



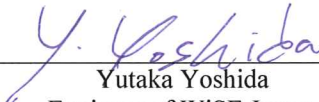
# RADIO TEST REPORT


Test Report No. : 31JE0038-HO-01-B

**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 E: 2012  
**Test Result** : Complied

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

**Date of test:** April 24 to May 10, 2012

**Representative test engineer:**   
Yutaka Yoshida  
Engineer of WiSE Japan,  
UL Verification Service

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



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>

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13-EM-F0429

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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 : February 15, 2012  
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

	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 *2) 5755 - 5795MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5MHz		20MHz	2.4GHz band 5MHz 5GHz band 20MHz	2.4GHz band 5MHz 5GHz band 40MHz
Antenna type	Sleeve antenna (Omni-Directional)				
Antenna Gain: G <sub>ANT</sub>	1.5dBi@2.4GHz Band, 2.1dBi@5GHz Band				
Directional Gain	4.51dBi@2.4GHz Band, 5.11dBi@5GHz Band (G <sub>ANT</sub> + 10log2)				
Antenna Connector type	U.FL Alternative connector				

\*1) These bands(5180 - 5320MHz and 5190-5310MHz) are applied for this report.

Other bands are applied for other test report.(Test Report No.: 31JE0038-HO-01-A)

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart E: 2012, final revised on August 13, 2012 and effective September 12, 2012

Title : FCC 47CFR Part15 Radio Frequency Device Subpart E  
Unlicensed National Information Infrastructure Devices  
Section 15.407 General technical requirements

\* The revision on August 13, 2012 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	FCC: 15.407(b)(6) / 15.207	QP 18.3dB, 4.56266MHz, L AV 18.0dB, 7.23130MHz, N	Complied	-
	IC: RSS-Gen 7.2.4	IC: RSS-Gen 7.2.4			
26dB Emission Bandwidth	FCC :ANSI C63.4:2003 FCC KDB 789033 D01 v01r01	FCC : 15.407(a)(1)(2)(3)	See data	N/A	Conducted
	IC: -	IC: -			
Maximum Conducted Output Power	FCC :ANSI C63.4:2003, FCC KDB 789033 D01 v01r01	FCC : 15.407(a)(1)(2)(3)		Complied	Conducted
	IC: -	IC: RSS-210 A9.2(1)(2)(3)			
Peak Power Spectral Density	FCC :ANSI C63.4:2003, FCC KDB 789033 D01 v01r01	FCC : 15.407(a)(1)(2)(3)		Complied	Conducted
	IC: -	IC: RSS-210 A9.2(1)(2)(3)			
Peak Excursion Ratio	FCC :ANSI C63.4:2003, FCC KDB 789033 D01 v01r01	FCC : 15.407(a)(6)	Complied	Conducted	
	IC: -	IC: -			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.4:2003 FCC KDB 789033 D01 v01r01	FCC : 15.407(b), 15.205 and 15.209	1.9dB 5350.000MHz, AV, Hori.	Complied	Conducted / Radiated
	IC: -	IC: RSS-210 A.9.2(1)(2)(3)			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. For DFS tests, please see the test report number 31JE0038-HO-01-01-B issued by UL Japan, Inc.					

#### **FCC 15.31 (e)**

The RF Module has own regulator.

The RF Module is constantly provided voltage through own regulator regardless of input voltage (DC3.3V).

Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203/212 Antenna requirement**

The EUT has a unique antenna connector (U.FL on the Module and Reverse SMA for Antenna itself).

Therefore the equipment complies with the requirement of 15.203/212.

### **3.3 Addition to standard**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Band Width	RSS-Gen 4.6.1	RSS-210 A9.2 (1)(2)(3)	N/A	N/A	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

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### 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	3.6dB
No.3	3.6dB
No.4	3.6dB

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	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

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

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

#### 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	4.75 x 5.4 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 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

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

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

Refer to APPENDIX.

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

### **4.1 Operating Modes**

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

<b>Mode</b>	<b>Remarks*</b>
IEEE 802.11a (11a)	54Mbps, PN9
IEEE 802.11n MIMO 20MHz BW (11n-20): 5GHz	MCS 8, PN9
IEEE 802.11n MIMO 40MHz BW (11n-40): 5GHz	MCS 8, PN9
*Transmitting duty was close to 100% on all tests. *The worst condition was determined based on the test result of Maximum Conducted Output Power (Mid Channel)	
*EUT has the power settings by the software as follows; Power settings: 11a(54Mbps): 12.5dBm(5180 to 5320MHz) 11n-20 5GHz (MCS8): 11.0dBm(5180 to 5320MHz) 11n-40 5GHz (MCS8): 10.0dBm(5190 and 5310MHz), 11.0dBm(5230 and 5270MHz)	
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.	

\*The details of Operating mode(s)

<b>Test Item</b>	<b>Operating Mode</b>	<b>Tested Antenna</b>	<b>Tested Frequency</b>	
			<b>Low Band</b>	<b>Middle Band</b>
Conducted emission, Spurious Emission (Radiated)(Below 1GHz)	11n-40 Tx *1)	0+1	5230MHz	-
26dB Emission Bandwidth, 99% Occupied Bandwidth, Peak Excursion Ratio, Spurious Emission(Conducted)	11a Tx	1 *3)	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz
	11n-20 Tx	0 *3)	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz
	11n-40 Tx	1 *3)	5190MHz 5230MHz	5270MHz 5310MHz
Maximum Conducted Output Power, Peak Power Spectral Density,	11a Tx	1 *3)	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz
	11n-20 Tx	0, 1, 0+1	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz
	11n-40 Tx	0, 1, 0+1	5190MHz 5230MHz	5270MHz 5310MHz
Spurious Emission (Radiated)(Above 1GHz)	11n-20 Tx *2)	0+1	5180MHz 5240MHz	5320MHz
	11n-40 Tx	0+1	5190MHz 5230MHz	5310MHz

\*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.

\*2) Since 11a and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.

\*3) After the comparison between Antenna 0 and Antenna 1, test was performed with the antenna that had higher power as a representative.

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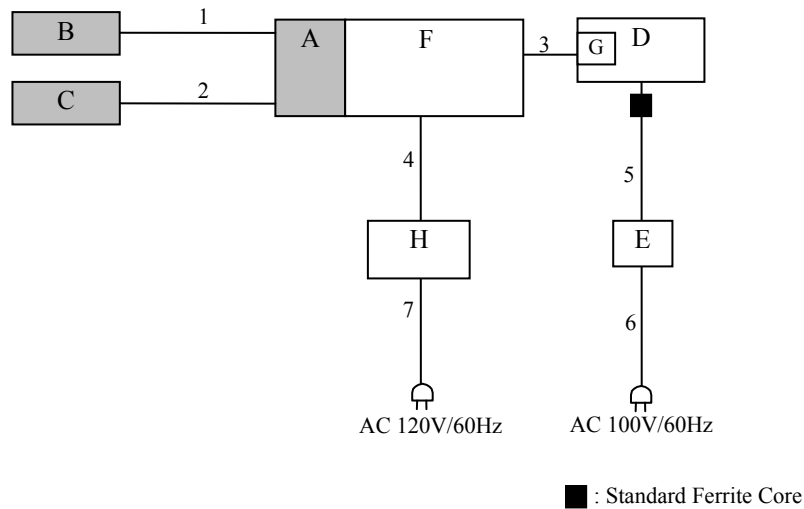
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## 4.2 Configuration and peripherals



\* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless LAN PCI Express Mini Card Module	SX-PCEAN	008092-01 1B48	silex technology, Inc.	EUT
B	Antenna	TD17027A2S0	001	Sansei Denki	EUT
C	Antenna	TD17027A2S0	002	Sansei Denki	EUT
D	Laptop PC	T60	L3-KY149	Lenovo	-
E	AC Adaptor	92P1160	11S92P1160Z1ZBGH77W6YJ	Lenovo	-
F	Jig	MR11-EC2C	-	B plus	-
G	Express Card Adaptor	-	-	B plus	-
H	DC Power Supply	PW8-3ATP	09067054	KENWOOD TMI	-

### 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	2.0	Unshielded	Unshielded	-
5	DC Cable	1.8	Unshielded	Unshielded	-
6	AC Cable	0.9	Unshielded	Unshielded	-
7	AC Cable	2.0	Unshielded	Unshielded	-

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## **SECTION 5: Conducted Emission**

### **Test Procedure**

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

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

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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## **SECTION 6: Radiated Spurious Emission and Band Edge Compliance**

### **Test Procedure**

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

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

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

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

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

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

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

Below 1GHz

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

Above 1GHz

Inside of restricted bands(Section 15.205): Apply to limit in the Section 15.209(a).

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

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

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

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**Test Antennas are used as below;**

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

Frequency	Below 1GHz	Above 1GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	PK	AV
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	Method 1 *1) RBW: 1MHz VBW: 3MHz Detector and averaging type set for linear voltage averaging.  Method 2*1) RBW: 1MHz When duty cycle $\geq$ 98 percent (or duty cycle < 98 percent when a video trigger with the trigger level set to enable triggering only on full power pulse is used), VBW was set at 10Hz.  duty cycle is < 98 percent, set VBW $\geq$ 1/T
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz) 0.5m*3) (above 26.5GHz)	

\*1) The test method was also referred to FCC KDB 789033 D01 "Guidelines for Compliance Testing of unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E".

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

\*3) Distance Factor:  $20 \times \log(3.0\text{m}/0.5\text{m}) = 15.6\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT and of X(0 and 90), Y(0 and 90) and Z(0 and 90) axes of antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

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

## **SECTION 7: Antenna Terminal Conducted Tests**

### **Test Procedure**

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

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used and Test method</b>
26dB Bandwidth	30MHz, 60MHz	Close to 1% of EBW	Greater than RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	Close to 1% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power, Peak Power Spectral Density	40MHz, 80MHz	1MHz	3MHz	Auto	RMS Power Averaging (100 times)	Clear Write	SA-1
Peak Excursion Ratio	40MHz, 80MHz	1MHz	3MHz	Auto	Peak RMS Power Averaging (100 times)	Max Hold Clear Write	Spectrum Analyzer
Conducted Spurious Emission	9kHz-150kHz 150kHz-30MHz	200Hz 9.1kHz	620Hz 27kHz	Auto	Peak	Max Hold	Spectrum Analyzer

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

**Test data** : APPENDIX  
**Test result** : Pass

**APPENDIX 1: Data of EMI test**

**Conducted Emission**

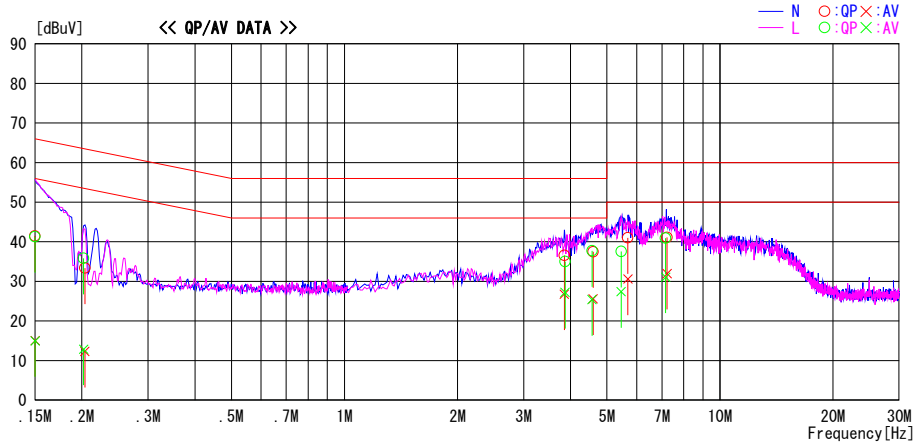
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2012/04/27

Report No. : 31JE0038-H0-01  
Power : DC 3.3V  
Temp./Humi. : 22deg. C / 40% RH  
Engineer : Hiroshi Kukita

Mode / Remarks : 11n-40 (MIMO) 5230MHz

LIMIT : FCC15.207 QP  
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	28.2	1.8	13.3	41.5	15.1	66.0	56.0	24.5	40.9	N	
0.20365	20.1	-1.0	13.3	33.4	12.3	63.5	53.5	30.1	41.2	N	
3.85217	23.0	13.2	13.6	36.6	26.8	56.0	46.0	19.4	19.2	N	
4.59289	23.8	11.9	13.7	37.5	25.6	56.0	46.0	18.5	20.4	N	
5.68420	27.2	16.8	13.8	41.0	30.6	60.0	50.0	19.0	19.4	N	
7.23130	27.2	18.1	13.9	41.1	32.0	60.0	50.0	18.9	18.0	N	
0.15000	28.0	1.7	13.3	41.3	15.0	66.0	56.0	24.7	41.0	L	
0.20220	22.5	-0.4	13.3	35.8	12.9	63.5	53.5	27.7	40.6	L	
3.86560	21.4	13.6	13.6	35.0	27.2	56.0	46.0	21.0	18.8	L	
4.56266	24.0	11.7	13.7	37.7	25.4	56.0	46.0	18.3	20.6	L	
5.45454	23.8	13.6	13.8	37.6	27.4	60.0	50.0	22.4	22.6	L	
7.16273	27.0	17.2	13.9	40.9	31.1	60.0	50.0	19.1	18.9	L	

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

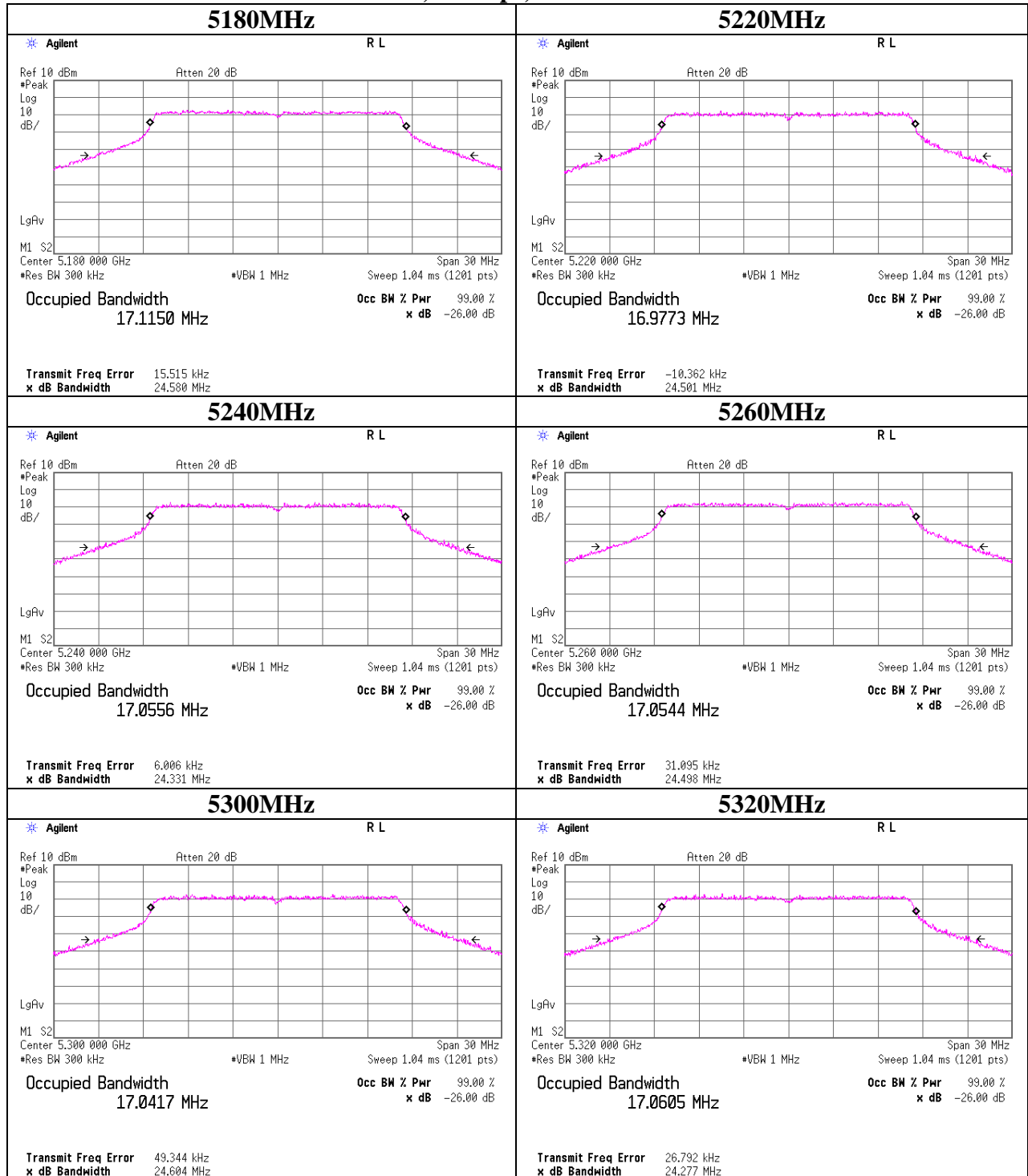
### 26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place : Head Office EMC Lab. No.11 Measurement Room  
Report No. : 31JE0038-HO-01  
Date : 05/09/2012  
Temperature/ Humidity : 26deg. C / 52% RH  
Engineer : Yutaka Yoshida  
Mode : 11a Tx, 54Mbps

