

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

150Mbps Wireless N ADSL2+ Modem Router

Model: DL4312; DL4312D

Trade Name: netis

Issued to

NETIS SYSTEMS CO., LTD 4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park, Nanshan, Shenzhen, China

Issued by

Compliance Certification Services Inc. No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan, R.O.C. TEL: 886-3-324-0332 FAX: 886-3-324-5235 http://www.ccsrf.com service@ccsrf.com



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Revision History

Rev.	lssue Date	Revisions	Effect Page	Revised By
00	April 23, 2014	Initial Issue	All	Iren Wang



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1 TEST RESULT CERTIFICATION

Applicant:	NETIS SYSTEMS CO., LTD 4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park, Nanshan, Shenzhen, China
Manufacturer:	Shenzhen Netcore Industrial Ltd. 4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park, Nanshan, Shenzhen, China
Equipment Under Test:	150Mbps Wireless N ADSL2+ Modem Router
Trade Name:	netis
Model:	DL4312; DL4312D
Date of Test:	April 1 ~ 2, 2014

APPLICABLE STANDARDS					
STANDARD TEST RESULT					
FCC 47 CFR Part 15 Subpart C	No non-compliance noted				

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

tan Lin

Stan Lin Section Manager

Reviewed by:

ngel Yn

Angel Hu Section Manager



2 EUT DESCRIPTION

Product	150Mbps Wireless N ADSL2+ Modem Router				
Trade Name	netis				
Model Number	DL4312; DL4312D				
Model Discrepancy	All the model numbers (list on this report) are identical, just for ma purpose only except Antenna. Model Number Antenna DL4312 Fixed DL4312D Detachable			identical, just for marketing	
EUT Power Rating	12VDC, 0.5A				
Power Adapter	Tenpao Model NT120050UL				
Power Adapter Power Rating	ating I/P: 100-240VAC, 50/60HZ, 0.2A O/P: 12VDC, 0.5A				
RF Module Manufacturer	Realtek	Model	RTL8188EF	R-CG	
Frequency Range	IEEE 802.11b/g/ IEEE IEEE 802.11n HT40 r			2412~2462MHz	
Transmit Power	IEEE 802.11b mode: 15.39 dBm (0.0346W) IEEE 802.11g mode: 21.36 dBm (0.1368W) IEEE 802.11n HT20 mode: 21.36 dBm (0.1368W) IEEE 802.11n HT40 mode: 22.76 dBm (0.1888W)				
Modulation Technique & Transmit Data Rate	ps) 18, 12, 11 , 9, 6 Mbps) 52, 39, 26, 19.5, 13, 6.5 .5, 108, 81, 54, 40.5, 27,				
Antenna Specification	Dipole Antenna / Gair	n: 5 dBi			

Remark:

1. The sample selected for test was production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: <u>T58DL4312R</u> filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.

3. This report is compliance with the 558074 D01 DTS Meas Guidance v03r01 Requirement.



3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209, 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT is a 1Tx1R SISO transmitter.

The EUT (model: DL4312D) had been tested under operating condition and had been reported as worst case on this test report.

Software used to control the EUT for staying in continuous transmitting and receiving mode was programmed.

The worst case data rate is determined as the data rate with highest output power.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis). The worst emission was found in lie-down position (Z axis) and the worst case was recorded.

IEEE 802.11b mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate was chosen for full testing.

IEEE 802.11g mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate was chosen for full testing.

IEEE 802.11n HT20 mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 mode:

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



4 INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Conducted Emissions Test Site							
Name of Equipment	Serial Number	Calibration Due					
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015			
Spectrum Analyzer	Agilent	N9010A	MY52220817	03/20/2015			
Spectrum Analyzer	R&S	FSL	100837	11/11/2014			
Power meter	Anritsu	ML2495A	1033009	09/29/2014			
Power Sensor	Anritsu	MA2411B	0917221	09/29/2014			

3M Semi Anechoic Chamber							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015			
Spectrum Analyzer	R&S	FSL	100837	11/11/2014			
Pre-Amplifier	HP	8447D	2944A06530	08/10/2014			
Pre-Amplifier	EMEC	EM01M26G	060570	07/25/2014			
Pre-Amplifier	MITEQ	AMF-6F-26040 0-40-8P	985646	08/08/2014			
Pre-Amplifier	Agilent	8449B	3008A01738	08/10/2014			
EMI Test Receiver	SCHAFFNER	SCR 3501	43 0	03/30/2015			
Loop Antenna	EMCO	6502	2356	06/12/2014			
Bilog Antenna	TESEQ	CBL 6112D	35378	09/11/2014			
Horn Antenna	EMCO	3115	00022250	08/04/2014			
Horn Antenna	EMCO	3116	00026370	12/29/2014			
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R			
Turn Table	CCS	CC-T-1F	N/A	N.C.R			
Test S/W EZ-EMC							

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.



Powerline Conducted Emissions Test Site #4							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
EMI Test Receiver	R&S	ESCI	100782	06/14/2014			
LISN	R&S	ENV216	100066	02/06/2015			
LISN	R&S	ENV 4200	830326/016	05/30/2014			
ISN	FCC	FCC-TLISN-T2- 02	20587	08/01/2014			
ISN	TESEQ	ISN-T8	30843	08/16/2014			
Current Probe	FCC	F-35	506	07/19/2014			
ISN	TESEQ	ISN ST08	27907	09/30/2014			
Test S/W		EZ	-EMC				

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.

4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	±2.0543
3M Semi Anechoic Chamber / 30MHz ~ 200MHz	±3.5921
3M Semi Anechoic Chamber / 200MHz ~ 1GHz	±3.5657
3M Semi Anechoic Chamber / 1 ~ 8GHz	±2.5873
3M Semi Anechoic Chamber / 8 ~ 18GHz	±2.6646
3M Semi Anechoic Chamber / 18 ~ 26GHz	±2.9617
3M Semi Anechoic Chamber / 26 ~ 40GHz	±3.4250

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 163-1, Jhongsheng Rd., Sindien District, Taipei City 23151, Taiwan
 Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No 11, Wugong 6th Rd, Wugu District, New Taipei City 24891, Taiwan (R.O.C)
 Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan
 Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, IC 2324G-2 for 3M Semi Anechoic Chamber B.



5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA A2LA		CFR 47, FCC Part15/18, CISPR 22, EN 55022, ICES-003, AS/NZS CISPR 22, VCCI V-3, EN 55011, CISPR 11, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 61000-6-1/2/3/4, EN 55024, CISPR 24, AS/NZS CISPR 24, AS/NZS 61000.6.2, EN 55014-1/-2, ETSI EN 300 386 v1.3.2/v1.3.3, IEC/EN 61000-3-2, AS/NZS 61000.3.2, IEC/EN 61000-3-3, AS/NZS 61000.3.3	ACCREDITED TESTING CERT #0824.01
USA	FCC MRA	3 meter Open Area Test Sites to perform FCC Part 15/18 measurements	FC TW1026
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-2882/2541/2798/725/1868 C-402/747/912 T-1930/1646
Taiwan	TAF	EN 55014-1, CISPR 14, CNS 13781-1, EN 55013, CISPR 13, CNS 13439, EN 55011, CISPR 11, CNS 13803, PLMN09, IS2045-0, LP0002 FCC Part 27/90, Part 15B/C/D/E, RSS-192/193/210/310 ETSI EN 300 328/ 300 220-1/ 300 220-2/ 301 893/ 301 489-01/ 301 489-03/ 301 489-07 / 301 489-17/ 300 440-1/ 300 440-2 AS/NZS 4268, AS/NZS 4771 CISPR 22, EN 55022, CNS 13438, AS/NZS CISPR 22, VCCI, IEC/EN 61000-4-2/3/4/5/6/8/11, CNS 14676-2/3/4/5/6/8, CNS 14934-2/3, CNS 13783-1, CNS 13439, CNS 13803	Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	SL2-IS-E-0014 / IN-E-0014 /A1-E-0014 /R1-E-0014 /R2-E-0014 /L1-E-0014
Canada	Industry Canada	RSS-Gen Issue 3	Canada IC 2324C-5

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6 SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

For Ra	For Radiated Emissions(Below 1GHz) and Powerline Conducted Emission							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord	
1	Notebook PC (Remote)	1706-A78	LV-L1870 06/09	FCC DOC	IBM	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core	
2	Notebook PC (Remote)	D400	0932RY	E2K24GBRL	DELL	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core	
3	Notebook PC (Remote)	ThinkPad T430u	PB-VZLGG 12/09	FCC DoC	LENOVO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core	
4	Notebook PC (Remote)	ThinkPad T430u	PB-VZHMR 12/09	FCC DoC	LENOVO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core	
5	Notebook PC (Remote)	TP00013A	LR-9XH2K	FCC DoC	LENOVO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core	
6	Multi Services Access Node	IES-1000	N/A	N/A	Zyxel	RJ-11 Cable: Unshielded, 10m	Unshielded, 1.8m	

For Ra	For Radiated Emissions(Above 1GHz) and Conducted Emission								
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord		
1	Notebook PC (Remote)	D400	0932RY	E2K24GBRL		I ANI Cable	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core		

Remark: Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



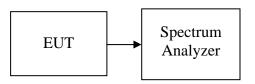
7 FCC PART 15 REQUIREMENTS

7.1 6DB BANDWIDTH

<u>LIMIT</u>

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Configuration



TEST PROCEDURE

- 1. Place the EUT on the table and set it in the transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto, Span = 30MHz (IEEE 802.11b, IEEE 802.11g, IEEE 802.11n HT20) or Span = 50MHz (IEEE 802.11n HT40).
- 4. Mark the peak frequency and –6dB (upper and lower) frequency.
- 5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted



<u>Test Data</u>

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.10		PASS
Mid	2437	10.10	>500	PASS
High	2462	10.10		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.45		PASS
Mid	2437	16.45	>500	PASS
High	2462	16.45		PASS

Test mode: IEEE 802.11n HT20 mode

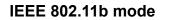
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.75		PASS
Mid	2437	17.75	>500	PASS
High	2462	17.75		PASS

Test mode: IEEE 802.11n HT40 mode

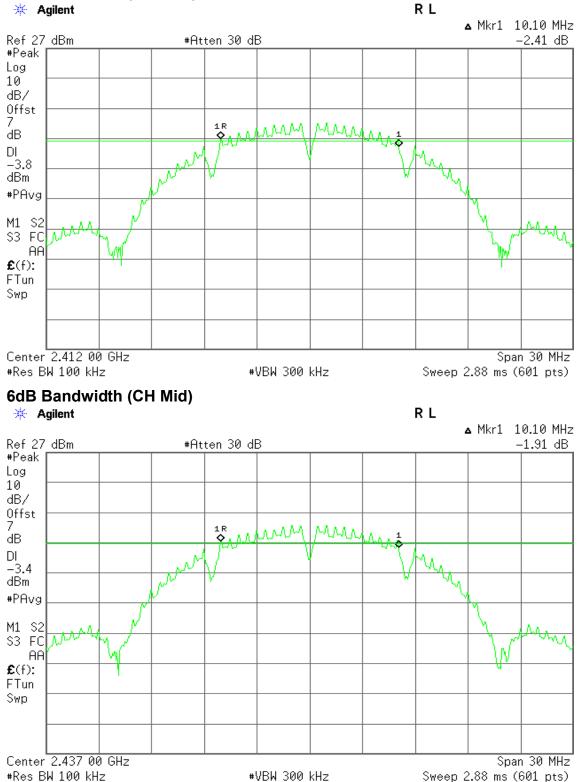
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.17		PASS
Mid	2437	36.25	>500	PASS
High	2452	36.17		PASS



Test Plot





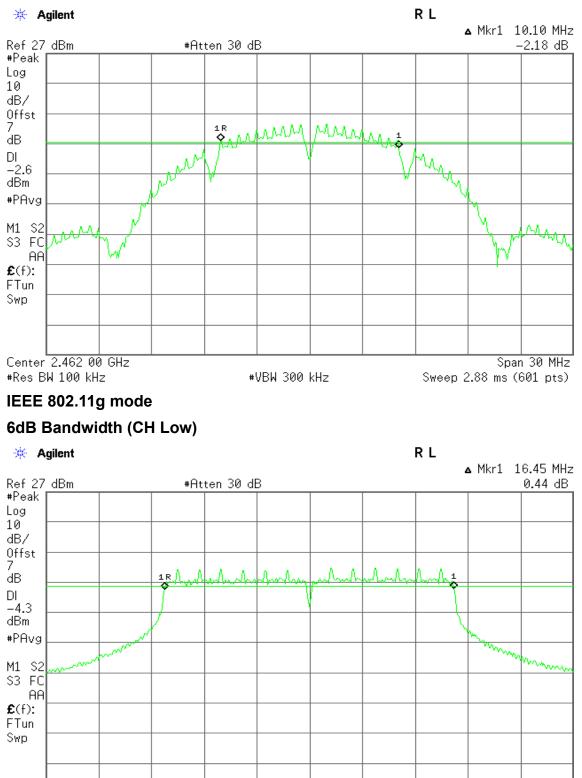




Center 2.412 00 GHz

#Res BW 100 kHz

6dB Bandwidth (CH High)



