



RADIO TEST REPORT


Test Report No. : 10748020H-B-R2

Applicant : silex technology, Inc.
Type of Equipment : Wireless LAN SDIO module
Model No. : SX-SDMAN2
FCC ID : N6C-SDMAN2
Test regulation : FCC Part 15 Subpart C: 2015
(WLAN, BT LE parts)
Test Result : Complied


1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 10748020H-B-R1. 10748020H-B-R1 is replaced with this report.

Date of test: May 1 to July 23, 2015

Representative test engineer:


Kazuya Yoshioka
Engineer
Consumer Technology Division

Approved by:


Takahiro Hatakeda
Leader
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	6
SECTION 4: Operation of E.U.T. during testing.....	9
SECTION 5: Conducted Emission.....	16
SECTION 6: Radiated Spurious Emission	17
SECTION 7: Antenna Terminal Conducted Tests.....	19
APPENDIX 1: Test data	20
Conducted Emission	20
6dB Bandwidth	23
Maximum Peak Output Power	28
Average Output Power.....	32
Burst rate confirmation	34
Band Edge confirmation	36
Radiated Spurious Emission	39
Conducted Spurious Emission	63
Power Density	67
99%Occupied Bandwidth	73
APPENDIX 2: Test instruments	76
APPENDIX 3: Photographs of test setup	79
Conducted Emission	79
Radiated Spurious Emission	80

SECTION 1: Customer information

Company Name : silex technology, Inc.
Address : 2-3-1 Hikaridai, Seika-cho, Kyoto 619-0237, Japan
Telephone Number : +81-774-98-3878
Facsimile Number : +81-774-98-3758
Contact Person : Toshiro Kometani

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless LAN SDIO module
Model No. : SX-SDMAN2
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.3 V, DC 1.8 V
Receipt Date of Sample : April 17, 2015
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: SX-SDMAN2 (referred to as the EUT in this report) is a Wireless LAN SDIO module.

General Specification

Clock frequency(ies) in the system : 26 MHz
Operating Temperature : -20 deg. C - +85 deg. C

Radio Specification

Radio Type : Transceiver
Method of Frequency Generation : Synthesizer
Power Supply (inner) : DC 1.27 V

	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n (20 M band)	IEEE802.11n (40 M band)	Bluetooth Ver.4.0 with EDR function
Frequency of operation	2412 MHz - 2462 MHz *1)	2412 MHz - 2462 MHz *1)	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz	2402 MHz - 2480 MHz *1)
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		BT: FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK) LE: GFSK
Channel spacing	5MHz		20MHz	40MHz	BT: 1MHz LE: 2MHz
Antenna type	[Antenna 1] Antenna port 0: External antenna (WLAN) Antenna port 1: External antenna (WLAN / Bluetooth)				
	[Antenna 2] Antenna port 0: Chip antenna (WLAN) Antenna port 1: Chip antenna (WLAN / Bluetooth)				
Antenna Connector type	Antenna 1: U.FL Alternative connector Antenna 2: none				
Antenna Gain	Antenna 1: 1.8 dBi (2.4 GHz Band), 3.9 dBi (5 GHz Band) Antenna 2: 1.4 dBi (2.4 GHz Band), 2.3 dBi (5 GHz Band)				

*1) This test report applies to IEEE802.11b/g/n-20 (2412 MHz - 2462 MHz) and Bluetooth Ver.4.0 with EDR function (LE part: 2402 MHz - 2480 MHz).

* Spurious emission test was performed with two antenna type (external antenna and chip antenna).

** WLAN and Bluetooth do not transmit simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on June 12, 2015 and effective July 13, 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 revision on June 12, 2015 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4-2009 7. AC powerline Conducted Emission measurements IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	[WLAN] QP 9.5 dB, 0.15000 MHz, L AV 14.7 dB, 0.17890 MHz, L / 0.29746MHz L [BT LE] QP 17.1 dB, 11.92375 MHz, L AV 14.7 dB, 11.92375 MHz, L	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(4)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	[WLAN] 2.1 dB 2483.500 MHz, AV, Hori. [BT LE] 2.3 dB 2498.189 MHz, AV, Hori.	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.					
*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r03 12.2.7.					
* In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.					

FCC 15.31 (e)

The RF Module has own regulator.

The RF Module is constantly provided voltage through own regulator regardless of input voltage (DC 3.3 V / DC 1.8 V).

Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

[Antenna 1]

The EUT has a unique coupling/antenna connector (U.FL Alternative connector). Therefore the equipment complies with the requirement of 15.203/212.

[Antenna 2]

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 15.203/212.

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 $k = 2$.

Ise EMC Lab.

Test site (semi anechoic chamber)	Conducted emission Uncertainty (+/-)			
	No. 1	No. 2	No. 3	No. 4
150 kHz - 30 MHz	3.5 dB	3.5 dB	3.4 dB	3.5 dB

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

Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz	
0.7 dB	1.5 dB	1.5 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Conducted Emission test

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

Radiated emission test

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

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

3.5 Test Location

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

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

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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.

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

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

4.1 Operating Mode(s)

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

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n MIMO 20MHz BW (11n-20)	MCS 11 (Long GI), PN9
Bluetooth(BT) LE(Low Energy)	Maximum Packet Size, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel).	
*Power of the EUT was set by the software as follows; - Power Setting: Refer to the following table - Software: Atheros Radio Test Tool (ART-2-GUI) Version 2.3 *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 setting: WLAN]

	Rate	Antenna port	Target Power	Power Setting		
				Antenna 1	Antenna 2	
11b	11Mbps (Long GI)	Antenna 1	2412 MHz	12.5	13	13
			2437 MHz	12.5	13	13
			2462 MHz	12.5	13	12.5
11g	24Mbps	Antenna 1	2412 MHz	7.5	7	7
			2417 MHz	9	10	10
			2422 MHz	10.5	12	12
			2437 MHz - 2447 MHz	12.5	13	13
			2452 MHz	11	12	12
			2457 MHz	10	10.5	10
			2462 MHz	9	9	8.5
11n20	MCS11 (Long GI)	Antenna 0+1	2412 MHz	5.5	5.5	5.5
			2417 MHz	7.5	9.5	9.5
			2422 MHz	10	11.5	11.5
			2437 MHz - 2447 MHz	12.5	13	13
			2452 MHz	10	12	12
			2457 MHz	8	10.5	10
			2462 MHz	6	6.5	6

[Power setting: BT LE]

BT LE: 1.5dBm

*Above values of “Power Setting” were setting values in the test tool in order to output the Target power.
Since the serial number of the product was different for antenna 1 and antenna 2, there were two different power setting values.

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

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna port	Tested frequency
Conducted Emission *1)	11n-20 Tx	0+1	2437MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz
Spurious Emission above 1GHz (Radiated)	11b Tx 11g Tx	1 *2)	2412MHz 2437MHz 2462MHz
	11n-20 Tx	0+1	2412MHz 2437MHz 2462MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz
Spurious Emission below 1GHz (Radiated) *1)	11n-20 Tx	0+1	2437MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz
6dB Bandwidth 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	1 *2)	2412MHz 2437MHz 2462MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz
Maximum Peak Output Power, Power Density	11b Tx 11g Tx	1 *2)	2412MHz 2437MHz 2462MHz
	11n-20 Tx	0+1	2412MHz 2437MHz 2462MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz
Spurious Emission (Conducted) *1)	11n-20 Tx	1	2437MHz
	BT LE Tx	1	2402MHz 2440MHz 2480MHz

*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 Antenna port 0 and Antenna port 1, test was performed with the antenna that had higher power as a representative.

[BT LE mode only]

-This EUT has two ratings: DC 3.3 V and DC 1.8 V.

After the comparison between above ratings, all tests except for Maximum Peak Output Power test were performed with rating that had worst case (DC 3.3 V) as a representative.

UL Japan, Inc.

Ise EMC Lab.

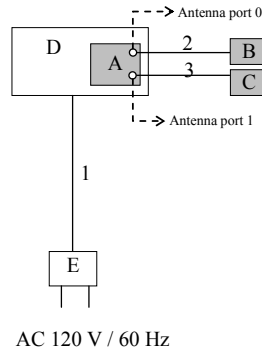
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

[Antenna 1: WLAN]



* 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	Remark
A	Wireless LAN SDIO module	SX-SDMAN2	84253F-010541	silex technology, Inc.	EUT
B	External antenna	H2B1PC1A1C	1	Unictron Technologies Corporation	EUT
C	External antenna	H2B1PC1A1C	2	Unictron Technologies Corporation	EUT
D	Jig	-	-	silex technology, Inc.	-
E	AC Adapter	US115-05	B12-0112765	UNIFIVE	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.80	Unshielded	Unshielded	-
2	RF Cable	0.15	Shielded	Shielded	-
3	RF Cable	0.15	Shielded	Shielded	-

UL Japan, Inc.

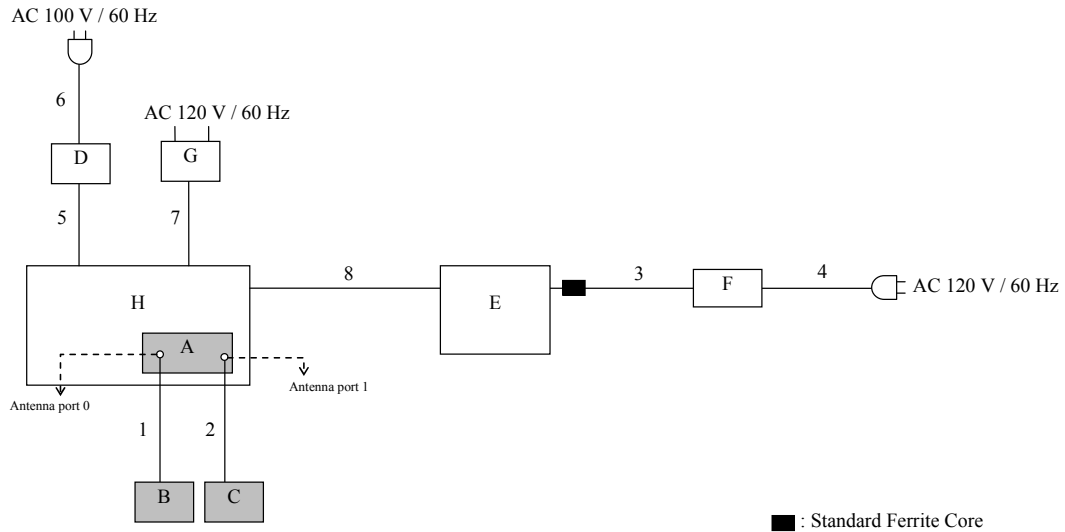
Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Antenna 1: BT LE]



* 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	Wireless LAN SDIO module	SX-SDMAN2	84253F-01053F	silex technology, Inc.	EUT
B	External Antenna	H2B1PC1A1C	1	Unictron Technologies Corporation	EUT
C	External Antenna	H2B1PC1A1C	2	Unictron Technologies Corporation	EUT
D	Power supply	PMC35-2A	13090501	KIKUSUI ELECTRONICS, CORP.	-
E	Laptop PC	Latitude E6530	1FBSYW1	Dell	-
F	AC Adapter	LA90PM111	CN-0Y4M8K-72438-31A-0861-A00	Dell	-
G	AC Adapter	US115-05	B12-0112765	UNIFIVE	-
H	Jig	-	-	silex technology, Inc.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.15	Unshielded	Unshielded	-
2	Antenna Cable	0.15	Unshielded	Unshielded	-
3	DC Cable	1.80	Unshielded	Unshielded	-
4	AC Cable	0.80	Unshielded	Unshielded	-
5	DC Cable	0.80	Unshielded	Unshielded	-
6	AC Cable	2.10	Unshielded	Unshielded	-
7	DC Cable	1.80	Unshielded	Unshielded	-
8	USB Cable	1.70	Shielded	Shielded	-

UL Japan, Inc.

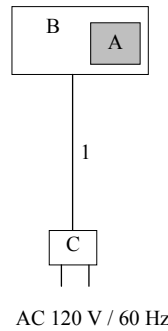
Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Antenna 2: WLAN (Below 1GHz)]



* 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	Remark
A	Wireless LAN SDIO module	SX-SDMAN2	84253F-0106D4	silex technology, Inc.	EUT
B	Jig	-	-	silex technology, Inc.	-
C	AC Adapter	US115-05	B12-0112765	UNIFIVE	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.80	Unshielded	Unshielded	-

UL Japan, Inc.

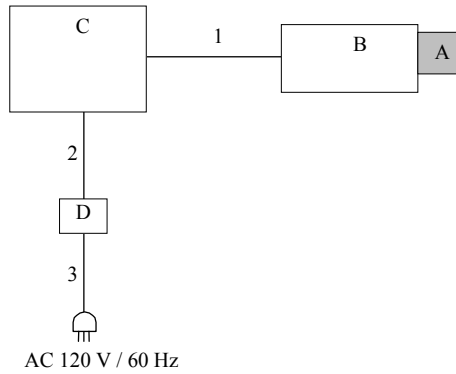
Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Antenna 2: WLAN (Above 1GHz)]



* 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	Remark
A	Wireless LAN SDIO module	SX-SDMAN2	84253F-0106D4	silex technology, Inc.	EUT
B	Jig	-	-	silex technology, Inc.	-
C	Laptop PC	Hp Pro Book 6550b	CNU1242MQO	Hp	-
D	AC Adapter	PPPO09L-E	WBGSTOAIROPJ9U	Hp	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	0.30	Unshielded	Unshielded	-
2	DC Cable	1.80	Unshielded	Unshielded	-
3	AC Cable	1.80	Unshielded	Unshielded	-

UL Japan, Inc.

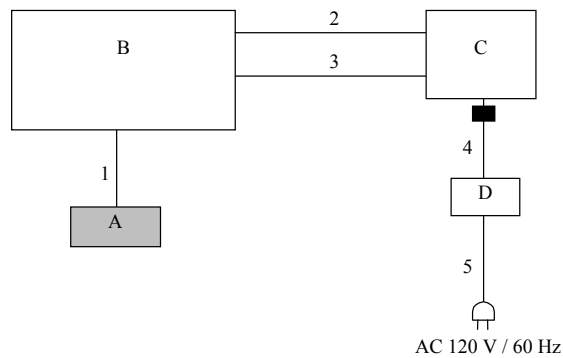
Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Antenna 2: BT LE]



■ : Standard Ferrite Core

* 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	Wireless LAN SDIO module	SX-SDMAN2	84253F-0106D4	silex technology, Inc.	EUT
B	Jig	-	-	silex technology, Inc.	-
C	Laptop PC	Latitude E6530	1FBSYW1	Dell	-
D	AC Adapter	LA90PM111	CN-0Y4M8K-72438-31A-0861-A00	Dell	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	FFC Harness Cable	0.15	Unshielded	Unshielded	-
2	Signal Cable	0.40	Unshielded	Unshielded	-
3	RS-232C-USB conversion Cable	1.80	Shielded	Shielded	-
4	DC Cable	1.80	Unshielded	Unshielded	-
5	AC Cable	0.80	Unshielded	Unshielded	-

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

SECTION 5: Conducted Emission

Test Procedure and conditions

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

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results. Integration Method: <u>13.3.1</u> RBW: 100kHz VBW: 300kHz Span: 2MHz Band Power: 1MHz Detector: Power Averaging (RMS) Trace: 100 traces	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	3 m (below 10 GHz), 1 m *2) (above 10 GHz)		3 m (below 10 GHz), 1 m *2) (above 10 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r03"

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

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

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

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

Measurement range : 30 M - 26.5 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r03".

*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.

(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

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

APPENDIX 1: Test data

Conducted Emission

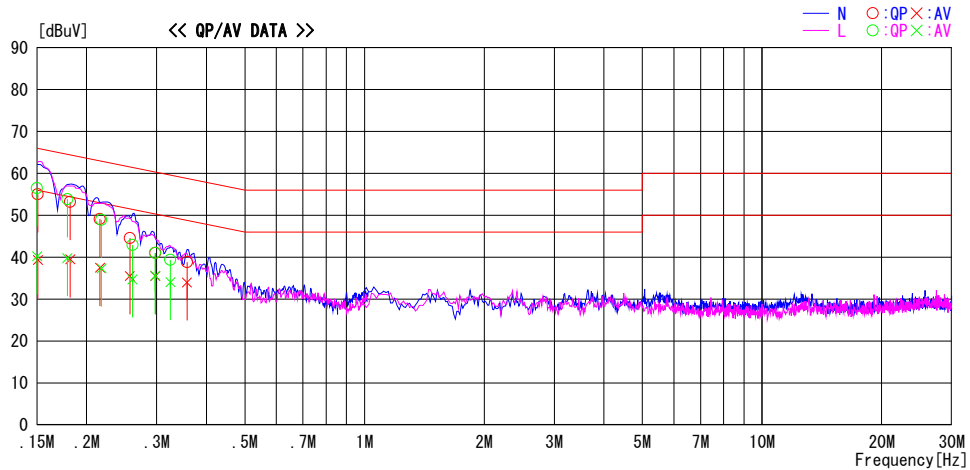
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2015/05/27

Report No. : 10748020H
 Temp./Humi. : 24deg. C / 41% RH
 Engineer : Tomoki Matsui

Mode / Remarks : Tx 11n-20 2437MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15075	41.7	26.0	13.3	55.0	39.3	66.0	56.0	11.0	16.7	N	
0.18175	39.9	26.2	13.3	53.2	39.5	64.4	54.4	11.2	14.9	N	
0.21604	35.8	24.2	13.3	49.1	37.5	63.0	53.0	13.9	15.5	N	
0.25690	31.3	22.2	13.3	44.6	35.5	61.5	51.5	16.9	16.0	N	
0.29769	27.7	22.2	13.3	41.0	35.5	60.3	50.3	19.3	14.8	N	
0.35760	25.5	20.7	13.3	38.8	34.0	58.8	48.8	20.0	14.8	N	
0.15000	43.2	26.9	13.3	56.5	40.2	66.0	56.0	9.5	15.8	L	
0.17890	40.5	26.5	13.3	53.8	39.8	64.5	54.5	10.7	14.7	L	
0.21776	35.6	24.0	13.3	48.9	37.3	62.9	52.9	14.0	15.6	L	
0.26074	29.6	21.4	13.3	42.9	34.7	61.4	51.4	18.5	16.7	L	
0.29746	27.7	22.3	13.3	41.0	35.6	60.3	50.3	19.3	14.7	L	
0.32490	26.1	20.8	13.3	39.4	34.1	59.6	49.6	20.2	15.5	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

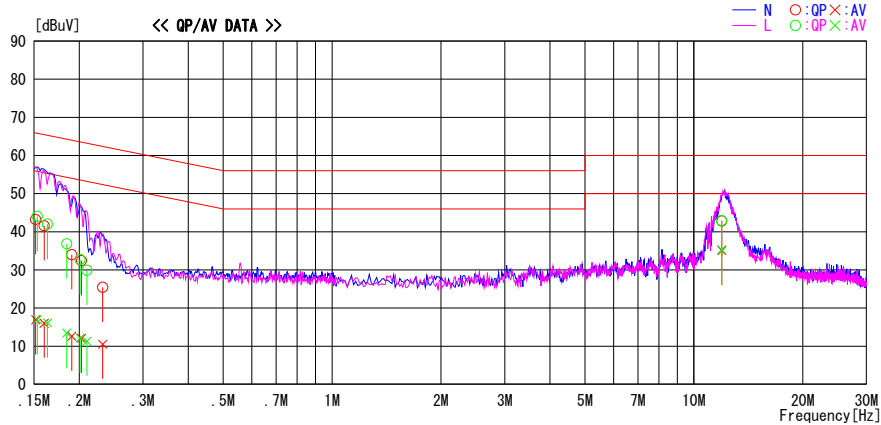
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/05/27

