



FCC TEST REPORT (PART 27)

REPORT NO.: RF970108H04

MODEL NO.: CPEi25150

RECEIVED: Jan. 11, 2008

TESTED: Jan. 24 to Feb.01, 2008

ISSUED: March 24, 2008

APPLICANT: Motorola Inc.

ADDRESS: 1475 W. Shure Drive, Arlington Heights, IL 60004 USA

ISSUED BY: Advance Data Technology Corporation

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Chiung Lin Hsiang, Hsin Chu Hsien, Taiwan.

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1 CERTIFICATION

PRODUCT: WiMAX CPE

MODEL: CPEi25150

APPLICANT: Motorola Inc.

TESTED: Jan. 24 to 28, 2008

TEST SAMPLE: ENGINEERING SAMPLE

TEST STANDARDS: FCC Part 27, Subpart C & M

The above equipment (Model no.: CPEi25150) 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 : Claire Kuan , **DATE:** March 24, 2008
(Claire Kuan, Specialist)

**TECHNICAL
ACCEPTANCE :** Hank Chung , **DATE:** March 24, 2008
Responsible for RF (Hank Chung, Deputy Manager)

APPROVED BY : May Chen , **DATE:** March 24, 2008
(May Chen, Deputy Manager)

Revision Note:

| Revision No. | Revised Date | Comment |
|--------------|----------------|--|
| Rev.1.0 | March 24, 2008 | Modify antenna type from patch to slot on page 7 |

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 27.50(h)(2) | Maximum Peak Output Power Limit: max. 2 watts conducted peak power | PASS | Meet the requirement of limit. |
| 2.1055 27.54 | Frequency Stability Stay with the authorized bands of operation | PASS | Meet the requirement of limit. |
| 2.1049 27.53(m)(6) | Emission Bandwidth | PASS | Meet the requirement of limit. |
| 2.1051 27.53(m)(4)(6) | Band Edge Measurements | PASS | Meet the requirement of limit. |
| 2.1051 27.53(m)(4)(6) | Conducted Spurious Emissions | PASS | Meet the requirement of limit. |
| 2.1053 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:

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) | 2.33 dB |
| Radiated emissions (18GHz -40GHz) | 2.55 dB |

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|------------------------------|---------------------------|
| PRODUCT | WiMAX CPE |
| MODEL NO. | CPEi25150 |
| FCC ID | VYO-CPE25150 |
| POWER SUPPLY | DC 12V from power adapter |
| MODULATION TYPE | BPSK-1/2, QPSK-1/2 |
| MODULATION TECHNOLOGY | OFDMA |
| FREQUENCY RANGE | 2505MHz ~ 2685MHz |
| CHANNEL BANDWIDTH | 5MHz & 10MHz |
| NUMBER OF CHANNEL | 128 |
| MAX. CONDUCTED POWER | 27.40dBm |
| ANTENNA TYPE | Slot antenna with 7.17dBi |
| DATA CABLE | NA |
| I/O PORTS | LAN port *1 |
| ASSOCIATED DEVICES | NA |

NOTE:

1. The EUT must be supplied with a power adapter as following:

| Brand | Model No. | Spec. |
|-------|-------------|--|
| Delta | EADP-24KB B | Input: 100-240V, 1A, 50-60Hz Output: 12VDC,2A |

2. 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.

Rev. 1.0 dated March 24, 2008

3.2 DESCRIPTION OF TEST MODES

Three channels have been tested and presented.

Low channel (L): 2505MHz.

Middle channel (M): 2600MHz.

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 ³ 1G | |
| - | √ | √ | √ | √ | √ | √ | √ | - |

Where **OP**: Output power

FS: Frequency stability

EB: Emission bandwidth

CE: Channel edge

CSE: Conducted spurious emissions

RE<1G: Radiated emission below 1GHz

RE³1G: 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 |
|----------------|-----------------------|-----------------|
| L, M, H | OFDMA | QPSK-1/2 |

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 |
|----------------|-----------------------|-----------------|
| L | OFDMA | QPSK-1/2 |

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 |
|----------------|-----------------------|-----------------|
| L, M, H | OFDMA | QPSK-1/2 |

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 |
|----------------|-----------------------|-----------------|
| L, M, H | OFDMA | QPSK-1/2 |

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 |
|----------------|-----------------------|-----------------|
| L, M, H | OFDMA | QPSK-1/2 |

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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|----------------|-----------------------|-----------------|
| L | OFDMA | QPSK-1/2 |

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.

| TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE |
|----------------|-----------------------|-----------------|
| L, M, H | OFDMA | QPSK-1/2 |

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

ANSI/TIA/EIA-603-C-2004

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

3.4 DESCRIPTION OF SUPPORT UNITS

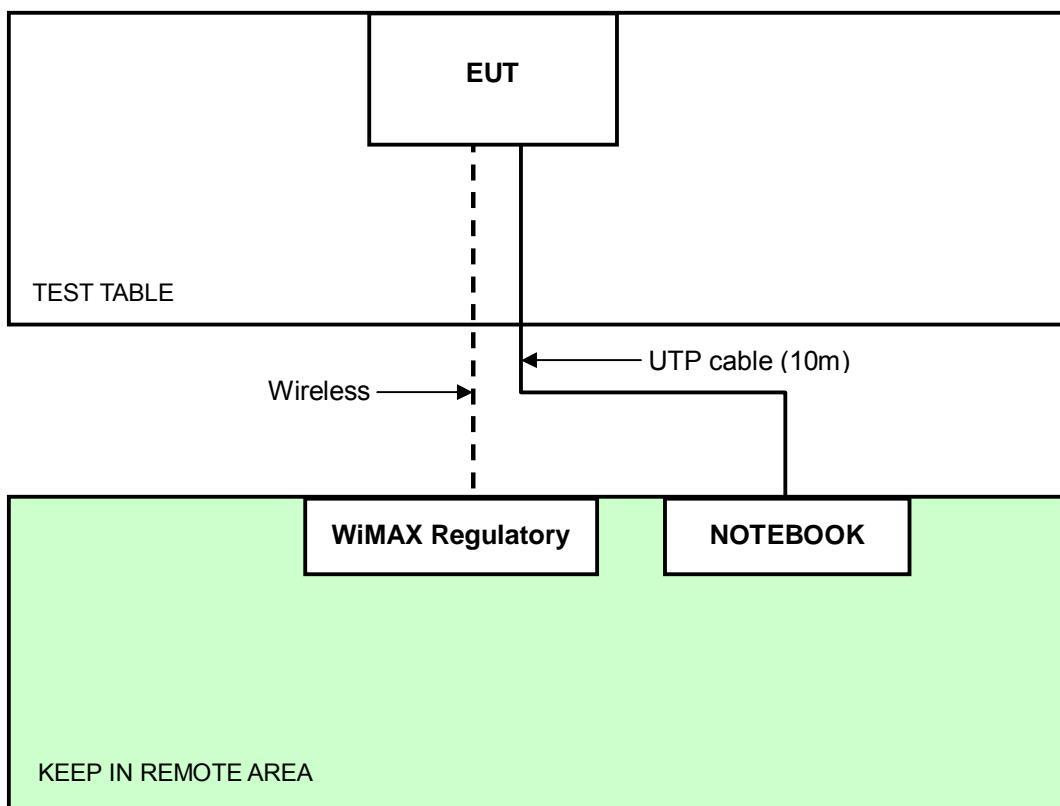
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|------------------|---------|-----------|-----------------------------------|---------|
| 1 | NOTEBOOK | DELL | PP18L | 6976685584 | FCC Doc |
| 2 | WiMAX Regulatory | Agilent | E4438C | MY45094468/005 506 602 UK6 UNJ | NA |

| 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).

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



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 "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 Until |
|----------------------------|--------------|------------|------------------|
| Agilent Spectrum Analyzer | E4440A | MY46185282 | Jun.14,2008 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2008 |
| JFW 10dB attenuation | 50HF-010-SMA | N/A | N/A |

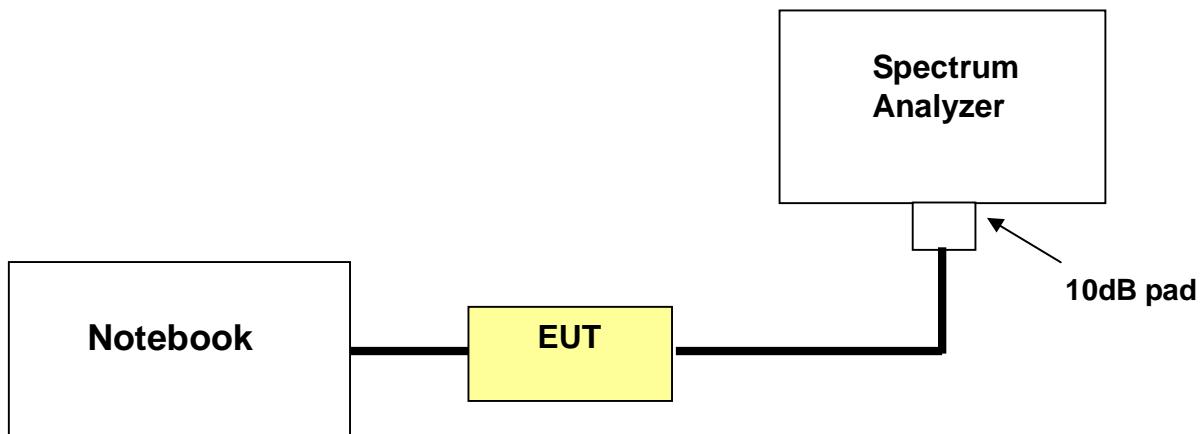
NOTE:

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

4.1.3 TEST PROCEDURES

- a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b. Set RBW=100kHz, VBW=1MHz, Detector mode=Peak.
- c. Computer power by integrating the spectrum across the 26dB EBW of the signal.
- d. Record the power level.