Antenna	Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
1	5180	24.580	17.115	-
	5220	24.501	16.977	-
	5240	24.331	17.056	-
	5260	24.498	17.054	-
	5300	24.604	17.042	-
	5320	24.277	17.061	-

## 26dB Emission Bandwidth 99% Occupied Bandwidth

### 11a, 54Mbps, Antenna 1



## **26dB Emission Bandwidth and 99% Occupied Bandwidth**

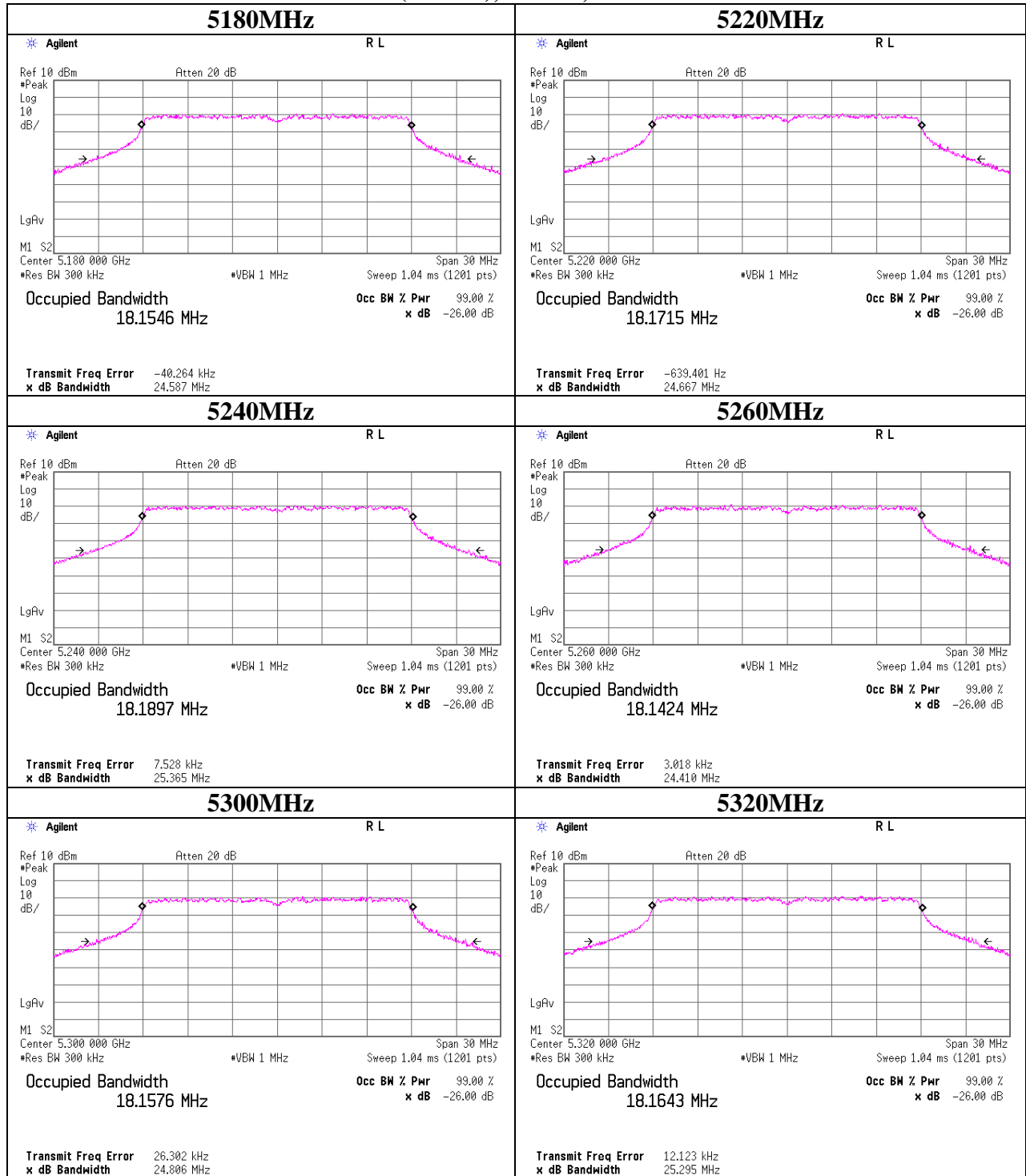
Test place                      Head Office EMC Lab. No.11 Measurement Room  
Report No.                      31JE0038-HO-01  
Date                              05/09/2012  
Temperature/ Humidity        26deg. C / 52% RH  
Engineer                        Yutaka Yoshida  
Mode                              11n-20(MIMO) Tx, MCS 8

Antenna	Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
0	5180	24.587	18.155	-
	5220	24.677	18.172	-
	5240	25.365	18.190	-
	5260	24.410	18.142	-
	5300	24.806	18.158	-
	5320	25.295	18.164	-



**26dB Emission Bandwidth 99% Occupied Bandwidth**

**11n-20(MIMO), MCS 8, Antenna 0**



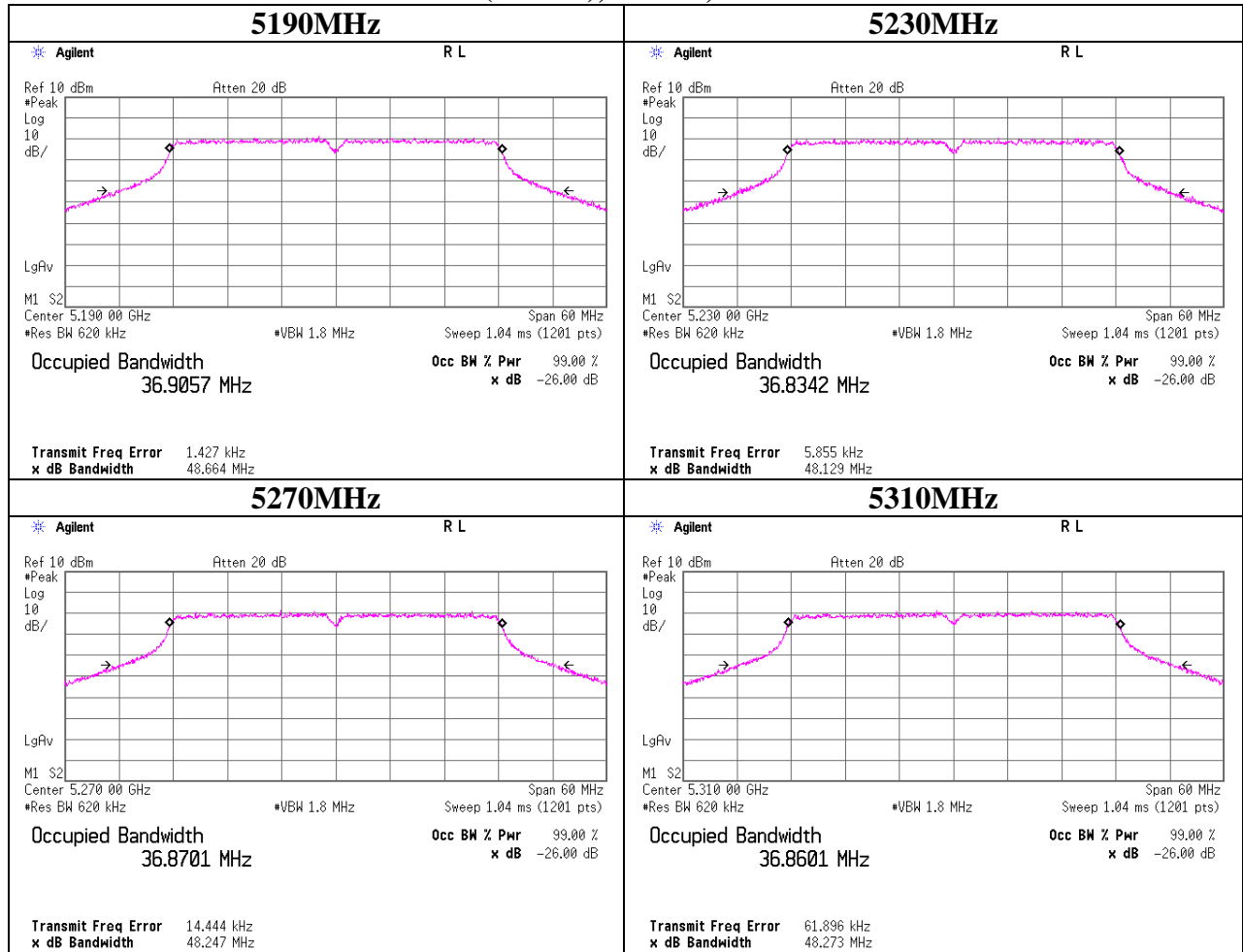
### 26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place                      Head Office EMC Lab. No.11 Measurement Room  
Report No.                      31JE0038-HO-01  
Date                              05/09/2012  
Temperature/ Humidity        26deg. C / 52% RH  
Engineer                        Yutaka Yoshida  
Mode                              11n-40(MIMO) Tx, MCS 8

Antenna	Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
1	5190	48.664	36.906	-
	5230	48.129	36.834	-
	5270	48.247	36.870	-
	5310	48.273	36.860	-

## 26dB Emission Bandwidth

### 11n-40(MIMO), MCS 8, Antenna 1



## Maximum Conducted Output Power

Test place : Head Office EMC Lab. No.6 Shielded Room  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 23deg.C. / 43%  
Engineer : Tomohisa Nakagawa  
Mode : 11a Tx, 54Mbps

**Antenna 1**

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	0.25	0.00	10.00	2.1	10.25	12.35	16.98	-	6.73	-
5220.0	0.32	0.00	10.00	2.1	10.32	12.42	16.98	-	6.66	-
5240.0	0.65	0.00	10.00	2.1	10.65	12.75	16.98	-	6.33	-
5260.0	0.65	0.00	10.01	2.1	10.66	12.76	23.97	-	13.31	-
5300.0	0.84	0.00	10.01	2.1	10.85	12.95	23.97	-	13.12	-
5320.0	1.06	0.00	10.01	2.1	11.07	13.17	23.97	-	12.90	-

Result(Cond.) = Reading + Atten.Loss

Result(e.i.r.p.) = Reading + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

**\*ON time was only measured using Gate function.**

## Maximum Conducted Output Power

Test place : Head Office EMC Lab. No.6 Shielded Room  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 23deg.C. / 43%  
Engineer : Tomohisa Nakagawa  
Mode : 11n-20(MIMO) Tx, MCS 8

### Antenna 0+1

Freq. [MHz]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	12.83	17.94	16.98	-	4.15	-
5220.0	12.65	17.76	16.98	-	4.33	-
5240.0	12.78	17.89	16.98	-	4.20	-
5260.0	12.78	17.89	23.97	-	11.19	-
5300.0	12.80	17.91	23.97	-	11.17	-
5320.0	12.86	17.97	23.97	-	11.11	-

Result [dBm] = 10 x log (10 ^ (Antenna 1 Result [dBm] / 10) + 10 ^ (Antenna 2 Result [dBm] / 10))

### Antenna 0

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	0.05	0.00	10.00	5.11	10.05	15.16	16.98	-	6.93	-
5220.0	0.03	0.00	10.00	5.11	10.03	15.14	16.98	-	6.95	-
5240.0	0.22	0.00	10.00	5.11	10.22	15.33	16.98	-	6.76	-
5260.0	0.31	0.00	10.01	5.11	10.32	15.43	23.97	-	13.65	-
5300.0	0.42	0.00	10.01	5.11	10.43	15.54	23.97	-	13.54	-
5320.0	0.58	0.00	10.01	5.11	10.59	15.70	23.97	-	13.38	-

### Antenna 1

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	-0.42	0.00	10.00	5.11	9.58	14.69	16.98	-	7.40	-
5220.0	-0.80	0.00	10.00	5.11	9.20	14.31	16.98	-	7.78	-
5240.0	-0.74	0.00	10.00	5.11	9.26	14.37	16.98	-	7.72	-
5260.0	-0.88	0.00	10.01	5.11	9.13	14.24	23.97	-	14.84	-
5300.0	-0.98	0.00	10.01	5.11	9.03	14.14	23.97	-	14.94	-
5320.0	-1.05	0.00	10.01	5.11	8.96	14.07	23.97	-	15.01	-

Result(Cond.) = Reading + Cable Loss + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

**\*ON time was only measured using Gate function.**

## Maximum Conducted Output Power

Test place Head Office EMC Lab. No.11 Measurement Room  
Report No. 31JE0038-HO-01  
Date 05/09/2012  
Temperature/ Humidity 26deg. C / 52% RH  
Engineer Yutaka Yoshida  
Mode 11n-40(MIMO) Tx, MCS 8

### Antenna 0+1

Freq. [MHz]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5190.0	13.24	18.35	16.98	-	3.74	-
5230.0	14.25	19.36	16.98	-	2.73	-
5270.0	14.23	19.34	23.97	-	9.74	-
5310.0	13.15	18.26	23.97	-	10.82	-

Result [dBm] = 10 x log (10 ^ (Antenna 0 Result [dBm] / 10) + 10 ^ (Antenna 1 Result [dBm] / 10))

### Antenna 0

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5190.0	-3.29	3.08	10.10	5.11	9.89	15.00	16.98	-	7.09	-
5230.0	-2.36	3.09	10.10	5.11	10.83	15.94	16.98	-	6.15	-
5270.0	-2.50	3.11	10.09	5.11	10.70	15.81	23.97	-	13.27	-
5310.0	-3.54	3.13	10.09	5.11	9.68	14.79	23.97	-	14.29	-

