RADIO TEST REPORT

Test Report No. : 10195552-001H-B-R1

Applicant	:	**silex technology, Inc.**
Type of Equipment	:	**SDIO Wireless Module**
Model No.	:	**SX-SDMAN**
FCC ID	:	**N6C-SDMAN**
Test regulation	:	**FCC Part 15 Subpart E: 2013 (Permissive Change Class II Application) *Conducted emission and Spurious Emission Restricted Band Edge test only**
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 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 report is a revised version of 10195552-001H-B. 10195552-001H-B is replaced with this report.

Date of test: March 5 to 13, 2014

Representative test engineer:
T. Shimada
Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:
T. Hatakeda
Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service

NVLAP®
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.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

REVISION HISTORY

Original Test Report No.: 10195552-001H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10195552-001H-B	March 20, 2014	-	-
1	10195552-001H-B-R1	March 25, 2014	P.36-39	Addition and Correction of photographs of worst case position

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

CONTENTS **PAGE**

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	:	SDIO Wireless Module
Model No.	:	SX-SDMAN
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC3.3V
Receipt Date of Sample	:	January 18, 2014
Country of Mass-production	:	Japan
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model No: SX-SDMAN (referred to as the EUT in this report) is the SDIO Wireless Module.

General Specification

Clock frequency(ies) in the system : 26MHz

Radio Specification

Radio Type : Transceiver
Method of Frequency Generation : Synthesizer
Power Supply (inner) : DC1.2V

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

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412-2462MHz*1)	2412-2462MHz*1)	5180-5320MHz 5745-5825MHz*2)	2412 - 2462MHz*1) 5180-5320MHz 5745-5825MHz *2)	5190 - 5310MHz 5755 - 5795MHz *2)
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5MHz		20MHz	2.4GHz band 5MHz 5GHz band 20MHz	40MHz
Antenna type	Mini-Nanoblade antenna: Laird Technologies Stand Alone antenna: Molex				
Antenna Gain	Mini-Nanoblade antenna: 2.5dBi (2.4GHz), 4.8dBi (5GHz) Stand Alone antenna: 3.0dBi (2.4GHz), 4.6dBi (5GHz)				
Antenna Connector type	U.FL Alternative connector				

*1) 2412 - 2462MHz is applied for other test report.(Test Report No.: 1019552-001H-A)
*2) 5745 - 5825MHz is applied for other test report.(Test Report No.: 1019552-001H-A)

Specification of Bluetooth (Ver.4.0 + EDR)

Type of radio	Bluetooth
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Channel spacing	1MHz
Antenna type	Mini-Nanoblade antenna: Laird Technologies Stand Alone antenna: Molex
Antenna Gain	Mini-Nanoblade antenna: 2.5dBi (2.4GHz), 4.8dBi (5GHz) Stand Alone antenna: 3.0dBi (2.4GHz), 4.6dBi (5GHz)
Antenna Connector Type	U.FL Alternative connector

Specification of Low Energy (Ver.4.0 + EDR/LE Dual mode)

Type of radio	Low Energy
Frequency of Operation	2402-2480MHz
Type of Modulation	DSSS
Channel spacing	2MHz
Antenna type	Mini-Nanoblade antenna: Laird Technologies Stand Alone antenna: Molex
Antenna Gain	Mini-Nanoblade antenna: 2.5dBi (2.4GHz), 4.8dBi (5GHz) Stand Alone antenna: 3.0dBi (2.4GHz), 4.6dBi (5GHz)
Antenna Connector Type	U.FL Alternative connector

*This test report applies for Wireless LAN (IEEE802.11a/n-20/n-40).
Wireless LAN and Bluetooth do not transmit simultaneously.

<Contents of the change from original model>
Test Report Number of original model is 32IE0154-HO-01-C-R1.
Specification was changed from the original model as follows:
*Antenna of the EUT was modified. The radio specification is identical to the original.
Therefore only Conducted emission test and Spurious Emission Restricted Band Edge test were performed in this report.
Additionally, only the information of modified antenna is described in this report.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart E: 2013, final revised on September 30, 2013 and effective October 30, 2013
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC :**ANSI C63.4:2003	**FCC:** 15.407(b)(6) / 15.207	**QP** 18.0dB, 0.16843MHz, L **AV** 24.7dB, 4.39254MHz, L	Complied	-
	IC: RSS-Gen 7.2.4	**IC:** RSS-Gen 7.2.4			
Spurious Emission Restricted Band Edge	**FCC:** ANSI C63.4:2003 FCC KDB 789033 D01 v01r01	**FCC :** 15.407(b), 15.205 and 15.209	2.4dB 5350.000MHz, AV, Hori.	Complied	Radiated
	IC: -	**IC:** RSS-210 A.9.2(1)(2)(3)			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. For DFS tests, please see the test report number 32IE0154-HO-01-D issued by UL Japan, Inc.					

FCC 15.31 (e)
The RF Module has own regulator.
The RF Module is constantly provided voltage through own regulator regardless of input voltage (DC3.3V).
Therefore, this EUT complies with the requirement.