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

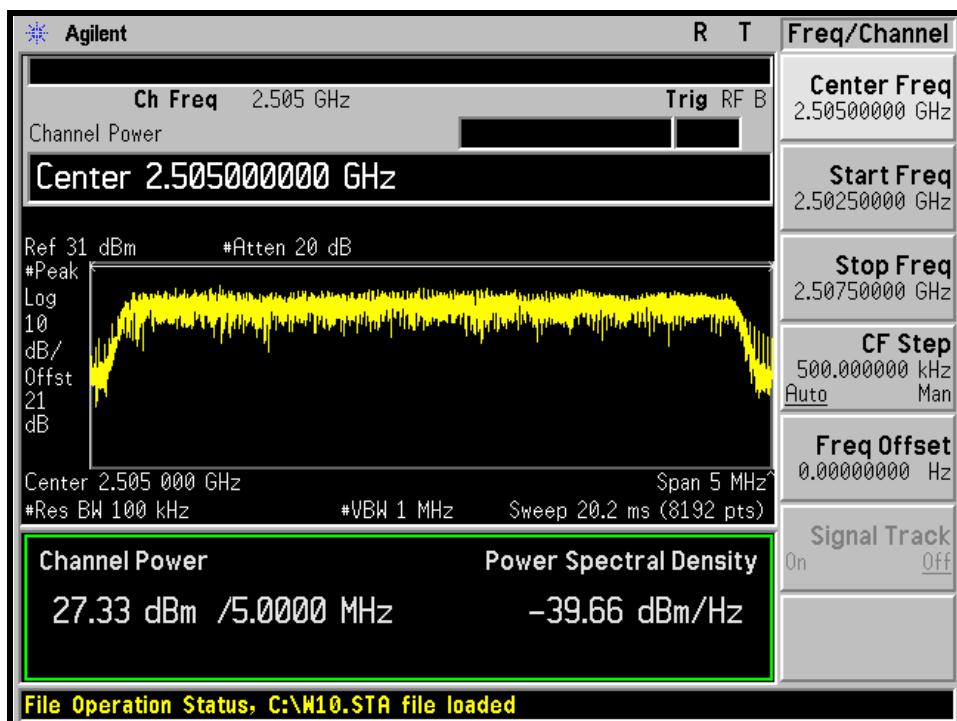
4.1.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

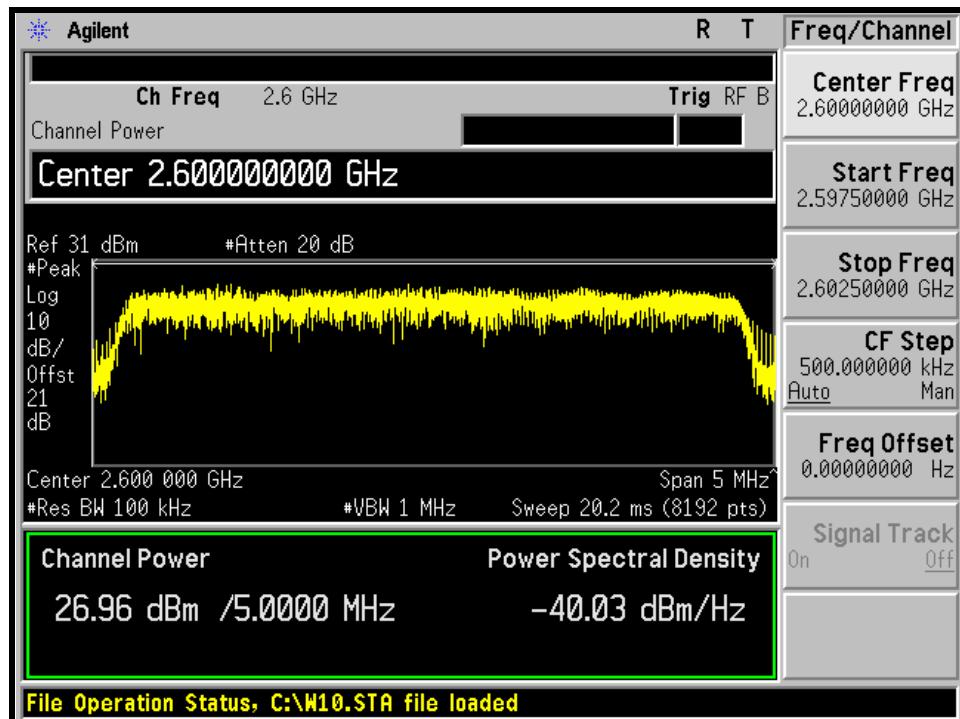
| | | | |
|--------------------------|--------------------------|-------------------|-----------|
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | DETECTOR FUNCTION | Peak |
| ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH 965hPa | TESTED BY | Rex Huang |

| CONDUCTED POWER | | | |
|-----------------|-----------------|-----------------------|------------------------|
| CHANNEL | FREQUENCY (MHz) | PEAK POWER OUTPUT(mW) | PEAK POWER OUTPUT(dBm) |
| Low | 2505 | 540.754 | 27.33 |
| Middle | 2600 | 496.592 | 26.96 |
| High | 2685 | 492.040 | 26.92 |

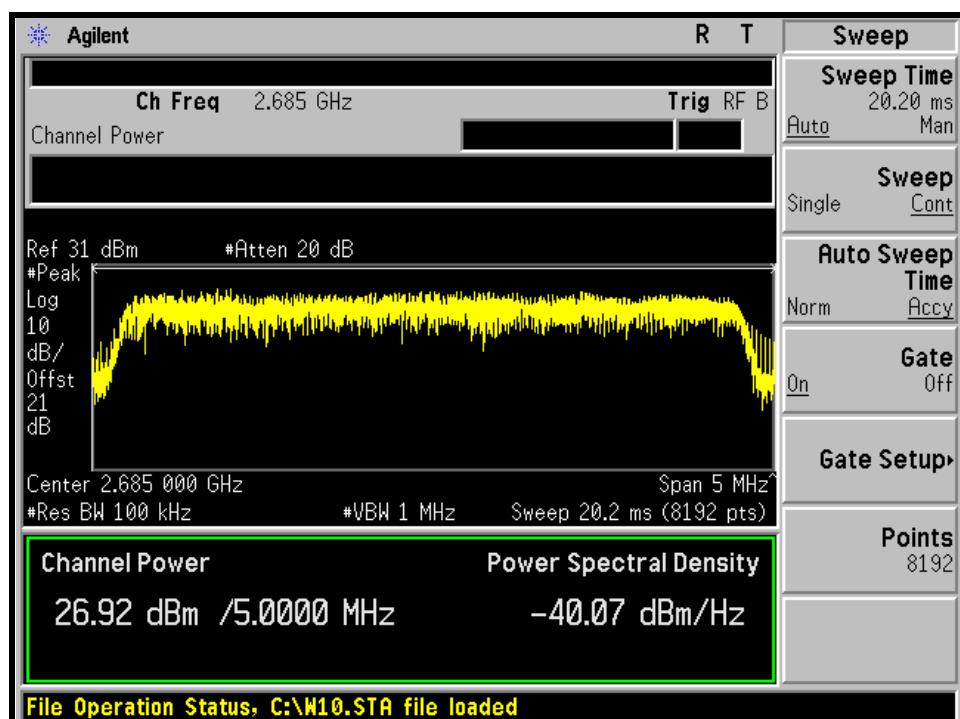
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



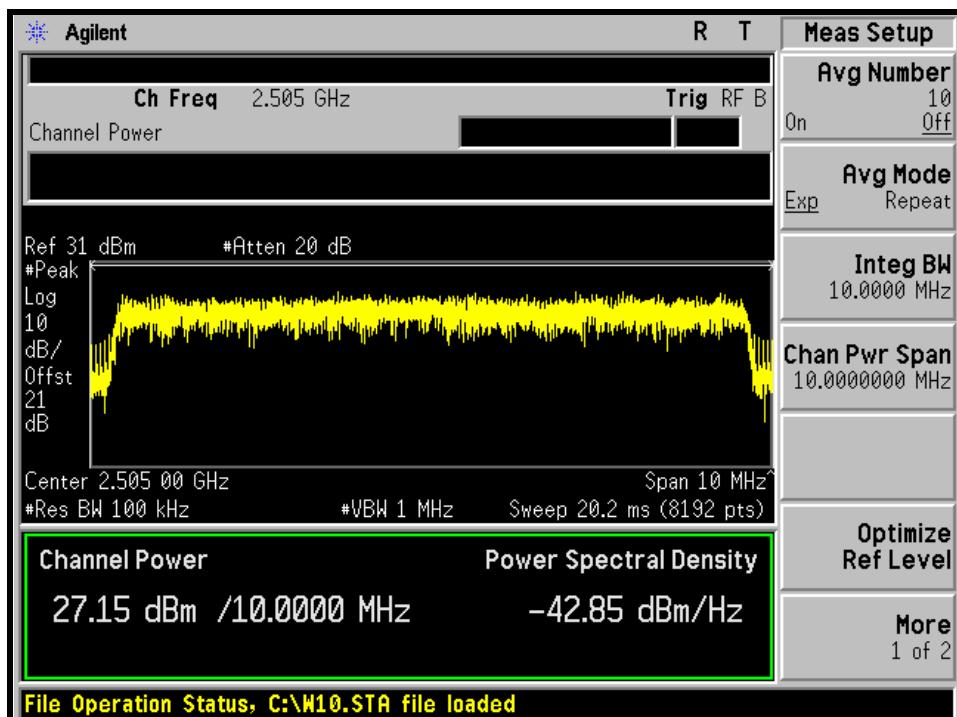
CHANNEL BANDWIDTH: 10MHz

| | | | |
|--------------------------|--------------------------|-------------------|-----------|
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | DETECTOR FUNCTION | Peak |
| ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH 965hPa | TESTED BY | Rex Huang |