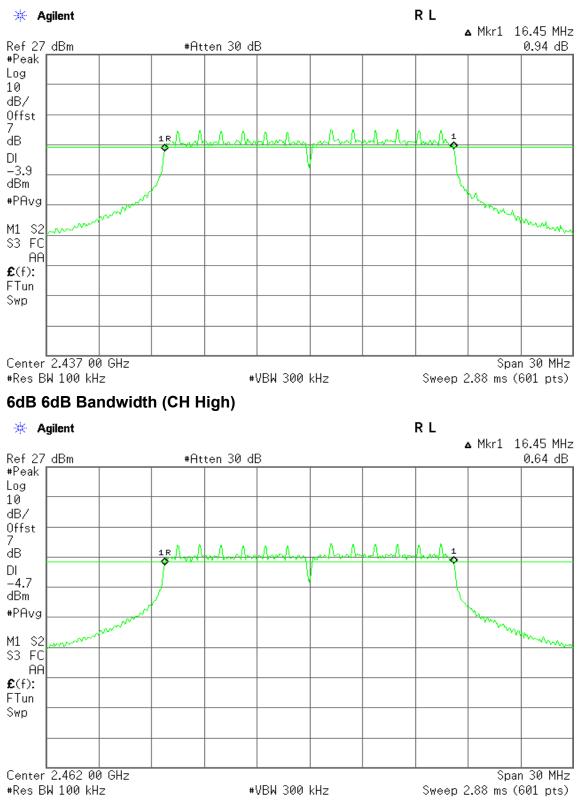
Span 30 MHz

Sweep 2.88 ms (601 pts)

#VBW 300 kHz



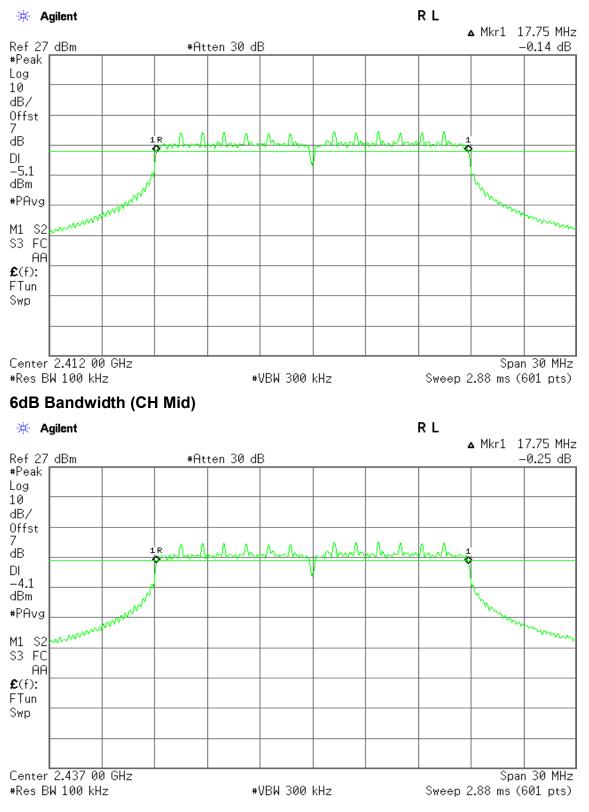
6dB Bandwidth (CH Mid)





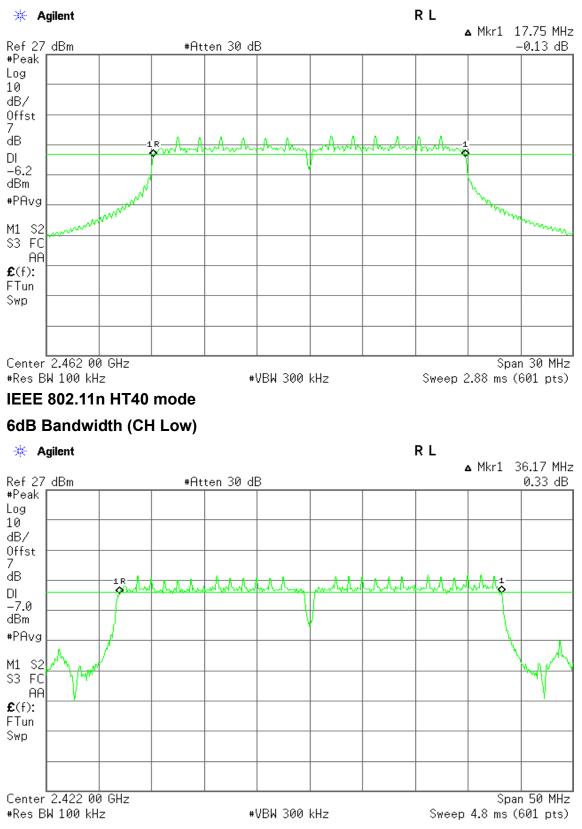
IEEE 802.11n HT20 mode

6dB Bandwidth (CH Low)



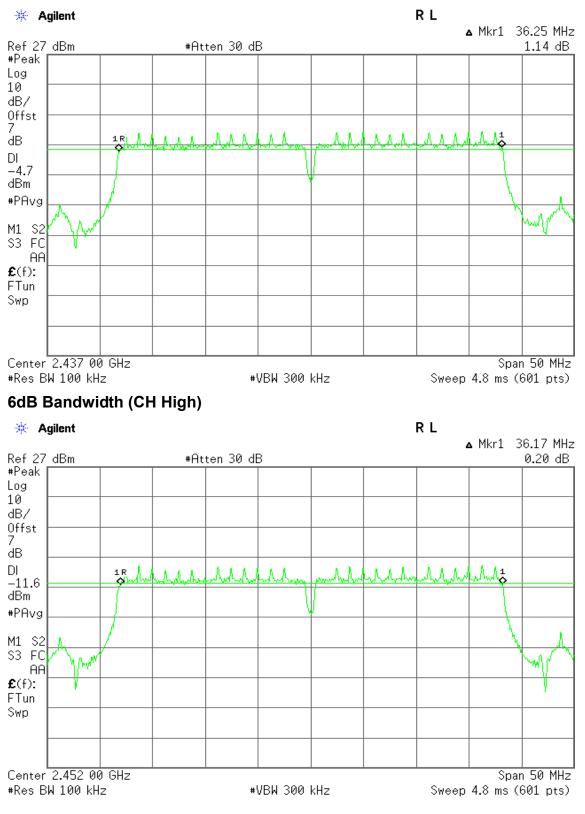


6dB Bandwidth (CH High)





6dB Bandwidth (CH Mid)





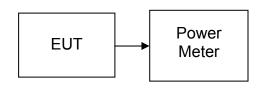
7.2 PEAK POWER

<u>LIMIT</u>

The maximum peak output power of the intentional radiator shall not exceed the following:

- 1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
- 2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted



<u>Test Data</u>

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	14.69	0.0294		PASS
Mid	2437	15.03	0.0318	1	PASS
High	2462	15.39	0.0346		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	21.16	0.1306		PASS
Mid	2437	21.36	0.1368	1	PASS
High	2462	20.74	0.1186		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	20.91	0.1233		PASS
Mid	2437	21.36	0.1368	1	PASS
High	2462	19.29	0.0849		PASS

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2422	19.70	0.0933		PASS
Mid	2437	22.76	0.1888	1	PASS
High	2452	16.04	0.0402		PASS

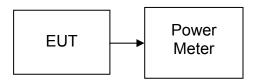


7.3 AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted



<u>Test Data</u>

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	11.61	0.0145
Mid	2437	11.91	0.0155
High	2462	12.43	0.0175

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.62	0.0230
Mid	2437	13.86	0.0243
High	2462	13.18	0.0208

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.67	0.0233
Mid	2437	13.77	0.0238
High	2462	11.70	0.0148

Test mode: IEEE 802.11n HT40 mode

Channel	Channel Frequency (MHz)		Output Power (W)		
Low	2422	11.75	0.0150		
Mid	2437	13.66	0.0232		
High	2452	7.76	0.0060		



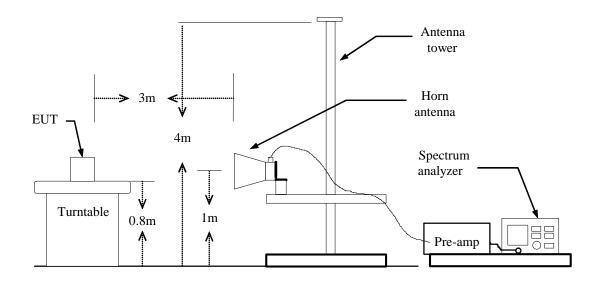
7.4 BAND EDGES MEASUREMENT

<u>LIMIT</u>

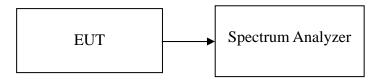
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration

For Radiated



For Conducted





TEST PROCEDURE

For Radiated

- 1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
- 5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

For Conducted

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

TEST RESULTS

Refer to attach spectrum analyzer data chart.



TEST DATA

Band Edges (IEEE 802.11b mode / CH Low)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

	RF 50 Ω	DC CORREC		SENSE:INT	ALIGN AUTO	11:09:	50 AM Apr 02, 2
olay	Line 54.00 dE	3μV/m	PNO: Fast 😱 IFGain:Low	Trig: Free Run #Atten: 20 dB	#Avg Type: RN Avg Hold:>100	1S /100	TYPE MWWW DET P P N I
IB/div	Ref Offset 6 dE Ref 122.99 (3 dBµV/m				Mkr1 2.39 44.51	90 00 G 8 dBµV
,							
L							- · · ·
<u> </u>							
						. /	54.00 dE
			<i>4</i> 1/D	W 300 Hz		Stop 2 Sweep 286 m	2.42000 G s (1001 p
	1.0 MHz		#VB				
BW MODE T	1.0 MHz	×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
	1.0 MHz	× 2.390 00 GH	Y		FUNCTION WIDTH	FUNCTION VALUE	
BW MODE T	1.0 MHz		Y		FUNCTION WIDTH	FUNCTION VALUE	
BW MODE T	1.0 MHz		Y		FUNCTION WIDTH	FUNCTION VALUE	
BW MODE T	1.0 MHz		Y		FUNCTION WIDTH	FUNCTION VALUE	
BW MODE T	1.0 MHz		Y		FUNCTION WIDTH	FUNCTION VALUE	
BW MODE T	1.0 MHz		Y		FUNCTION WIDTH	FUNCTION VALUE	



Detector mode: Peak

Polarity: Horizontal

Agilent Spe		lyzer - Swept SA									
	RF	50 Ω DC CORREC	SENSE	EINT	ALIGN AUTO			6 AM Apr 02, 2014			
Display	Line /			'rig: Free Run Atten: 20 dB		/pe: RMS ld:>100/100	Ir	RACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P N N N N			
10 dB/div	Ref Offset 6 dB Mkr1 2.390 00 GHz 0 dB/div Ref 122.99 dBμV/m 49.603 dBμV/m										
113											
103											
93.0								~~~~			
83.0								74.00 dBµ∀/m			
73.0 63.0											
53.0						1 June					
43.0		and and a start of the second se	an out the the owner and the		a Maahda maraharina and	wynd wedd ³⁰⁰⁰					
33.0											
Start 2.3 Res BW			#VBW 3	.0 MHz		#Swi	Stop 2. eep 100 ms	42000 GHz s (1001 pts)			
MKR MODE 1 N 2	TRC SCL	× 2.390 00 GHz	Y 49.603 dBµV/n	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE				
2 3 4											
4 5 6 7											
7 8											
8 9 10											
11 12											
MSG					I status						

