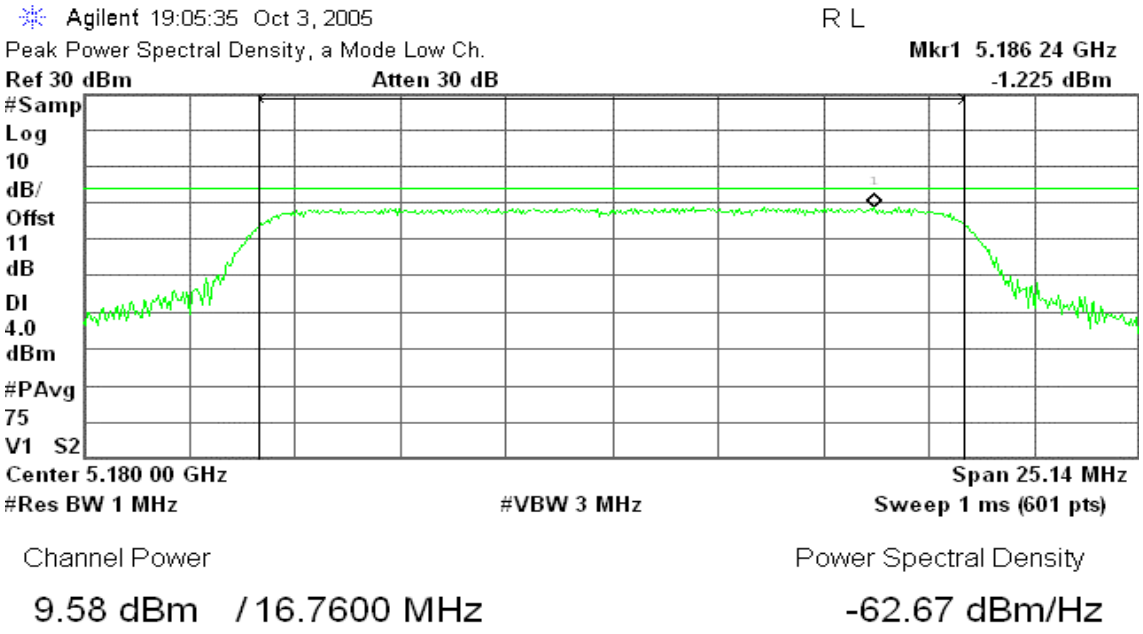
Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

CH Low



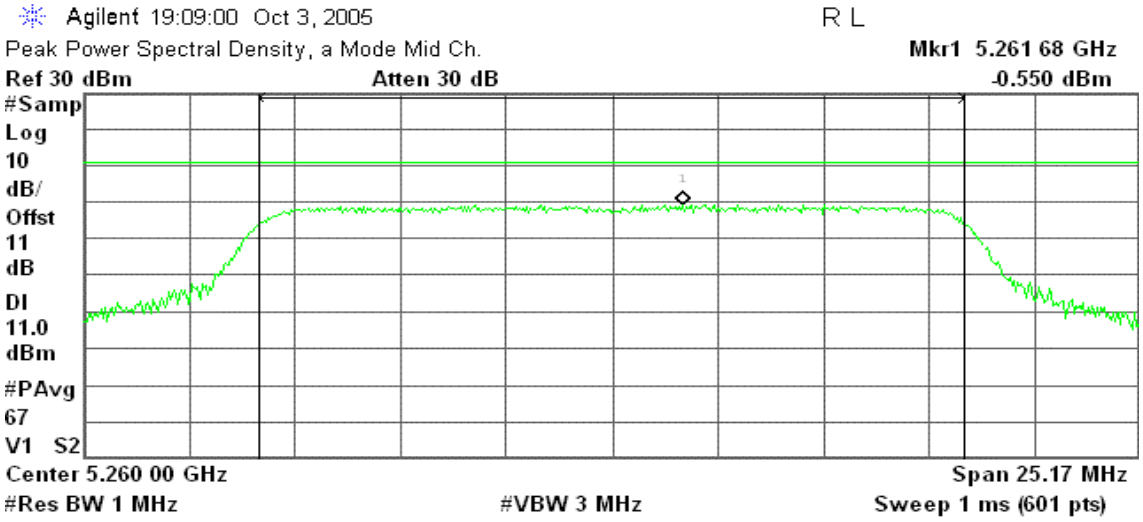
Channel Power

9.58 dBm / 16.7600 MHz

Power Spectral Density

-62.67 dBm/Hz

CH Mid



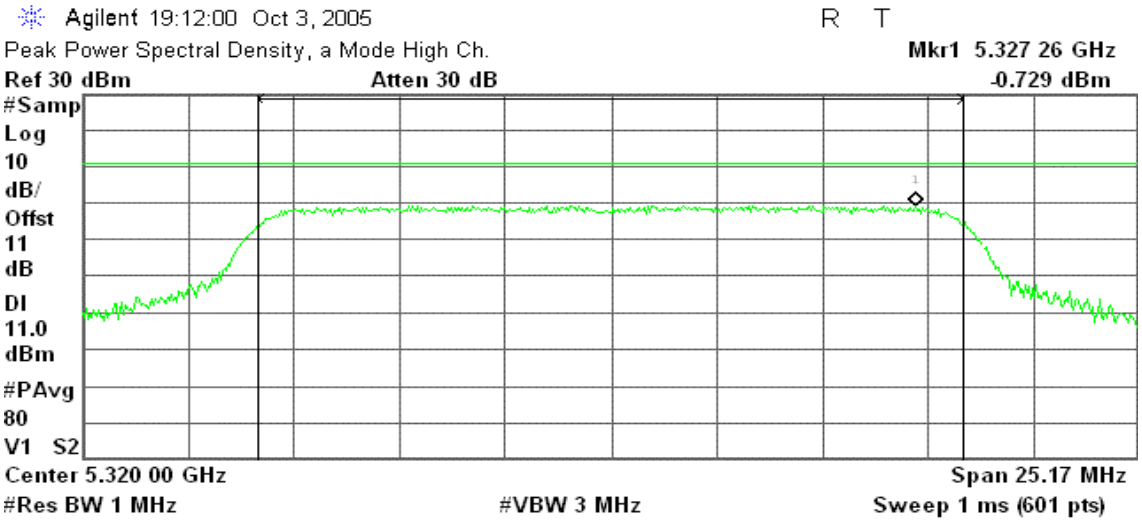
Channel Power

9.79 dBm / 16.7800 MHz

Power Spectral Density

-62.46 dBm/Hz

CH High



Channel Power

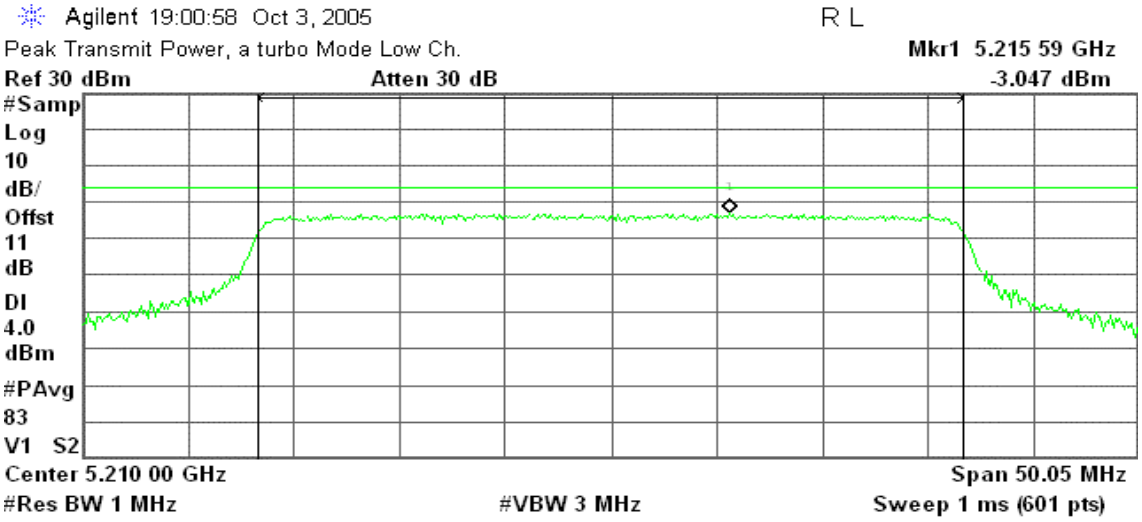
10.42 dBm / 16.7800 MHz

Power Spectral Density

-61.82 dBm/Hz

IEEE 802.11a Turbo mode

CH Low



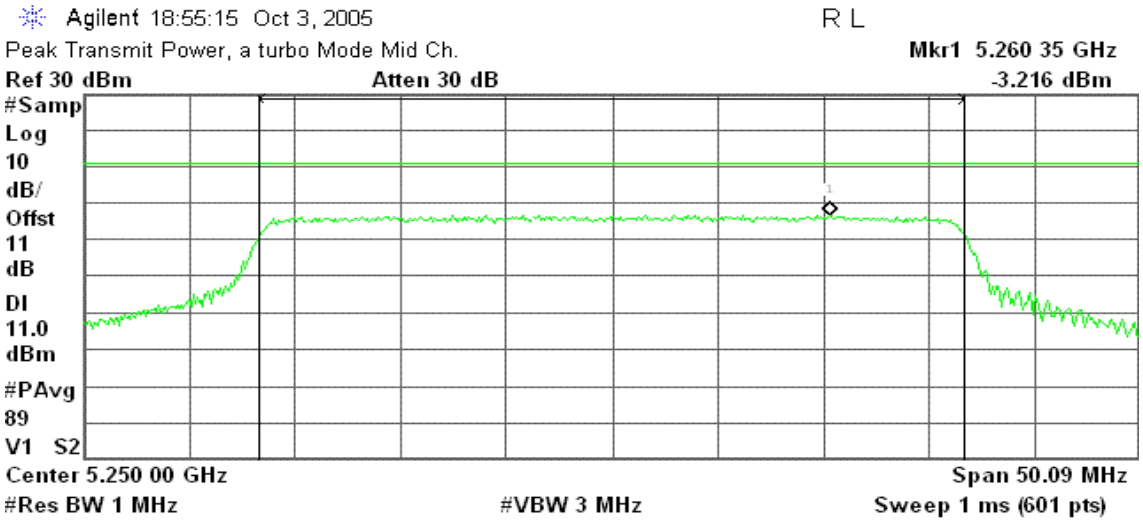
Channel Power

10.15 dBm / 33.3700 MHz

Power Spectral Density

-65.09 dBm/Hz

CH Mid



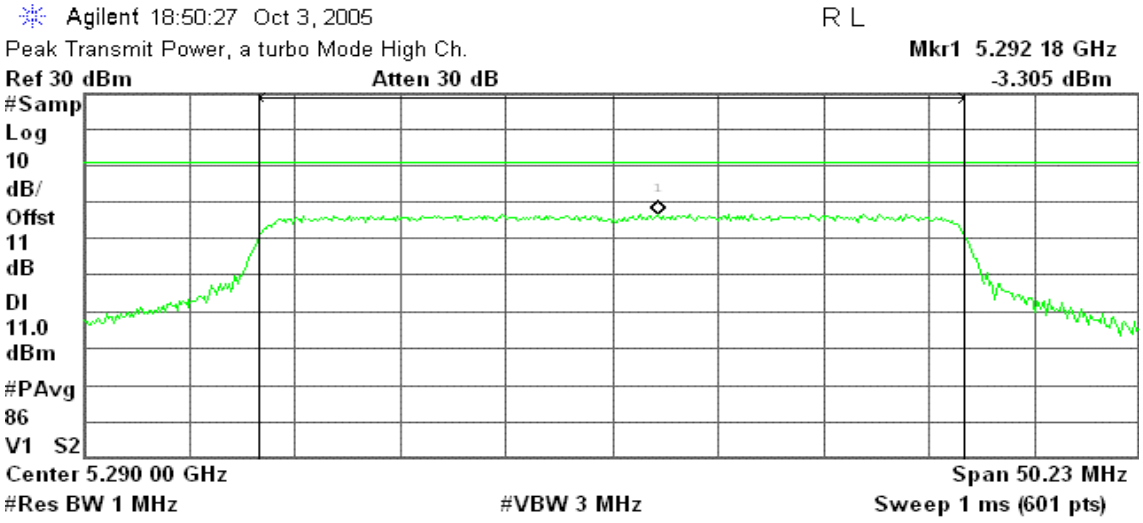
Channel Power

10.65 dBm / 33.3900 MHz

Power Spectral Density

-64.59 dBm/Hz

CH High



Channel Power

11.55 dBm / 33.4900 MHz

Power Spectral Density

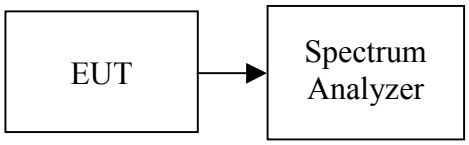
-63.70 dBm/Hz

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 (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

