	Atten. Loss	Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[dB]
2412	-24.22	1.65	9.98	-12.59	0.06	8.00	20.59
2437	-22.69	1.66	9.98	-11.05	0.08	8.00	19.05
2462	-24.38	1.66	9.98	-12.74	0.05	8.00	20.74

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

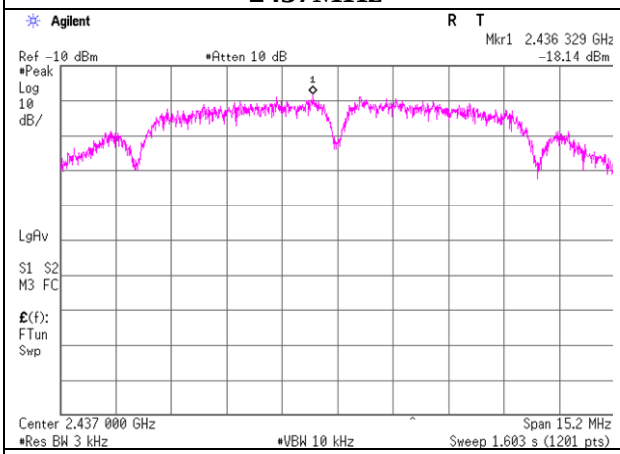
Power Density

11b Antenna 1

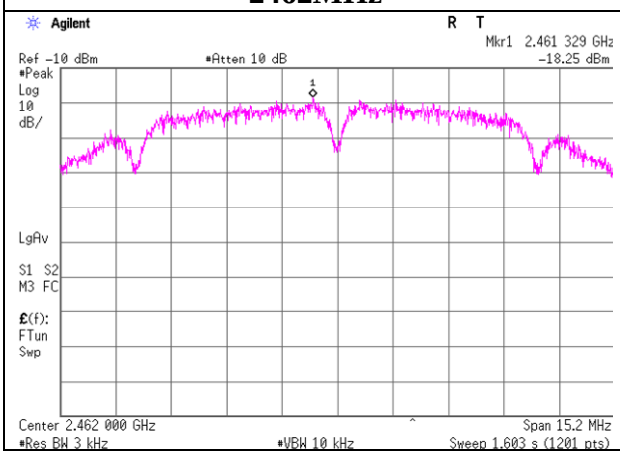
2412MHz



2437MHz

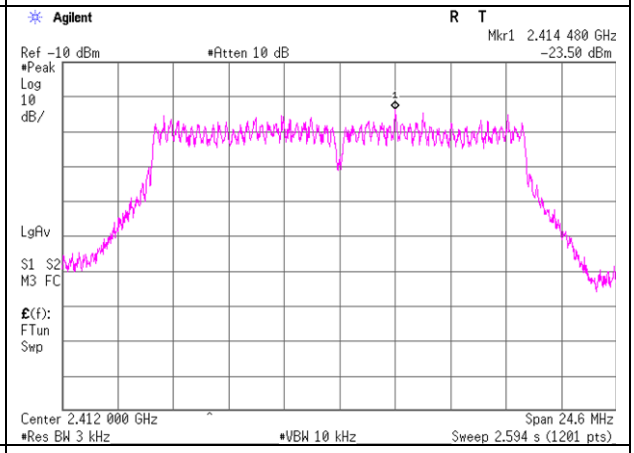


2462MHz

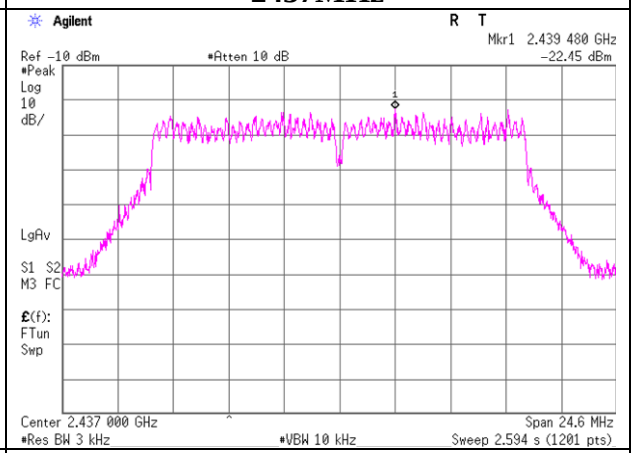


11g Antenna 1

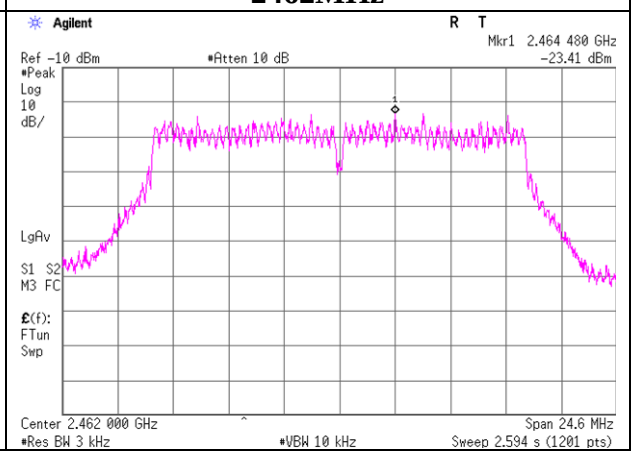
2412MHz



