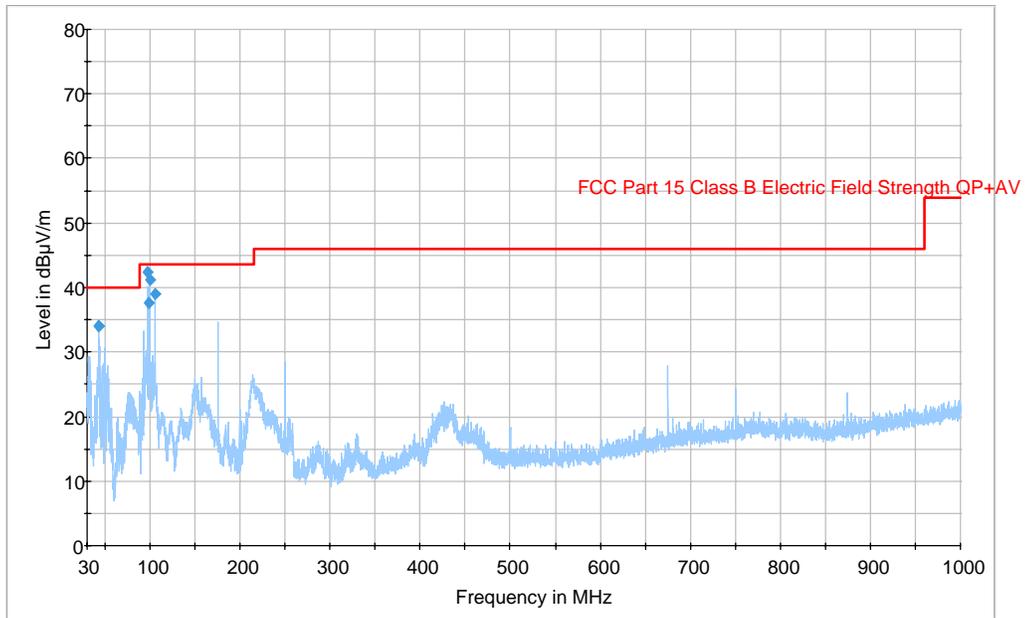


Unwanted Emission@ 3 meter

Run # 1 Radiated Harmonic and Spur Emission 802.11a (Omni - Antenna 10.0 dBi)



Frequency (MHz)	QuasiPeak (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Margin (dB)	Limit (dBµV/m)
43.293750	34.1	99.0	V	333.0	5.9	40.0
43.296250	34.0	99.0	V	250.0	6.0	40.0
97.657500	42.4	99.0	H	253.0	1.1	43.5
98.466250	37.6	100.0	H	39.0	5.9	43.5
100.285000	41.2	98.0	H	261.0	2.3	43.5
105.620000	38.9	326.0	V	312.0	4.6	43.5

## §15.207(a) – AC Line Conducted Emissions

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### Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is  $\pm 2.4$  dB.

### EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundled when necessary.

The notebook PC was connected with 120Vac/60Hz power source.

### Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	2006-03-13
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	2005-08-16

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB of specification limits). Quasi-peak readings are distinguished with a "Qp".

## Summary of Test Results

According to the data in following table, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

**16.0 dB at 2.034000 MHz** in the **Line** conductor mode\*  
**14.2 dB at 2.034000 MHz** in the **Neutral** conductor mode\*

*\*The test data was within the measurement of uncertainty*

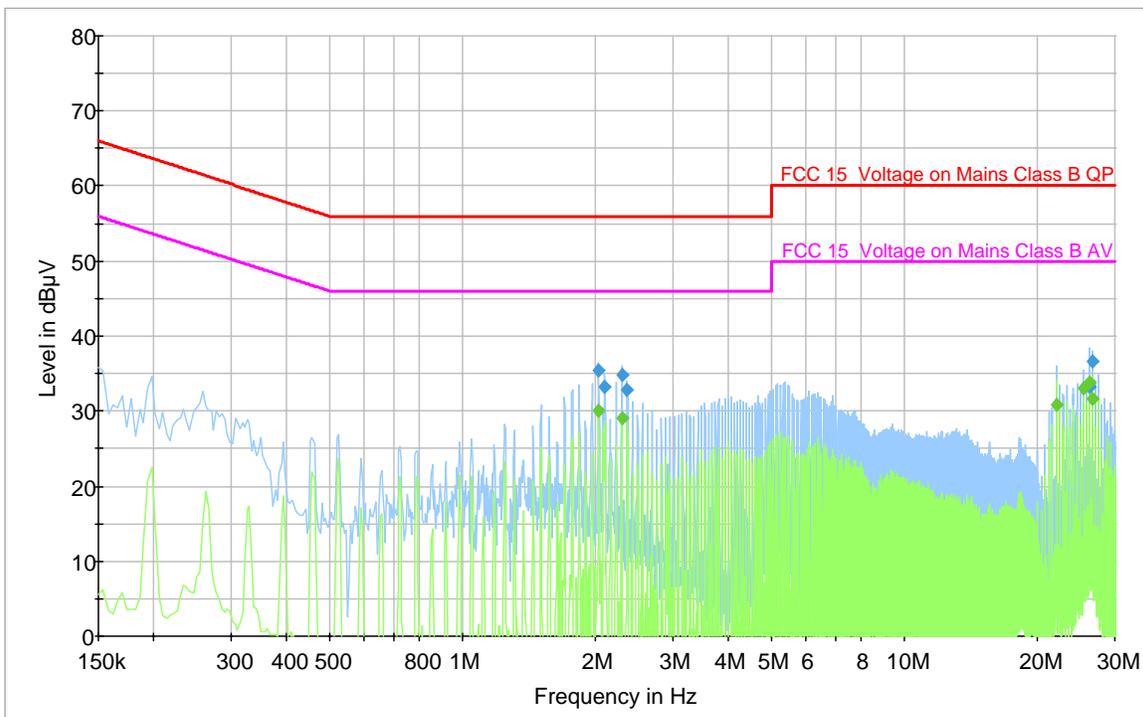
## Environmental Conditions

Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

The testing was performed by James Ma on 2006-06-15.

## Conducted Emissions Test plots and Data

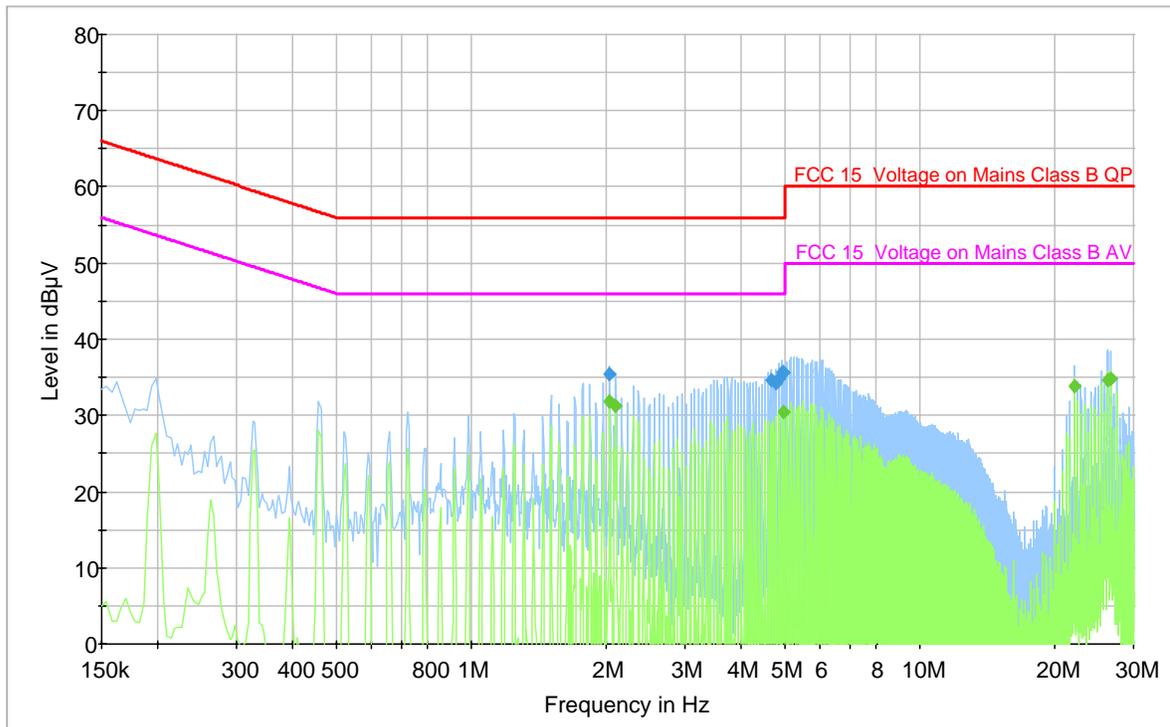
Line:



Frequency (MHz)	Average (dB $\mu$ V)	Line	Margin (dB)	Limit (dB $\mu$ V)
2.034000	30.0	L1	16.0	46.0
26.278000	33.8	L1	16.2	50.0
25.442000	33.1	L1	16.9	50.0
2.298000	29.0	L1	17.0	46.0
26.690000	31.6	L1	18.4	50.0
22.102000	30.9	L1	19.1	50.0
2.034000	35.5	L1	20.5	56.0
2.298000	34.8	L1	21.2	56.0
2.098000	33.3	L1	22.7	56.0
2.362000	32.7	L1	23.3	56.0
26.698000	36.6	L1	23.5	60.0
26.266000	33.3	L1	26.7	60.0

### Conducted Emissions Test plots and Data

Neutral:



