# FCC TEST REPORT (PART 27)

**REPORT NO.:** RF981110H01

**MODEL NO.:** RG231, RG231-2.5-4D2V1W, RG231-2.5-1D2V1W

**RECEIVED:** Nov. 10, 2009

**TESTED:** Nov. 20 to Dec. 09, 2009

**ISSUED:** Dec. 10, 2009

**APPLICANT:** Accton Wireless Broadband Corp.

**ADDRESS:** 3F, No. 1 Creation Rd. III, Science-based Industrial Park Hsinchu 30077, Taiwan, R.O.C.

**ISSUED BY :** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**LAB LOCATION :** No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

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# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | WiMAX 802.16e Indoor Gateway |
| **BRAND NAME:** | AWB |
| **MODEL NO.:** | RG231, RG231-2.5-4D2V1W, RG231-2.5-1D2V1W |
| **APPLICANT:** | Accton Wireless Broadband Corp. |
| **TESTED:** | Nov. 20 to Dec. 09, 2009 |
| **TEST SAMPLE:** | R&D SAMPLE |
| **TEST STANDARDS:** | FCC 47 CFR Part 2 |
| | FCC 47 CFR Part 27, Subpart C & M |
| | ANSI/TIA/EIA-603-C-2004 |

The above equipment (Model No.: RG231) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, 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** : Carol Liao , **DATE:** *Dec. 10, 2009*
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE** : , **DATE:** *Dec. 10, 2009*
( Hank Chung, Deputy Manager )

**APPROVED BY** : , **DATE:** *Dec. 10, 2009*
(May Chen, Deputy Manager )

# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 27 & Part 2 | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE AND LIMIT** | **RESULT** | **REMARK** |
| 2.1046<br>27.50(h)(2) | Maximum Peak Output Power<br>Limit: max. 2 watts conducted peak power | PASS | Meet the requirement of limit. |
| 2.1055<br>27.54 | Frequency Stability<br>Stay with the authorized bands of operation | PASS | Meet the requirement of limit. |
| 2.1049<br>27.53(m)(6) | Emission Bandwidth | PASS | Meet the requirement of limit. |
| 2.1051<br>27.53(m)(4)(6) | Band Edge Measurements | PASS | Meet the requirement of limit. |
| 2.1051<br>27.53(m)(4)(6) | Conducted Spurious Emissions | PASS | Meet the requirement of limit. |
| 2.1053<br>27.53(m)(4)(6) | Radiated Spurious Emissions | 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 16-4-2:

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

| Measurement | Value |
|---|---|
| Radiated emissions (30MHz-1GHz) | 3.94 dB |
| Radiated emissions (1GHz -18GHz) | 2.49 dB |
| Radiated emissions (18GHz -40GHz) | 2.70 dB |

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | WiMAX 802.16e Indoor Gateway |
| **MODEL NO.** | RG231, RG231-2.5-4D2V1W, RG231-2.5-1D2V1W |
| **FCC ID** | V8YFW181RG25011W |
| **POWER SUPPLY** | DC 12V from Power Adapter |
| **POWER CORD** | DC output cable (Unshielded, 1.6m)<br>DC output cable (Unshielded, 1.9m) |
| **MODULATION TECHNOLOGY** | OFDMA |
| **MODULATION** | QPSK-1/2, -3/4, 16QAM-1/2, 3/4,<br>64QAM-1/2, -2/3, -3/4 (64QAM for Rx only) |
| **FREQUENCY RANGE** | 5MHz: 2502.5MHz ~ 2687.5MHz<br>10MHz: 2505MHz ~ 2685MHz |
| **CHANNEL BANDWIDTH** | 5MHz & 10MHz |
| **MAX. CONDUCTED POWER** | 5MHz: 27.3dBm<br>10MHz: 27.2dBm |
| **ANTENNA TYPE** | Please see note 2 |
| **DATA CABLE** | NA |
| **I/O PORTS** | **For RG231 and RG231-2.5-4D2V1W:**<br>RJ-45 port x 4 (LAN)<br>RJ-11 port x 2 (FXS)<br>USB port x 1 (USB 2.0)<br>**For RG231-2.5-1D2V1W:**<br>RJ-45 port x 1 (LAN)<br>RJ-11 port x 2 (FXS)<br>USB port x 1 (USB 2.0) |
| **ASSOCIATED DEVICES** | Adapter x 1 |

**NOTE:**

1. The EUT has three model names which are identical to each other in all aspects except for the following :

| Model No. | Difference |
|---|---|
| RG231 | 4 Lan port & 2 FXS port & 1 Wlan |
| RG231-2.5-4D2V1W | 4 Lan port & 2 FXS port & 1 Wlan |
| RG231-2.5-1D2V1W | 1 Lan port & 2 FXS port & 1 Wlan |

The EUT was pre-tested in chamber with above models, the worst case was found in model: RG231-2.5-4D2V1W. Therefore only the test data of the model was recorded in this report.

2. There are two antennas provided to this EUT, please refer to the following table:

| No. | Antenna Type | Antenna Connector | Antenna Gain (dBi) | Cable loss(dB) | Net Gain (dBi) | Cable Length (cm) | Frequency range (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | Printed Dipole | IPEX | 6.15 | 0.5 | 5.65 | 6.2 | 2500~2700 |
| 2 | PCB Dipole | IPEX | 6.76 | 0.5 | 6.26 | 6.2 | 2500~2700 |

From the above antennas, antenna2 was selected as representative antenna for the test and its data was recorded in this report.

3. The EUT inside has one 802.11bgn 1T1R Module which model name is RG231-W1T1R Module and FCC ID: V8YNW181RG25021W; therefore emission tests are added for simultaneously transmit between WLAN and WiMAX function. The emission tests have been performed at the worst channel of both WLAN and WiMAX, and recorded in this report.

4. The EUT must be supplied with a power adapter and following two different models could be chosen:

| No. | Brand | Model No. | Spec. |
|---|---|---|---|
| 1 | APD | WA-24E12 | AC Input: 100-240VAC, 50-60Hz, 0.65A<br>DC Output: 12VDC, 2A<br>DC output cable (Unshielded, 1.6m) |
| 2 | APD | WA-18G12U | AC Input: 100-240VAC, 50-60Hz, 0.5A<br>DC Output: 12VDC, 1.5A<br>DC output cable (Unshielded, 1.9m) |

The EUT was pre-tested in chamber with above power adapters, the worse case was found in power adapter 2. Therefore only the test data of the power adapter was recorded in this report.

5. For the EUT Modulation type and coding rate. After pre-testing items of output power and spurious emissions, 5MHz:QPSK-1/2 and 10MHz:16QAM-1/2 were found to be worst case, and were selected for the final test configuration.

| Up Link | | Down Link | |
|---|---|---|---|
| Modulation | Coding rate | Modulation | Coding rate |
| QPSK | 1/2 | QPSK | 1/2 |
| | 3/4 | | 3/4 |
| 16QAM | 1/2 | 16QAM | 1/2 |
| | 3/4 | | 3/4 |
| | | 64QAM | 1/2 |
| | | | 2/3 |
| | | | 3/4 |

6. The EUT embedded a firmware for testing that needs to control from Notebook computer to let EUT with different DL/UL ration.

7. The device has different DL/UL ration in normal operation. It was tested with 38.66% (DL:UL= 29:18) and 38.68% (DL:UL=29:18) duty cycle mode for 5MHz and 10MHz, which is the worse mode, and controlled by software. (The detail duty cycle refer to appendix A). The typical control traffic was transmitted in 3 control symbols.

8. The above EUT information was declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

Three channels have been tested and presented.

**CHANNEL BANDWIDTH: 5MHz**

**Low channel (L)**: 2502.5MHz.

**Middle channel (M)**: 2600MHz.

**High channel (H)**: 2687.5MHz.

**CHANNEL BANDWIDTH: 10MHz**

**Low channel (L)**: 2505MHz.

**Middle channel (M)**: 2595MHz.

**High channel (H)**: 2685MHz.

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO | | | | | | | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | OP | FS | EB | CE | CSE | RE<1G | RE≥1G | |
| MODE 1 | √ | √ | √ | √ | √ | √ | √ | Channel Bandwidth: 5MHz |
| MODE 2 | √ | √ | √ | √ | √ | √ | √ | Channel Bandwidth: 10MHz |
| MODE 3 | - | - | - | - | - | √ | √ | WiMAX + WiFi |

Where **OP:** Output power
**FS:** Frequency stability
**EB:** Emission bandwidth
**CE:** Channel edge
**CSE**: Conducted spurious emissions
**RE<1G:** Radiated emission below 1GHz
**RE≥1G:** Radiated emission above 1GHz

**OUTPUT POWER 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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | EUT CONFIGURE MODE |
|---|---|---|---|
| L, M, H | OFDMA | QPSK | MODE 1 |
| L, M, H | OFDMA | 16QAM | MODE 2 |

**FREQUENCY STABILITY 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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|---|---|---|
| M | OFDMA | Unmodulation |

**EMISSION BANDWIDTH 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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | EUT CONFIGURE MODE |
|---|---|---|---|
| L, M, H | OFDMA | QPSK | MODE 1 |
| L, M, H | OFDMA | 16QAM | MODE 2 |

**CHANNEL EDGE 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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | EUT CONFIGURE MODE |
|---|---|---|---|
| L, M, H | OFDMA | QPSK | MODE 1 |
| L, M, H | OFDMA | 16QAM | MODE 2 |

**CONDUCTED SPURIOUS EMISSIONS 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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | EUT CONFIGURE MODE |
|---|---|---|---|
| L, M, H | OFDMA | QPSK | MODE 1 |
| L, M, H | OFDMA | 16QAM | MODE 2 |

**RADIATED EMISSION MEASUREMENT (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.

| Normal test | | | |
|---|---|---|---|
| **TESTED CHANNEL** | **MODULATION TECHNOLOGY** | **MODULATION TYPE** | **EUT CONFIGURE MODE** |
| M | OFDMA | QPSK | MODE 1 |
| L | OFDMA | 16QAM | MODE 2 |
| **simultaneously transmit test(WLAN+WiMAX)** | | | |
| **TESTED CHANNEL** | **MODULATION TECHNOLOGY** | **MODULATION TYPE** | **EUT CONFIGURE MODE** |
| M (5MHz) | OFDMA | QPSK | MODE 3 |
| 6 (11g) | OFDM | BPSK | |

**RADIATED EMISSION MEASUREMENT (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.

| Normal test | | | |
|---|---|---|---|
| **TESTED CHANNEL** | **MODULATION TECHNOLOGY** | **MODULATION TYPE** | **EUT CONFIGURE MODE** |
| L, M, H | OFDMA | QPSK | MODE 1 |
| L, M, H | OFDMA | 16QAM | MODE 2 |
| **simultaneously transmit test(WLAN+WiMAX)** | | | |
| **TESTED CHANNEL** | **MODULATION TECHNOLOGY** | **MODULATION TYPE** | **EUT CONFIGURE MODE** |
| M (5MHz) | OFDMA | QPSK | MODE 3 |
| 6 (11g) | OFDM | BPSK | |

## 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 27, Subpart C & M**

**ANSI/TIA/EIA-603-C-2004**

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

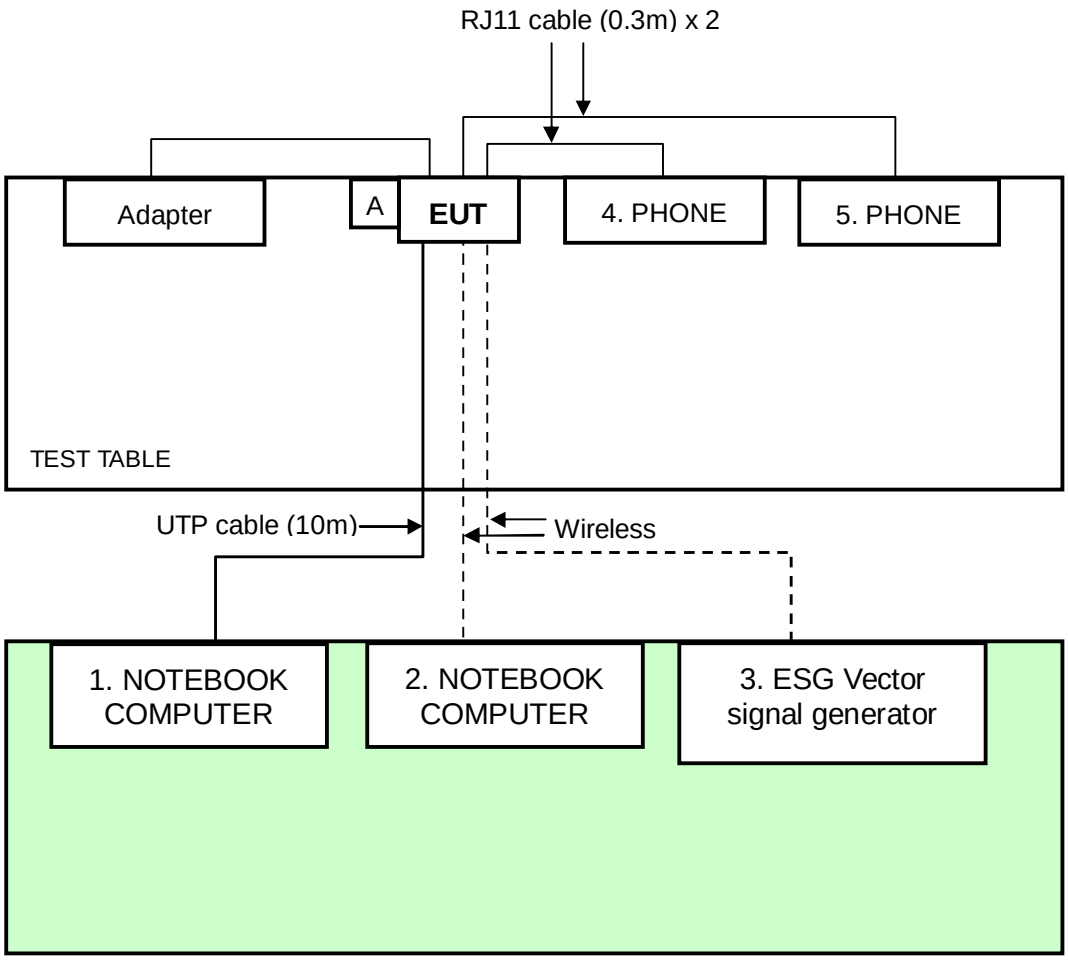
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | NOTEBOOK COMPUTER | DELL | PPT | 17044664176 | E2K24GBRL |
| 2 | NOTEBOOK COMPUTER | DELL | PP18L | 12252644560 | FCC DoC |
| 3 | ESG Vector signal generator | Agilent | E4438C | MY45094468/005 506 602 UK6 UNJ | NA |
| 4 | TELEPHONE | HTT | HTT-806 | 9543663 | FCC DoC |
| 5 | TELEPHONE | HTT | HTT-806 | 9545065 | FCC DoC |
| 6 | 150 Mbps N Wireless USB Adapter | AWB | WUS620 | NA | V8YFIC17S620T00W |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | UTP cable (10m) |
| 2 | NA |
| 3 | NA |
| 4 | RJ11 cable (0.3m) |
| 5 | RJ11 cable (0.3m) |
| 6 | NA |

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

### 3.4.1 CONFIGURATION OF SYSTEM UNDER TEST




**NOTE:** 1. Item A is the 150 Mbps N Wireless USB Adapter (Support unit 6).

# 4 TEST TYPES AND RESULTS

## 4.1 OUTPUT POWER MEASUREMENT

### 4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “Other User stations are limited to 2 watts and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Anritsu Power Meter | ML2495A | 0824006 | April 25, 2009 | April 24, 2010 |
| Pulse Power Sensor | MA2411B | 0738172 | April 25, 2009 | April 24, 2010 |

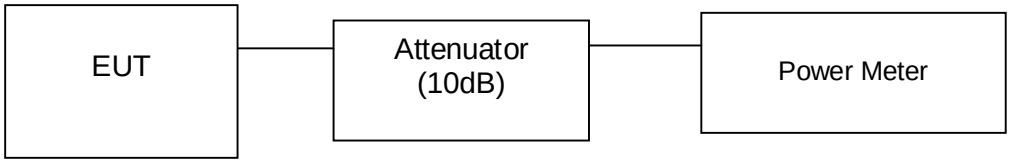
**NOTE:**
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1.3 TEST PROCEDURES

a. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.

b. Record the power level.

### 4.1.4 TEST SETUP




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

### 4.1.5 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared other computer systems (support unit 1 and 2) to act as communication partners and placed them outside of testing area.
3. The communication partners run test program “Beceem Diagnostic Control Panel 3.3.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.
4. Support unit 4 & 5 (Phone) are call to each other via EUT.

## 4.1.6 TEST RESULTS

### CHANNEL BANDWIDTH: 5MHz

| | | | |
|---|---|---|---|
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **DETECTOR FUNCTION** | RMS |
| **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa | **TESTED BY** | Phoenix Huang |

| CONDUCTED POWER | | | |
|---|---|---|---|
| **CHANNEL** | **FREQUENCY (MHz)** | **POWER OUTPUT(mW)** | **POWER OUTPUT(dBm)** |
| Low | 2502.5 | 524.807 | 27.20 |
| Middle | 2600 | 537.032 | 27.30 |
| High | 2687.5 | 467.735 | 26.70 |

### CHANNEL BANDWIDTH: 10MHz

| | | | |
|---|---|---|---|
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **DETECTOR FUNCTION** | RMS |
| **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa | **TESTED BY** | Phoenix Huang |

| CONDUCTED POWER | | | |
|---|---|---|---|
| **CHANNEL** | **FREQUENCY (MHz)** | **POWER OUTPUT(mW)** | **POWER OUTPUT(dBm)** |
| Low | 2505 | 524.807 | 27.20 |
| Middle | 2600 | 512.861 | 27.10 |
| High | 2685 | 501.187 | 27.00 |

## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -30℃ ~ 50℃.