### Antenna 1

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5190.0	-2.64	3.08	10.10	5.11	10.54	15.65	16.98	-	6.44	-
5230.0	-1.57	3.09	10.10	5.11	11.62	16.73	16.98	-	5.36	-
5270.0	-1.51	3.11	10.09	5.11	11.69	16.80	23.97	-	12.28	-
5310.0	-2.66	3.13	10.09	5.11	10.56	15.67	23.97	-	13.41	-

Result(Cond.) = Reading + Cable Loss + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

**\*ON time was only measured using Gate function.**

### Peak Power Spectral Density

Test place : Head Office EMC Lab. No.6 Shielded Room  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 23deg.C. / 43%  
Engineer : Tomohisa Nakagawa  
Mode : 11a Tx, 54Mbps

Antenna 1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
5180.0	-11.62	0.00	10.00	-1.62	4.00	5.62
5220.0	-11.54	0.00	10.00	-1.54	4.00	5.54
5240.0	-11.29	0.00	10.00	-1.29	4.00	5.29
5260.0	-11.18	0.00	10.01	-1.17	11.00	12.17
5300.0	-10.89	0.00	10.01	-0.88	11.00	11.88
5320.0	-10.83	0.00	10.01	-0.82	11.00	11.82

Result = Reading + Cable Loss + Attenuator

**\*ON time was only measured using Gate function.**

## Peak Power Spectral Density

Test place : Head Office EMC Lab. No.6 Shielded Room  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 23deg.C. / 43%  
Engineer : Tomohisa Nakagawa  
Mode : 11n-20(MIMO) Tx, MCS 8

Antenna 0+1

Freq.	Result	Limit	Margin
[MHz]	[dBm]	[dBm]	[dB]
5180.0	0.93	4.00	3.07
5220.0	0.71	4.00	3.29
5240.0	0.86	4.00	3.14
5260.0	0.91	11.00	10.09
5300.0	0.98	11.00	10.02
5320.0	1.03	11.00	9.97

Result [dBm] = 10 x log (10 ^ (Antenna 0 Result [dBm] / 10) + 10 ^ (Antenna 1 Result [dBm] / 10))

Antenna 0

Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
5180.0	-11.82	0.00	10.00	-1.82	4.00	5.82
5220.0	-11.90	0.00	10.00	-1.90	4.00	5.90
5240.0	-11.71	0.00	10.00	-1.71	4.00	5.71
5260.0	-11.52	0.00	10.01	-1.51	11.00	12.51
5300.0	-11.37	0.00	10.01	-1.36	11.00	12.36
5320.0	-11.20	0.00	10.01	-1.19	11.00	12.19

Antenna 1

Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
5180.0	-12.36	0.00	10.00	-2.36	4.00	6.36
5220.0	-12.75	0.00	10.00	-2.75	4.00	6.75
5240.0	-12.65	0.00	10.00	-2.65	4.00	6.65
5260.0	-12.79	0.00	10.01	-2.78	11.00	13.78
5300.0	-12.83	0.00	10.01	-2.82	11.00	13.82
5320.0	-12.97	0.00	10.01	-2.96	11.00	13.96

Result = Reading + Cable Loss + Attenuator

**\*ON time was only measured using Gate function.**



## Peak Power Spectral Density

Test place : Head Office EMC Lab. No.11 Shielded Room  
Report No. : 31JE0038-HO-01  
Date : 05/09/2012  
Temperature/ Humidity : 26deg. C / 52% RH  
Engineer : Yutaka Yoshida  
Mode : 11n-40(MIMO) Tx, MCS 8

Antenna 0+1

Freq.	Result	Limit	Margin
[MHz]	[dBm]	[dBm]	[dB]
5190.0	-1.78	4.00	5.78
5230.0	-0.77	4.00	4.77
5270.0	-0.74	11.00	11.74
5310.0	-1.88	11.00	12.88

Result [dBm] = 10 x log (10 ^ (Antenna 0 Result [dBm] / 10) + 10 ^ (Antenna 1 Result [dBm] / 10))

Antenna 0

Freq.	Reading	Cable Loss	Atten.	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
5190.0	-18.34	3.08	10.10	-5.16	4.00
5230.0	-17.35	3.09	10.10	-4.16	4.00
5270.0	-17.44	3.11	10.09	-4.24	11.00
5310.0	-18.35	3.23	10.09	-5.03	11.00

Antenna 1

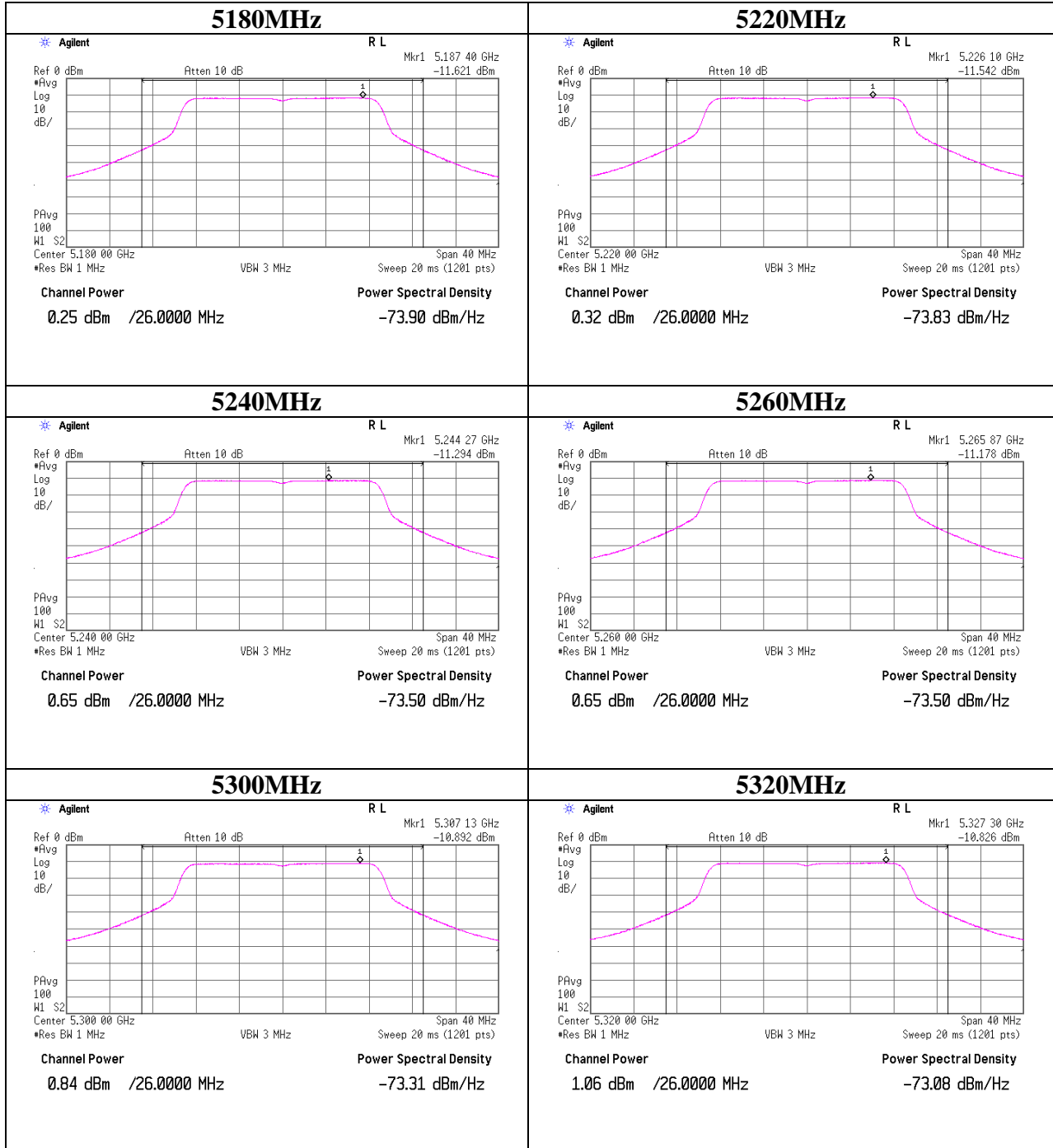
Freq.	Reading	Cable Loss	Atten.	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
5190.0	-17.59	3.08	10.06	-4.45	4.00
5230.0	-16.59	3.09	10.06	-3.44	4.00
5270.0	-16.48	3.11	10.06	-3.31	11.00
5310.0	-18.05	3.23	10.06	-4.76	11.00

Result = Reading + Cable Loss + Attenuator

**\*ON time was only measured using Gate function.**

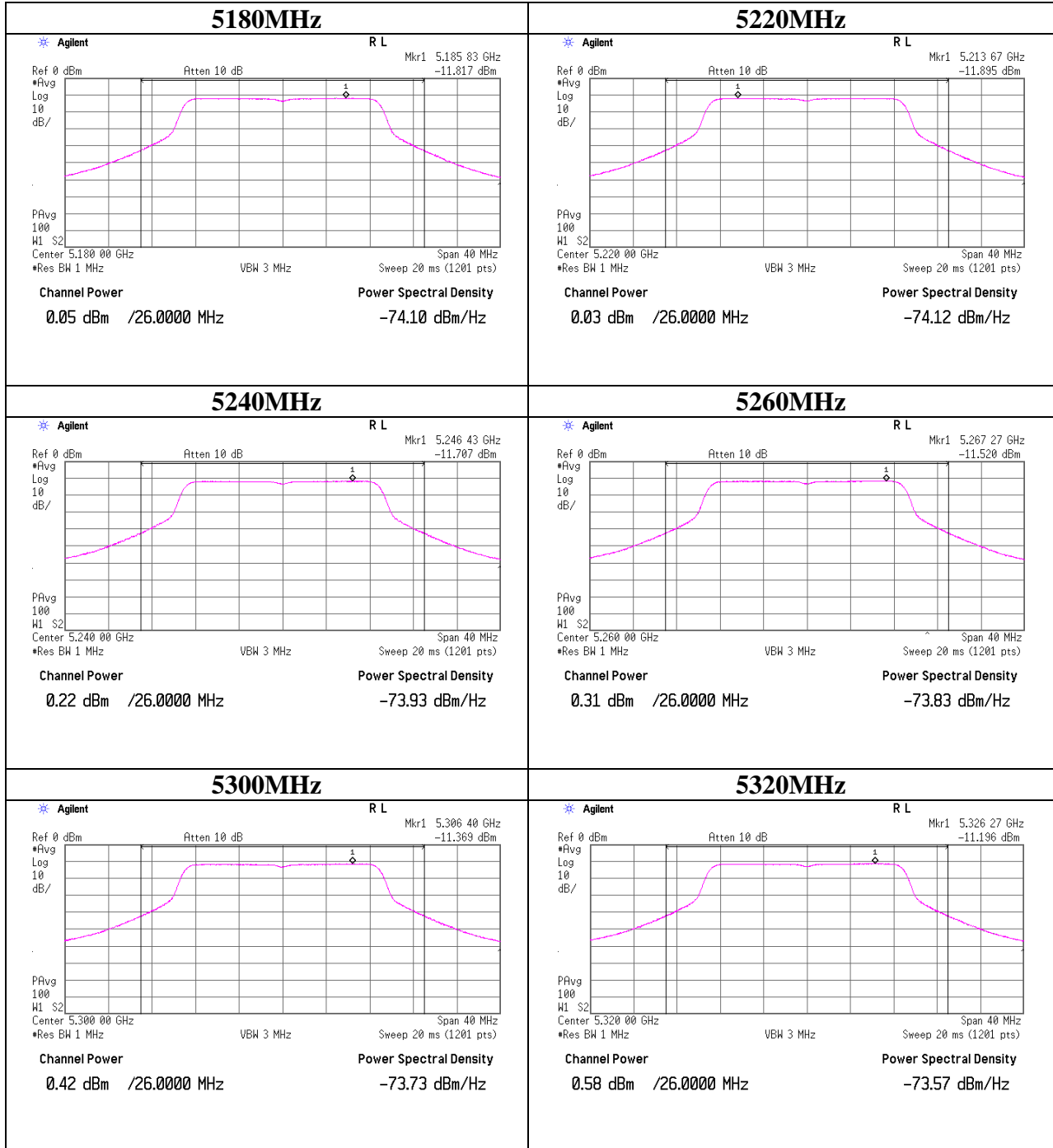
**Maximum Conducted Output Power & Peak Power Spectral Density**

**11a Antenna 1**



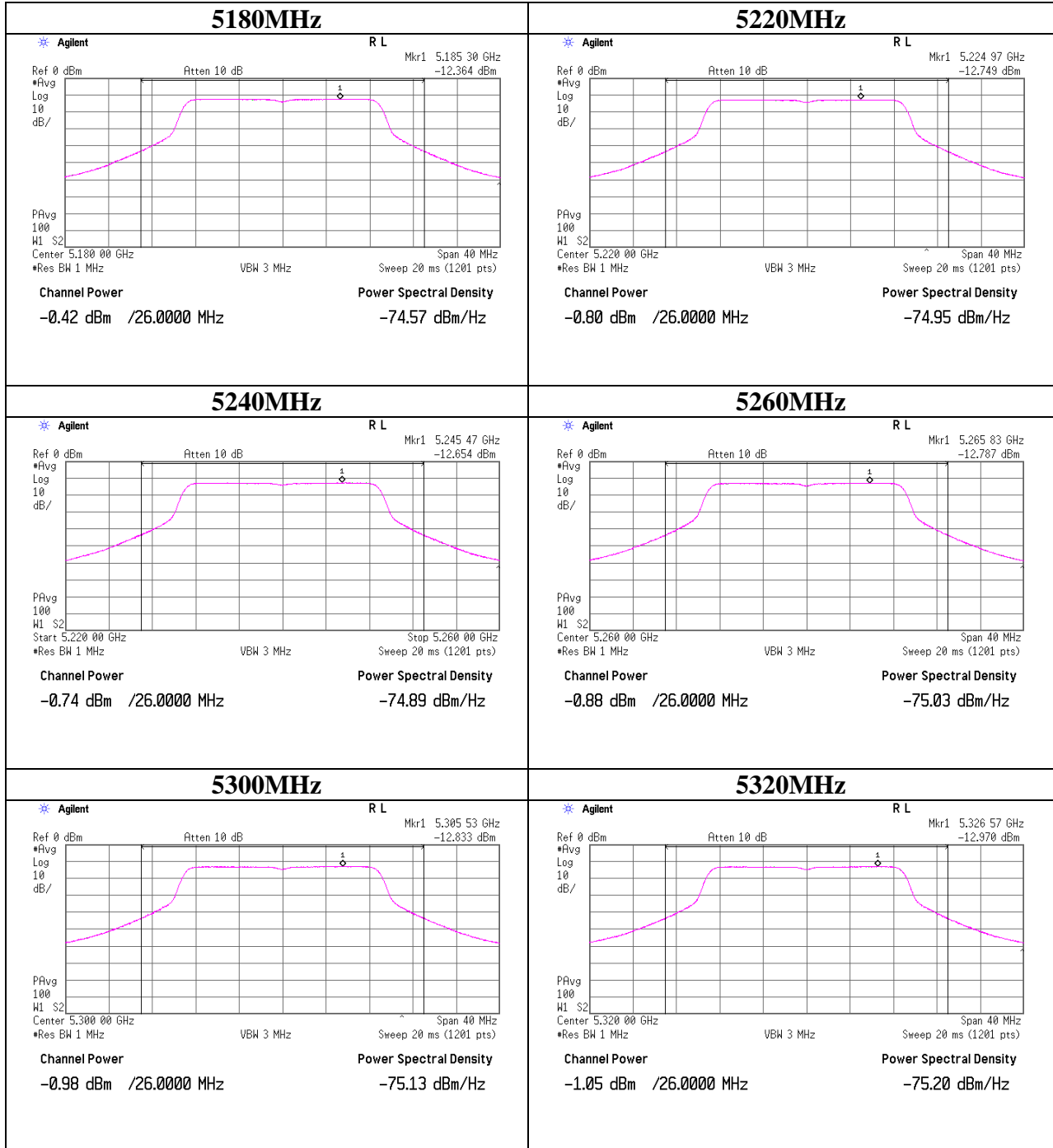
**Maximum Conducted Output Power & Peak Power Spectral Density**