Report No. : 10748020H
 Temp./Humi. : 22deg. C / 43% RH
 Engineer : Tomohisa Nakagawa

Mode / Remarks : Tx LE 2480MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

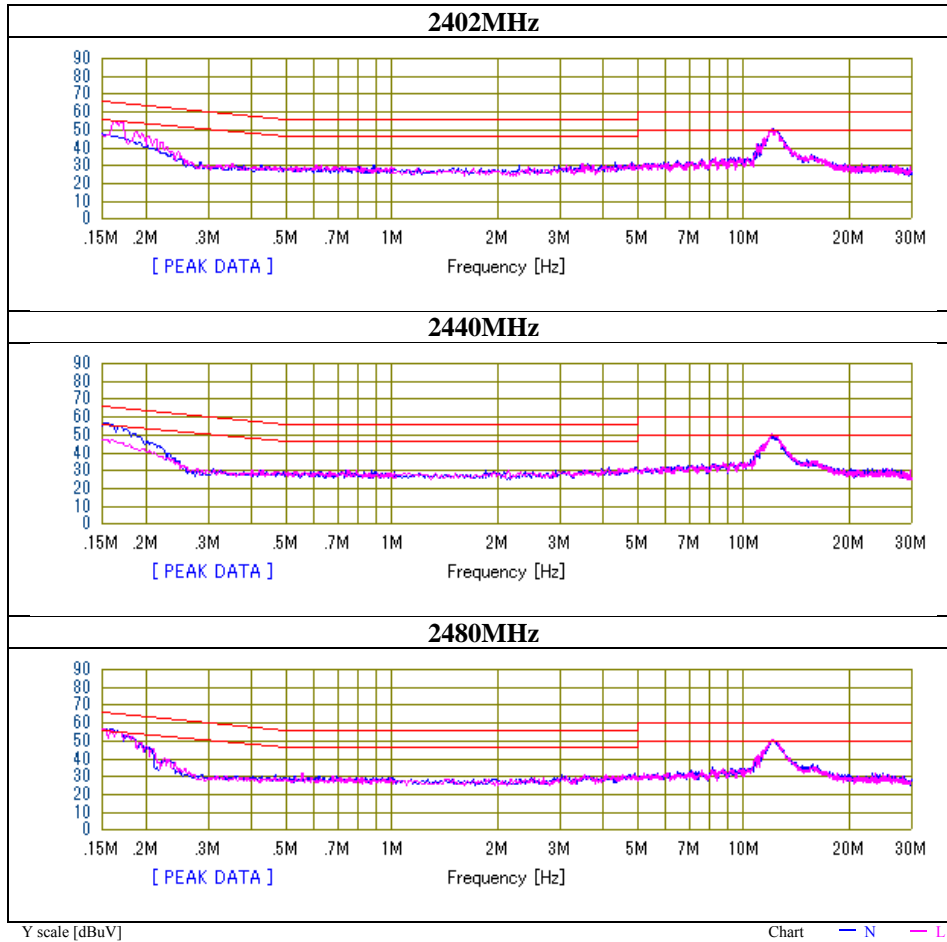


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15170	30.0	3.7	13.2	43.2	16.9	65.9	55.9	22.7	39.0	N	
0.16010	28.4	2.8	13.2	41.6	16.0	65.5	55.5	23.9	39.5	N	
0.19066	20.8	-0.6	13.2	34.0	12.6	64.0	54.0	30.0	41.4	N	
0.20295	19.2	-1.1	13.2	32.4	12.1	63.5	53.5	31.1	41.4	N	
0.23227	12.2	-2.7	13.2	25.4	10.5	62.4	52.4	37.0	41.9	N	
11.94760	28.5	20.8	14.3	42.8	35.1	60.0	50.0	17.2	14.9	N	
0.15325	30.8	3.8	13.2	44.0	17.0	65.8	55.8	21.8	38.8	L	
0.16348	28.8	2.9	13.2	42.0	16.1	65.3	55.3	23.3	39.2	L	
0.18472	23.6	0.2	13.2	36.8	13.4	64.3	54.3	27.5	40.9	L	
0.20110	19.5	-1.1	13.2	32.7	12.1	63.6	53.6	30.9	41.5	L	
0.21003	16.7	-1.9	13.2	29.9	11.3	63.2	53.2	33.3	41.9	L	
11.92375	28.6	21.0	14.3	42.9	35.3	60.0	50.0	17.1	14.7	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.2 Semi Anechoic Chamber
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 68% RH
Engineer	Tomohisa Nakagawa
Mode	Tx BT LE

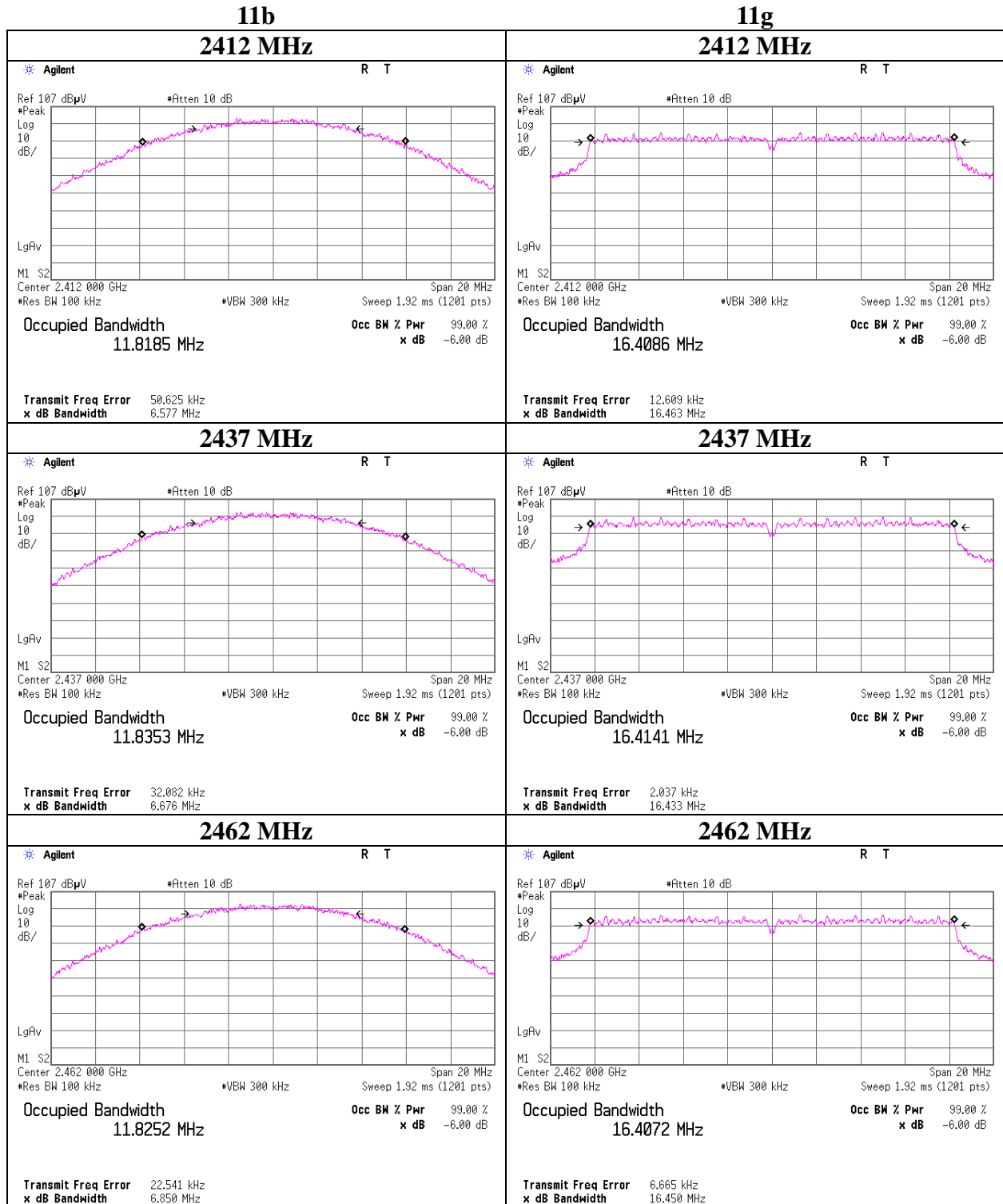


6dB Bandwidth

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10748020H
Date May 22, 2015
Temperature / Humidity 23deg. C / 43% RH
Engineer Kazuya Yoshioka
Mode Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	6.577	> 500
	2437	6.676	> 500
	2462	6.850	> 500
11g	2412	16.463	> 500
	2437	16.433	> 500
	2462	16.450	> 500
11n-20	2412	17.621	> 500
	2437	17.624	> 500
	2462	17.644	> 500

6dB Bandwidth



UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

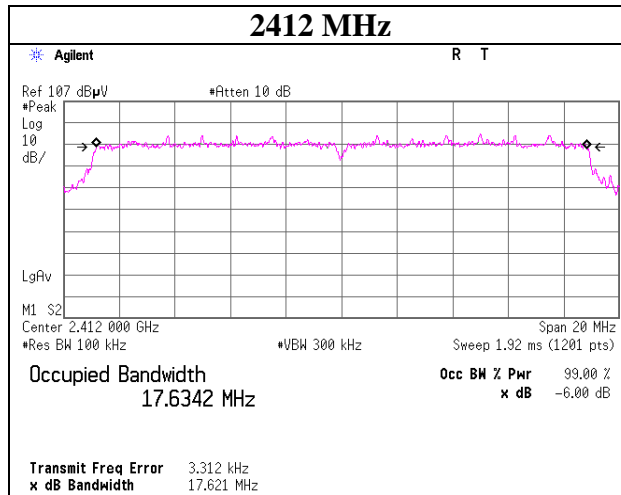
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

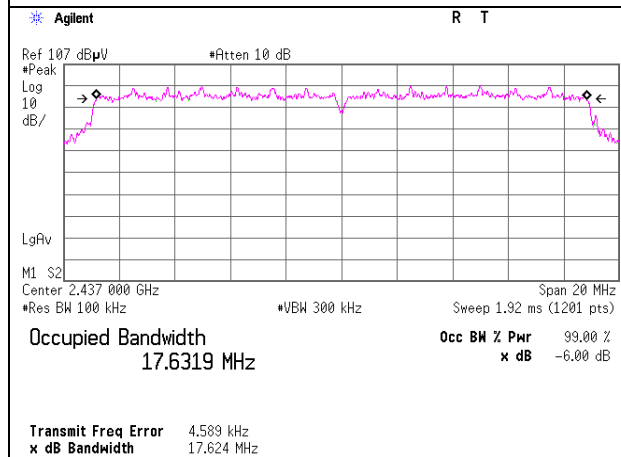
6dB Bandwidth

11n-20

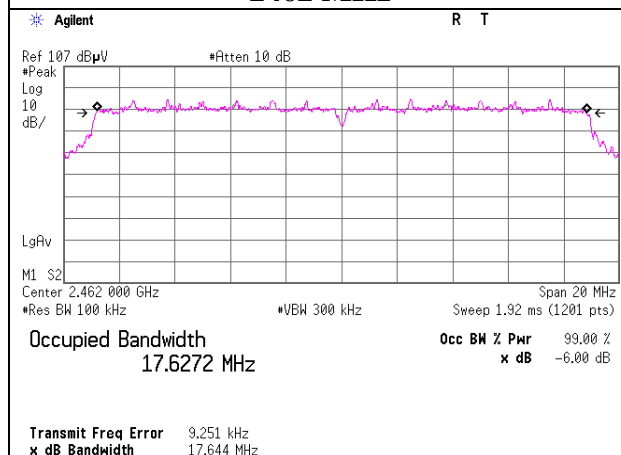
2412 MHz



2437 MHz



2462 MHz



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

6dB Bandwidth

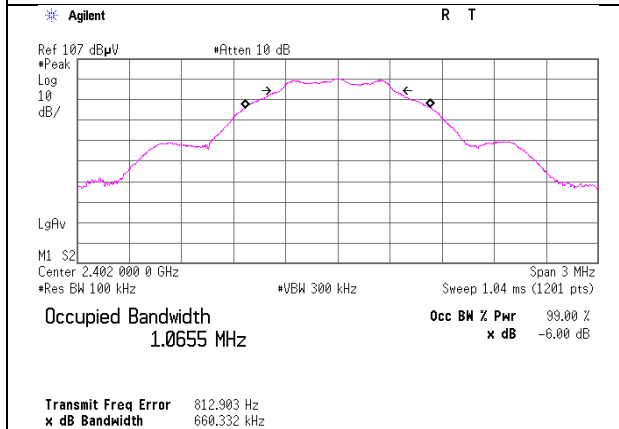
Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10748020H
Date May 27, 2015
Temperature / Humidity 23deg. C / 48% RH
Engineer Yuta Moriya
Mode Tx BT LE

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
BT LE	2402	0.660	> 500
	2440	0.664	> 500
	2480	0.664	> 500

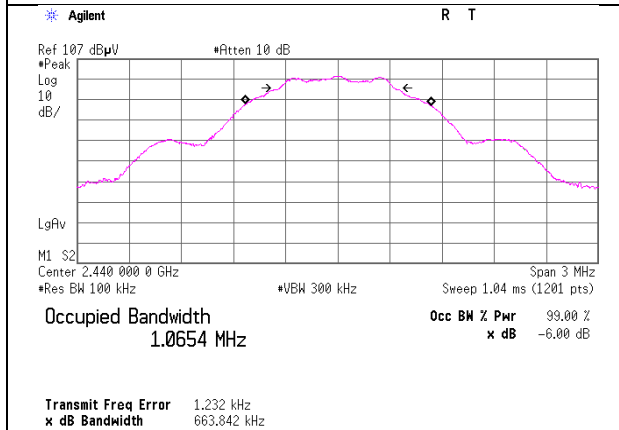
6dB Bandwidth

BT LE

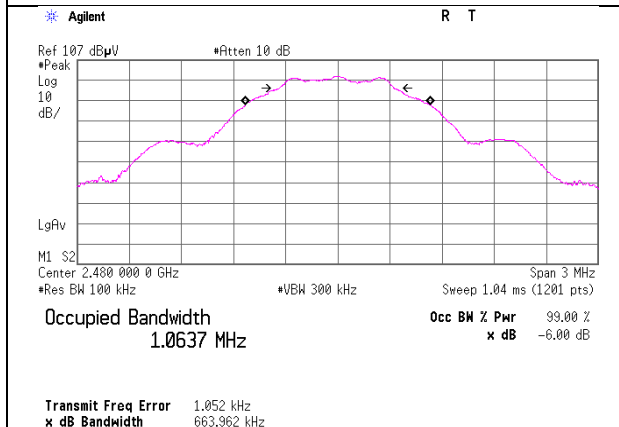
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
 Report No. : 10748020H
 Date : May 1, 2015
 Temperature / Humidity : 23deg. C / 52% RH
 Engineer : Kazuya Yoshioka
 Mode : Tx 11b

Antenna port 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.83	2.07	10.02	16.92	49.20	30.00	1000	13.08
2437	3.92	2.08	10.02	16.02	39.99	30.00	1000	13.98
2462	4.21	2.09	10.02	16.32	42.85	30.00	1000	13.68

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2412MHz

Rate [Mbps]	Reading Antenna port0 [dBm]	Reading Antenna port1 [dBm]	Remark
1	3.89		
2	3.72		
5.5	3.76		
11	3.95	4.83	*

*: Worst Rate

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

Rate [Mbps]	Reading Antenna port0 [dBm]	Preamble	Remark
11	3.95	Long	*
11	3.94	Short	

*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.6 Measurement Room	
Report No.	10748020H	
Date	May 1, 2015	July 23, 2015
Temperature / Humidity	23deg. C / 52% RH	24deg. C / 60% RH
Engineer	Kazuya Yoshioka	Kazuya Yoshioka
Mode	Tx 11g	

Antenna port 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.56	0.77	10.11	17.44	55.46	30.00	1000	12.56
2437	9.09	2.08	10.02	21.19	131.52	30.00	1000	8.81
2462	8.29	0.77	10.11	19.17	82.60	30.00	1000	10.83

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2412MHz

Rate [Mbps]	Reading Antenna port0 [dBm]	Reading Antenna port1 [dBm]	Remark
6	6.62		
9	6.26		
12	6.27		
18	6.33		
24	9.47	9.52	*
36	9.31		
48	9.01		
54	8.80		

*: 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.6 Measurement Room	
Report No.	10748020H	
Date	May 1, 2015	July 23, 2015
Temperature / Humidity	23deg. C / 52% RH	24deg. C / 60% RH
Engineer	Kazuya Yoshioka	Kazuya Yoshioka
Mode	Tx 11n-20	

Antenna port 0+1

Freq. [MHz]	Antenna port 0 Result [mW]	Antenna port 1 Result [mW]	Result Antenna port 0 + 1		Limit		Margin [dB]
			[dBm]	[mW]	[dBm]	[mW]	
2412	34.99	47.10	19.14	82.09	30.00	1000	10.86
2437	121.34	129.12	23.99	250.46	30.00	1000	6.01
2462	42.66	57.15	19.99	99.81	30.00	1000	10.01

Sample Calculation:
Result = Antenna 0+1

Antenna port 0

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.56	0.77	10.11	15.44	34.99	30.00	1000	14.56
2437	8.74	2.08	10.02	20.84	121.34	30.00	1000	9.16
2462	5.42	0.77	10.11	16.30	42.66	30.00	1000	13.70

Antenna port 1

Freq. [MHz]	P/M(PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	5.85	0.77	10.11	16.73	47.10	30.00	1000	13.27
2437	9.01	2.08	10.02	21.11	129.12	30.00	1000	8.89
2462	6.69	0.77	10.11	17.57	57.15	30.00	1000	12.43

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

2412MHz

MCS Index	Reading Antenna port 0 [dBm]	Reading Antenna port 1 [dBm]	Total Antenna port 0+1 [dBm]	Remark
0	6.51		-	
1	6.40		-	
2	6.43		-	
3	9.07	9.28	-	*
4	8.97		-	
5	8.75		-	
6	8.68		-	
7	7.47		-	
8	6.63	6.66	9.66	
9	6.27	6.73	9.52	
10	6.43	6.57	9.51	
11	8.96	8.98	11.98	*
12	8.88	8.83	11.87	
13	8.68	8.80	11.75	
14	8.72	8.84	11.79	
15	7.17	8.69	11.01	

*Worst Rate

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

MCS Number	Reading Antenna port 0 [dBm]	Reading Antenna port 1 [dBm]	Total Antenna port 0+1 [dBm]	GI	Remark
3	-	9.28	-	Long	*
3	-	9.10	-	Short	
11	8.96	8.98	11.98	Long	*
11	8.89	8.94	11.93	Short	

* Worst GI

*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.6 Measurement Room
Report No. : 10748020H
Date : May 27, 2015
Temperature / Humidity : 23deg. C / 48% RH
Engineer : Yuta Moriya
Mode : Tx BT LE

DC 3.3 V

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-9.65	2.06	10.02	2.43	1.75	30.00	1000	27.57
2440	-8.31	2.08	10.02	3.79	2.39	30.00	1000	26.21
2480	-7.86	2.10	10.02	4.26	2.67	30.00	1000	25.74

DC 1.8 V

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-9.82	2.06	10.02	2.26	1.68	30.00	1000	27.74
2440	-8.83	2.08	10.02	3.27	2.12	30.00	1000	26.73
2480	-8.96	2.10	10.02	3.16	2.07	30.00	1000	26.84

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

Average Output Power
(Reference data for RF Exposure)

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 10748020H
Date : May 22, 2015 July 23, 2015
Temperature / Humidity : 23deg. C / 43% RH 24deg. C / 60% RH
Engineer : Kazuya Yoshioka Kazuya Yoshioka
Mode : Tx

11b 1 Mbps Antenna port 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	0.97	2.07	10.02	13.06	20.23	0.02	13.08	20.32
2437	0.40	2.08	10.02	12.50	17.78	0.02	12.52	17.86
2462	0.98	2.09	10.02	13.09	20.37	0.02	13.11	20.46

11g 6 Mbps Antenna port 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.55	0.77	10.11	7.33	5.41	0.10	7.43	5.53
2437	0.14	2.08	10.02	12.24	16.75	0.10	12.34	17.14
2462	-1.84	0.77	10.11	9.04	8.02	0.10	9.14	8.20

11n-20 MCS 8 Antenna port 0+1

Freq. [MHz]	Antenna port 0 [mW]	Antenna port 1 [mW]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
			[dBm]	[mW]		[dBm]	[mW]
2412	3.24	3.25	8.13	6.49	0.23	8.36	6.85
2437	16.44	16.48	15.18	32.93	0.23	15.41	34.72
2462	3.79	3.98	8.91	7.77	0.23	9.14	8.20

11n-20 MCS 8 Antenna port 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.77	0.77	10.11	5.11	3.24	0.23	5.34	3.42
2437	0.06	2.08	10.02	12.16	16.44	0.23	12.39	17.34
2462	-5.09	0.77	10.11	5.79	3.79	0.23	6.02	4.00

11n-20 MCS 8 Antenna port 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.76	0.77	10.11	5.12	3.25	0.23	5.35	3.43
2437	0.07	2.08	10.02	12.17	16.48	0.23	12.40	17.38
2462	-4.88	0.77	10.11	6.00	3.98	0.23	6.23	4.20

Sample Calculation:

Result (Frame power) = Reading + Cable Loss + Attenuator

Result (Burst power) = Frame power + Duty factor

*As a result of preliminary test, the formal test was performed with the worst rate.