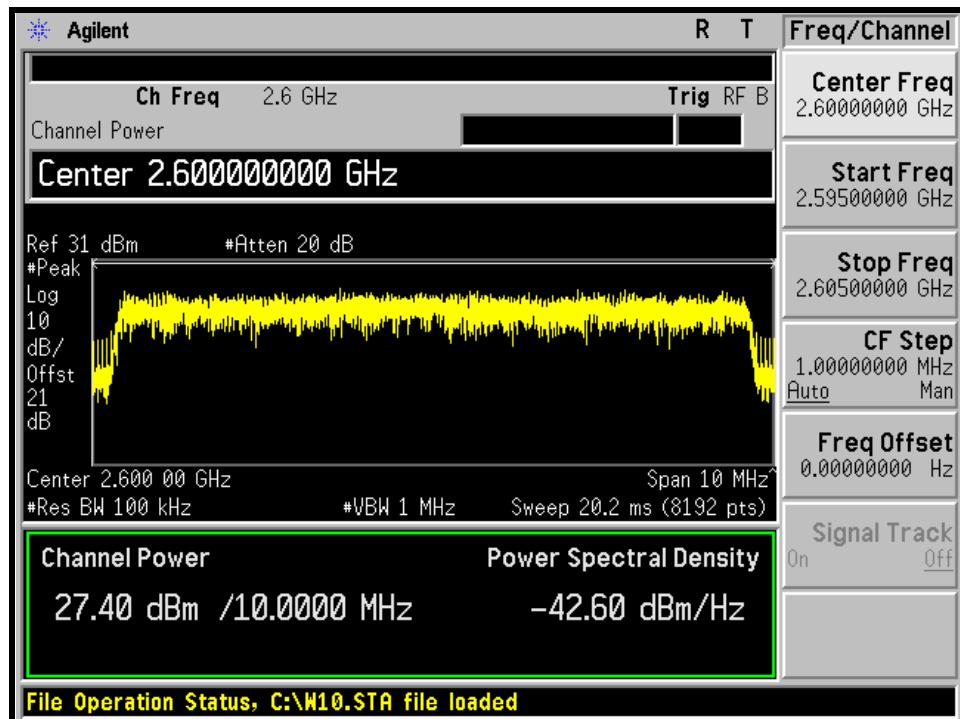
CONDUCTED POWER

| CHANNEL | FREQUENCY (MHz) | PEAK POWER OUTPUT(mW) | PEAK POWER OUTPUT(dBm) |
|---------|-----------------|-----------------------|------------------------|
| Low | 2505 | 518.800 | 27.15 |
| Middle | 2600 | 549.541 | 27.40 |
| High | 2685 | 510.505 | 27.08 |

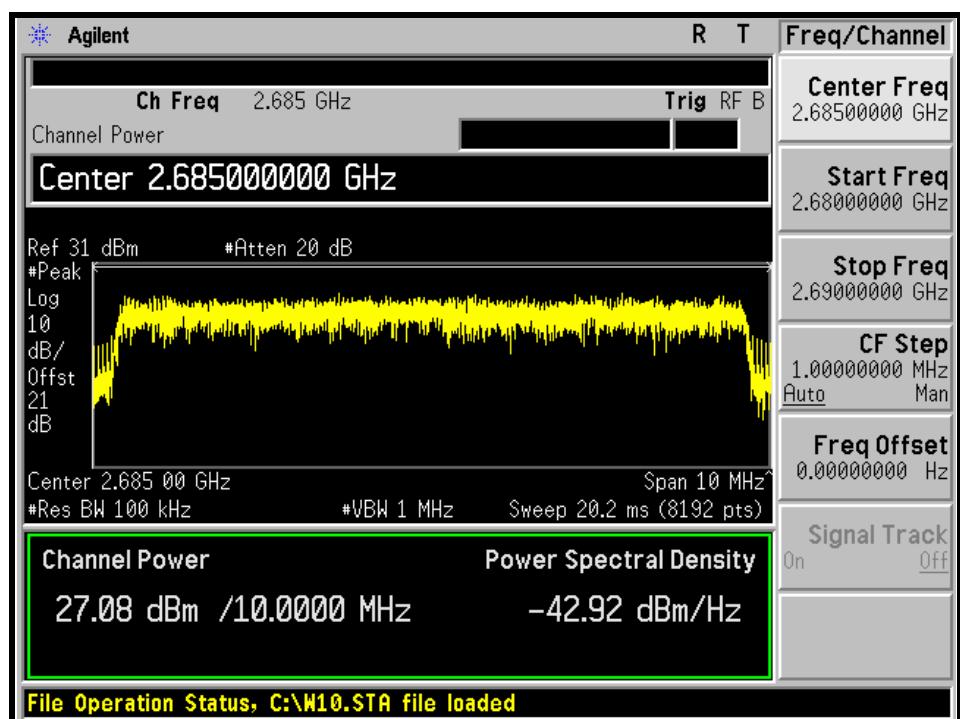
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY 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°C ~ 50°C.

4.2.2 TEST INSTRUMENTS

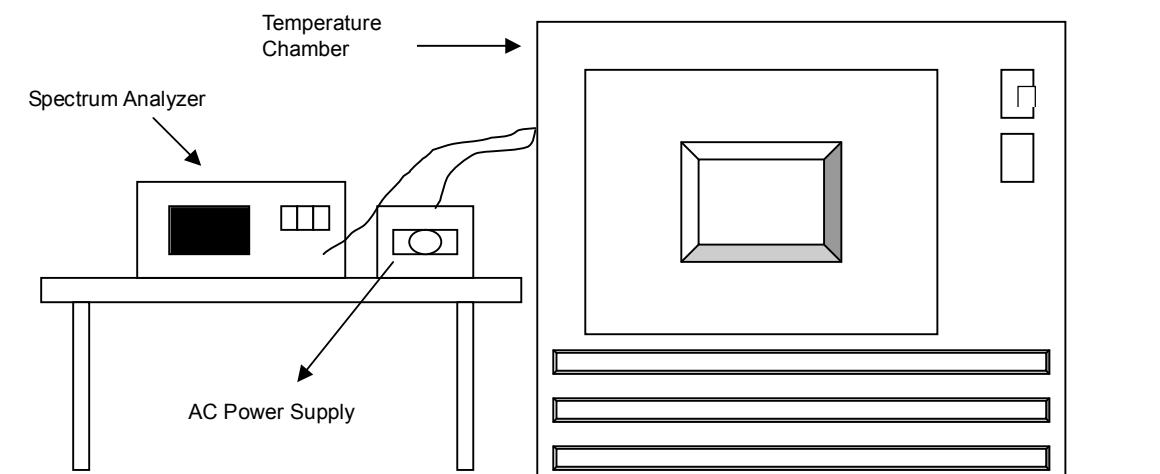
| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|----------------------------|-------------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSP40 | 100037 | Aug. 12, 2008 |
| OVEN | MHU-225AU | 911033 | Dec. 04, 2008 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2008 |
| AC POWER SOURCE | 6205 | 1140503 | 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.
2. The test was performed in ADT RF OVEN room.

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 138 Volts. 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 $\pm 0.5^{\circ}\text{C}$ 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

CHANNEL BANDWIDTH: 5MHz & 10MHz

| | | | |
|--------------------------|--------------------------|----------------------|--------------|
| MODE | Low channel (2505MHz) | INPUT POWER (SYSTEM) | 120Vac, 60Hz |
| ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH 965hPa | TESTED BY | Rex Huang |

AFC FREQUENCY ERROR VS. TEMP.

| VOLTAGE (Volts) | FREQUENCY (MHz) | FREQUENCY DRIFT (ppm) |
|-----------------|-----------------|-----------------------|
| 102 | 2504.9981 | -0.758 |
| 120 | 2504.9947 | -2.116 |
| 138 | 2504.9977 | -0.918 |

AFC FREQUENCY ERROR VS. TEMP.

| TEMP. (°C) | FREQUENCY (MHz) | FREQUENCY DRIFT (ppm) |
|------------|-----------------|-----------------------|
| 50 | 2505.0023 | 0.918 |
| 40 | 2505.0049 | 1.956 |
| 30 | 2504.9989 | -0.439 |
| 20 | 2504.9947 | -2.116 |
| 10 | 2505.0028 | 1.118 |
| 0 | 2505.0053 | 2.116 |
| -10 | 2504.9949 | -2.036 |
| -20 | 2504.9991 | -0.359 |

NOTE: The EUT can't operate and without any TX signal at -30°C.

