RADIO TEST REPORT

Test Report No. : 32HE0123-SH-01-A

Applicant	:	**Sony Corporation**
Type of Equipment	:	**Digital HD Video Camera Recorder**
Model No.	:	**HDR-AS15**
FCC ID	:	**AK8HDRAS15**
Test regulation	:	**FCC Part15 Subpart C: 2012**
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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: March 22 to 28, 2012

Representative test engineer:

Tatsuya Arai
Engineer of WiSE Japan,
UL Verification Service

Approved by :

Toyokazu Imamura
Leader of WiSE Japan,
UL Verification Service

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☒ There is no testing item of "Non-accreditation".

JAB Testing RTL02610

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REVISION HISTORY

Original Test Report No.: 32HE0123-SH-01-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	32HE0123-SH-01-A	April 6, 2012	-	-
1	32HE0123-SH-01-A	May 9, 2012	P1-2, 4, 7, 10, 31	P4: Correction of clock frequency P7: Correction of Remarks *2) P10: Addition of Detection P31: Correction of description on data
2	32HE0123-SH-01-A	May 9, 2012	P1-2, 4	P4: Correction of comments for FCC 15.31 (e)
3	32HE0123-SH-01-A	May 10, 2012	P1-2, 4	P4: Correction of comments for FCC 15.31 (e)

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SECTION 1: Customer information

Company Name	:	Sony Corporation
Brand Name	:	SONY
Address	:	Shinagawa INTERCITY C Tower 2-15-3, Konan Minato-ku, Tokyo, 108-6201 Japan
Telephone Number	:	+81-3-5769-5640
Facsimile Number	:	+81-3-5769-5996
Contact Person	:	Toshihiro Maeda

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Digital HD Video Camera Recorder
Model No.	:	HDR-AS15
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC3.6V
Receipt Date of Sample	:	March 22, 2012
Country of Mass-production	:	China
Condition of EUT	:	Engineering 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: HDR-AS15 (referred to as the EUT in this report) is a Digital HD Video Camera Recorder.

Clock frequency(ies) in the system : 32.768kHz, 12MHz, 16.368MHz, 26MHz

Radio specification

Equipment type	:	Transceiver
Frequency of operation	:	2412-2462MHz
Bandwidth & channel spacing	:	20MHz & 5MHz
Type of modulation	:	DSSS: CCK,DQPSK, DBPSK OFDM: 64QAM, 16QAM, QPSK, BPSK
Antenna type	:	Inverted F(chip)
Antenna connector type	:	None
Antenna gain with cable loss	:	-6.98 dBi
ITU code	:	D1D, G1D
Operation temperature range	:	0 to +40 deg.C.

FCC 15.31 (e)
This EUT provides stable voltage (DC1.8V / DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2012, final revised on February 1, 2012
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

The EUT will be tested for the compliance with FCC Part 15 Subpart B by the customer.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	4.3dB Freq.: 0.52663MHz Detector: Average Phase: N Mode: Tx 2437MHz, IEEE 802.11g	Complied
6dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(2) & 15.209	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(3) & 15.209	Conducted	N/A		Complied
Spurious emission & Restricted band edges	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	3.5dB Freq.: 741.753MHz Detector: Quasi-Peak Polarization: Vertical Mode: Tx 2437MHz, IEEE 802.11g	Complied
Power density	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (e) & 15.209	Conducted	N/A	* See data	Complied
Note: UL Japan's EMI Work Procedures No.13-EM-W0420 and 13-EM-W0422 These tests were also referred to "Guidance on Measurement for Digital Transmission Systems Section15.247".						

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	-
Note: UL Japan's EMI Work Procedures No.13-EM-W0420 and 13-EM-W0422					

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

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.6 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	5.0 dB
	300MHz-1GHz	5.0 dB	5.2 dB	5.0 dB
	1GHz-13GHz	4.8 dB	4.8 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	13GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.8 dB	4.3 dB	4.4 dB

*1: SAC=Semi-Anechoic Chamber
*2: SR= Shielded Room is applied besides radiated emission

Conducted emission test

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

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB
Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB
Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB
Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB
Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB
Bandwidth measurement uncertainty for this test was: (±) 5.4%

3.5 Test location

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Facsimile number : +81 463 50 6401
JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐ No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Full-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☒ No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☒ No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

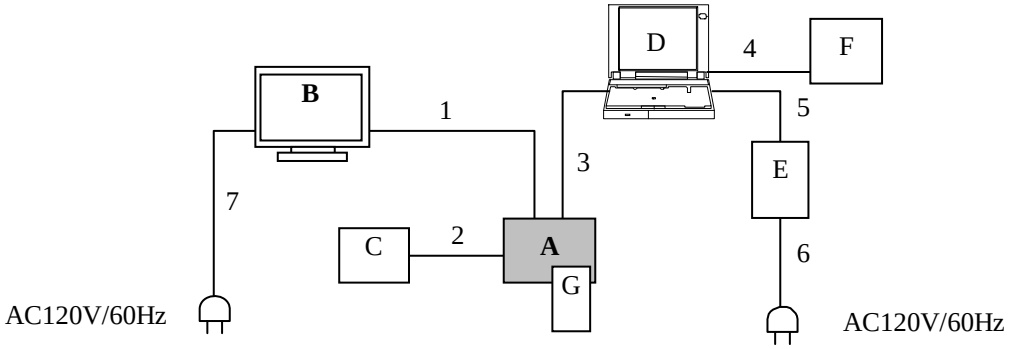
4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Mode	Tested frequency	Power setting *1)	Worst data rate *2)
Conducted emission & Radiated emission (below 1GHz) *3)	Transmitting IEEE 802.11g	2437MHz,	7	48Mbps, PN9
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	7	11Mbps, PN9
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	7	48Mbps, PN9
	Transmitting IEEE 802.11n-20	2412MHz, 2437MHz, 2462MHz	7	MCS3, PN9
*1) Software: Tera Term Ver.4.68 *2) The worst condition was determined based on the test result of Maximum Peak Output Power. *3) 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.				

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital HD Video Camera Recorder	HDR-AS15	*1)	SONY	EUT
B	LCD Monitor	ET-0019-N	ETH2901919026	BEN Q	-
C	Electret Condenser Microphone	ECM-MSD1	-	SONY	-
D	Laptop computer	PCG-6K1L	28241031 3003640	SONY	-
E	AC adaptor	VGP-AC19V10	147911451 1005323	SONY	-
F	All-Terrain Hand Disk	Rugged	1327906220105QR	LACIE	-
G	Memory Stick Micro	MS-M8	-	SONY	-

*1) Conducted / Radiated emission: 82, Other test: 80

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	HDMI	1.5	Shielded	Shielded	-
2	Stereo	0.3	Shielded	Shielded	-
3	USB	1.0	Shielded	Shielded	-
4	IEEE 1384	1.8	Shielded	Shielded	-
5	DC	1.8	Unshielded	Unshielded	-
6	AC	1.0	Unshielded	Unshielded	-
7	AC	1.5	Unshielded	Unshielded	-

***** All cables used for the measurement are exclusive use or marketed.

SECTION 5: Conducted emission

5.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was 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 LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.
Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via PC within a shielded room.
The EUT was connected to a Line Impedance Stabilization Network (LISN) via PC.
An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, an average detector.
The conducted emission measurements were made with the following detector of the test receiver.

Detector Type : Quasi-Peak/ Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

SECTION 6: 6dB bandwidth & Occupied bandwidth (99%)

Test procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 7: Maximum peak output power

Test procedure
The Maximum Peak Output Power was measured with a power meter connected to the antenna port.
Detection type: Peak / Average *1)

Summary of the test results: Pass
Refer to APPENDIX 1

*1) Testing using an average detector was performed in order to confirm that the output power of the EUT met the exclusion limits stated in FCC Part 2 Section 2.1093 and FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET 65 and the EUT was exempt from RF exposure SAR evaluation.

SECTION 8: Spurious emission (Antenna port conducted)

Test procedure
The spurious emission was measured with a spectrum analyzer connected to the antenna port.
In any 100kHz bandwidth outside the frequency 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.
In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 9: Radiated emission

9.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

9.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in APPENDIX 3.

9.3 Test conditions

Frequency range : 30MHz to 25GHz
EUT position : Table top

9.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detection of the test receiver and spectrum analyzer.

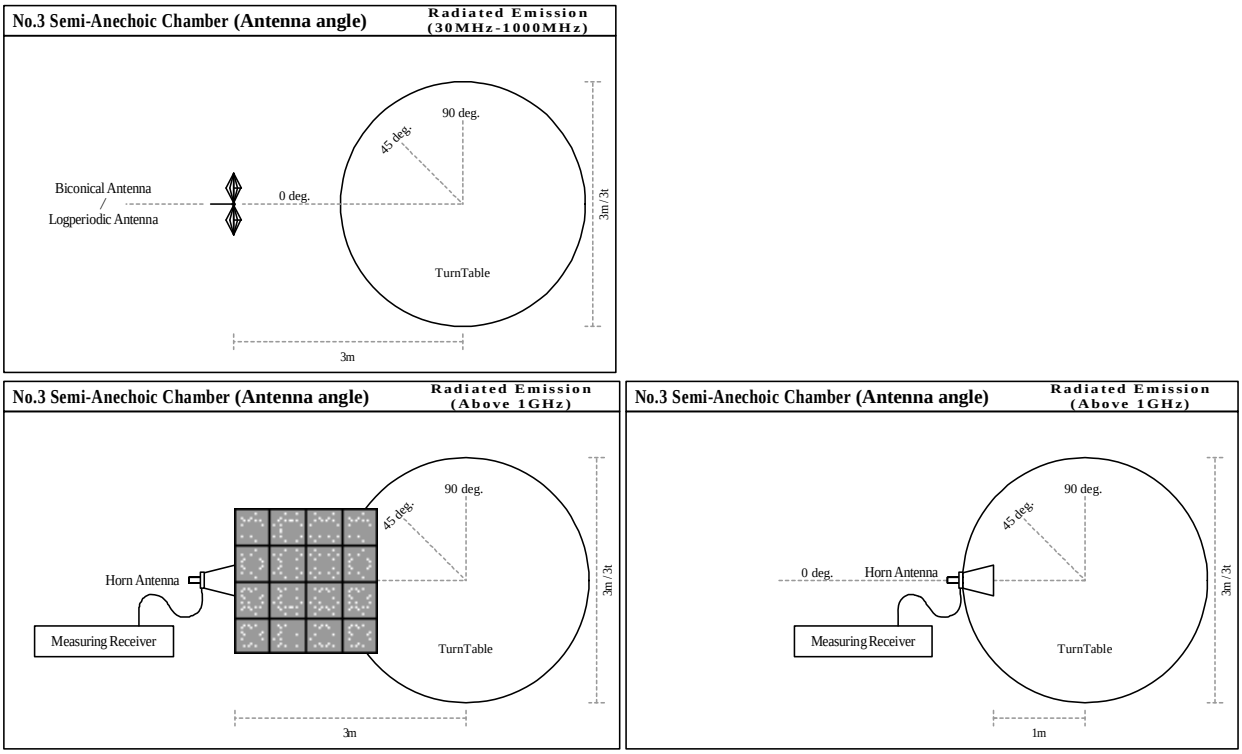
Frequency	30-1000MHz	1-25GHz	
Detection type	Quasi-Peak	Peak	* Average
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz

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

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

	Carrier	Spurious		
		Below 1GHz	1-15GHz	15-25GHz
Horizontal	Y	Y	Y	Y
Vertical	X	Y	X	X

Figure 1. Antenna angle



9.5 Band edge

Band edge level is below the limits of FCC 15.209. Refer to the data.

9.6 Results

Summary of the test results : Pass *No noise was detected above the 6th order harmonics.
Refer to APPENDIX 1

SECTION 10: Peak Power density

Test procedure
The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used : Spectrum Analyzer *1)
RBW / VBW : 30kHz / 100kHz *2)

*1) PSD Option 1 of " Measurement of Digital Transmission Systems Operating under Section 15.247".
*2) The test was not performed at RBW: 3kHz that was stated in the Regulation. However, the measurement value with RBW: 3kHz is less than the value of RBW: 30kHz and the test data met the limit with RBW: 30kHz.

Summary of the test results: Pass
Refer to APPENDIX 1

Contents of APPENDIXES

APPENDIX 1: Test data

Conducted emission
6dB bandwidth
Maximum peak output power
Radiated emission
Spurious emission (Antenna port conducted)
Peak power density
99% Occupied bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of the worst position

DATA OF CONDUCTED EMISSION TEST

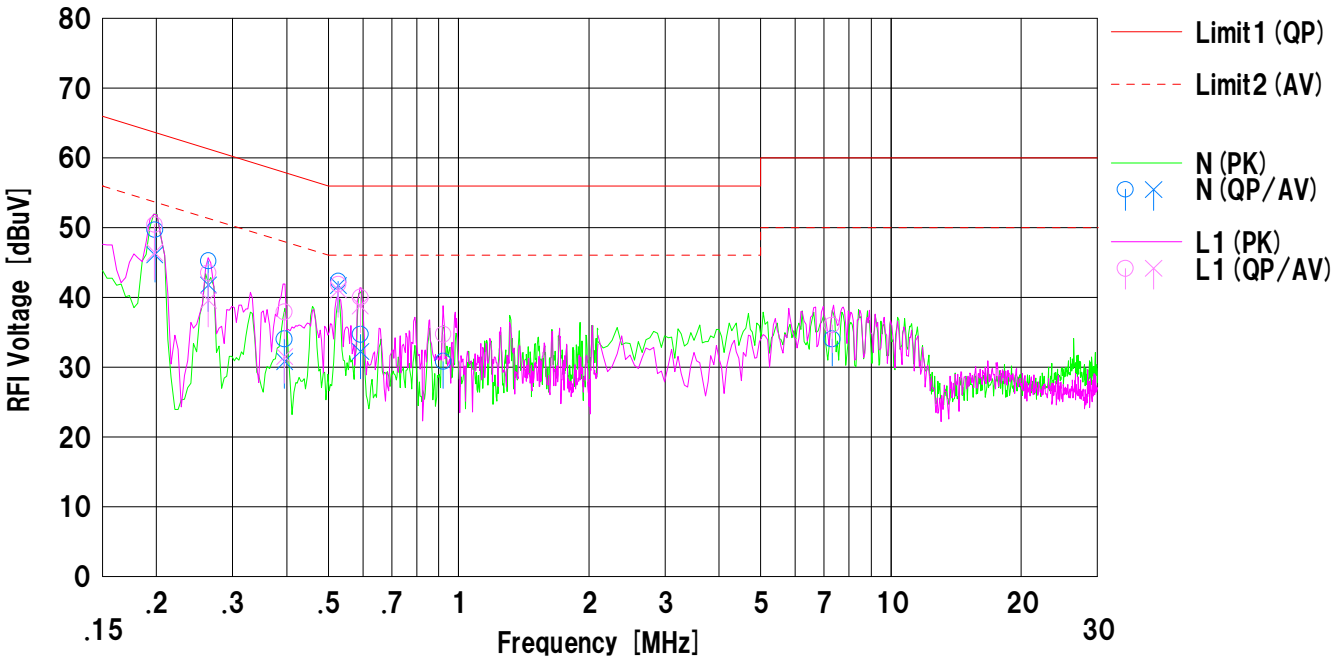
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2012/03/28

Company	: Sony Corporation	Mode	: Tx 11g 2437MHz
Kind of EUT	: Digital HD Video Camera Recorder	Report No.	: 32HE0123-SH-01-A
Model No.	: HDR-AS15	Power	: DC3.6V
Serial No.	: 82	Temp./Humi.	: 23deg.C. / 31%RH

Remarks : -

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tatsuya Arai



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.19825	37.1	33.5	12.6	49.7	46.1	63.6	53.6	13.9	7.5	N	
2	0.26350	32.6	29.2	12.6	45.2	41.8	61.3	51.3	16.1	9.5	N	
3	0.39538	21.3	18.1	12.7	34.0	30.8	57.9	47.9	23.9	17.1	N	
4	0.52663	29.6	29.0	12.7	42.3	41.7	56.0	46.0	13.7	4.3	N	
5	0.59288	22.0	19.5	12.7	34.7	32.2	56.0	46.0	21.3	13.8	N	
6	0.92175	18.1	---	12.7	30.8	---	56.0	46.0	25.2	---	N	
7	7.30563	21.0	---	13.0	34.0	---	60.0	50.0	26.0	---	N	
8	0.19800	37.8	33.8	12.6	50.4	46.4	63.6	53.6	13.2	7.2	L1	
9	0.26375	30.9	27.0	12.6	43.5	39.6	61.3	51.3	17.8	11.7	L1	
10	0.39550	25.2	18.8	12.7	37.9	31.5	57.9	47.9	20.0	16.4	L1	
11	0.52638	29.2	28.3	12.7	41.9	41.0	56.0	46.0	14.1	5.0	L1	
12	0.59250	27.3	26.1	12.7	40.0	38.8	56.0	46.0	16.0	7.2	L1	
13	0.92075	22.0	---	12.7	34.7	---	56.0	46.0	21.3	---	L1	
14	7.30115	23.0	---	13.0	36.0	---	60.0	50.0	24.0	---	L1	

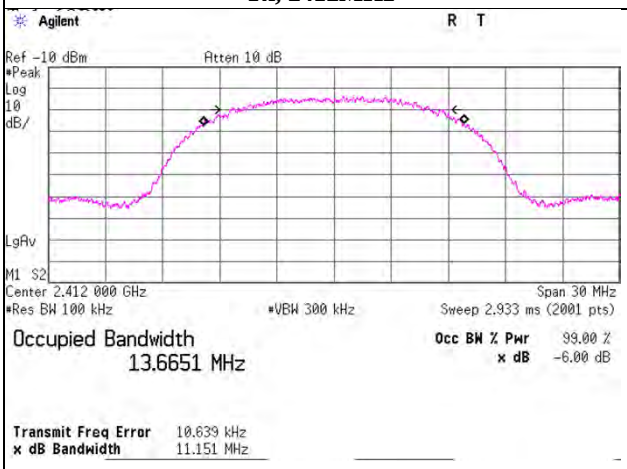
Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-05

-6dB Bandwidth

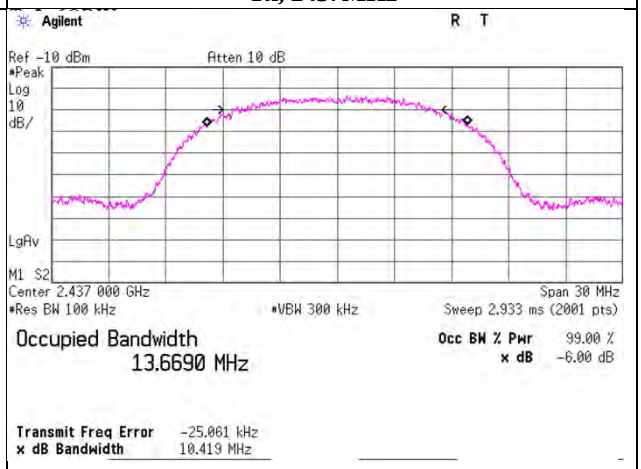
Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 11Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	11.151	> 0.500
2437.0000	10.419	> 0.500
2462.0000	10.487	> 0.500

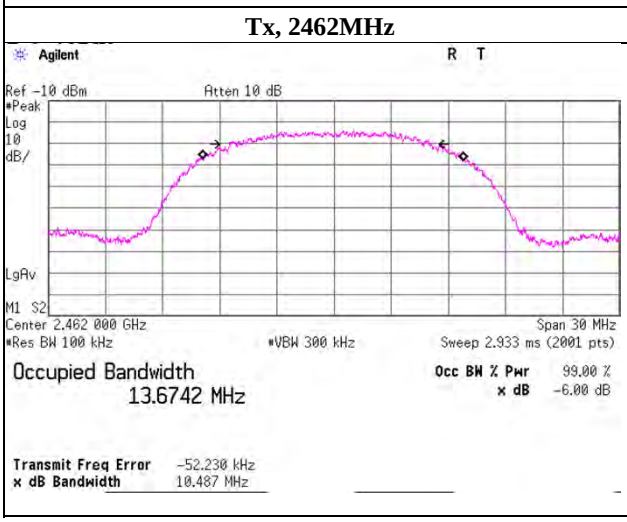
Tx, 2412MHz

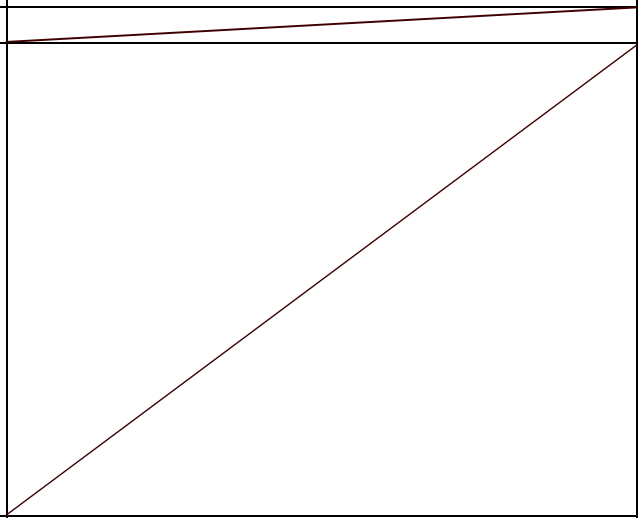


Tx, 2437MHz



Tx, 2462MHz





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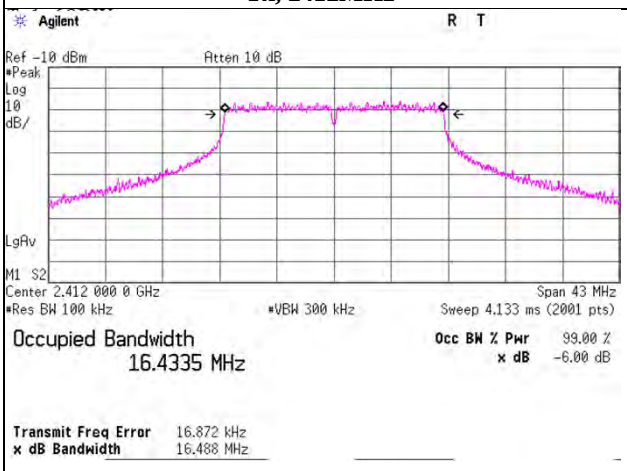
-6dB Bandwidth