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11b mode / CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

tart Freq 2.46000000 GHz Trig: Free Run IEGain:Low #Avg Type: RMS AvgHold>100/100 Trace [12] Vorter May Stop 2.483 50 C Ref Offset 6 dB 0 dB/div Ref 122.99 dBµV/m Stop 2.483 50 C 51.240 dBµV 113 30 30 30 30 30 30 30 30 30 30 30 30 30		um Analyzer - Swej							
Ref Offset 6 dB Ref Offset 6 dB Mkr1 2.483 50 C 51.240 dBµ² 0 B 0	-	RF 50 Ω			ENSE:INT		RMS		
Ref Offset 6 dB Mkr1 2.483 50 C 00 51.240 dBµV/m 01 0 02 0 03 0 04 0 05 0 06 0 07 0 08 0 08 0 09 0 00 0 01 0 02 0 03 0 04 0 05 0 05 0 06 0 07 0 08 0 08 0 09 0 00 0 00 0 01 0 02 0 03 0 04 0 05 0 05 0 06 0 07 0 08 0 09 0 09 0 09 0 09 0 09 0 09 0 09 0 100 0 100	an rie	q 2.400000		PNO: Fast				1	YPE MWWWW
Bildiv Ref 122.99 dBµV/m 51.240 dBµN Image: State of the state of			I	FGain:Low	#Atten: 20 dB				,
9 9 10 10 10 10 10 10 10 10 10 10	dB/div						r	0kr1 2.48 51.240	3 50 G⊦ dBµV/
30 -	g								
Image: state of the second state of	13								
Image: state of the second state of the sec)3								
Image: state of the s	.0								
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0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 54.00 0 51.240	.0								
U U	.0 0.					1			
Mode Transmission Transmission Stop 2.50000 Stop 2.50000 Sweep 104 ms (1001						Q'			54.00 dBµ
Art 2.46000 GHz es BW 1.0 MHz #VBW 300 Hz Stop 2.50000 104 ms (1001 MODE TRC SCL X Y FUNCTION WIDTH FUNCTION WIDTH N 1 f 2.483 50 GHz 51.240 dBµV/m FUNCTION WIDTH N 1 f 2.483 50 GHz 51.240 dBµV/m FUNCTION WIDTH	.0								
Art 2.46000 GHz #VBW 300 Hz Stop 2.50000 art 2.46000 GHz #VBW 300 Hz Sweep 104 ms (1001 Mode Trc ScL X Y FUNCTION WIDTH FUNCTION WIDTH N 1 f 2.483 50 GHz 51.240 dBµV/m FUNCTION WIDTH FUNCTION VALUE N 1 f 2.483 50 GHz 51.240 dBµV/m FUNCTION WIDTH FUNCTION VALUE									
Image: Normal State #VBW 300 Hz Sweep 104 ms (1001 N 1 f 2.483 50 GHz 51.240 dBµV/m N 1 f 2.483 50 GHz 51.240 dBµV/m									
N 1 f 2.483 50 GHz 51.240 dBµV/m				#\/B)A	/ 300 Hz		SWA	Stop 2. en 104 ms	50000 Gl
N 1 f 2.483 50 GHz 51.240 dBμV/m			~						(1001 p
$ \begin{bmatrix} 1 \\ 1 \\ 2 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3$	N 1					POINCTION WIDTH		ONCHON VALUE	
	:								
	,								
Image: Sector									
	'								
)								
Lo STATUS									



Detector mode: Peak

Polarity: Horizontal

	Analyzer - Swept SA						
	RF 50 Ω DC CORREC	SENSE:INT	1	ALIGNAUTO #Avg Type	DMC		1 AM Apr 02, 2014 ACE 1 2 3 4 5 6
Marker 1 2.4	483500000000 GHz		Free Run n: 20 dB	#Avg Type Avg Hold:>		Т	ACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P N N N N
10 dB/div R	tef Offset 6 dΒ tef 122.99 dΒμV/m				M		3 50 GHz dBµV/m
Log 113							
103							
93.0							
83.0							74.00 dBµV/m
73.0		and harden all advantages		<u> </u>			1700 dep 1
63.0			Maran Maraha				
53.0 43.0				- ANA AND MALE	mannen	an statements	****
33.0							
						Oten 3	
Start 2.46000 #Res BW 1.0		#VBW 3.0 F	MHz		#Swee	stop 2.: ep 100 ms	50000 GHz (1001 pts)
MKR MODE TRC SI		Y	FUNCTION FU	NCTION WIDTH	FUI	NCTION VALUE	
	f 2.483 50 GHz	z 56.747 dBµV/m					
2 3 4 5 6 7							
5							
8							
8 9 10							
11							
MSG				I STATUS			

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11g mode / CH Low)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





Detector mode: Peak

Polarity: Horizontal

Agilent Spec	ctrum Analyzer - Swept SA										
	RF 50 Ω DC CORP	REC SENSE:I	INT	ALIGNAUTO #Avg Type:	DMC		8 PM Apr 01, 2014 ACE 1 2 3 4 5 6				
Display	[,] Line 74.00 dBµV/m		ig: Free Run tten: 20 dB	#Avgitype: Avg Hold:>			TYPE MWWWWW DET P P N N N N				
10 dB/div											
113											
103 ——											
93.0							~				
83.0							74.00 dBµ∀/m				
73.0					A1 /						
53.0					Junt						
43.0	physical and the second se	www.dent	cade the prove of the spectrum of the prove	any manager and the second							
33.0											
#Res BV	31000 GHz N 1.0 MHz	#VBW 3.0				ep 100 ms	42000 GHz (1001 pts)				
MKR MODE 1 N 2 3	TRC SCL X 1 f 2.390 00) GHz 56.715 dBµV/m	FUNCTION	FUNCTION WIDTH	FL	INCTION VALUE					
3 4 5											
4 5 6 7											
8 9 10											
11											
12 MSG											

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11g mode / CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

gilent Spect	rum Analyzer - Swe							
-	Line 54.00 d		SENSE:I	NT	ALIGNAUTO #Avg Type	e: RMS		1 PM Apr 01, 20 ACE 1 2 3 4 5
ισριάγι	Line 54.00 u	Р		g: Free Run	Avg Hold:	> 100/100		
		IF	Gain:Low #At	ten: 20 dB				,
dB/div	Ref Offset 6 c Ref 122.99					l	0 Wkr1 2.48 52.225	3 50 G⊦ dBµV/
g								
13								
03								
3.0								
3.0								
3.0								
8.0					1			
3.0								54.00 dBµ
8.0								
3.0								
	6000 GHz / 1.0 MHz		#VBW 51	0 H7		SWE	Stop 2. ep 61.2 ms	50000 GI
R MODE T		×	× 1811 V		FUNCTION WIDTH		UNCTION VALUE	(1001 p
N	1 f	2.483 50 GHz	52.225 dBµV/m	rononon			SHOHON PALOE	
2								
4								
5								
7								
3								
) (
1								



Detector mode: Peak

Polarity: Horizontal

Agilent Spec		lyzer - Swept SA									
	RF	50 Ω DC CORREC	SEN!	NSE:INT	AL	.IGN AUTO	PHC		0 PM Apr 01, 2014		
Display	Line 74			Trig: Free R #Atten: 20 d		#Avg Type Avg Hold:>			RACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P N N N N		
10 dB/div											
113											
103											
93.0									i		
83.0		V	month land and						74.00 dBµ∀/m		
73.0				With Enderson	<u>.</u>				14.00 00001		
63.0					· · · · · · · · · · · · · · · · · · ·	1					
53.0			+			- And Brand Branch	maters and the state	-	and a monthly		
43.0											
33.0											
Start 2.4 #Res BV			#VBW	3.0 MHz			#Swe	Stop 2. ep 100 ms	50000 GHz s (1001 pts)		
MKR MODE	TRC SCL	× 2.483 50 GHz	55.084 dBµV/	FUNCT	TION FUNCT	TION WIDTH	FUI	NCTION VALUE			
2 3											
4 5 6 7											
6											
8											
8 9 10											
11											
MSG						I STATUS					

Detector mode: Average

Polarity: Horizontal

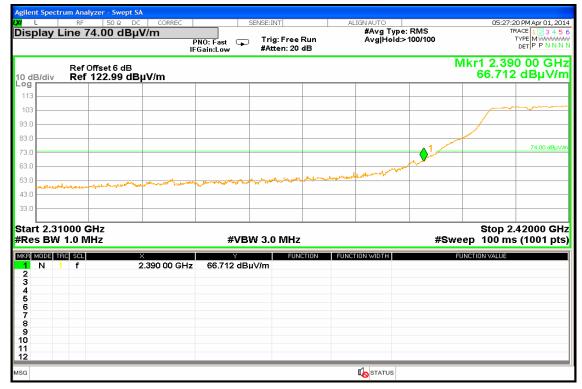
		er - Swept SA							
Vienlav I	RF	່ 50 Ω DC 00 dBµV			SENSE:INT	A	LIGNAUTO #Avg Type:	RMS	06:03:34 PM Apr 01, 20 TRACE 1 2 3 4 5
nspiay i		00 α Β μ ν		PNO: Fast 🕞	Trig: Free #Atten: 20		Avg Hold: 3		DET P P N N
	Ref Offs							MI	(r1 2.483 50 GH
0 dB/div	Ref 12	2.99 dBµ	IV/m						42.951 dBµV/r
113									
103									
93.0									
3.0									
3.0									
3.0									
3.0							1		54.00 dBµ\
3.0									
3.0									
	6000 GH: 1.0 MHz			#VB	W 510 Hz			Sweep	Stop 2.50000 GH 61.2 ms (1001 pt
KR MODE T		×		Y		CTION FUNC	TION WIDTH	FUN	CTION VALUE
1 N 2	1 f	2	.483 50 GHz	2 42.951 dB	µV/m				
3									
5									
5									
3									
0									
1									



Band Edges (IEEE 802.11n HT20 mode / CH Low)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

	um Analyzer - Swep								
<mark>⊯</mark> L Display I	RF 50 Ω .ine 54.00 dB			NSE:INT		ALIGNAUTO #Avg Type:	RMS		1 PM Apr 01, 2014
	-ine 54.00 db	F	NO: Fast 🖵	Trig: Free I #Atten: 20 (Avg Hold:>	100/100		
		IF	Gain:Low	#Atten: 20 (ab			Alert 0.20	
10 dB/div	Ref Offset 6 dE Ref 122.99 d						n	/lkr1 2.39 49 119	dBµV/m
Log	Rei 122.99 u	юμνлп							
113									
103									
93.0									
83.0									
73.0									
63.0							A1		54.00 dBµ∀/m
53.0							9		34.00 dbp////
43.0							-		
33.0									
Start 2.31	000 GHz		I					Stop 2.	42000 GHz
#Res BW	1.0 MHz		#VBW	/ 560 Hz			Swe	ep 153 ms	
MKR MODE T		×	Y		CTION FUN	ICTION WIDTH	F	UNCTION VALUE	
1 N 1 2	f	2.390 00 GHz	49.119 dBµ\	//m					
3									
5									
6 7									
8 9									
10									
11 12									
MSG						STATUS			
						~			



Detector mode: Peak

Polarity: Horizontal

Agilent Spectrum Analyzer - Swept SA						
L RF 50Ω DC CORREC	SENSE:IN	IT	ALIGN AUTO			6 PM Apr 01, 2014
Marker 2 2.390000000000 GHz	PNO: Fast 🖵 Trig IFGain:Low #Att	: Free Run en: 20 dB	#Avg Type: Avg Hold:>1		TF	ACE 123456 TYPE MWWWWW DET PPNNNN
Ref Offset 6 dB 10 dB/div Ref 122.99 dBµV/m ∟og				N		0 00 GHz dBµV/m
113						
103						
93.0						
83.0						74.00 dBµ∀/m
73.0					~	74:00 000 771
63.0				\sim $2 -$		
43.0	al management	erent of monte-te-	and and a strange of the state			
33.0						
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW 3.0	MHz		#Swe		42000 GHz (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.389 34 GH 2 N 1 f 2.390 00 GH		FUNCTION F	UNCTION WIDTH	FL	INCTION VALUE	
3	z 53.895 dBµV/m					
4 5 6 7						
6						
8						
10						
12 MSG						