Average Output Power
(Reference data for RF Exposure)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 48% RH
Engineer	Yuta Moriya
Mode	Tx BT LE

DC3.3V

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-11.82	2.06	10.02	0.26	1.06	1.80	2.06	1.61
2440	-10.47	2.08	10.02	1.63	1.46	1.80	3.43	2.20
2480	-10.03	2.10	10.02	2.09	1.62	1.80	3.89	2.45

DC1.8V

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-11.93	2.06	10.02	0.15	1.04	1.80	1.95	1.57
2440	-10.96	2.08	10.02	1.14	1.30	1.80	2.94	1.97
2480	-11.12	2.10	10.02	1.00	1.26	1.80	2.80	1.91

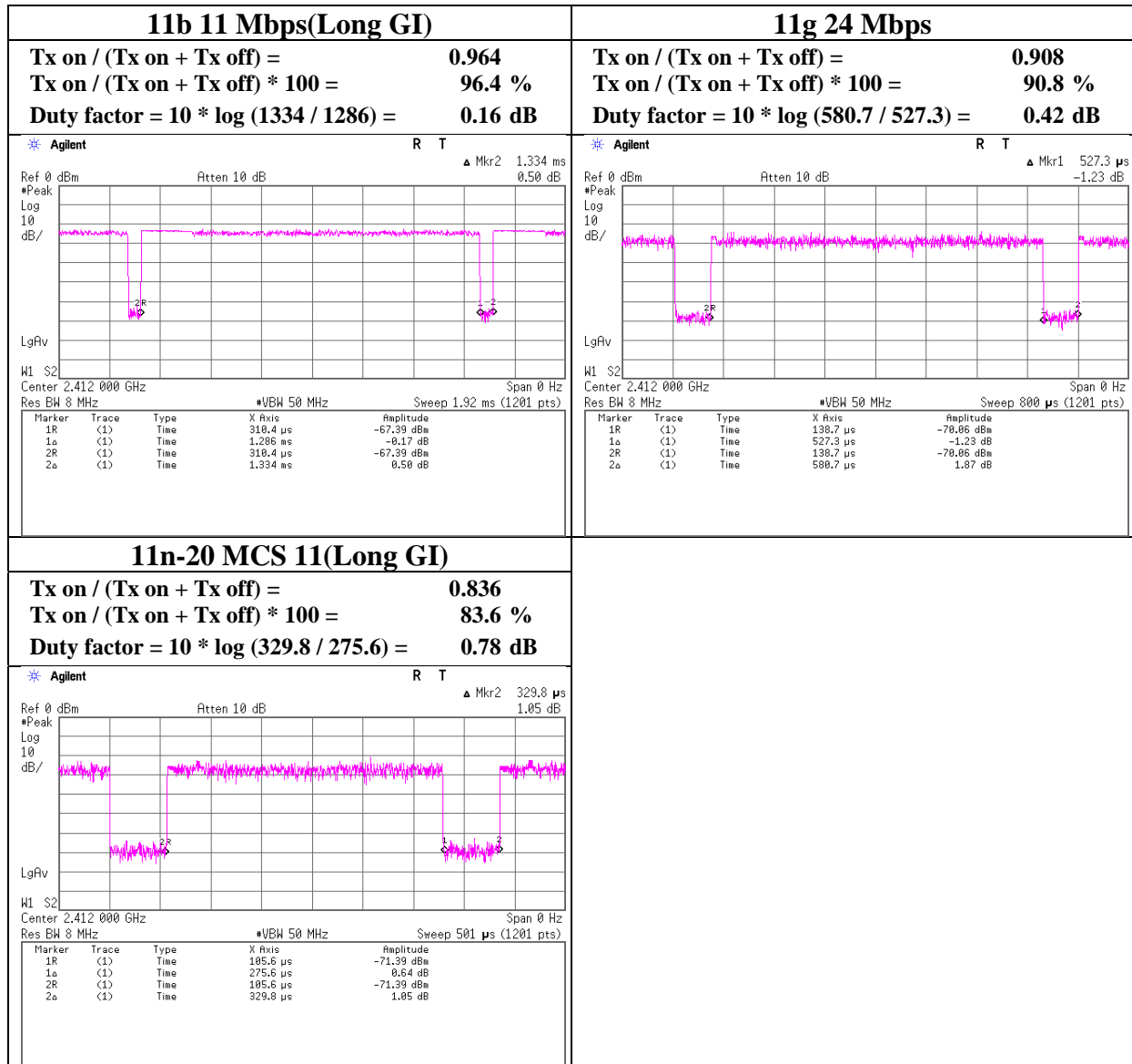
Sample Calculation:

Result (Frame power) = Reading + Cable Loss + Attenuator

Result (Burst power) = Frame power + Duty factor

Burst rate confirmation

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10748020H
Date	May 2, 2015
Temperature/ Humidity	23deg. C / 45% RH
Engineer	Koji Yamamoto
Mode	11b / 11g / 11n-20

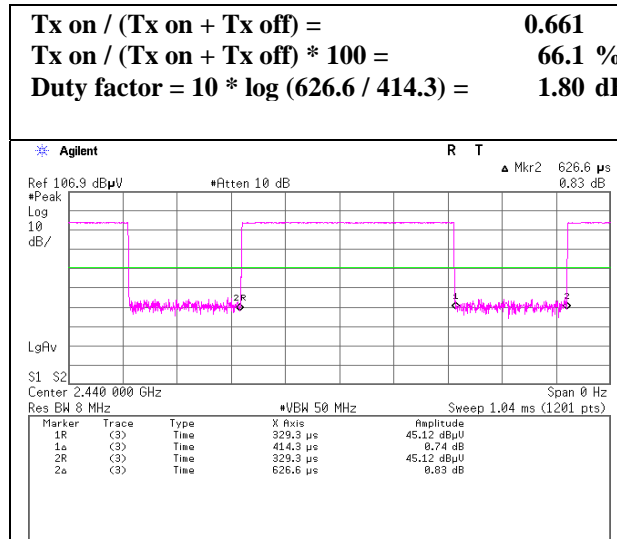


Burst rate confirmation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	10748020H
Date	May 19, 2015
Temperature / Humidity	23deg. C / 54% RH
Engineer	Yuta Moriya
Mode	Tx BT LE

BT LE

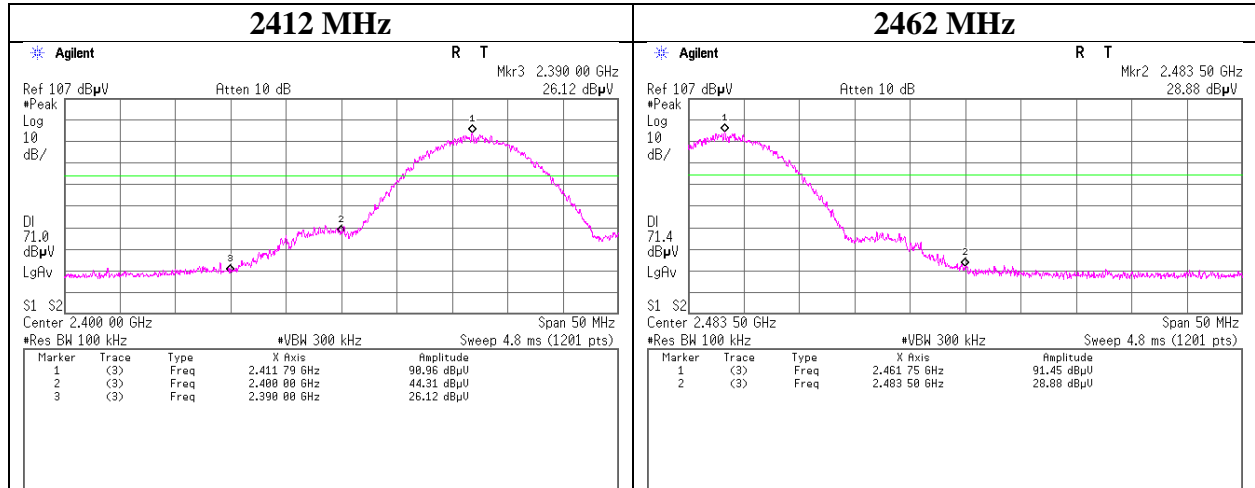
Tx on / (Tx on + Tx off) =	0.661
Tx on / (Tx on + Tx off) * 100 =	66.1 %
Duty factor = 10 * log (626.6 / 414.3) =	1.80 dB



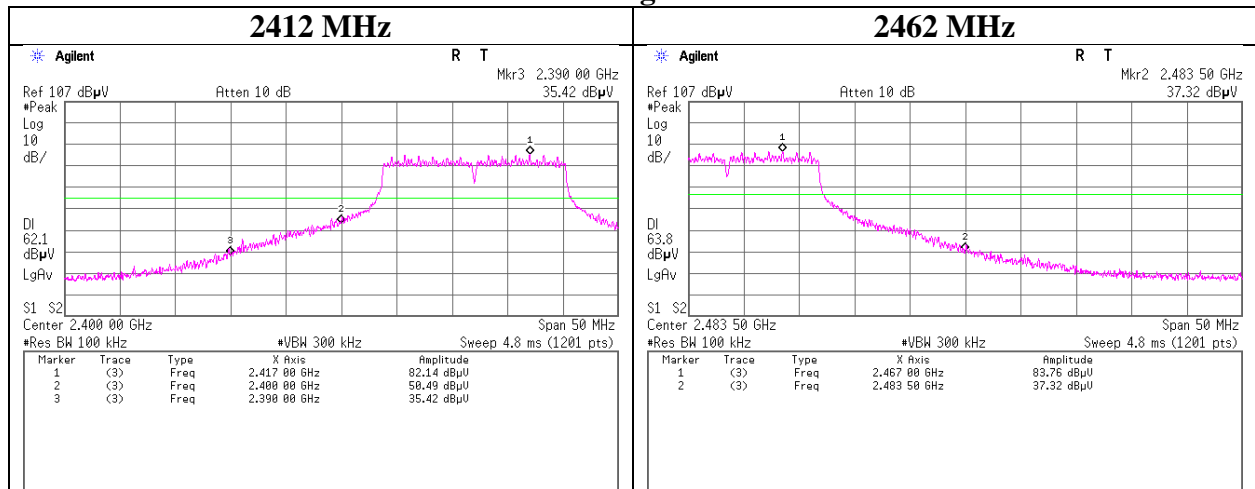
Band Edge confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	July 23, 2015
Temperature/ Humidity	24deg. C / 60% RH
Engineer	Kazuya Yoshioka
Mode	11b / 11g

11b



11g

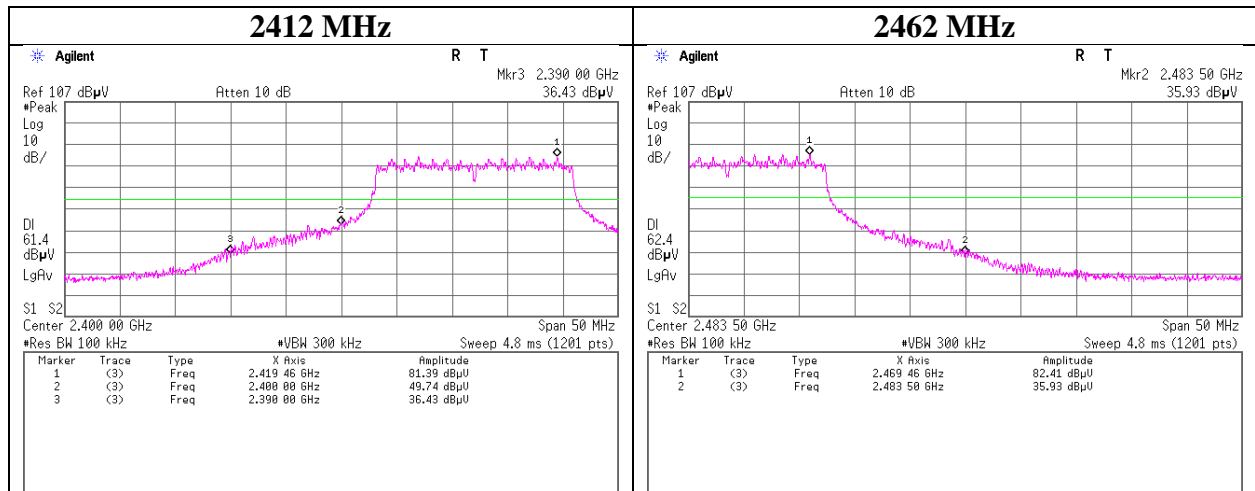


*Final result of band edge was measured as radiated spurious emission. Refer to Radiated Spurious Emission's pages.

Band Edge confirmation

Test place : Ise EMC Lab. No.6 Measurement Room
 Report No. : 10748020H
 Date : July 23, 2015
 Temperature/ Humidity : 24deg. C / 60% RH
 Engineer : Kazuya Yoshioka
 Mode : 11n-20

11n-20

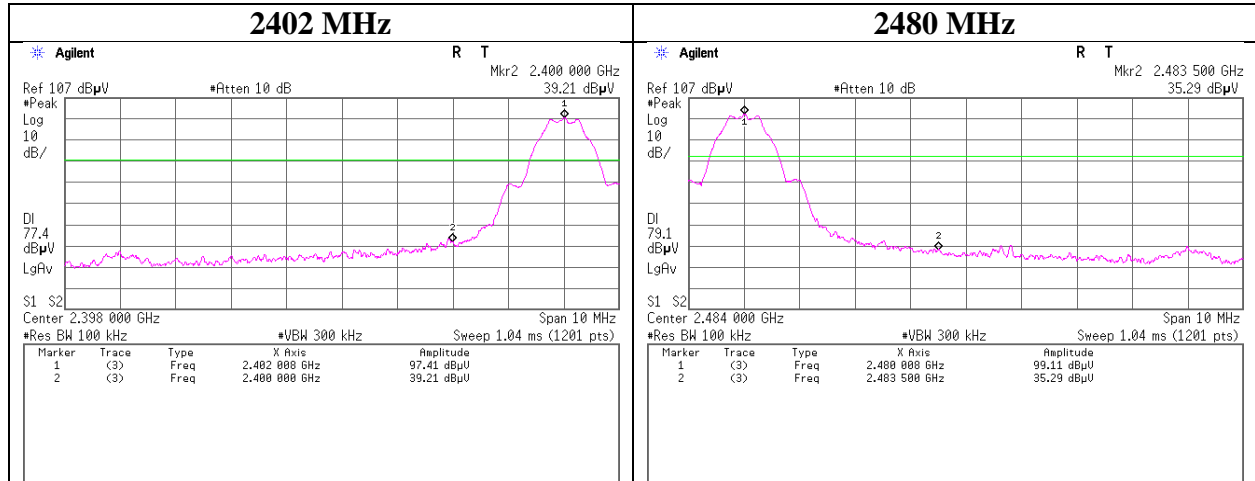


*Final result of band edge was measured as radiated spurious emission. Refer to Radiated Spurious Emission's pages.