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

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

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

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

Radiated emission test(3m)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Head Office 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

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	6.2 x 4.7 x 3.0m	2.4 x 3.4m	-

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

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Modes

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 802.11a (11a)	24Mbps, PN9
IEEE 802.11n 20MHz BW (11n-20)	MCS 1 (Long GI), PN9
IEEE 802.11n 40MHz BW (11n-40)	MCS 3 (Long GI), PN9

*The worst condition was determined based on the test result of Maximum Peak Output Power.
*EUT has the power settings by the software as follows;
Power settings:
11a W52, W53(24Mbps, Long GI): 5180MHz: 13.0dBm, others: 14.0dBm
11n-20 W52, W53(MCS 1, Long GI): 5180MHz: 13.0dBm, others: 14.0dBm
11n-40 W52, W53(MCS 3, Long GI): 5190MHz: 9.5dBm, 5310MHz: 11.5dBm, others: 14.0dBm

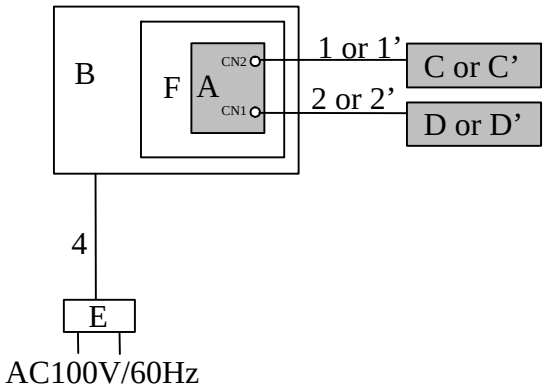
Software: Atheros Test Command (Athtestcmd) v3.1.1 Build 563
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna port	Tested Frequency	
			Low Band	Middle Band
Conducted emission	11n-20 Tx *1)	2 *3)	-	5320MHz
Spurious Emission(Radiated)	11n-20 Tx *2)	2 *3)	5180MHz 5240MHz	5320MHz
	11n-40 Tx	2 *3)	5190MHz 5230MHz	5310MHz

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test (Test Report Number of original model is 32IE0154-HO-01-C-R1).
*2) Since 11a and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power (Test Report Number of original model is 32IE0154-HO-01-C-R1).
*3) After the comparison between Antenna port 1 and Antenna port 2, test was performed with the antenna that had higher power as a representative.

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* Radiated emission was tested with the EUT on a single jig board in original application. For this testing, the antenna radiation was focused, and different jig boards were used.
* EUT has Molex antenna and Laird antenna. The test was performed with below worst configurations.
-CN1 and CN2 were connected to Molex antenna.
-CN1 and CN2 were connected to Laird antenna.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SDIO Wireless Module	SX-SDMAN	008092-5099DA	silex technology, Inc.	EUT
B	Jig Board	-	-	silex technology, Inc.	-
C	Stand Alone antenna	47950-0001	001	Molex	EUT
C'	Mini-Nanoblade antenna	Mini-Nanoblade	001	Laird Technologies	EUT
D	Stand Alone antenna	47950-0001	002	Molex	EUT
D'	Mini-Nanoblade antenna	Mini-Nanoblade	002	Laird Technologies	EUT
E	AC Adaptor	US115-05	C08-0259307	UNIFIVE	-
F	Jig	-	-	silex technology, Inc.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable (Molex)	0.08	Shielded	Shielded	-
1'	Antenna Cable (Laird)	0.08	Shielded	Shielded	-
2	Antenna Cable (Molex)	0.08	Shielded	Shielded	-
2'	Antenna Cable (Laird)	0.08	Shielded	Shielded	-
3	DC Cable	1.8	Unshielded	Unshielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cable and AC 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 or a Measurement Room.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
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.

Below 1GHz
The result also satisfied with the general limits specified in section 15.209(a).

Above 1GHz

Inside of restricted bands(Section 15.205):	Apply to limit in the Section 15.209(a).
Outside of the restricted bands:	Apply to limit 68.2dBuV/m(–27dBm e.i.r.p.*) in the Section 15.407(b)(1)(2)(3).

*Electric Field Strength to e.i.r.p. Conversion

$$E = \frac{1000000\sqrt{30P}}{3} \text{ (uV/m)} \qquad \text{:P is the e.i.r.p. (Watts)}$$

Test Antennas are used as below;

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

Frequency	Below 1GHz	Above 1GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	PK	AV
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	Method AD *1) RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Duty factor was added to the results.
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz) 0.5m*3) (above 26.5GHz)	

*1) The test method was also referred to KDB 789033 D01 General UNII Test Procedures v01r03 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on April 8, 2013)".
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB
*3) Distance Factor: 20 x log (3.0m/0.5m) = 15.6dB

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

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

Measurement range : **30M-40GHz**
Test data : **APPENDIX**
Test result : **Pass**

APPENDIX 1: Data of EMI test

Conducted Emission
[Molex antenna]