<b>Frequency (MHz)</b>	<b>Average (dB<math>\mu</math>V)</b>	<b>Line</b>	<b>Margin (dB)</b>	<b>Limit (dB<math>\mu</math>V)</b>
2.034000	31.8	N	14.2	46.0
2.102000	31.3	N	14.7	46.0
26.682000	34.9	N	15.1	50.0
26.266000	34.6	N	15.4	50.0
4.990000	30.4	N	15.6	46.0
22.098000	33.9	N	16.1	50.0
4.922000	35.7	N	20.4	56.0
4.990000	35.6	N	20.4	56.0
2.034000	35.5	N	20.5	56.0
4.858000	34.8	N	21.2	56.0
4.658000	34.7	N	21.3	56.0
4.794000	34.1	N	21.9	56.0

## **§2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

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### **Standard Applicable**

Requirements: CFR 47, § 2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

### **Measurement Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### **Equipment Lists**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Cal. Date</b>
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Measurement Result**

#### **Environmental Conditions**

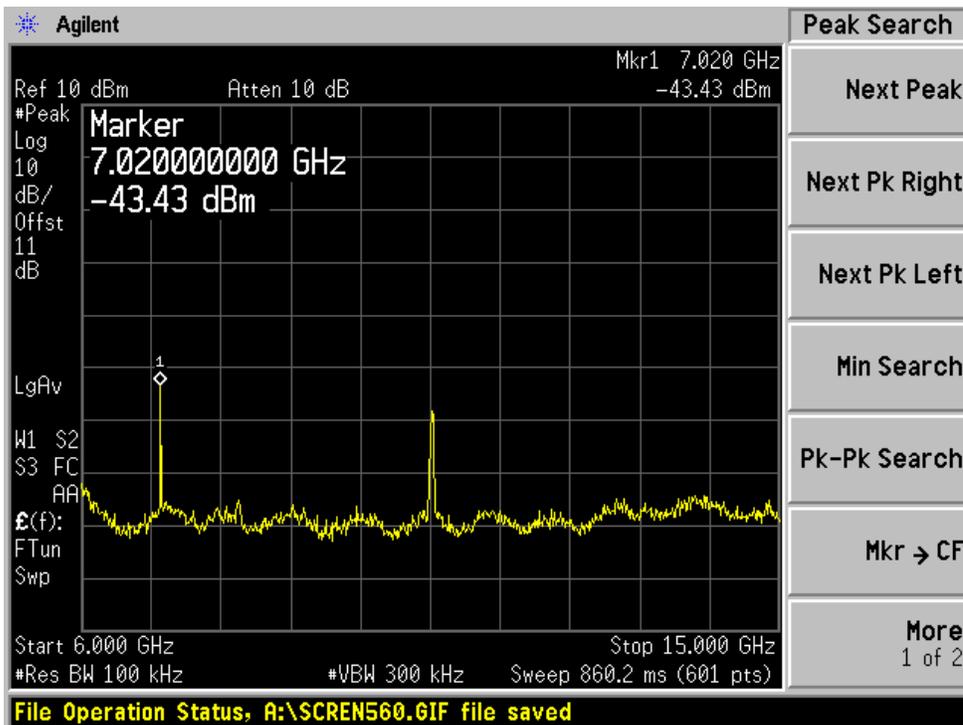
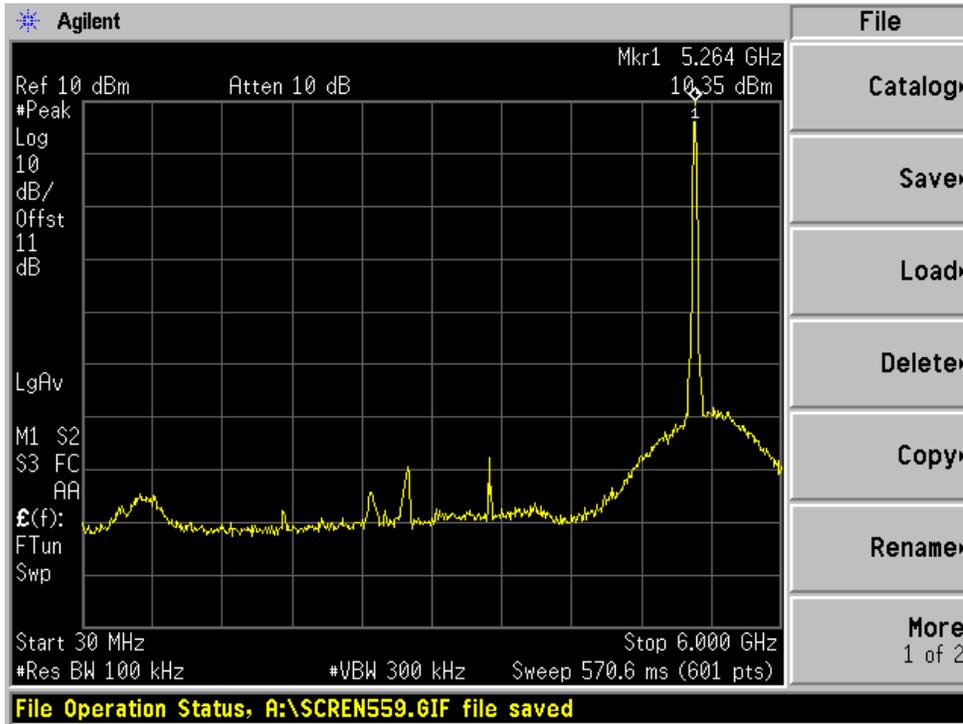
Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

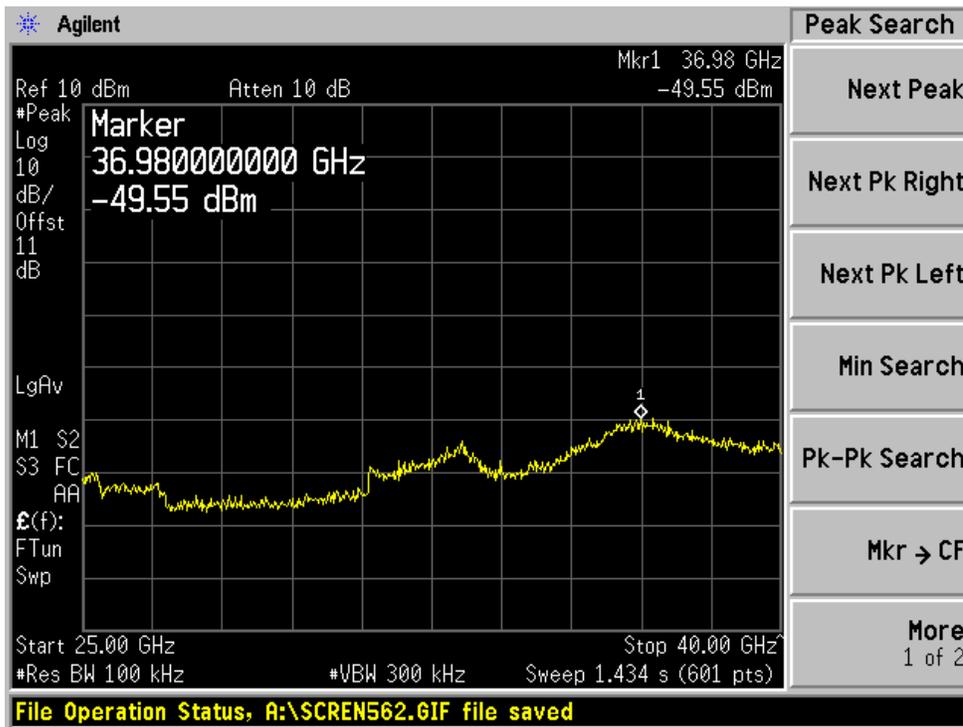
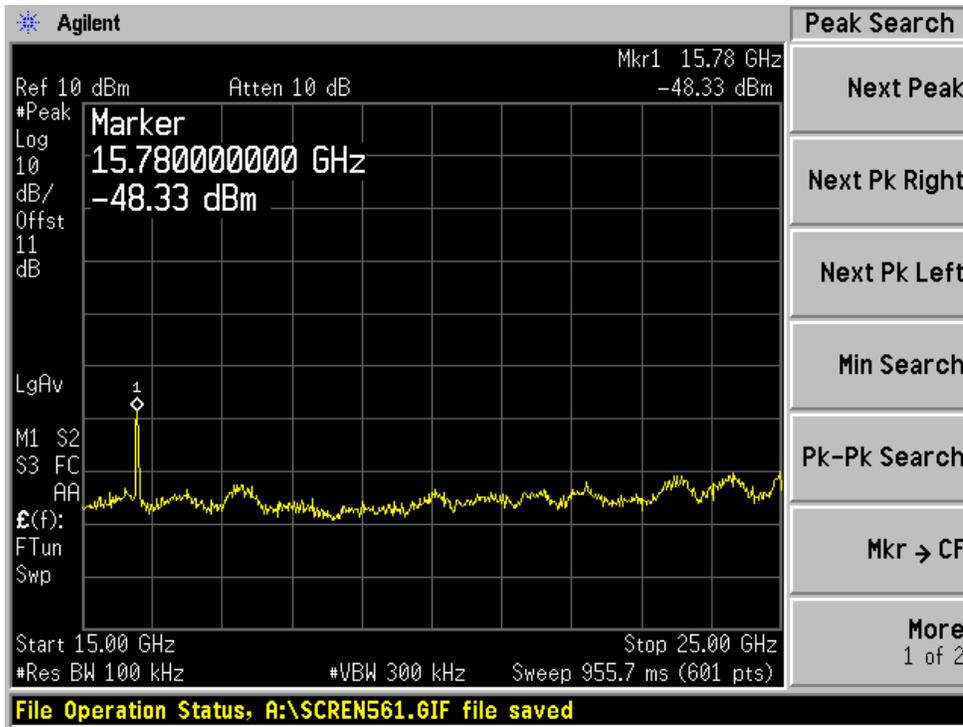
*The testing was performed by James Ma on 2006-06-15.*

Please refer to following pages for plots of spurious emission.