Band Edge confirmation

Test place : Ise EMC Lab. No.6 Measurement Room
 Report No. : 10748020H
 Date : July 23, 2015
 Temperature/ Humidity : 24deg. C / 60% RH
 Engineer : Kazuya Yoshioka
 Mode : BT LE

BT LE



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

Radiated Spurious Emission **(Antenna 1)**

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10748020H	
Date	May 3, 2015	May 19, 2015
Temperature / Humidity	23deg. C / 49% RH	25deg. C / 57% RH
Engineer	Koji Yamamoto	Keisuke Kawamura
	(1-10GHz)	(Above 10GHz)
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	2390.000	PK	52.6	26.8	3.2	32.0	-	50.6	73.9	23.3	
Hori	4824.000	PK	47.9	30.6	5.3	31.3	-	52.5	73.9	21.4	
Hori	7236.000	PK	43.0	35.9	6.6	32.0	-	53.5	73.9	20.4	Floor Noise
Hori	9648.000	PK	42.8	38.5	7.0	32.4	-	55.9	73.9	18.0	Floor Noise
Hori	2390.000	AV	44.0	26.8	3.2	32.0	0.2	42.2	53.9	11.7	*1)
Hori	4824.000	AV	39.6	30.6	5.3	31.3	0.2	44.4	53.9	9.5	
Hori	7236.000	AV	35.2	35.9	6.6	32.0	-	45.7	53.9	8.2	Floor Noise
Hori	9648.000	AV	35.0	38.5	7.0	32.4	-	48.1	53.9	5.8	Floor Noise
Vert	2390.000	PK	48.5	26.8	3.2	32.0	-	46.5	73.9	27.4	
Vert	4824.000	PK	49.3	30.6	5.3	31.3	-	53.9	73.9	20.0	
Vert	7236.000	PK	43.6	35.9	6.6	32.0	-	54.1	73.9	19.8	Floor Noise
Vert	9648.000	PK	43.7	38.5	7.0	32.4	-	56.8	73.9	17.1	Floor Noise
Vert	2390.000	AV	40.3	26.8	3.2	32.0	0.2	38.5	53.9	15.4	*1)
Vert	4824.000	AV	42.0	30.6	5.3	31.3	0.2	46.8	53.9	7.1	
Vert	7236.000	AV	35.5	35.9	6.6	32.0	-	46.0	53.9	7.9	Floor Noise
Vert	9648.000	AV	35.7	38.5	7.0	32.4	-	48.8	53.9	5.1	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

*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	105.3	26.8	3.2	32.0	103.3	-	-	Carrier
Hori	2400.000	PK	61.5	26.8	3.2	32.0	59.5	83.3	23.8	
Vert	2412.000	PK	101.4	26.8	3.2	32.0	99.4	-	-	Carrier
Vert	2400.000	PK	57.5	26.8	3.2	32.0	55.5	79.4	23.9	

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

Radiated Spurious Emission (Antenna 1)

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10748020H
Date May 3, 2015 May 19, 2015
Temperature / Humidity 23deg. C / 49% RH 25deg. C / 57% RH
Engineer Koji Yamamoto Keisuke Kawamura
 (1-10GHz) (Above 10GHz)
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	4874.000	PK	45.8	30.7	5.3	31.3	-	50.5	73.9	23.4	
Hori	7311.000	PK	43.6	35.9	6.5	32.0	-	54.0	73.9	19.9	Floor Noise
Hori	9748.000	PK	44.1	38.7	7.1	32.4	-	57.5	73.9	16.4	Floor Noise
Hori	4874.000	AV	35.5	30.7	5.3	31.3	0.2	40.4	53.9	13.5	
Hori	7311.000	AV	33.2	35.9	6.5	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	4874.000	PK	45.1	30.7	5.3	31.3	-	49.8	73.9	24.1	
Vert	7311.000	PK	43.5	35.9	6.5	32.0	-	53.9	73.9	20.0	Floor Noise
Vert	9748.000	PK	43.8	38.7	7.1	32.4	-	57.2	73.9	16.7	Floor Noise
Vert	4874.000	AV	36.1	30.7	5.3	31.3	0.2	41.0	53.9	12.9	
Vert	7311.000	AV	33.1	35.9	6.5	32.0	-	43.5	53.9	10.4	Floor Noise
Vert	9748.000	AV	33.1	38.7	7.1	32.4	-	46.5	53.9	7.4	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

Radiated Spurious Emission
(Antenna 1)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : May 3, 2015 May 19, 2015
Temperature / Humidity : 23deg. C / 49% RH 25deg. C / 57% RH
Engineer : Koji Yamamoto Keisuke Kawamura
 (1-10GHz) (Above 10GHz)
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	47.3	26.9	3.2	32.0	-	45.4	73.9	28.5	
Hori	4924.000	PK	42.8	30.8	5.3	31.3	-	47.6	73.9	26.3	
Hori	7386.000	PK	43.7	35.9	6.5	32.1	-	54.0	73.9	19.9	Floor Noise
Hori	9848.000	PK	44.0	38.8	7.1	32.5	-	57.4	73.9	16.5	Floor Noise
Hori	2483.500	AV	38.8	26.9	3.2	32.0	0.2	37.1	53.9	16.8	*1)
Hori	4924.000	AV	34.4	30.8	5.3	31.3	0.2	39.4	53.9	14.5	
Hori	7386.000	AV	33.8	35.9	6.5	32.1	-	44.1	53.9	9.8	Floor Noise
Hori	9848.000	AV	33.5	38.8	7.1	32.5	-	46.9	53.9	7.0	Floor Noise
Vert	2483.500	PK	46.6	26.9	3.2	32.0	-	44.7	73.9	29.2	
Vert	4924.000	PK	44.2	30.8	5.3	31.3	-	49.0	73.9	24.9	
Vert	7386.000	PK	43.6	35.9	6.5	32.1	-	53.9	73.9	20.0	Floor Noise
Vert	9848.000	PK	43.4	38.8	7.1	32.5	-	56.8	73.9	17.1	Floor Noise
Vert	2483.500	AV	40.2	26.9	3.2	32.0	0.2	38.5	53.9	15.4	*1)
Vert	4924.000	AV	36.2	30.8	5.3	31.3	0.2	41.2	53.9	12.7	
Vert	7386.000	AV	33.1	35.9	6.5	32.1	-	43.4	53.9	10.5	Floor Noise
Vert	9848.000	AV	33.9	38.8	7.1	32.5	-	47.3	53.9	6.6	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
(Antenna 1)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : May 3, 2015
Temperature / Humidity : 23deg. C / 49% RH
Engineer : Koji Yamamoto
(1-10GHz)
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	64.9	26.8	3.2	32.0	-	62.9	73.9	11.0	
Hori	2390.000	AV	53.0	26.8	3.2	32.0	0.4	51.4	53.9	2.5	*1)
Vert	2390.000	PK	61.1	26.8	3.2	32.0	-	59.1	73.9	14.8	
Vert	2390.000	AV	48.8	26.8	3.2	32.0	0.4	47.2	53.9	6.7	*1)

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 $20\log(3.0m/1.0m) = 9.5dB$

*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	96.7	26.8	3.2	32.0	94.7	-	-	Carrier
Hori	2400.000	PK	66.2	26.8	3.2	32.0	64.2	74.7	10.5	
Vert	2412.000	PK	93.6	26.8	3.2	32.0	91.6	-	-	Carrier
Vert	2400.000	PK	62.2	26.8	3.2	32.0	60.2	71.6	11.4	

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

Radiated Spurious Emission
(Antenna 1)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
 Report No. : 10748020H
 Date : May 3, 2015
 Temperature / Humidity : 23deg. C / 49% RH
 Engineer : Koji Yamamoto
 (1-10GHz)
 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	66.1	26.9	3.2	32.0	-	64.2	73.9	9.7	
Hori	2483.500	AV	53.3	26.9	3.2	32.0	0.4	51.8	53.9	2.1	*1)
Vert	2483.500	PK	65.2	26.9	3.2	32.0	-	63.3	73.9	10.6	
Vert	2483.500	AV	51.8	26.9	3.2	32.0	0.4	50.3	53.9	3.6	*1)

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 $20\log(3.0m/1.0m) = 9.5dB$

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

Radiated Spurious Emission (Antenna 1)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10748020H	
Date	May 3, 2015	May 19, 2015
Temperature / Humidity	23deg. C / 49% RH	25deg. C / 57% RH
Engineer	Koji Yamamoto	Keisuke Kawamura
	(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	64.3	26.8	3.2	32.0	-	62.3	73.9	11.6	
Hori	4824.000	PK	42.3	30.6	5.3	31.3	-	46.9	73.9	27.0	Floor Noise
Hori	7236.000	PK	43.6	35.9	6.6	32.0	-	54.1	73.9	19.8	Floor Noise
Hori	9648.000	PK	42.2	38.5	7.0	32.4	-	55.3	73.9	18.6	Floor Noise
Hori	2390.000	AV	52.5	26.8	3.2	32.0	0.8	51.3	53.9	2.6	*1)
Hori	4824.000	AV	32.5	30.6	5.3	31.3	-	37.1	53.9	16.8	Floor Noise
Hori	7236.000	AV	35.1	35.9	6.6	32.0	-	45.6	53.9	8.3	Floor Noise
Hori	9648.000	AV	35.4	38.5	7.0	32.4	-	48.5	53.9	5.4	Floor Noise
Vert	2390.000	PK	63.6	26.8	3.2	32.0	-	61.6	73.9	12.3	
Vert	4824.000	PK	44.3	30.6	5.3	31.3	-	48.9	73.9	25.0	Floor Noise
Vert	7236.000	PK	43.5	35.9	6.6	32.0	-	54.0	73.9	19.9	Floor Noise
Vert	9648.000	PK	43.5	38.5	7.0	32.4	-	56.6	73.9	17.3	Floor Noise
Vert	2390.000	AV	52.5	26.8	3.2	32.0	0.8	51.3	53.9	2.6	*1)
Vert	4824.000	AV	33.1	30.6	5.3	31.3	-	37.7	53.9	16.2	Floor Noise
Vert	7236.000	AV	35.9	35.9	6.6	32.0	-	46.4	53.9	7.5	Floor Noise
Vert	9648.000	AV	35.1	38.5	7.0	32.4	-	48.2	53.9	5.7	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	98.5	26.8	3.2	32.0	96.5	-	-	Carrier
Hori	2400.000	PK	65.1	26.8	3.2	32.0	63.1	76.5	13.4	
Vert	2412.000	PK	97.0	26.8	3.2	32.0	95.0	-	-	Carrier
Vert	2400.000	PK	64.2	26.8	3.2	32.0	62.2	75.0	12.8	

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

Radiated Spurious Emission
(Antenna 1)

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10748020H
Date May 3, 2015 May 19, 2015 May 27, 2015
Temperature / Humidity 23deg. C / 49% RH 25deg. C / 57% RH 25deg. C / 57% RH
Engineer Koji Yamamoto Keisuke Kawamura Tomohisa Nakagawa
(1-10GHz) (Above 10GHz) (below 1GHz)
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	46.774	QP	28.4	11.8	6.9	28.5	-	18.6	40.0	21.4	
Hori	102.505	QP	25.9	10.5	7.5	28.2	-	15.7	43.5	27.8	
Hori	399.599	QP	33.2	17.6	9.4	28.3	-	31.9	46.0	14.1	
Hori	410.821	QP	36.4	17.7	9.5	28.3	-	35.3	46.0	10.7	
Hori	450.100	QP	29.8	18.1	9.5	28.4	-	29.0	46.0	17.0	
Hori	500.601	QP	29.8	18.7	9.9	28.5	-	29.9	46.0	16.1	
Hori	4874.000	PK	49.4	30.7	5.3	31.3	-	54.1	73.9	19.8	
Hori	7311.000	PK	43.2	35.9	6.5	32.0	-	53.6	73.9	20.3	Floor Noise
Hori	9748.000	PK	43.1	38.7	7.1	32.4	-	56.5	73.9	17.4	Floor Noise
Hori	4874.000	AV	36.6	30.7	5.3	31.3	0.8	42.1	53.9	11.8	
Hori	7311.000	AV	33.7	35.9	6.5	32.0	-	44.1	53.9	9.8	Floor Noise
Hori	9748.000	AV	33.5	38.7	7.1	32.4	-	46.9	53.9	7.0	Floor Noise
Vert	46.774	QP	42.6	11.8	6.9	28.5	-	32.8	40.0	7.2	
Vert	102.505	QP	31.3	10.5	7.5	28.2	-	21.1	43.5	22.4	
Vert	399.599	QP	32.6	17.6	9.4	28.3	-	31.3	46.0	14.7	
Vert	410.821	QP	35.2	17.7	9.5	28.3	-	34.1	46.0	11.9	
Vert	450.100	QP	29.5	18.1	9.5	28.4	-	28.7	46.0	17.3	
Vert	500.601	QP	31.6	18.7	9.9	28.5	-	31.7	46.0	14.3	
Vert	4874.000	PK	47.9	30.7	5.3	31.3	-	52.6	73.9	21.3	
Vert	7311.000	PK	43.9	35.9	6.5	32.0	-	54.3	73.9	19.6	Floor Noise
Vert	9748.000	PK	44.3	38.7	7.1	32.4	-	57.7	73.9	16.2	Floor Noise
Vert	4874.000	AV	36.3	30.7	5.3	31.3	0.8	41.8	53.9	12.1	
Vert	7311.000	AV	33.6	35.9	6.5	32.0	-	44.0	53.9	9.9	Floor Noise
Vert	9748.000	AV	33.0	38.7	7.1	32.4	-	46.4	53.9	7.5	Floor Noise

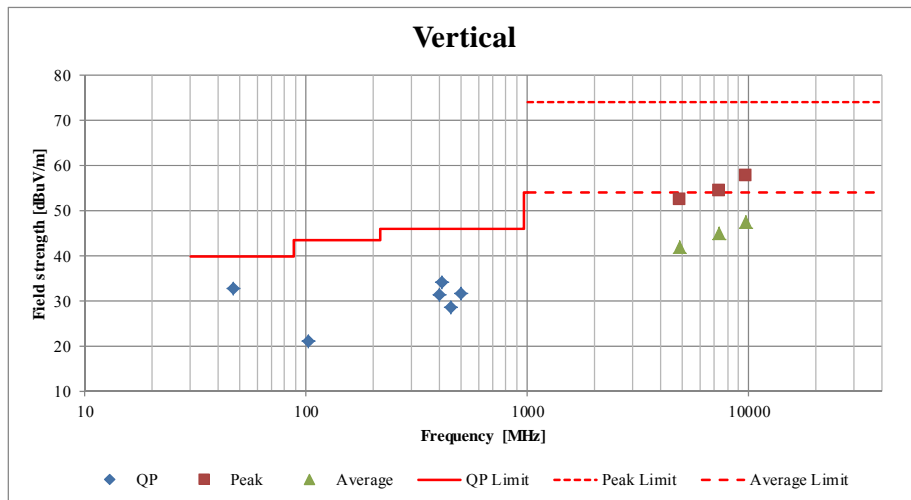
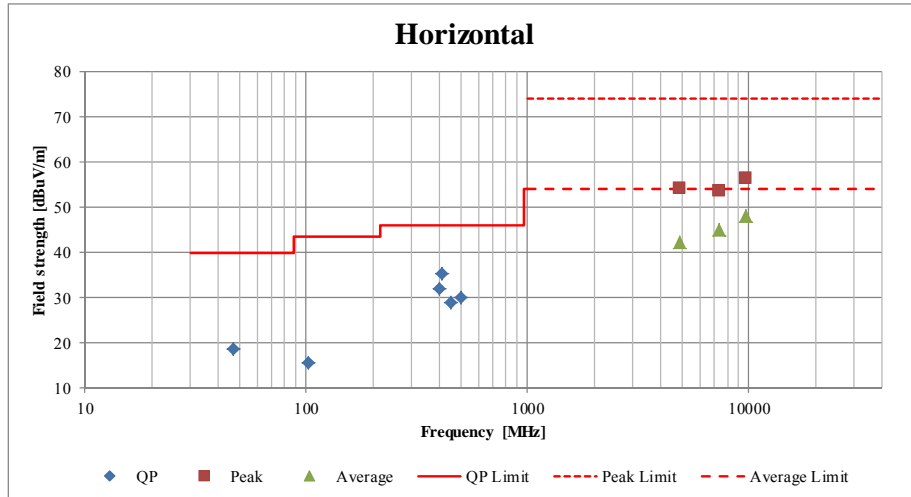
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty Factor

*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

Radiated Spurious Emission
(Plot data, Worst case)
(Antenna 1)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	10748020H		
Date	May 3, 2015	May 19, 2015	May 27, 2015
Temperature / Humidity	23deg. C / 49% RH	25deg. C / 57% RH	25deg. C / 57% RH
Engineer	Koji Yamamoto	Keisuke Kawamura	Tomohisa Nakagawa
	(1-10GHz)	(Above 10GHz)	(below 1GHz)
Mode	Tx 11n-20 2437MHz		



Radiated Spurious Emission
(Antenna 1)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10748020H	
Date	May 3, 2015	May 19, 2015
Temperature / Humidity	23deg. C / 49% RH	25deg. C / 57% RH
Engineer	Koji Yamamoto (1-10GHz)	Keisuke Kawamura (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	66.3	26.9	3.2	32.0	-	64.4	73.9	9.5	
Hori	4924.000	PK	41.8	30.8	5.3	31.3	-	46.6	73.9	27.3	Floor Noise
Hori	7386.000	PK	43.1	35.9	6.5	32.1	-	53.4	73.9	20.5	Floor Noise
Hori	9848.000	PK	42.3	38.8	7.1	32.5	-	55.7	73.9	18.2	Floor Noise
Hori	2483.500	AV	52.8	26.9	3.2	32.0	0.8	51.7	53.9	2.2	*1)
Hori	4924.000	AV	32.3	30.8	5.3	31.3	-	37.1	53.9	16.8	Floor Noise
Hori	7386.000	AV	33.6	35.9	6.5	32.1	-	43.9	53.9	10.0	Floor Noise
Hori	9848.000	AV	33.1	38.8	7.1	32.5	-	46.5	53.9	7.4	Floor Noise
Vert	2483.500	PK	66.7	26.9	3.2	32.0	-	64.8	73.9	9.1	
Vert	4924.000	PK	42.5	30.8	5.3	31.3	-	47.3	73.9	26.6	Floor Noise
Vert	7386.000	PK	44.1	35.9	6.5	32.1	-	54.4	73.9	19.5	Floor Noise
Vert	9848.000	PK	43.6	38.8	7.1	32.5	-	57.0	73.9	16.9	Floor Noise
Vert	2483.500	AV	51.9	26.9	3.2	32.0	0.8	50.8	53.9	3.1	*1)
Vert	4924.000	AV	32.8	30.8	5.3	31.3	-	37.6	53.9	16.3	Floor Noise
Vert	7386.000	AV	33.5	35.9	6.5	32.1	-	43.8	53.9	10.1	Floor Noise
Vert	9848.000	AV	33.3	38.8	7.1	32.5	-	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)

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 17, 2015
Temperature / Humidity : 23deg. C / 73% 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	2390.000	PK	49.7	26.9	3.4	32.0	-	48.0	73.9	25.9	
Hori	4824.000	PK	46.9	31.8	5.5	31.3	-	52.9	73.9	21.0	
Hori	7236.000	PK	43.0	36.0	5.8	32.0	-	52.8	73.9	21.1	Floor Noise
Hori	9648.000	PK	44.4	38.2	6.7	32.4	-	56.9	73.9	17.0	Floor Noise
Hori	2390.000	AV	39.3	26.9	3.4	32.0	0.2	37.8	53.9	16.1	*1)
Hori	4824.000	AV	38.7	31.8	5.5	31.3	0.2	44.9	53.9	9.0	
Hori	7236.000	AV	32.4	36.0	5.8	32.0	-	42.2	53.9	11.7	Floor Noise
Hori	9648.000	AV	34.2	38.2	6.7	32.4	-	46.7	53.9	7.2	Floor Noise
Vert	2390.000	PK	50.7	26.9	3.4	32.0	-	49.0	73.9	24.9	
Vert	4824.000	PK	44.1	31.8	5.5	31.3	-	50.1	73.9	23.8	
Vert	7236.000	PK	43.4	36.0	6.8	32.0	-	54.2	73.9	19.7	Floor Noise
Vert	9648.000	PK	46.0	38.2	7.3	32.4	-	59.1	73.9	14.8	Floor Noise
Vert	2390.000	AV	42.9	26.9	3.4	32.0	0.2	41.4	53.9	12.5	*1)
Vert	4824.000	AV	36.1	31.8	5.5	31.3	0.2	42.3	53.9	11.6	
Vert	7236.000	AV	34.5	36.0	6.8	32.0	-	45.3	53.9	8.6	Floor Noise
Vert	9648.000	AV	36.6	38.2	7.3	32.4	-	49.7	53.9	4.2	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
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	2412.000	PK	103.7	26.9	3.4	32.0	102.0	-	-	Carrier
Hori	2400.000	PK	59.2	26.9	3.4	32.0	57.5	82.0	24.5	
Vert	2412.000	PK	103.6	26.9	3.4	32.0	101.9	-	-	Carrier
Vert	2400.000	PK	60.1	26.9	3.4	32.0	58.4	81.9	23.5	