4.3 EMISSION BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

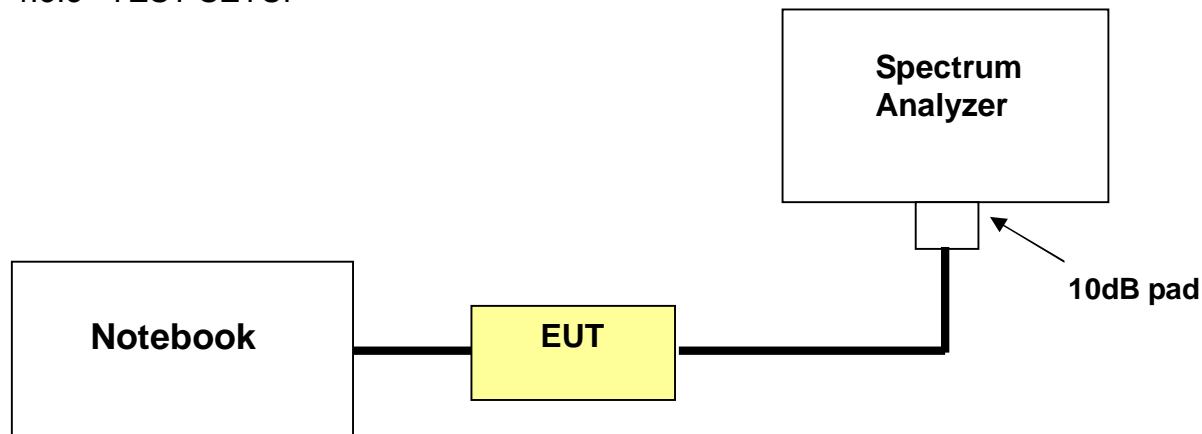
According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|----------------------------|--------------|------------|------------------|
| Agilent Spectrum Analyzer | E4440A | MY46185282 | Jun.14,2008 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2008 |
| JFW 10dB attenuation | 50HF-010-SMA | 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.

4.3.3 TEST SETUP



4.3.4 TEST PROCEDURES

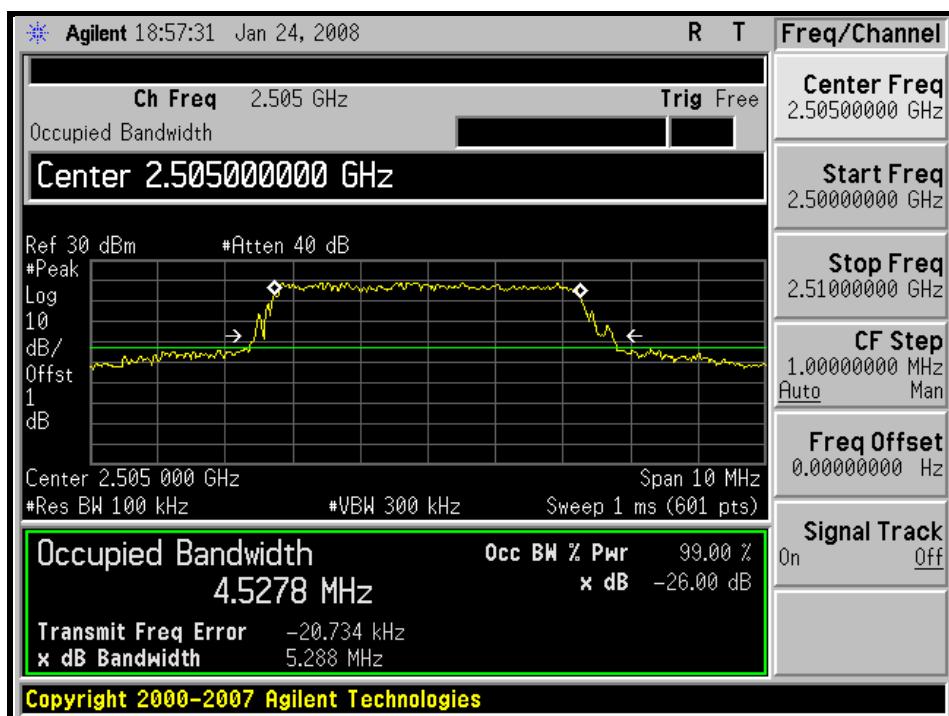
- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 26dB bandwidth is define as the total spectrum the power of which is higher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

4.3.5 TEST RESULTS

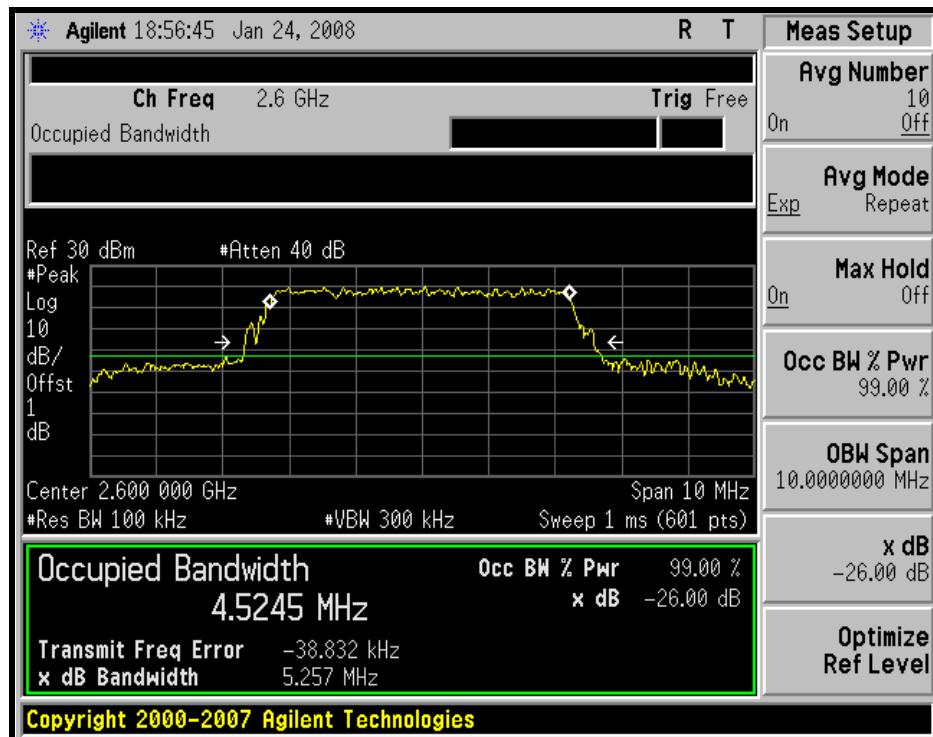
CHANNEL BANDWIDTH: 5MHz

| FREQUENCY (MHz) | -26 dBc BANDWIDTH (MHz) |
|-----------------|-------------------------|
| 2505 | 5.288 |
| 2600 | 5.257 |
| 2685 | 5.346 |

