



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Wireless USB Adapter

Model: DWL-AG132

Trade Name: D-Link

Issued to

D-Link Corporation
No.8, Li-shing Road VII, Science-based Industrial Park,
Hsinchu, Taiwan R.O.C.

Issued by

Compliance Certification Services Inc.
No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,
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1. TEST RESULT CERTIFICATION

Applicant: D-Link Corporation
No.8, Li-shing Road VII, Science-based Industrial Park,
Hsinchu, Taiwan R.O.C.

Equipment Under Test: Wireless USB Adapter

Trade Name: D-Link

Model: DWL-AG132

Date of Test: November 16 ~ 22, 2004

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 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 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:

Reviewed by:

Harris W. Lai
Executive Vice President
Compliance Certification Services Inc.

Devin Chang
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Wireless USB Adapter
Trade Name	D-Link
Model Number	DWL-AG132
Model Discrepancy	N/A
Power Supply	Powered from host device
Frequency Range	IEEE 802.11a: Base mode: 5.180~5.320 GHz Turbo mode: 5.210 GHz / 5.250 GHz / 5.290 GHz
Transmit Power	IEEE 802.11a: 16.05 dBm
Modulation Technique	IEEE 802.11a: DSSS+ OFDM
Transmit Data Rate	108, 54, 48, 36,24, 18, 11, 9, 6 5.5, 2, 1Mbps
Number of Channels	IEEE802.11a: Base mode: 8 Channels Turbo mode: 3 Channels
Antenna Specification	IEEE802.11a: Multilayer Chip Antenna / Gain: 2.0 dBi

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
1	5180
2	5200
3	5220
4	5240
5	5260
6	5280
7	5300
8	5320

Note:

1. This submittal(s) (test report) is intended for FCC ID: KA2DWLAG132B1 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.
2. The 5.2 GHz U-NII band is applicable to this report; another bands of operation (2.4 GHz) is documented in a separate report.



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 emission level, the relative positions of the EUT was rotated in each of the three orthogonal axes, 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: DWL-AG132) can work alone or with a cradle, after pretest, EUT connected with a cradle was chose as the worst configuration for final testing with the test mode listed below.

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

After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz's worst case is in normal link mode.

IEEE 802.11a Base mode: Channel 1 (5180MHz), Channel 5 (5260MHz), Channel 8 (5320MHz) and turbo mode: Channel 1 (5210MHz), Channel 2 (5250MHz), Channel 3 (5290MHz) which give the higher data rate were chosen for the final testing.



4. 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.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

- No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
- No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, 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 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (Registration no: 93105 and 90471).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	EN 55011, EN 55014-1, AS/NZS 1044, CNS 13783-1, EN 55022, CNS 13438, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, FCC OST/MP-5, AS/NZS CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11	 200600-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	4 3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328-2, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	 ELA 124a ELA 124b ELA 124c
Taiwan	CNLA	EN 300 328-1/2, EN 300 220-1/2/3, EN 300 440-1/2, EN 61000-3-2, EN 61000-3-3, 47 CFR FCC Part 15 Subpart C/D/E, EN 55013, CNS 13439, EN 55014-1, CNS 13783-1, EN 55022, CNS 13438, CISPR 22, AS/NZS 3548, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, IEEE Std 1528, FCC OET Bulletin, 65+Supplement C, EN50360, EN50361, EN50371, RSS102	 0363 ILAC MRA
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	 SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	RSS212, Issue 1	 IC 3991-3 IC 3991-4

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



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

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

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	IBM	2672(X31)	99PBTKB	FCC DoC	N/A	Unshielded, 1.8m
2.	Printer	EPSON	STYLUS C60	DR3K039633	FCC DoC	Shielded, 1.8m	Unshielded, 1.8m
3.	USB Mouse	HP	MO19UCA	20440964	FCC DoC	Shielded, 1.8m	N/A

Notes:

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.*



7. FCC PART 15 REQUIREMENTS

7.1 26 dB EMISSION BANDWIDTH

LIMIT

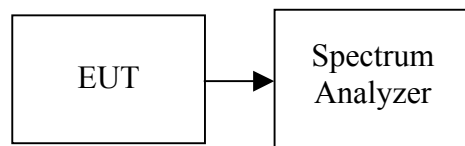
For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth 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.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2005

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

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 = 50MHz / 100MHz (Turbo Mode), and Sweep = auto.
- Or
- Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth (Base Mode) / >26dB bandwidth (Turbo Mode), 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

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	Base mode	5180
Mid		5260
High		5320
Low	Turbo mode	5210
Mid		5250
High		5290



Test Plot

IEEE 802.11a Base mode

CH 5180

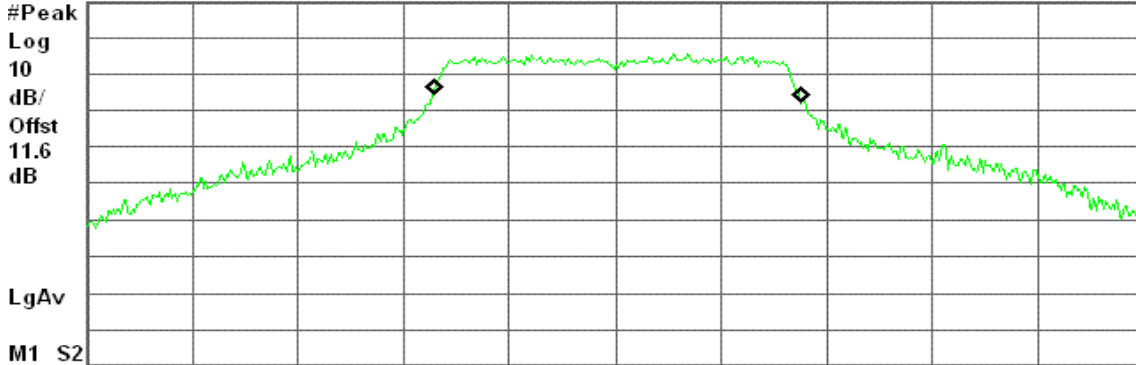
Agilent 10:45:46 Nov 16, 2004

R L

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.180 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 910 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth

17.2656 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error

112.253 kHz

x dB Bandwidth

27.971 MHz

CH 5260

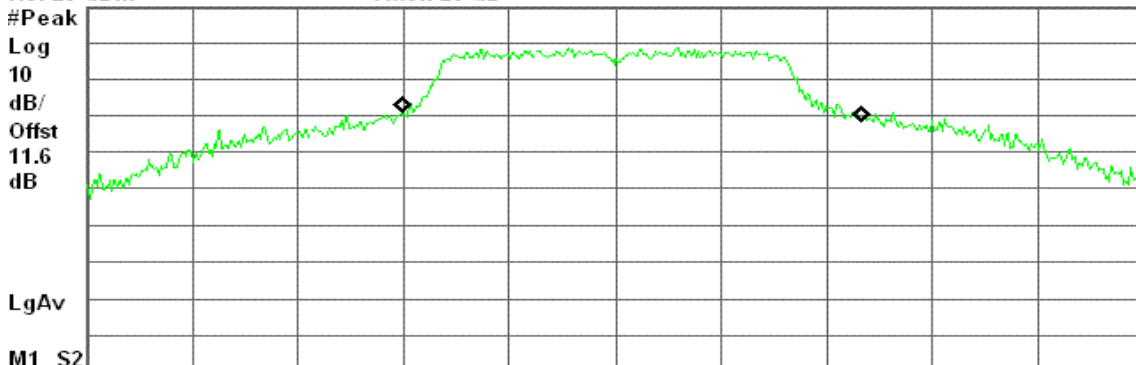
Agilent 10:50:54 Nov 16, 2004

R L

26 dB BW, a Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.260 00 GHz

Span 50 MHz

#Res BW 360 kHz

#VBW 1.1 MHz

Sweep 1 ms (601 pts)

Occupied Bandwidth

21.7682 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error

778.388 kHz

x dB Bandwidth

39.103 MHz



CH 5320

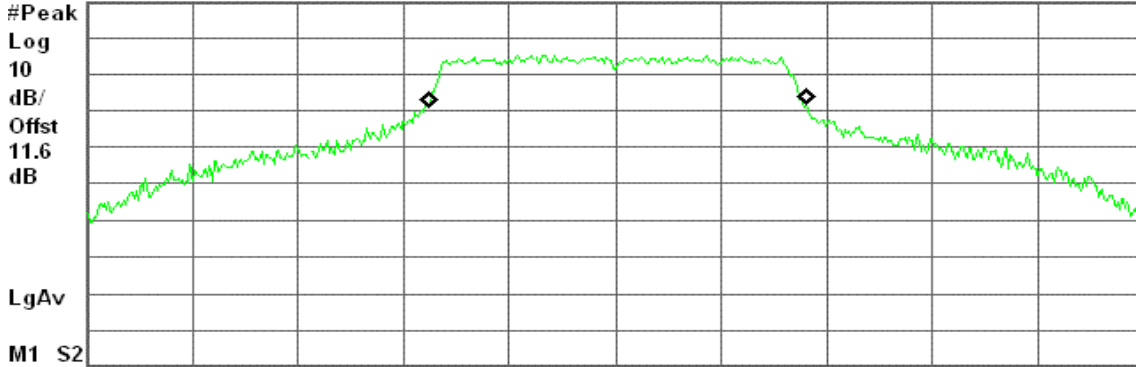
Agilent 10:55:13 Nov 16, 2004

R L

26 dB BW, a Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.320 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 910 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.7827 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 124.110 kHz
x dB Bandwidth 33.654 MHz

IEEE 802.11a Turbo mode

CH 5210

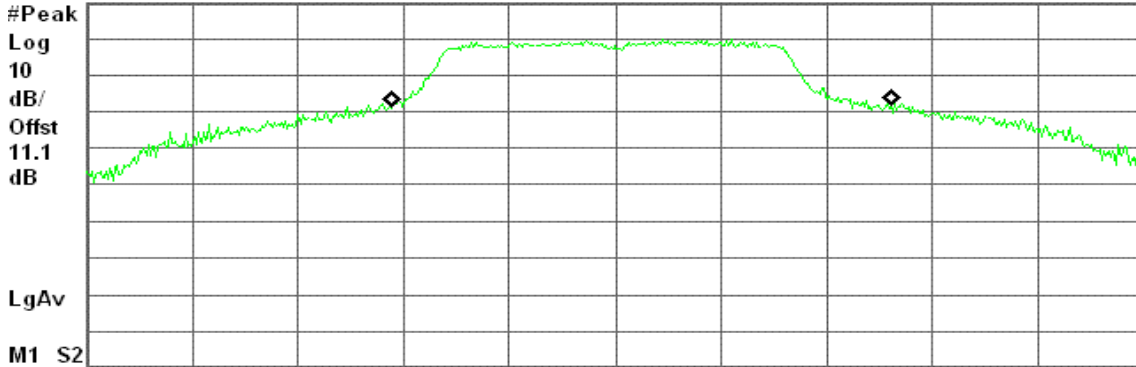
Agilent 15:35:24 Nov 19, 2004

R L

26 dB BW, a turbo Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.210 0 GHz

Span 100 MHz

#Res BW 910 kHz

#VBW 2.7 MHz

Sweep 20 ms (601 pts)

Occupied Bandwidth
47.4162 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 2.462 MHz
x dB Bandwidth 85.452 MHz



CH 5250

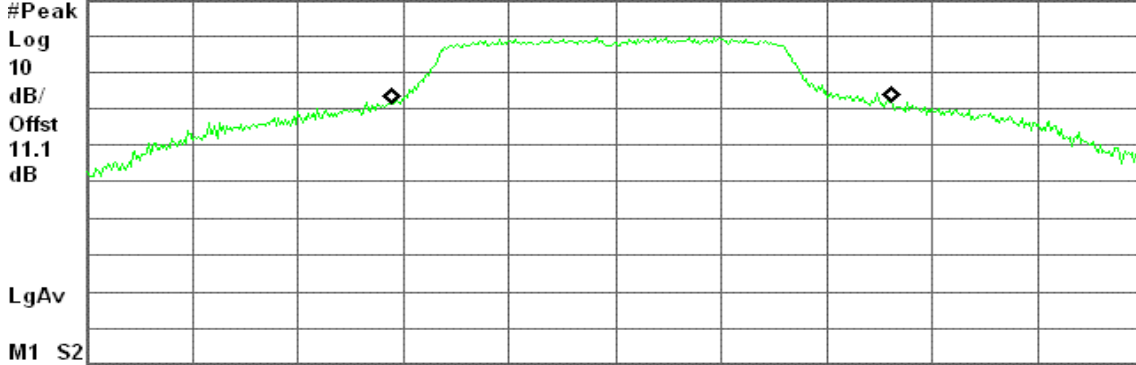
Agilent 15:38:41 Nov 19, 2004

R L

26 dB BW, a turbo Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.250 0 GHz

Span 100 MHz

#Res BW 910 kHz

#VBW 2.7 MHz

Sweep 20 ms (601 pts)

Occupied Bandwidth
47.3422 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 2.455 MHz
x dB Bandwidth 82.894 MHz

CH 5290

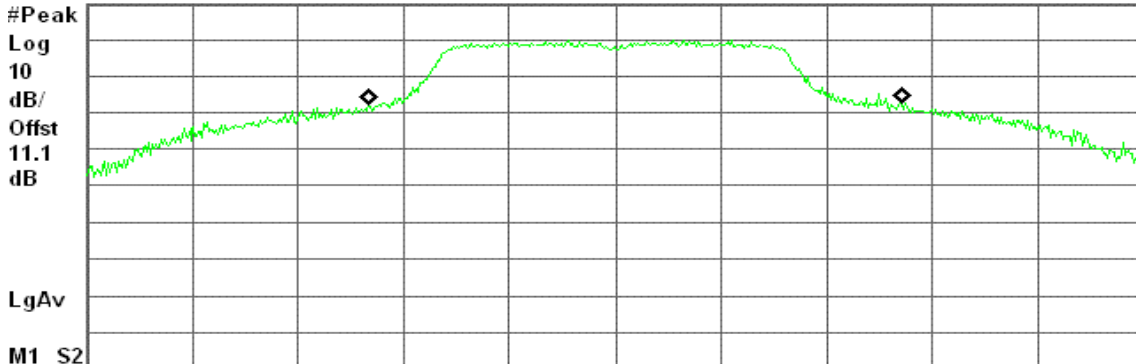
Agilent 15:40:19 Nov 19, 2004

R L

26 dB BW, a turbo Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.290 0 GHz

Span 100 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Occupied Bandwidth
50.4293 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.895 MHz
x dB Bandwidth 85.154 MHz