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Channel	Frequency (MHz)		Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	Base mode	5180	9.97	13.0	-3.03	PASS
Mid		5260	9.97	13.0	-3.03	PASS
High		5320	11.48	13.0	-1.52	PASS
Low	Turbo mode	5210	10.00	13.0	-3.00	PASS
Mid		5250	9.15	13.0	-3.85	PASS
High		5290	9.41	13.0	-3.59	PASS

Omnidirectional antenna / 6.0 dBi for 5 GHz

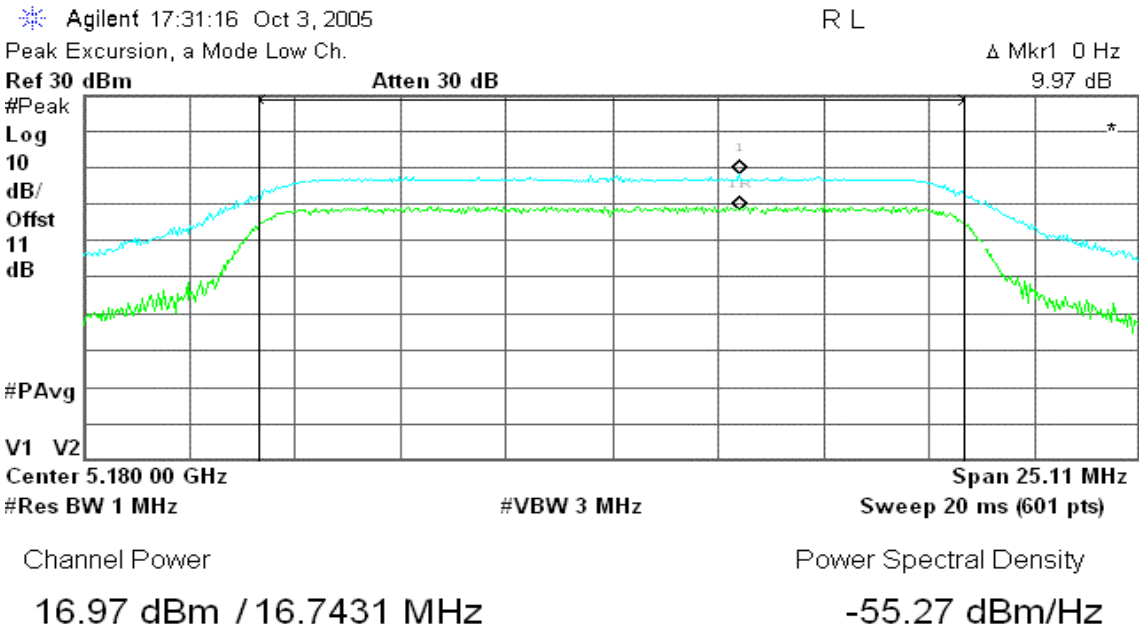
Channel	Frequency (MHz)		Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	Base mode	5180	9.32	13.0	-3.68	PASS
Mid		5260	9.71	13.0	-3.29	PASS
High		5320	10.05	13.0	-2.95	PASS
Low	Turbo mode	5210	8.65	13.0	-4.35	PASS
Mid		5250	10.22	13.0	-2.78	PASS
High		5290	9.07	13.0	-3.93	PASS

Test Plot

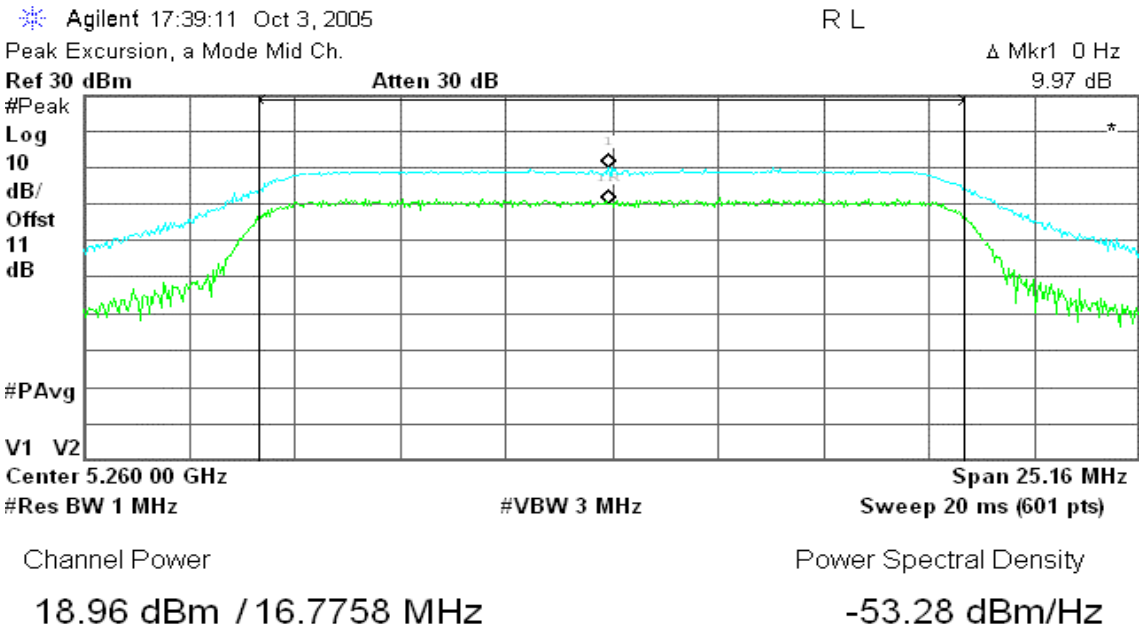
Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