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

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 17, 2015
Temperature / Humidity : 23deg. C / 73% 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	4874.000	PK	47.0	31.9	5.5	31.3	-	53.1	73.9	20.8	
Hori	7311.000	PK	42.6	36.0	6.8	32.0	-	53.4	73.9	20.5	Floor Noise
Hori	9748.000	PK	44.6	38.2	7.3	32.4	-	57.7	73.9	16.2	Floor Noise
Hori	4874.000	AV	38.3	31.9	5.5	31.3	0.2	44.6	53.9	9.3	
Hori	7311.000	AV	34.1	36.0	6.8	32.0	-	44.9	53.9	9.0	Floor Noise
Hori	9748.000	AV	35.8	38.2	7.3	32.4	-	48.9	53.9	5.0	Floor Noise
Vert	4874.000	PK	43.7	31.9	5.5	31.3	-	49.8	73.9	24.1	
Vert	7311.000	PK	42.3	36.0	6.8	32.0	-	53.1	73.9	20.8	Floor Noise
Vert	9748.000	PK	44.2	38.2	7.3	32.4	-	57.3	73.9	16.6	Floor Noise
Vert	4874.000	AV	35.5	31.9	5.5	31.3	0.2	41.8	53.9	12.1	
Vert	7311.000	AV	34.1	36.0	6.8	32.0	-	44.9	53.9	9.0	Floor Noise
Vert	9748.000	AV	35.8	38.2	7.3	32.4	-	48.9	53.9	5.0	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
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 17, 2015
Temperature / Humidity : 23deg. C / 73% 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	51.2	26.9	3.4	32.0	-	49.5	73.9	24.4	
Hori	4924.000	PK	47.0	32.0	5.5	31.3	-	53.2	73.9	20.7	
Hori	7386.000	PK	42.5	36.0	6.8	32.1	-	53.2	73.9	20.7	Floor Noise
Hori	9848.000	PK	44.0	38.2	7.4	32.5	-	57.1	73.9	16.8	Floor Noise
Hori	2483.500	AV	40.7	26.9	3.4	32.0	0.2	39.2	53.9	14.7	*1)
Hori	4924.000	AV	38.4	32.0	5.5	31.3	0.2	44.8	53.9	9.1	
Hori	7386.000	AV	33.7	36.0	6.8	32.1	-	44.4	53.9	9.5	Floor Noise
Hori	9848.000	AV	35.5	38.2	7.4	32.5	-	48.6	53.9	5.3	Floor Noise
Vert	2483.500	PK	50.7	26.9	3.4	32.0	-	49.0	73.9	24.9	
Vert	4924.000	PK	44.7	32.0	5.5	31.3	-	50.9	73.9	23.0	
Vert	7386.000	PK	42.2	36.0	6.8	32.1	-	52.9	73.9	21.0	Floor Noise
Vert	9848.000	PK	44.8	38.2	7.4	32.5	-	57.9	73.9	16.0	Floor Noise
Vert	2483.500	AV	39.5	26.9	3.4	32.0	0.2	38.0	53.9	15.9	*1)
Vert	4924.000	AV	35.6	32.0	5.5	31.3	0.2	42.0	53.9	11.9	
Vert	7386.000	AV	33.8	36.0	6.8	32.1	-	44.5	53.9	9.4	Floor Noise
Vert	9848.000	AV	35.6	38.2	7.4	32.5	-	48.7	53.9	5.2	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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 16, 2015
Temperature / Humidity : 24deg. C / 63% RH
Engineer : Tomoki Matsui
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	65.6	26.9	3.4	32.0	-	63.9	73.9	10.0	
Hori	2390.000	AV	53.0	26.9	3.4	32.0	0.4	51.7	53.9	2.2	*1)
Vert	2390.000	PK	65.6	26.9	3.4	32.0	-	63.9	73.9	10.0	
Vert	2390.000	AV	52.9	26.9	3.4	32.0	0.4	51.6	53.9	2.3	*1)

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 $20\log(3.0m/1.0m)= 9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

*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	2412.000	PK	93.4	26.9	3.4	32.0	91.7	-	-	Carrier
Hori	2400.000	PK	65.4	26.9	3.4	32.0	63.7	71.7	8.0	
Vert	2412.000	PK	93.0	26.9	3.4	32.0	91.3	-	-	Carrier
Vert	2400.000	PK	66.6	26.9	3.4	32.0	64.9	71.3	6.4	

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

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
 Report No. : 10748020H
 Date : July 16, 2015
 Temperature / Humidity : 24deg. C / 63% RH
 Engineer : Tomoki Matsui
 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	68.5	26.9	3.4	32.0	-	66.8	73.9	7.1	
Hori	2483.500	AV	52.7	26.9	3.4	32.0	0.4	51.4	53.9	2.5	*1)
Vert	2483.500	PK	66.1	26.9	3.4	32.0	-	64.4	73.9	9.5	
Vert	2483.500	AV	51.0	26.9	3.4	32.0	0.4	49.7	53.9	4.2	*1)

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)

Radiated Spurious Emission
(Antenna 2)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10748020H	
Date	July 14, 2015	July 17, 2015
Temperature / Humidity	21deg. C / 53% RH	23deg. C / 73% RH
Engineer	Ken Fujita	Tomoki Matsui
	(Band Edge)	(Above 1GHz)
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	63.7	26.9	3.4	32.0	-	62.0	73.9	11.9	
Hori	4824.000	PK	41.2	31.8	5.5	31.3	-	47.2	73.9	26.7	Floor Noise
Hori	7236.000	PK	42.6	36.0	6.8	32.0	-	53.4	73.9	20.5	Floor Noise
Hori	9648.000	PK	45.0	38.2	7.3	32.4	-	58.1	73.9	15.8	Floor Noise
Hori	2390.000	AV	52.4	26.9	3.4	32.0	0.78	51.5	53.9	2.4	*1)
Hori	4824.000	AV	33.1	31.8	5.5	31.3	-	39.1	53.9	14.8	Floor Noise
Hori	7236.000	AV	34.3	36.0	6.8	32.0	-	45.1	53.9	8.8	Floor Noise
Hori	9648.000	AV	36.2	38.2	7.3	32.4	-	49.3	53.9	4.6	Floor Noise
Vert	2390.000	PK	63.0	26.9	3.4	32.0	-	61.3	73.9	12.6	
Vert	4824.000	PK	41.4	31.8	5.5	31.3	-	47.4	73.9	26.5	Floor Noise
Vert	7236.000	PK	42.6	36.0	6.8	32.0	-	53.4	73.9	20.5	Floor Noise
Vert	9648.000	PK	45.0	38.2	7.3	32.4	-	58.1	73.9	15.8	Floor Noise
Vert	2390.000	AV	52.2	26.9	3.4	32.0	0.78	51.3	53.9	2.6	*1)
Vert	4824.000	AV	32.7	31.8	5.5	31.3	-	38.7	53.9	15.2	Floor Noise
Vert	7236.000	AV	34.1	36.0	6.8	32.0	-	44.9	53.9	9.0	Floor Noise
Vert	9648.000	AV	36.5	38.2	7.3	32.4	-	49.6	53.9	4.3	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
 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	2412.000	PK	95.3	26.9	3.4	32.0	93.6	-	-	Carrier
Hori	2400.000	PK	64.0	26.9	3.4	32.0	62.3	73.6	11.3	
Vert	2412.000	PK	94.3	26.9	3.4	32.0	92.6	-	-	Carrier
Vert	2400.000	PK	63.7	26.9	3.4	32.0	62.0	72.6	10.6	

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

Radiated Spurious Emission
(Antenna 2)

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
 Report No. 10748020H
 Date July 17, 2015 July 17, 2015
 Temperature / Humidity 23deg. C / 73% RH 22deg. C / 63% RH
 Engineer Tomoki Matsui Tomohisa Nakagawa
 (Above 1GHz) (Below 1GHz)
 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	30.900	QP	22.6	17.1	7.0	32.3	-	14.4	40.0	25.6	
Hori	47.550	QP	27.8	11.5	7.3	32.2	-	14.4	40.0	25.6	
Hori	95.950	QP	25.3	9.5	8.0	32.2	-	10.6	43.5	32.9	
Hori	411.422	QP	26.6	17.6	10.7	32.1	-	22.8	46.0	23.2	
Hori	646.823	QP	25.0	19.9	12.0	32.1	-	24.8	46.0	21.2	
Hori	822.851	QP	29.7	22.3	12.9	31.4	-	33.5	46.0	12.5	
Hori	4874.000	PK	44.4	31.9	4.6	31.3	-	49.6	73.9	24.3	Floor Noise
Hori	7311.000	PK	43.3	36.0	5.9	32.0	-	53.2	73.9	20.7	Floor Noise
Hori	9748.000	PK	44.4	38.2	6.7	32.4	-	56.9	73.9	17.0	Floor Noise
Hori	4874.000	AV	35.3	31.9	4.6	31.3	-	40.5	53.9	13.4	Floor Noise
Hori	7311.000	AV	34.4	36.0	5.9	32.0	-	44.3	53.9	9.6	Floor Noise
Hori	9748.000	AV	34.6	38.2	6.7	32.4	-	47.1	53.9	6.8	Floor Noise
Vert	30.900	QP	24.4	17.1	7.0	32.3	-	16.2	40.0	23.8	
Vert	47.550	QP	43.1	11.5	7.3	32.2	-	29.7	40.0	10.3	
Vert	95.950	QP	30.9	9.5	8.0	32.2	-	16.2	43.5	27.3	
Vert	411.422	QP	28.4	17.6	10.7	32.1	-	24.6	46.0	21.4	
Vert	646.823	QP	25.3	19.9	12.0	32.1	-	25.1	46.0	20.9	
Vert	822.851	QP	30.9	22.3	12.9	31.4	-	34.7	46.0	11.3	
Vert	4874.000	PK	43.1	31.9	5.5	31.3	-	49.2	73.9	24.7	Floor Noise
Vert	7311.000	PK	42.3	36.0	6.8	32.0	-	53.1	73.9	20.8	Floor Noise
Vert	9748.000	PK	45.3	38.2	7.3	32.4	-	58.4	73.9	15.5	Floor Noise
Vert	4874.000	AV	33.7	31.9	5.5	31.3	-	39.8	53.9	14.1	Floor Noise
Vert	7311.000	AV	34.4	36.0	6.8	32.0	-	45.2	53.9	8.7	Floor Noise
Vert	9748.000	AV	35.7	38.2	7.3	32.4	-	48.8	53.9	5.1	Floor Noise

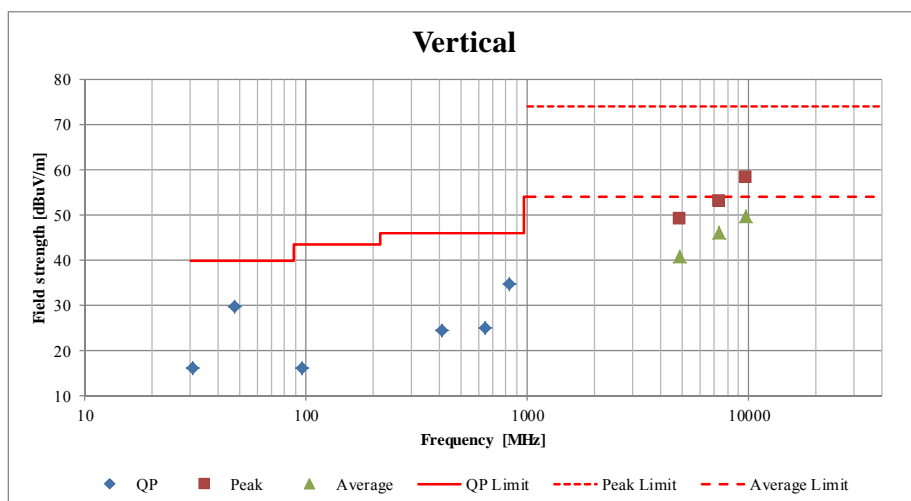
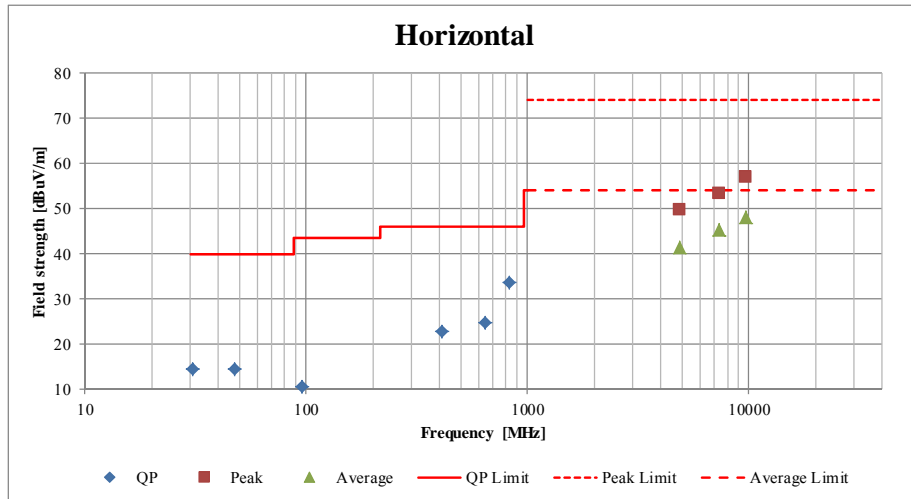
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*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
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission
(Plot data, Worst case)
(Antenna 2)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10748020H	
Date	July 17, 2015	July 17, 2015
Temperature / Humidity	23deg. C / 73% RH	22deg. C / 63% RH
Engineer	Tomoki Matsui	Tomohisa Nakagawa
Mode	Tx 11n-20 2437MHz	



Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 16, 2015 July 17, 2015
Temperature / Humidity : 24deg. C / 63% RH 23deg. C / 73% RH
Engineer : Tomoki Matsui Tomoki Matsui
 (Band Edge) (Above 1GHz)
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	66.0	26.9	3.4	32.0	-	64.3	73.9	9.6	
Hori	4924.000	PK	41.9	32.0	5.5	31.3	-	48.1	73.9	25.8	Floor Noise
Hori	7386.000	PK	41.7	36.0	6.8	32.1	-	52.4	73.9	21.5	Floor Noise
Hori	9848.000	PK	44.2	38.2	7.4	32.5	-	57.3	73.9	16.6	Floor Noise
Hori	2483.500	AV	51.5	26.9	3.4	32.0	0.78	50.6	53.9	3.3	*1)
Hori	4924.000	AV	32.9	32.0	5.5	31.3	-	39.1	53.9	14.8	Floor Noise
Hori	7386.000	AV	33.6	36.0	6.8	32.1	-	44.3	53.9	9.6	Floor Noise
Hori	9848.000	AV	35.7	38.2	7.4	32.5	-	48.8	53.9	5.1	Floor Noise
Vert	2483.500	PK	64.7	26.9	3.4	32.0	-	63.0	73.9	10.9	
Vert	4924.000	PK	40.9	32.0	5.5	31.3	-	47.1	73.9	26.8	Floor Noise
Vert	7386.000	PK	41.4	36.0	6.8	32.1	-	52.1	73.9	21.8	Floor Noise
Vert	9848.000	PK	44.1	38.2	7.4	32.5	-	57.2	73.9	16.7	Floor Noise
Vert	2483.500	AV	50.0	26.9	3.4	32.0	0.78	49.1	53.9	4.8	*1)
Vert	4924.000	AV	32.9	32.0	5.5	31.3	-	39.1	53.9	14.8	Floor Noise
Vert	7386.000	AV	33.6	36.0	6.8	32.1	-	44.3	53.9	9.6	Floor Noise
Vert	9848.000	AV	35.8	38.2	7.4	32.5	-	48.9	53.9	5.0	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
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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

Radiated Spurious Emission
(Antenna 1)

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10748020H
Date May 18, 2015 May 19, 2015
Temperature / Humidity 22deg. C / 44% RH 23deg. C / 54% RH
Engineer Keisuke Kawamura Yuta Moriya
(Below 1GHz) (Above 1GHz)
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	99.702	QP	33.2	10.1	7.4	28.2	-	22.5	43.5	21.0	
Hori	144.011	QP	36.9	14.6	7.8	28.1	-	31.2	43.5	12.3	
Hori	192.022	QP	29.4	16.4	8.1	27.9	-	26.0	43.5	17.5	
Hori	240.021	QP	36.7	17.0	8.4	27.6	-	34.5	46.0	11.5	
Hori	264.019	QP	30.5	17.9	8.6	27.5	-	29.5	46.0	16.5	
Hori	288.000	QP	28.1	19.1	8.8	27.4	-	28.6	46.0	17.4	
Hori	2354.211	PK	50.6	29.3	3.4	35.0	-	48.3	73.9	25.6	
Hori	2390.000	PK	44.9	29.3	3.5	35.0	-	42.7	73.9	31.2	
Hori	2498.189	PK	57.5	29.3	3.5	34.9	-	55.4	73.9	18.5	
Hori	4804.000	PK	43.0	32.7	5.8	34.2	-	47.3	73.9	26.6	
Hori	7206.000	PK	42.1	36.8	7.2	34.1	-	52.0	73.9	21.9	Floor Noise
Hori	9608.000	PK	42.8	38.9	8.1	34.7	-	55.1	73.9	18.8	Floor Noise
Hori	2354.211	AV	41.7	29.3	3.4	35.0	1.8	41.2	53.9	12.7	*1)
Hori	2390.000	AV	36.7	29.3	3.5	35.0	1.8	36.3	53.9	17.6	*1)
Hori	2498.189	AV	51.9	29.3	3.5	34.9	1.8	51.6	53.9	2.3	
Hori	4804.000	AV	34.8	32.7	5.8	34.2	1.8	40.9	53.9	13.0	
Hori	7206.000	AV	34.5	36.8	7.2	34.1	-	44.4	53.9	9.5	Floor Noise
Hori	9608.000	AV	34.5	38.9	8.1	34.7	-	46.8	53.9	7.1	Floor Noise
Vert	49.863	QP	42.2	10.7	7.0	28.5	-	31.4	40.0	8.6	
Vert	50.918	QP	41.3	10.3	7.0	28.5	-	30.1	40.0	9.9	
Vert	54.038	QP	42.6	9.3	7.0	28.5	-	30.4	40.0	9.6	
Vert	99.736	QP	43.2	10.1	7.4	28.2	-	32.5	43.5	11.0	
Vert	144.012	QP	40.3	14.6	7.8	28.1	-	34.6	43.5	8.9	
Vert	240.017	QP	37.4	17.0	8.4	27.6	-	35.2	46.0	10.8	
Vert	2354.211	PK	48.2	29.3	3.4	35.0	-	45.9	73.9	28.0	
Vert	2390.000	PK	44.3	29.3	3.5	35.0	-	42.1	73.9	31.8	
Vert	2498.189	PK	55.1	29.3	3.5	34.9	-	53.0	73.9	20.9	
Vert	4804.000	PK	42.4	32.7	5.8	34.2	-	46.7	73.9	27.2	
Vert	7206.000	PK	42.1	36.8	7.2	34.1	-	52.0	73.9	21.9	Floor Noise
Vert	9608.000	PK	42.7	38.9	8.1	34.7	-	55.0	73.9	18.9	Floor Noise
Vert	2354.211	AV	40.1	29.3	3.4	35.0	1.8	39.6	53.9	14.3	*1)
Vert	2390.000	AV	36.0	29.3	3.5	35.0	1.8	35.6	53.9	18.3	*1)
Vert	2498.189	AV	49.4	29.3	3.5	34.9	1.8	49.1	53.9	4.8	
Vert	4804.000	AV	34.2	32.7	5.8	34.2	1.8	40.3	53.9	13.6	
Vert	7206.000	AV	34.2	36.8	7.2	34.1	-	44.1	53.9	9.8	Floor Noise
Vert	9608.000	AV	34.4	38.9	8.1	34.7	-	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	2402.000	PK	104.7	29.3	3.5	35.0	102.5	-	-	Carrier
Hori	2400.000	PK	45.9	29.3	3.5	35.0	43.7	82.5	38.8	
Vert	2402.000	PK	99.6	29.3	3.5	35.0	97.4	-	-	Carrier
Vert	2400.000	PK	42.3	29.3	3.5	35.0	40.1	77.4	37.3	

