

## FCC TEST REPORT (15.407)

**REPORT NO.:** RF940705L06  
**MODEL NO.:** AP41  
**RECEIVED:** Jul. 05, 2005  
**TESTED:** Jul. 05 ~ Jul. 12, 2005  
**ISSUED:** Jul. 13, 2005

**APPLICANT:** Delta Networks, Inc.

**ADDRESS:** 252, Shang Ying Road, Kuei San Taoyuan  
Shien 333, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB ADDRESS:** No. 47, 14<sup>th</sup> Ling, Chia Pau Tsuen, Lin Kou  
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**TEST LOCATION:** No. 19, Hwa Ya 2<sup>nd</sup> Rd., Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan,  
R.O.C.

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0528  
ILAC MRA



No. 2177-01

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## 1. CERTIFICATION

**PRODUCT:** 802.11 a+b+g wireless AP  
**BRAND NAME:** ARUBA  
**MODEL NO.:** AP41  
**APPLICANT:** Delta Networks, Inc.  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Jul. 05 ~ Jul. 12, 2005  
**STANDARDS:** FCC Part 15, Subpart E (Section 15.407)  
ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Andrea Hsia, **DATE:** Jul. 13, 2005  
( Andrea Hsia )

**TECHNICAL**  
**ACCEPTANCE :** Gary Chang, **DATE:** Jul. 13, 2005  
Responsible for RF ( Gary Chang )

**APPROVED BY :** Cody Chang, **DATE:** Jul. 13, 2005  
( Cody Chang, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart E (Section 15.407) |                                                              |        |                                                                                    |
|-----------------------------------------------------------|--------------------------------------------------------------|--------|------------------------------------------------------------------------------------|
| Standard Section                                          | Test Type                                                    | Result | Remark                                                                             |
| 15.407(b)(5)                                              | AC Power Conducted Emission                                  | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -13.21dB at 0.310MHz   |
| 15.407(b/1/2/3)(b)(5)                                     | Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -1.60dB at 10360.00MHz |
| 15.407(a/1/2/3)                                           | Peak Transmit Power                                          | PASS   | Meet the requirement of limit.                                                     |
| 15.407(a)(6)                                              | Peak Power Excursion                                         | PASS   | Meet the requirement of limit.                                                     |
| 15.407(a/1/2/3)                                           | Peak Power Spectral Density                                  | PASS   | Meet the requirement of limit.                                                     |
| 15.407(g)                                                 | Frequency Stability                                          | PASS   | Meet the requirement of limit.                                                     |

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

| Measurement         | Frequency       | Uncertainty |
|---------------------|-----------------|-------------|
| Conducted emissions | 9kHz~30MHz      | 2.44 dB     |
| Radiated emissions  | 30MHz ~ 200MHz  | 3.73 dB     |
|                     | 200MHz ~1000MHz | 3.74 dB     |
|                     | 1GHz ~ 18GHz    | 2.20 dB     |
|                     | 18GHz ~ 40GHz   | 1.88 dB     |

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

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |                                                                                                                                                                            |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>                   | 802.11 a+b+g wireless AP                                                                                                                                                   |
| <b>MODEL NO.</b>             | AP41                                                                                                                                                                       |
| <b>POWER SUPPLY</b>          | 48Vdc from POE                                                                                                                                                             |
| <b>MODULATION TYPE</b>       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM                                                                                                            |
| <b>MODULATION TECHNOLOGY</b> | DSSS, OFDM                                                                                                                                                                 |
| <b>TRANSFER RATE</b>         | 802.11b: 11/5.5/2/1Mbps<br>802.11g: 54/48/36/24/18/12/9/6Mbps<br>802.11a: 54/48/36/24/18/12/9/6Mbps                                                                        |
| <b>FREQUENCY RANGE</b>       | 802.11b & 802.11g: 2.412 ~ 2.462GHz<br>802.11a: 5.150 ~ 5.350GHz and 5.725 ~ 5.850GHz                                                                                      |
| <b>NUMBER OF CHANNEL</b>     | 802.11b & 802.11g: 11<br>802.11a: 12                                                                                                                                       |
| <b>CHANNEL SPACING</b>       | 802.11b & 802.11g: 5MHz<br>802.11a: 20MHz                                                                                                                                  |
| <b>OUTPUT POWER</b>          | 50.933mW for 802.11b<br>51.168mW for 802.11g<br>20.941mW for 5.150 ~ 5.350GHz<br>50.816mW for 5.725 ~ 5.850GHz                                                             |
| <b>ANTENNA TYPE</b>          | For 2.4GHz<br>Dipole antenna with 2.11dBi gain<br>Printed antenna with 0.86dBi gain<br>For 5.0GHz<br>Dipole antenna with 2.07dBi gain<br>Printed antenna with 0.66dBi gain |
| <b>DATA CABLE</b>            | NA                                                                                                                                                                         |
| <b>I/O PORTS</b>             | RJ45                                                                                                                                                                       |
| <b>ASSOCIATED DEVICES</b>    | NA                                                                                                                                                                         |

**NOTE:**

1. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

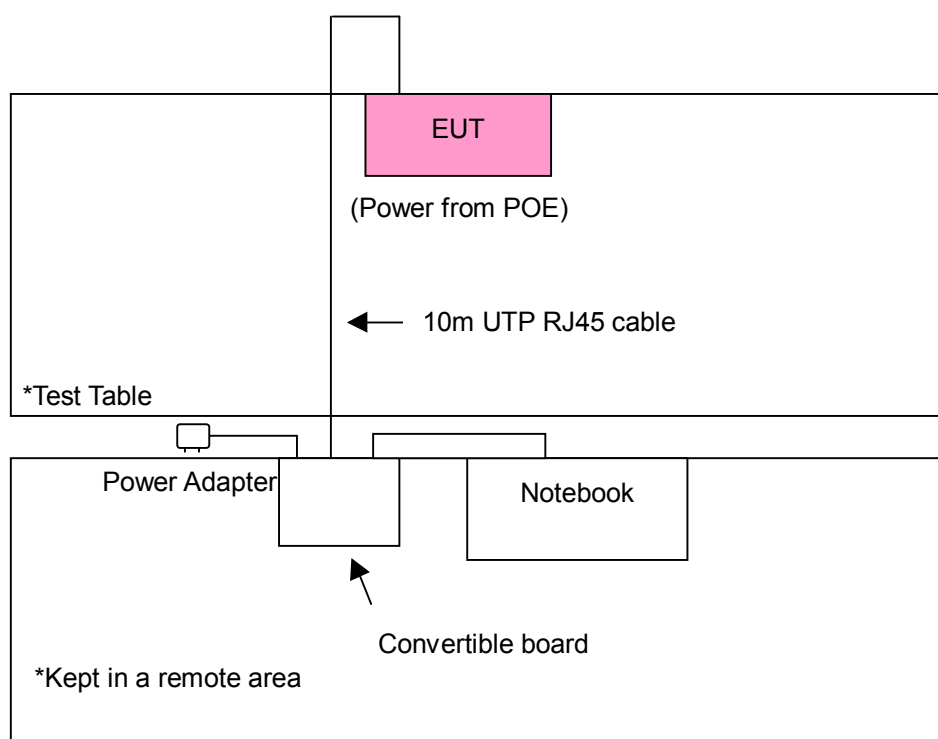
### 3.2 DESCRIPTION OF TEST MODES

Operated in 5150 ~ 5250MHz, 5250MHz ~ 5350MHz bands:

Eight channels are provided to this EUT.

| Channel | Frequency |
|---------|-----------|
| 1       | 5180 MHz  |
| 2       | 5200 MHz  |
| 3       | 5220 MHz  |
| 4       | 5240 MHz  |
| 5       | 5260 MHz  |
| 6       | 5280 MHz  |
| 7       | 5300 MHz  |
| 8       | 5320 MHz  |

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

| EUT<br>configure<br>mode | Applicable to |       |       |      | Description |
|--------------------------|---------------|-------|-------|------|-------------|
|                          | PLC           | RE<1G | RE≥1G | APCM |             |
| -                        | V             | V     | V     | V    | -           |

Where PLC: Power Line Conducted Emission

RE&lt;1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

#### **Power Line Conducted Emission Test:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Mode    | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11a | 1 to 8            | 1              | OFDM                  | BPSK            | 6                |

#### **Radiated Emission Test (Below 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Mode    | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11a | 1 to 8            | 1              | OFDM                  | BPSK            | 6                |

#### **Radiated Emission Test (Above 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Mode    | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11a | 1 to 8            | 1, 4, 5, 8     | OFDM                  | BPSK            | 6                |

**Bandedge Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Mode    | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11a | 1 to 8            | 1, 8           | OFDM                  | BPSK            | 6                |

**Antenna Port Conducted Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Mode    | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11a | 1 to 8            | 1, 4, 5, 8     | OFDM                  | BPSK            | 6                |

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is an 802.11 a+b+g wireless AP. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

#### FCC Part 15, Subpart E (15.407)

#### ANSI C63.4-2003

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT           | BRAND   | MODEL NO.      | SERIAL NO.  | FCC ID           |
|-----|-------------------|---------|----------------|-------------|------------------|
| 1   | NOTEBOOK COMPUTER | DELL    | PP05L          | 12130898320 | E2K24CLNS        |
| 2   | POWER ADAPTER     | POE-PSE | DSA-0421S-50 1 | NA          | FCC DoC Approved |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | NA                                                  |
| 2   | NA                                                  |

**NOTE:** All power cords of the above support units are non shielded (1.8m).

## 4. TEST TYPES AND RESULTS (5150 ~ 5350MHz Band)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB $\mu$ V) |          |
|-----------------------------|------------------------------|----------|
|                             | Quasi-peak                   | Average  |
| 0.15-0.5                    | 66 to 56                     | 56 to 46 |
| 0.5-5                       | 56                           | 46       |
| 5-30                        | 60                           | 50       |

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER       | MODEL NO.   | SERIAL NO.     | CALIBRATED UNTIL |
|----------------------------------|-------------|----------------|------------------|
| Test Receiver<br>ROHDE & SCHWARZ | ESCS30      | 100291         | Nov. 16, 2005    |
| RF signal cable<br>Woken         | 5D-FB       | Cable-HYC01-01 | Jan. 09, 2006    |
| LISN<br>SCHWARZBECK              | NNBL 8226-2 | 8226-142       | May. 02, 2006    |
| LISN<br>ROHDE & SCHWARZ          | ESH2-Z5     | 100104         | Feb. 15, 2006    |
| Software<br>ADT                  | ADT_Cond_V3 | NA             | NA               |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Shielded Room 1.
  3. The VCCI Site Registration No. is C-2040.



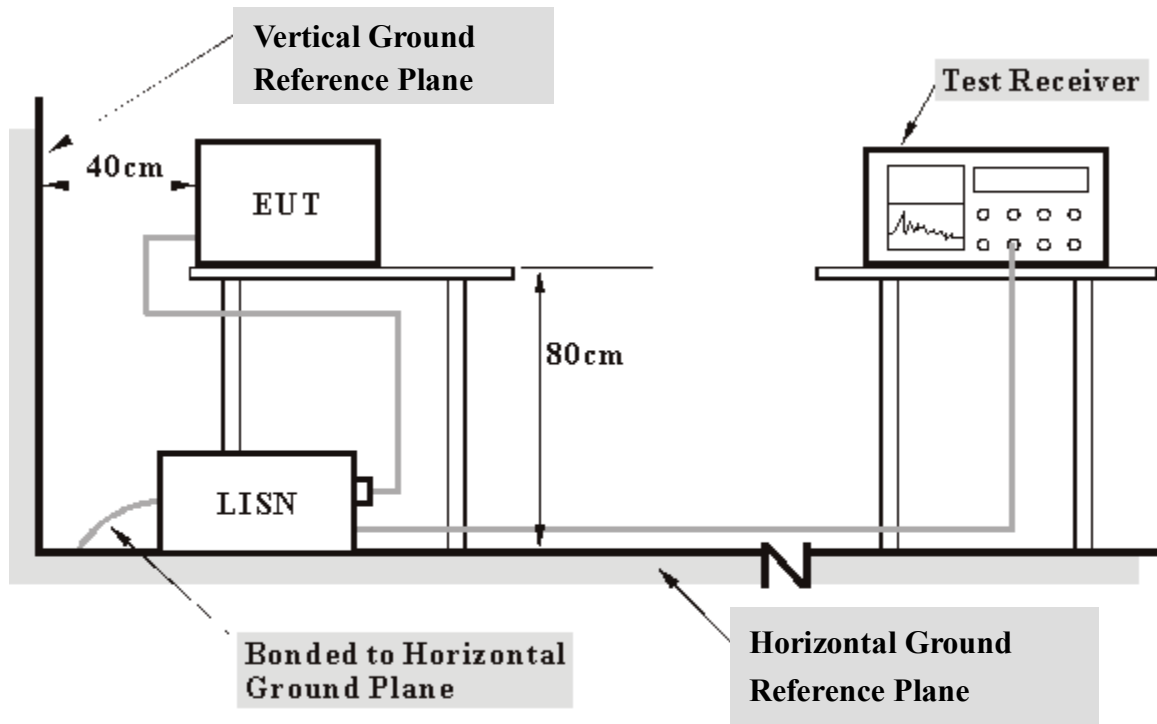
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



- Note:** 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared another notebook system to act as a communication partner and placed it outside of testing area.
- The communication partner run a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ45 cable.
- The communication partner sent data to EUT by command "PING".

## 4.1.7 TEST RESULTS

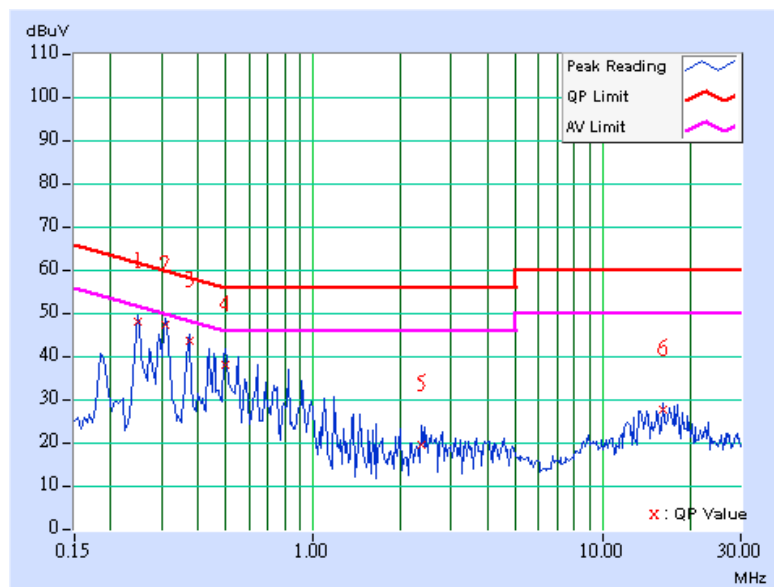
**Conducted Worst-Case Data**

| EUT             | 802.11 a+b+g wireless AP | MEASUREMENT DETAIL       |                         |
|-----------------|--------------------------|--------------------------|-------------------------|
| MODEL           | AP41                     | PHASE                    | Line 1                  |
| CHANNEL         | Channel 1                | 6dB BANDWIDTH            | 9 kHz                   |
| MODULATION TYPE | BPSK                     | ENVIRONMENTAL CONDITIONS | 23deg. C, 65%RH, 991hPa |
| TRANSFER RATE   | 6Mbps                    | INPUT POWER (SYSTEM)     | 120Vac, 60 Hz           |
| TESTED BY       | Gary Chang               |                          |                         |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit        |              | Margin        |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|--------------|--------------|---------------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)]    |              | (dB)          |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.         | AV.          | Q.P.          | AV. |
| 1  | 0.248          | 0.11                    | 47.62         | -   | 47.73          | -   | 61.84        | 51.84        | -14.11        | -   |
| 2  | <b>0.310</b>   | <b>0.11</b>             | <b>46.65</b>  | -   | <b>46.76</b>   | -   | <b>59.97</b> | <b>49.97</b> | <b>-13.21</b> | -   |
| 3  | 0.373          | 0.11                    | 43.12         | -   | 43.23          | -   | 58.44        | 48.44        | -15.21        | -   |
| 4  | 0.500          | 0.13                    | 37.46         | -   | 37.59          | -   | 56.00        | 46.00        | -18.41        | -   |
| 5  | 2.375          | 0.28                    | 19.10         | -   | 19.38          | -   | 56.00        | 46.00        | -36.62        | -   |
| 6  | 16.227         | 0.67                    | 27.14         | -   | 27.81          | -   | 60.00        | 50.00        | -32.19        | -   |

