



RADIO TEST REPORT

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

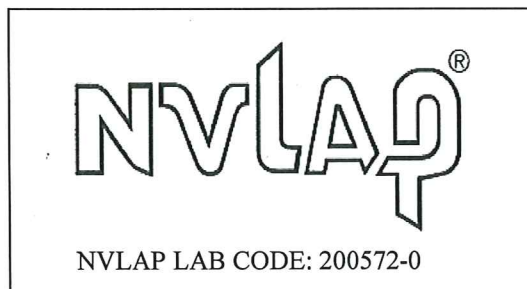
Applicant : silex technology, Inc.
Type of Equipment : SDIO Wireless Module
Model No. : SX-SDMAN
FCC ID : N6C-SDMAN
Test regulation : FCC Part 15 Subpart C: 2013
(Permissive Change Class II Application)
*Conducted emission and Radiated Spurious Emission
test only
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 10195552-001H-A. 10195552-001H-A is replaced with this report.

Date of test: February 19 to March 5, 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



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/mar1/index.jsp#nvlap>

REVISION HISTORY

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

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10195552-001H-A	March 20, 2014	-	-
1	10195552-001H-A- R1	March 25, 2014	P.55-58	Addition and Correction of photographs of worst case position

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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	2412-2462MHz	5180-5320MHz *1) 5745-5825MHz	2412 - 2462MHz 5180-5320MHz *1) 5745-5825MHz	5190 - 5310MHz *2) 5755 - 5795MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5MHz		20MHz	<u>2.4GHz band</u> 5MHz <u>5GHz band</u> 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) 5180 - 5320MHz is applied for other test report.(Test Report No.: 1019552-001H-B)

*2) 5190 - 5310MHz is applied for other test report.(Test Report No.: 1019552-001H-B)

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 (IEEE802.11b/g/a/n-20/n-40).
Wireless LAN and Bluetooth do not transmit simultaneously.

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<Contents of the change from original model>

Test Report Number of original model is 32IE0154-HO-01-A-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 Radiated Spurious Emission test were performed in this report.

Additionally, only the information of modified antenna is described in this report.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2013, final revised on September 30, 2013 and effective October 30, 2013

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	QP 17.8dB, 0.16483MHz, L AV 22.9dB, 0.41100MHz, N	Complied	-
Spurious Emission Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3	4.6dB 2390.000MHz, AV, Hori.	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* In case any questions arise about test procedure, ANSI C63.4: 2003 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 (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.

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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.

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3.5 Test Location

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	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	-	-	8.0 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 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)	5.5Mbps (Long GI), PN9
IEEE 802.11g (11g)	24Mbps (Long GI), PN9
IEEE 802.11n 20MHz BW (11n-20: 2.4GHz)	MCS 3 (Long GI), PN9
IEEE 802.11n 20MHz BW (11n-20: 5GHz)	MCS 0 (Long GI), PN9
IEEE 802.11n 40MHz BW (11n-40: 5GHz)	MCS 3 (Long GI), PN9
*Transmitting duty was 100% on all tests.	
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) from original report (32IE0154-HO-01-A-R1).	
*EUT has the power settings by the software as follows; Power settings: 11b(5.5Mbps, Long GI): 2412MHz: 13.0dBm, 2437MHz: 13.0dBm, 2462MHz: 13.0dBm 11g(24Mbps, Long GI): 2412MHz: 8.0dBm, 2437MHz: 13.0dBm, 2462MHz: 8.5dBm 11n-20(2.4GHz Band, MCS 3, Long GI): 2412MHz: 7.0dBm, 2437MHz: 12.0dBm, 2462MHz: 7.5dBm 11a(6Mbps, Long GI): 5745MHz: 13.0dBm, 5785MHz: 13.0dBm, 5825MHz: 13.0dBm 11n-20(5GHz(W58) Band, MCS 0, Long GI): 5745MHz: 13.0dBm, 5785MHz: 13.0dBm, 5825MHz: 13.0dBm 11n-40(5GHz(W58) Band, MCS 3, Long GI): 5755MHz: 13.0dBm, 5795MHz: 13.0dBm	
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.	

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[2.4GHz band]

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna port	Tested frequency
Spurious Emission (Radiated)	11b Tx 11g Tx *1)	2 *2)	2412MHz 2437MHz 2462MHz
	11n-20 Tx	2 *2)	2412MHz 2462MHz

*1) Since 11g 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.

*2) After the comparison between Antenna port 1 and Antenna port 2, test was performed with the antenna that had higher power as a representative.

[5GHz band]

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna	Tested frequency
Conducted Emission	11n-20 Tx *3)	2 *2)	5745MHz
Spurious Emission (Radiated)	11n-20 Tx *1)	2 *2)	5745MHz 5785MHz 5825MHz
	11n-40 Tx	2 *2)	5755MHz 5795MHz

*1) 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.

*2) After the comparison between Antenna port 1 and Antenna port 2, test was performed with the antenna that had higher power as a representative.

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

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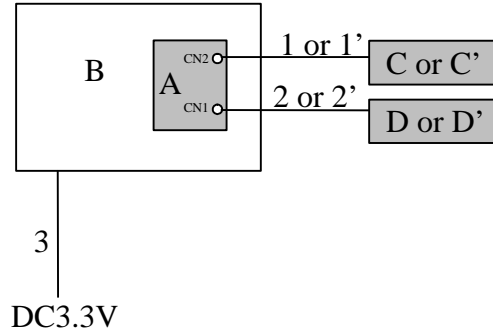
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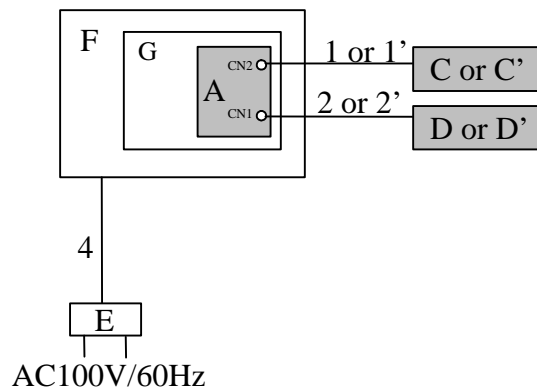
Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

[2.4GHz band]



[5GHz band]



- * 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 Board	-	-	silex technology, Inc.	-
G	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 and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

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

For the tests on EUT with other peripherals (as a whole system)

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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

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SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on April 9, 2013)".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

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

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

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

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

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

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

Test Antennas are used as below;

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

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

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

*1) Average Power Measurement was performed based on 12.2.7 of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on April 9, 2013)"

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

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT 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 : 30M-40GHz
Test data : APPENDIX
Test result : Pass

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APPENDIX 1: Data of EMI test

Conducted Emission
[Molex antenna]