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

Radiated Spurious Emission (Antenna 1)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10748020H	
Date	May 18, 2015	May 19, 2015
Temperature / Humidity	22deg. C / 44% RH	23deg. C / 54% RH
Engineer	Keisuke Kawamura (Below 1GHz)	Yuta Moriya (Above 1GHz)
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	99.702	QP	32.7	10.1	7.4	28.2	-	22.0	43.5	21.5	
Hori	144.011	QP	35.9	14.6	7.8	28.1	-	30.2	43.5	13.3	
Hori	192.022	QP	29.1	16.4	8.1	27.9	-	25.7	43.5	17.8	
Hori	240.021	QP	36.2	17.0	8.4	27.6	-	34.0	46.0	12.0	
Hori	264.015	QP	30.5	17.9	8.6	27.5	-	29.5	46.0	16.5	
Hori	288.013	QP	27.4	19.1	8.8	27.4	-	27.9	46.0	18.1	
Hori	2536.255	PK	56.1	29.3	3.5	34.9	-	54.0	73.9	19.9	
Hori	4880.000	PK	43.7	32.8	5.9	34.2	-	48.2	73.9	25.7	
Hori	7320.000	PK	42.0	36.8	7.1	34.1	-	51.8	73.9	22.1	Floor Noise
Hori	9760.000	PK	42.8	39.0	8.1	34.7	-	55.2	73.9	18.7	Floor Noise
Hori	2536.255	AV	50.1	29.3	3.5	34.9	1.8	49.8	53.9	4.1	
Hori	4880.000	AV	35.6	32.8	5.9	34.2	1.8	41.9	53.9	12.0	
Hori	7320.000	AV	34.1	36.8	7.1	34.1	-	43.9	53.9	10.0	Floor Noise
Hori	9760.000	AV	34.3	39.0	8.1	34.7	-	46.7	53.9	7.2	Floor Noise
Vert	49.783	QP	42.5	10.7	7.0	28.5	-	31.7	40.0	8.3	
Vert	50.817	QP	43.0	10.4	7.0	28.5	-	31.9	40.0	8.1	
Vert	53.926	QP	43.5	9.3	7.0	28.5	-	31.3	40.0	8.7	
Vert	99.702	QP	40.6	10.1	7.4	28.2	-	29.9	43.5	13.6	
Vert	144.012	QP	38.8	14.6	7.8	28.1	-	33.1	43.5	10.4	
Vert	240.017	QP	37.4	17.0	8.4	27.6	-	35.2	46.0	10.8	
Vert	2536.255	PK	54.8	29.3	3.5	34.9	-	52.7	73.9	21.2	
Vert	4880.000	PK	43.6	32.8	5.9	34.2	-	48.1	73.9	25.8	
Vert	7320.000	PK	42.3	36.8	7.1	34.1	-	52.1	73.9	21.8	Floor Noise
Vert	9760.000	PK	42.2	39.0	8.1	34.7	-	54.6	73.9	19.3	Floor Noise
Vert	2536.255	AV	48.8	29.3	3.5	34.9	1.8	48.5	53.9	5.4	
Vert	4880.000	AV	34.6	32.8	5.9	34.2	1.8	40.9	53.9	13.0	
Vert	7320.000	AV	34.0	36.8	7.1	34.1	-	43.8	53.9	10.1	Floor Noise
Vert	9760.000	AV	34.1	39.0	8.1	34.7	-	46.5	53.9	7.4	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

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	2440.000	PK	104.3	29.3	3.5	34.9	102.2	-	-	Carrier
Hori	2392.238	PK	52.4	29.3	3.5	35.0	50.2	82.2	32.0	
Vert	2440.000	PK	103.3	29.3	3.5	34.9	101.2	-	-	Carrier
Vert	2392.238	PK	52.7	29.3	3.5	35.0	50.5	81.2	30.7	

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

Radiated Spurious Emission
(Antenna 1)

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
 Report No. : 10748020H
 Date : May 18, 2015 May 19, 2015
 Temperature / Humidity : 22deg. C / 44% RH 23deg. C / 54% RH
 Engineer : Keisuke Kawamura Yuta Moriya
 (Below 1GHz) (Above 1GHz)
 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	99.702	QP	31.5	10.1	7.4	28.2	-	20.8	43.5	22.7	
Hori	144.011	QP	36.1	14.6	7.8	28.1	-	30.4	43.5	13.1	
Hori	192.022	QP	28.9	16.4	8.1	27.9	-	25.5	43.5	18.0	
Hori	240.021	QP	36.1	17.0	8.4	27.6	-	33.9	46.0	12.1	
Hori	264.019	QP	30.4	17.9	8.6	27.5	-	29.4	46.0	16.6	
Hori	288.013	QP	28.2	19.1	8.8	27.4	-	28.7	46.0	17.3	
Hori	2384.173	PK	54.9	29.3	3.5	35.0	-	52.7	73.9	21.2	
Hori	2483.500	PK	51.6	29.3	3.5	34.9	-	49.5	73.9	24.4	
Hori	2528.320	PK	55.6	29.3	3.5	34.9	-	53.5	73.9	20.4	
Hori	4960.000	PK	43.8	33.0	5.9	34.3	-	48.4	73.9	25.5	
Hori	7440.000	PK	42.2	36.8	7.0	34.2	-	51.8	73.9	22.1	Floor Noise
Hori	9920.000	PK	42.9	39.0	8.2	34.7	-	55.4	73.9	18.5	Floor Noise
Hori	2384.173	AV	50.0	29.3	3.5	35.0	1.8	49.6	53.9	4.3	*1)
Hori	2483.500	AV	41.8	29.3	3.5	34.9	1.8	41.5	53.9	12.4	*1)
Hori	2528.320	AV	48.8	29.3	3.5	34.9	1.8	48.5	53.9	5.4	
Hori	4960.000	AV	35.1	33.0	5.9	34.3	1.8	41.5	53.9	12.4	
Hori	7440.000	AV	34.2	36.8	7.0	34.2	-	43.8	53.9	10.1	Floor Noise
Hori	9920.000	AV	34.4	39.0	8.2	34.7	-	46.9	53.9	7.0	Floor Noise
Vert	49.754	QP	41.9	10.7	7.0	28.5	-	31.1	40.0	8.9	
Vert	50.788	QP	43.0	10.4	7.0	28.5	-	31.9	40.0	8.1	
Vert	53.900	QP	43.4	9.3	7.0	28.5	-	31.2	40.0	8.8	
Vert	99.736	QP	43.0	10.1	7.4	28.2	-	32.3	43.5	11.2	
Vert	144.012	QP	39.1	14.6	7.8	28.1	-	33.4	43.5	10.1	
Vert	240.017	QP	37.4	17.0	8.4	27.6	-	35.2	46.0	10.8	
Vert	2384.173	PK	55.1	29.3	3.5	35.0	-	52.9	73.9	21.0	
Vert	2483.500	PK	51.1	29.3	3.5	34.9	-	49.0	73.9	24.9	
Vert	2528.320	PK	54.8	29.3	3.5	34.9	-	52.7	73.9	21.2	
Vert	4960.000	PK	43.3	33.0	5.9	34.3	-	47.9	73.9	26.0	
Vert	7440.000	PK	42.2	36.8	7.0	34.2	-	51.8	73.9	22.1	Floor Noise
Vert	9920.000	PK	42.6	39.0	8.2	34.7	-	55.1	73.9	18.8	Floor Noise
Vert	2384.173	AV	49.0	29.3	3.5	35.0	1.8	48.6	53.9	5.3	*1)
Vert	2483.500	AV	40.2	29.3	3.5	34.9	1.8	39.9	53.9	14.0	*1)
Vert	2528.320	AV	46.5	29.3	3.5	34.9	1.8	46.2	53.9	7.7	
Vert	4960.000	AV	34.8	33.0	5.9	34.3	1.8	41.2	53.9	12.7	
Vert	7440.000	AV	34.2	36.8	7.0	34.2	-	43.8	53.9	10.1	Floor Noise
Vert	9920.000	AV	34.2	39.0	8.2	34.7	-	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)

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 13, 2015
Temperature / Humidity : 22deg. C / 60% RH
Engineer : Kazuya Yoshioka
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	73.731	QP	44.4	6.4	7.7	32.1	-	26.4	40.0	13.6	
Hori	99.693	QP	40.5	10.1	8.0	32.3	-	26.3	43.5	17.2	
Hori	166.002	QP	46.7	15.7	8.8	32.2	-	39.0	43.5	4.5	
Hori	192.010	QP	40.5	16.4	9.0	32.1	-	33.8	43.5	9.7	
Hori	240.016	QP	42.3	17.0	9.4	32.1	-	36.6	46.0	9.4	
Hori	331.788	QP	32.0	15.7	10.2	32.0	-	25.9	46.0	20.1	
Hori	2390.000	PK	43.9	26.9	3.4	32.0	-	42.2	73.9	31.7	*1)
Hori	2498.326	PK	54.1	26.9	3.4	31.9	-	52.5	73.9	21.4	
Hori	4804.000	PK	42.8	31.8	5.5	31.3	-	48.8	73.9	25.1	
Hori	7206.000	PK	41.4	36.0	6.8	32.0	-	52.2	73.9	21.7	Floor noise
Hori	9608.000	PK	41.2	38.2	7.3	32.4	-	54.3	73.9	19.6	Floor noise
Hori	2390.000	AV	34.7	26.9	3.4	32.0	1.8	34.8	53.9	19.1	*1)
Hori	2498.326	AV	48.7	26.9	3.4	31.9	1.8	48.9	53.9	5.0	
Hori	4804.000	AV	34.9	31.8	5.5	31.3	1.8	42.7	53.9	11.2	
Hori	7206.000	AV	33.4	36.0	6.8	32.0	-	44.2	53.9	9.7	Floor noise
Hori	9608.000	AV	33.6	38.2	7.3	32.4	-	46.7	53.9	7.2	Floor noise
Vert	73.731	QP	47.2	6.4	7.7	32.1	-	29.2	40.0	10.8	
Vert	99.637	QP	42.4	10.1	8.0	32.3	-	28.2	43.5	15.3	
Vert	165.982	QP	36.0	15.7	8.8	32.2	-	28.3	43.5	15.2	
Vert	192.018	QP	35.6	16.4	9.0	32.1	-	28.9	43.5	14.6	
Vert	240.020	QP	39.8	17.0	9.4	32.1	-	34.1	46.0	11.9	
Vert	331.788	QP	29.2	15.7	10.2	32.0	-	23.1	46.0	22.9	
Vert	2390.000	PK	42.4	26.9	3.4	32.0	-	40.7	73.9	33.2	*1)
Vert	2498.266	PK	53.7	26.9	3.4	31.9	-	52.1	73.9	21.8	
Vert	4804.000	PK	42.2	31.8	5.5	31.3	-	48.2	73.9	25.7	
Vert	7206.000	PK	41.6	36.0	6.8	32.0	-	52.4	73.9	21.5	Floor noise
Vert	9608.000	PK	41.4	38.2	7.3	32.4	-	54.5	73.9	19.4	Floor noise
Vert	2390.000	AV	34.1	26.9	3.4	32.0	1.8	34.2	53.9	19.7	*1)
Vert	2498.266	AV	48.1	26.9	3.4	31.9	1.8	48.3	53.9	5.6	
Vert	4804.000	AV	33.4	31.8	5.5	31.3	1.8	41.2	53.9	12.7	
Vert	7206.000	AV	33.4	36.0	6.8	32.0	-	44.2	53.9	9.7	Floor noise
Vert	9608.000	AV	33.6	38.2	7.3	32.4	-	46.7	53.9	7.2	Floor noise

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

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

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

26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

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

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	101.5	26.9	3.4	32.0	99.8	-	-	Carrier
Hori	2400.000	PK	44.2	26.9	3.4	32.0	42.5	79.8	37.3	
Vert	2402.000	PK	100.1	26.9	3.4	32.0	98.4	-	-	Carrier
Vert	2400.000	PK	42.6	26.9	3.4	32.0	40.9	78.4	37.5	

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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 13, 2015
Temperature / Humidity : 22deg. C / 60% RH
Engineer : Kazuya Yoshioka
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	73.731	QP	44.4	6.4	7.7	32.1	-	26.4	40.0	13.6	
Hori	99.637	QP	43.7	10.1	8.0	32.3	-	29.5	43.5	14.0	
Hori	110.589	QP	36.7	11.6	8.2	32.2	-	24.3	43.5	19.2	
Hori	166.116	QP	41.5	15.7	8.8	32.2	-	33.8	43.5	9.7	
Hori	240.018	QP	42.5	17.0	9.4	32.1	-	36.8	46.0	9.2	
Hori	331.790	QP	32.2	15.7	10.2	32.0	-	26.1	46.0	19.9	
Hori	2487.727	PK	54.9	26.9	3.4	32.0	-	53.2	73.9	20.7	
Hori	2536.185	PK	52.7	27.0	3.4	31.9	-	51.2	73.9	22.7	
Hori	4880.000	PK	41.1	31.9	5.5	31.3	-	47.2	73.9	26.7	
Hori	7320.000	PK	41.6	36.0	6.8	32.0	-	52.4	73.9	21.5	Floor noise
Hori	9760.000	PK	42.0	38.2	7.3	32.5	-	55.0	73.9	18.9	Floor noise
Hori	2487.727	AV	48.1	26.9	3.4	32.0	1.8	48.2	53.9	5.7	
Hori	2536.185	AV	46.3	27.0	3.4	31.9	1.8	46.6	53.9	7.3	
Hori	4880.000	AV	32.8	31.9	5.5	31.3	1.8	40.7	53.9	13.2	
Hori	7320.000	AV	33.7	36.0	6.8	32.0	-	44.5	53.9	9.4	Floor noise
Hori	9760.000	AV	33.7	38.2	7.3	32.5	-	46.7	53.9	7.2	Floor noise
Vert	73.729	QP	47.4	6.4	7.7	32.1	-	29.4	40.0	10.6	
Vert	99.627	QP	46.3	10.1	8.0	32.3	-	32.1	43.5	11.4	
Vert	110.593	QP	39.7	11.6	8.2	32.2	-	27.3	43.5	16.2	
Vert	166.020	QP	34.9	15.7	8.8	32.2	-	27.2	43.5	16.3	
Vert	240.022	QP	39.9	17.0	9.4	32.1	-	34.2	46.0	11.8	
Vert	331.788	QP	29.4	15.7	10.2	32.0	-	23.3	46.0	22.7	
Vert	2487.691	PK	55.1	26.9	3.4	32.0	-	53.4	73.9	20.5	
Vert	2536.300	PK	54.3	27.0	3.4	31.9	-	52.8	73.9	21.1	
Vert	4880.000	PK	40.1	31.9	5.5	31.3	-	46.2	73.9	27.7	Floor noise
Vert	7320.000	PK	41.8	36.0	6.8	32.0	-	52.6	73.9	21.3	Floor noise
Vert	9760.000	PK	42.2	38.2	7.3	32.5	-	55.2	73.9	18.7	Floor noise
Vert	2487.691	AV	48.1	26.9	3.4	32.0	1.8	48.2	53.9	5.7	
Vert	2536.300	AV	48.4	27.0	3.4	31.9	1.8	48.7	53.9	5.2	
Vert	4880.000	AV	32.1	31.9	5.5	31.3	-	38.2	53.9	15.7	Floor noise
Vert	7320.000	AV	33.7	36.0	6.8	32.0	-	44.5	53.9	9.4	Floor noise
Vert	9760.000	AV	33.7	38.2	7.3	32.5	-	46.7	53.9	7.2	Floor noise

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

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

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

Radiated Spurious Emission
(Antenna 2)

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10748020H
Date : July 13, 2015
Temperature / Humidity : 22deg. C / 60% RH
Engineer : Kazuya Yoshioka
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	73.731	QP	45.0	6.4	7.7	32.1	-	27.0	40.0	13.0	
Hori	99.613	QP	45.3	10.1	8.0	32.3	-	31.1	43.5	12.4	
Hori	166.160	QP	42.1	15.7	8.8	32.2	-	34.4	43.5	9.1	
Hori	192.016	QP	40.5	16.4	9.0	32.1	-	33.8	43.5	9.7	
Hori	240.020	QP	41.3	17.0	9.4	32.1	-	35.6	46.0	10.4	
Hori	331.794	QP	32.3	15.7	10.2	32.0	-	26.2	46.0	19.8	
Hori	2483.500	PK	51.9	26.9	3.4	32.0	-	50.2	73.9	23.7	*1)
Hori	2576.261	PK	54.5	27.2	3.5	31.9	-	53.3	73.9	20.6	
Hori	4960.000	PK	40.9	32.1	5.4	31.2	-	47.2	73.9	26.7	
Hori	7440.000	PK	41.5	36.0	6.8	32.1	-	52.2	73.9	21.7	Floor noise
Hori	9920.000	PK	41.9	38.2	7.4	32.5	-	55.0	73.9	18.9	Floor noise
Hori	2483.500	AV	39.3	26.9	3.4	32.0	1.8	39.4	53.9	14.5	*1)
Hori	2576.261	AV	49.0	27.2	3.5	31.9	1.8	49.6	53.9	4.3	
Hori	4960.000	AV	33.2	32.1	5.4	31.2	1.8	41.3	53.9	12.6	
Hori	7440.000	AV	33.6	36.0	6.8	32.1	-	44.3	53.9	9.6	Floor noise
Hori	9920.000	AV	34.2	38.2	7.4	32.5	-	47.3	53.9	6.6	Floor noise
Vert	73.731	QP	47.7	6.4	7.7	32.1	-	29.7	40.0	10.3	
Vert	99.663	QP	46.2	10.1	8.0	32.3	-	32.0	43.5	11.5	
Vert	166.160	QP	31.9	15.7	8.8	32.2	-	24.2	43.5	19.3	
Vert	192.016	QP	36.5	16.4	9.0	32.1	-	29.8	43.5	13.7	
Vert	240.020	QP	40.0	17.0	9.4	32.1	-	34.3	46.0	11.7	
Vert	331.790	QP	29.4	15.7	10.2	32.0	-	23.3	46.0	22.7	
Vert	2483.500	PK	49.0	26.9	3.4	32.0	-	47.3	73.9	26.6	*1)
Vert	2576.217	PK	54.3	27.2	3.5	31.9	-	53.1	73.9	20.8	
Vert	4960.000	PK	40.9	32.1	5.4	31.2	-	47.2	73.9	26.7	
Vert	7440.000	PK	41.8	36.0	6.8	32.1	-	52.5	73.9	21.4	Floor noise
Vert	9920.000	PK	42.1	38.2	7.4	32.5	-	55.2	73.9	18.7	Floor noise
Vert	2483.500	AV	38.1	26.9	3.4	32.0	1.8	38.2	53.9	15.7	*1)
Vert	2576.217	AV	49.0	27.2	3.5	31.9	1.8	49.6	53.9	4.3	
Vert	4960.000	AV	32.9	32.1	5.4	31.2	1.8	41.0	53.9	12.9	
Vert	7440.000	AV	33.6	36.0	6.8	32.1	-	44.3	53.9	9.6	Floor noise
Vert	9920.000	AV	34.2	38.2	7.4	32.5	-	47.3	53.9	6.6	Floor noise