2437MHz



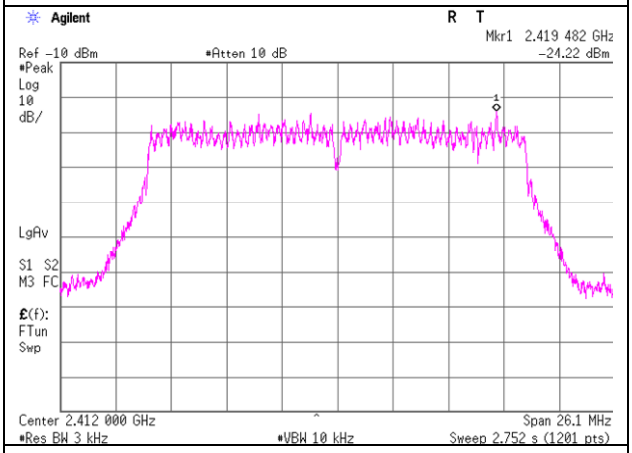
2462MHz



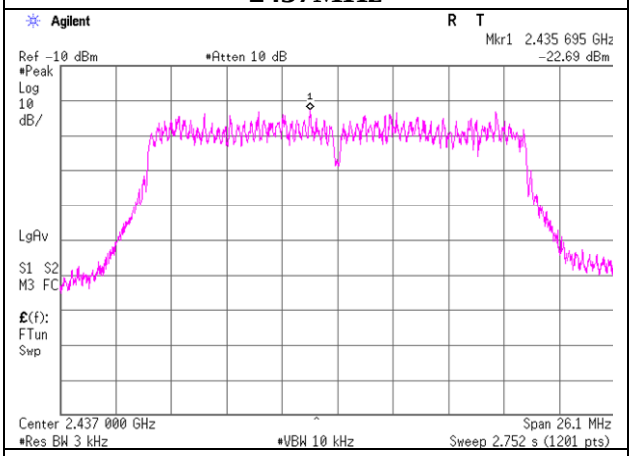
Power Density

11n-20 Antenna 1

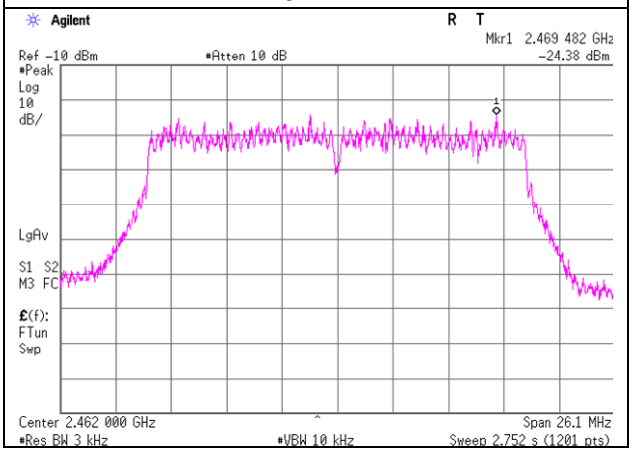
2412MHz



2437MHz



2462MHz



Power Density

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

Antenna 2

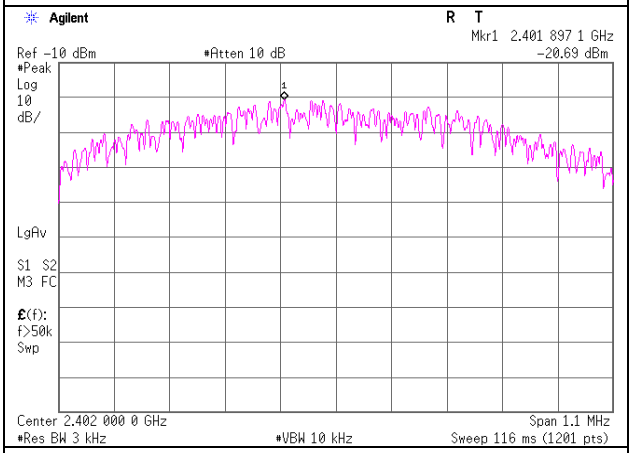
Freq.	Reading	Cable Loss	Atten.	Result		Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[dB]
2402	-20.69	1.64	9.98	-9.07	0.12	8.00	17.07
2440	-20.80	1.66	9.98	-9.16	0.12	8.00	17.16
2480	-20.95	1.68	9.98	-9.29	0.12	8.00	17.29

