FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Air Tune

Model: AVT-01

Trade Name: cideko

Issued to

Holy Investment Co., Ltd.
1F., No.2, Lane 25, Yong-an 2nd St., Yongkang City, Tainan County 710, Taiwan

Issued by

Compliance Certification Services Inc.
Hsinchu Lab.

NO. 989-1 Wen Shan Rd., Shang Shan Village,
Qionglin Shiang Hsinchu County 30741, Taiwan, R.O.C

TEL: +886-3-5921698
FAX: +886-3-5921108

REVISION HISTORY

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		October 26, 2009		Initial Issue	ALL	Leah Peng

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

Applicant: Holy Investment Co., Ltd.

1F., No.2, Lane 25, Yong-an 2nd St., Yongkang City, Tainan County 710, Taiwan

Manufacture: Jow Tong Technology CO., LTD.

46, Lane 337, Chung Cheng Rd., Yung Kang City, Tainan County 710, Taiwan, R.O.C.

Equipment Under Test: Air Tune

Trade Name: cideko

Model: AVT-01

Date of Test: August 25, 2009 ~ October 17, 2009

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

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

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

Approved by:

Alex Chiu
Director
Compliance Certification Services Inc.

Reviewed by:

Alan Fan
Senior Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

<table>
<tr><td>Product</td><td>Air Tune</td></tr>
<tr><td>Trade Name</td><td>cideko</td></tr>
<tr><td>Model Number</td><td>AVT-01</td></tr>
<tr><td>Model Discrepancy</td><td>All the specification and layout are identical except they come with different model numbers for marketing purposes.</td></tr>
<tr><td>Power Supply</td><td>Powered by Adapter
Brand: Sun fone
Input: 100-240Vac, 50-60Hz, 1.0A
Output: 12Vdc, 3A</td></tr>
<tr><td>Operating Frequency Range & Number of Channels</td><td>
<table>
<tr><th></th><th>Mode</th><th>Frequency Range (MHz)</th><th>Number of Channels</th></tr>
<tr><td rowspan="3">UNII Band</td><td>IEEE 802.11a</td><td>5180 – 5240</td><td>4 Channels</td></tr>
<tr><td>draft 802.11n Standard-20 MHz</td><td>5180 – 5240</td><td>4 Channels</td></tr>
<tr><td>draft 802.11n Wide-40 MHz</td><td>5190 ~ 5230</td><td>2 Channels</td></tr>
</table>
</td></tr>
<tr><td>Transmit Power</td><td>IEEE 802.11a mode / 5180 ~ 5240MHz: 13.90 dBm
draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz: 16.75 dBm
draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz: 16.69 dBm</td></tr>
<tr><td>Modulation Technique</td><td>OFDM (QPSK, BPSK, 16-QAM, 64-QAM)</td></tr>
<tr><td>Transmit Data Rate</td><td>IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps
draft 802.11n Standard-20 MHz Channel mode: OFDM (6, 7, 13, 14, 19, 21, 26, 28, 39, 43, 52, 57, 58, 65, 72, 78, 86, 104, 115, 117, 130, 144 Mbps)
draft 802.11n Wide-40 MHz Channel mode: OFDM (6, 13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)</td></tr>
<tr><td>Antenna Specification</td><td>Antenna Type: Dipole Antenna * 3pcs.
Antenna Model: RFA-25-X4M3-B20
Antenna Connector: RP SMA PLUG
IEEE 802.11a: 2.0 dBi
IEEE 802.11b/g/n mode: 1.5 dBi
Impedance: 50Ω;
Brand: ARISTOTLE</td></tr>
<tr><td>Antenna Designation</td><td>Dipole Antenna</td></tr>
</table>

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
IEEE 802.11a / 5180MHz – 5240MHz / 4 Channels	
CHANNEL	**MHz**
36	5180
40	5200
44	5220
48	5240
draft 802.11n Standard-20 MHz / 5180MHz – 5240MHz / 4 Channels	
CHANNEL	**MHz**
36	5180
40	5200
44	5220
48	5240
draft 802.11n Wide-40 MHz / 5190MHz – 5230MHz / 2 Channels	
CHANNEL	**MHz**
38	5190
46	5230

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **XV3AVT01** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. 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 (model: AVT-01) had been tested under operating condition.

The EUT is a 2x3 configuration spatial MIMO (2Tx & 3Rx) without beam forming function that operate in double TX chains and treble RX chains. The 2x3 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

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

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE 802.11a mode / 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz:

Channel Low (5190MHz) and Channel High (5230MHz) 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

Remark: Each piece of equipment is scheduled for calibration once a year.

Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	OCT. 14, 2010
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 12, 2010
EMI Test Receiver	R&S	ESVS10	833206/012	APR. 28, 2010
Pre-Amplifier	HP	8447F	2944A03817	AUG. 31, 2010
Amplifier	MITEQ	AFSYY-00108650-42-10P-44	1205908	OCT. 23, 2010
Bilog Antenna	Sunol	JB1	A013105-1	SEP. 16, 2010
Horn Antenna	Com-Power	AH-118	71032	DEC. 22, 2009
Turn Table	YO Chen	001	N/A	N.C.R
Antenna Tower	AR	TP100A	N/A	N.C.R
Controller	CT	SC101	N/A	N.C.R
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180-1-2	EC1204141	N.C.R
Power Meter	Anritsu	ML2487A	6K00003888	APR. 26, 2010
Power Sensor	Anritsu	MA2491A	33265	APR. 26, 2010
AC Power Source	T-POWER	TFC-3020	N930010	N.C.R
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5 GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.1 dB

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. 11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☒ No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

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

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

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

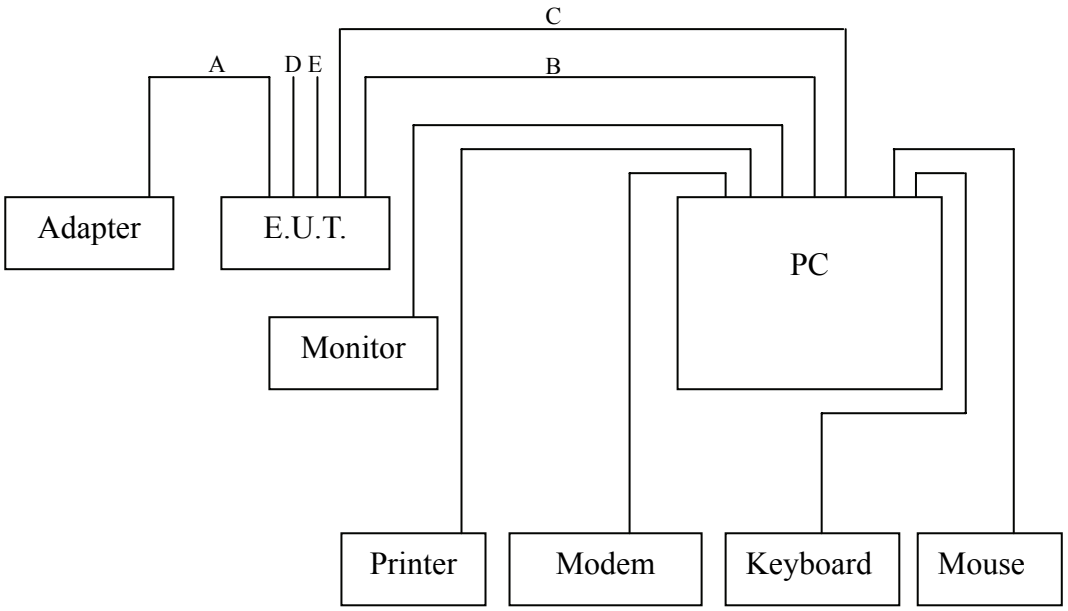
5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	90585, 90584
Taiwan	TAF	FCC Method-47 CFR Part 15 Subpart C,D,E CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, CNS 13803, CISPR 13, CNS 13439, FCC Method-47 CFR Part 15 Subpart B, CISPR 14-1, EN 55014-1, CNS 13783-1, EN 55015, CNS 14115, CISPR 22, EN 55022, VCCI CNS 13438, EN 61000-4-2/3/4/5/6/8/11	Testing Laboratory 0240
Taiwan	BSMI	CNS 13803, CNS 13438, CNS 13439, CNS 13783-1, CNS 14115	SL2-IS-E-0002 SL2-IN-E-0002 SL2-A1-E-0002 SL2-R1-E-0002 SL2-R2-E-0002 SL2-L1-E-0002

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

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT



6.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	FCC ID	Signal Cable
1	PC	HP	D330uT	DOC	Power cable, unshd, 1.5m
2	LCD Monitor	BenQ	FP731	DOC	VGA cable, shd, 1.8m
3	Keyboard(PS2)	HP	KB-0133	DOC	Keyboard cable, shd, 1.9m
4	Mouse(PS2)	HP	M-S69	JNZ211443	Mouse cable, shd, 1.8m
5	Modem	LEMEL	MD-56K	DOC	RS232 cable, shd, 1.1m
6	Printer	HP	C2164A	B94C2164X	Printer cable, shd, 1.8m

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

No.	Signal cable description	
A	DC cable	Unshielded, 1.2m, 1pc., with 2 cores
B	Audio cable	Shielded, 1.1m, 1pcs., with a core
C	VGA cable	Shielded, 1.1m, 1pcs., with 2 cores
D	RJ 45 cable	Unshielded, 3.0m, 1pcs., with a core
E	RJ45 cable	Unshielded, 3.0m, 3pcs.

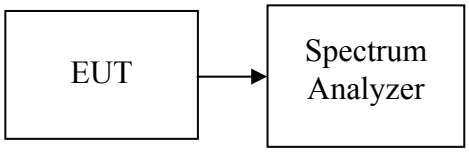
7. FCC PART 15 REQUIREMENTS

7.1 26 DB EMISSION BANDWIDTH

LIMIT

According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

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.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, and Sweep = auto.
4. Mark the peak frequency and –26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Bandwidth (MHz) Chain C
Low	5180	20.340
Mid	5220	19.839
High	5240	19.839

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	19.939
Mid	5220	20.040
High	5240	19.939

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	20.040
Mid	5220	20.240
High	5240	20.240

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	40.681
High	5230	40.881

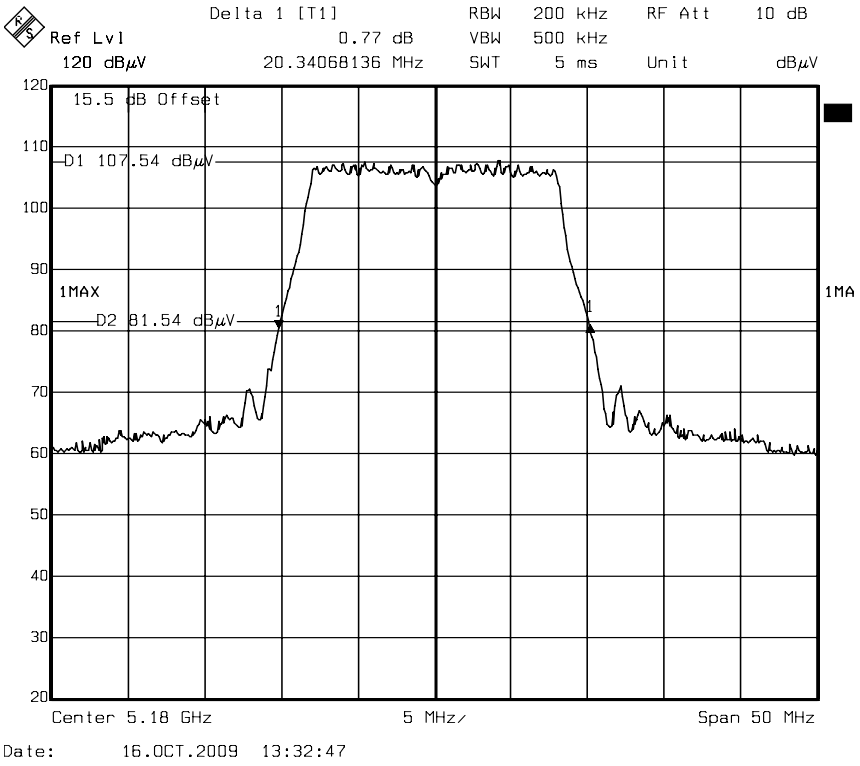
Test mode: draft 802.11n Wide-40 MHz Channel mode/ 5190 ~ 5230MHz / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	41.082
High	5230	41.082