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

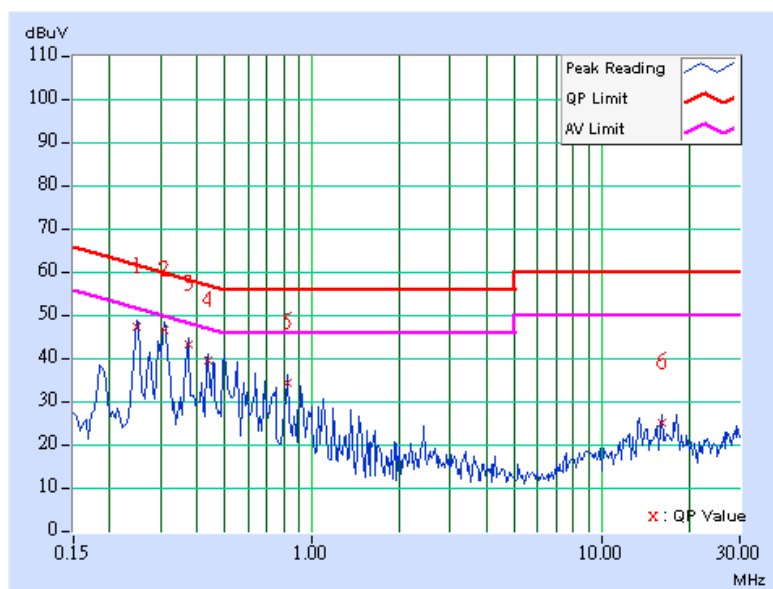
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



| EUT             | 802.11 a+b+g wireless AP | MEASUREMENT DETAIL       |                         |
|-----------------|--------------------------|--------------------------|-------------------------|
| MODEL           | AP41                     | PHASE                    | Line 2                  |
| CHANNEL         | Channel 1                | 6dB BANDWIDTH            | 9 kHz                   |
| MODULATION TYPE | BPSK                     | ENVIRONMENTAL CONDITIONS | 23deg. C, 65%RH, 991hPa |
| TRANSFER RATE   | 6Mbps                    | INPUT POWER (SYSTEM)     | 120Vac, 60 Hz           |
| TESTED BY       | Gary Chang               |                          |                         |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value<br>[dB (uV)] |     | Emission Level<br>[dB (uV)] |     | Limit<br>[dB (uV)] |       | Margin<br>(dB) |     |
|----|----------------|-------------------------|----------------------------|-----|-----------------------------|-----|--------------------|-------|----------------|-----|
|    |                |                         |                            |     |                             |     |                    |       |                |     |
|    |                |                         | Q.P.                       | AV. | Q.P.                        | AV. | Q.P.               | AV.   | Q.P.           | AV. |
| 1  | 0.248          | 0.11                    | 46.98                      | -   | 47.09                       | -   | 61.84              | 51.84 | -14.75         | -   |
| 2  | 0.310          | 0.11                    | 46.14                      | -   | 46.25                       | -   | 59.97              | 49.97 | -13.72         | -   |
| 3  | 0.373          | 0.11                    | 42.90                      | -   | 43.01                       | -   | 58.44              | 48.44 | -15.43         | -   |
| 4  | 0.435          | 0.12                    | 39.16                      | -   | 39.28                       | -   | 57.15              | 47.15 | -17.88         | -   |
| 5  | 0.822          | 0.20                    | 33.85                      | -   | 34.05                       | -   | 56.00              | 46.00 | -21.95         | -   |
| 6  | 16.227         | 0.52                    | 24.65                      | -   | 25.17                       | -   | 60.00              | 50.00 | -34.83         | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009-0.490       | 2400/F(kHz)                       | 300                           |
| 0.490-1.705       | 24000/F(kHz)                      | 30                            |
| 1.705-30.0        | 30                                | 30                            |
| 30-88             | 100                               | 3                             |
| 88-216            | 150                               | 3                             |
| 216-960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

| Frequencies (MHz) | EIRP Limit (dBm) | Equivalent Field Strength at 3m (dBμV/m) *note 3 |
|-------------------|------------------|--------------------------------------------------|
| 5150~5250         | -27              | 68.3                                             |
| 5250~5350         | -27              | 68.3                                             |
| 5725~5825         | -27 *note 1      | 68.3                                             |
|                   | -17 *note 2      | 78.3                                             |

**NOTE:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$

## 4.2.3 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.          | SERIAL NO.  | CALIBRATED UNTIL |
|-----------------------------------------|--------------------|-------------|------------------|
| Test Receiver<br>ROHDE & SCHWARZ        | ESI7               | 100033      | May. 19, 2006    |
| Spectrum Analyzer<br>ROHDE & SCHWARZ    | FSP40              | 100039      | Nov. 21, 2006    |
| BILOG Antenna<br>SCHWARZBECK            | VULB9168           | 9168-160    | Jun. 01, 2006    |
| HORN Antenna<br>SCHWARZBECK             | 9120D              | 9120D-408   | Jan. 17, 2006    |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9170          | BBHA9170243 | Jan. 23, 2006    |
| Preamplifier<br>Agilent                 | 8447D              | 2944A10633  | Nov. 09, 2005    |
| Preamplifier<br>Agilent                 | 8449B              | 3008A01964  | Nov. 06, 2005    |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104       | 218183/4    | Jan. 26, 2006    |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104       | 218195/4    | Jan. 26, 2006    |
| Software<br>ADT.                        | ADT_Radiated_V5.14 | NA          | NA               |
| Antenna Tower<br>inn-co GmbH            | MA 4000            | 013303      | NA               |
| Antenna Tower Controller<br>inn-co GmbH | CO2000             | 017303      | NA               |
| Turn Table<br>ADT.                      | TT100.             | TT93021703  | NA               |
| Turn Table Controller<br>ADT.           | SC100.             | SC93021703  | NA               |

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

2. The test was performed in HwaYa Chamber 2.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The VCCI Site Registration No. is R-237.

5. The IC Site Registration No. is IC4924-3.

#### 4.2.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

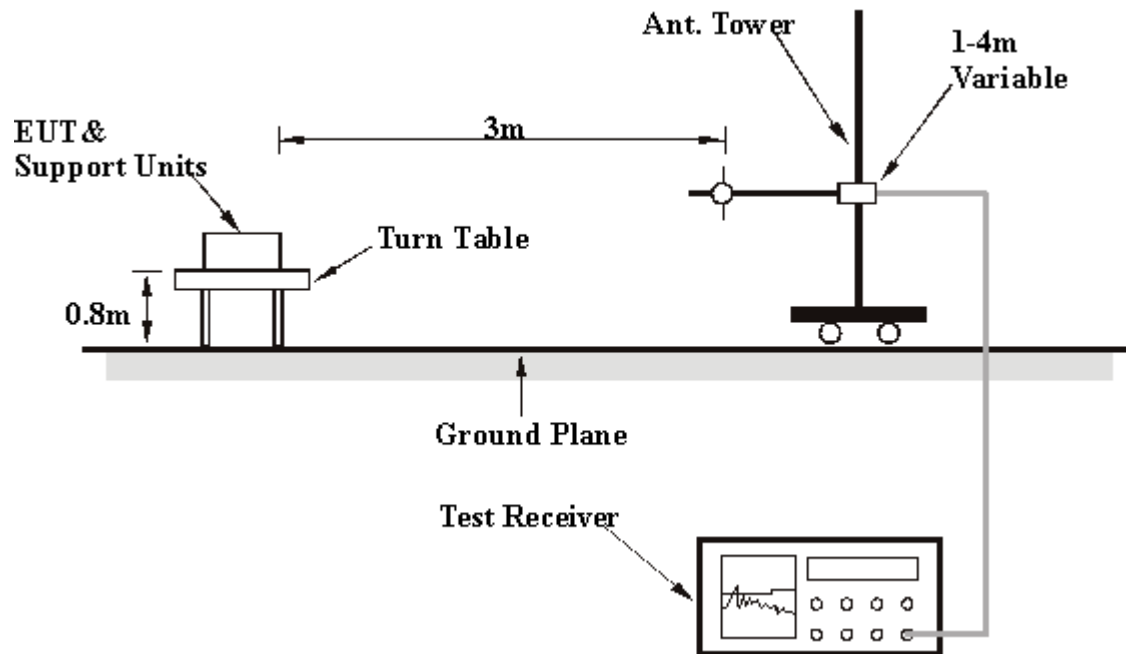
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.6 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

#### 4.2.8 TEST RESULTS

##### Below 1GHz Worst-Case Data

| EUT             | 802.11 a+b+g wireless AP | MEASUREMENT DETAIL       |                         |
|-----------------|--------------------------|--------------------------|-------------------------|
| MODEL           | AP41                     | FREQUENCY RANGE          | Below 1000MHz           |
| CHANNEL         | Channel 1                | DETECTOR FUNCTION        | Quasi-Peak              |
| MODULATION TYPE | BPSK                     | ENVIRONMENTAL CONDITIONS | 24deg. C, 70%RH, 991hPa |
| TRANSFER RATE   | 6Mbps                    | INPUT POWER (SYSTEM)     | 120Vac, 60 Hz           |
| TESTED BY       | Morgan Chen              |                          |                         |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.                                                 | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                   | 47.49       | 29.43 QP                | 40.00          | -10.57      | 1.25 H             | 64                   | 14.76            | 14.68                    |
| 2                                                   | 84.43       | 26.54 QP                | 40.00          | -13.46      | 1.00 H             | 151                  | 16.56            | 9.98                     |
| 3                                                   | 249.66      | 30.89 QP                | 46.00          | -15.11      | 1.00 H             | 52                   | 18.28            | 12.61                    |
| 4                                                   | 500.42      | 36.63 QP                | 46.00          | -9.37       | 1.25 H             | 115                  | 16.34            | 20.29                    |
| 5                                                   | 624.83      | 31.64 QP                | 46.00          | -14.36      | 1.00 H             | 133                  | 8.57             | 23.07                    |
| 6                                                   | 751.18      | 36.46 QP                | 46.00          | -9.54       | 1.00 H             | 100                  | 10.54            | 25.91                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.                                               | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                 | 47.49       | 37.39 QP                | 40.00          | -2.61       | 1.25 V             | 193                  | 22.71            | 14.68                    |
| 2                                                 | 84.43       | 35.24 QP                | 40.00          | -4.76       | 1.00 V             | 259                  | 25.27            | 9.98                     |
| 3                                                 | 142.75      | 32.25 QP                | 43.50          | -11.25      | 1.00 V             | 70                   | 18.90            | 13.35                    |
| 4                                                 | 249.66      | 34.85 QP                | 46.00          | -11.15      | 1.00 V             | 31                   | 22.24            | 12.61                    |
| 5                                                 | 500.42      | 41.21 QP                | 46.00          | -4.79       | 1.00 V             | 10                   | 20.91            | 20.29                    |
| 6                                                 | 751.18      | 35.79 QP                | 46.00          | -10.21      | 1.00 V             | 244                  | 9.88             | 25.91                    |

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

**802.11a OFDM Normal modulation**

|                        |                          |                                 |                           |
|------------------------|--------------------------|---------------------------------|---------------------------|
| <b>EUT</b>             | 802.11 a+b+g wireless AP | <b>MEASUREMENT DETAIL</b>       |                           |
| <b>MODEL</b>           | AP41                     | <b>FREQUENCY RANGE</b>          | 1 ~ 40 GHz                |
| <b>CHANNEL</b>         | Channel 1                | <b>DETECTOR FUNCTION</b>        | Peak(PK)<br>Average (AV)  |
| <b>MODULATION TYPE</b> | BPSK                     | <b>ENVIRONMENTAL CONDITIONS</b> | 24deg.C, 70%RH,<br>991hPa |
| <b>TRANSFER RATE</b>   | 6Mbps                    | <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz             |
| <b>TESTED BY</b>       | Morgan Chen              |                                 |                           |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3453.00        | 42.58 PK                      | 68.30             | -25.72         | 1.03 H                   | 326                        | 9.24                   | 33.34                          |
| 2   | #5150.00       | 49.04 PK                      | 74.00             | -24.96         | 1.00 H                   | 311                        | 10.51                  | 38.53                          |
| 3   | *5180.00       | 94.54 PK                      |                   |                | 1.00 H                   | 311                        | 56.02                  | 38.52                          |
| 3   | *5180.00       | 84.60 AV                      |                   |                | 1.00 H                   | 311                        | 46.08                  | 38.52                          |
| 4   | 10360.00       | 61.94 PK                      | 68.30             | -6.36          | 1.08 H                   | 99                         | 14.27                  | 47.67                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3453.00        | 44.65 PK                      | 68.30             | -23.65         | 1.00 V                   | 300                        | 11.31                  | 33.34                          |
| 2   | #5150.00       | 58.60 PK                      | 74.00             | -15.40         | 1.00 V                   | 313                        | 20.07                  | 38.53                          |
| 3   | *5180.00       | 104.10 PK                     |                   |                | 1.00 V                   | 313                        | 65.58                  | 38.52                          |
| 3   | *5180.00       | 93.43 AV                      |                   |                | 1.00 V                   | 313                        | 54.91                  | 38.52                          |
| 4   | 10360.00       | 66.70 PK                      | 68.30             | -1.60          | 1.08 V                   | 99                         | 19.03                  | 47.67                          |

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#” The radiated frequency falling in the restricted band.

| EUT             | 802.11 a+b+g wireless AP | MEASUREMENT DETAIL       |                           |
|-----------------|--------------------------|--------------------------|---------------------------|
| MODEL           | AP41                     | FREQUENCY RANGE          | 1 ~ 40 GHz                |
| CHANNEL         | Channel 4                | DETECTOR FUNCTION        | Peak(PK)<br>Average (AV)  |
| MODULATION TYPE | BPSK                     | ENVIRONMENTAL CONDITIONS | 24deg.C, 70%RH,<br>991hPa |
| TRANSFER RATE   | 6Mbps                    | INPUT POWER (SYSTEM)     | 120Vac, 60 Hz             |
| TESTED BY       | Morgan Chen              |                          |                           |

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3493.00        | 42.87 PK                      | 68.30             | -25.43         | 1.01 H                   | 354                        | 9.53                   | 33.34                          |
| 2   | *5240.00       | 95.61 PK                      |                   |                | 1.11 H                   | 21                         | 57.07                  | 38.54                          |
| 2   | *5240.00       | 85.72 AV                      |                   |                | 1.11 H                   | 21                         | 47.18                  | 38.54                          |
| 3   | 10480.00       | 62.12 PK                      | 68.30             | -6.18          | 1.07 H                   | 68                         | 14.08                  | 48.04                          |

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3493.00        | 44.85 PK                      | 68.30             | -23.45         | 1.02 V                   | 315                        | 11.51                  | 33.34                          |
| 2   | *5240.00       | 105.37 PK                     |                   |                | 1.19 V                   | 20                         | 66.83                  | 38.54                          |
| 2   | *5240.00       | 94.09 AV                      |                   |                | 1.19 V                   | 20                         | 55.55                  | 38.54                          |
| 3   | 10480.00       | 66.18 PK                      | 68.30             | -2.12          | 1.11 V                   | 8                          | 18.14                  | 48.04                          |

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. "\*" : Fundamental frequency
  6. "#"The radiated frequency falling in the restricted band.

|                        |                          |                                 |                           |
|------------------------|--------------------------|---------------------------------|---------------------------|
| <b>EUT</b>             | 802.11 a+b+g wireless AP | <b>MEASUREMENT DETAIL</b>       |                           |
| <b>MODEL</b>           | AP41                     | <b>FREQUENCY RANGE</b>          | 1 ~ 40 GHz                |
| <b>CHANNEL</b>         | Channel 5                | <b>DETECTOR FUNCTION</b>        | Peak(PK)<br>Average (AV)  |
| <b>MODULATION TYPE</b> | BPSK                     | <b>ENVIRONMENTAL CONDITIONS</b> | 24deg.C, 70%RH,<br>991hPa |
| <b>TRANSFER RATE</b>   | 6Mbps                    | <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz             |
| <b>TESTED BY</b>       | Morgan Chen              |                                 |                           |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 3506.00     | 42.31 PK                | 68.30          | -25.99      | 1.02 H             | 318                  | 8.94             | 33.37                    |
| 2   | *5260.00    | 95.72 PK                |                |             | 1.13 H             | 37                   | 57.18            | 38.54                    |
| 2   | *5260.00    | 85.83 AV                |                |             | 1.13 H             | 37                   | 47.29            | 38.54                    |
| 3   | 10520.00    | 62.32 PK                | 68.30          | -5.98       | 1.09 H             | 57                   | 14.19            | 48.13                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 3506.00     | 44.75 PK                | 68.30          | -23.55      | 1.03 V             | 326                  | 11.38            | 33.37                    |
| 2   | *5260.00    | 105.42 PK               |                |             | 1.15 V             | 18                   | 66.88            | 38.54                    |
| 2   | *5260.00    | 94.21 AV                |                |             | 1.15 V             | 18                   | 55.67            | 38.54                    |
| 3   | 10520.00    | 66.14 PK                | 68.30          | -2.16       | 1.10 V             | 8                    | 18.01            | 48.13                    |

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. "\*" : Fundamental frequency
  6. "#" The radiated frequency falling in the restricted band.