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

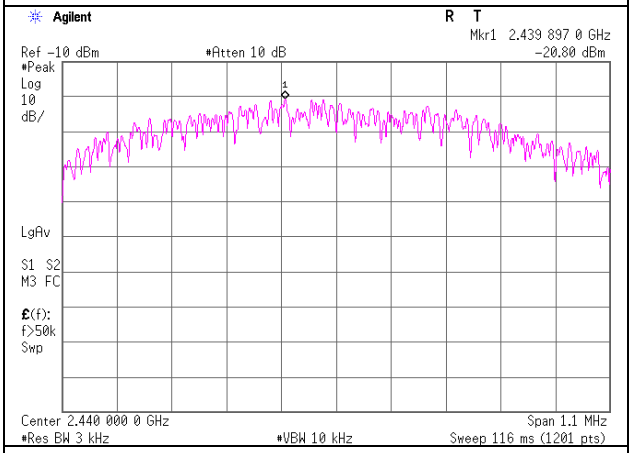
Power Density

BT LE Antenna 2

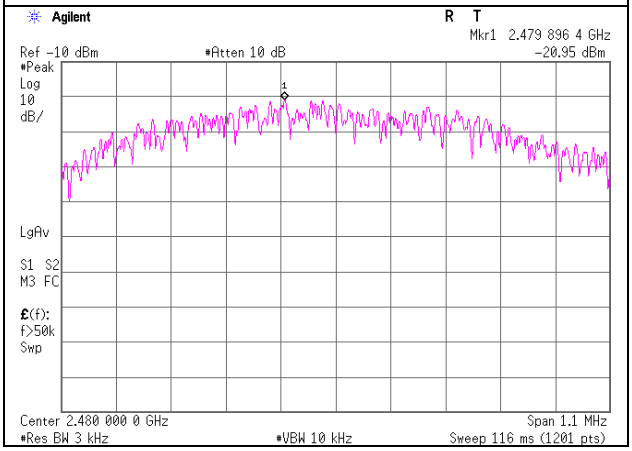
2402MHz



2440MHz

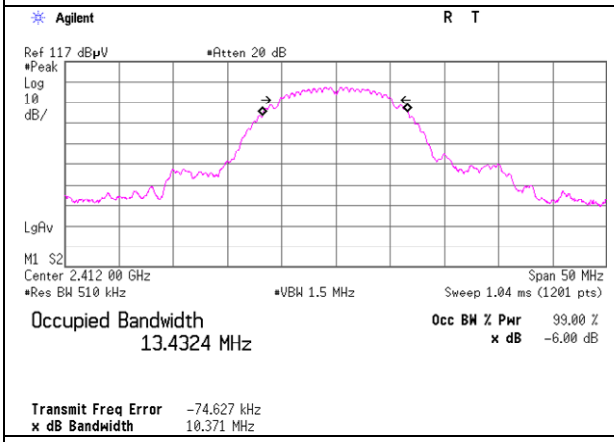
