# RADIO TEST REPORT

## Test Report No. : 10219901H-A-R1

| | | |
|---|---|---|
| **Applicant** | : | **silex technology, Inc.** |
| **Type of Equipment** | : | **Wireless LAN PCI Express Mini Card Module** |
| **Model No.** | : | **SX-PCEAN** |
| **FCC ID** | : | **N6C-SXPCEAN** |
| **Test regulation** | : | **FCC Part 15 Subpart C: 2014 (Conducted emission and Radiated spurious emission tests only) * Class II Permissive Change** |
| **Test Result** | : | **Complied** |

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 10219901H-A. 10219901H-A is replaced with this report.

**Date of test:** April 6 to 12, 2014

**Representative test engineer:**
Kazuya Yoshioka
Engineer
Consumer Technology Division

**Approved by:**
Takahiro Hatakeda
Leader
Consumer Technology Division

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

**UL Japan, Inc.**
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# REVISION HISTORY

## Original Test Report No.: 10219901H-A

| Revision | Test report No. | Date | Page revised | Contents |
|---|---|---|---|---|
| - (Original) | 10219901H-A | April 25, 2014 | - | - |
| 1 | 10219901H-A-R1 | July 24, 2014 | P.6 | Version update of FCC Part 15C |
| 1 | 10219901H-A-R1 | July 24, 2014 | P.10 | - Correction of word from “tested antenna” to “tested antenna port”<br>- Correction of explanatory note *3) for tested antenna port |
| 1 | 10219901H-A-R1 | July 24, 2014 | P.15-17 | Correction of word from “antenna 0” to “antenna port 0” |
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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 | : | Wireless LAN PCI Express Mini Card Module |
| Model No. | : | SX-PCEAN |
| Serial No. | : | Refer to Clause 4.2 |
| Rating | : | DC3.3V |
| Receipt Date of Sample | : | April 5, 2014 |
| Country of Mass-production | : | Japan |
| Condition of EUT | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT | : | No Modification by the test lab |

## 2.2 Product Description

Model No: SX-PCEAN (referred to as the EUT in this report) is the Wireless LAN PCI Express Mini Card Module.

**General Specification**

Clock frequency(ies) in the system : 40MHz

**Radio Specification**

Radio Type : Transceiver
Method of Frequency Generation : Synthesizer
Power Supply (inner) : DC1.2V
Antenna Gain : 2.6dBi@2.4GHz Band, 3.3dBi@5GHz Band

| | 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)<br>5745-5825MHz | 2412-2462MHz<br>5180-5320MHz *1)<br>5745-5825MHz | 2422-2452MHz<br>5190-5310MHz *1)<br>5755-5795MHz |
| 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<br>5MHz<br>5GHz band<br>20MHz | 2.4GHz band<br>5MHz<br>5GHz band<br>40MHz |
| Antenna type | Printed PCB Antenna | | | | |
| Antenna Connector type | U.FL Alternative connector | | | | |

*1) These bands(5180 - 5320MHz and 5190-5310MHz) are applied for other test report (Test Report No.: 10219901H-B).

<Contents of the change from original model>
Test Report Number of original model is 31JE0038-HO-01-A.
Specification was changed from the original model as follows:
*Antenna of the EUT was added. The radio specification is identical to the original.
Therefore Conducted emission and Radiated spurious emission tests were only performed.
Additionally, only the information of added antenna is described in this report.

# SECTION 3: Test specification, procedures & results

## 3.1 Test Specification

| | | |
|---|---|---|
| Test Specification | : | FCC Part 15 Subpart C: 2014, final revised on May 1, 2014 and effective June 2, 2014 |
| Title | : | FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz |

* The revision on May 1, 2014 does not affect the test specification applied to the EUT.

## 3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| Conducted Emission | **FCC:** ANSI C63.4:2003<br>7. AC powerline Conducted Emission measurements | **FCC:** Section 15.207 | **QP**<br>17.6dB, 0.19639MHz, N<br>**AV**<br>14.7dB, 0.39940MHz, N | Complied | - |
| | **IC:** RSS-Gen 7.2.4 | **IC:** RSS-Gen 7.2.4 | | | |
| Spurious Emission Restricted Band Edges | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section15.247(d) | 2.8dB<br>2483.500MHz, AV, Hori | Complied | Radiated |
| | **IC:** RSS-Gen 4.9 | **IC:** RSS-210 A8.5<br>RSS-Gen 7.2.3 | | | |
| 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 on the Module).
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

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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 | 4.8 x 4.6m | - |

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

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

Refer to APPENDIX.

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

## 4.1 Operating Mode(s)

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

| Mode | Remarks* |
|---|---|
| IEEE 802.11b (11b) | 1Mbps(Long), PN9 |
| IEEE 802.11n MIMO 20MHz BW (11n-20): 2.4GHz / 5GHz | MCS 8, PN9 |
| IEEE 802.11n MIMO 40MHz BW (11n-40): 2.4GHz / 5GHz | MCS 8, PN9 |
| *Transmitting duty was 100% on all tests.<br>*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel).<br>Please refer to original test report 31JE0038-HO-01-A issued by UL Japan, Inc.. | |
| *EUT has the power settings by the software as follows;<br>Power settings:<br>11b(1Mbps): 13.5dBm(2412 to 2462MHz),<br>11n-20 2.4GHz (MCS8): 10.5dBm(2412MHz), 14.5dBm(2417 to 2457MHz), 10.5dBm(2462MHz)<br>11n-40 2.4GHz (MCS8): 6.0dBm(2422MHz), 13.5dBm(2427 to2447MHz), 7.0dBm(2452MHz)<br>11n-20 5GHz (MCS8): 13.5dBm(5745 to 5825MHz)<br>11n-40 5GHz (MCS8): 11.0dBm(5755 and 5795MHz)<br><br>Software: Atheros Radio Test (ART)<br>- Revision 0.9 BUILD #27 ART_11n<br>- Customer Version (ANWI BUILD)<br>*Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product. | |

*The details of Operating mode(s): 2.4GHz

| Test Item | Operating Mode | Tested Antenna port | Tested frequency |
|---|---|---|---|
| Conducted Emission | 11n-20(MIMO) Tx *1) | 0+1 | 2437MHz |
| Spurious Emission (Radiated) | 11b Tx | 0 *3) | 2412MHz<br>2437MHz<br>2462MHz |
| | 11n-20(MIMO) Tx *2) | 0+1 | 2412MHz<br>2437MHz<br>2462MHz |
| | 11n-40(MIMO) Tx | 0+1 | 2422MHz<br>2437MHz<br>2452MHz |

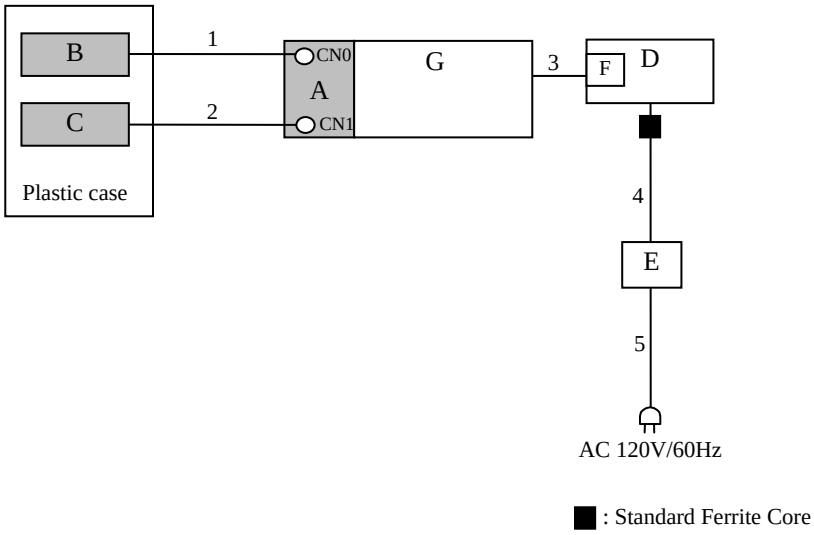
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.
*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.
*3) The test was performed with the antenna port that had higher power as a representative.

*The details of Operating mode(s): 5GHz

| Test Item | Operating Mode | Tested Antenna port | Tested frequency |
|---|---|---|---|
| Spurious Emission (Radiated) | 11n-20(MIMO) Tx *4) | 0+1 | 5745MHz<br>5785MHz<br>5825MHz |
| | 11n-40(MIMO) Tx | 0+1 | 5755MHz<br>5795MHz |

*4) 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.

### 4.2 Configuration and peripherals




* Cabling and setup were taken into consideration and test data was taken under worse case conditions.
* No difference was confirmed with and without a standard ferrite core in Conducted emission test.
* The typical plastic case was used for this test in order to ensure the capability of PCB antenna.