### 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100037 | Aug. 03, 2009 | Aug. 02, 2010 |
| OVEN | MHU-225AU | 911033 | Dec. 18, 2008 | Dec. 17, 2009 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2009 | Nov. 12, 2010 |
| AC POWER SOURCE | 6205 | 1140503 | N/A | N/A |

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

### 4.2.3 TEST PROCEDURE

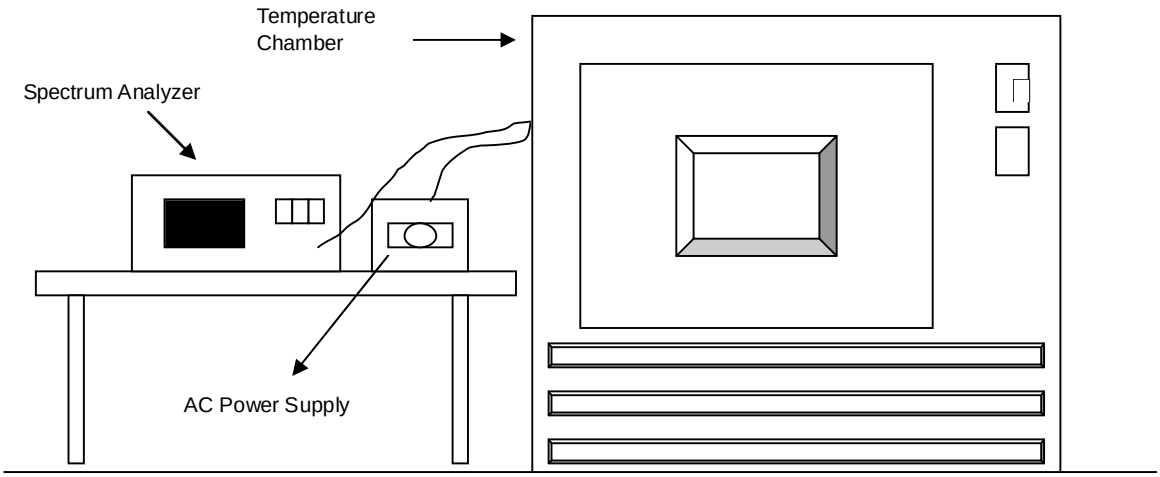
a. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 102 Volts to 138Volts. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing.

d. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

### 4.2.4 TEST SETUP



## 4.2.5 TEST RESULTS

| | | | |
|---|---|---|---|
| **MODE** | Middle channel (2600MHz) | **INPUT POWER (SYSTEM)** | 120Vac, 60Hz |
| **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa | **TESTED BY** | Phoenix Huang |

| AFC FREQUENCY ERROR VS. VOLTAGE | | | | | | |
|---|---|---|---|---|---|---|
| **VOLTAGE (Volts)** | **2Minutes** | | **5Minutes** | | **10Minutes** | |
| | **FREQUENCY (MHz)** | **PPM (%)** | **FREQUENCY (MHz)** | **PPM (%)** | **FREQUENCY (MHz)** | **PPM (%)** |
| 138 | 2599.9855 | 0.000558 | 2599.9841 | 0.000612 | 2599.9823 | 0.000681 |
| 120 | 2599.9836 | 0.000631 | 2599.9857 | 0.000550 | 2599.9864 | 0.000523 |
| 102 | 2599.9827 | 0.000665 | 2599.9817 | 0.000704 | 2599.9836 | 0.000631 |

| AFC FREQUENCY ERROR VS. TEMP | | | | | | |
|---|---|---|---|---|---|---|
| **TEMP (℃)** | **2Minutes** | | **5Minutes** | | **10Minutes** | |
| | **FREQUENCY (MHz)** | **PPM (%)** | **FREQUENCY (MHz)** | **PPM (%)** | **FREQUENCY (MHz)** | **PPM (%)** |
| 50 | 2599.9835 | 0.000635 | 2599.9824 | 0.000677 | 2599.9837 | 0.000627 |
| 40 | 2599.9824 | 0.000677 | 2599.9833 | 0.000642 | 2599.9847 | 0.000588 |
| 30 | 2599.9814 | 0.000715 | 2599.983 | 0.000654 | 2599.9856 | 0.000554 |
| 20 | 2599.9836 | 0.000631 | 2599.9857 | 0.000550 | 2599.9864 | 0.000523 |
| 10 | 2599.9866 | 0.000515 | 2599.9847 | 0.000588 | 2599.9862 | 0.000531 |
| 0 | 2599.9865 | 0.000519 | 2599.9889 | 0.000427 | 2599.9876 | 0.000477 |
| -10 | 2599.9814 | 0.000715 | 2599.9846 | 0.000592 | 2599.9837 | 0.000627 |
| -20 | 2599.9929 | 0.000273 | 2599.9931 | 0.000265 | 2599.9911 | 0.000342 |
| -30 | 2599.9920 | 0.000308 | 2599.9930 | 0.000269 | 2599.9922 | 0.000300 |

## 4.3 EMISSION BANDWIDTH MEASUREMENT

### 4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

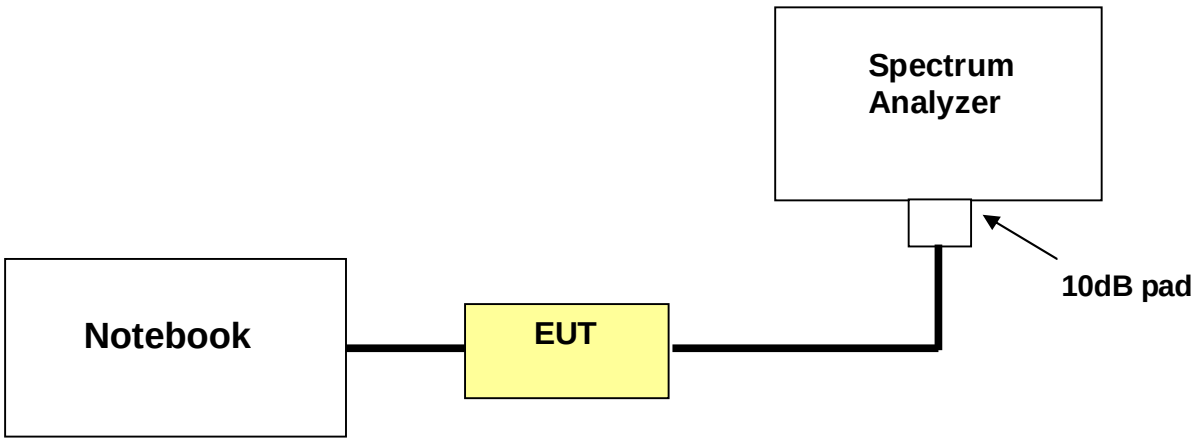
According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

### 4.3.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Agilent Spectrum Analyzer | E4440A | MY46185282 | Jun. 14, 2009 | Jun. 13, 2010 |
| HUBER+SUHNER | SUCOFLEX104 | 231115/4 | May 29, 2009 | May 28, 2010 |
| JFW 10dB attenuation | 50HF-010-SMA | N/A | N/A | N/A |

**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 SETUP



### 4.3.4 TEST PROCEDURES

a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

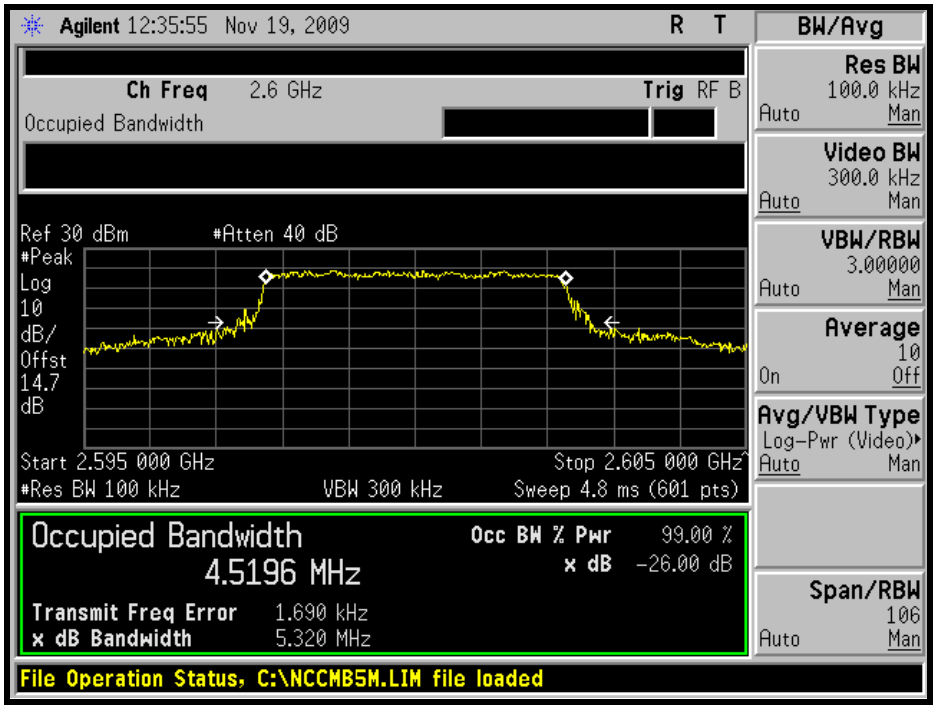
## 4.3.5 TEST RESULTS

**CHANNEL BANDWIDTH: 5MHz**

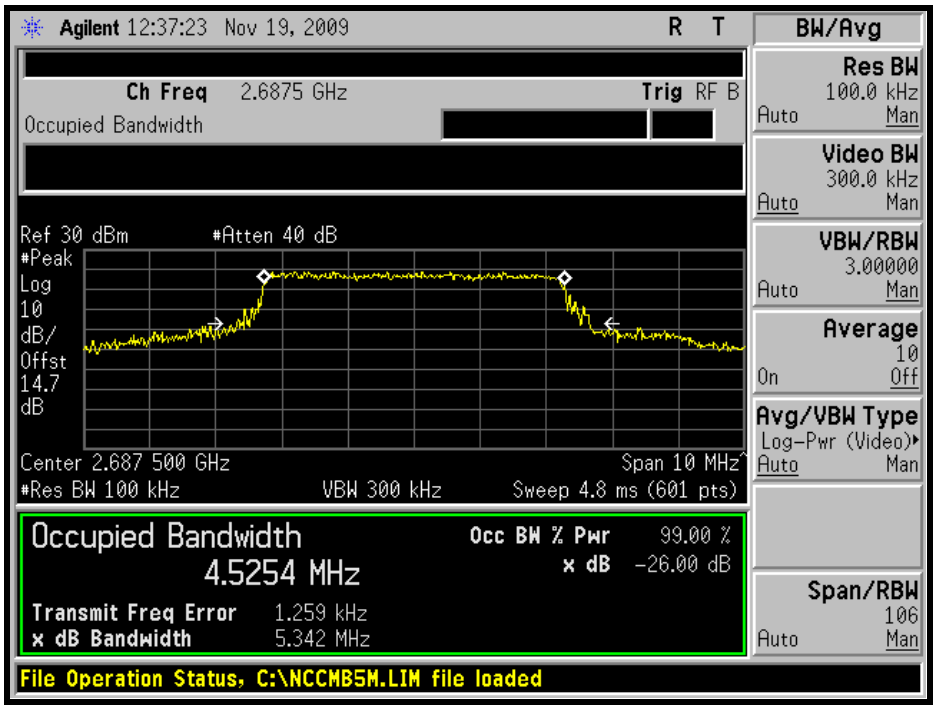
| FREQUENCY (MHz) | -26 dBc BANDWIDTH (MHz) |
|---|---|
| 2502.5 | 5.37 |
| 2600 | 5.32 |
| 2687.5 | 5.34 |

**LOW CHANNEL**

**MIDDLE CHANNEL**



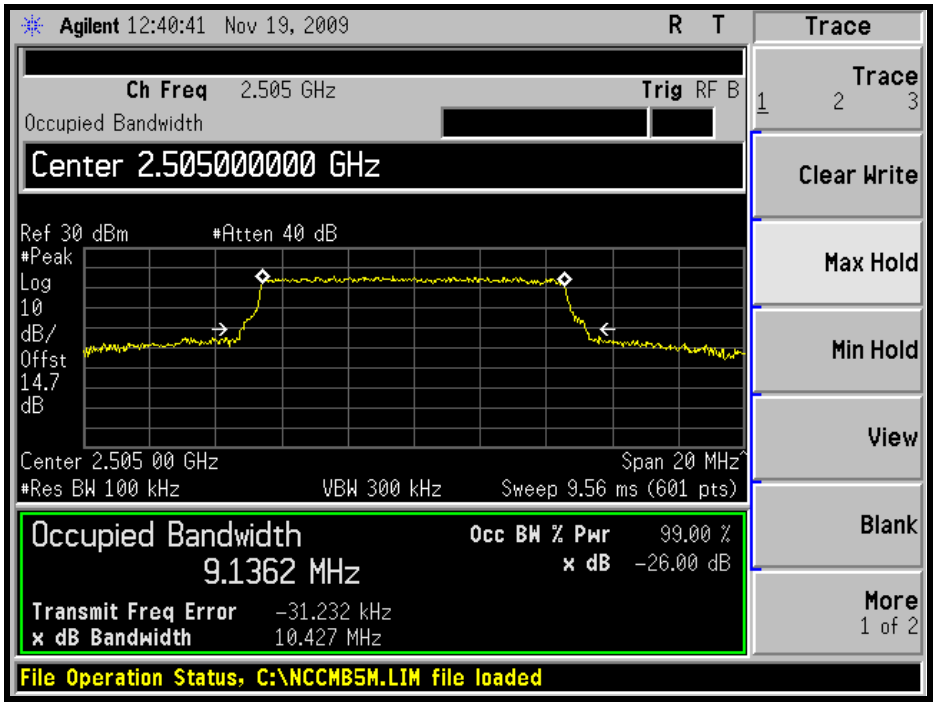

**HIGH CHANNEL**



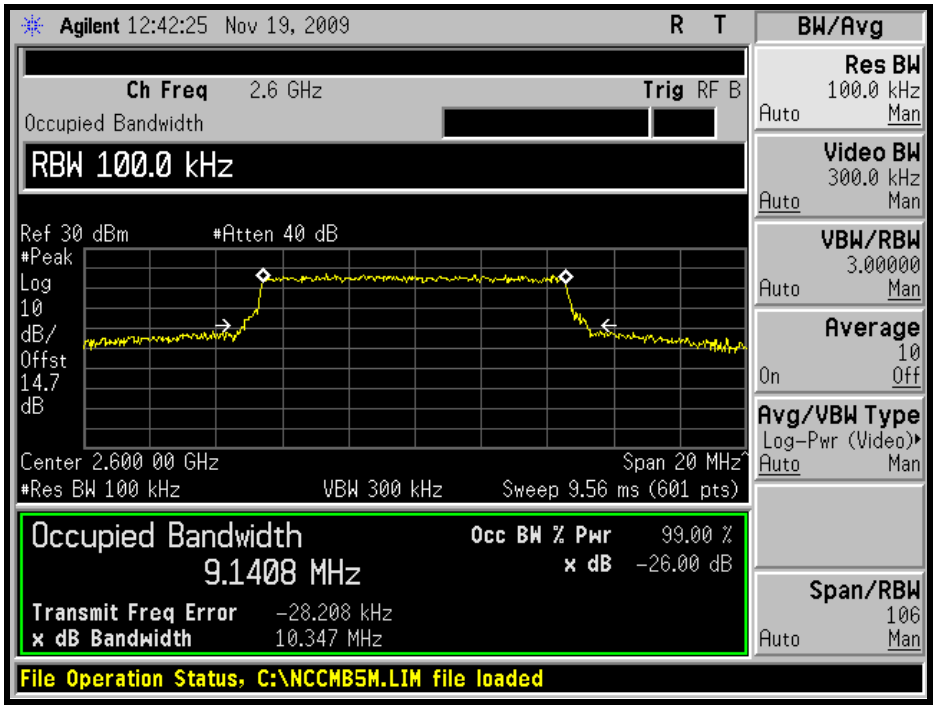
## CHANNEL BANDWIDTH: 10MHz

| FREQUENCY (MHz) | -26 dBc BANDWIDTH (MHz) |
|---|---|
| 2505 | 10.43 |
| 2600 | 10.35 |
| 2685 | 10.39 |

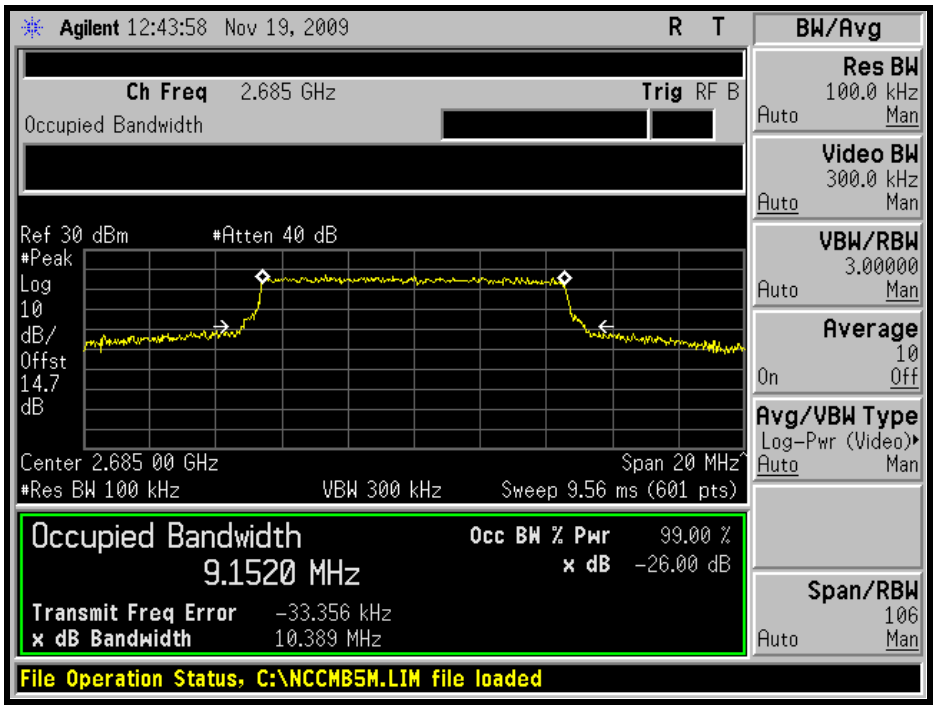
**LOW CHANNEL**



**MIDDLE CHANNEL**




**HIGH CHANNEL**



## 4.4 CHANNEL EDGE MEASUREMENT

### 4.4.1 LIMITS OF CHANNEL EDGE MEASUREMENT

According to FCC 27.53(m)(2) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P)dB. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

### 4.4.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Agilent Spectrum Analyzer | E4446A | MY46180622 | Apr. 24 , 2009 | Apr. 23 , 2010 |
| HUBER+SUHNER | SUCOFLEX104 | 22238114 | July 31, 2009 | July 30, 2010 |
| JFW 10dB attenuation | 50HF-010-SMA | N/A | N/A | N/A |

**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 SETUP

Same as Item 4.3.3

### 4.4.4 TEST PROCEDURES

a. The EUT was set up for the rated peak power . The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. For Channel bandwidth: 5 MHz:

The center frequency of spectrum is the band edge frequency and span is 20MHz. RB of the spectrum is 68kHz and VB of the spectrum is 220kHz.

c. For Channel bandwidth: 10 MHz:

The center frequency of spectrum is the band edge frequency and span is 30MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz.

d. Record the max trace plot into the test report.