DATA OF CONDUCTED EMISSION TEST

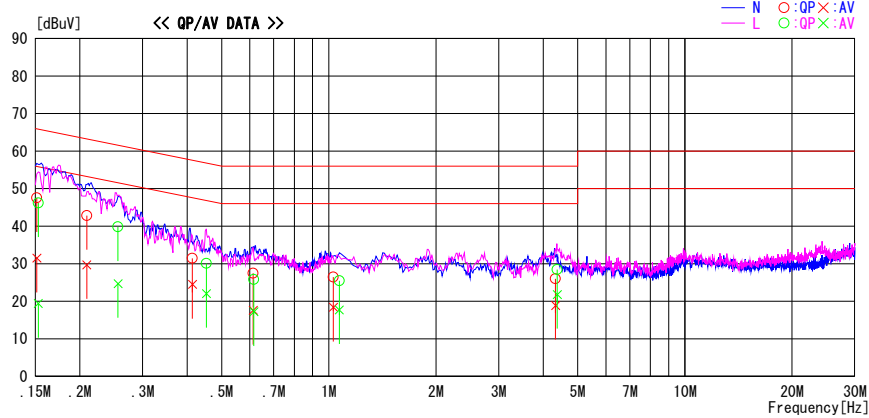
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2014/03/05

Report No. : 10195552H

Temp./Humi. : 19deg. C / 36% RH
Engineer : Tomohisa Nakagawa

Mode / Remarks : Tx 11n20_MCS0_5745MHz

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]		
0.15145	34.2	18.1	13.4	47.6	31.5	65.9	55.9	18.3	24.4	N	
0.20920	29.4	16.3	13.4	42.8	29.7	63.2	53.2	20.4	23.5	N	
0.41408	18.1	11.1	13.4	31.5	24.5	57.6	47.6	26.1	23.1	N	
0.61340	14.0	4.1	13.5	27.5	17.6	56.0	46.0	28.5	28.4	N	
1.03046	13.0	4.9	13.5	26.5	18.4	56.0	46.0	29.5	27.6	N	
4.33377	11.8	4.7	14.2	26.0	18.9	56.0	46.0	30.0	27.1	N	
0.15290	32.8	6.0	13.4	46.2	19.4	65.8	55.8	19.6	36.4	L	
0.25590	26.4	11.3	13.4	39.8	24.7	61.6	51.6	21.8	26.9	L	
0.45340	16.7	8.7	13.4	30.1	22.1	56.8	46.8	26.7	24.7	L	
0.61588	12.3	3.7	13.5	25.8	17.2	56.0	46.0	30.2	28.8	L	
1.07005	12.0	4.2	13.5	25.5	17.7	56.0	46.0	30.5	28.3	L	
4.37941	14.3	7.6	14.2	28.5	21.8	56.0	46.0	27.5	24.2	L	

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

Conducted Emission
[Laird antenna]

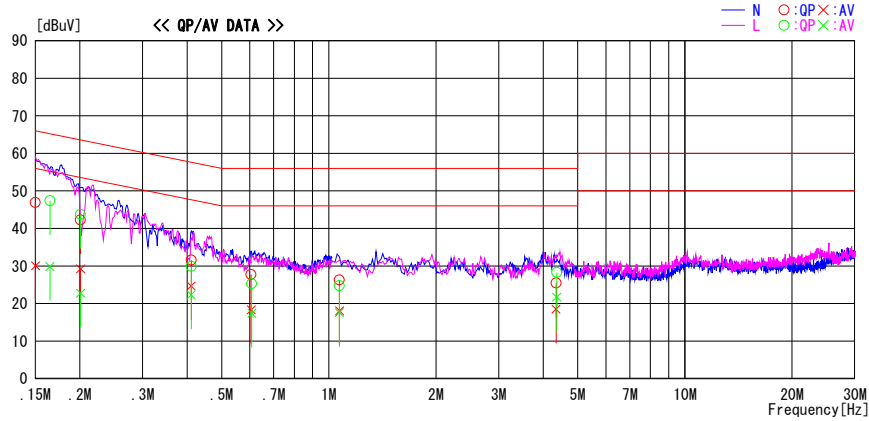
DATA OF CONDUCTED EMISSION TEST

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

Report No. : 10195552H
 Temp./Humi. : 19deg. C / 36% RH
 Engineer : Tomohisa Nakagawa

Mode / Remarks : Tx 11n20_MCS0_5745MHz

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]		
0.15000	33.5	16.7	13.4	46.9	30.1	66.0	56.0	19.1	25.9	N	
0.20075	28.9	15.8	13.4	42.3	29.2	63.6	53.6	21.3	24.4	N	
0.41100	18.2	11.3	13.4	31.6	24.7	57.6	47.6	26.0	22.9	N	
0.60530	14.2	4.8	13.5	27.7	18.3	56.0	46.0	28.3	27.7	N	
1.07192	12.8	4.6	13.5	26.3	18.1	56.0	46.0	29.7	27.9	N	
4.34510	11.3	4.3	14.2	25.5	18.5	56.0	46.0	30.5	27.5	N	
0.16483	34.0	16.5	13.4	47.4	29.9	65.2	55.2	17.8	25.3	L	
0.20075	30.3	9.4	13.4	43.7	22.8	63.6	53.6	19.9	30.8	L	
0.41100	16.5	8.9	13.4	29.9	22.3	57.6	47.6	27.7	25.3	L	
0.60820	11.8	3.9	13.5	25.3	17.4	56.0	46.0	30.7	28.6	L	
1.07070	11.2	4.1	13.5	24.7	17.6	56.0	46.0	31.3	28.4	L	
4.36614	14.1	7.5	14.2	28.3	21.7	56.0	46.0	27.7	24.3	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F.(LIGN 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.3 Semi Anechoic Chamber
 Report No. : 10195552H
 Date : 02/19/2014 03/09/2014
 Temperature/ Humidity : 22deg. C / 30% RH 23deg. C / 31% RH
 Engineer : Satofumi Matsuyama Shinya Watanabe
 (1-10GHz) (Above 10GHz)
 Mode : 11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	50.7	28.2	3.1	32.4	49.6	73.9	24.3	
Hori	3216.000	PK	46.8	29.1	3.6	32.0	47.5	73.9	26.4	
Hori	4824.000	PK	NS	-	-	-	-	73.9	-	
Hori	7236.000	PK	NS	-	-	-	-	73.9	-	
Hori	9648.000	PK	NS	-	-	-	-	73.9	-	
Hori	2390.000	AV	39.2	28.2	3.1	32.4	38.1	53.9	15.8	
Hori	3216.000	AV	40.4	29.1	3.6	32.0	41.1	53.9	12.8	
Hori	4824.000	AV	NS	-	-	-	-	53.9	-	
Hori	7236.000	AV	NS	-	-	-	-	53.9	-	
Hori	9648.000	AV	NS	-	-	-	-	53.9	-	
Vert	2390.000	PK	49.3	28.2	3.1	32.4	48.2	73.9	25.7	
Vert	3216.000	PK	49.0	29.1	3.6	32.0	49.7	73.9	24.2	
Vert	4824.000	PK	NS	-	-	-	-	73.9	-	
Vert	7236.000	PK	NS	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	73.9	-	
Vert	2390.000	AV	37.1	28.2	3.1	32.4	36.0	53.9	17.9	
Vert	3216.000	AV	42.7	29.1	3.6	32.0	43.4	53.9	10.5	
Vert	4824.000	AV	NS	-	-	-	-	53.9	-	
Vert	7236.000	AV	NS	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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