IEEE 802.11a Base mode

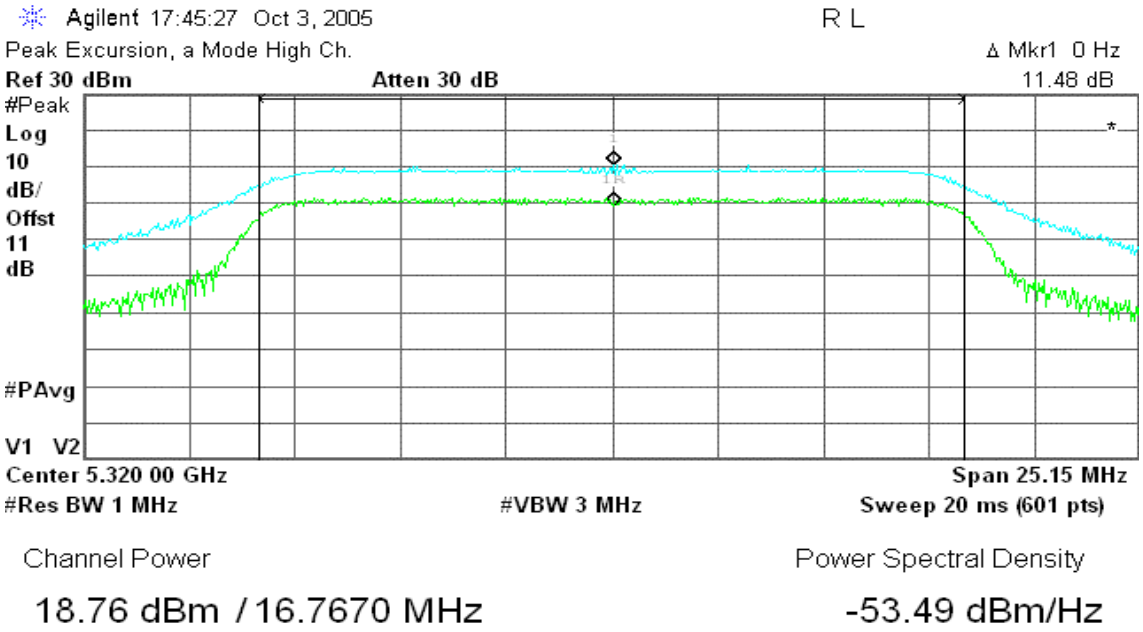
CH Low



CH Mid

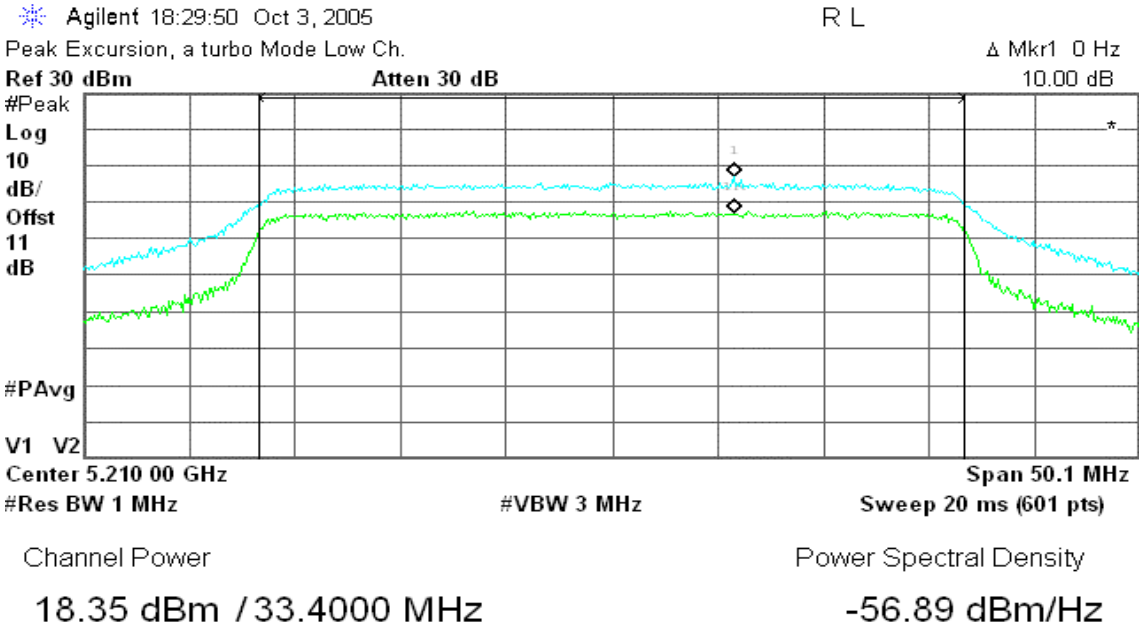


CH High

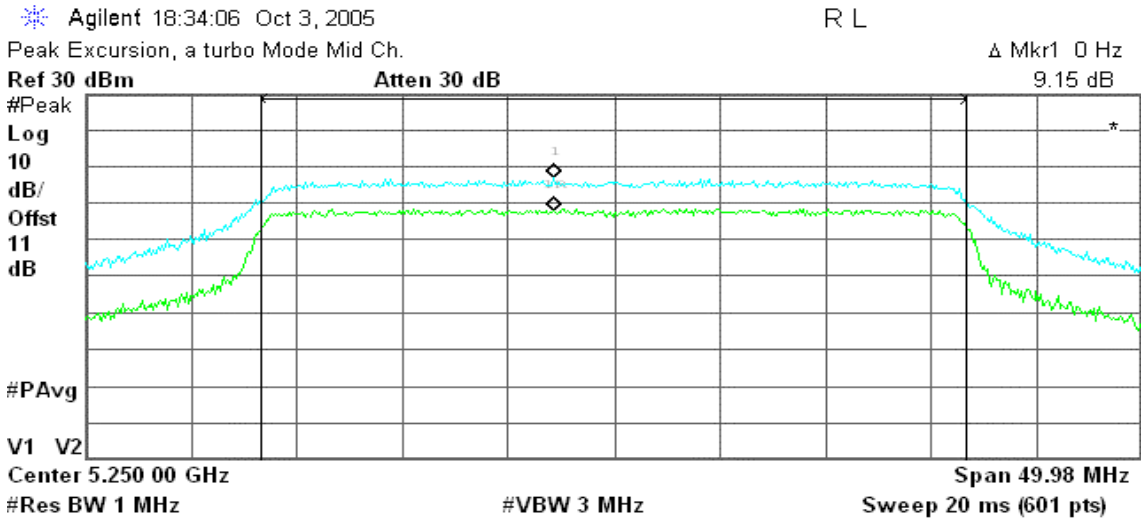


IEEE 802.11a Turbo mode

CH Low



CH Mid



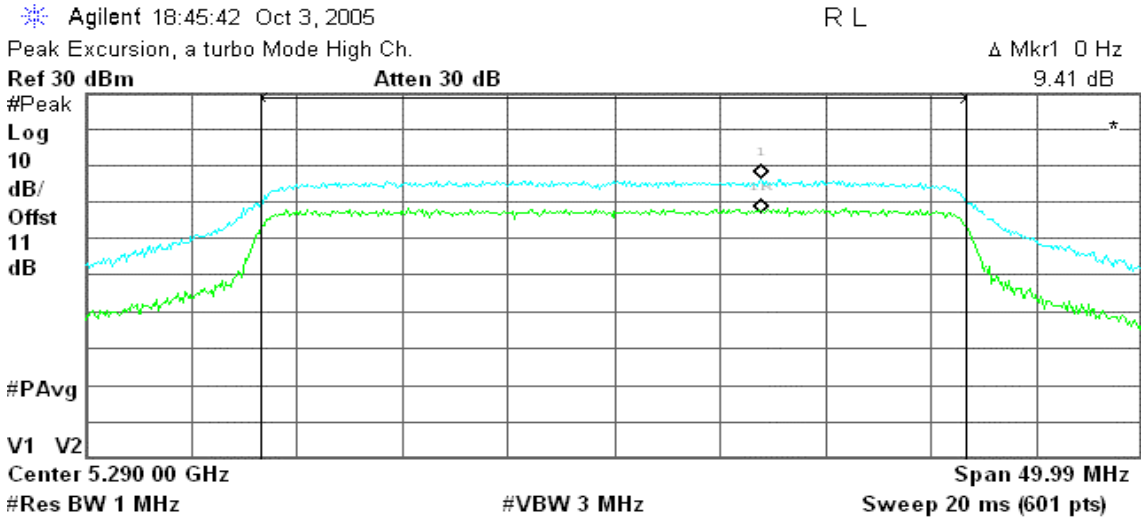
Channel Power

17.76 dBm / 33.3200 MHz

Power Spectral Density

-57.47 dBm/Hz

CH High



Channel Power

18.03 dBm / 33.3300 MHz

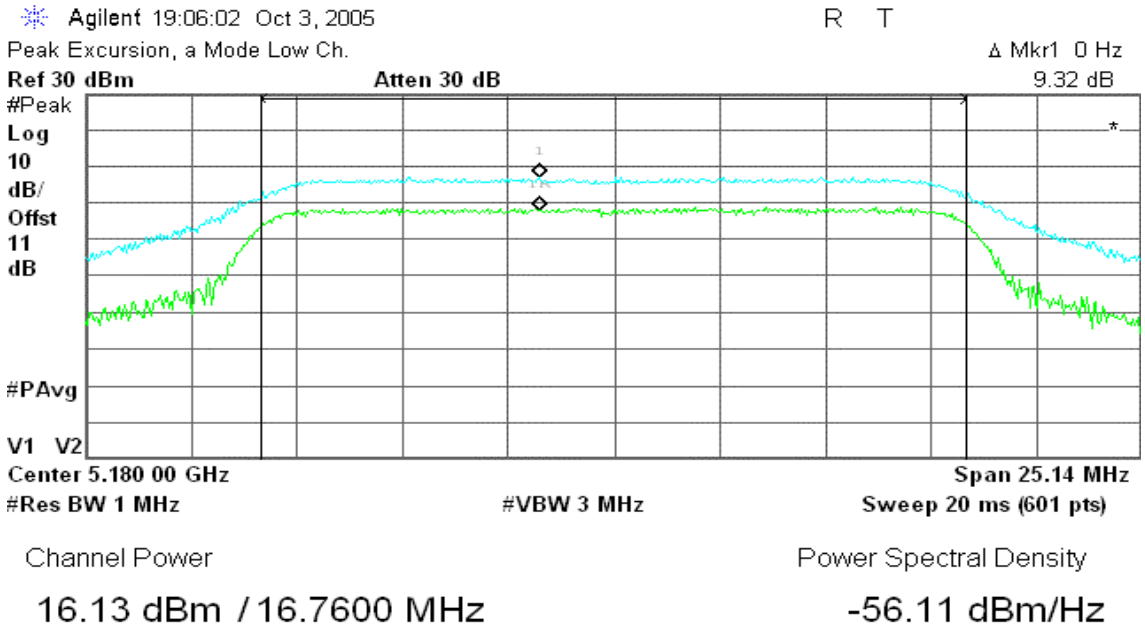
Power Spectral Density

-57.20 dBm/Hz

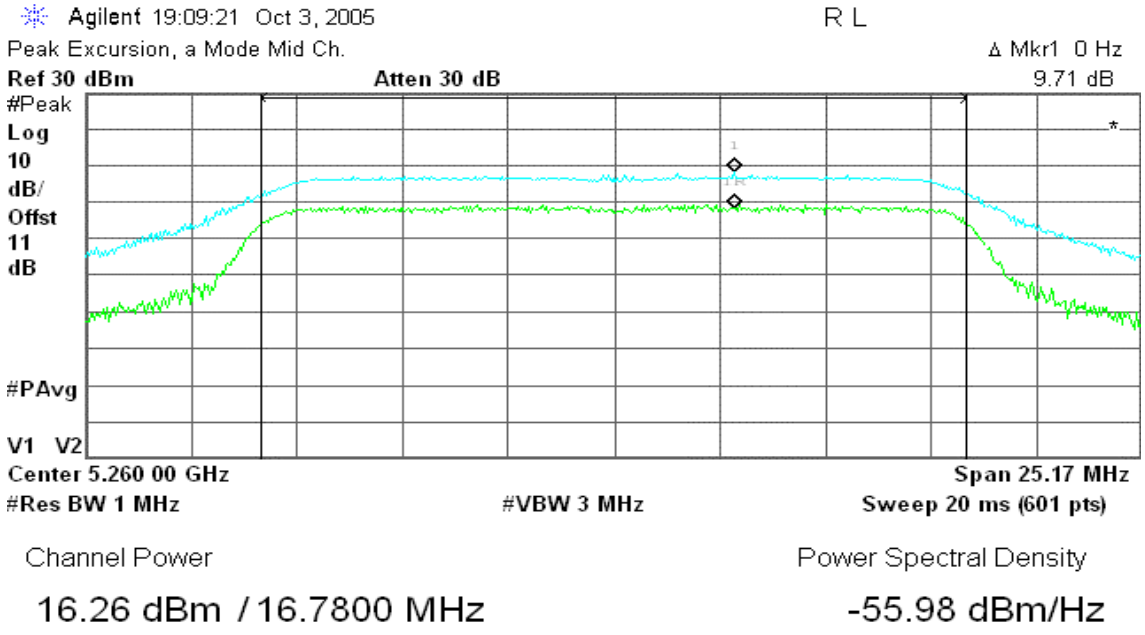
Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