7.2 PEAK POWER

LIMIT

- For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50mW (17dBm) or $4\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4dBm in any 1 MHz band.
- For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250mW (24dBm) or $11\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11dBm in any 1 MHz band.
- For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1mW (30dBm) or $17\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17dBm in any 1 MHz 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. The peak power shall not exceeded the limit as follows:

Frequency (MHz)	10 Log B (dB)	Limit 4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Base mode	5180	12.37	17
	5260	13.38	24
	5320	12.50	24
Turbo mode	5210	16.76	17
	5250	16.75	17
	5290	17.03	24



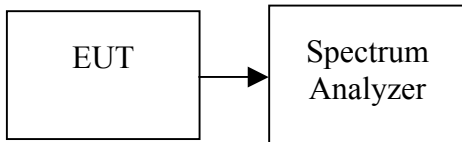
MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2005

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

Test Configuration

The EUT was connected to a spectrum analyzer through a 50 Ω 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

Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	
Low	Base mode	5180	2.80	11.60	14.40	17
Mid		5260	4.44	11.60	16.04	24
High		5320	2.94	11.60	14.54	24
Low	Turbo mode	5210	4.90	11.10	16.00	17
Mid		5250	4.61	11.10	15.71	17
High		5290	4.95	11.10	16.05	24



Test Plot

IEEE 802.11a Base mode

CH 5180

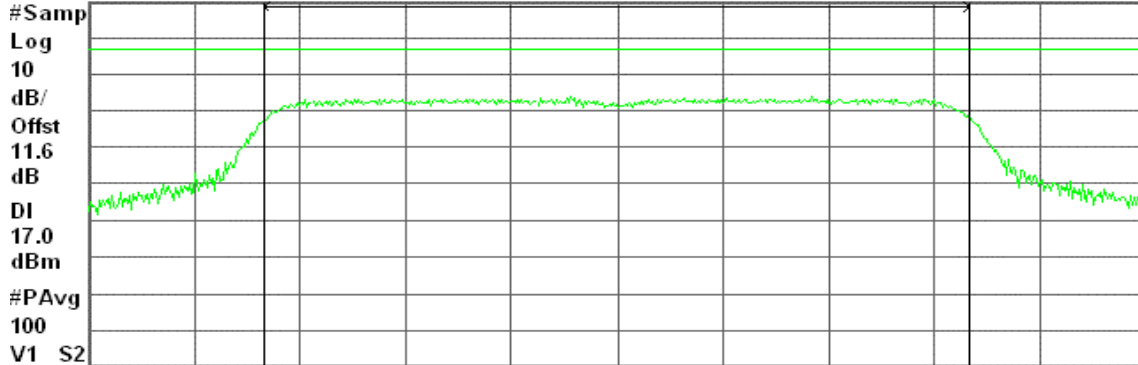
Agilent 10:46:23 Nov 16, 2004

R L

Peak Transmit Power, a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.180 00 GHz

Span 25.32 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.40 dBm / 16.8800 MHz

-57.88 dBm/Hz

CH 5260

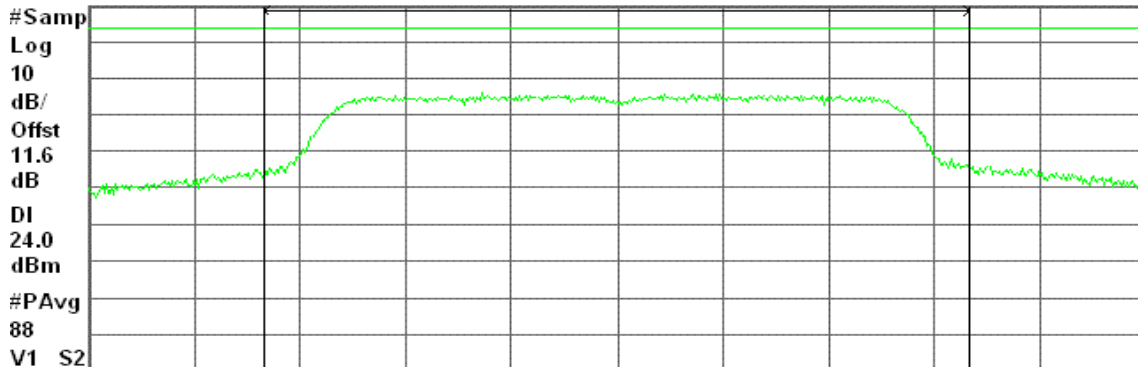
Agilent 10:51:33 Nov 16, 2004

R L

Peak Transmit Power, a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.260 00 GHz

Span 30.81 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.04 dBm / 20.5400 MHz

-57.09 dBm/Hz



CH 5320

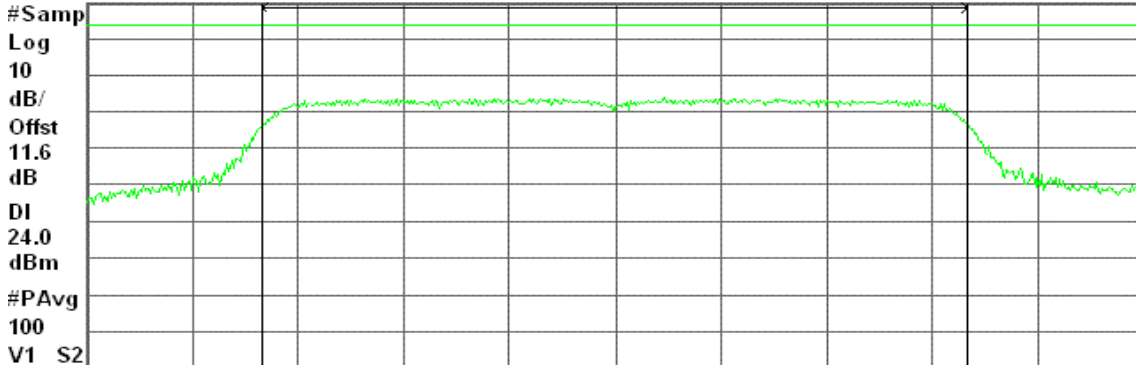
Agilent 10:55:42 Nov 16, 2004

R L

Peak Transmit Power, a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.320 00 GHz

Span 25.73 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.54 dBm / 17.1500 MHz

-57.81 dBm/Hz

IEEE 802.11a Turbo mode

CH 5210

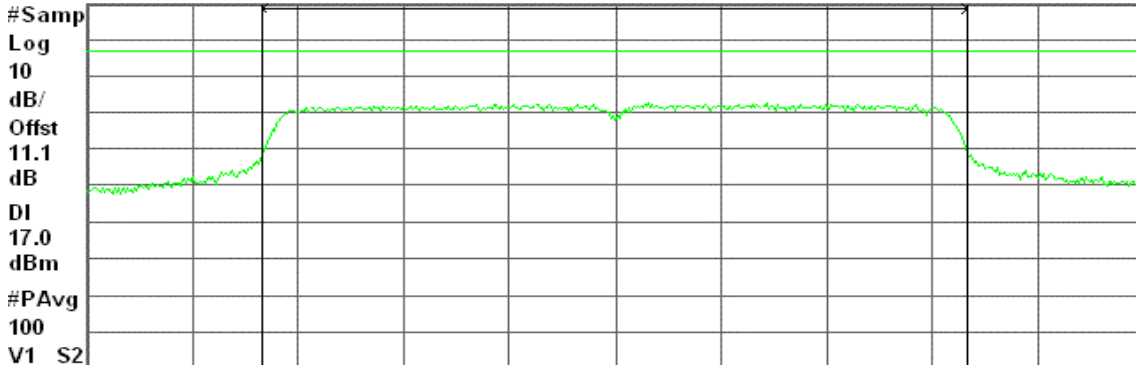
Agilent 15:12:17 Nov 19, 2004

R L

Peak Transmit Power, a turbo Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.210 00 GHz

Span 52.03 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.00 dBm / 34.6900 MHz

-59.40 dBm/Hz



CH 5250

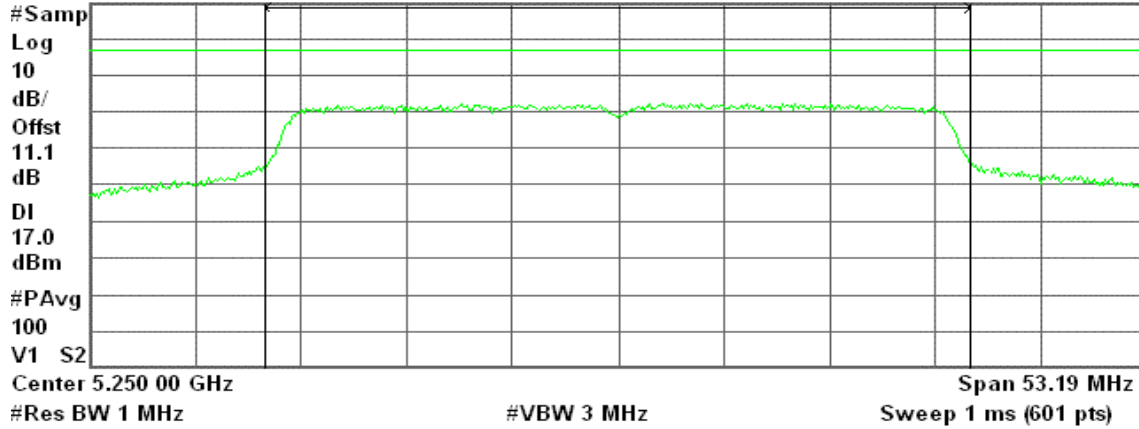
Agilent 15:17:44 Nov 19, 2004

R L

Peak Transmit Power, a turbo Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

15.71 dBm / 35.4600 MHz

Power Spectral Density

-59.78 dBm/Hz

CH 5290

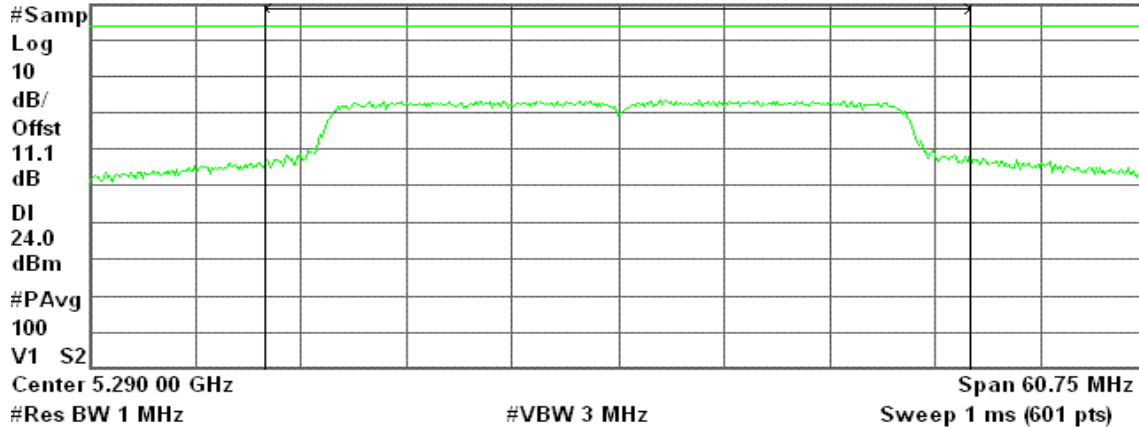
Agilent 15:24:04 Nov 19, 2004

R L

Peak Transmit Power, a turbo Mode High Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

16.05 dBm / 40.5000 MHz

Power Spectral Density

-60.02 dBm/Hz

7.3 BAND EDGES MEASUREMENT

LIMIT

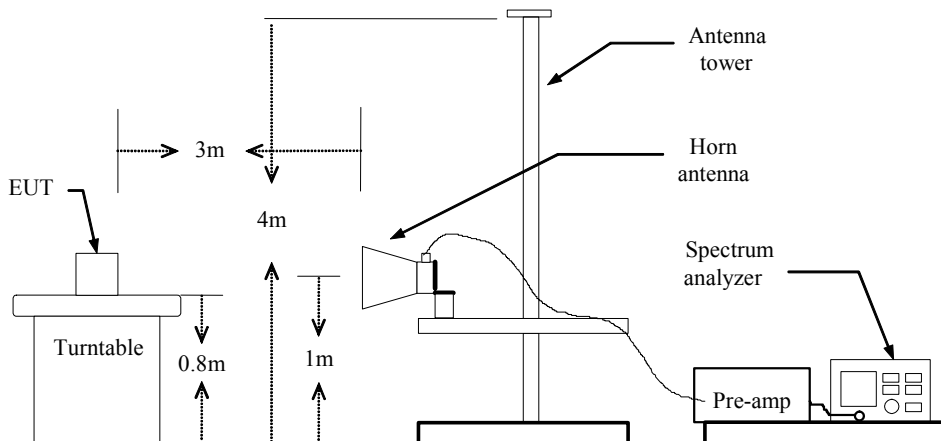
According to §15.407(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEB	8258929/011	07/13/2005
Pre-Amplifier	HP	8447D	2944A09173	03/03/2005
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R
Horn antenna	Schwarzbeck	BBHA 9120	D210	02/23/2005
Pre-Amplifier	HP	8449B	3008B00965	10/02/2005

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

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.