Test Plot

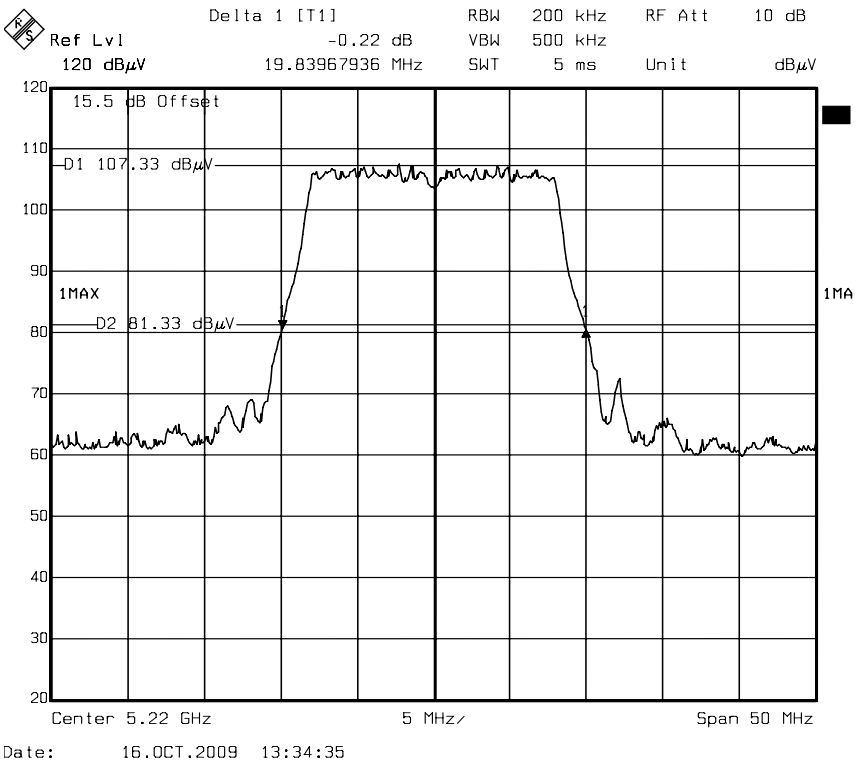
IEEE 802.11a mode / 5180 ~ 5240MHz

CH Low



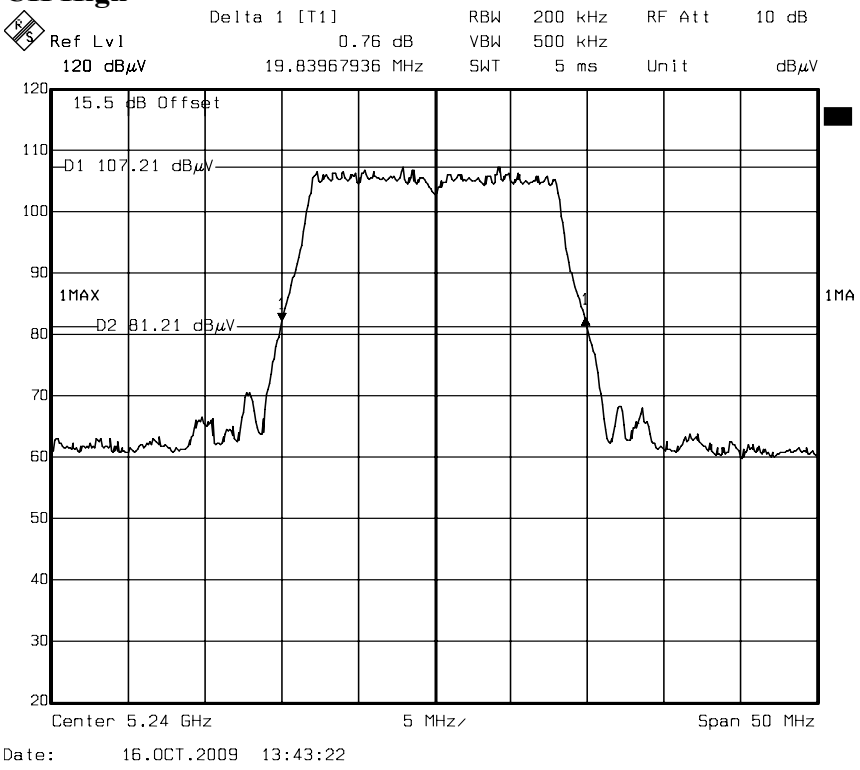
Date: 16.OCT.2009 13:32:47

CH Mid



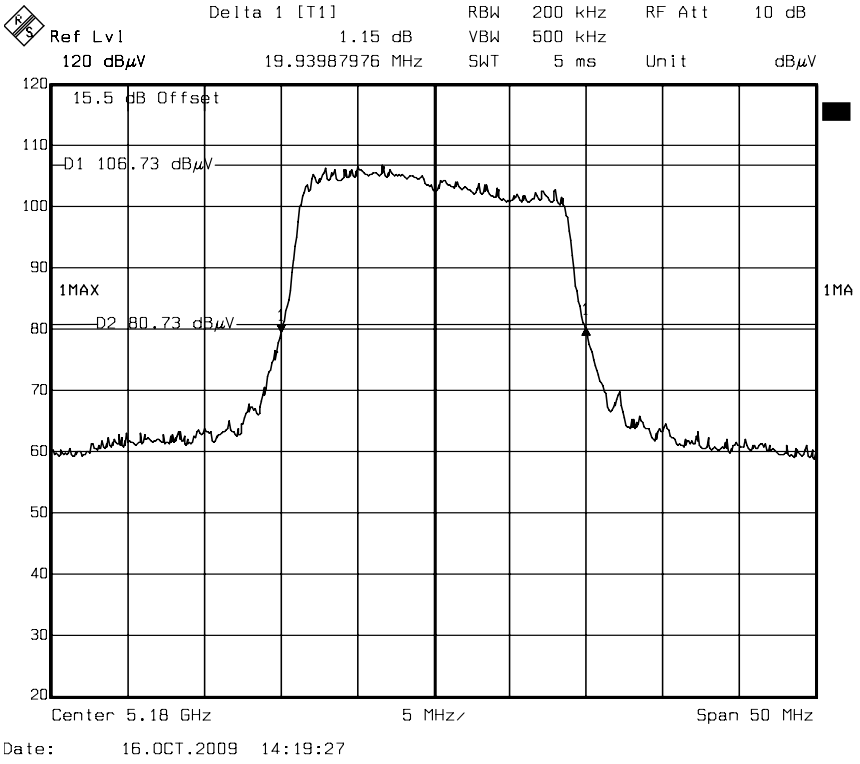
Date: 16.OCT.2009 13:34:35

CH High

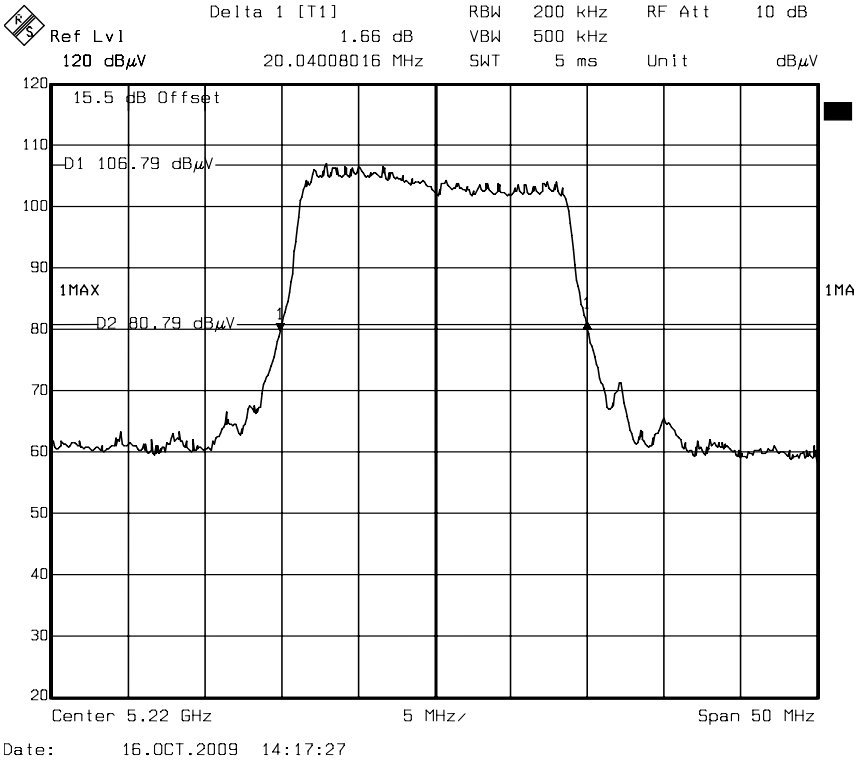


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

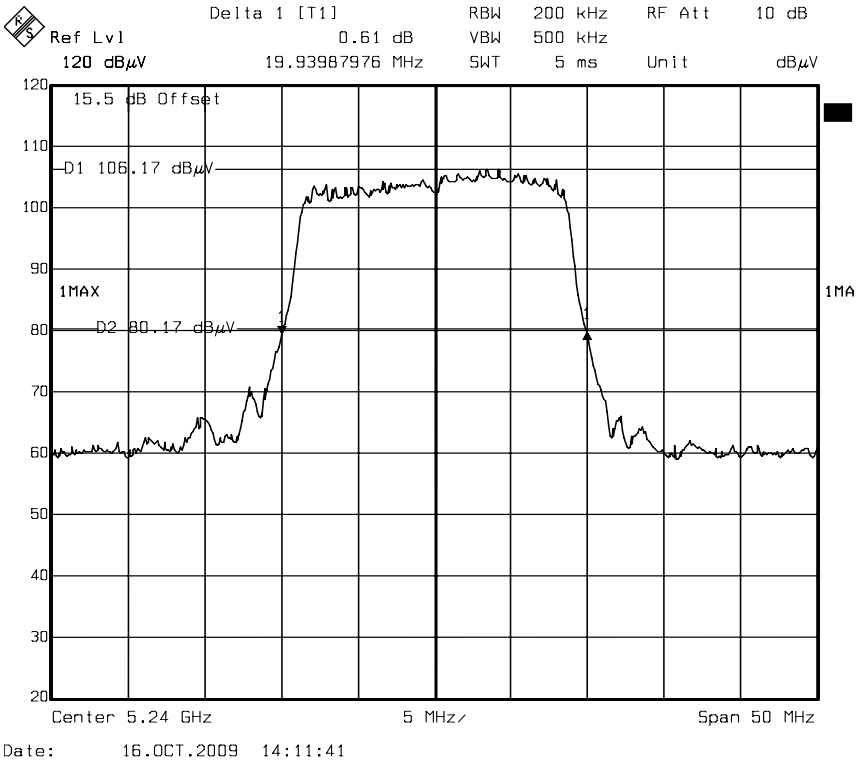
CH Low



CH Mid

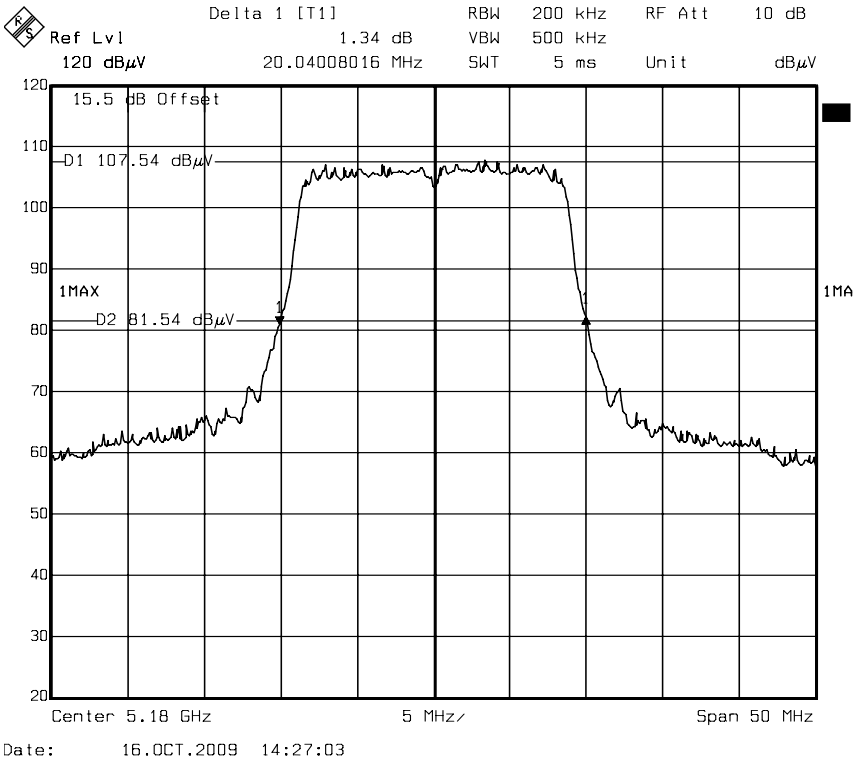


CH High

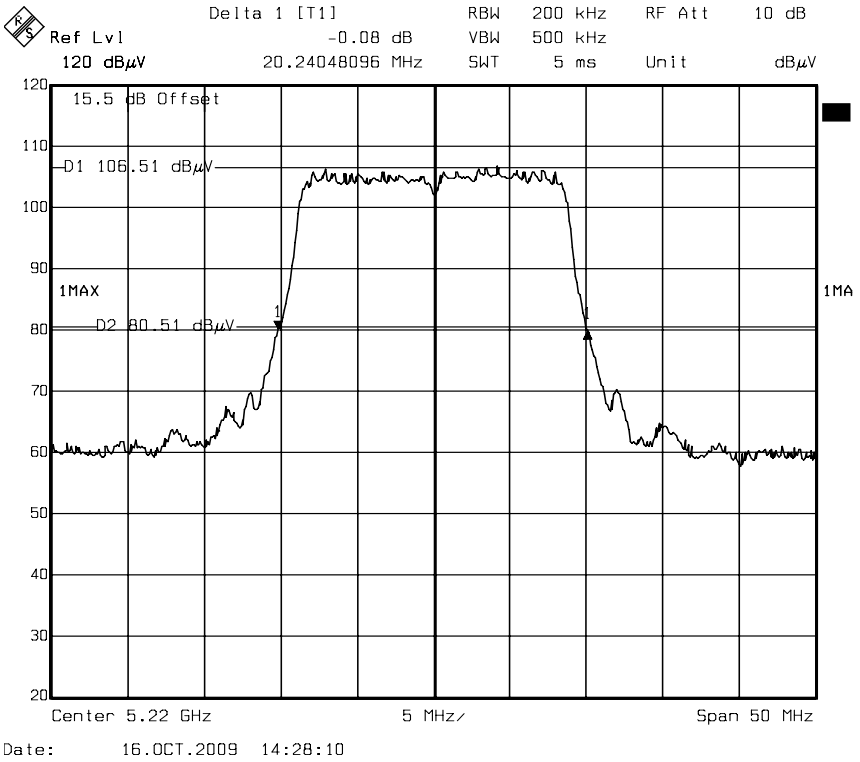


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

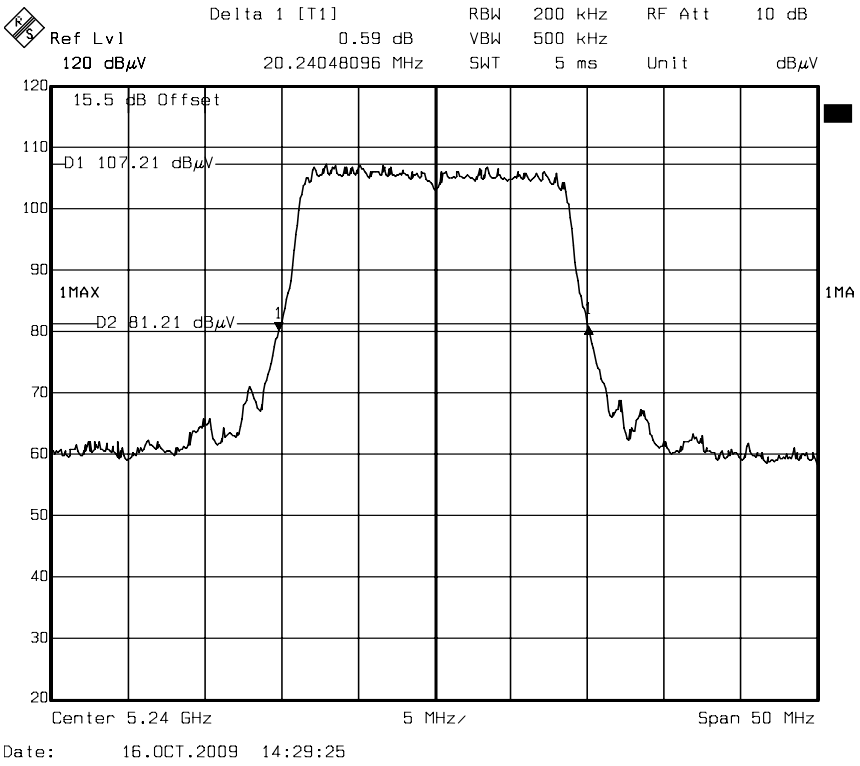
CH Low



CH Mid

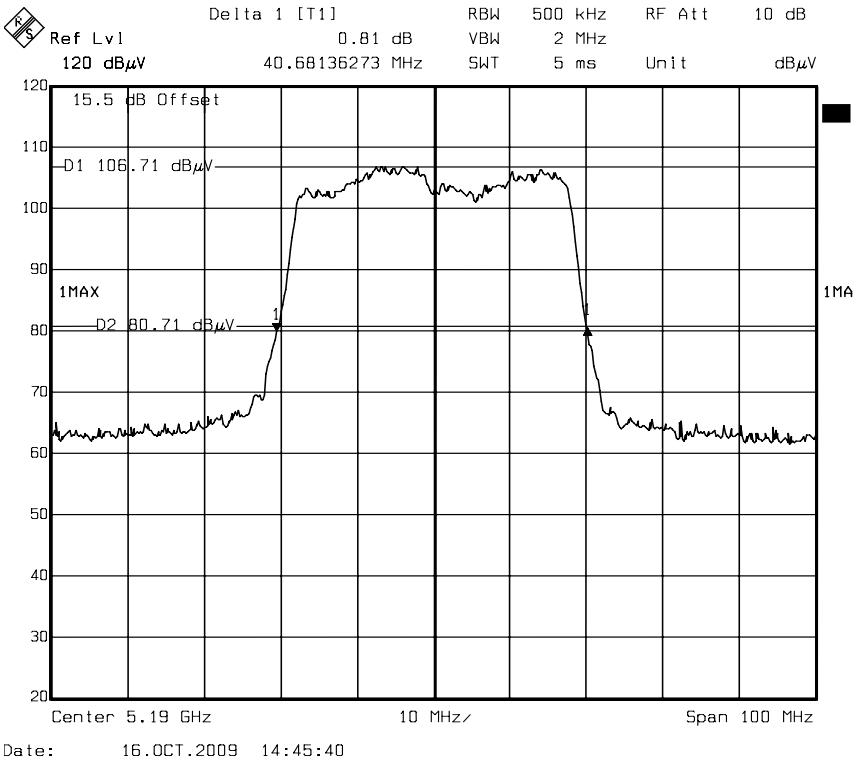


CH High

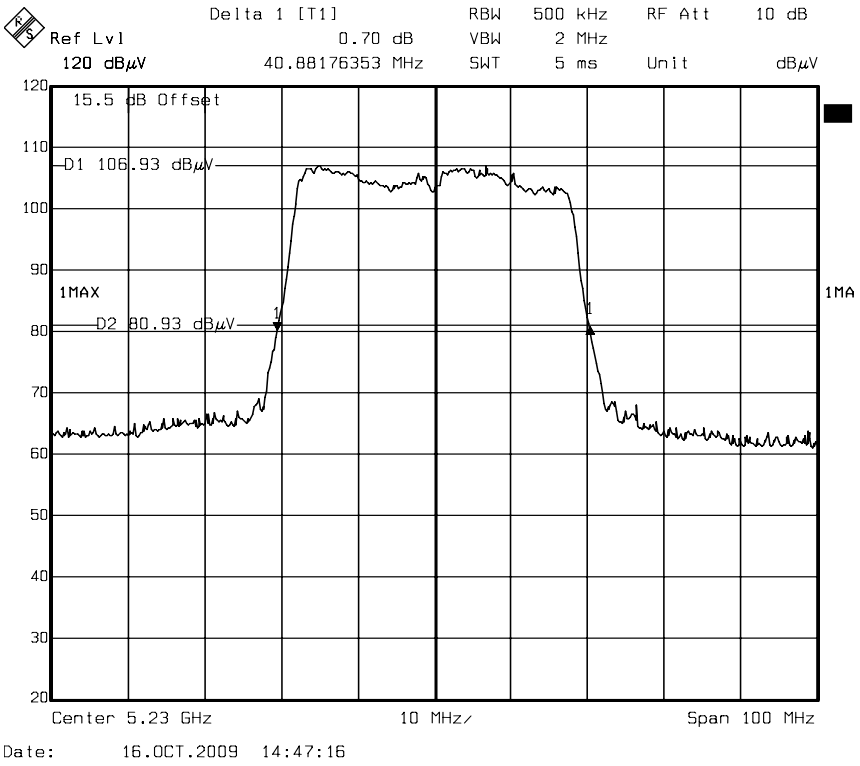


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

CH Low

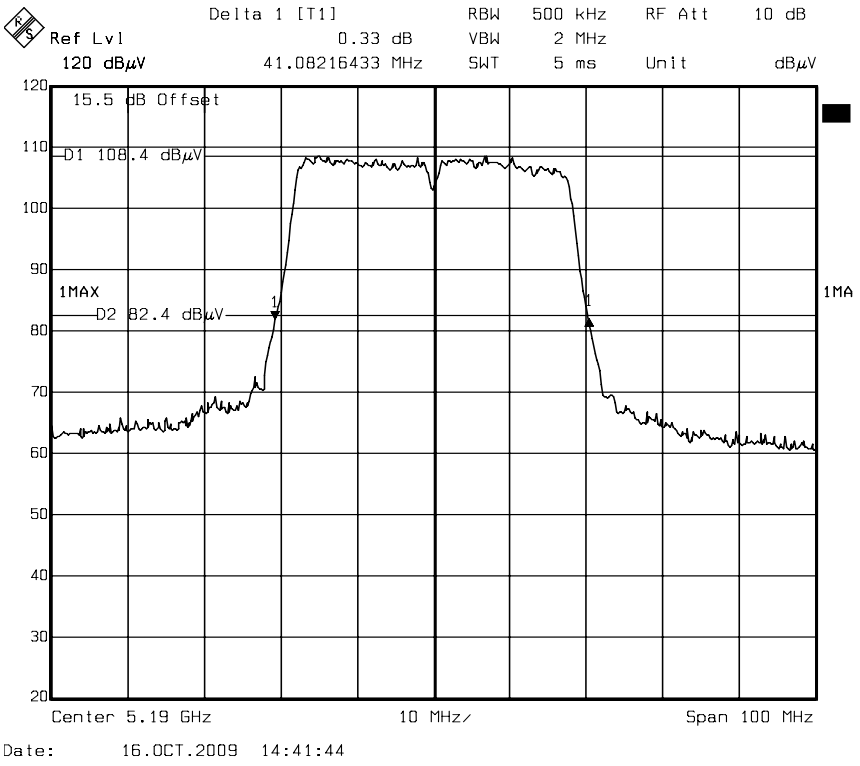


CH High

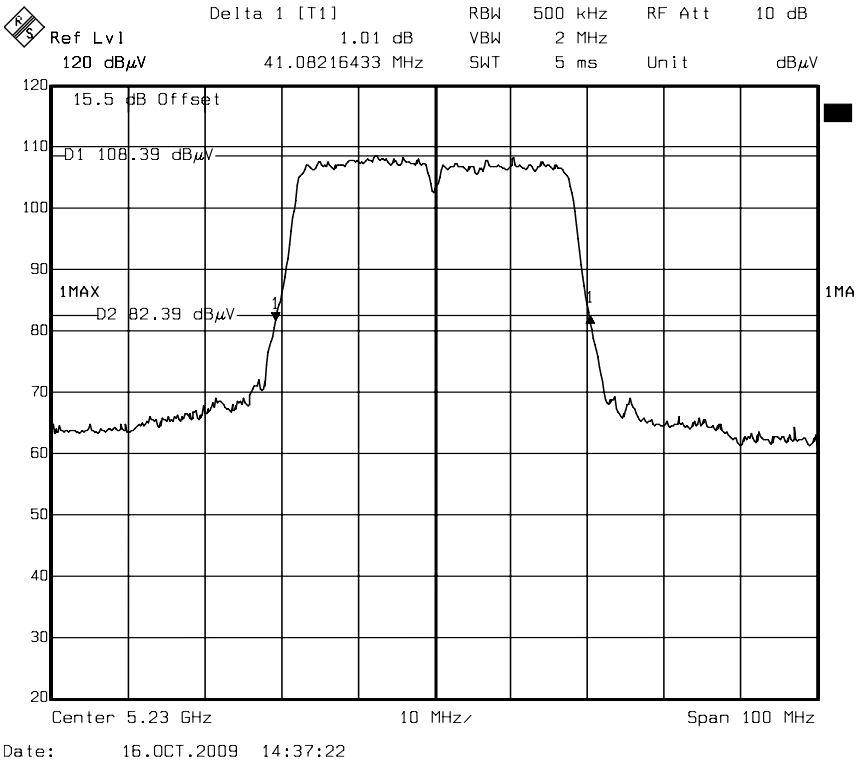


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

CH Low



CH High


Delta 1 [T1]
RBW 500 kHz
RF Att 10 dB
Ref Lvl
1.01 dB
VBW 2 MHz
120 dBµV
41.08216433 MHz
SWT 5 ms
Unit dBµV
15.5 dB Offset
D1 108.39 dBµV
1MAX
D2 82.39 dBµV
1MA
Center 5.23 GHz
10 MHz/
Span 100 MHz
Date: 16.OCT.2009 14:37:22

7.2 MAXIMUM CONDUCTED OUTPUT POWER

LIMIT

According to §15.407(a),

(1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The peak power shall not exceed the limit as follow:

Specified Limit of the Peak Power

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	20.340	13.084	17.08	17.00
Mid	5220	19.839	12.975	16.98	17.00
High	5240	19.839	12.975	16.98	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz

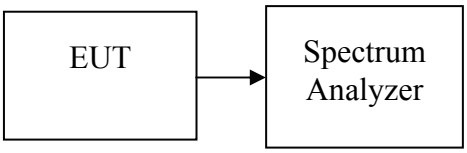
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	19.939	20.040	23.00	13.617	17.617	17.00
Mid	5220	20.040	20.240	23.15	13.646	17.646	17.00
High	5240	19.939	20.240	23.10	13.637	17.637	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5190	40.681	41.082	43.90	16.424	20.424	17.00
High	5230	40.881	41.082	43.99	16.434	20.434	17.00

Test Configuration

The EUT was connected to a spectrum analyzer through a 50Ω RF cable.



TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "free run".·Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	13.37	17.00
Mid	5220	13.90	17.00
High	5240	13.62	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	12.53	14.68	16.75	17.00
Mid	5220	12.89	13.70	16.32	17.00
High	5240	12.34	14.42	16.51	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz

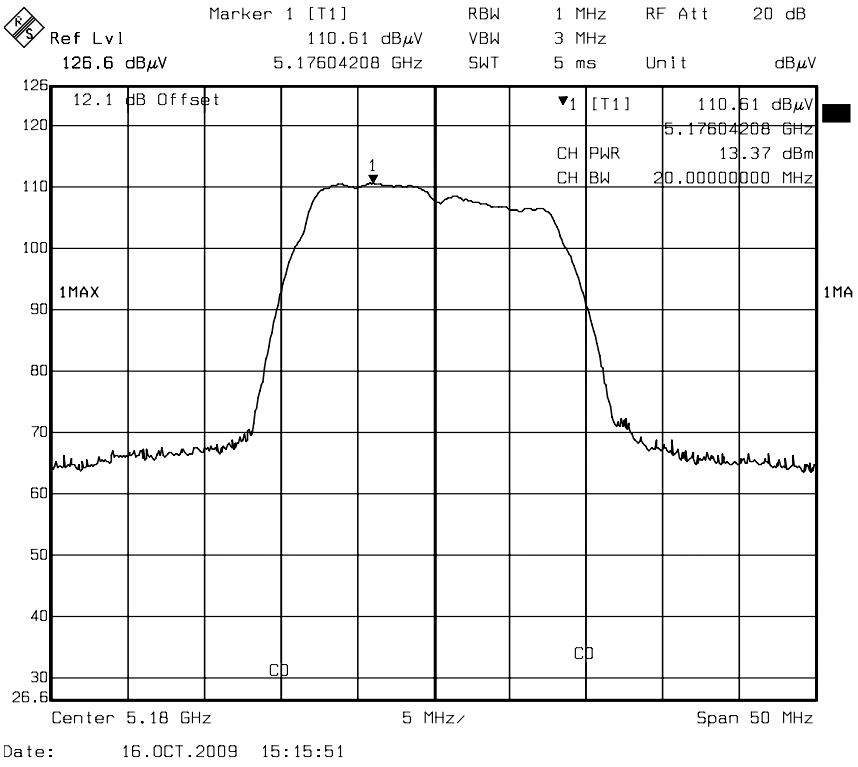
Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5190	12.44	14.39	16.53	17.00
High	5230	12.55	14.58	16.69	17.00

Remark: Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000))

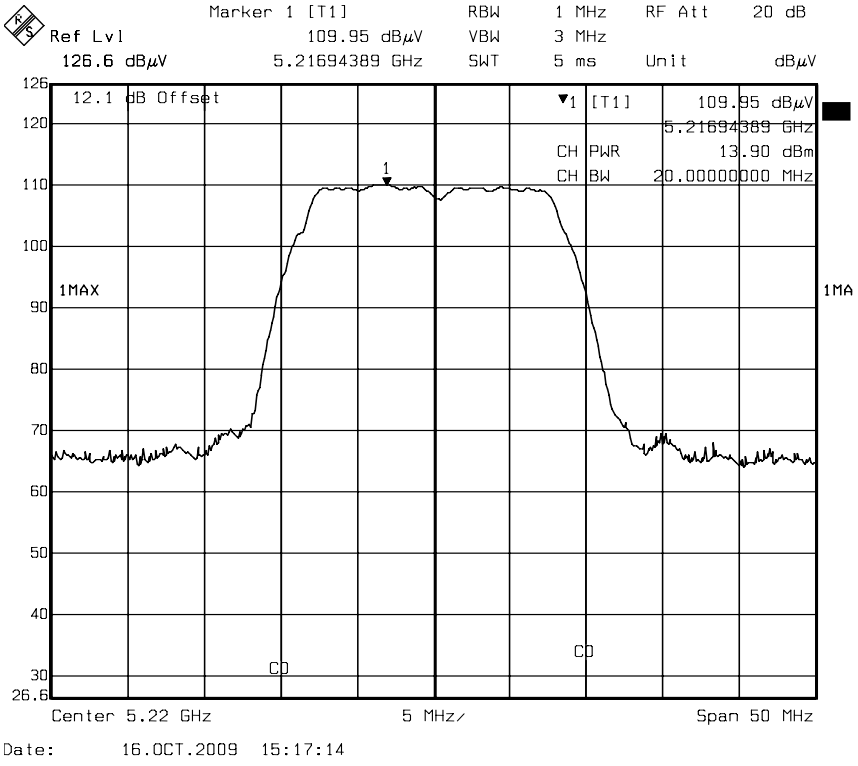
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