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11n HT20 mode / CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

gilent Spect	rum Analyzer - Swej								
ideo B\	RF 50Ω	DC CORREC	S	ENSE:INT		IGNAUTO AVG Type:		TF	1 PM Apr 01, 20
			PNO: Fast 😱 FGain:Low	Trig: Free I #Atten: 20 (Avg Hold:>	100/100		
	Ref Offset 6 d						N	lkr1 2.48	3 50 GH
dB/div	Ref 122.99							51.239	dBµV/⊨
1 13									
103									
3.0									
3.0									
3.0									
3.0						1			
3.0									54.00 dBµ
3.0									
3.0									
	6000 GHz	I				1			50000 GI
Res BW	1.0 MHz		#VBV	V 560 Hz			Swee	ep 55.7 ms	s (1001 p
	RC SCL	× 2.483 50 GHz	51.239 dBu		TION FUNCT	ION WIDTH	FL	INCTION VALUE	
2		2.465 50 GHZ	51.255 UBµ	van					
4									
5									
7 3									
9									
1									
	<020 TX 2462 A								
- File	<g20 2462="" a<="" td="" tx=""><td>v v.png> saved</td><td></td><td></td><td></td><td>STATUS</td><td></td><td></td><td></td></g20>	v v.png> saved				STATUS			



Detector mode: Peak

Polarity: Horizontal

PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Hold>100/100 TVPE M Der P Ref Offset 6 dB Mkr1 2.483 50 55.352 dB 10 dB/div Ref 122.99 dBµV/m 55.352 dB 113 III IIII IIII 103 IIII IIIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	
PN0: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Hold>100/100 Type M Dot Nkr1 2.483 50 55.352 dB 10 dB/div Ref 122.99 dBµV/m 55.352 dB 113	
OdB/div Ref 122.99 dBµV/m 55.352 dB 103 <th>GHz µV/m</th>	GHz µV/m
113	
83.0	
74	
73.0	.00 dBµV/m
	UU deµ V/m
53.0	
43.0	
33.0	
Start 2.46000 GHz Stop 2.5000 #Res BW 1.0 MHz #VBW 3.0 MHz #Sweep 100 ms (100	
MKR MODE TRC SCI. X Y FUNCTION FUNCTION VALUE 1 N 1 f 2.483 50 GHz 55.352 dBµV/m	
4	
6	
2 3 4 4 5 6 6 7 7 8 9 9	
9	
11	
12 MSG Lostatus	

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11n HT40 mode / CH Low)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





Detector mode: Peak

Polarity: Horizontal

Agilent Spectrum Ana	lyzer - Swept SA						
LXI L RF	50Ω DC CORREC	SENSE:I	NT	ALIGN AUTO			2 PM Apr 01, 2014
Display Line 7		PNO: Fast 😱 Trig FGain:Low #Att	g: Free Run ten: 20 dB	#Avg Type Avg Hold:>	100/100	٦	ACE 123456 TYPE MWWWWW DET PPNNNN
	Offset 6 dB 122.99 dBµV/m					lkr1 2.388 56.531	8 13 GHz dBµV/m
113							
103							
93.0							
83.0						_/	74.00 dBµV/m
73.0					- 1		74.00 dbpv/m
63.0					λ_{1}^{2}	\sim	
53.0	and the second and the second	provenations	modellegenerby	M. W. Marthan Marthan Martha	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
43.0							
Start 2.31000 0 #Res BW 1.0 N		#VBW 3.0) MHz		#Swe		42000 GHz (1001 pts)
MKR MODE TRC SCL	X		FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE	
1 N 1 f 2 N 1 f	2.388 13 GHz 2.390 00 GHz						
2 N 1 f 3 4 5 6 7							
5 6							
7							
8 9 10							
11							
MSG				I STATUS			

Detector mode: Average

Polarity: Horizontal





Band Edges (IEEE 802.11n HT40 mode / CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

	rum Analyzer - Sw								
d L	RF 50 Ω		SEN	NSE:INT	ALIG	GNAUTO AVG Type:	PMS		52 PM Apr 01, 201 RACE 1 2 3 4 5
Marker 2	2.4000000	P	PNO: Fast 😱 Gain:Low	Trig: Free Run #Atten: 20 dB		Avg Hold:>1			TYPE MWWWWW DET P P N N N
10 dB/div	Ref Offset 6 Ref 122.99						Ν	/kr2 2.48 52.299	6 08 GH:) dBµV/n
og									
113									
103									
93.0									
3.0									
3.0									
3.0				\sim		<mark>0</mark> 2			54.00 dBµ\
3.0									
3.0									
3.0									
	6000 GHz		<i>4</i> 0 (D14)				•	Stop 2	.50000 GH
	1.0 MHz			1.1 kHz				ep 28.4 m	s (1001 pt
KR MODE T 1 N <mark>2</mark> N	RC SCL 1 f 1 f	× 2.483 50 GHz 2.486 08 GHz	51.894 dBµV 52.299 dBµV		FUNCTIO	ON WIDTH	F	UNCTION VALUE	
3									
5									
5 7									
8 9									
0									
1 2									
						STATUS			



Detector mode: Peak

Polarity: Horizontal

PN0: Fast IFGain:Low Trig: Free Run #Atten: 20 dB AvgjHold>100/100 Type Mi Def Ref Offset 6 dB dB/div Ref 0ffset 6 dB S2.048 dBj Mkr2 2.486 08 52.048 dBj 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SENSE:INT ALIGN AUTO 07:16:29 PM Apr 01	INT	SENSE:	CORREC	50 Ω DC	RF		L
Ref 122.99 dBµV/m 52.048 dB; 3 - </th <th>at 😱 Trig: Free Run Avg Hold:>100/100 TYPE MWW</th> <th></th> <th></th> <th>PI</th> <th>74.00 dBµ\</th> <th>Line 7</th> <th>lay L</th> <th>spl</th>	at 😱 Trig: Free Run Avg Hold:>100/100 TYPE MWW			PI	74.00 dBµ\	Line 7	lay L	spl
33 34 <td< th=""><th>Mkr2 2.486 08 G 52.048 dBμ\</th><th></th><th></th><th>μV/m</th><th></th><th></th><th>/div</th><th></th></td<>	Mkr2 2.486 08 G 52.048 dBμ\			μV/m			/div	
Image: State of the section of the								- I -
Image: state								I3 -
And Construction And Construction<								0
Image: Stop 2.5000 Stop 2.5000 art 2.46000 GHz #VBW 3.0 MHz se BW 1.0 MHz #VBW 3.0 MHz #Sweep 100 ms (100 Image: Stop 2.5000 #Sweep 100 ms (100 Image: Stop 2.5000 #Sweep 100 ms (100								oF
art 2.46000 GHz es BW 1.0 MHz MODE TRE SCL X X X X X X X X X X X X X	74.00 d		<u> </u>	+				0
Image: Non-State Image: Non-State Stop 2.5000 Image: Non-State #VBW 3.0 MHz #Sweep 100 ms (100 Image: Non-State Y Function N 1 f 2.483 50 GHz 52.111 dBuV/m		. Alanda	~~~					0
Art 2.46000 GHz Stop 2.5000 es BW 1.0 MHz #VBW 3.0 MHz #Sweep 100 ms (100 MODE If 2.483 50 GHz 52.111 dBuV/m		warmingh						
Art 2.46000 GHz Stop 2.5000 es BW 1.0 MHz #VBW 3.0 MHz #Sweep 100 ms (100 MODE TRC SCL X Y FUNCTION WIDTH FUNCTION VALUE N 1 f 2.483 50 GHz 52.111 dBuV/m FUNCTION								- 0
es BW 1.0 MHz #VBW 3.0 MHz #Sweep 100 ms (100 MODE TRC SCL X Y FUNCTION WIDTH FUNCTION VALUE N 1 f 2.483 50 GHz 52.111 dBuV/m								0
N 1 f 2.483 50 GHz 52.111 dBμV/m		.0 MHz	#VBW 3.		MHz	1.0 N	BW	es
	11 dBµV/m	1		2.483 50 GHz	2	1 f	N 1	٩

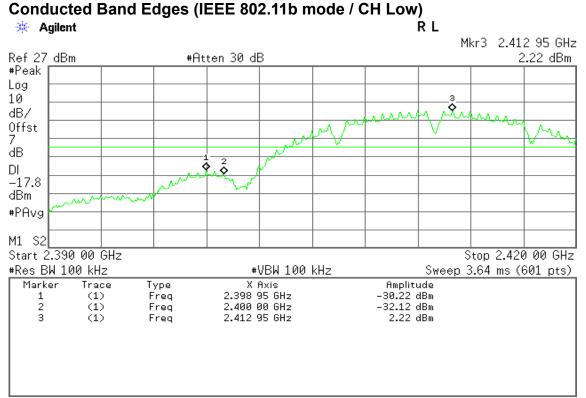
Detector mode: Average

Polarity: Horizontal

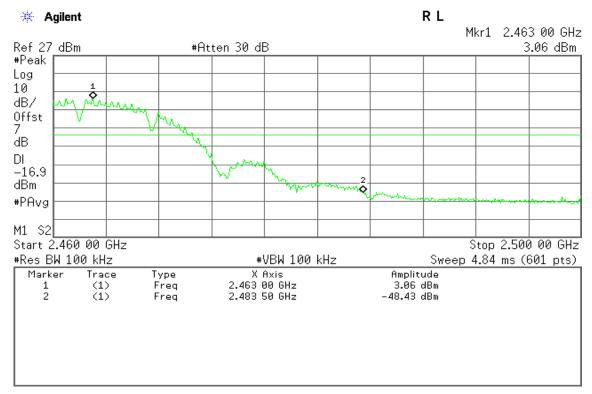




Test Plot

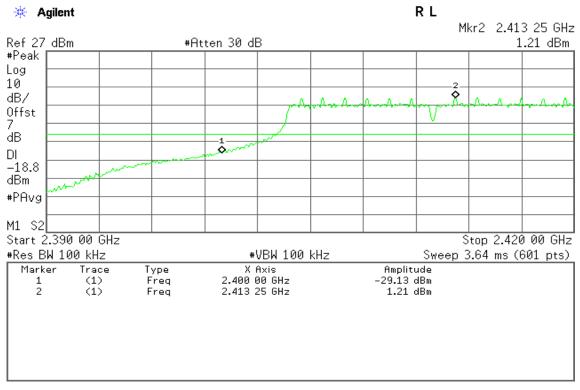


Conducted Band Edges (IEEE 802.11b mode / CH High)

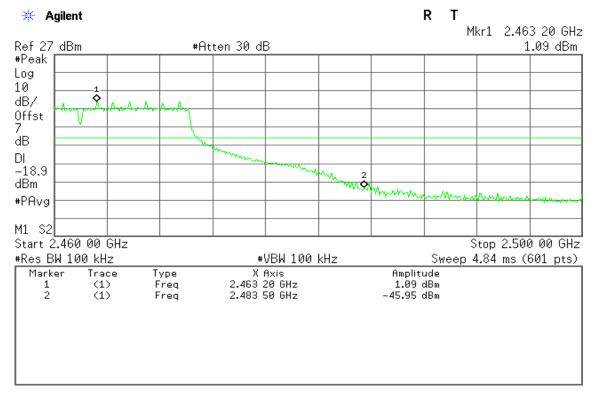




Conducted Band Edges (IEEE 802.11g mode / CH Low)

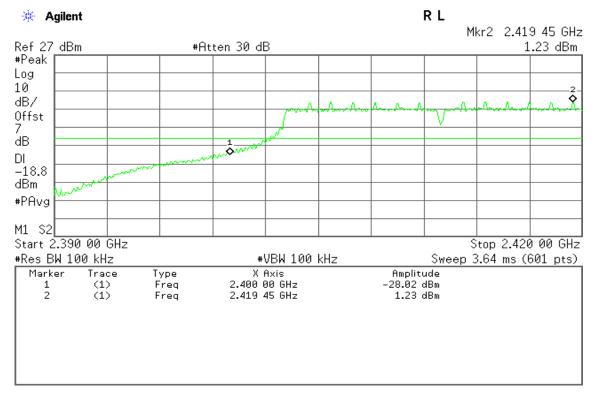


Conducted Band Edges (IEEE 802.11g mode / CH High)

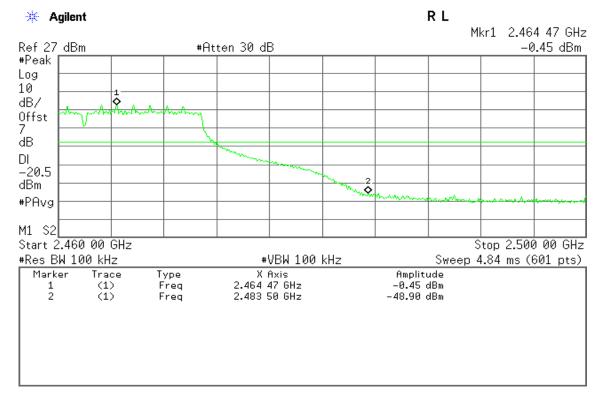




Conducted Band Edges (IEEE 802.11n HT20 mode / CH Low)