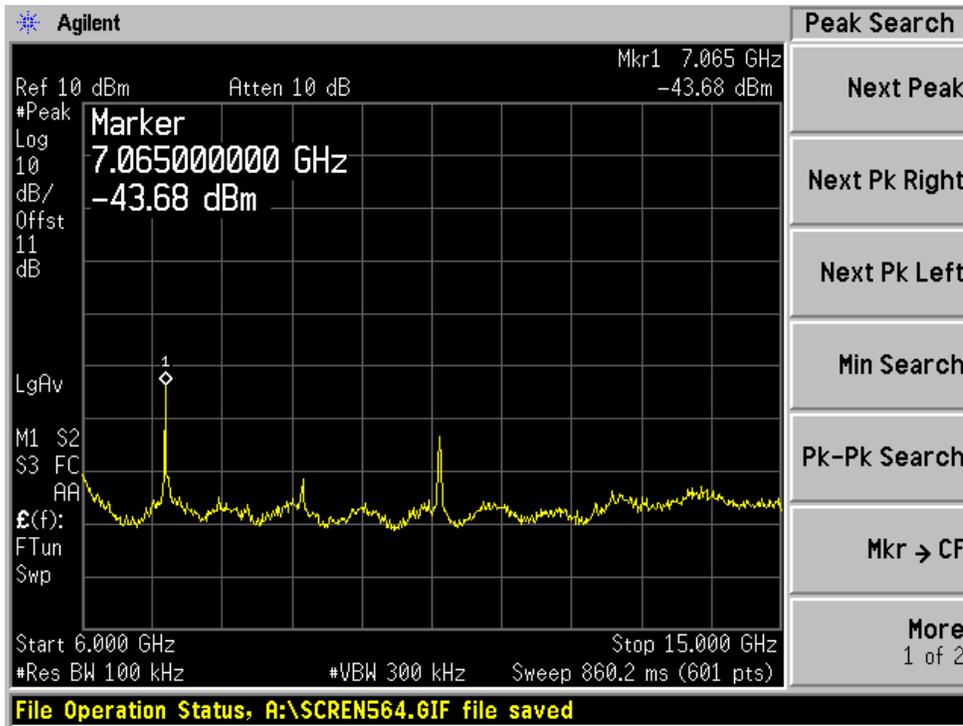
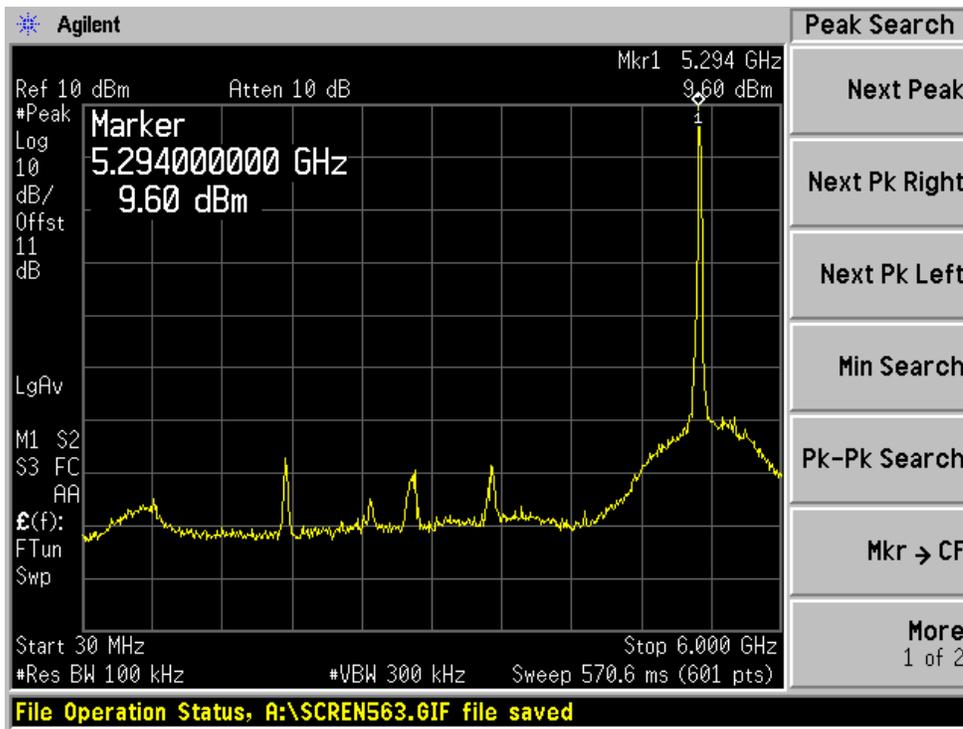
802.11a (15.407)

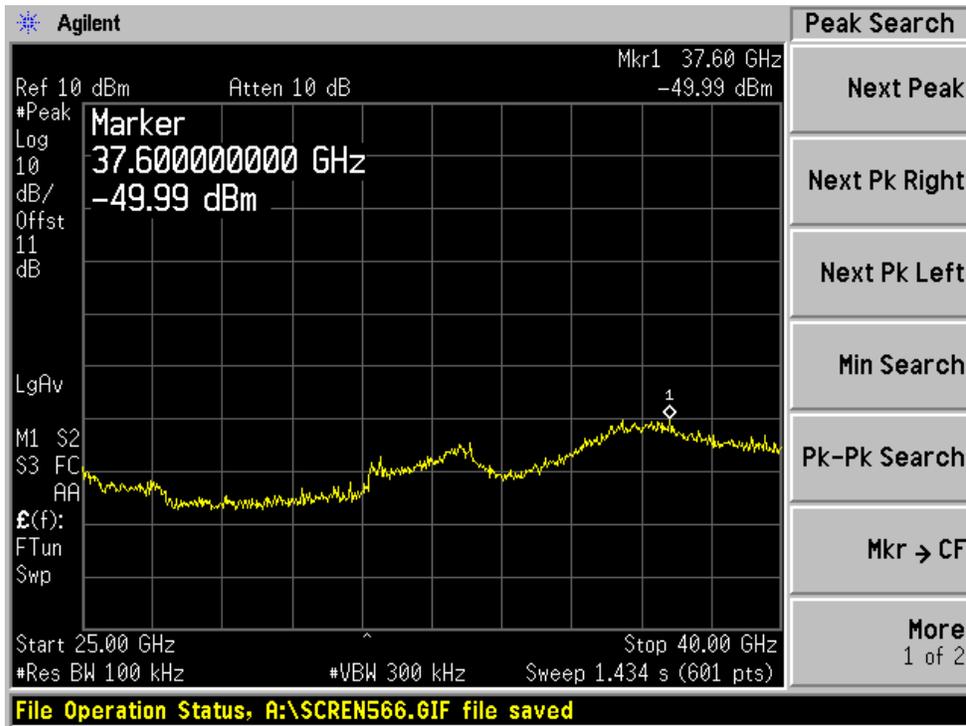
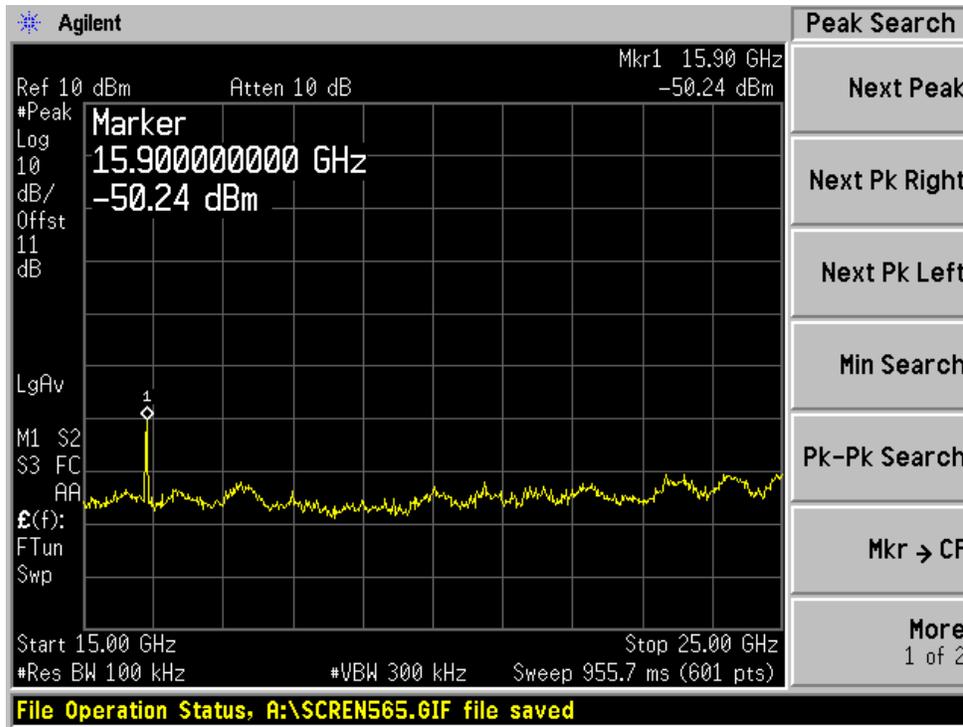
Low Channel