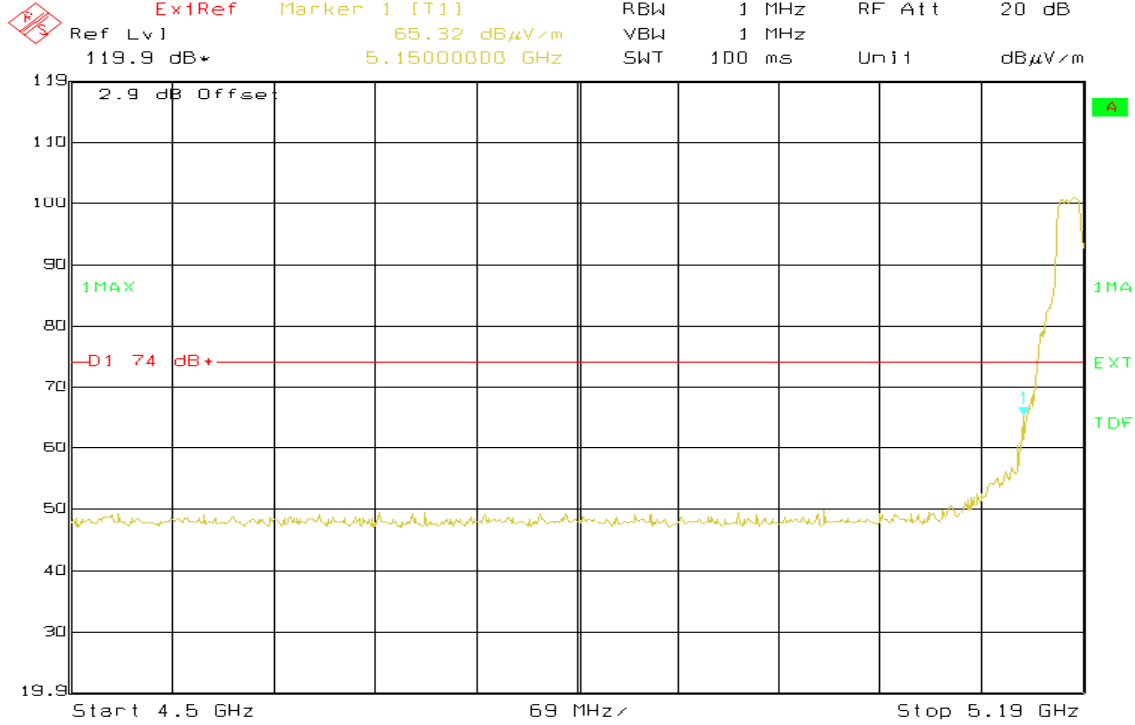


Test Plot

IEEE 802.11a Base mode / CH 5180

Detector mode: Peak

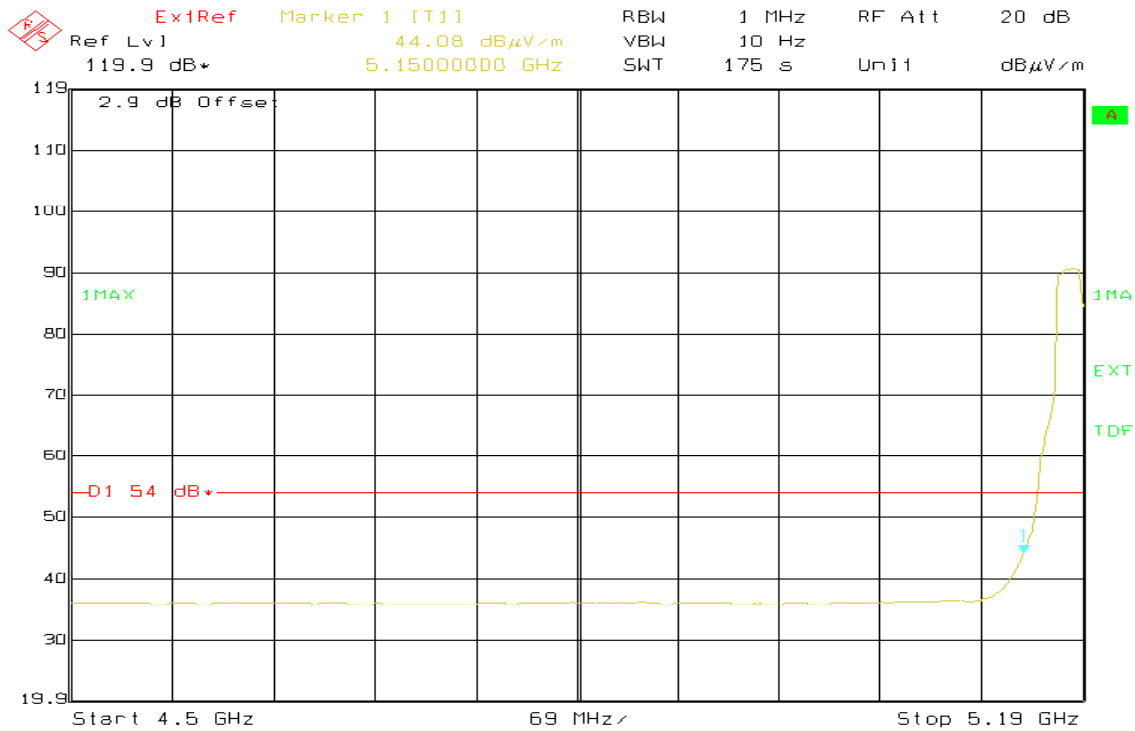
Polarity: Vertical



Date: 15.NOV.2004 13:57:44

Detector mode: Average

Polarity: Vertical

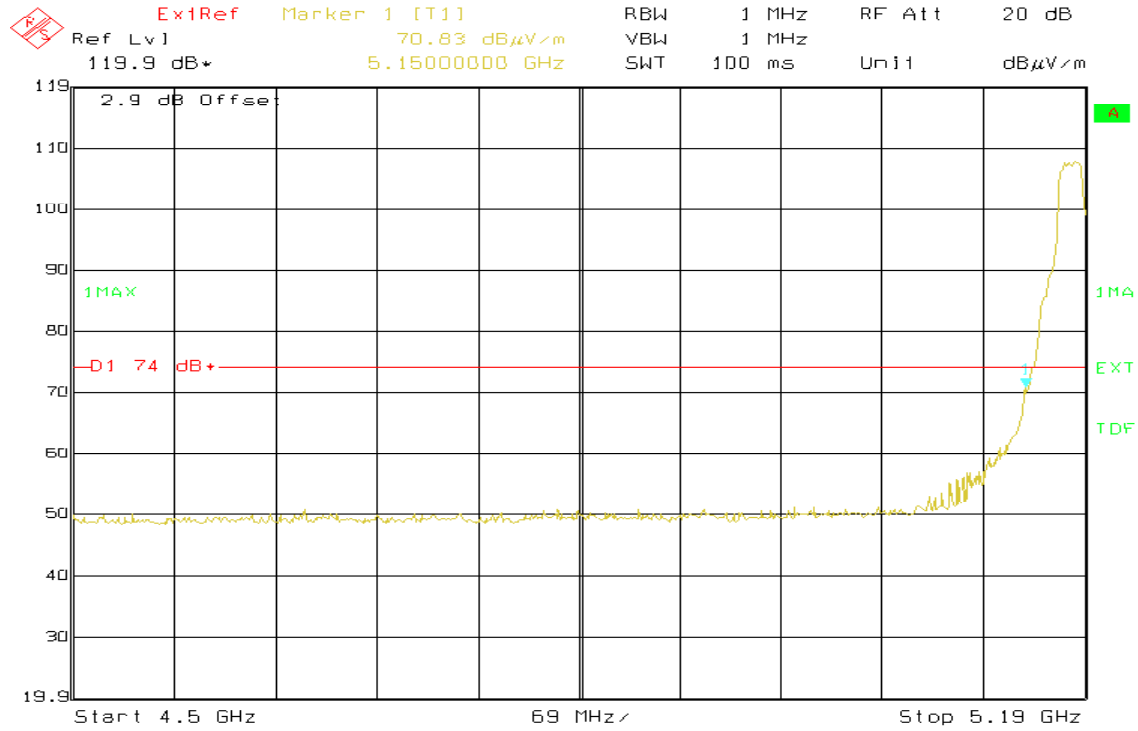


Date: 15.NOV.2004 14:01:54



Detector mode: Peak

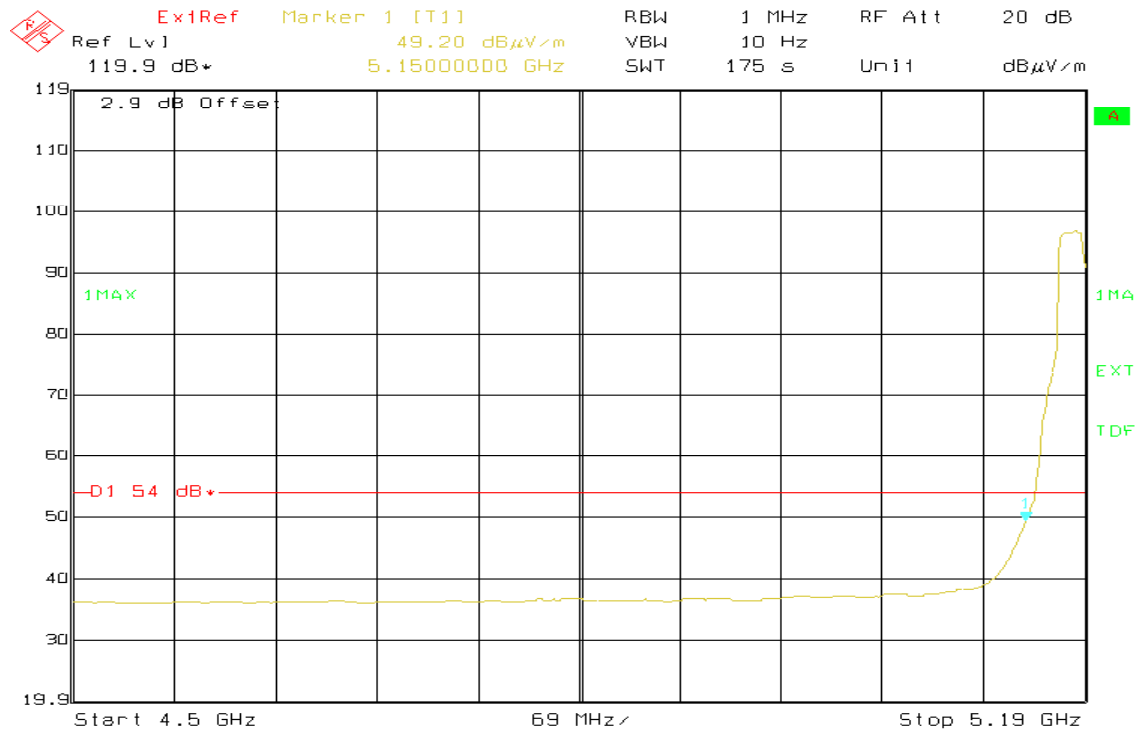
Polarity: Horizontal



Date: 15.NOV.2004 13:47:17

Detector mode: Average

Polarity: Horizontal



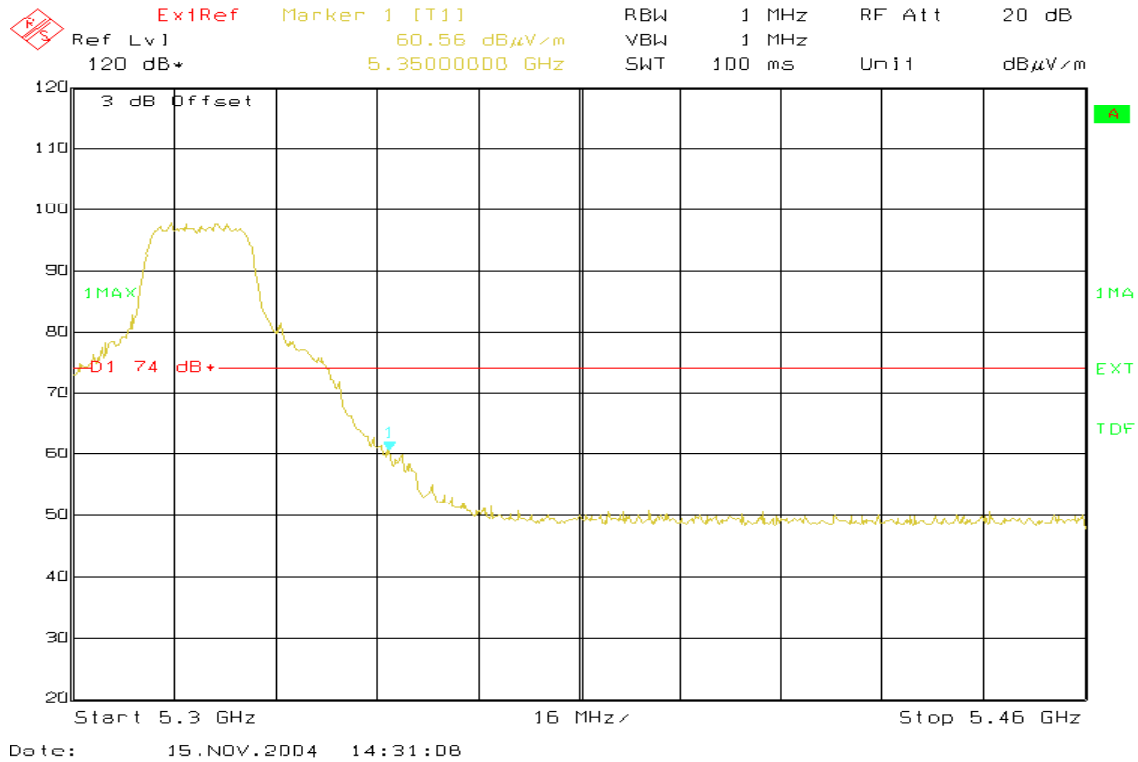
Date: 15.NOV.2004 13:51:09



IEEE 802.11a Base mode / CH 5320

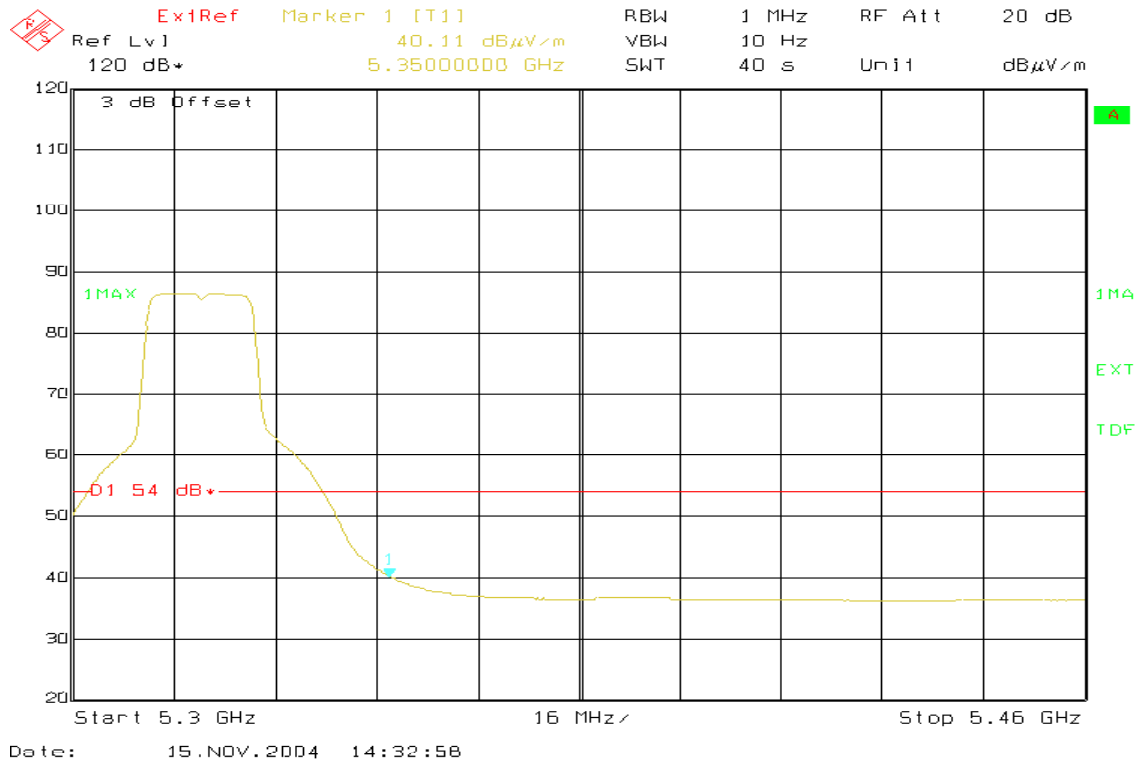
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