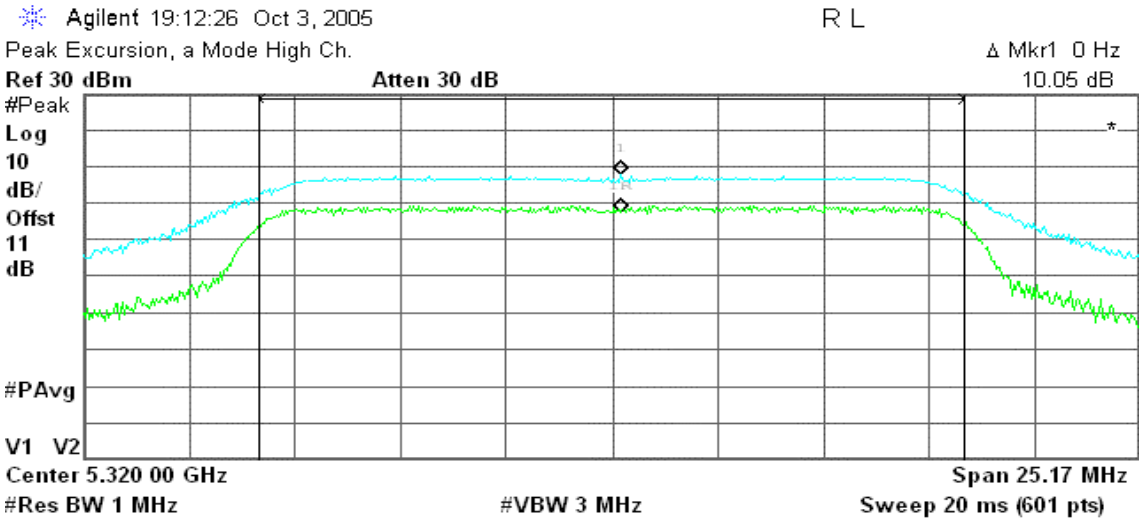
CH Low



CH Mid



CH High



Channel Power

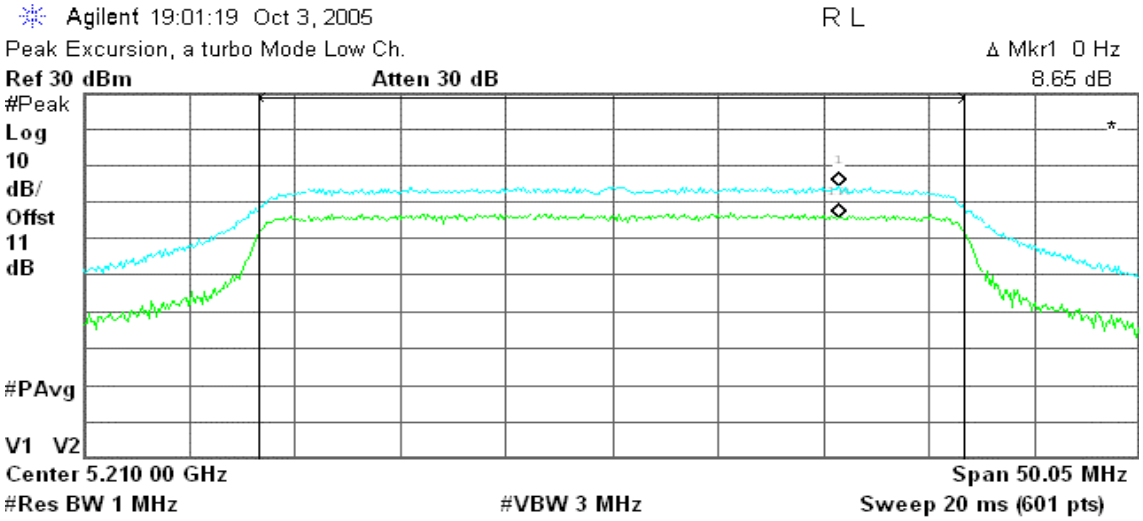
16.84 dBm / 16.7800 MHz

Power Spectral Density

-55.40 dBm/Hz

<u>IEEE 802.11a Turbo mode</u>

CH Low



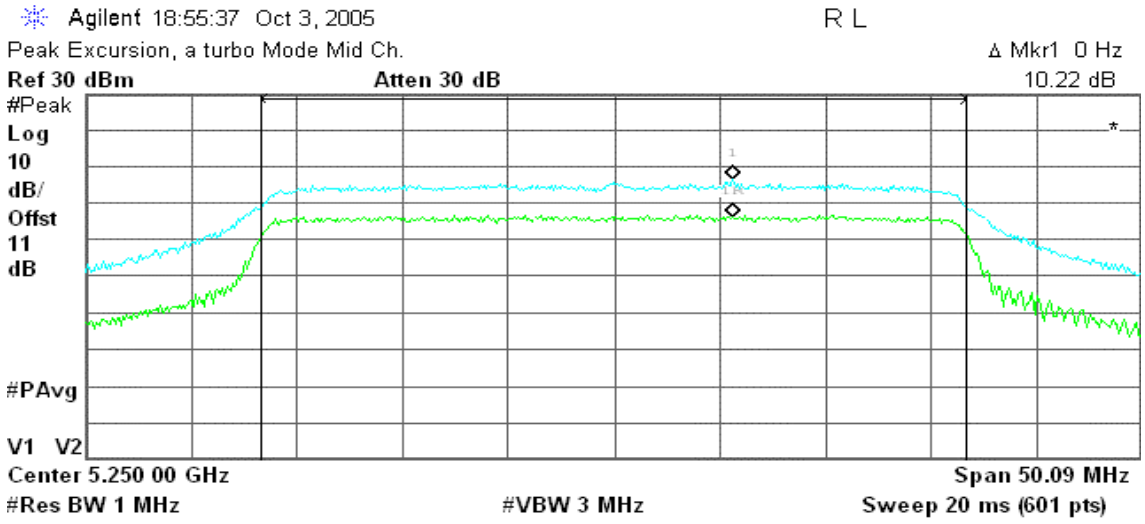
Channel Power

16.07 dBm / 33.3700 MHz

Power Spectral Density

-59.17 dBm/Hz

CH Mid



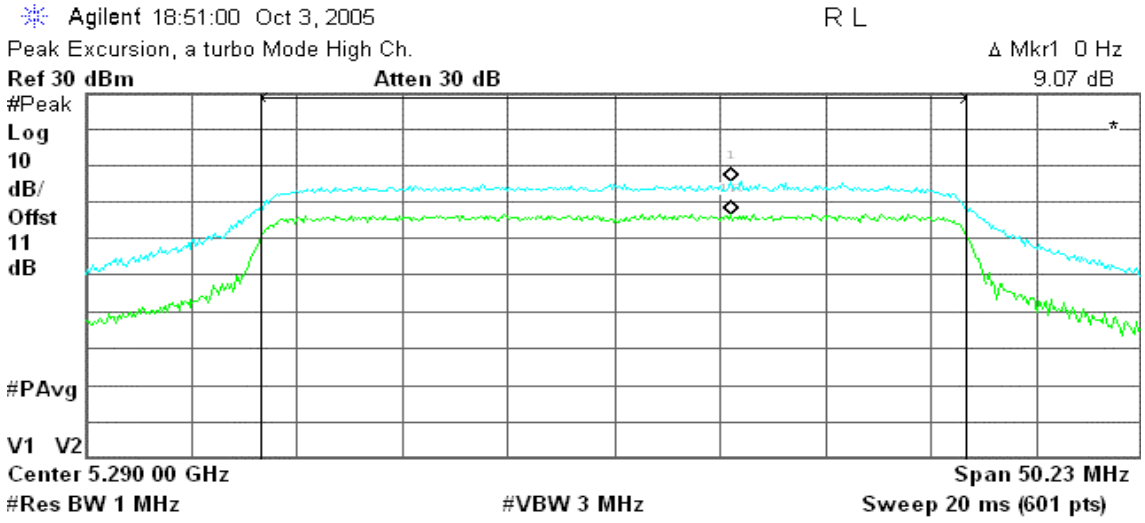
Channel Power

16.38 dBm / 33.3900 MHz

Power Spectral Density

-58.86 dBm/Hz

CH High



Channel Power

16.61 dBm / 33.4900 MHz

Power Spectral Density

-58.64 dBm/Hz

7.6 RADIATED UNDESIRABLE EMISSION

LIMIT

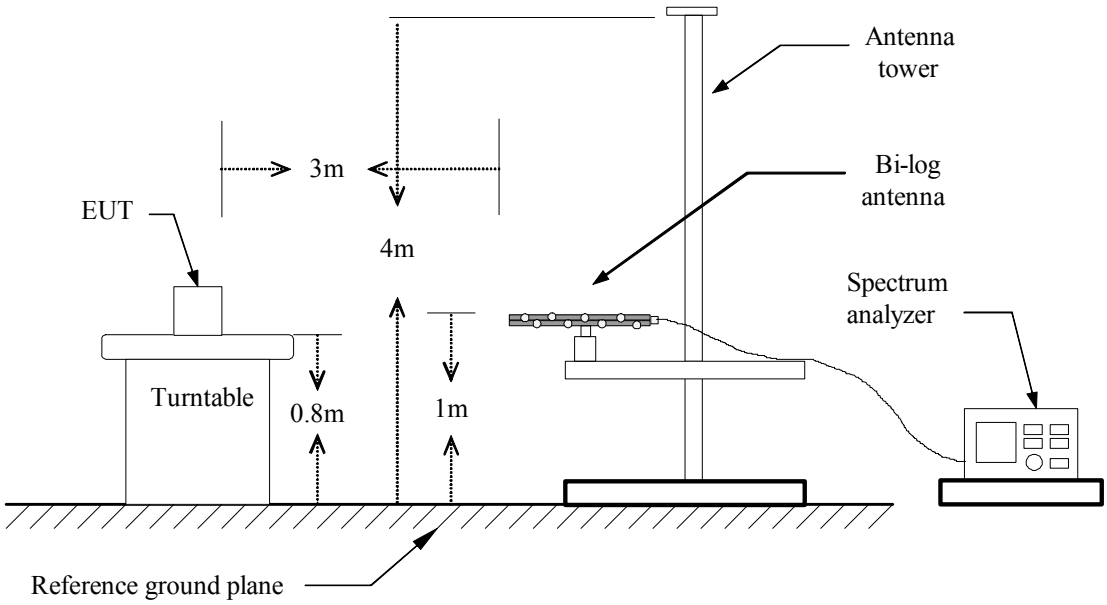
According to 15.407(b),

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

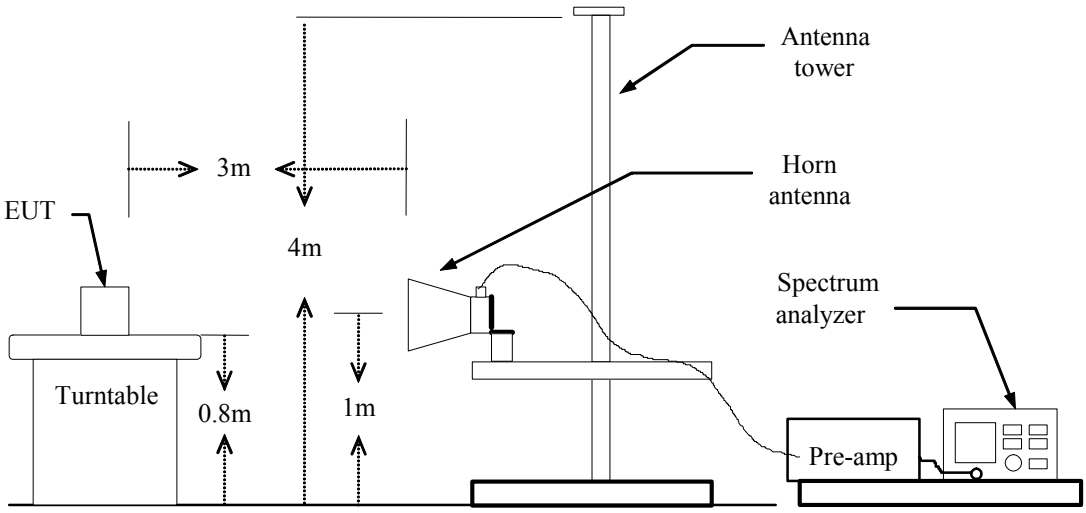
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: Normal Link **Test Date:** October 7, 2005

Temperature: 25°C **Tested by:** Bruce Chen

Humidity: 58% 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)
82.38	V	Peak	62.27	-25.63	36.65	40.00	-3.35
151.25	V	Peak	55.14	-20.50	34.64	43.50	-8.86
440.31	V	Peak	52.33	-14.88	37.45	46.00	-8.55
480.08	V	Peak	51.41	-13.76	37.65	46.00	-8.35
770.11	V	Peak	47.63	-9.82	37.81	46.00	-8.19
N/A							
151.25	H	Peak	58.54	-20.50	38.03	43.50	-5.47
399.57	H	Peak	49.09	-16.07	33.02	46.00	-12.98
440.31	H	Peak	52.34	-14.88	37.47	46.00	-8.53
480.08	H	Peak	53.64	-13.76	39.88	46.00	-6.12
559.62	H	Peak	49.33	-12.54	36.79	46.00	-9.21
770.11	H	Peak	53.85	-9.82	44.03	46.00	-1.97

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. *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.*
4. *The IF bandwidth of SPA between 30MHz and 1GHz was 100 kHz.*

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: Normal Link **Test Date:** October 7, 2005

Temperature: 25°C **Tested by:** Bruce Chen

Humidity: 58% 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)
82.38	V	Peak	62.71	-25.63	37.08	40.00	-2.92
151.25	V	Peak	59.72	-20.50	39.22	43.50	-4.28
440.31	V	Peak	54.15	-14.88	39.27	46.00	-6.73
480.08	V	Peak	52.40	-13.76	38.64	46.00	-7.36
770.11	V	Peak	48.64	-9.82	38.83	46.00	-7.17
N/A							
151.25	H	Peak	55.40	-20.50	34.90	43.50	-8.60
440.31	H	Peak	53.24	-14.88	38.36	46.00	-7.64
480.08	H	Peak	53.58	-13.76	39.82	46.00	-6.18
559.62	H	Peak	48.75	-12.54	36.21	46.00	-9.79
770.11	H	Peak	53.36	-9.82	43.54	46.00	-2.46
879.72	H	Peak	44.32	-8.50	35.82	46.00	-10.18

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. *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.*
4. *The IF bandwidth of SPA between 30MHz and 1GHz was 100 kHz.*

Above 1 GHz

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	39.31	-3.68	35.64	54.00	-18.36	Peak
5025.00	V	39.20	7.02	46.22	54.00	-7.78	Peak
5172.00	V	37.16	7.41	44.57	54.00	-9.43	Peak
5515.00	V	39.93	8.29	48.22	54.00	-5.78	Peak
N/A							
1098.00	H	39.92	-3.68	36.24	54.00	-17.76	Peak
5018.00	H	39.39	7.00	46.38	54.00	-7.62	Peak
5179.00	H	36.86	7.43	44.29	54.00	-9.71	Peak
5529.00	H	37.60	8.29	45.88	54.00	-8.12	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH Mid **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	39.52	-3.68	35.84	54.00	-18.16	Peak
4997.00	V	38.40	6.95	45.35	54.00	-8.65	Peak
5515.00	V	39.86	8.29	48.15	54.00	-5.85	Peak
10520.00	V	33.55	18.15	51.70	54.00	-2.30	Peak
N/A							
1098.00	H	45.00	-3.68	41.33	54.00	-12.67	Peak
5025.00	H	37.95	7.02	44.97	54.00	-9.03	Peak
5529.00	H	37.84	8.29	46.13	54.00	-7.87	Peak
10520.00	H	34.82	18.15	52.97	54.00	-1.03	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH High **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	42.34	-3.68	38.67	54.00	-15.33	Peak
5039.00	V	39.21	7.05	46.27	54.00	-7.73	Peak
5578.00	V	39.10	8.28	47.39	54.00	-6.61	Peak
N/A							
1098.00	H	43.16	-3.68	39.48	54.00	-14.52	Peak
5032.00	H	38.20	7.04	45.23	54.00	-8.77	Peak
5529.00	H	37.28	8.29	45.56	54.00	-8.44	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	40.23	-3.68	36.56	54.00	-17.44	Peak
5018.00	V	38.92	7.00	45.92	54.00	-8.08	Peak
5522.00	V	38.88	8.29	47.17	54.00	-6.83	Peak
N/A							
1098.00	H	43.95	-3.68	40.28	54.00	-13.72	Peak
5025.00	H	38.12	7.02	45.14	54.00	-8.86	Peak
5494.00	H	36.81	8.27	45.08	54.00	-8.92	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m)

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH Mid **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	43.99	-3.68	40.31	54.00	-13.69	Peak
5004.00	V	39.24	6.96	46.20	54.00	-7.80	Peak
5515.00	V	39.90	8.29	48.19	54.00	-5.81	Peak
N/A							
1098.00	H	44.59	-3.68	40.91	54.00	-13.09	Peak
5018.00	H	38.62	7.00	45.61	54.00	-8.39	Peak
5242.00	H	36.93	7.60	44.53	54.00	-9.47	Peak
5725.00	H	38.18	8.27	46.45	54.00	-7.55	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH High **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1098.00	V	41.47	-3.68	37.79	54.00	-16.21	Peak
4969.00	V	38.65	6.93	45.59	54.00	-8.41	Peak
5494.00	V	38.61	8.27	46.88	54.00	-7.12	Peak
N/A							
1098.00	H	43.99	-3.68	40.32	54.00	-13.68	Peak
5018.00	H	38.41	7.00	45.40	54.00	-8.60	Peak
5690.00	H	37.37	8.27	45.65	54.00	-8.35	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
10360.000	V	71.64	-33.74	37.90	54.00	-16.10	Peak
N/A							
10360.000	H	77.27	-33.74	43.53	54.00	-10.47	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH Mid **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
10520.000	V	68.23	-34.19	34.04	54.00	-19.96	Peak
N/A							
10520.000	H	71.58	-34.19	37.38	54.00	-16.62	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: Tx / IEEE 802.11a Base mode / CH High **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** James Yu

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
10630.000	V	65.79	-34.21	31.58	54.00	-22.42	Peak
N/A							
10640.000	H	70.83	-34.21	36.62	54.00	-17.38	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** Chris Hsieh

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1063.00	V	51.10	-6.81	44.29	54.00	-9.71	Peak
4192.00	V	43.32	-1.30	42.02	54.00	-11.98	Peak
10407.38	V	80.51	-34.89	45.61	54.00	-8.39	Peak
N/A							
4283.00	H	42.39	-1.07	41.32	54.00	-12.68	Peak
6537.00	H	43.93	2.41	46.34	54.00	-7.66	Peak
10420.00	H	75.83	-34.93	40.90	54.00	-13.10	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** Chris Hsieh

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
4318.00	V	42.31	-0.98	41.33	54.00	-12.67	Peak
7286.00	V	42.70	6.00	48.70	54.00	-5.30	Peak
10515.33	V	80.79	-35.19	45.60	54.00	-8.40	Peak
N/A							
4108.00	H	43.30	-1.52	41.78	54.00	-12.22	Peak
10515.33	H	77.35	-35.19	42.16	54.00	-11.84	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: TX IEEE 802.11a Turbo mode / CH Low **Test Date:** September 21, 2005

Temperature: 25°C **Tested by:** Chris Hsieh

Humidity: 55% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
6943.00	V	42.65	6.89	49.54	54.00	-4.46	Peak
10587.30	V	80.46	-35.20	45.26	54.00	-8.74	Peak
N/A							
4367.00	H	41.73	-0.86	40.88	54.00	-13.12	Peak
10587.30	H	73.98	-35.20	38.78	54.00	-15.22	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
   Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. 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.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m).