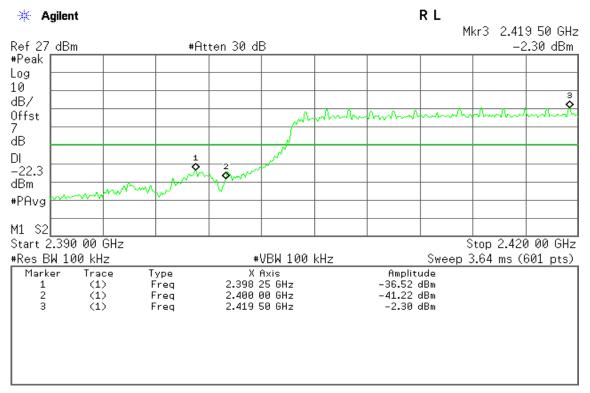


Conducted Band Edges (IEEE 802.11n HT20 mode / CH High)

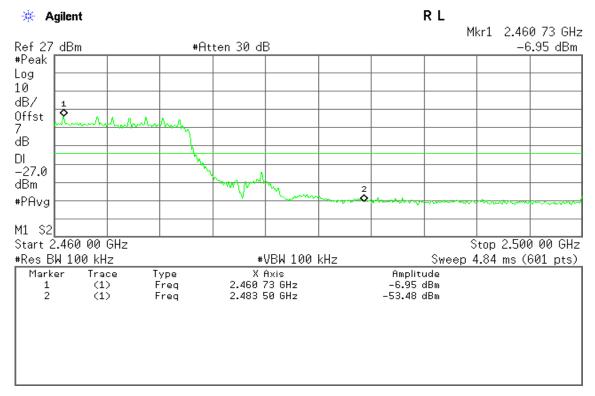




Conducted Band Edges (IEEE 802.11n HT40 mode / CH Low)



Conducted Band Edges (IEEE 802.11n HT40 mode / CH High)



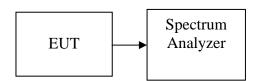


7.5 PEAK POWER SPECTRAL DENSITY

<u>LIMIT</u>

- 1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
- 2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS channel bandwidth.
- 3. Set the RBW \geq 3 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

TEST RESULTS

No non-compliance noted



<u>Test Data</u>

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-4.86		PASS
Mid	2437	-4.44	8.00	PASS
High	2462	-5.24		PASS

Test mode: IEEE 802.11g mode

		-		
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-14.87		PASS
Mid	2437	-14.50	8.00	PASS
High	2462	-15.30		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-13.93		PASS
Mid	2437	-13.28	8.00	PASS
High	2462	-15.55		PASS

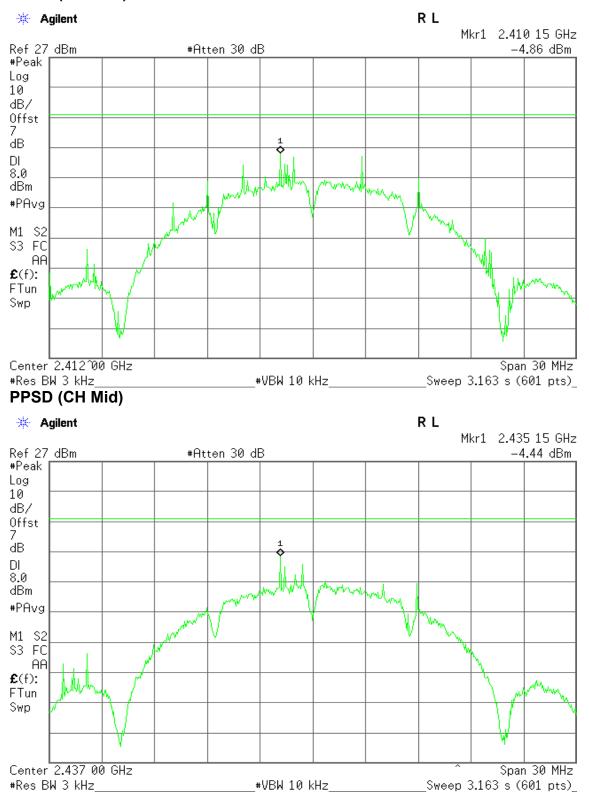
Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-16.29		PASS
Mid	2437	-13.44	8.00	PASS
High	2452	-21.58		PASS



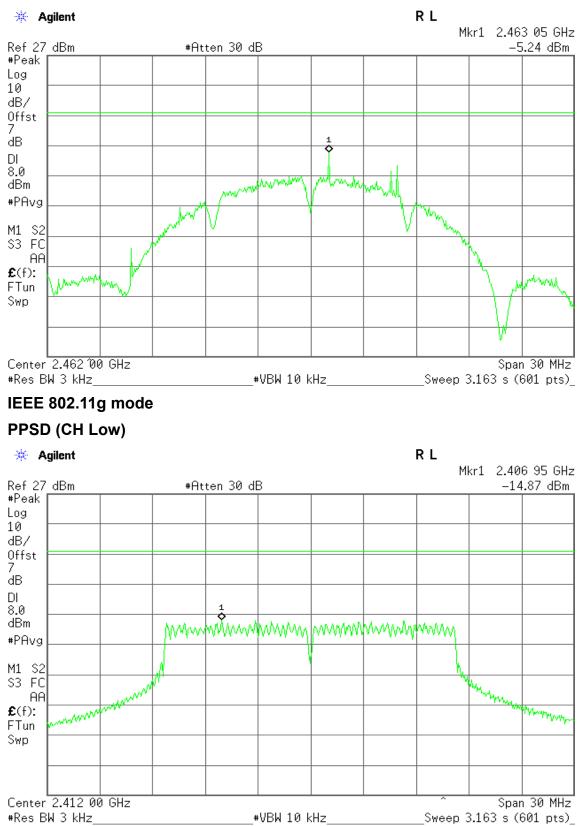
Test Plot

IEEE 802.11b mode PPSD (CH Low)



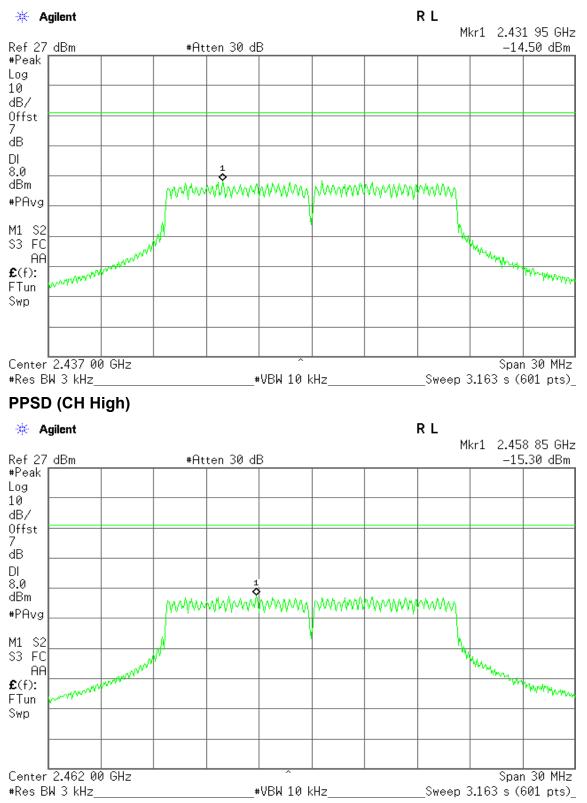


PPSD (CH High)



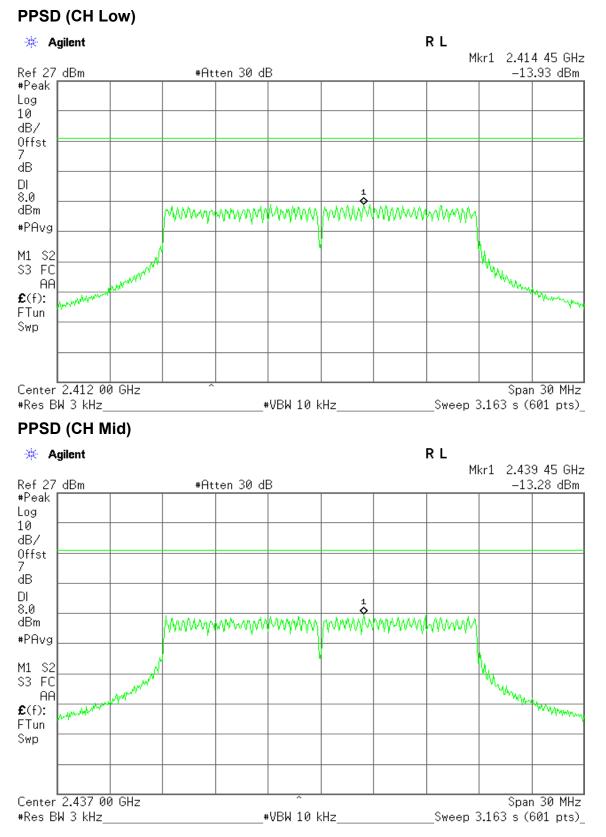


PPSD (CH Mid)





IEEE 802.11n HT20 mode

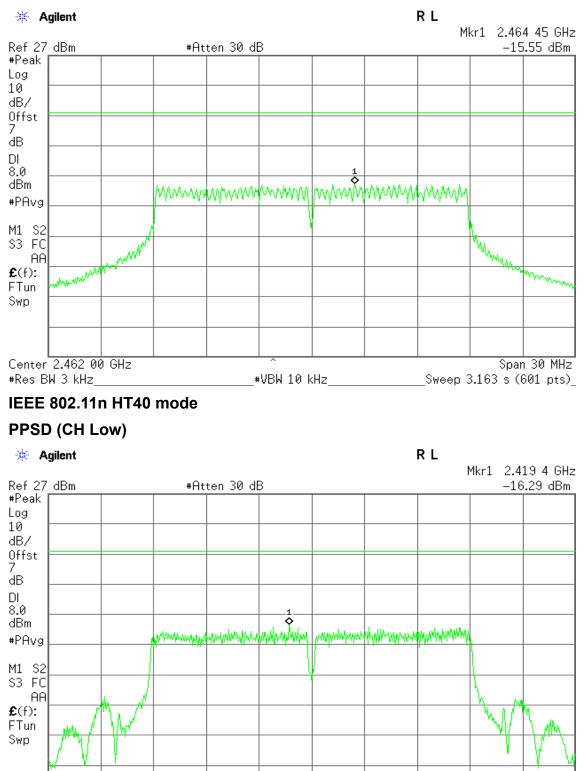




PPSD (CH High)

Center 2.422 0 GHz

#Res BW 3 kHz



#VBW 10 kHz

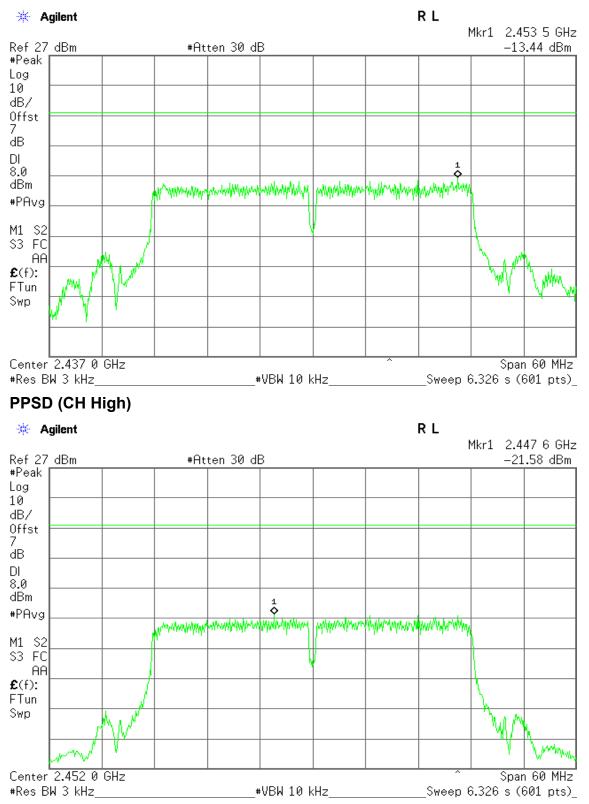
Page 54

Span 60 MHz

Sweep 6.326 s (601 pts)