|                        |                          |                                 |                           |
|------------------------|--------------------------|---------------------------------|---------------------------|
| <b>EUT</b>             | 802.11 a+b+g wireless AP | <b>MEASUREMENT DETAIL</b>       |                           |
| <b>MODEL</b>           | AP41                     | <b>FREQUENCY RANGE</b>          | 1 ~ 40 GHz                |
| <b>CHANNEL</b>         | Channel 8                | <b>DETECTOR FUNCTION</b>        | Peak(PK)<br>Average (AV)  |
| <b>MODULATION TYPE</b> | BPSK                     | <b>ENVIRONMENTAL CONDITIONS</b> | 24deg.C, 70%RH,<br>991hPa |
| <b>TRANSFER RATE</b>   | 6Mbps                    | <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz             |
| <b>TESTED BY</b>       | Morgan Chen              |                                 |                           |

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3546.00        | 42.75 PK                      | 68.30             | -25.55         | 1.01 H                   | 319                        | 9.19                   | 33.56                          |
| 2   | *5320.00       | 94.65 PK                      |                   |                | 1.12 H                   | 45                         | 56.10                  | 38.55                          |
| 2   | *5320.00       | 84.58 AV                      |                   |                | 1.12 H                   | 45                         | 46.03                  | 38.55                          |
| 3   | #5350.00       | 47.74 PK                      | 74.00             | -26.26         | 1.12 H                   | 45                         | 9.21                   | 38.53                          |
| 3   | #5350.00       | 37.65 AV                      | 54.00             | -16.35         | 1.12 H                   | 45                         | -0.88                  | 38.53                          |
| 4   | #10640.00      | 62.02 PK                      | 74.00             | -11.98         | 1.07 H                   | 64                         | 13.80                  | 48.22                          |
| 4   | #10640.00      | 48.32 AV                      | 54.00             | -5.68          | 1.07 H                   | 64                         | 0.10                   | 48.22                          |

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq.<br>(MHz) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(m) | Table<br>Angle<br>(Degree) | Raw<br>Value<br>(dBuV) | Correction<br>Factor<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 3546.00        | 44.85 PK                      | 68.30             | -23.45         | 1.05 V                   | 315                        | 11.29                  | 33.56                          |
| 2   | *5320.00       | 104.21 PK                     |                   |                | 1.00 V                   | 325                        | 65.66                  | 38.55                          |
| 2   | *5320.00       | 93.54 AV                      |                   |                | 1.00 V                   | 325                        | 54.99                  | 38.55                          |
| 3   | #5350.00       | 57.21 PK                      | 74.00             | -16.79         | 1.09 V                   | 7                          | 18.68                  | 38.53                          |
| 3   | #5350.00       | 46.54 AV                      | 54.00             | -7.46          | 1.09 V                   | 7                          | 8.01                   | 38.53                          |
| 4   | #10640.00      | 65.10 PK                      | 74.00             | -8.90          | 1.13 V                   | 37                         | 16.88                  | 48.22                          |
| 4   | #10640.00      | 52.25 AV                      | 54.00             | -1.75          | 1.13 V                   | 37                         | 4.03                   | 48.22                          |

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#” The radiated frequency falling in the restricted band.

### 4.3 PEAK TRANSMIT POWER MEASUREMENT

#### 4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

| Frequency Band   | Limit                                         |
|------------------|-----------------------------------------------|
| 5.15 – 5.25GHz   | The lesser of 50mW (17dBm) or 4dBm + 10logB   |
| 5.25 – 5.35GHz   | The lesser of 250mW (24dBm) or 11dBm + 10logB |
| 5.725 – 5.825GHz | The lesser of 1W (30dBm) or 17dBm + 10logB    |

**NOTE:** Where B is the 26dB emission bandwidth in MHz.

#### 4.3.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSEK30    | 100049     | Aug. 12, 2005    |

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

#### 4.3.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set span to encompass the entire emission bandwidth of the signal.
3. Set RBW to 1MHz, VBW to 3MHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

**NOTE:**

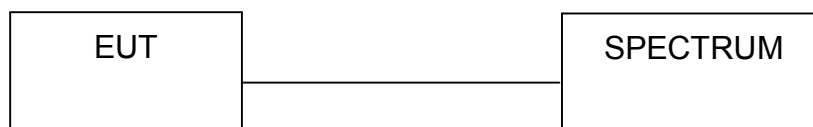
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

## 4.3.7 TEST RESULTS

## 802.11a OFDM modulation

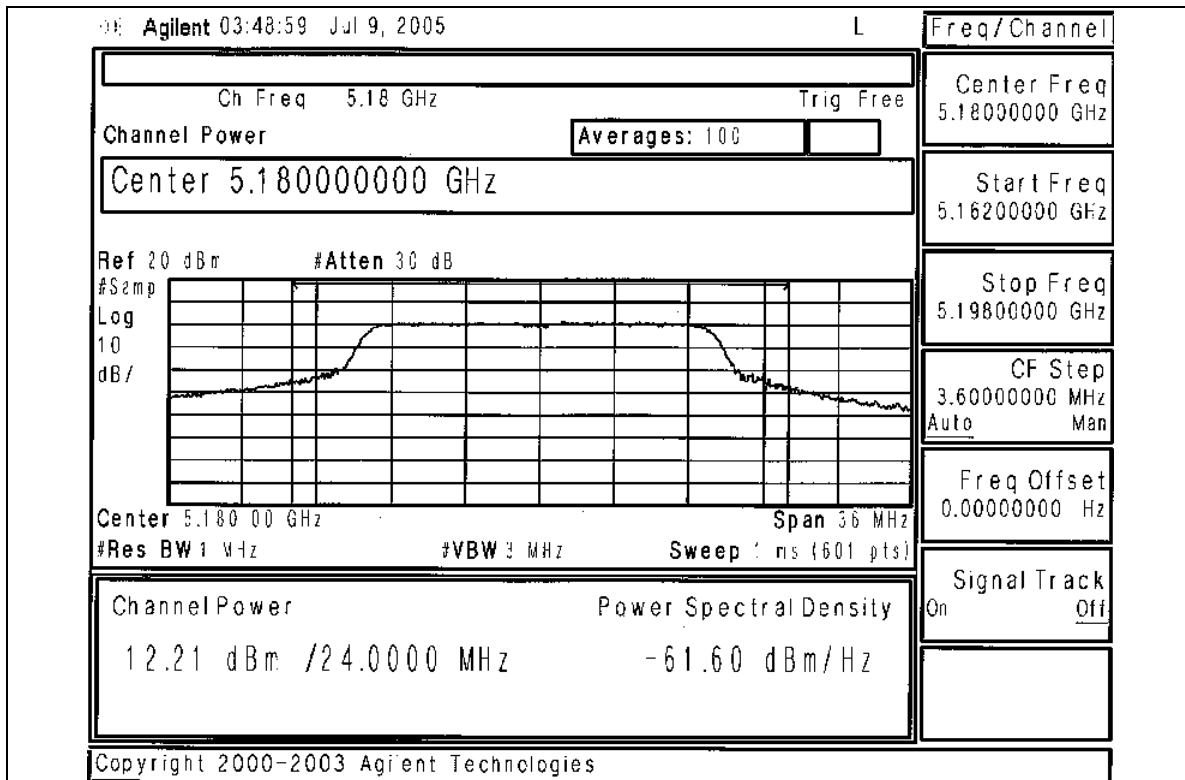
|                             |                          |                                 |                        |
|-----------------------------|--------------------------|---------------------------------|------------------------|
| <b>EUT</b>                  | 802.11 a+b+g wireless AP | <b>MODEL</b>                    | AP41                   |
| <b>MODULATION TYPE</b>      | BPSK                     | <b>TRANSFER RATE</b>            | 6Mbps                  |
| <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz            | <b>ENVIRONMENTAL CONDITIONS</b> | 26deg.C, 63%RH, 991hPa |
| <b>TESTED BY</b>            | Long Chen                |                                 |                        |

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (mW) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | 26dBc Occupied Bandwidth (MHz) | PASS/FAIL |
|---------|-------------------------|------------------------|-------------------------|------------------------|--------------------------------|-----------|
| 1       | 5180                    | 16.634                 | 12.21                   | 17.00                  | 23.56                          | PASS      |
| 4       | 5240                    | 20.749                 | 13.17                   | 17.00                  | 23.98                          | PASS      |
| 5       | 5260                    | 20.941                 | 13.21                   | 24.00                  | 23.98                          | PASS      |
| 8       | 5320                    | 17.219                 | 12.36                   | 24.00                  | 24.68                          | PASS      |

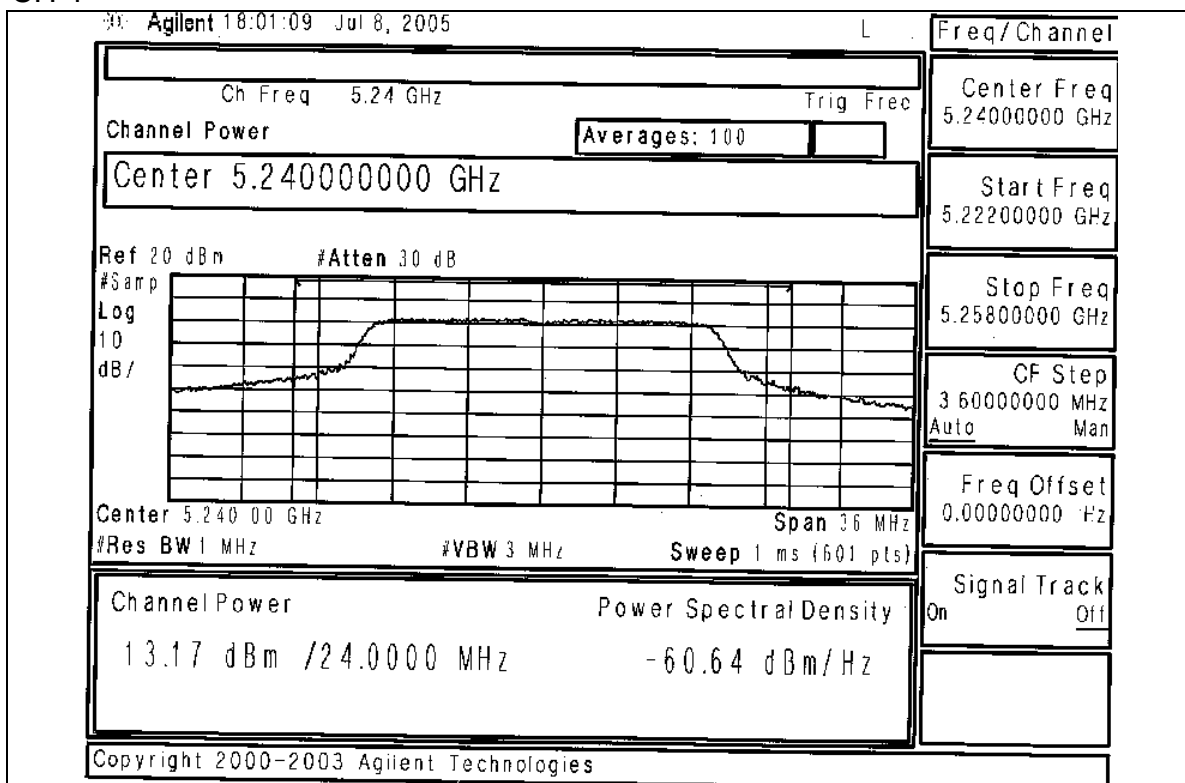
**NOTE:** The 26dBc Occupied Bandwidth plot, please refer to the following pages.