**Description of EUT and Support equipment**

| No. | Item | Model number | Serial number | Manufacturer | Remark |
|---|---|---|---|---|---|
| A | Wireless LAN PCI Express Mini Card Module | SX-PCEAN | 008092 4DC308 | silex technology, Inc. | EUT |
| B | Antenna | AA222 | 001 | Unictron | EUT |
| C | Antenna | AA222 | 002 | Unictron | EUT |
| D | Laptop PC | T61 | L3R2056 | Lenovo | - |
| E | AC Adaptor | 92P1160 | 11S92P1160Z1ZBGH6B6DKV | Lenovo | - |
| F | Express Card Adaptor | - | - | B plus | - |
| G | Jig | - | 200023176 | B plus | - |

**List of cables used**

| No. | Name | Length (m) | Shield | | Remark |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | Antenna Cable | 0.1 | Shielded | Shielded | - |
| 2 | Antenna Cable | 0.1 | Shielded | Shielded | - |
| 3 | MiniPCI Cable | 0.3 | Shielded | Shielded | - |
| 4 | DC Cable | 1.8 | Unshielded | Unshielded | - |
| 5 | AC Cable | 1.0 | Unshielded | Unshielded | - |

## SECTION 5: Conducted Emission

**Test Procedure and conditions**

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

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

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

## SECTION 6: Radiated Spurious Emission

**Test Procedure**

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "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, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

**Test Antennas are used as below;**

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

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

**20dBc was applied to the frequency over the limit of FCC 15.209 / Table 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<br>VBW: 3MHz | RBW: 1MHz<br>VBW: 10Hz | RBW: 100kHz<br>VBW: 300kHz (S/A) |
| Test Distance | 3m | 3m (below 10GHz),<br>1m *2) (above 10GHz) | | 3m (below 10GHz),<br>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 x log (3.0m/1.0m) = 9.5dB

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

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

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

# APPENDIX 1: Data of EMI test

## Conducted Emission

DATA OF CONDUCTED EMISSION TEST

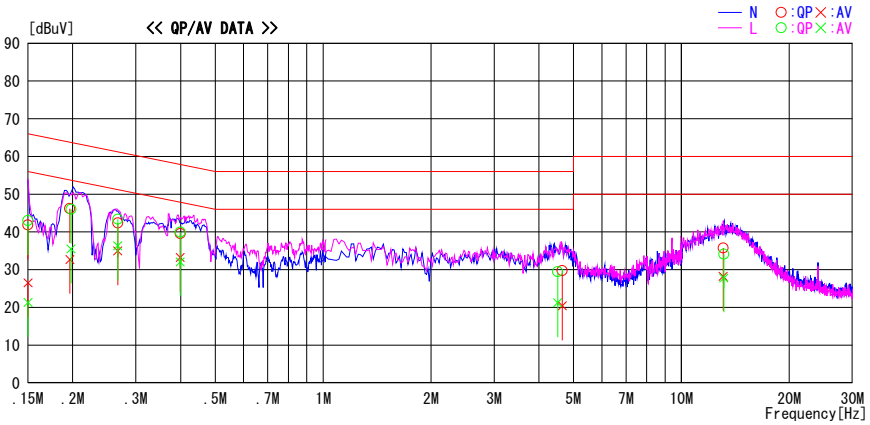
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2014/04/12

Report No. : 10219901H

Temp./Humi. : 23deg. C / 39% RH
Engineer : Kazuya Yoshioka

Mode / Remarks : WLAN Tx 11n20 MCS8 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV




| Frequency | Reading Level | | Corr. | Results | | Limit | | Margin | | Phase | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | QP | AV | Factor | QP | AV | QP | AV | QP | AV | | |
| [MHz] | [dBuV] | [dBuV] | [dB] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dB] | [dB] | | |
| 0.15000 | 28.6 | 13.3 | 13.2 | 41.8 | 26.5 | 66.0 | 56.0 | 24.2 | 29.5 | N | |
| 0.19639 | 33.0 | 19.5 | 13.2 | 46.2 | 32.7 | 63.8 | 53.8 | 17.6 | 21.1 | N | |
| 0.26720 | 29.2 | 21.8 | 13.2 | 42.4 | 35.0 | 61.2 | 51.2 | 18.8 | 16.2 | N | |
| 0.39940 | 26.4 | 20.0 | 13.2 | 39.6 | 33.2 | 57.9 | 47.9 | 18.3 | 14.7 | N | |
| 4.64840 | 15.8 | 6.5 | 13.9 | 29.7 | 20.4 | 56.0 | 46.0 | 26.3 | 25.6 | N | |
| 13.07360 | 20.9 | 13.4 | 14.8 | 35.7 | 28.2 | 60.0 | 50.0 | 24.3 | 21.8 | N | |
| 0.15000 | 29.8 | 8.1 | 13.2 | 43.0 | 21.3 | 66.0 | 56.0 | 23.0 | 34.7 | L | |
| 0.19791 | 32.8 | 22.3 | 13.2 | 46.0 | 35.5 | 63.7 | 53.7 | 17.7 | 18.2 | L | |
| 0.26727 | 30.2 | 23.1 | 13.2 | 43.4 | 36.3 | 61.2 | 51.2 | 17.8 | 14.9 | L | |
| 0.39915 | 26.7 | 18.9 | 13.2 | 39.9 | 32.1 | 57.9 | 47.9 | 18.0 | 15.8 | L | |
| 4.51463 | 15.6 | 7.3 | 13.9 | 29.5 | 21.2 | 56.0 | 46.0 | 26.5 | 24.8 | L | |
| 13.13000 | 19.3 | 13.0 | 14.8 | 34.1 | 27.8 | 60.0 | 50.0 | 25.9 | 22.2 | 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

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11b Tx 2412MHz, 1Mbps, Antenna port 0 | |

| 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 | 51.2 | 27.0 | 3.0 | 34.7 | 46.5 | 73.9 | 27.4 | |
| Hori | 2497.400 | PK | 61.7 | 26.9 | 3.1 | 34.7 | 57.0 | 73.9 | 16.9 | |
| Hori | 4824.000 | PK | 43.5 | 31.9 | 5.4 | 33.9 | 46.9 | 73.9 | 27.0 | |
| Hori | 4980.334 | PK | 50.1 | 32.2 | 5.4 | 34.0 | 53.7 | 73.9 | 20.2 | |
| Hori | 7236.000 | PK | 43.0 | 35.7 | 6.5 | 33.8 | 51.4 | 73.9 | 22.5 | |
| Hori | 9648.000 | PK | 44.4 | 38.1 | 7.2 | 34.4 | 55.3 | 73.9 | 18.6 | |
| Hori | 2390.000 | AV | 38.8 | 27.0 | 3.0 | 34.7 | 34.1 | 53.9 | 19.8 | |
| Hori | 2497.400 | AV | 44.4 | 26.9 | 3.1 | 34.7 | 39.7 | 53.9 | 14.2 | |
| Hori | 4824.000 | AV | 34.0 | 31.9 | 5.4 | 33.9 | 37.4 | 53.9 | 16.5 | |
| Hori | 4980.334 | AV | 32.3 | 32.2 | 5.4 | 34.0 | 35.9 | 53.9 | 18.0 | |
| Hori | 7236.000 | AV | 30.9 | 35.7 | 6.5 | 33.8 | 39.3 | 53.9 | 14.6 | |
| Hori | 9648.000 | AV | 31.8 | 38.1 | 7.2 | 34.4 | 42.7 | 53.9 | 11.2 | |
| Vert | 2390.000 | PK | 53.2 | 27.0 | 3.0 | 34.7 | 48.5 | 73.9 | 25.4 | |
| Vert | 2497.400 | PK | 63.4 | 26.9 | 3.1 | 34.7 | 58.7 | 73.9 | 15.2 | |
| Vert | 4824.000 | PK | 43.4 | 31.9 | 5.4 | 33.9 | 46.8 | 73.9 | 27.1 | |
| Vert | 4980.334 | PK | 50.9 | 32.2 | 5.4 | 34.0 | 54.5 | 73.9 | 19.4 | |
| Vert | 7236.000 | PK | 42.5 | 35.7 | 6.5 | 33.8 | 50.9 | 73.9 | 23.0 | |
| Vert | 9648.000 | PK | 43.9 | 38.1 | 7.2 | 34.4 | 54.8 | 73.9 | 19.1 | |
| Vert | 2390.000 | AV | 41.3 | 27.0 | 3.0 | 34.7 | 36.6 | 53.9 | 17.3 | |
| Vert | 2497.400 | AV | 46.5 | 26.9 | 3.1 | 34.7 | 41.8 | 53.9 | 12.1 | |
| Vert | 4824.000 | AV | 30.4 | 31.9 | 5.4 | 33.9 | 33.8 | 53.9 | 20.1 | |
| Vert | 4980.334 | AV | 33.3 | 32.2 | 5.4 | 34.0 | 36.9 | 53.9 | 17.0 | |
| Vert | 7236.000 | AV | 31.0 | 35.7 | 6.5 | 33.8 | 39.4 | 53.9 | 14.5 | |
| Vert | 9648.000 | AV | 33.9 | 38.1 | 7.2 | 34.4 | 44.8 | 53.9 | 9.1 | |