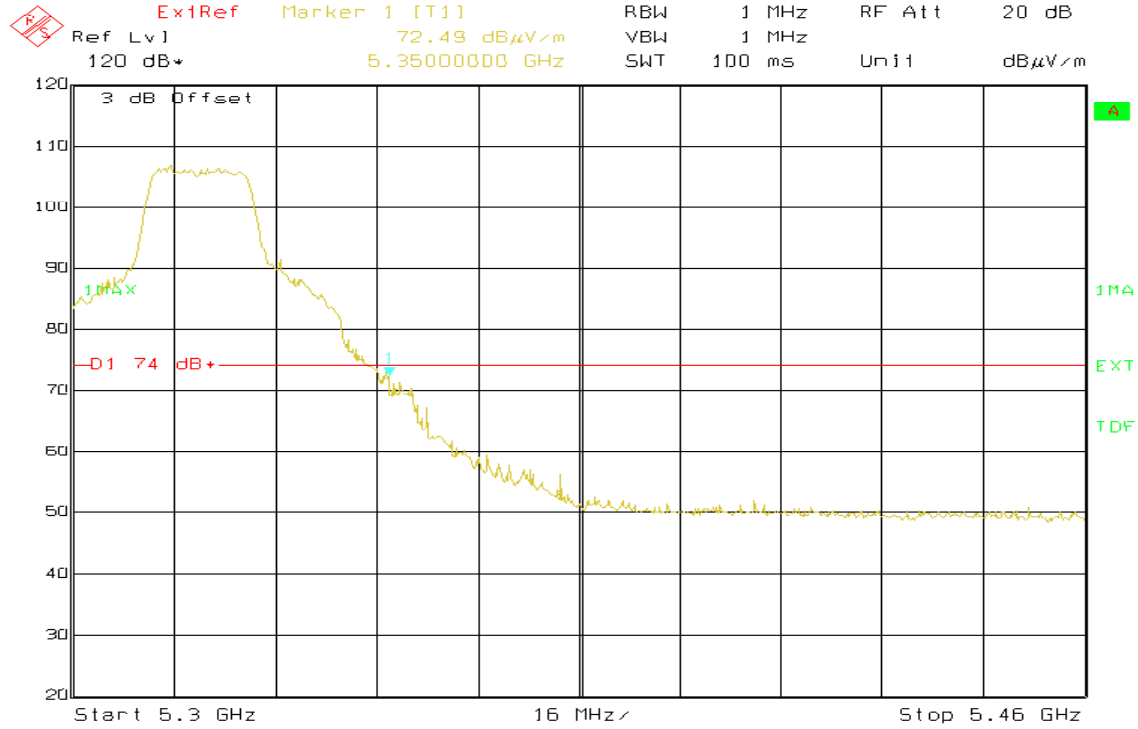
Polarity: Vertical





Detector mode: Peak

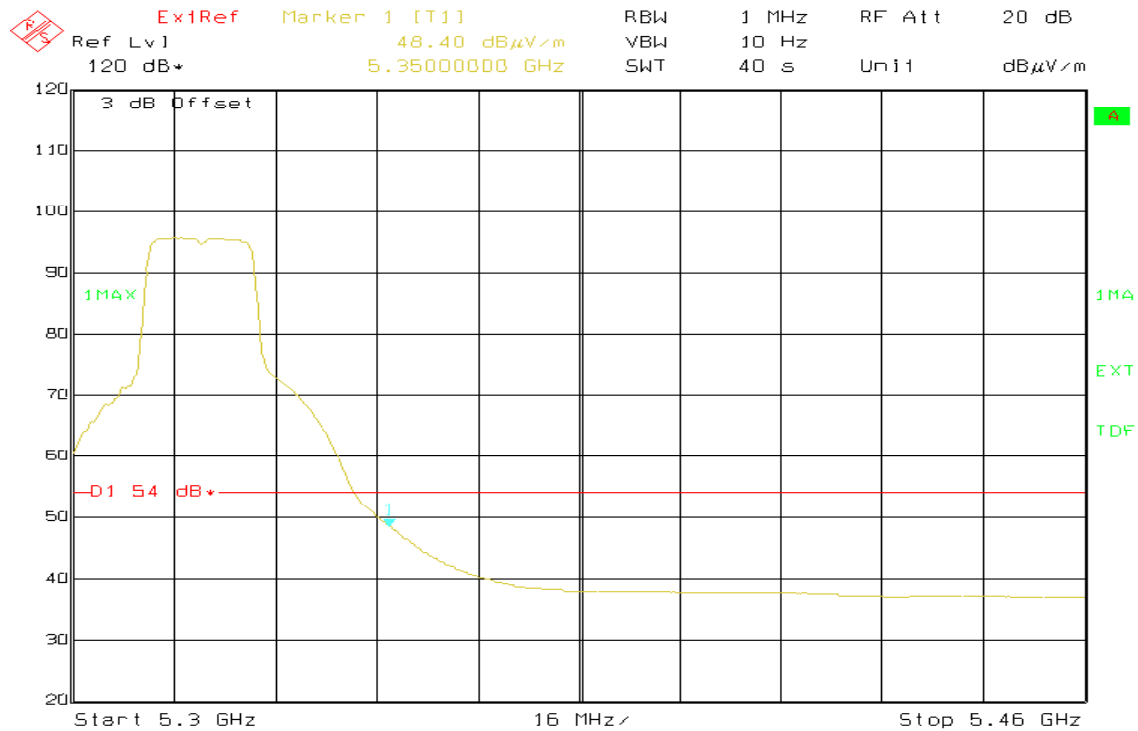
Polarity: Horizontal



Date: 15.NOV.2004 14:15:02

Detector mode: Average

Polarity: Horizontal



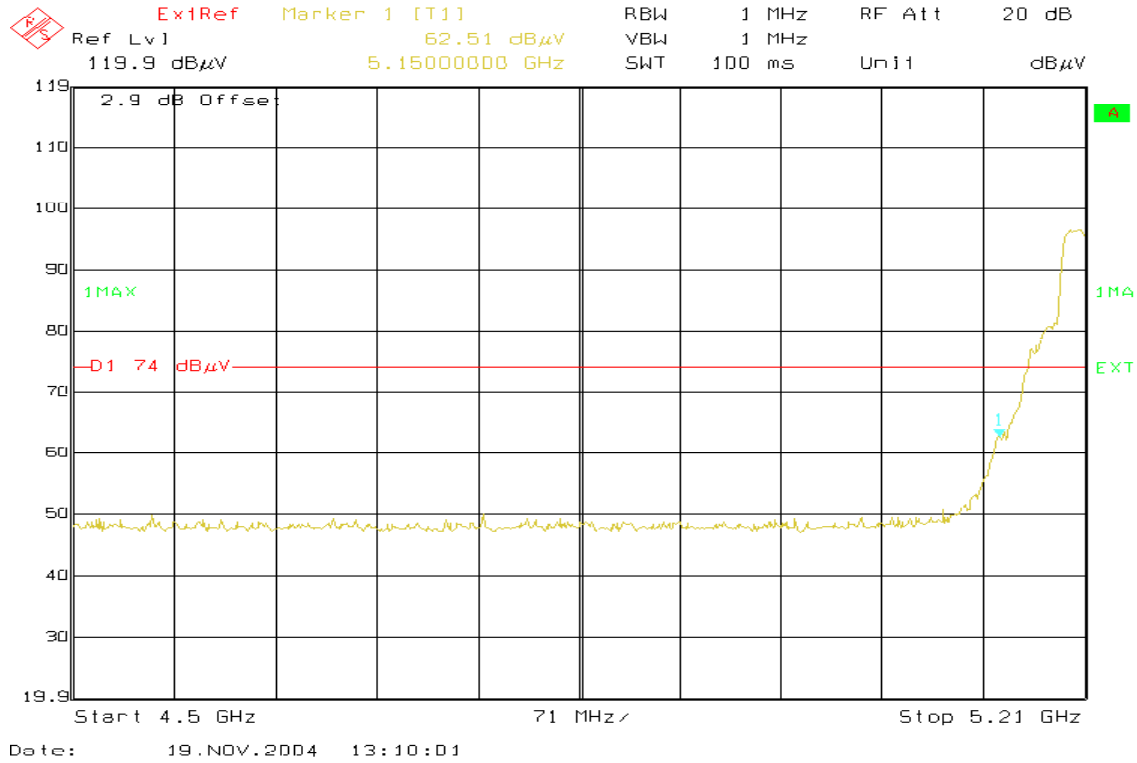
Date: 15.NOV.2004 14:17:19



IEEE 802.11a Turbo mode / CH 5150

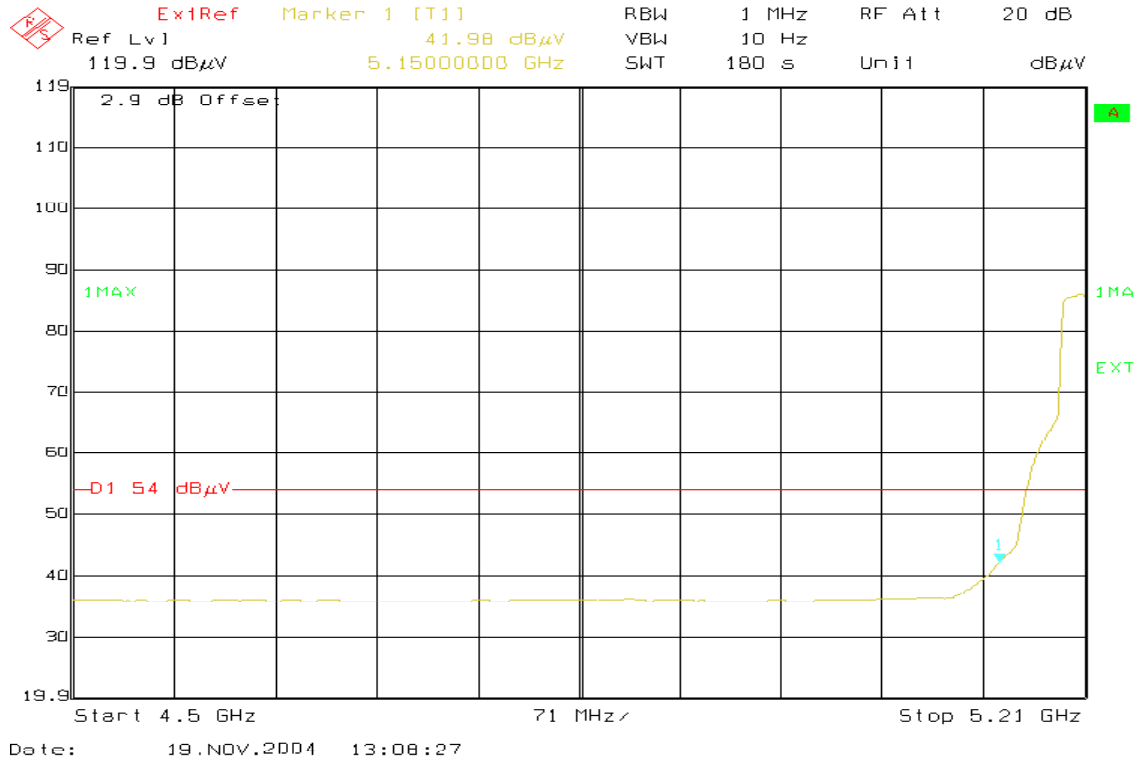
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