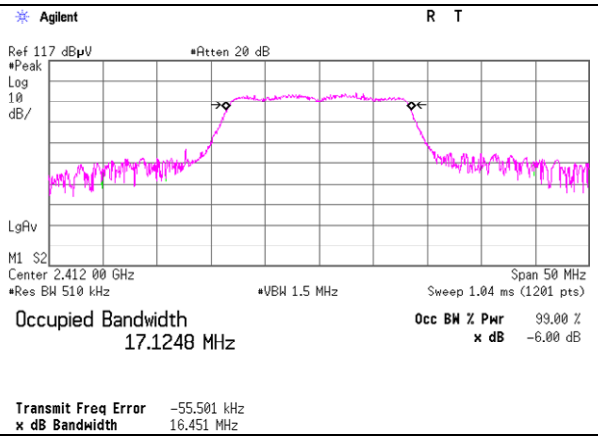
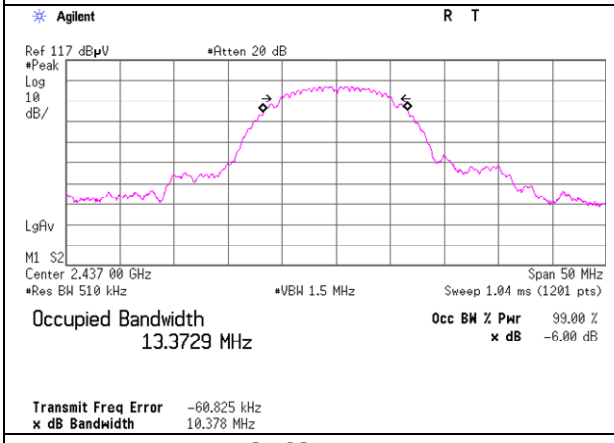
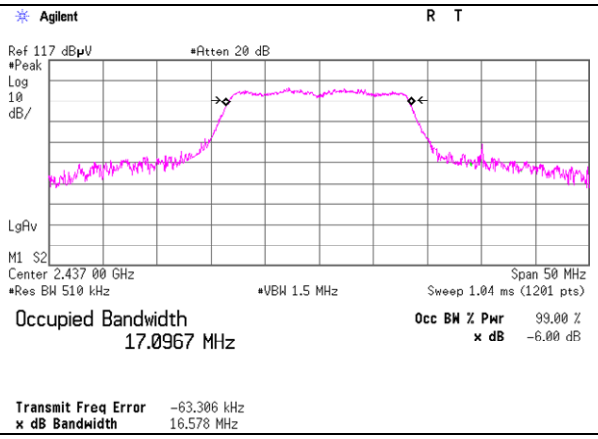
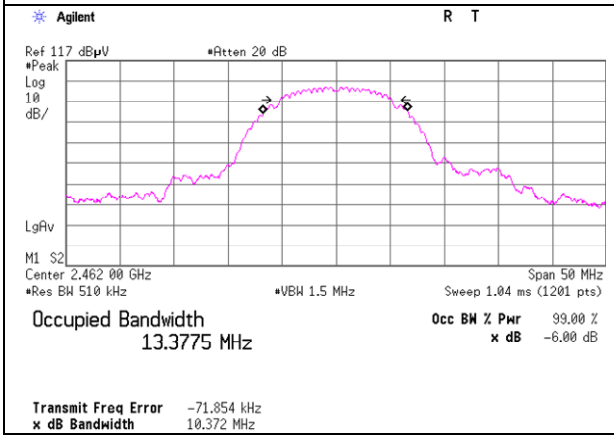
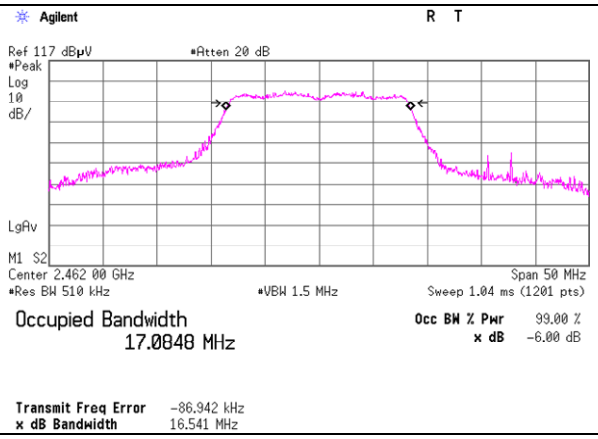