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 | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2412.000 | PK | 100.6 | 27.0 | 3.0 | 34.7 | 95.9 | - | - | Carrier |
| Hori | 2400.000 | PK | 61.1 | 27.0 | 3.0 | 34.7 | 56.4 | 75.9 | 19.5 | |
| Vert | 2412.000 | PK | 104.4 | 27.0 | 3.0 | 34.7 | 99.7 | - | - | Carrier |
| Vert | 2400.000 | PK | 63.4 | 27.0 | 3.0 | 34.7 | 58.7 | 79.7 | 21.0 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/08/2014 | 04/10/2014 |
| Temperature/ Humidity | 25 deg. C / 42% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11b Tx 2437MHz, 1Mbps, Antenna port 0 | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2489.403 | PK | 63.9 | 26.9 | 3.1 | 34.7 | 59.2 | 73.9 | 14.7 | |
| Hori | 4874.000 | PK | 46.2 | 32.0 | 5.4 | 33.9 | 49.7 | 73.9 | 24.2 | |
| Hori | 4980.920 | PK | 53.8 | 32.2 | 5.4 | 34.0 | 57.4 | 73.9 | 16.5 | |
| Hori | 7311.000 | PK | 43.8 | 35.8 | 6.6 | 33.8 | 52.4 | 73.9 | 21.5 | |
| Hori | 9748.000 | PK | 45.6 | 38.3 | 7.3 | 34.5 | 56.7 | 73.9 | 17.2 | |
| Hori | 2489.403 | AV | 53.6 | 26.9 | 3.1 | 34.7 | 48.9 | 53.9 | 5.0 | |
| Hori | 4874.000 | AV | 38.0 | 32.0 | 5.4 | 33.9 | 41.5 | 53.9 | 12.4 | |
| Hori | 4980.920 | AV | 34.3 | 32.2 | 5.4 | 34.0 | 37.9 | 53.9 | 16.0 | |
| Hori | 7311.000 | AV | 30.4 | 35.8 | 6.6 | 33.8 | 39.0 | 53.9 | 14.9 | |
| Hori | 9748.000 | AV | 34.1 | 38.3 | 7.3 | 34.5 | 45.2 | 53.9 | 8.7 | |
| Vert | 2489.403 | PK | 57.6 | 26.9 | 3.1 | 34.7 | 52.9 | 73.9 | 21.0 | |
| Vert | 4874.000 | PK | 45.7 | 32.0 | 5.4 | 33.9 | 49.2 | 73.9 | 24.7 | |
| Vert | 4980.920 | PK | 51.0 | 32.2 | 5.4 | 34.0 | 54.6 | 73.9 | 19.3 | |
| Vert | 7311.000 | PK | 44.3 | 35.8 | 6.6 | 33.8 | 52.9 | 73.9 | 21.0 | |
| Vert | 9748.000 | PK | 45.1 | 38.3 | 7.3 | 34.5 | 56.2 | 73.9 | 17.7 | |
| Vert | 2489.403 | AV | 48.6 | 26.9 | 3.1 | 34.7 | 43.9 | 53.9 | 10.0 | |
| Vert | 4874.000 | AV | 37.0 | 32.0 | 5.4 | 33.9 | 40.5 | 53.9 | 13.4 | |
| Vert | 4980.920 | AV | 33.4 | 32.2 | 5.4 | 34.0 | 37.0 | 53.9 | 16.9 | |
| Vert | 7311.000 | AV | 30.5 | 35.8 | 6.6 | 33.8 | 39.1 | 53.9 | 14.8 | |
| Vert | 9748.000 | AV | 32.6 | 38.3 | 7.3 | 34.5 | 43.7 | 53.9 | 10.2 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa | Tsubasa Takayama |
| | (1-10GHz) | (Above 10GHz) |
| Mode | 11b Tx 2462MHz, 1Mbps, Antenna port 0 | |

| 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 | 53.4 | 26.9 | 3.1 | 34.7 | 48.7 | 73.9 | 25.2 | |
| Hori | 2489.403 | PK | 72.6 | 26.9 | 3.1 | 34.7 | 67.9 | 73.9 | 6.0 | |
| Hori | 4924.000 | PK | 45.5 | 32.1 | 5.4 | 33.9 | 49.1 | 73.9 | 24.8 | |
| Hori | 4980.920 | PK | 52.5 | 32.2 | 5.4 | 34.0 | 56.1 | 73.9 | 17.8 | |
| Hori | 7386.000 | PK | 44.0 | 35.8 | 6.6 | 33.8 | 52.6 | 73.9 | 21.3 | |
| Hori | 9848.000 | PK | 43.9 | 38.5 | 7.3 | 34.5 | 55.2 | 73.9 | 18.7 | |
| Hori | 2483.500 | AV | 40.6 | 26.9 | 3.1 | 34.7 | 35.9 | 53.9 | 18.0 | |
| Hori | 2489.403 | AV | 54.4 | 26.9 | 3.1 | 34.7 | 49.7 | 53.9 | 4.2 | |
| Hori | 4924.000 | AV | 38.5 | 32.1 | 5.4 | 33.9 | 42.1 | 53.9 | 11.8 | |
| Hori | 4980.920 | AV | 34.7 | 32.2 | 5.4 | 34.0 | 38.3 | 53.9 | 15.6 | |
| Hori | 7386.000 | AV | 31.3 | 35.8 | 6.6 | 33.8 | 39.9 | 53.9 | 14.0 | |
| Hori | 9848.000 | AV | 32.3 | 38.5 | 7.3 | 34.5 | 43.6 | 53.9 | 10.3 | |
| Vert | 2483.500 | PK | 52.8 | 26.9 | 3.1 | 34.7 | 48.1 | 73.9 | 25.8 | |
| Vert | 2489.403 | PK | 68.6 | 26.9 | 3.1 | 34.7 | 63.9 | 73.9 | 10.0 | |
| Vert | 4924.000 | PK | 46.0 | 32.1 | 5.4 | 33.9 | 49.6 | 73.9 | 24.3 | |
| Vert | 4980.920 | PK | 50.9 | 32.2 | 5.4 | 34.0 | 54.5 | 73.9 | 19.4 | |
| Vert | 7386.000 | PK | 44.3 | 35.8 | 6.6 | 33.8 | 52.9 | 73.9 | 21.0 | |
| Vert | 9848.000 | PK | 45.0 | 38.5 | 7.3 | 34.5 | 56.3 | 73.9 | 17.6 | |
| Vert | 2483.500 | AV | 41.0 | 26.9 | 3.1 | 34.7 | 36.3 | 53.9 | 17.6 | |
| Vert | 2489.403 | AV | 51.4 | 26.9 | 3.1 | 34.7 | 46.7 | 53.9 | 7.2 | |
| Vert | 4924.000 | AV | 39.0 | 32.1 | 5.4 | 33.9 | 42.6 | 53.9 | 11.3 | |
| Vert | 4980.920 | AV | 34.1 | 32.2 | 5.4 | 34.0 | 37.7 | 53.9 | 16.2 | |
| Vert | 7386.000 | AV | 31.2 | 35.8 | 6.6 | 33.8 | 39.8 | 53.9 | 14.1 | |
| Vert | 9848.000 | AV | 33.0 | 38.5 | 7.3 | 34.5 | 44.3 | 53.9 | 9.6 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11n-20(MIMO) Tx 2412MHz, MCS 8 | |