**11n-20 Antenna 0**



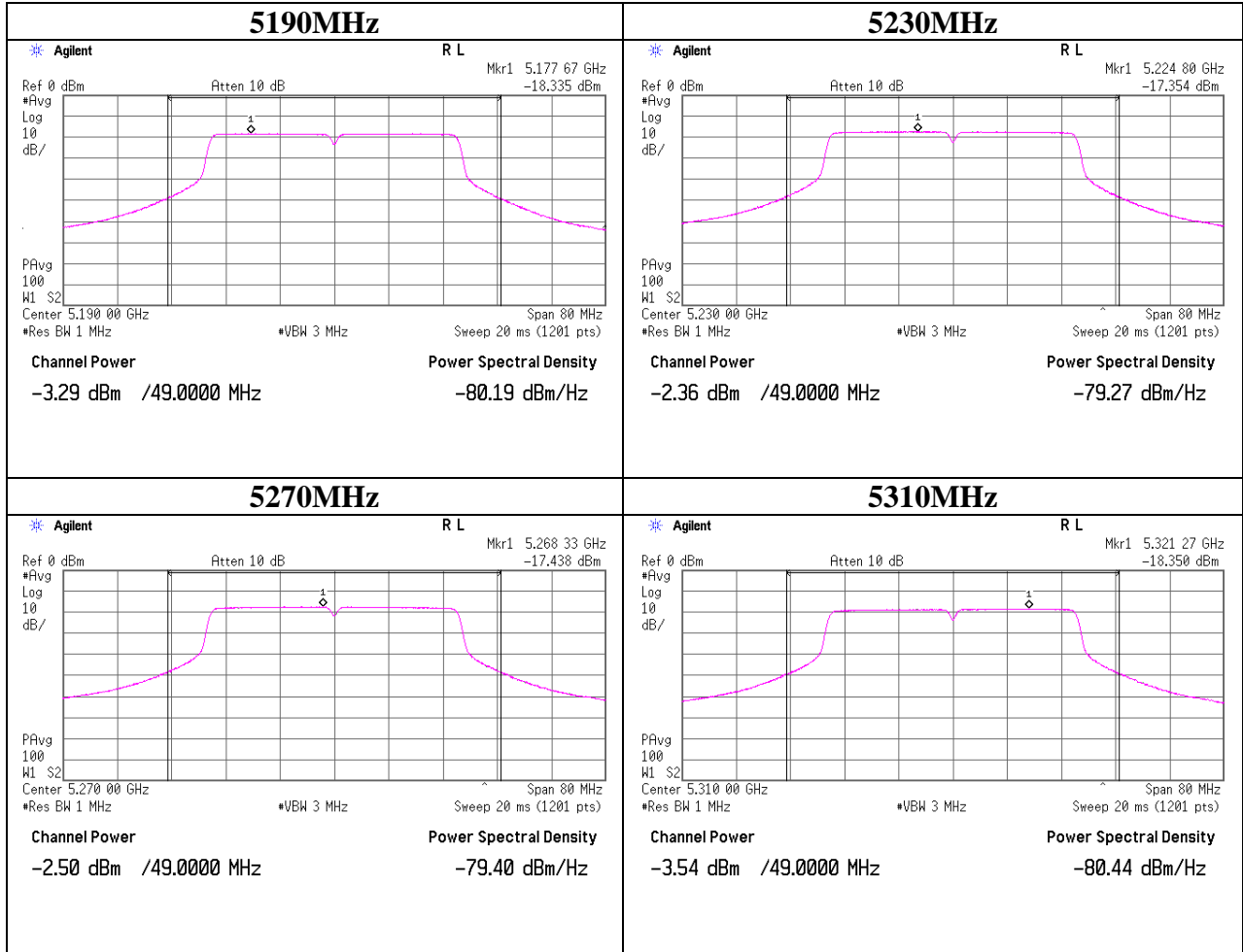
**Maximum Conducted Output Power & Peak Power Spectral Density**

**11n-20 Antenna 1**



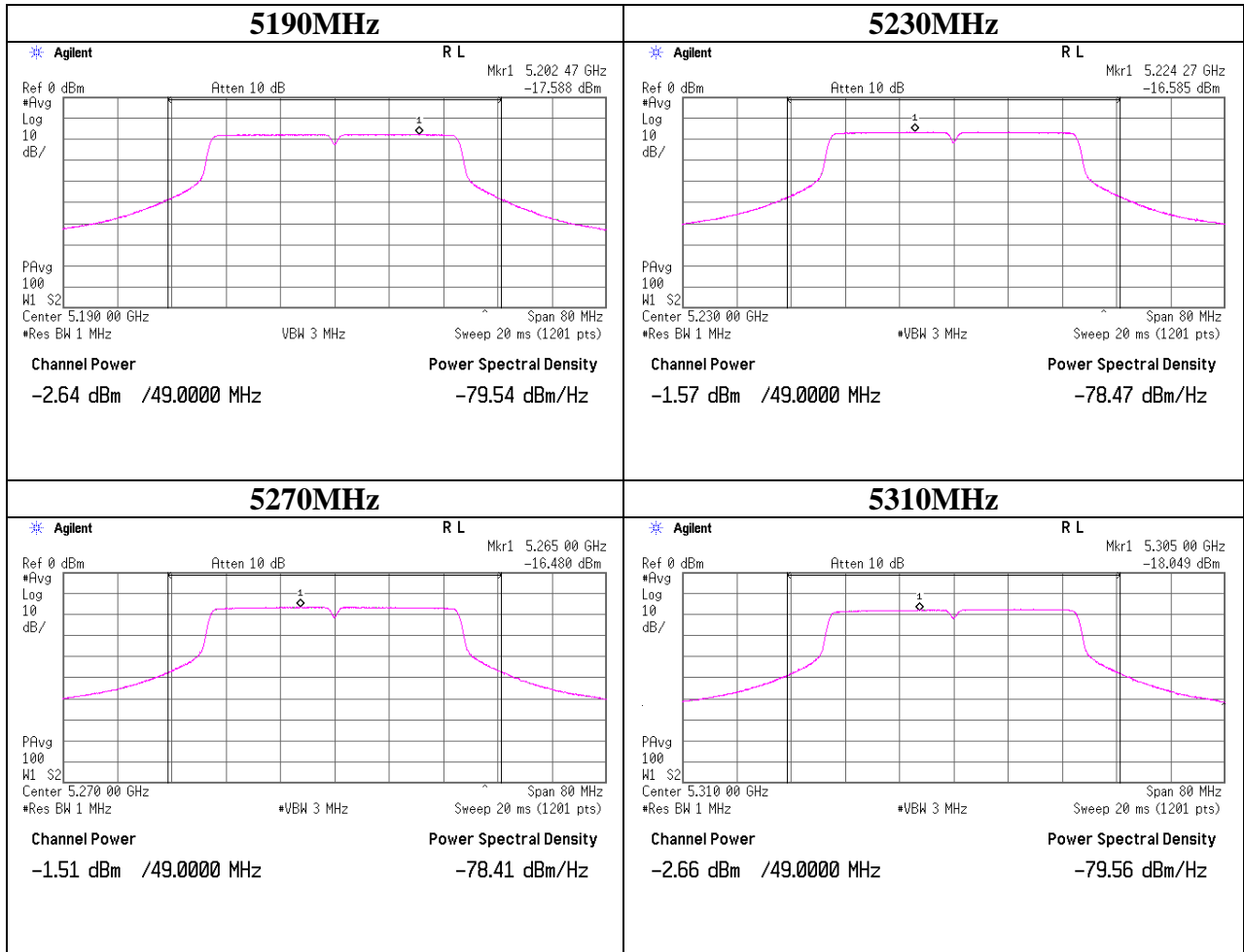
**Maximum Conducted Output Power & Peak Power Spectral Density**

**11n-40 Antenna 0**



**Maximum Conducted Output Power & Peak Power Spectral Density**

**11n-40 Antenna 1**



**Maximum Conducted Output Power & Peak Power Spectral Density**  
**(Reference data)**

Test place                      Head Office EMC Lab. No.6 Semi Anechoic Chamber  
Report No.                      31JE0038-HO-01  
Date                              04/24/2012  
Temperature/ Humidity        21deg. C / 68% RH  
Engineer                        Yutaka Yoshida  
Mode                              11a Tx

Antenna 0, 5180MHz

Data Rate [Mbps]	Reading [dBm]	Remark
6	-0.23	
9	-0.30	
12	-0.29	
18	-0.32	
24	-0.32	
36	-0.30	
48	-0.28	
54	-0.22	

Antenna 1, 5180MHz

Data Rate [Mbps]	Reading [dBm]	Remark
6	-0.16	
9	-0.08	
12	-0.05	
18	-0.07	
24	-0.06	
36	-0.07	
48	-0.06	
54	-0.01	*

\* Worst Rate

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

**Maximum Conducted Output Power & Peak Power Spectral Density  
(Reference data)**

Test place : Head Office EMC Lab. No.6 Semi Anechoic Chamber  
Report No. : 31JE0038-HO-01  
Date : 04/24/2012  
Temperature/ Humidity : 21deg. C / 68% RH  
Engineer : Yutaka Yoshida  
Mode : 11n-20 Tx

11n-20 5180MHz

MCS Number	Reading Antenna 0		Reading Antenna 1		Result Antenna 0 + 1		Remark
	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]	
0	<b>-1.96</b>	0.64	-2.17	0.61	-	-	*(SISO)
1	-1.97	0.64	-2.15	0.61	-	-	
2	-1.97	0.64	-2.10	0.62	-	-	
3	-1.97	0.64	-2.06	0.62	-	-	
4	-2.07	0.62	-2.06	0.62	-	-	
5	-2.19	0.60	-2.22	0.60	-	-	
6	-2.20	0.60	-2.25	0.60	-	-	
7	-2.27	0.59	-2.24	0.60	-	-	
8	-2.02	0.63	-2.12	0.61	<b>0.94</b>	1.24	*(MIMO)
9	-2.07	0.62	-2.14	0.61	0.91	1.23	
10	-2.04	0.63	-2.13	0.61	0.93	1.24	
11	-2.13	0.61	-2.32	0.59	0.79	1.20	
12	-2.12	0.61	-2.31	0.59	0.80	1.20	
13	-2.10	0.62	-2.21	0.60	0.86	1.22	
14	-2.13	0.61	-2.15	0.61	0.87	1.22	
15	-2.07	0.62	-2.11	0.62	0.92	1.24	

\*: Worst Rate

Sample Calculation:

Result Antenna 0 + 1 [dBm] = 10\*LOG(Result Antenna 0 + 1 [mW])

Result Antenna 0 + 1 [mW] = Reading Antenna 0 [mW] + Reading Antenna 1 [mW]

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



**Maximum Conducted Output Power & Peak Power Spectral Density**  
**(Reference data)**

Test place : Head Office EMC Lab. No.6 Semi Anechoic Chamber  
Report No. : 31JE0038-HO-01  
Date : 04/24/2012  
Temperature/ Humidity : 21deg. C / 68% RH  
Engineer : Yutaka Yoshida  
Mode : 11n-40 Tx

11n-40 5190MHz

MCS Number	Reading Antenna 0		Reading Antenna 1		Result Antenna 0 + 1		Remark
	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]	
0	-2.07	0.62	-2.16	0.61	-	-	
1	-2.12	0.61	-2.20	0.60	-	-	
2	<b>-2.04</b>	0.63	-2.16	0.61	-	-	*(SISO)
3	-2.28	0.59	-2.36	0.58	-	-	
4	-2.25	0.60	-2.35	0.58	-	-	
5	-2.21	0.60	-2.38	0.58	-	-	
6	-2.44	0.57	-2.64	0.54	-	-	
7	-2.69	0.54	-2.71	0.54	-	-	
8	-2.04	0.63	-2.13	0.61	<b>0.93</b>	1.24	*(MIMO)
9	-2.21	0.60	-2.39	0.58	0.71	1.18	
10	-2.27	0.59	-2.37	0.58	0.69	1.17	
11	-2.35	0.58	-2.41	0.57	0.63	1.16	
12	-2.60	0.55	-2.76	0.53	0.33	1.08	
13	-2.58	0.55	-2.66	0.54	0.39	1.09	
14	-2.76	0.53	-2.90	0.51	0.18	1.04	
15	-2.77	0.53	-2.87	0.52	0.19	1.04	

\*: Worst Rate

Sample Calculation:

Result Antenna 0 + 1 [dBm] = 10\*LOG(Result Antenna 0 + 1 [mW])

Result Antenna 0 + 1 [mW] = Reading Antenna 0 [mW] + Reading Antenna 1 [mW]

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

## Radiated Spurious Emission

Test place                                   Head Office EMC Lab. No.3 Anechoic Chamber  
Report No.                                   31JE0038-HO-01  
Date   04/25/2012  
Temperature/ Humidity                 21deg. C / 47% RH  
Engineer                                    Katsunori Okai  
  (Above 1GHz)  
Mode   11n-20(MIMO) Tx 5180MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5150.000	PK	56.4	30.8	3.3	31.4	-	59.1	68.2	9.1	Bandedge	
Hori	10360.000	PK	43.0	38.2	-2.3	33.2	-	45.7	68.2	22.5	Outside	
Hori	15540.000	PK	44.3	39.0	-0.8	32.3	-	50.2	73.9	23.7	Inside	
Hori	5150.000	AV	46.8	30.8	3.3	31.4	0.15	49.7	53.9	4.3	Bandedge	
Hori	15540.000	AV	34.2	39.0	-0.8	32.3	0.15	40.3	53.9	13.7	Inside	
Vert	5150.000	PK	54.0	30.8	3.3	31.4	-	56.7	68.2	11.5	Bandedge	
Vert	10360.000	PK	43.4	38.2	-2.3	33.2	-	46.1	68.2	22.1	Outside	
Vert	15540.000	PK	44.5	39.0	-0.8	32.3	-	50.4	73.9	23.5	Inside	
Vert	5150.000	AV	43.2	30.8	3.3	31.4	0.15	46.1	53.9	7.9	Bandedge	
Vert	15540.000	AV	35.6	39.0	-0.8	32.3	0.15	41.7	53.9	12.3	Inside	

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

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

\*AV: Method 1

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 : Head Office EMC Lab. No.3 Anechoic Chamber  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 21deg. C / 47% RH  
Engineer : Katsunori Okai  
(Above 1GHz)  
Mode : 11n-20(MIMO) Tx 5240MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	10480.000	PK	41.0	38.1	-2.3	33.2	-	43.6	68.2	24.6	Outside	
Hori	15720.000	PK	42.9	38.6	-0.8	32.3	-	48.4	73.9	25.5	Inside	
Hori	15720.000	AV	34.5	38.6	-0.8	32.3	0.15	40.2	53.9	13.8	Inside	
Vert	10480.000	PK	43.5	38.1	-2.3	33.2	-	46.1	68.2	22.1	Outside	
Vert	15720.000	PK	47.2	38.6	-0.8	32.3	-	52.7	73.9	21.2	Inside	
Vert	15720.000	AV	36.4	38.6	-0.8	32.3	0.15	42.1	53.9	11.9	Inside	