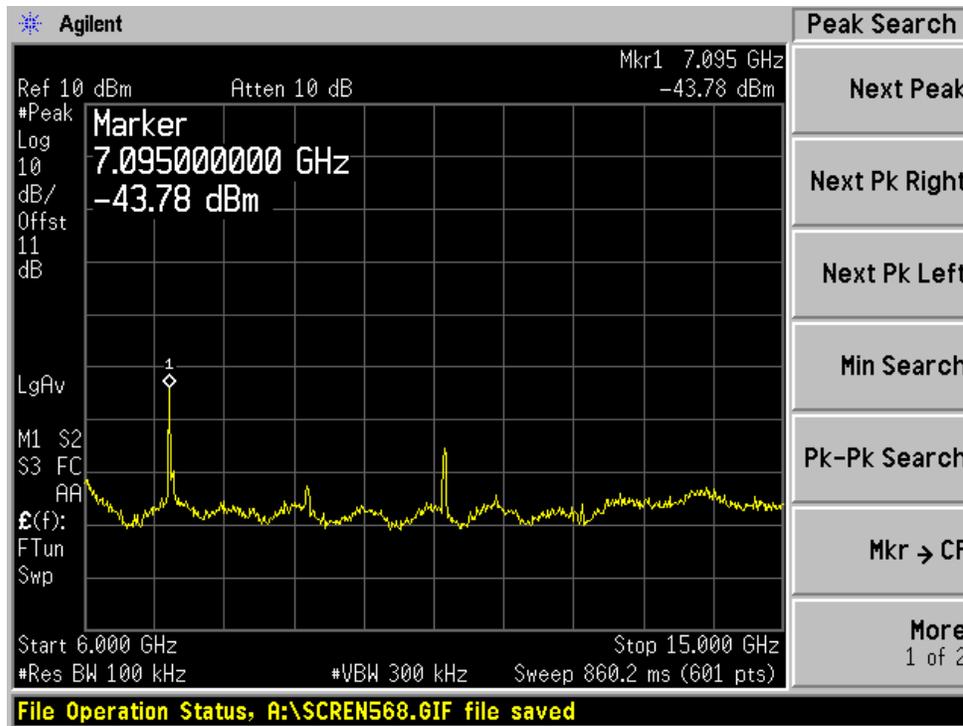
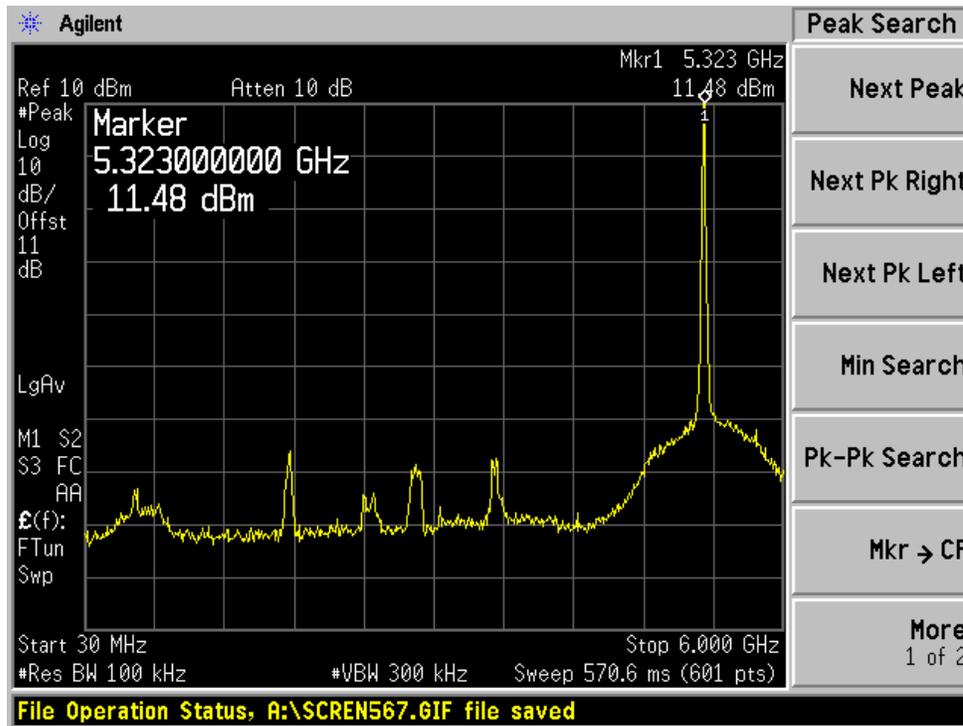


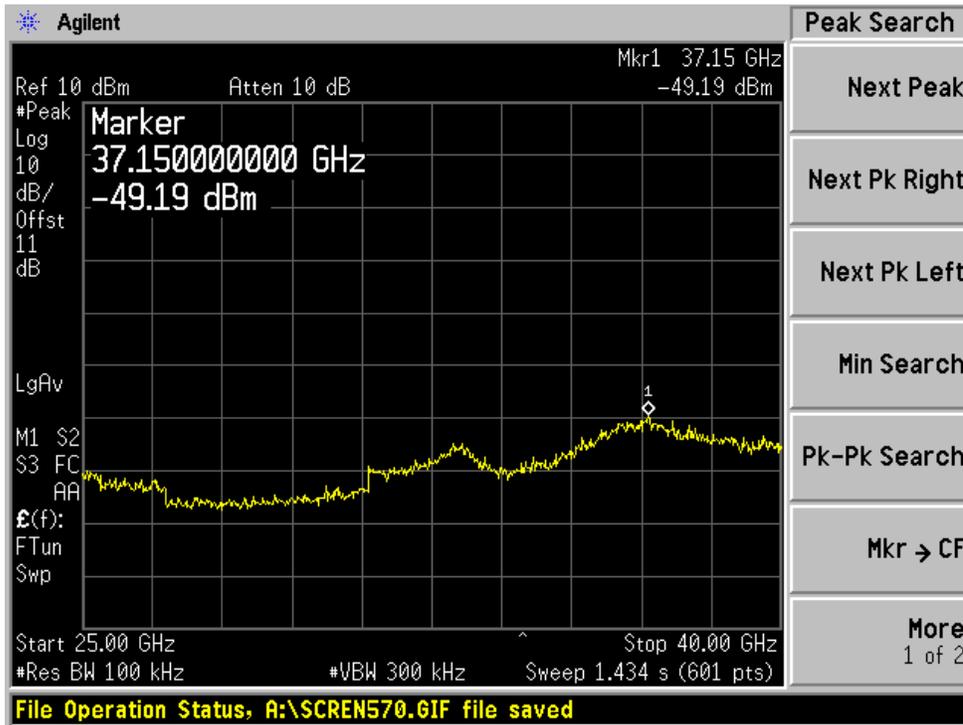
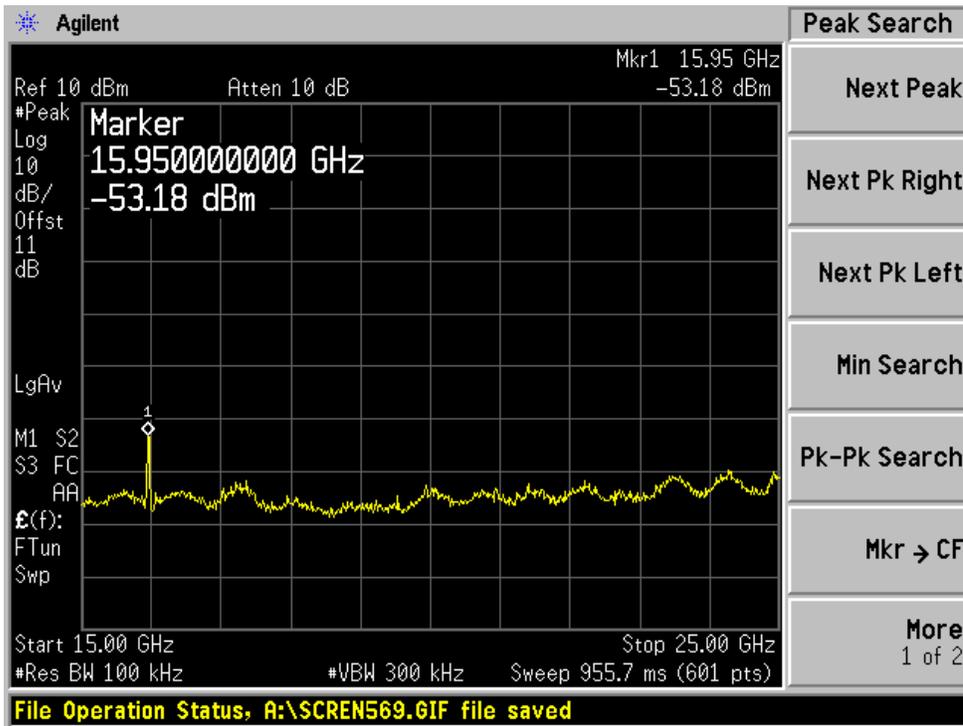
Mid Channel





# High Channel





## §15.407 – 26 dB BANDWIDTH

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### Standard Applicable

According to §15.407, 26dB Bandwidth should be shown.

### Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth. (6 dB bandwidth for DTS)
4. Same as (3) except 26 dB. (26dB bandwidth for UNII)
5. Repeat above procedures until all frequencies measured were complete.

### Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Measurement Result

#### Environmental Conditions

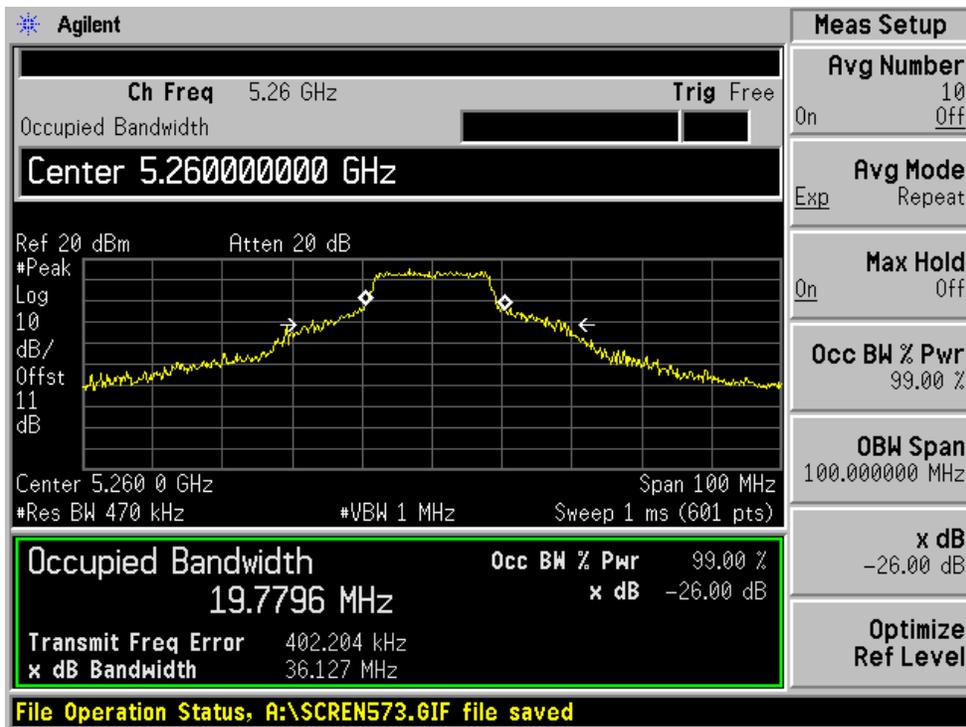
Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