| 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 | 73.3 | 27.0 | 3.0 | 34.7 | 68.6 | 73.9 | 5.3 | |
| Hori | 2497.400 | PK | 72.3 | 26.9 | 3.1 | 34.7 | 67.6 | 73.9 | 6.3 | |
| Hori | 4824.000 | PK | 42.7 | 31.9 | 4.6 | 33.9 | 45.3 | 73.9 | 28.6 | |
| Hori | 4980.334 | PK | 51.7 | 32.2 | 5.4 | 34.0 | 55.3 | 73.9 | 18.6 | |
| Hori | 7236.000 | PK | 44.3 | 35.7 | 5.7 | 33.8 | 51.9 | 73.9 | 22.0 | |
| Hori | 9648.000 | PK | 45.4 | 38.1 | 6.5 | 34.4 | 55.6 | 73.9 | 18.3 | |
| Hori | 2390.000 | AV | 54.3 | 27.0 | 3.0 | 34.7 | 49.6 | 53.9 | 4.3 | |
| Hori | 2497.400 | AV | 54.2 | 26.9 | 3.1 | 34.7 | 49.5 | 53.9 | 4.4 | |
| Hori | 4824.000 | AV | 30.5 | 31.9 | 4.6 | 33.9 | 33.1 | 53.9 | 20.8 | |
| Hori | 4980.334 | AV | 34.1 | 32.2 | 5.4 | 34.0 | 37.7 | 53.9 | 16.2 | |
| Hori | 7236.000 | AV | 31.2 | 35.7 | 5.7 | 33.8 | 38.8 | 53.9 | 15.1 | |
| Hori | 9648.000 | AV | 31.8 | 38.1 | 6.5 | 34.4 | 42.0 | 53.9 | 11.9 | |
| Vert | 2390.000 | PK | 72.9 | 27.0 | 3.0 | 34.7 | 68.2 | 73.9 | 5.7 | |
| Vert | 2497.400 | PK | 64.8 | 26.9 | 3.1 | 34.7 | 60.1 | 73.9 | 13.8 | |
| Vert | 4824.000 | PK | 42.9 | 31.9 | 4.6 | 33.9 | 45.5 | 73.9 | 28.4 | |
| Vert | 4980.334 | PK | 50.5 | 32.2 | 5.4 | 34.0 | 54.1 | 73.9 | 19.8 | |
| Vert | 7236.000 | PK | 42.7 | 35.7 | 5.7 | 33.8 | 50.3 | 73.9 | 23.6 | |
| Vert | 9648.000 | PK | 44.4 | 38.1 | 6.5 | 34.4 | 54.6 | 73.9 | 19.3 | |
| Vert | 2390.000 | AV | 54.6 | 27.0 | 3.0 | 34.7 | 49.9 | 53.9 | 4.0 | |
| Vert | 2497.400 | AV | 48.5 | 26.9 | 3.1 | 34.7 | 43.8 | 53.9 | 10.1 | |
| Vert | 4824.000 | AV | 30.4 | 31.9 | 4.6 | 33.9 | 33.0 | 53.9 | 20.9 | |
| Vert | 4980.334 | AV | 33.1 | 32.2 | 5.4 | 34.0 | 36.7 | 53.9 | 17.2 | |
| Vert | 7236.000 | AV | 31.2 | 35.7 | 5.7 | 33.8 | 38.8 | 53.9 | 15.1 | |
| Vert | 9648.000 | AV | 31.8 | 38.1 | 6.5 | 34.4 | 42.0 | 53.9 | 11.9 | |

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

**20dBc Data Sheet**

| Polarity | Frequency | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2412.000 | PK | 106.7 | 27.0 | 3.0 | 34.7 | 102.0 | - | - | Carrier |
| Hori | 2400.000 | PK | 75.7 | 27.0 | 3.0 | 34.7 | 71.0 | 82.0 | 11.0 | |
| Vert | 2412.000 | PK | 107.4 | 27.0 | 3.0 | 34.7 | 102.7 | - | - | Carrier |
| Vert | 2400.000 | PK | 76.1 | 27.0 | 3.0 | 34.7 | 71.4 | 82.7 | 11.3 | |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/08/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 25 deg. C / 42% RH | 23 deg. C / 32% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) | Tsubasa Takayama (Below 1GHz) |
| Mode | 11n-20(MIMO) Tx 2437MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 99.764 | QP | 49.3 | 10.2 | 8.1 | 32.1 | 35.5 | 43.5 | 8.0 | |
| Hori | 120.000 | QP | 35.3 | 13.0 | 8.3 | 32.1 | 24.5 | 43.5 | 19.0 | |
| Hori | 199.822 | QP | 36.8 | 16.5 | 9.1 | 32.0 | 30.4 | 43.5 | 13.1 | |
| Hori | 298.927 | QP | 41.0 | 19.7 | 9.9 | 31.9 | 38.7 | 46.0 | 7.3 | |
| Hori | 398.847 | QP | 41.3 | 17.5 | 10.6 | 31.9 | 37.5 | 46.0 | 8.5 | |
| Hori | 497.795 | QP | 34.4 | 19.2 | 11.2 | 32.0 | 32.8 | 46.0 | 13.2 | |
| Hori | 698.029 | QP | 34.2 | 22.2 | 12.3 | 32.3 | 36.4 | 46.0 | 9.6 | |
| Hori | 925.658 | QP | 32.0 | 24.8 | 13.4 | 31.1 | 39.1 | 46.0 | 6.9 | |
| Hori | 2489.403 | PK | 60.8 | 26.9 | 3.1 | 34.7 | 56.1 | 73.9 | 17.8 | |
| Hori | 4874.000 | PK | 45.3 | 32.0 | 5.4 | 33.9 | 48.8 | 73.9 | 25.1 | |
| Hori | 4980.920 | PK | 53.7 | 32.2 | 5.4 | 34.0 | 57.3 | 73.9 | 16.6 | |
| Hori | 7311.000 | PK | 44.2 | 35.8 | 6.6 | 33.8 | 52.8 | 73.9 | 21.1 | |
| Hori | 9748.000 | PK | 46.8 | 38.3 | 7.3 | 34.5 | 57.9 | 73.9 | 16.0 | |
| Hori | 2489.403 | AV | 52.9 | 26.9 | 3.1 | 34.7 | 48.2 | 53.9 | 5.7 | |
| Hori | 4874.000 | AV | 31.0 | 32.0 | 5.4 | 33.9 | 34.5 | 53.9 | 19.4 | |
| Hori | 4980.920 | AV | 35.4 | 32.2 | 5.4 | 34.0 | 39.0 | 53.9 | 14.9 | |
| Hori | 7311.000 | AV | 30.7 | 35.8 | 6.6 | 33.8 | 39.3 | 53.9 | 14.6 | |
| Hori | 9748.000 | AV | 31.7 | 38.3 | 7.3 | 34.5 | 42.8 | 53.9 | 11.1 | |
| Vert | 99.764 | QP | 49.8 | 10.2 | 8.1 | 32.1 | 36.0 | 43.5 | 7.5 | |
| Vert | 120.000 | QP | 35.5 | 13.0 | 8.3 | 32.1 | 24.7 | 43.5 | 18.8 | |
| Vert | 199.822 | QP | 38.9 | 16.5 | 9.1 | 32.0 | 32.5 | 43.5 | 11.0 | |
| Vert | 298.927 | QP | 37.0 | 19.7 | 9.9 | 31.9 | 34.7 | 46.0 | 11.3 | |
| Vert | 398.847 | QP | 35.6 | 17.5 | 10.6 | 31.9 | 31.8 | 46.0 | 14.2 | |
| Vert | 497.795 | QP | 33.9 | 19.2 | 11.2 | 32.0 | 32.3 | 46.0 | 13.7 | |
| Vert | 698.029 | QP | 31.0 | 22.2 | 12.3 | 32.3 | 33.2 | 46.0 | 12.8 | |
| Vert | 925.658 | QP | 31.8 | 24.8 | 13.4 | 31.1 | 38.9 | 46.0 | 7.1 | |
| Vert | 2489.403 | PK | 56.7 | 26.9 | 3.1 | 34.7 | 52.0 | 73.9 | 21.9 | |
| Vert | 4874.000 | PK | 47.5 | 32.0 | 5.4 | 33.9 | 51.0 | 73.9 | 22.9 | |
| Vert | 4980.920 | PK | 51.3 | 32.2 | 5.4 | 34.0 | 54.9 | 73.9 | 19.0 | |
| Vert | 7311.000 | PK | 45.9 | 35.8 | 6.6 | 33.8 | 54.5 | 73.9 | 19.4 | |
| Vert | 9748.000 | PK | 49.0 | 38.3 | 7.3 | 34.5 | 60.1 | 73.9 | 13.8 | |
| Vert | 2489.403 | AV | 49.9 | 26.9 | 3.1 | 34.7 | 45.2 | 53.9 | 8.7 | |
| Vert | 4874.000 | AV | 33.0 | 32.0 | 5.4 | 33.9 | 36.5 | 53.9 | 17.4 | |
| Vert | 4980.920 | AV | 34.1 | 32.2 | 5.4 | 34.0 | 37.7 | 53.9 | 16.2 | |
| Vert | 7311.000 | AV | 32.6 | 35.8 | 6.6 | 33.8 | 41.2 | 53.9 | 12.7 | |
| Vert | 9748.000 | AV | 34.5 | 38.3 | 7.3 | 34.5 | 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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11n-20(MIMO) Tx 2462MHz, MCS 8 | |