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

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

\*AV: Method 1

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 : Head Office EMC Lab. No.3 Anechoic Chamber  
Report No. : 31JE0038-HO-01  
Date : 04/25/2012  
Temperature/ Humidity : 21deg. C / 47% RH  
Engineer : Katsunori Okai  
(Above 1GHz)  
Mode : 11n-20(MIMO) Tx 5320MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5350.000	PK	61.6	31.0	3.4	31.4	-	64.6	68.2	3.6	Bandedge	
Hori	10640.000	PK	42.4	38.1	-2.2	33.2	-	45.1	73.9	28.8	Inside	
Hori	15960.000	PK	43.1	38.1	-0.9	32.2	-	48.1	73.9	25.8	Inside	
Hori	5350.000	AV	45.9	31.0	3.4	31.4	0.15	49.1	53.9	4.8	Bandedge	
Hori	10640.000	AV	32.8	38.1	-2.2	33.2	0.15	35.7	53.9	18.3	Inside	
Hori	15960.000	AV	33.9	38.1	-0.9	32.2	0.15	39.1	53.9	14.9	Inside	
Vert	5350.000	PK	56.3	31.0	3.4	31.4	-	59.3	68.2	8.9	Bandedge	
Vert	10640.000	PK	44.2	38.1	-2.2	33.2	-	46.9	73.9	27.0	Inside	
Vert	15960.000	PK	46.8	38.1	-0.9	32.2	-	51.8	73.9	22.1	Inside	
Vert	5350.000	AV	42.1	31.0	3.4	31.4	0.15	45.3	53.9	8.7	Bandedge	
Vert	10640.000	AV	33.6	38.1	-2.2	33.2	0.15	36.5	53.9	17.5	Inside	
Vert	15960.000	AV	36.5	38.1	-0.9	32.2	0.15	41.7	53.9	12.3	Inside	

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

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

\*AV: Method 1

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                   Head Office EMC Lab. No.3 Anechoic Chamber  
Report No.                   31JE0038-HO-01  
Date                           04/26/2012  
Temperature/ Humidity     23deg. C / 57% RH  
Engineer                    Katsunori Okai  
(Above 1GHz)  
Mode                         11n-40(MIMO) Tx 5190MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5150.000	PK	63.2	30.8	3.3	31.4	65.9	68.2	2.3	Bandedge	
Hori	10380.000	PK	42.5	38.2	-2.3	33.2	45.2	68.2	23.0	Outside	
Hori	15570.000	PK	43.1	38.9	-0.9	32.3	48.8	73.9	25.1	Inside	
Hori	5150.000	AV	48.5	30.8	3.3	31.4	51.2	53.9	2.7	Bandedge	
Hori	15570.000	AV	31.2	38.9	-0.9	32.3	36.9	53.9	17.0	Inside	
Vert	5150.000	PK	58.9	30.8	3.3	31.4	61.6	68.2	6.6	Bandedge	
Vert	10380.000	PK	42.9	38.2	-2.3	33.2	45.6	68.2	22.6	Outside	
Vert	15570.000	PK	43.6	38.9	-0.9	32.3	49.3	73.9	24.6	Inside	
Vert	5150.000	AV	44.7	30.8	3.3	31.4	47.4	53.9	6.5	Bandedge	
Vert	15570.000	AV	31.4	38.9	-0.9	32.3	37.1	53.9	16.8	Inside	

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 have enough margin (more than 20dB).

\*AV: Method 2

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	Head Office EMC Lab. No.3 Anechoic Chamber	
Report No.	31JE0038-HO-01	
Date	04/26/2012	04/26/2012
Temperature/ Humidity	23deg. C / 57% RH	23deg. C / 57% RH
Engineer	Katsunori Okai	Shimada Takumi
	(Above 1GHz)	(30-1000MHz)
Mode	11n-40(MIMO) Tx 5230MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	33.246	QP	36.6	17.4	7.2	32.2	29.0	40.0	11.0	Outside	
Hori	71.592	QP	34.5	6.6	7.8	32.2	16.7	40.0	23.3	Outside	
Hori	100.231	QP	54.2	10.1	8.1	32.3	40.1	43.5	3.4	Outside	
Hori	143.992	QP	48.0	14.6	8.6	32.3	38.9	43.5	4.6	Outside	
Hori	166.532	QP	42.1	15.6	8.9	32.2	34.4	43.5	9.1	Inside	
Hori	336.009	QP	41.6	15.6	10.2	32.1	35.3	46.0	10.7	Outside	
Hori	432.000	QP	41.1	17.9	10.9	32.0	37.9	46.0	8.1	Outside	
Hori	528.001	QP	37.6	18.6	11.5	32.0	35.7	46.0	10.3	Outside	
Hori	623.997	QP	36.3	19.7	12.0	32.0	36.0	46.0	10.0	Outside	
Hori	734.842	QP	35.3	21.1	12.7	31.8	37.3	46.0	8.7	Outside	
Vert	33.248	QP	47.0	17.4	7.2	32.2	39.4	40.0	0.6	Outside	
Vert	71.597	QP	47.5	6.6	7.8	32.2	29.7	40.0	10.3	Outside	
Vert	100.233	QP	49.5	10.1	8.1	32.3	35.4	43.5	8.1	Outside	
Vert	143.991	QP	42.4	14.6	8.6	32.3	33.3	43.5	10.2	Outside	
Vert	166.542	QP	44.2	15.6	8.9	32.2	36.5	43.5	7.0	Inside	
Vert	336.006	QP	36.4	15.6	10.2	32.1	30.1	46.0	15.9	Outside	
Vert	431.999	QP	35.2	17.9	10.9	32.0	32.0	46.0	14.0	Outside	
Vert	527.993	QP	42.8	18.6	11.5	32.0	40.9	46.0	5.1	Outside	
Vert	623.995	QP	35.0	19.7	12.0	32.0	34.7	46.0	11.3	Outside	
Vert	734.842	QP	36.8	21.1	12.7	31.8	38.8	46.0	7.2	Outside	

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 have enough margin (more than 20dB).

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	10460.000	PK	43.1	38.1	-2.3	33.2	45.7	68.2	22.5	Outside	
Hori	15690.000	PK	44.4	38.7	-0.8	32.3	50.0	73.9	23.9	Inside	
Hori	15690.000	AV	32.6	38.7	-0.8	32.3	38.2	53.9	15.7	Inside	
Vert	10460.000	PK	41.7	38.1	-2.3	33.2	44.3	68.2	23.9	Outside	
Vert	15690.000	PK	46.6	38.7	-0.8	32.3	52.2	73.9	21.7	Inside	
Vert	15690.000	AV	33.0	38.7	-0.8	32.3	38.6	53.9	15.3	Inside	

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 have enough margin (more than 20dB).

\*AV: Method 2

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 Head Office EMC Lab. No.3 Anechoic Chamber  
Report No. 31JE0038-HO-01  
Date 04/26/2012  
Temperature/ Humidity 23deg. C / 57% RH  
Engineer Katsunori Okai  
(Above 1GHz)  
Mode 11n-40(MIMO) Tx 5310MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5350.000	PK	63.6	31.0	3.4	31.4	66.6	68.2	1.6	Bandedge	
Hori	10620.000	PK	42.2	38.1	-2.2	33.2	44.9	73.9	29.0	Inside	
Hori	15930.000	PK	43.9	38.1	-0.9	32.2	48.9	73.9	25.0	Inside	
Hori	5350.000	AV	49.0	31.0	3.4	31.4	52.0	53.9	1.9	Bandedge	
Hori	10620.000	AV	30.3	38.1	-2.2	33.2	33.0	53.9	20.9	Inside	
Hori	15930.000	AV	31.3	38.1	-0.9	32.2	36.3	53.9	17.6	Inside	
Vert	5350.000	PK	59.6	31.0	3.4	31.4	62.6	68.2	5.6	Bandedge	
Vert	10620.000	PK	43.3	38.1	-2.2	33.2	46.0	73.9	27.9	Inside	
Vert	15930.000	PK	45.2	38.1	-0.9	32.2	50.2	73.9	23.7	Inside	
Vert	5350.000	AV	45.0	31.0	3.4	31.4	48.0	53.9	5.9	Bandedge	
Vert	10620.000	AV	30.5	38.1	-2.2	33.2	33.2	53.9	20.7	Inside	
Vert	15930.000	AV	32.8	38.1	-0.9	32.2	37.8	53.9	16.1	Inside	

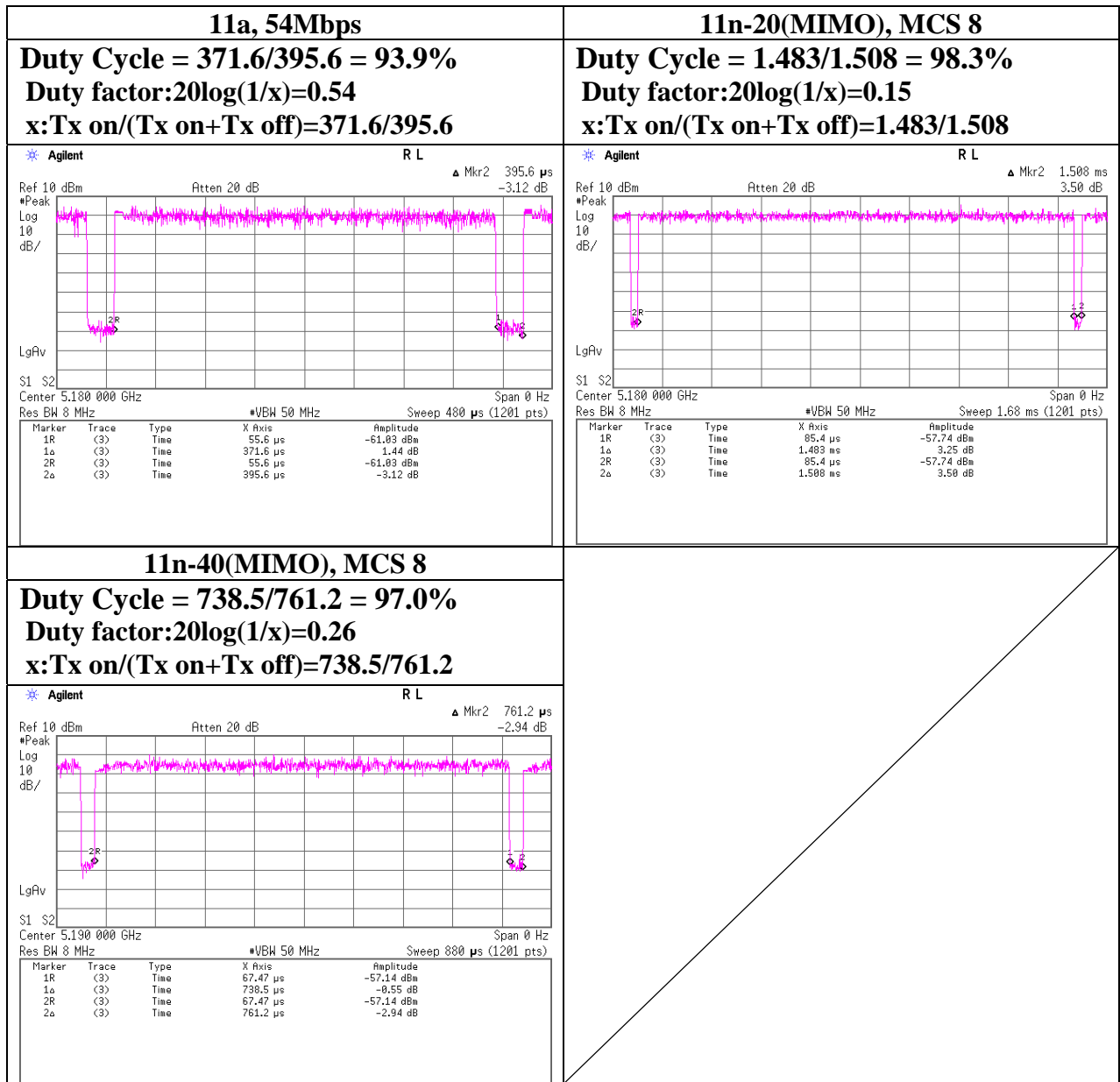
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*AV: Method 2

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

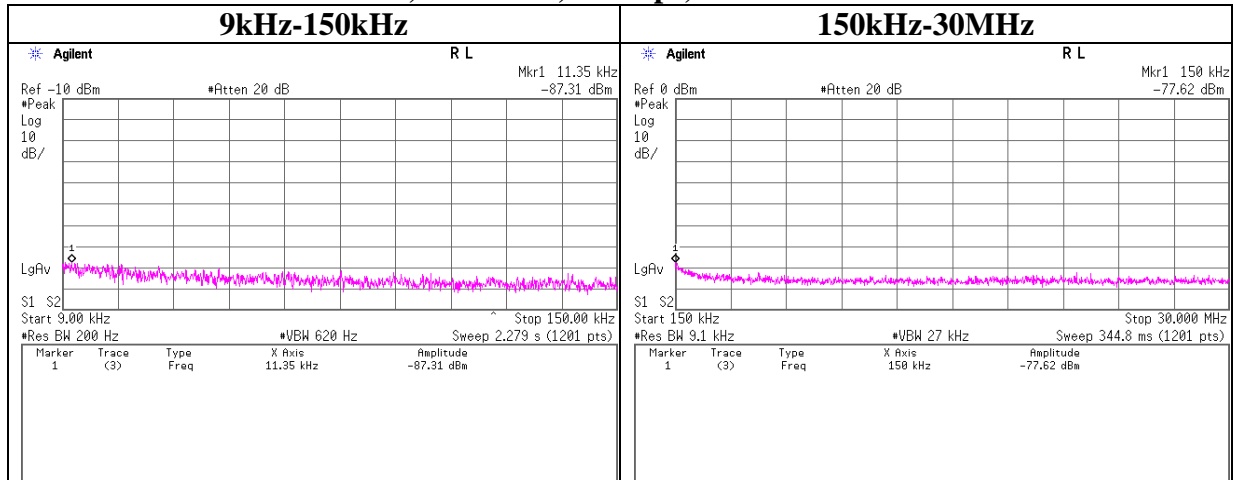
### Duty Cycle





### Conducted Spurious Emission

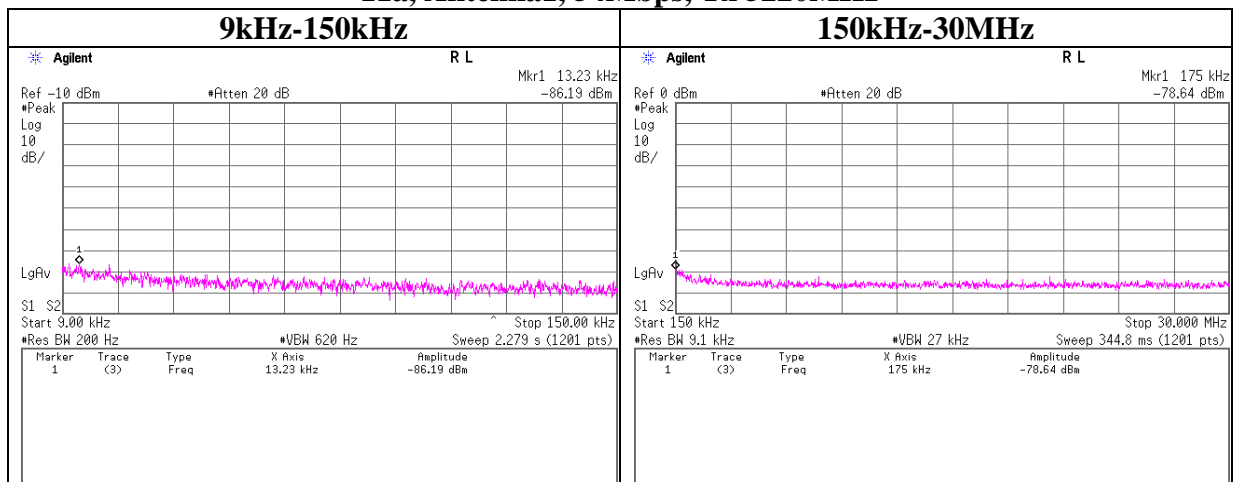
#### 11a, Antenna1, 54Mbps, Tx 5180MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
11.35	-87.3	0.0	5.9	2.1	37.0	-42.3	-27.0	15.3	
150.00	-77.6	0.0	5.9	2.1	20.4	-49.3	-27.0	22.3	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