PPSD (CH Mid)





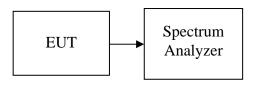
7.6 SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

<u>LIMIT</u>

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range for IEEE 802.11b/g, 30MHz to 40GHz range for IEEE 802.11a with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

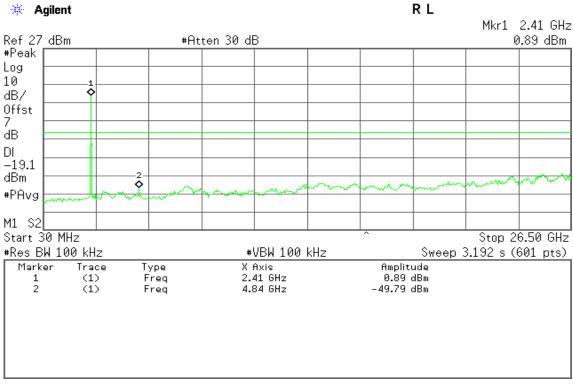
No non-compliance noted



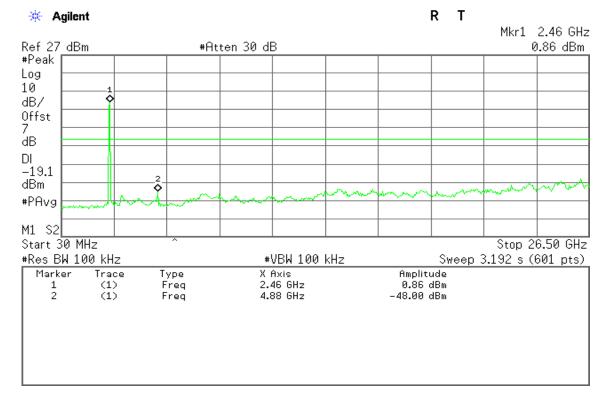
Test Plot

IEEE 802.11b mode

CH Low

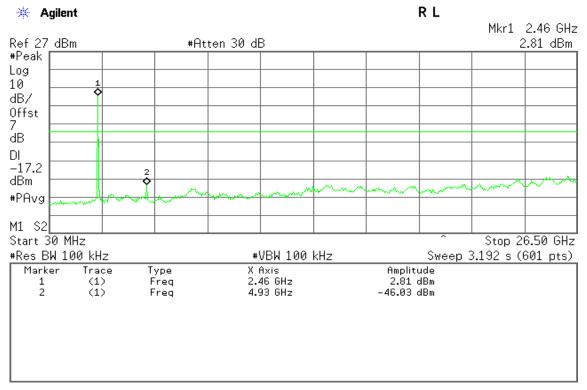


CH Mid



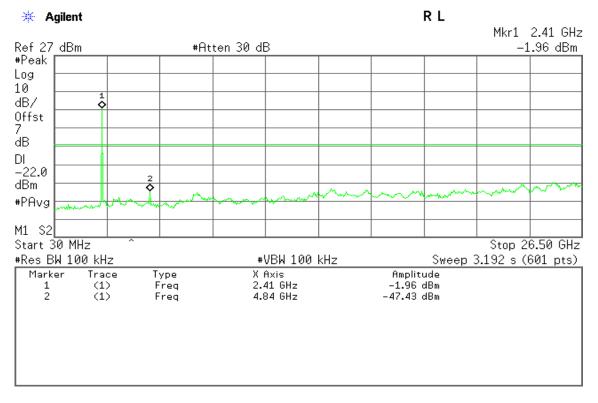


CH High



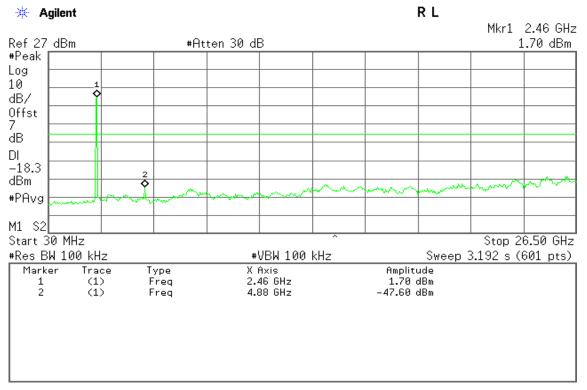
IEEE 802.11g mode

CH Low

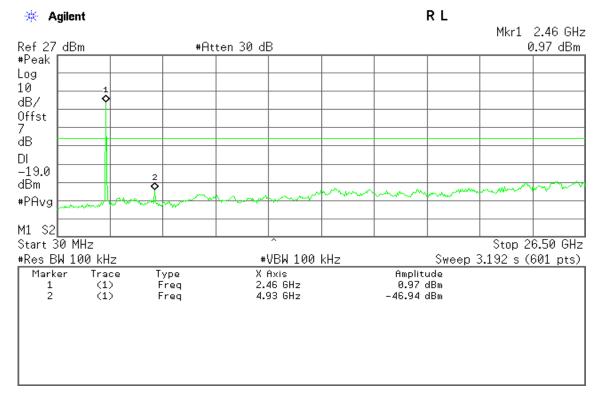




CH Mid



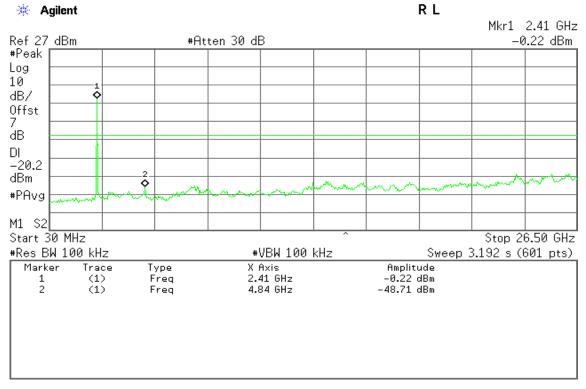
CH High



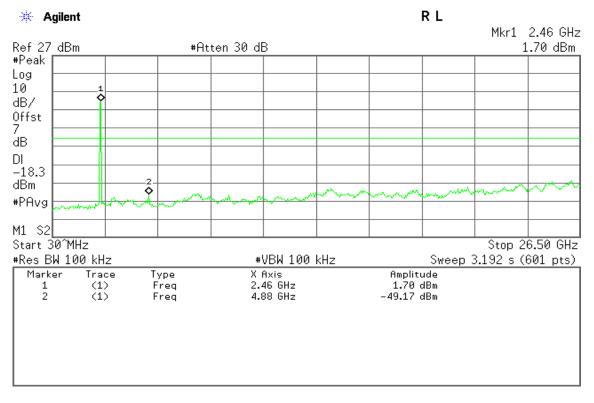


IEEE 802.11n HT20 mode

CH Low

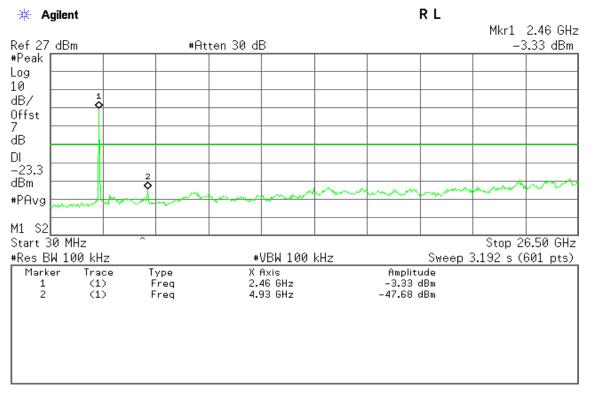


CH Mid



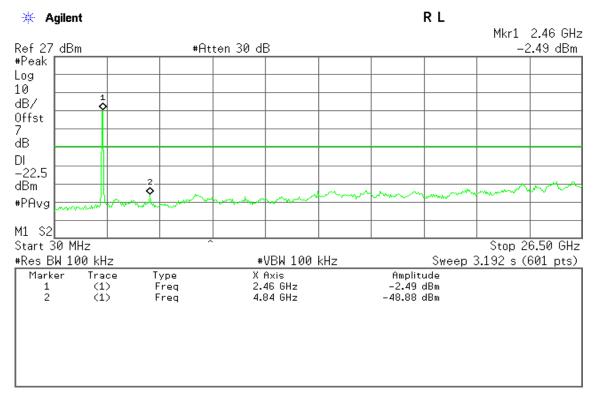


CH High



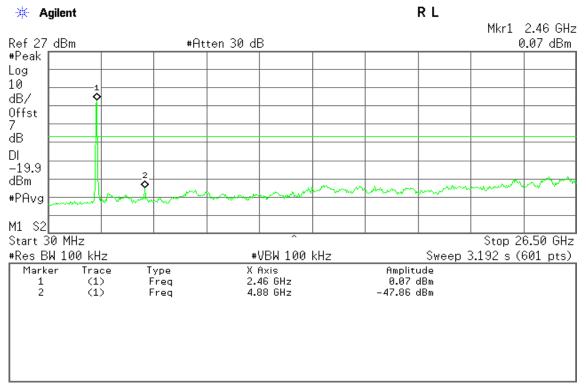
IEEE 802.11n HT40 mode

CH Low

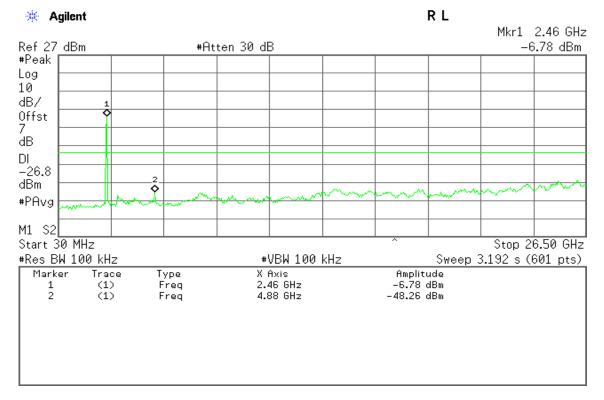




CH Mid



CH High





7.6.2 Radiated Emissions

<u>LIMIT</u>

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

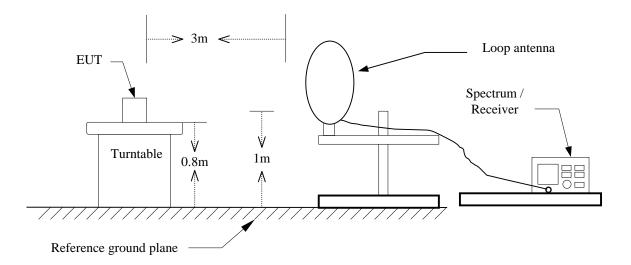
2. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
0.009 - 0.490	2400/F(kHz) +80	20LOG((2400/F(kHz))+80)
0.490 - 1.705	24000/F(kHz) +40	20LOG((24000/F(kHz))+40)
1.705 – 30.0	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

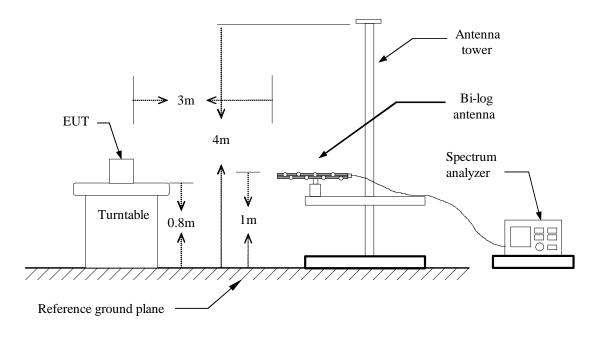


Test Configuration

9kHz ~ 30MHz

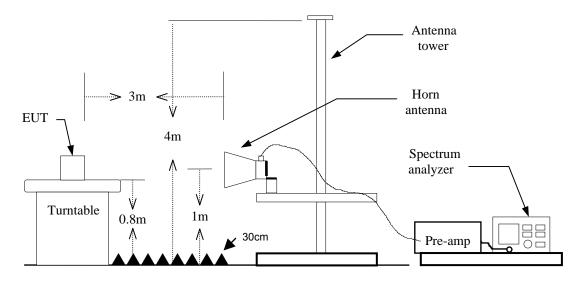


30MHz ~ 1GHz





Above 1 GHz



TEST PROCEDURE

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Set the spectrum analyzer in the following setting as:

Below 30MHz

RBW=10kHz / VBW=30kHz / Sweep=AUTO

30 ~ 1000MHz:

```
RBW=100kHz / VBW=300KHz / Sweep=AUTO
```

Above 1GHz:

- a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
- b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
- 7. Repeat above procedures until the measurements for all frequencies are complete.