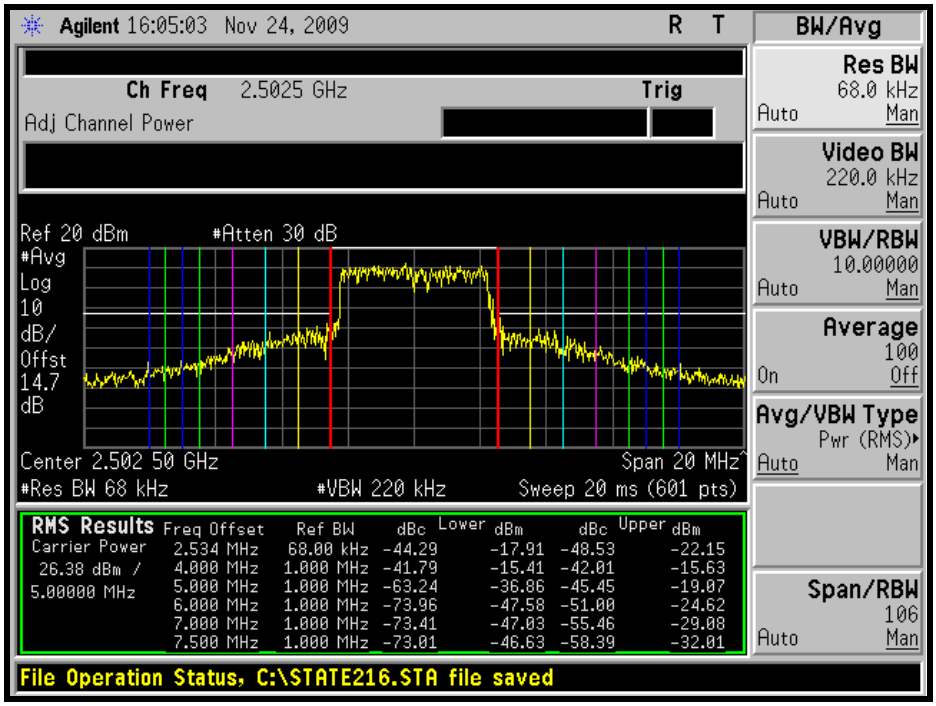
### 4.4.5 EUT OPERATING CONDITION

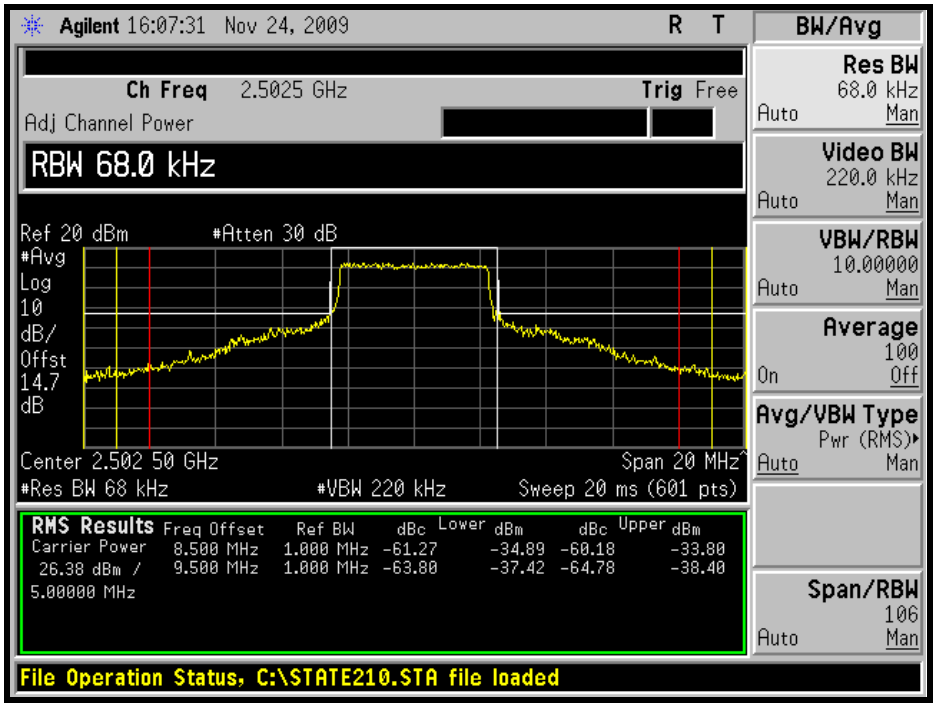
Same as item 4.1.5

## 4.4.6 TEST RESULTS

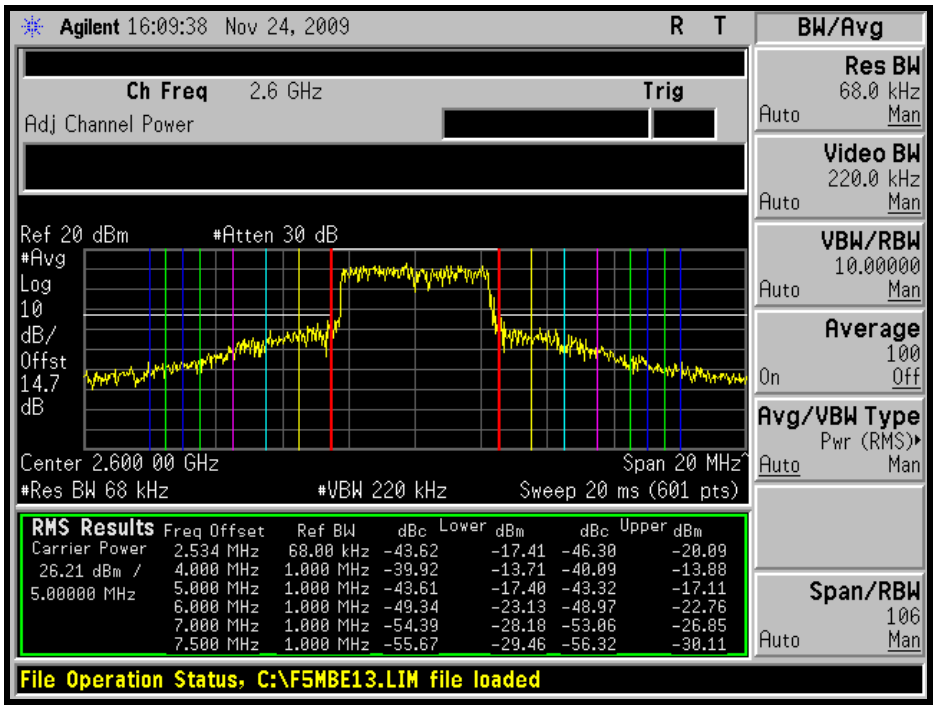
### CHANNEL BANDWIDTH: 5MHz

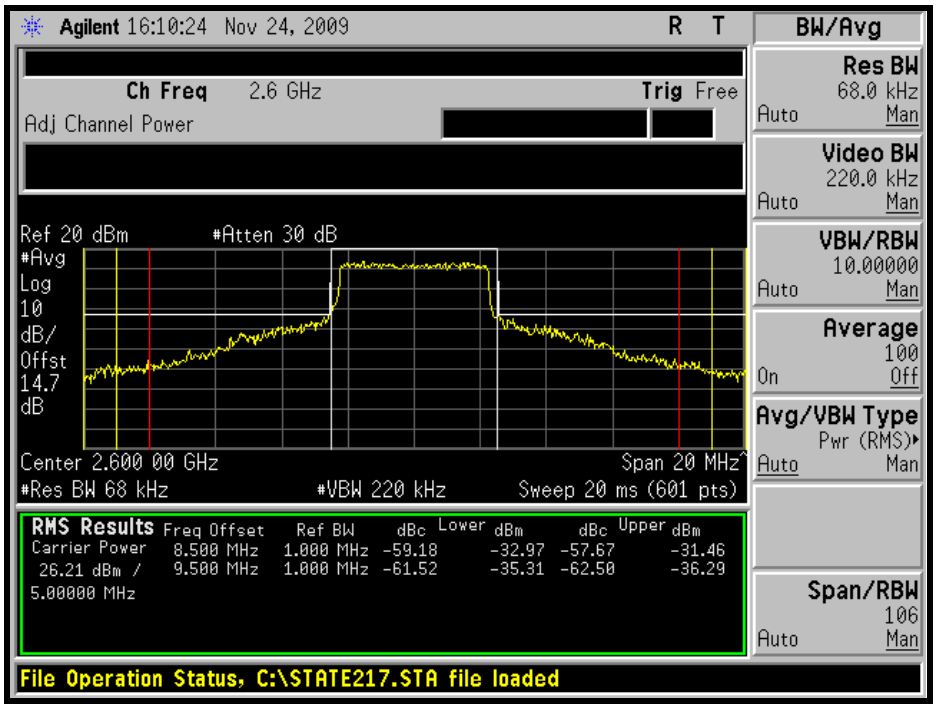
#### LOW CHANNEL



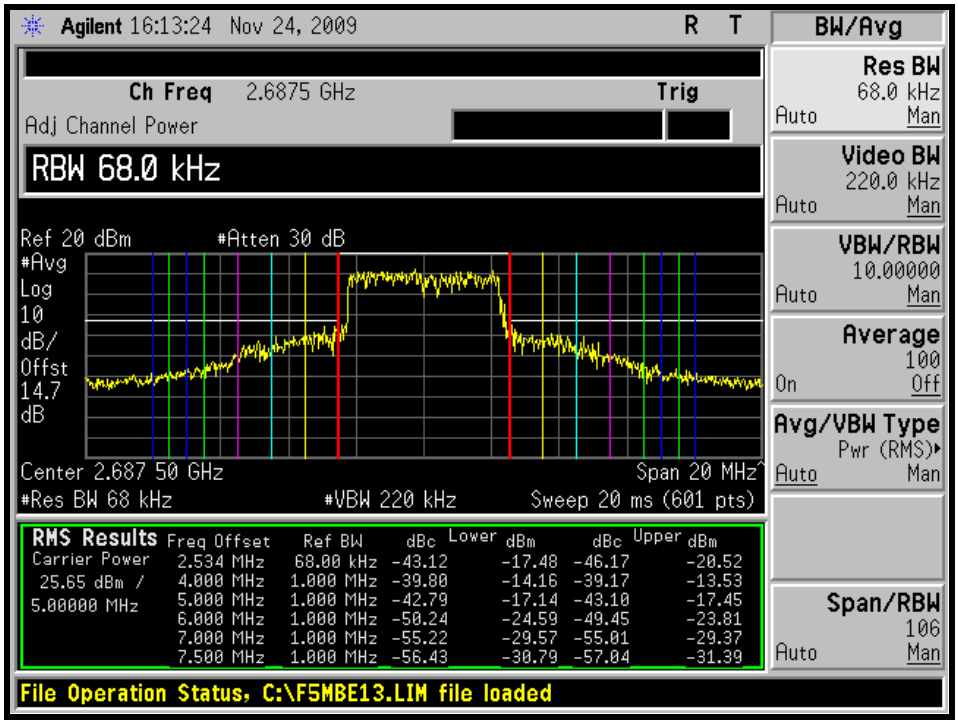



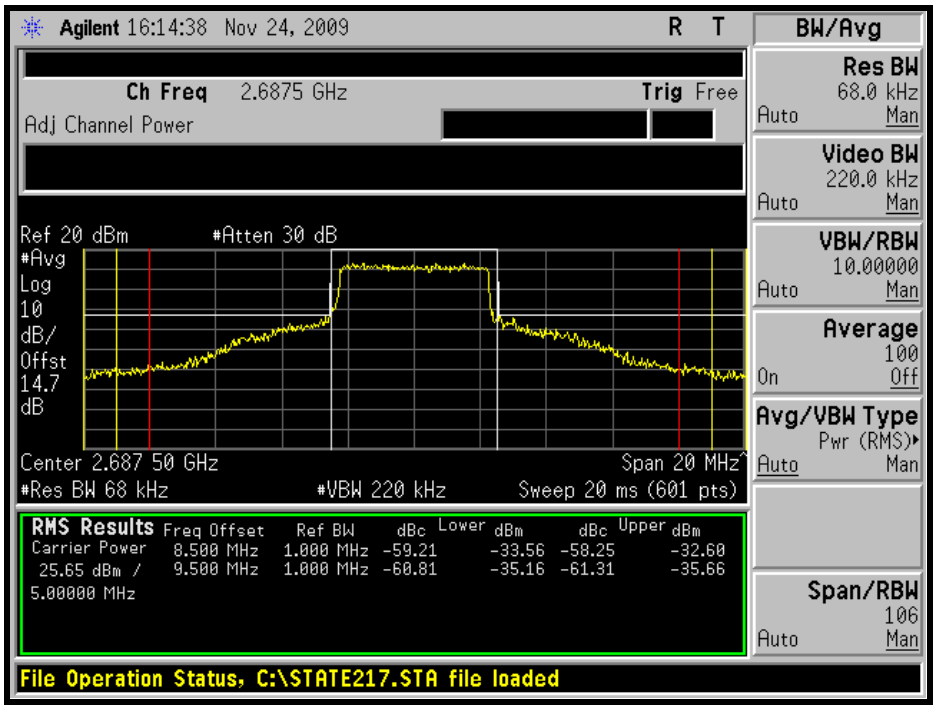
**MIDDLE CHANNEL**



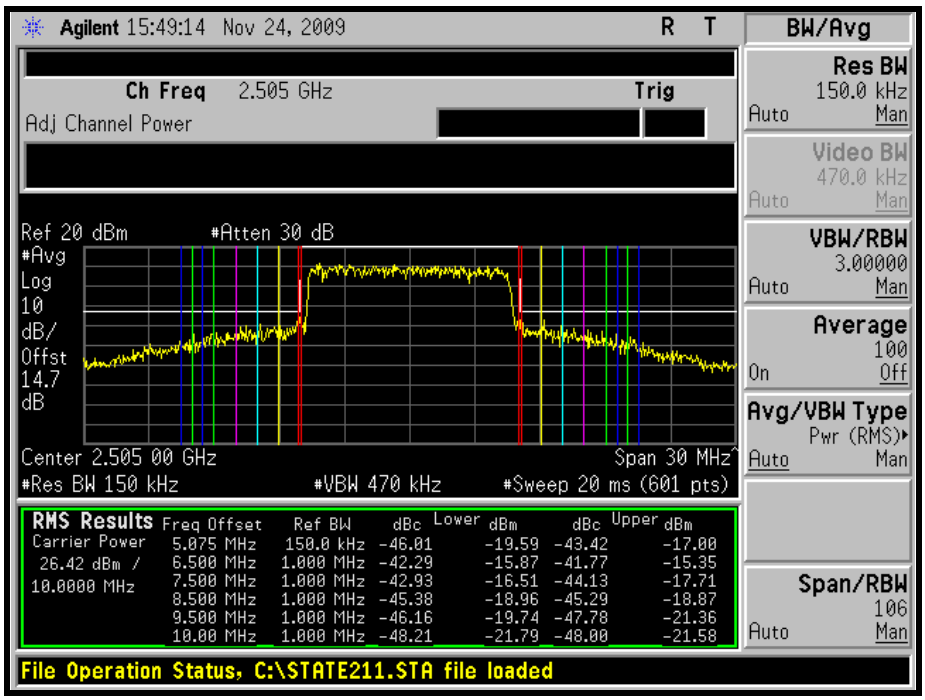
**HIGH CHANNEL**

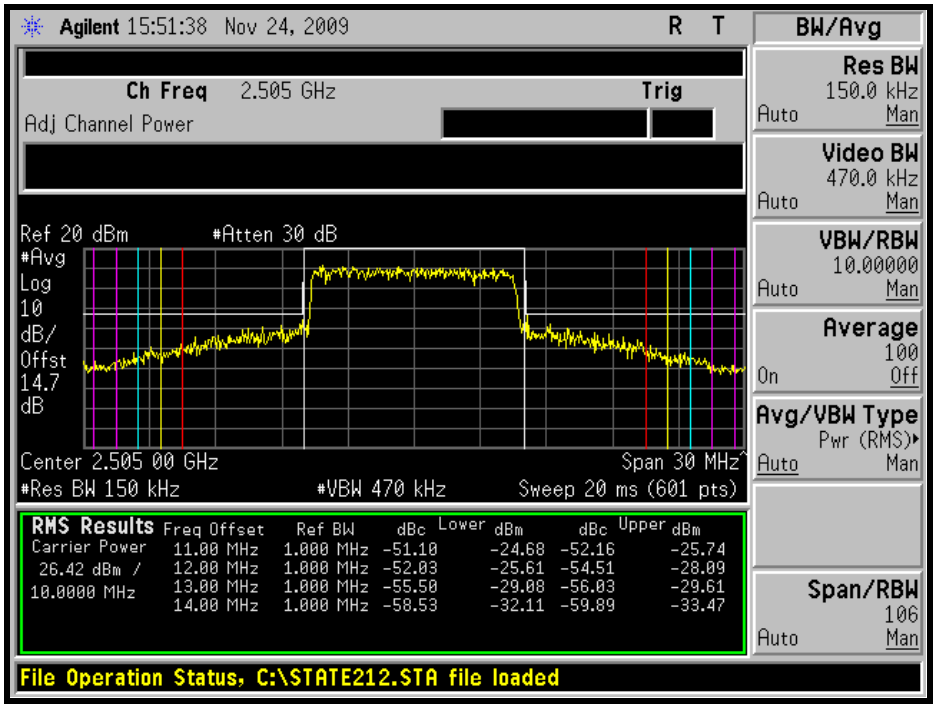


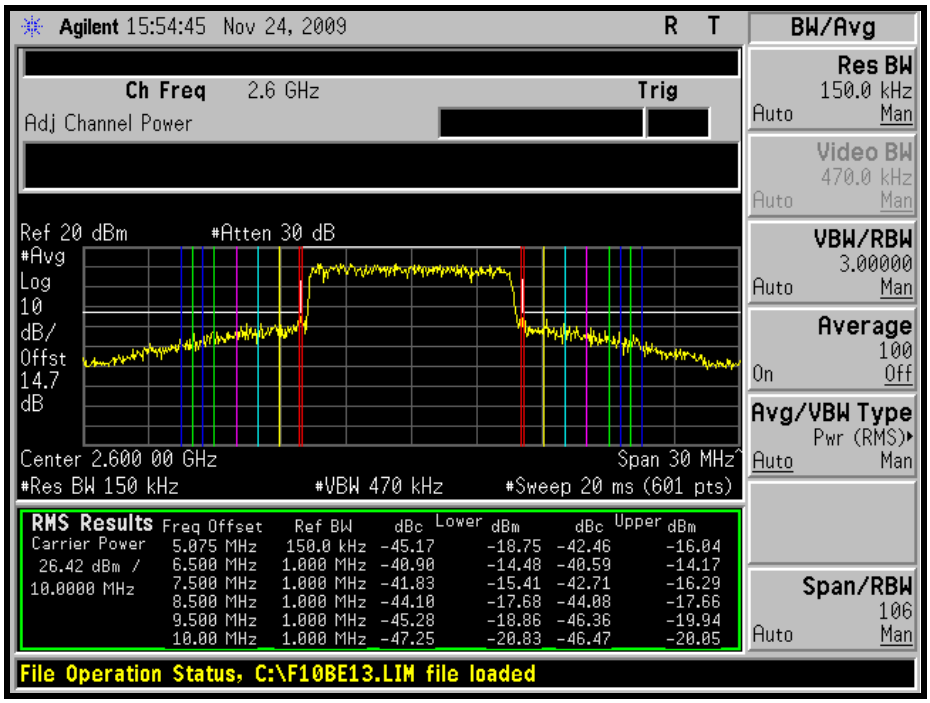
## CHANNEL BANDWIDTH: 10MHz

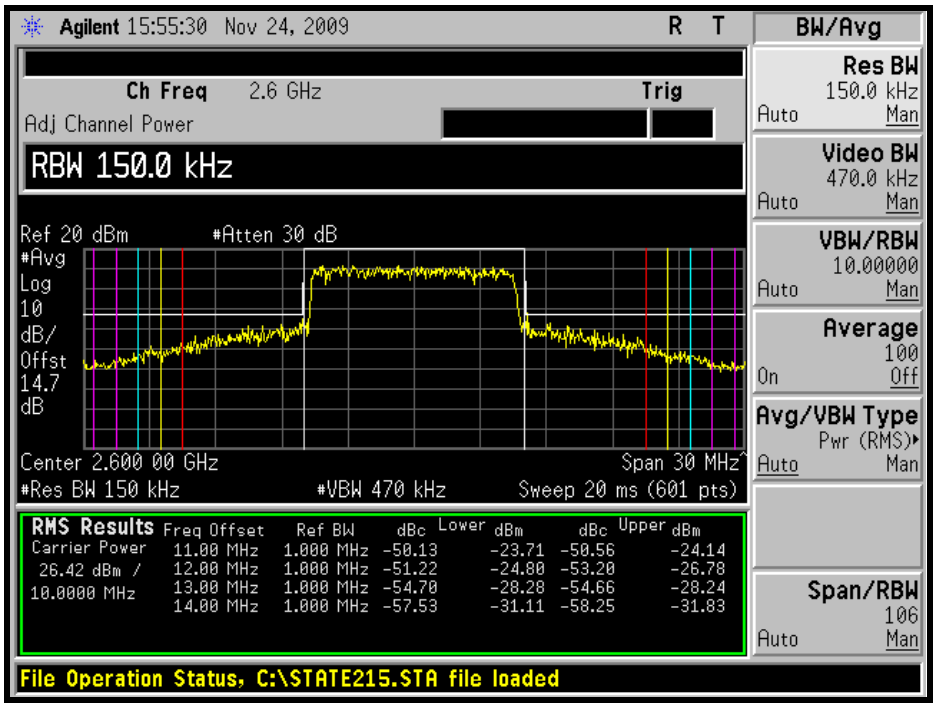
### LOW CHANNEL



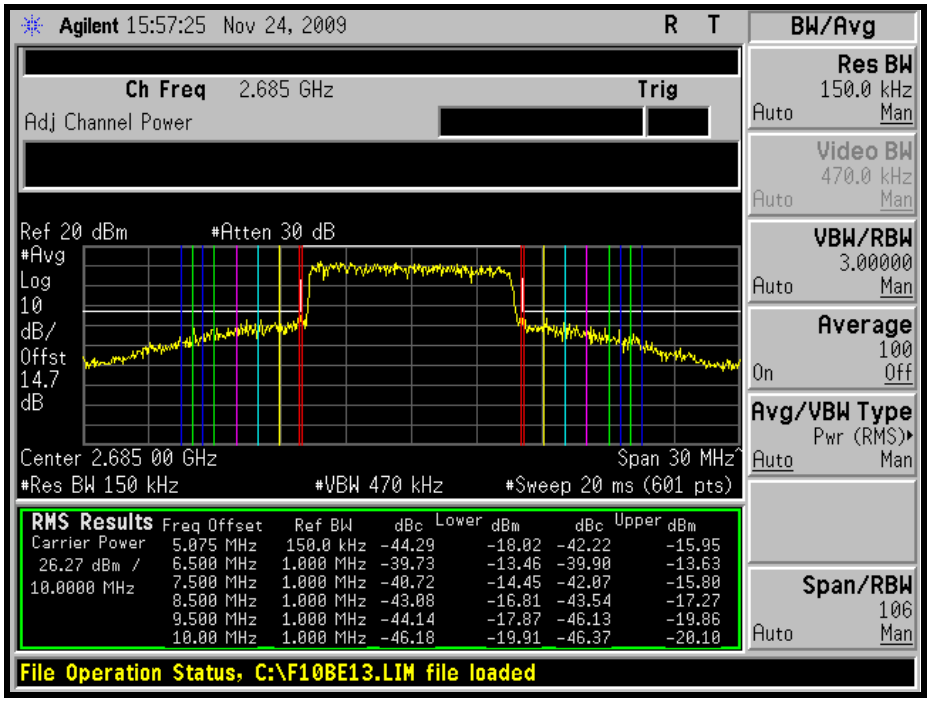



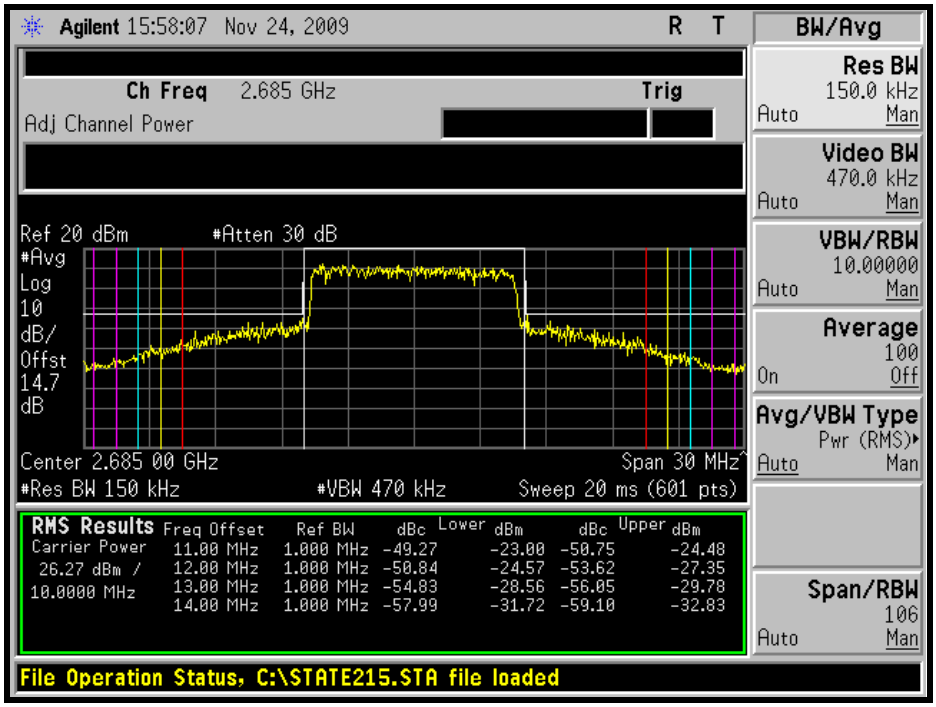
**MIDDLE CHANNEL**



**HIGH CHANNEL**



## 4.5 CONDUCTED SPURIOUS EMISSIONS

### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 27.53(m)(2), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P)dB from the channel edges.