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

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

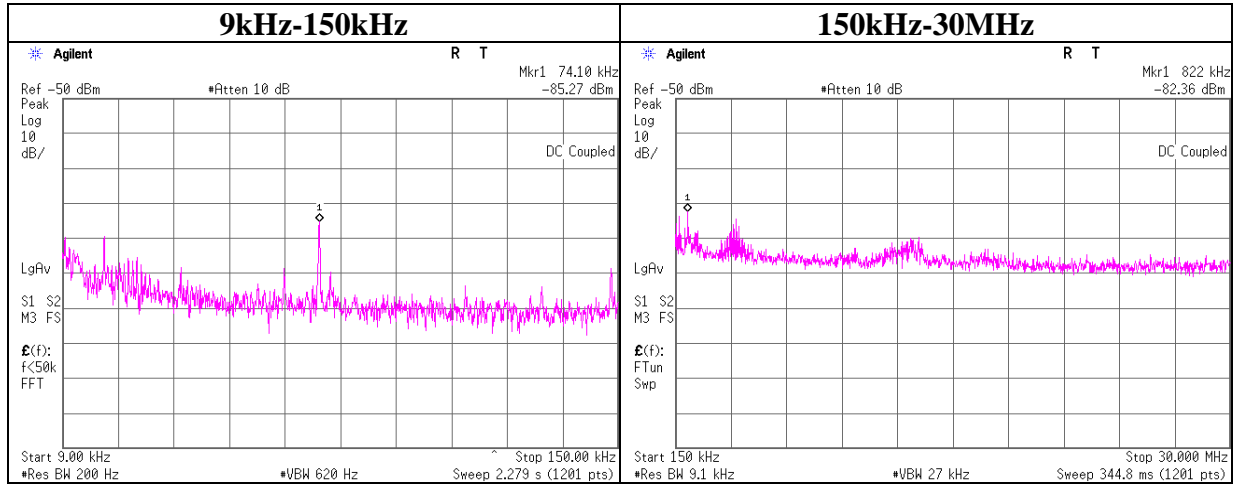
Distance factor: 10 GHz - 26.5 GHz $20\log(3.0\text{ m} / 1.0\text{ m}) = 9.5\text{ dB}$

26.5 GHz - 40 GHz $20\log(3.0\text{ m} / 0.5\text{ m}) = 15.6\text{ dB}$

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

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 22, 2015
Temperature / Humidity	23deg. C / 43% RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 2437MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
74.10	-85.3	0.00	9.8	2.0	2	-70.4	300	6.0	-9.2	30.2	39.4	
822.00	-82.4	0.01	9.8	2.0	2	-67.5	30	6.0	13.7	29.3	15.6	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10*\log(N)$

UL Japan, Inc.

Ise EMC Lab.

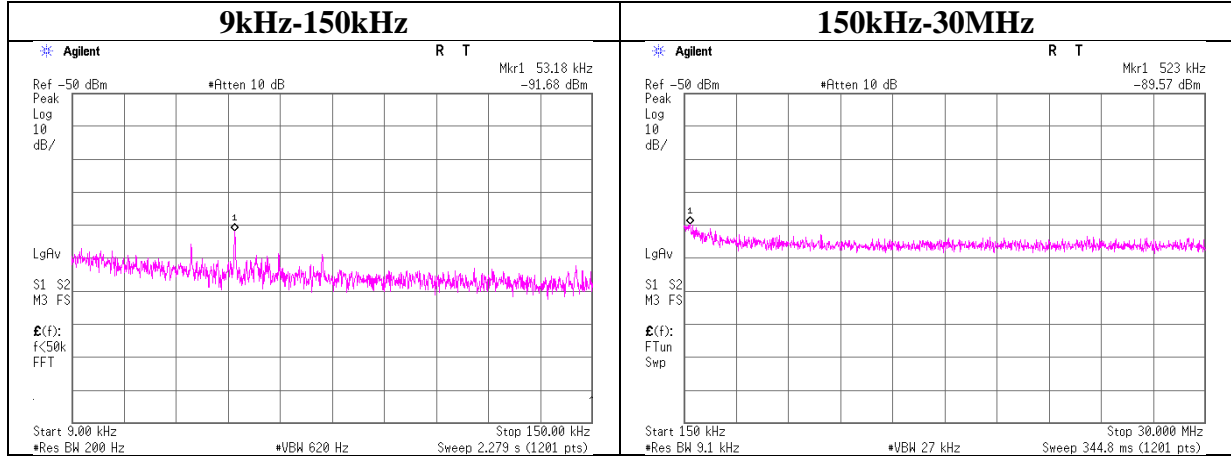
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 48% RH
Engineer	Yuta Moriya
Mode	Tx BT LE 2402MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
53.18	-91.7	0.00	9.8	2.0	1	-79.9	300	6.0	-18.6	33.0	51.6	
523.00	-89.6	0.00	9.8	2.0	1	-77.8	30	6.0	3.5	33.2	29.7	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10*\log(N)$

UL Japan, Inc.

Ise EMC Lab.

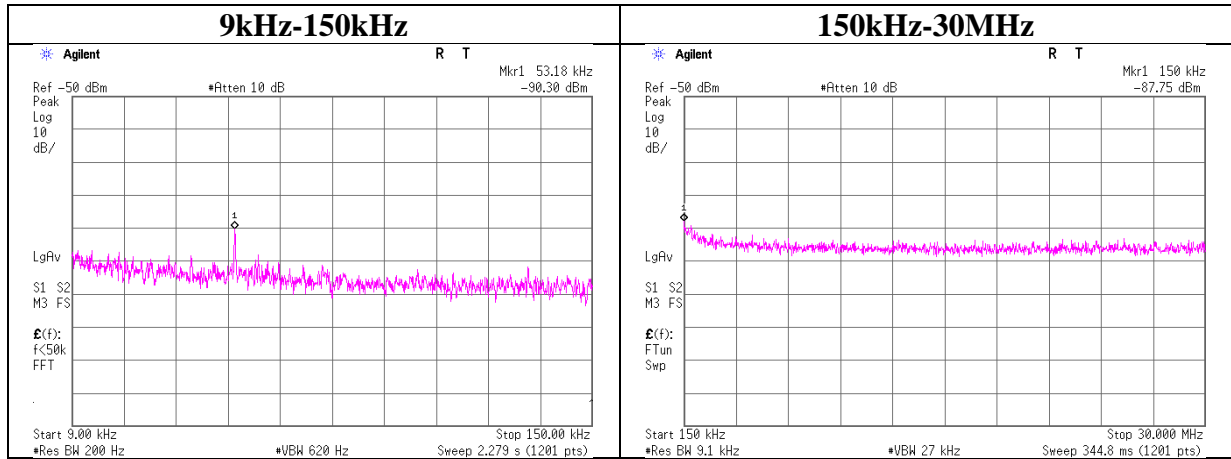
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 48% RH
Engineer	Yuta Moriya
Mode	Tx BT LE 2440MHz



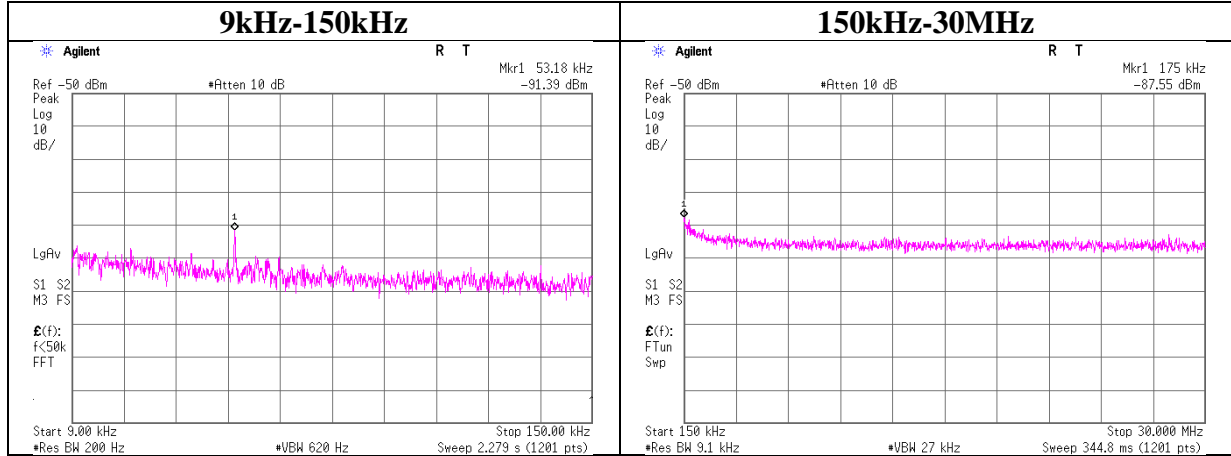
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
53.18	-90.3	0.00	9.8	2.0	1	-78.5	300	6.0	-17.2	33.0	50.2	
150.00	-87.8	0.00	9.8	2.0	1	-75.9	300	6.0	-14.7	24.0	38.7	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10*\log(N)$

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 48% RH
Engineer	Yuta Moriya
Mode	Tx BT LE 2480MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
53.18	-91.4	0.08	9.8	2.0	1	-79.5	300	6.0	-18.2	33.0	51.2	
175.00	-87.6	0.00	9.8	2.0	1	-75.7	300	6.0	-14.5	22.7	37.2	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10*\log(N)$

Power Density

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10748020H
Date May 22, 2015 July 23, 2015
Temperature / Humidity 23deg. C / 43% RH 24deg. C / 60% RH
Engineer Kazuya Yoshioka Kazuya Yoshioka
Mode Tx

11b Antenna port 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-20.87	2.07	10.02	-8.78	8.00	16.78
2437.00	-22.03	2.08	10.02	-9.93	8.00	17.93
2462.00	-21.40	2.09	10.02	-9.29	8.00	17.29

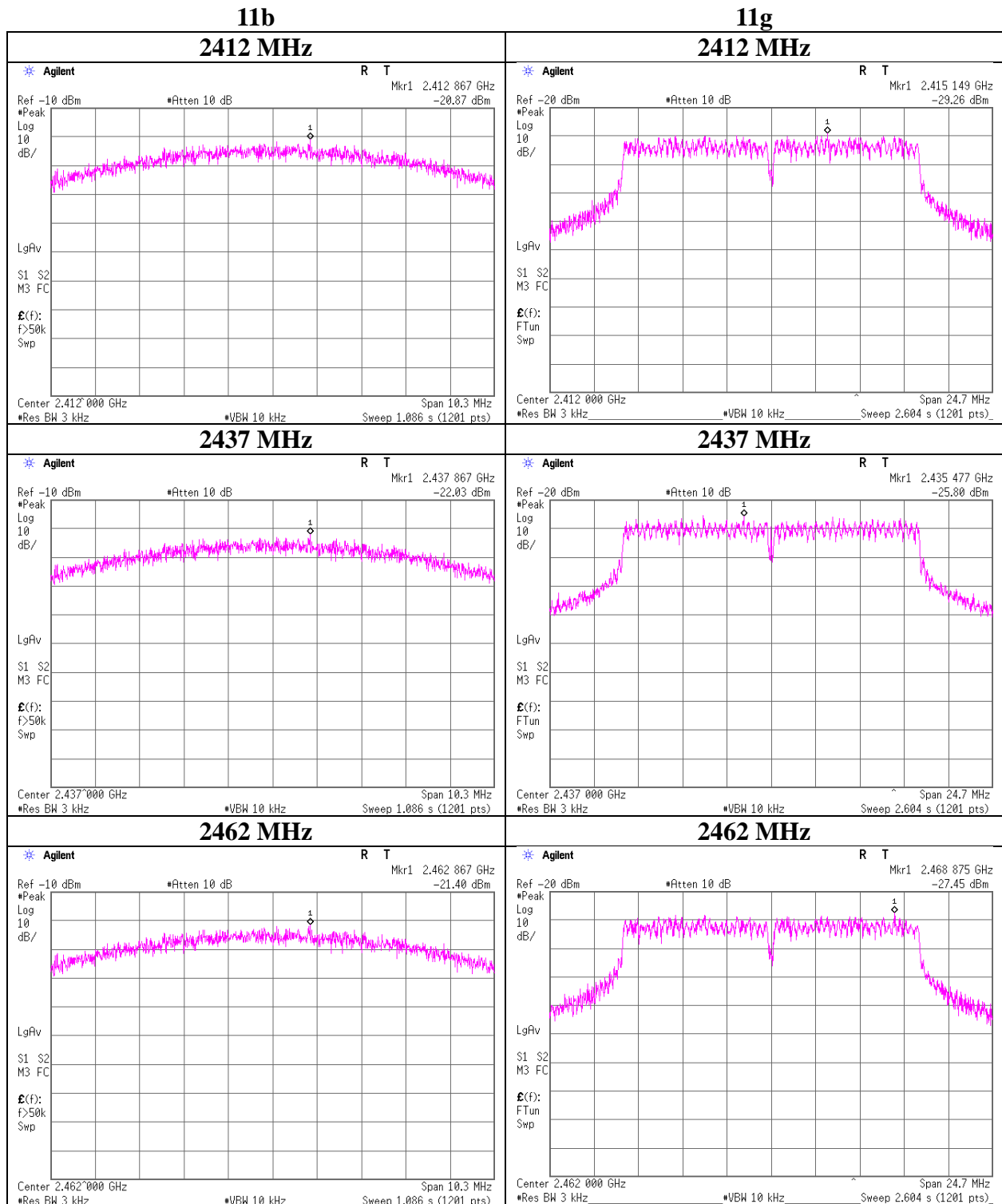
11g Antenna port 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-29.26	1.58	10.11	-17.57	8.00	25.57
2437.00	-25.80	2.08	10.02	-13.70	8.00	21.70
2462.00	-27.45	1.60	10.11	-15.74	8.00	23.74

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Power Density



Power Density

Test place	Ise EMC Lab. No.6 Measurement Room	
Report No.	10748020H	
Date	May 22, 2015	July 23, 2015
Temperature / Humidity	23deg. C / 43% RH	24deg. C / 60% RH
Engineer	Kazuya Yoshioka	Kazuya Yoshioka
Mode	Tx 11n-20	

11n-20 Antenna port 0 + 1

Freq. [MHz]	Antenna 0 Result [mW]	Antenna 1 Result [mW]	Result		Limit [dBm]	Margin [dB]
			[dBm]	[mW]		
2412.00	0.02	0.05	-11.52	0.07	8.00	19.52
2437.00	0.04	0.03	-11.25	0.08	8.00	19.25
2462.00	0.02	0.07	-10.36	0.09	8.00	18.36

Sample Calculation:

Result = Antenna port 0 + 1

Antenna port 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit [dBm]	Margin [dB]
				[dBm]	[mW]		
2412.00	-28.05	1.58	10.11	-16.36	0.02	8.00	24.36
2437.00	-26.06	2.08	10.02	-13.96	0.04	8.00	21.96
2462.00	-27.86	1.60	10.11	-16.15	0.02	8.00	24.15

Antenna port 1

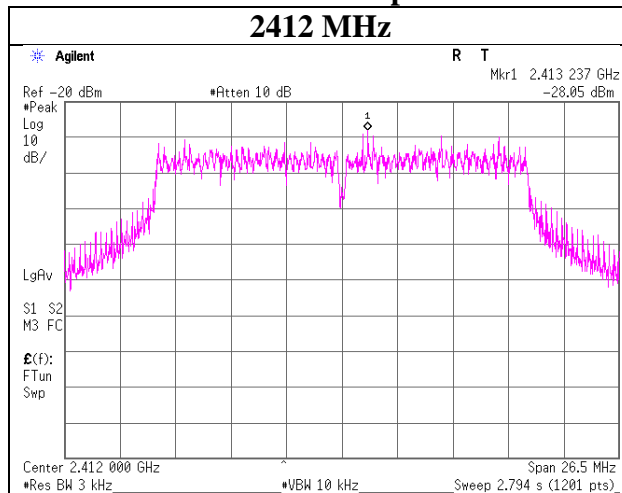
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit [dBm]	Margin [dB]
				[dBm]	[mW]		
2412.00	-24.93	1.58	10.11	-13.24	0.05	8.00	21.24
2437.00	-26.68	2.08	10.02	-14.58	0.03	8.00	22.58
2462.00	-23.40	1.60	10.11	-11.69	0.07	8.00	19.69

Sample Calculation:

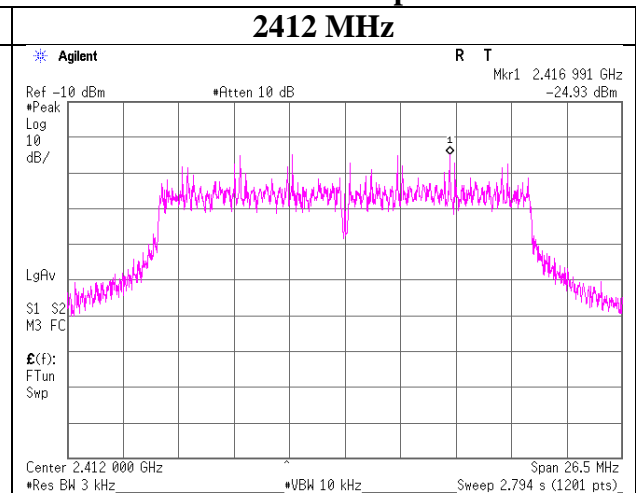
Result = Reading + Cable Loss + Attenuator Loss