DATA SAMPLE

Below 1 GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
x.xx	43.20	-20.71	22.49	40.00	-17.51	V	QP
Reading (dBuV)= UncorrectedCorrection Factor (dB/m)= Antenna factor			equency in Mł d Analyzer / R ctor – Amplifie BuV) + Corr. F	eceiver read r gain + Cab	le loss		

= Limit stated in standard

= Result (dBuV/m) – Limit (dBuV/m)

= Quasi-Peak

Above 1 GHz

Limit (dBuV/m)

Margin (dB)

Q.P.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark	
x.xx	45.25	6.91	52.16	74.00	-21.84	Н	peak	
x.xx	32.33	6.91	39.24	54.00	-14.76	Н	AVG	
Frequency (MHz) = Emission frequency in MHz								

-requency (MHz) Reading (dBuV) Correction Factor (dB/m) Result (dBuV/m) Limit (dBuV/m) Margin (dB)

mission frequency in MHz

= Uncorrected Analyzer / Receiver reading

= Antenna factor + Cable loss – Amplifier gain

= Reading (dBuV) + Corr. Factor (dB/m)

= Limit stated in standard

= Result (dBuV/m) – Limit (dBuV/m)



Below 1 GHz

Operation Mode:	Normal Link	Test Date:	2014/4/2
Temperature:	26°C	Tested by:	Louis Shen
Humidity:	56% RH	Polarity:	Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
30.6400	47.00	-9.37	37.63	40.00	-2.37	V	QP
74.5500	55.09	-20.55	34.54	40.00	-5.46	V	QP
106.6299	54.17	-16.02	38.15	43.50	-5.35	V	QP
250.1899	55.20	-13.48	41.72	46.00	-4.28	V	QP
500.4499	54.31	-9.24	45.07	46.00	-0.93	V	QP
750.0200	51.20	-6.13	45.07	46.00	-0.93	V	QP
90.1400	51.20	-18.27	32.93	43.50	-10.57	Н	QP
139.6100	41.70	-15.41	26.29	43.50	-17.21	Н	QP
250.1900	58.50	-13.48	45.02	46.00	-0.98	Н	QP
299.6600	51.50	-12.49	39.01	46.00	-6.99	Н	QP
500.4500	50.00	-9.24	40.76	46.00	-5.24	Н	QP
750.0200	47.90	-6.13	41.77	46.00	-4.23	Н	QP

Remark:

- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 5. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).



Above 1 GHz

Temperature:	26° C
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Humidity:	56%RH
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Tested by: Francis Lee **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1564.000	53.67	-4.96	48.71	74.00	-25.29	V	peak
2000.000	53.45	-1.30	52.15	74.00	-21.85	V	peak
2000.000	41.17	-1.30	39.87	54.00	-14.13	V	AVG
2700.000	54.53	-1.47	53.06	74.00	-20.94	V	peak
2700.000	41.70	-1.47	40.23	54.00	-13.77	V	AVG
3765.000	40.44	3.26	43.70	74.00	-30.30	V	peak
4825.000	46.86	2.68	49.54	74.00	-24.46	V	peak
7500.000	39.17	11.54	50.71	74.00	-23.29	V	peak
1398.000	53.31	-6.95	46.36	74.00	-27.64	Н	peak
2172.000	54.75	-3.62	51.13	74.00	-22.87	Н	peak
2592.000	54.37	-3.40	50.97	74.00	-23.03	Н	peak
3905.000	40.91	5.20	46.11	74.00	-27.89	Н	peak
4825.000	41.80	5.88	47.68	74.00	-26.32	Н	peak
7320.000	38.83	11.72	50.55	74.00	-23.45	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: TX / IEEE 802.11b mode / CH Mid Test Date: 2014/4/1~2

Temperature:	26 °C	Tested by:	Francis Lee
Humidity:	56%RH	Polarity:	Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1596.000	53.78	-4.81	48.97	74.00	-25.03	V	peak
1994.000	53.46	-1.39	52.07	74.00	-21.93	V	peak
1994.000	41.31	-1.39	39.92	54.00	-14.08	V	AVG
2688.000	55.56	-1.55	54.01	74.00	-19.99	V	peak
2688.000	43.17	-1.55	41.62	54.00	-12.38	V	AVG
3835.000	41.77	2.91	44.68	74.00	-29.32	V	peak
4875.000	49.77	3.81	53.58	74.00	-20.42	V	peak
4875.000	48.71	3.81	52.52	54.00	-1.48	V	AVG
7500.000	39.96	11.54	51.50	74.00	-22.50	V	peak
1386.000	53.75	-7.26	46.49	74.00	-27.51	Н	peak
2192.000	54.26	-3.58	50.68	74.00	-23.32	Н	peak
2750.000	54.37	-2.92	51.45	74.00	-22.55	Н	peak
4315.000	40.16	7.55	47.71	74.00	-26.29	Н	peak
4875.000	41.43	6.73	48.16	74.00	-25.84	Н	peak
7295.000	39.24	11.75	50.99	74.00	-23.01	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: TX / IEEE 802.11b mode / CH High Test Date: 2014/4/1~2

Temperature:	26° ℃			Teste	ed by: Fran	ncis Lee
Humidity:	56%RH	I		Pola	rity: Ver.	/ Hor.
Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V

(MHz)	(dBuV)	Factor (dB/m)	(dBuV/m)	(dBuV/m)	(dB)	H/V	Remark
1614.000	54.73	-4.91	49.82	74.00	-24.18	V	peak
1992.000	54.40	-1.43	52.97	74.00	-21.03	V	peak
1992.000	41.25	-1.43	39.82	54.00	-14.18	V	AVG
2254.000	53.98	-1.45	52.53	74.00	-21.47	V	peak
2254.000	41.65	-1.45	40.20	54.00	-13.80	V	AVG
2718.000	54.73	-1.58	53.15	74.00	-20.85	V	peak
2718.000	42.27	-1.58	40.69	54.00	-13.31	V	AVG
3785.000	41.02	3.51	44.53	74.00	-29.47	V	peak
4925.000	48.92	4.61	53.53	74.00	-20.47	V	peak
4925.000	46.00	4.61	50.61	54.00	-3.39	V	AVG
7540.000	39.08	11.69	50.77	74.00	-23.23	V	peak
1382.000	54.08	-7.36	46.72	74.00	-27.28	Н	peak
2194.000	53.81	-3.57	50.24	74.00	-23.76	Н	peak
2692.000	55.01	-3.37	51.64	74.00	-22.36	Н	peak
4350.000	40.65	7.29	47.94	74.00	-26.06	Н	peak
5910.000	39.76	9.18	48.94	74.00	-25.06	Н	peak
7295.000	39.10	11.75	50.85	74.00	-23.15	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: TX / IEEE 802.11g mode / CH Low **Test Date:** 2014/4/2

Temperature:	26 ℃	Tested by:	Francis Lee
Humidity:	56%RH	Polarity:	Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1594.000	53.75	-4.82	48.93	74.00	-25.07	V	peak
1986.000	53.38	-1.52	51.86	74.00	-22.14	V	peak
2582.000	57.05	-1.95	55.10	74.00	-18.90	V	peak
2582.000	43.63	-1.95	41.68	54.00	-12.32	V	AVG
3630.000	41.10	2.79	43.89	74.00	-30.11	V	peak
4835.000	55.79	2.91	58.70	74.00	-15.30	V	peak
4835.000	48.96	2.91	51.87	54.00	-2.13	V	AVG
7565.000	40.31	11.78	52.09	74.00	-21.91	V	peak
7565.000	27.36	11.78	39.14	54.00	-14.86	V	AVG
1384.000	53.81	-7.31	46.50	74.00	-27.50	Н	peak
2130.000	54.54	-3.71	50.83	74.00	-23.17	Н	peak
2714.000	54.36	-3.25	51.11	74.00	-22.89	Н	peak
4310.000	39.89	7.59	47.48	74.00	-26.52	Н	peak
4825.000	45.78	5.88	51.66	74.00	-22.34	Н	peak
7320.000	39.23	11.72	50.95	74.00	-23.05	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: TX / IEEE 802.11g mode / CH Mid Test Date: 2014/4/2

Temperature:	26 ℃	Tested
Humidity:	56%RH	Polarity

Tested by: Francis Lee Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1552.000	54.09	-5.02	49.07	74.00	-24.93	V	peak
2200.000	53.87	-1.33	52.54	74.00	-21.46	V	peak
2200.000	41.76	-1.33	40.43	54.00	-13.57	V	AVG
2724.000	54.67	-1.62	53.05	74.00	-20.95	V	peak
2724.000	42.40	-1.62	40.78	54.00	-13.22	V	AVG
3735.000	41.19	2.90	44.09	74.00	-29.91	V	peak
4870.000	55.13	3.70	58.83	74.00	-15.17	V	peak
4870.000	47.36	3.70	51.06	54.00	-2.94	V	AVG
7475.000	39.18	11.48	50.66	74.00	-23.34	V	peak
1394.000	53.98	-7.05	46.93	74.00	-27.07	Н	peak
2170.000	54.56	-3.63	50.93	74.00	-23.07	Н	peak
2582.000	54.64	-3.44	51.20	74.00	-22.80	Н	peak
4295.000	39.65	7.58	47.23	74.00	-26.77	Н	peak
4870.000	47.41	6.64	54.05	74.00	-19.95	Н	peak
4870.000	35.67	6.64	42.31	54.00	-11.69	Н	AVG
7300.000	40.29	11.82	52.11	74.00	-21.89	Н	peak
7300.000	27.08	11.82	38.90	54.00	-15.10	Н	AVG

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 Marrin (JD) - Demark result (JDu)(m) - Average limit (JDu)(m)



Operation Mode: TX / IEEE 802.11g mode / CH High **Test Date:** 2014/4/2

Temperature:	26 °C	Tested by	: Francis Lee
Humidity:	56%RH	Polarity:	Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1576.000	53.97	-4.90	49.07	74.00	-24.93	V	peak
2016.000	53.86	-1.66	52.20	74.00	-21.80	V	peak
2016.000	41.30	-1.66	39.64	54.00	-14.36	V	AVG
2236.000	54.82	-1.41	53.41	74.00	-20.59	V	peak
2236.000	41.78	-1.41	40.37	54.00	-13.63	V	AVG
2642.000	56.01	-1.88	54.13	74.00	-19.87	V	peak
2642.000	43.63	-1.88	41.75	54.00	-12.25	V	AVG
3510.000	41.40	2.30	43.70	74.00	-30.30	V	peak
4920.000	54.81	4.56	59.37	74.00	-14.63	V	peak
4920.000	47.65	4.56	52.21	54.00	-1.79	V	AVG
7360.000	39.36	10.97	50.33	74.00	-23.67	V	peak
1422.000	53.88	-7.36	46.52	74.00	-27.48	Н	peak
2166.000	54.11	-3.63	50.48	74.00	-23.52	Н	peak
2790.000	54.34	-2.57	51.77	74.00	-22.23	Н	peak
3595.000	40.60	4.05	44.65	74.00	-29.35	Н	peak
4925.000	43.52	7.26	50.78	74.00	-23.22	Н	peak
7295.000	38.99	11.75	50.74	74.00	-23.26	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 Marrin (JD) - Demark result (JDu)(m) - Average limit (JDu)(m)



Remark

peak peak

Operation Mode: TX / IEEE 802.11n HT20 mode / CH Low Test Date: 2014/4/2									
Temperature:26°CTested by:Francis Lee									
Humidity:56%RHPolarity:Ver. / Hor.									
Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	I		
1568.000	53.82	-4.94	48.88	74.00	-25.12	V			
1998.000	54.16	-1.33	52.83	74.00	-21.17	V			
1998.000	41.41	-1.33	40.08	54.00	-13.92	V			
2186.000	53.88	-1.64	52.24	74.00	-21.76	V			
2186.000	41.93	-1.64	40.29	54.00	-13.71	V			

