



Test report No. : 10219901H-A-R1
Page : 1 of 34
Issued date : April 25, 2014
Revised date : July 24, 2014
FCC ID : N6C-SXPCEAN

RADIO TEST REPORT

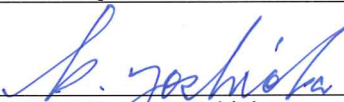
Test Report No. : 10219901H-A-R1

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

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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 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

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10219901H-A

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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
(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) 5745-5825MHz	2412-2462MHz 5180-5320MHz *1) 5745-5825MHz	2422-2452MHz 5190-5310MHz *1) 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 5MHz 5GHz band 20MHz	2.4GHz band 5MHz 5GHz band 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.

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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
Section 15.207 Conducted limits
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 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	QP 17.6dB, 0.19639MHz, N AV 14.7dB, 0.39940MHz, 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	2.8dB 2483.500MHz, 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 on the Module).

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	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. *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel). 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; Power settings: 11b(1Mbps): 13.5dBm(2412 to 2462MHz), 11n-20 2.4GHz (MCS8): 10.5dBm(2412MHz), 14.5dBm(2417 to 2457MHz), 10.5dBm(2462MHz) 11n-40 2.4GHz (MCS8): 6.0dBm(2422MHz), 13.5dBm(2427 to 2447MHz), 7.0dBm(2452MHz) 11n-20 5GHz (MCS8): 13.5dBm(5745 to 5825MHz) 11n-40 5GHz (MCS8): 11.0dBm(5755 and 5795MHz) Software: Atheros Radio Test (ART) - Revision 0.9 BUILD #27 ART_11n - Customer Version (ANWI BUILD) *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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*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
			2437MHz
			2462MHz
	11n-20(MIMO) Tx *2)	0+1	2412MHz
			2437MHz
			2462MHz
	11n-40(MIMO) Tx	0+1	2422MHz
			2437MHz
			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
			5785MHz
			5825MHz
	11n-40(MIMO) Tx	0+1	5755MHz
			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.

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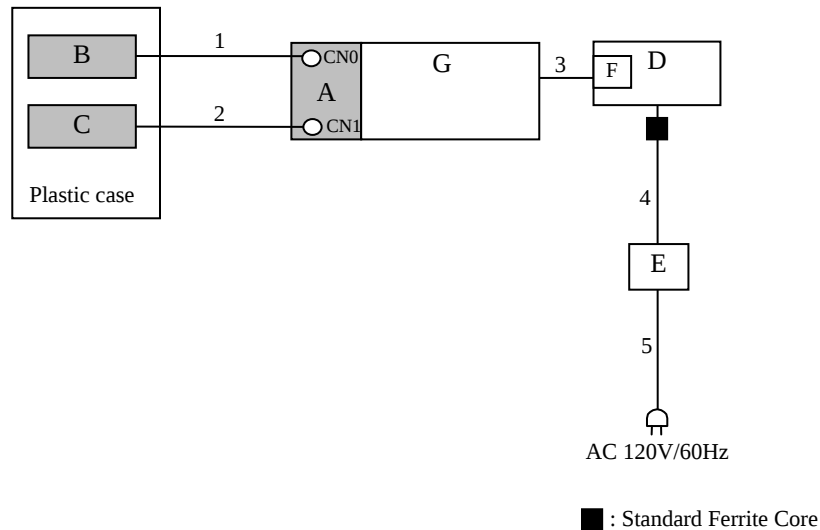
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4.2 Configuration and peripherals



- * 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	-

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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

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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, 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 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 (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

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APPENDIX 1: Data of EMI test