2480MHz



99%Occupied Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/24/2015
Temperature/ Humidity	24 deg. C / 43% RH
Engineer	Shinichi Miyazono
Mode	Tx 11b / 11g

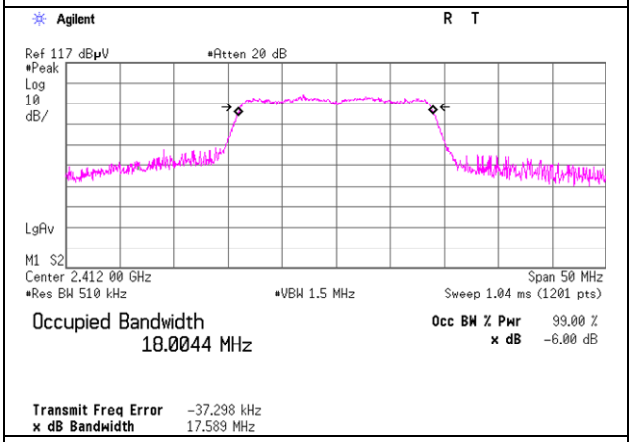
11b	11g
2412MHz	**2412MHz**
	
2437MHz	**2437MHz**
	
2462MHz	**2462MHz**
	

99% Occupied Bandwidth

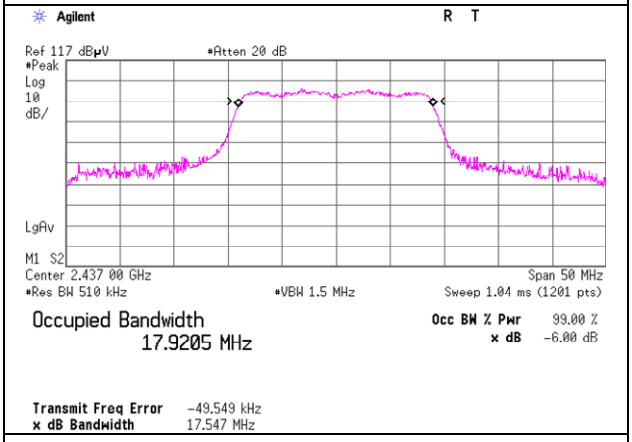
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/24/2015
Temperature/ Humidity	24 deg. C / 43% RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-20