Power Density

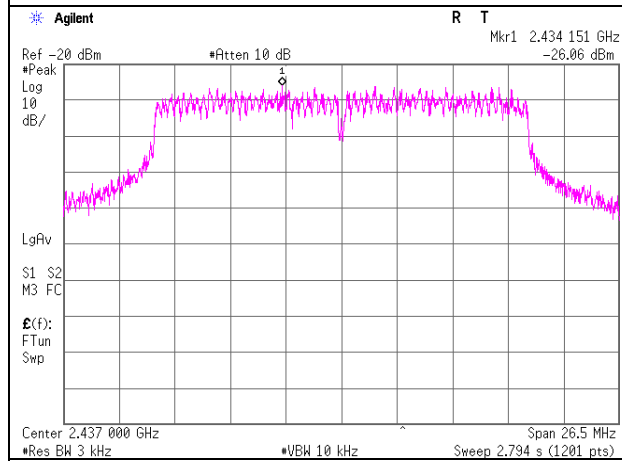
11n-20 Antenna port 0



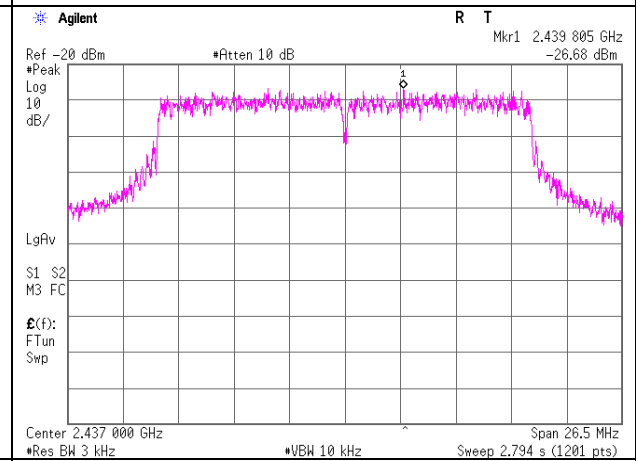
11n-20 Antenna port 1



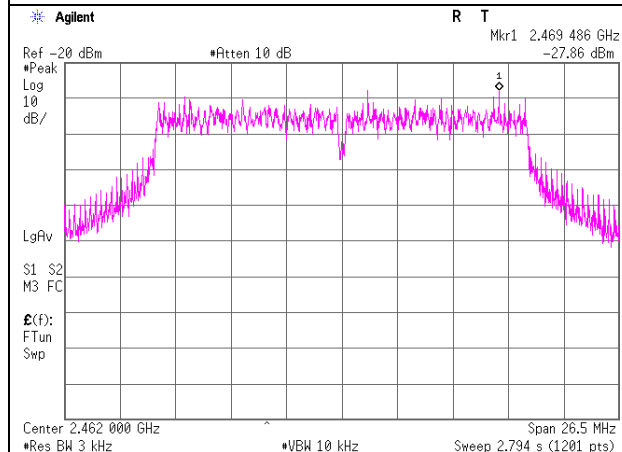
2437 MHz



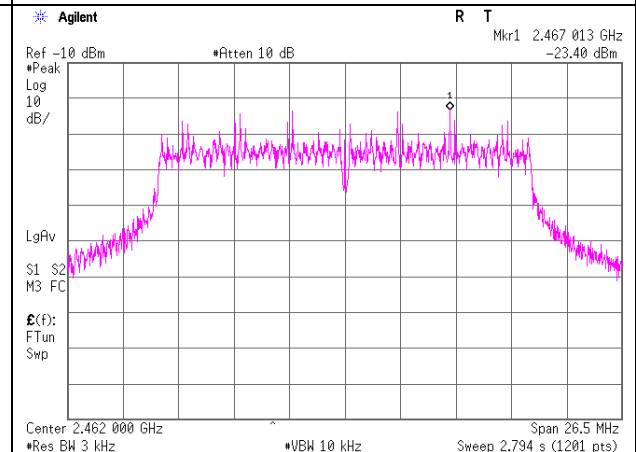
2437 MHz



2462 MHz



2462 MHz



Power Density

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10748020H
Date May 27, 2015
Temperature / Humidity 23deg. C / 48% RH
Engineer Yuta Moriya
Mode Tx BT LE

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-24.14	2.06	10.02	-12.06	8.00	20.06
2440.00	-22.80	2.08	10.02	-10.70	8.00	18.70
2480.00	-22.30	2.10	10.02	-10.18	8.00	18.18

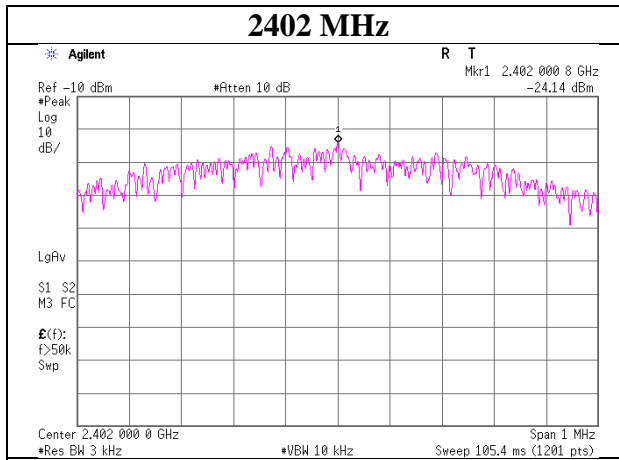
Sample Calculation:

Result = Reading + Cable Loss + Attenuator

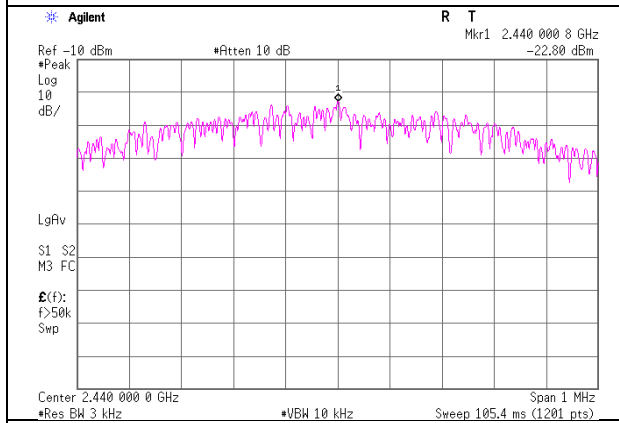
Power Density

BT LE

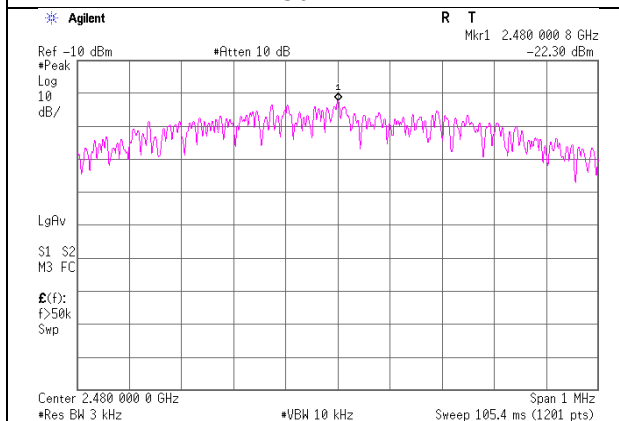
2402 MHz



2440 MHz

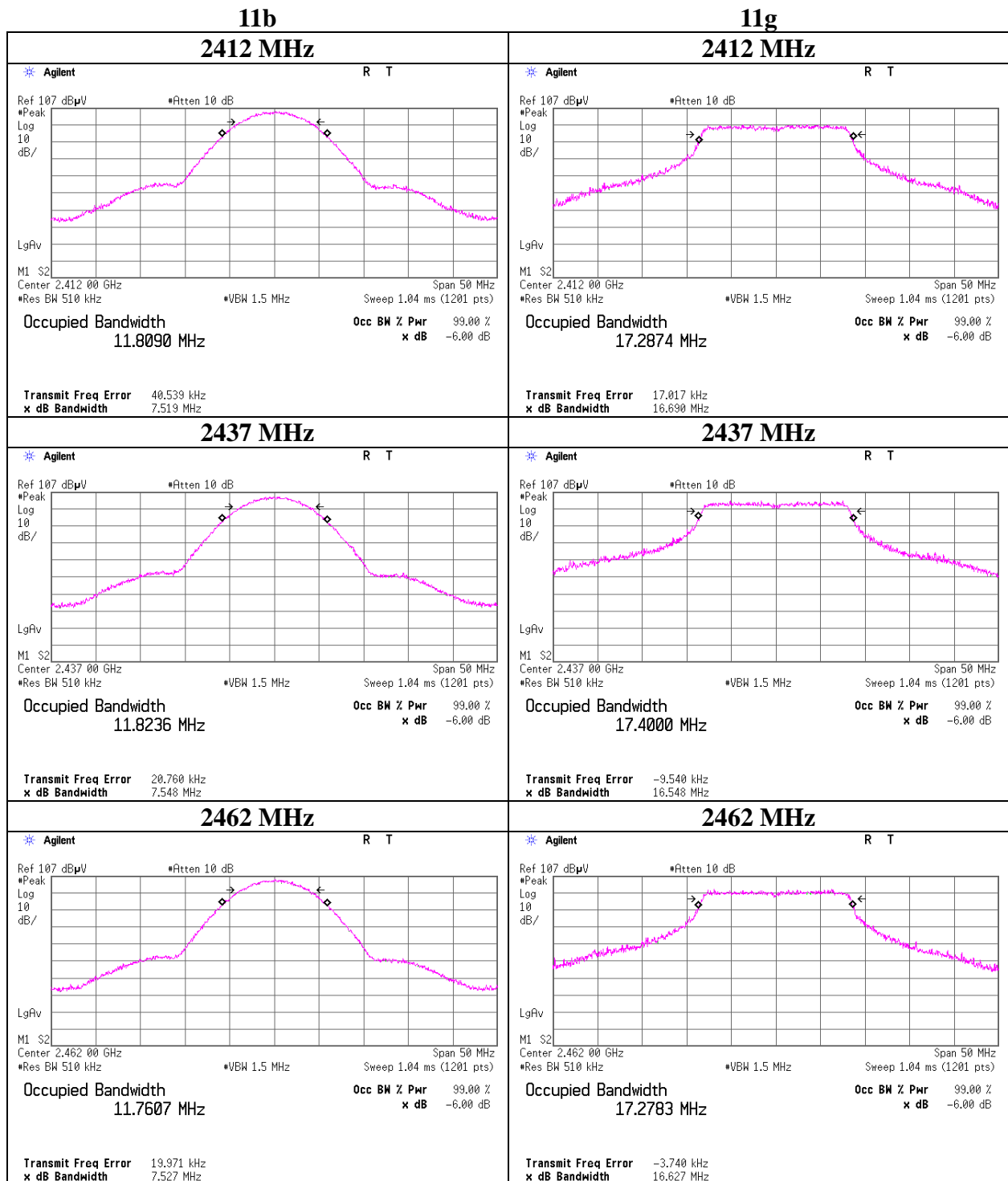


2480 MHz



99% Occupied Bandwidth

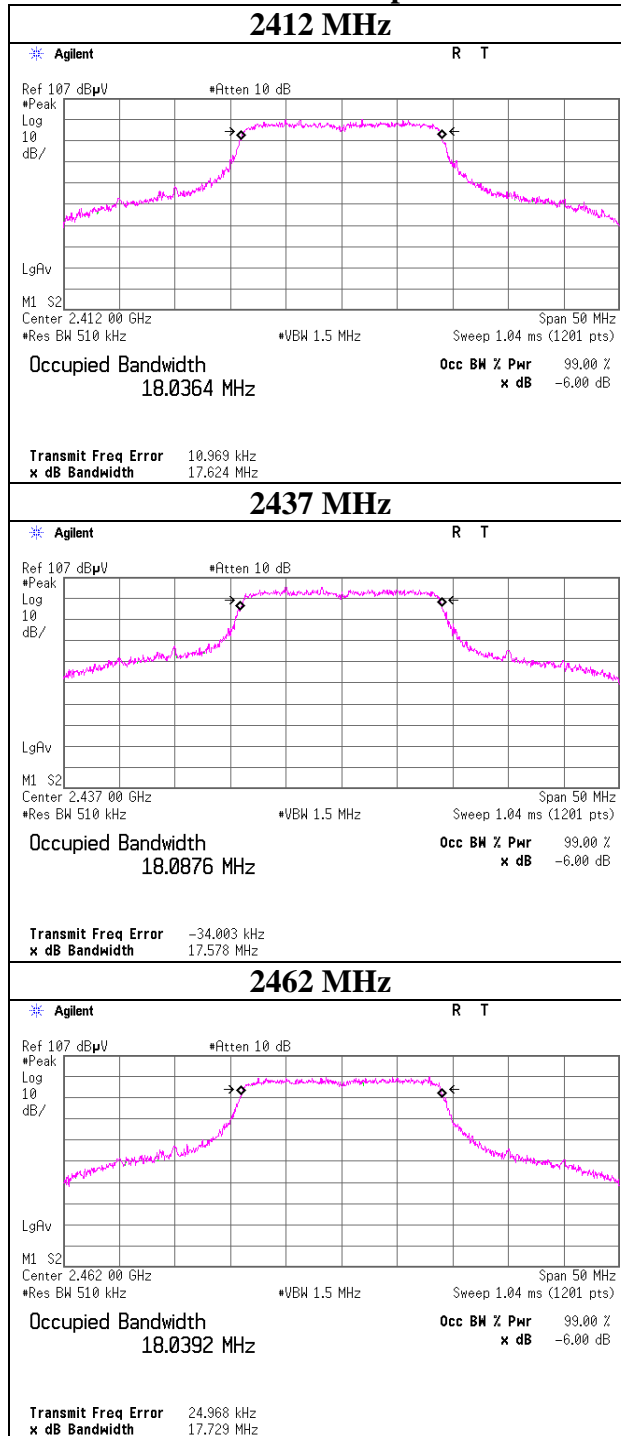
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 22, 2015
Temperature / Humidity	23deg. C / 43% RH
Engineer	Kazuya Yoshioka
Mode	Tx



99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 22, 2015
Temperature / Humidity	23deg. C / 43% RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20

11n-20 Antenna port 1



UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

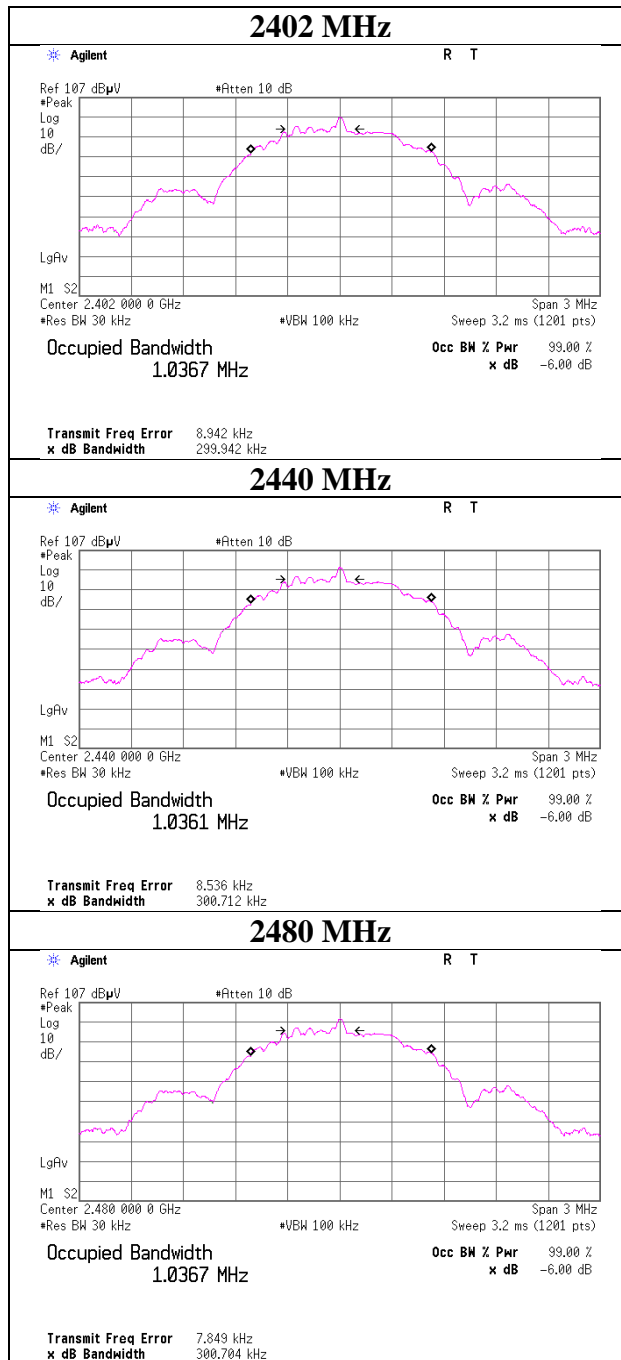
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10748020H
Date	May 27, 2015
Temperature / Humidity	23deg. C / 48% RH
Engineer	Yuta Moriya
Mode	Tx BT LE

BT LE



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

APPENDIX 2: Test instruments

Test equipment (1/3)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2015/02/26 * 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-35	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2014/09/12 * 12
MCC-36	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2014/09/12 * 12
MTA-46	Terminator	Mini-Circuits	ANNE-50X+	MUU3460143	AT	Pre Check
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/13 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/18 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2015/01/13 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	RE/CE	2015/02/16 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	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	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2015/04/08 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMEN T	310	260834	RE	2015/03/10 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2015/05/19 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	51201197	RE	2015/01/16 * 12
MRENT-1 24	Spectrum Analyzer	KEYSIGHT	E4440A	MY46187750	RE	2015/06/24 * 12
MCC-103	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2014/06/12 * 12 *1)
MCC-137	Microwave cable	HUBER+SUH NER	SUCOFLEX 102	37954/2	AT	2014/10/02 * 12
MTA-37	Terminator	-	50Ω SMA	-	AT	Pre Check
MCC-105	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2014/06/12 * 12 *1)
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
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2014/06/11 * 12 *1)
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2014/10/18 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2014/10/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agile nt	-	-	RE	2015/02/06 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2014/11/11 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2014/09/26 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2015/05/15 * 12

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

Test equipment (2/3)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MHF-16	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	RE	2014/09/29 * 12
MCC-176	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S303	RE	2015/03/27 * 12
MTW-02	Torque wrench	HUBER+SUHNER	74 Z-0-0-21	98190	RE	2015/01/16 * 36
MHA-02	Horn Antenna 18-26.5GHz	EMCO	Sep-60	1265	RE	2015/02/05 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2015/01/28 * 12
MHA-29	Horn Antenna 26.5-40GHz	ETS LINDGREN	Oct-60	152399	RE	2014/09/02 * 12
MPA-22	Pre Amplifier	MITEQ, Inc	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 /1871328	RE	2014/09/11 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2015/03/09 * 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	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE/CE	2014/11/12 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12 * 1)
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2015/03/12 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	2	RE	2014/09/24 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/19 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2015/03/19 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	1	RE	2014/09/22 * 12
MPM-12	Power Meter	Anritsu	ML2495A	825002	AT	2014/06/16 * 12 * 1)
MPSE-17	Power sensor	Anritsu	MA2411B	738285	AT	2014/06/16 * 12 * 1)
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2014/06/12 * 12 * 1)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2014/06/25 * 12 * 1)
MOS-22	Thermo-Hygrometer	Custom	CTH-201	3	RE/CE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-ME MI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	

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

Test equipment (3/3)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE/CE	2014/06/03 * 12 *1)
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(EUT)	2014/07/10 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2015/02/06 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12

***1) This test equipment was used for the tests before the expiration date of the calibration.**

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**