7.7 CONDUCTED UNDESIRABLE EMISSION

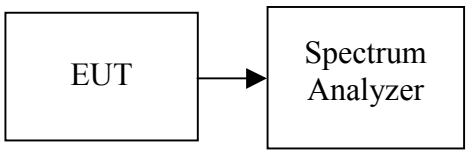
LIMIT

According to 15.407(b),

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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 detector 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.

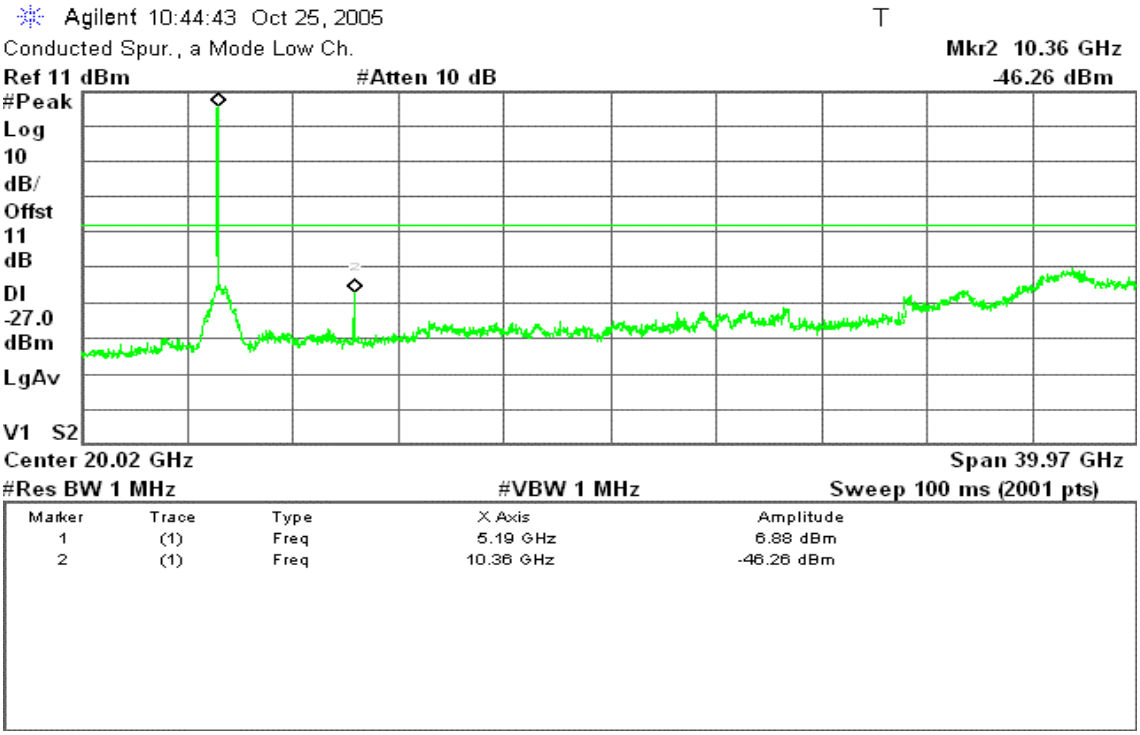
Test Plot

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

IEEE 802.11a Base mode

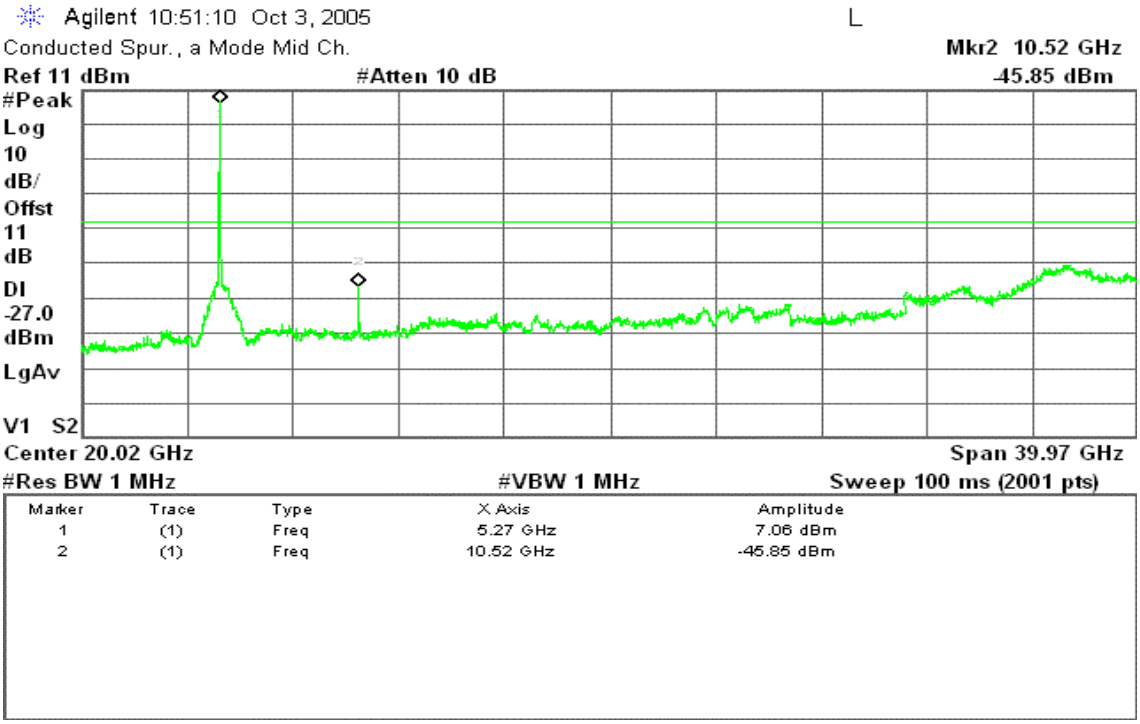
CH Low

30MHz ~ 40GHz



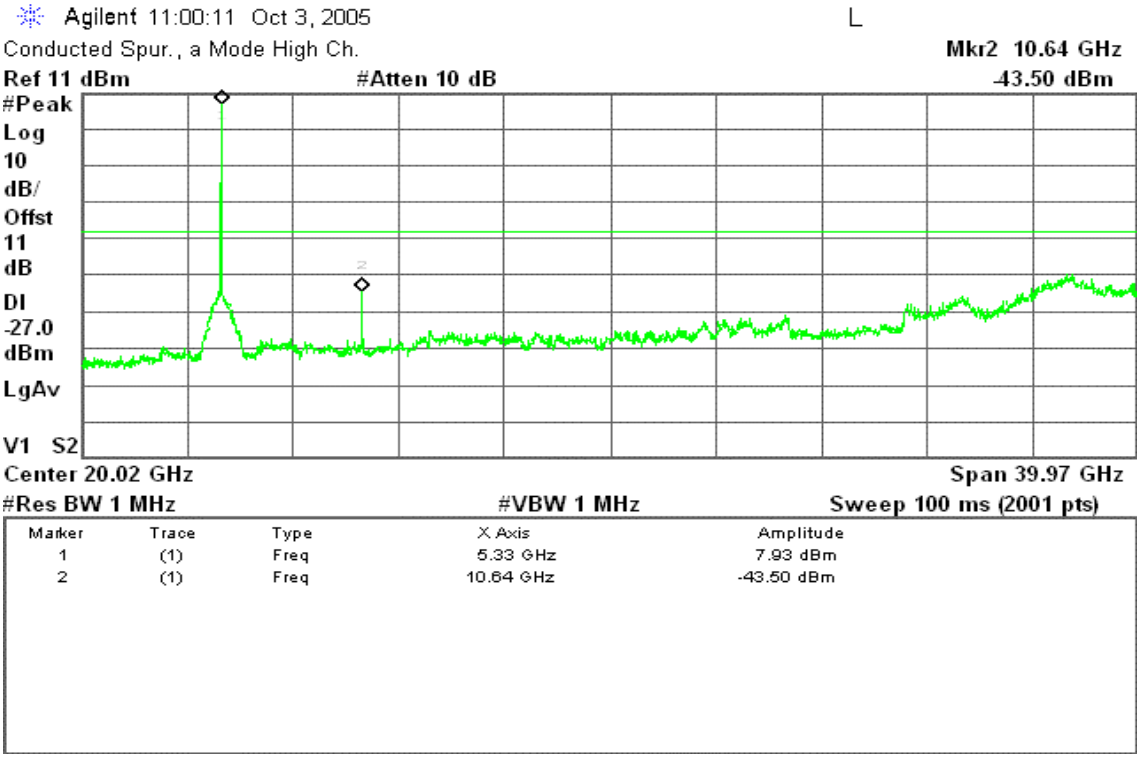