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	103.8	28.4	3.0	34.7	100.5	-	-	Carrier
Hori	2400.000	PK	63.7	28.4	3.0	34.7	60.4	80.5	20.1	
Vert	2412.000	PK	102.1	28.4	3.0	34.7	98.8	-	-	Carrier
Vert	2400.000	PK	61.1	28.4	3.0	34.7	57.8	78.8	21.0	

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

Radiated Spurious Emission
[Molex antenna]

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10195552H
Date 02/19/2014 03/09/2014
Temperature/ Humidity 22deg. C / 30% RH 23deg. C / 31% RH
Engineer Satofumi Matsuyama Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	3249.335	PK	46.8	29.1	3.7	32.0	47.6	73.9	26.3	
Hori	4874.000	PK	NS	-	-	-	-	73.9	-	
Hori	7311.000	PK	NS	-	-	-	-	73.9	-	
Hori	9748.000	PK	NS	-	-	-	-	73.9	-	
Hori	3249.335	AV	41.0	29.1	3.7	32.0	41.8	53.9	12.1	
Hori	4874.000	AV	NS	-	-	-	-	53.9	-	
Hori	7311.000	AV	NS	-	-	-	-	53.9	-	
Hori	9748.000	AV	NS	-	-	-	-	53.9	-	
Vert	3249.335	PK	49.1	29.1	3.7	32.0	49.9	73.9	24.0	
Vert	4874.000	PK	NS	-	-	-	-	73.9	-	
Vert	7311.000	PK	NS	-	-	-	-	73.9	-	
Vert	9748.000	PK	NS	-	-	-	-	73.9	-	
Vert	3249.335	AV	43.5	29.1	3.7	32.0	44.3	53.9	9.6	
Vert	4874.000	AV	NS	-	-	-	-	53.9	-	
Vert	7311.000	AV	NS	-	-	-	-	53.9	-	
Vert	9748.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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.3 Semi Anechoic Chamber
Report No. 10195552H
Date 02/19/2014 03/09/2014
Temperature/ Humidity 22deg. C / 30% RH 23deg. C / 31% RH
Engineer Satofumi Matsuyama Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	51.9	28.4	3.1	32.3	51.1	73.9	22.8	
Hori	3282.680	PK	46.9	29.1	3.7	31.9	47.8	73.9	26.1	
Hori	4924.000	PK	NS	-	-	-	-	73.9	-	
Hori	7386.000	PK	NS	-	-	-	-	73.9	-	
Hori	9848.000	PK	NS	-	-	-	-	73.9	-	
Hori	2483.500	AV	40.3	28.4	3.1	32.3	39.5	53.9	14.4	
Hori	3282.680	AV	40.7	29.1	3.7	31.9	41.6	53.9	12.3	
Hori	4924.000	AV	NS	-	-	-	-	53.9	-	
Hori	7386.000	AV	NS	-	-	-	-	53.9	-	
Hori	9848.000	AV	NS	-	-	-	-	53.9	-	
Vert	2483.500	PK	50.3	28.4	3.1	32.3	49.5	73.9	24.4	
Vert	3282.680	PK	48.0	29.1	3.7	31.9	48.9	73.9	25.0	
Vert	4924.000	PK	NS	-	-	-	-	73.9	-	
Vert	7386.000	PK	NS	-	-	-	-	73.9	-	
Vert	9848.000	PK	NS	-	-	-	-	73.9	-	
Vert	2483.500	AV	38.7	28.4	3.1	32.3	37.9	53.9	16.0	
Vert	3282.680	AV	41.5	29.1	3.7	31.9	42.4	53.9	11.5	
Vert	4924.000	AV	NS	-	-	-	-	53.9	-	
Vert	7386.000	AV	NS	-	-	-	-	53.9	-	
Vert	9848.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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.3 Semi Anechoic Chamber
 Report No. 10195552H
 Date 02/19/2014 03/09/2014
 Temperature/ Humidity 22deg. C / 30% RH 23deg. C / 31% RH
 Engineer Satofumi Matsuyama Shinya Watanabe
 (1-10GHz) (Above 10GHz)
 Mode 11g Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	68.2	28.2	3.1	32.4	67.1	73.9	6.8	
Hori	3216.012	PK	46.4	29.1	3.6	32.0	47.1	73.9	26.8	
Hori	4824.000	PK	NS	-	-	-	-	73.9	-	
Hori	7236.000	PK	NS	-	-	-	-	73.9	-	
Hori	9648.000	PK	NS	-	-	-	-	73.9	-	
Hori	2390.000	AV	49.1	28.2	3.1	32.4	48.0	53.9	5.9	
Hori	3216.012	AV	39.9	29.1	3.6	32.0	40.6	53.9	13.3	
Hori	4824.000	AV	NS	-	-	-	-	53.9	-	
Hori	7236.000	AV	NS	-	-	-	-	53.9	-	
Hori	9648.000	AV	NS	-	-	-	-	53.9	-	
Vert	2390.000	PK	66.7	28.2	3.1	32.4	65.6	73.9	8.3	
Vert	3216.012	PK	48.8	29.1	3.6	32.0	49.5	73.9	24.4	
Vert	4824.000	PK	NS	-	-	-	-	73.9	-	
Vert	7236.000	PK	NS	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	73.9	-	
Vert	2390.000	AV	47.5	28.2	3.1	32.4	46.4	53.9	7.5	
Vert	3216.012	AV	44.0	29.1	3.6	32.0	44.7	53.9	9.2	
Vert	4824.000	AV	NS	-	-	-	-	53.9	-	
Vert	7236.000	AV	NS	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	53.9	-	

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).
 NS:No signal detect
 Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)= 9.5dB$
 26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

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	94.1	28.4	3.0	34.7	90.8	-	-	Carrier
Hori	2400.000	PK	65.8	28.4	3.0	34.7	62.5	70.8	8.3	
Vert	2412.000	PK	94.3	28.4	3.0	34.7	91.0	-	-	Carrier
Vert	2400.000	PK	64.4	28.4	3.0	34.7	61.1	71.0	9.9	

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

Radiated Spurious Emission
[Molex antenna]