### 4.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| Agilent<br>Spectrum Analyzer | E4440A | MY46185282 | Jun. 14, 2009 | Jun. 13, 2010 |
| HUBER+SUHNER | SUCOFLEX104 | 231115/4 | May 29, 2009 | May 28, 2010 |
| JFW 10dB attenuation | 50HF-010-SMA | N/A | N/A | N/A |
| Wainwright Instruments<br>High Pass Filter | WHK3.1/18G-10SS | ZZ-010091 | N/A | N/A |

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

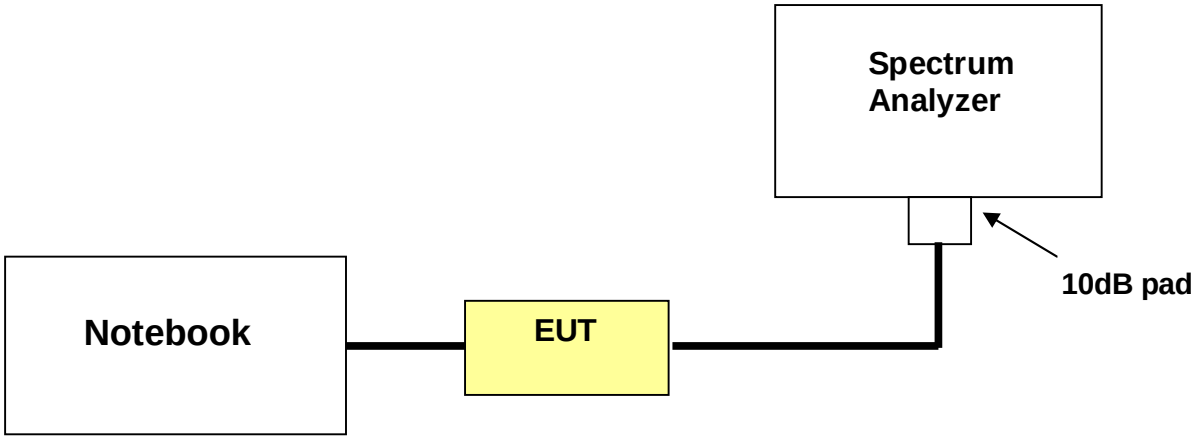
### 4.5.3 TEST PROCEDURE

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. When the spectrum scanned from 30MHz to 3GHz, it shall be connected to the 10dB pad attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

c. When the spectrum scanned from 3GHz to 26.5GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

### 4.5.4 TEST SETUP



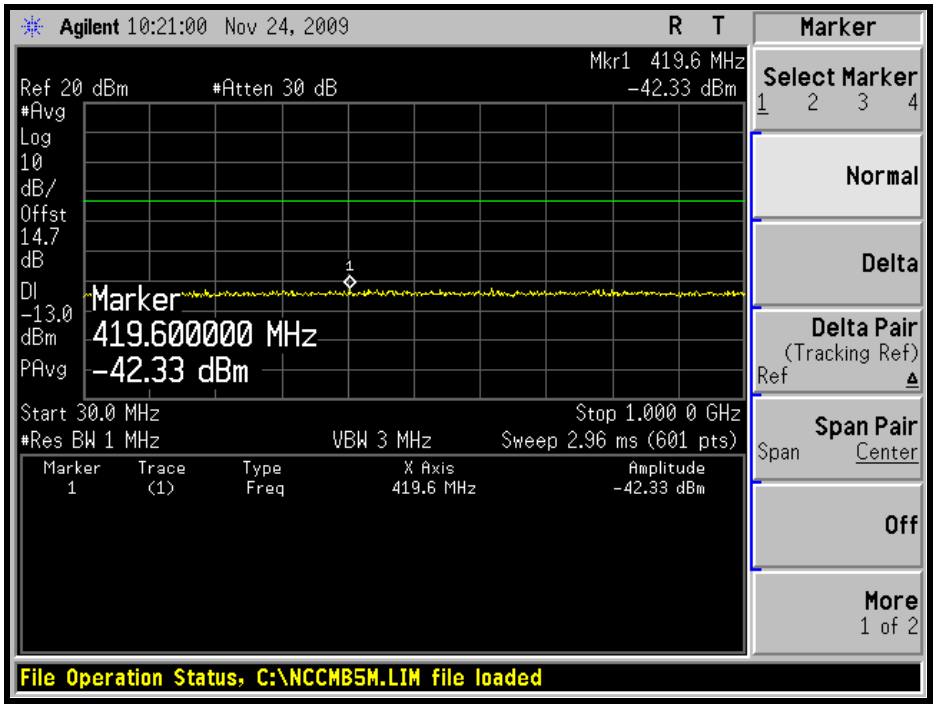

### 4.5.5 EUT OPERATING CONDITIONS

Same as item 4.1.5

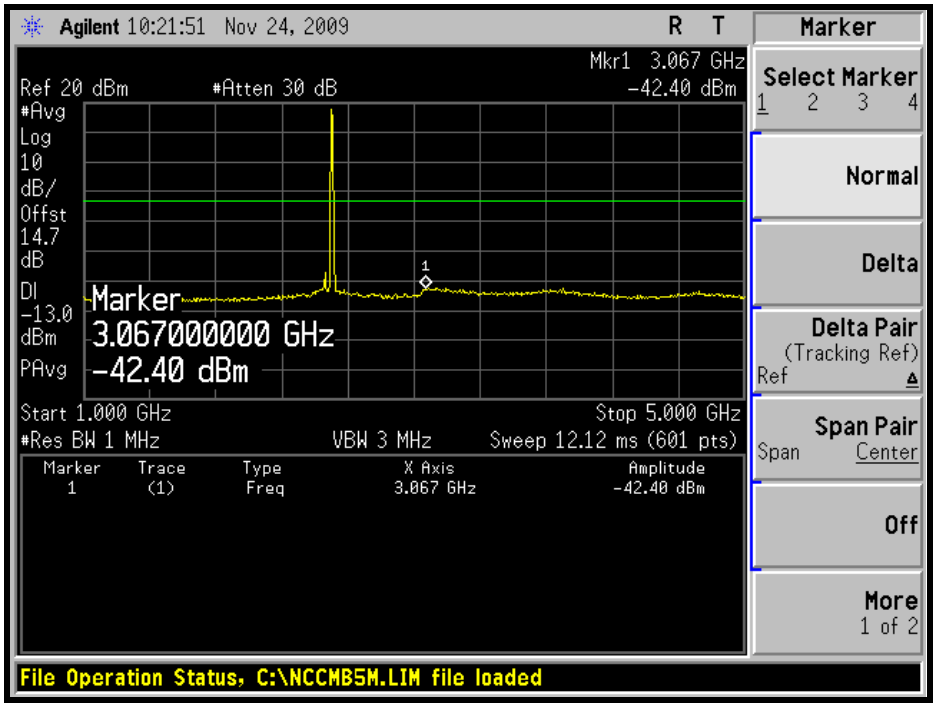
## 4.5.6 TEST RESULTS

**CHANNEL BANDWIDTH: 5MHz**

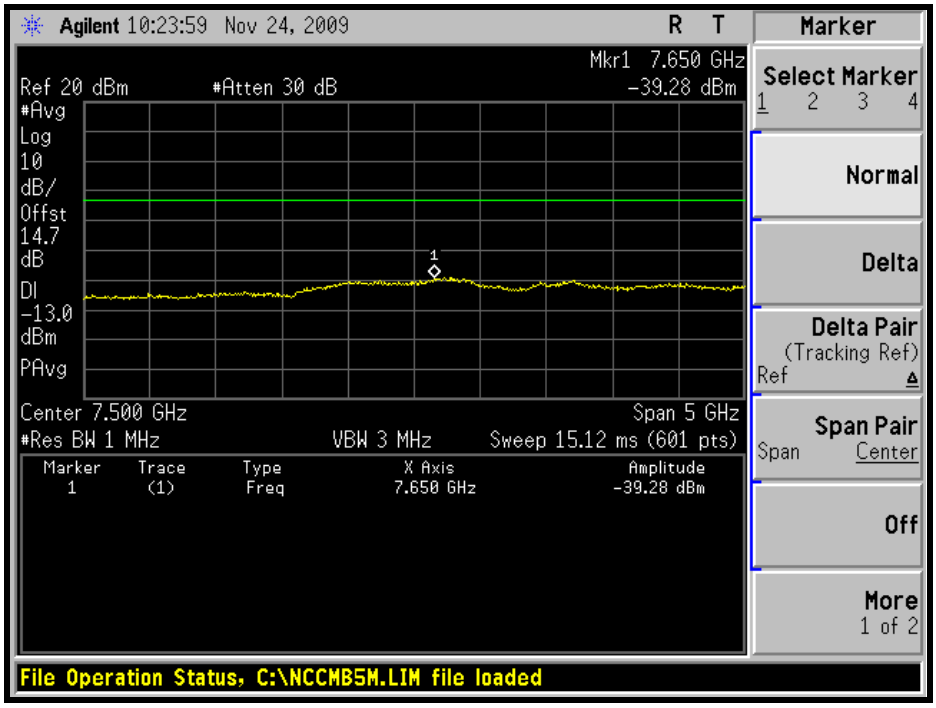
**LOW CHANNEL:** 30MHz ~ 1GHz:



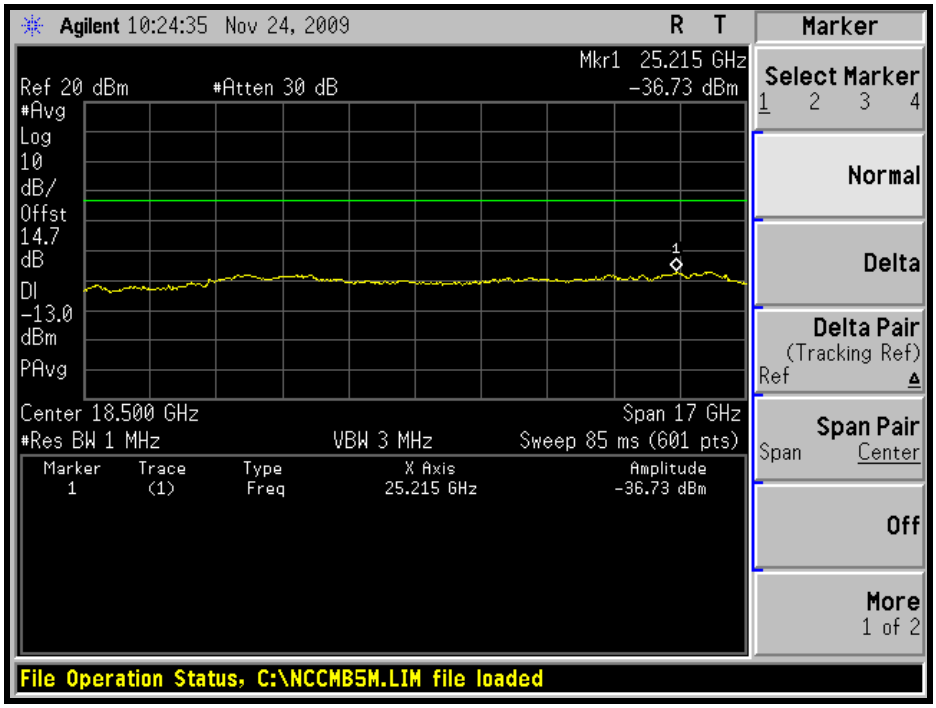

1GHz ~ 5GHz:



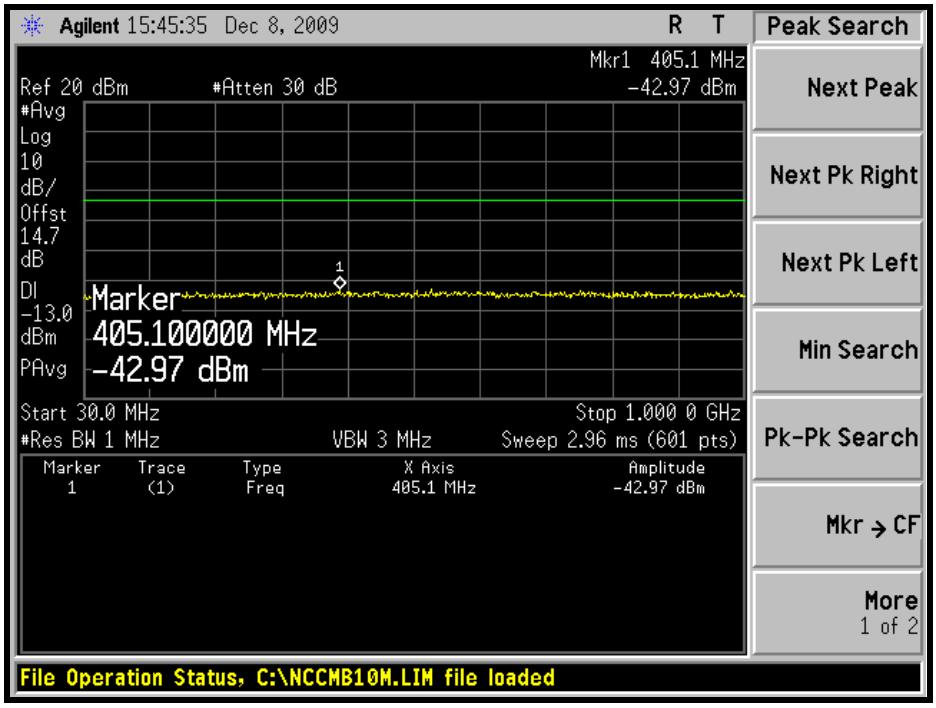
5GHz ~ 10GHz:



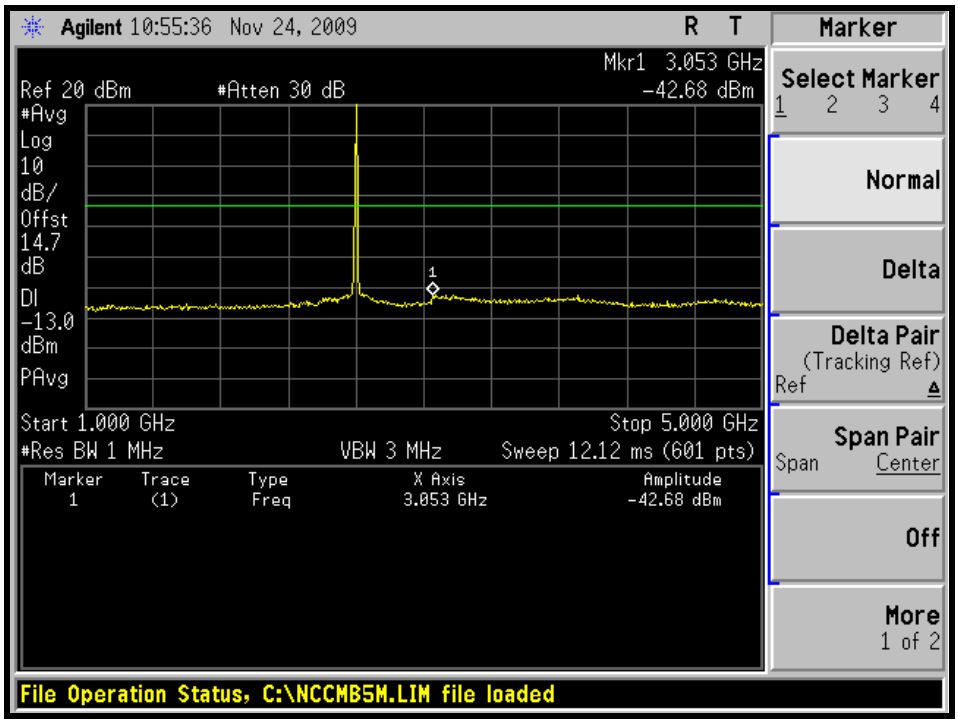

10GHz ~ 27GHz:



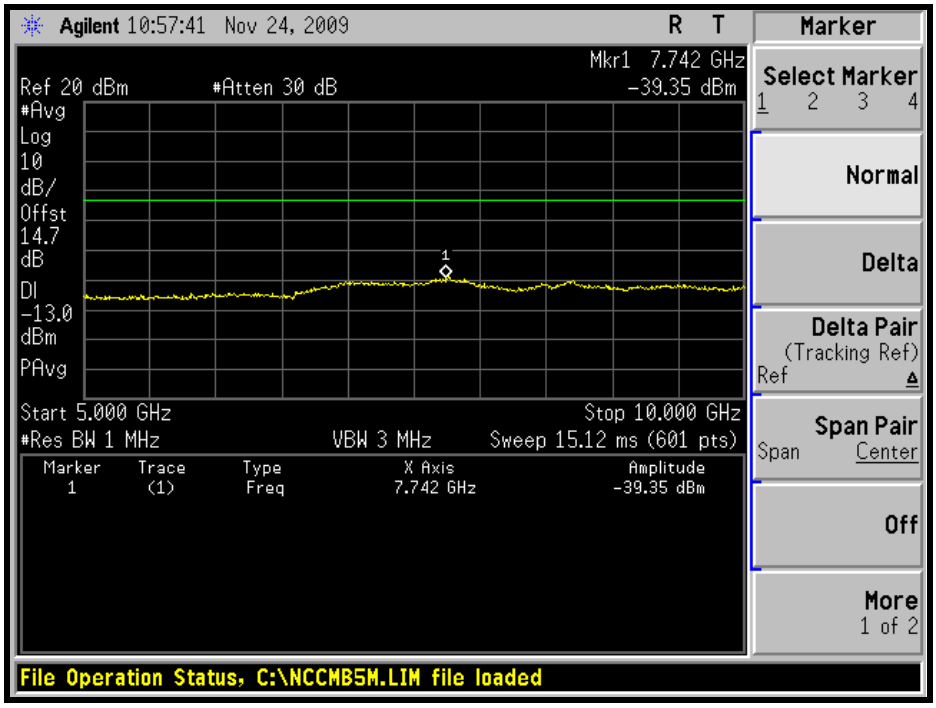
**MIDDLE CHANNEL:** 30MHz ~ 1GHz:



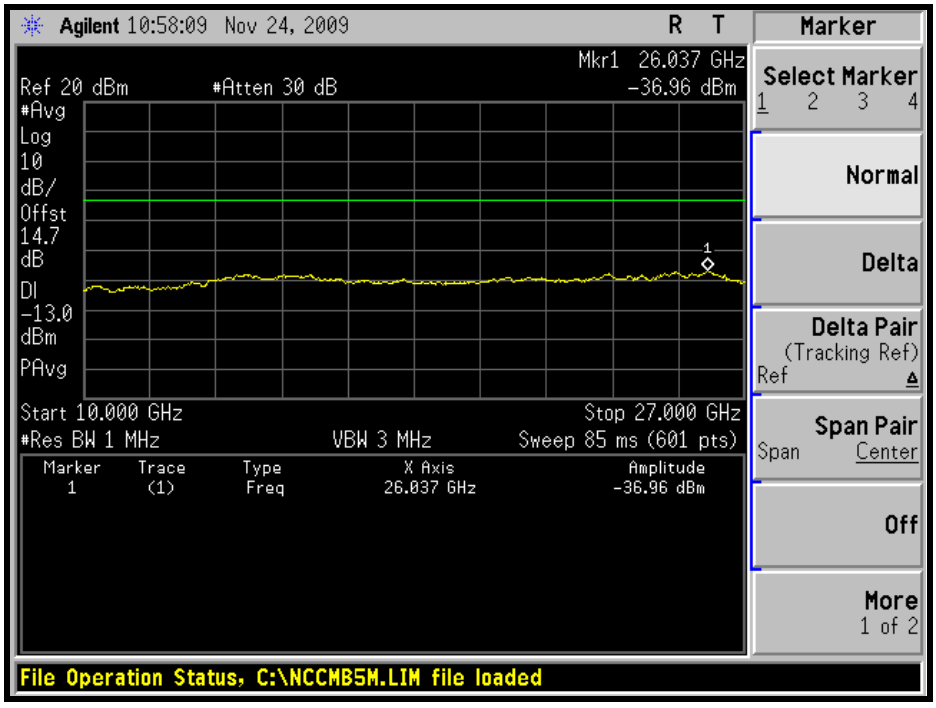

1GHz ~ 5GHz:



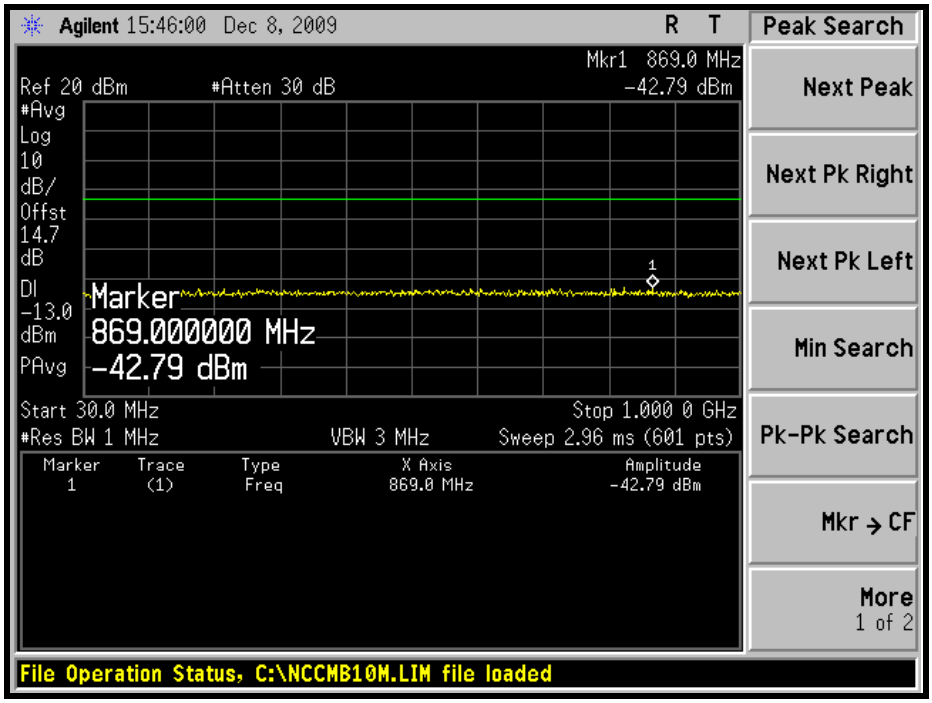
5GHz ~ 10GHz:



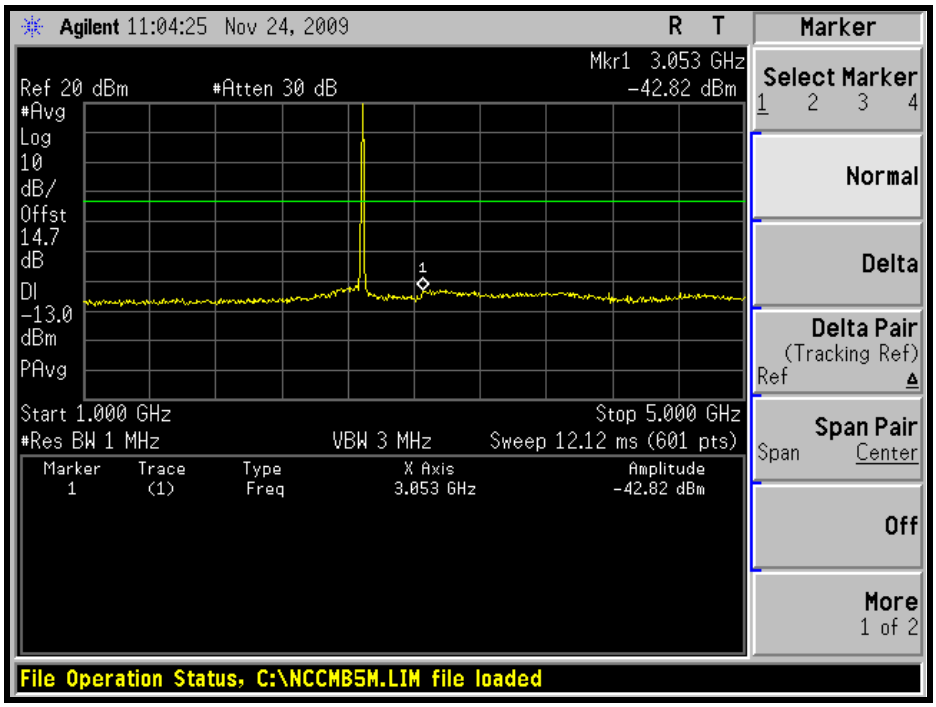

10GHz ~ 27GHz:



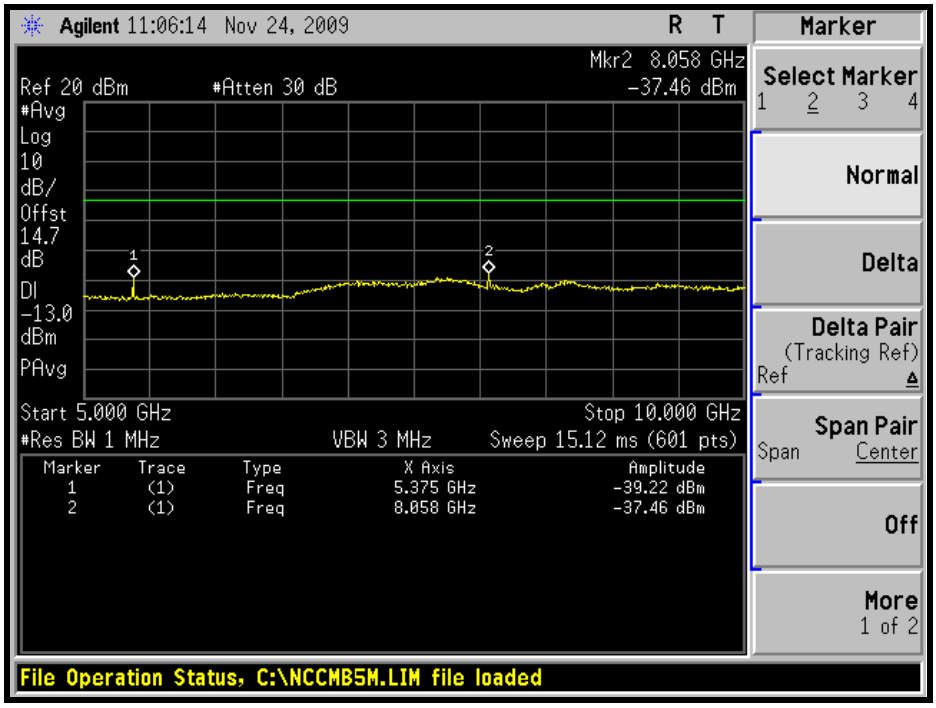
**HIGH CHANNEL:** 30MHz ~ 1GHz:



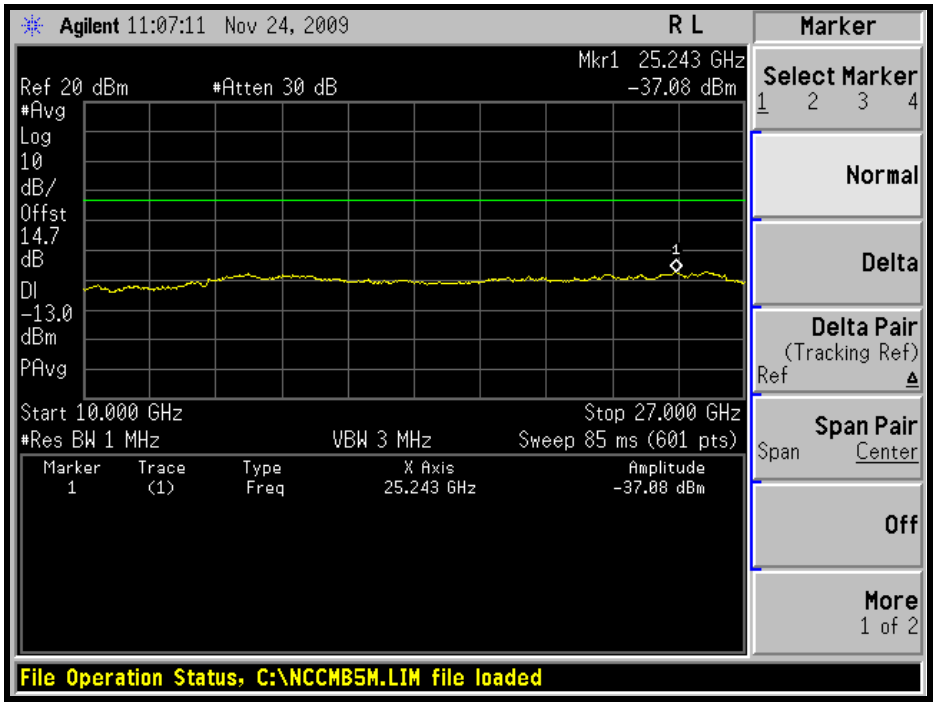

1GHz ~ 5GHz:



5GHz ~ 10GHz:

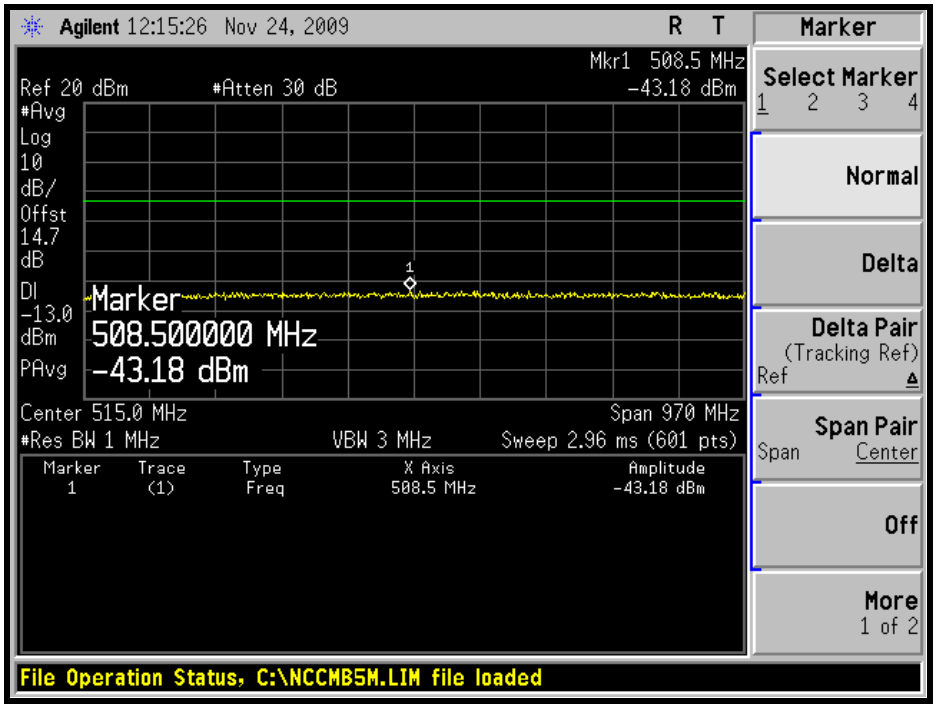



10GHz ~ 27GHz:

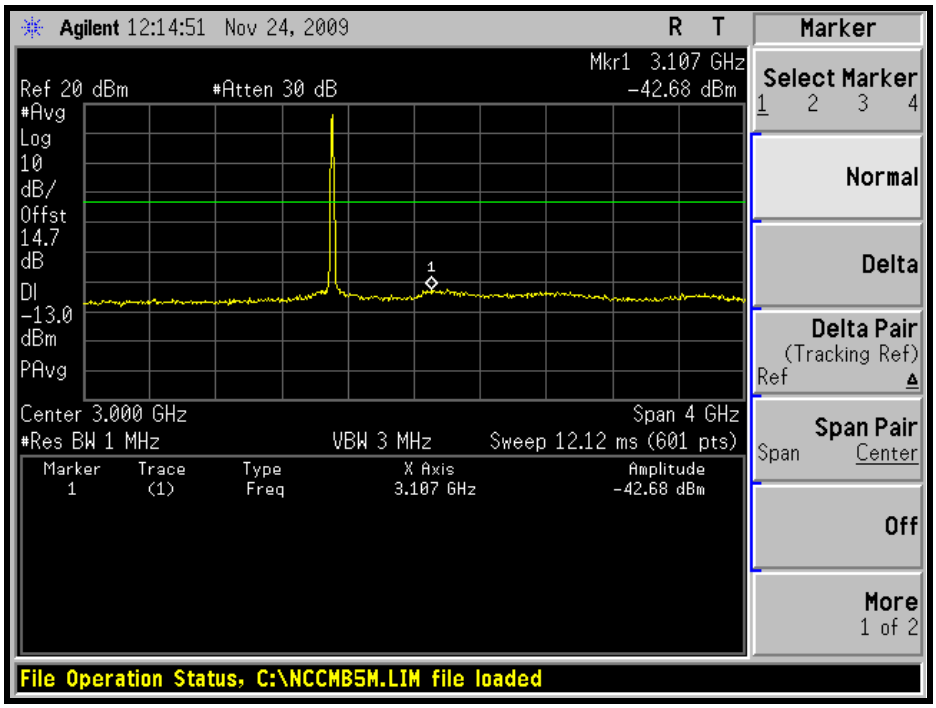


## CHANNEL BANDWIDTH: 10MHz

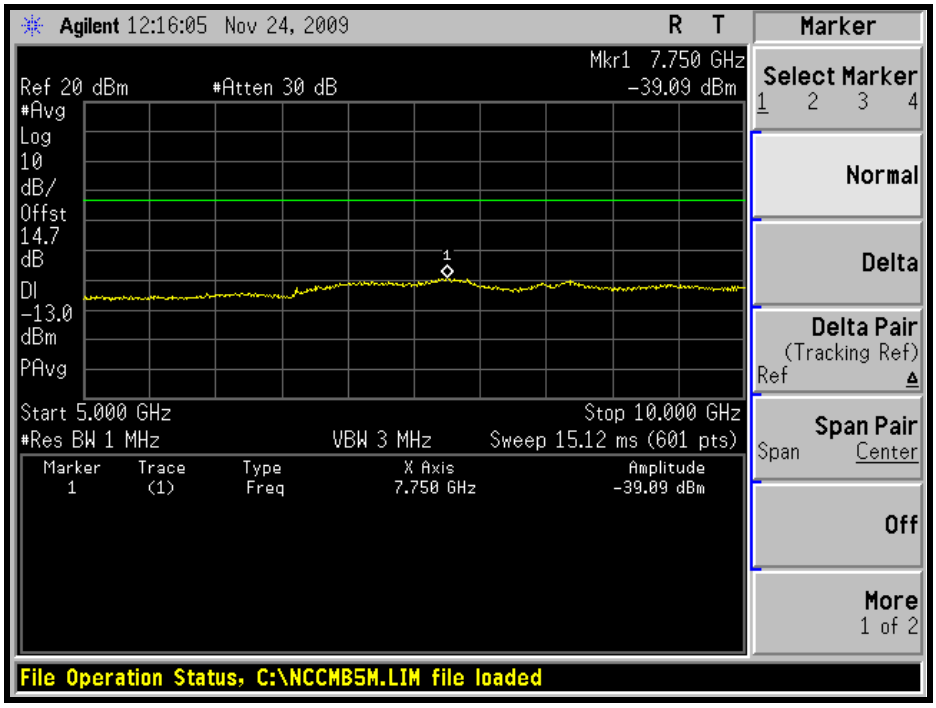
**LOW CHANNEL:** 30MHz ~ 1GHz:



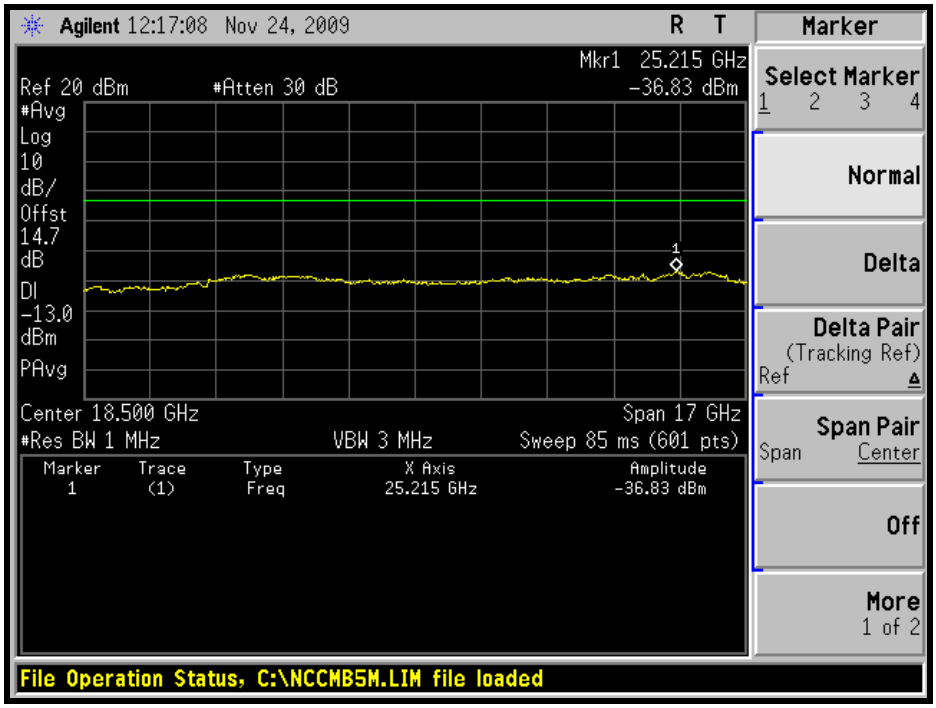

1GHz ~ 5GHz:



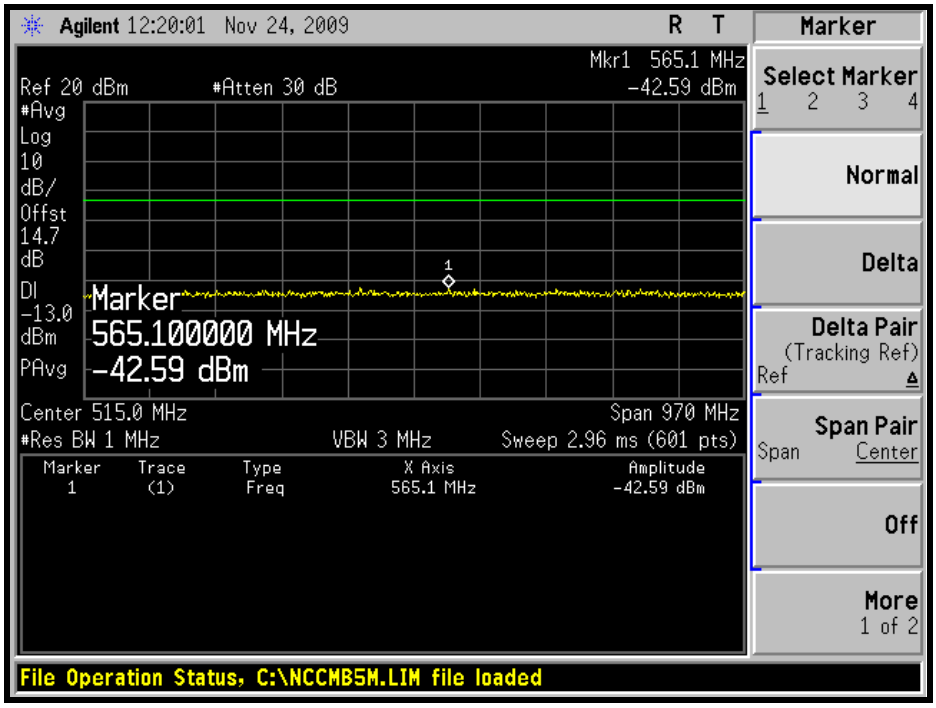
5GHz ~ 10GHz:



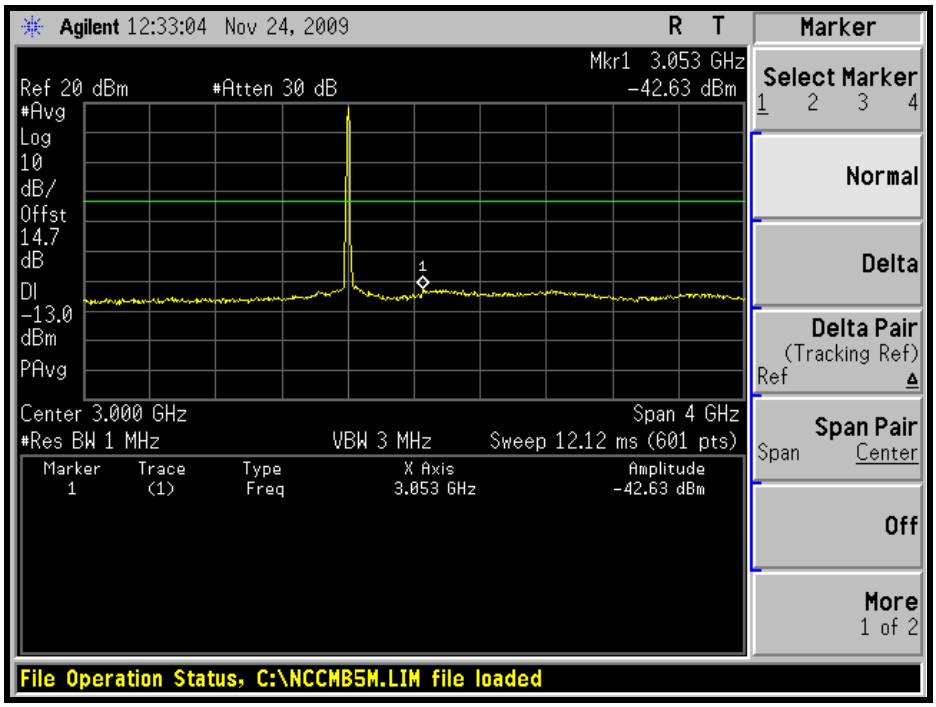

10GHz ~ 27GHz:



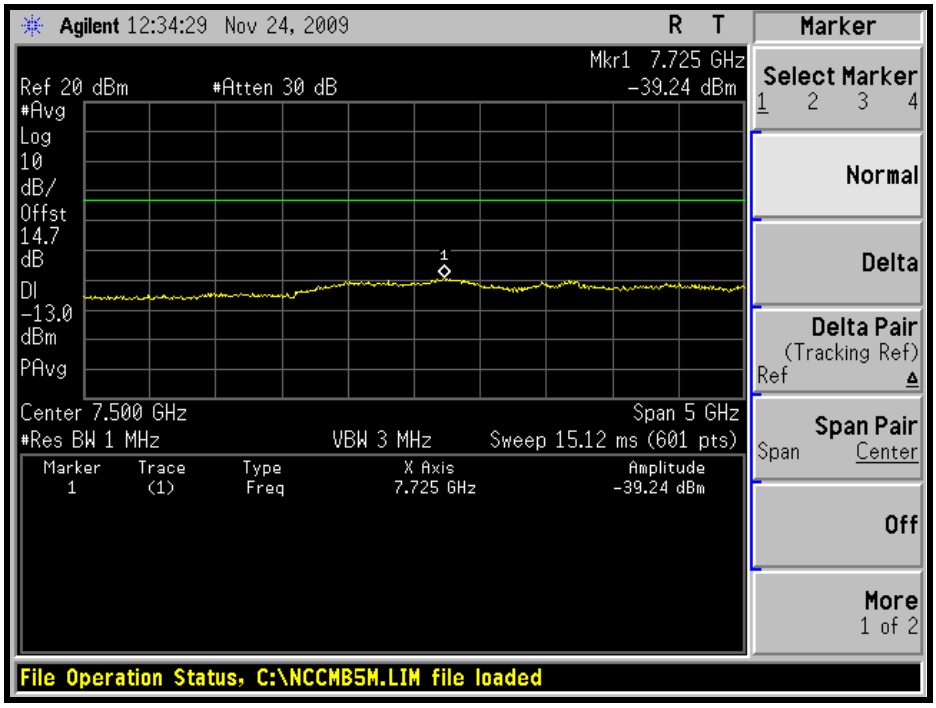
**MIDDLE CHANNEL:** 30MHz ~ 1GHz:



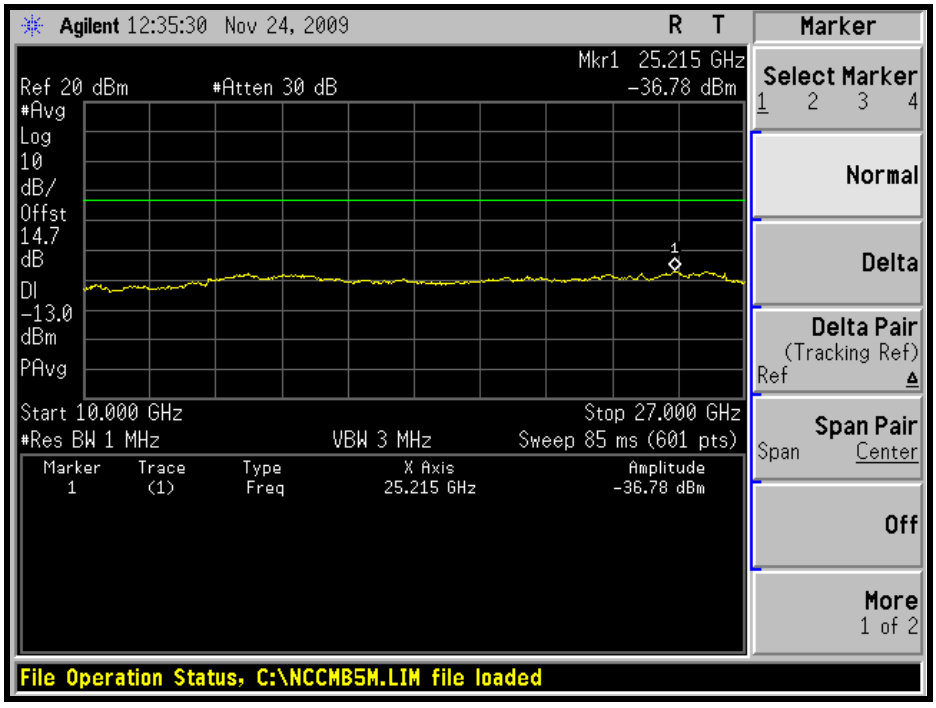

1GHz ~ 5GHz:



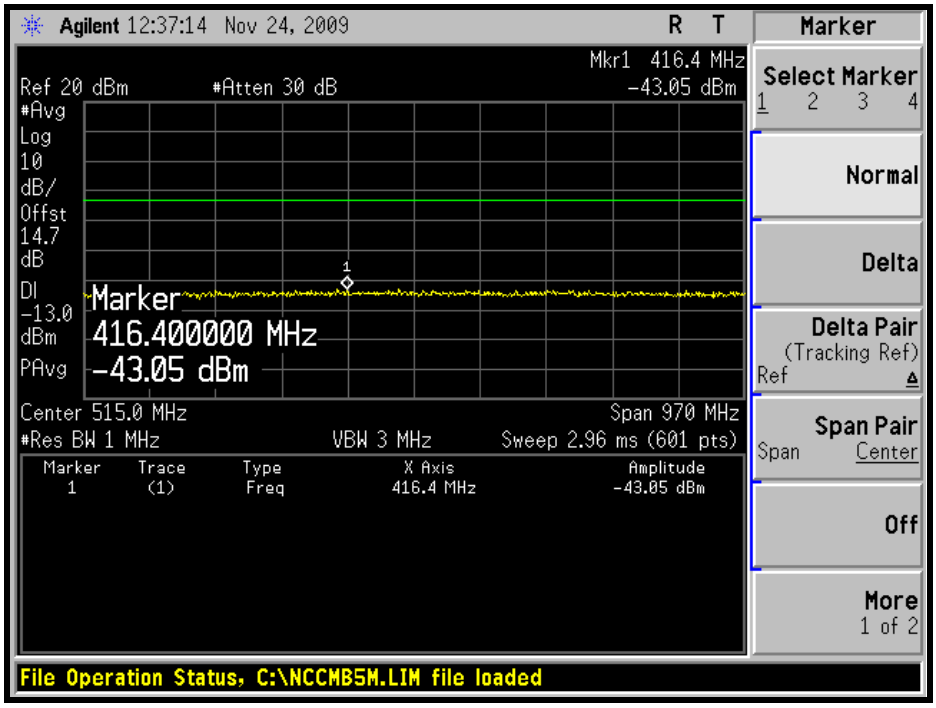
5GHz ~ 10GHz:



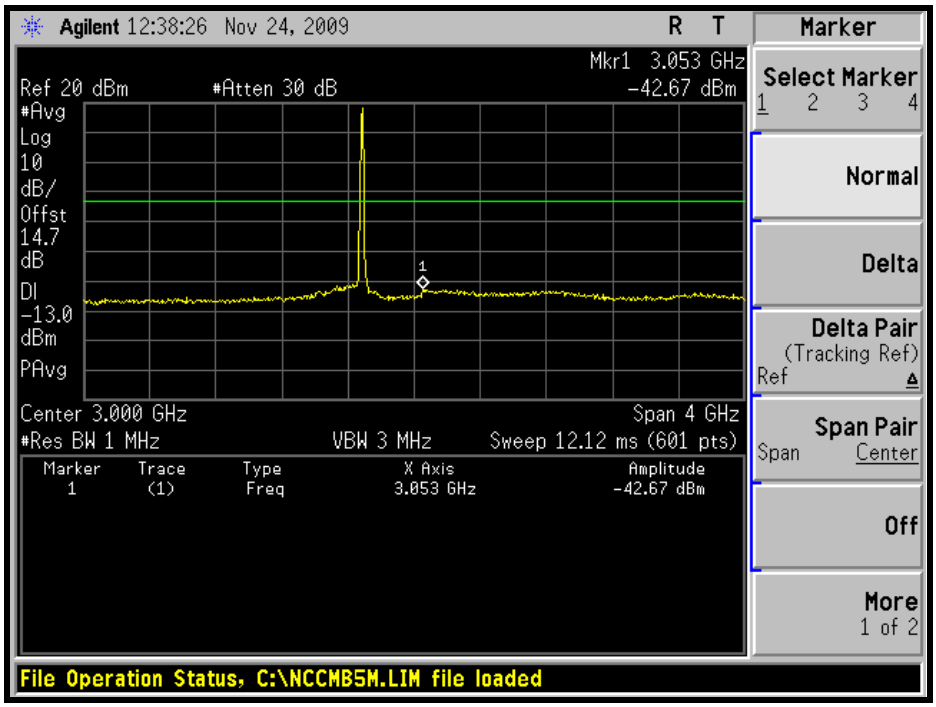

10GHz ~ 27GHz:



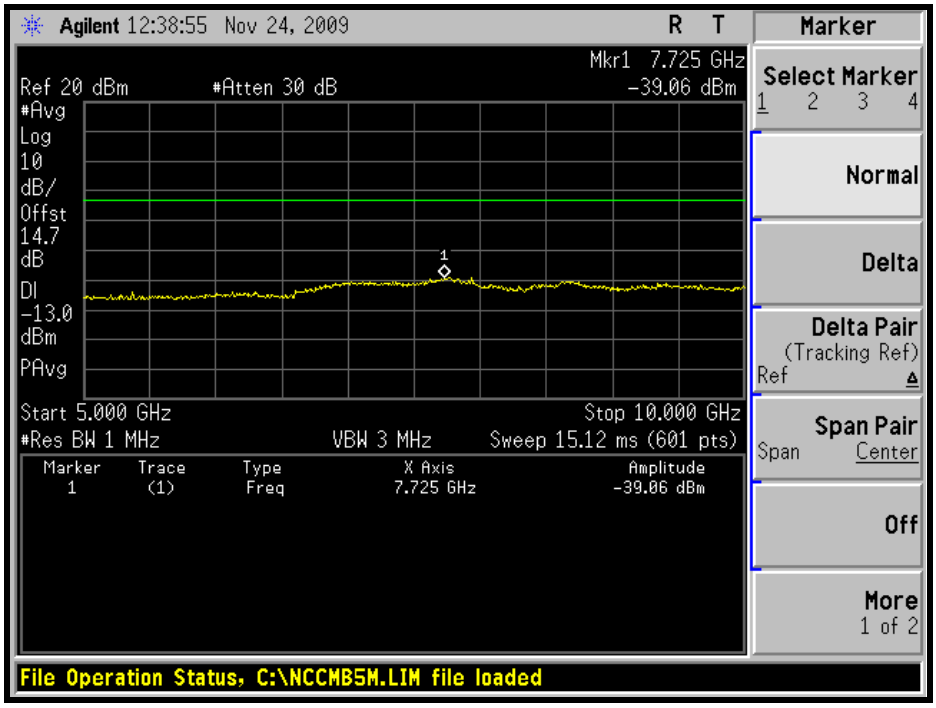
**HIGH CHANNEL:** 30MHz ~ 1GHz:



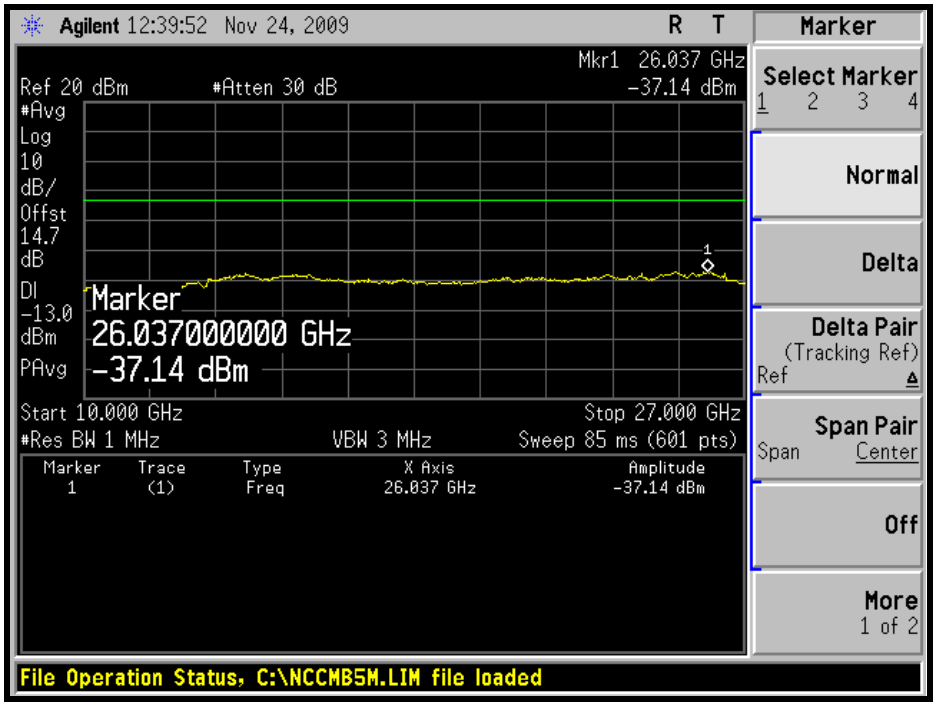

1GHz ~ 5GHz:



5GHz ~ 10GHz:




10GHz ~ 27GHz:



## 4.6 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

### 4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (2), On any frequency outside a licensee's frequency block the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P)dB from the channel edges.

### 4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| ROHDE & SCHWARZ Spectrum Analyzer | FSP40 | 100036 | Dec. 9, 2009 | Dec. 8, 2010 |
| Agilent PSA Spectrum Analyzer | E4446A | MY46180622 | Apr. 24 , 2009 | Apr. 23 , 2010 |
| HP Pre_Amplifier | 8449B | 3008A01923 | Nov. 02, 2009 | Nov. 01, 2010 |
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 847124/029 | Aug. 28, 2009 | Aug. 27, 2010 |
| SCHWARZBECK TRILOG Broadband Antenna | VULB 9168 | 138 | April 29, 2009 | April 28, 2010 |
| Schwarzbeck Horn_Antenna | BBHA9120 | D124 | Dec. 09, 2009 | Dec. 08, 2010 |
| Schwarzbeck Horn_Antenna | BBHA 9170 | BBHA9170153 | Jan. 22, 2009 | Jan. 21, 2010 |
| R&S Loop Antenna | HFH2-Z2 | 100070 | Jan. 14, 2008 | Jan. 13, 2010 |
| RF Switches | EMH-011 | 08009 | Oct. 07, 2009 | Oct. 06, 2010 |
| RF CABLE (Chaintek) | Sucoflex 106 | 28077 | Aug. 14, 2009 | Aug. 13, 2010 |
| RF Cable | 8DFB | STCCAB-30M-1GHz | Oct. 07, 2009 | Oct. 06, 2010 |
| Software | ADT_Radiated_V7.6.15.9.2 | NA | NA | NA |
| CT Antenna Tower & Turn Table | NA | NA | 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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

### 4.6.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.

c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.

d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.

e. The signal generator level has to be adjusted to have the same emission nature.

f. The radiated power can be calculated via the factor and antenna gain.

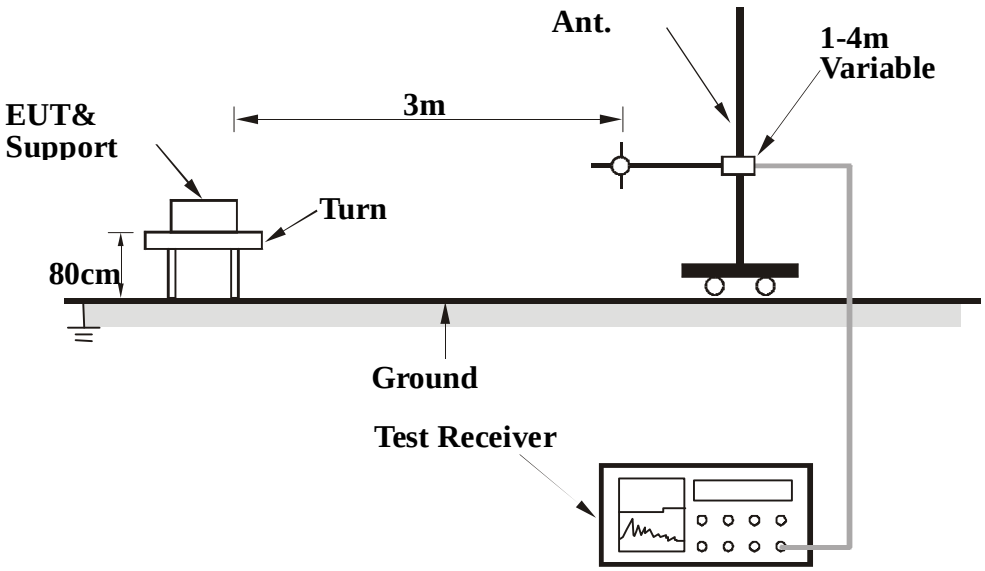
g. Repeat step a ~ f for horizontal polarization.

**NOTE:** The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is 3MHz.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP




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

4.6.6 EUT OPERATING CONDITIONS

Same as item 4.1.5

## 4.6.7 TEST RESULTS - NORMAL TEST

### CHANNEL BANDWIDTH: 5MHz

| MODE | Middle channel | FREQUENCY RANGE | Below 1000MHz |
|---|---|---|---|
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH 1014hPa |
| TESTED BY | Phoenix Huang | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 113.42 | 32.05 | -13 | -57.90 | -1.00 | -58.90 |
| 2 | 125 | 30.73 | -13 | -59.95 | -1.21 | -61.17 |
| 3 | 143.18 | 34.83 | -13 | -58.20 | -1.21 | -59.41 |
| 4 | 175.01 | 38.05 | -13 | -54.35 | 1.47 | -52.88 |
| 5 | 250 | 32.54 | -13 | -62.42 | 3.89 | -58.53 |
| 6 | 500.02 | 34.63 | -13 | -60.89 | 2.89 | -58.00 |
| 7 | 750.1 | 34.73 | -13 | -61.65 | 0.82 | -60.83 |
| 8 | 960 | 36.62 | -13 | -61.21 | 0.39 | -60.82 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 61.92 | 28.44 | -13 | -54.83 | -7.02 | -61.85 |
| 2 | 125 | 28.83 | -13 | -61.85 | -1.21 | -63.07 |
| 3 | 133.17 | 31.57 | -13 | -64.33 | -1.52 | -65.85 |
| 4 | 175.01 | 38.05 | -13 | -54.35 | 1.47 | -52.88 |
| 5 | 250.03 | 30.27 | -13 | -64.69 | 3.89 | -60.80 |
| 6 | 500.02 | 36.63 | -13 | -58.89 | 2.89 | -56.00 |
| 7 | 750.1 | 34.13 | -13 | -62.25 | 0.82 | -61.43 |
| 8 | 960 | 36.62 | -13 | -61.21 | 0.39 | -60.82 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