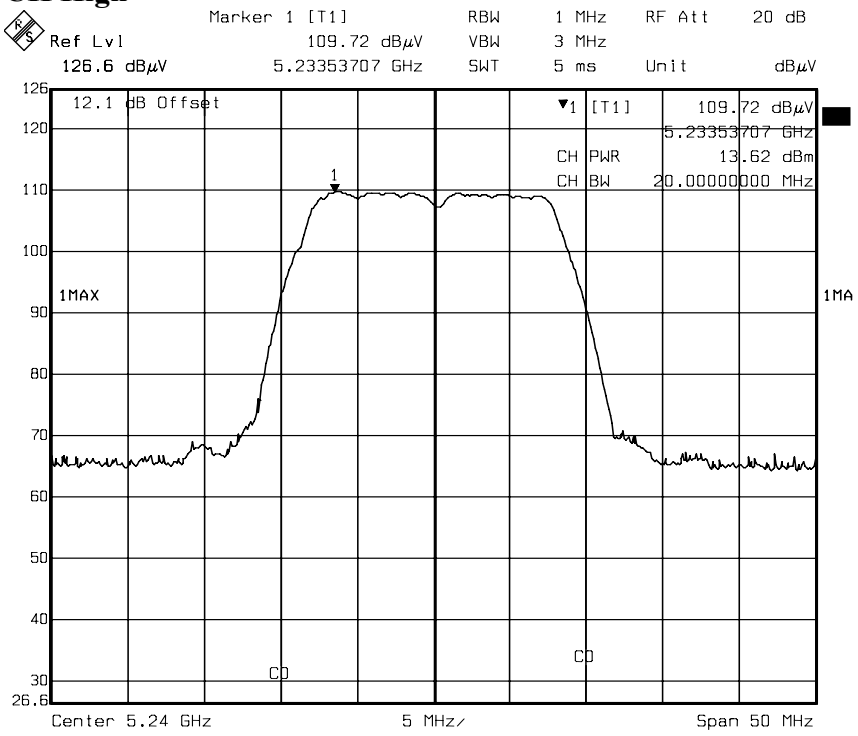
CH Low



CH Mid

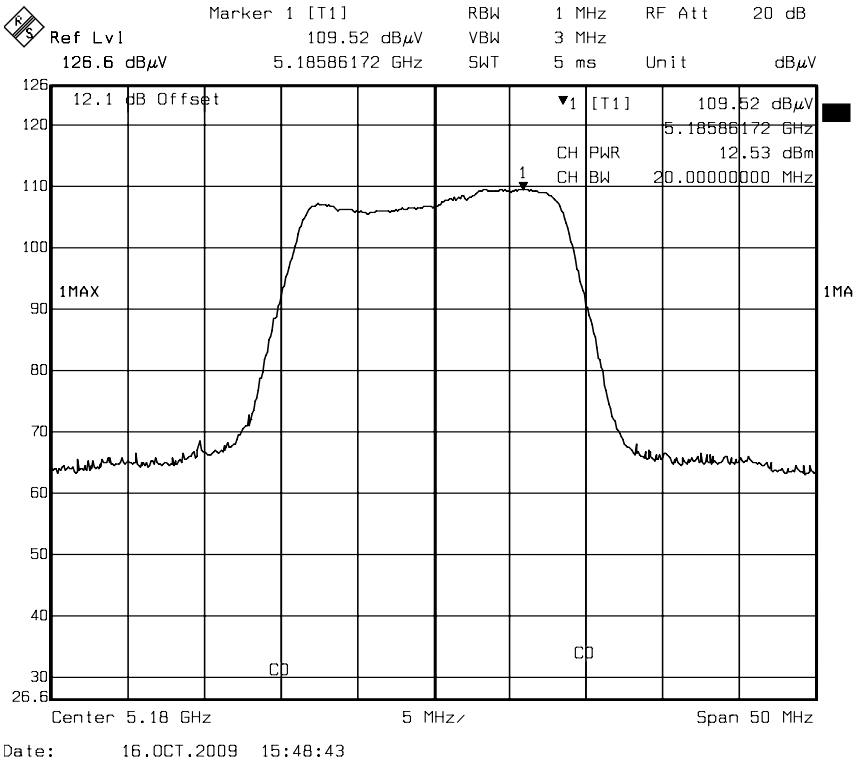


CH High

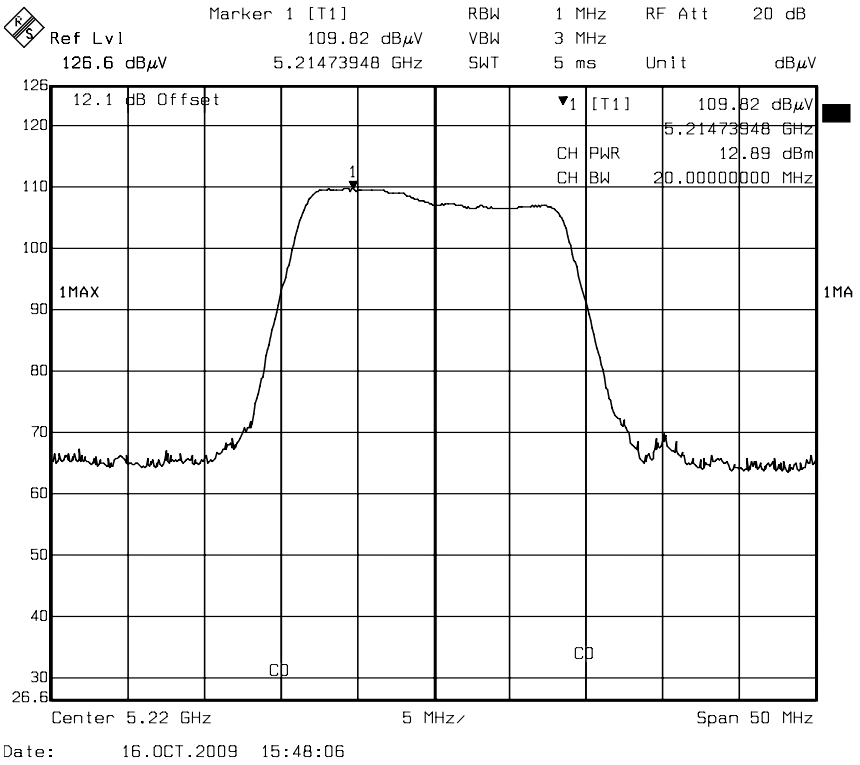


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

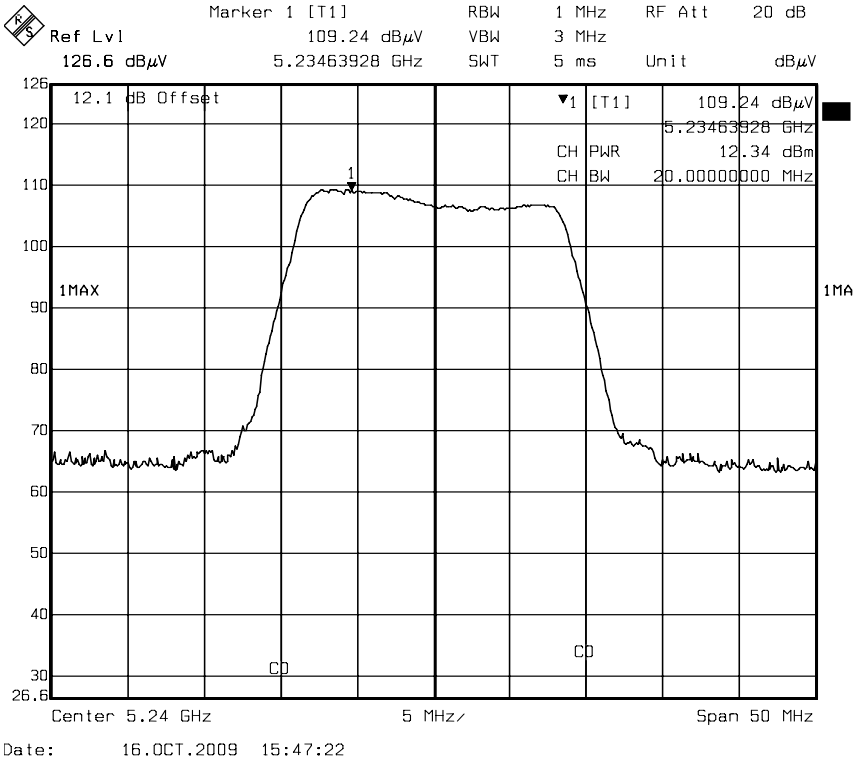
CH Low



CH Mid

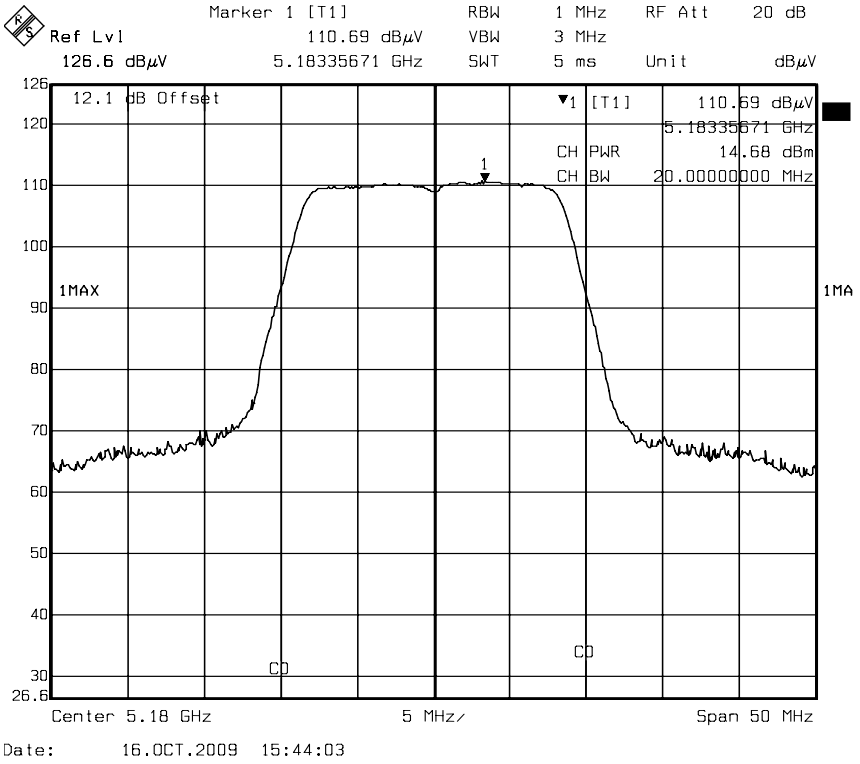


CH High

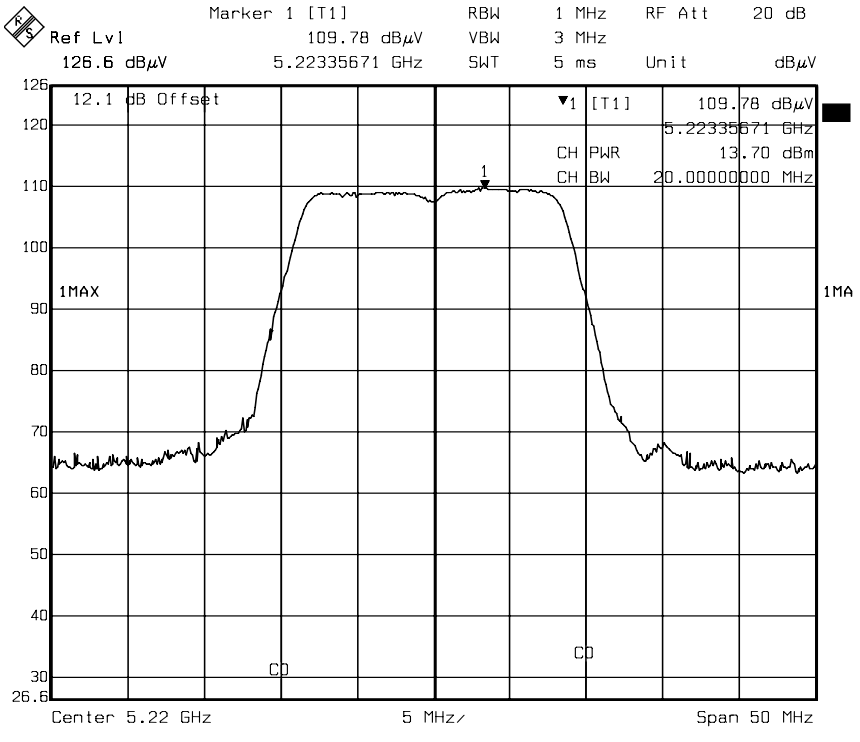


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

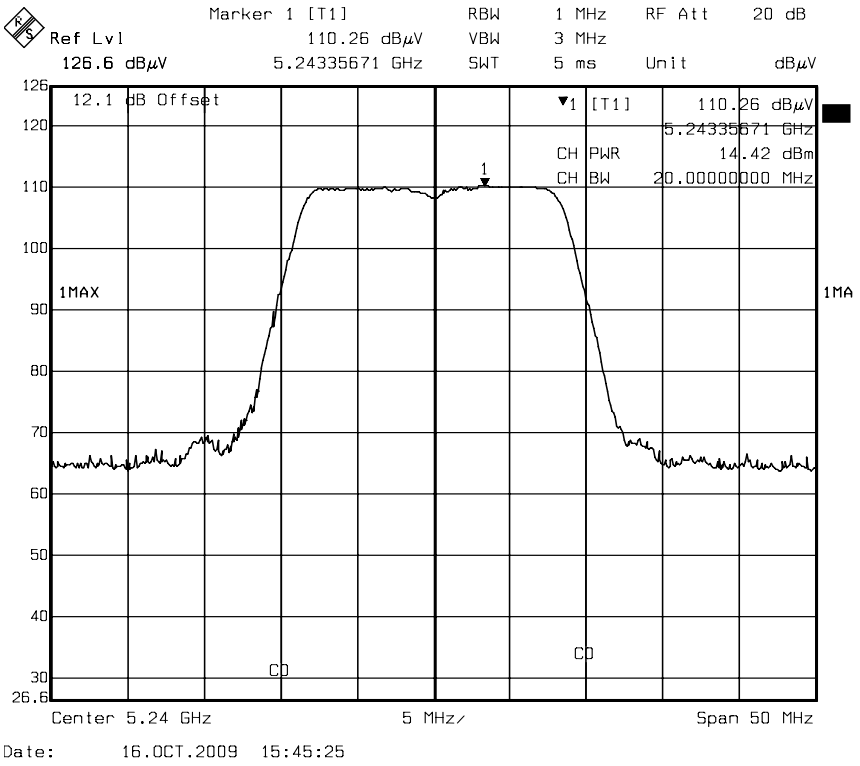
CH Low



CH Mid

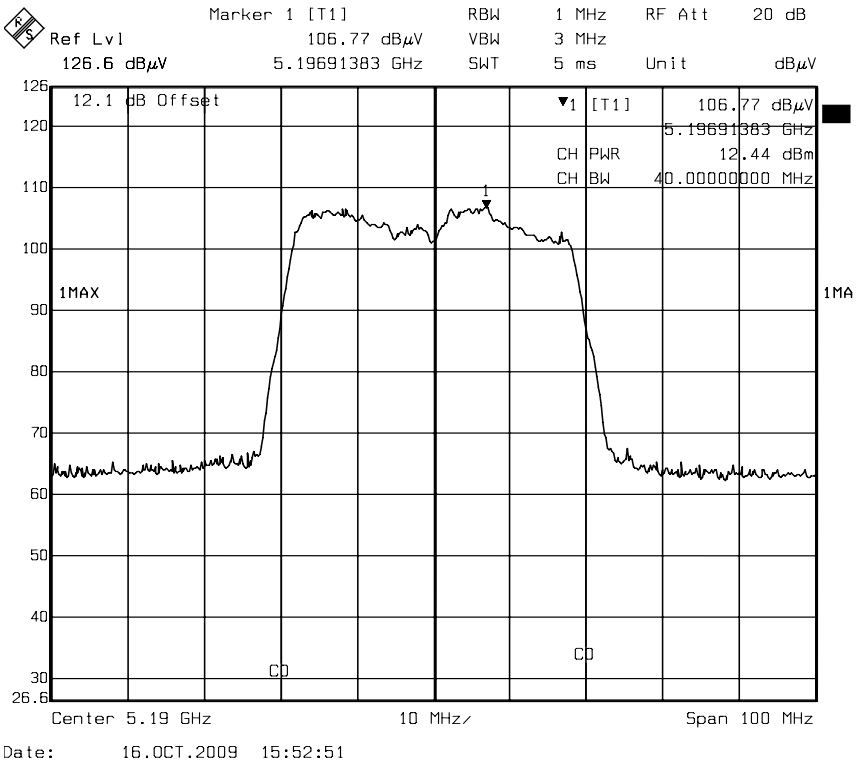


CH High

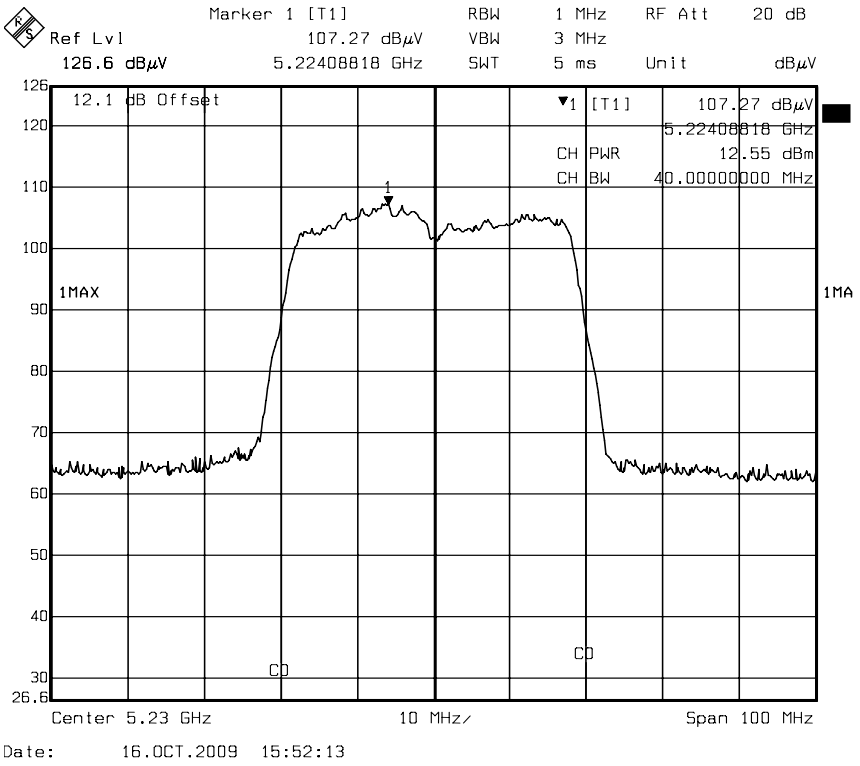


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

CH Low

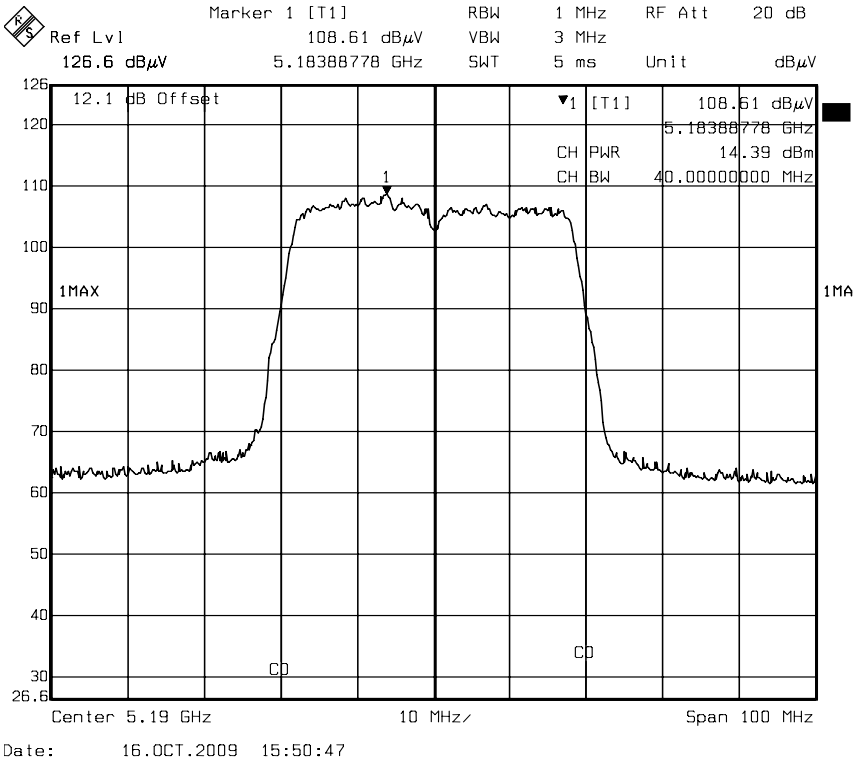


CH High

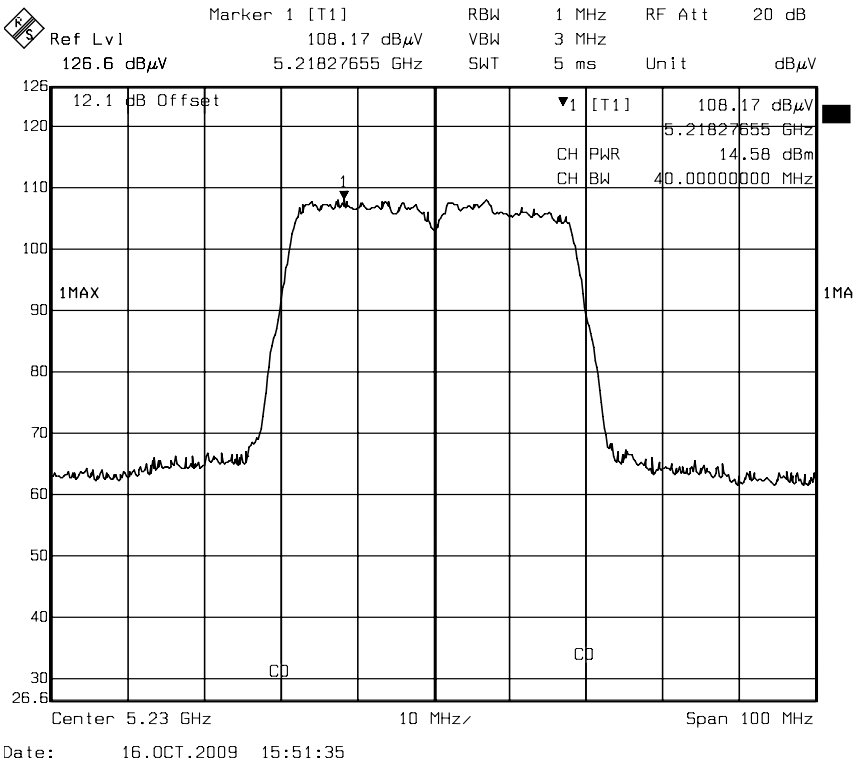


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

CH Low



CH High

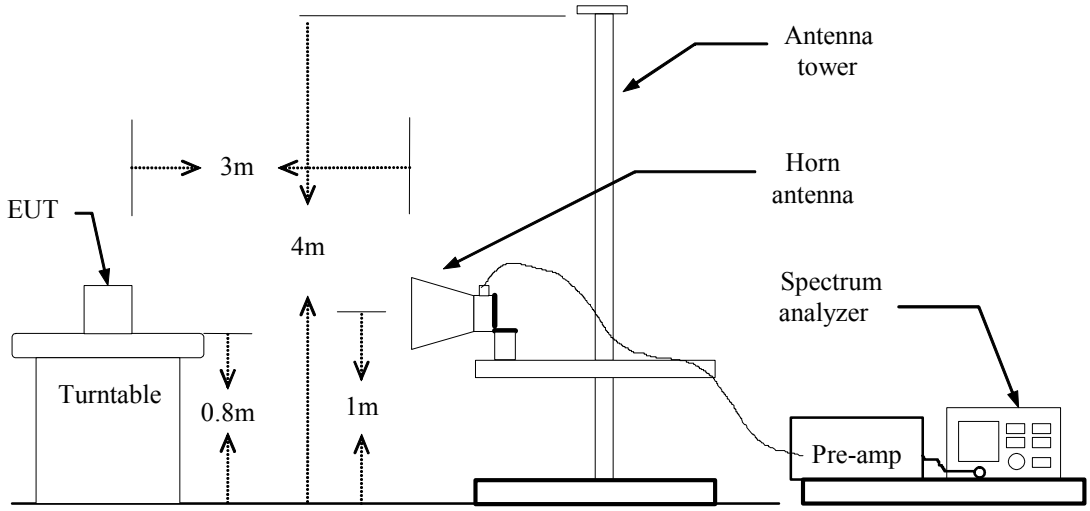

Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
108.17 dBµV
VBW 3 MHz
126.6 dBµV
5.21827655 GHz
SWT 5 ms
Unit dBµV
12.1 dB Offset
1 [T1]
108.17 dBµV
5.21827655 GHz
CH PWR
14.58 dBm
CH BW
40.00000000 MHz
1MAX
1MA
CO
CO
Center 5.23 GHz
10 MHz/
Span 100 MHz
Date: 16.OCT.2009 15:51:35

7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(b),
(1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Test Configuration



TEST PROCEDURE

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=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.

IEEE 802.11a mode / 5150MHz

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	5150.00	60.68	74	-13.32	Peak
	H	5150.00	47.73	54	-6.27	Average
	V	5150.00	61.30	74	-12.70	Peak
	V	5150.00	48.81	54	-5.19	Average

draft 802.11n Standard-20 MHz Channel mode / 5150MHz

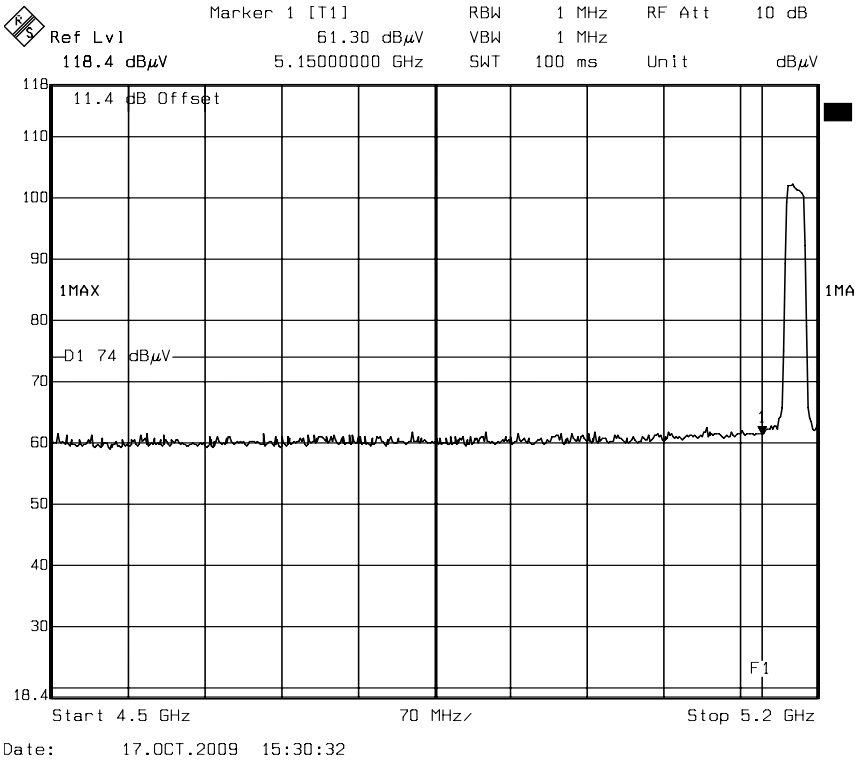
Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	5150.00	59.68	74	-14.32	Peak
	H	5150.00	47.72	54	-6.28	Average
	V	5150.00	61.19	74	-12.81	Peak
	V	5150.00	48.91	54	-5.09	Average

draft 802.11n Wide-40 MHz Channel mode / 5150MHz

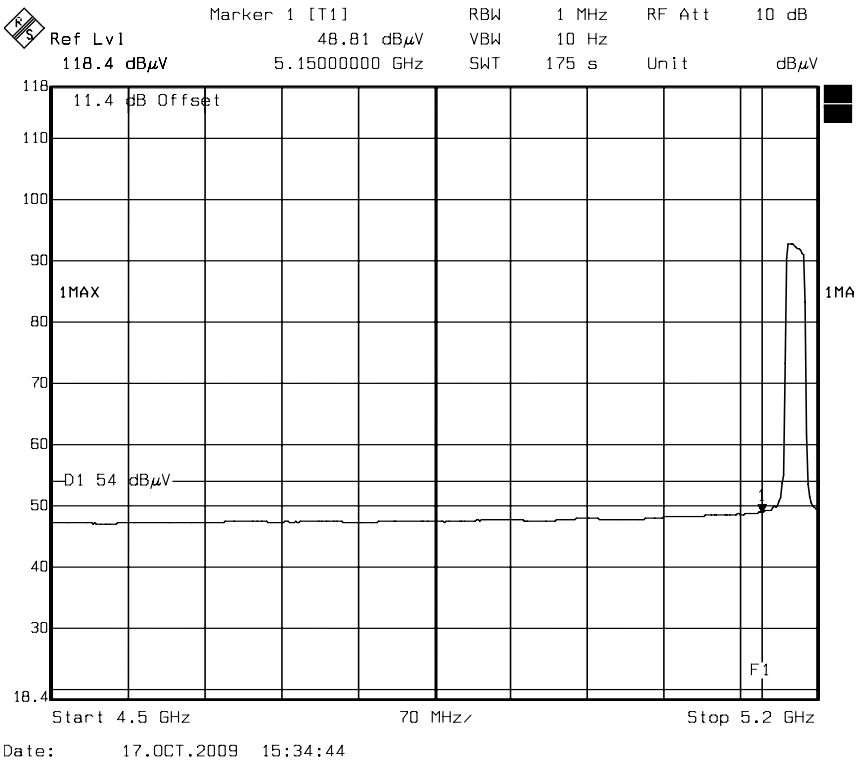
Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	5150.00	59.78	74	-14.22	Peak
	H	5150.00	47.78	54	-6.22	Average
	V	5150.00	62.06	74	-11.94	Peak
	V	5150.00	49.17	54	-4.83	Average

Band Edges (IEEE 802.11a mode / 5150 MHz)