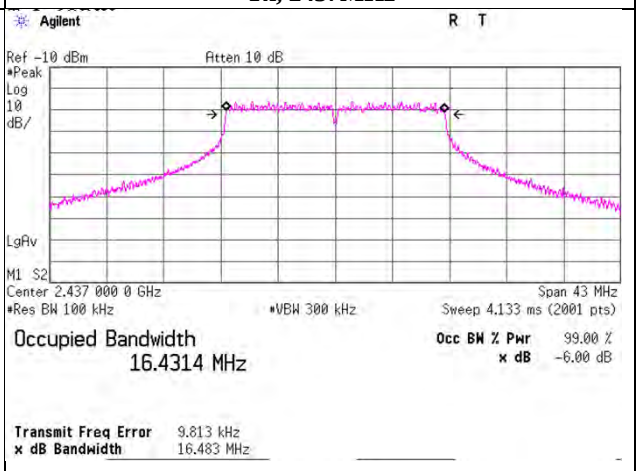
Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.488	> 0.500
2437.0000	16.483	> 0.500
2462.0000	16.483	> 0.500

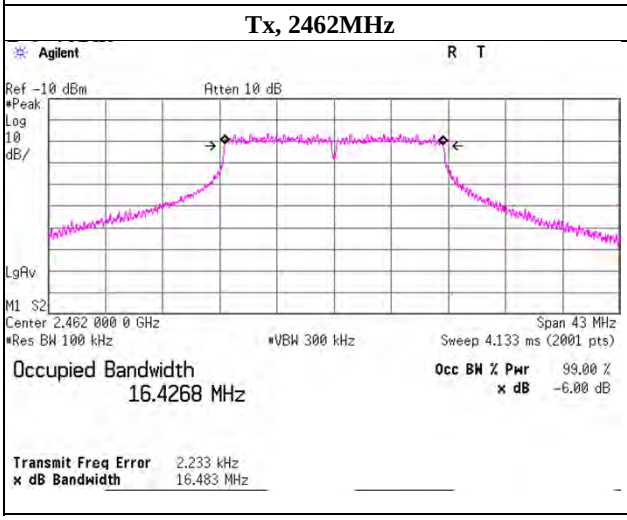
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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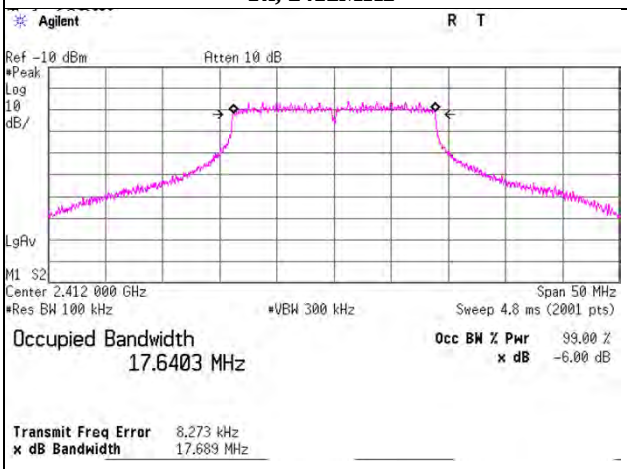
-6dB Bandwidth

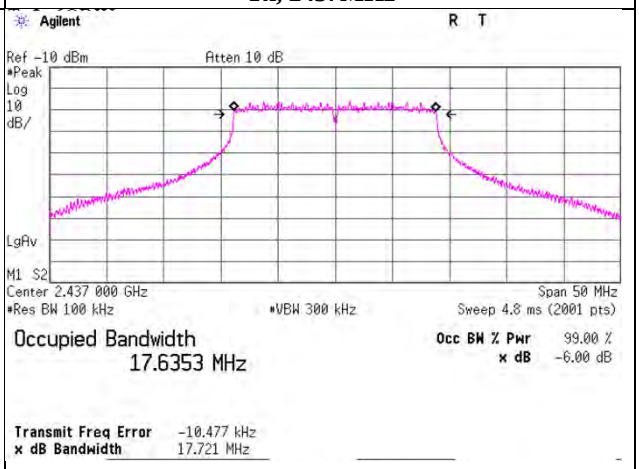
Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11n, PN9, worst data mode 3(MCS)	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	17.689	> 0.500
2437.0000	17.721	> 0.500
2462.0000	17.698	> 0.500

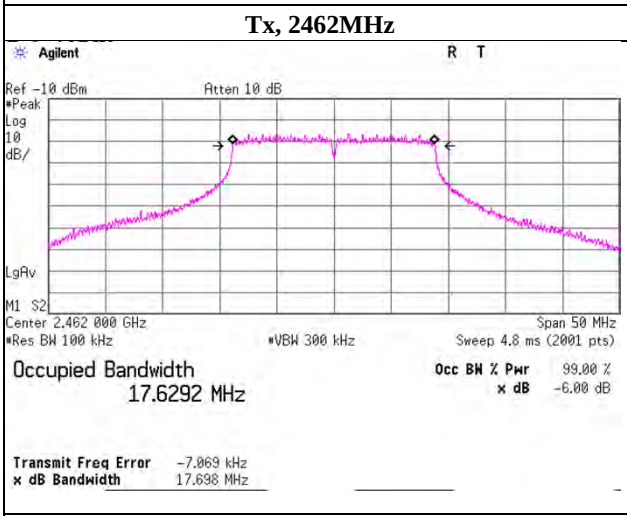
Tx, 2412MHz

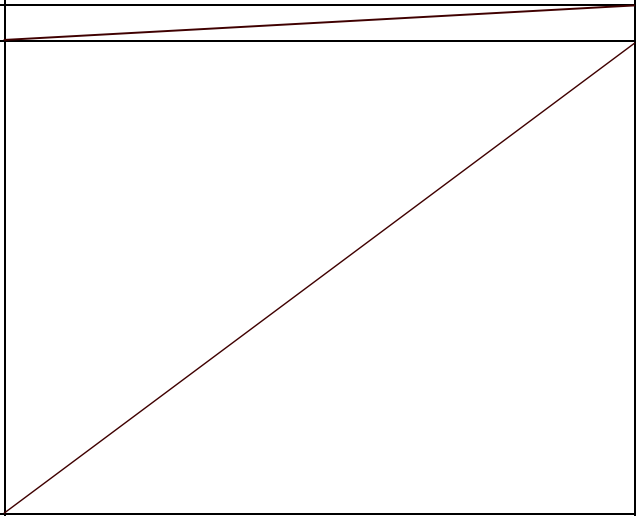


Tx, 2437MHz



Tx, 2462MHz





Peak Output Power (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room	
Date	3/22/2012		
Temperature / Humidity	23deg.C , 32%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11b, PN9,	worst data mode :	11 Mbps

(* P/M: Power Meter with power sensor)

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	-11.75	1.26	20.01	9.52	8.95	30.00	1000	20.48
Mid	2437.0	-11.78	1.26	20.01	9.49	8.89	30.00	1000	20.51
High	2462.0	-12.10	1.27	20.01	9.18	8.28	30.00	1000	20.82

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

[Pre check]

	Data rate	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
	[Mbps]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
	1	2437.0	-11.80	1.26	20.01	9.47	8.85	30.00	1000	20.53	
	2	2437.0	-11.96	1.26	20.01	9.31	8.53	30.00	1000	20.69	
	5.5	2437.0	-11.87	1.26	20.01	9.40	8.71	30.00	1000	20.60	
	11	2437.0	-11.78	1.26	20.01	**9.49**	8.89	30.00	1000	**20.51**	**Worst**

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

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Peak Output Power (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room	
Date	3/22/2012		
Temperature / Humidity	23deg.C , 32%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11g, PN9,	worst data mode :	48 Mbps

(* P/M: Power Meter with power sensor)

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	-5.89	1.26	20.01	15.38	34.51	30.00	1000	14.62
Mid	2437.0	-5.27	1.26	20.01	16.00	39.81	30.00	1000	14.00
High	2462.0	-5.61	1.27	20.01	15.67	36.90	30.00	1000	14.33

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

[Pre check]

	Data rate	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
	[Mbps]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
	6	2437.0	-5.32	1.26	20.01	15.95	39.36	30.00	1000	14.05	
	9	2437.0	-5.34	1.26	20.01	15.93	39.17	30.00	1000	14.07	
	12	2437.0	-5.41	1.26	20.01	15.86	38.55	30.00	1000	14.14	
	18	2437.0	-5.37	1.26	20.01	15.90	38.90	30.00	1000	14.10	
	24	2437.0	-5.36	1.26	20.01	15.91	38.99	30.00	1000	14.09	
	36	2437.0	-5.33	1.26	20.01	15.94	39.26	30.00	1000	14.06	
	48	2437.0	-5.27	1.26	20.01	**16.00**	39.81	30.00	1000	**14.00**	**Worst**
	54	2437.0	-5.34	1.26	20.01	15.93	39.17	30.00	1000	14.07	

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

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Peak Output Power (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room	
Date	3/22/2012		
Temperature / Humidity	23deg.C , 32%RH		
Engineer	Akio Hayashi		
Mode	Tx, IEEE802.11n, PN9,	worst data mode :	3 (MCS)

(* P/M: Power Meter with power sensor)

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	-5.89	1.26	20.01	15.38	34.51	30.00	1000	14.62
Mid	2437.0	-5.31	1.26	20.01	15.96	39.45	30.00	1000	14.04
High	2462.0	-5.83	1.27	20.01	15.45	35.08	30.00	1000	14.55

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

[Pre check]

Mode	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	
(MCS)	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	
0	2437.0	-5.45	1.26	20.01	15.82	38.19	30.00	1000	14.18	
1	2437.0	-5.48	1.26	20.01	15.79	37.93	30.00	1000	14.21	
2	2437.0	-5.38	1.26	20.01	15.89	38.82	30.00	1000	14.11	
3	2437.0	-5.31	1.26	20.01	**15.96**	39.45	30.00	1000	**14.04**	**Worst**
4	2437.0	-5.51	1.26	20.01	15.76	37.67	30.00	1000	14.24	
5	2437.0	-5.42	1.26	20.01	15.85	38.46	30.00	1000	14.15	
6	2437.0	-5.33	1.26	20.01	15.94	39.26	30.00	1000	14.06	
7	2437.0	-5.58	1.26	20.01	15.69	37.07	30.00	1000	14.31	

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

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Average Output Power (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx	

[11b] (* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]
Low	2412.0	-14.35	1.26	20.01	6.92	4.92
Mid	2437.0	-14.40	1.26	20.01	6.87	4.86
High	2462.0	-14.77	1.27	20.01	6.51	4.48

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

[11g] (* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]
Low	2412.0	-14.83	1.26	20.01	6.44	4.41
Mid	2437.0	-14.71	1.26	20.01	6.56	4.53
High	2462.0	-15.05	1.27	20.01	6.23	4.20

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

[11n] (* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Average) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]
Low	2412.0	-14.51	1.26	20.01	6.76	4.74
Mid	2437.0	-14.74	1.26	20.01	6.53	4.50
High	2462.0	-14.70	1.27	20.01	6.58	4.55