# Peak Power Output: CH 1

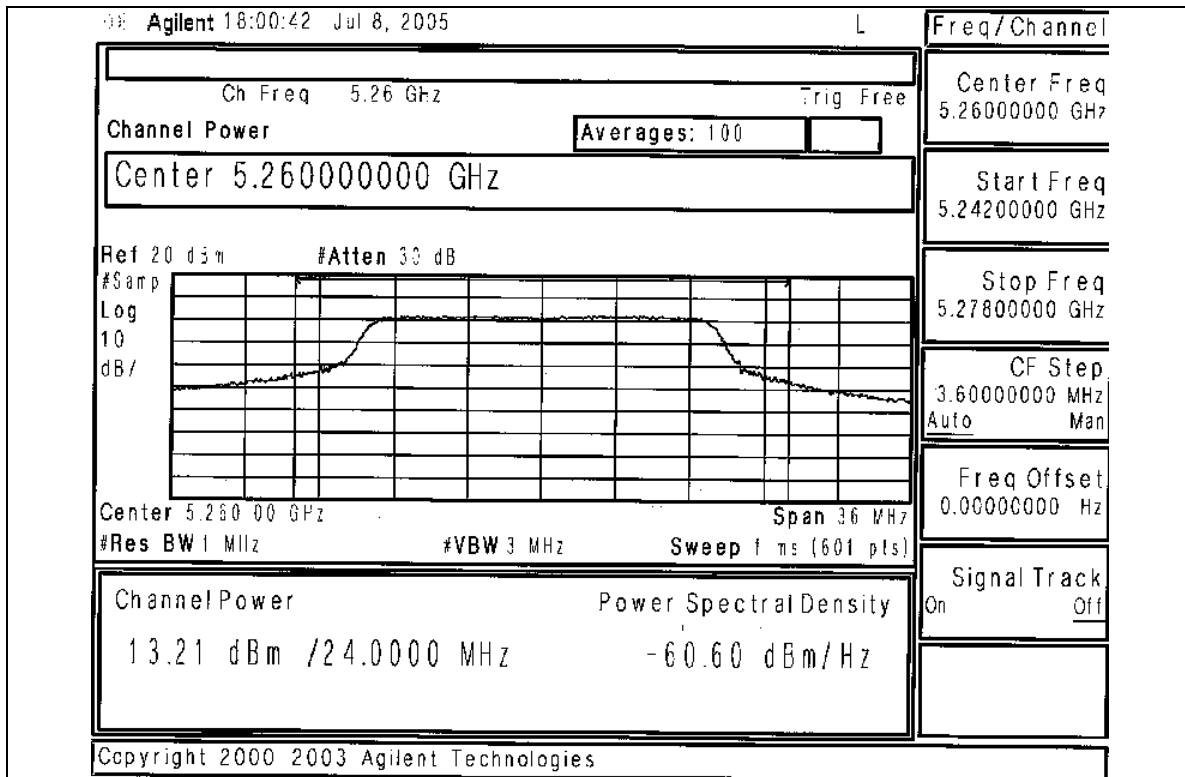


## CH 4

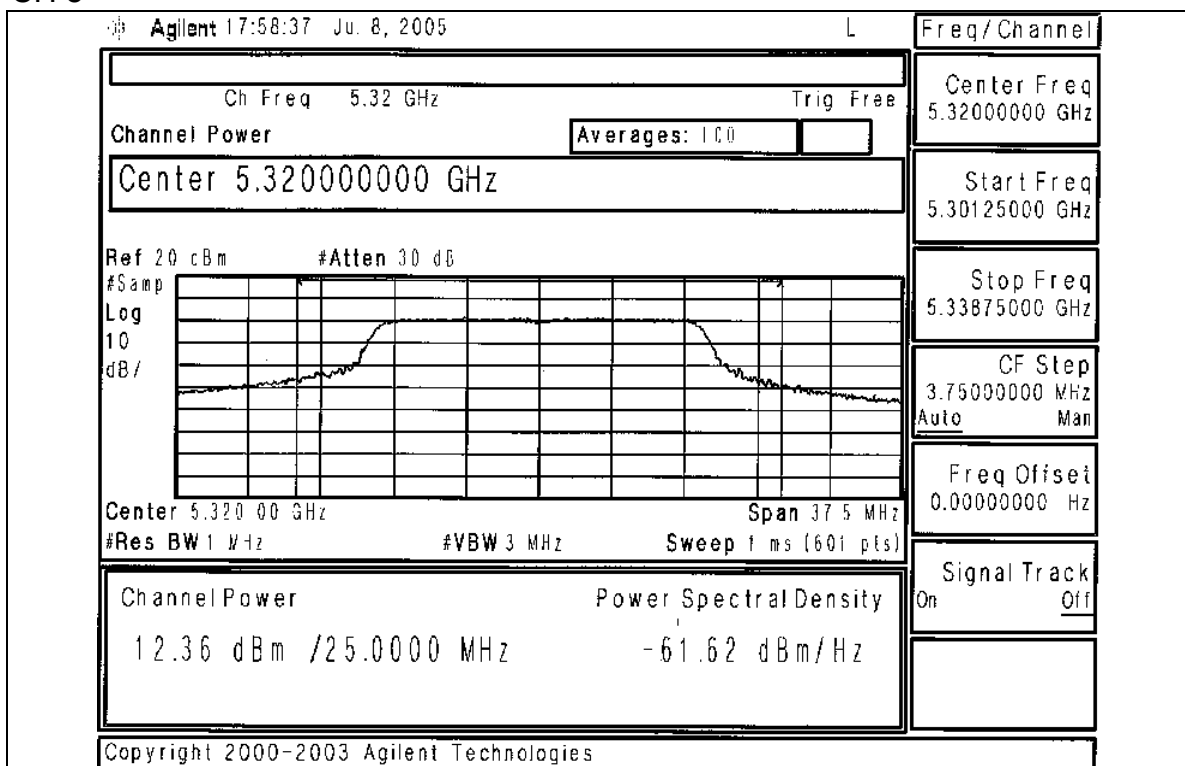




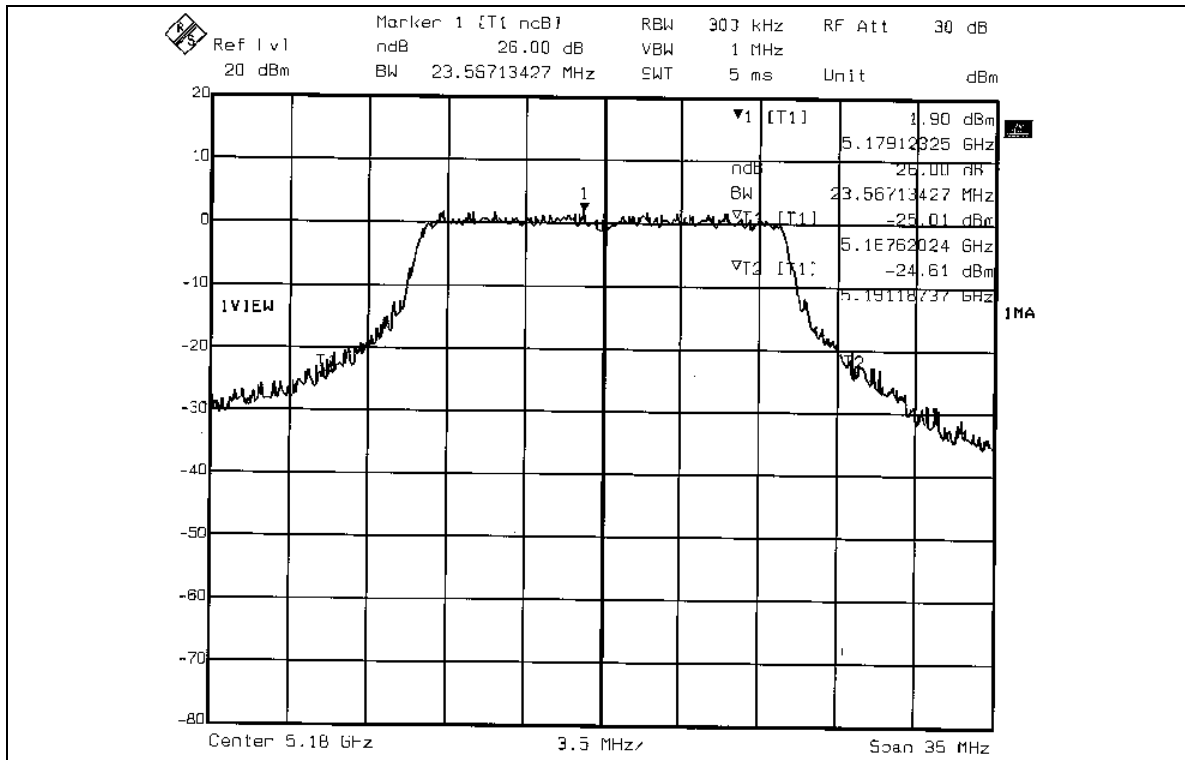
## CH 5



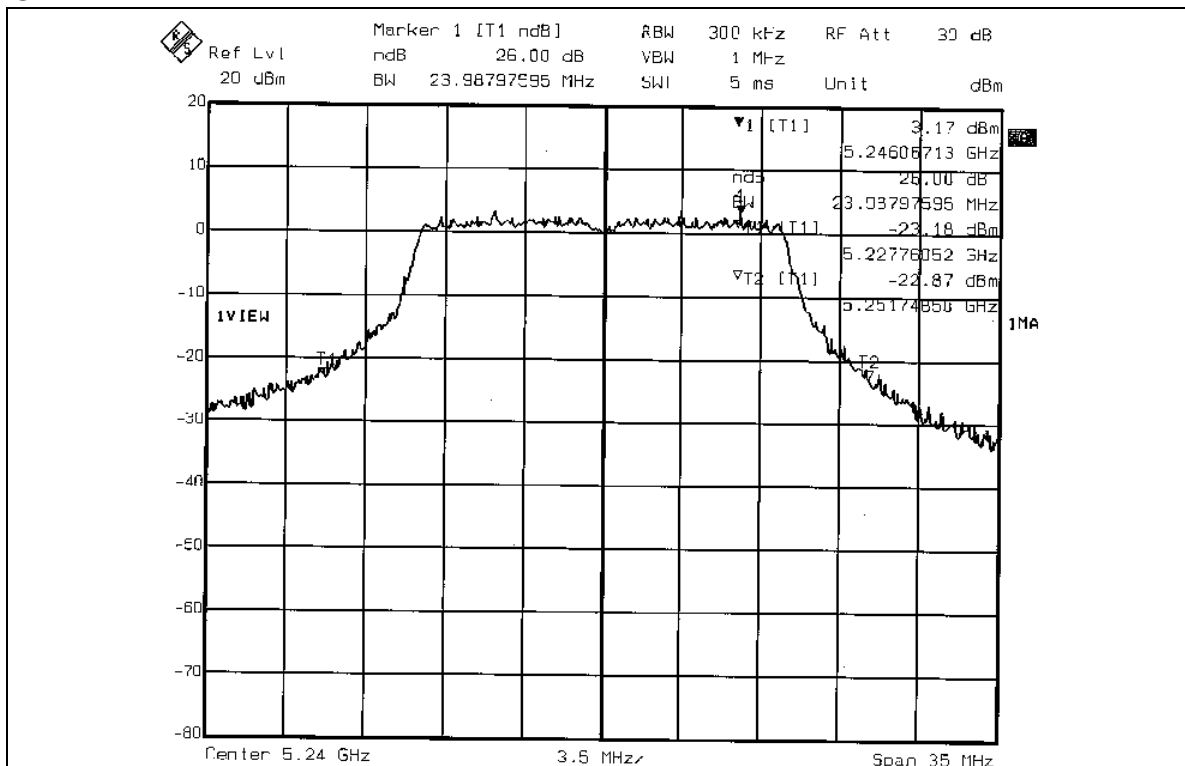
## CH 8



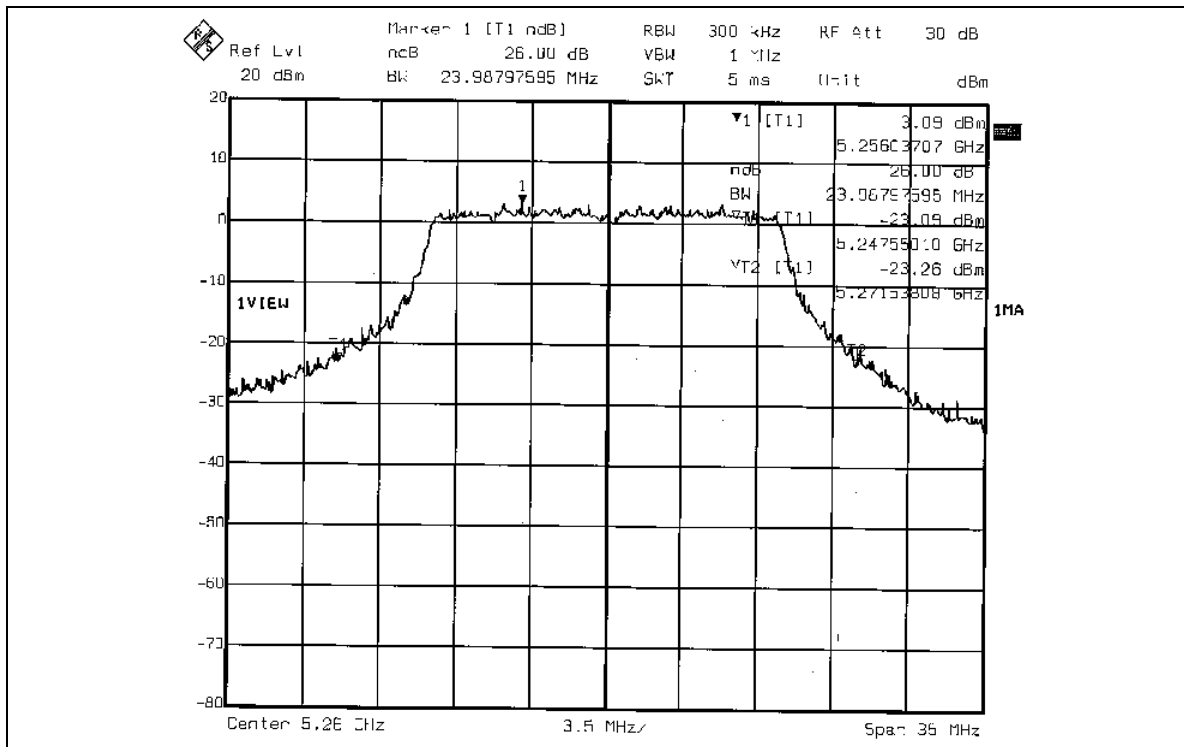
## 26dB Occupied Bandwidth: CH 1



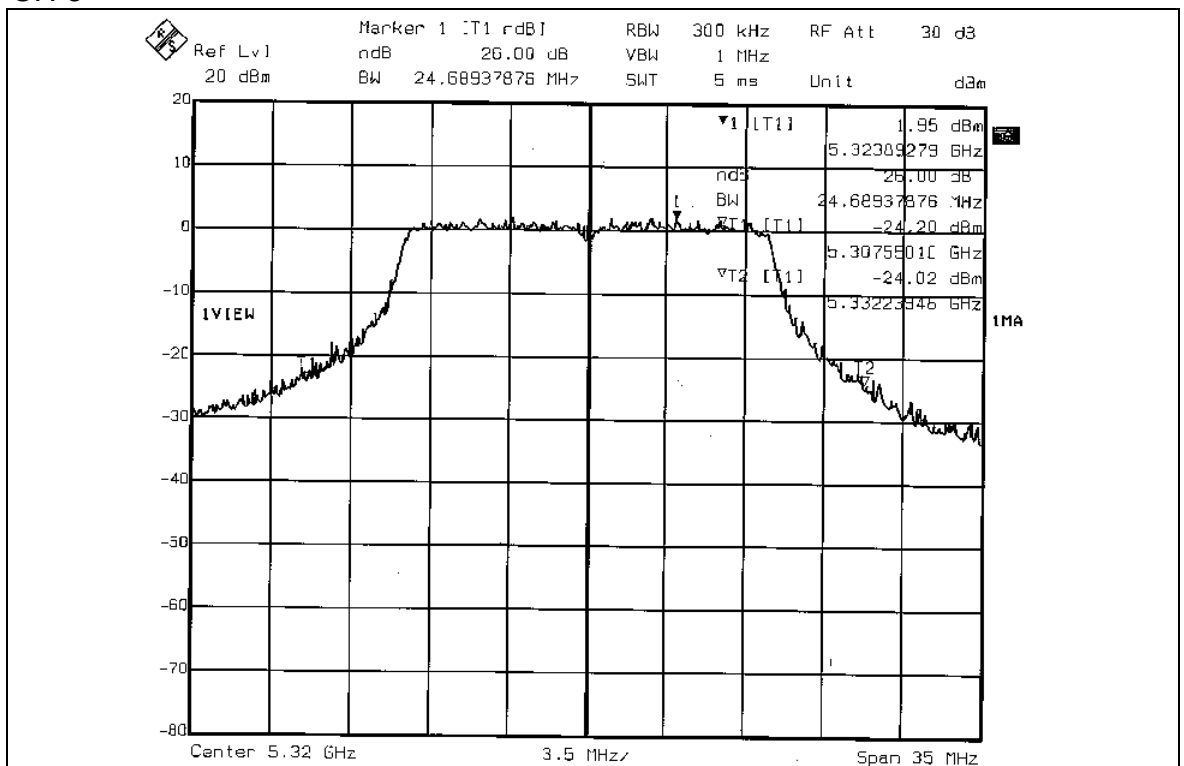
## CH 4



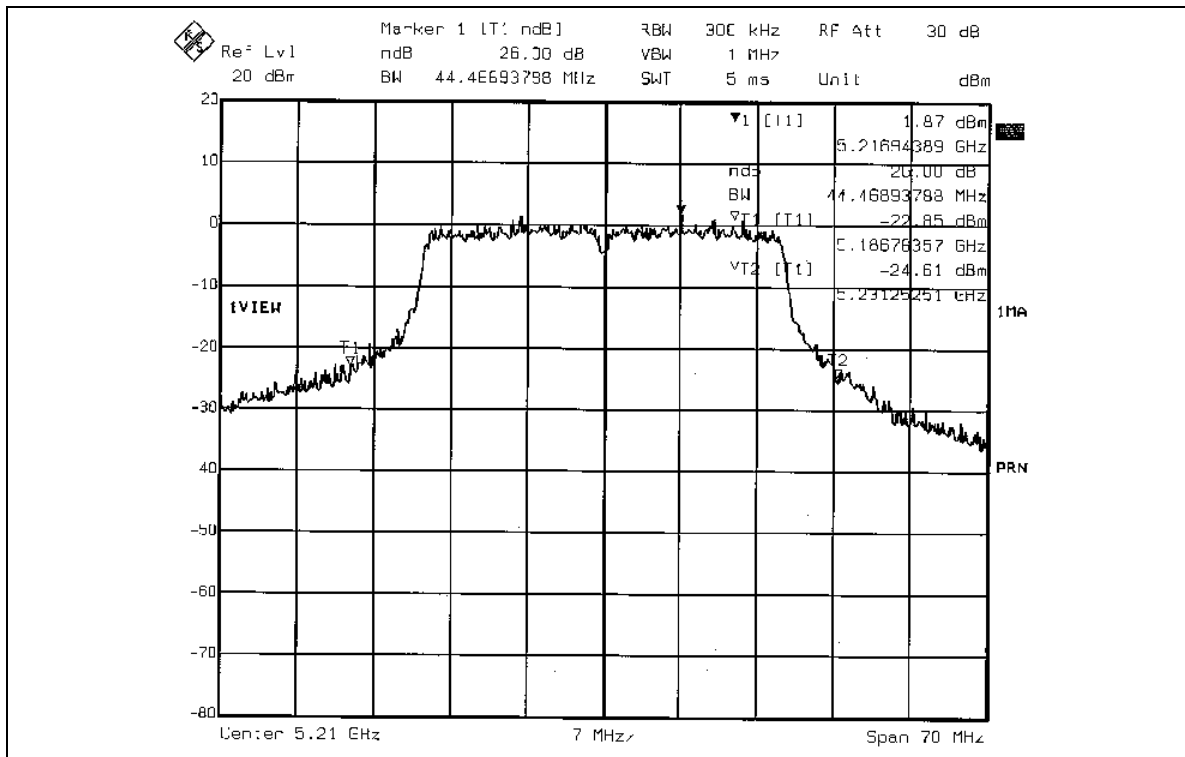
## CH 5



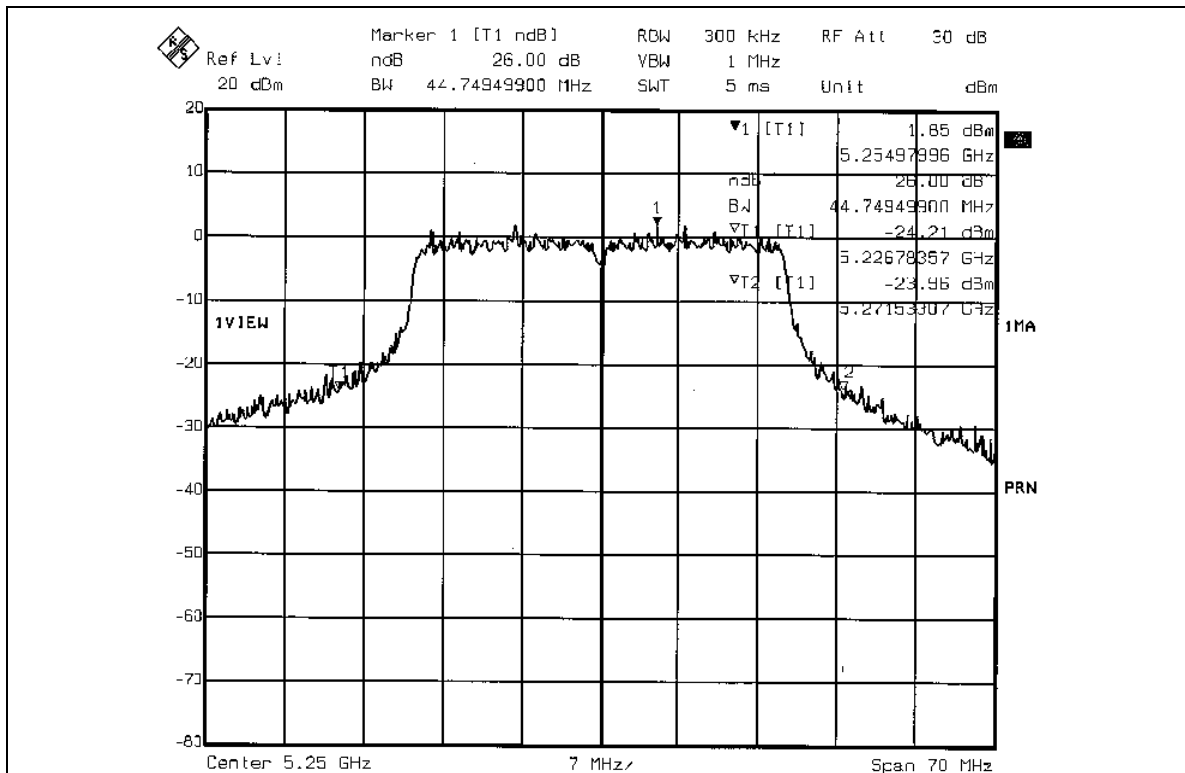
## CH 8



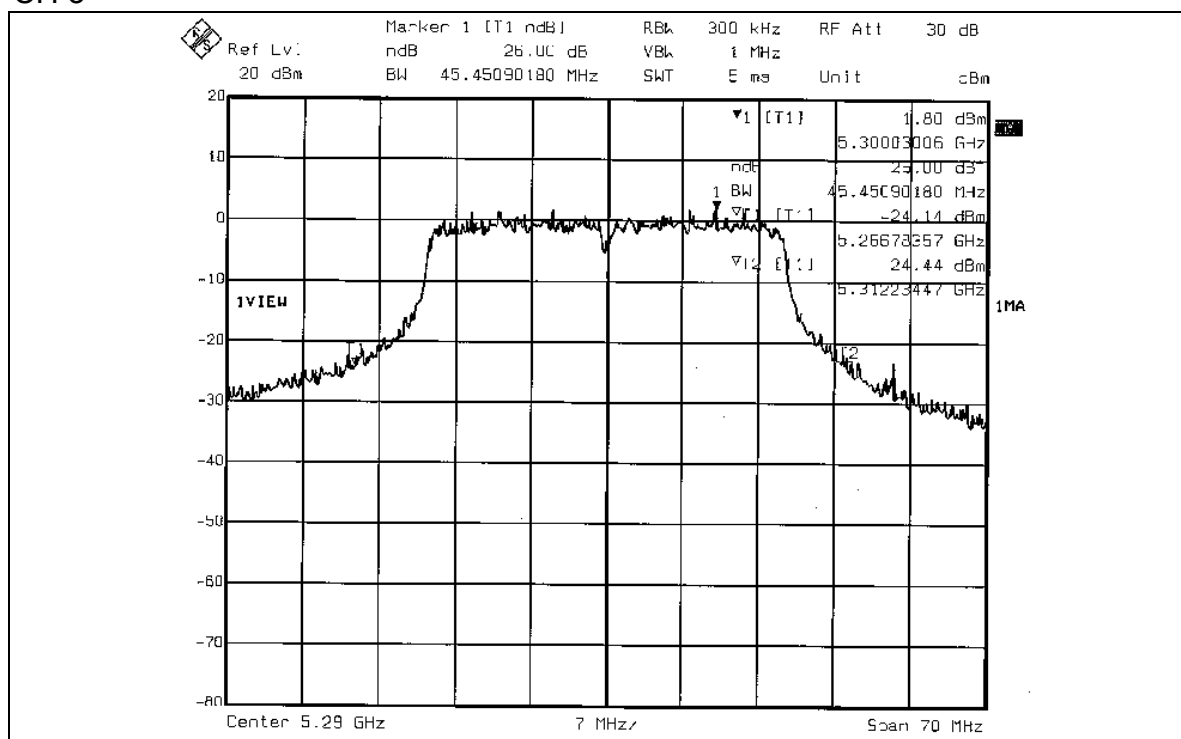
## 26dB Occupied Bandwidth: CH 1



## CH 2



## CH 3



#### 4.4 PEAK POWER EXCURSION MEASUREMENT

##### 4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

| Frequency Band    | Limit |
|-------------------|-------|
| 5.15 – 5.25 GHz   | 13dB  |
| 5.25 – 5.35 GHz   | 13dB  |
| 5.725 – 5.825 GHz | 13dB  |

##### 4.4.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER          | FSEK30    | 100049     | Aug. 12, 2005    |

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

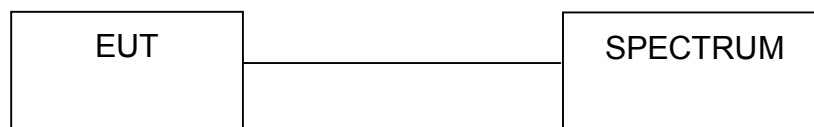
#### 4.4.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum bandwidth span to view the entire spectrum.
3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300KHz).
4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

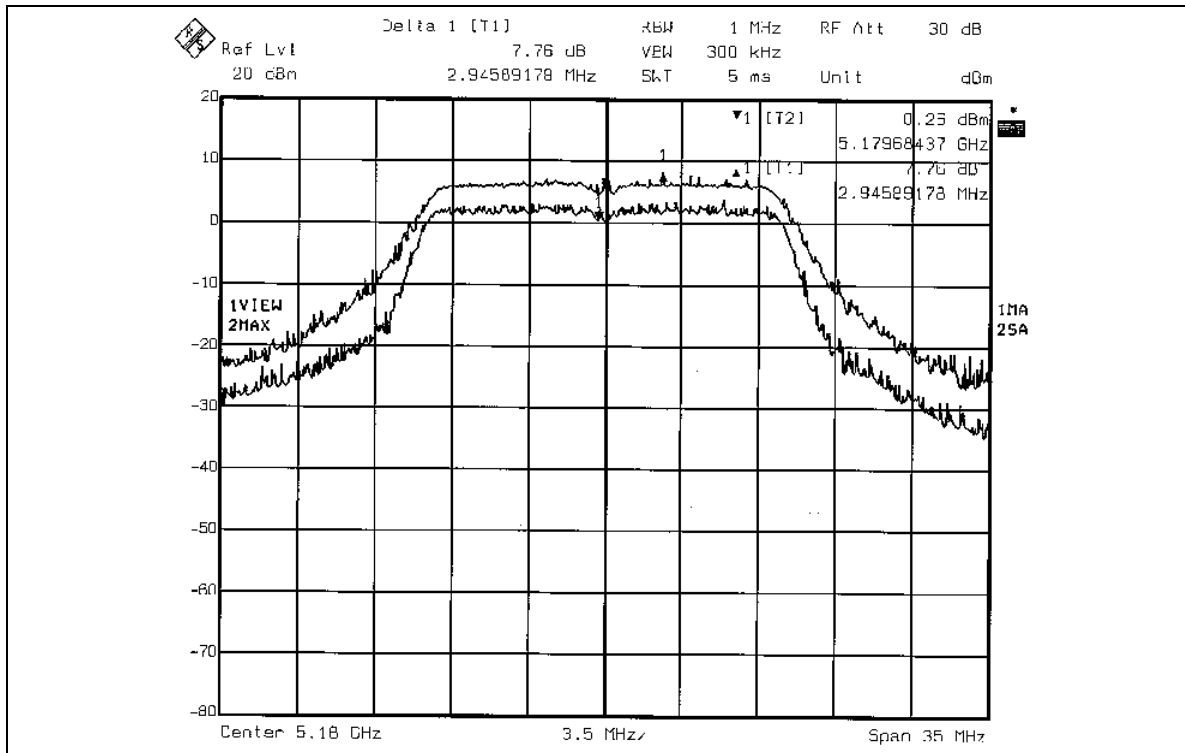
## 4.4.7 TEST RESULTS

## 802.11a OFDM modulation

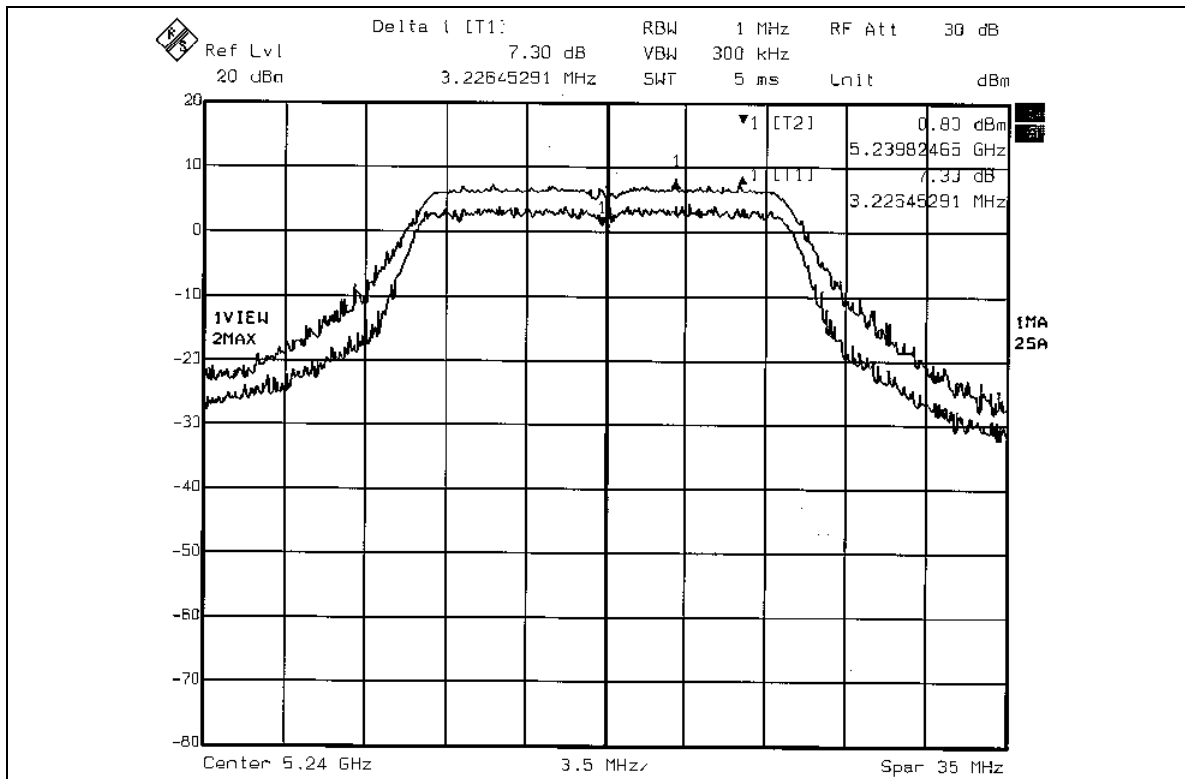
|                             |                          |                                 |                        |
|-----------------------------|--------------------------|---------------------------------|------------------------|