CH Mid

30MHz ~ 40GHz



CH High

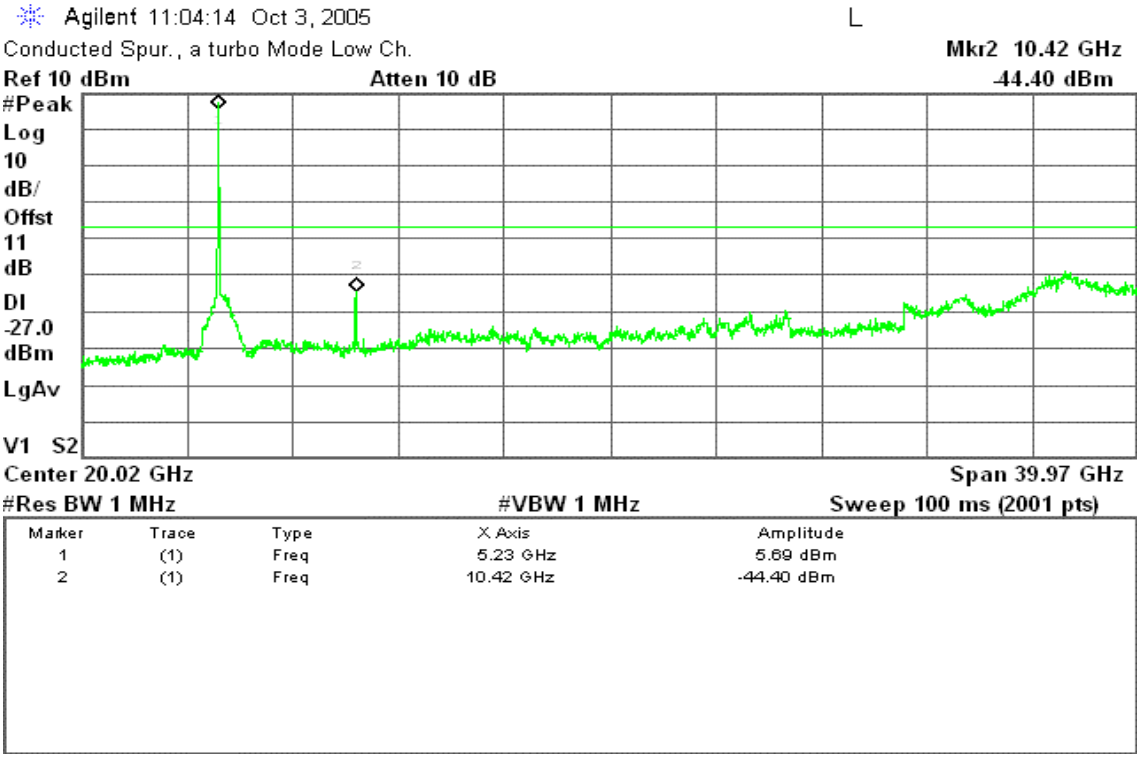
30MHz ~ 40GHz



IEEE 802.11a Turbo mode

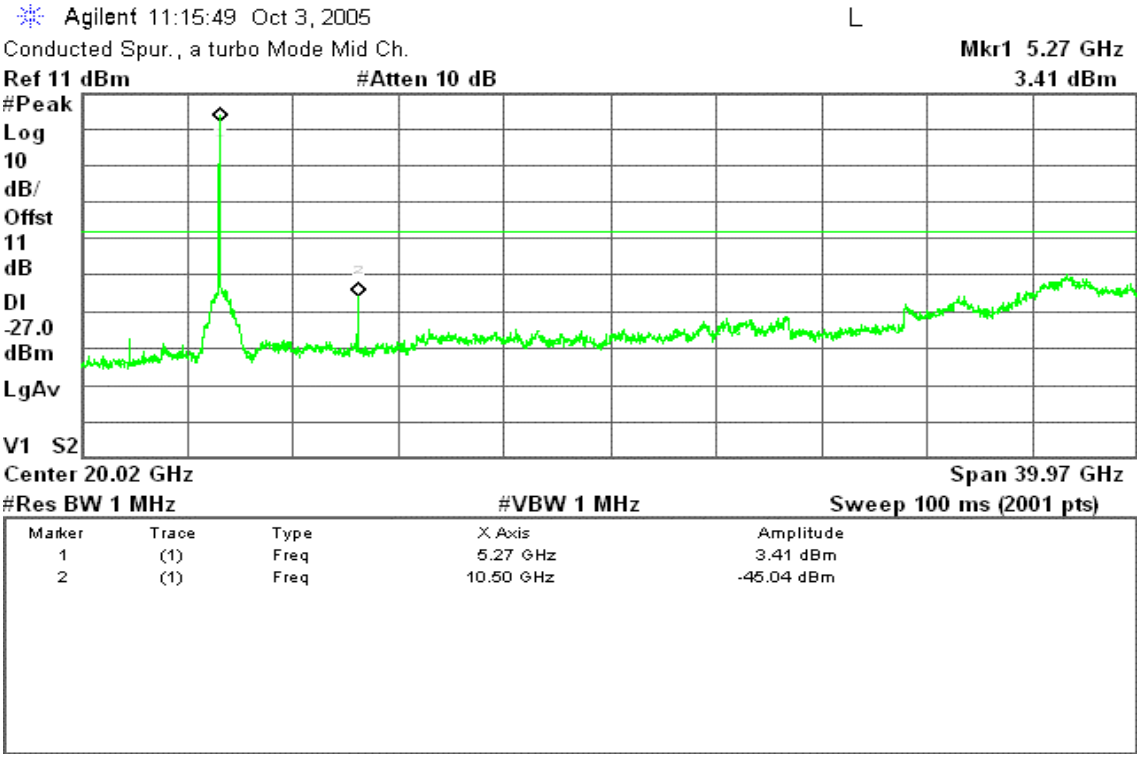
CH Low

30MHz ~ 40GHz



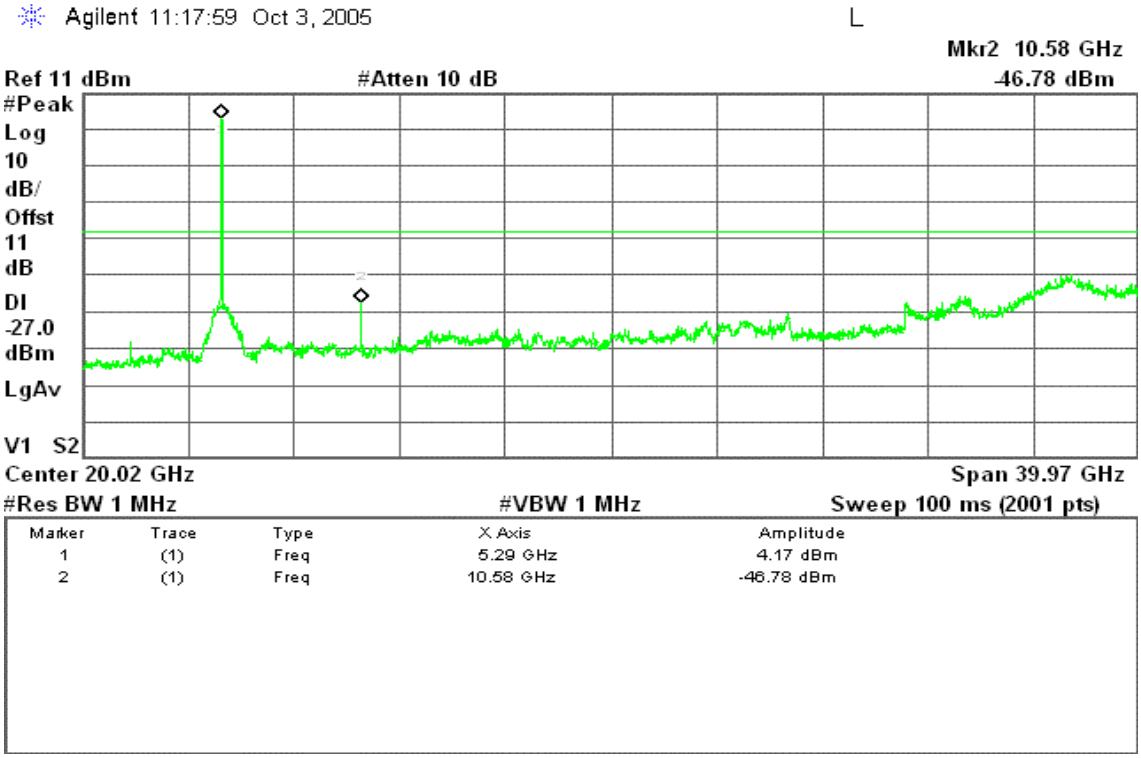
CH Mid

30MHz ~ 40GHz



CH High

30MHz ~ 40GHz

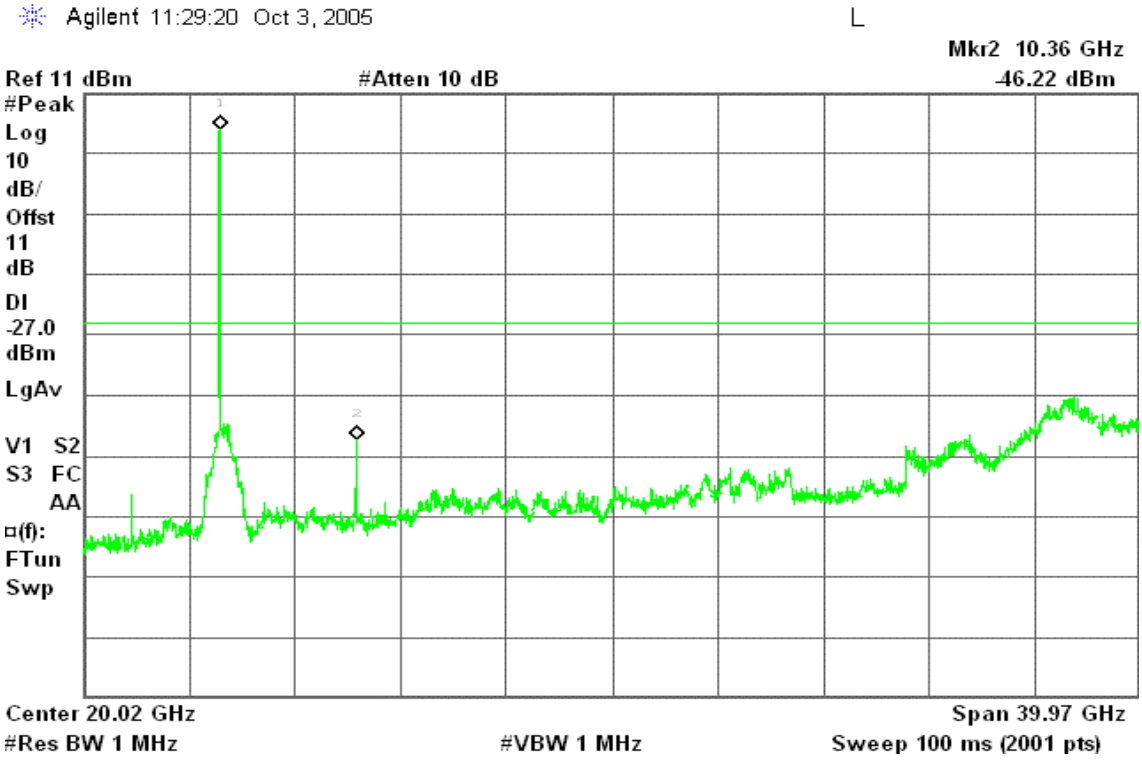


Omnidirectional antenna / 6.0 dBi for 5 GHz

IEEE 802.11a Base mode

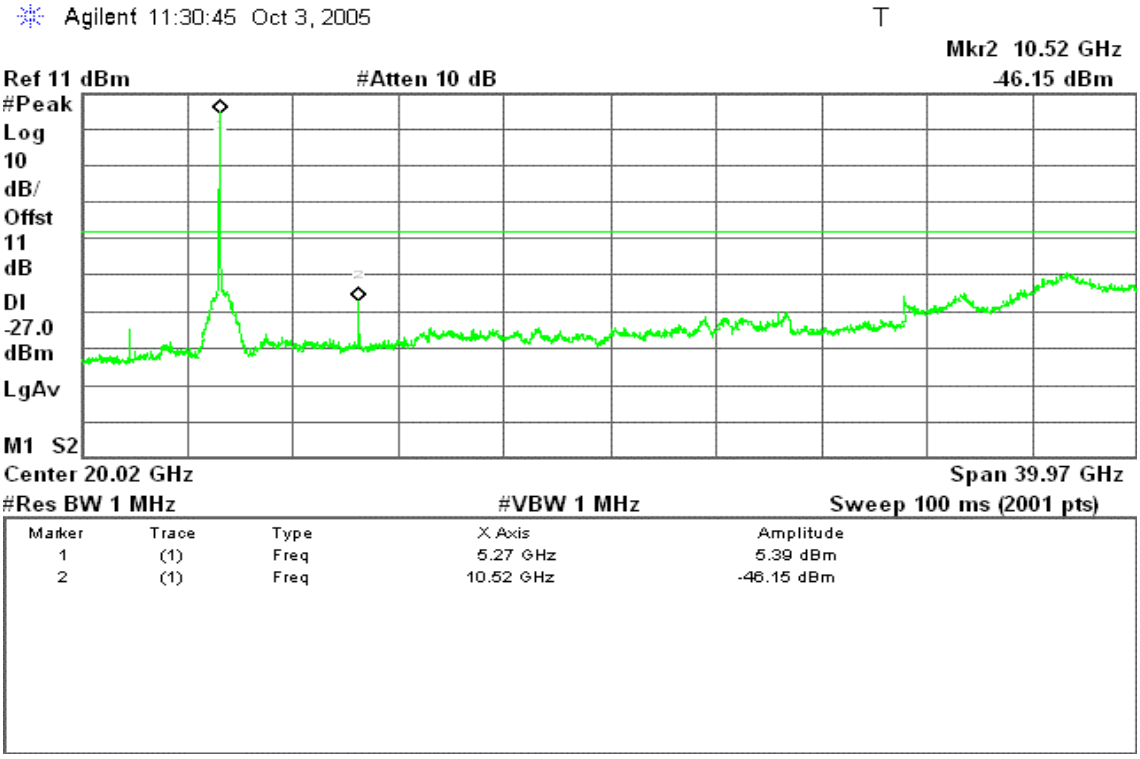
CH Low

30MHz ~ 40GHz



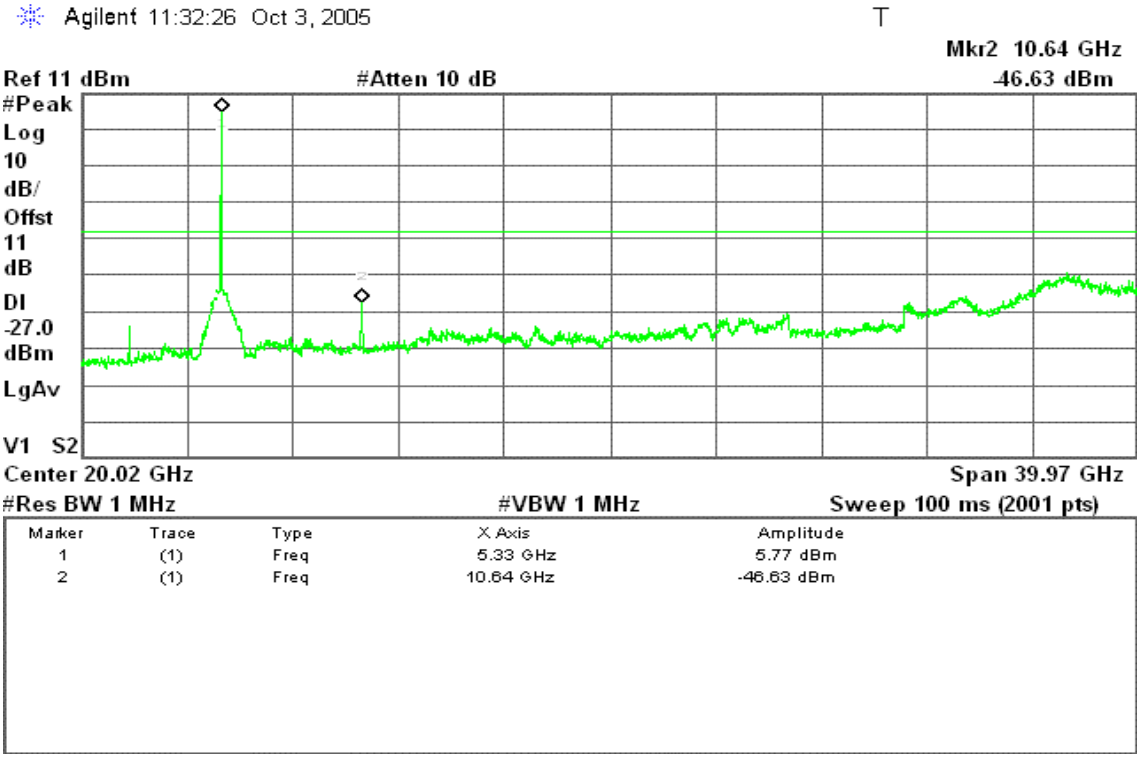
CH Mid