#### 11a, Antenna1, 54Mbps, Tx 5220MHz

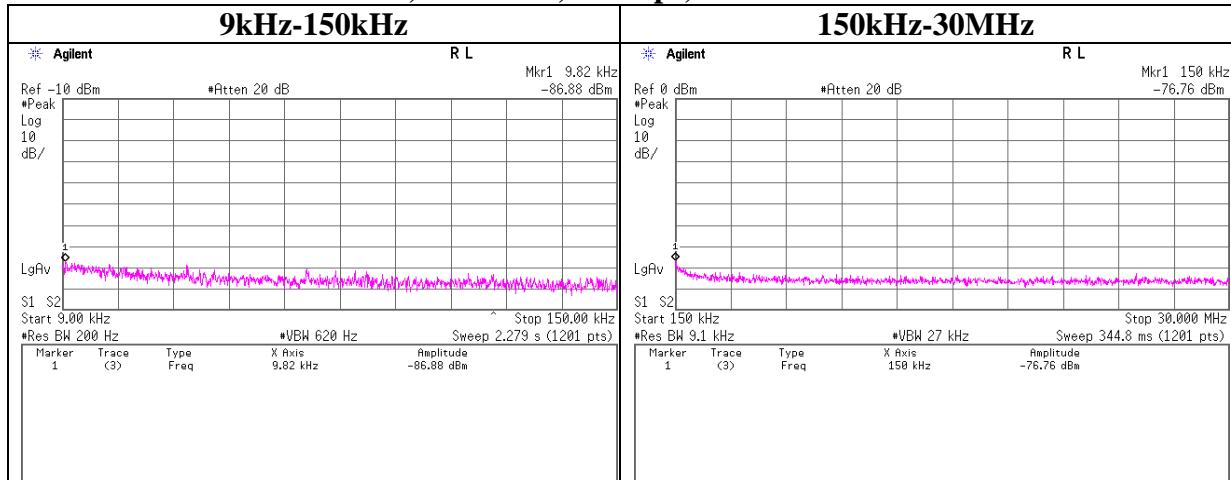


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
13.23	-86.2	0.0	5.9	2.1	37.0	-41.2	-27.0	14.2	
175.00	-78.6	0.0	5.9	2.1	20.4	-50.3	-27.0	23.3	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

### Conducted Spurious Emission

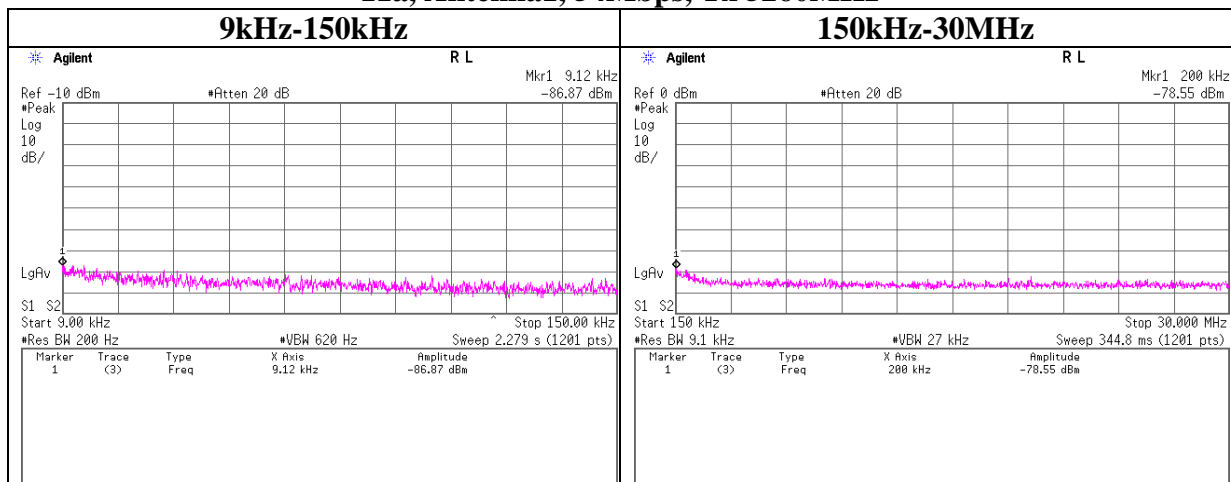
#### 11a, Antenna1, 54Mbps, Tx 5240MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
9.82	-86.9	0.0	5.9	2.1	37.0	-41.8	-27.0	14.8	
150.00	-76.8	0.0	5.9	2.1	20.4	-68.8	-27.0	41.8	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

#### 11a, Antenna1, 54Mbps, Tx 5260MHz

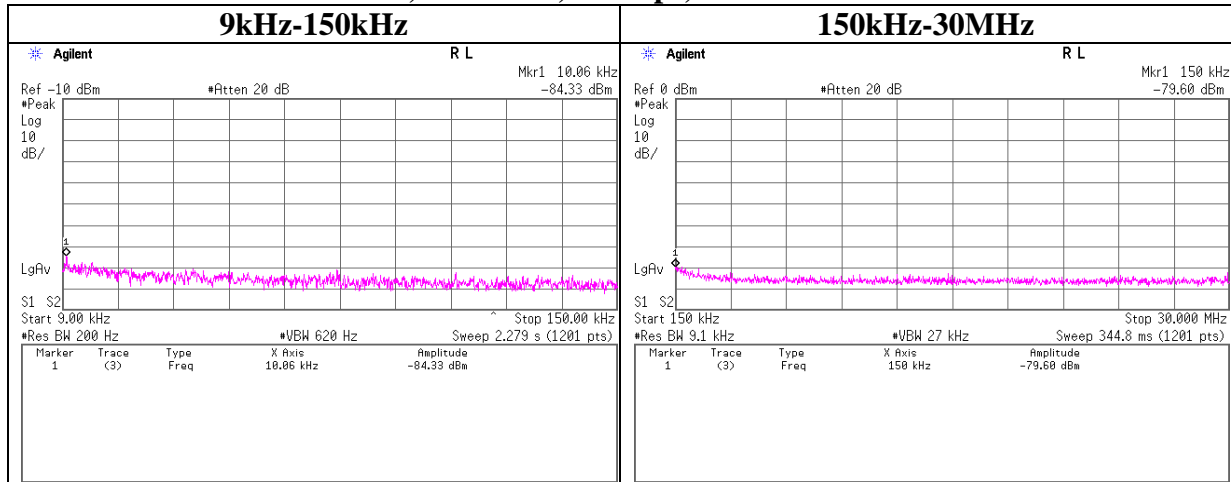


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
9.12	-86.9	0.0	5.9	2.1	37.0	-41.8	-27.0	14.8	
200.00	-78.6	0.0	5.9	2.1	20.4	-50.2	-27.0	23.2	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

### Conducted Spurious Emission

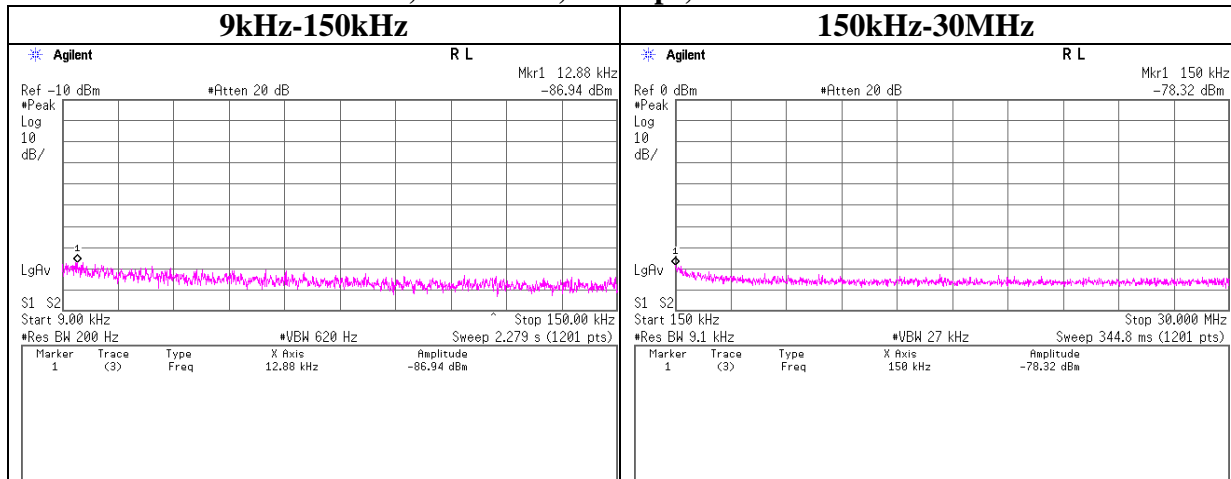
#### 11a, Antenna1, 54Mbps, Tx 5300MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
10.06	-84.3	0.0	5.9	2.1	37.0	-39.3	-27.0	12.3	
150.00	-79.6	0.0	5.9	2.1	20.4	-51.2	-27.0	24.2	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

#### 11a, Antenna1, 54Mbps, Tx 5320MHz

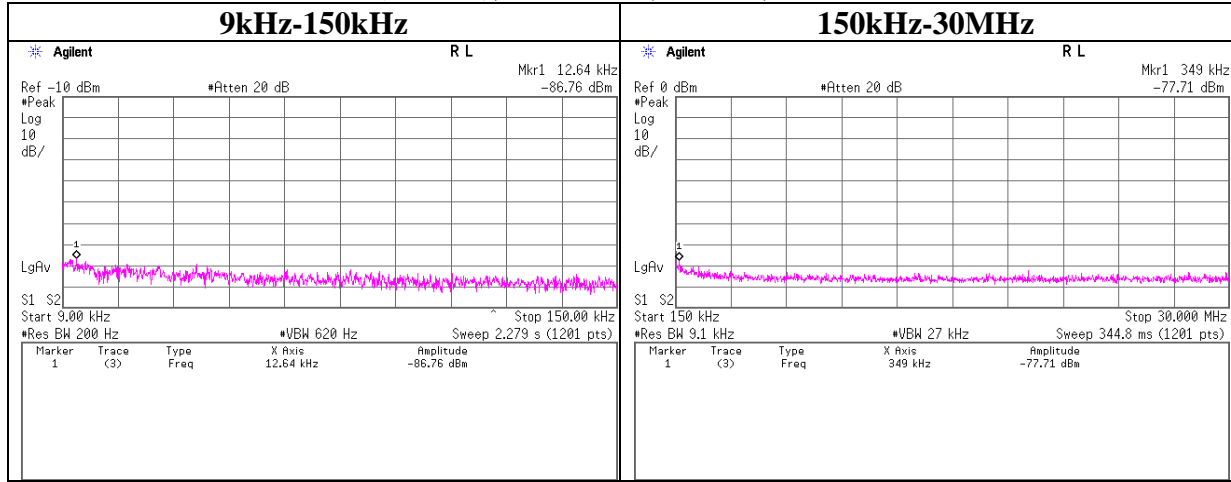


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
12.88	-86.9	0.0	5.9	2.1	37.0	-41.9	-27.0	14.9	
150.00	-78.3	0.0	5.9	2.1	20.4	-50.0	-27.0	23.0	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + RBW factor

**Conducted Spurious Emission**

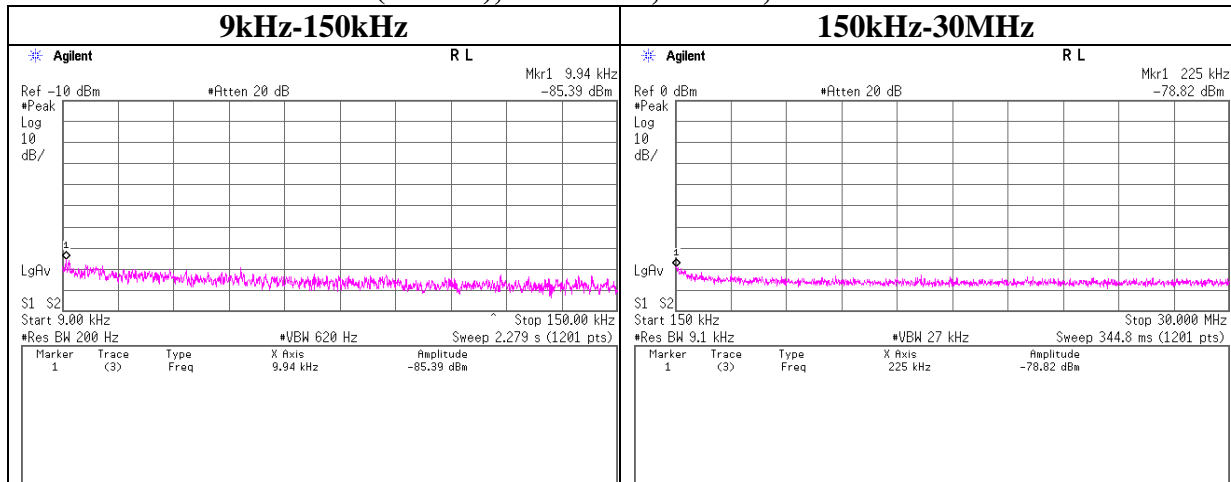
**11n-20(MIMO), Antenna 0, MCS 8, Tx 5180MHz**



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
12.64	-86.8	0.0	5.9	5.11	2	37.0	-35.7	-27.0	8.7	
349.00	-77.7	0.0	5.9	5.11	2	20.4	-43.3	-27.0	16.3	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