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10195552H
Date	02/19/2014 03/09/2014
Temperature/ Humidity	22deg. C / 30% RH 23deg. C / 31% RH
Engineer	Satofumi Matsuyama Shinya Watanabe
	(1-10GHz) (Above 10GHz)
Mode	11g Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	3249.312	PK	46.3	29.1	3.7	32.0	47.1	73.9	26.8	
Hori	4874.000	PK	NS	-	-	-	-	73.9	-	
Hori	7311.000	PK	NS	-	-	-	-	73.9	-	
Hori	9748.000	PK	NS	-	-	-	-	73.9	-	
Hori	3249.312	AV	40.9	29.1	3.7	32.0	41.7	53.9	12.2	
Hori	4874.000	AV	NS	-	-	-	-	53.9	-	
Hori	7311.000	AV	NS	-	-	-	-	53.9	-	
Hori	9748.000	AV	NS	-	-	-	-	53.9	-	
Vert	3249.312	PK	46.7	29.1	3.7	32.0	47.5	73.9	26.4	
Vert	4874.000	PK	NS	-	-	-	-	73.9	-	
Vert	7311.000	PK	NS	-	-	-	-	73.9	-	
Vert	9748.000	PK	NS	-	-	-	-	73.9	-	
Vert	3249.312	AV	41.3	29.1	3.7	32.0	42.1	53.9	11.8	
Vert	4874.000	AV	NS	-	-	-	-	53.9	-	
Vert	7311.000	AV	NS	-	-	-	-	53.9	-	
Vert	9748.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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

Radiated Spurious Emission
[Molex antenna]

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10195552H	
Date	02/19/2014	03/09/2014
Temperature/ Humidity	22deg. C / 30% RH	23deg. C / 31% RH
Engineer	Satofumi Matsuyama	Shinya Watanabe
	(1-10GHz)	(Above 10GHz)
Mode	11g Tx 2462MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	64.4	28.4	3.1	32.3	63.6	73.9	10.3	
Hori	3282.645	PK	47.1	29.1	3.7	31.9	48.0	73.9	25.9	
Hori	4924.000	PK	NS	-	-	-	-	73.9	-	
Hori	7386.000	PK	NS	-	-	-	-	73.9	-	
Hori	9848.000	PK	NS	-	-	-	-	73.9	-	
Hori	2483.500	AV	48.3	28.4	3.1	32.3	47.5	53.9	6.4	
Hori	3282.645	AV	41.2	29.1	3.7	31.9	42.1	53.9	11.8	
Hori	4924.000	AV	NS	-	-	-	-	53.9	-	
Hori	7386.000	AV	NS	-	-	-	-	53.9	-	
Hori	9848.000	AV	NS	-	-	-	-	53.9	-	
Vert	2483.500	PK	61.3	28.4	3.1	32.3	60.5	73.9	13.4	
Vert	3282.645	PK	48.1	29.1	3.7	31.9	49.0	73.9	24.9	
Vert	4924.000	PK	NS	-	-	-	-	73.9	-	
Vert	7386.000	PK	NS	-	-	-	-	73.9	-	
Vert	9848.000	PK	NS	-	-	-	-	73.9	-	
Vert	2483.500	AV	45.4	28.4	3.1	32.3	44.6	53.9	9.3	
Vert	3282.645	AV	41.5	29.1	3.7	31.9	42.4	53.9	11.5	
Vert	4924.000	AV	NS	-	-	-	-	53.9	-	
Vert	7386.000	AV	NS	-	-	-	-	53.9	-	
Vert	9848.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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.3 Semi Anechoic Chamber
Report No. 10195552H
Date 02/19/2014 03/09/2014
Temperature/ Humidity 22deg. C / 30% RH 23deg. C / 31% RH
Engineer Satofumi Matsuyama Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11n-20 Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	68.9	PK	28.2	3.1	32.4	67.8	73.9	6.1	
Hori	2390.000	48.4	AV	28.2	3.1	32.4	47.3	53.9	6.6	
Vert	2390.000	66.9	PK	28.2	3.1	32.4	65.8	73.9	8.1	
Vert	2390.000	46.2	AV	28.2	3.1	32.4	45.1	53.9	8.8	

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

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	92.7	28.4	3.0	34.7	89.4	-	-	Carrier
Hori	2400.000	PK	65.4	28.4	3.0	34.7	62.1	69.4	7.3	
Vert	2412.000	PK	91.1	28.4	3.0	34.7	87.8	-	-	Carrier
Vert	2400.000	PK	63.1	28.4	3.0	34.7	59.8	67.8	8.0	

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

Radiated Spurious Emission **[Molex antenna]**

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Report No. 10195552H
 Date 02/19/2014 03/09/2014
 Temperature/ Humidity 22deg. C / 30% RH 23deg. C / 31% RH
 Engineer Satofumi Matsuyama Shinya Watanabe
 (1-10GHz) (Above 10GHz)
 Mode 11n-20 Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	60.6	28.7	3.1	34.7	57.7	73.9	16.2	
Hori	2483.500	AV	41.9	28.7	3.1	34.7	39.0	53.9	14.9	
Vert	2483.500	PK	60.2	28.7	3.1	34.7	57.3	73.9	16.6	
Vert	2483.500	AV	42.9	28.7	3.1	34.7	40.0	53.9	13.9	

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
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	52.3	28.3	3.0	34.7	48.9	73.9	25.0	
Hori	3215.948	PK	49.0	29.4	3.6	34.3	47.7	73.9	26.2	
Hori	4824.000	PK	42.7	32.3	5.4	33.9	46.5	73.9	27.4	
Hori	7236.000	PK	NS	-	-	-	-	73.9	-	
Hori	9648.000	PK	NS	-	-	-	-	73.9	-	
Hori	2390.000	AV	39.7	28.3	3.0	34.7	36.3	53.9	17.6	
Hori	3215.948	AV	44.8	29.4	3.6	34.3	43.5	53.9	10.4	
Hori	4824.000	AV	30.5	32.3	5.4	33.9	34.3	53.9	19.6	
Hori	7236.000	AV	NS	-	-	-	-	53.9	-	
Hori	9648.000	AV	NS	-	-	-	-	53.9	-	
Vert	2390.000	PK	51.0	28.3	3.0	34.7	47.6	73.9	26.3	
Vert	3216.085	PK	47.3	29.4	3.6	34.3	46.0	73.9	27.9	
Vert	4824.000	PK	42.1	32.3	5.4	33.9	45.9	73.9	28.0	
Vert	7236.000	PK	NS	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	73.9	-	
Vert	2390.000	AV	39.5	28.3	3.0	34.7	36.1	53.9	17.8	
Vert	3216.085	AV	41.2	29.4	3.6	34.3	39.9	53.9	14.0	
Vert	4824.000	AV	30.3	32.3	5.4	33.9	34.1	53.9	19.8	
Vert	7236.000	AV	NS	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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