30MHz ~ 40GHz



CH High

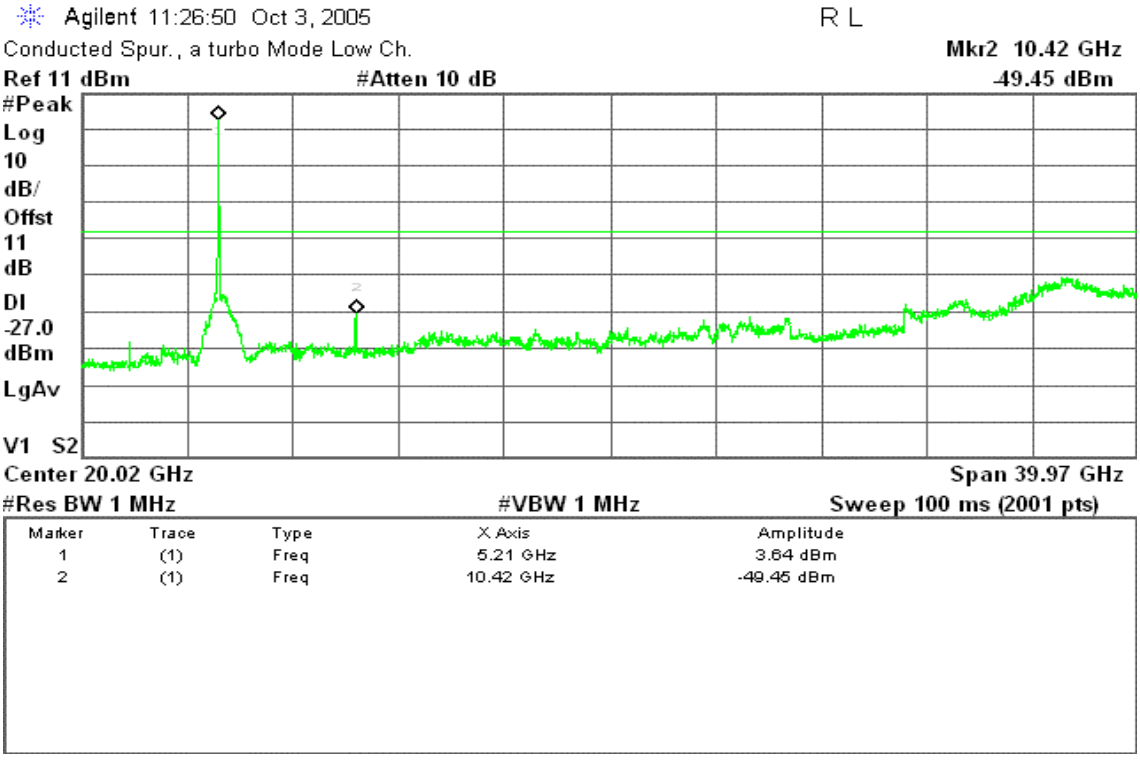
30MHz ~ 40GHz



IEEE 802.11a Turbo mode

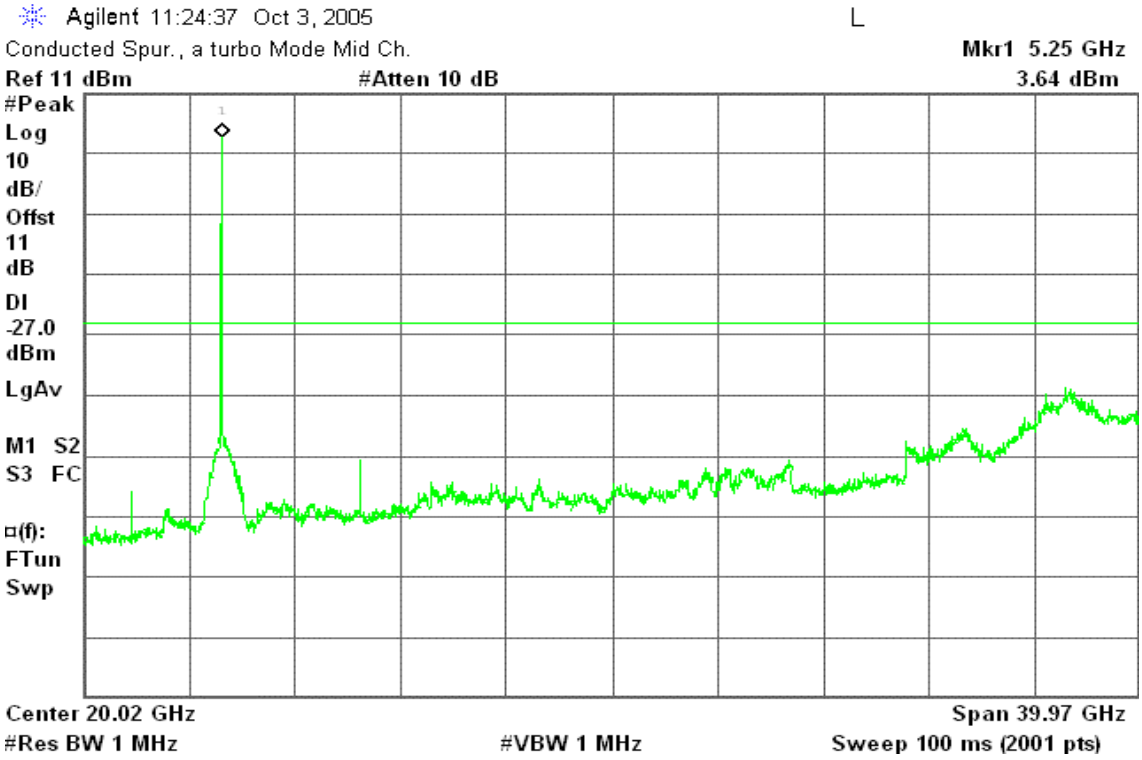
CH Low

30MHz ~ 40GHz



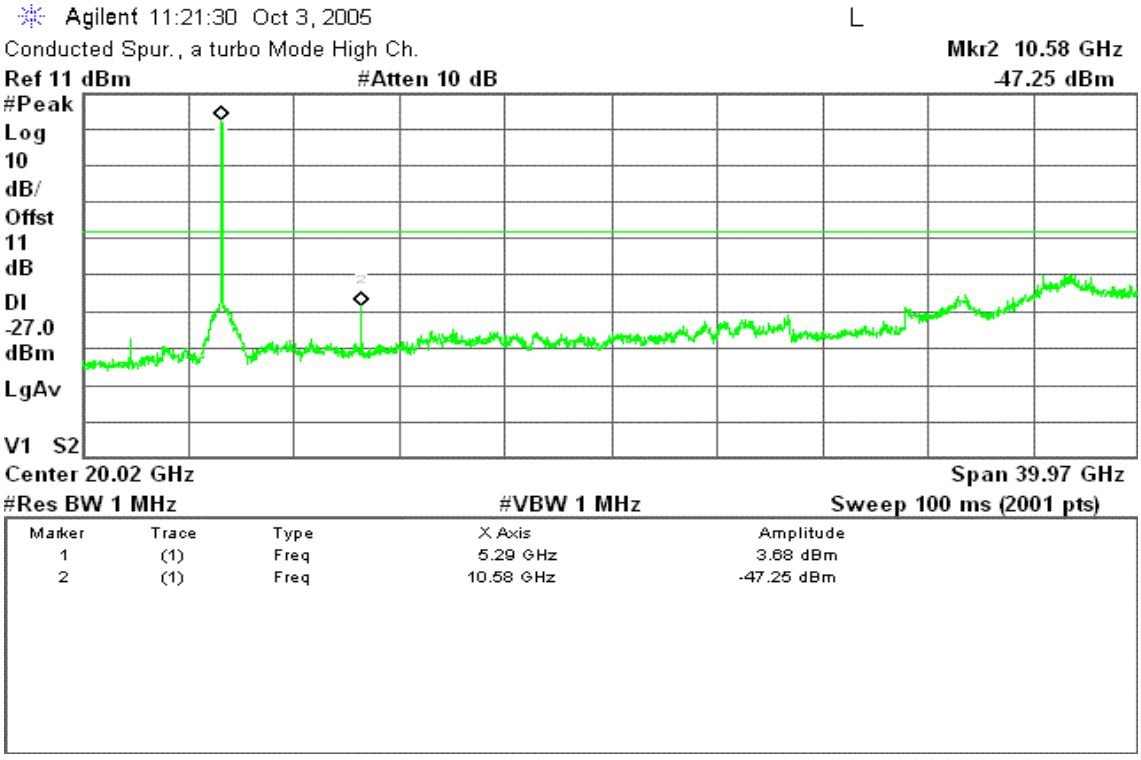
CH Mid

30MHz ~ 40GHz



CH High

30MHz ~ 40GHz



7.8 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

Omnidirectional Panel antenna / 3.0 dBi for 2.4 GHz and 5 GHz

Operation Mode:	Normal Link	**Test Date:**	October 5, 2005
Temperature:	25°C	**Tested by:**	Mark Chen
Humidity:	55% RH		