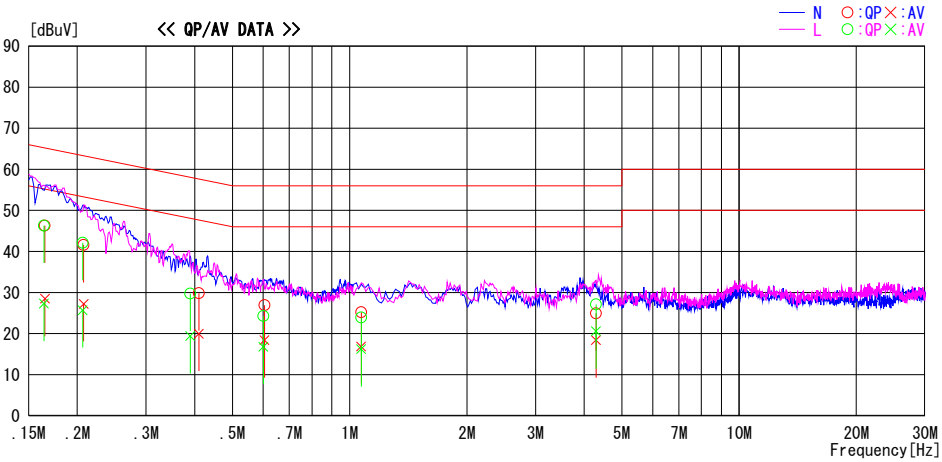
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2014/03/05

Report No. : 10195552-001H
Power : AC 120V / 60Hz
Temp./Humi. : 20deg. C / 31% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 11n20_MCS1_5320MHz_Ant(Molex)

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16502	33.1	15.3	13.2	46.3	28.5	65.2	55.2	18.9	26.7	N	
0.20743	28.4	14.0	13.2	41.6	27.2	63.3	53.3	21.7	26.1	N	
0.40999	16.6	6.8	13.2	29.8	20.0	57.6	47.6	27.8	27.6	N	
0.60457	13.6	5.1	13.3	26.9	18.4	56.0	46.0	29.1	27.6	N	
1.07038	11.8	3.5	13.4	25.2	16.9	56.0	46.0	30.8	29.1	N	
4.29113	11.1	4.6	13.8	24.9	18.4	56.0	46.0	31.1	27.6	N	
0.16410	33.1	14.1	13.2	46.3	27.3	65.3	55.3	19.0	28.0	L	
0.20642	28.9	12.5	13.2	42.1	25.7	63.3	53.3	21.2	27.6	L	
0.38959	16.5	6.2	13.2	29.7	19.4	58.1	48.1	28.4	28.7	L	
0.60024	11.0	3.5	13.3	24.3	16.8	56.0	46.0	31.7	29.2	L	
1.07003	10.5	2.8	13.4	23.9	16.2	56.0	46.0	32.1	29.8	L	
4.29086	13.3	6.8	13.8	27.1	20.6	56.0	46.0	28.9	25.4	L	

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

Conducted Emission
[Laird antenna]

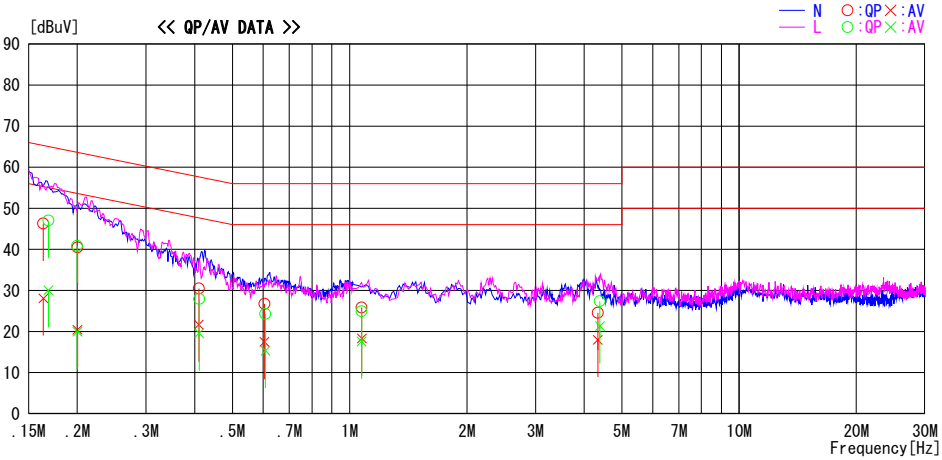
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2014/03/05

Report No. : 10195552-001H
Power : AC 120V / 60Hz
Temp./Humi. : 20deg. C / 31% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 11n20_MCS1_5320MHz_Ant(Laird)

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16355	33.1	14.9	13.2	46.3	28.1	65.3	55.3	19.0	27.2	N	
0.20013	27.3	7.2	13.2	40.5	20.4	63.6	53.6	23.1	33.2	N	
0.41010	17.3	8.5	13.2	30.5	21.7	57.6	47.6	27.1	25.9	N	
0.60457	13.4	4.2	13.3	26.7	17.5	56.0	46.0	29.3	28.5	N	
1.07413	12.4	4.9	13.4	25.8	18.3	56.0	46.0	30.2	27.7	N	
4.33930	10.8	4.2	13.8	24.6	18.0	56.0	46.0	31.4	28.0	N	
0.16843	33.8	16.9	13.2	47.0	30.1	65.0	55.0	18.0	24.9	L	
0.20000	27.6	6.8	13.2	40.8	20.0	63.6	53.6	22.8	33.6	L	
0.41100	14.7	6.4	13.2	27.9	19.6	57.6	47.6	29.7	28.0	L	
0.60820	11.0	2.0	13.3	24.3	15.3	56.0	46.0	31.7	30.7	L	
1.07246	11.5	4.2	13.4	24.9	17.6	56.0	46.0	31.1	28.4	L	
4.39254	13.6	7.5	13.8	27.4	21.3	56.0	46.0	28.6	24.7	L	