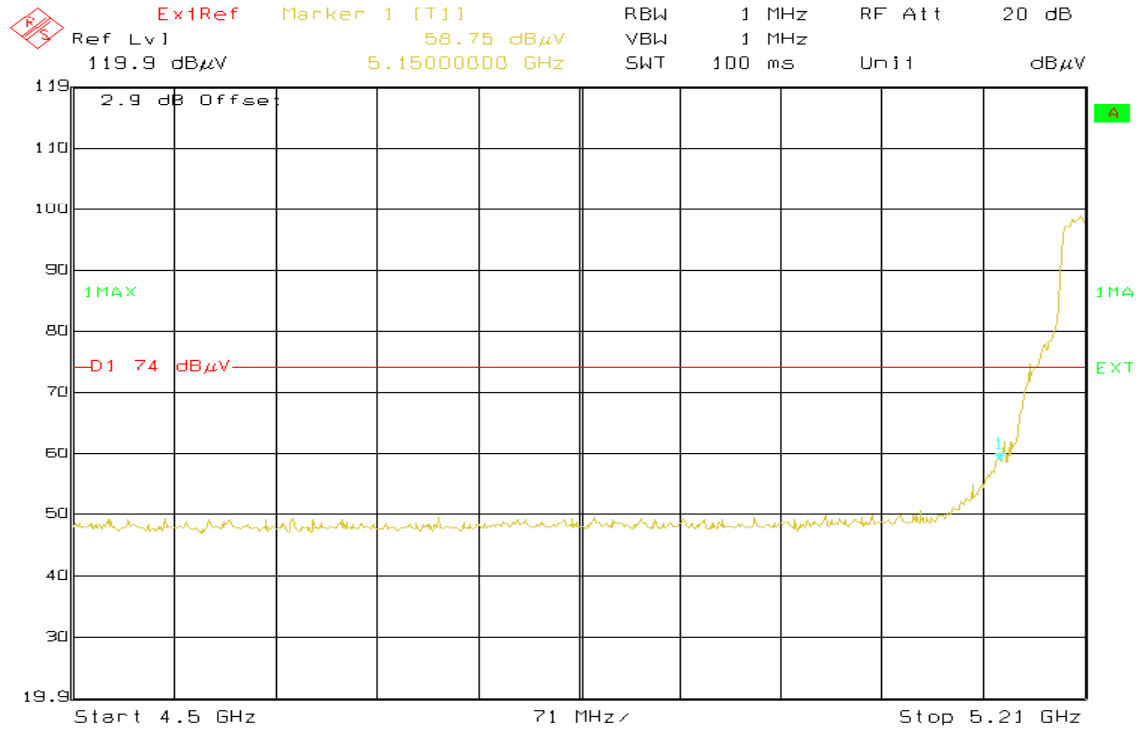
Polarity: Vertical





Detector mode: Peak

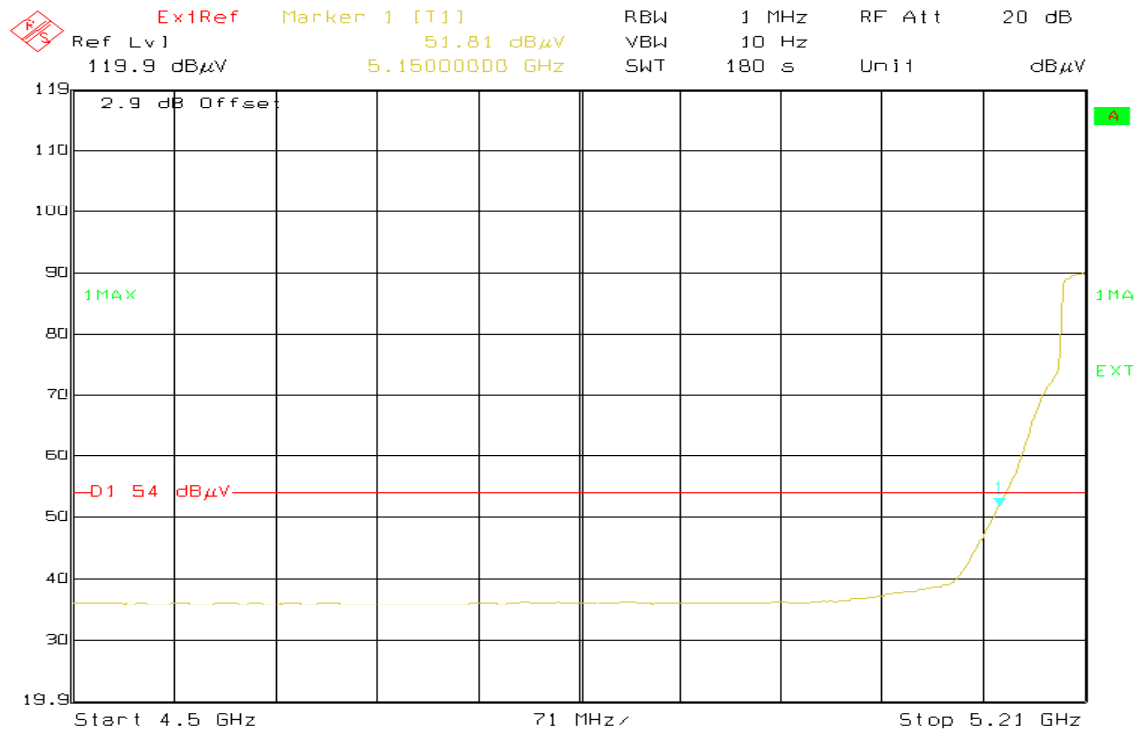
Polarity: Horizontal



Date: 19.NOV.2004 11:45:28

Detector mode: Average

Polarity: Horizontal



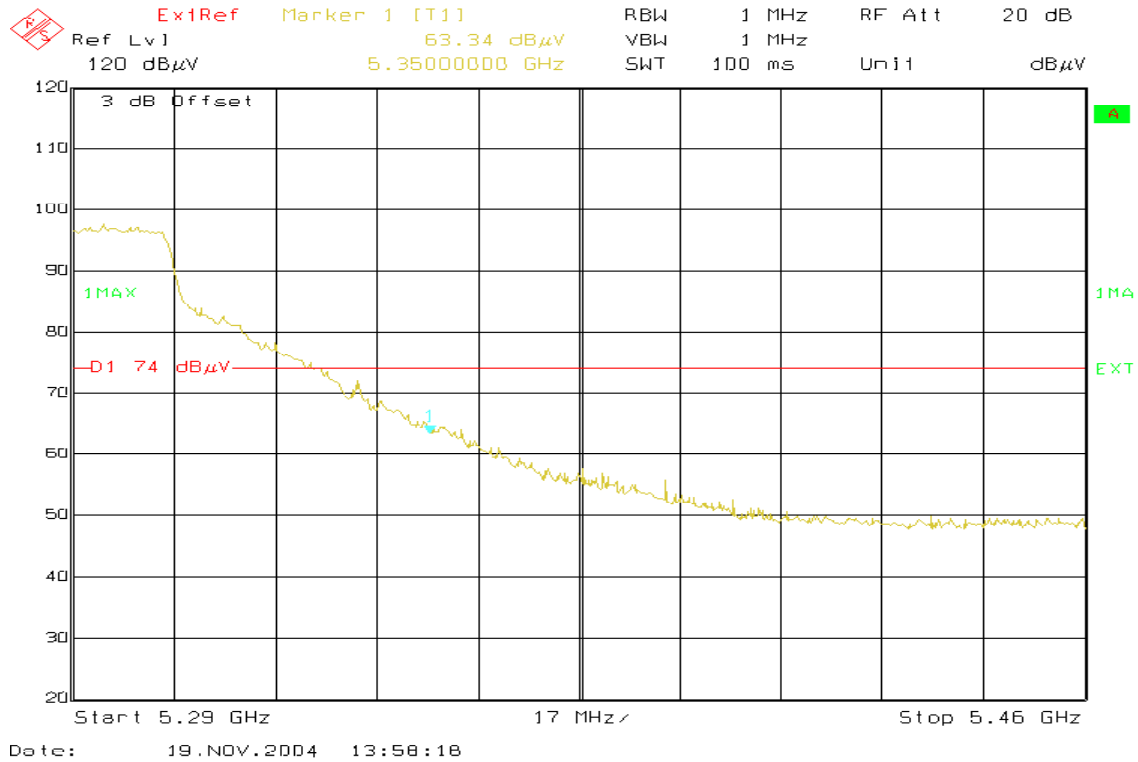
Date: 19.NOV.2004 11:40:14



IEEE 802.11a Turbo mode / CH 5350

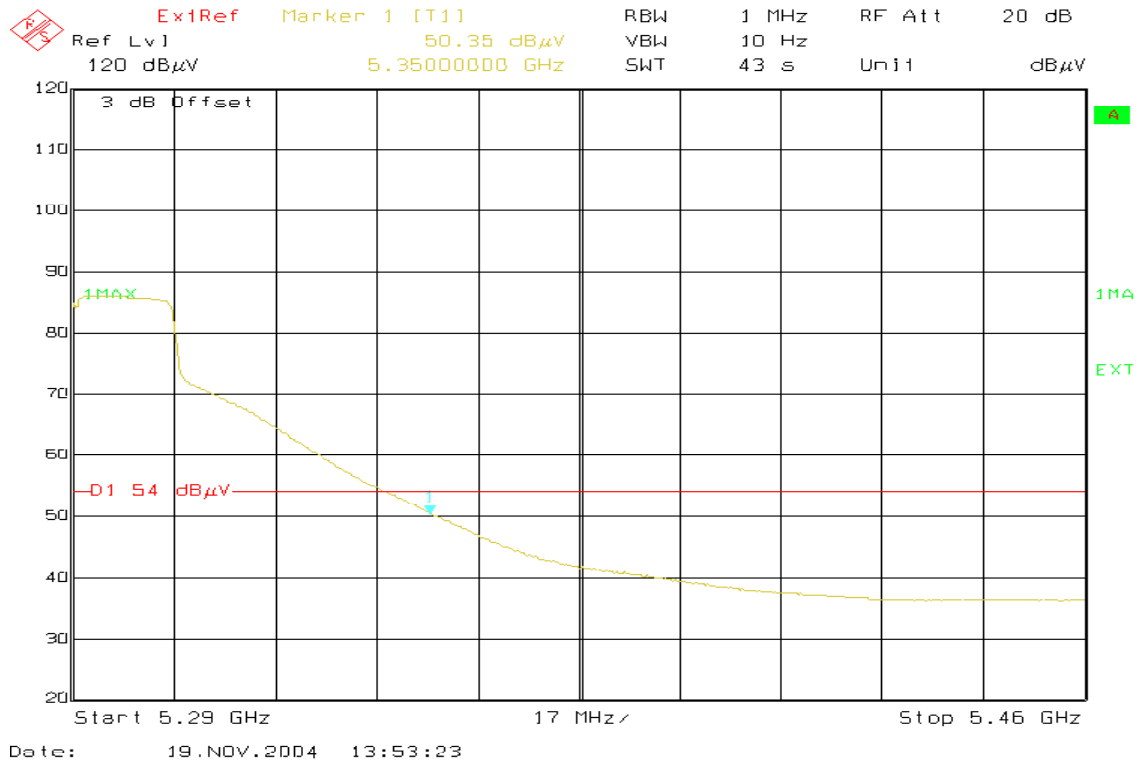
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





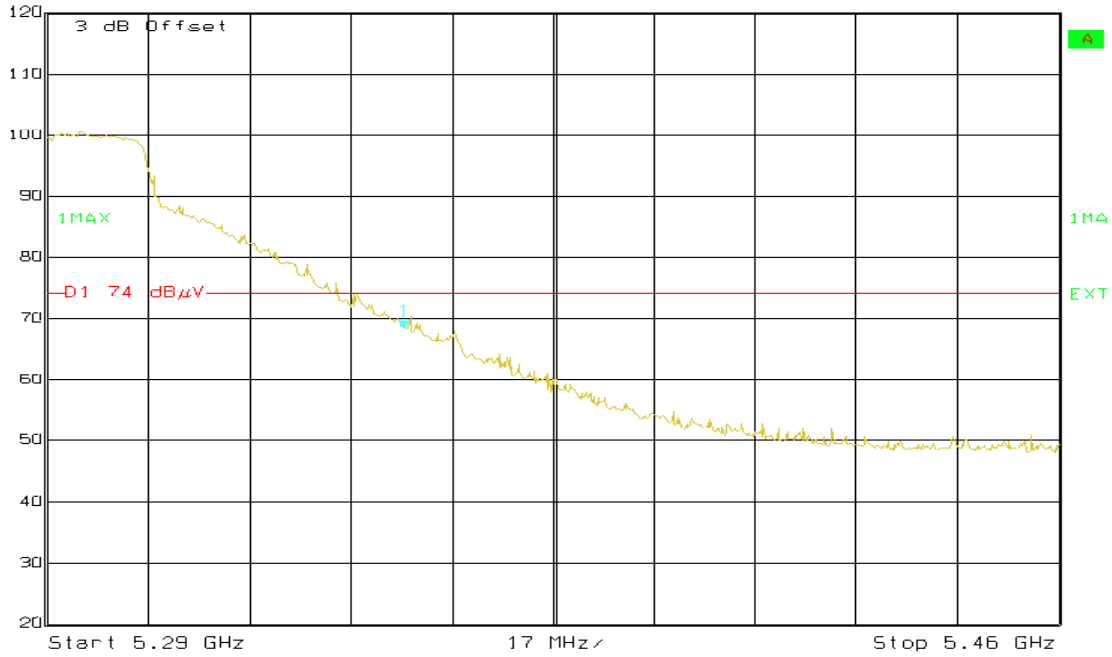
Detector mode: Peak

Polarity: Horizontal



Ex1Ref Marker 1 [T1]
Ref Lvl] 68.44 dBμV
120 dBμV 5.35000000 GHz

RBW 1 MHz RF Att 20 dB
VBW 1 MHz
SWT 100 ms Unit dBμV



Date: 19.NOV.2004 13:47:53

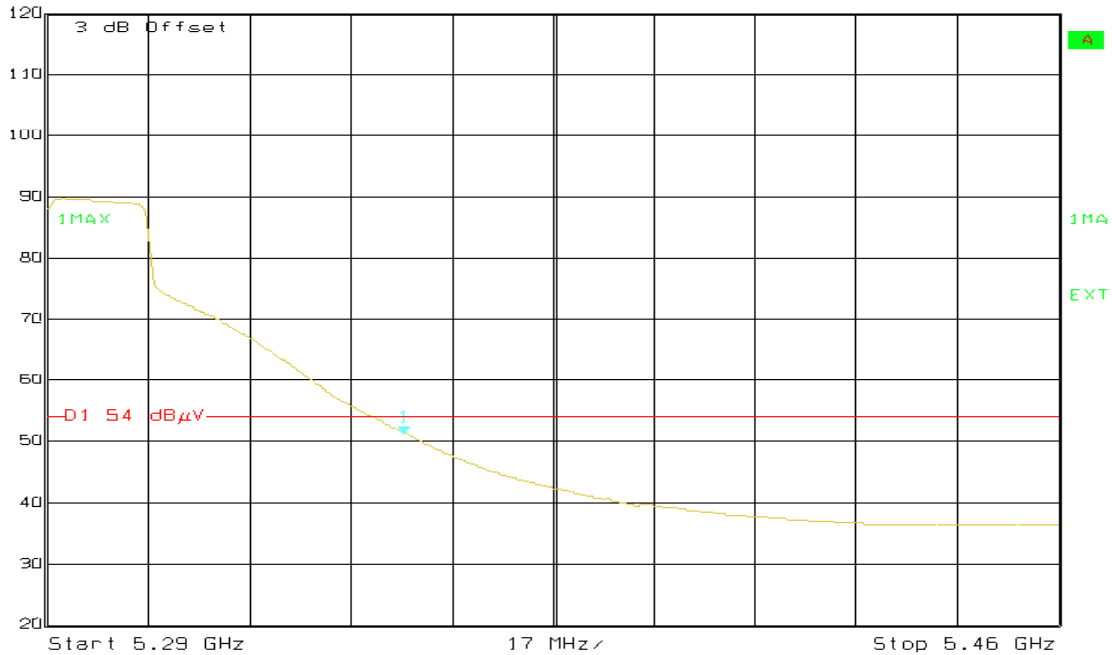
Detector mode: Average

Polarity: Horizontal



Ex1Ref Marker 1 [T1]
Ref Lvl] 51.16 dBμV
120 dBμV 5.35000000 GHz

RBW 1 MHz RF Att 20 dB
VBW 10 Hz
SWT 43 s Unit dBμV



Date: 19.NOV.2004 13:46:30



7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

- For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.
- For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

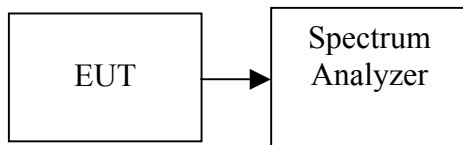
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2005