*The testing was performed by James Ma on 2006-06-15.*

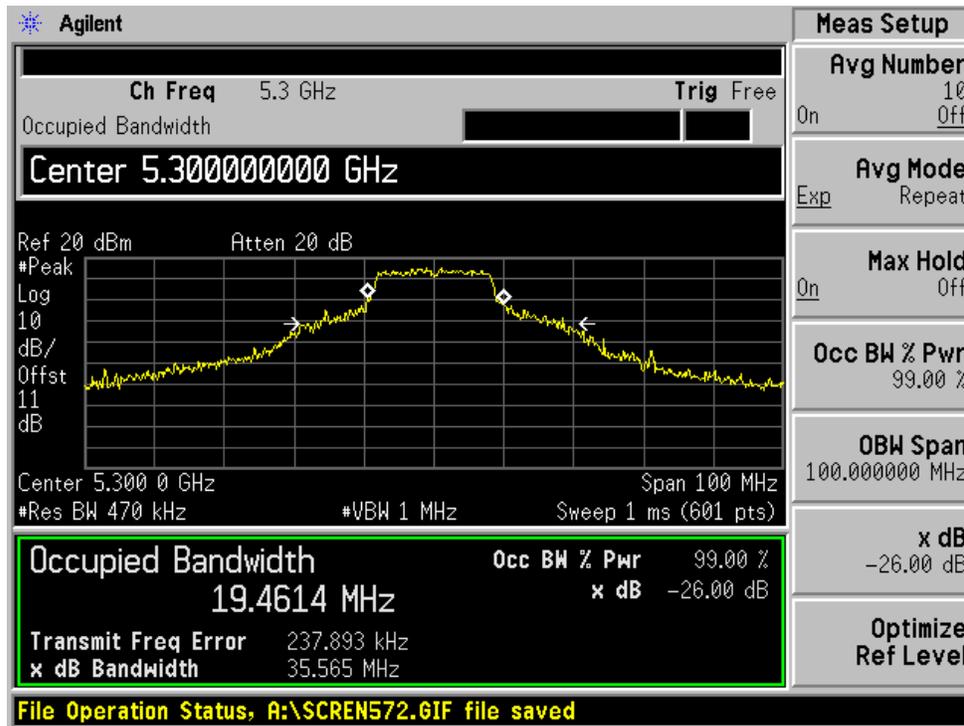
**Test Result for -26 dB Channel Bandwidth (15.407)**

Channel 802.11a	Frequency MHz	Channel Bandwidth (KHz)
Low	5260	36127
Mid	5300	35565
High	5320	37909

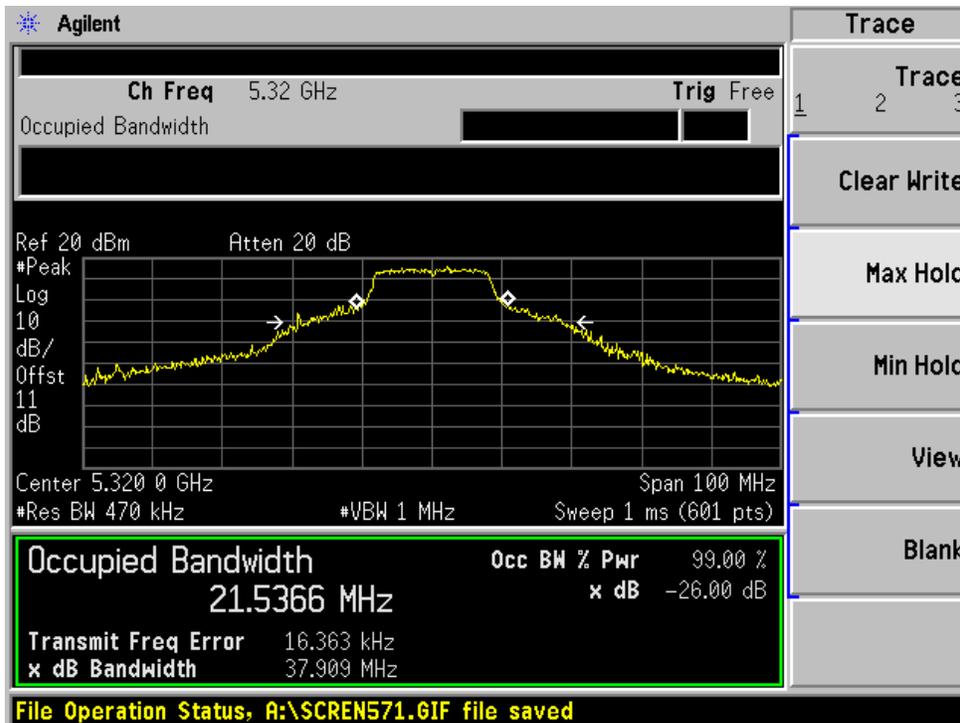
Low Channel



Mid Channel



High Channel



## §15.407(a)(2) - PEAK OUTPUT POWER MEASUREMENT

---

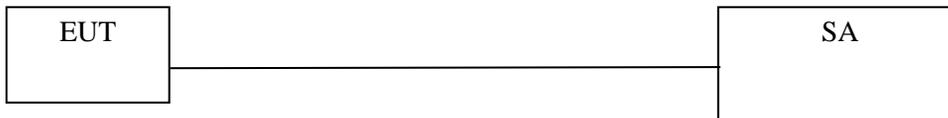
### Standard Applicable

According to §15.407(a)(1), for the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or  $4 \text{ dBm} + 10\log B$ , where B is the 26 dB emission bandwidth in MHz.

According to §15.407(a)(2), For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz.

### Measurement Procedure

1. Place the EUT on a bench 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 a spectrum analyzer.



### Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BAACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Measurement Result

#### Environmental Conditions

Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022mbar

*The testing was performed by James Ma on 2006-06-15.*

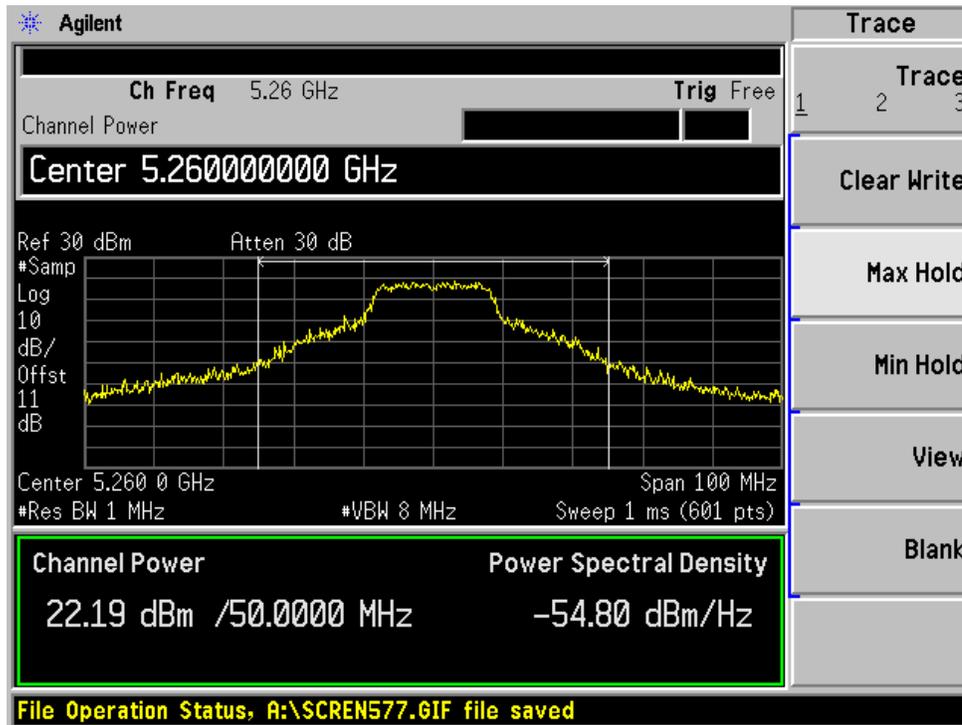
802.11a

Channel	Frequency MHz	Max Peak Output Power (dBm)	Limit (dBm)	TX Gain Setting
Low	5260	22.19	24.0	17
Mid	5300	22.16	24.0	17
High	5320	22.01	24.0	17