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

Radiated Spurious Emission
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-20 Tx 5180MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4731.997	PK	47.0	31.7	3.6	33.9	-	48.4	73.9	25.5	Inside	
Hori	5150.000	PK	48.0	32.2	3.8	33.9	-	50.1	68.2	18.1	Bandedge	
Hori	10360.000	PK	44.6	39.1	-2.5	34.2	-	47.0	68.2	21.2	Outside	
Hori	15540.000	PK	44.1	39.7	-0.8	33.1	-	49.9	73.9	24.0	Inside	
Hori	4731.997	AV	40.1	31.7	3.6	33.9	-	41.5	53.9	12.4	Inside	
Hori	5150.000	AV	38.3	32.2	3.8	33.9	0.2	40.6	53.9	13.3	Bandedge	
Hori	15540.000	AV	35.8	39.7	-0.8	33.1	0.2	41.8	53.9	12.1	Inside	
Vert	4731.965	PK	48.0	31.7	3.6	33.9	-	49.4	73.9	24.5	Inside	
Vert	5150.000	PK	50.3	32.2	3.8	33.9	-	52.4	68.2	15.8	Bandedge	
Vert	10360.000	PK	45.2	39.1	-2.5	34.2	-	47.6	68.2	20.6	Outside	
Vert	15540.000	PK	44.7	39.7	-0.8	33.1	-	50.5	73.9	23.4	Inside	
Vert	4731.965	AV	41.1	31.7	3.6	33.9	-	42.5	53.9	11.4	Inside	
Vert	5150.000	AV	38.6	32.2	3.8	33.9	0.2	40.9	53.9	13.0	Bandedge	
Vert	15540.000	AV	36.1	39.7	-0.8	33.1	0.2	42.1	53.9	11.8	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-20 Tx 5240MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.957	PK	47.8	31.8	3.7	33.9	-	49.4	73.9	24.5	Inside	
Hori	10480.000	PK	44.2	39.2	-2.3	34.1	-	47.0	68.2	21.2	Outside	
Hori	15720.000	PK	44.9	39.1	-0.7	33.2	-	50.1	73.9	23.8	Inside	
Hori	4783.957	AV	40.9	31.8	3.7	33.9	-	42.5	53.9	11.4	Inside	
Hori	15720.000	AV	36.4	39.1	-0.7	33.2	0.2	41.8	53.9	12.1	Inside	
Vert	4783.983	PK	48.4	31.8	3.7	33.9	-	50.0	73.9	23.9	Inside	
Vert	10480.000	PK	44.2	39.2	-2.3	34.1	-	47.0	68.2	21.2	Outside	
Vert	15720.000	PK	45.5	39.1	-0.7	33.2	-	50.7	73.9	23.2	Inside	
Vert	4783.983	AV	40.8	31.8	3.7	33.9	-	42.4	53.9	11.5	Inside	
Vert	15720.000	AV	35.7	39.1	-0.7	33.2	0.2	41.1	53.9	12.8	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz / 30M-1000MHz)
Mode	11n-20 Tx 5320MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	52.551	QP	27.8	10.0	7.0	28.5	-	16.3	40.0	23.7	Outside	
Hori	164.999	QP	22.5	15.5	7.9	28.1	-	17.8	43.5	25.7	Inside	
Hori	367.666	QP	21.9	16.4	9.0	28.1	-	19.2	46.0	26.8	Outside	
Hori	411.427	QP	28.4	17.4	9.2	28.4	-	26.6	46.0	19.4	Outside	
Hori	499.995	QP	31.7	18.1	9.5	28.8	-	30.5	46.0	15.5	Outside	
Hori	639.767	QP	34.6	19.8	10.1	28.8	-	35.7	46.0	10.3	Outside	
Hori	4809.967	PK	47.3	31.8	3.7	33.9	-	48.9	73.9	25.0	Inside	
Hori	5350.000	PK	52.6	32.2	3.8	33.7	-	54.9	68.2	13.3	Bandedge	
Hori	10640.000	PK	48.0	39.3	-2.3	34.0	-	51.0	73.9	22.9	Inside	
Hori	15960.000	PK	45.4	38.4	-0.7	33.3	-	49.8	73.9	24.1	Inside	
Hori	4809.967	AV	40.0	31.8	3.7	33.9	-	41.6	53.9	12.3	Inside	
Hori	5350.000	AV	42.7	32.2	3.8	33.7	0.2	45.2	53.9	8.7	Bandedge	
Hori	10640.000	AV	39.6	39.3	-2.3	34.0	0.2	42.8	53.9	11.1	Inside	
Hori	15960.000	AV	36.1	38.4	-0.7	33.3	0.2	40.7	53.9	13.2	Inside	
Vert	52.551	QP	42.8	10.0	7.0	28.5	-	31.3	40.0	8.7	Outside	
Vert	77.851	QP	32.6	6.4	7.2	28.6	-	17.6	40.0	22.4	Outside	
Vert	114.351	QP	25.8	12.1	7.6	28.4	-	17.1	43.5	26.4	Inside	
Vert	411.427	QP	27.8	17.4	9.2	28.4	-	26.0	46.0	20.0	Outside	
Vert	499.995	QP	26.8	18.1	9.5	28.8	-	25.6	46.0	20.4	Outside	
Vert	640.767	QP	29.8	19.8	10.1	28.8	-	30.9	46.0	15.1	Outside	
Vert	4809.966	PK	47.3	31.8	3.7	33.9	-	48.9	73.9	25.0	Inside	
Vert	5350.000	PK	49.6	32.2	3.8	33.7	-	51.9	68.2	16.3	Bandedge	
Vert	10640.000	PK	52.5	39.3	-2.3	34.0	-	55.5	73.9	18.4	Inside	
Vert	15960.000	PK	45.9	38.4	-0.7	33.3	-	50.3	73.9	23.6	Inside	
Vert	4809.966	AV	39.2	31.8	3.7	33.9	-	40.8	53.9	13.1	Inside	
Vert	5350.000	AV	39.2	32.2	3.8	33.7	0.2	41.7	53.9	12.2	Bandedge	
Vert	10640.000	AV	44.3	39.3	-2.3	34.0	0.2	47.5	53.9	6.4	Inside	
Vert	15960.000	AV	36.5	38.4	-0.7	33.3	0.2	41.1	53.9	12.8	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5190MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.945	PK	50.3	31.8	3.7	33.9	-	51.9	73.9	22.0	Inside	
Hori	5150.000	PK	50.3	32.2	3.8	33.9	-	52.4	68.2	15.8	Bandedge	
Hori	10380.000	PK	44.1	39.1	-2.5	34.2	-	46.5	68.2	21.7	Outside	
Hori	15570.000	PK	44.5	39.6	-0.8	33.2	-	50.1	73.9	23.8	Inside	
Hori	4783.945	AV	42.3	31.8	3.7	33.9	-	43.9	53.9	10.0	Inside	
Hori	5150.000	AV	39.3	32.2	3.8	33.9	0.8	42.2	53.9	11.7	Bandedge	
Hori	15570.000	AV	36.2	39.6	-0.8	33.2	0.8	42.6	53.9	11.3	Inside	
Vert	4783.962	PK	51.3	31.8	3.7	33.9	-	52.9	73.9	21.0	Inside	
Vert	5150.000	PK	48.4	32.2	3.8	33.9	-	50.5	68.2	17.7	Bandedge	
Vert	10380.000	PK	43.8	39.1	-2.5	34.2	-	46.2	68.2	22.0	Outside	
Vert	15570.000	PK	44.9	39.6	-0.8	33.2	-	50.5	73.9	23.4	Inside	
Vert	4783.962	AV	44.5	31.8	3.7	33.9	-	46.1	53.9	7.8	Inside	
Vert	5150.000	AV	37.2	32.2	3.8	33.9	0.8	40.1	53.9	13.8	Bandedge	
Vert	15570.000	AV	35.8	39.6	-0.8	33.2	0.8	42.2	53.9	11.7	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5230MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4731.986	PK	49.4	31.7	3.6	33.9	-	50.8	73.9	23.1	Inside	
Hori	10460.000	PK	44.6	39.2	-2.3	34.1	-	47.4	68.2	20.8	Outside	
Hori	15690.000	PK	45.4	39.2	-0.7	33.2	-	50.7	73.9	23.2	Inside	
Hori	4731.986	AV	41.9	31.7	3.6	33.9	-	43.3	53.9	10.6	Inside	
Hori	15690.000	AV	36.2	39.2	-0.7	33.2	0.8	42.3	53.9	11.6	Inside	
Vert	4731.986	PK	48.9	31.7	3.6	33.9	-	50.3	73.9	23.6	Inside	
Vert	10460.000	PK	47.2	39.2	-2.3	34.1	-	50.0	68.2	18.2	Outside	
Vert	15690.000	PK	45.5	39.2	-0.7	33.2	-	50.8	73.9	23.1	Inside	
Vert	4731.986	AV	42.1	31.7	3.6	33.9	-	43.5	53.9	10.4	Inside	
Vert	15690.000	AV	36.5	39.2	-0.7	33.2	0.8	42.6	53.9	11.3	Inside	