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2412 MHz			
	Tx, IEEE802.11b, PN9, worst data mode 11Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	53.3	25.0	12.9	40.8	50.4	73.9	23.5	100	122	
Hori.	2386.380	PK	46.3	27.2	13.8	41.1	46.2	73.9	27.7	113	158	
Hori.	2390.000	PK	47.6	27.2	13.8	41.1	47.5	73.9	26.4	113	158	
Hori.	2397.980	PK	48.3	27.3	13.8	41.1	48.3	73.9	25.6	113	158	
Hori.	2400.000	PK	48.4	27.3	13.8	41.1	48.4	73.9	25.5	113	158	
Hori.	2966.956	PK	54.4	28.6	5.5	41.4	47.1	73.9	26.8	107	178	
Hori.	4302.218	PK	52.6	30.3	5.8	41.6	47.1	73.9	26.8	100	93	
Hori.	4450.463	PK	55.7	30.4	5.9	41.5	50.5	73.9	23.4	100	93	
Hori.	4824.000	PK	46.6	31.1	5.9	41.0	42.6	73.9	31.3	100	175	
Hori.	7236.000	PK	46.8	36.6	7.4	41.3	49.5	73.9	24.4	100	0	
Hori.	9648.000	PK	44.7	38.2	8.6	38.8	52.7	73.9	21.2	100	0	
Hori.	12060.000	PK	44.1	39.3	10.2	39.2	54.4	73.9	19.5	100	0	
Hori.	1440.000	AV	46.2	25.0	12.9	40.8	43.3	53.9	10.6	100	122	
Hori.	2386.380	AV	35.9	27.2	13.8	41.1	35.8	53.9	18.1	113	158	
Hori.	2390.000	AV	35.4	27.2	13.8	41.1	35.3	53.9	18.6	113	158	
Hori.	2397.980	AV	37.7	27.3	13.8	41.1	37.7	53.9	16.2	113	158	
Hori.	2400.000	AV	36.9	27.3	13.8	41.1	36.9	53.9	17.0	113	158	
Hori.	2966.956	AV	46.8	28.6	5.5	41.4	39.5	53.9	14.4	107	178	
Hori.	4302.218	AV	45.8	30.3	5.8	41.6	40.3	53.9	13.6	100	93	
Hori.	4450.463	AV	48.1	30.4	5.9	41.5	42.9	53.9	11.0	100	93	
Hori.	4824.000	AV	36.7	31.1	5.9	41.0	32.7	53.9	21.2	100	175	
Hori.	7236.000	AV	36.0	36.6	7.4	41.3	38.7	53.9	15.2	100	0	
Hori.	9648.000	AV	32.4	38.2	8.6	38.8	40.4	53.9	13.5	100	0	
Hori.	12060.000	AV	34.0	39.3	10.2	39.2	44.3	53.9	9.6	100	0	
Vert.	1440.000	PK	49.5	25.0	12.9	40.8	46.6	73.9	27.3	100	0	
Vert.	2386.380	PK	47.0	27.2	13.8	41.1	46.9	73.9	27.0	119	177	
Vert.	2390.000	PK	46.8	27.2	13.8	41.1	46.7	73.9	27.2	119	177	
Vert.	2397.980	PK	47.9	27.3	13.8	41.1	47.9	73.9	26.0	119	177	
Vert.	2400.000	PK	47.4	27.3	13.8	41.1	47.4	73.9	26.5	119	177	
Vert.	2966.974	PK	52.9	28.6	5.5	41.4	45.6	73.9	28.3	100	202	
Vert.	4302.198	PK	50.2	30.3	5.8	41.6	44.7	73.9	29.2	100	118	
Vert.	4450.489	PK	53.6	30.4	5.9	41.5	48.4	73.9	25.5	100	119	
Vert.	4824.000	PK	46.8	31.1	5.9	41.0	42.8	73.9	31.1	100	206	
Vert.	7236.000	PK	47.2	36.6	7.4	41.3	49.9	73.9	24.0	100	0	
Vert.	9648.000	PK	43.2	38.2	8.6	38.8	51.2	73.9	22.7	100	0	
Vert.	12060.000	PK	45.2	39.3	10.2	39.2	55.5	73.9	18.4	100	0	
Vert.	1440.000	AV	40.4	25.0	12.9	40.8	37.5	53.9	16.4	100	0	
Vert.	2386.380	AV	35.4	27.2	13.8	41.1	35.3	53.9	18.6	119	177	
Vert.	2390.000	AV	35.4	27.2	13.8	41.1	35.3	53.9	18.6	119	177	
Vert.	2397.980	AV	36.8	27.3	13.8	41.1	36.8	53.9	17.1	119	177	
Vert.	2400.000	AV	36.3	27.3	13.8	41.1	36.3	53.9	17.6	119	177	
Vert.	2966.974	AV	44.4	28.6	5.5	41.4	37.1	53.9	16.8	100	202	
Vert.	4302.198	AV	41.2	30.3	5.8	41.6	35.7	53.9	18.2	100	118	
Vert.	4450.489	AV	45.4	30.4	5.9	41.5	40.2	53.9	13.7	100	119	
Vert.	4824.000	AV	36.9	31.1	5.9	41.0	32.9	53.9	21.0	100	206	
Vert.	7236.000	AV	36.6	36.6	7.4	41.3	39.3	53.9	14.6	100	0	
Vert.	9648.000	AV	33.0	38.2	8.6	38.8	41.0	53.9	12.9	100	0	
Vert.	12060.000	AV	34.3	39.3	10.2	39.2	44.6	53.9	9.3	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2437 MHz			
	Tx, IEEE802.11b, PN9, worst data mode 11Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	53.3	25.0	12.9	40.8	50.4	73.9	23.5	100	122	
Hori.	2966.993	PK	52.6	28.6	5.5	41.4	45.3	73.9	28.6	108	179	
Hori.	4302.115	PK	53.3	30.3	5.8	41.6	47.8	73.9	26.1	100	88	
Hori.	4450.453	PK	56.3	30.4	5.9	41.5	51.1	73.9	22.8	100	95	
Hori.	4874.000	PK	47.1	31.2	5.9	41.0	43.2	73.9	30.7	100	169	
Hori.	7311.000	PK	47.0	36.7	7.5	41.4	49.8	73.9	24.1	100	0	
Hori.	9748.000	PK	44.0	38.5	8.6	38.8	52.3	73.9	21.6	100	0	
Hori.	12185.000	PK	44.5	39.3	10.2	39.2	54.8	73.9	19.1	100	0	
Hori.	1440.000	AV	45.9	25.0	12.9	40.8	43.0	53.9	10.9	100	122	
Hori.	2966.993	AV	44.8	28.6	5.5	41.4	37.5	53.9	16.4	108	179	
Hori.	4302.115	AV	46.7	30.3	5.8	41.6	41.2	53.9	12.7	100	88	
Hori.	4450.453	AV	47.9	30.4	5.9	41.5	42.7	53.9	11.2	100	95	
Hori.	4874.000	AV	36.5	31.2	5.9	41.0	32.6	53.9	21.3	100	169	
Hori.	7311.000	AV	36.7	36.7	7.5	41.4	39.5	53.9	14.4	100	0	
Hori.	9748.000	AV	33.2	38.5	8.6	38.8	41.5	53.9	12.4	100	0	
Hori.	12185.000	AV	34.2	39.3	10.2	39.2	44.5	53.9	9.4	100	0	
Vert.	1440.000	PK	49.3	25.0	12.9	40.8	46.4	73.9	27.5	100	148	
Vert.	2966.978	PK	52.2	28.6	5.5	41.4	44.9	73.9	29.0	100	170	
Vert.	4302.188	PK	50.5	30.3	5.8	41.6	45.0	73.9	28.9	100	123	
Vert.	4451.309	PK	54.3	30.4	5.9	41.5	49.1	73.9	24.8	100	120	
Vert.	4874.000	PK	46.6	31.2	5.9	41.0	42.7	73.9	31.2	100	188	
Vert.	7311.000	PK	47.0	36.7	7.5	41.4	49.8	73.9	24.1	100	0	
Vert.	9748.000	PK	43.8	38.5	8.6	38.8	52.1	73.9	21.8	100	0	
Vert.	12185.000	PK	45.1	39.3	10.2	39.2	55.4	73.9	18.5	100	0	
Vert.	1440.000	AV	40.7	25.0	12.9	40.8	37.8	53.9	16.1	100	148	
Vert.	2966.978	AV	44.0	28.6	5.5	41.4	36.7	53.9	17.2	100	170	
Vert.	4302.188	AV	41.7	30.3	5.8	41.6	36.2	53.9	17.7	100	123	
Vert.	4451.309	AV	45.6	30.4	5.9	41.5	40.4	53.9	13.5	100	120	
Vert.	4874.000	AV	36.5	31.2	5.9	41.0	32.6	53.9	21.3	100	188	
Vert.	7311.000	AV	36.6	36.7	7.5	41.4	39.4	53.9	14.5	100	0	
Vert.	9748.000	AV	33.1	38.5	8.6	38.8	41.4	53.9	12.5	100	0	
Vert.	12185.000	AV	34.1	39.3	10.2	39.2	44.4	53.9	9.5	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2462 MHz			
	Tx, IEEE802.11b, PN9, worst data mode 11Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	51.0	25.0	12.9	40.8	48.1	73.9	25.8	100	121	
Hori.	2483.500	PK	47.6	27.5	13.8	41.1	47.8	73.9	26.1	104	172	
Hori.	2966.991	PK	51.6	28.6	5.5	41.4	44.3	73.9	29.6	112	206	
Hori.	4302.121	PK	52.9	30.3	5.8	41.6	47.4	73.9	26.5	100	85	
Hori.	4450.502	PK	56.2	30.4	5.9	41.5	51.0	73.9	22.9	100	90	
Hori.	4924.000	PK	47.8	31.3	5.9	40.9	44.1	73.9	29.8	100	173	
Hori.	7386.000	PK	46.3	36.9	7.5	41.4	49.3	73.9	24.6	100	0	
Hori.	9848.000	PK	42.8	38.7	8.6	38.8	51.3	73.9	22.6	100	0	
Hori.	12310.000	PK	44.7	39.4	10.2	39.2	55.1	73.9	18.8	100	0	
Hori.	1440.000	AV	43.8	25.0	12.9	40.8	40.9	53.9	13.0	100	121	
Hori.	2483.500	AV	35.3	27.5	13.8	41.1	35.5	53.9	18.4	104	172	
Hori.	2966.991	AV	42.9	28.6	5.5	41.4	35.6	53.9	18.3	112	206	
Hori.	4302.121	AV	46.5	30.3	5.8	41.6	41.0	53.9	12.9	100	85	
Hori.	4450.502	AV	48.4	30.4	5.9	41.5	43.2	53.9	10.7	100	90	
Hori.	4924.000	AV	36.8	31.3	5.9	40.9	33.1	53.9	20.8	100	173	
Hori.	7386.000	AV	36.7	36.9	7.5	41.4	39.7	53.9	14.2	100	0	
Hori.	9848.000	AV	33.2	38.7	8.6	38.8	41.7	53.9	12.2	100	0	
Hori.	12310.000	AV	33.6	39.4	10.2	39.2	44.0	53.9	9.9	100	0	
Vert.	1440.000	PK	49.5	25.0	12.9	40.8	46.6	73.9	27.3	100	151	
Vert.	2483.500	PK	47.3	27.5	13.8	41.1	47.5	73.9	26.4	113	181	
Vert.	2967.003	PK	51.9	28.6	5.5	41.4	44.6	73.9	29.3	100	168	
Vert.	4302.084	PK	50.1	30.3	5.8	41.6	44.6	73.9	29.3	100	131	
Vert.	4450.466	PK	52.8	30.4	5.9	41.5	47.6	73.9	26.3	100	119	
Vert.	4924.000	PK	47.0	31.3	5.9	40.9	43.3	73.9	30.6	100	184	
Vert.	7386.000	PK	47.2	36.9	7.5	41.4	50.2	73.9	23.7	100	0	
Vert.	9848.000	PK	43.4	38.7	8.6	38.8	51.9	73.9	22.0	100	0	
Vert.	12310.000	PK	44.0	39.4	10.2	39.2	54.4	73.9	19.5	100	0	
Vert.	1440.000	AV	41.5	25.0	12.9	40.8	38.6	53.9	15.3	100	151	
Vert.	2483.500	AV	35.4	27.5	13.8	41.1	35.6	53.9	18.3	113	181	
Vert.	2967.003	AV	43.8	28.6	5.5	41.4	36.5	53.9	17.4	100	168	
Vert.	4302.084	AV	41.5	30.3	5.8	41.6	36.0	53.9	17.9	100	131	
Vert.	4450.466	AV	45.1	30.4	5.9	41.5	39.9	53.9	14.0	100	119	
Vert.	4924.000	AV	36.6	31.3	5.9	40.9	32.9	53.9	21.0	100	184	
Vert.	7386.000	AV	36.9	36.9	7.5	41.4	39.9	53.9	14.0	100	0	
Vert.	9848.000	AV	33.4	38.7	8.6	38.8	41.9	53.9	12.0	100	0	
Vert.	12310.000	AV	34.0	39.4	10.2	39.2	44.4	53.9	9.5	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2412 MHz			
	Tx, IEEE802.11g, PN9, worst data mode 48Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	50.0	25.0	12.9	40.8	47.1	73.9	26.8	100	124	
Hori.	2390.000	PK	48.3	27.2	13.8	41.1	48.2	73.9	25.7	109	175	
Hori.	2400.000	PK	62.0	27.3	13.8	41.1	62.0	73.9	11.9	109	175	
Hori.	2966.962	PK	51.5	28.6	5.5	41.4	44.2	73.9	29.7	110	190	
Hori.	4302.152	PK	53.1	30.3	5.8	41.6	47.6	73.9	26.3	100	85	
Hori.	4450.472	PK	55.9	30.4	5.9	41.5	50.7	73.9	23.2	100	93	
Hori.	4824.000	PK	46.6	31.1	5.9	41.0	42.6	73.9	31.3	100	0	
Hori.	7236.000	PK	47.8	36.6	7.4	41.3	50.5	73.9	23.4	100	0	
Hori.	9648.000	PK	43.4	38.2	8.6	38.8	51.4	73.9	22.5	100	0	
Hori.	12060.000	PK	44.3	39.3	10.2	39.2	54.6	73.9	19.3	100	0	
Hori.	1440.000	AV	42.8	25.0	12.9	40.8	39.9	53.9	14.0	100	124	
Hori.	2390.000	AV	35.9	27.2	13.8	41.1	35.8	53.9	18.1	109	175	
Hori.	2400.000	AV	46.5	27.3	13.8	41.1	46.5	53.9	7.4	109	175	
Hori.	2966.962	AV	43.4	28.6	5.5	41.4	36.1	53.9	17.8	110	190	
Hori.	4302.152	AV	46.2	30.3	5.8	41.6	40.7	53.9	13.2	100	85	
Hori.	4450.472	AV	48.5	30.4	5.9	41.5	43.3	53.9	10.6	100	93	
Hori.	4824.000	AV	35.7	31.1	5.9	41.0	31.7	53.9	22.2	100	0	
Hori.	7236.000	AV	36.6	36.6	7.4	41.3	39.3	53.9	14.6	100	0	
Hori.	9648.000	AV	33.0	38.2	8.6	38.8	41.0	53.9	12.9	100	0	
Hori.	12060.000	AV	34.1	39.3	10.2	39.2	44.4	53.9	9.5	100	0	
Vert.	1440.000	PK	47.9	25.0	12.9	40.8	45.0	73.9	28.9	100	135	
Vert.	2390.000	PK	49.5	27.2	13.8	41.1	49.4	73.9	24.5	118	135	
Vert.	2400.000	PK	61.2	27.3	13.8	41.1	61.2	73.9	12.7	118	135	
Vert.	2966.928	PK	51.5	28.6	5.5	41.4	44.2	73.9	29.7	100	170	
Vert.	4302.177	PK	50.4	30.3	5.8	41.6	44.9	73.9	29.0	100	119	
Vert.	4450.434	PK	53.8	30.4	5.9	41.5	48.6	73.9	25.3	100	121	
Vert.	4824.000	PK	45.6	31.1	5.9	41.0	41.6	73.9	32.3	100	0	
Vert.	7236.000	PK	47.9	36.6	7.4	41.3	50.6	73.9	23.3	100	0	
Vert.	9648.000	PK	42.9	38.2	8.6	38.8	50.9	73.9	23.0	100	0	
Vert.	12060.000	PK	45.3	39.3	10.2	39.2	55.6	73.9	18.3	100	0	
Vert.	1440.000	AV	39.6	25.0	12.9	40.8	36.7	53.9	17.2	100	135	
Vert.	2390.000	AV	36.0	27.2	13.8	41.1	35.9	53.9	18.0	118	135	
Vert.	2400.000	AV	46.0	27.3	13.8	41.1	46.0	53.9	7.9	118	135	
Vert.	2966.928	AV	43.7	28.6	5.5	41.4	36.4	53.9	17.5	100	170	
Vert.	4302.177	AV	41.6	30.3	5.8	41.6	36.1	53.9	17.8	100	119	
Vert.	4450.434	AV	45.4	30.4	5.9	41.5	40.2	53.9	13.7	100	121	
Vert.	4824.000	AV	35.6	31.1	5.9	41.0	31.6	53.9	22.3	100	0	
Vert.	7236.000	AV	36.5	36.6	7.4	41.3	39.2	53.9	14.7	100	0	
Vert.	9648.000	AV	33.0	38.2	8.6	38.8	41.0	53.9	12.9	100	0	
Vert.	12060.000	AV	34.1	39.3	10.2	39.2	44.4	53.9	9.5	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2437 MHz			
	Tx, IEEE802.11g, PN9, worst data mode 48Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	145.895	QP	44.1	14.6	7.6	32.1	34.2	43.5	9.3	242	244	
Hori.	498.055	QP	37.7	17.7	9.5	31.9	33.0	46.0	13.0	187	12	
Hori.	741.753	QP	41.2	20.8	10.2	31.7	40.5	46.0	5.5	150	233	
Hori.	1440.000	PK	53.2	25.0	12.9	40.8	50.3	73.9	23.6	110	119	
Hori.	2966.979	PK	52.6	28.6	5.5	41.4	45.3	73.9	28.6	111	190	
Hori.	4302.171	PK	52.9	30.3	5.8	41.6	47.4	73.9	26.5	100	84	
Hori.	4450.514	PK	56.2	30.4	5.9	41.5	51.0	73.9	22.9	100	94	
Hori.	4874.000	PK	46.1	31.2	5.9	41.0	42.2	73.9	31.7	100	0	
Hori.	7311.000	PK	47.2	36.7	7.5	41.4	50.0	73.9	23.9	100	0	
Hori.	9748.000	PK	43.0	38.5	8.6	38.8	51.3	73.9	22.6	100	0	
Hori.	12185.000	PK	44.6	39.3	10.2	39.2	54.9	73.9	19.0	100	0	
Hori.	1440.000	AV	45.5	25.0	12.9	40.8	42.6	53.9	11.3	110	119	
Hori.	2966.979	AV	45.2	28.6	5.5	41.4	37.9	53.9	16.0	111	190	
Hori.	4302.171	AV	46.4	30.3	5.8	41.6	40.9	53.9	13.0	100	84	
Hori.	4450.514	AV	48.2	30.4	5.9	41.5	43.0	53.9	10.9	100	94	
Hori.	4874.000	AV	35.7	31.2	5.9	41.0	31.8	53.9	22.1	100	0	
Hori.	7311.000	AV	36.6	36.7	7.5	41.4	39.4	53.9	14.5	100	0	
Hori.	9748.000	AV	32.3	38.5	8.6	38.8	40.6	53.9	13.3	100	0	
Hori.	12185.000	AV	33.2	39.3	10.2	39.2	43.5	53.9	10.4	100	0	
Vert.	32.264	QP	42.7	17.1	6.6	32.1	34.3	40.0	5.7	100	153	
Vert.	58.716	QP	52.0	8.6	6.8	32.1	35.3	40.0	4.7	100	81	
Vert.	143.095	QP	45.1	14.5	7.5	32.1	35.0	43.5	8.5	100	256	
Vert.	498.055	QP	41.5	17.7	9.5	31.9	36.8	46.0	9.2	100	140	
Vert.	741.753	QP	43.2	20.8	10.2	31.7	42.5	46.0	3.5	100	10	
Vert.	1440.000	PK	47.9	25.0	12.9	40.8	45.0	73.9	28.9	100	149	
Vert.	2966.935	PK	50.5	28.6	5.5	41.4	43.2	73.9	30.7	100	171	
Vert.	4302.115	PK	50.0	30.3	5.8	41.6	44.5	73.9	29.4	100	121	
Vert.	4450.510	PK	54.4	30.4	5.9	41.5	49.2	73.9	24.7	100	118	
Vert.	4874.000	PK	46.7	31.2	5.9	41.0	42.8	73.9	31.1	100	0	
Vert.	7311.000	PK	47.0	36.7	7.5	41.4	49.8	73.9	24.1	100	0	
Vert.	9748.000	PK	43.4	38.5	8.6	38.8	51.7	73.9	22.2	100	0	
Vert.	12185.000	PK	44.2	39.3	10.2	39.2	54.5	73.9	19.4	100	0	
Vert.	1440.000	AV	40.0	25.0	12.9	40.8	37.1	53.9	16.8	100	149	
Vert.	2966.935	AV	40.8	28.6	5.5	41.4	33.5	53.9	20.4	100	171	
Vert.	4302.115	AV	41.9	30.3	5.8	41.6	36.4	53.9	17.5	100	121	
Vert.	4450.510	AV	45.9	30.4	5.9	41.5	40.7	53.9	13.2	100	118	
Vert.	4874.000	AV	35.7	31.2	5.9	41.0	31.8	53.9	22.1	100	0	
Vert.	7311.000	AV	36.4	36.7	7.5	41.4	39.2	53.9	14.7	100	0	
Vert.	9748.000	AV	33.0	38.5	8.6	38.8	41.3	53.9	12.6	100	0	
Vert.	12185.000	AV	33.9	39.3	10.2	39.2	44.2	53.9	9.7	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2462 MHz			
	Tx, IEEE802.11g, PN9, worst data mode 48Mbps			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	53.3	25.0	12.9	40.8	50.4	73.9	23.5	100	120	
Hori.	2483.500	PK	50.9	27.5	13.8	41.1	51.1	73.9	22.8	100	153	
Hori.	2966.975	PK	51.2	28.6	5.5	41.4	43.9	73.9	30.0	109	200	
Hori.	4302.167	PK	52.8	30.3	5.8	41.6	47.3	73.9	26.6	100	86	
Hori.	4450.447	PK	56.7	30.4	5.9	41.5	51.5	73.9	22.4	100	93	
Hori.	4924.000	PK	46.3	31.3	5.9	40.9	42.6	73.9	31.3	100	0	
Hori.	7386.000	PK	47.2	36.9	7.5	41.4	50.2	73.9	23.7	100	0	
Hori.	9848.000	PK	43.8	38.7	8.6	38.8	52.3	73.9	21.6	100	0	
Hori.	12310.000	PK	44.4	39.4	10.2	39.2	54.8	73.9	19.1	100	0	
Hori.	1440.000	AV	45.6	25.0	12.9	40.8	42.7	53.9	11.2	100	120	
Hori.	2483.500	AV	37.7	27.5	13.8	41.1	37.9	53.9	16.0	100	153	
Hori.	2966.975	AV	43.0	28.6	5.5	41.4	35.7	53.9	18.2	109	200	
Hori.	4302.167	AV	46.4	30.3	5.8	41.6	40.9	53.9	13.0	100	86	
Hori.	4450.447	AV	48.9	30.4	5.9	41.5	43.7	53.9	10.2	100	93	
Hori.	4924.000	AV	36.1	31.3	5.9	40.9	32.4	53.9	21.5	100	0	
Hori.	7386.000	AV	36.9	36.9	7.5	41.4	39.9	53.9	14.0	100	0	
Hori.	9848.000	AV	33.5	38.7	8.6	38.8	42.0	53.9	11.9	100	0	
Hori.	12310.000	AV	33.9	39.4	10.2	39.2	44.3	53.9	9.6	100	0	
Vert.	1440.000	PK	49.3	25.0	12.9	40.8	46.4	73.9	27.5	100	151	
Vert.	2483.500	PK	48.0	27.5	13.8	41.1	48.2	73.9	25.7	117	178	
Vert.	2966.970	PK	49.6	28.6	5.5	41.4	42.3	73.9	31.6	100	170	
Vert.	4302.187	PK	50.0	30.3	5.8	41.6	44.5	73.9	29.4	100	122	
Vert.	4450.531	PK	54.0	30.4	5.9	41.5	48.8	73.9	25.1	100	117	
Vert.	4924.000	PK	46.6	31.3	5.9	40.9	42.9	73.9	31.0	100	0	
Vert.	7386.000	PK	49.0	36.9	7.5	41.4	52.0	73.9	21.9	100	0	
Vert.	9848.000	PK	43.6	38.7	8.6	38.8	52.1	73.9	21.8	100	0	
Vert.	12310.000	PK	43.8	39.4	10.2	39.2	54.2	73.9	19.7	100	0	
Vert.	1440.000	AV	41.0	25.0	12.9	40.8	38.1	53.9	15.8	100	151	
Vert.	2483.500	AV	35.8	27.5	13.8	41.1	36.0	53.9	17.9	117	178	
Vert.	2966.970	AV	41.0	28.6	5.5	41.4	33.7	53.9	20.2	100	170	
Vert.	4302.187	AV	41.6	30.3	5.8	41.6	36.1	53.9	17.8	100	122	
Vert.	4450.531	AV	46.1	30.4	5.9	41.5	40.9	53.9	13.0	100	117	
Vert.	4924.000	AV	35.9	31.3	5.9	40.9	32.2	53.9	21.7	100	0	
Vert.	7386.000	AV	36.2	36.9	7.5	41.4	39.2	53.9	14.7	100	0	
Vert.	9848.000	AV	32.9	38.7	8.6	38.8	41.4	53.9	12.5	100	0	
Vert.	12310.000	AV	33.4	39.4	10.2	39.2	43.8	53.9	10.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2412 MHz			
	Tx, IEEE802.11n, PN9, worst data mode 3(MCS)			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	52.9	25.0	12.9	40.8	50.0	73.9	23.9	109	119	
Hori.	2390.000	PK	51.6	27.2	13.8	41.1	51.5	73.9	22.4	158	159	
Hori.	2400.000	PK	63.2	27.3	13.8	41.1	63.2	73.9	10.7	158	159	
Hori.	2966.961	PK	50.7	28.6	5.5	41.4	43.4	73.9	30.5	115	202	
Hori.	4302.170	PK	52.9	30.3	5.8	41.6	47.4	73.9	26.5	100	83	
Hori.	4450.483	PK	55.8	30.4	5.9	41.5	50.6	73.9	23.3	100	90	
Hori.	4824.000	PK	45.8	31.1	5.9	41.0	41.8	73.9	32.1	100	0	
Hori.	7236.000	PK	47.3	36.6	7.4	41.3	50.0	73.9	23.9	100	0	
Hori.	9648.000	PK	43.8	38.2	8.6	38.8	51.8	73.9	22.1	100	0	
Hori.	12060.000	PK	44.5	39.3	10.2	39.2	54.8	73.9	19.1	100	0	
Hori.	1440.000	AV	45.6	25.0	12.9	40.8	42.7	53.9	11.2	109	119	
Hori.	2390.000	AV	36.4	27.2	13.8	41.1	36.3	53.9	17.6	158	159	
Hori.	2400.000	AV	46.4	27.3	13.8	41.1	46.4	53.9	7.5	158	159	
Hori.	2966.961	AV	42.2	28.6	5.5	41.4	34.9	53.9	19.0	115	202	
Hori.	4302.170	AV	45.6	30.3	5.8	41.6	40.1	53.9	13.8	100	83	
Hori.	4450.483	AV	48.4	30.4	5.9	41.5	43.2	53.9	10.7	100	90	
Hori.	4824.000	AV	35.7	31.1	5.9	41.0	31.7	53.9	22.2	100	0	
Hori.	7236.000	AV	36.5	36.6	7.4	41.3	39.2	53.9	14.7	100	0	
Hori.	9648.000	AV	32.9	38.2	8.6	38.8	40.9	53.9	13.0	100	0	
Hori.	12060.000	AV	34.1	39.3	10.2	39.2	44.4	53.9	9.5	100	0	
Vert.	2390.000	PK	49.2	27.2	13.8	41.1	49.1	73.9	24.8	100	133	
Vert.	2400.000	PK	62.2	27.3	13.8	41.1	62.2	73.9	11.7	100	133	
Vert.	2966.961	PK	51.2	28.6	5.5	41.4	43.9	73.9	30.0	100	171	
Vert.	4302.130	PK	50.2	30.3	5.8	41.6	44.7	73.9	29.2	100	121	
Vert.	4450.473	PK	53.6	30.4	5.9	41.5	48.4	73.9	25.5	100	118	
Vert.	4824.000	PK	46.3	31.1	5.9	41.0	42.3	73.9	31.6	100	0	
Vert.	7236.000	PK	47.4	36.6	7.4	41.3	50.1	73.9	23.8	100	0	
Vert.	9648.000	PK	43.7	38.2	8.6	38.8	51.7	73.9	22.2	100	0	
Vert.	12060.000	PK	44.4	39.3	10.2	39.2	54.7	73.9	19.2	100	0	
Vert.	2390.000	AV	36.3	27.2	13.8	41.1	36.2	53.9	17.7	100	133	
Vert.	2400.000	AV	45.7	27.3	13.8	41.1	45.7	53.9	8.2	100	133	
Vert.	2966.961	AV	41.8	28.6	5.5	41.4	34.5	53.9	19.4	100	171	
Vert.	4302.130	AV	42.2	30.3	5.8	41.6	36.7	53.9	17.2	100	121	
Vert.	4450.473	AV	46.1	30.4	5.9	41.5	40.9	53.9	13.0	100	118	
Vert.	4824.000	AV	35.7	31.1	5.9	41.0	31.7	53.9	22.2	100	0	
Vert.	7236.000	AV	36.6	36.6	7.4	41.3	39.3	53.9	14.6	100	0	
Vert.	9648.000	AV	33.0	38.2	8.6	38.8	41.0	53.9	12.9	100	0	
Vert.	12060.000	AV	34.1	39.3	10.2	39.2	44.4	53.9	9.5	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2437 MHz			
	Tx, IEEE802.11n, PN9, worst data mode 3(MCS)			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	51.7	25.0	12.9	40.8	48.8	73.9	25.1	103	121	
Hori.	2966.968	PK	52.8	28.6	5.5	41.4	45.5	73.9	28.4	109	191	
Hori.	4302.088	PK	53.8	30.3	5.8	41.6	48.3	73.9	25.6	100	87	
Hori.	4450.469	PK	56.1	30.4	5.9	41.5	50.9	73.9	23.0	100	88	
Hori.	4874.000	PK	47.3	31.2	5.9	41.0	43.4	73.9	30.5	100	0	
Hori.	7311.000	PK	46.4	36.7	7.5	41.4	49.2	73.9	24.7	100	0	
Hori.	9748.000	PK	42.9	38.5	8.6	38.8	51.2	73.9	22.7	100	0	
Hori.	12185.000	PK	46.1	39.3	10.2	39.2	56.4	73.9	17.5	100	0	
Hori.	1440.000	AV	44.0	25.0	12.9	40.8	41.1	53.9	12.8	103	121	
Hori.	2966.968	AV	44.6	28.6	5.5	41.4	37.3	53.9	16.6	109	191	
Hori.	4302.088	AV	46.9	30.3	5.8	41.6	41.4	53.9	12.5	100	87	
Hori.	4450.469	AV	48.1	30.4	5.9	41.5	42.9	53.9	11.0	100	88	
Hori.	4874.000	AV	35.8	31.2	5.9	41.0	31.9	53.9	22.0	100	0	
Hori.	7311.000	AV	36.5	36.7	7.5	41.4	39.3	53.9	14.6	100	0	
Hori.	9748.000	AV	32.5	38.5	8.6	38.8	40.8	53.9	13.1	100	0	
Hori.	12185.000	AV	33.4	39.3	10.2	39.2	43.7	53.9	10.2	100	0	
Vert.	1440.000	PK	49.8	25.0	12.9	40.8	46.9	73.9	27.0	100	149	
Vert.	2966.966	PK	50.6	28.6	5.5	41.4	43.3	73.9	30.6	100	169	
Vert.	4302.114	PK	49.7	30.3	5.8	41.6	44.2	73.9	29.7	100	123	
Vert.	4450.437	PK	54.3	30.4	5.9	41.5	49.1	73.9	24.8	100	120	
Vert.	4874.000	PK	45.8	31.2	5.9	41.0	41.9	73.9	32.0	100	0	
Vert.	7311.000	PK	47.2	36.7	7.5	41.4	50.0	73.9	23.9	100	0	
Vert.	9748.000	PK	44.3	38.5	8.6	38.8	52.6	73.9	21.3	100	0	
Vert.	12185.000	PK	44.6	39.3	10.2	39.2	54.9	73.9	19.0	100	0	
Vert.	1440.000	AV	41.5	25.0	12.9	40.8	38.6	53.9	15.3	100	149	
Vert.	2966.966	AV	41.9	28.6	5.5	41.4	34.6	53.9	19.3	100	169	
Vert.	4302.114	AV	41.1	30.3	5.8	41.6	35.6	53.9	18.3	100	123	
Vert.	4450.437	AV	45.3	30.4	5.9	41.5	40.1	53.9	13.8	100	120	
Vert.	4874.000	AV	35.7	31.2	5.9	41.0	31.8	53.9	22.1	100	0	
Vert.	7311.000	AV	36.5	36.7	7.5	41.4	39.3	53.9	14.6	100	0	
Vert.	9748.000	AV	33.1	38.5	8.6	38.8	41.4	53.9	12.5	100	0	
Vert.	12185.000	AV	33.9	39.3	10.2	39.2	44.2	53.9	9.7	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber		
Date	March 23, 2012	March 25, 2012	March 26, 2012	March 28, 2012
Temperature / Humidity	24 deg.C , 30%RH	22 deg.C , 36%RH	22 deg.C , 36%RH	23 deg.C, 31%RH
Engineer	Tatsuya Arai	Shinichi Takano	Hikaru Shirasawa	Tatsuya Arai
Mode	Tx, 2462 MHz			
	Tx, IEEE802.11n, PN9, worst data mode 3(MCS)			