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	103.4	28.4	3.0	34.7	100.1	-	-	Carrier
Hori	2400.000	PK	64.2	28.4	3.0	34.7	60.9	80.1	19.2	
Vert	2412.000	PK	102.9	28.4	3.0	34.7	99.6	-	-	Carrier
Vert	2400.000	PK	64.5	28.4	3.0	34.7	61.2	79.6	18.4	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
 (1-10GHz) (Above 10GHz)
Mode 11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	3249.294	PK	50.2	29.4	3.7	34.2	49.1	73.9	24.8	
Hori	4874.000	PK	NS	-	-	-	-	73.9	-	
Hori	7311.000	PK	NS	-	-	-	-	73.9	-	
Hori	9748.000	PK	NS	-	-	-	-	73.9	-	
Hori	3249.294	AV	47.4	29.4	3.7	34.2	46.3	53.9	7.6	
Hori	4874.000	AV	NS	-	-	-	-	53.9	-	
Hori	7311.000	AV	NS	-	-	-	-	53.9	-	
Hori	9748.000	AV	NS	-	-	-	-	53.9	-	
Vert	3249.204	PK	47.0	29.4	3.7	34.2	45.9	73.9	28.0	
Vert	4874.000	PK	44.4	32.4	5.4	33.9	48.3	73.9	25.6	
Vert	7311.000	PK	NS	-	-	-	-	73.9	-	
Vert	9748.000	PK	NS	-	-	-	-	73.9	-	
Vert	3249.204	AV	42.2	29.4	3.7	34.2	41.1	53.9	12.8	
Vert	4874.000	AV	30.8	32.4	5.4	33.9	34.7	53.9	19.2	
Vert	7311.000	AV	NS	-	-	-	-	53.9	-	
Vert	9748.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	48.7	28.7	3.1	34.7	45.8	73.9	28.1	
Hori	3281.676	PK	50.7	29.4	3.7	34.2	49.6	73.9	24.3	
Hori	4924.000	PK	43.2	32.6	5.4	33.9	47.3	73.9	26.6	
Hori	7386.000	PK	NS	-	-	-	-	73.9	-	
Hori	9848.000	PK	NS	-	-	-	-	73.9	-	
Hori	2483.500	AV	36.8	28.7	3.1	34.7	33.9	53.9	20.0	
Hori	3281.676	AV	47.6	29.4	3.7	34.2	46.5	53.9	7.4	
Hori	4924.000	AV	30.6	32.6	5.4	33.9	34.7	53.9	19.2	
Hori	7386.000	AV	NS	-	-	-	-	53.9	-	
Hori	9848.000	AV	NS	-	-	-	-	53.9	-	
Vert	2483.500	PK	52.1	28.7	3.1	34.7	49.2	73.9	24.7	
Vert	3282.678	PK	47.2	29.4	3.7	34.2	46.1	73.9	27.8	
Vert	4924.000	PK	42.5	32.6	5.4	33.9	46.6	73.9	27.3	
Vert	7386.000	PK	NS	-	-	-	-	73.9	-	
Vert	9848.000	PK	NS	-	-	-	-	73.9	-	
Vert	2483.500	AV	39.9	28.7	3.1	34.7	37.0	53.9	16.9	
Vert	3282.678	AV	42.1	29.4	3.7	34.2	41.0	53.9	12.9	
Vert	4924.000	AV	31.1	32.6	5.4	33.9	35.2	53.9	18.7	
Vert	7386.000	AV	NS	-	-	-	-	53.9	-	
Vert	9848.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11g Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	67.0	28.3	3.0	34.7	63.6	73.9	10.3	
Hori	3215.957	PK	48.0	29.4	3.6	34.3	46.7	73.9	27.2	
Hori	4824.000	PK	NS	-	-	-	-	73.9	-	
Hori	7236.000	PK	NS	-	-	-	-	73.9	-	
Hori	9648.000	PK	NS	-	-	-	-	73.9	-	
Hori	2390.000	AV	52.7	28.3	3.0	34.7	49.3	53.9	4.6	
Hori	3215.957	AV	41.6	29.4	3.6	34.3	40.3	53.9	13.6	
Hori	4824.000	AV	NS	-	-	-	-	53.9	-	
Hori	7236.000	AV	NS	-	-	-	-	53.9	-	
Hori	9648.000	AV	NS	-	-	-	-	53.9	-	
Vert	2390.000	PK	64.9	28.3	3.0	34.7	61.5	73.9	12.4	
Vert	3215.862	PK	47.4	29.4	3.6	34.3	46.1	73.9	27.8	
Vert	4824.000	PK	46.1	32.3	5.4	33.9	49.9	73.9	24.0	
Vert	7236.000	PK	NS	-	-	-	-	73.9	-	
Vert	9648.000	PK	NS	-	-	-	-	73.9	-	
Vert	2390.000	AV	52.0	28.3	3.0	34.7	48.6	53.9	5.3	
Vert	3215.862	AV	40.9	29.4	3.6	34.3	39.6	53.9	14.3	
Vert	4824.000	AV	33.9	32.3	5.4	33.9	37.7	53.9	16.2	
Vert	7236.000	AV	NS	-	-	-	-	53.9	-	
Vert	9648.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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

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	96.5	28.4	3.0	34.7	93.2	-	-	Carrier
Hori	2400.000	PK	68.5	28.4	3.0	34.7	65.2	73.2	8.0	
Vert	2412.000	PK	95.7	28.4	3.0	34.7	92.4	-	-	Carrier
Vert	2400.000	PK	66.9	28.4	3.0	34.7	63.6	72.4	8.8	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11g Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	3249.287	PK	47.9	29.4	3.7	34.2	46.8	73.9	27.1	
Hori	4874.000	PK	48.4	32.4	6.3	33.9	53.2	73.9	20.7	
Hori	7311.000	PK	NS	-	-	-	-	73.9	-	
Hori	9748.000	PK	NS	-	-	-	-	73.9	-	
Hori	3249.287	AV	42.8	29.4	3.7	34.2	41.7	53.9	12.2	
Hori	4874.000	AV	36.5	32.4	6.3	33.9	41.3	53.9	12.6	
Hori	7311.000	AV	NS	-	-	-	-	53.9	-	
Hori	9748.000	AV	NS	-	-	-	-	53.9	-	
Vert	3249.333	PK	47.2	29.4	3.7	34.2	46.1	73.9	27.8	
Vert	4874.000	PK	50.9	32.4	5.4	33.9	54.8	73.9	19.1	
Vert	7311.000	PK	NS	-	-	-	-	73.9	-	
Vert	9748.000	PK	NS	-	-	-	-	73.9	-	
Vert	3249.333	AV	42.0	29.4	3.7	34.2	40.9	53.9	13.0	
Vert	4874.000	AV	40.7	32.4	5.4	33.9	44.6	53.9	9.3	
Vert	7311.000	AV	NS	-	-	-	-	53.9	-	
Vert	9748.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11g Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	60.9	28.7	3.1	34.7	58.0	73.9	15.9	
Hori	3282.676	PK	50.9	29.4	3.7	34.2	49.8	73.9	24.1	
Hori	4924.000	PK	44.9	32.6	5.4	33.9	49.0	73.9	24.9	
Hori	7386.000	PK	NS	-	-	-	-	73.9	-	
Hori	9848.000	PK	NS	-	-	-	-	73.9	-	
Hori	2483.500	AV	45.9	28.7	3.1	34.7	43.0	53.9	10.9	
Hori	3282.676	AV	48.0	29.4	3.7	34.2	46.9	53.9	7.0	
Hori	4924.000	AV	34.4	32.6	5.4	33.9	38.5	53.9	15.4	
Hori	7386.000	AV	NS	-	-	-	-	53.9	-	
Hori	9848.000	AV	NS	-	-	-	-	53.9	-	
Vert	2483.500	PK	61.2	28.7	3.1	34.7	58.3	73.9	15.6	
Vert	3282.471	PK	47.5	29.4	3.7	34.2	46.4	73.9	27.5	
Vert	4924.000	PK	47.3	32.6	5.4	33.9	51.4	73.9	22.5	
Vert	7386.000	PK	NS	-	-	-	-	73.9	-	
Vert	9848.000	PK	NS	-	-	-	-	73.9	-	
Vert	2483.500	AV	48.1	28.7	3.1	34.7	45.2	53.9	8.7	
Vert	3282.471	AV	42.8	29.4	3.7	34.2	41.7	53.9	12.2	
Vert	4924.000	AV	35.8	32.6	5.4	33.9	39.9	53.9	14.0	
Vert	7386.000	AV	NS	-	-	-	-	53.9	-	
Vert	9848.000	AV	NS	-	-	-	-	53.9	-	