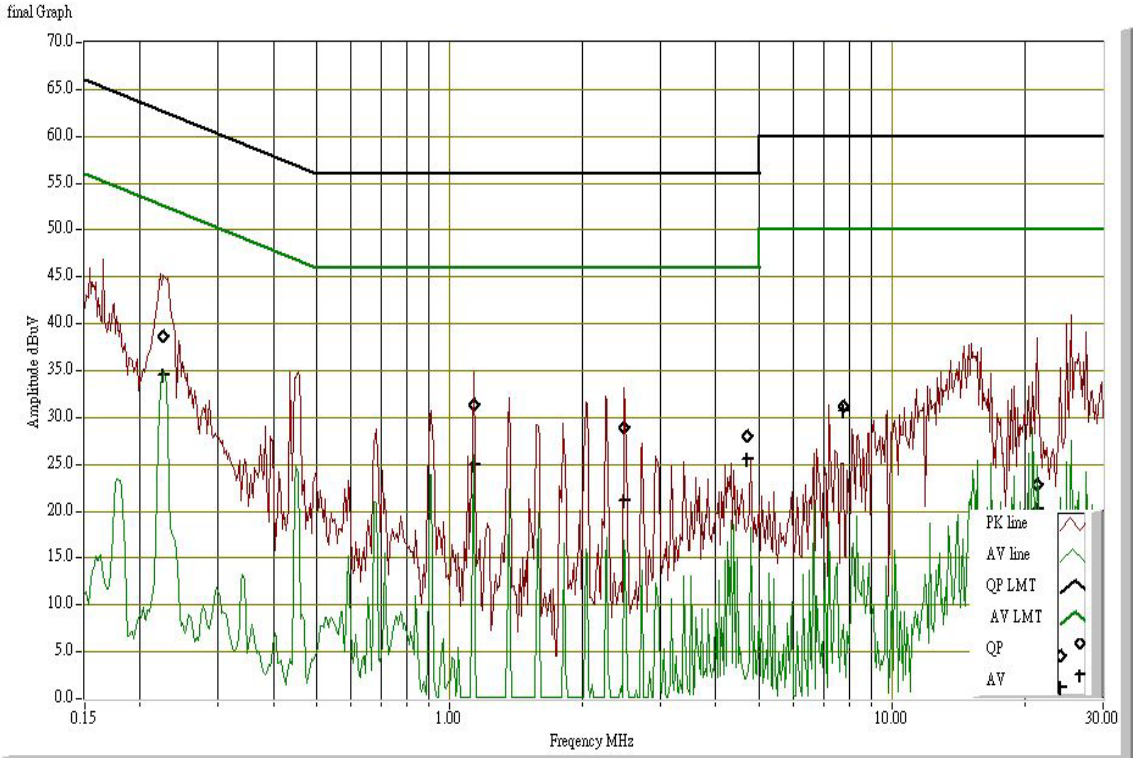
Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.225	38.670	34.500	0.100	38.770	34.600	62.632	52.632	-23.862	-18.032	L1
4.710	28.030	25.520	0.171	28.201	25.691	56.000	46.000	-27.799	-20.309	L1
1.135	31.350	24.970	0.100	31.450	25.070	56.000	46.000	-24.550	-20.930	L1
2.479	28.850	21.200	0.100	28.950	21.300	56.000	46.000	-27.050	-24.700	L1
7.777	31.240	30.740	0.478	31.718	31.218	60.000	50.000	-28.282	-18.782	L1
21.308	22.860	20.290	1.200	24.060	21.490	60.000	50.000	-35.940	-28.510	L1
0.227	39.930	31.430	0.100	40.030	31.530	62.559	52.559	-22.529	-21.029	L2
0.454	27.970	26.480	0.100	28.070	26.580	56.802	46.802	-28.732	-20.222	L2
1.135	33.590	28.940	0.100	33.690	29.040	56.000	46.000	-22.310	-16.960	L2
7.770	31.390	31.250	0.477	31.867	31.727	60.000	50.000	-28.133	-18.273	L2
20.805	28.780	27.720	1.200	29.980	28.920	60.000	50.000	-30.020	-21.080	L2
25.391	29.210	26.690	1.216	30.426	27.906	60.000	50.000	-29.574	-22.094	L2

Remark:

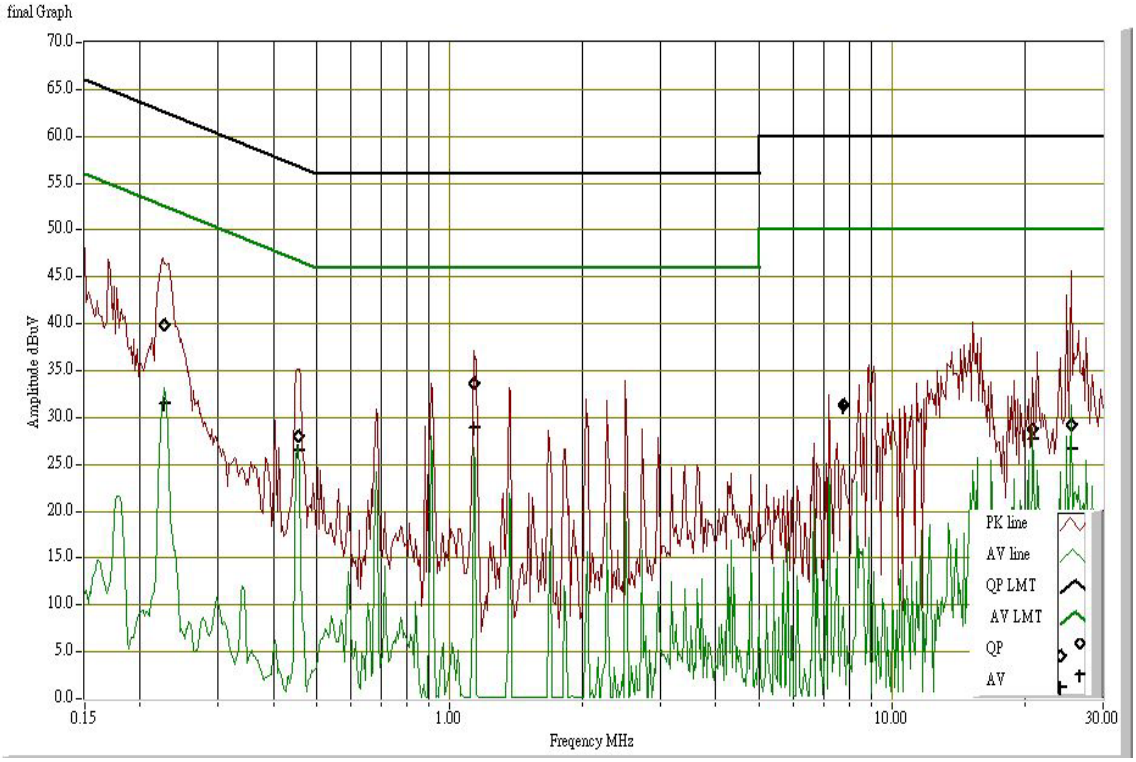
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between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

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



Omnidirectional antenna / 6.0 dBi for 5 GHz

Operation Mode: Normal Link **Test Date:** October 7, 2005
Temperature: 25°C **Tested by:** Mark Chen
Humidity: 55% RH

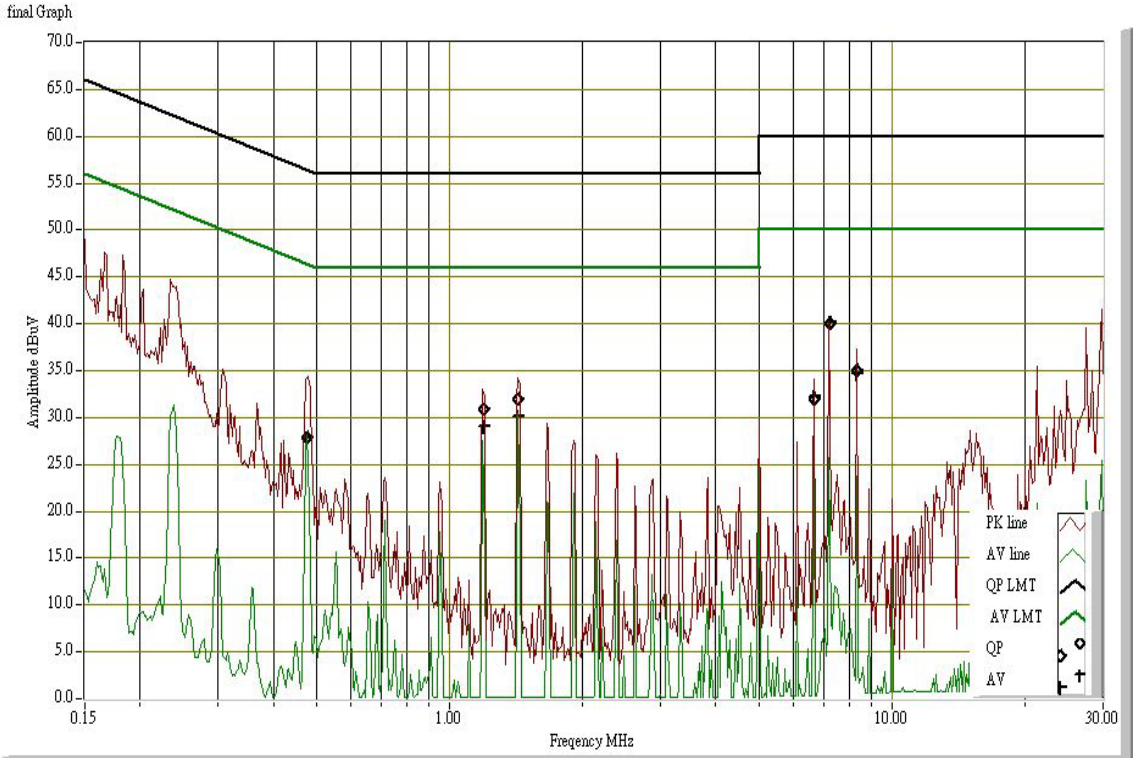
Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.476	27.910	27.870	0.100	28.010	27.970	56.409	46.409	-28.399	-18.439	L1
1.191	30.890	29.100	0.100	30.990	29.200	56.000	46.000	-25.010	-16.800	L1
1.430	31.980	30.150	0.100	32.080	30.250	56.000	46.000	-23.920	-15.750	L1
6.667	32.000	32.260	0.367	32.367	32.627	60.000	50.000	-27.633	-17.373	L1
7.220	40.010	40.150	0.422	40.432	40.572	60.000	50.000	-19.568	-9.428	L1
8.329	34.970	34.680	0.533	35.503	35.213	60.000	50.000	-24.497	-14.787	L1
0.240	35.520	33.760	0.100	35.620	33.860	62.096	52.096	-26.476	-18.236	L2
0.480	26.390	24.410	0.100	26.490	24.510	56.339	46.339	-29.849	-21.829	L2
1.200	29.240	21.360	0.100	29.340	21.460	56.000	46.000	-26.660	-24.540	L2
1.432	32.350	29.950	0.100	32.450	30.050	56.000	46.000	-23.550	-15.950	L2
7.220	40.030	40.150	0.422	40.452	40.572	60.000	50.000	-19.548	-9.428	L2
8.331	34.930	34.680	0.533	35.463	35.213	60.000	50.000	-24.537	-14.787	L2

Remark:

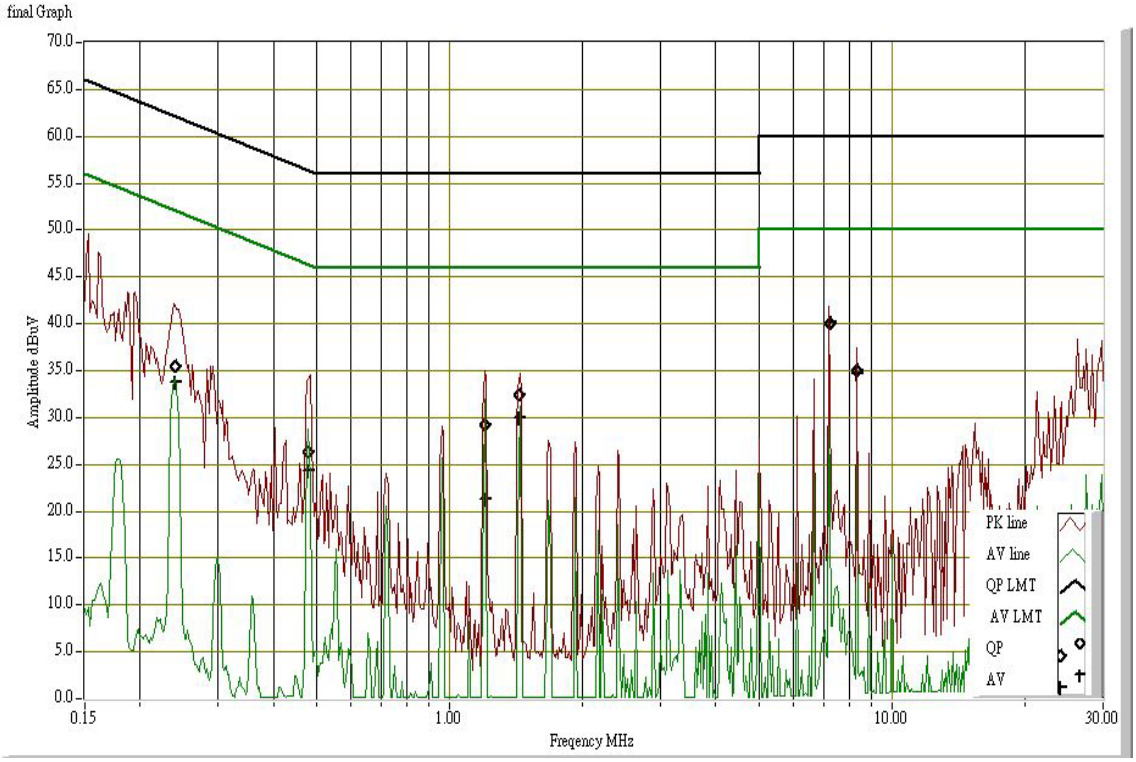
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between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

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



7.9 TRANSMISSION IN ABSENCE OF DATA

LIMIT

According to §15.319(f), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or 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

Remark: *For the details, please refer to the theory of the operation.*

7.10 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 RESULTS

Please refer to the user's manual for further details.

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