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	1440.000	PK	53.0	25.0	12.9	40.8	50.1	73.9	23.8	100	122	
Hori.	2483.500	PK	48.3	27.5	13.8	41.1	48.5	73.9	25.4	112	156	
Hori.	2967.016	PK	52.4	28.6	5.5	41.4	45.1	73.9	28.8	108	189	
Hori.	4302.183	PK	52.9	30.3	5.8	41.6	47.4	73.9	26.5	100	86	
Hori.	4451.121	PK	56.6	30.4	5.9	41.5	51.4	73.9	22.5	100	86	
Hori.	4924.000	PK	46.0	31.3	5.9	40.9	42.3	73.9	31.6	100	0	
Hori.	7386.000	PK	47.9	36.9	7.5	41.4	50.9	73.9	23.0	100	0	
Hori.	9848.000	PK	44.2	38.7	8.6	38.8	52.7	73.9	21.2	100	0	
Hori.	12310.000	PK	44.0	39.4	10.2	39.2	54.4	73.9	19.5	100	0	
Hori.	1440.000	AV	45.4	25.0	12.9	40.8	42.5	53.9	11.4	100	122	
Hori.	2483.500	AV	35.8	27.5	13.8	41.1	36.0	53.9	17.9	112	156	
Hori.	2967.016	AV	44.3	28.6	5.5	41.4	37.0	53.9	16.9	108	189	
Hori.	4302.183	AV	46.0	30.3	5.8	41.6	40.5	53.9	13.4	100	86	
Hori.	4451.121	AV	48.8	30.4	5.9	41.5	43.6	53.9	10.3	100	86	
Hori.	4924.000	AV	36.0	31.3	5.9	40.9	32.3	53.9	21.6	100	0	
Hori.	7386.000	AV	36.8	36.9	7.5	41.4	39.8	53.9	14.1	100	0	
Hori.	9848.000	AV	32.9	38.7	8.6	38.8	41.4	53.9	12.5	100	0	
Hori.	12310.000	AV	33.3	39.4	10.2	39.2	43.7	53.9	10.2	100	0	
Vert.	1440.000	PK	48.2	25.0	12.9	40.8	45.3	73.9	28.6	100	153	
Vert.	2483.500	PK	50.0	27.5	13.8	41.1	50.2	73.9	23.7	115	180	
Vert.	2967.012	PK	52.6	28.6	5.5	41.4	45.3	73.9	28.6	100	168	
Vert.	4302.131	PK	49.9	30.3	5.8	41.6	44.4	73.9	29.5	100	120	
Vert.	4450.527	PK	54.6	30.4	5.9	41.5	49.4	73.9	24.5	100	119	
Vert.	4924.000	PK	46.4	31.3	5.9	40.9	42.7	73.9	31.2	100	0	
Vert.	7386.000	PK	47.0	36.9	7.5	41.4	50.0	73.9	23.9	100	0	
Vert.	9848.000	PK	43.8	38.7	8.6	38.8	52.3	73.9	21.6	100	0	
Vert.	12310.000	PK	44.2	39.4	10.2	39.2	54.6	73.9	19.3	100	0	
Vert.	1440.000	AV	39.9	25.0	12.9	40.8	37.0	53.9	16.9	100	153	
Vert.	2483.500	AV	36.5	27.5	13.8	41.1	36.7	53.9	17.2	115	180	
Vert.	2967.012	AV	43.7	28.6	5.5	41.4	36.4	53.9	17.5	100	168	
Vert.	4302.131	AV	41.8	30.3	5.8	41.6	36.3	53.9	17.6	100	120	
Vert.	4450.527	AV	46.4	30.4	5.9	41.5	41.2	53.9	12.7	100	119	
Vert.	4924.000	AV	36.1	31.3	5.9	40.9	32.4	53.9	21.5	100	0	
Vert.	7386.000	AV	36.9	36.9	7.5	41.4	39.9	53.9	14.0	100	0	
Vert.	9848.000	AV	33.1	38.7	8.6	38.8	41.6	53.9	12.3	100	0	
Vert.	12310.000	AV	33.8	39.4	10.2	39.2	44.2	53.9	9.7	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier)

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

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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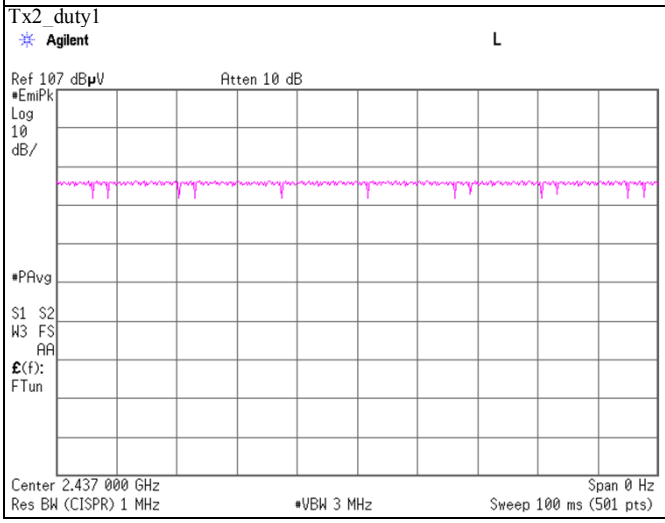
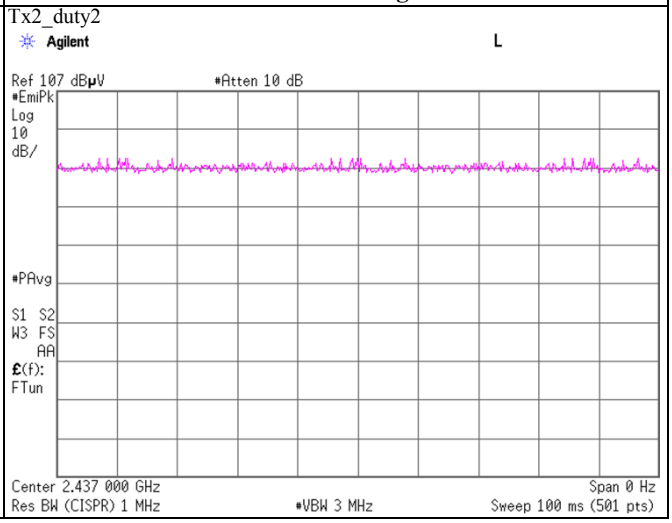
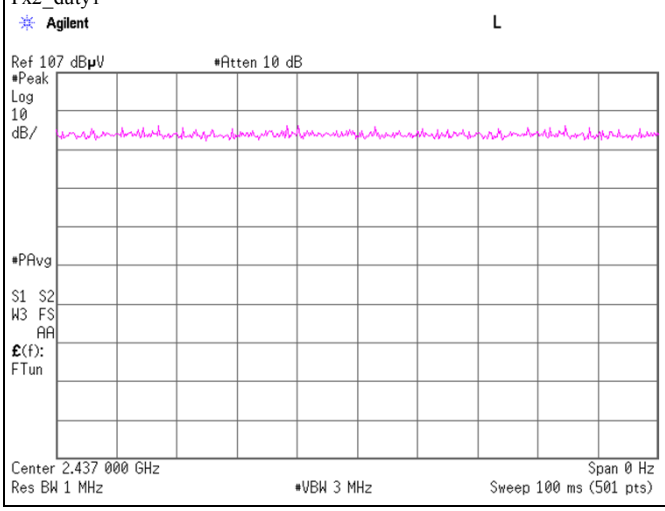
Burst rate confirmation

IEEE802.11b	IEEE802.11g
Tx2_duty1 	Tx2_duty2 

IEEE802.11n-HT20	
Tx2_duty1 	

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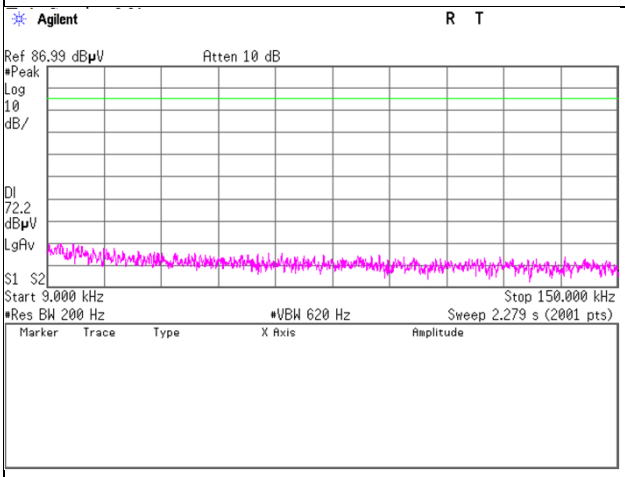
Spurious emission (Conducted)

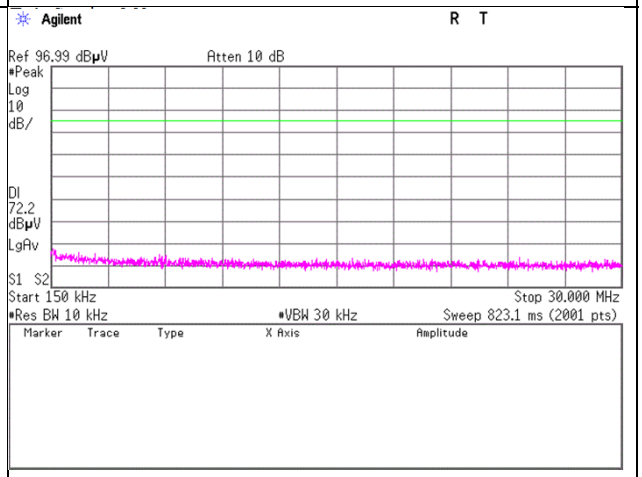
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2412MHz (1/2)

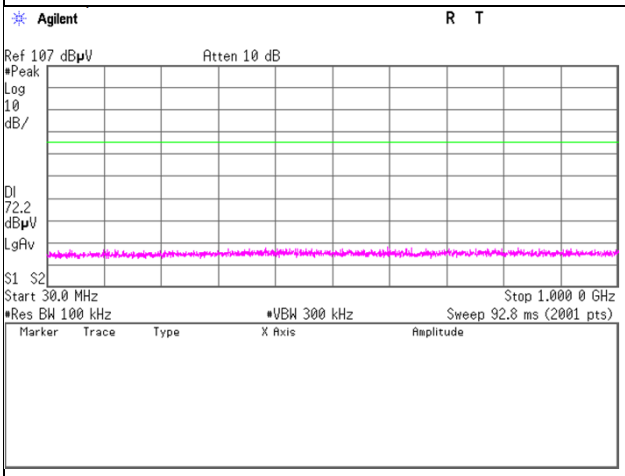
9kHz - 150kHz



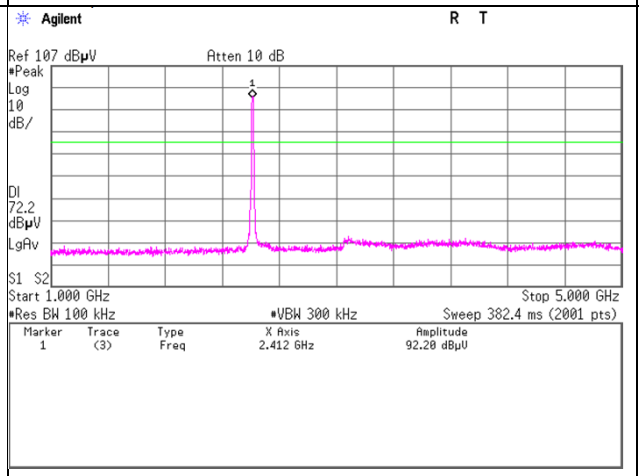
150kHz - 30MHz



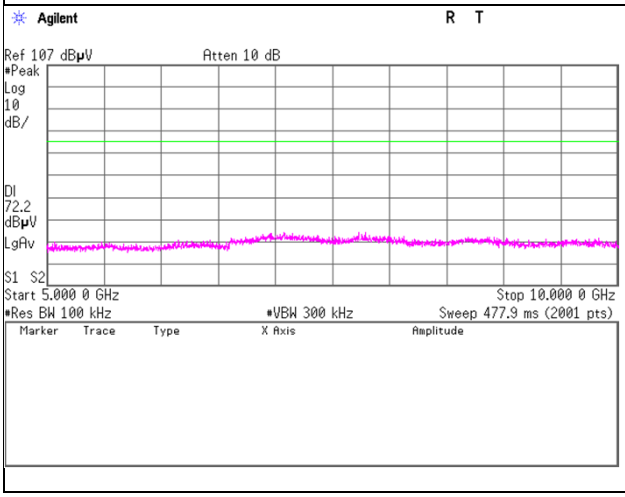
30MHz - 1GHz



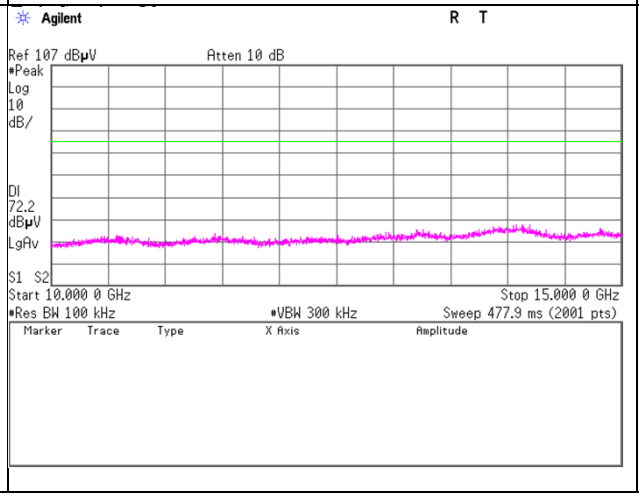
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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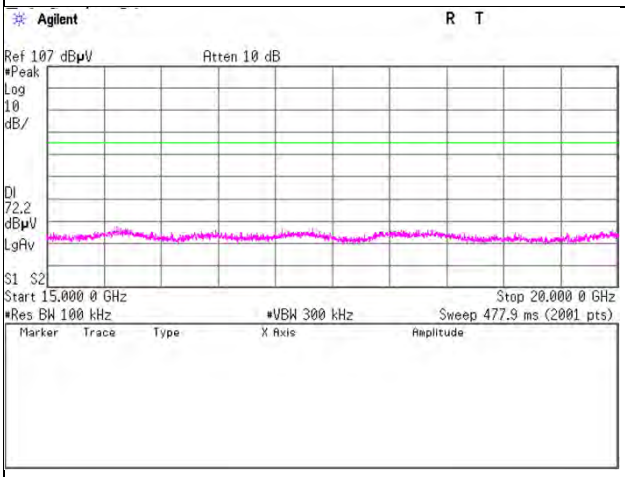
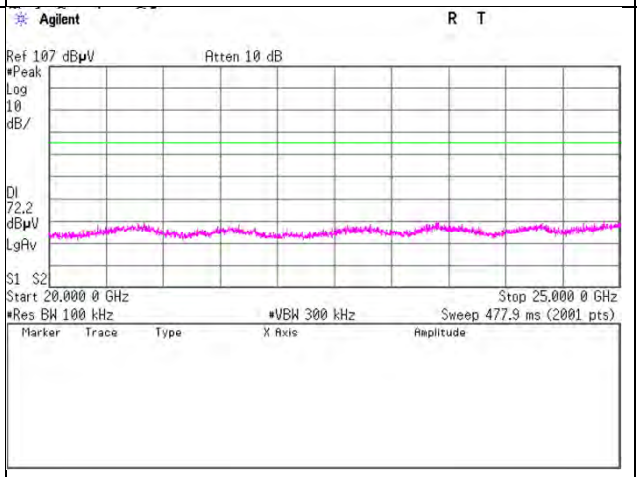
Spurious emission (Conducted)

Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2412MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx1_SpuriousG6	Tx1_SpuriousG7
Tx1_SpuriousG8	

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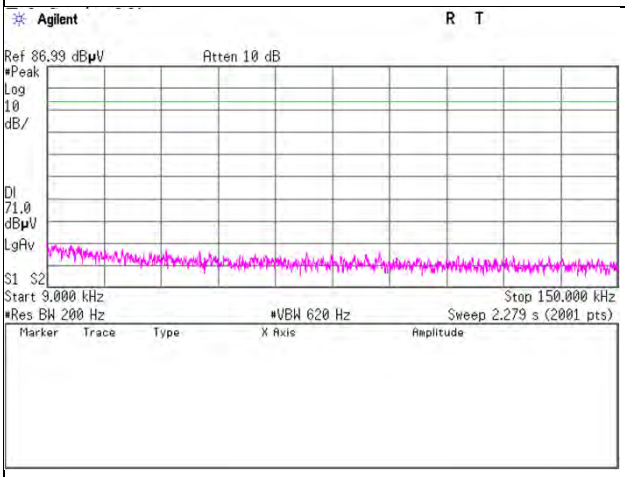
Spurious emission (Conducted)

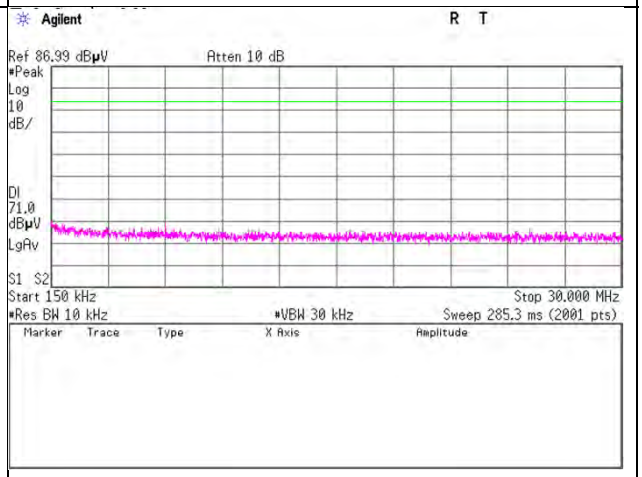
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2437MHz (1/2)

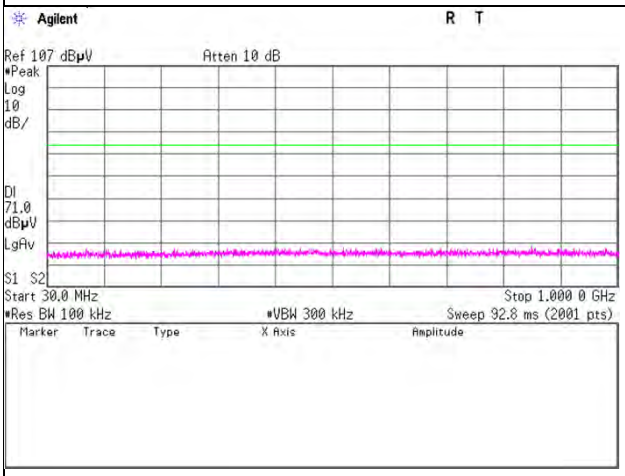
9kHz - 150kHz



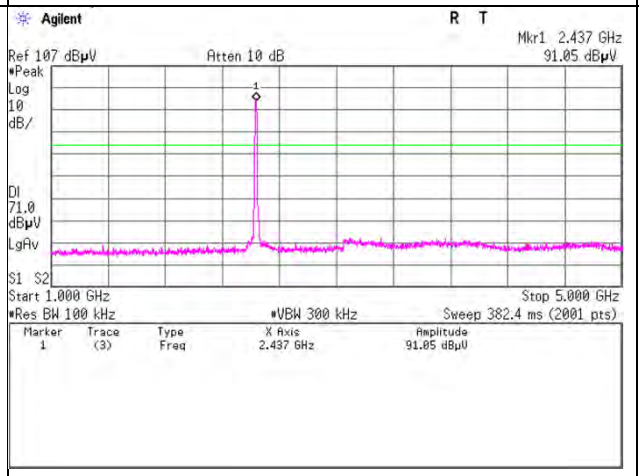
150kHz - 30MHz



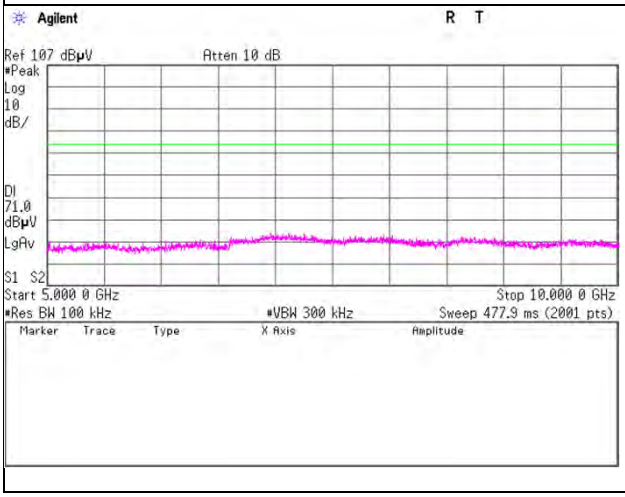
30MHz - 1GHz



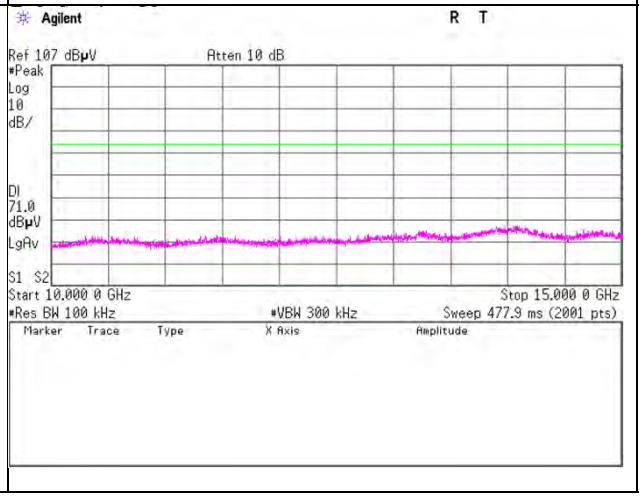
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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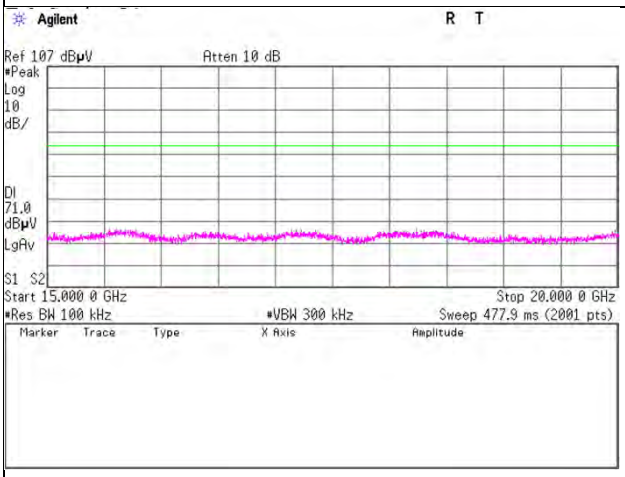
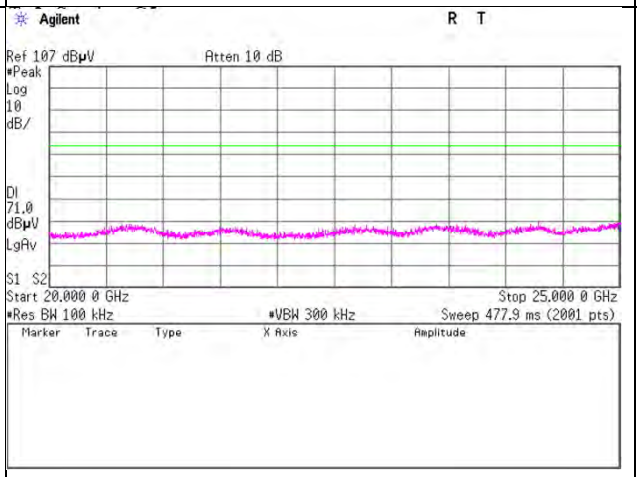
Spurious emission (Conducted)

Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2437MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx2_SpuriousG6	Tx2_SpuriousG7
Tx2_SpuriousG8	

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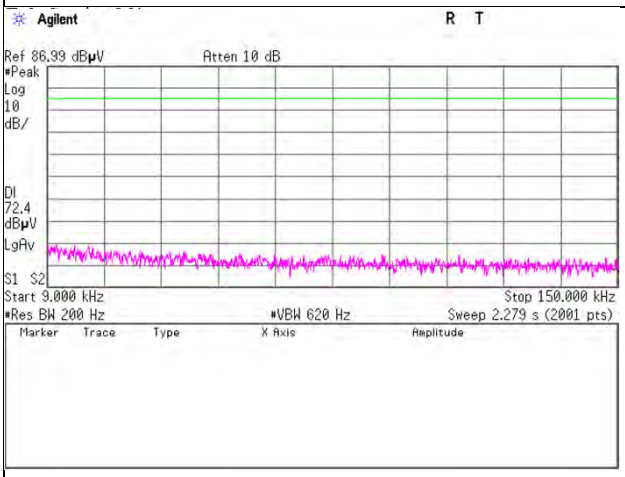
Spurious emission (Conducted)

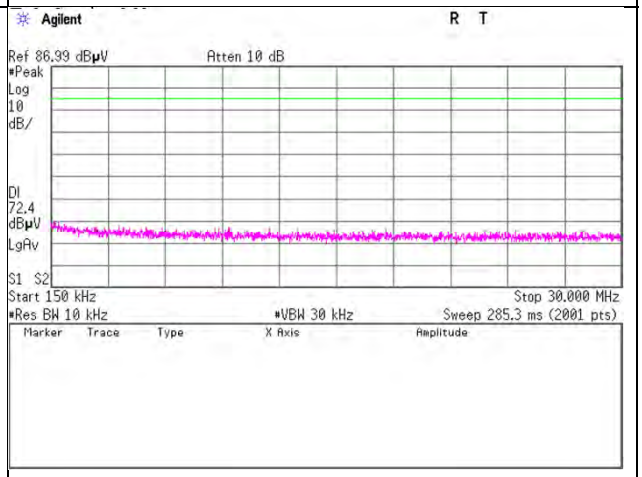
Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2462MHz (1/2)

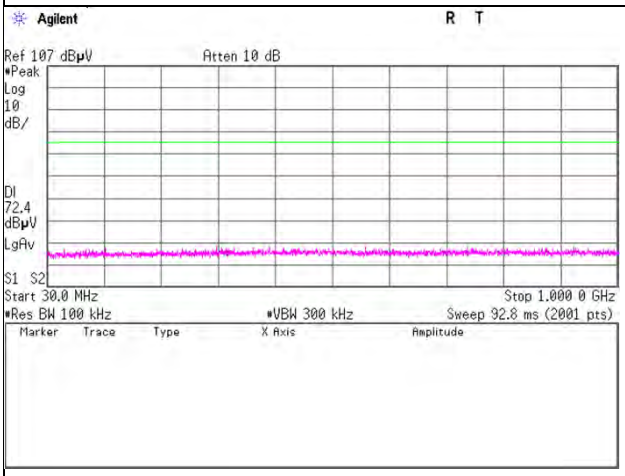
9kHz - 150kHz



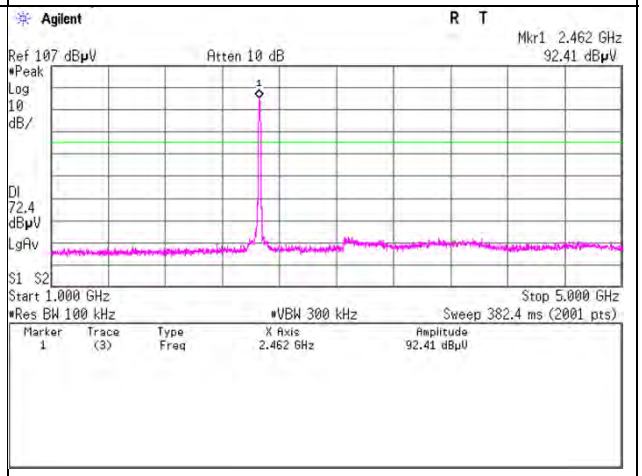
150kHz - 30MHz



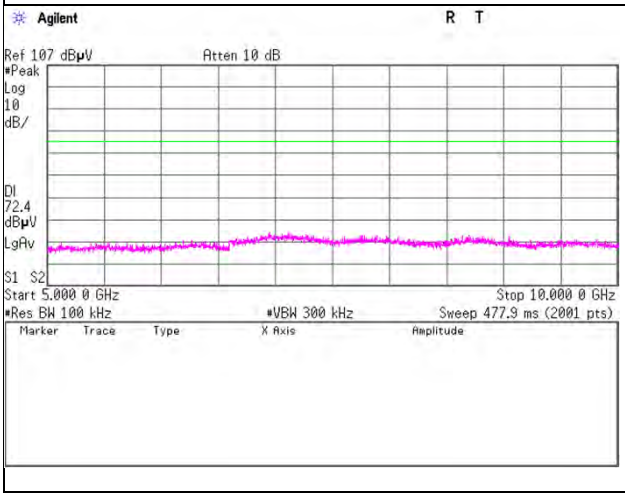
30MHz - 1GHz



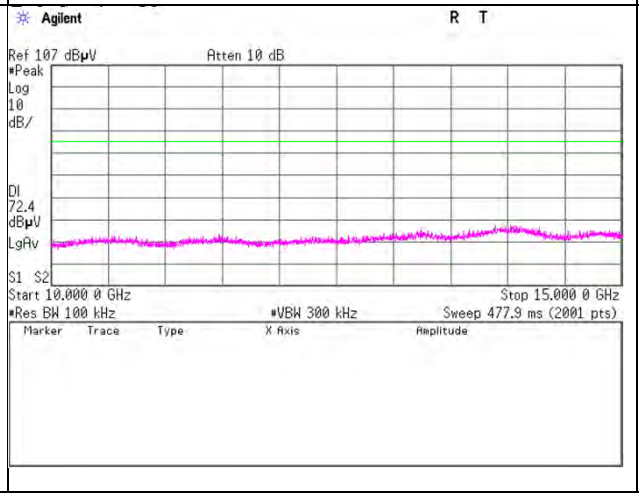
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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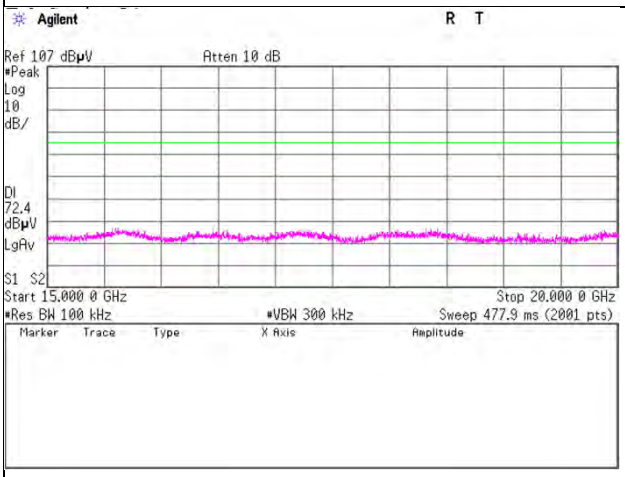
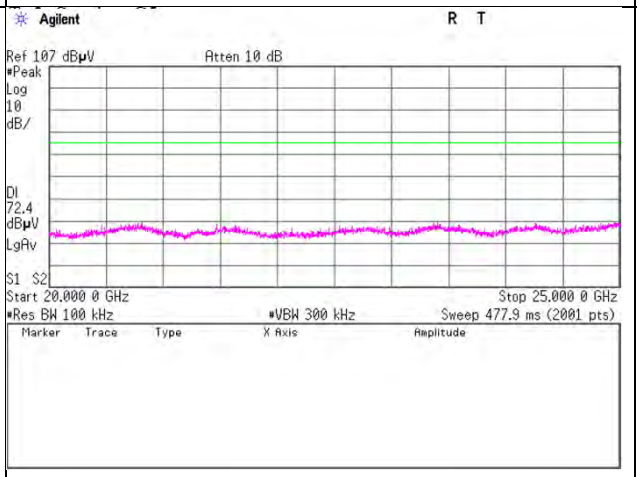
Spurious emission (Conducted)

Tx, IEEE802.11b, PN9, worst data mode 11Mbps

Tx, 2462MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx3_SpuriousG6	Tx3_SpuriousG7
Tx3_SpuriousG8	

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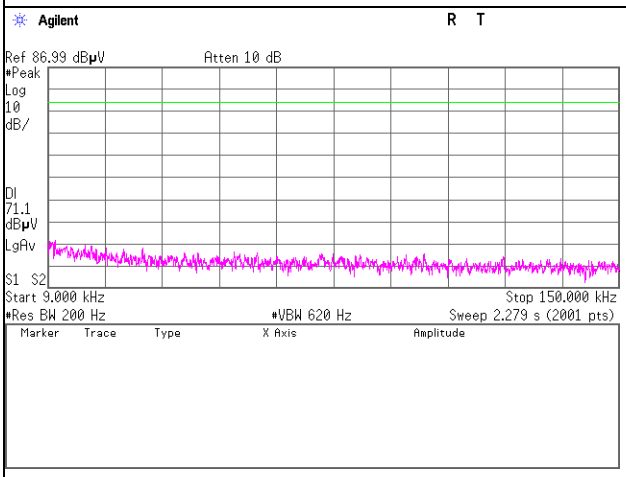
Spurious emission (Conducted)

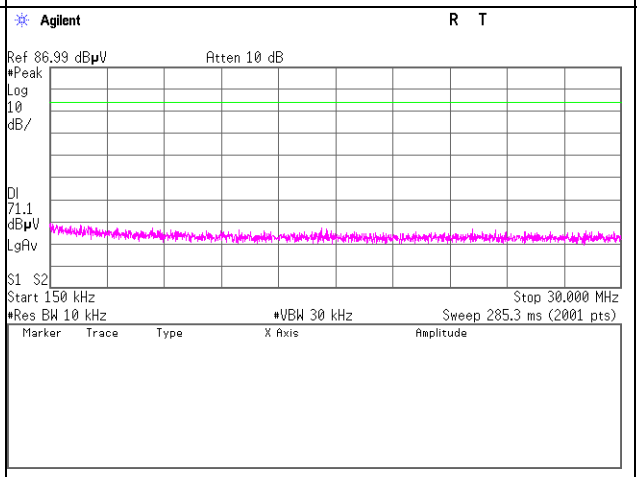
Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2412MHz (1/2)

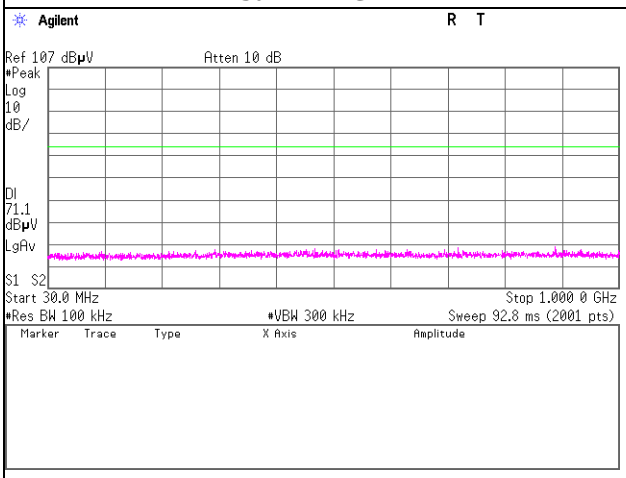
9kHz - 150kHz



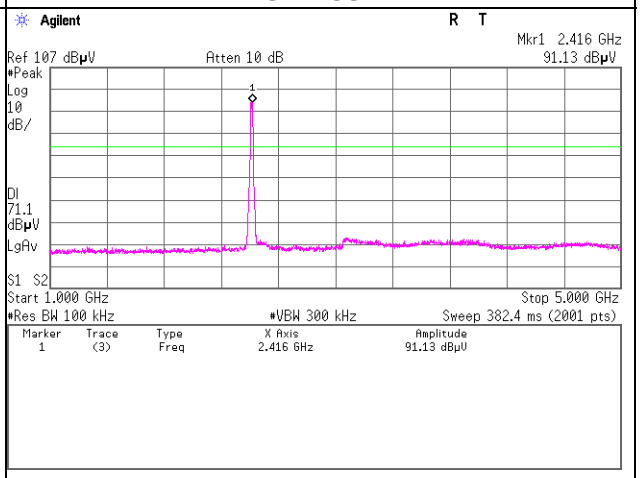
150kHz - 30MHz



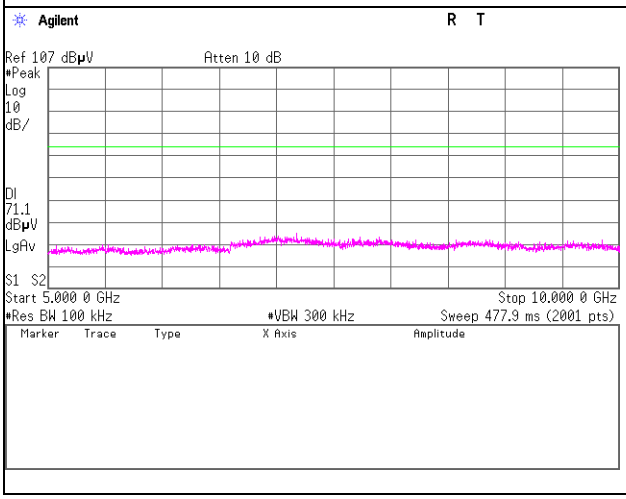
30MHz - 1GHz



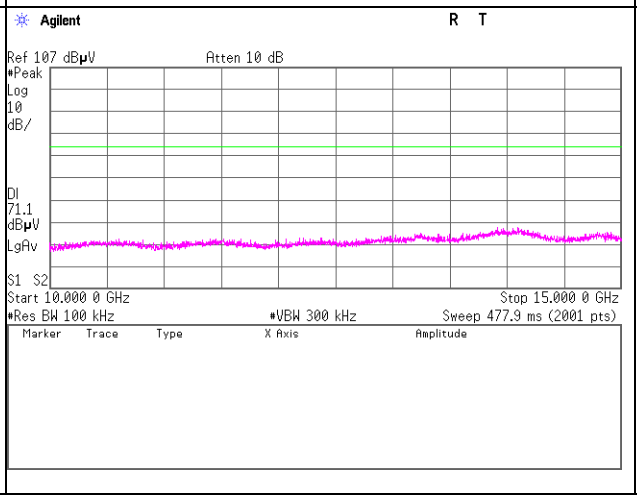
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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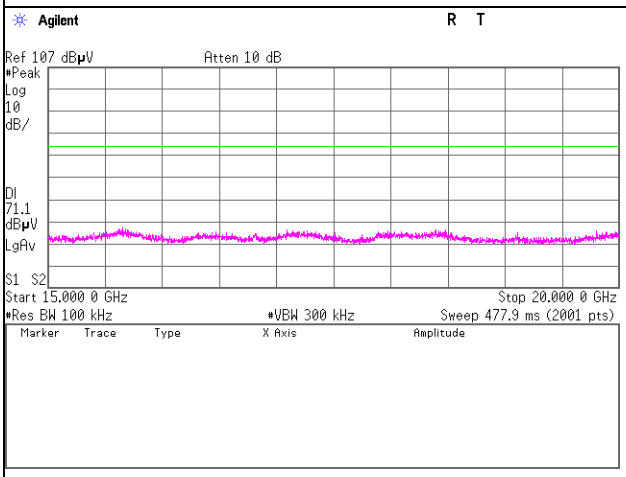
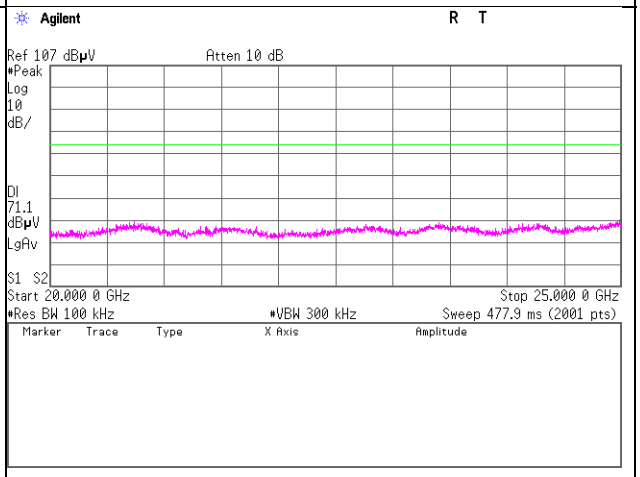
Spurious emission (Conducted)

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2412MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx1_SpuriousG6	Tx1_SpuriousG7
Tx1_SpuriousG8	

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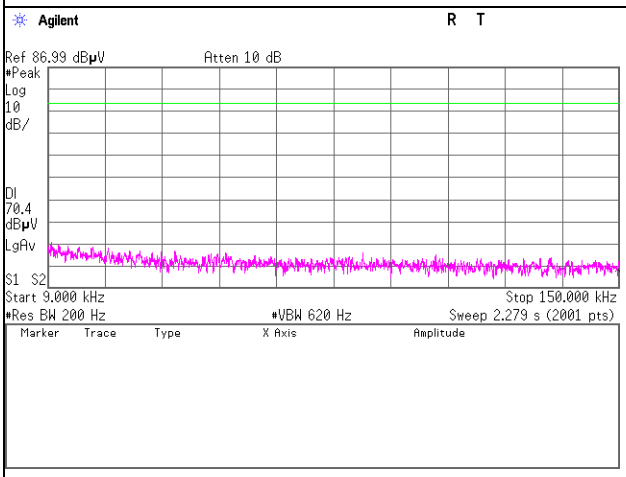
Spurious emission (Conducted)

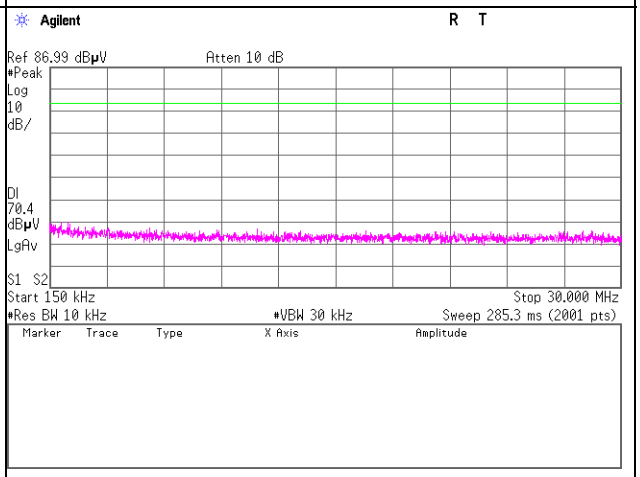
Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2437MHz (1/2)