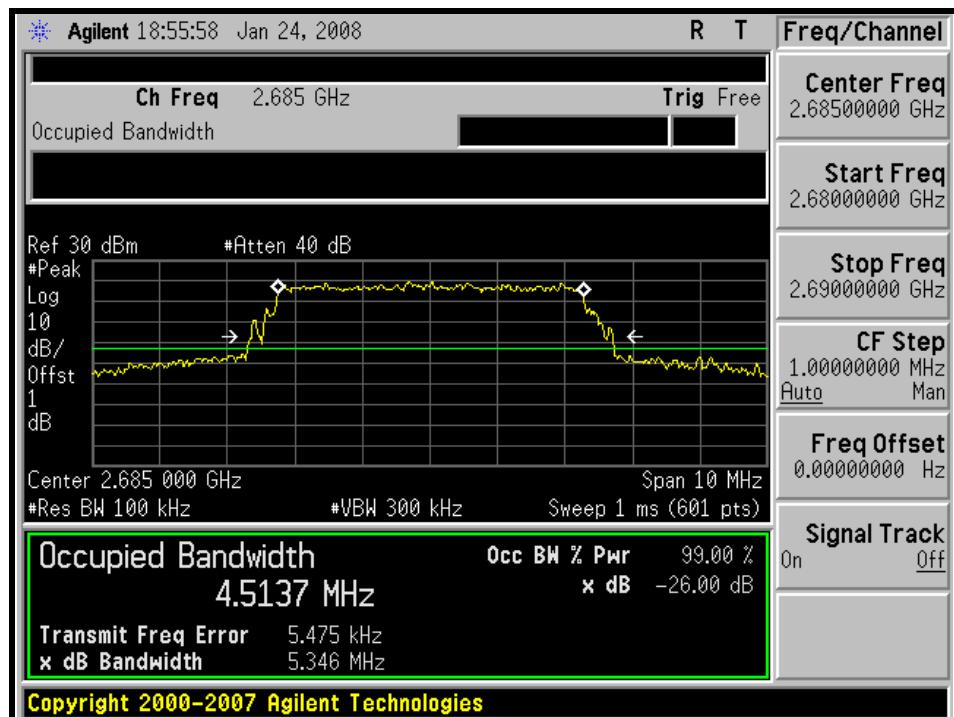
LOW CHANNEL



MIDDLE CHANNEL



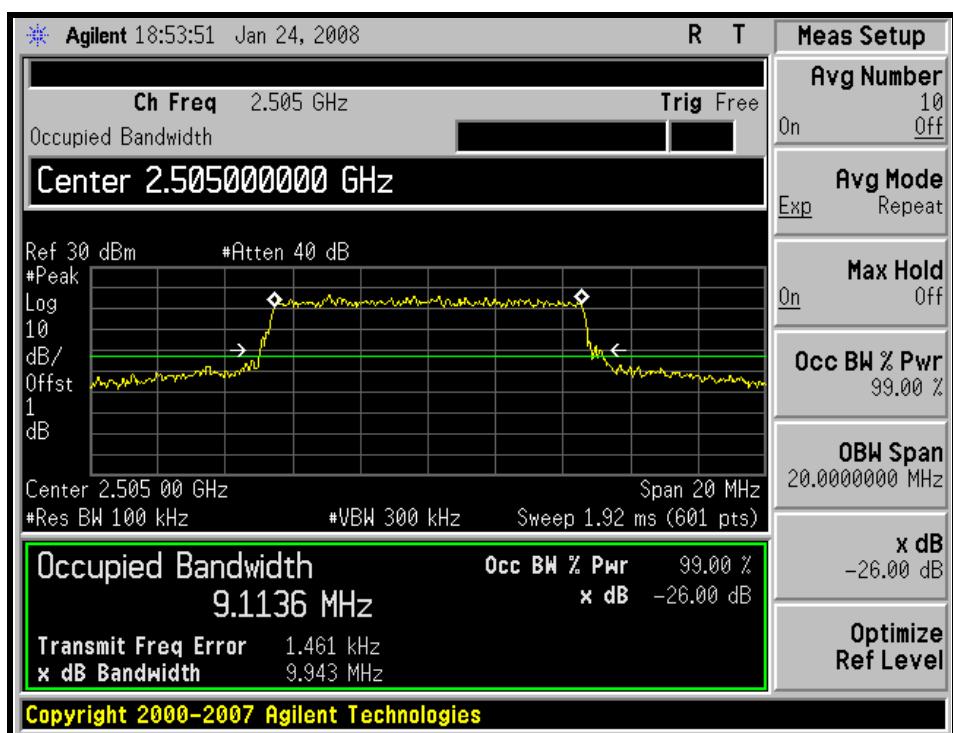
HIGH CHANNEL



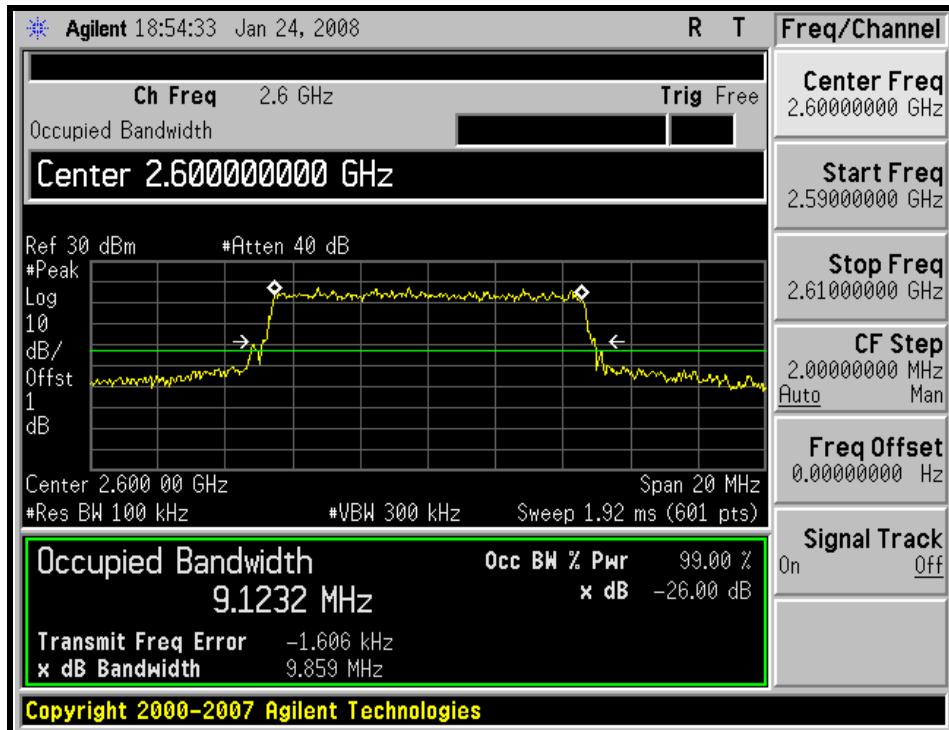
CHANNEL BANDWIDTH: 10MHz

| FREQUENCY (MHz) | -26 dBc BANDWIDTH (MHz) |
|-----------------|-------------------------|
| 2505 | 9.943 |
| 2600 | 9.859 |
| 2685 | 10.018 |

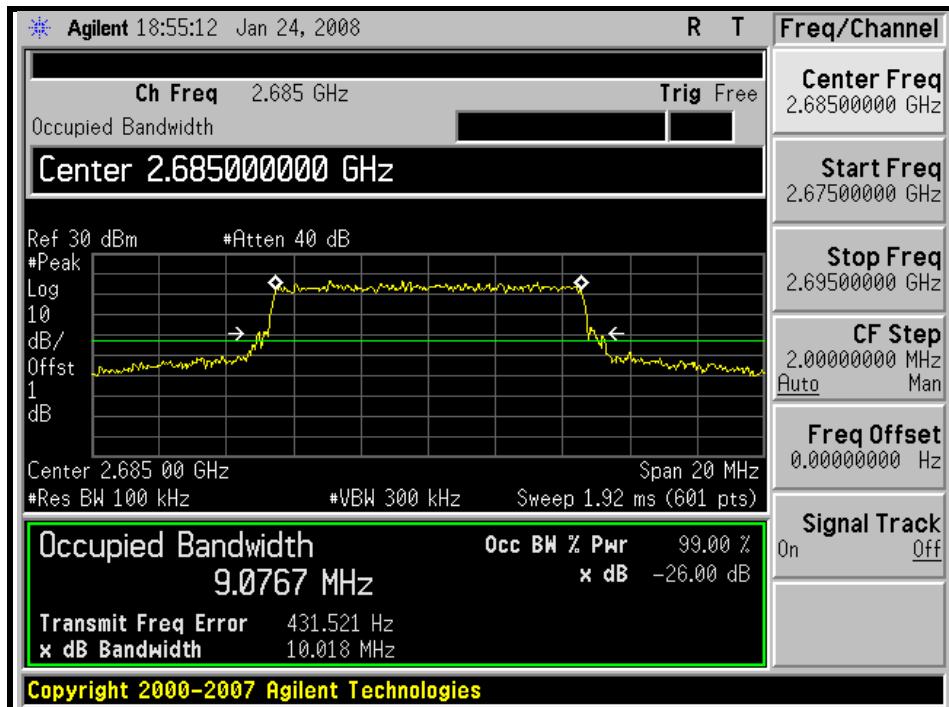
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



4.4 CHANNEL EDGE MEASUREMENT

4.4.1 LIMITS OF CHANNEL EDGE MEASUREMENT

According to FCC 27.53(m)(4) 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 UNTIL |
|------------------------------|--------------|------------|------------------|
| Agilent Spectrum Analyzer | E4440A | MY46185282 | Jun.14,2008 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2008 |
| JFW 10dB attenuation | 50HF-010-SMA | 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.

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 51kHz and VB of the spectrum is 160kHz.

- 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 100kHz and VB of the spectrum is 300kHz.