| <b>EUT</b>                  | 802.11 a+b+g wireless AP | <b>MODEL</b>                    | AP41                   |
| <b>MODULATION TYPE</b>      | BPSK                     | <b>TRANSFER RATE</b>            | 6Mbps                  |
| <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz            | <b>ENVIRONMENTAL CONDITIONS</b> | 26deg.C, 63%RH, 991hPa |
| <b>TESTED BY</b>            | Long Chen                |                                 |                        |

| <b>CHANNEL</b> | <b>CHANNEL FREQUENCY (MHz)</b> | <b>PEAK POWER EXCURSION (dB)</b> | <b>PEAK to AVERAGE EXCURSION LIMIT (dB)</b> | <b>PASS/FAIL</b> |
|----------------|--------------------------------|----------------------------------|---------------------------------------------|------------------|
| 1              | 5180                           | 7.76                             | 13                                          | PASS             |
| 4              | 5240                           | 7.30                             | 13                                          | PASS             |
| 5              | 5260                           | 6.23                             | 13                                          | PASS             |
| 8              | 5320                           | 6.07                             | 13                                          | PASS             |

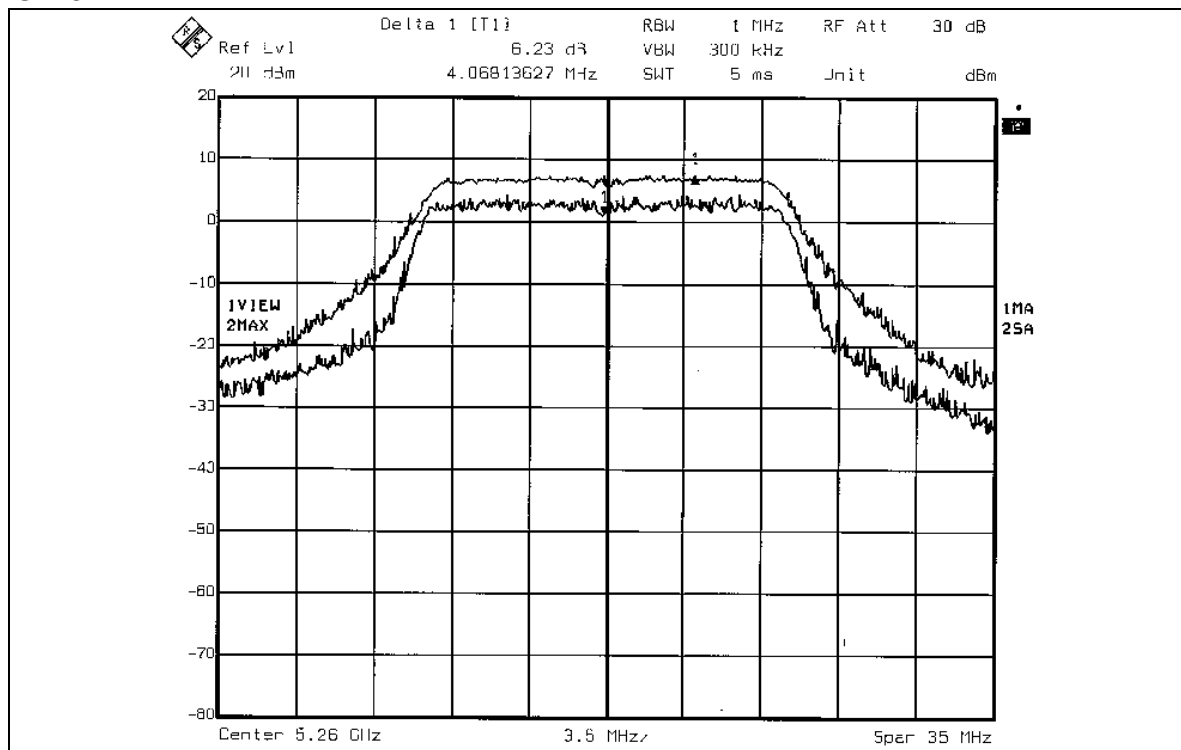
## CH 1



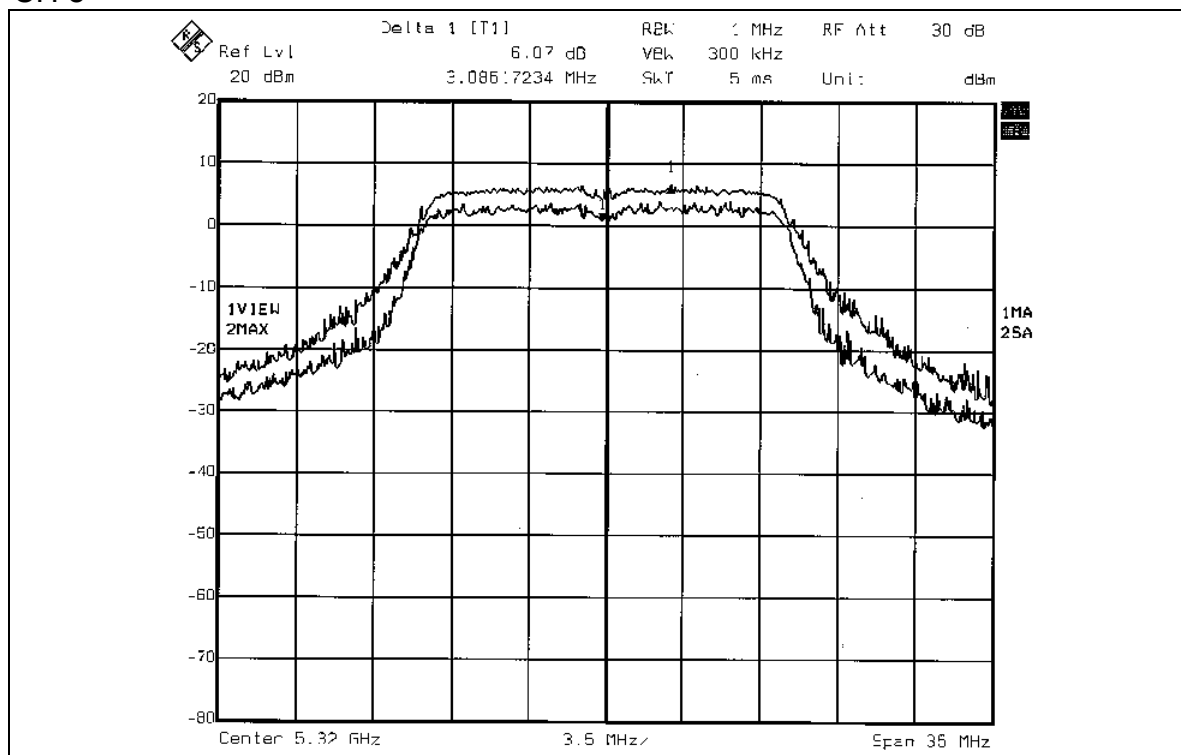
## CH 4



## CH 5



## CH 8



## 4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

| Frequency Band   | Limit |
|------------------|-------|
| 5.15 ~ 5.25GHz   | 4dBm  |
| 5.25 ~ 5.35GHz   | 11dBm |
| 5.725 ~ 5.825GHz | 17dBm |