11n-20

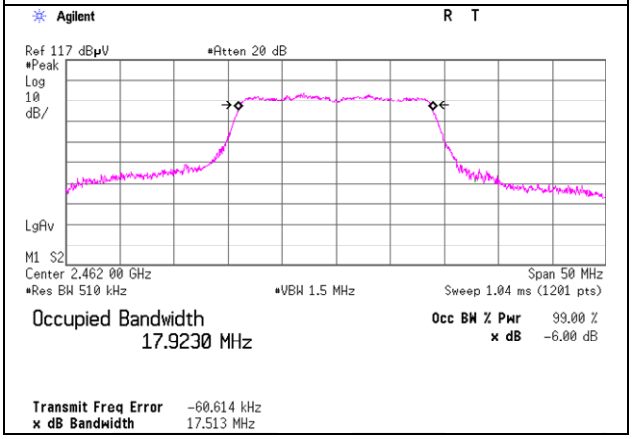
2412MHz



2437MHz



2462MHz

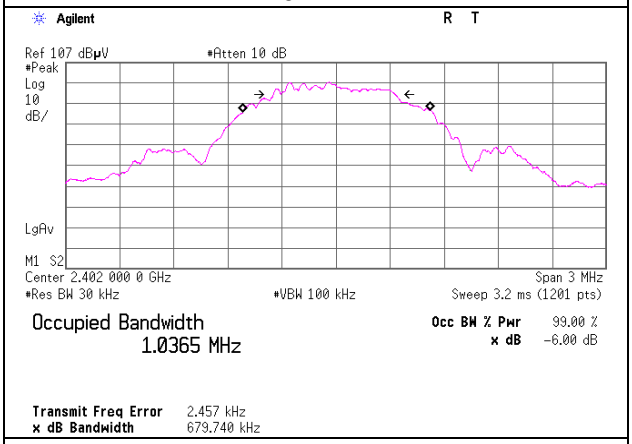


99% Occupied Bandwidth

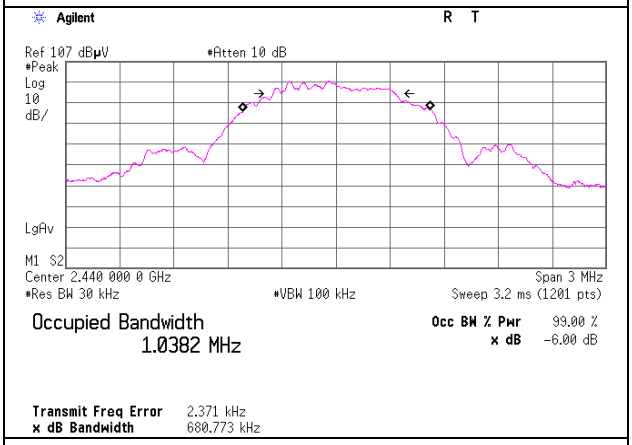
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	10689818H
Date	04/26/2015
Temperature/ Humidity	24 deg. C / 37% RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

BT LE

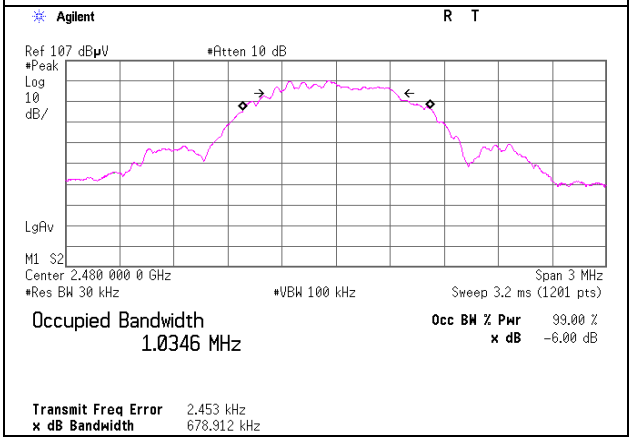
2402MHz



2440MHz



2480MHz



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2014/06/25 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2014/10/17 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2015/02/05 * 12
MCC-166	Microwave Cable	Junkosha	MWX221	1303S120(1m) / 1311S167(5m)	RE	2014/09/24 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2015/01/28 * 12
MAT-57	Attenuator(10dB)	Suhner	6810.19.A	-	RE	2015/01/08 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/26 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2015/01/13 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2015/03/12 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2014/06/11 * 12
MJM-23	Measure	ASKUL	-	-	RE/CE	-
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	RE	2015/02/16 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2014/09/24 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2015/02/26 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2015/03/09 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2014/06/30 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE/CE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2014/06/02 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2014/09/26 * 12
MTW-02	Torque wrench	HUBER+SUHNER	74 Z-0-0-21	98190	RE	2015/01/16 * 36
MTW-04	Torque wrench	HUBER+SUHNER	74 Z-0-0-21	17129	RE	2015/01/16 * 36
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE	2014/07/10 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2014/07/15 * 12

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOTS-MATM	Antenna Terminal Measurement Software	UL Japan	-	-	AT	-
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2014/12/22 * 12
MSA-15	Spectrum Analyzer	Agilent	E4440A	MY46187105	AT	2014/11/11 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2015/04/01 * 12
MPSE-22	Power sensor	Agilent	N1923A	MY54070003	AT	2015/04/01 * 12
MCC-37	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2014/09/25 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2014/08/08 * 12
MAT-24	Attenuator(10dB)(above1GHz)	Agilent	8493C	71389	AT	2014/06/12 * 12
MTW-09	Torque wrench	HUBER+SUHNER	74 Z-0-0-21	72676	AT	2015/03/05 * 36
MCC-64	Coaxial Cable	UL Japan	-	-	AT	2015/03/06 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2014/11/19 * 12
MAT-25	Attenuator(10dB)(above1GHz)	Agilent	8493C	71642	AT	2014/06/12 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2014/10/02 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2014/06/16 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2014/06/16 * 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