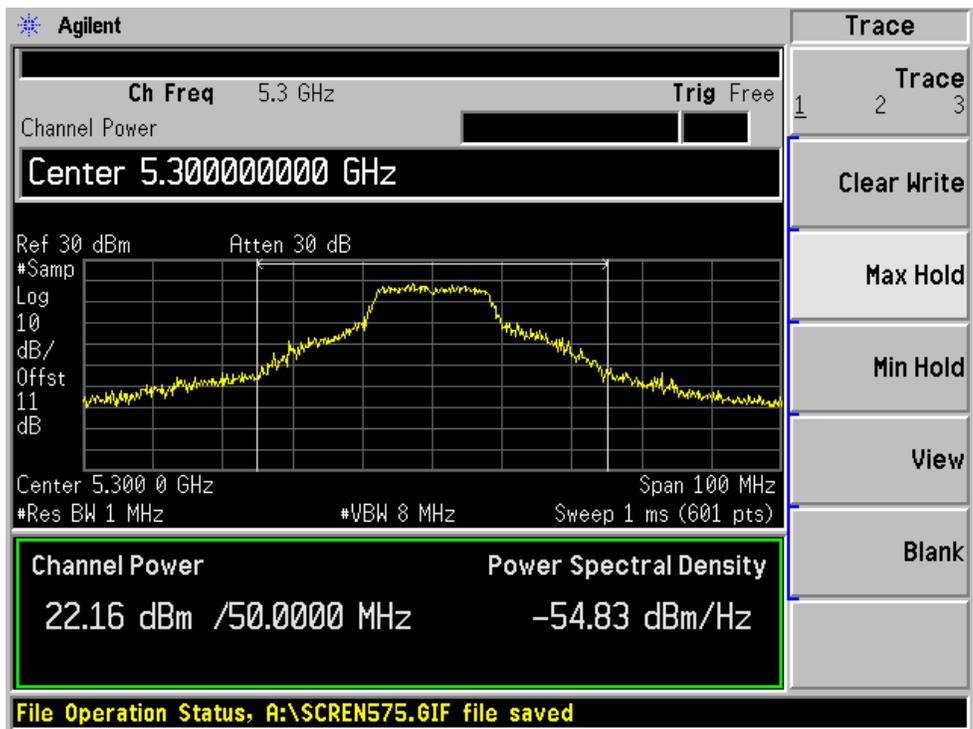
Note:

ERIP limit = 30 dBm
when use the transmitting antennas greater than 6 dBi the conducted power must be reduced

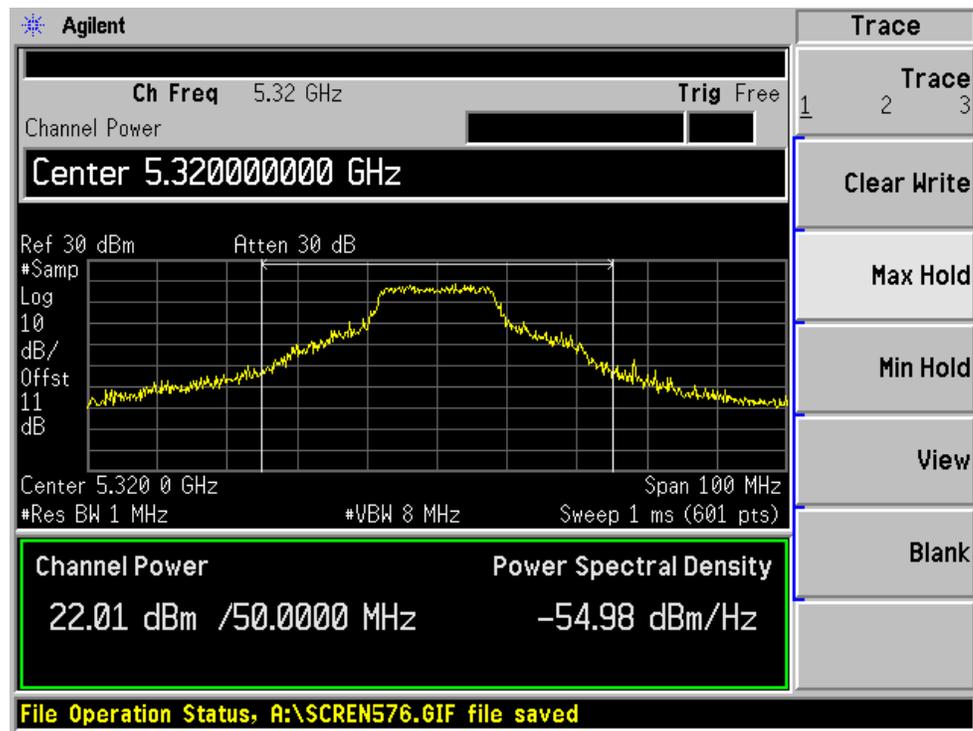
Low Channel



Mid channel



High Channel



## **§15.247(e) & §15.407(a)(2) - POWER SPECTRAL DENSITY**

---

### **Standard Applicable**

According to §15.247 (d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.407(a) (1), For the band 5.15–5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (2), For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **Measurement Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 6MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Adjust the center frequency of SA on any frequency be measured and set SA to 50MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (UNII)
5. Repeat above procedures until all frequencies measured were complete.

### **Equipment Lists**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Cal. Date</b>
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

## Measurement Result

### Environmental Conditions

Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

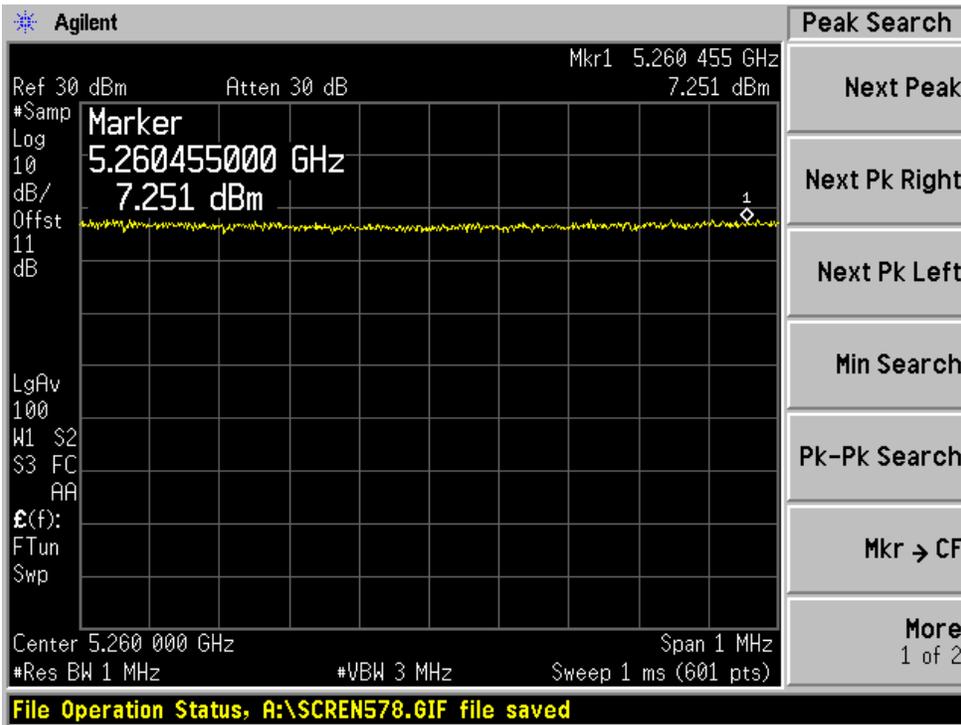
The testing was performed by James Ma on 2006-06-15.

### Test Result for 802.11a, (15.407)

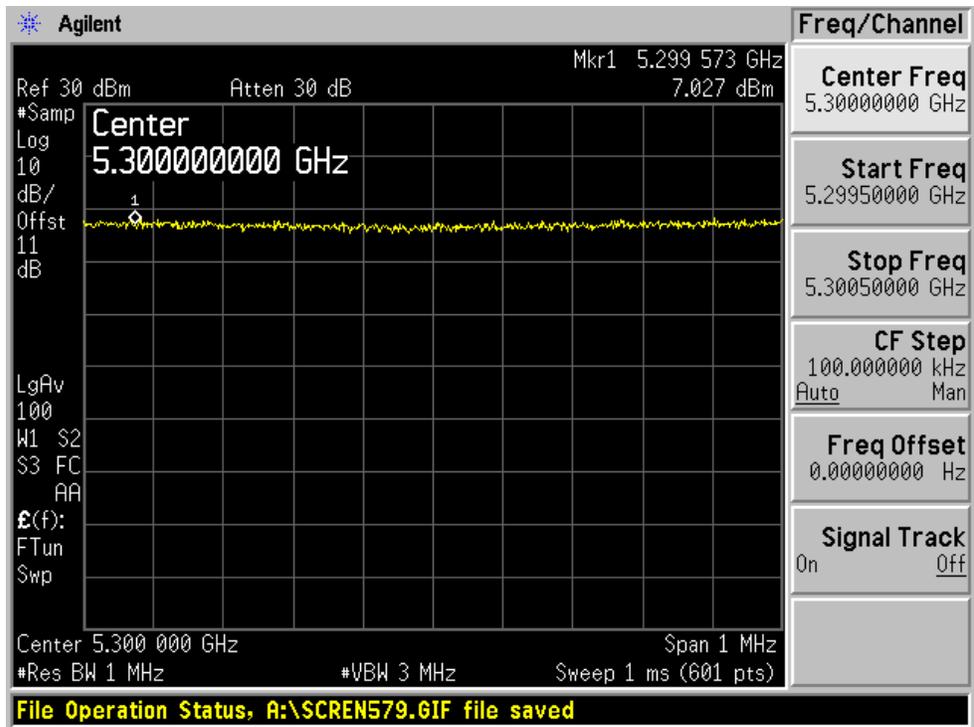
Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	5260	7.251	11
Mid	5300	7.027	11
High	5320	6.916	11

Note: when use the transmitting antennas greater than 6 dBi the conducted power must be reduced