**11n-20(MIMO), Antenna 0, MCS 8, Tx 5220MHz**

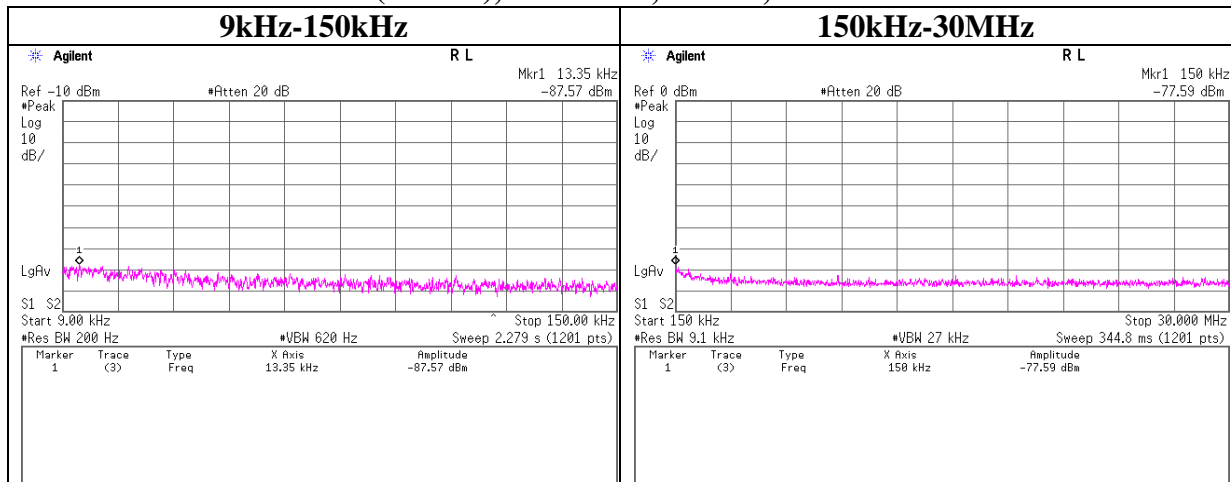


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
9.94	-85.4	0.0	5.9	5.11	2	37.0	-34.3	-27.0	7.3	
225.00	-78.8	0.0	5.9	5.11	2	20.4	-44.4	-27.0	17.4	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

### Conducted Spurious Emission

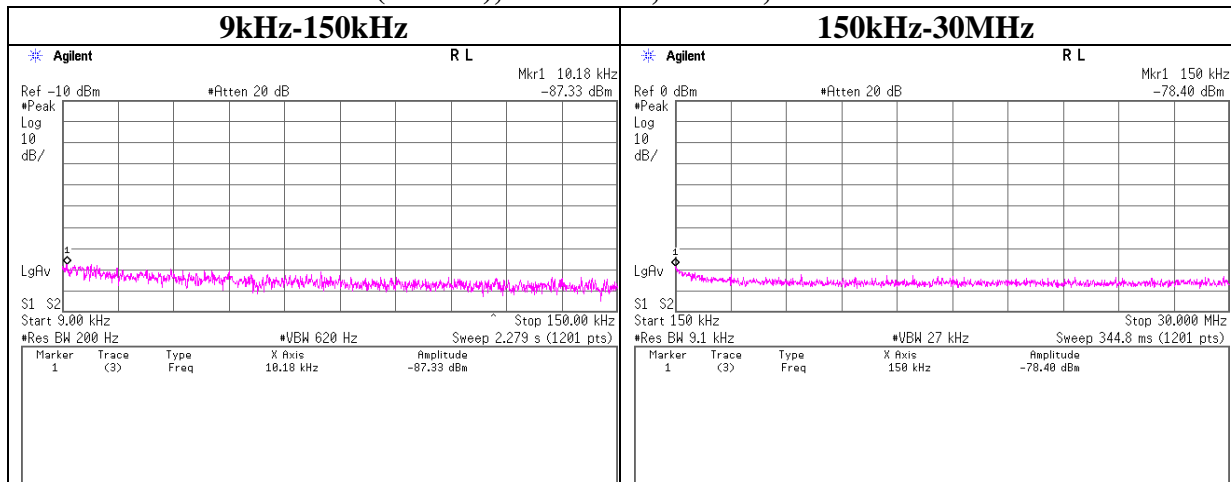
#### 11n-20(MIMO), Antenna 0, MCS 8, Tx 5240MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
13.35	-87.6	0.0	5.9	5.11	2	37.0	-36.5	-27.0	9.5	
150.00	-77.6	0.0	5.9	5.11	2	20.4	-43.2	-27.0	16.2	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

#### 11n-20(MIMO), Antenna 0, MCS 8, Tx 5260MHz

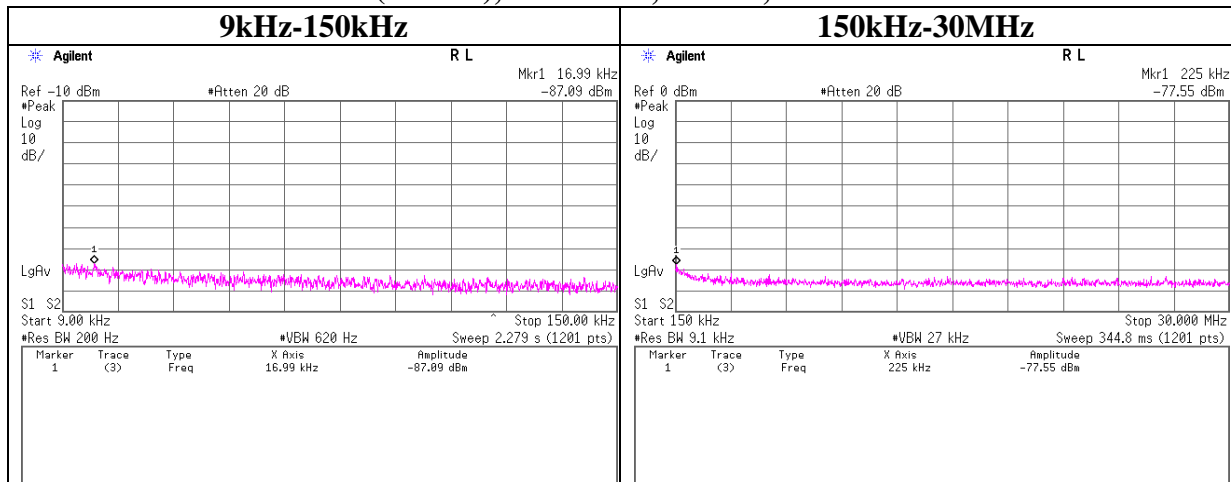


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
10.18	-87.3	0.0	5.9	5.11	2	37.0	-36.3	-27.0	9.3	
150.00	-78.4	0.0	5.9	5.11	2	20.4	-44.0	-27.0	17.0	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

### Conducted Spurious Emission

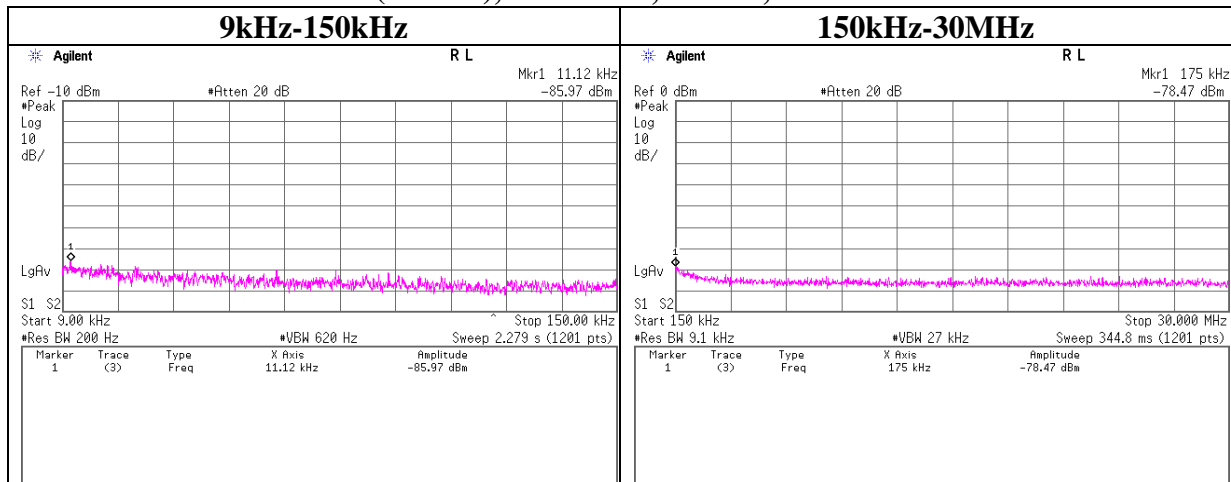
#### 11n-20(MIMO), Antenna 0, MCS 8, Tx 5300MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
16.99	-87.1	0.0	5.9	5.11	2	37.0	-36.0	-27.0	9.0	
225.00	-77.6	0.0	5.9	5.11	2	20.4	-43.2	-27.0	16.2	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

#### 11n-20(MIMO), Antenna 0, MCS 8, Tx 5320MHz

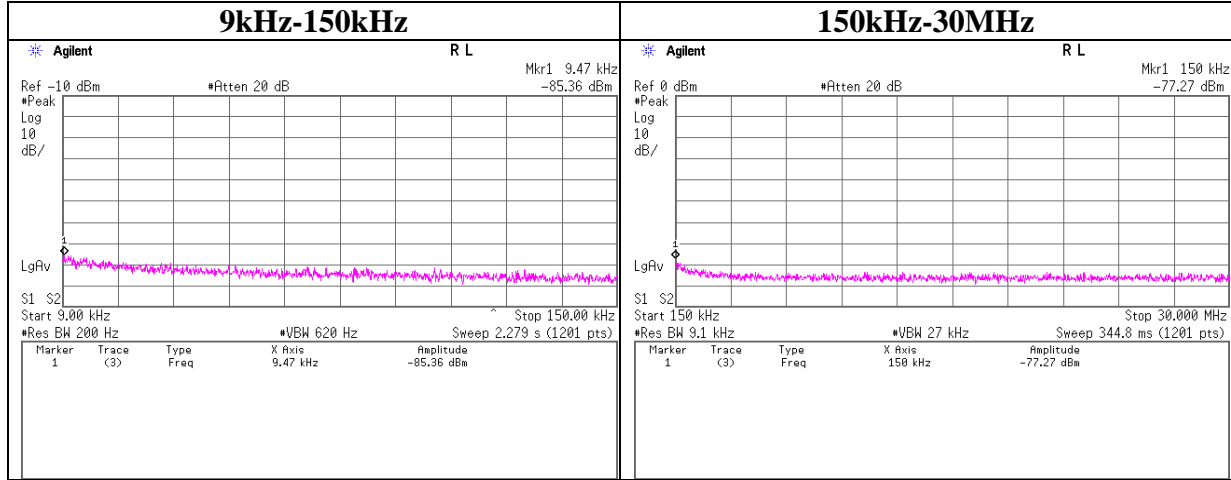


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
11.12	-86.0	0.0	5.9	5.11	2	37.0	-34.9	-27.0	7.9	
175.00	-78.5	0.0	5.9	5.11	2	20.4	-44.1	-27.0	17.1	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

**Conducted Spurious Emission**

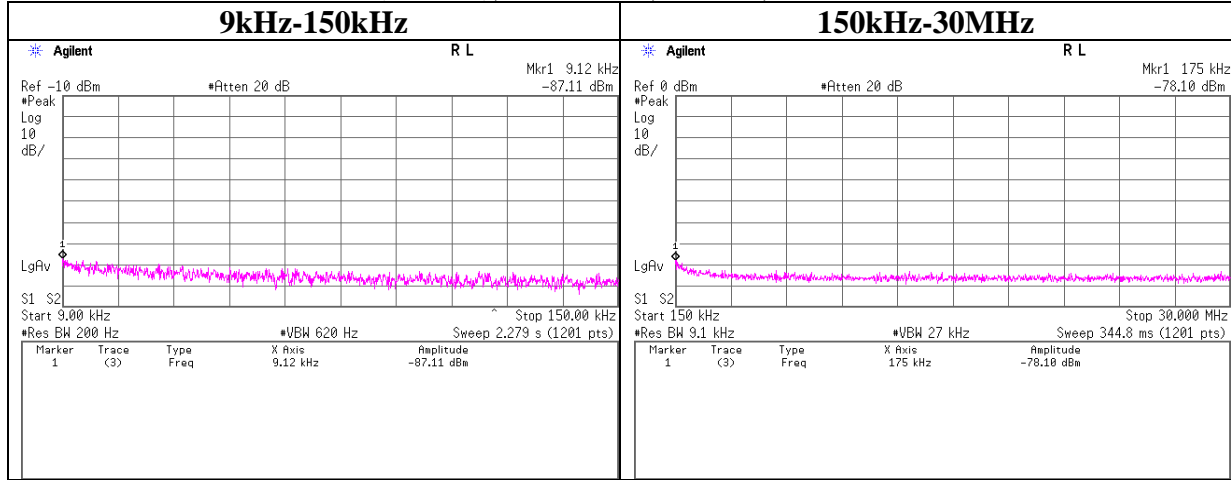
**11n-40(MIMO), Antenna 1, MCS 8, Tx 5190MHz**



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
9.47	-85.4	0.0	5.9	5.11	2	37.0	-34.3	-27.0	7.3	
150.00	-77.3	0.0	5.9	5.11	2	20.4	-42.9	-27.0	15.9	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

**11n-40(MIMO), Antenna 1, MCS 8, Tx 5230MHz**

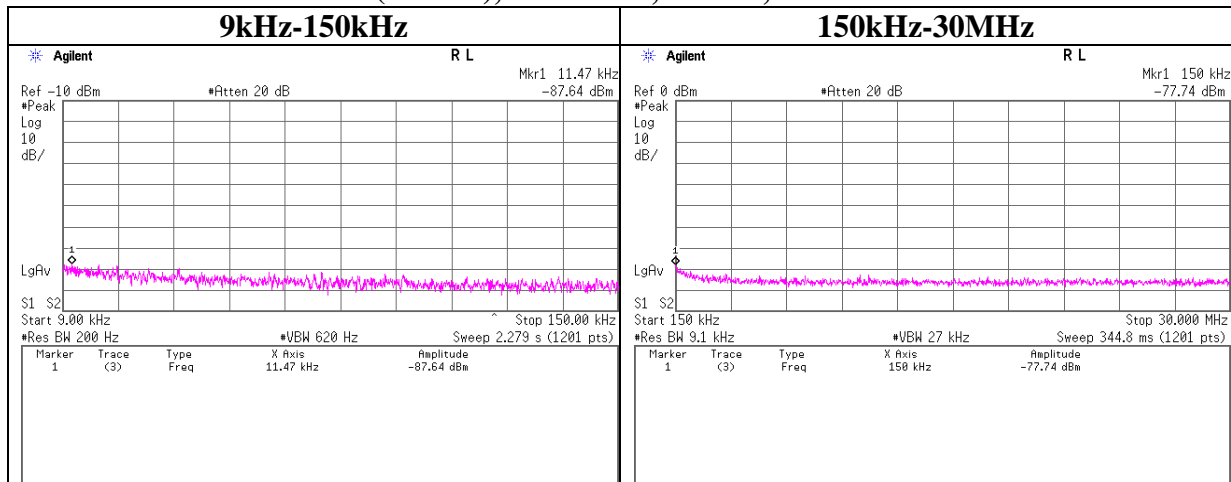


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
9.12	-87.1	0.0	5.9	5.11	2	37.0	-36.0	-27.0	9.0	
175.00	-78.1	0.0	5.9	5.11	2	20.4	-43.7	-27.0	16.7	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