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

*Other frequency noises omitted in this report were not seen or have 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
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5310MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.908	PK	52.4	31.8	3.7	33.9	-	54.0	73.9	19.9	Inside	
Hori	5350.000	PK	60.8	32.2	3.8	33.7	-	63.1	68.2	5.1	Bandedge	
Hori	10620.000	PK	46.9	39.3	-2.3	34.0	-	49.9	73.9	24.0	Inside	
Hori	15930.000	PK	45.7	38.5	-0.8	33.3	-	50.1	73.9	23.8	Inside	
Hori	4783.908	AV	45.1	31.8	3.7	33.9	-	46.7	53.9	7.2	Inside	
Hori	5350.000	AV	48.4	32.2	3.8	33.7	0.8	51.5	53.9	2.4	Bandedge	
Hori	10620.000	AV	37.6	39.3	-2.3	34.0	0.8	41.4	53.9	12.5	Inside	
Hori	15930.000	AV	36.4	38.5	-0.8	33.3	0.8	41.6	53.9	12.3	Inside	
Vert	4783.908	PK	49.8	31.8	3.7	33.9	-	51.4	73.9	22.5	Inside	
Vert	5350.000	PK	57.2	32.2	3.8	33.7	-	59.5	68.2	8.7	Bandedge	
Vert	10620.000	PK	48.5	39.3	-2.3	34.0	-	51.5	73.9	22.4	Inside	
Vert	15930.000	PK	44.2	38.5	-0.8	33.3	-	48.6	73.9	25.3	Inside	
Vert	4783.908	AV	43.0	31.8	3.7	33.9	-	44.6	53.9	9.3	Inside	
Vert	5350.000	AV	45.1	32.2	3.8	33.7	0.8	47.4	53.9	6.5	Bandedge	
Vert	10620.000	AV	38.8	39.3	-2.3	34.0	0.8	42.6	53.9	11.3	Inside	
Vert	15930.000	AV	36.0	38.5	-0.8	33.3	0.8	41.2	53.9	12.7	Inside	