1998.000	41.41	-1.33	40.08	54.00	-13.92	V	AVG
2186.000	53.88	-1.64	52.24	74.00	-21.76	V	peak
2186.000	41.93	-1.64	40.29	54.00	-13.71	V	AVG
2734.000	55.62	-1.68	53.94	74.00	-20.06	V	peak
2734.000	42.04	-1.68	40.36	54.00	-13.64	V	AVG
3760.000	40.94	3.20	44.14	74.00	-29.86	V	peak
4835.000	54.08	2.91	56.99	74.00	-17.01	V	peak
4835.000	49.52	2.91	52.43	54.00	-1.57	V	AVG
7390.000	39.59	11.22	50.81	74.00	-23.19	V	peak
4404.000	54.40	7.40	40.70	74.00	07.00		
1424.000	54.18	-7.40	46.78	74.00	-27.22	H	peak
2124.000	54.09	-3.73	50.36	74.00	-23.64	Н	peak
2628.000	54.80	-3.36	51.44	74.00	-22.56	Н	peak
4275.000	41.23	7.24	48.47	74.00	-25.53	Н	peak
6145.000	40.91	8.46	49.37	74.00	-24.63	Н	peak
7230.000	40.06	10.89	50.95	74.00	-23.05	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 Marrin (JD) - Demoderate (JD) (m) - Among Junit (JD) (m)



Remark

Operation Mode: TX / IEEE 802.11n HT20 mode / Test Date: 2014/4/2 CH Mid								
Temperature	0			Teste	ed by: Frar	ncis Lee		
Humidity:	56%RH	ł		Pola	rity: Ver.	/ Hor.		
Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V		
1640.000	54.72	-5.13	49.59	74.00	-24.41	V		
2024.000	53.44	-1.84	51.60	74.00	-22.40	V		
2234 000	54 39	-1 40	52 99	74 00	-21 01	V		

1640.000	54.72	-5.13	49.59	74.00	-24.41	V	peak
2024.000	53.44	-1.84	51.60	74.00	-22.40	V	peak
2234.000	54.39	-1.40	52.99	74.00	-21.01	V	peak
2234.000	42.04	-1.40	40.64	54.00	-13.36	V	AVG
2728.000	54.95	-1.65	53.30	74.00	-20.70	V	peak
2728.000	42.37	-1.65	40.72	54.00	-13.28	V	AVG
3805.000	40.43	3.58	44.01	74.00	-29.99	V	peak
4875.000	55.74	3.81	59.55	74.00	-14.45	V	peak
4875.000	47.05	3.81	50.86	54.00	-3.14	V	AVG
6865.000	39.73	7.55	47.28	74.00	-26.72	V	peak
1354.000	55.20	-8.08	47.12	74.00	-26.88	Н	peak
2206.000	54.54	-3.73	50.81	74.00	-23.19	Н	peak
2816.000	54.04	-2.36	51.68	74.00	-22.32	Н	peak
3840.000	40.89	5.15	46.04	74.00	-27.96	Н	peak
4875.000	45.43	6.73	52.16	74.00	-21.84	Н	peak
4875.000	37.42	6.73	44.15	54.00	-9.85	Н	AVG
7300.000	39.19	11.82	51.01	74.00	-22.99	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Remark

Operation Mode: TX / IEEE 802.11n HT20 mode / CH High					Date: 201	4/4/2
Temperature					ed by: Frar	ncis Lee
Humidity:	56%RH	1		Pola	rity: Ver.	/ Hor.
Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V
1564.000	53.60	-4.96	48.64	74.00	-25.36	V

/ peak
/ peak
/ AVG
/ peak
/ AVG
/ peak
/ AVG
/ peak
/ peak
/ AVG
/ peak
l peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Temperature:

Operation Mode: TX / IEEE 802.11n HT40 mode / CH Low

26°℃

Test Date: 2014/4/2 Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1590.000	54.16	-4.84	49.32	74.00	-24.68	V	peak
2006.000	53.28	-1.44	51.84	74.00	-22.16	V	peak
2706.000	55.17	-1.51	53.66	74.00	-20.34	V	peak
2706.000	42.53	-1.51	41.02	54.00	-12.98	V	AVG
3795.000	41.40	3.63	45.03	74.00	-28.97	V	peak
4845.000	50.45	3.13	53.58	74.00	-20.42	V	peak
4845.000	48.36	3.13	51.49	54.00	-2.51	V	AVG
7295.000	40.71	10.46	51.17	74.00	-22.83	V	peak
1386.000	53.25	-7.26	45.99	74.00	-28.01	Н	peak
2174.000	54.88	-3.62	51.26	74.00	-22.74	Н	peak
2806.000	54.64	-2.43	52.21	74.00	-21.79	Н	peak
2806.000	41.96	-2.43	39.53	54.00	-14.47	Н	AVG
3625.000	41.95	4.06	46.01	74.00	-27.99	Н	peak
4845.000	42.07	6.21	48.28	74.00	-25.72	Н	peak
7325.000	39.09	11.69	50.78	74.00	-23.22	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Temperature:

Operation Mode: TX / IEEE 802.11n HT40 mode / CH Mid

26°℃

Test Date: 2014/4/2 Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1570.000	53.48	-4.93	48.55	74.00	-25.45	V	peak
2014.000	53.88	-1.62	52.26	74.00	-21.74	V	peak
2014.000	41.62	-1.62	40.00	54.00	-14.00	V	AVG
2700.000	55.42	-1.47	53.95	74.00	-20.05	V	peak
2700.000	43.67	-1.47	42.20	54.00	-11.80	V	AVG
3795.000	40.67	3.63	44.30	74.00	-29.70	V	peak
4870.000	55.92	3.70	59.62	74.00	-14.38	V	peak
4870.000	47.35	3.70	51.05	54.00	-2.95	V	AVG
7545.000	38.98	11.71	50.69	74.00	-23.31	V	peak
1398.000	53.55	-6.95	46.60	74.00	-27.40	Н	peak
2094.000	54.24	-3.94	50.30	74.00	-23.70	Н	peak
2866.000	53.86	-1.98	51.88	74.00	-22.12	Н	peak
3835.000	41.28	5.14	46.42	74.00	-27.58	Н	peak
4875.000	45.80	6.73	52.53	74.00	-21.47	Н	peak
4875.000	38.60	6.73	45.33	54.00	-8.67	Н	AVG
7300.000	39.15	11.82	50.97	74.00	-23.03	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Temperature:

Operation Mode: TX / IEEE 802.11n HT40 mode / CH High

26°℃

Test Date: 2014/4/2 Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1544.000	53.50	-5.05	48.45	74.00	-25.55	V	peak
2016.000	53.53	-1.66	51.87	74.00	-22.13	V	peak
2252.000	54.05	-1.44	52.61	74.00	-21.39	V	peak
2252.000	42.45	-1.44	41.01	54.00	-12.99	V	AVG
2692.000	55.38	-1.53	53.85	74.00	-20.15	V	peak
2692.000	43.89	-1.53	42.36	54.00	-11.64	V	AVG
3615.000	40.99	2.86	43.85	74.00	-30.15	V	peak
4905.000	47.25	4.42	51.67	74.00	-22.33	V	peak
7400.000	39.46	11.30	50.76	74.00	-23.24	V	peak
1402.000	53.57	-6.94	46.63	74.00	-27.37	Н	peak
2186.000	53.89	-3.59	50.30	74.00	-23.70	Н	peak
2818.000	54.27	-2.34	51.93	74.00	-22.07	Н	peak
3870.000	40.80	5.18	45.98	74.00	-28.02	Н	peak
4905.000	41.72	7.17	48.89	74.00	-25.11	Н	peak
7345.000	39.25	11.59	50.84	74.00	-23.16	Н	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3. Average test would be performed if the peak result were greater than the average limit.

4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



7.7 POWERLINE CONDUCTED EMISSIONS

<u>LIMIT</u>

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBµV)				
(10112)	Quasi-peak	Average			
0.15 to 0.50	66 to 56*	56 to 46*			
0.50 to 5	56	46			
5 to 30	60	50			

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

- 1. The EUT was placed on a table, which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode:	Normal Link	Test Date:	2014/4/2
Temperature:	25 ℃	Tested by:	Louis Shen
Humidity:	57% RH		

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.5242	35.29	19.38	9.85	45.14	29.23	56.00	46.00	-10.86	-16.77	L1
0.5470	35.13	21.35	9.85	44.98	31.20	56.00	46.00	-11.02	-14.80	L1
0.6491	37.25	23.15	9.86	47.11	33.01	56.00	46.00	-8.89	-12.99	L1
0.9272	31.49	16.17	9.88	41.37	26.05	56.00	46.00	-14.63	-19.95	L1
1.0140	31.00	18.30	9.89	40.89	28.19	56.00	46.00	-15.11	-17.81	L1
1.1454	26.92	15.25	9.90	36.82	25.15	56.00	46.00	-19.18	-20.85	L1
7.6364	32.58	23.10	10.16	42.74	33.26	60.00	50.00	-17.26	-16.74	L1
0.5248	35.48	19.50	9.77	45.25	29.27	56.00	46.00	-10.75	-16.73	L2
0.5473	35.11	21.27	9.77	44.88	31.04	56.00	46.00	-11.12	-14.96	L2
0.6463	36.86	23.05	9.79	46.65	32.84	56.00	46.00	-9.35	-13.16	L2
0.6723	35.01	19.12	9.79	44.80	28.91	56.00	46.00	-11.20	-17.09	L2
0.9119	30.28	15.95	9.82	40.10	25.77	56.00	46.00	-15.90	-20.23	L2
7.5967	31.57	22.17	10.19	41.76	32.36	60.00	50.00	-18.24	-17.64	L2

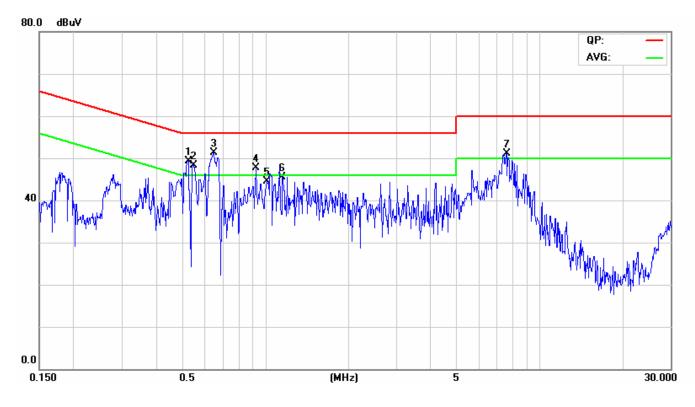
Remark:

- 1. Measuring frequencies from 0.15 MHz to 30MHz.
- 2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
- 3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
- 4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

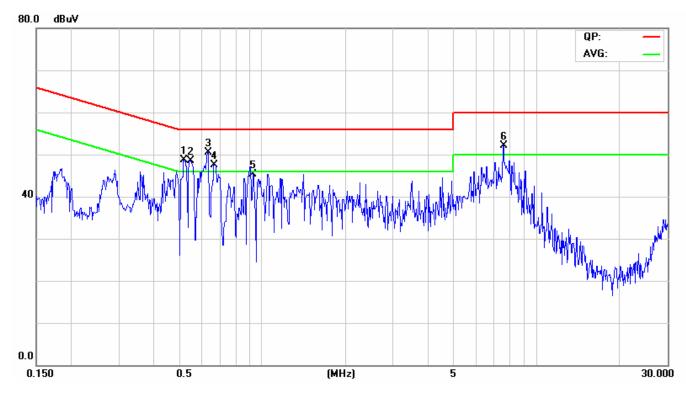


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



8 APPENDIX I PHOTOGRAPHS OF TEST SETUP

Radiated Emissions Setup Photos Below 1GHz







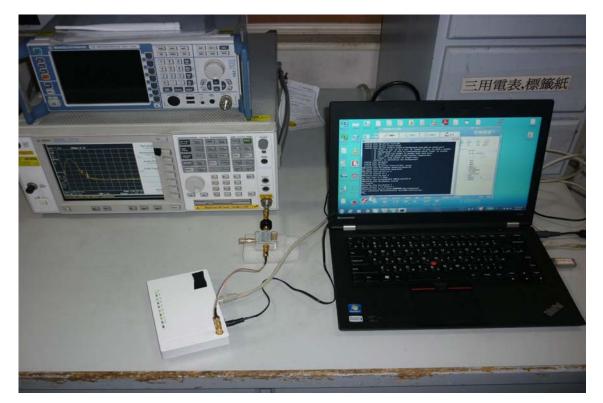
Above 1GHz







Conducted Emissions Setup Photo





Powerline Conducted Emissions Setup Photos







9 APPENDIX II: PHOTOGRAPHS OF EUT

Refer to T140328D06 Photographs.