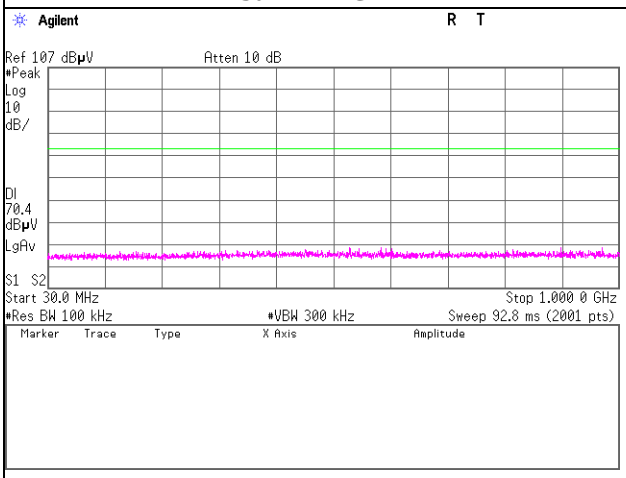
9kHz - 150kHz



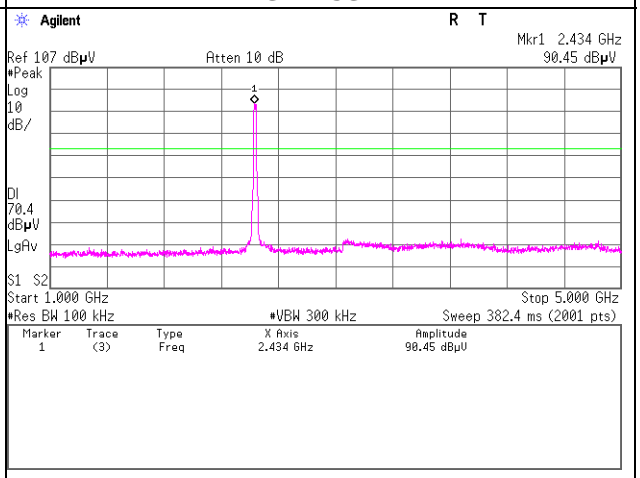
150kHz - 30MHz



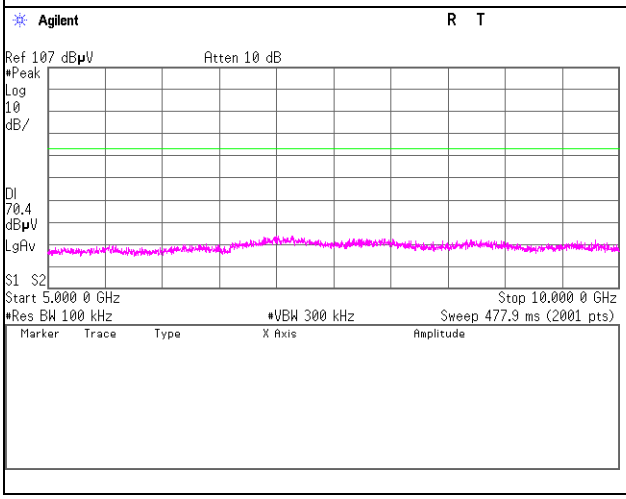
30MHz - 1GHz



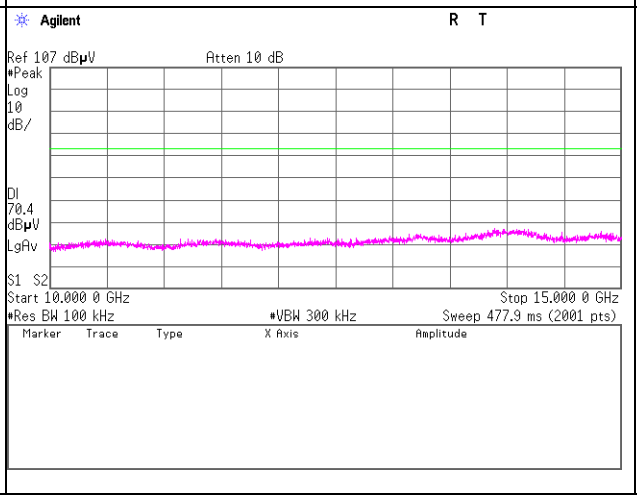
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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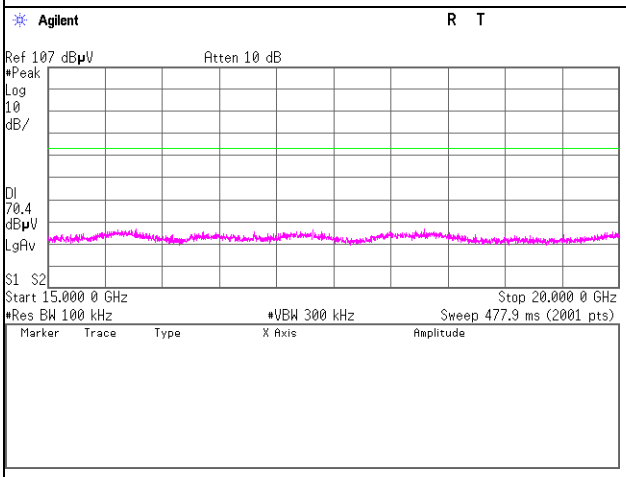
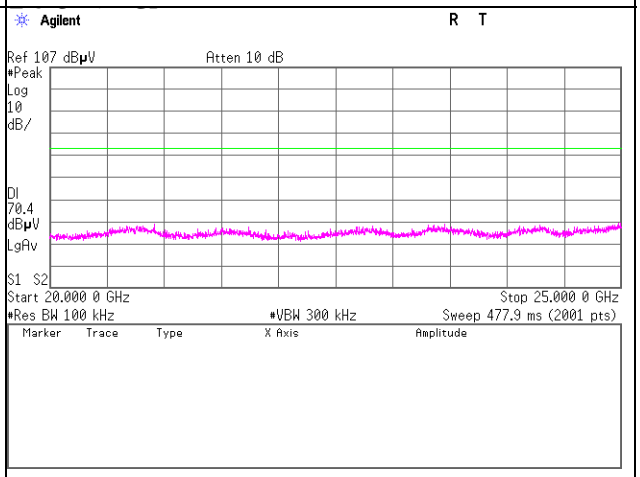
Spurious emission (Conducted)

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2437MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx2_SpuriousG6	Tx2_SpuriousG7
Tx2_SpuriousG8	

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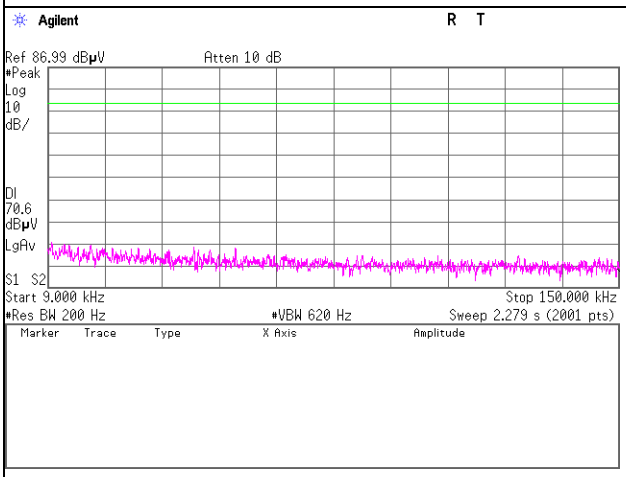
Spurious emission (Conducted)

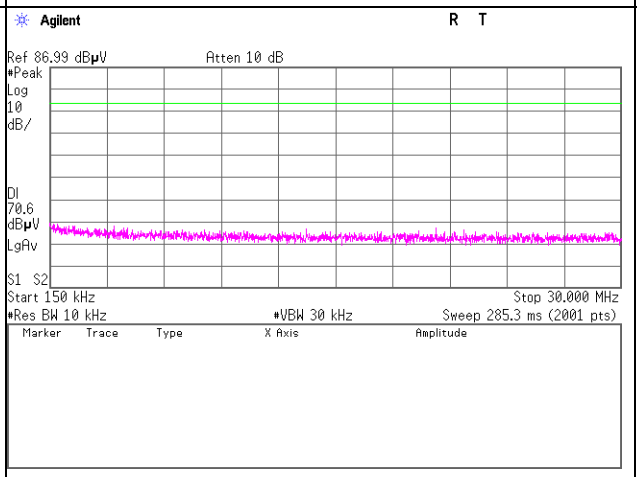
Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2462MHz (1/2)

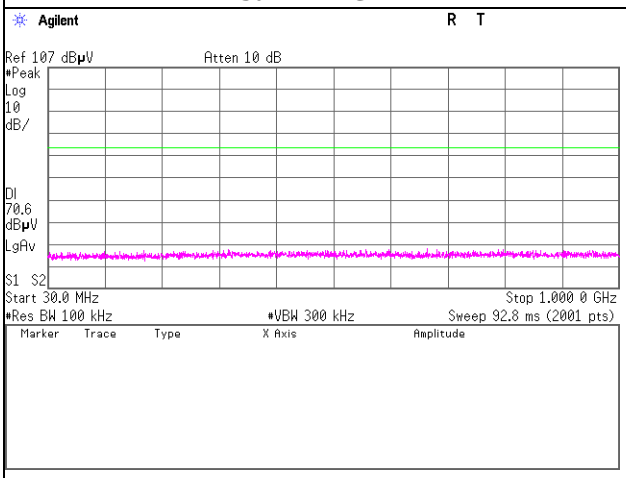
9kHz - 150kHz



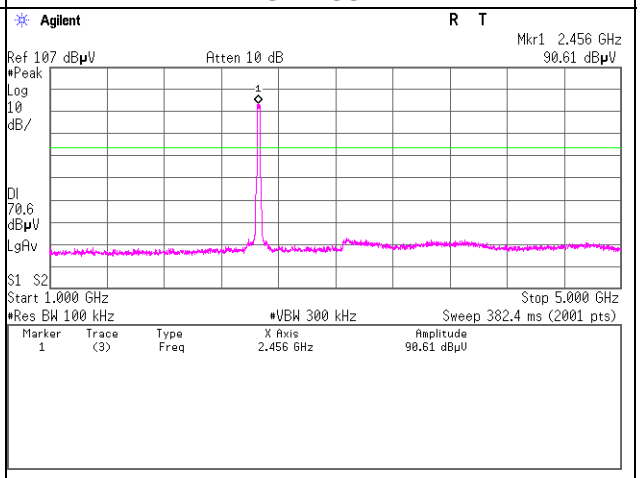
150kHz - 30MHz



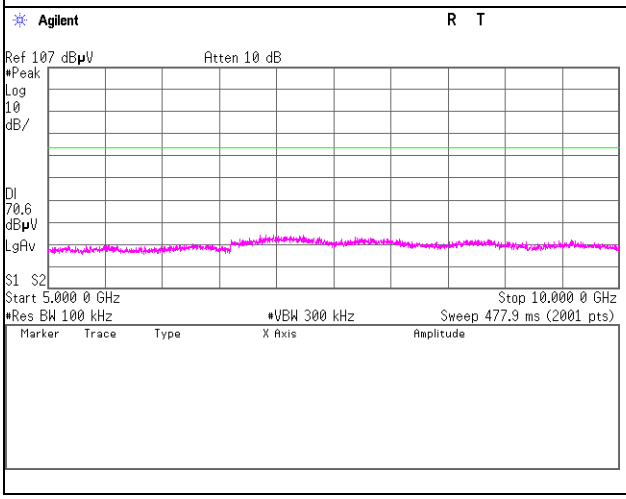
30MHz - 1GHz



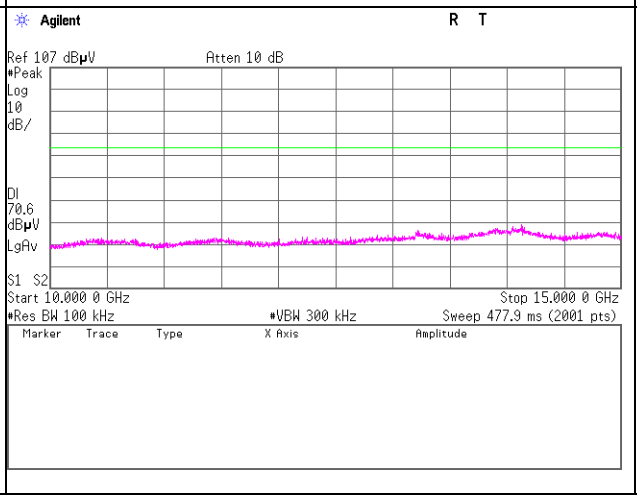
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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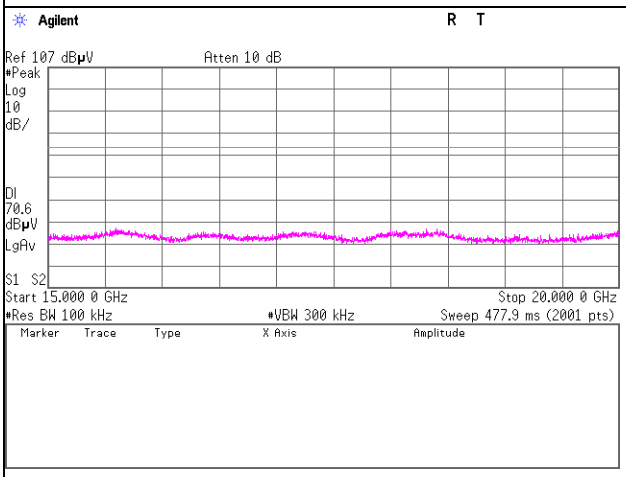
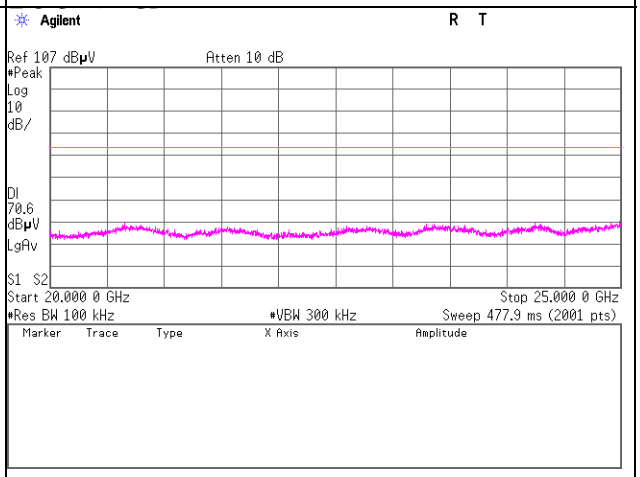
Spurious emission (Conducted)

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2462MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx3_SpuriousG6	Tx3_SpuriousG7
Tx3_SpuriousG8	

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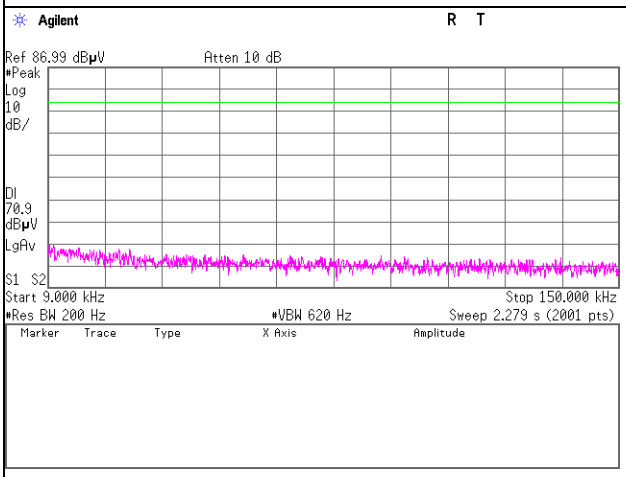
Spurious emission (Conducted)

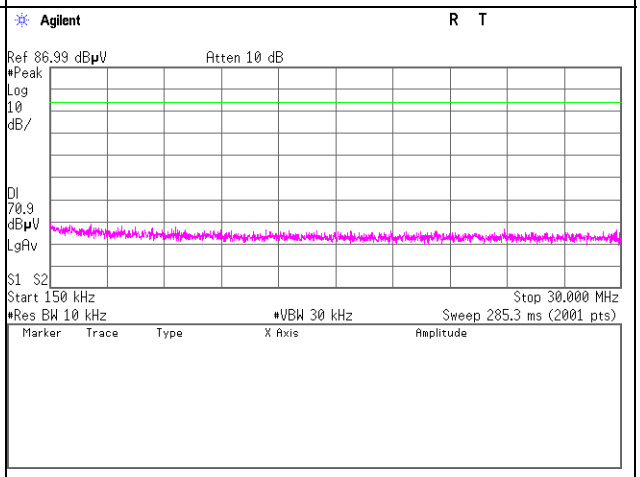
Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2412MHz (1/2)

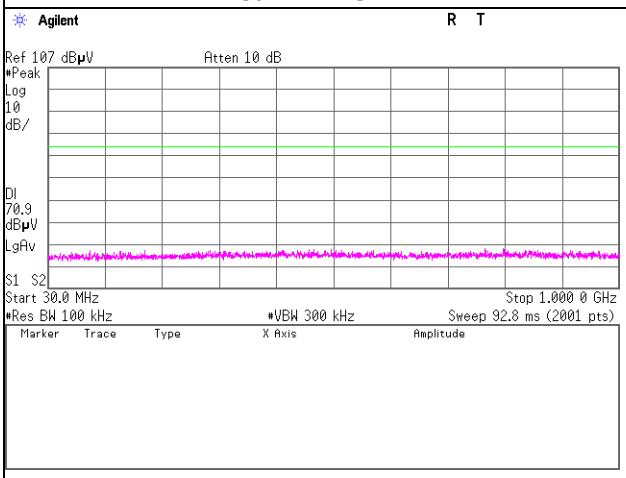
9kHz - 150kHz



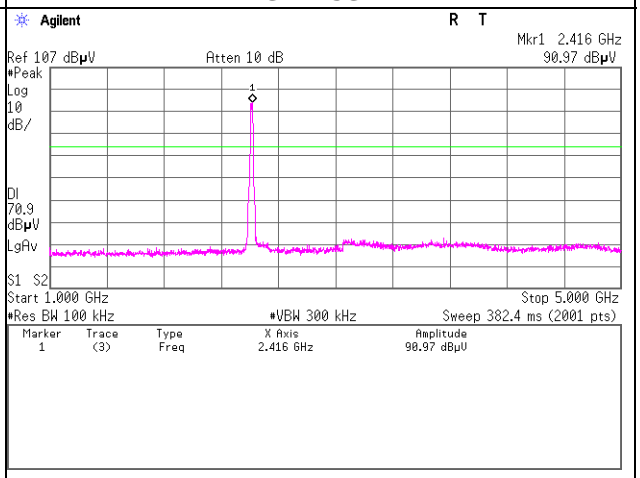
150kHz - 30MHz



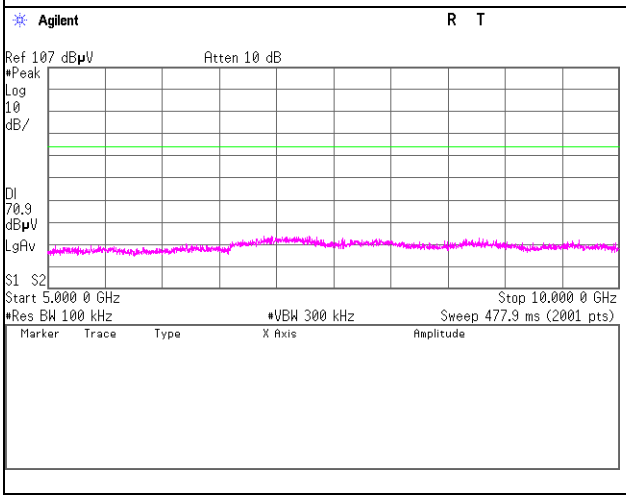
30MHz - 1GHz



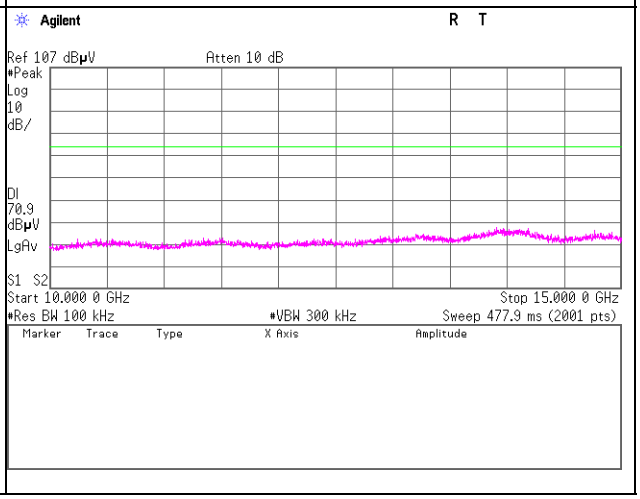
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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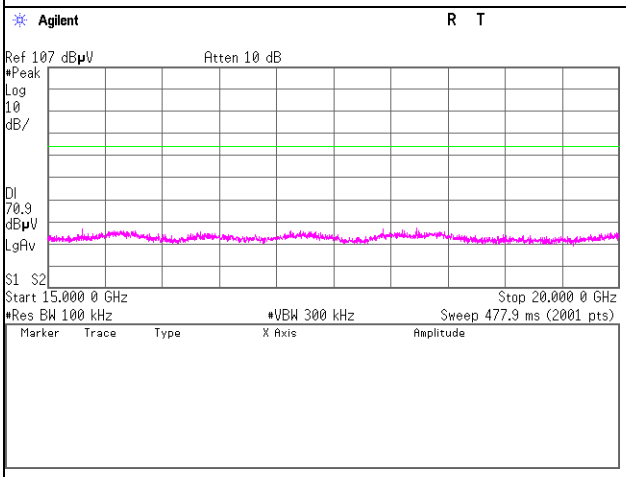
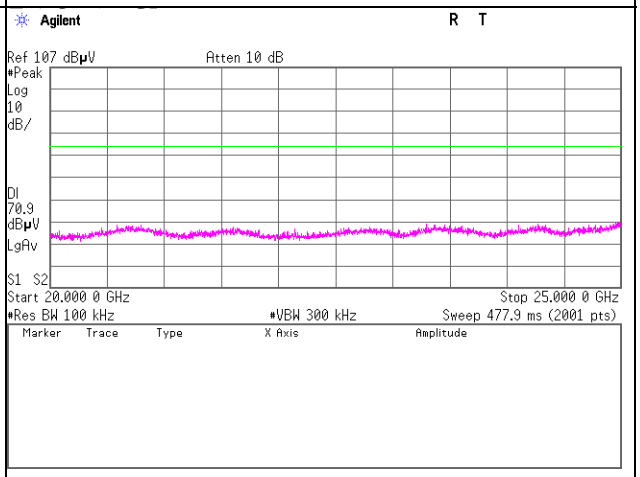
Spurious emission (Conducted)

Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2412MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx1_SpuriousG6	Tx1_SpuriousG7
Tx1_SpuriousG8	

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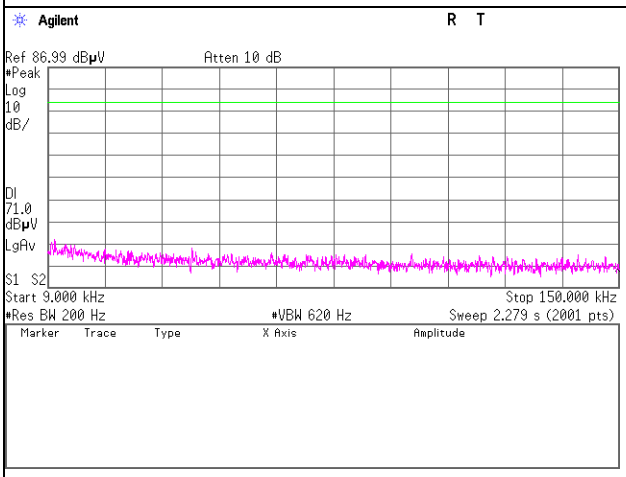
Spurious emission (Conducted)