## CHANNEL BANDWIDTH: 10MHz

| | | | |
|---|---|---|---|
| **MODE** | Low channel | **FREQUENCY RANGE** | Below 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Eric Lee | | |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 113.68 | 32.51 | -13 | -57.43 | -1.01 | -58.43 |
| 2 | 125.08 | 30.88 | -13 | -59.82 | -1.22 | -61.04 |
| 3 | 143.22 | 35.02 | -13 | -58.00 | -1.21 | -59.21 |
| 4 | 175 | 38.41 | -13 | -53.99 | 1.46 | -52.52 |
| 5 | 250.04 | 32.55 | -13 | -62.41 | 3.89 | -58.52 |
| 6 | 500.1 | 34.62 | -13 | -60.90 | 2.89 | -58.01 |
| 7 | 750.01 | 34.94 | -13 | -61.44 | 0.82 | -60.62 |
| 8 | 959.96 | 36.87 | -13 | -60.96 | 0.39 | -60.57 |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 62.05 | 29.25 | -13 | -54.10 | -6.98 | -61.08 |
| 2 | 124.98 | 29.01 | -13 | -61.67 | -1.21 | -62.88 |
| 3 | 133.39 | 32.22 | -13 | -63.62 | -1.51 | -65.13 |
| 4 | 175.12 | 39.17 | -13 | -53.26 | 1.48 | -51.78 |
| 5 | 250.02 | 31.25 | -13 | -63.71 | 3.89 | -59.82 |
| 6 | 500 | 36.77 | -13 | -58.75 | 2.89 | -55.86 |
| 7 | 750.03 | 34.15 | -13 | -62.23 | 0.82 | -61.41 |
| 8 | 960 | 36.87 | -13 | -60.96 | 0.39 | -60.57 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

## 4.6.8 TEST RESULTS - SIMULTANEOUSLY TRANSMIT TEST (WLAN+WIMAX)

| | | | |
|---|---|---|---|
| **MODE** | Middle channel (5MHz)+ 11g channel 6 | **FREQUENCY RANGE** | Below 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Phoenix Huang | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 113.42 | 32.4 | -13 | -57.55 | -1.00 | -58.55 |
| 2 | 125 | 31.24 | -13 | -59.44 | -1.21 | -60.66 |
| 3 | 143.18 | 34.33 | -13 | -58.70 | -1.21 | -59.91 |
| 4 | 175.01 | 37.29 | -13 | -55.11 | 1.47 | -53.64 |
| 5 | 250 | 33.51 | -13 | -61.45 | 3.89 | -57.56 |
| 6 | 500.02 | 35.26 | -13 | -60.26 | 2.89 | -57.37 |
| 7 | 750.1 | 35.33 | -13 | -61.05 | 0.82 | -60.23 |
| 8 | 960 | 37.22 | -13 | -60.61 | 0.39 | -60.22 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 61.92 | 28.47 | -13 | -54.80 | -7.02 | -61.82 |
| 2 | 125 | 28.62 | -13 | -62.06 | -1.21 | -63.28 |
| 3 | 133.17 | 31.11 | -13 | -64.79 | -1.52 | -66.31 |
| 4 | 175.01 | 37.23 | -13 | -55.17 | 1.47 | -53.70 |
| 5 | 250.03 | 31.5 | -13 | -63.46 | 3.89 | -59.57 |
| 6 | 500.02 | 37.5 | -13 | -58.02 | 2.89 | -55.13 |
| 7 | 750.1 | 35.23 | -13 | -61.15 | 0.82 | -60.33 |
| 8 | 960 | 36.44 | -13 | -61.39 | 0.39 | -61.00 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

## 4.7 RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

### 4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (2), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P)dB from the channel edges.

### 4.7.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|
| ROHDE & SCHWARZ Spectrum Analyzer | FSP40 | 100036 | Dec. 9, 2009 | Dec. 8, 2010 |
| Agilent PSA Spectrum Analyzer | E4446A | MY46180622 | Apr. 24 , 2009 | Apr. 23 , 2010 |
| HP Pre_Amplifier | 8449B | 3008A01923 | Nov. 02, 2009 | Nov. 01, 2010 |
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 847124/029 | Aug. 28, 2009 | Aug. 27, 2010 |
| SCHWARZBECK TRILOG Broadband Antenna | VULB 9168 | 138 | April 29, 2009 | April 28, 2010 |
| Schwarzbeck Horn_Antenna | BBHA9120 | D124 | Dec. 09, 2009 | Dec. 08, 2010 |
| Schwarzbeck Horn_Antenna | BBHA 9170 | BBHA9170153 | Jan. 22, 2009 | Jan. 21, 2010 |
| R&S Loop Antenna | HFH2-Z2 | 100070 | Jan. 14, 2008 | Jan. 13, 2010 |
| RF Switches | EMH-011 | 08009 | Oct. 07, 2009 | Oct. 06, 2010 |
| RF CABLE (Chaintek) | Sucoflex 106 | 28077 | Aug. 14, 2009 | Aug. 13, 2010 |
| RF Cable | 8DFB | STCCAB-30M-1GHz | Oct. 07, 2009 | Oct. 06, 2010 |
| Software | ADT_Radiated_V7.6.15.9.2 | NA | NA | NA |
| CT Antenna Tower & Turn Table | NA | NA | 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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

### 4.7.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.

c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.

d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.

e. The signal generator level has to be adjusted to have the same emission nature.

f. The radiated power can be calculated via the factor and antenna gain.

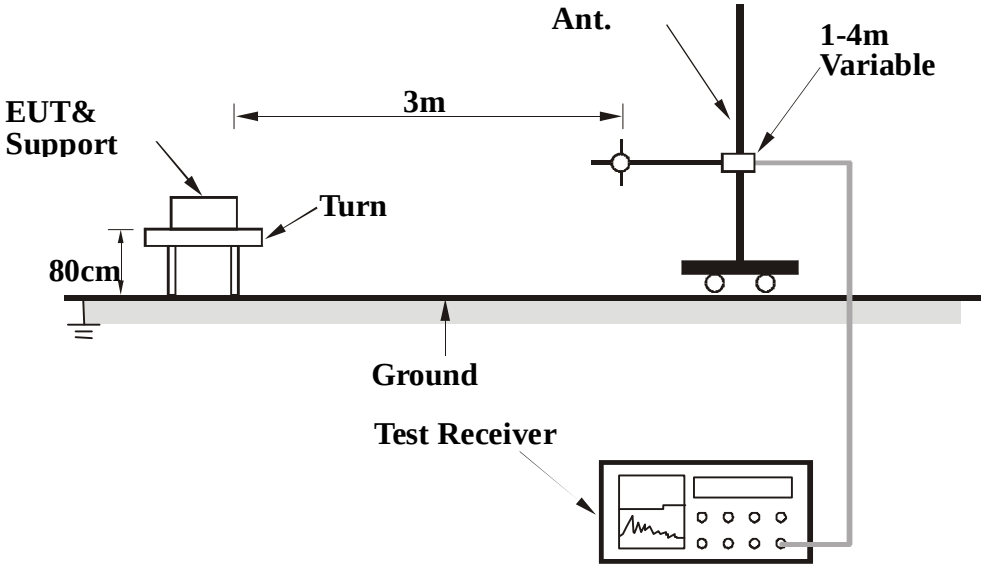
g. Repeat step a ~ f for horizontal polarization.

**NOTE:** The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is 3MHz.

### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP




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

4.7.6 EUT OPERATING CONDITIONS

Same as item 4.1.5

## 4.7.7 TEST RESULTS - NORMAL TEST

**CHANNEL BANDWIDTH: 5MHz**

| | | | |
|---|---|---|---|
| **MODE** | Low channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 5005 | 49 | -13 | -55.24 | 7.01 | -48.23 |
| 2 | 7507.5 | 63.6 | -13 | -39.02 | 4.54 | -34.48 |
| 3 | 10010 | 56 | -13 | -45.57 | 4.03 | -41.54 |
| 4 | 12512.5 | 66.2 | -13 | -35.38 | 4.34 | -31.04 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 5005 | 56.4 | -13 | -47.84 | 7.01 | -40.83 |
| 2 | 7507.5 | 64.2 | -13 | -38.42 | 4.54 | -33.88 |
| 3 | 10010 | 56.3 | -13 | -45.27 | 4.03 | -41.24 |
| 4 | 12512.5 | 67.88 | -13 | -33.70 | 4.34 | -29.36 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

| | | | |
|---|---|---|---|
| **MODE** | Middle channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5200 | 49.1 | -13 | -55.43 | 7.05 | -48.38 |
| 2 | 7800 | 64.92 | -13 | -37.70 | 4.29 | -33.41 |
| 3 | 10400 | 59.9 | -13 | -42.11 | 3.66 | -38.44 |
| 4 | 12995 | 63 | -13 | -37.84 | 4.44 | -33.39 |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5200 | 57.4 | -13 | -47.13 | 7.05 | -40.08 |
| 2 | 7800 | 67.64 | -13 | -34.98 | 4.29 | -30.69 |
| 3 | 10400 | 62.84 | -13 | -39.17 | 3.66 | -35.50 |
| 4 | 12995 | 66.3 | -13 | -34.54 | 4.44 | -30.09 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

| | | | |
|---|---|---|---|
| **MODE** | High channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5375 | 50.4 | -13 | -54.39 | 7.09 | -47.30 |
| 2 | 8062.5 | 63.5 | -13 | -39.12 | 4.13 | -34.99 |
| 3 | 10750 | 64.2 | -13 | -37.64 | 3.33 | -34.30 |
| 4 | 13437.5 | 63.1 | -13 | -37.12 | 3.40 | -33.72 |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5375 | 66.48 | -13 | -38.31 | 7.09 | -31.22 |
| 2 | 8062.5 | 64.5 | -13 | -38.12 | 4.13 | -33.99 |
| 3 | 10750 | 68.4 | -13 | -33.44 | 3.33 | -30.10 |
| 4 | 13437.5 | 62 | -13 | -38.22 | 3.40 | -34.82 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

## CHANNEL BANDWIDTH: 10MHz

| | | | |
|---|---|---|---|
| **MODE** | Low channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5010 | 48.4 | -13 | -55.85 | 7.01 | -48.83 |
| 2 | 7515 | 59.2 | -13 | -43.42 | 4.53 | -38.89 |
| 3 | 10020 | 55.3 | -13 | -46.28 | 4.02 | -42.26 |
| 4 | 12525 | 62.1 | -13 | -39.46 | 4.34 | -35.12 |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5010 | 50.3 | -13 | -53.95 | 7.01 | -46.93 |
| 2 | 7515 | 60.3 | -13 | -42.32 | 4.53 | -37.79 |
| 3 | 10020 | 54.6 | -13 | -46.98 | 4.02 | -42.96 |
| 4 | 12525 | 65.4 | -13 | -36.16 | 4.34 | -31.82 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

| | | | |
|---|---|---|---|
| **MODE** | Middle channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5200 | 46.4 | -13 | -58.13 | 7.05 | -51.08 |
| 2 | 7800 | 56.9 | -13 | -45.72 | 4.29 | -41.43 |
| 3 | 10400 | 50.2 | -13 | -52.03 | 3.67 | -48.37 |
| 4 | 12995 | 63.8 | -13 | -37.04 | 4.44 | -32.59 |

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

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
|---|---|---|---|---|---|---|
| 1 | 5200 | 50.5 | -13 | -54.03 | 7.05 | -46.98 |
| 2 | 7800 | 62.53 | -13 | -40.09 | 4.29 | -35.80 |
| 3 | 10400 | 55.42 | -13 | -46.81 | 3.67 | -43.15 |
| 4 | 12995 | 63.4 | -13 | -37.44 | 4.44 | -32.99 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

| | | | |
|---|---|---|---|
| **MODE** | High channel | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 5370 | 44.72 | -13 | -60.07 | 7.09 | -52.97 |
| 2 | 8055 | 56.86 | -13 | -45.76 | 4.13 | -41.63 |
| 3 | 10740 | 59.9 | -13 | -41.95 | 3.34 | -38.61 |
| 4 | 13425 | 59.3 | -13 | -40.94 | 3.43 | -37.50 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 5370 | 49.2 | -13 | -55.59 | 7.09 | -48.49 |
| 2 | 8055 | 58.4 | -13 | -44.22 | 4.13 | -40.09 |
| 3 | 10740 | 63.5 | -13 | -38.35 | 3.34 | -35.01 |
| 4 | 13425 | 62.9 | -13 | -37.34 | 3.43 | -33.90 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

## 4.7.8 TEST RESULTS - SIMULTANEOUSLY TRANSMIT TEST (WLAN+WIMAX)

| | | | |
|---|---|---|---|
| **MODE** | Middle channel (5MHz)+ 11g channel 6 | **FREQUENCY RANGE** | Above 1000MHz |
| **INPUT POWER (SYSTEM)** | 120Vac, 60Hz | **ENVIRONMENTAL CONDITIONS** | 20deg°C, 60%RH 1014hPa |
| **TESTED BY** | Frank Liu | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 4874 | 58.3 | -13 | -46.00 | 7.08 | -38.92 |
| 2 | 5200 | 64.92 | -13 | -39.61 | 7.05 | -32.56 |
| 3 | 7800 | 59.9 | -13 | -42.72 | 4.29 | -38.43 |
| 4 | 10400 | 63 | -13 | -39.01 | 3.66 | -35.34 |
| 5 | 12995 | 64.6 | -13 | -36.24 | 4.44 | -31.79 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Power level (dBm) |
| 1 | 4874 | 60.23 | -13 | -44.07 | 7.08 | -36.99 |
| 2 | 5200 | 57.9 | -13 | -46.63 | 7.05 | -39.58 |
| 3 | 7800 | 68.2 | -13 | -34.42 | 4.29 | -30.13 |
| 4 | 10400 | 63.4 | -13 | -38.61 | 3.66 | -34.94 |
| 5 | 12995 | 67.2 | -13 | -33.64 | 4.44 | -29.19 |

**REMARKS**: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)

# 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

# 6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, 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.

| | |
|---|---|
| **USA** | FCC, NVLAP |
| **Germany** | TUV Rheinland |
| **Japan** | VCCI |
| **Norway** | NEMKO |
| **Canada** | INDUSTRY CANADA , CSA |
| **R.O.C.** | TAF, BSMI, NCC |
| **Netherlands** | Telefication |
| **Singapore** | GOST-ASIA(MOU) |
| **Russia** | 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. If you have any comments, please feel free to contact us at the following:


**Linko EMC/RF Lab**:
Tel: 886-2-26052180
Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab**:
Tel: 886-3-5935343
Fax: 886-3-5935342

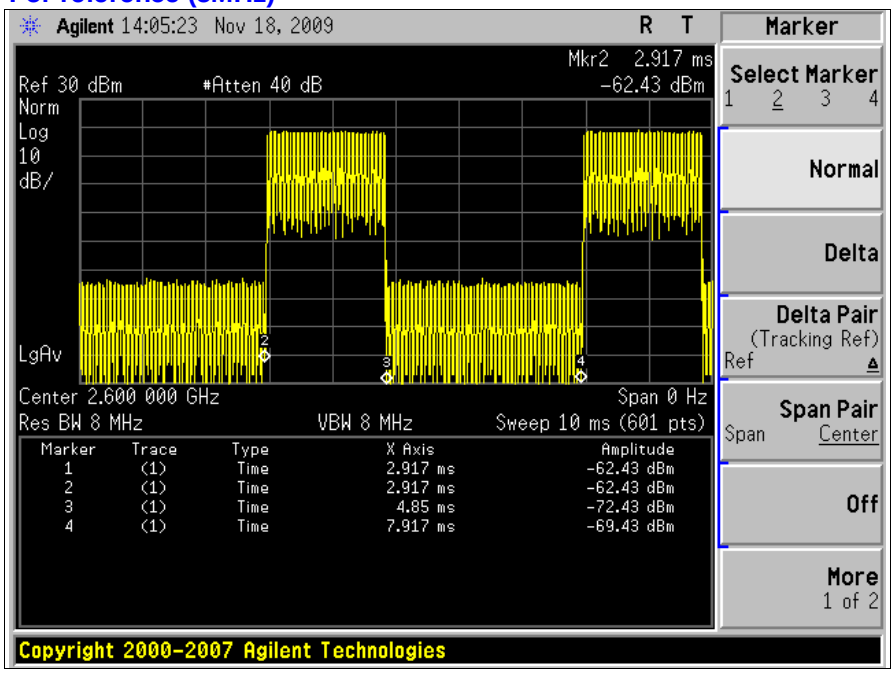
**Hwa Ya EMC/RF/Safety/Telecom Lab**:
Tel: 886-3-3183232
Fax: 886-3-3185050

**Web Site**: www.adt.com.tw


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

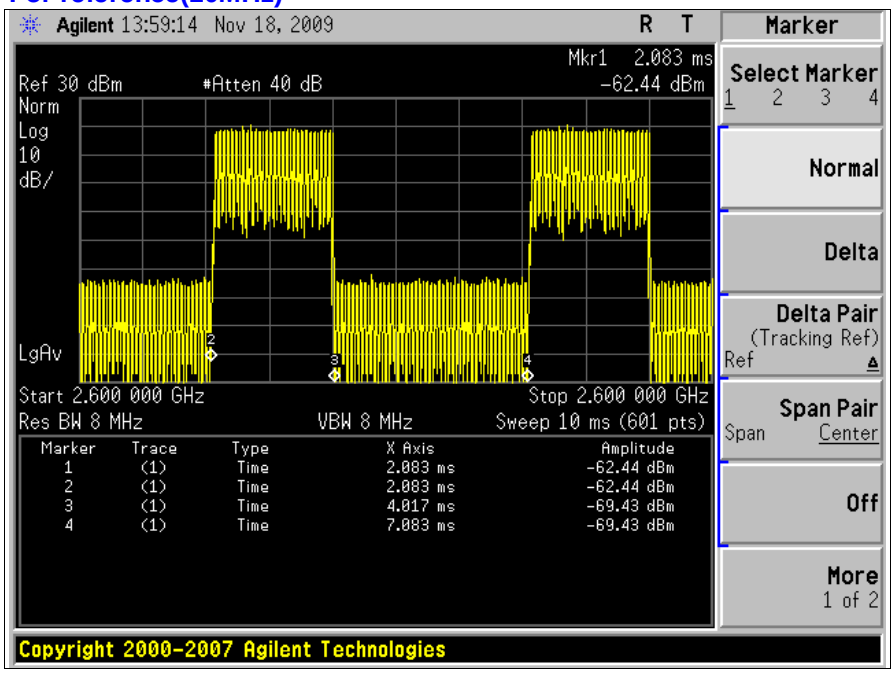
# 7 APPENDIX- A DL/UL RATION FOR TEST

**For reference (5MHz)**




The ratio is approximate 38.66%.

**For reference(10MHz)**




The ratio is approximate 38.68%.

**--- END ---**