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).

NS:No signal detect

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 Semi Anechoic Chamber
Report No. 10195552H
Date 02/21/2014 03/09/2014
Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
Engineer Kazuya Yoshioka Shinya Watanabe
(1-10GHz) (Above 10GHz)
Mode 11n-20 Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	63.8	28.3	3.0	34.7	60.4	73.9	13.5	
Hori	2390.000	AV	50.5	28.3	3.0	34.7	47.1	53.9	6.8	
Vert	2390.000	PK	67.4	28.3	3.0	34.7	64.0	73.9	9.9	
Vert	2390.000	AV	52.6	28.3	3.0	34.7	49.2	53.9	4.7	

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

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	92.3	28.4	3.0	34.7	89.0	-	-	Carrier
Hori	2400.000	PK	64.3	28.4	3.0	34.7	61.0	69.0	8.0	
Vert	2412.000	PK	95.1	28.4	3.0	34.7	91.8	-	-	Carrier
Vert	2400.000	PK	66.1	28.4	3.0	34.7	62.8	71.8	9.0	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Report No. 10195552H
 Date 02/21/2014 03/09/2014
 Temperature/ Humidity 23deg. C / 35% RH 23deg. C / 31% RH
 Engineer Kazuya Yoshioka Shinya Watanabe
 (1-10GHz) (Above 10GHz)
 Mode 11n-20 Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	60.5	28.7	3.1	34.7	57.6	73.9	16.3	
Hori	2483.500	AV	47.0	28.7	3.1	34.7	44.1	53.9	9.8	
Vert	2483.500	PK	62.4	28.7	3.1	34.7	59.5	73.9	14.4	
Vert	2483.500	AV	48.6	28.7	3.1	34.7	45.7	53.9	8.2	

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

Radiated Spurious Emission
[Molex antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/02/2014 03/04/2014 03/05/2014
Temperature/ Humidity 22 deg. C / 31% RH 20 deg. C / 23% RH 19 deg. C / 36% RH
Engineer Tomohisa Nakagawa Yutaka Yoshida Tomohisa Nakagawa
(1-10GHz) (10-40GHz) Below 1GHz
Mode 11n-20 Tx 5745MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	41.700	QP	22.7	14.0	6.9	28.6	15.0	40.0	25.0	
Hori	110.000	QP	22.3	11.5	7.5	28.4	12.9	43.5	30.6	
Hori	125.000	QP	23.0	13.3	7.6	28.3	15.6	43.5	27.9	
Hori	250.000	QP	21.9	17.1	8.4	27.7	19.7	46.0	26.3	
Hori	411.999	QP	28.7	17.4	9.2	28.4	26.9	46.0	19.1	
Hori	499.995	QP	30.3	18.1	9.5	28.8	29.1	46.0	16.9	
Hori	11490.000	PK	52.5	39.7	-2.0	33.7	56.5	73.9	17.4	
Hori	11490.000	AV	39.6	39.7	-2.0	33.7	43.6	53.9	10.4	
Vert	41.700	QP	22.8	14.0	6.9	28.6	15.1	40.0	24.9	
Vert	110.000	QP	22.4	11.5	7.5	28.4	13.0	43.5	30.5	
Vert	125.000	QP	23.0	13.3	7.6	28.3	15.6	43.5	27.9	
Vert	250.000	QP	21.9	17.1	8.4	27.7	19.7	46.0	26.3	
Vert	411.999	QP	29.3	17.4	9.2	28.4	27.5	46.0	18.5	
Vert	499.995	QP	26.5	18.1	9.5	28.8	25.3	46.0	20.7	
Vert	11490.000	PK	58.3	39.7	-2.0	33.7	62.3	73.9	11.6	
Vert	11490.000	AV	43.9	39.7	-2.0	33.7	47.9	53.9	6.0	

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

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	5745.000	PK	97.7	32.7	4.0	33.7	100.7	-	-	Carrier
Hori	5725.000	PK	57.9	32.7	4.0	33.7	60.9	80.7	19.8	
Vert	5745.000	PK	97.3	32.7	4.0	33.7	100.3	-	-	Carrier
Vert	5725.000	PK	57.1	32.7	4.0	33.7	60.1	80.3	20.2	

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

Radiated Spurious Emission
[Molex antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/02/2014 03/04/2014
Temperature/ Humidity 22 deg. C / 31% RH 20 deg. C / 23% RH
Engineer Tomohisa Nakagawa Yutaka Yoshida
 (1-10GHz) (10-40GHz)
Mode 11n-20 Tx 5785MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11570.000	PK	52.9	39.7	-1.9	33.7	57.0	73.9	16.9	
Hori	11570.000	AV	38.9	39.7	-1.9	33.7	43.0	53.9	10.9	
Vert	11570.000	PK	57.3	39.7	-1.9	33.7	61.4	73.9	12.5	
Vert	11570.000	AV	43.2	39.7	-1.9	33.7	47.3	53.9	6.6	

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

Radiated Spurious Emission
[Molex antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/02/2014 03/04/2014
Temperature/ Humidity 22 deg. C / 31% RH 20 deg. C / 23% RH
Engineer Tomohisa Nakagawa Yutaka Yoshida
(1-10GHz) (10-40GHz)
Mode 11n-20 Tx 5825MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11650.000	PK	51.0	39.7	-1.8	33.7	55.2	73.9	18.7	
Hori	11650.000	AV	38.0	39.7	-1.8	33.7	42.2	53.9	11.7	
Vert	11650.000	PK	55.5	39.7	-1.8	33.7	59.7	73.9	14.2	
Vert	11650.000	AV	43.0	39.7	-1.8	33.7	47.2	53.9	6.7	