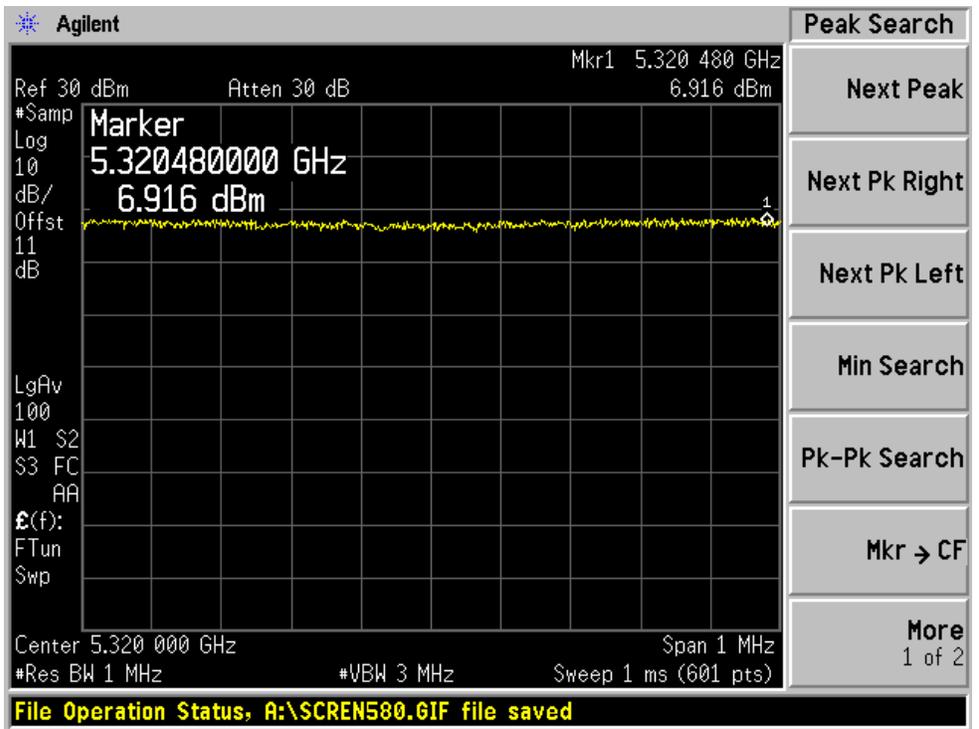
Low Channel



### Mid Channel



### High Channel



## §15.407(a)(6) - Peak Excursion To Average Ratio

---

### Standard Applicable

According to §15.407(a)(6), 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 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less.

### Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP2.0 plug test cable, so output power levels were calculated from conducted emission levels.

The analyzer center frequency was set to the EUT carrier frequency. For the peak value trace A, the analyzer resolution and video bandwidth were set to 1MHz. Do a MAX HOLD, then VIEW. For the average value trace B, the analyzer resolution bandwidth was set to 1MHz, set to power averaging mode.

The delta from the peak value trace and the Average should not exceed 13dBm across any 1MHz bandwidth.

### Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Measurement Result

#### Environmental Conditions

Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

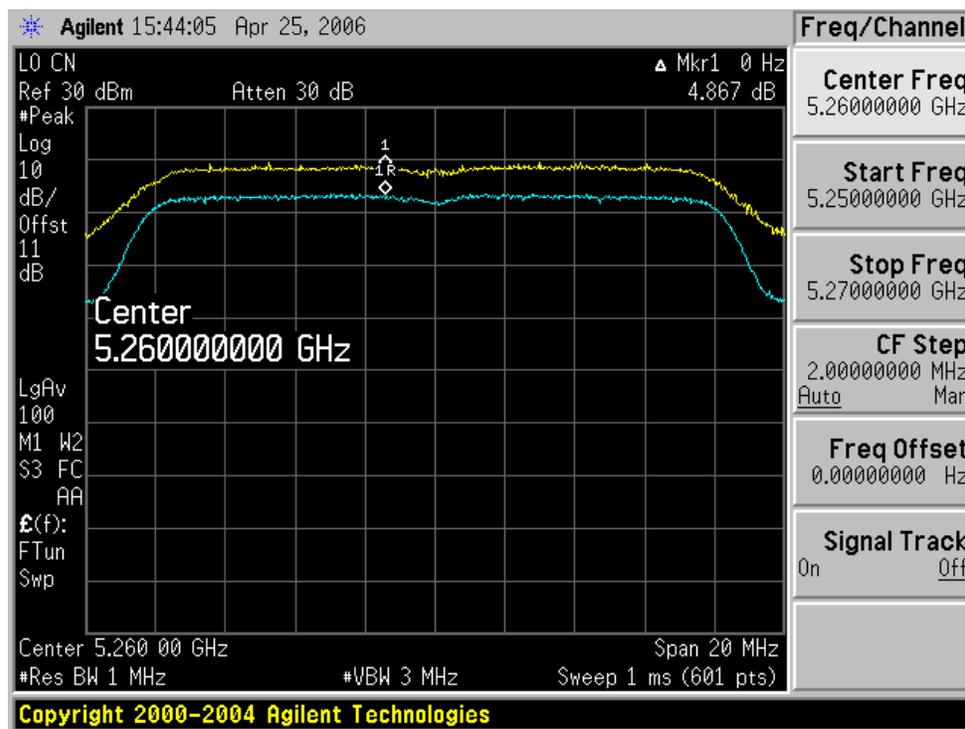
*The testing was performed by James Ma on 2006-06-15.*

802.11a, 15.407

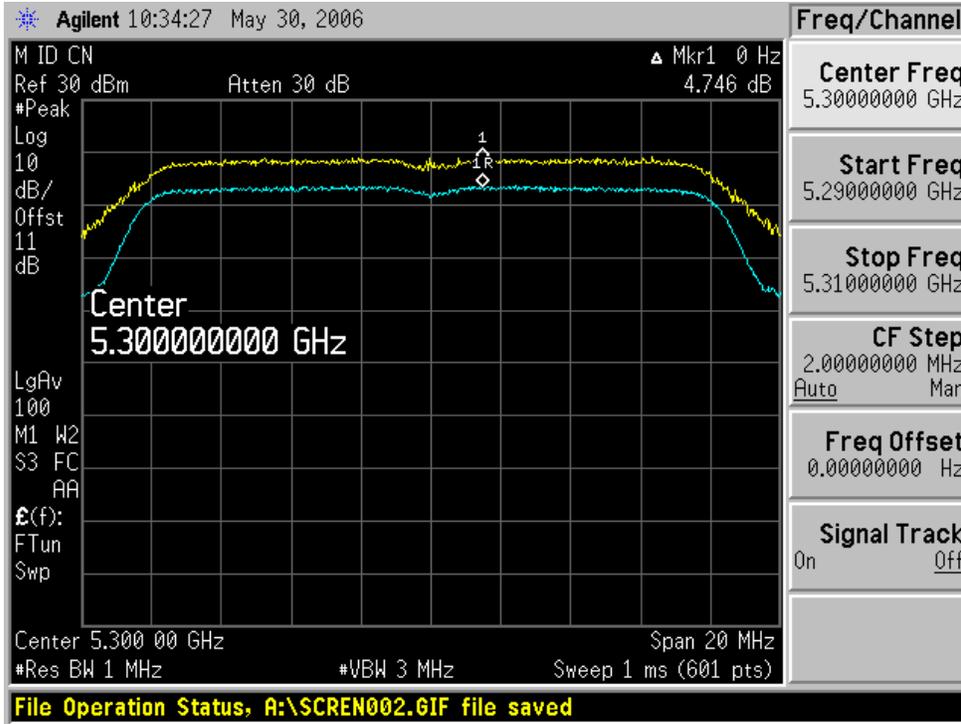
Channel	Frequency MHz	Measured dB	Limit dB
Low	5260	4.867	13
Mid	5300	4.746	13
High	5320	4.476	13

Please see the hereinafter plots for more detail.

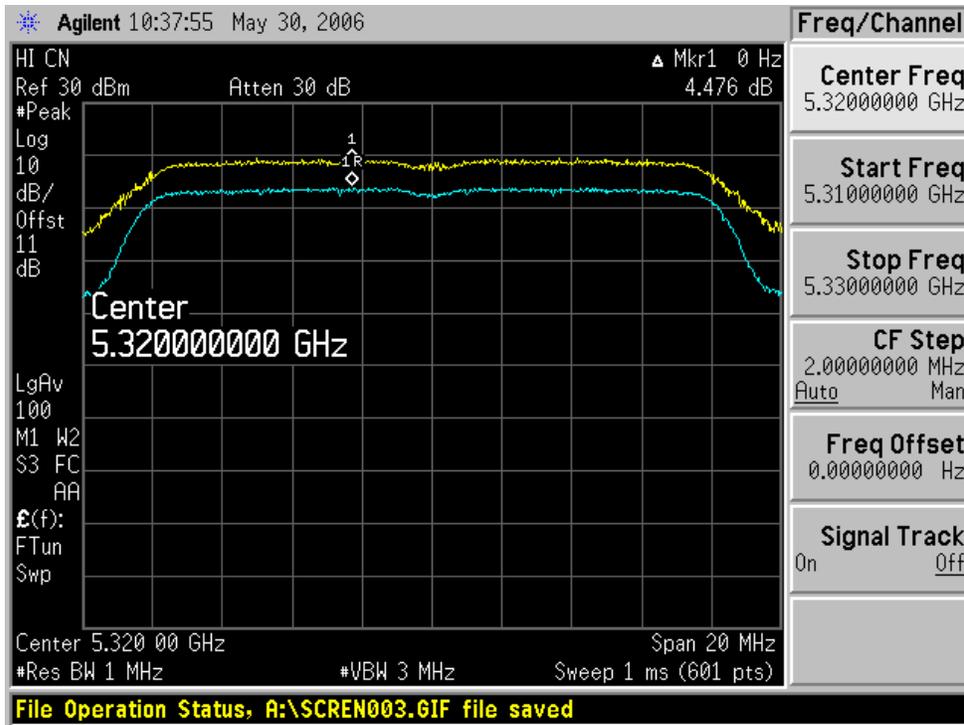
Low Channel



Mid Channel



High Channel



## §15.407(b) - Out of Band Emission

---

### Standard Applicable

§15.407 (b), undesirable emission limits: except as shown in paragraph (b)(6) of this section, the peak emission outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

§15.407 (b)(2), for transmitters operating in the 5.25 – 5.35 GHz & 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. 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 Procedure

For this test, the EUT's antenna was removed and replaced with a low loss cable, so output power levels were calculated from conducted emission levels.