| 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 | 70.1 | 26.9 | 3.1 | 34.7 | 65.4 | 73.9 | 8.5 | |
| Hori | 2489.403 | PK | 70.9 | 26.9 | 3.1 | 34.7 | 66.2 | 73.9 | 7.7 | |
| Hori | 4924.000 | PK | 42.7 | 32.1 | 4.6 | 33.9 | 45.5 | 73.9 | 28.4 | |
| Hori | 4980.920 | PK | 51.8 | 32.2 | 5.4 | 34.0 | 55.4 | 73.9 | 18.5 | |
| Hori | 7386.000 | PK | 43.5 | 35.8 | 6.6 | 33.8 | 52.1 | 73.9 | 21.8 | |
| Hori | 9848.000 | PK | 44.1 | 38.5 | 7.3 | 34.5 | 55.4 | 73.9 | 18.5 | |
| Hori | 2483.500 | AV | 52.9 | 26.9 | 3.1 | 34.7 | 48.2 | 53.9 | 5.7 | |
| Hori | 2489.403 | AV | 52.0 | 26.9 | 3.1 | 34.7 | 47.3 | 53.9 | 6.6 | |
| Hori | 4924.000 | AV | 30.7 | 32.1 | 5.4 | 33.9 | 34.3 | 53.9 | 19.6 | |
| Hori | 4980.920 | AV | 34.4 | 32.2 | 5.4 | 34.0 | 38.0 | 53.9 | 15.9 | |
| Hori | 7386.000 | AV | 31.3 | 35.8 | 6.6 | 33.8 | 39.9 | 53.9 | 14.0 | |
| Hori | 9848.000 | AV | 31.8 | 38.5 | 7.3 | 34.5 | 43.1 | 53.9 | 10.8 | |
| Vert | 2483.500 | PK | 74.2 | 26.9 | 3.1 | 34.7 | 69.5 | 73.9 | 4.4 | |
| Vert | 2489.403 | PK | 65.7 | 26.9 | 3.1 | 34.7 | 61.0 | 73.9 | 12.9 | |
| Vert | 4924.000 | PK | 42.2 | 32.1 | 5.4 | 33.9 | 45.8 | 73.9 | 28.1 | |
| Vert | 4980.920 | PK | 50.3 | 32.2 | 5.4 | 34.0 | 53.9 | 73.9 | 20.0 | |
| Vert | 7386.000 | PK | 44.3 | 35.8 | 6.6 | 33.8 | 52.9 | 73.9 | 21.0 | |
| Vert | 9848.000 | PK | 44.1 | 38.5 | 7.3 | 34.5 | 55.4 | 73.9 | 18.5 | |
| Vert | 2483.500 | AV | 55.5 | 26.9 | 3.1 | 34.7 | 50.8 | 53.9 | 3.1 | |
| Vert | 2489.403 | AV | 48.5 | 26.9 | 3.1 | 34.7 | 43.8 | 53.9 | 10.1 | |
| Vert | 4924.000 | AV | 30.7 | 32.1 | 5.4 | 33.9 | 34.3 | 53.9 | 19.6 | |
| Vert | 4980.920 | AV | 33.1 | 32.2 | 5.4 | 34.0 | 36.7 | 53.9 | 17.2 | |
| Vert | 7386.000 | AV | 31.3 | 35.8 | 6.6 | 33.8 | 39.9 | 53.9 | 14.0 | |
| Vert | 9848.000 | AV | 31.9 | 38.5 | 7.3 | 34.5 | 43.2 | 53.9 | 10.7 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11n-40(MIMO) Tx 2422MHz, MCS 8 | |

| 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 | 65.7 | 27.0 | 3.0 | 34.7 | 61.0 | 73.9 | 12.9 | |
| Hori | 2497.400 | PK | 72.1 | 26.9 | 3.1 | 34.7 | 67.4 | 73.9 | 6.5 | |
| Hori | 4844.000 | PK | 42.9 | 31.9 | 5.4 | 33.9 | 46.3 | 73.9 | 27.6 | |
| Hori | 4980.334 | PK | 52.1 | 32.2 | 5.4 | 34.0 | 55.7 | 73.9 | 18.2 | |
| Hori | 7266.000 | PK | 43.7 | 35.7 | 6.5 | 33.8 | 52.1 | 73.9 | 21.8 | |
| Hori | 9688.000 | PK | 44.1 | 38.2 | 7.3 | 34.4 | 55.2 | 73.9 | 18.7 | |
| Hori | 2390.000 | AV | 49.5 | 27.0 | 3.0 | 34.7 | 44.8 | 53.9 | 9.1 | |
| Hori | 2497.400 | AV | 54.3 | 26.9 | 3.1 | 34.7 | 49.6 | 53.9 | 4.3 | |
| Hori | 4844.000 | AV | 30.5 | 31.9 | 5.4 | 33.9 | 33.9 | 53.9 | 20.0 | |
| Hori | 4980.334 | AV | 34.6 | 32.2 | 5.4 | 34.0 | 38.2 | 53.9 | 15.7 | |
| Hori | 7266.000 | AV | 31.2 | 35.7 | 6.5 | 33.8 | 39.6 | 53.9 | 14.3 | |
| Hori | 9688.000 | AV | 31.7 | 38.2 | 7.3 | 34.4 | 42.8 | 53.9 | 11.1 | |
| Vert | 2390.000 | PK | 69.7 | 27.0 | 3.0 | 34.7 | 65.0 | 73.9 | 8.9 | |
| Vert | 2497.400 | PK | 63.6 | 26.9 | 3.1 | 34.7 | 58.9 | 73.9 | 15.0 | |
| Vert | 4844.000 | PK | 42.8 | 31.9 | 5.4 | 33.9 | 46.2 | 73.9 | 27.7 | |
| Vert | 4980.334 | PK | 49.2 | 32.2 | 5.4 | 34.0 | 52.8 | 73.9 | 21.1 | |
| Vert | 7266.000 | PK | 43.2 | 35.7 | 6.5 | 33.8 | 51.6 | 73.9 | 22.3 | |
| Vert | 9688.000 | PK | 43.7 | 38.2 | 7.3 | 34.4 | 54.8 | 73.9 | 19.1 | |
| Vert | 2390.000 | AV | 53.5 | 27.0 | 3.0 | 34.7 | 48.8 | 53.9 | 5.1 | |
| Vert | 2497.400 | AV | 47.0 | 26.9 | 3.1 | 34.7 | 42.3 | 53.9 | 11.6 | |
| Vert | 4844.000 | AV | 30.5 | 31.9 | 5.4 | 33.9 | 33.9 | 53.9 | 20.0 | |
| Vert | 4980.334 | AV | 31.8 | 32.2 | 5.4 | 34.0 | 35.4 | 53.9 | 18.5 | |
| Vert | 7266.000 | AV | 31.2 | 35.7 | 6.5 | 33.8 | 39.6 | 53.9 | 14.3 | |
| Vert | 9688.000 | AV | 31.7 | 38.2 | 7.3 | 34.4 | 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 | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2422.000 | PK | 101.2 | 27.0 | 3.1 | 34.7 | 96.6 | - | - | Carrier |
| Hori | 2400.000 | PK | 66.8 | 27.0 | 3.0 | 34.7 | 62.1 | 76.6 | 14.5 | |
| Vert | 2422.000 | PK | 100.3 | 27.0 | 3.1 | 34.7 | 95.7 | - | - | Carrier |
| Vert | 2400.000 | PK | 70.0 | 27.0 | 3.0 | 34.7 | 65.3 | 75.7 | 10.4 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/08/2014 | 04/10/2014 |
| Temperature/ Humidity | 25 deg. C / 42% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11n-40(MIMO) Tx 2437MHz, MCS 8 | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2489.403 | PK | 61.5 | 26.9 | 3.1 | 34.7 | 56.8 | 73.9 | 17.1 | |
| Hori | 4874.000 | PK | 45.6 | 32.0 | 5.4 | 33.9 | 49.1 | 73.9 | 24.8 | |
| Hori | 4980.920 | PK | 52.7 | 32.2 | 5.4 | 34.0 | 56.3 | 73.9 | 17.6 | |
| Hori | 7311.000 | PK | 44.3 | 35.8 | 6.6 | 33.8 | 52.9 | 73.9 | 21.0 | |
| Hori | 9748.000 | PK | 47.7 | 38.3 | 7.3 | 34.5 | 58.8 | 73.9 | 15.1 | |
| Hori | 2489.403 | AV | 55.3 | 26.9 | 3.1 | 34.7 | 50.6 | 53.9 | 3.3 | |
| Hori | 4874.000 | AV | 31.1 | 32.0 | 5.4 | 33.9 | 34.6 | 53.9 | 19.3 | |
| Hori | 4980.920 | AV | 32.6 | 32.2 | 5.4 | 34.0 | 36.2 | 53.9 | 17.7 | |
| Hori | 7311.000 | AV | 30.4 | 35.8 | 6.6 | 33.8 | 39.0 | 53.9 | 14.9 | |
| Hori | 9748.000 | AV | 32.4 | 38.3 | 7.3 | 34.5 | 43.5 | 53.9 | 10.4 | |
| Vert | 2489.403 | PK | 57.6 | 26.9 | 3.1 | 34.7 | 52.9 | 73.9 | 21.0 | |
| Vert | 4874.000 | PK | 47.1 | 32.0 | 5.4 | 33.9 | 50.6 | 73.9 | 23.3 | |
| Vert | 4980.920 | PK | 51.1 | 32.2 | 5.4 | 34.0 | 54.7 | 73.9 | 19.2 | |
| Vert | 7311.000 | PK | 44.2 | 35.8 | 6.6 | 33.8 | 52.8 | 73.9 | 21.1 | |
| Vert | 9748.000 | PK | 48.0 | 38.3 | 7.3 | 34.5 | 59.1 | 73.9 | 14.8 | |
| Vert | 2489.403 | AV | 50.9 | 26.9 | 3.1 | 34.7 | 46.2 | 53.9 | 7.7 | |
| Vert | 4874.000 | AV | 32.6 | 32.0 | 5.4 | 33.9 | 36.1 | 53.9 | 17.8 | |
| Vert | 4980.920 | AV | 33.5 | 32.2 | 5.4 | 34.0 | 37.1 | 53.9 | 16.8 | |
| Vert | 7311.000 | AV | 30.5 | 35.8 | 6.6 | 33.8 | 39.1 | 53.9 | 14.8 | |
| Vert | 9748.000 | AV | 33.1 | 38.3 | 7.3 | 34.5 | 44.2 | 53.9 | 9.7 | |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | |
| Report No. | 10219901H | |
| Date | 04/06/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (Above 10GHz) |
| Mode | 11n-40(MIMO) Tx 2452MHz, MCS 8 | |