Conducted Emission

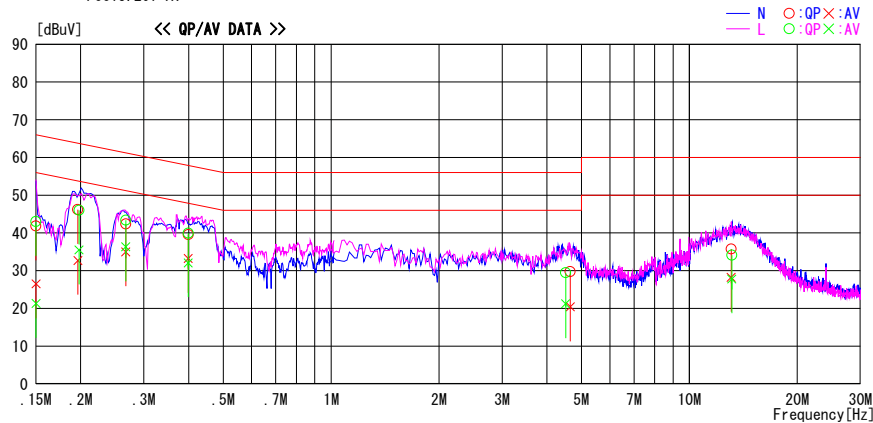
DATA OF CONDUCTED EMISSION TEST

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 [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	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 (L1SN 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 Tsubasa Takayama
(1-10GHz) (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(Amplifier)

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 Tsubasa Takayama
(1-10GHz) (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 $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
 26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Radiated Spurious Emission

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 Tsubasa Takayama
(1-10GHz) (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(Amplifier)

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 Tsubasa Takayama Tsubasa Takayama
(1-10GHz) (Above 10GHz) (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 Tsubasa Takayama
(1-10GHz) (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 Tsubasa Takayama
(1-10GHz) (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(Amplifier)

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 Tsubasa Takayama
(1-10GHz) (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 Tsubasa Takayama
(1-10GHz) (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 Tsubasa Takayama Tomohisa Nakagawa
(1-10GHz) (10-26.5GHz) (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(Amplifier)

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 Tsubasa Takayama Tomohisa Nakagawa
(1-10GHz) (10-26.5GHz) (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 $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
 26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Radiated Spurious Emission

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 Tsubasa Takayama Tomohisa Nakagawa
(1-10GHz) (10-26.5GHz) (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(Amplifier)

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 Tsubasa Takayama Tomohisa Nakagawa
(1-10GHz) (10-26.5GHz) (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(Amplifier)

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 Tsubasa Takayama Tomohisa Nakagawa
(1-10GHz) (10-26.5GHz) (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