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

*Other frequency noises omitted in this report were not seen or have 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

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

Radiated Spurious Emission
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-20 Tx 5180MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4731.930	PK	49.5	31.7	3.6	33.9	-	50.9	73.9	23.0	Inside	
Hori	5150.000	PK	49.8	32.2	3.8	33.9	-	51.9	68.2	16.3	Bandedge	
Hori	10360.000	PK	45.0	39.1	-2.5	34.2	-	47.4	68.2	20.8	Outside	
Hori	15540.000	PK	44.7	39.7	-0.8	33.1	-	50.5	73.9	23.4	Inside	
Hori	4731.930	AV	41.8	31.7	3.6	33.9	-	43.2	53.9	10.7	Inside	
Hori	5150.000	AV	40.4	32.2	3.8	33.9	0.2	42.7	53.9	11.2	Bandedge	
Hori	15540.000	AV	36.4	39.7	-0.8	33.1	0.2	42.4	53.9	11.5	Inside	
Vert	4731.930	PK	46.8	31.7	3.6	33.9	-	48.2	73.9	25.7	Inside	
Vert	5150.000	PK	48.8	32.2	3.8	33.9	-	50.9	68.2	17.3	Bandedge	
Vert	10360.000	PK	44.3	39.1	-2.5	34.2	-	46.7	68.2	21.5	Outside	
Vert	15540.000	PK	44.6	39.7	-0.8	33.1	-	50.4	73.9	23.5	Inside	
Vert	4731.930	AV	38.3	31.7	3.6	33.9	-	39.7	53.9	14.2	Inside	
Vert	5150.000	AV	39.2	32.2	3.8	33.9	0.2	41.5	53.9	12.4	Bandedge	
Vert	15540.000	AV	36.3	39.7	-0.8	33.1	0.2	42.3	53.9	11.6	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-20 Tx 5240MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.978	PK	49.0	31.8	3.7	33.9	-	50.6	73.9	23.3	Inside	
Hori	10480.000	PK	45.0	39.2	-2.3	34.1	-	47.8	68.2	20.4	Outside	
Hori	15720.000	PK	45.5	39.1	-0.7	33.2	-	50.7	73.9	23.2	Inside	
Hori	4783.978	AV	40.8	31.8	3.7	33.9	-	42.4	53.9	11.5	Inside	
Hori	15720.000	AV	36.5	39.1	-0.7	33.2	0.2	41.9	53.9	12.0	Inside	
Vert	4783.980	PK	47.7	31.8	3.7	33.9	-	49.3	73.9	24.6	Inside	
Vert	10480.000	PK	45.3	39.2	-2.3	34.1	-	48.1	68.2	20.1	Outside	
Vert	15720.000	PK	45.6	39.1	-0.7	33.2	-	50.8	73.9	23.1	Inside	
Vert	4783.980	AV	40.2	31.8	3.7	33.9	-	41.8	53.9	12.1	Inside	
Vert	15720.000	AV	36.2	39.1	-0.7	33.2	0.2	41.6	53.9	12.3	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz / 30M-1000MHz)
Mode	11n-20 Tx 5320MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	52.551	QP	27.3	10.0	7.0	28.5	-	15.8	40.0	24.2	Outside	
Hori	159.599	QP	22.3	15.2	7.9	28.1	-	17.3	43.5	26.2	Outside	
Hori	411.427	QP	28.1	17.4	9.2	28.4	-	26.3	46.0	19.7	Outside	
Hori	499.995	QP	33.4	18.1	9.5	28.8	-	32.2	46.0	13.8	Outside	
Hori	576.499	QP	26.7	19.2	9.8	28.8	-	26.9	46.0	19.1	Outside	
Hori	639.767	QP	32.7	19.8	10.1	28.8	-	33.8	46.0	12.2	Outside	
Hori	4809.980	PK	45.9	31.8	3.7	33.9	-	47.5	73.9	26.4	Inside	
Hori	5350.000	PK	51.5	32.2	3.8	33.7	-	53.8	68.2	14.4	Bandedge	
Hori	10640.000	PK	48.0	39.3	-2.3	34.0	-	51.0	73.9	22.9	Inside	
Hori	15960.000	PK	45.2	38.4	-0.7	33.3	-	49.6	73.9	24.3	Inside	
Hori	4809.980	AV	37.1	31.8	3.7	33.9	-	38.7	53.9	15.2	Inside	
Hori	5350.000	AV	42.0	32.2	3.8	33.7	0.2	44.5	53.9	9.4	Bandedge	