| 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 | 71.1 | 26.9 | 3.1 | 34.7 | 66.4 | 73.9 | 7.5 | |
| Hori | 2489.403 | PK | 73.1 | 26.9 | 3.1 | 34.7 | 68.4 | 73.9 | 5.5 | |
| Hori | 4904.000 | PK | 42.9 | 32.0 | 5.4 | 33.9 | 46.4 | 73.9 | 27.5 | |
| Hori | 4980.920 | PK | 52.0 | 32.2 | 5.4 | 34.0 | 55.6 | 73.9 | 18.3 | |
| Hori | 7356.000 | PK | 43.9 | 35.8 | 6.6 | 33.8 | 52.5 | 73.9 | 21.4 | |
| Hori | 9808.000 | PK | 43.7 | 38.4 | 7.3 | 34.5 | 54.9 | 73.9 | 19.0 | |
| Hori | 2483.500 | AV | 55.8 | 26.9 | 3.1 | 34.7 | 51.1 | 53.9 | 2.8 | |
| Hori | 2489.403 | AV | 55.6 | 26.9 | 3.1 | 34.7 | 50.9 | 53.9 | 3.0 | |
| Hori | 4904.000 | AV | 30.4 | 32.0 | 5.4 | 33.9 | 33.9 | 53.9 | 20.0 | |
| Hori | 4980.920 | AV | 34.0 | 32.2 | 5.4 | 34.0 | 37.6 | 53.9 | 16.3 | |
| Hori | 7356.000 | AV | 31.3 | 35.8 | 6.6 | 33.8 | 39.9 | 53.9 | 14.0 | |
| Hori | 9808.000 | AV | 31.7 | 38.4 | 7.3 | 34.5 | 42.9 | 53.9 | 11.0 | |
| Vert | 2483.500 | PK | 70.1 | 26.9 | 3.1 | 34.7 | 65.4 | 73.9 | 8.5 | |
| Vert | 2489.403 | PK | 71.1 | 26.9 | 3.1 | 34.7 | 66.4 | 73.9 | 7.5 | |
| Vert | 4904.000 | PK | 45.3 | 32.0 | 5.4 | 33.9 | 48.8 | 73.9 | 25.1 | |
| Vert | 4980.920 | PK | 51.4 | 32.2 | 5.4 | 34.0 | 55.0 | 73.9 | 18.9 | |
| Vert | 7356.000 | PK | 44.5 | 35.8 | 6.6 | 33.8 | 53.1 | 73.9 | 20.8 | |
| Vert | 9808.000 | PK | 45.2 | 38.4 | 7.3 | 34.5 | 56.4 | 73.9 | 17.5 | |
| Vert | 2483.500 | AV | 53.5 | 26.9 | 3.1 | 34.7 | 48.8 | 53.9 | 5.1 | |
| Vert | 2489.403 | AV | 53.2 | 26.9 | 3.1 | 34.7 | 48.5 | 53.9 | 5.4 | |
| Vert | 4904.000 | AV | 30.5 | 32.0 | 5.4 | 33.9 | 34.0 | 53.9 | 19.9 | |
| Vert | 4980.920 | AV | 33.7 | 32.2 | 5.4 | 34.0 | 37.3 | 53.9 | 16.6 | |
| Vert | 7356.000 | AV | 31.2 | 35.8 | 6.6 | 33.8 | 39.8 | 53.9 | 14.1 | |
| Vert | 9808.000 | AV | 31.6 | 38.4 | 7.3 | 34.5 | 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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/06/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH | 22 deg. C / 38% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (10-26.5GHz) | Tomohisa Nakagawa (26.5-40 GHz) |
| Mode | 11n-20(MIMO) Tx 5745MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2492.811 | PK | 69.8 | 26.9 | 2.5 | 34.7 | 64.5 | 73.9 | 9.4 | |
| Hori | 11490.000 | PK | 49.8 | 40.2 | -2.1 | 33.7 | 54.2 | 73.9 | 19.7 | |
| Hori | 17235.000 | PK | 46.9 | 40.3 | -0.5 | 33.1 | 53.6 | 73.9 | 20.3 | |
| Hori | 2492.811 | AV | 51.7 | 26.9 | 2.5 | 34.7 | 46.4 | 53.9 | 7.5 | |
| Hori | 11490.000 | AV | 38.9 | 40.2 | -2.1 | 33.7 | 43.3 | 53.9 | 10.6 | |
| Hori | 17235.000 | AV | 36.4 | 40.3 | -0.5 | 33.1 | 43.1 | 53.9 | 10.8 | |
| Vert | 2492.811 | PK | 63.4 | 26.9 | 2.5 | 34.7 | 58.1 | 73.9 | 15.8 | |
| Vert | 11490.000 | PK | 48.9 | 40.2 | -2.1 | 33.7 | 53.3 | 73.9 | 20.6 | |
| Vert | 17235.000 | PK | 36.0 | 40.3 | -0.5 | 33.1 | 42.7 | 73.9 | 31.2 | |
| Vert | 2492.811 | AV | 45.7 | 26.9 | 2.5 | 34.7 | 40.4 | 53.9 | 13.5 | |
| Vert | 11490.000 | AV | 37.6 | 40.2 | -2.1 | 33.7 | 42.0 | 53.9 | 11.9 | |
| Vert | 17235.000 | AV | 35.9 | 40.3 | -0.5 | 33.1 | 42.6 | 53.9 | 11.3 | |