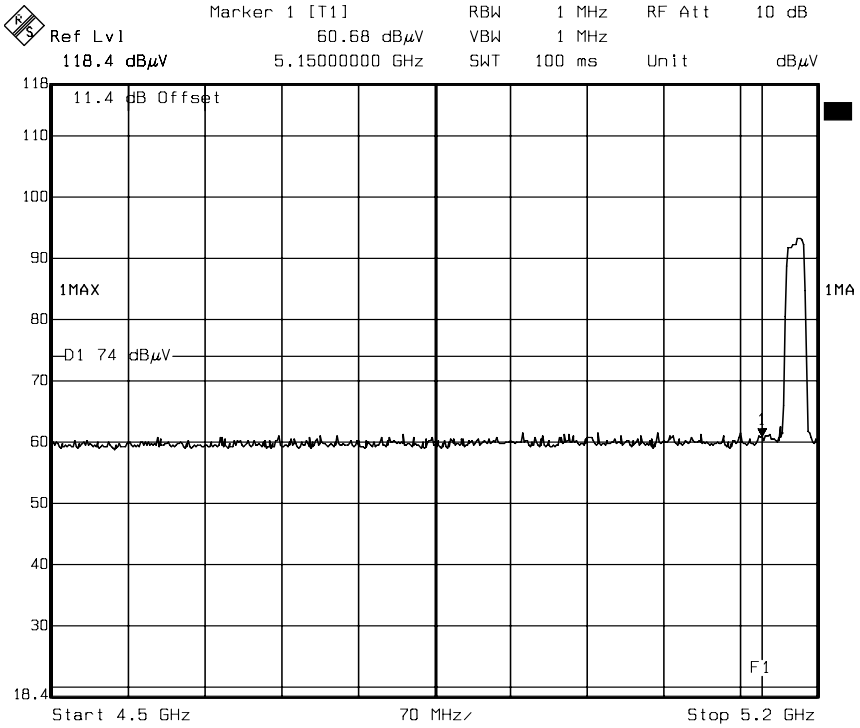
Detector mode: Peak Polarity: Vertical



Detector mode: Average Polarity: Vertical

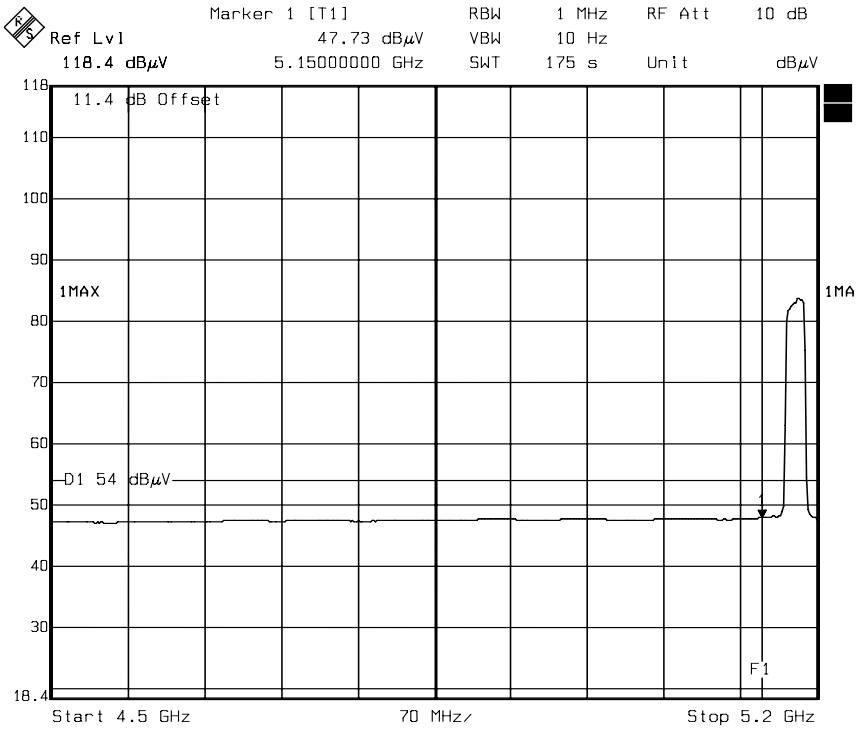


Detector mode: Peak **Polarity: Horizontal**



Date: 17.OCT.2009 16:36:31

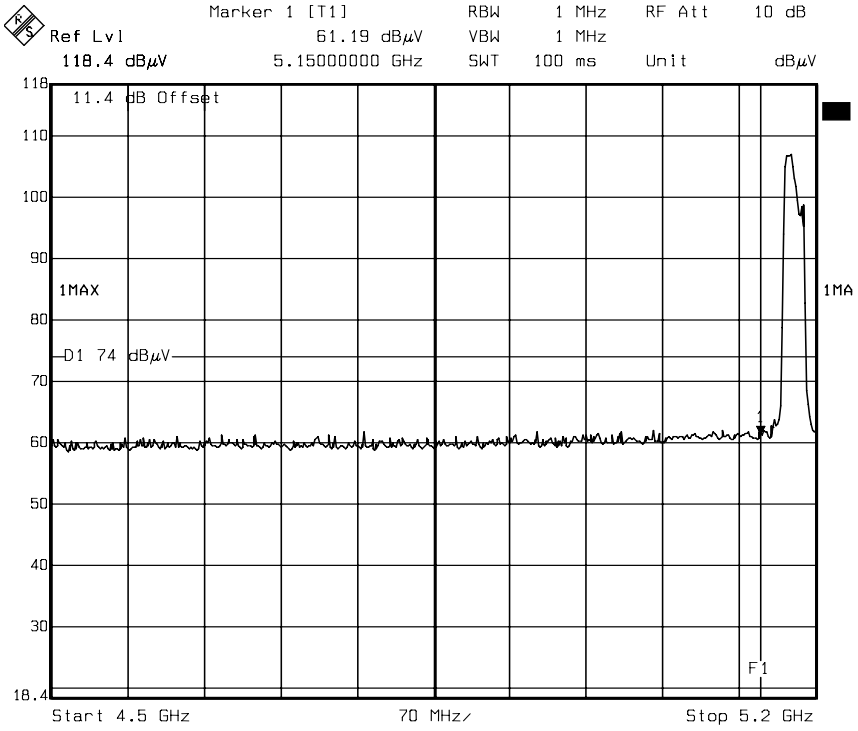
Detector mode: Average **Polarity: Horizontal**



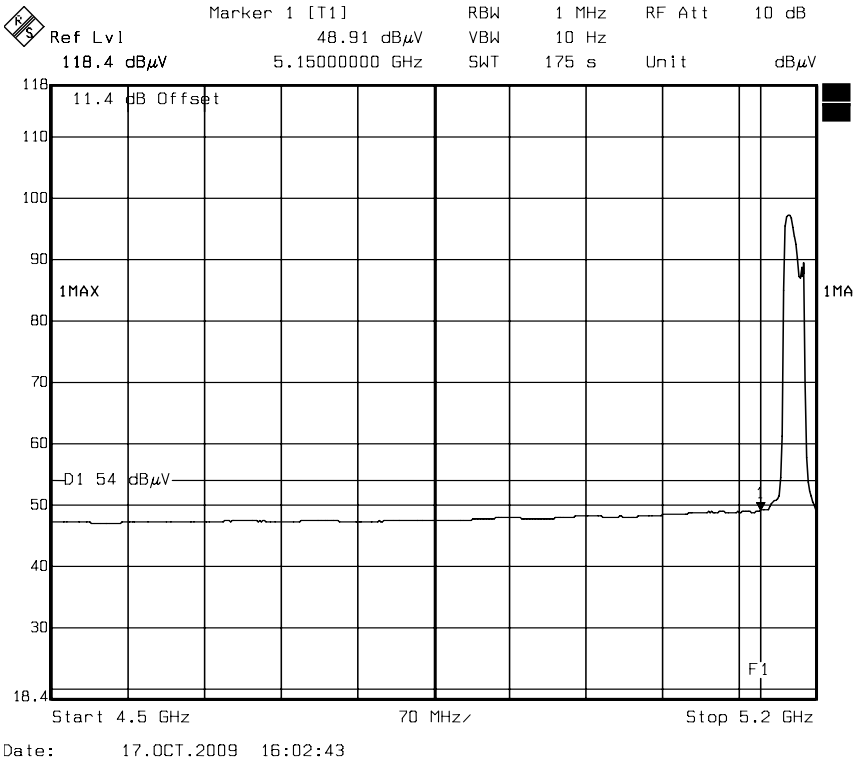
Date: 17.OCT.2009 16:39:43

Band Edges (draft 802.11n Standard-20 MHz Channel mode / 5150 MHz)

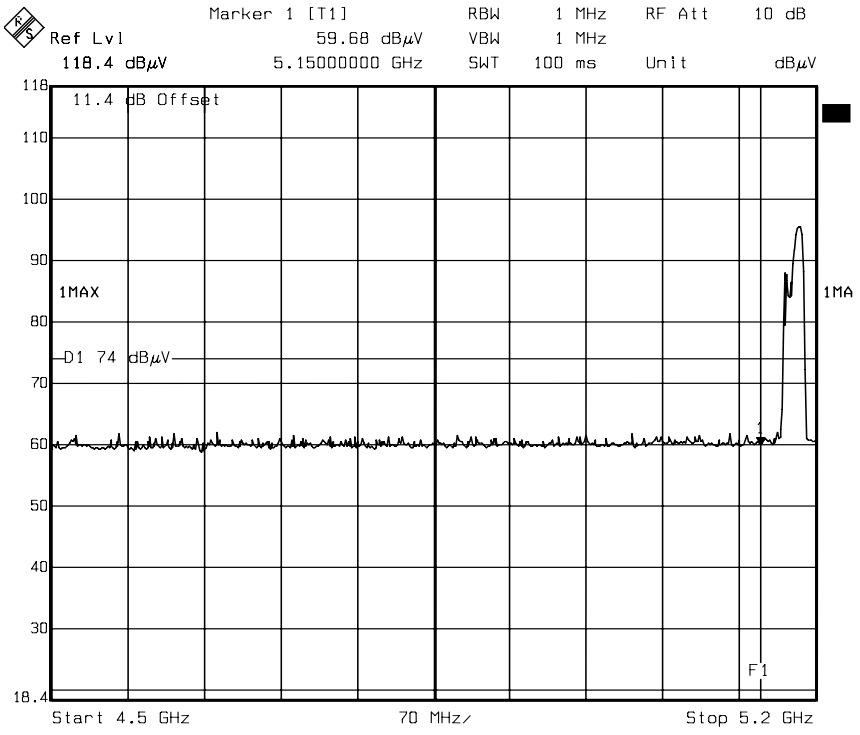
Detector mode: Peak **Polarity: Vertical**



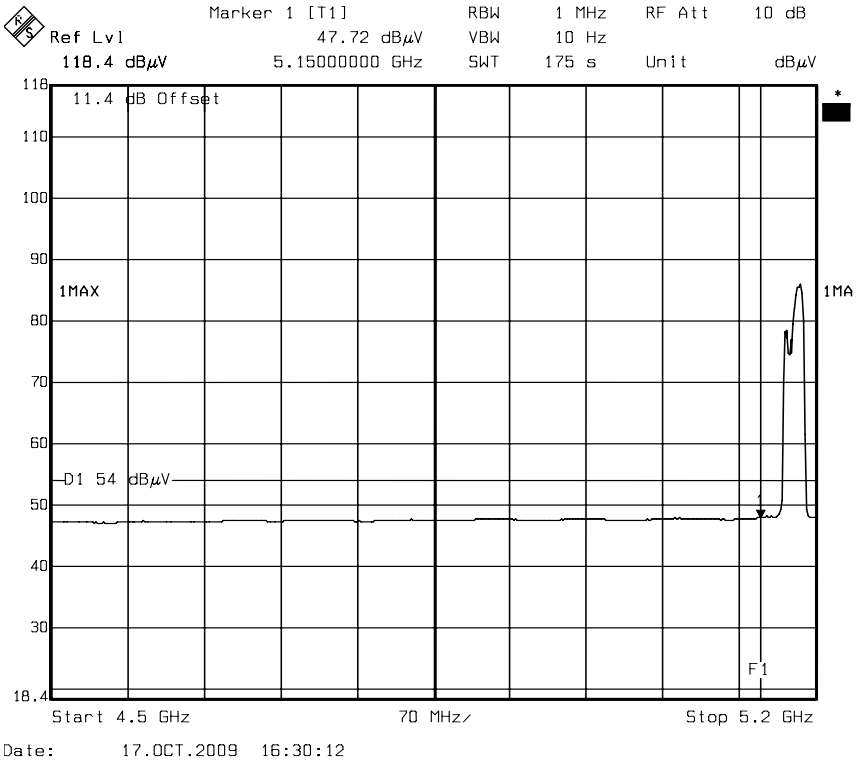
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

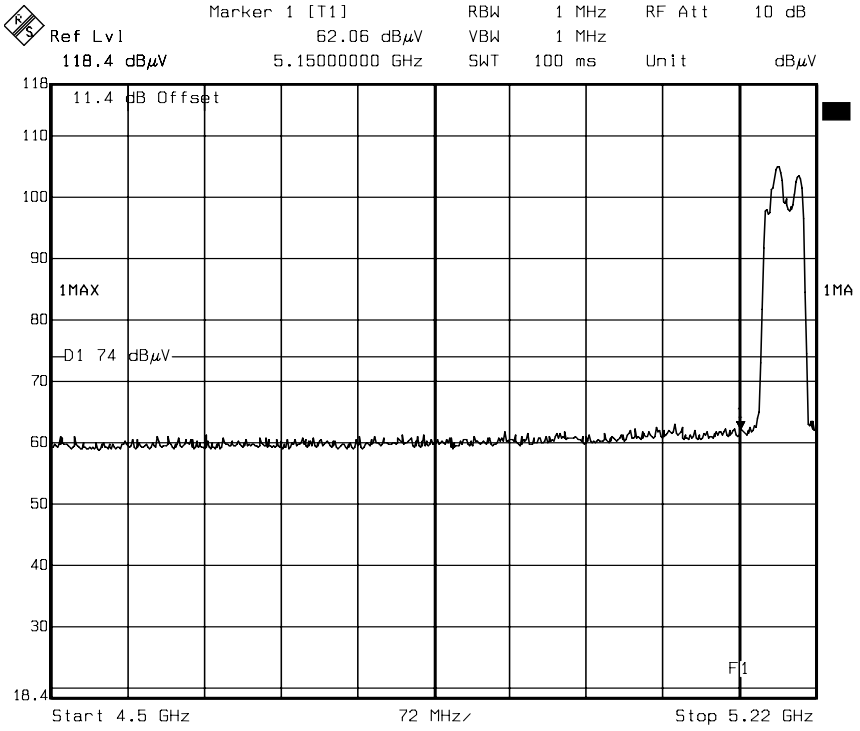


Detector mode: Average **Polarity: Horizontal**

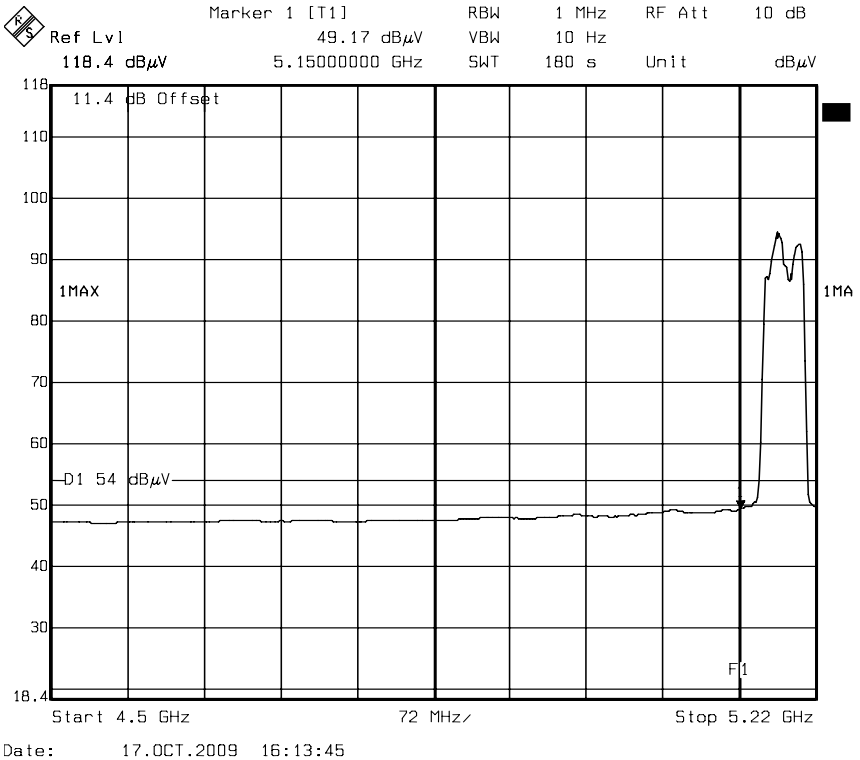


Band Edges (draft 802.11n Wide-40 MHz Channel mode / 5150 MHz)

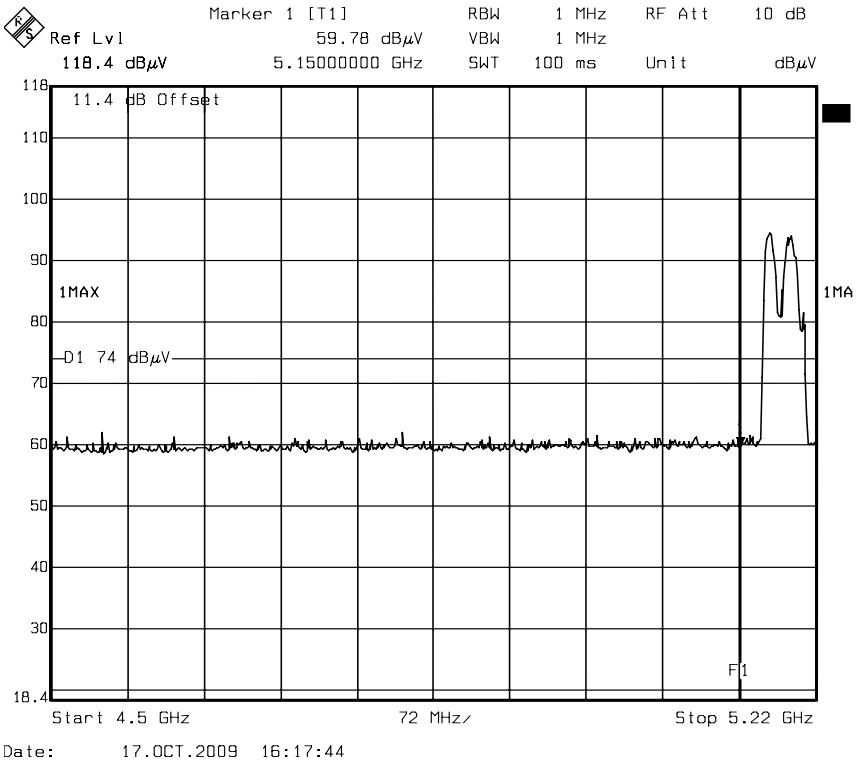
Detector mode: Peak **Polarity: Vertical**



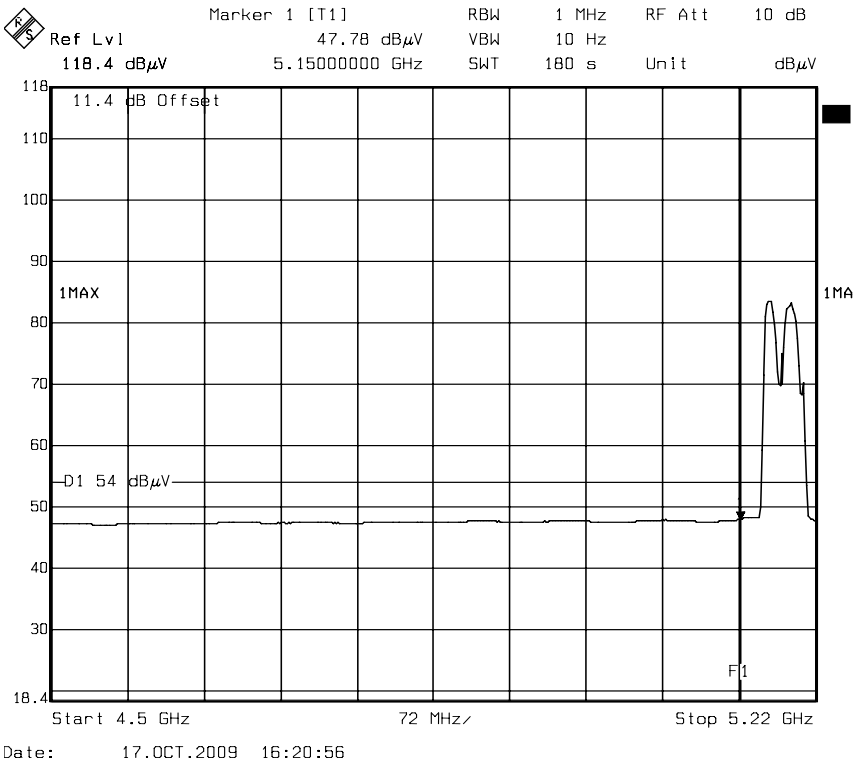
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

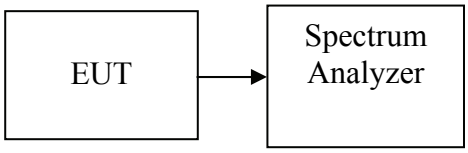
According to §15.407(a),

(1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.