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

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	5825.000	PK	97.4	32.9	4.0	33.7	100.6	-	-	Carrier
Hori	5850.000	PK	47.6	32.9	4.0	33.7	50.8	80.6	29.8	
Vert	5825.000	PK	94.8	32.9	4.0	33.7	98.0	-	-	Carrier
Vert	5850.000	PK	44.9	32.9	4.0	33.7	48.1	78.0	29.9	

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

Radiated Spurious Emission
[Molex antenna]

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10195552H	
Date	03/02/2014	03/04/2014
Temperature/ Humidity	22 deg. C / 31% RH	20 deg. C / 23% RH
Engineer	Tomohisa Nakagawa	Yutaka Yoshida
	(1-10GHz)	(10-40GHz)
Mode	11n-40 Tx 5755MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11510.000	PK	49.5	39.7	-2.0	33.7	53.5	73.9	20.4	
Hori	11510.000	AV	38.6	39.7	-2.0	33.7	42.6	53.9	11.3	
Vert	11510.000	PK	52.3	39.7	-2.0	33.7	56.3	73.9	17.7	
Vert	11510.000	AV	41.6	39.7	-2.0	33.7	45.6	53.9	8.3	

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

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	5755.000	PK	94.3	32.7	4.0	33.7	97.3	-	-	Carrier
Hori	5725.000	PK	61.3	32.7	4.0	33.7	64.3	77.3	13.0	
Vert	5755.000	PK	95.0	32.7	4.0	33.7	98.0	-	-	Carrier
Vert	5725.000	PK	62.4	32.7	4.0	33.7	65.4	78.0	12.6	

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

Radiated Spurious Emission
[Molex antenna]

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10195552H
Date : 03/02/2014 03/04/2014
Temperature/ Humidity : 22 deg. C / 31% RH 20 deg. C / 23% RH
Engineer : Tomohisa Nakagawa Yutaka Yoshida
 (1-10GHz) (10-40GHz)
Mode : 11n-40 Tx 5795MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11590.000	PK	49.3	39.7	-1.8	33.7	53.5	73.9	20.4	
Hori	11590.000	AV	38.6	39.7	-1.8	33.7	42.8	53.9	11.1	
Vert	11590.000	PK	51.5	39.7	-1.8	33.7	55.7	73.9	18.2	
Vert	11590.000	AV	40.7	39.7	-1.8	33.7	44.9	53.9	9.0	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/03/2014 03/04/2014 03/05/2014
Temperature/ Humidity 21 deg. C / 34% RH 20 deg. C / 23% RH 19 deg. C / 36% RH
Engineer Takumi Shimada Yutaka Yoshida Tomohisa Nakagawa
(1-10GHz) (10-40GHz) Below 1GHz
Mode 11n-20 Tx 5745MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	41.700	QP	22.8	14.0	6.9	28.6	15.1	40.0	24.9	
Hori	110.000	QP	22.5	11.5	7.5	28.4	13.1	43.5	30.4	
Hori	125.000	QP	22.6	13.3	7.6	28.3	15.2	43.5	28.3	
Hori	250.000	QP	22.0	17.1	8.4	27.7	19.8	46.0	26.2	
Hori	411.999	QP	29.5	17.4	9.2	28.4	27.7	46.0	18.3	
Hori	499.995	QP	32.3	18.1	9.5	28.8	31.1	46.0	14.9	
Hori	11490.000	PK	49.3	39.7	-2.0	33.7	53.3	73.9	20.6	
Hori	11490.000	AV	37.3	39.7	-2.0	33.7	41.3	53.9	12.6	
Vert	41.700	QP	22.8	14.0	6.9	28.6	15.1	40.0	24.9	
Vert	110.000	QP	22.5	11.5	7.5	28.4	13.1	43.5	30.4	
Vert	125.000	QP	22.5	13.3	7.6	28.3	15.1	43.5	28.4	
Vert	250.000	QP	23.2	17.1	8.4	27.7	21.0	46.0	25.0	
Vert	411.999	QP	28.9	17.4	9.2	28.4	27.1	46.0	18.9	
Vert	499.995	QP	26.8	18.1	9.5	28.8	25.6	46.0	20.4	
Vert	11490.000	PK	54.6	39.7	-2.0	33.7	58.6	73.9	15.3	
Vert	11490.000	AV	41.2	39.7	-2.0	33.7	45.2	53.9	8.7	

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

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	5745.000	PK	92.2	32.7	4.0	33.7	95.2	-	-	Carrier
Hori	5725.000	PK	57.6	32.7	4.0	33.7	60.6	75.2	14.6	
Vert	5745.000	PK	92.3	32.7	4.0	33.7	95.3	-	-	Carrier
Vert	5725.000	PK	54.2	32.7	4.0	33.7	57.2	75.3	18.1	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/03/2014 03/04/2014
Temperature/ Humidity 21 deg. C / 34% RH 20 deg. C / 23% RH
Engineer Takumi Shimada Yutaka Yoshida
 (1-10GHz) (10-40GHz)
Mode 11n-20 Tx 5785MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11570.000	PK	49.8	39.7	-1.9	33.7	53.9	73.9	20.0	
Hori	11570.000	AV	37.3	39.7	-1.9	33.7	41.4	53.9	12.5	
Vert	11570.000	PK	48.5	39.7	-1.9	33.7	52.6	73.9	21.3	
Vert	11570.000	AV	37.3	39.7	-1.9	33.7	41.4	53.9	12.5	

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

Radiated Spurious Emission
[Laird antenna]

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10195552H
Date 03/03/2014 03/04/2014
Temperature/ Humidity 21 deg. C / 34% RH 20 deg. C / 23% RH
Engineer Takumi Shimada Yutaka Yoshida
(1-10GHz) (10-40GHz)
Mode 11n-40 Tx 5795MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11590.000	PK	47.3	39.7	-1.8	33.7	51.5	73.9	22.4	
Hori	11590.000	AV	35.6	39.7	-1.8	33.7	39.8	53.9	14.1	
Vert	11590.000	PK	50.0	39.7	-1.8	33.7	54.2	73.9	19.7	
Vert	11590.000	AV	38.6	39.7	-1.8	33.7	42.8	53.9	11.1	