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 | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 5745.000 | PK | 98.8 | 32.7 | 4.0 | 33.7 | 101.8 | - | - | Carrier |
| Hori | 5725.000 | PK | 57.6 | 32.7 | 4.0 | 33.7 | 60.6 | 81.8 | 21.2 | |
| Vert | 5745.000 | PK | 102.4 | 32.7 | 4.0 | 33.7 | 105.4 | - | - | Carrier |
| Vert | 5725.000 | PK | 61.2 | 32.7 | 4.0 | 33.7 | 64.2 | 85.4 | 21.2 | |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/06/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH | 22 deg. C / 38% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (10-26.5GHz) | Tomohisa Nakagawa (26.5-40 GHz) |
| Mode | 11n-20(MIMO) Tx 5785MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2492.811 | PK | 68.4 | 26.9 | 2.5 | 34.7 | 63.1 | 73.9 | 10.8 | |
| Hori | 11570.000 | PK | 46.7 | 40.1 | -2.0 | 33.7 | 51.1 | 73.9 | 22.8 | |
| Hori | 17355.000 | PK | 46.9 | 41.1 | -0.5 | 33.0 | 54.5 | 73.9 | 19.4 | |
| Hori | 2492.811 | AV | 50.4 | 26.9 | 2.5 | 34.7 | 45.1 | 53.9 | 8.8 | |
| Hori | 11570.000 | AV | 38.8 | 40.1 | -2.0 | 33.7 | 43.2 | 53.9 | 10.7 | |
| Hori | 17355.000 | AV | 36.6 | 41.1 | -0.5 | 33.0 | 44.2 | 53.9 | 9.7 | |
| Vert | 2492.811 | PK | 62.7 | 26.9 | 2.5 | 34.7 | 57.4 | 73.9 | 16.5 | |
| Vert | 11570.000 | PK | 50.6 | 40.1 | -2.0 | 33.7 | 55.0 | 73.9 | 18.9 | |
| Vert | 17355.000 | PK | 46.7 | 41.1 | -0.5 | 33.0 | 54.3 | 73.9 | 19.6 | |
| Vert | 2492.811 | AV | 44.3 | 26.9 | 2.5 | 34.7 | 39.0 | 53.9 | 14.9 | |
| Vert | 11570.000 | AV | 37.2 | 40.1 | -2.0 | 33.7 | 41.6 | 53.9 | 12.3 | |
| Vert | 17355.000 | AV | 36.2 | 41.1 | -0.5 | 33.0 | 43.8 | 53.9 | 10.1 | |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/06/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH | 23 deg. C / 32% RH | 22 deg. C / 38% RH |
| Engineer | Tomohisa Nakagawa (1-10GHz) | Tsubasa Takayama (10-26.5GHz) | Tomohisa Nakagawa (26.5-40 GHz) |
| Mode | 11n-20(MIMO) Tx 5825MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2492.811 | PK | 69.5 | 26.9 | 2.5 | 34.7 | 64.2 | 73.9 | 9.7 | |
| Hori | 11650.000 | PK | 48.8 | 40.1 | -2.0 | 33.7 | 53.2 | 73.9 | 20.7 | |
| Hori | 17475.000 | PK | 46.9 | 41.9 | -0.4 | 33.0 | 55.4 | 73.9 | 18.5 | |
| Hori | 2492.811 | AV | 51.4 | 26.9 | 2.5 | 34.7 | 46.1 | 53.9 | 7.8 | |
| Hori | 11650.000 | AV | 38.9 | 40.1 | -2.0 | 33.7 | 43.3 | 53.9 | 10.6 | |
| Hori | 17475.000 | AV | 36.4 | 41.9 | -0.4 | 33.0 | 44.9 | 53.9 | 9.0 | |
| Vert | 2492.811 | PK | 65.3 | 26.9 | 2.5 | 34.7 | 60.0 | 73.9 | 13.9 | |
| Vert | 11650.000 | PK | 51.2 | 40.1 | -2.0 | 33.7 | 55.6 | 73.9 | 18.3 | |
| Vert | 17475.000 | PK | 46.5 | 41.9 | -0.4 | 33.0 | 55.0 | 73.9 | 18.9 | |
| Vert | 2492.811 | AV | 47.3 | 26.9 | 2.5 | 34.7 | 42.0 | 53.9 | 11.9 | |
| Vert | 11650.000 | AV | 39.1 | 40.1 | -2.0 | 33.7 | 43.5 | 53.9 | 10.4 | |
| Vert | 17475.000 | AV | 35.6 | 41.9 | -0.4 | 33.0 | 44.1 | 53.9 | 9.8 | |

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

**20dBc Data Sheet**

| Polarity | Frequency | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 5825.000 | PK | 104.8 | 32.9 | 4.0 | 33.7 | 108.0 | - | - | Carrier |
| Hori | 5850.000 | PK | 61.3 | 32.9 | 4.0 | 33.7 | 64.5 | 88.0 | 23.5 | |
| Vert | 5825.000 | PK | 101.8 | 32.9 | 4.0 | 33.7 | 105.0 | - | - | Carrier |
| Vert | 5850.000 | PK | 56.4 | 32.9 | 4.0 | 33.7 | 59.6 | 85.0 | 25.4 | |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/09/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 23 deg. C / 36% RH | 23 deg. C / 32% RH | 22 deg. C / 38% RH |
| Engineer | Kazuya Yoshioka (1-10GHz) | Tsubasa Takayama (10-26.5GHz) | Tomohisa Nakagawa (26.5-40 GHz) |
| Mode | 11n-40(MIMO) Tx 5755MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2499.016 | PK | 70.3 | 26.9 | 2.5 | 34.7 | 65.0 | 73.9 | 8.9 | |
| Hori | 11510.000 | PK | 45.9 | 40.2 | -2.1 | 33.7 | 50.3 | 73.9 | 23.6 | |
| Hori | 17265.000 | PK | 46.3 | 40.5 | -0.5 | 33.1 | 53.2 | 73.9 | 20.7 | |
| Hori | 2499.016 | AV | 52.5 | 26.9 | 2.5 | 34.7 | 47.2 | 53.9 | 6.7 | |
| Hori | 11510.000 | AV | 36.7 | 40.2 | -2.1 | 33.7 | 41.1 | 53.9 | 12.8 | |
| Hori | 17265.000 | AV | 34.9 | 40.5 | -0.5 | 33.1 | 41.8 | 53.9 | 12.1 | |
| Vert | 2498.585 | PK | 64.2 | 26.9 | 2.5 | 34.7 | 58.9 | 73.9 | 15.0 | |
| Vert | 11510.000 | PK | 47.3 | 40.2 | -2.1 | 33.7 | 51.7 | 73.9 | 22.2 | |
| Vert | 17265.000 | PK | 45.4 | 40.5 | -0.5 | 33.1 | 52.3 | 73.9 | 21.6 | |
| Vert | 2498.585 | AV | 46.3 | 26.9 | 2.5 | 34.7 | 41.0 | 53.9 | 12.9 | |
| Vert | 11510.000 | AV | 36.3 | 40.2 | -2.1 | 33.7 | 40.7 | 53.9 | 13.2 | |
| Vert | 17265.000 | AV | 34.3 | 40.5 | -0.5 | 33.1 | 41.2 | 53.9 | 12.7 | |

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 | Detector | Reading | Ant.Fac. | Loss | Gain | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 5755.000 | PK | 96.0 | 32.7 | 4.0 | 33.7 | 99.0 | - | - | Carrier |
| Hori | 5725.000 | PK | 62.2 | 32.7 | 4.0 | 33.7 | 65.2 | 79.0 | 13.8 | |
| Vert | 5755.000 | PK | 98.0 | 32.7 | 4.0 | 33.7 | 101.0 | - | - | Carrier |
| Vert | 5725.000 | PK | 62.4 | 32.7 | 4.0 | 33.7 | 65.4 | 81.0 | 15.6 | |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Test place | Ise EMC Lab. No.2 and No.4 Semi Anechoic Chamber | | |
| Report No. | 10219901H | | |
| Date | 04/09/2014 | 04/10/2014 | 04/10/2014 |
| Temperature/ Humidity | 23 deg. C / 36% RH | 23 deg. C / 32% RH | 22 deg. C / 38% RH |
| Engineer | Kazuya Yoshioka (1-10GHz) | Tsubasa Takayama (10-26.5GHz) | Tomohisa Nakagawa (26.5-40 GHz) |
| Mode | 11n-40(MIMO) Tx 5795MHz, MCS 8 | | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2498.903 | PK | 70.2 | 26.9 | 2.5 | 34.7 | 64.9 | 73.9 | 9.0 | |
| Hori | 11590.000 | PK | 46.9 | 40.1 | -2.0 | 33.7 | 51.3 | 73.9 | 22.6 | |
| Hori | 17385.000 | PK | 44.3 | 41.3 | -0.5 | 33.0 | 52.1 | 73.9 | 21.8 | |
| Hori | 2498.903 | AV | 52.2 | 26.9 | 2.5 | 34.7 | 46.9 | 53.9 | 7.0 | |
| Hori | 11590.000 | AV | 35.8 | 40.1 | -2.0 | 33.7 | 40.2 | 53.9 | 13.7 | |
| Hori | 17385.000 | AV | 34.2 | 41.3 | -0.5 | 33.0 | 42.0 | 53.9 | 11.9 | |
| Vert | 2497.308 | PK | 67.8 | 26.9 | 2.5 | 34.7 | 62.5 | 73.9 | 11.4 | |
| Vert | 11590.000 | PK | 46.1 | 40.1 | -2.0 | 33.7 | 50.5 | 73.9 | 23.4 | |
| Vert | 17385.000 | PK | 44.0 | 41.3 | -0.5 | 33.0 | 51.8 | 73.9 | 22.1 | |
| Vert | 2497.308 | AV | 49.7 | 26.9 | 2.5 | 34.7 | 44.4 | 53.9 | 9.5 | |
| Vert | 11590.000 | AV | 35.9 | 40.1 | -2.0 | 33.7 | 40.3 | 53.9 | 13.6 | |
| Vert | 17385.000 | AV | 34.0 | 41.3 | -0.5 | 33.0 | 41.8 | 53.9 | 12.1 | |