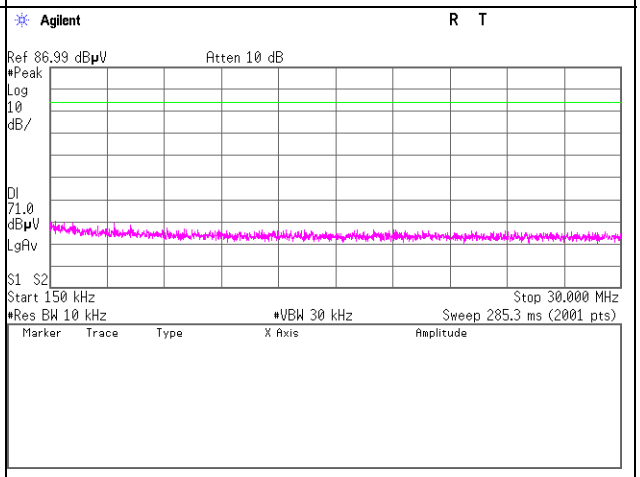
Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2437MHz (1/2)

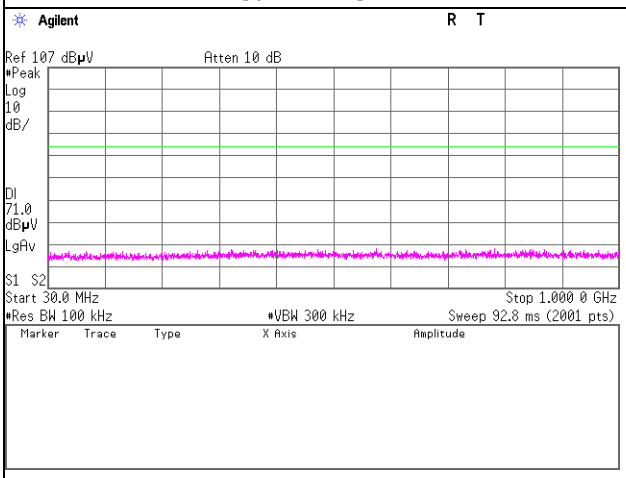
9kHz - 150kHz



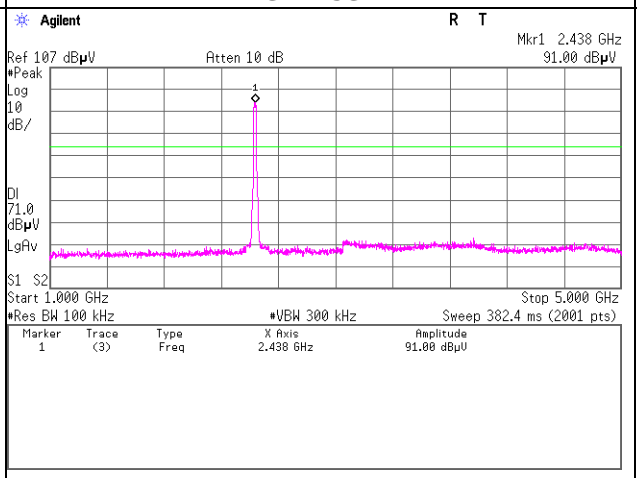
150kHz - 30MHz



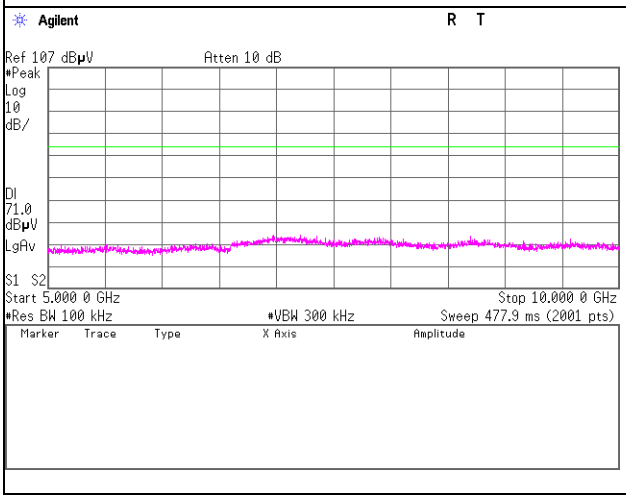
30MHz - 1GHz



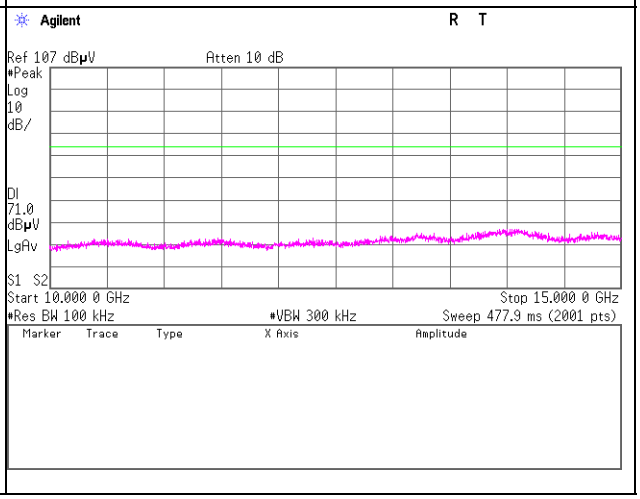
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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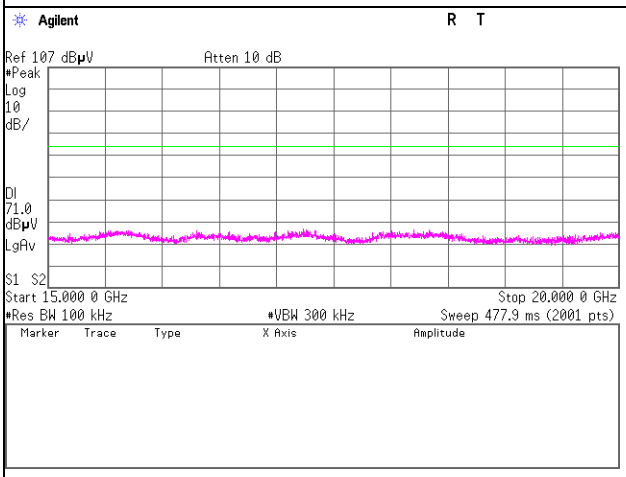
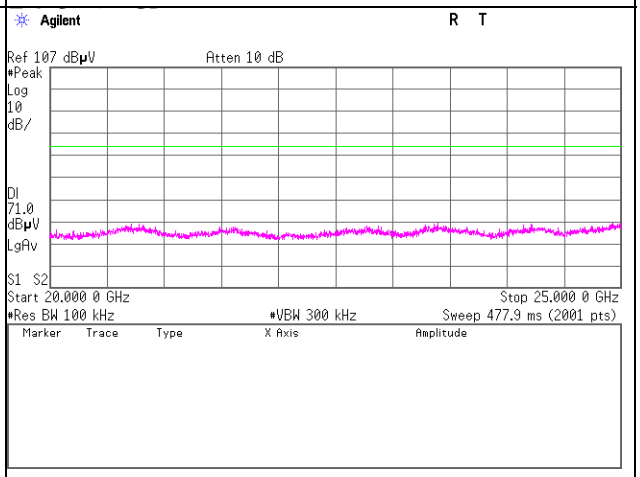
Spurious emission (Conducted)

Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2437MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx2_SpuriousG6	Tx2_SpuriousG7
Tx2_SpuriousG8	

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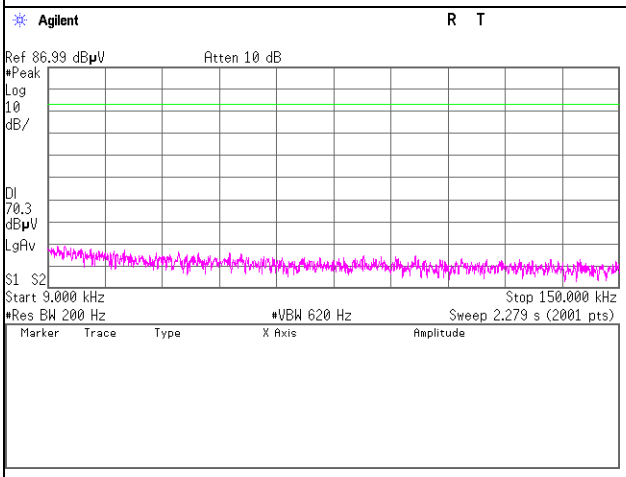
Spurious emission (Conducted)

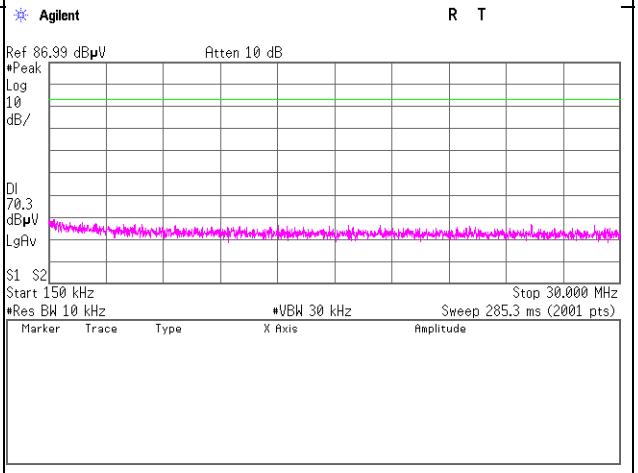
Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2462MHz (1/2)

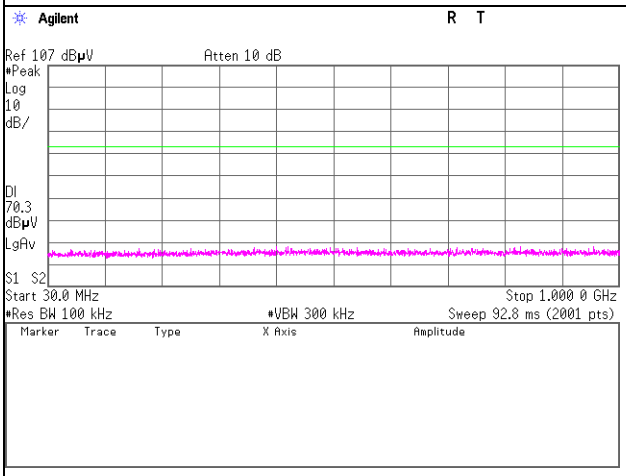
9kHz - 150kHz



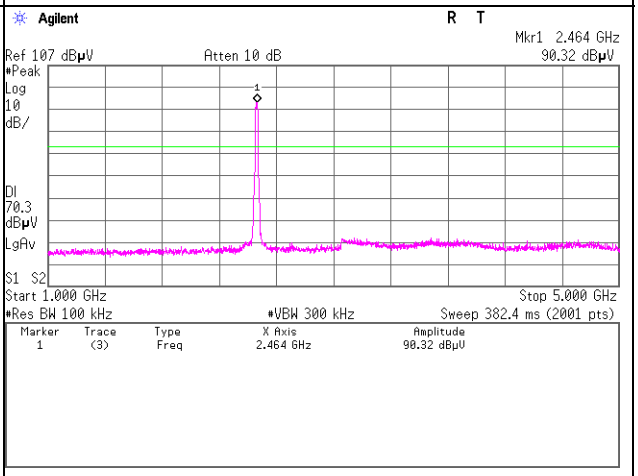
150kHz - 30MHz



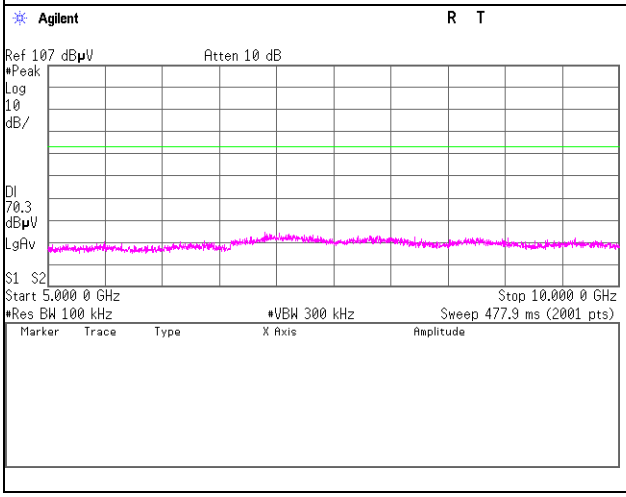
30MHz - 1GHz



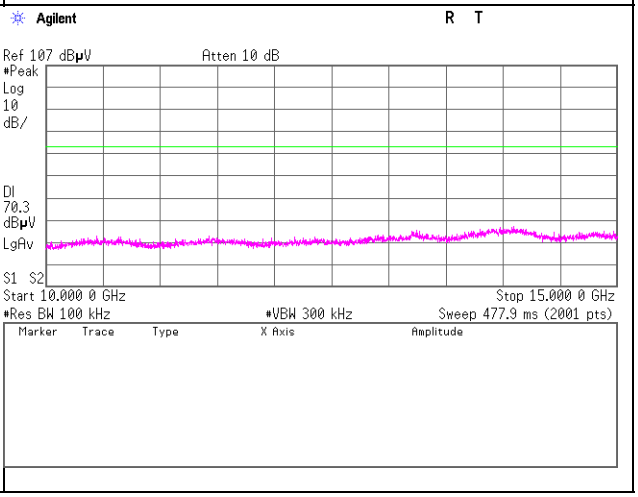
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



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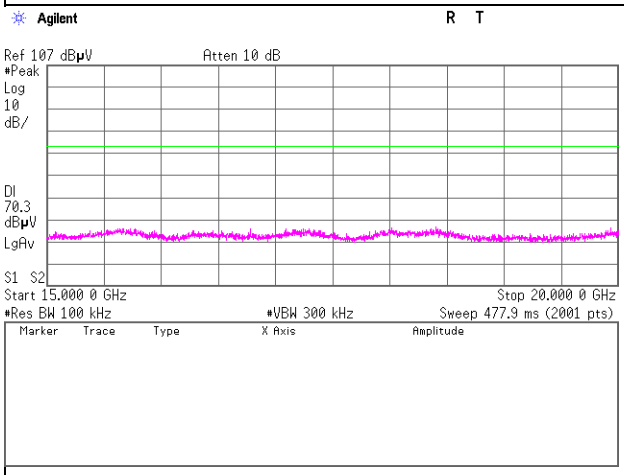
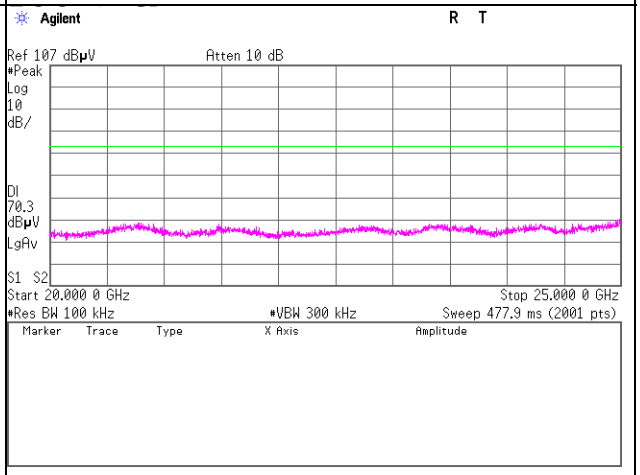
Spurious emission (Conducted)

Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2462MHz (2/2)	
15GHz - 20GHz	**20GHz - 25GHz**
	
Tx3_SpuriousG6	Tx3_SpuriousG7
Tx3_SpuriousG8	

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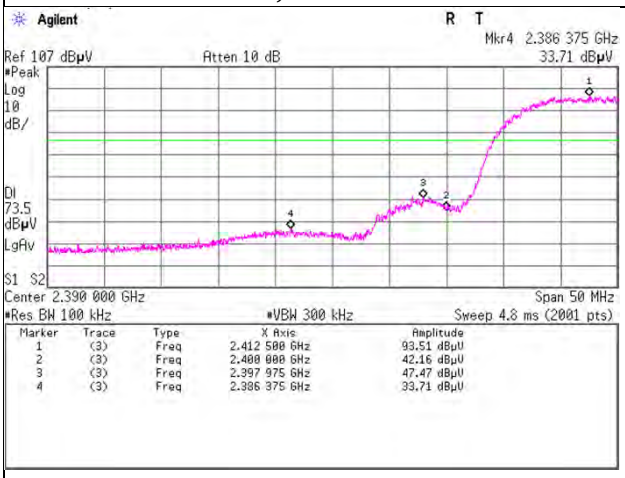
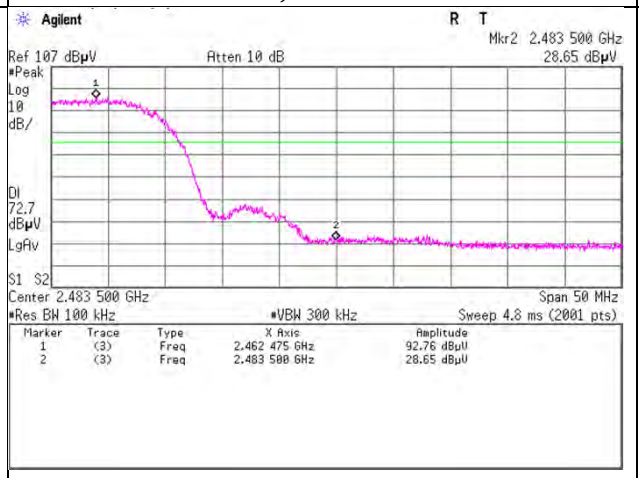
Spurious emission (Conducted)

Band Edge compliance

Tx, IEEE802.11b, PN9, worst data mode 11Mbps	
Tx, 2412MHz	**Tx, 2462MHz**
	

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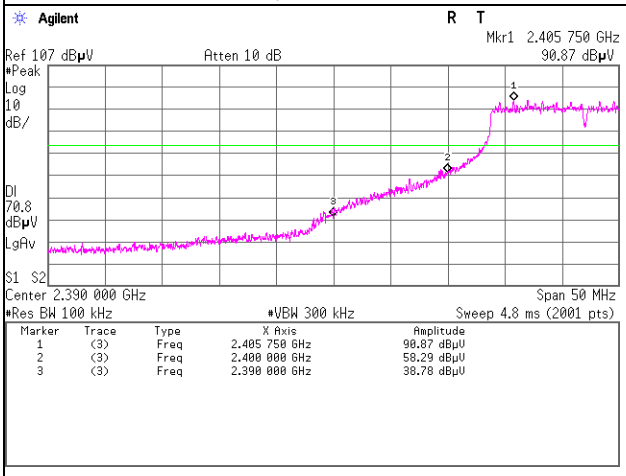
Spurious emission (Conducted)

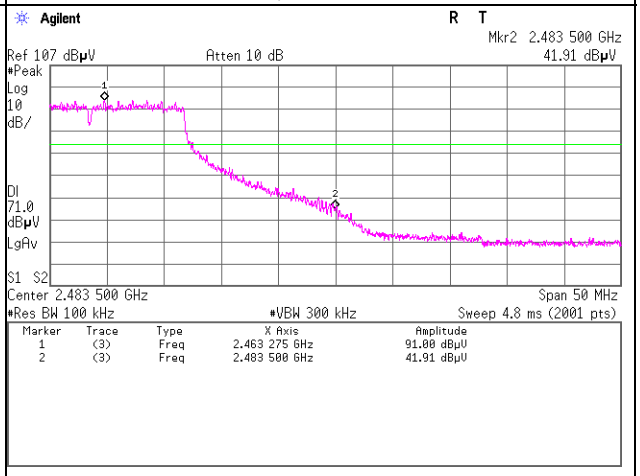
Band Edge compliance

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

Tx, 2412MHz



Tx, 2462MHz



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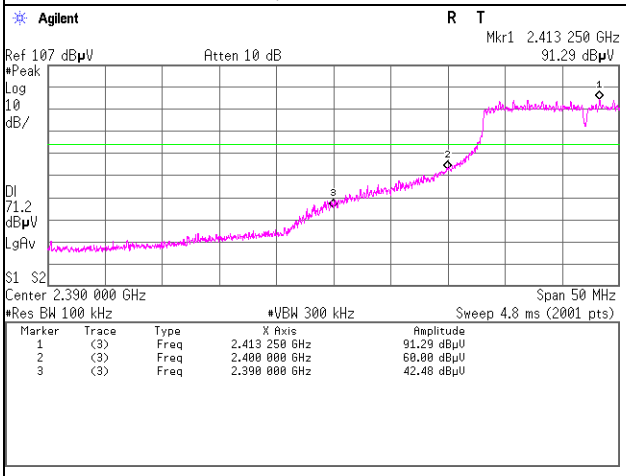
Spurious emission (Conducted)

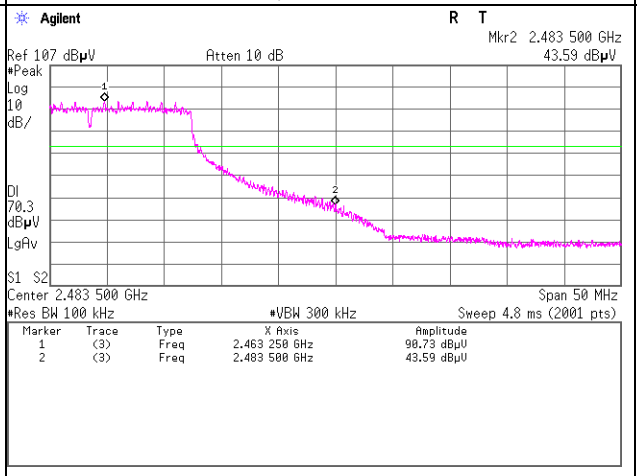
Band Edge compliance

Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

Tx, 2412MHz



Tx, 2462MHz



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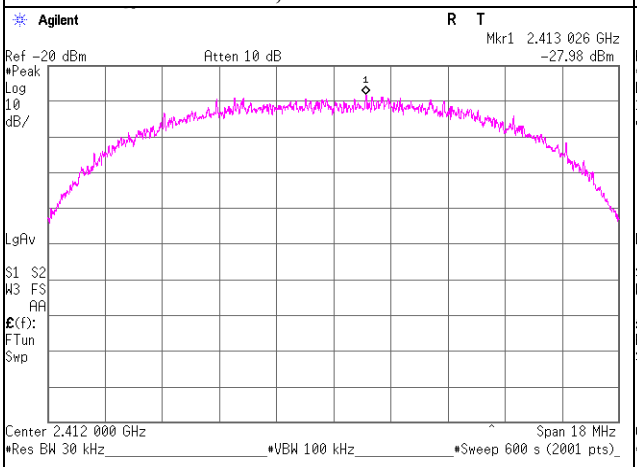
Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11b, PN9, worst data mode 11Mbps	