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

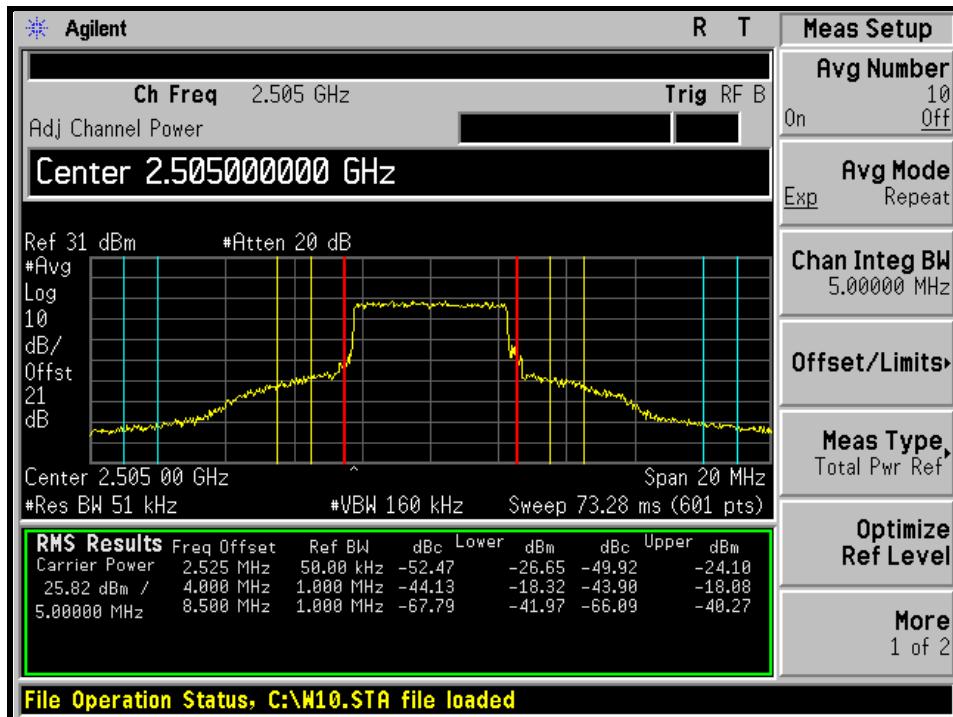
4.4.5 EUT OPERATING CONDITION

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

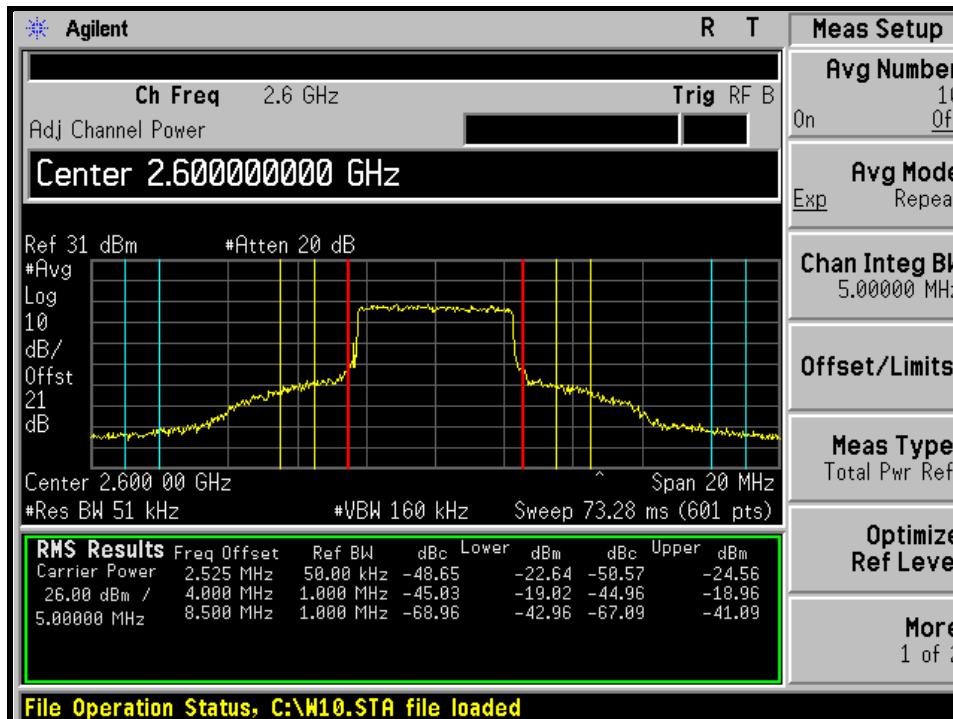
4.4.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