(2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = Sweep= AUTO
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	2.41	4.00	-1.59	PASS
Mid	5220	3.01	4.00	-0.99	PASS
High	5240	2.44	4.00	-1.56	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	0.77	0.94	3.87	4.00	-0.13	PASS
Mid	5220	1.14	0.64	3.91	4.00	-0.09	PASS
High	5240	0.78	0.82	3.81	4.00	-0.19	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5190	-0.91	0.47	2.84	4.00	-1.16	PASS
High	5230	-0.80	0.41	2.86	4.00	-1.14	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	2.66	4.00	-1.34	PASS
Mid	5220	2.31	4.00	-1.69	PASS
High	5240	3.05	4.00	-0.95	PASS

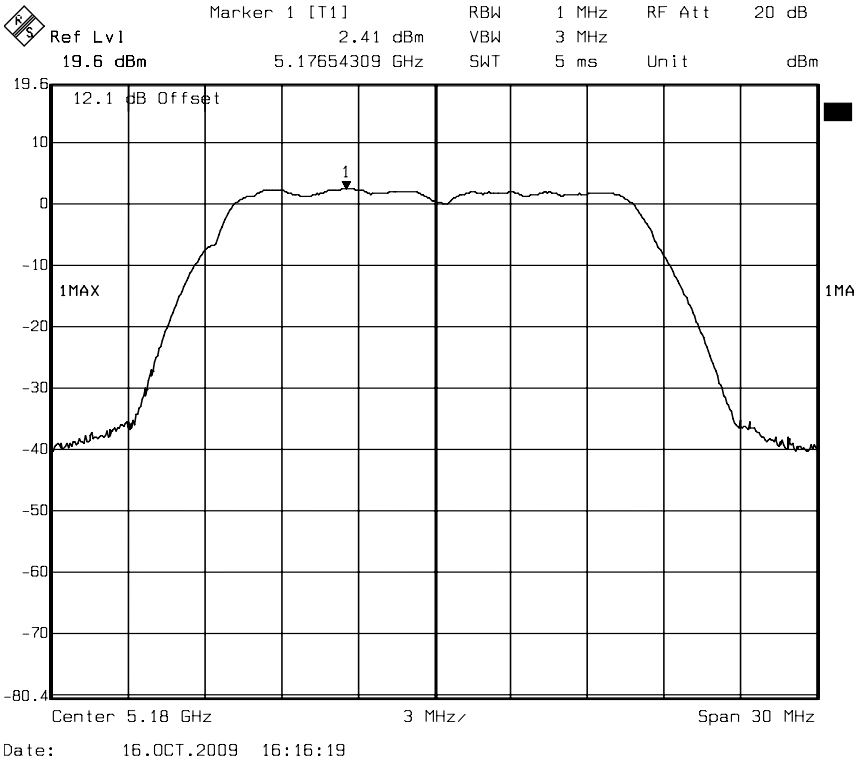
Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5190	2.66	4.00	-1.34	PASS
High	5230	2.51	4.00	-1.49	PASS

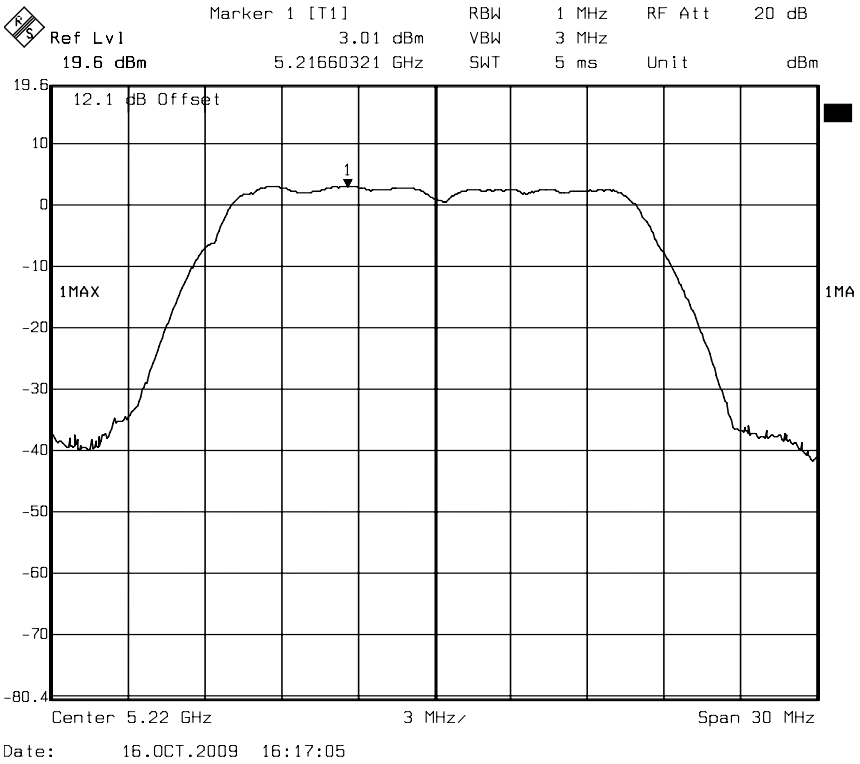
Remark: Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))