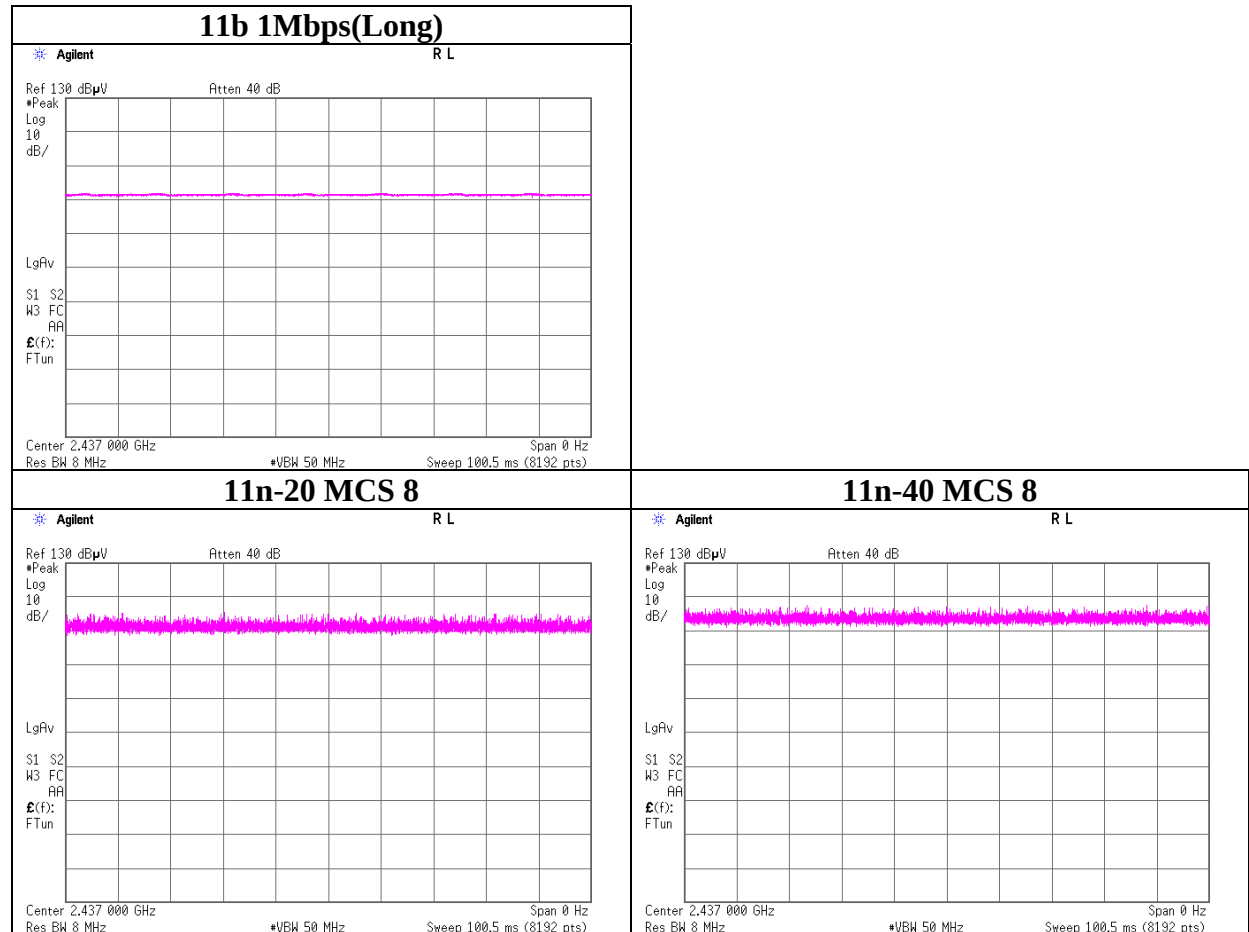
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5795.000	PK	94.9	32.8	4.0	33.7	98.0	-	-	Carrier
Hori	5850.000	PK	46.6	32.9	4.0	33.7	49.8	78.0	28.2	
Vert	5795.000	PK	98.1	32.8	4.0	33.7	101.2	-	-	Carrier
Vert	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(Amplifier)

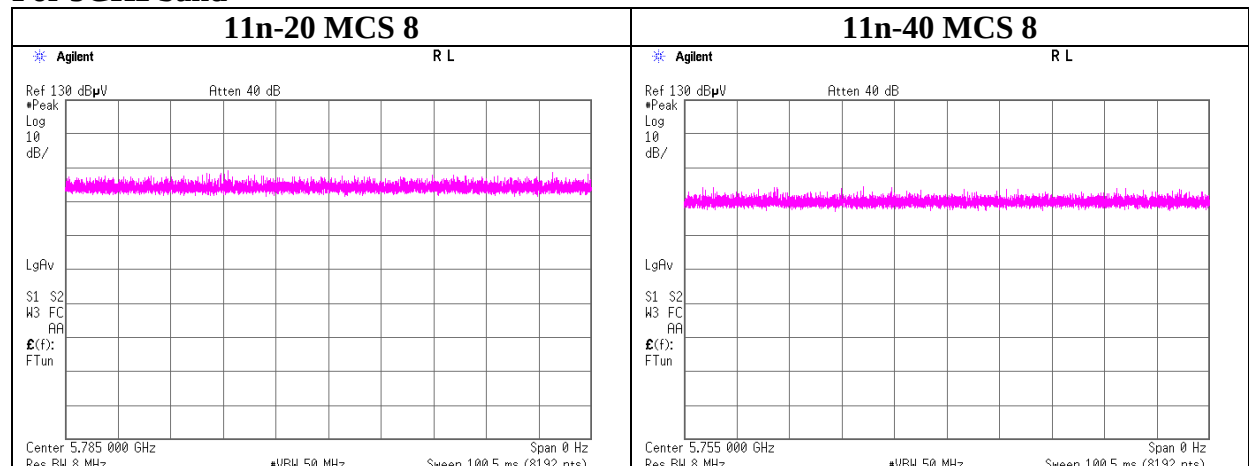
Duty Cycle

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



For 5GHz band



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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	ES140	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

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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**