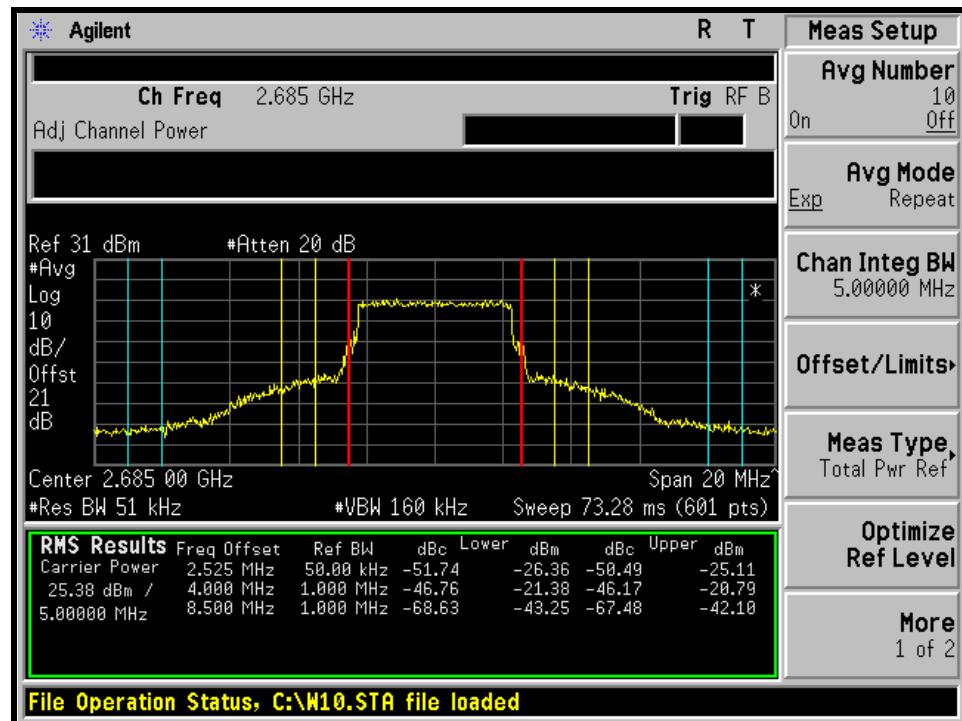
LOW CHANNEL



MIDDLE CHANNEL

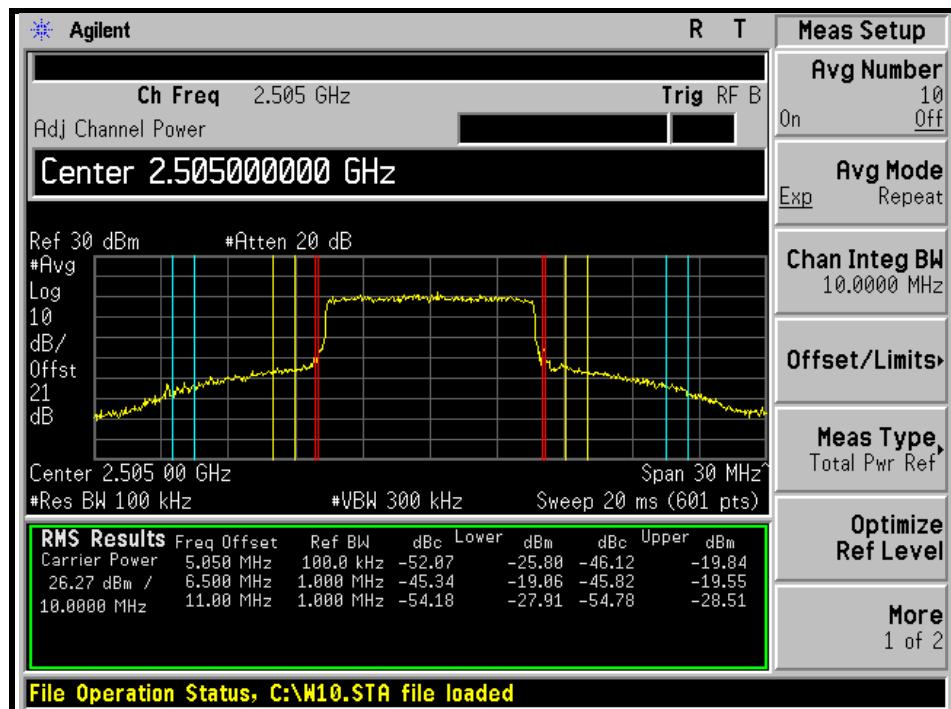


HIGH CHANNEL

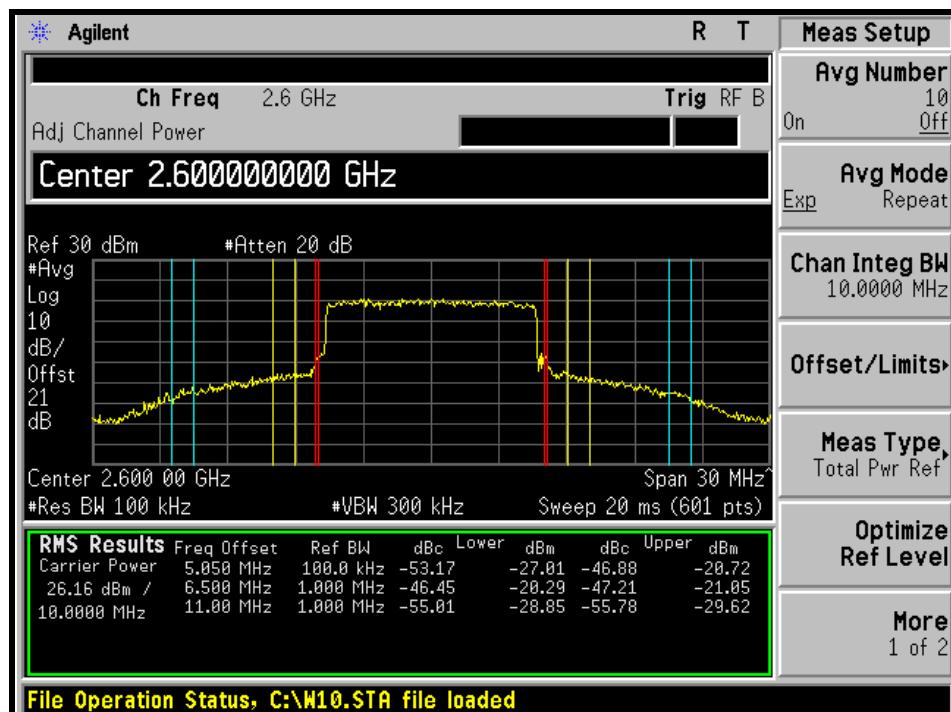


CHANNEL BANDWIDTH: 10MHZ

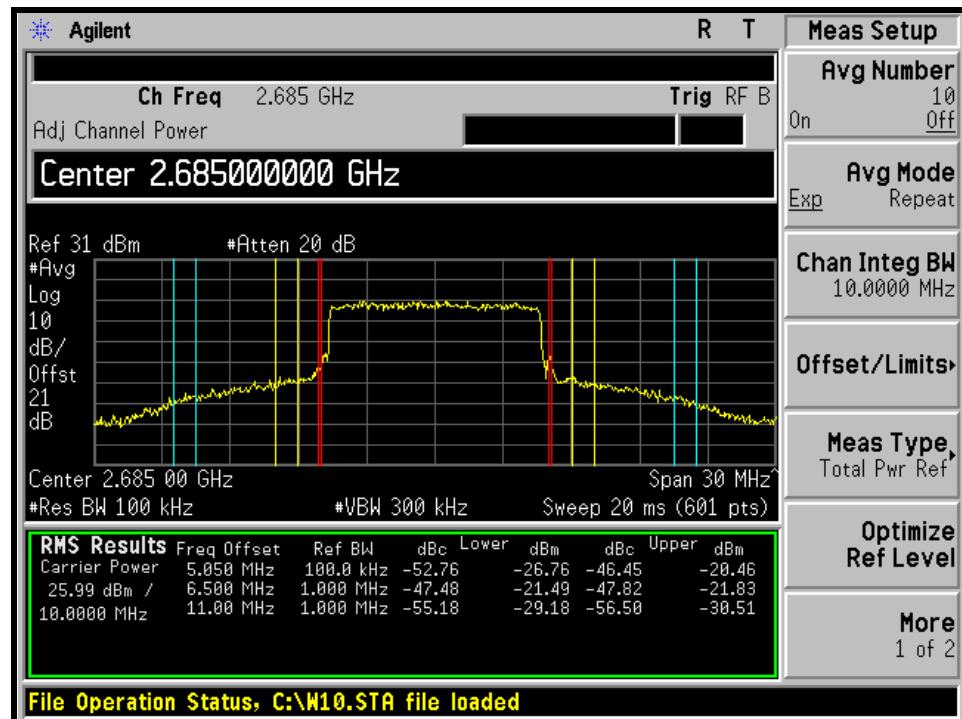
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 27.53(m)(4), 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.

4.5.2 TEST INSTRUMENTS

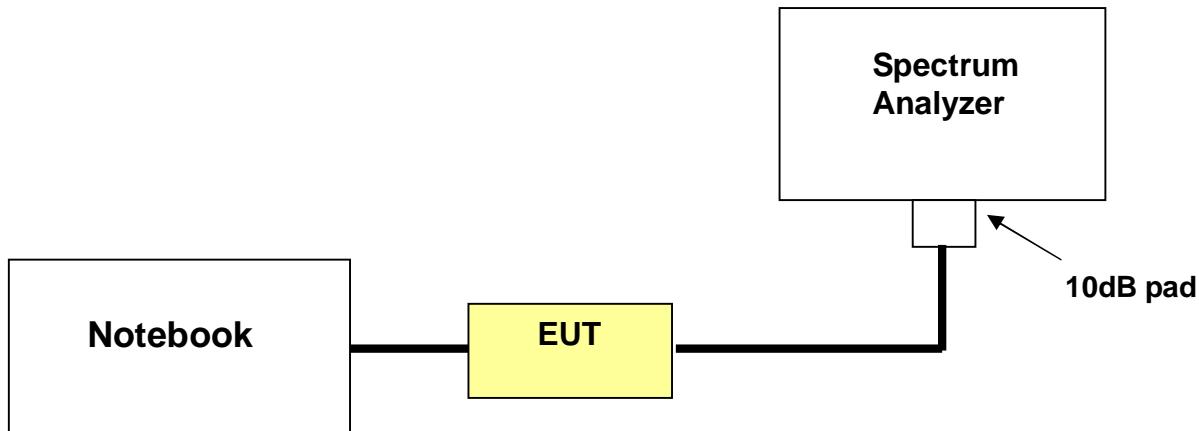
| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|---|-----------------|------------|------------------|
| Agilent Spectrum Analyzer | E4440A | MY46185282 | Jun.14,2008 |
| HUBER+SUHNER | SUCOFLEX104 | 22076614 | Nov. 13, 2008 |
| JFW 10dB attenuation | 50HF-010-SMA | NA | NA |
| Wainwright Instruments High Pass Filter | WHK3.1/18G-10SS | ZZ-010091 | 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.

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 1GHz, 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 1GHz to 27GHz, 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



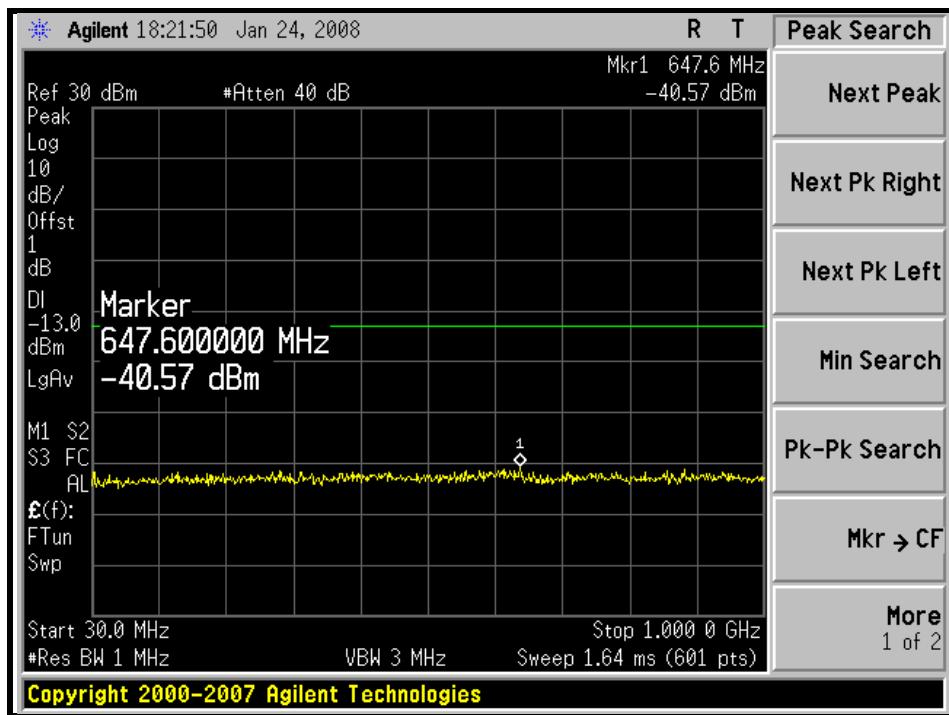
4.5.5 EUT OPERATING CONDITIONS

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

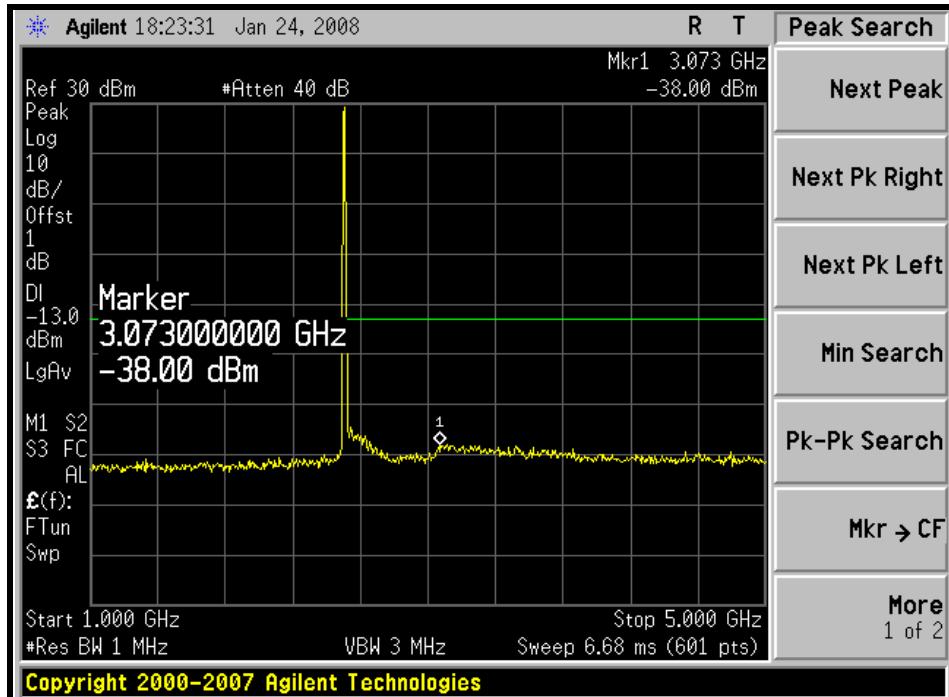
4.5.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