Hori	10640.000	AV	37.6	39.3	-2.3	34.0	0.2	40.6	53.9	13.3	Inside	
Hori	15960.000	AV	36.2	38.4	-0.7	33.3	0.2	40.6	53.9	13.3	Inside	
Vert	52.551	QP	42.3	10.0	7.0	28.5	-	30.8	40.0	9.2	Outside	
Vert	77.851	QP	32.1	6.4	7.2	28.6	-	17.1	40.0	22.9	Outside	
Vert	112.031	QP	26.2	11.8	7.5	28.4	-	17.1	43.5	26.4	Inside	
Vert	411.427	QP	27.6	17.4	9.2	28.4	-	25.8	46.0	20.2	Outside	
Vert	499.995	QP	28.0	18.1	9.5	28.8	-	26.8	46.0	19.2	Outside	
Vert	641.834	QP	27.6	19.8	10.1	28.7	-	28.8	46.0	17.2	Outside	
Vert	4809.991	PK	43.7	31.8	3.7	33.9	-	45.3	73.9	28.6	Inside	
Vert	5350.000	PK	50.8	32.2	3.8	33.7	-	53.1	68.2	15.1	Bandedge	
Vert	10640.000	PK	50.3	39.3	-2.3	34.0	-	53.3	73.9	20.6	Inside	
Vert	15960.000	PK	45.2	38.4	-0.7	33.3	-	49.6	73.9	24.3	Inside	
Vert	4809.991	AV	34.9	31.8	3.7	33.9	-	36.5	53.9	17.4	Inside	
Vert	5350.000	AV	41.7	32.2	3.8	33.7	0.2	44.2	53.9	9.7	Bandedge	
Vert	10640.000	AV	42.2	39.3	-2.3	34.0	0.2	45.4	53.9	8.5	Inside	
Vert	15960.000	AV	36.3	38.4	-0.7	33.3	0.2	40.9	53.9	13.0	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5190MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.857	PK	49.2	31.8	3.7	33.9	-	50.8	73.9	23.1	Inside	
Hori	5150.000	PK	48.1	32.2	3.8	33.9	-	50.2	68.2	18.0	Bandedge	
Hori	10380.000	PK	43.9	39.1	-2.5	34.2	-	46.3	68.2	21.9	Outside	
Hori	15570.000	PK	44.3	39.6	-0.8	33.2	-	49.9	73.9	24.0	Inside	
Hori	4783.857	AV	42.1	31.8	3.7	33.9	-	43.7	53.9	10.2	Inside	
Hori	5150.000	AV	37.5	32.2	3.8	33.9	0.8	40.4	53.9	13.5	Bandedge	
Hori	15570.000	AV	36.4	39.6	-0.8	33.2	0.8	42.8	53.9	11.1	Inside	
Vert	4783.870	PK	46.7	31.8	3.7	33.9	-	48.3	73.9	25.6	Inside	
Vert	5150.000	PK	48.4	32.2	3.8	33.9	-	50.5	68.2	17.7	Bandedge	
Vert	10380.000	PK	44.5	39.1	-2.5	34.2	-	46.9	68.2	21.3	Outside	
Vert	15570.000	PK	44.3	39.6	-0.8	33.2	-	49.9	73.9	24.0	Inside	
Vert	4783.870	AV	39.2	31.8	3.7	33.9	-	40.8	53.9	13.1	Inside	
Vert	5150.000	AV	38.2	32.2	3.8	33.9	0.8	41.1	53.9	12.8	Bandedge	
Vert	15570.000	AV	36.2	39.6	-0.8	33.2	0.8	42.6	53.9	11.3	Inside	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier) + Duty Factor(AV)
*Other frequency noises omitted in this report were not seen or have 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
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5230MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4731.969	PK	46.0	31.7	3.6	33.9	-	47.4	73.9	26.5	Inside	
Hori	10460.000	PK	44.5	39.2	-2.3	34.1	-	47.3	68.2	20.9	Outside	
Hori	15690.000	PK	45.4	39.2	-0.7	33.2	-	50.7	73.9	23.2	Inside	
Hori	4731.969	AV	38.3	31.7	3.6	33.9	-	39.7	53.9	14.2	Inside	
Hori	15690.000	AV	36.6	39.2	-0.7	33.2	0.8	42.7	53.9	11.2	Inside	
Vert	4731.969	PK	46.8	31.7	3.6	33.9	-	48.2	73.9	25.7	Inside	
Vert	10460.000	PK	47.2	39.2	-2.3	34.1	-	50.0	68.2	18.2	Outside	
Vert	15690.000	PK	45.5	39.2	-0.7	33.2	-	50.8	73.9	23.1	Inside	
Vert	4731.969	AV	38.8	31.7	3.6	33.9	-	40.2	53.9	13.7	Inside	
Vert	15690.000	AV	36.5	39.2	-0.7	33.2	0.8	42.6	53.9	11.3	Inside	