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 | 94.9 | 32.8 | 4.0 | 33.7 | 98.0 | - | - | Carrier |
| Hori | 5850.000 | PK | 46.6 | 32.9 | 4.0 | 33.7 | 49.8 | 78.0 | 28.2 | |
| Vert | 5795.000 | PK | 98.1 | 32.8 | 4.0 | 33.7 | 101.2 | - | - | Carrier |
| Vert | 5850.000 | PK | 44.2 | 32.9 | 4.0 | 33.7 | 47.4 | 81.2 | 33.8 | |

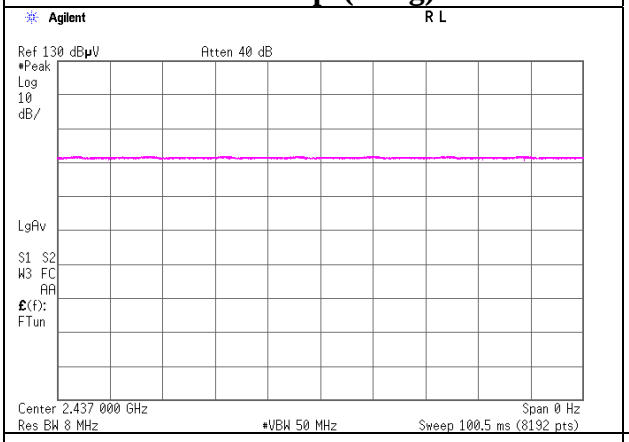
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

# Duty Cycle

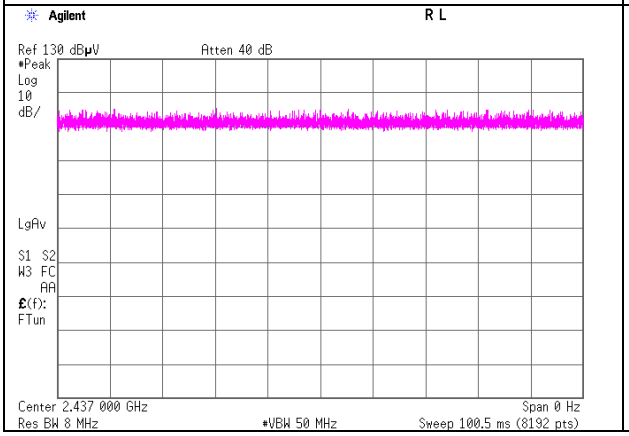
| | |
|---|---|
| Test place | Ise EMC Lab. No.2 Semi Anechoic Chamber |
| Report No. | 10219901H |
| Date | 04/06/2014 |
| Temperature/ Humidity | 21 deg. C / 41% RH |
| Engineer | Tomohisa Nakagawa |

## For 2.4GHz Band

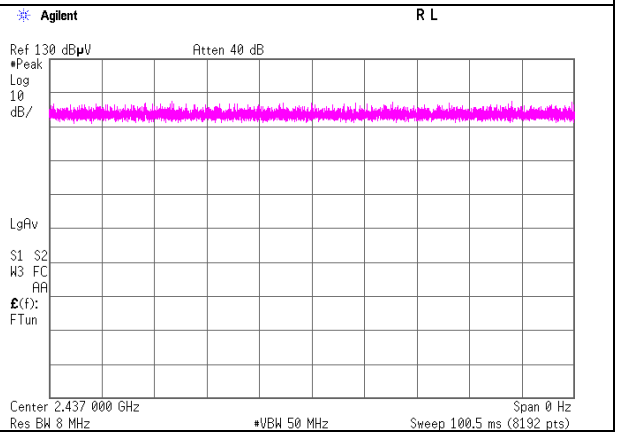
### 11b 1Mbps(Long)




### 11n-20 MCS 8

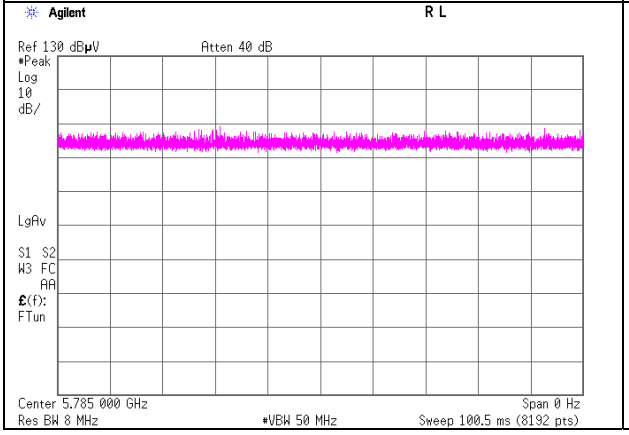



### 11n-40 MCS 8

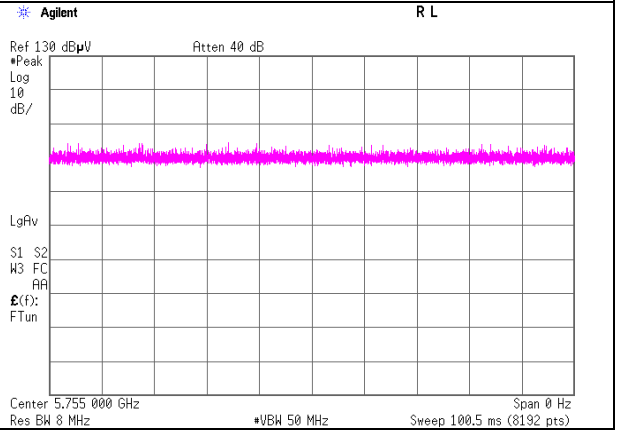



## For 5GHz band

### 11n-20 MCS 8




### 11n-40 MCS 8

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# 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 | - |
| MRENT-116 | Spectrum Analyzer | Agilent | E4440A | MY46187620 | RE/CE | 2014/03/05 * 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 |
| MHA-17 | Horn Antenna 15-40GHz | Schwarzbeck | BBHA9170 | BBHA9170307 | RE | 2013/06/30 * 12 |
| MHF-26 | High Pass Filter 3.5-18.0GHz | UL Japan | HPF SELECTOR | 002 | RE | 2013/09/01 * 12 |
| MAT-20 | Attenuator(10dB)(above 1GHz) | HIROSE ELECTRIC CO.,LTD. | AT-110 | - | RE | 2014/01/29 * 12 |
| MAEC-04 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2014/02/28 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | 1501 | RE | 2014/02/20 * 12 |
| MJM-09 | Measure | KDS | E19-55 | - | RE | - |
| MSA-03 | Spectrum Analyzer | Agilent | E4448A | MY44020357 | RE | 2014/04/08 * 12 |
| MTR-01 | Test Receiver | Rohde & Schwarz | ESI40 | 100084 | RE | 2013/11/12 * 12 |
| MBA-05 | Biconical Antenna | Schwarzbeck | BBA9106 | 1302 | RE | 2013/11/24 * 12 |
| MLA-08 | Logperiodic Antenna | Schwarzbeck | UKLP9140-A | N/A | RE | 2013/11/24 * 12 |
| MCC-50 | Coaxial Cable | UL Japan | - | - | RE | 2013/06/18 * 12 |
| MAT-68 | Attenuator | Anritsu | MP721B | 6200961025 | RE | 2013/11/26 * 12 |
| MPA-14 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260833 | RE | 2014/03/14 * 12 |
| MHA-21 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 9120D-557 | RE | 2013/08/12 * 12 |
| MCC-141 | Microwave Cable | Junkosha | MWX221 | 1305S002R(1m) / 1204S062(5m) | RE | 2013/05/28 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | MY39500780 | RE | 2014/03/11 * 12 |
| MHA-04 | Horn Antenna 26.5-40GHz | EMCO | 3160-10 | 1140 | RE | 2013/11/25 * 12 |
| MPA-03 | Microwave System Power Amplifier | Agilent | 83050A | 3950M00205 | RE | 2013/06/20 * 12 |
| MCC-140 | Microwave Cable | Junkosha | J12J101596-00 | JAN-31-12-001 | RE | 2014/02/21 * 12 |
| MTR-03 | Test Receiver | Rohde & Schwarz | ESCI | 100300 | CE | 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 |

**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**