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

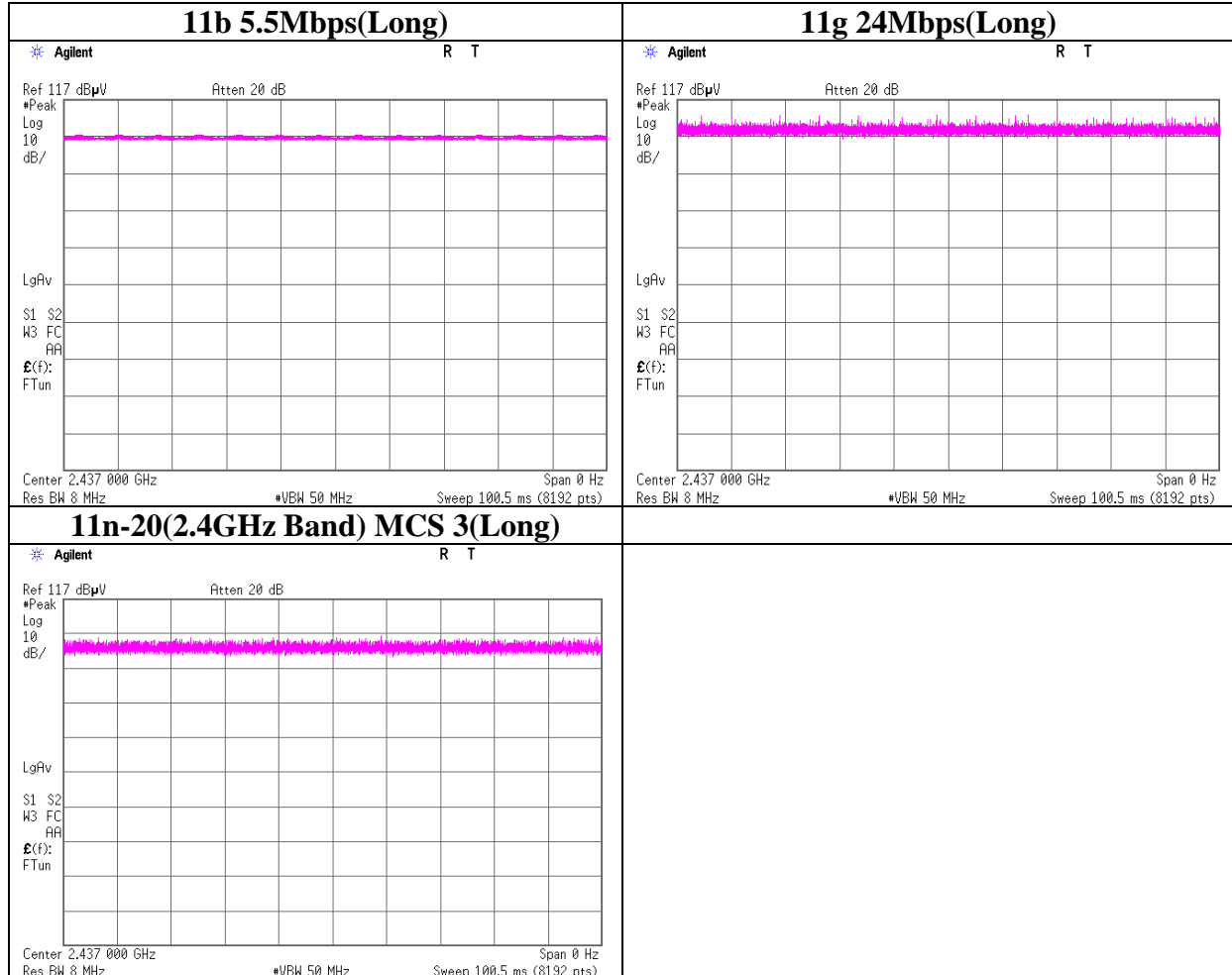
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5795.000	PK	93.3	32.9	4.0	33.7	96.5	-	-	Carrier
Hori	5850.000	PK	40.3	32.9	4.0	33.7	43.5	76.5	33.0	
Vert	5795.000	PK	88.2	32.9	4.0	33.7	91.4	-	-	Carrier
Vert	5850.000	PK	38.0	32.9	4.0	33.7	41.2	71.4	30.2	

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

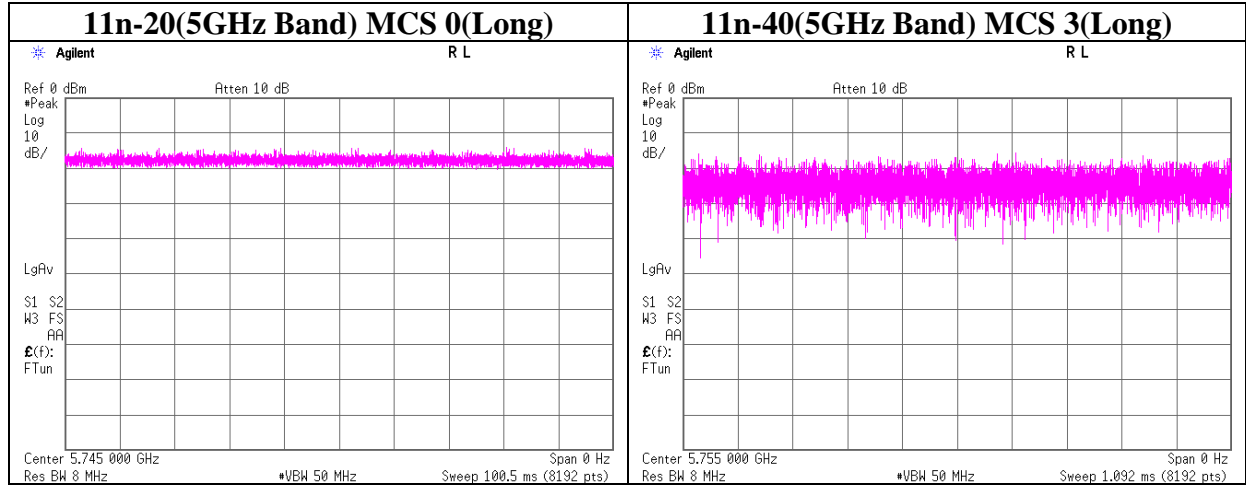
The Tested Burst Timing

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	10195552H
Date	03/02/2014
Temperature/ Humidity	22 deg. C / 31% RH
Engineer	Tomohisa Nakagawa



The Tested Burst Timing

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	10195552H
Date	03/02/2014
Temperature/ Humidity	22 deg. C / 31% RH
Engineer	Tomohisa Nakagawa



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-114	Spectrum Analyzer	Agilent	E4440A	MY46187105	RE	2013/11/11 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2013/05/17 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2013/09/27 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2013/03/12 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2013/09/01 * 12
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	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2013/06/14 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2013/08/12 * 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
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2013/09/01 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2014/02/21 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2013/05/30 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2014/02/21 * 12
MHA-04	Horn Antenna 26.5-40GHz	EMCO	3160-10	1140	RE	2013/11/25 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2014/02/21 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2014/02/20 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2013/03/19 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2013/12/24 * 12
MPSU-04	Power Supply	Agilent	87421A	3611A01548	RE	Pre Check

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE/RE	2013/06/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2014/01/27 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2014/01/20 * 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
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

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