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

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Result	
Low	Base mode	5180	3.527	4	-0.473	PASS
Mid		5260	5.993	11	-5.007	PASS
High		5320	4.170	11	-6.830	PASS
Low	Turbo mode	5210	2.580	4	-1.420	PASS
Mid		5250	2.451	4	-1.549	PASS
High		5290	2.451	11	-8.549	PASS



Test Plot

IEEE 802.11a Base mode

CH 5180

Agilent 10:49:05 Nov 16, 2004

R L

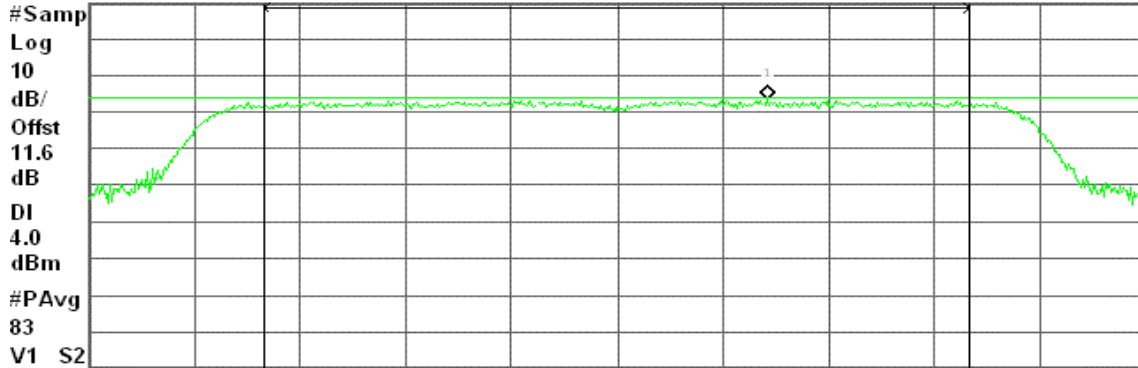
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.183 06 GHz

Ref 30 dBm

Atten 30 dB

3.527 dBm



Center 5.180 00 GHz

Span 21.6 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

13.37 dBm / 14.4000 MHz

-58.21 dBm/Hz

CH 5260

Agilent 10:51:59 Nov 16, 2004

R L

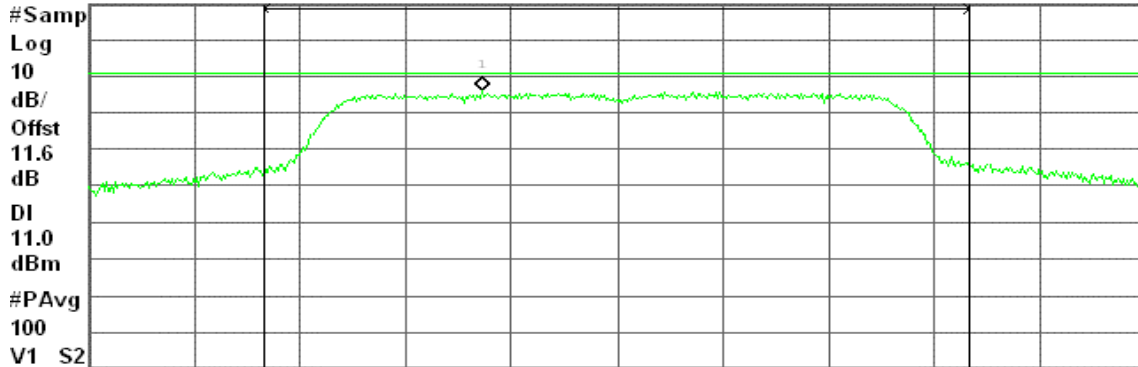
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.256 10 GHz

Ref 30 dBm

Atten 30 dB

5.993 dBm



Center 5.260 00 GHz

Span 30.81 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.39 dBm / 20.5400 MHz

-56.74 dBm/Hz



CH 5320

Agilent 10:55:53 Nov 16, 2004

R L

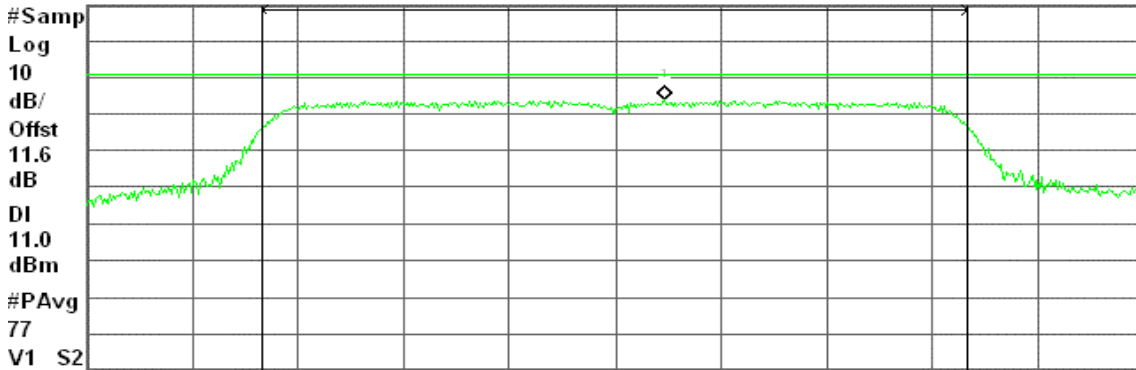
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.321 20 GHz

Ref 30 dBm

Atten 30 dB

4.170 dBm



Center 5.320 00 GHz

Span 25.73 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.43 dBm / 17.1500 MHz

-57.91 dBm/Hz

IEEE 802.11a Turbo mode

CH 5210

Agilent 15:13:31 Nov 19, 2004

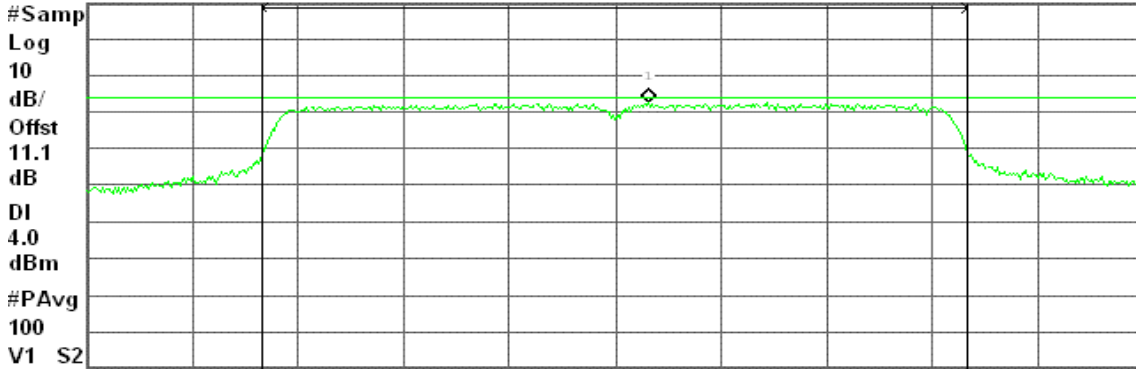
R L

Ref 30 dBm

Atten 30 dB

Mkr1 5.211 65 GHz

2.580 dBm



Center 5.210 00 GHz

Span 52.03 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.15 dBm / 34.6900 MHz

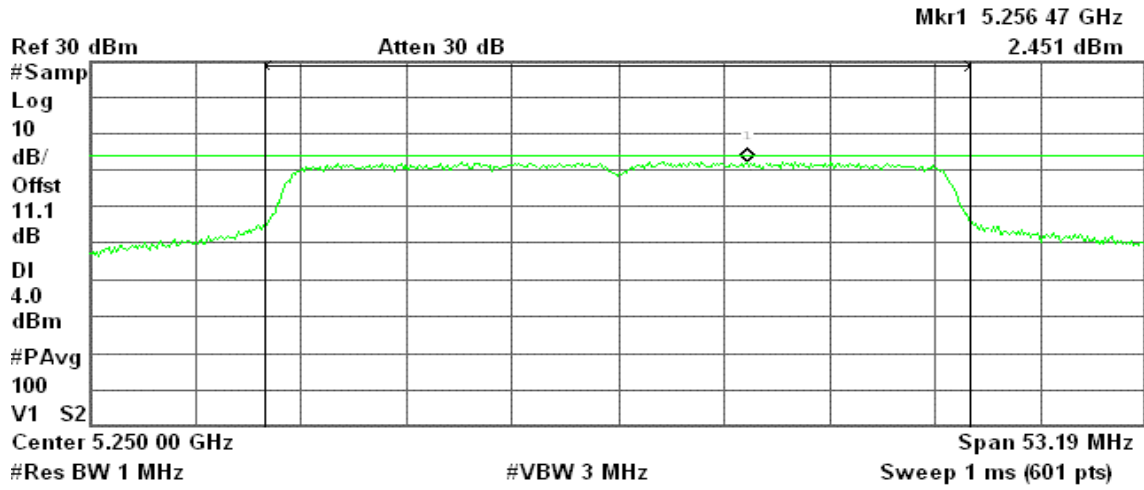
-59.26 dBm/Hz



CH 5250

Agilent 15:18:23 Nov 19, 2004

R L



Channel Power

16.47 dBm / 35.4600 MHz

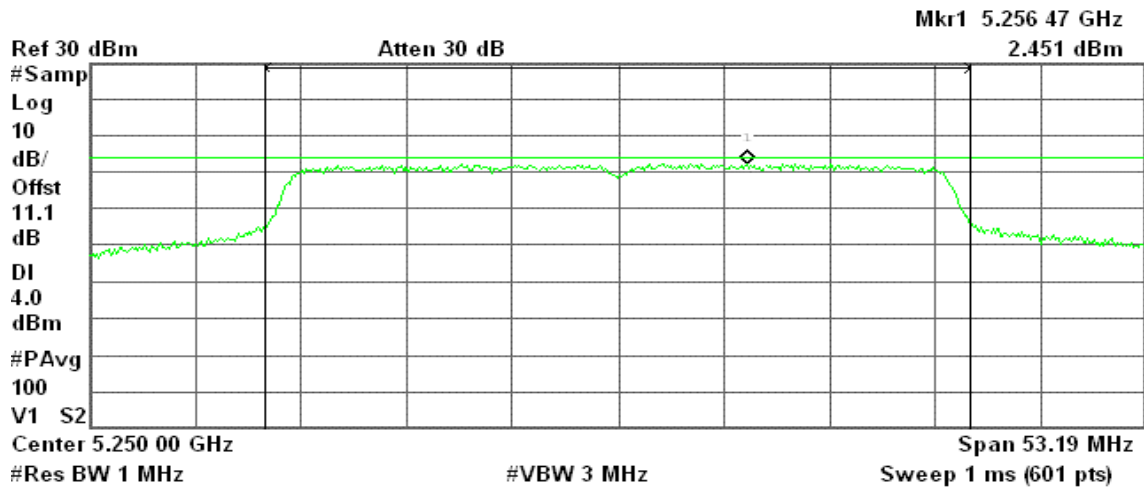
Power Spectral Density

-59.03 dBm/Hz

CH 5290

Agilent 15:18:23 Nov 19, 2004

R L



Channel Power

16.47 dBm / 35.4600 MHz

Power Spectral Density

-59.03 dBm/Hz



7.5 PEAK EXCURSION

LIMIT

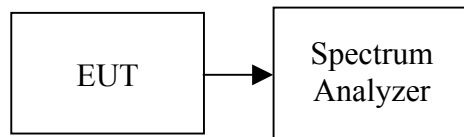
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2005

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

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 (Base Mode) / >26dB bandwidth (Turbo Mode), Max. hold.
4. Trace B, Set RBW = 1MHz, VBW = 30kHz, Span >26dB bandwidth (Base Mode) / >26dB bandwidth (Turbo Mode), Max. hold.
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat the above procedure until measurements for all frequencies were complete.



TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result	
Low	Base mode	5180	10.12	13	-2.88	PASS
Mid		5260	9.12	13	-3.88	PASS
High		5320	9.46	13	-3.54	PASS
Low	Turbo mode	5210	8.46	13	-4.54	PASS
Mid		5250	8.30	13	-4.70	PASS
High		5290	7.32	13	-5.68	PASS

(Note: Maximum antenna gain = 2.0 dBi, therefore there is no reduction due to antenna gain.)



Test Plot

IEEE 802.11a Base mode

CH 5180

Agilent 10:47:06 Nov 16, 2004

R L

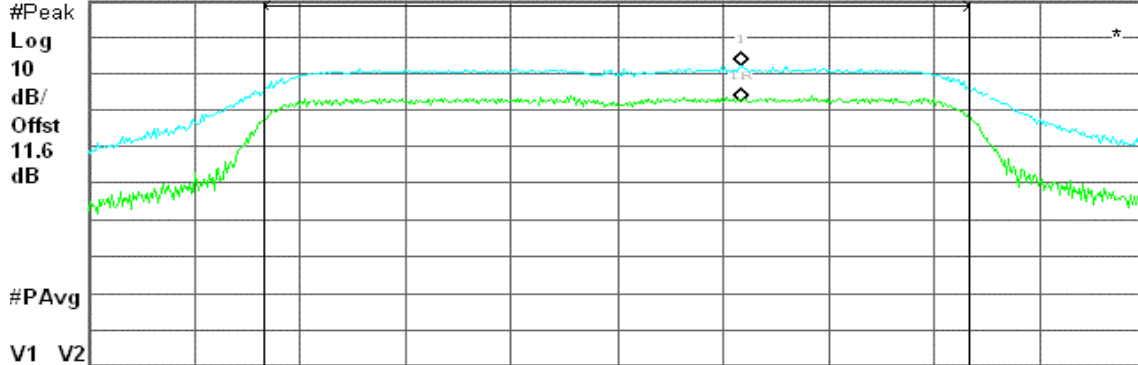
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

10.12 dB



Center 5.180 00 GHz

Span 25.32 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

20.86 dBm / 16.8800 MHz

-51.41 dBm/Hz

CH 5260

Agilent 10:52:24 Nov 16, 2004

R L

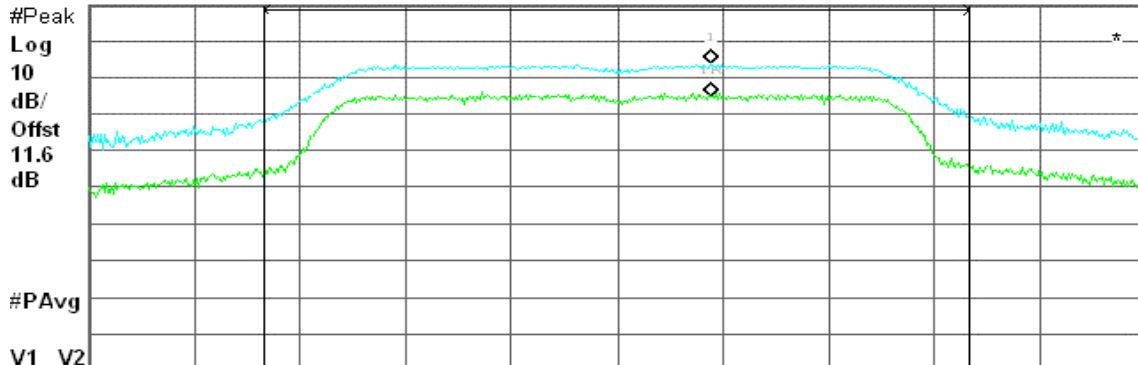
Peak Excursion, a Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