### 4.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER          | FSEK30    | 100049     | Aug. 12, 2005    |

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

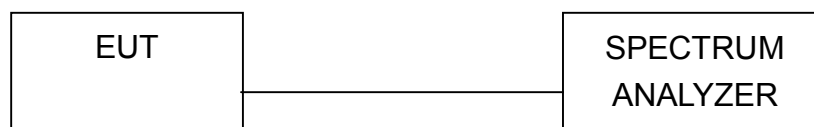
#### 4.5.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITIONS

Same as 5.3.6

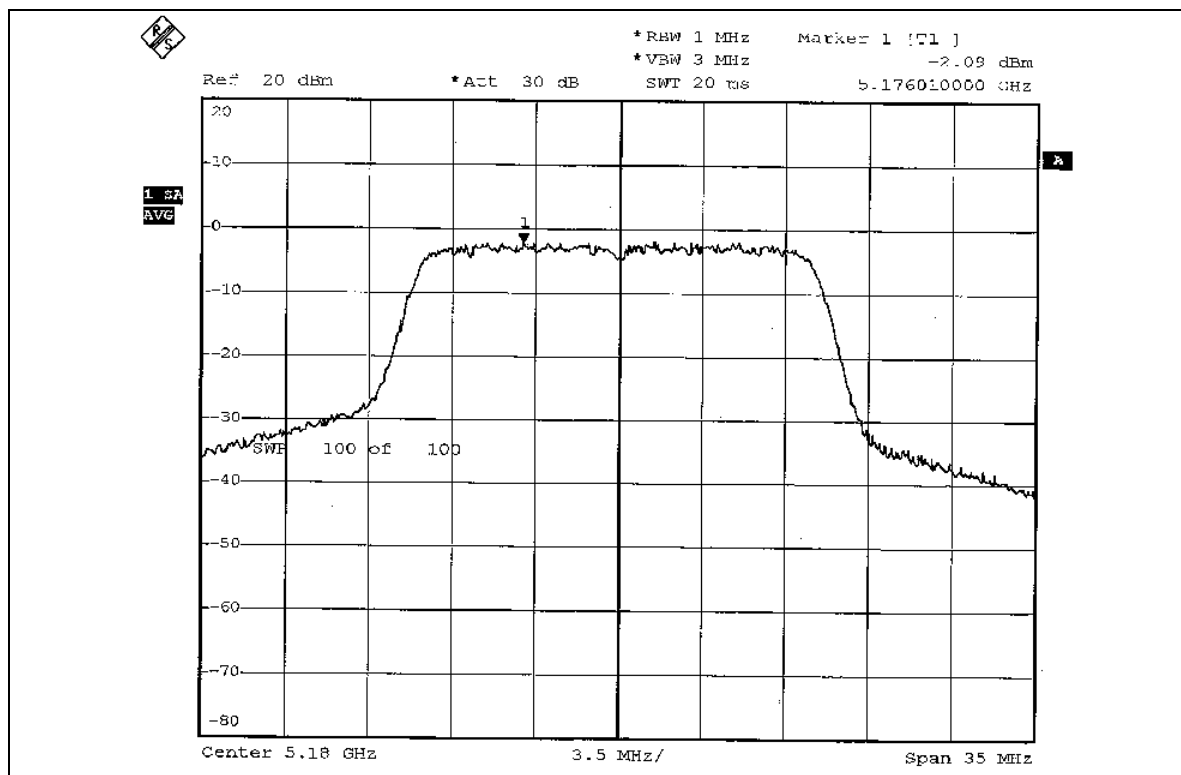
## 4.5.7 TEST RESULTS

## 802.11a OFDM modulation

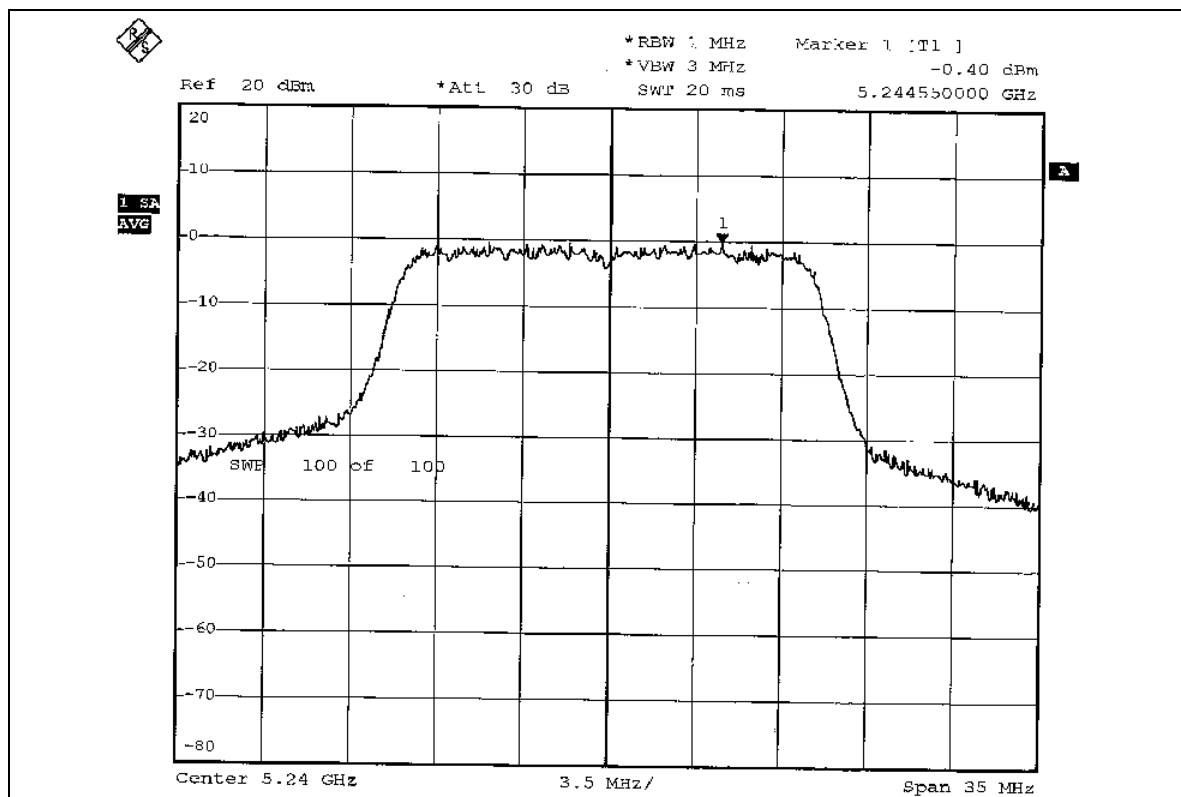
|                             |                          |                                 |                        |
|-----------------------------|--------------------------|---------------------------------|------------------------|
| <b>EUT</b>                  | 802.11 a+b+g wireless AP | <b>MODEL</b>                    | AP41                   |
| <b>MODULATION TYPE</b>      | BPSK                     | <b>TRANSFER RATE</b>            | 6Mbps                  |
| <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz            | <b>ENVIRONMENTAL CONDITIONS</b> | 26deg.C, 63%RH, 991hPa |
| <b>TESTED BY</b>            | Long Chen                |                                 |                        |

| CHANNEL | CHANNEL FREQUENCY (MHz ) | RF POWER LEVEL IN 1MHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---------|--------------------------|---------------------------------|---------------------|-----------|
| 1       | 5180                     | -2.09                           | 4                   | PASS      |
| 4       | 5240                     | -0.40                           | 4                   | PASS      |
| 5       | 5260                     | -0.65                           | 11                  | PASS      |
| 8       | 5320                     | -2.15                           | 11                  | PASS      |

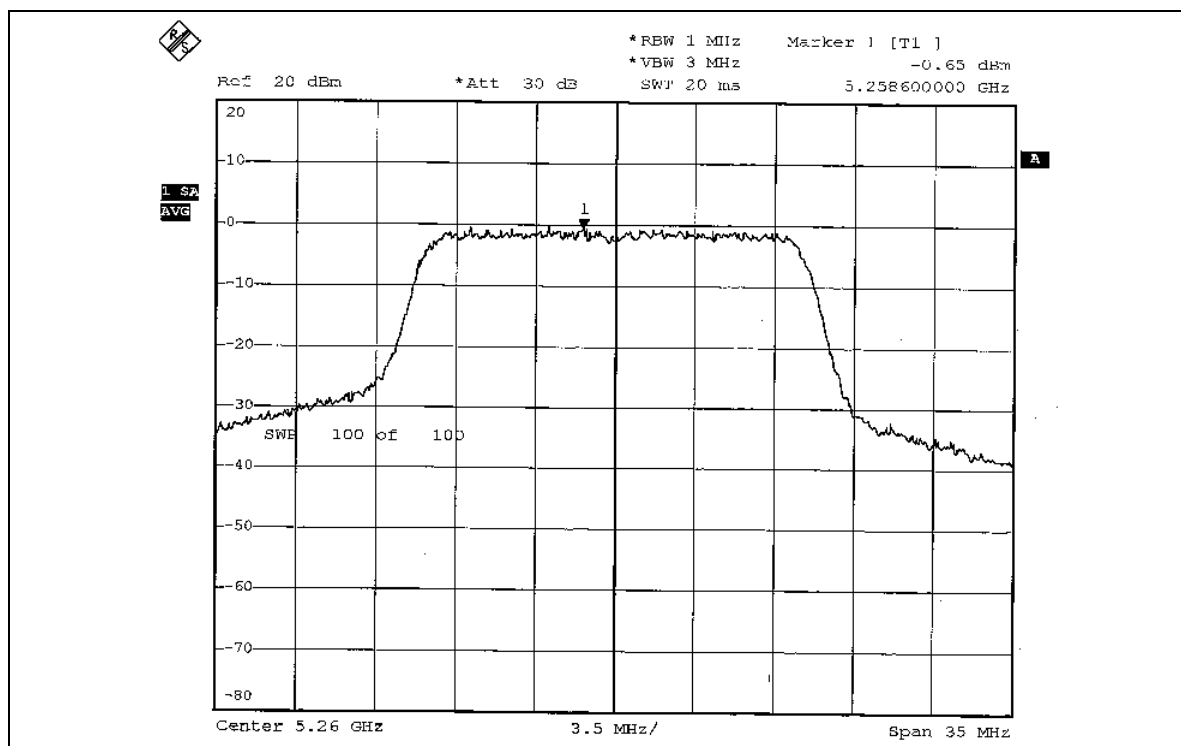
## CH 1



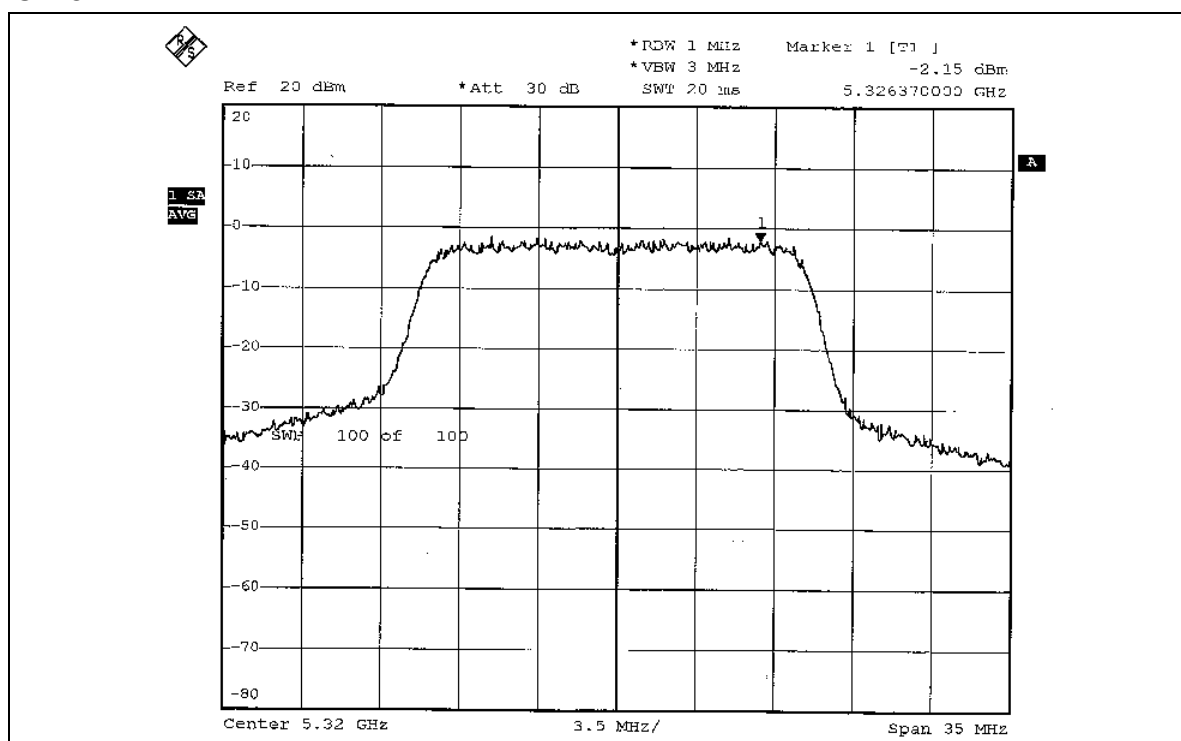
## CH 4



## CH 5



## CH 8



## 4.6 FREQUENCY STABILITY

### 4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

### 4.6.2 TEST INSTRUMENTS

| Description & Manufacturer                    | Model No. | Serial No. | Calibrated Until |
|-----------------------------------------------|-----------|------------|------------------|
| ANRITSU SPECTRUM ANALYZER                     | MS2667C   | M10281     | Mar. 09, 2006    |
| WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER | TH-4S-C   | W981030    | Jul. 18, 2006    |

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

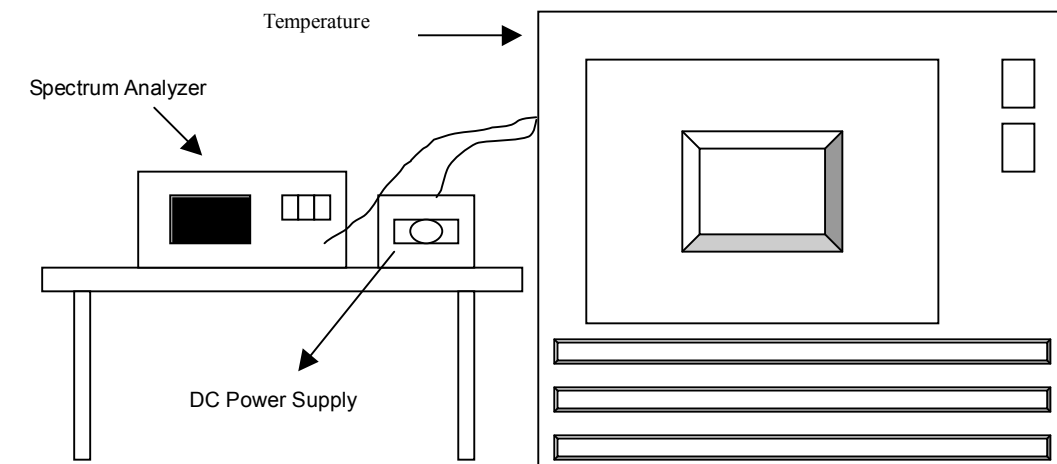
### 4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 TEST SETUP



#### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

## 4.6.7 TEST RESULTS

| Operating frequency: 5320MHz |                          |           |            |           |            | Limit : $\pm 0.015\%$ |            |           |            |
|------------------------------|--------------------------|-----------|------------|-----------|------------|-----------------------|------------|-----------|------------|
| Temp.<br>(°C)                | Power<br>supply<br>(Vac) | 0 minute  |            | 2 minute  |            | 5 minute              |            | 10 minute |            |
|                              |                          | (MHz)     | (%)        | (MHz)     | (%)        | (MHz)                 | (%)        | (MHz)     | (%)        |
| 50                           | 138                      | 5319.9812 | -0.0003529 | 5319.9812 | -0.0003527 | 5319.9813             | -0.0003524 | 5319.9813 | -0.0003518 |
|                              | 120                      | 5319.9813 | -0.0003521 | 5319.9813 | -0.0003517 | 5319.9812             | -0.0003526 | 5319.9813 | -0.0003516 |
|                              | 102                      | 5319.9813 | -0.0003523 | 5320.9813 | 0.0184450  | 5319.9813             | -0.0003516 | 5319.9812 | -0.0003527 |
| 40                           | 138                      | 5319.9854 | -0.0002739 | 5319.9855 | -0.0002733 | 5319.9855             | -0.0002733 | 5319.9855 | -0.0002727 |
|                              | 120                      | 5319.9855 | -0.0002727 | 5319.9854 | -0.0002738 | 5319.9855             | -0.0002729 | 5319.9855 | -0.0002731 |
|                              | 102                      | 5319.9855 | -0.0002734 | 5319.9855 | -0.0002732 | 5319.9855             | -0.0002728 | 5319.9855 | -0.0002733 |
| 30                           | 138                      | 5319.9922 | -0.0001465 | 5319.9922 | -0.0001458 | 5319.9923             | -0.0001450 | 5319.9923 | -0.0001449 |
|                              | 120                      | 5319.9923 | -0.0001454 | 5319.9923 | -0.0001449 | 5319.9923             | -0.0001450 | 5319.9923 | -0.0001452 |
|                              | 102                      | 5319.9922 | -0.0001459 | 5319.9923 | -0.0001454 | 5319.9923             | -0.0001456 | 5319.9923 | -0.0001451 |
| 20                           | 138                      | 5319.9972 | -0.0000532 | 5319.9972 | -0.0000535 | 5319.9972             | -0.0000532 | 5319.9971 | -0.0000538 |
|                              | 120                      | 5319.9972 | -0.0000535 | 5319.9972 | -0.0000536 | 5319.9971             | -0.0000538 | 5319.9971 | -0.0000543 |
|                              | 102                      | 5319.9971 | -0.0000545 | 5319.9972 | 0.0000234  | 5319.9972             | -0.0000529 | 5319.9971 | -0.0000544 |
| 10                           | 138                      | 5320.0012 | 0.0000230  | 5320.0012 | 0.0000240  | 5320.0012             | 0.0000228  | 5320.0012 | 0.0000229  |
|                              | 120                      | 5320.0012 | 0.0000234  | 5320.0013 | 0.0000591  | 5320.0013             | 0.0000243  | 5320.0012 | 0.0000233  |
|                              | 102                      | 5320.0013 | 0.0000237  | 5320.0031 | 0.0000598  | 5320.0012             | 0.0000233  | 5320.0013 | 0.0000238  |
| 0                            | 138                      | 5320.0032 | 0.0000595  | 5320.0032 | 0.0000594  | 5320.0031             | 0.0000592  | 5320.0032 | 0.0000593  |
|                              | 120                      | 5320.0032 | 0.0000601  | 5320.0032 | 0.0001720  | 5320.0032             | 0.0000595  | 5320.0031 | 0.0000590  |
|                              | 102                      | 5320.0032 | 0.0000592  | 5320.0092 | 0.0001721  | 5320.0031             | 0.0000591  | 5320.0031 | 0.0000590  |
| -10                          | 138                      | 5320.0092 | 0.0001725  | 5320.0092 | 0.0001716  | 5320.0091             | 0.0001719  | 5320.0092 | 0.0001725  |
|                              | 120                      | 5320.0092 | 0.0001724  | 5320.0091 | 0.0002556  | 5320.0092             | 0.0001723  | 5320.0091 | 0.0001718  |
|                              | 102                      | 5320.0092 | 0.0001726  | 5320.0136 | 0.0002474  | 5320.0092             | 0.0001721  | 5320.0092 | 0.0001725  |
| -20                          | 138                      | 5320.0131 | 0.0002465  | 5320.0132 | 0.0002472  | 5320.0131             | 0.0002468  | 5320.0131 | 0.0002471  |
|                              | 120                      | 5320.0132 | 0.0002480  | 5320.0132 | 0.0003696  | 5320.0131             | 0.0002471  | 5320.0132 | 0.0002475  |
|                              | 102                      | 5320.0132 | 0.0002481  | 5320.0197 | 0.0003693  | 5620.0132             | 5.6393453  | 5320.0132 | 0.0002478  |
| -30                          | 138                      | 5320.0197 | 0.0003700  | 5320.0196 | 0.0003694  | 5320.0196             | 0.0003688  | 5320.0197 | 0.0003702  |
|                              | 120                      | 5320.0197 | 0.0003702  | 5320.0197 | 0.0007538  | 5320.0196             | 0.0003692  | 5320.0197 | 0.0003701  |
|                              | 102                      | 5320.0196 | 0.0003687  | 5320.0401 | 0.0007538  | 5320.0196             | 0.0003690  | 5320.0196 | 0.0003692  |

## 4.7 BAND EDGES MEASUREMENT

### 4.7.1 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER          | FSEK30    | 100049     | Aug. 12, 2005    |

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

### 4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

### 4.7.4 TEST RESULTS

For signals in the restricted bands above and below the 5.15 to 5.35GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak filed strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Peak RBW=VBW=1MHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

**802.11a OFDM modulation****Channel 1 (5180MHz)**

The band edge emission plot on page 63 shows 37.77dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 is 104.10dBuV/m (Peak), so the maximum field strength in restrict band is  $104.10 - 37.77 = 66.33$ dBuV/m which is under 74dBuV/m limit.

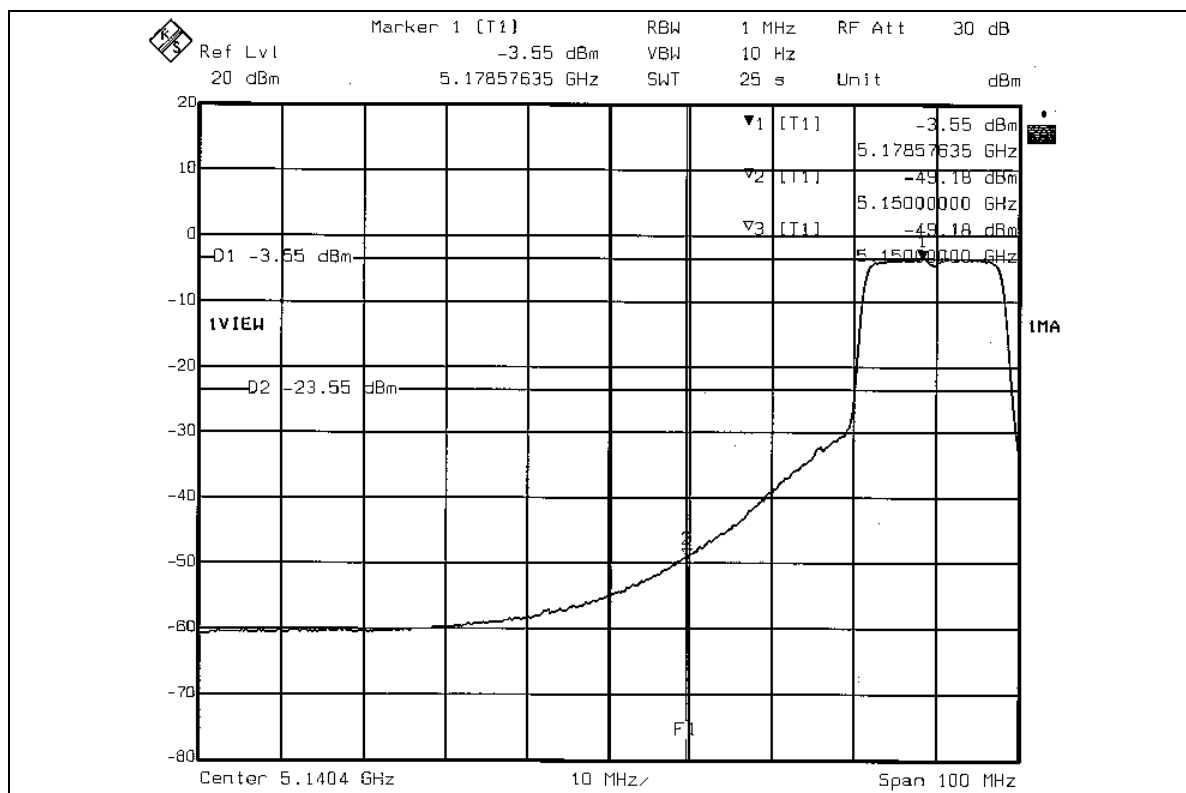
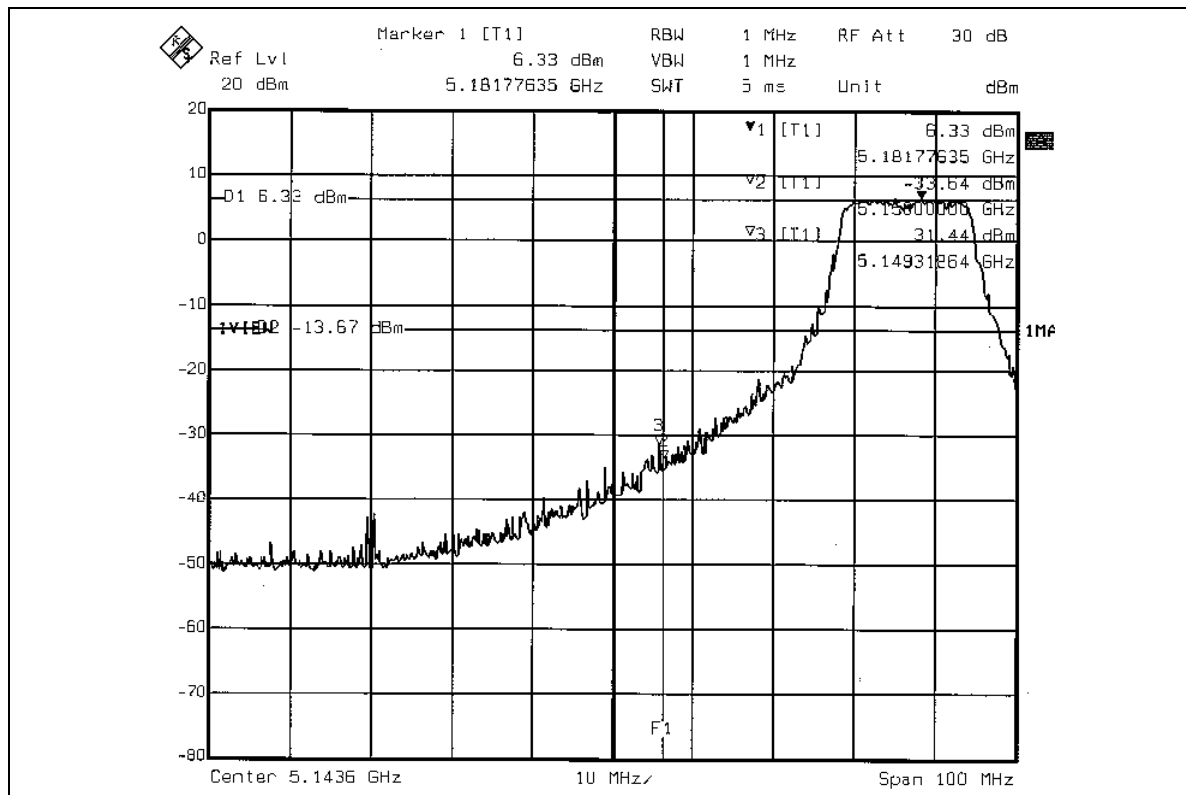
The band edge emission plot on page 63 shows 45.63dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 is 93.43dBuV/m (Average), so the maximum field strength in restrict band is  $93.43 - 45.63 = 47.80$ dBuV/m which is under 54dBuV/m limit.

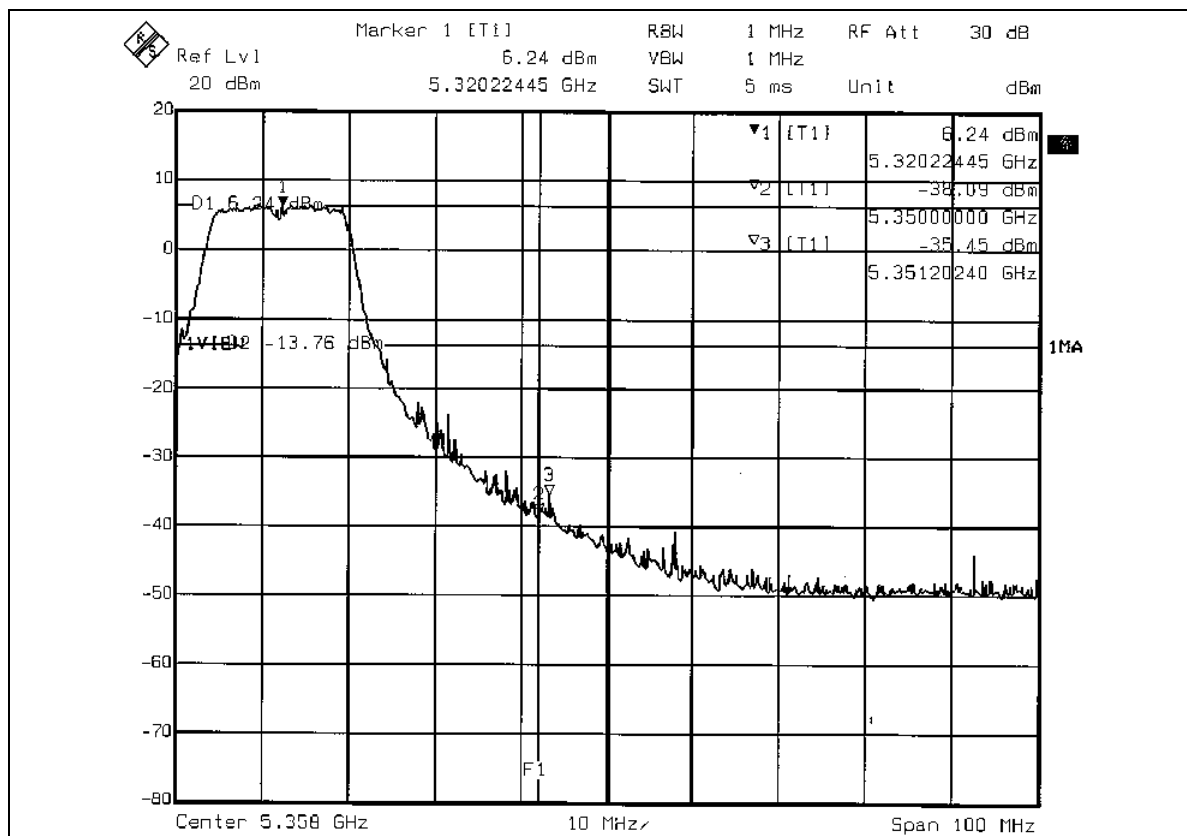
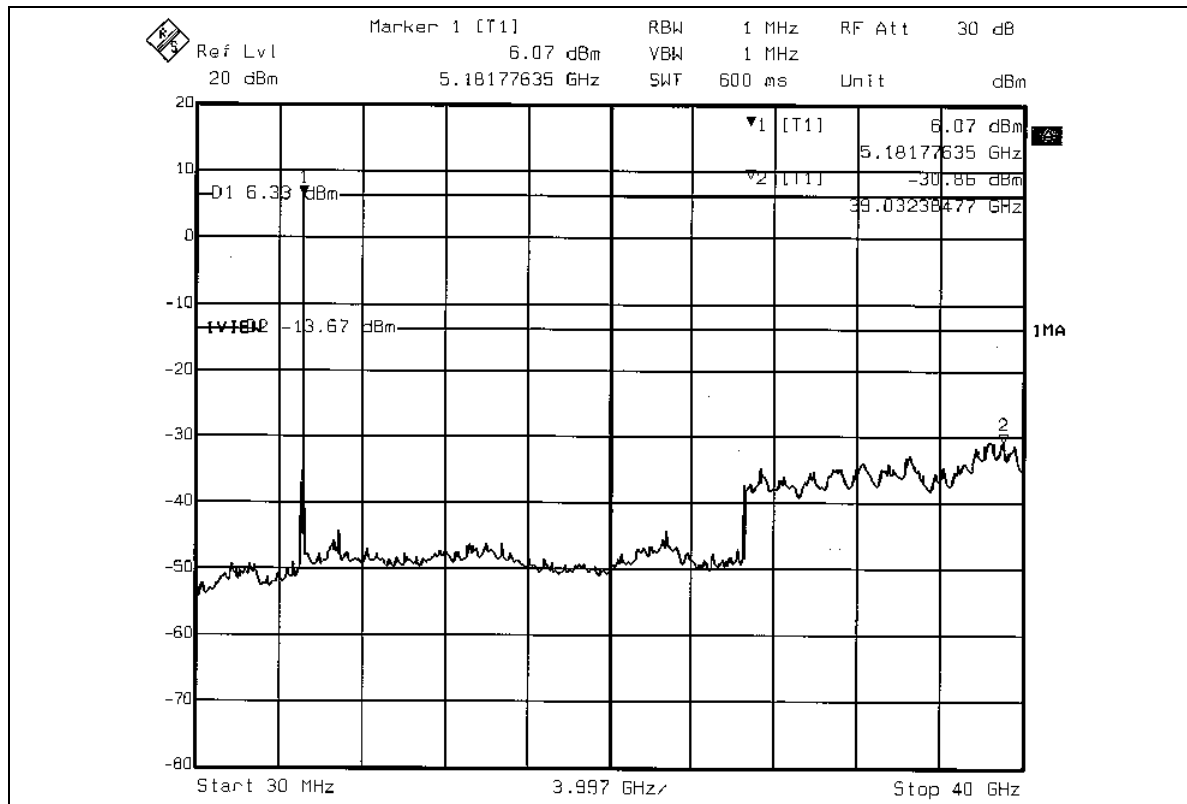
**Channel 8 (5320MHz)**