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

*Other frequency noises omitted in this report were not seen or have 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
[Laird antenna]

Test place	Head Office EMC Lab. No.2 Anechoic Chamber		
Report No.	10195552-001H		
Date	3/6/2014	3/12/2014	3/13/2014
Temperature/ Humidity	20deg. C / 31% RH	20deg. C / 32% RH	20deg. C / 37% RH
Engineer	Takumi Shimada (1-10GHz)	Hiroshi Kukita (10-18GHz)	Keisuke Kawamura (18-40GHz)
Mode	11n-40 Tx 5310MHz		

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]	Inside or Outside of Restricted Bands	Remark
Hori	4783.979	PK	50.2	31.8	3.7	33.9	-	51.8	73.9	22.1	Inside	
Hori	5350.000	PK	54.3	32.2	3.8	33.7	-	56.6	68.2	11.6	Bandedge	
Hori	10620.000	PK	43.9	39.3	-2.3	34.0	-	46.9	73.9	27.0	Inside	
Hori	15930.000	PK	45.5	38.5	-0.8	33.3	-	49.9	73.9	24.0	Inside	
Hori	4783.979	AV	44.1	31.8	3.7	33.9	-	45.7	53.9	8.2	Inside	
Hori	5350.000	AV	42.4	32.2	3.8	33.7	0.8	45.5	53.9	8.4	Bandedge	
Hori	10620.000	AV	34.9	39.3	-2.3	34.0	0.8	38.7	53.9	15.2	Inside	
Hori	15930.000	AV	36.5	38.5	-0.8	33.3	0.8	41.7	53.9	12.2	Inside	
Vert	4783.979	PK	47.4	31.8	3.7	33.9	-	49.0	73.9	24.9	Inside	
Vert	5350.000	PK	58.6	32.2	3.8	33.7	-	60.9	68.2	7.3	Bandedge	
Vert	10620.000	PK	48.0	39.3	-2.3	34.0	-	51.0	73.9	22.9	Inside	
Vert	15930.000	PK	44.9	38.5	-0.8	33.3	-	49.3	73.9	24.6	Inside	
Vert	4783.979	AV	37.6	31.8	3.7	33.9	-	39.2	53.9	14.7	Inside	
Vert	5350.000	AV	47.9	32.2	3.8	33.7	0.8	50.2	53.9	3.7	Bandedge	
Vert	10620.000	AV	38.5	39.3	-2.3	34.0	0.8	42.3	53.9	11.6	Inside	
Vert	15930.000	AV	36.7	38.5	-0.8	33.3	0.8	41.9	53.9	12.0	Inside	

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

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

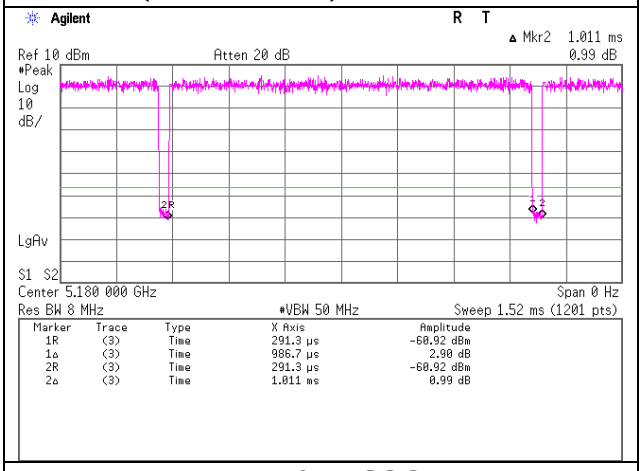
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Duty Cycle

Test place	Head Office EMC Lab. No.2 Anechoic Chamber
Report No.	10195552-001H
Date	3/6/2014
Temperature/ Humidity	20deg. C / 31% RH
Engineer	Takumi Shimada
Mode	11n-20 Tx 5180MHz / 11n-40 Tx 5190MHz

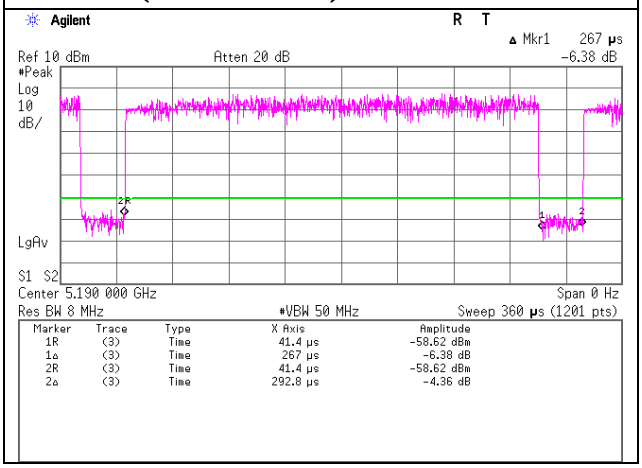
11n-20, MCS 1

Duty Cycle = 0.9867/1.011 = 97.6%
Duty factor:20log(1/x)=0.21
x:Tx on/(Tx on+Tx off)=0.9867/1.011



11n-40, MCS 3

Duty Cycle = 0.267/0.2928 = 91.2%
Duty factor:20log(1/x)=0.8
x:Tx on/(Tx on+Tx off)=0.267/0.2928



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2013/06/30 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2014/02/20 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/CE	2014/02/20 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE/RE	2013/06/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2014/01/27 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2014/02/20 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2014/02/21 * 12
MCC-166	Microwave Cable	Junkosha	MWX221	1303S120(1m) / 1311S167(5m)	RE	2013/11/27 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2014/01/21 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2013/12/24 * 12
MHF-16	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	RE	2013/09/25 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2013/11/25 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2013/10/13 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2013/10/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2014/02/20 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2013/11/26 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2013/09/12 * 12
MHA-04	Horn Antenna 26.5-40GHz	EMCO	3160-10	1140	RE	2013/11/25 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2013/03/19 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2013/06/20 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2013/06/14 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2014/02/21 * 12

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

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

Test Item: CE: Conducted Emission
RE: Radiated Emission