Test Plot
IEEE 802.11a mode / 5180 ~ 5240MHz

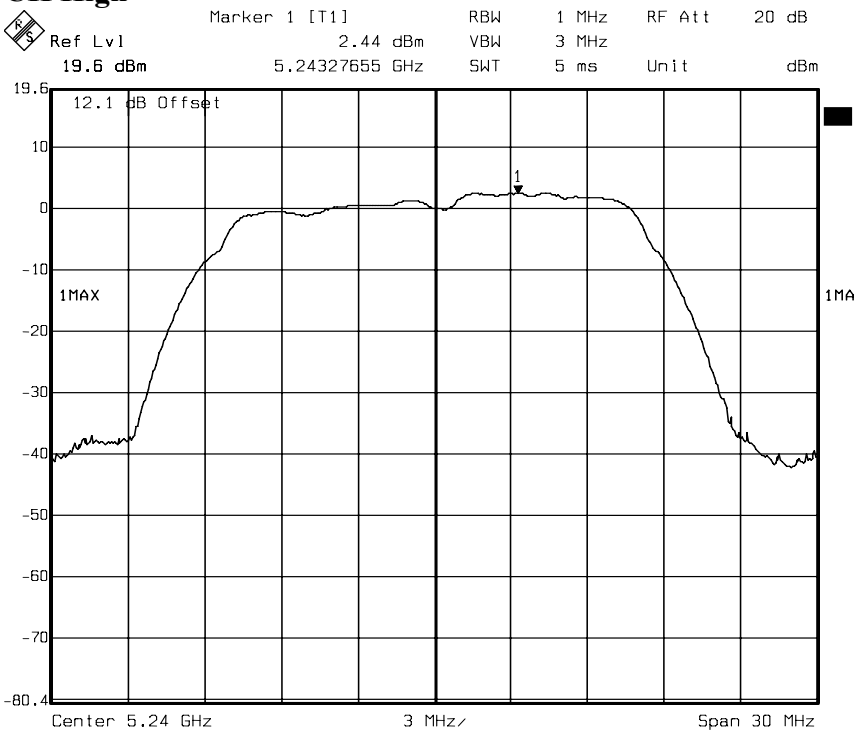
CH Low



CH Mid

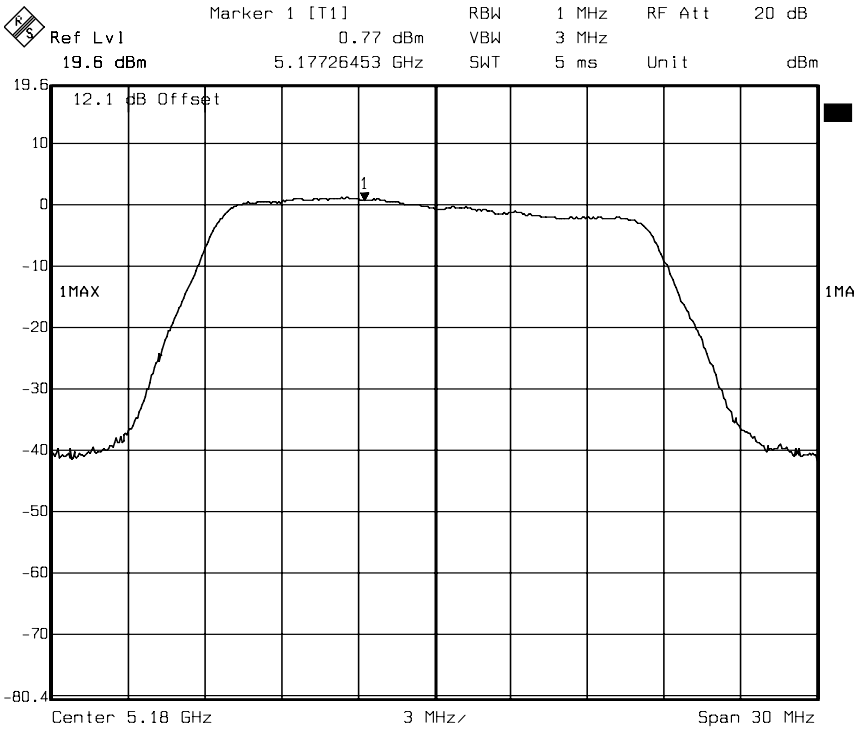


CH High

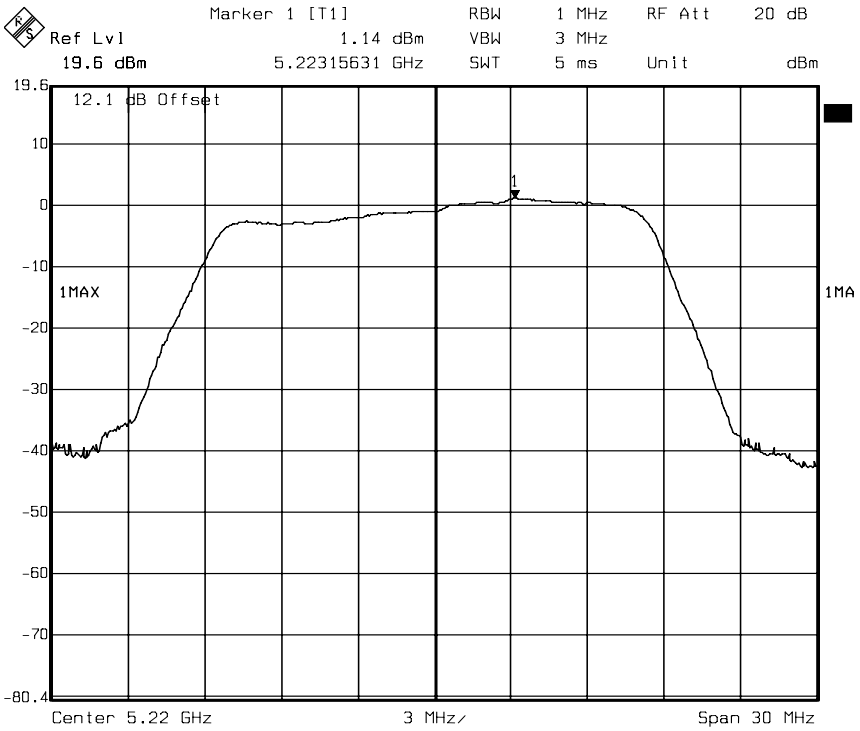


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

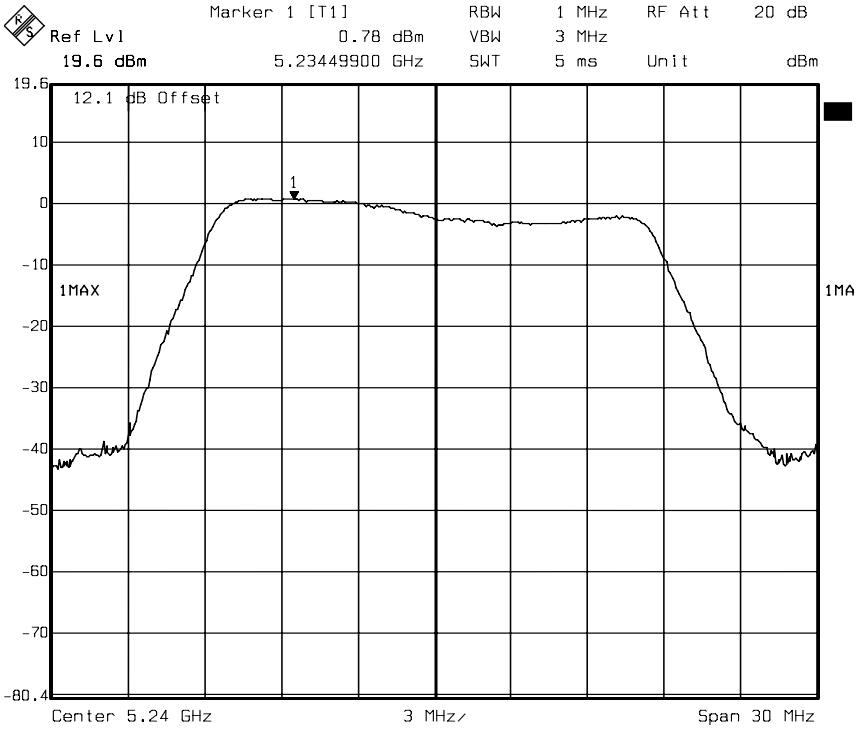
CH Low



CH Mid

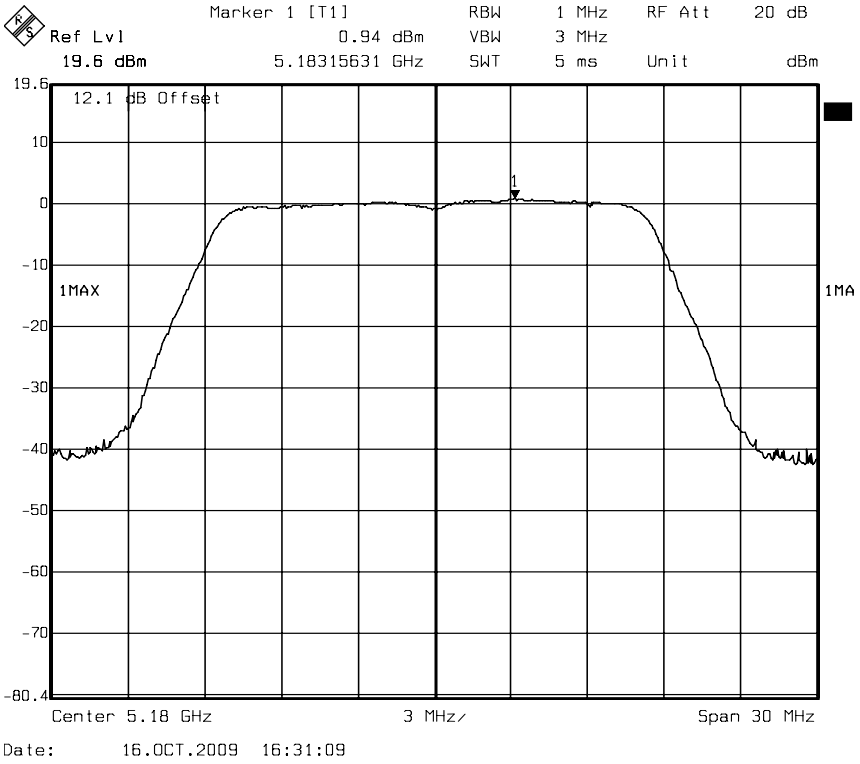


CH High

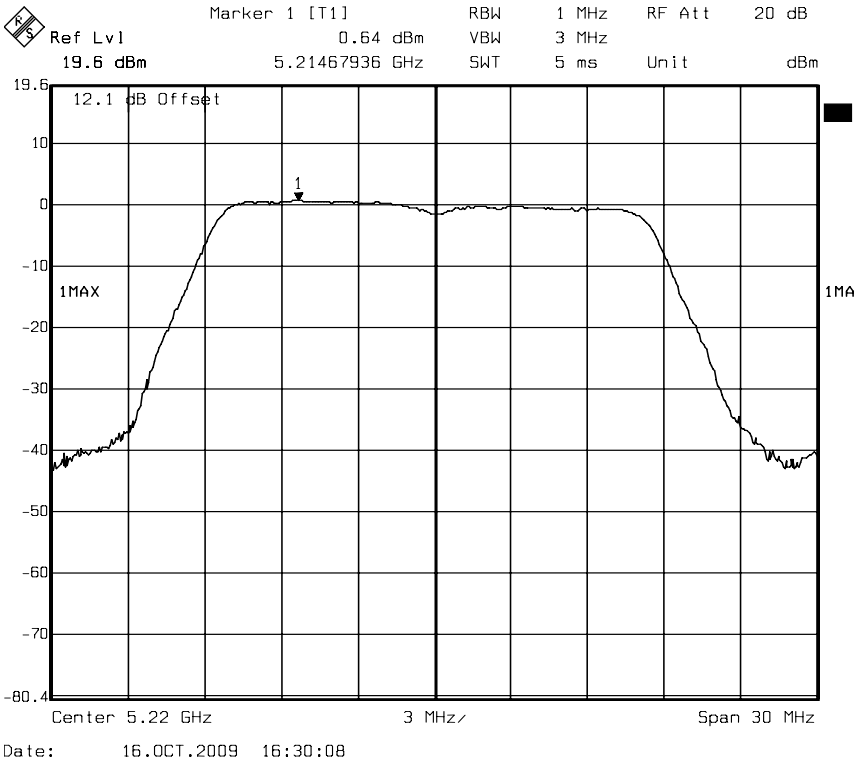


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

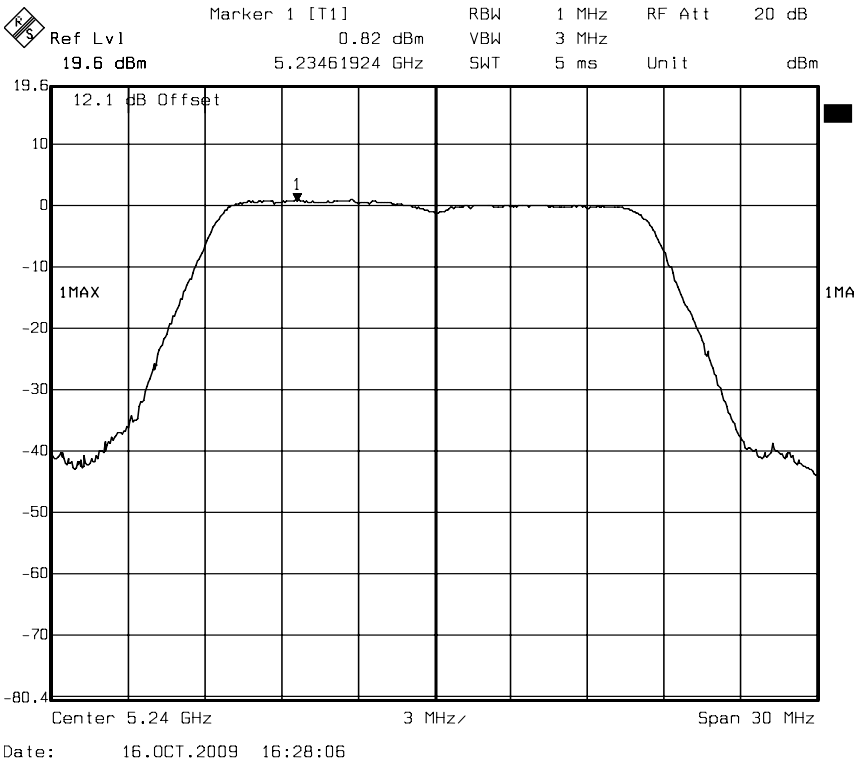
CH Low



CH Mid

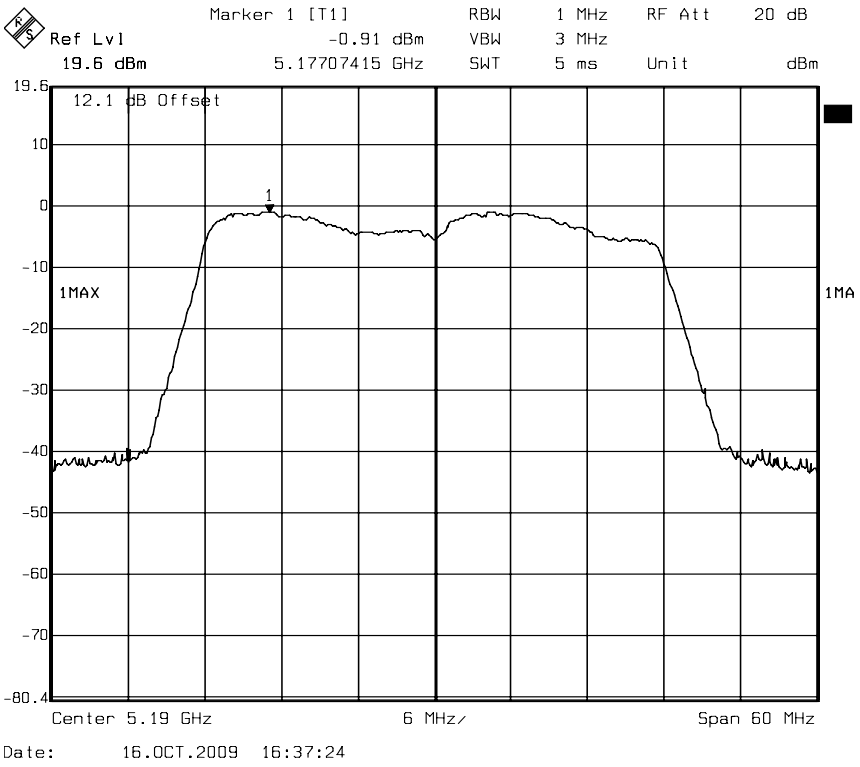


CH High

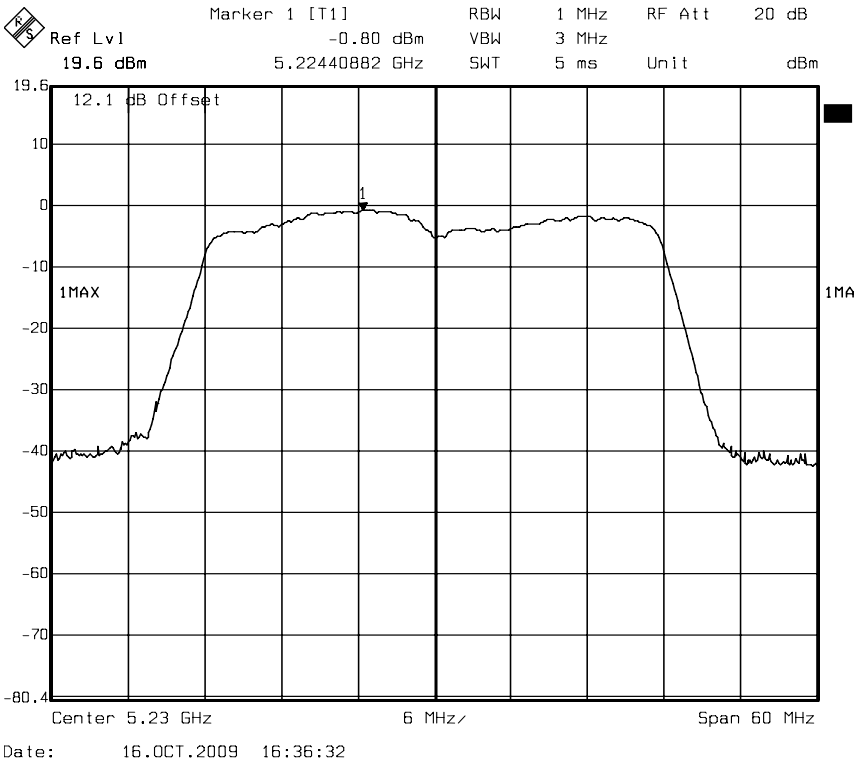


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

CH Low

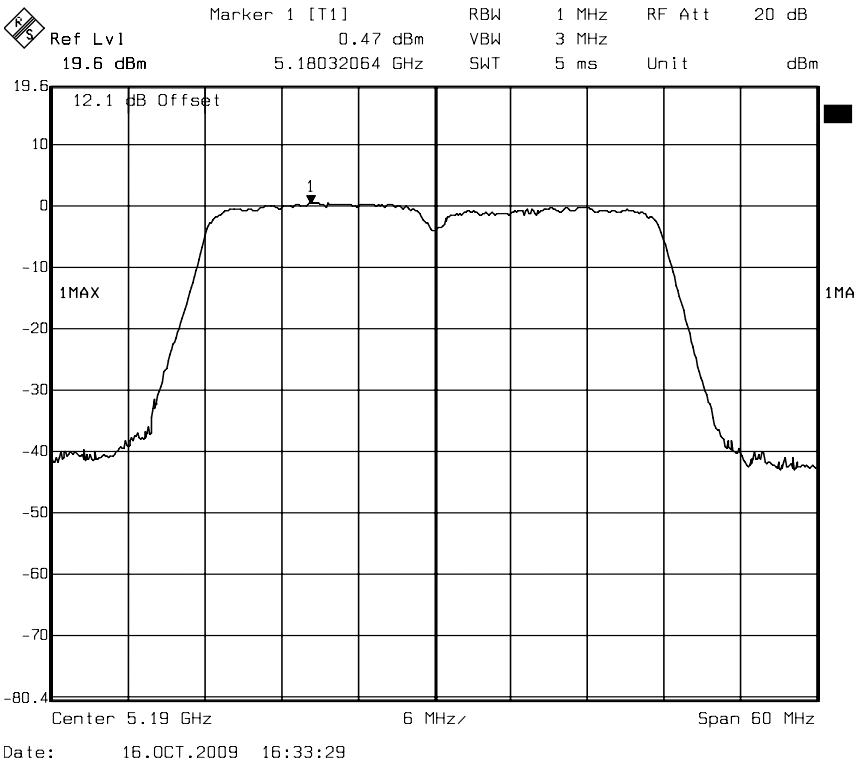


CH High

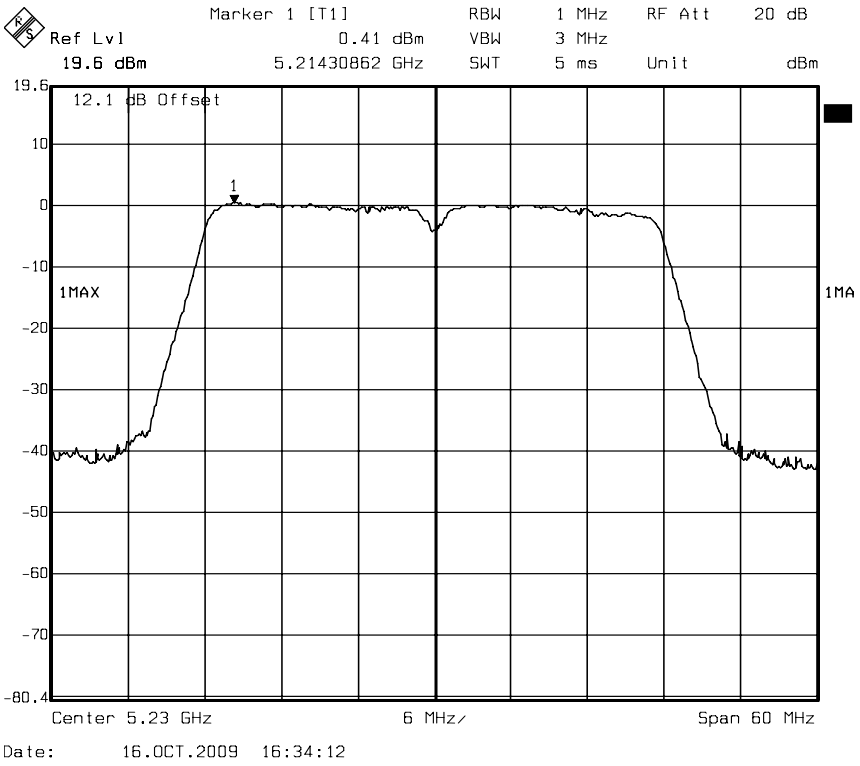


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

CH Low

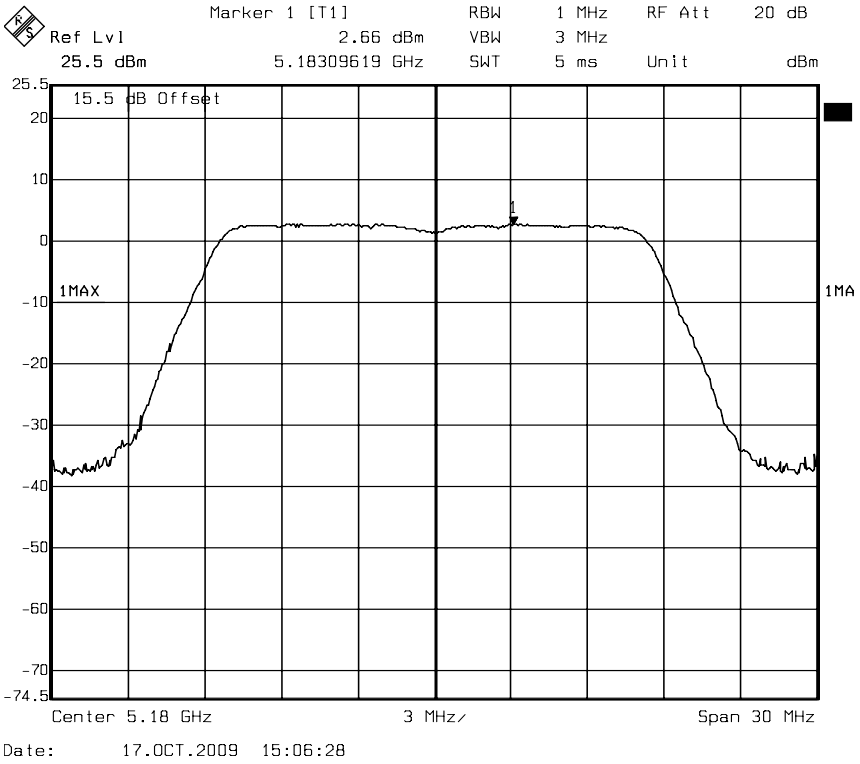


CH High

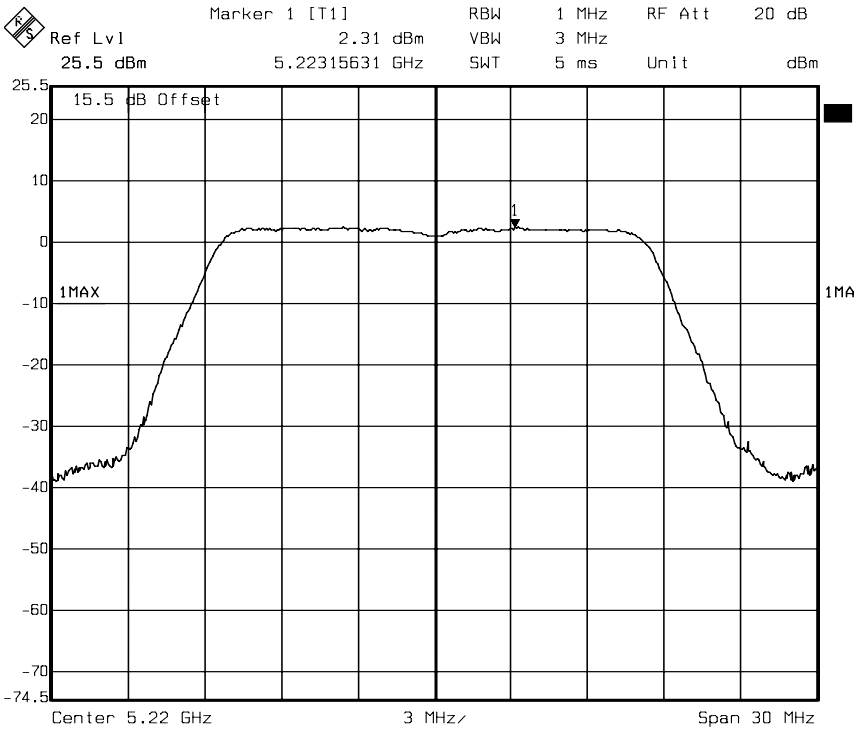


Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz with combiner:

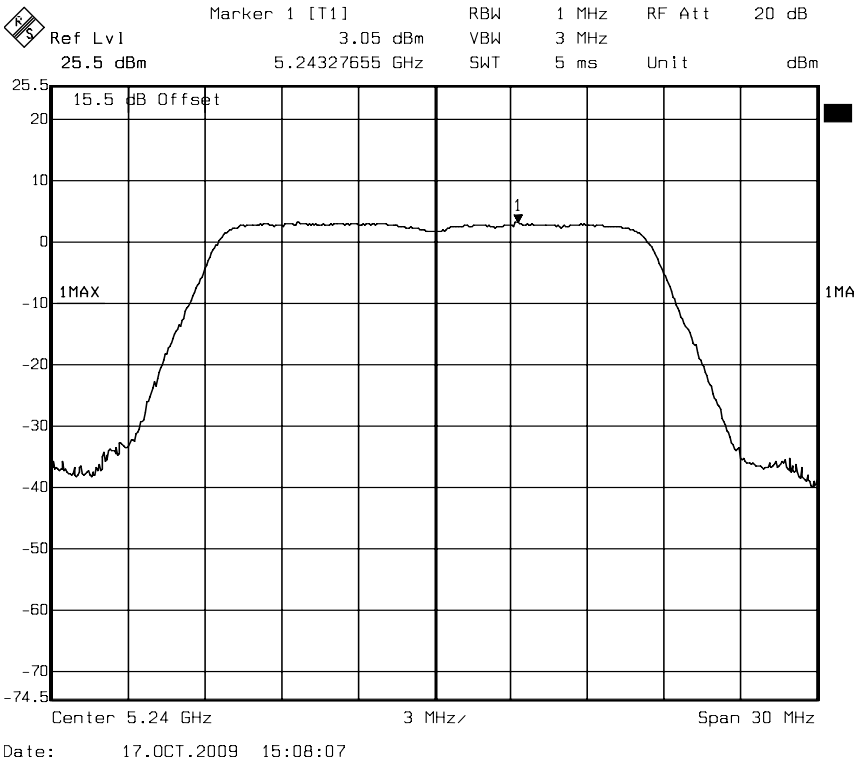
CH Low



CH Mid

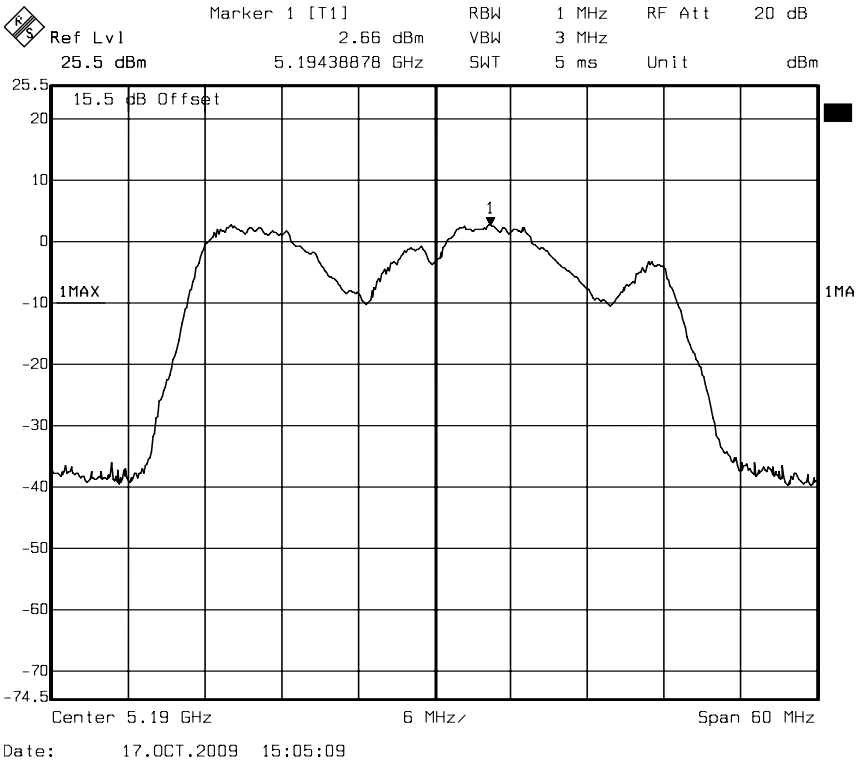


CH High

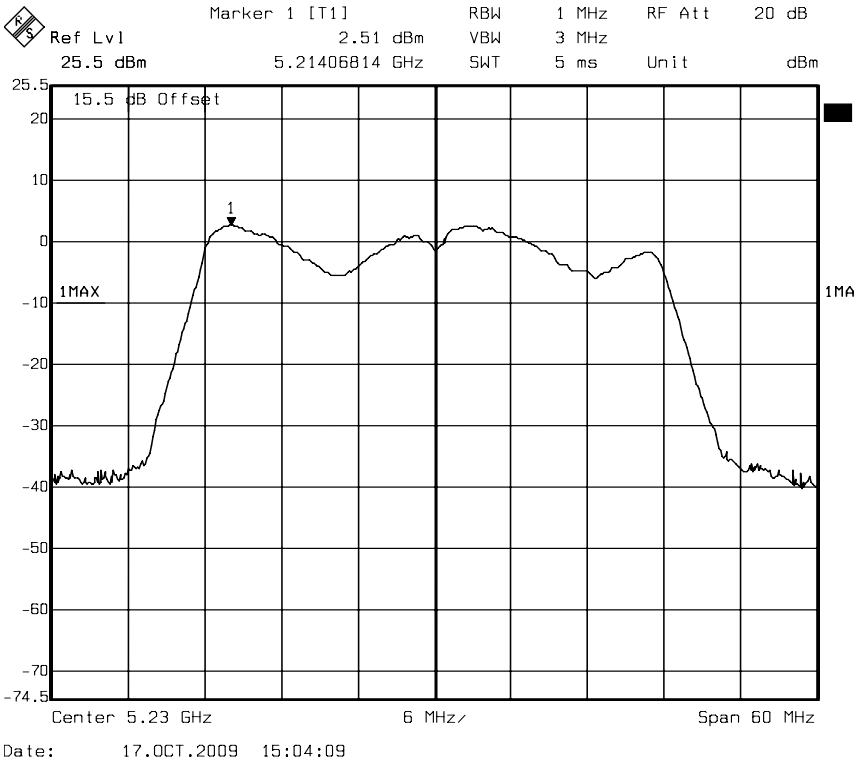


Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz with combiner:

CH Low



CH High

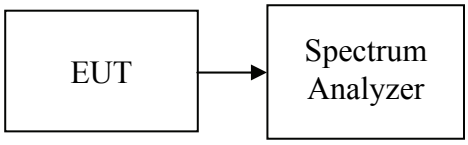


7.5 PEAK EXCURSION

LIMIT

According to §15.407(a)(6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW =1MHz, VBW = 3MHz, Span >26dB bandwidth, Max. hold.
4. Delta Mark trace A Maximum frequency and trace B same frequency.
5. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	7.11	13.00	-5.89	PASS
Middle	5220	7.21	13.00	-5.79	PASS
High	5240	7.25	13.00	-5.75	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	7.24	13.00	-5.76	PASS
Middle	5220	7.93	13.00	-5.07	PASS
High	5240	7.48	13.00	-5.52	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Result
Low	5180	7.88	13.00	-5.12	PASS
Middle	5220	7.66	13.00	-5.34	PASS
High	5240	7.44	13.00	-5.56	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	Limit (dBm)	Margin (dB)	Result
Low	5190	7.00	13.00	-6.00	PASS
High	5230	7.07	13.00	-5.93	PASS

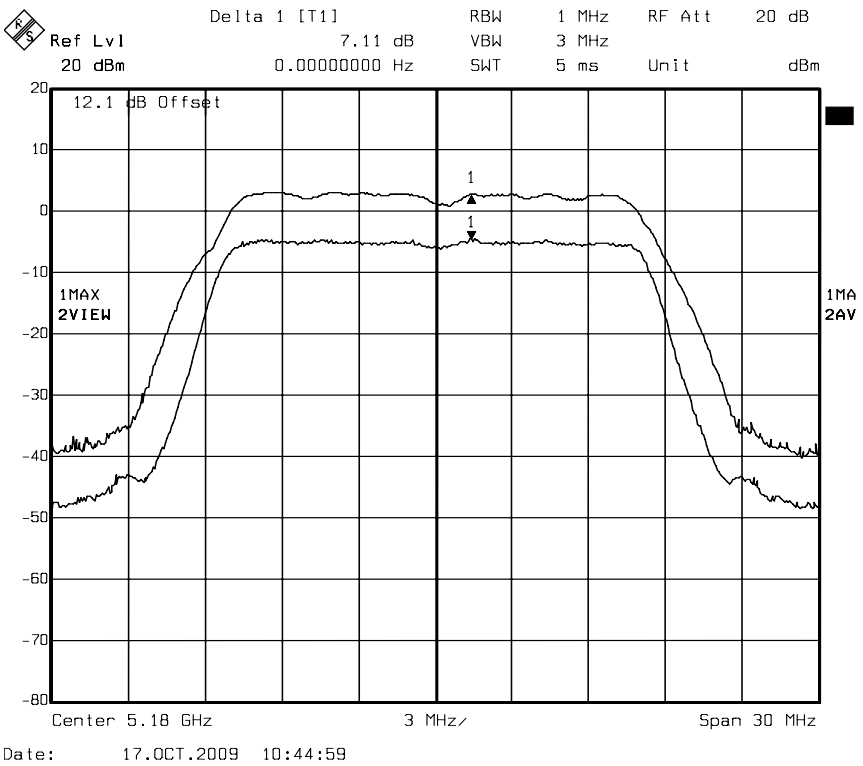
Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Result
Low	5190	7.27	13.00	-5.73	PASS
High	5230	6.31	13.00	-6.69	PASS

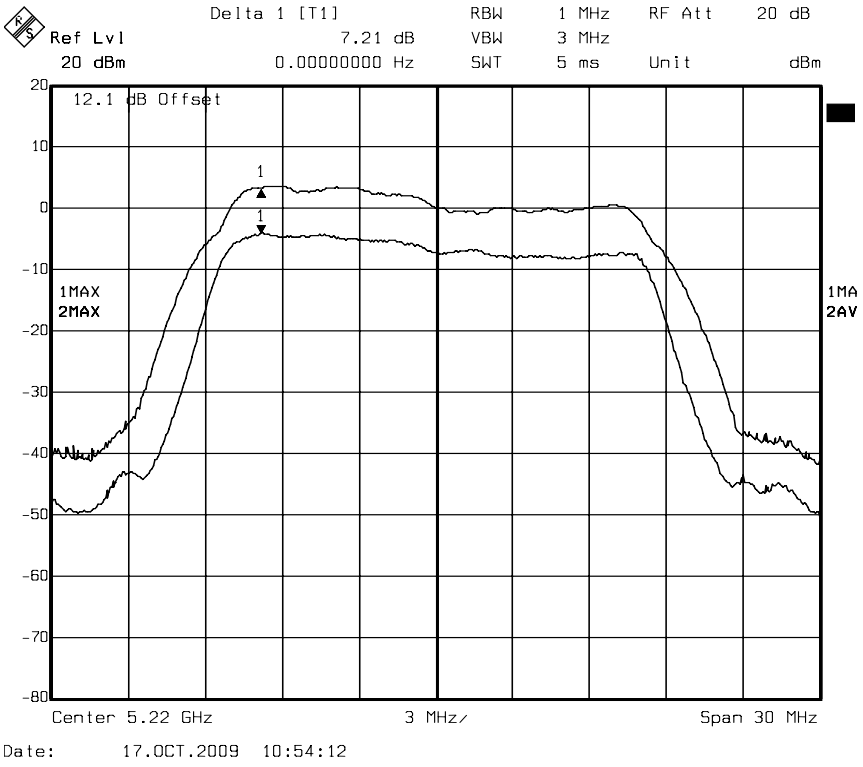
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