9.12 dB



Center 5.260 00 GHz

Span 30.81 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

22.88 dBm / 20.5400 MHz

-50.25 dBm/Hz



CH 5320

Agilent 10:56:16 Nov 16, 2004

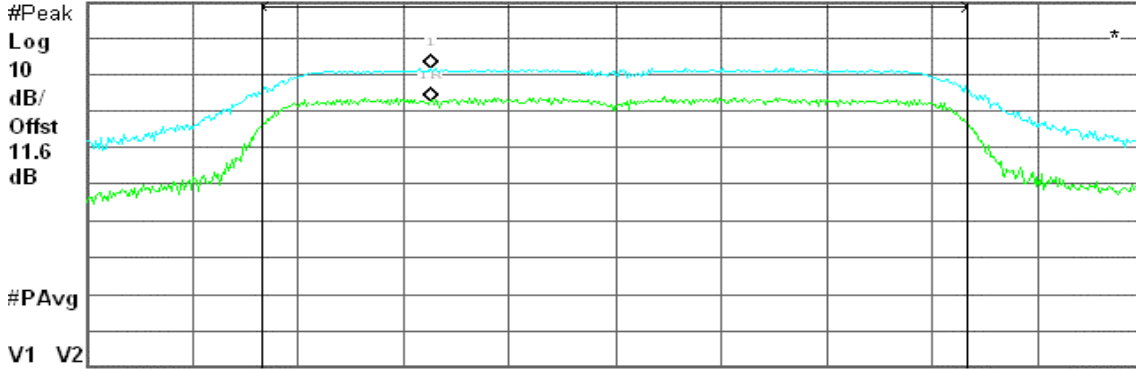
R L

Peak Excursion, a Mode High Ch.

Δ Mkr1 0 Hz
9.46 dB

Ref 30 dBm

Atten 30 dB



Center 5.320 00 GHz

Span 25.73 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

20.97 dBm / 17.1500 MHz

-51.38 dBm/Hz

IEEE 802.11a Turbo mode

CH 5210

Agilent 15:13:58 Nov 19, 2004

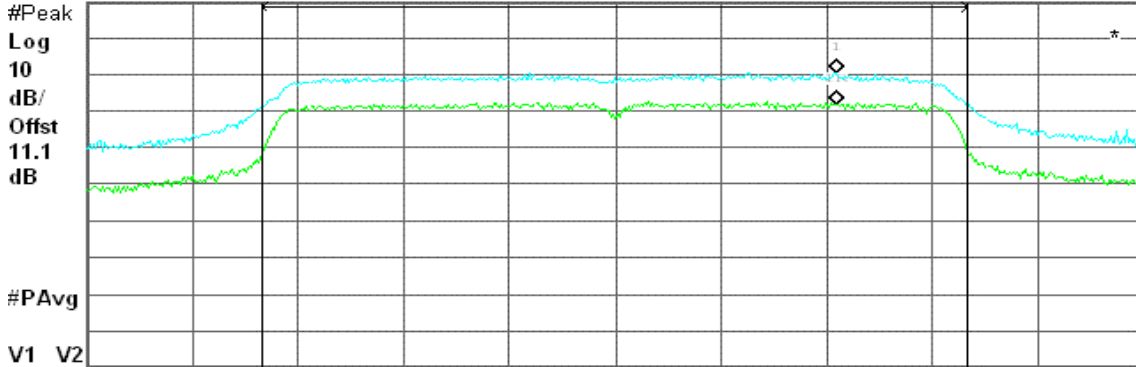
R L

Peak Excursion, a turbo Mode Low Ch.

Δ Mkr1 0 Hz
8.46 dB

Ref 30 dBm

Atten 30 dB



Center 5.210 00 GHz

Span 52.03 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

21.94 dBm / 34.6900 MHz

-53.46 dBm/Hz



CH 5250

Agilent 15:18:48 Nov 19, 2004

R L

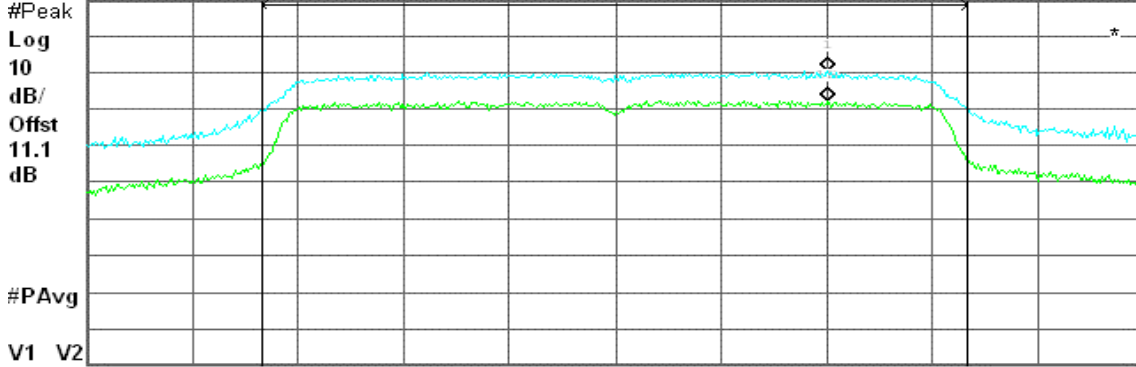
Peak Excursion, a turbo Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

8.30 dB



Center 5.250 00 GHz

Span 53.19 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

21.96 dBm / 35.4600 MHz

-53.53 dBm/Hz

CH 5290

Agilent 15:25:43 Nov 19, 2004

R L

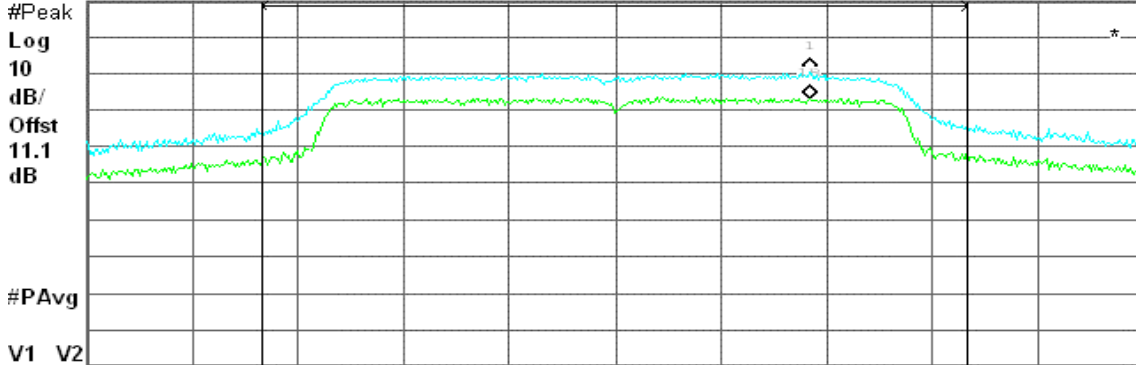
Peak Excursion, a turbo Mode High Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

7.32 dB



Center 5.290 00 GHz

Span 60.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

21.84 dBm / 40.5000 MHz

-54.23 dBm/Hz



7.6 RADIO FREQUENCY EXPOSURE

LIMIT

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	Wireless USB Adapter
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.35GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Bluetooth: 2.402 GHz ~ 2.482 GHz <input type="checkbox"/> Others: _____
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others: _____
Exposure classification	General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas (One for 2.4GHz, One for 5GHz) <ul style="list-style-type: none"> <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	16.04 dBm (40.18mW)
Antenna gain (Max)	2.0 dBi (Numeric gain: 1.58)
Evaluation applied	<input type="checkbox"/> MPE Evaluation* <input checked="" type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A
Note:	
1. The maximum output power is <u>16.04dBm (40.18mW)</u> at <u>5260MHz</u> (with <u>1.58 numeric antenna gain</u> .) 2. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.	

TEST RESULTS

No non-compliance noted.

Note: Please refer to the separated SAR report.



7.7 RADIATED UNDESIRABLE EMISSION

LIMIT

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

The provisions of §15.205 apply to intentional radiators operating under this section. The EUT is set to transmit in a continuous mode.

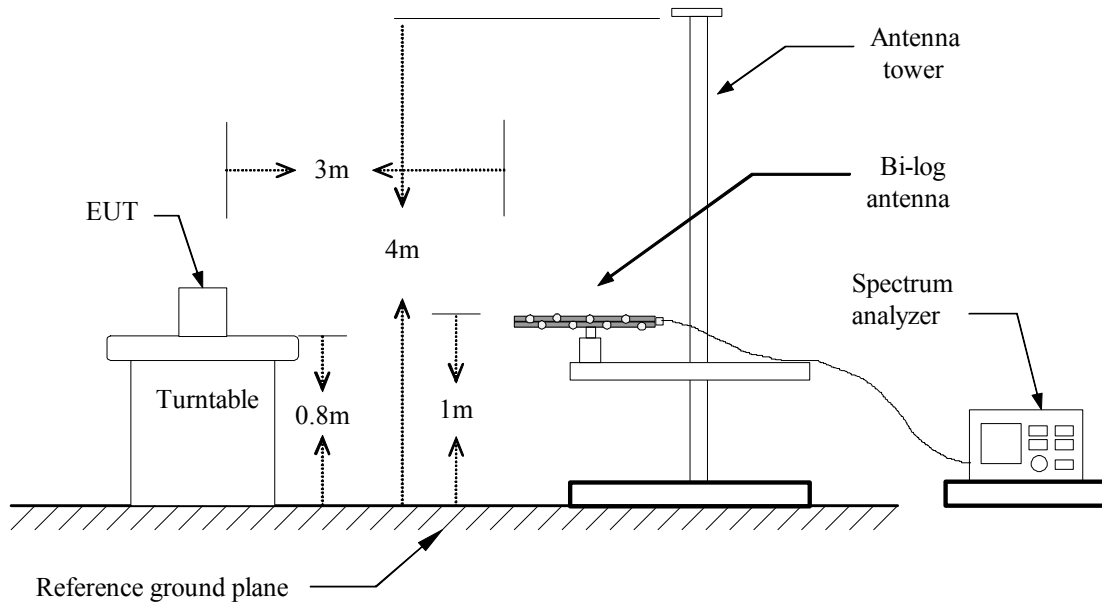
MEASUREMENT EQUIPMENT USED

Open Area Test Site # 3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/18/2005
Spectrum Analyzer	EMCO	3116	2487	11/27/2005
EMI Test Receiver	R&S	ESVS20	838804/004	01/04/2005
Pre-Amplifier	HP	8447D	2944A09173	03/03/2005
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/05/2005
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R
Site NSA	C&C	N/A	N/A	09/06/2005
Horn antenna	Schwarzbeck	BBHA 9120	D210	02/23/2005
Loop Antenna	EMCO	6502	2356	07/10/2005
Pre-Amplifier	HP	8449B	3008B00965	10/02/2005

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

Test Configuration

Below 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. Repeat above procedures until the measurements for all frequencies are complete.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.



TEST RESULTS

Below 1 GHz

Operation Mode: Normal link mode (worst case)

Test Date: November 22, 2004

Temperature: 20°C

Tested by: Chris Hsieh

Humidity: 60 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
259.89	V	PK	16.02	16.50	32.52	46.00	-13.48
288.02	V	PK	15.96	16.88	32.84	46.00	-13.16
454.86	V	PK	13.16	23.81	36.97	46.00	-9.03
576.11	V	PK	10.47	25.10	35.57	46.00	-10.43
665.35	V	PK	6.63	28.18	34.81	46.00	-11.19
874.87	V	PK	6.74	30.83	37.57	46.00	-8.43
185.20	H	PK	16.37	13.02	29.38	43.50	-14.12
288.02	H	PK	16.99	16.88	33.87	46.00	-12.13
454.86	H	PK	8.42	23.81	32.23	46.00	-13.77
576.11	H	PK	6.06	25.10	31.16	46.00	-14.84
666.32	H	PK	8.66	28.15	36.81	46.00	-9.19
877.78	H	PK	4.12	30.85	34.97	46.00	-11.03

Notes:

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 detector mode.
3. 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.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



Above 1 GHz

Operation Mode: TX IEEE 802.11a Base mode / CH 5180

Test Date: November 22, 2004

Temperature: 20°C

Tested by: Chris Hsieh

Humidity: 60% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10360.00	V	46.88	39.00	10.43	57.31	46.33	74.00	54.00	-7.67	AVG
15540.00	V	49.88	39.35	7.96	57.84	47.31	74.00	54.00	-6.69	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10360.00	H	44.00	35.28	10.43	54.43	45.71	74.00	54.00	-8.29	AVG
15540.00	H	44.50	---	7.96	52.46	---	74.00	54.00	-1.54	Peak
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
 - a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
 - b. *AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*



Operation Mode: TX IEEE 802.11a Base mode / CH 5260 Test Date: November 22, 2004

Temperature: 20°C Tested by: Chris Hsieh

Humidity: 60% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10520.00	V	46.88	39.00	10.56	57.44	46.33	74.00	54.00	-7.67	AVG
15780.00	V	49.88	39.35	7.49	57.37	46.84	74.00	54.00	-7.16	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10520.00	H	44.50	37.13	10.43	54.93	47.56	74.00	54.00	-6.44	AVG
15780.00	H	43.50	---	7.96	51.46	---	74.00	54.00	-2.54	Peak
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX IEEE 802.11a Base mode / CH 5320 Test Date: November 22, 2004

Temperature: 20°C Tested by: Chris Hsieh

Humidity: 60% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10640.00	V	48.22	40.89	10.65	58.87	46.33	74.00	54.00	-7.67	AVG
15960.00	V	49.87	43.37	7.14	57.01	50.51	74.00	54.00	-3.49	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10640.00	H	49.87	41.20	10.65	60.52	51.85	74.00	54.00	-2.15	AVG
15960.00	H	45.22	---	7.14	52.36	---	74.00	54.00	-1.64	Peak
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX IEEE 802.11a Turbo mode / CH 5210 Test Date: November 22, 2004

Temperature: 20°C Tested by: Chris Hsieh

Humidity: 60% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10420.00	V	44.50	36.20	10.48	54.98	46.33	74.00	54.00	-7.67	AVG
15630.00	V	50.37	41.57	7.79	58.16	49.36	74.00	54.00	-4.65	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10420.00	H	41.08	---	10.48	51.56	10.48	74.00	54.00	-2.44	Peak
15630.00	H	47.00	42.00	7.79	54.79	49.79	74.00	54.00	-4.22	AVG
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX IEEE 802.11a Turbo mode / CH 5250 Test Date: November 22, 2004

Temperature: 20°C Tested by: Chris Hsieh

Humidity: 60% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10500.00	V	47.12	42.12	10.55	57.67	46.33	74.00	54.00	-7.67	AVG
15750.00	V	46.57	41.57	7.55	54.12	49.12	74.00	54.00	-4.88	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10500.00	H	41.08	0.00	10.48	51.56	10.48	74.00	54.00	-2.44	Peak
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto..