### Conducted Spurious Emission

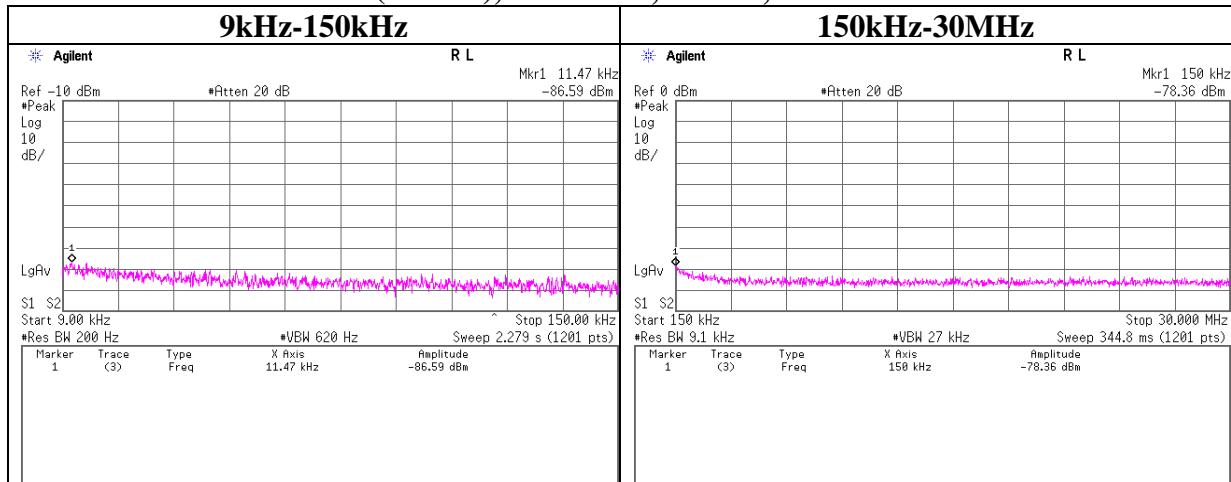
#### 11n-40(MIMO), Antenna 1, MCS 8, Tx 5270MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
11.47	-87.6	0.0	5.9	5.11	2	37.0	-36.6	-27.0	9.6	
150.00	-77.7	0.0	5.9	5.11	2	20.4	-43.3	-27.0	16.3	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor

#### 11n-40(MIMO), Antenna 1, MCS 8, Tx 5310MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	N (Number of Output)	RBW factor [dB]	EIRP [dBm]	Limit [dBm]	Margin [dB]	Remark
11.47	-86.6	0.0	5.9	5.11	2	37.0	-35.5	-27.0	8.5	
150.00	-78.4	0.0	5.9	5.11	2	20.4	-44.0	-27.0	17.0	

EIRP=Reading + Cable Loss + Attenuator + Antenna Gain + 10\*LOG(N) + RBW factor



### Peak Excursion Ratio

Test place Head Office EMC Lab. No.4 Measurement Room  
Report No. 31JE0038-HO-01  
Date 05/10/2012  
Temperature/ Humidity 22deg.C. / 57%  
Engineer Yutaka Yoshida  
Mode 11a Tx, 54Mbps  
Mode 11n-20(MIMO) Tx, MCS 8  
Mode 11n-40(MIMO) Tx, MCS 8

#### 11a

Antenna	Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
1	5180	9.91	13.00
	5220	10.03	13.00
	5240	10.42	13.00
	5260	10.47	13.00
	5300	9.80	13.00
	5320	9.95	13.00

#### 11n-20(MIMO)

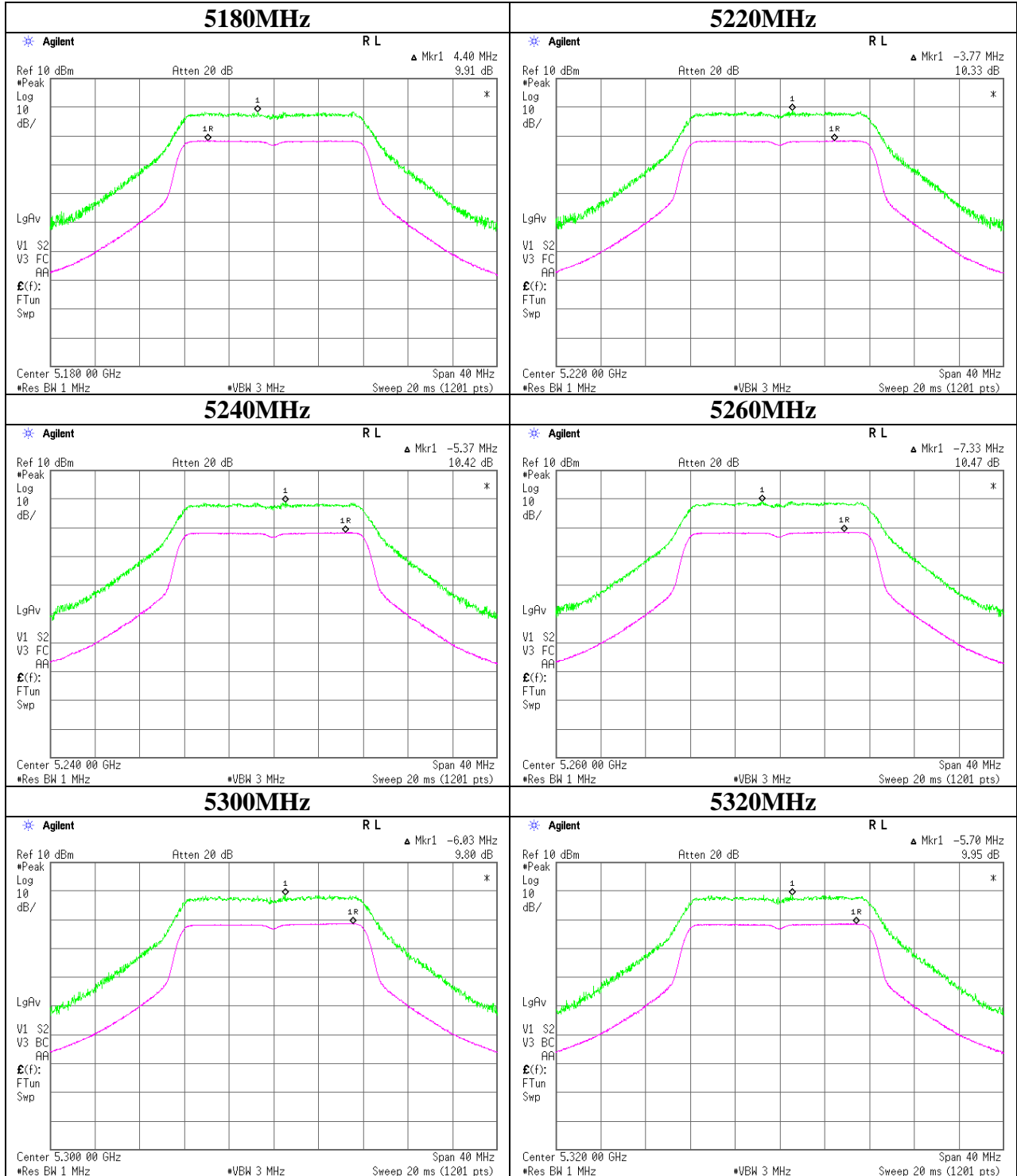
Antenna	Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
0	5180	11.12	13.00
	5220	10.63	13.00
	5240	10.51	13.00
	5260	10.05	13.00
	5300	10.48	13.00
	5320	10.45	13.00

#### 11n-40(MIMO)

Antenna	Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
1	5190	11.04	13.00
	5230	10.82	13.00
	5270	10.82	13.00
	5310	10.64	13.00

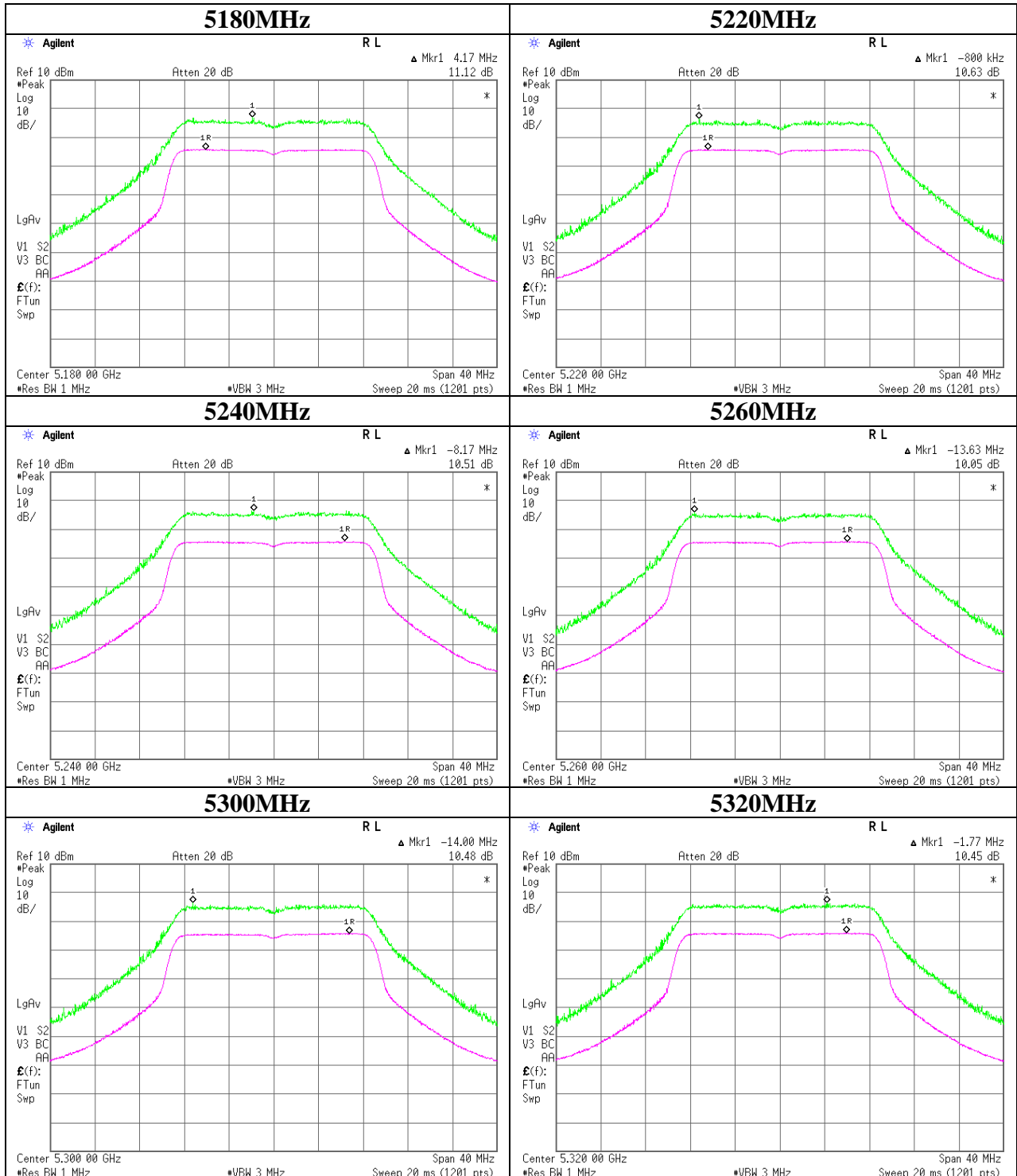
**Peak Excursion Ratio**

**11a Antenna 1**



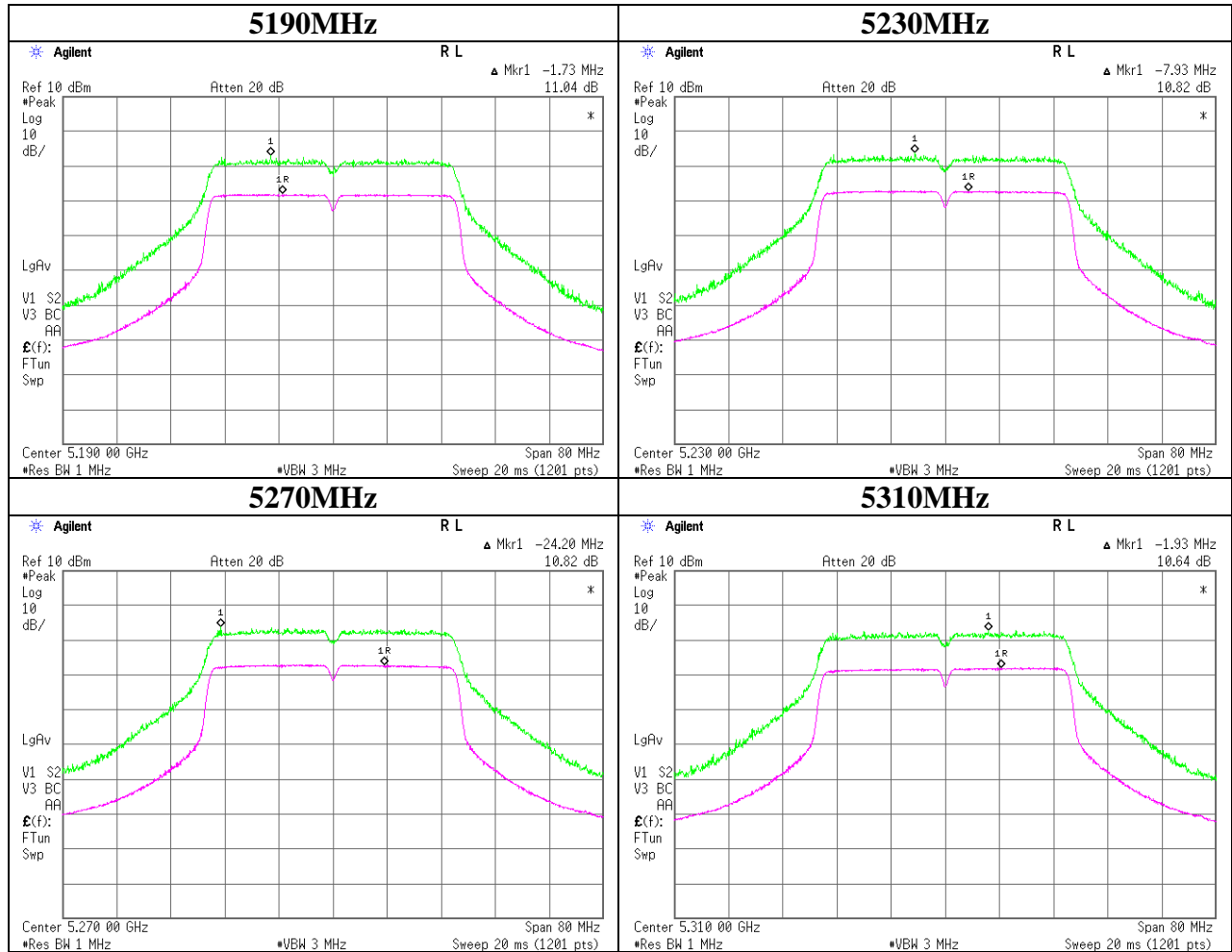
**Peak Excursion Ratio**

**11n-20 Antenna 0**



## Peak Excursion Ratio

### 11n-40 Antenna 1



## APPENDIX 2: Test instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2012/04/06 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MCC-103	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2011/06/24 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2011/06/23 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MCC-105	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2011/06/24 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MOS-23	Thermo-Hygrometer	Custom	CTH-201	0004	AT	2011/12/09 * 12
MCC-31	Coaxial cable	UL Japan	-	-	AT	2011/07/28 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	AT	2011/11/02 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2012/02/03 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2011/05/23 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2012/03/21 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MHF-22	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCB	602	RE	2012/01/28 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2011/12/08 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE	2011/11/23 * 12
APRCV05	Test Receiver	Rohde & Schwarz	ESS	840456/008	RE	2012/01/16 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	CE	-
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	CE	2012/04/05 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(AE)	2012/02/09 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2011/07/04 * 12

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Facsimile : +81 596 24 8124

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  
AT: Antenna Terminal Conducted test