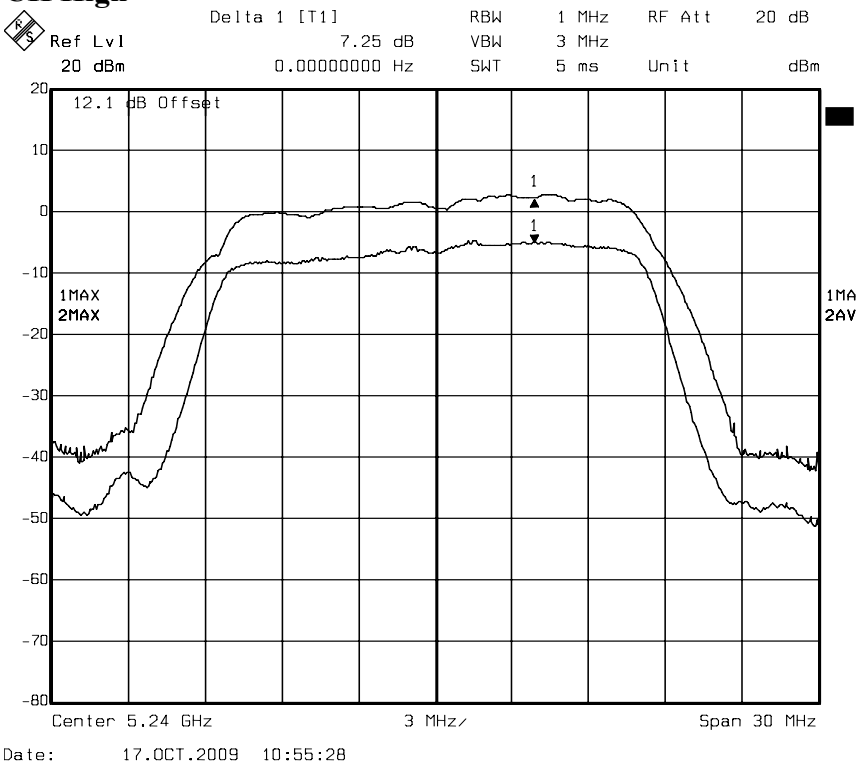
CH Low



CH Mid

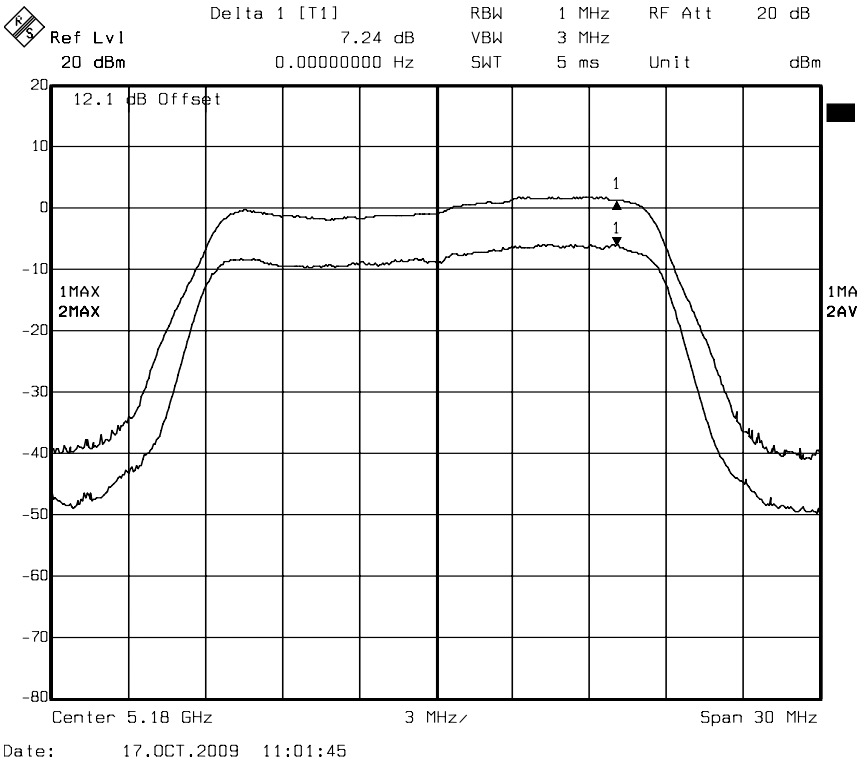


CH High

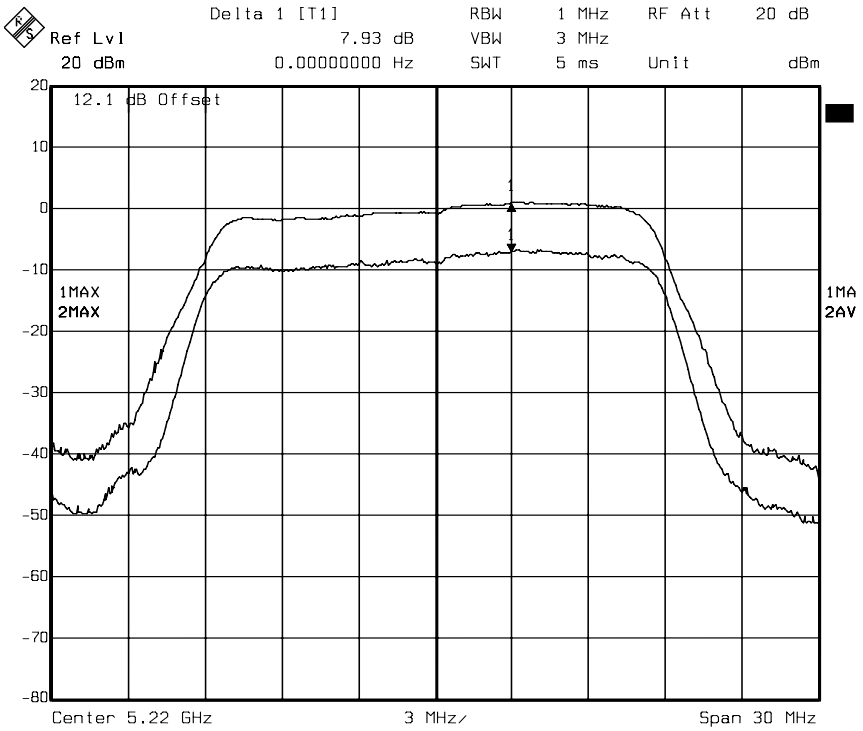


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

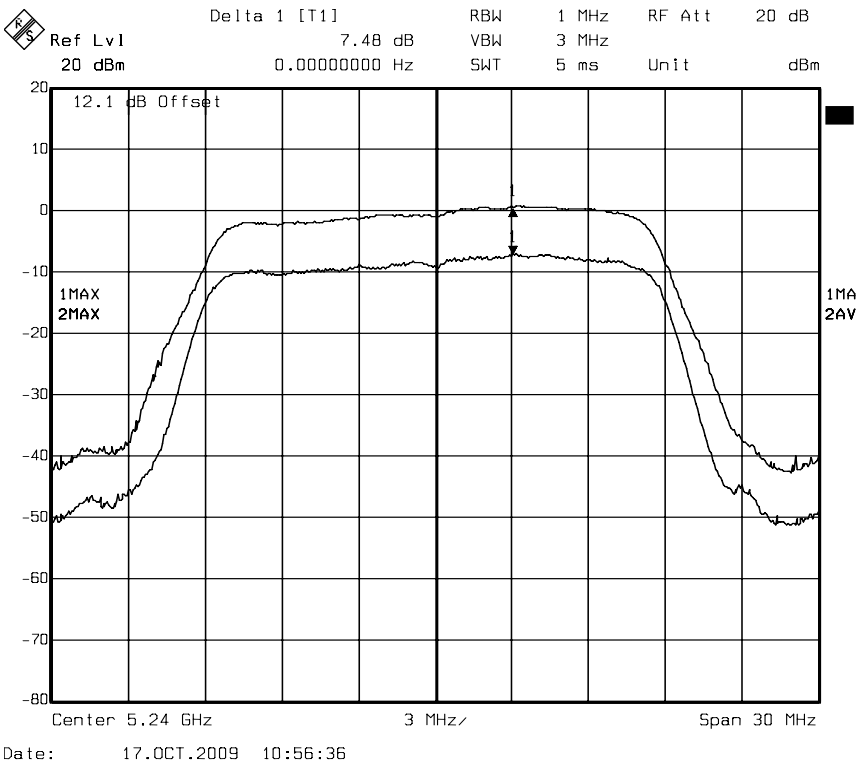
CH Low



CH Mid

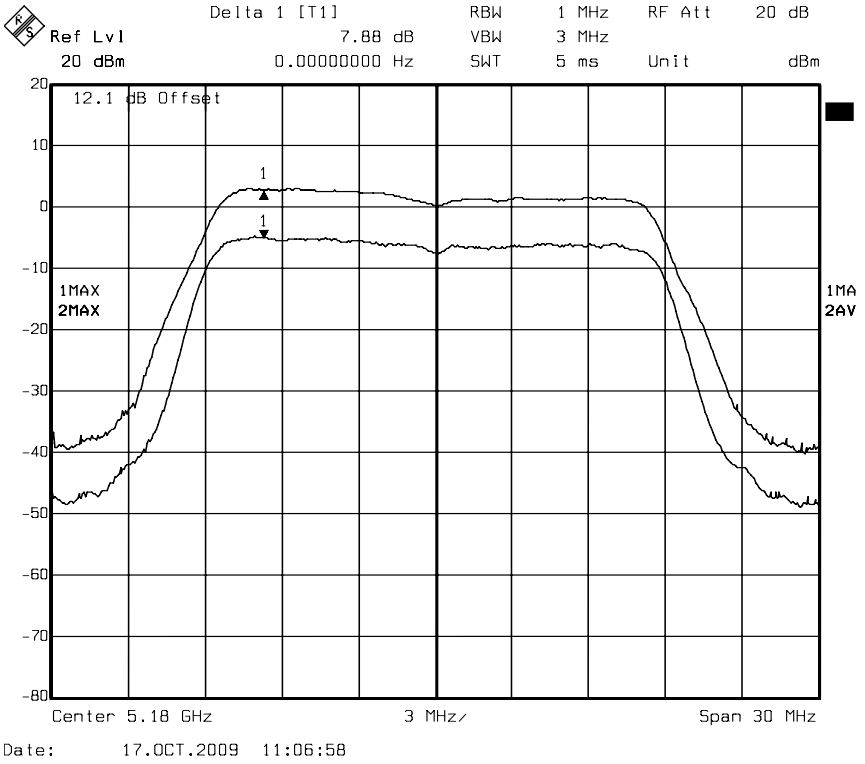


CH High

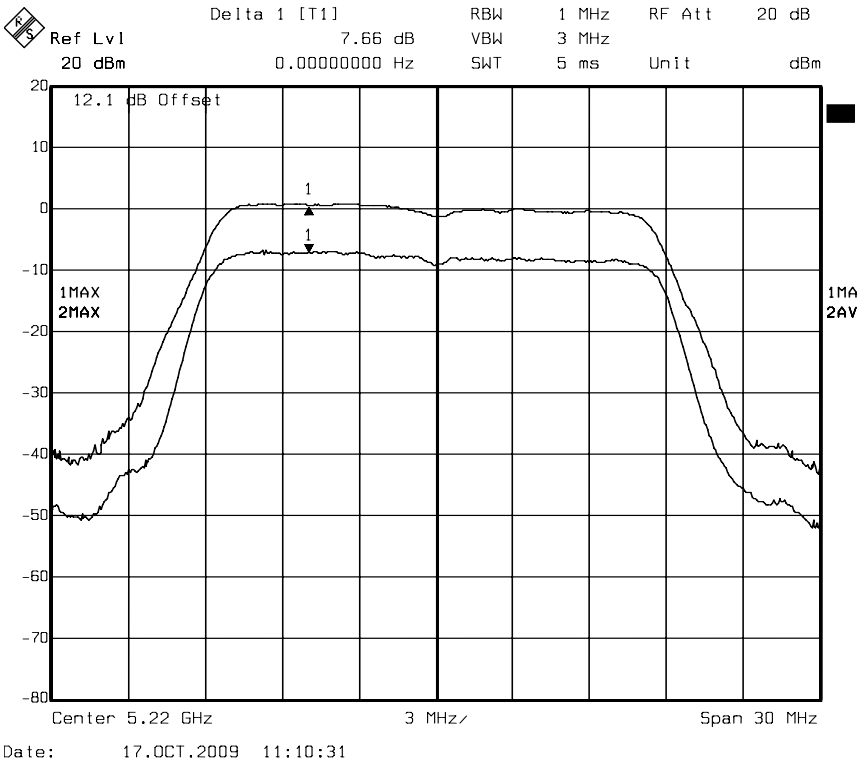


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

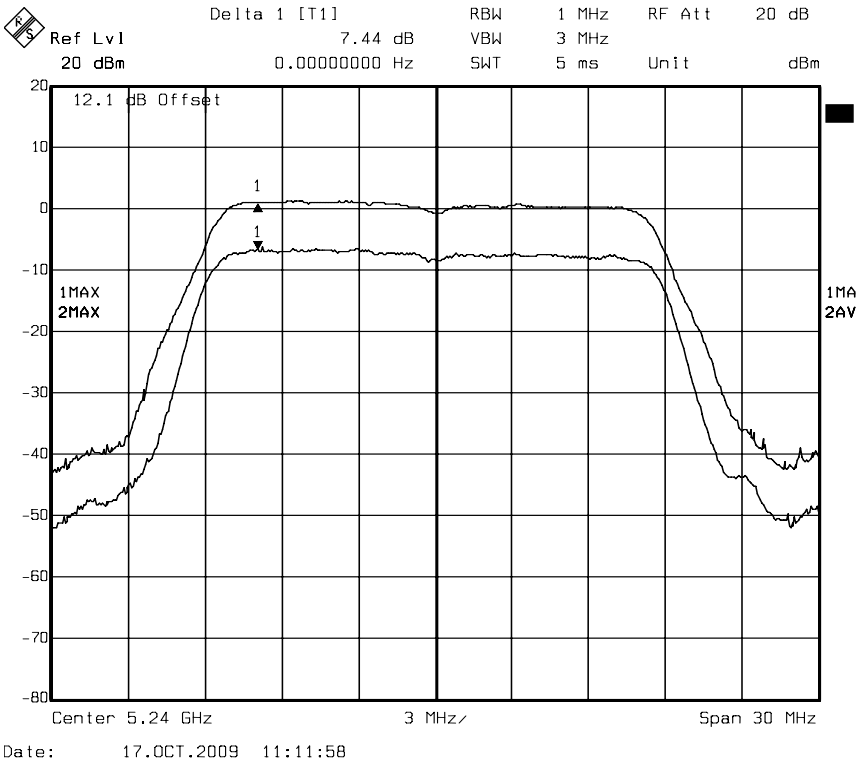
CH Low



CH Mid

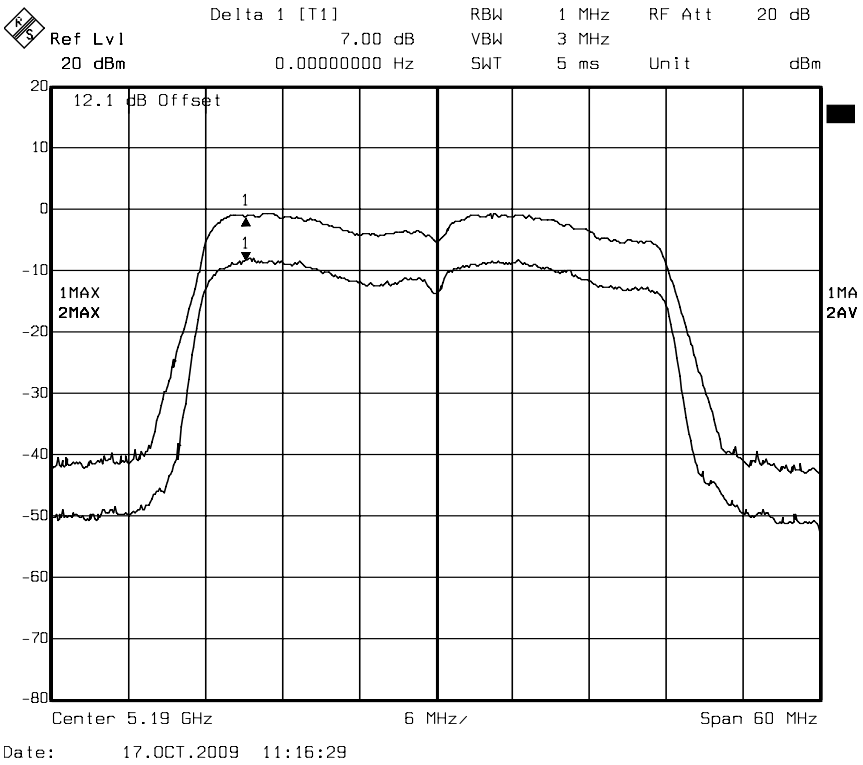


CH High

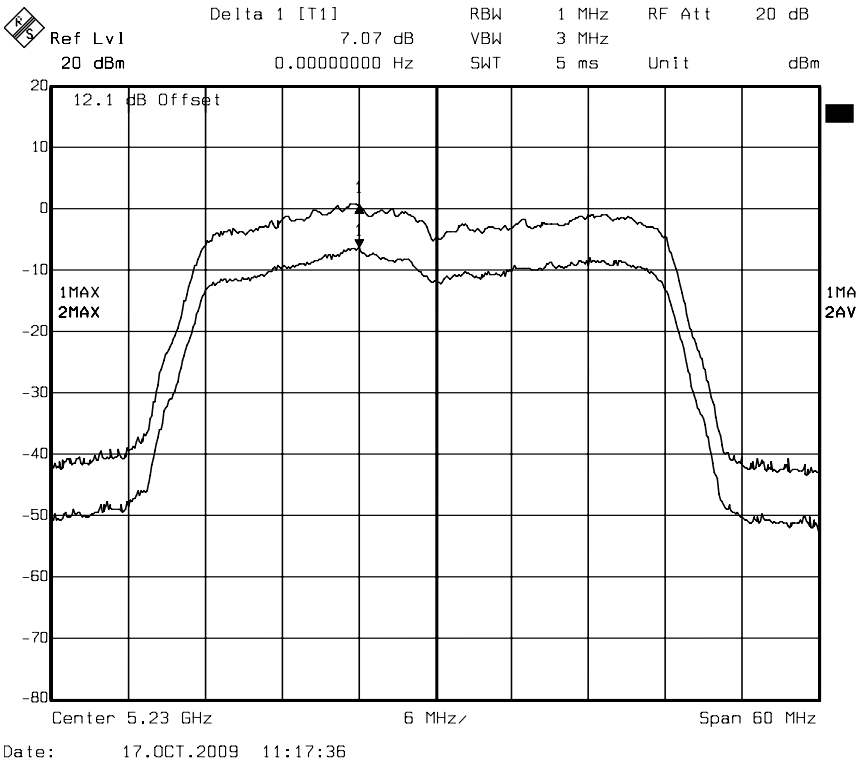


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

CH Low

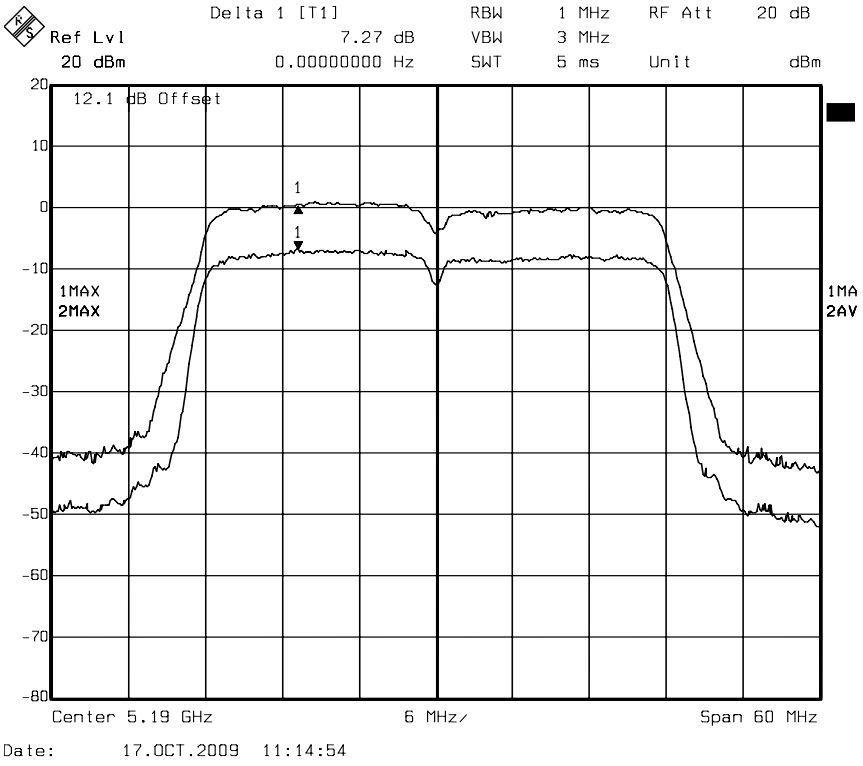


CH High

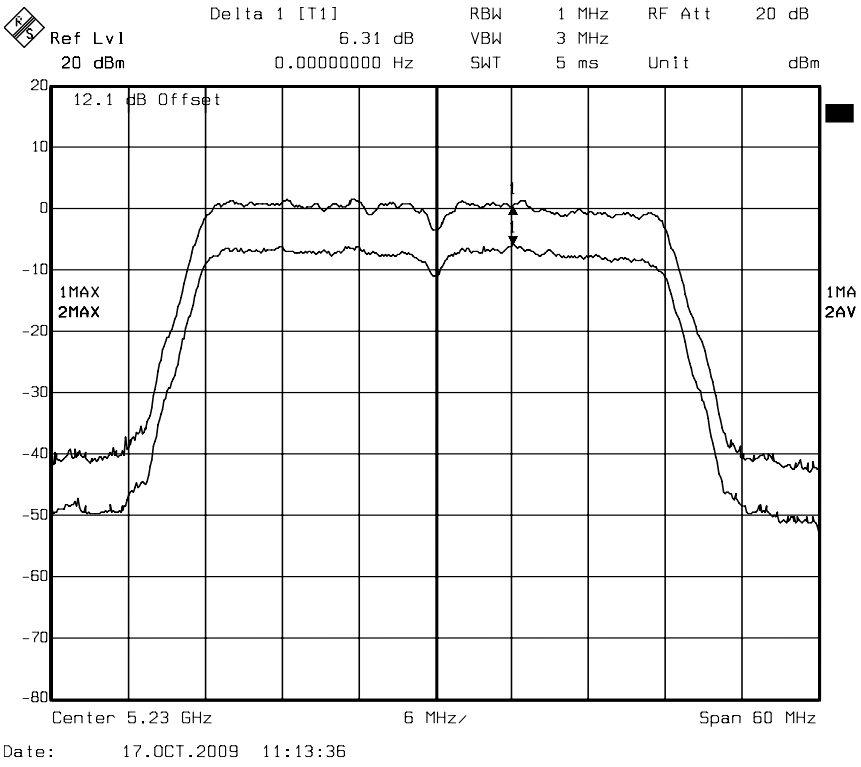


draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

CH Low



CH High


Delta 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
6.31 dB
VBW 3 MHz
20 dBm
0.00000000 Hz
SWT 5 ms
Unit dBm
12.1 dB Offset
1MAX
2MAX
1MA
2AV
Center 5.23 GHz
6 MHz/
Span 60 MHz
Date: 17.OCT.2009 11:13:36

7.6 RADIATED UNDESIRABLE EMISSION

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)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

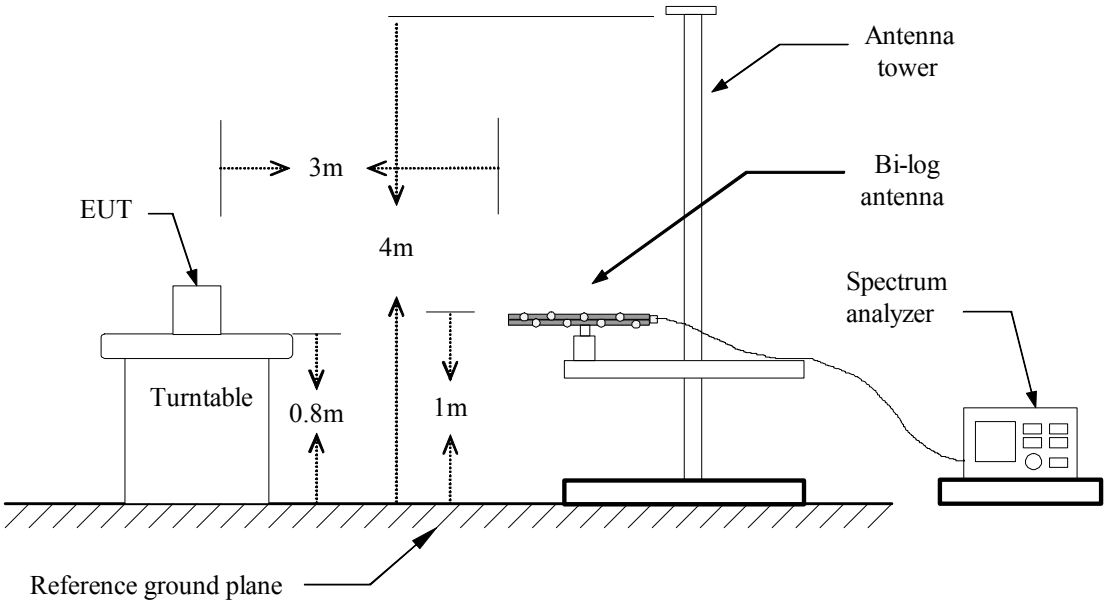
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

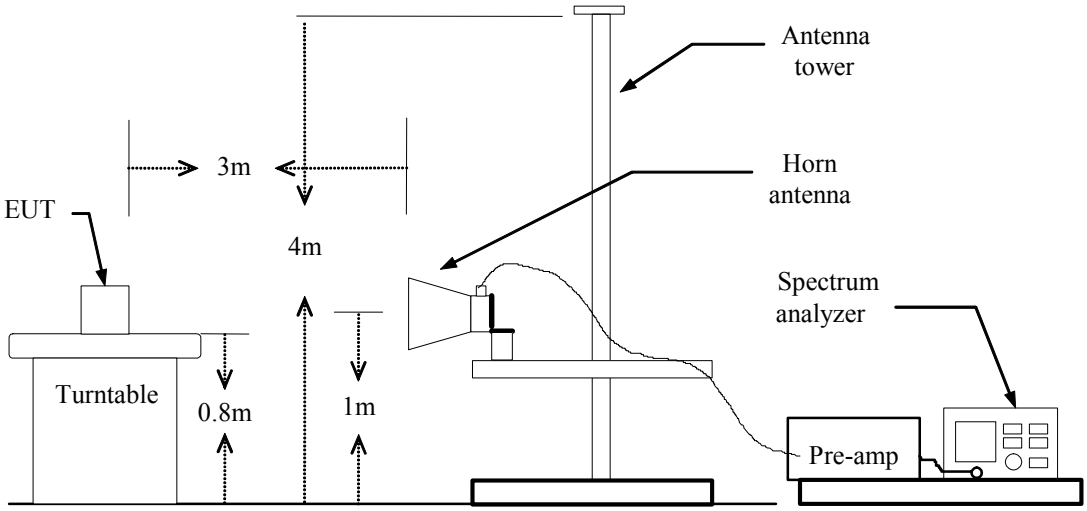
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



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 1GHz:

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

   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Link **Test Date:** October 20, 2009

Temperature: 27.5°C **Tested by:** Eric Yang

Humidity: 49% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
81.85	V	21.40	9.53	30.93	40.00	-9.07	QP
125.00	V	21.80	15.79	37.59	43.50	-5.91	QP
233.35	V	23.10	14.85	37.95	46.00	-8.05	QP
400.00	V	20.70	19.96	40.66	46.00	-5.34	QP
500.00	V	17.50	22.50	40.00	46.00	-6.00	QP
625.00	V	16.40	24.91	41.31	46.00	-4.69	QP
699.01	V	16.80	26.07	42.87	46.00	-3.13	QP
800.00	V	15.70	27.73	43.43	46.00	-2.57	QP
933.32	V	13.90	30.01	43.91	46.00	-2.09	QP
63.84	H	17.20	9.20	26.40	40.00	-13.60	QP
233.32	H	22.40	14.85	37.25	46.00	-8.75	QP
400.00	H	21.70	19.96	41.66	46.00	-4.34	QP
500.00	H	18.60	22.50	41.10	46.00	-4.90	QP
625.00	H	15.20	24.91	40.11	46.00	-5.90	QP
800.00	H	12.80	27.73	40.53	46.00	-5.47	QP
875.00	H	15.30	28.77	44.07	46.00	-1.94	QP
933.34	H	14.70	30.01	44.71	46.00	-1.29	QP
1000.00	H	20.30	30.74	51.04	54.00	-2.96	QP

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
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