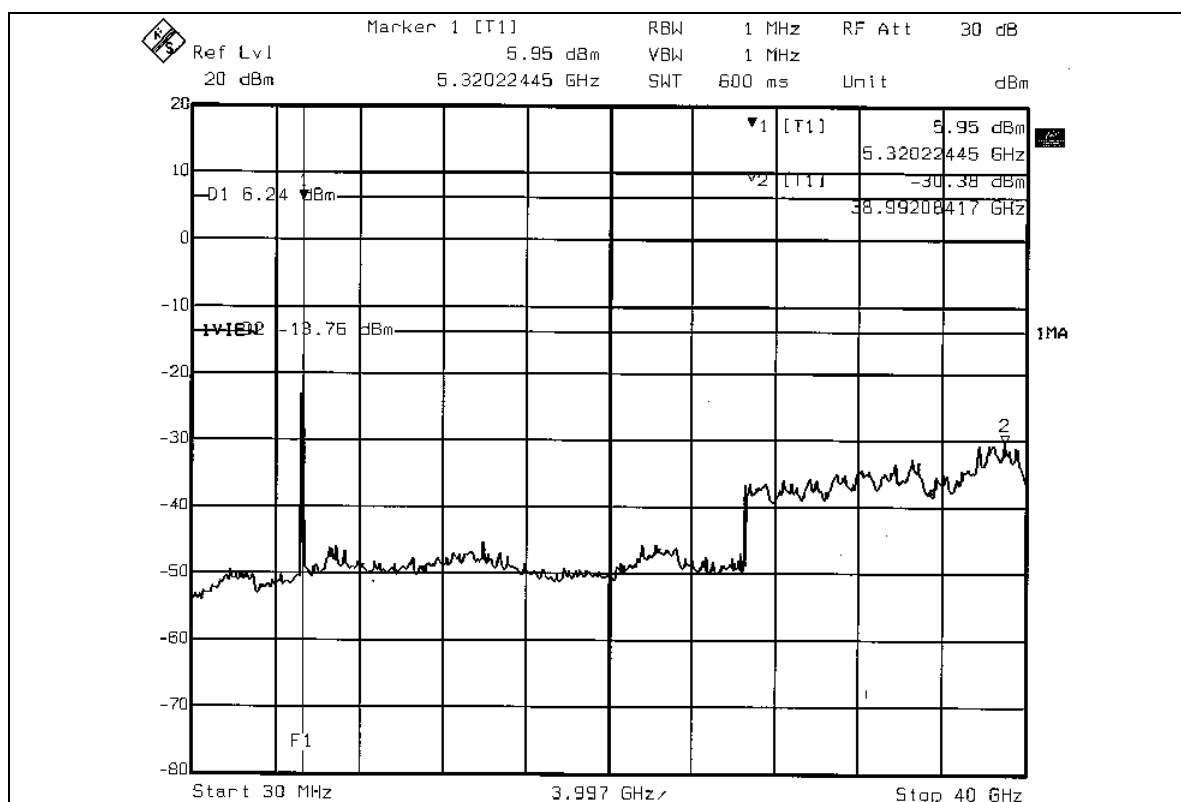
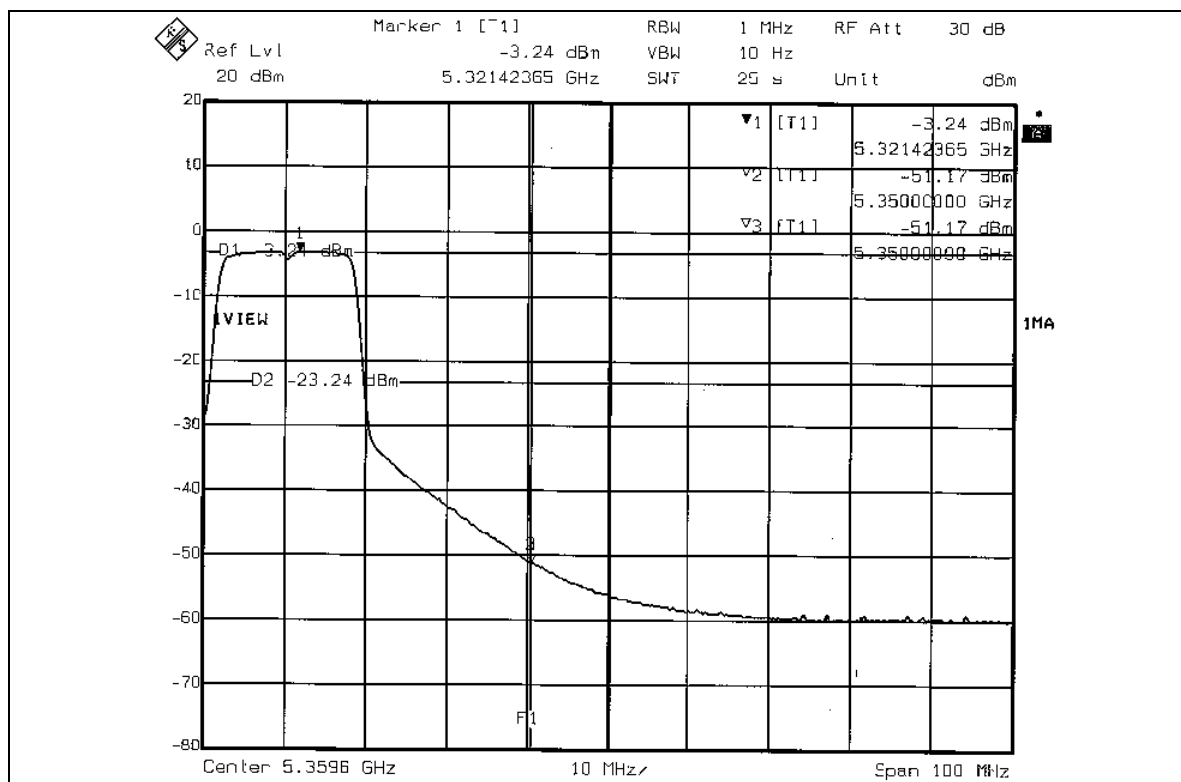
The band edge emission plot on page 64 shows 41.69dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 8 is 104.21dBuV/m (Peak), so the maximum field strength in restrict band is  $104.21 - 41.69 = 62.52$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 65 shows 47.93dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 8 is 93.54dBuV/m (Average), so the maximum field strength in restrict band is  $93.54 - 47.93 = 45.61$ dBuV/m which is under 54dBuV/m limit.

## 802.11a OFDM modulation









## **4.8 ANTENNA REQUIREMENT**

### **4.8.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

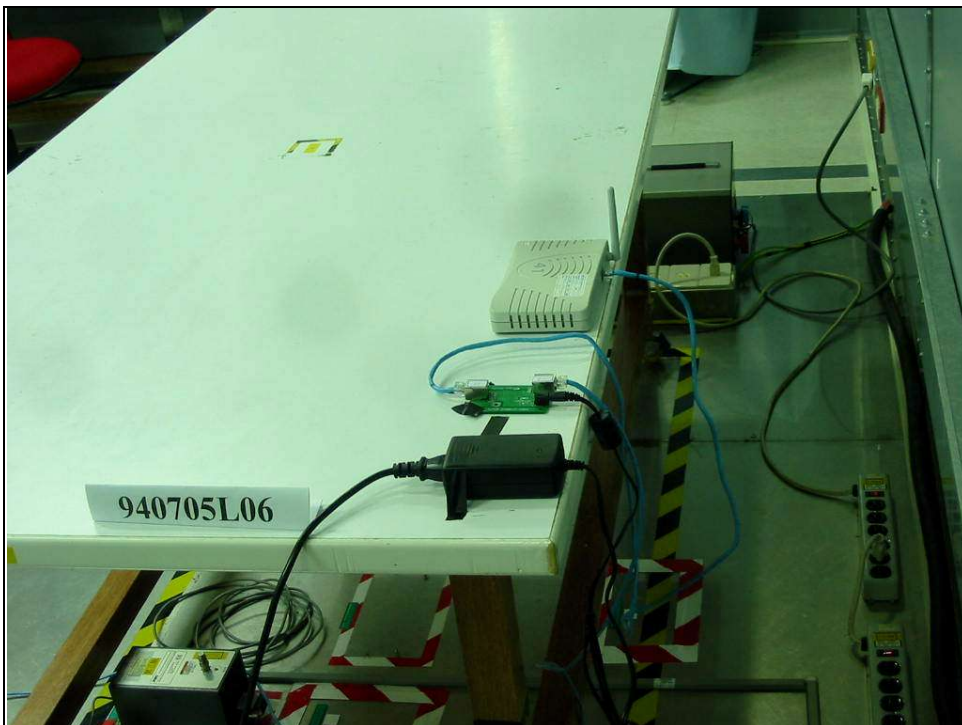
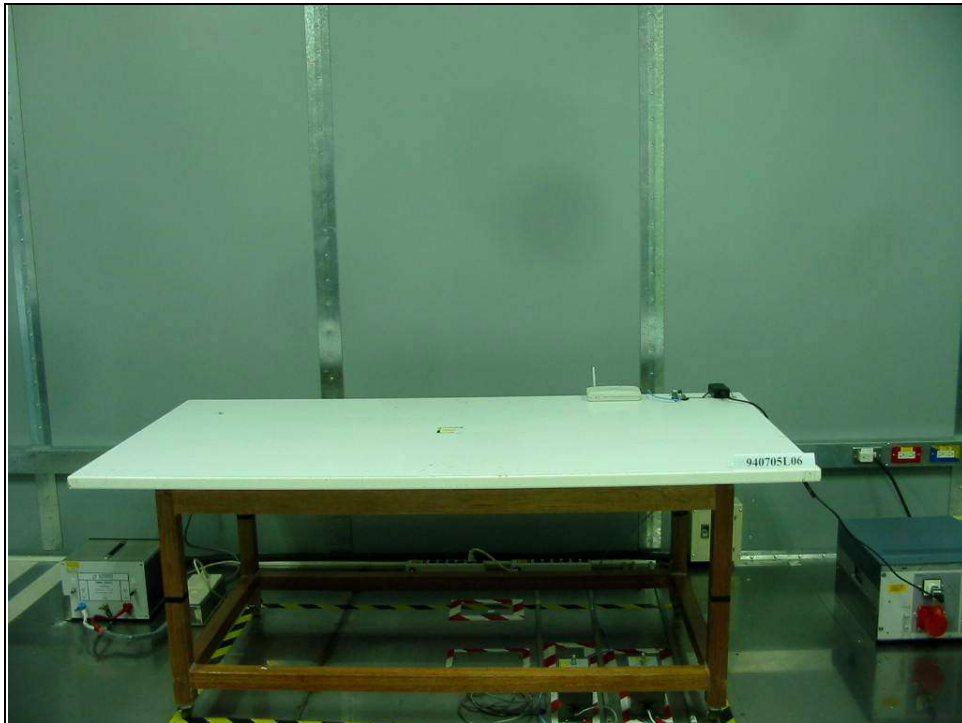
And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.8.2 ANTENNA CONNECTED CONSTRUCTION**

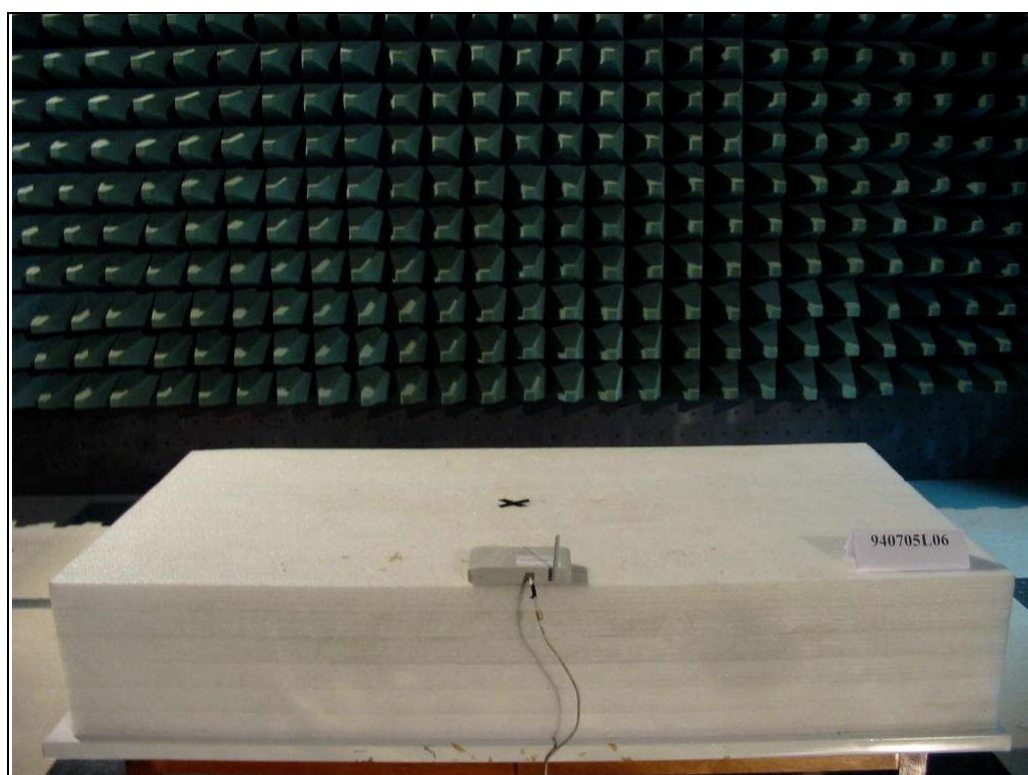
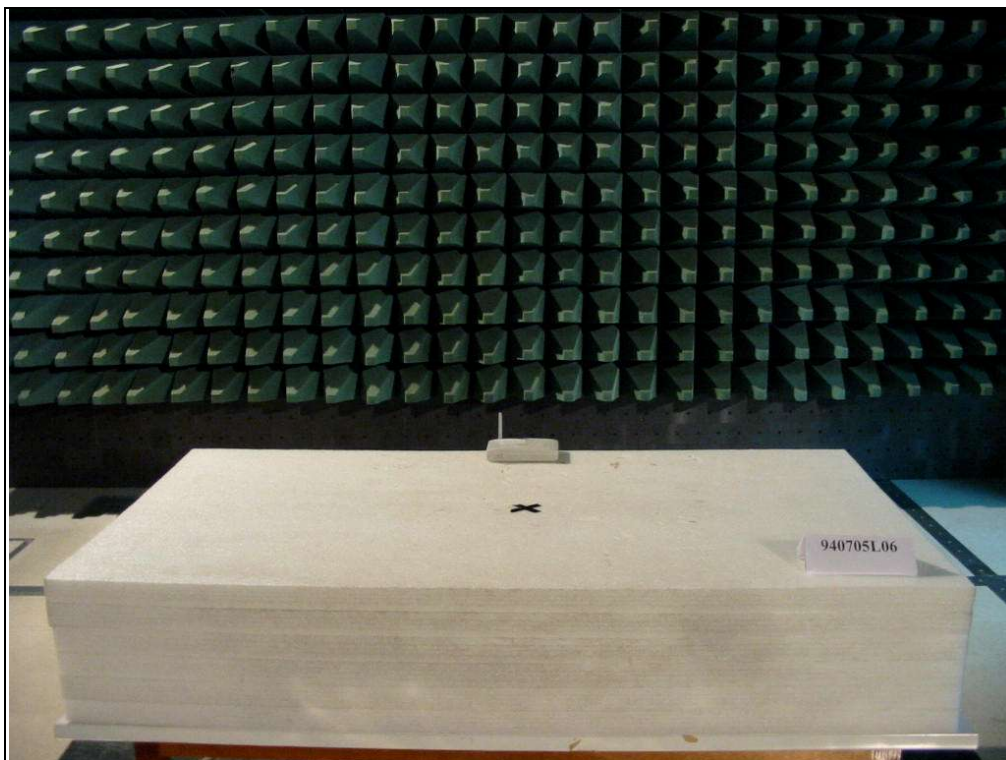
The antennas used in this product are Dipole antenna and Printed antenna with UFL connector. The maximum Gain of the antenna is 2.11dBi.

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



## RADIATED EMISSION TEST



## 6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

|                    |                       |
|--------------------|-----------------------|
| <b>USA</b>         | FCC, NVLAP, UL, A2LA  |
| <b>Germany</b>     | TUV Rheinland         |
| <b>Japan</b>       | VCCI                  |
| <b>Norway</b>      | NEMKO                 |
| <b>Canada</b>      | INDUSTRY CANADA , CSA |
| <b>R.O.C.</b>      | CNLA, BSMI, DGT       |
| <b>Netherlands</b> | Telefication          |
| <b>Singapore</b>   | PSB , GOST-ASIA(MOU)  |
| <b>Russia</b>      | CERTIS(MOU)           |

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Linko RF Lab.**

Tel: 886-3-3270910

Fax: 886-3-3270892

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also