Operation Mode: TX IEEE 802.11a Turbo mode / CH 5290 Test Date: November 22, 2004

Temperature: 20°C Tested by: Chris Hsieh

Humidity: 60% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10580.00	V	46.23	37.89	10.61	56.84	46.33	74.00	54.00	-7.67	AVG
15750.00	V	49.00	45.00	7.32	56.32	52.32	74.00	54.00	-1.69	AVG
N/A	---	---	---	---	---	---	---	---	---	---
10580.00	H	45.62	37.77	10.61	56.23	48.38	74.00	54.00	-5.62	AVG
N/A	---	---	---	---	---	---	---	---	---	---

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



7.8 CONDUCTED UNDESIRABLE EMISSION

LIMIT

Transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

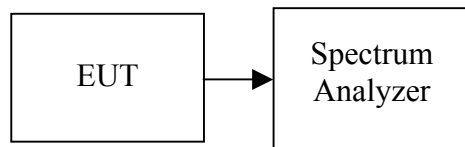
The provisions of §15.205 apply to intentional radiators operating under this section.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2005

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

Test Configuration



TEST PROCEDURE

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

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted

(Note: Maximum antenna gain = 2.0 dBi, therefore there is no reduction due to antenna gain.)



Test Plot

IEEE 802.11a Base mode

CH 5180

30MHz ~ 40GHz

Agilent 10:48:22 Nov 16, 2004

R L

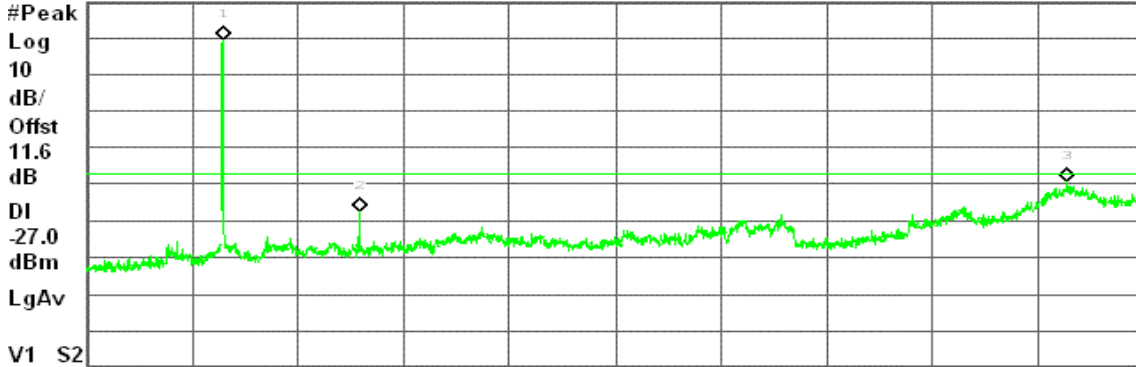
Conducted Spur., a Mode Low Ch.

Mkr3 37.12 GHz

Ref 20 dBm

Atten 20 dB

-29.41 dBm



V1 S2
 Start 30 MHz Stop 40.00 GHz
 #Res BW 1 MHz #VBW 1 MHz Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	9.66 dBm
2	(1)	Freq	10.36 GHz	-37.44 dBm
3	(1)	Freq	37.12 GHz	-29.41 dBm

CH 5260

30MHz ~ 40GHz

Agilent 10:53:35 Nov 16, 2004

R L

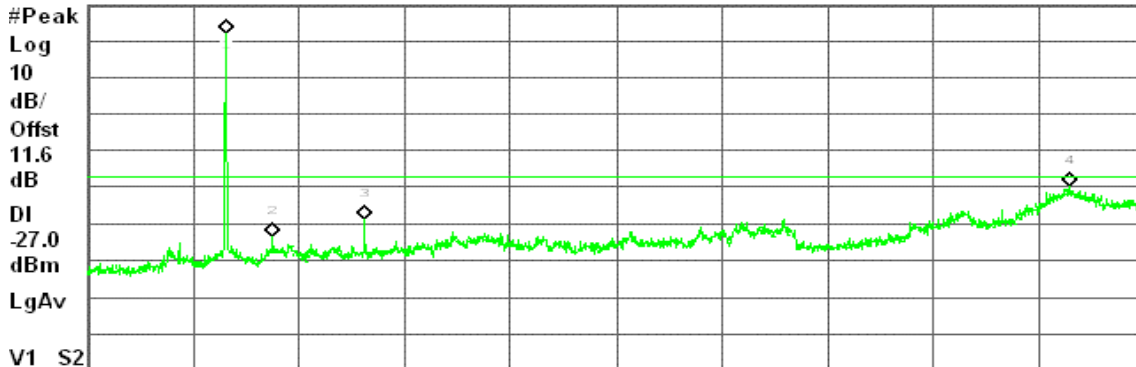
Conducted Spur., a Mode Mid Ch.

Mkr4 37.16 GHz

Ref 20 dBm

Atten 20 dB

-29.79 dBm



V1 S2
 Start 30 MHz Stop 40.00 GHz
 #Res BW 1 MHz #VBW 1 MHz Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.27 GHz	12.03 dBm
2	(1)	Freq	7.00 GHz	-43.67 dBm
3	(1)	Freq	10.52 GHz	-38.84 dBm
4	(1)	Freq	37.16 GHz	-29.79 dBm



CH 5320

30MHz ~ 40GHz

Agilent 10:56:58 Nov 16, 2004

R L

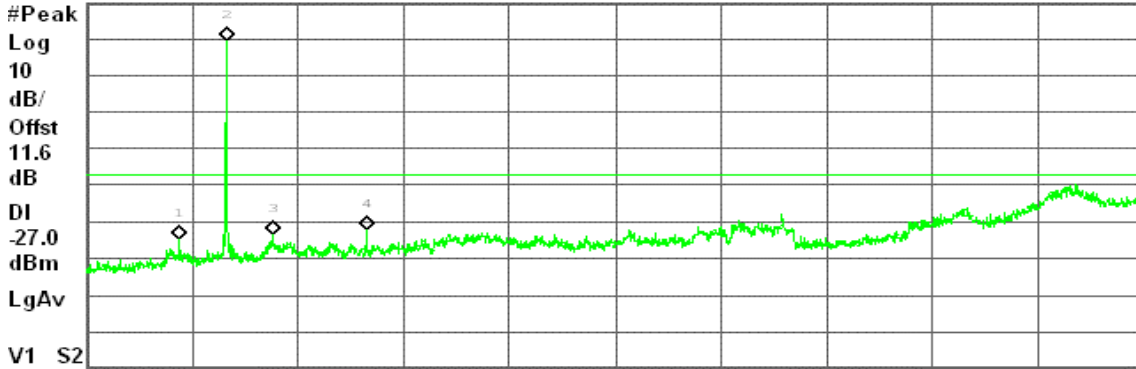
Conducted Spur., a Mode High Ch.

Mkr4 10.64 GHz

Ref 20 dBm

Atten 20 dB

-42.51 dBm



Start 30 MHz

Stop 40.00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.55 GHz	-45.09 dBm
2	(1)	Freq	5.33 GHz	9.80 dBm
3	(1)	Freq	7.08 GHz	-43.50 dBm
4	(1)	Freq	10.64 GHz	-42.51 dBm

IEEE 802.11a Turbo mode

CH 5210

30MHz ~ 40GHz

Agilent 15:14:42 Nov 19, 2004

R L

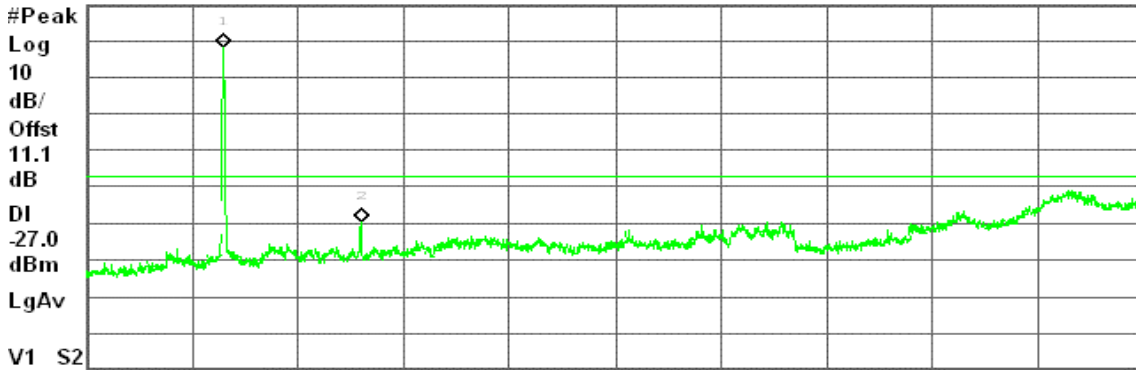
Conducted Spur., a turbo Mode Low Ch.

Mkr2 10.42 GHz

Ref 20 dBm

Atten 20 dB

-39.53 dBm



Start 30 MHz

Stop 40.00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	8.17 dBm
2	(1)	Freq	10.42 GHz	-39.53 dBm



CH 5250

30MHz ~ 40GHz

Agilent 15:19:23 Nov 19, 2004

R L

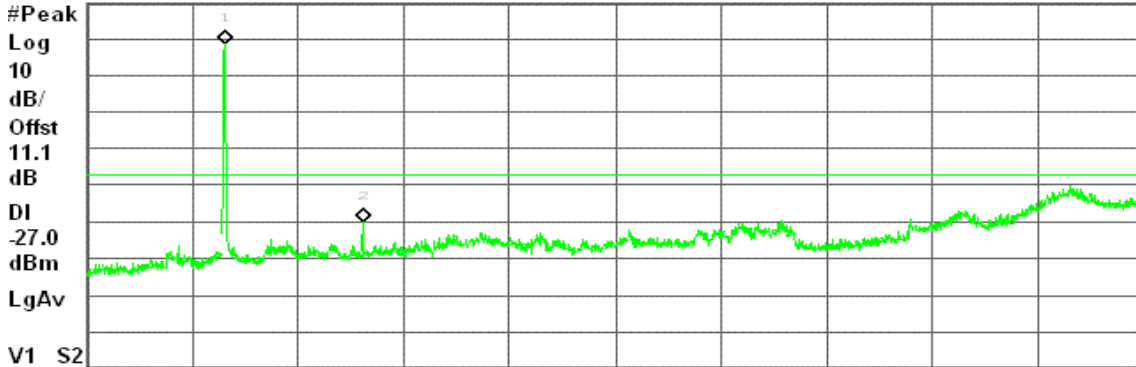
Conducted Spur., a turbo Mode Mid Ch.

Mkr2 10.50 GHz

Ref 20 dBm

Atten 20 dB

-40.21 dBm



Start 30 MHz

Stop 40.00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.25 GHz	8.60 dBm
2	(1)	Freq	10.50 GHz	-40.21 dBm

CH 5290

30MHz ~ 40GHz

Agilent 15:26:21 Nov 19, 2004

R L

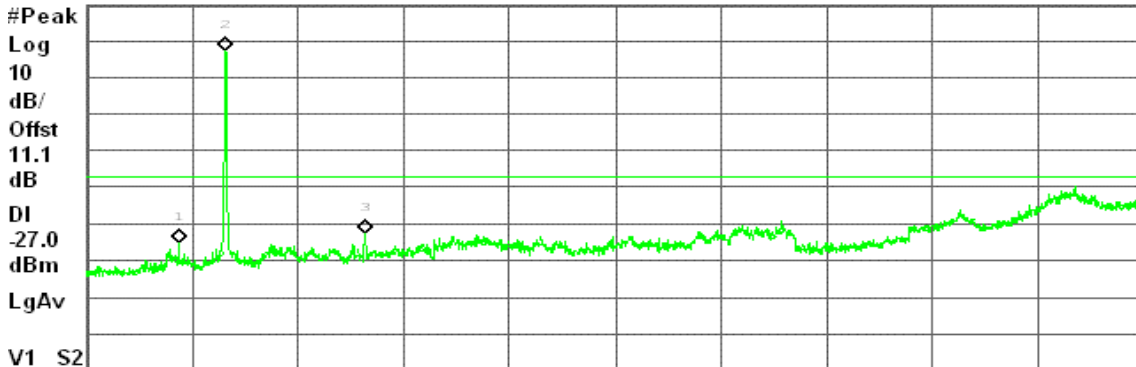
Conducted Spur., a turbo Mode High Ch.

Mkr3 10.58 GHz

Ref 20 dBm

Atten 20 dB

-42.58 dBm



Start 30 MHz

Stop 40.00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.53 GHz	-45.20 dBm
2	(1)	Freq	5.29 GHz	7.66 dBm
3	(1)	Freq	10.58 GHz	-42.58 dBm



7.9 TRANSMISSION IN ABSENCE OF DATA

LIMIT

The device shall automatically discontinue transmission in case of either absence of information to transmit or operation failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

TEST RESULTS

No non-compliance noted

Note: For the details, refer to the theory of the operation.

7.10 FREQUENCY STABILITY

LIMIT

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 operational description.

TEST RESULTS

Please refer to the operational description for details.

Note: An examination of the band-edge plots shows that the emission will stay within the authorized band over the entire temperature range.

7.11 ANTENNA REQUIREMENT

LIMIT

According to FCC Part 15.407(d), any U-NII device that operates in the 5.15-5.25 GHz band shall use a transmitting antenna that is an integral part of the device.

TEST RESULTS

No non-compliance noted

The antenna connector is designed with a unique connector and replacement of it by the user is not considered. For details, refer to the EUT photos.