Operation Mode: Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH Low **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.98	62.14	26.07	1.94	39.68	0.76	51.23	74.00	-22.77	P
*	1374.98	55.78	26.07	1.94	39.68	0.76	44.87	54.00	-9.13	A
	2071.96	51.22	30.26	2.33	40.06	1.08	44.82	74.00	-29.18	P
	2071.96	46.72	30.26	2.33	40.06	1.08	40.32	54.00	-13.68	A
*	4144.05	53.74	31.25	3.42	40.71	0.60	48.29	74.00	-25.71	P
*	4144.05	50.28	31.25	3.42	40.71	0.60	44.83	54.00	-9.17	A
	10357.25	47.55	39.24	6.04	37.29	0.54	56.09	74.00	-17.91	P
	10357.25	37.26	39.24	6.04	37.29	0.54	45.80	54.00	-8.20	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH Low	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.96	64.22	26.07	1.94	39.68	0.76	53.31	74.00	-20.69	P
*	1374.96	58.24	26.07	1.94	39.68	0.76	47.33	54.00	-6.67	A
	2071.94	53.32	30.26	2.33	40.06	1.08	46.92	74.00	-27.08	P
	2071.94	48.44	30.26	2.33	40.06	1.08	42.04	54.00	-11.96	A
*	4144.03	55.62	31.25	3.42	40.71	0.60	50.17	74.00	-23.83	P
*	4144.03	52.01	31.25	3.42	40.71	0.60	46.56	54.00	-7.44	A
	10357.24	48.22	39.24	6.04	37.29	0.54	56.76	74.00	-17.24	P
	10357.24	38.25	39.24	6.04	37.29	0.54	46.79	54.00	-7.21	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH Mid	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.01	61.45	26.08	1.94	39.69	0.77	50.55	74.00	-23.45	P
*	1375.01	55.33	26.08	1.94	39.69	0.77	44.43	54.00	-9.57	A
	2087.95	51.11	30.25	2.33	40.05	1.08	44.72	74.00	-29.28	P
	2087.95	46.37	30.25	2.33	40.05	1.08	39.98	54.00	-14.02	A
*	4175.98	53.45	31.32	3.43	40.73	0.60	48.07	74.00	-25.93	P
*	4175.98	50.22	31.32	3.43	40.73	0.60	44.84	54.00	-9.16	A
	10437.62	47.55	39.28	6.10	37.18	0.58	56.32	74.00	-17.68	P
	10437.62	37.19	39.28	6.10	37.18	0.58	45.96	54.00	-8.04	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH Mid	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.02	63.75	26.08	1.94	39.69	0.77	52.85	74.00	-21.15	P
*	1375.02	56.87	26.08	1.94	39.69	0.77	45.97	54.00	-8.03	A
	2087.94	52.51	30.25	2.33	40.05	1.08	46.12	74.00	-27.88	P
	2087.94	47.84	30.25	2.33	40.05	1.08	41.45	54.00	-12.55	A
*	4176.01	55.34	31.32	3.43	40.73	0.60	49.96	74.00	-24.04	P
*	4176.01	51.43	31.32	3.43	40.73	0.60	46.05	54.00	-7.95	A
	10437.58	48.52	39.28	6.10	37.18	0.58	57.29	74.00	-16.71	P
	10437.58	38.26	39.28	6.10	37.18	0.58	47.03	54.00	-6.97	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode: Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.03	62.11	26.08	1.94	39.69	0.77	51.21	74.00	-22.79	P
*	1375.03	55.87	26.08	1.94	39.69	0.77	44.97	54.00	-9.03	A
	2095.94	51.11	30.24	2.33	40.04	1.09	44.73	74.00	-29.27	P
	2095.94	46.35	30.24	2.33	40.04	1.09	39.97	54.00	-14.03	A
*	4191.94	52.75	31.36	3.44	40.73	0.59	47.41	74.00	-26.59	P
*	4191.94	48.55	31.36	3.44	40.73	0.59	43.21	54.00	-10.79	A
	10481.24	47.11	39.29	6.13	37.12	0.59	56.01	74.00	-17.99	P
	10481.24	37.25	39.29	6.13	37.12	0.59	46.15	54.00	-7.85	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Operation Mode: Tx / IEEE 802.11a mode / 5180 ~ 5240MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.02	63.54	26.08	1.94	39.69	0.77	52.64	74.00	-21.36	P
*	1375.02	57.44	26.08	1.94	39.69	0.77	46.54	54.00	-7.46	A
	2095.96	52.87	30.24	2.33	40.04	1.09	46.49	74.00	-27.51	P
	2095.96	47.67	30.24	2.33	40.04	1.09	41.29	54.00	-12.71	A
*	4191.95	54.58	31.36	3.44	40.73	0.59	49.24	74.00	-24.76	P
*	4191.95	50.24	31.36	3.44	40.73	0.59	44.90	54.00	-9.10	A
	10483.22	47.87	39.29	6.13	37.11	0.59	56.77	74.00	-17.23	P
	10483.22	37.55	39.29	6.13	37.11	0.59	46.45	54.00	-7.55	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH Low	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.96	57.35	26.07	1.94	39.68	0.76	46.44	74.00	-27.56	P
*	1374.96	51.44	26.07	1.94	39.68	0.76	40.53	54.00	-13.47	A
	2071.95	52.22	30.26	2.33	40.06	1.08	45.82	74.00	-28.18	P
	2071.95	47.58	30.26	2.33	40.06	1.08	41.18	54.00	-12.82	A
*	4143.96	56.22	31.25	3.42	40.71	0.60	50.77	74.00	-23.23	P
*	4143.96	53.42	31.25	3.42	40.71	0.60	47.97	54.00	-6.03	A
	10362.27	47.85	39.24	6.04	37.28	0.54	56.40	74.00	-17.60	P
	10362.27	37.99	39.24	6.04	37.28	0.54	46.54	54.00	-7.46	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH Low	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.95	63.25	26.07	1.94	39.68	0.76	52.34	74.00	-21.66	P
*	1374.95	57.24	26.07	1.94	39.68	0.76	46.33	54.00	-7.67	A
	2071.93	54.77	30.26	2.33	40.06	1.08	48.37	74.00	-25.63	P
	2071.93	49.11	30.26	2.33	40.06	1.08	42.71	54.00	-11.29	A
*	4143.95	58.08	31.25	3.42	40.71	0.60	52.63	74.00	-21.37	P
*	4143.95	55.72	31.25	3.42	40.71	0.60	50.27	54.00	-3.73	A
	10362.24	49.24	39.24	6.04	37.28	0.54	57.79	74.00	-16.21	P
	10362.24	39.85	39.24	6.04	37.28	0.54	48.40	54.00	-5.60	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH Mid	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.02	51.22	26.08	1.94	39.69	0.77	40.32	74.00	-33.68	P
*	1375.02	54.36	26.08	1.94	39.69	0.77	43.46	54.00	-10.54	A
	2087.91	51.22	30.25	2.33	40.05	1.08	44.83	74.00	-29.17	P
	2087.91	45.83	30.25	2.33	40.05	1.08	39.44	54.00	-14.56	A
*	4175.96	56.24	31.32	3.43	40.73	0.60	50.86	74.00	-23.14	P
*	4175.96	53.27	31.32	3.43	40.73	0.60	47.89	54.00	-6.11	A
	10442.19	47.35	39.28	6.10	37.17	0.58	56.13	74.00	-17.87	P
	10442.19	37.11	39.28	6.10	37.17	0.58	45.89	54.00	-8.11	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH Mid	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.99	63.25	26.07	1.94	39.68	0.76	52.34	74.00	-21.66	P
*	1374.99	57.41	26.07	1.94	39.68	0.76	46.50	54.00	-7.50	A
	2087.90	52.80	30.25	2.33	40.05	1.08	46.41	74.00	-27.59	P
	2087.90	46.96	30.25	2.33	40.05	1.08	40.57	54.00	-13.43	A
*	4175.98	58.16	31.32	3.43	40.73	0.60	52.78	74.00	-21.22	P
*	4175.98	55.75	31.32	3.43	40.73	0.60	50.37	54.00	-3.63	A
	10442.17	48.96	39.28	6.10	37.17	0.58	57.74	74.00	-16.26	P
	10442.17	38.52	39.28	6.10	37.17	0.58	47.30	54.00	-6.70	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode: Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.98	62.14	26.07	1.94	39.68	0.76	51.23	74.00	-22.77	P
*	1374.98	55.87	26.07	1.94	39.68	0.76	44.96	54.00	-9.04	A
	2095.99	51.46	30.24	2.33	40.04	1.09	45.08	74.00	-28.92	P
	2095.99	45.72	30.24	2.33	40.04	1.09	39.34	54.00	-14.66	A
*	4191.96	56.84	31.36	3.44	40.73	0.59	51.50	74.00	-22.50	P
*	4191.96	53.42	31.36	3.44	40.73	0.59	48.08	54.00	-5.92	A
	10484.18	47.22	39.29	6.13	37.11	0.59	56.12	74.00	-17.88	P
	10484.18	37.15	39.29	6.13	37.11	0.59	46.05	54.00	-7.95	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Operation Mode: Tx / draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.01	63.22	26.08	1.94	39.69	0.77	52.32	74.00	-21.68	P
*	1375.01	57.84	26.08	1.94	39.69	0.77	46.94	54.00	-7.06	A
	2095.98	53.37	30.24	2.33	40.04	1.09	46.99	74.00	-27.01	P
	2095.98	47.58	30.24	2.33	40.04	1.09	41.20	54.00	-12.80	A
*	4191.98	58.57	31.36	3.44	40.73	0.59	53.23	74.00	-20.77	P
*	4191.98	55.32	31.36	3.44	40.73	0.59	49.98	54.00	-4.02	A
	10484.22	48.57	39.29	6.13	37.11	0.59	57.47	74.00	-16.53	P
	10484.22	38.66	39.29	6.13	37.11	0.59	47.56	54.00	-6.44	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Operation Mode:	Tx / draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / CH Low	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.99	49.87	26.07	1.94	39.68	0.76	38.96	74.00	-35.04	P
*	1374.99	54.22	26.07	1.94	39.68	0.76	43.31	54.00	-10.69	A
	2075.98	51.22	30.25	2.33	40.06	1.08	44.82	74.00	-29.18	P
	2075.98	46.35	30.25	2.33	40.06	1.08	39.95	54.00	-14.05	A
*	4152.03	55.22	31.26	3.43	40.72	0.60	49.79	74.00	-24.21	P
*	4152.03	53.67	31.26	3.43	40.72	0.60	48.24	54.00	-5.76	A
	10382.19	47.66	39.25	6.06	37.25	0.55	56.27	74.00	-17.73	P
	10382.19	37.25	39.25	6.06	37.25	0.55	45.86	54.00	-8.14	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode:	Tx / draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / CH Low	**Test Date:**	August 25, 2009
Temperature:	28.1°C	**Tested by:**	Eric Yang
Humidity:	52% RH	**Polarity:**	Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.98	62.25	26.07	1.94	39.68	0.76	51.34	74.00	-22.66	P
*	1374.98	56.17	26.07	1.94	39.68	0.76	45.26	54.00	-8.74	A
	2075.95	53.43	30.25	2.33	40.06	1.08	47.03	74.00	-26.97	P
	2075.95	48.93	30.25	2.33	40.06	1.08	42.53	54.00	-11.47	A
*	4152.02	57.64	31.26	3.43	40.72	0.60	52.21	74.00	-21.79	P
*	4152.02	55.33	31.26	3.43	40.72	0.60	49.90	54.00	-4.10	A
	10382.16	48.25	39.25	6.06	37.25	0.55	56.86	74.00	-17.14	P
	10382.16	38.75	39.25	6.06	37.25	0.55	47.36	54.00	-6.64	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode: Tx / draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Hor.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1375.01	60.28	26.08	1.94	39.69	0.77	49.38	74.00	-24.62	P
*	1375.01	53.44	26.08	1.94	39.69	0.77	42.54	54.00	-11.46	A
	2092.05	51.22	30.24	2.33	40.05	1.09	44.84	74.00	-29.16	P
	2092.05	46.72	30.24	2.33	40.05	1.09	40.34	54.00	-13.66	A
*	4183.96	57.11	31.34	3.44	40.73	0.60	51.75	74.00	-22.25	P
*	4183.96	55.20	31.34	3.44	40.73	0.60	49.84	54.00	-4.16	A
	10462.35	47.55	39.28	6.11	37.14	0.58	56.39	74.00	-17.61	P
	10462.35	36.98	39.28	6.11	37.14	0.58	45.82	54.00	-8.18	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Operation Mode: Tx / draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / CH High **Test Date:** August 25, 2009

Temperature: 28.1°C **Tested by:** Eric Yang

Humidity: 52% RH **Polarity:** Ver.

	Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1374.97	63.11	26.07	1.94	39.68	0.76	52.20	74.00	-21.80	P
*	1374.97	56.84	26.07	1.94	39.68	0.76	45.93	54.00	-8.07	A
	2092.04	53.69	30.24	2.33	40.05	1.09	47.31	74.00	-26.69	P
	2092.04	48.16	30.24	2.33	40.05	1.09	41.78	54.00	-12.22	A
*	4183.95	59.55	31.34	3.44	40.73	0.60	54.19	74.00	-19.81	P
*	4183.95	57.20	31.34	3.44	40.73	0.60	51.84	54.00	-2.16	A
	10462.11	48.75	39.28	6.11	37.14	0.58	57.59	74.00	-16.41	P
	10462.11	37.98	39.28	6.11	37.14	0.58	46.82	54.00	-7.18	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).
7. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.7 POWERLINE CONDUCTED EMISSIONS

LIMIT

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 μH/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)	
	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.

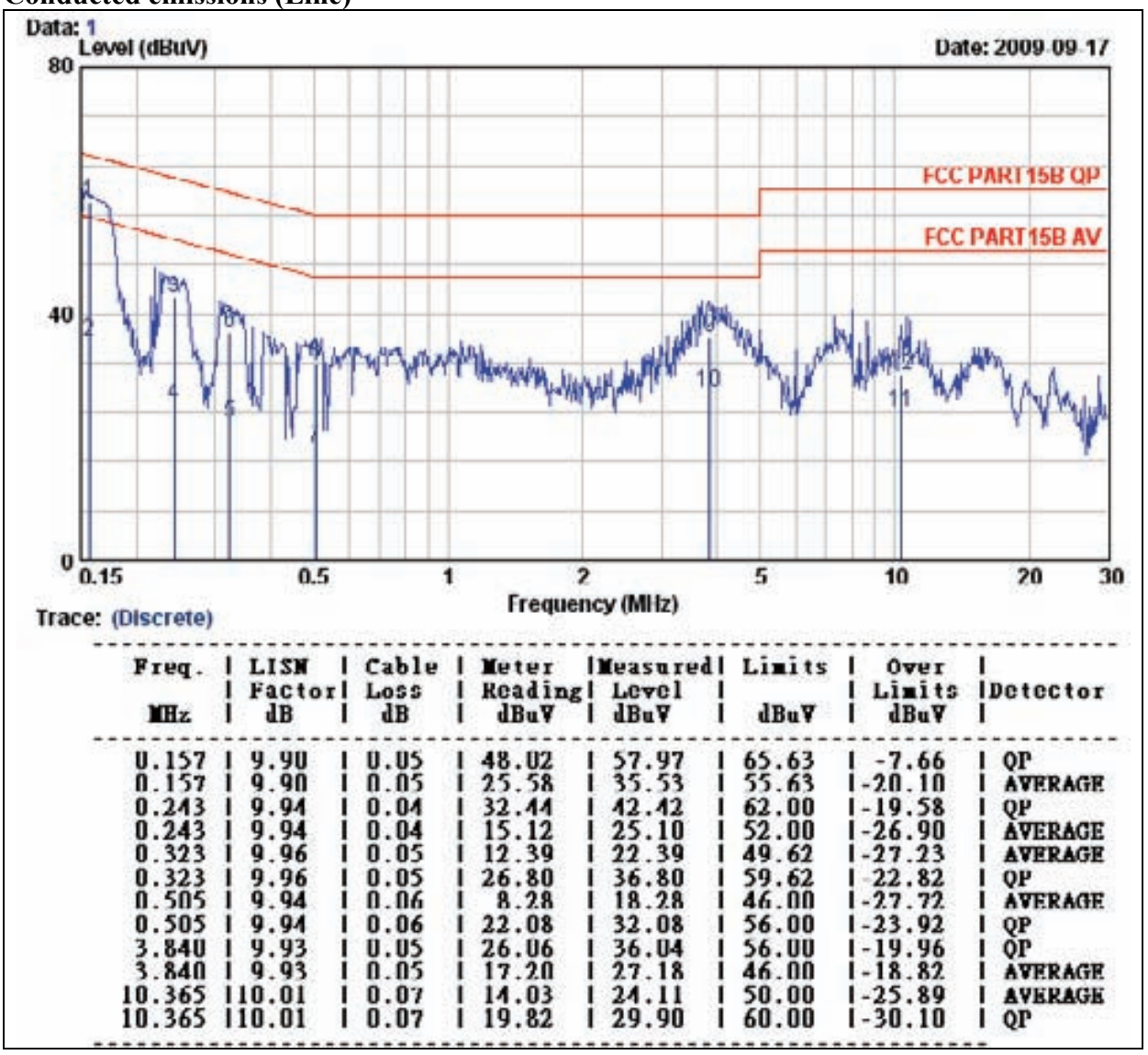
TEST RESULTS

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:	TX + RX mode	**Test Date:**	September 17, 2009
Temperature:	26°C	**Humidity:**	50% RH
Tested by:	Taiyu Cyu	**Test Mode**	Normal Link

Conducted emissions (Line)



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.157	9.90	0.05	48.02	57.97	65.63	-7.66	QP
0.157	9.90	0.05	25.58	35.53	55.63	-20.10	AVERAGE
0.243	9.94	0.04	32.44	42.42	62.00	-19.58	QP
0.243	9.94	0.04	15.12	25.10	52.00	-26.90	AVERAGE
0.323	9.96	0.05	12.39	22.39	49.62	-27.23	AVERAGE
0.323	9.96	0.05	26.80	36.80	59.62	-22.82	QP
0.505	9.94	0.06	8.28	18.28	46.00	-27.72	AVERAGE
0.505	9.94	0.06	22.08	32.08	56.00	-23.92	QP
3.840	9.93	0.05	26.06	36.04	56.00	-19.96	QP
3.840	9.93	0.05	17.20	27.18	46.00	-18.82	AVERAGE
10.365	10.01	0.07	14.03	24.11	50.00	-25.89	AVERAGE
10.365	10.01	0.07	19.82	29.90	60.00	-30.10	QP

Remark:

1 Measuring frequencies from 0.15 MHz to 30MHz.

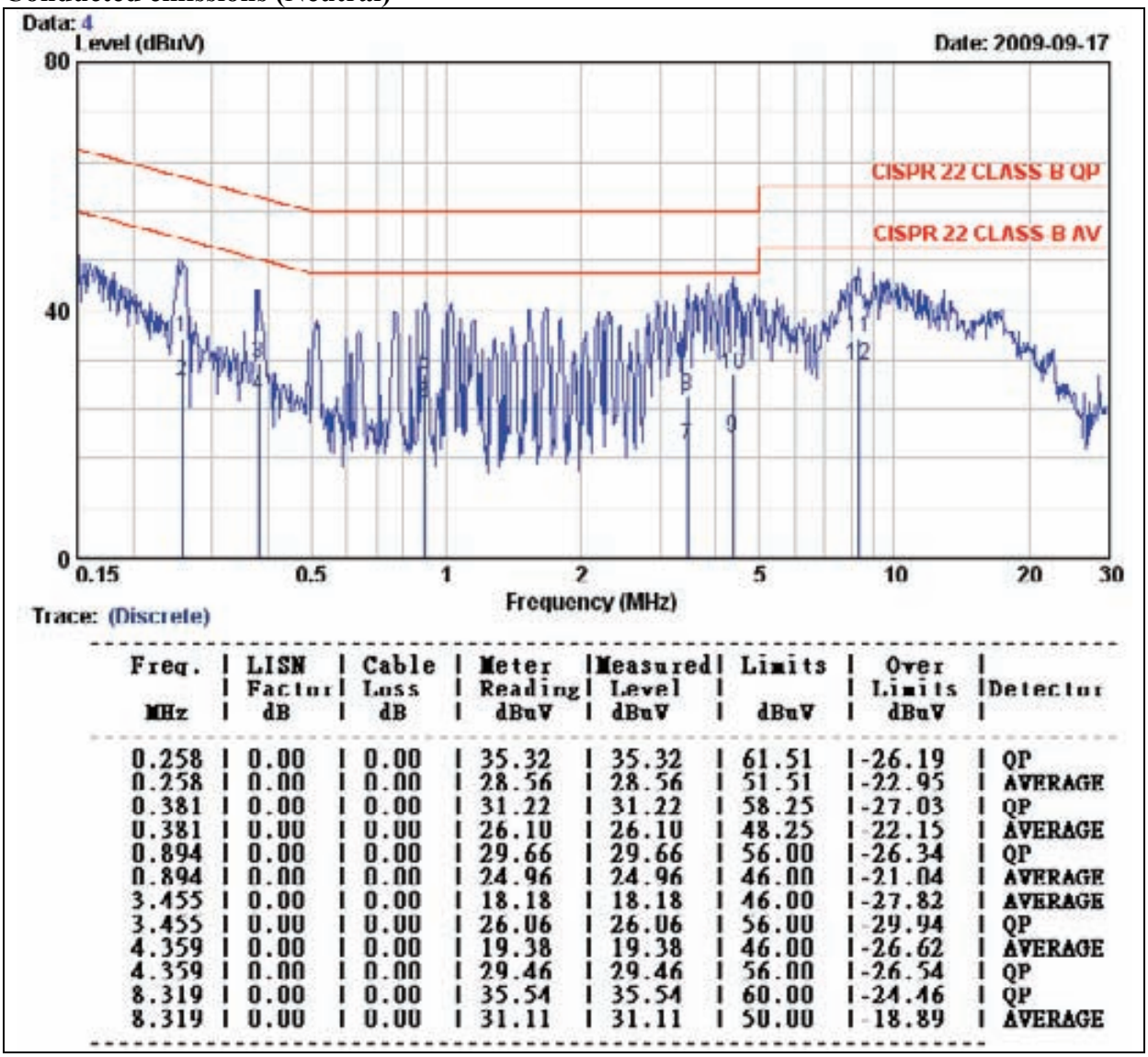
2 The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.

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 a. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
b.Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

Operation Mode:	TX + RX mode	**Test Date:**	September 17, 2009
Temperature:	26°C	**Humidity:**	50% RH
Tested by:	Taiyu Cyu	**Test Mode**	Normal Link

Conducted emissions (Neutral)



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.258	0.00	0.00	35.32	35.32	61.51	-26.19	QP
0.258	0.00	0.00	28.56	28.56	51.51	-22.95	AVERAGE
0.381	0.00	0.00	31.22	31.22	58.25	-27.03	QP
0.381	0.00	0.00	26.10	26.10	48.25	-22.15	AVERAGE
0.894	0.00	0.00	29.66	29.66	56.00	-26.34	QP
0.894	0.00	0.00	24.96	24.96	46.00	-21.04	AVERAGE
3.455	0.00	0.00	18.18	18.18	46.00	-27.82	AVERAGE
3.455	0.00	0.00	26.06	26.06	56.00	-29.94	QP
4.359	0.00	0.00	19.38	19.38	46.00	-26.62	AVERAGE
4.359	0.00	0.00	29.46	29.46	56.00	-26.54	QP
8.319	0.00	0.00	35.54	35.54	60.00	-24.46	QP
8.319	0.00	0.00	31.11	31.11	50.00	-18.89	AVERAGE

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;

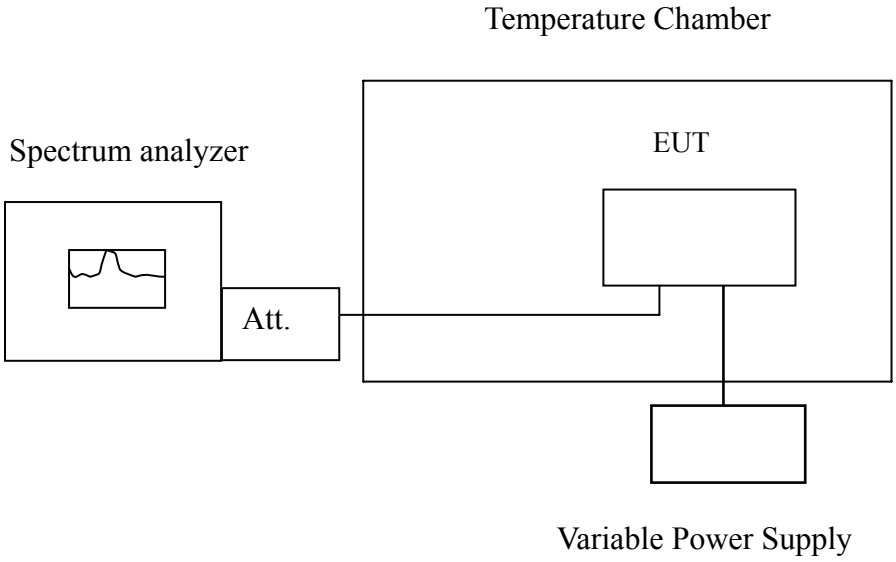
4 a. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
b.Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

7.8 FREQUENCY STABILITY

LIMIT

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST RESULTS

No non-compliance noted.

IEEE 802.11a mode / 5180 ~ 5240 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5180.025487	5150~5250	Pass
40	110	5180.019536	5150~5250	Pass
30	110	5179.990524	5150~5250	Pass
20	110	5179.997435	5150~5250	Pass
10	110	5180.016352	5150~5250	Pass
0	110	5179.995242	5150~5250	Pass
-10	110	5180.021364	5150~5250	Pass
-20	110	5179.992543	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5180.012187	5150~5250	Pass
	110	5179.997435	5150~5250	Pass
	121	5179.993514	5150~5250	Pass

CH High

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5240.017243	5150~5250	Pass
40	110	5240.015147	5150~5250	Pass
30	110	5239.982753	5150~5250	Pass
20	110	5240.016472	5150~5250	Pass
10	110	5239.984622	5150~5250	Pass
0	110	5239.991357	5150~5250	Pass
-10	110	5240.014162	5150~5250	Pass
-20	110	5239.993214	5150~5250	Pass

Operating Frequency: 5240 MHz,				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5239.982149	5150~5250	Pass
	110	5240.016472	5150~5250	Pass
	121	5240.024361	5150~5250	Pass

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5180.021434	5150~5250	Pass
40	110	5180.014395	5150~5250	Pass
30	110	5180.019734	5150~5250	Pass
20	110	5179.986532	5150~5250	Pass
10	110	5179.994512	5150~5250	Pass
0	110	5180.004219	5150~5250	Pass
-10	110	5179.975211	5150~5250	Pass
-20	110	5180.031367	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5180.014276	5150~5250	Pass
	110	5179.986532	5150~5250	Pass
	121	5179.993425	5150~5250	Pass

CH High

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5240.034215	5150~5250	Pass
40	110	5239.987436	5150~5250	Pass
30	110	5240.024651	5150~5250	Pass
20	110	5239.997351	5150~5250	Pass
10	110	5239.986527	5150~5250	Pass
0	110	5240.035246	5150~5250	Pass
-10	110	5240.014627	5150~5250	Pass
-20	110	5239.984621	5150~5250	Pass

Operating Frequency: 5240 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5239.984657	5150~5250	Pass
	110	5239.997351	5150~5250	Pass
	121	5240.016354	5150~5250	Pass

draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230 MHz:

CH Low

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5190.014172	5150~5250	Pass
40	110	5189.993541	5150~5250	Pass
30	110	5190.024514	5150~5250	Pass
20	110	5189.982535	5150~5250	Pass
10	110	5190.027135	5150~5250	Pass
0	110	5189.987421	5150~5250	Pass
-10	110	5189.992691	5150~5250	Pass
-20	110	5190.032514	5150~5250	Pass

Operating Frequency: 5190 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5189.973521	5150~5250	Pass
	110	5189.982535	5150~5250	Pass
	121	5190.043527	5150~5250	Pass

CH High

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5230.014136	5150~5250	Pass
40	110	5230.024367	5150~5250	Pass
30	110	5229.976242	5150~5250	Pass
20	110	5229.964352	5150~5250	Pass
10	110	5230.027135	5150~5250	Pass
0	110	5230.064251	5150~5250	Pass
-10	110	5229.924357	5150~5250	Pass
-20	110	5230.026149	5150~5250	Pass

Operating Frequency: 5230 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5229.912435	5150~5250	Pass
	110	5229.964352	5150~5250	Pass
	121	5230.045135	5150~5250	Pass

APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

EUT Specification

EUT	Air Tune
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.18GHz ~ 5.24GHz ☐ WLAN: 5.5GHz ~ 5.7GHz ☐ WLAN: 5.725GHz ~ 5.850GHz ☐ Bluetooth: 2.402 GHz ~ 2.482 GHz ☐ Others: _____
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others: _____
Exposure classification	General Population/Uncontrolled exposure *(S=1mW/cm^2)*
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11a mode / 5180 ~ 5240MHz: 13.90 dBm(24.547mW) draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz: 16.75 dBm(47.282mW) draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz: 16.69 dBm(46.696mW)
Antenna gain (Max)	IEEE 802.11a: 2 dBi (Numeric gain: 1.5848) IEEE 802.11b/g/n: 1.5 dBi (Numeric gain: 1.4125)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: *1. The maximum output power is 16.75dBm (47.282mW) at 5180MHz (with 1.4125 numeric antenna gain.)* *2. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*	

TEST RESULTS

No non-compliance noted.

MPE

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where *E = Field strength in Volts / meter*

P = Power in Watts
G = Numeric antenna gain
d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where *d = Distance in cm*
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm2

Maximum Permissible Exposure

EUT output power = 47.282mW

Numeric Antenna gain = 1.4125

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where *P = Power in mW*

G = Numeric antenna gain

S = Power density in mW / cm²

→ Power density = 0.01329 mW / cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)