The analyzer center frequency was set to the EUT carrier frequency. The analyzer resolution and video bandwidth were set to 1MHz. The entire band from 30kHz to 40GHz was investigated.

Every suspected signal was also investigated through radiated emission. Refer to section 15.205 restricted bands of operation.

### Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Measurement Result

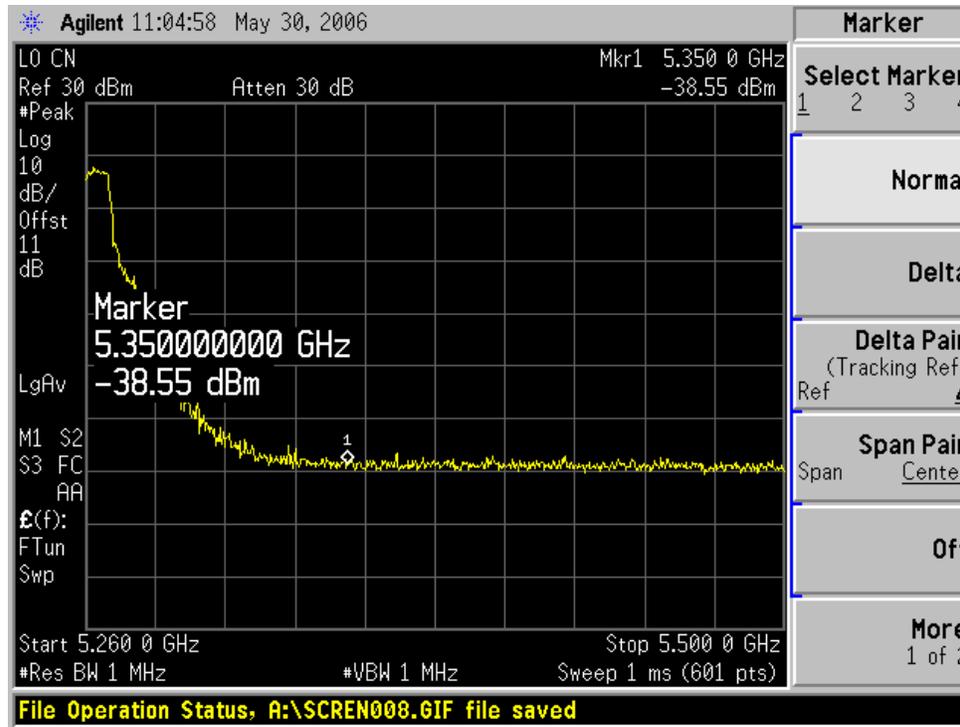
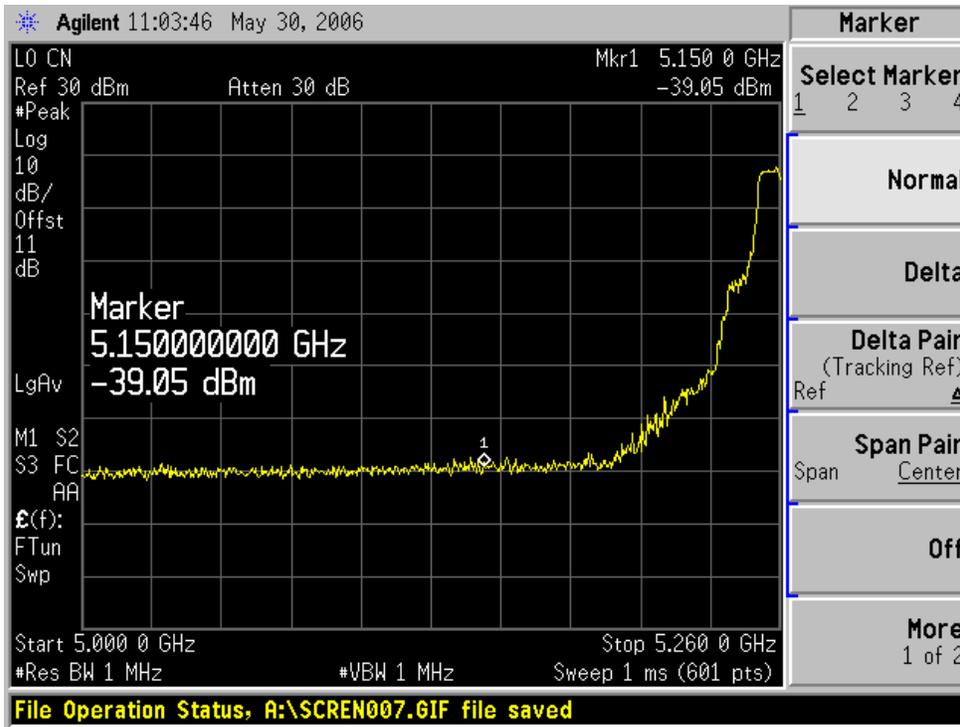
#### Environmental Conditions

Temperature:	21° C
Relative Humidity:	78%
ATM Pressure:	1022 mbar

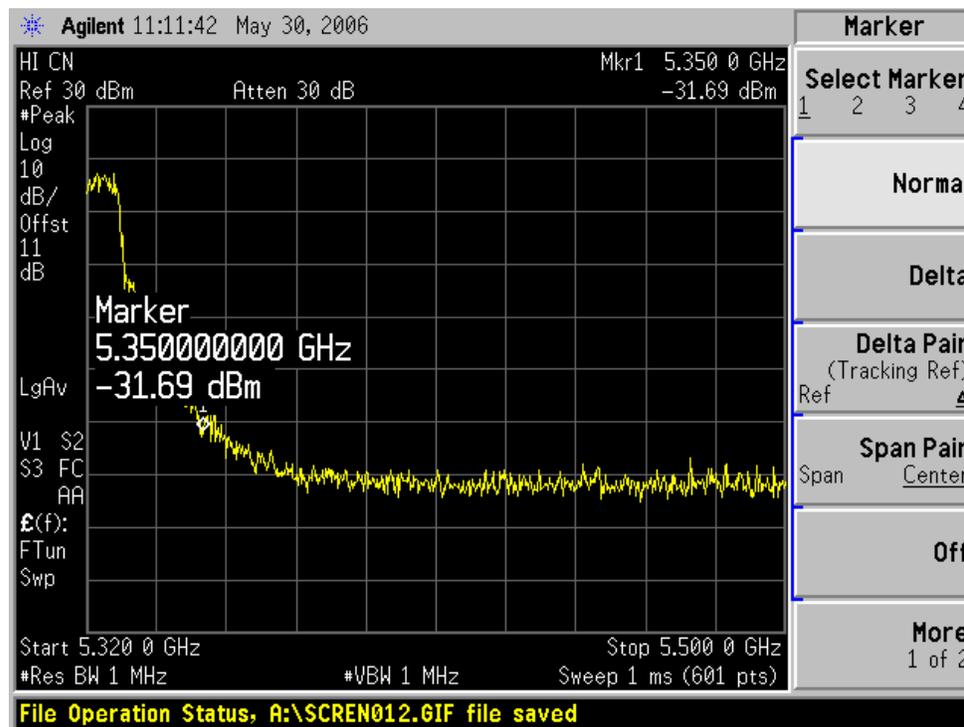
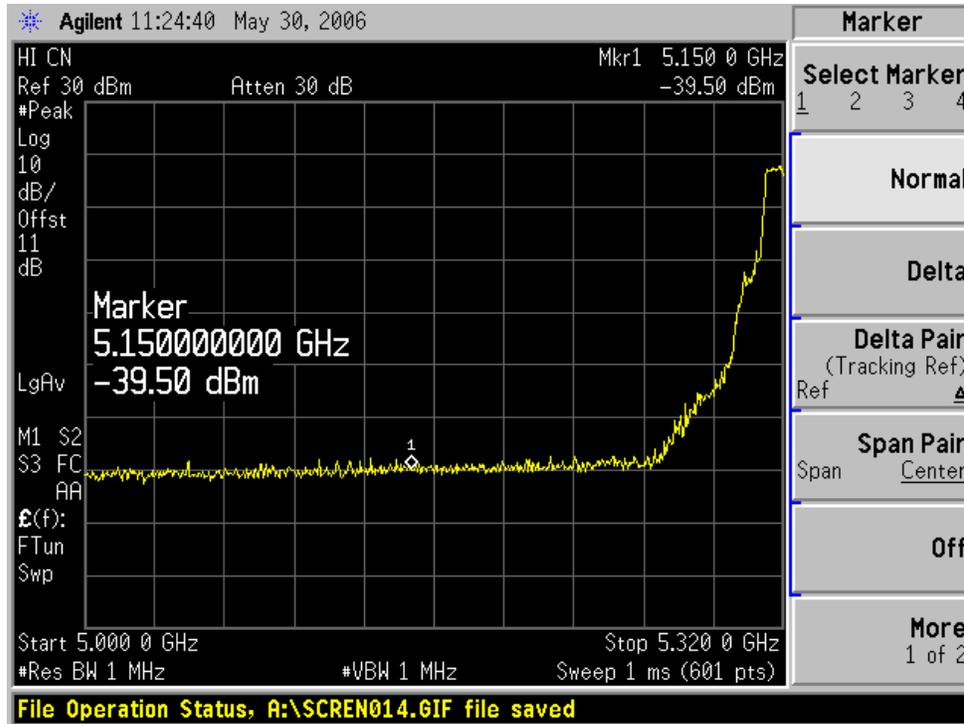
*The testing was performed by James Ma on 2006-06-15.*

Please refer to the following plots.

Low Channel



# High Channel



## **15.407(c) - Discontinue Transmitting With Absence of Data or Operational Failure**

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According to § 15.407 (c), 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 the transmission of control or signaling information or the user of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application a description of how this requirement is met.

## **§15.407(g) - Frequency Stability**

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### **Standard Applicable**

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 .

Please refer to use manual for all conditions.

## **Dynamic Frequency Selection**

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Customer has requested not to perform the DFS Testing.