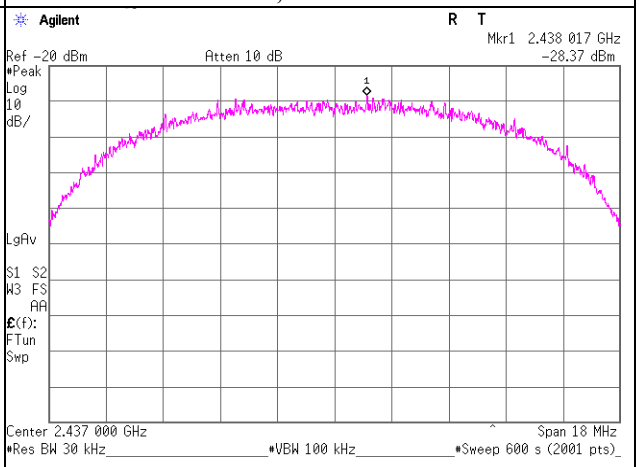
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2413.026	-27.98	1.26	20.01	-6.71	8.00	14.71
2437.0000	2438.017	-28.37	1.26	20.01	-7.10	8.00	15.10
2462.0000	2463.017	-28.12	1.27	20.01	-6.84	8.00	14.84

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

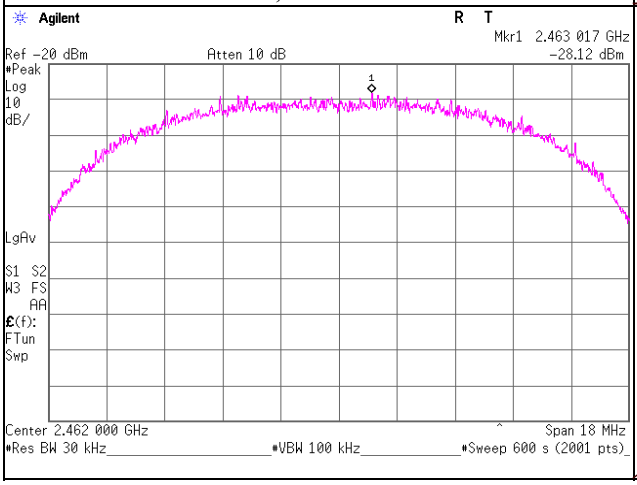
Tx, 2412MHz

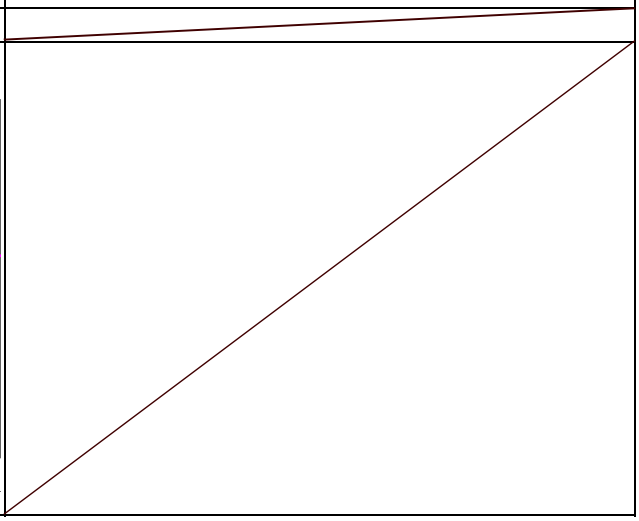


Tx, 2437MHz



Tx, 2462MHz





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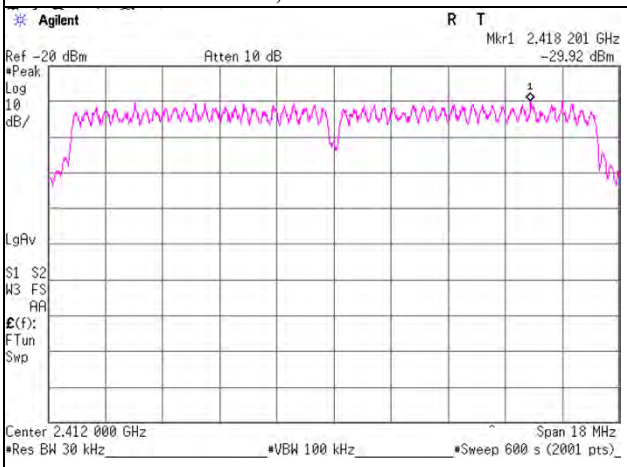
Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

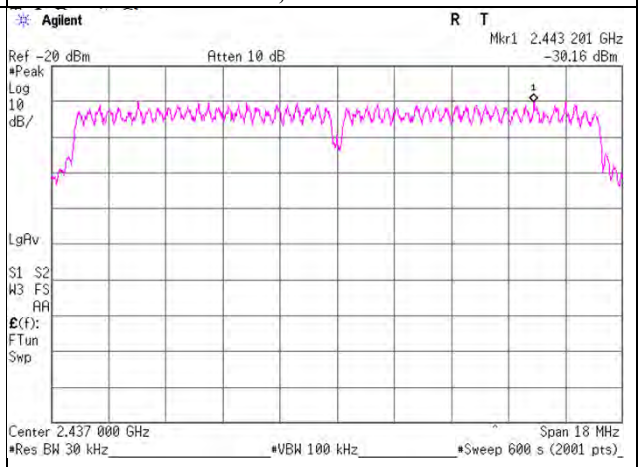
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2418.201	-29.92	1.26	20.01	-8.65	8.00	16.65
2437.0000	2443.201	-30.16	1.26	20.01	-8.89	8.00	16.89
2462.0000	2455.736	-30.44	1.27	20.01	-9.16	8.00	17.16

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

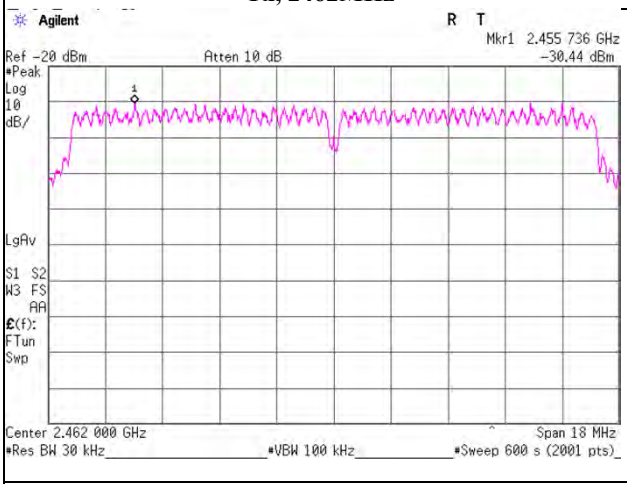
Tx, 2412MHz

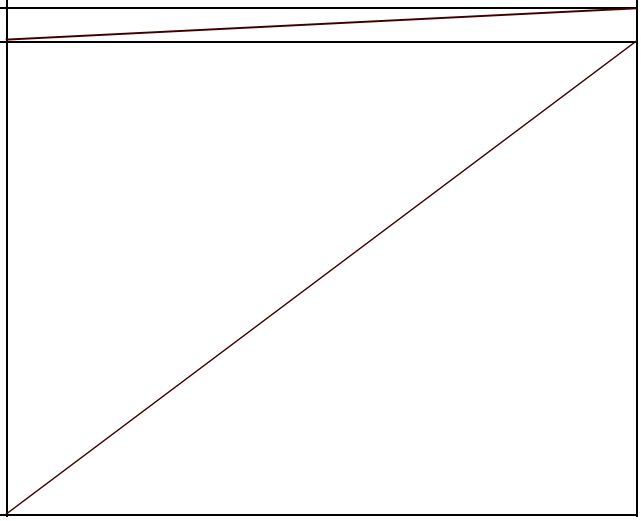


Tx, 2437MHz



Tx, 2462MHz





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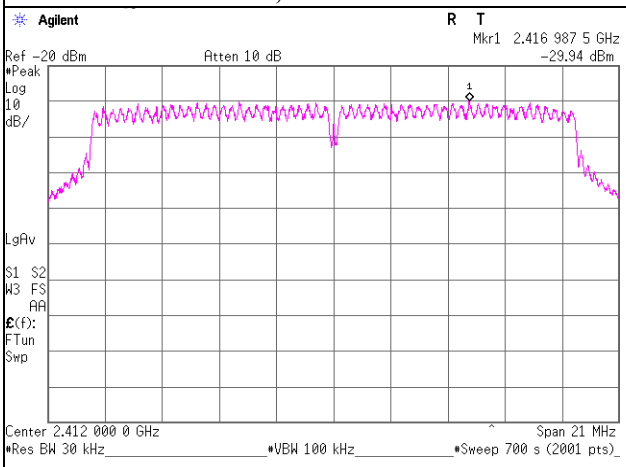
Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.6 Shielded Room
Date	3/22/2012	
Temperature / Humidity	23deg.C , 32%RH	
Engineer	Akio Hayashi	
Mode	Tx, IEEE802.11n, PN9, worst data mode 3(MCS)	

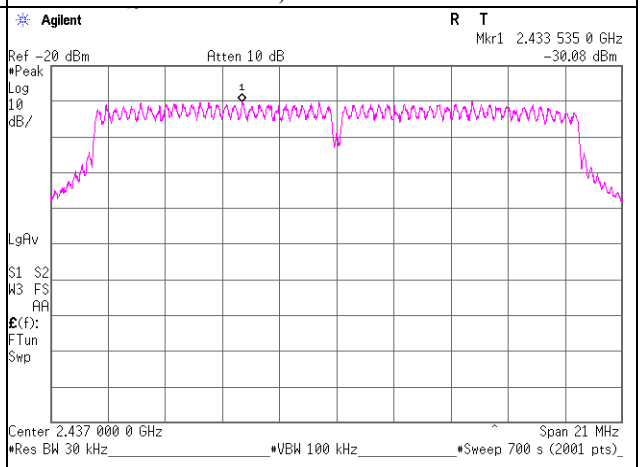
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2416.9875	-29.94	1.26	20.01	-8.67	8.00	16.67
2437.0000	2433.5350	-30.08	1.26	20.01	-8.81	8.00	16.81
2462.0000	2458.5350	-30.56	1.27	20.01	-9.28	8.00	17.28

Sample Calculation:
Result = Reading + Cable Loss + Atten. Loss

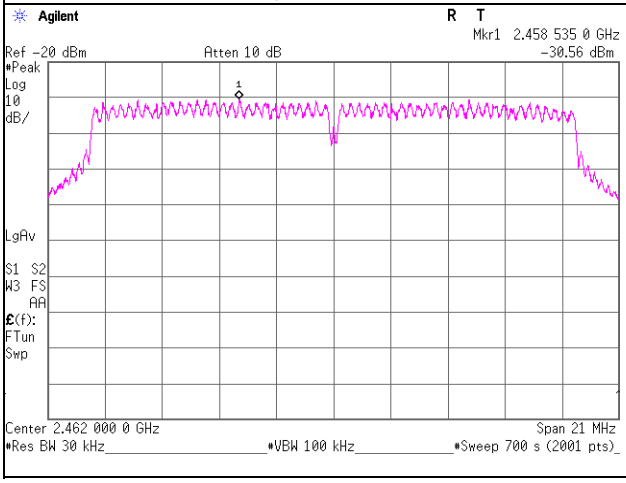
Tx, 2412MHz

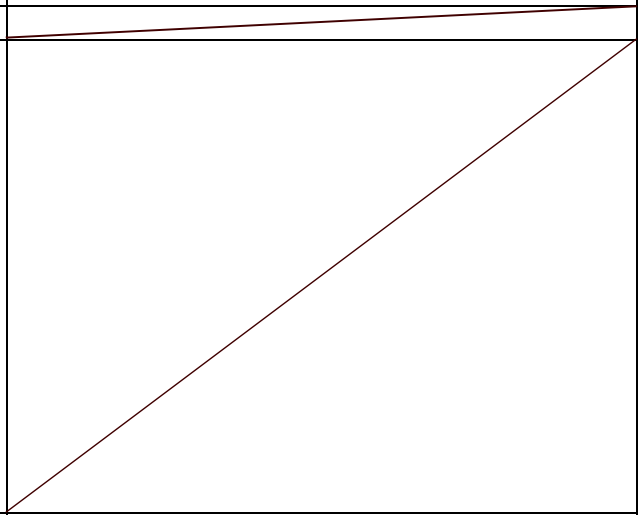


Tx, 2437MHz



Tx, 2462MHz





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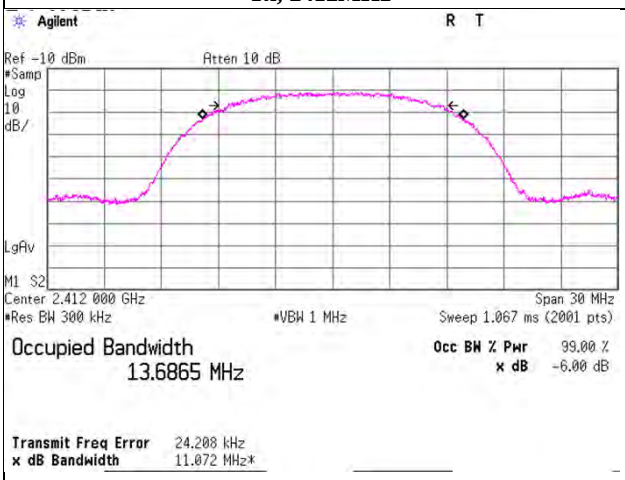
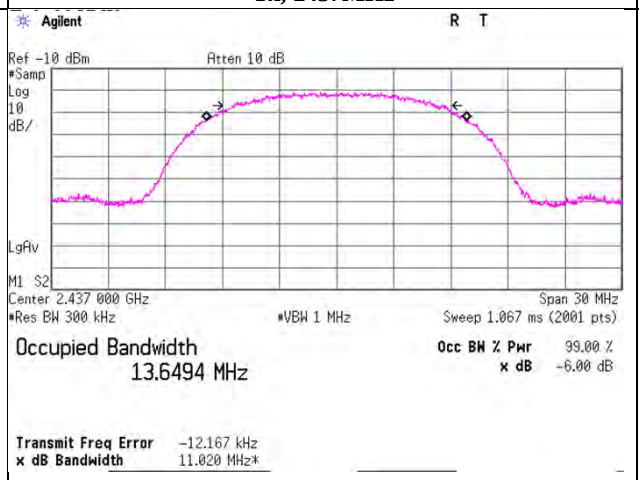
99% Occupied Bandwidth

Tx, IEEE802.11b, PN9, worst data mode 11Mbps

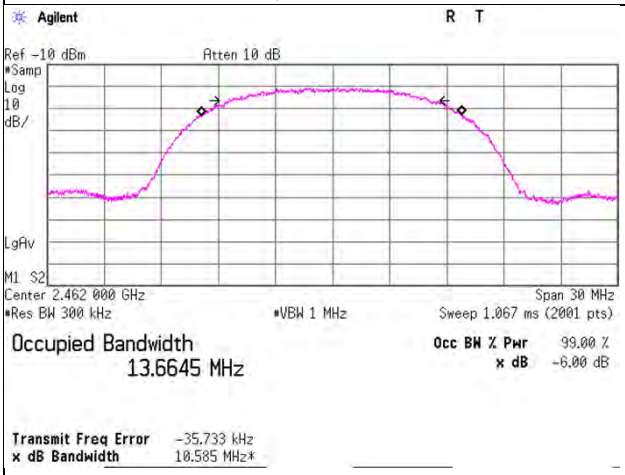
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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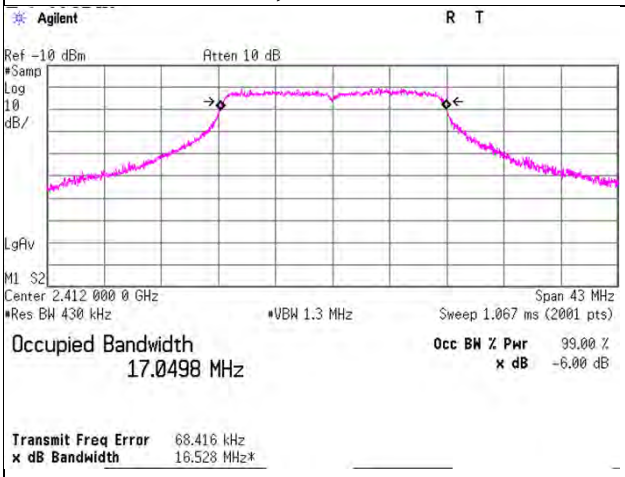
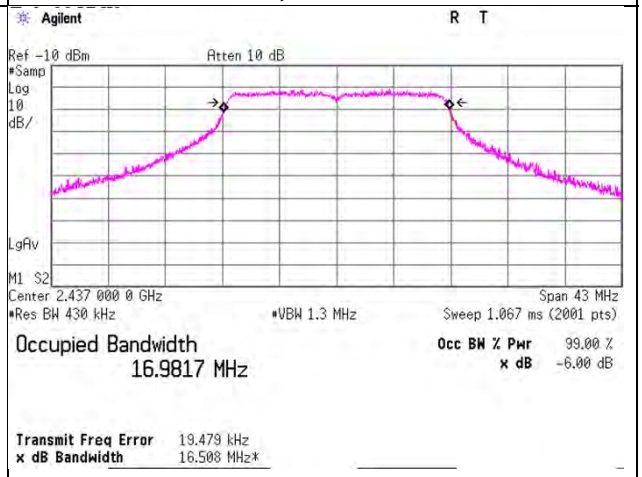
99% Occupied Bandwidth

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

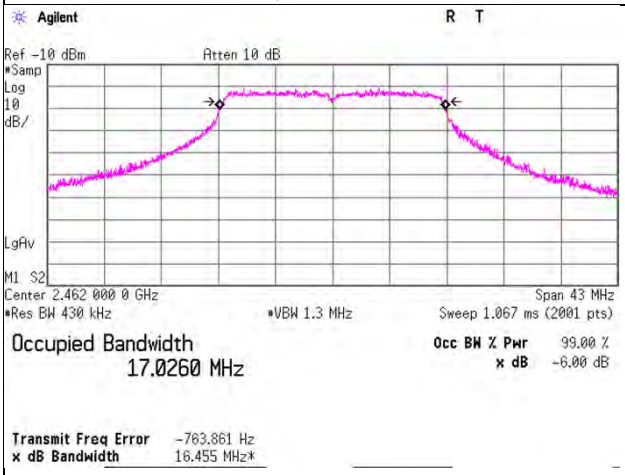
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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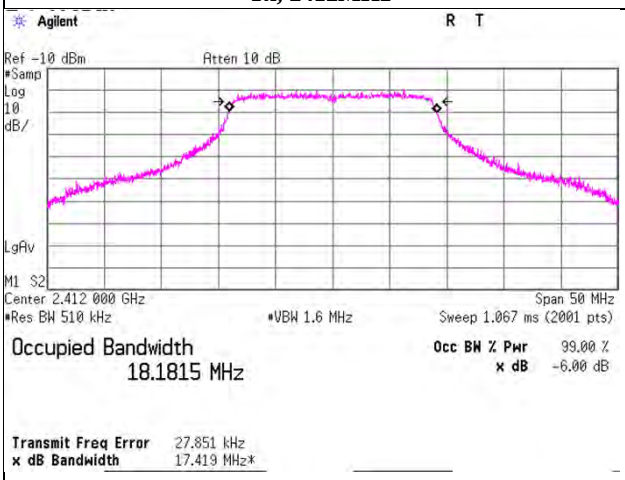
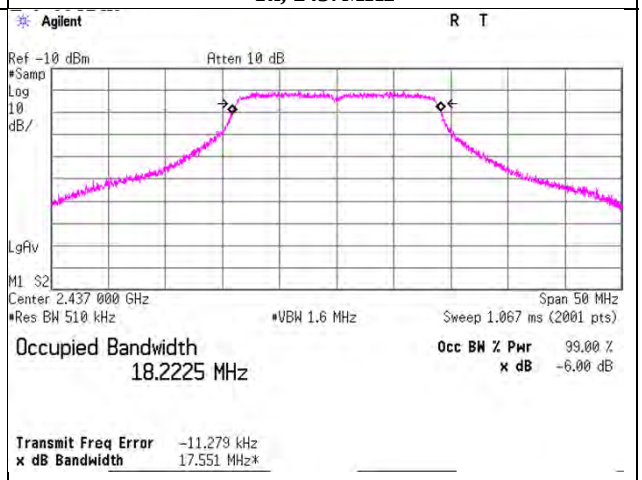
99% Occupied Bandwidth

Tx, IEEE802.11n, PN9, worst data mode 3(MCS)

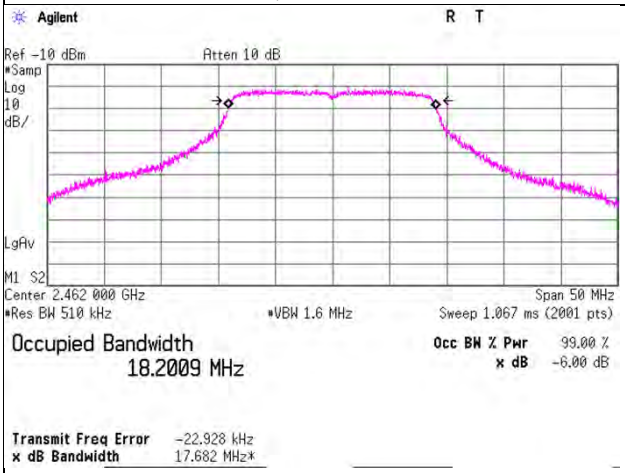
Tx, 2412MHz



Tx, 2437MHz



Tx, 2462MHz



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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)
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2012/02/06 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2011/04/12 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2011/12/05 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2012/03/12 * 12
SAT20-02	Attenuator	Agilent	8493C-020	74890	AT	2012/03/12 * 12
SAT10-08	Attenuator	Weinschel	W54-10	-	AT	2012/03/12 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/07/19 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2011/04/28 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2011/05/27 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2011/08/28 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2012/02/06 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2012/02/16 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2011/12/27 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2011/12/27 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2012/03/12 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2012/03/12 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2012/02/10 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2011/10/23 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2011/04/28 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2011/10/23 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE/CE	2011/07/28 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2011/09/23 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2011/04/28 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2012/02/23 * 12
SAT3-03	Attenuator	JFW	50HF-003N	-	CE	2012/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2012/03/26 * 12
STM-07	Terminator	TME	CT-01 BP	-	CE	2012/01/05 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2012/02/28 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.

Test Item :
- CE: Conducted emission,
- RE: Radiated emission,
- AT: Antenna terminal conducted test