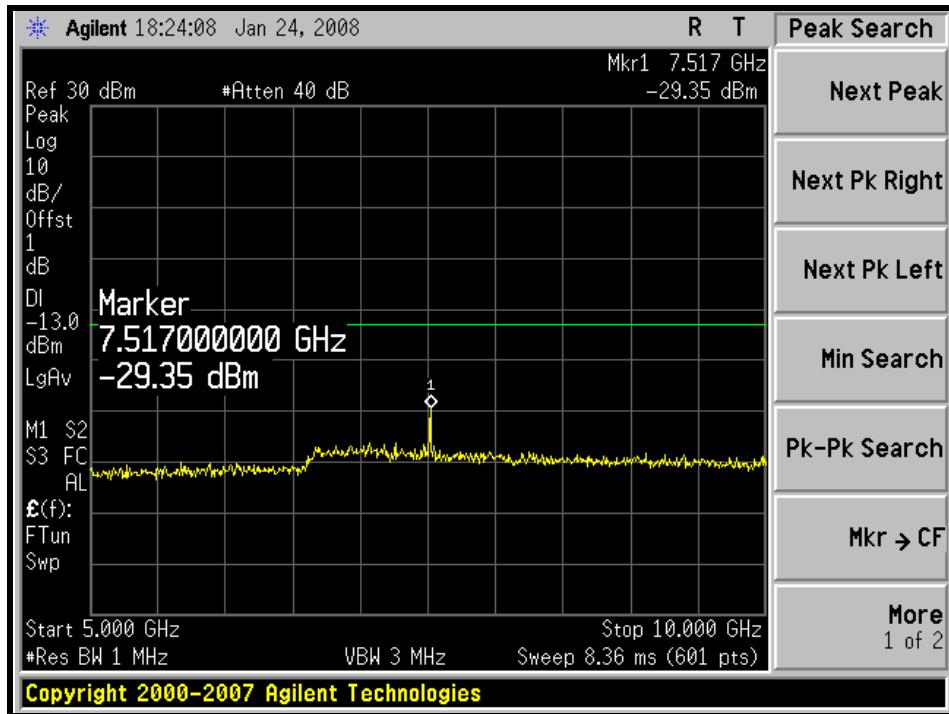
LOW CHANNEL: 30MHz ~ 1GHz:



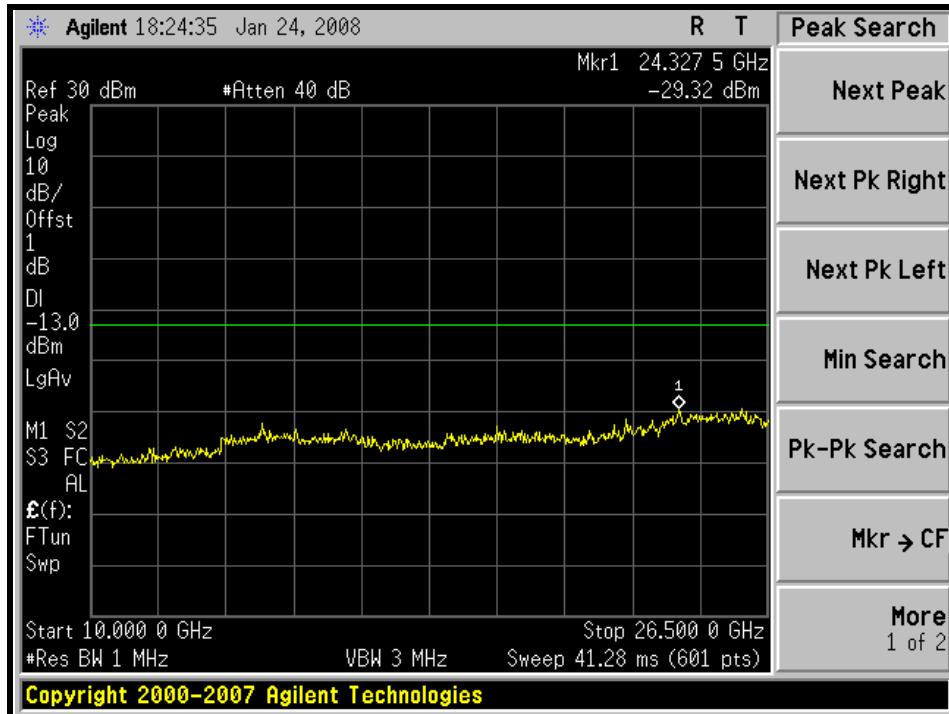
1GHz ~ 5GHz:



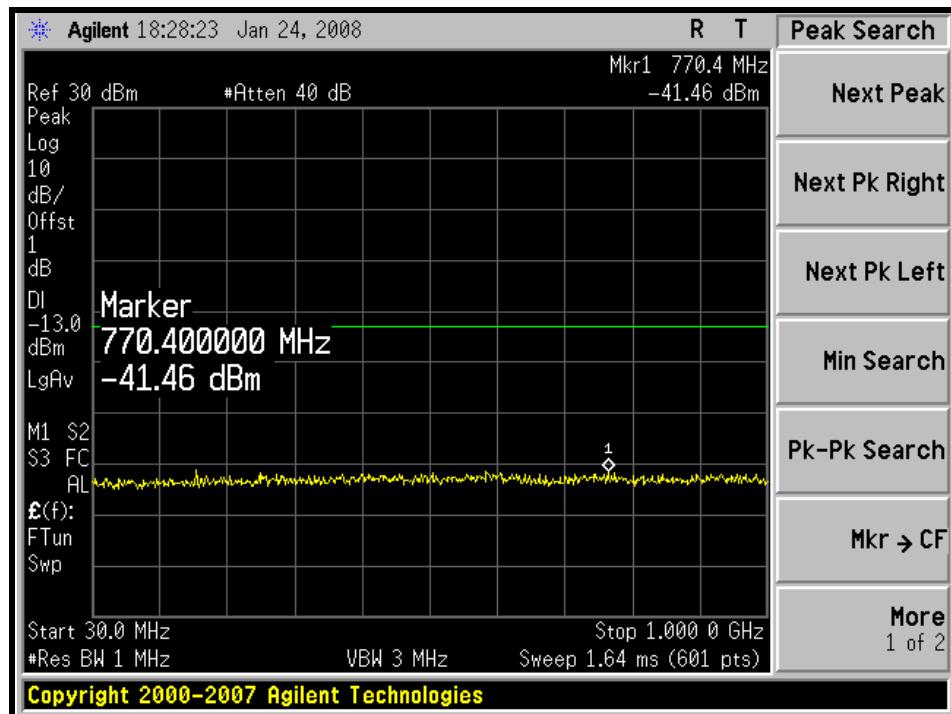
5GHz ~ 10GHz:



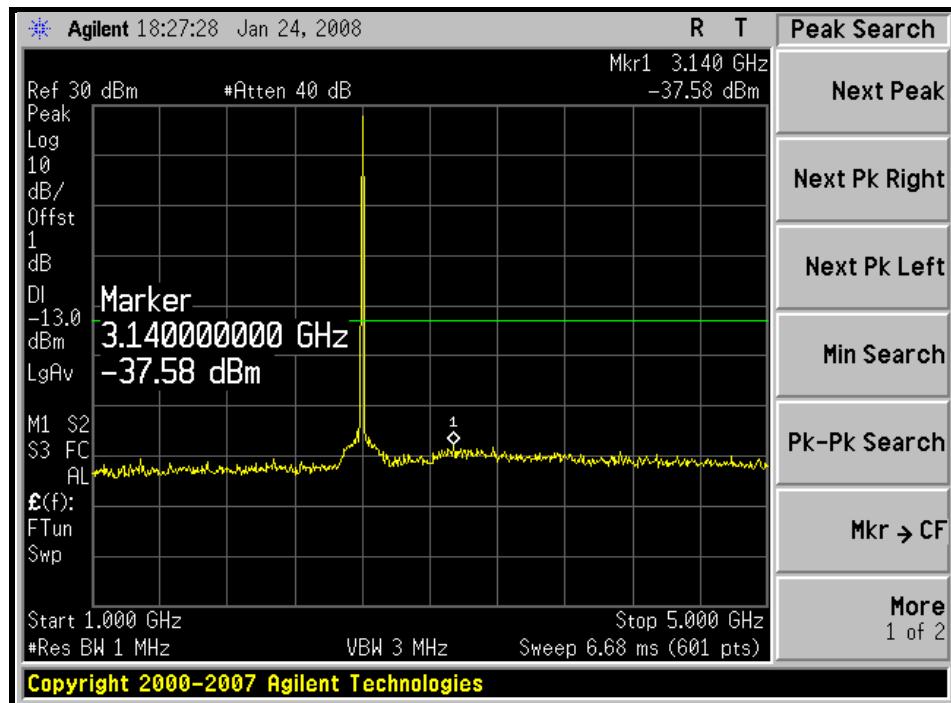
10GHz ~ 26.5GHz:



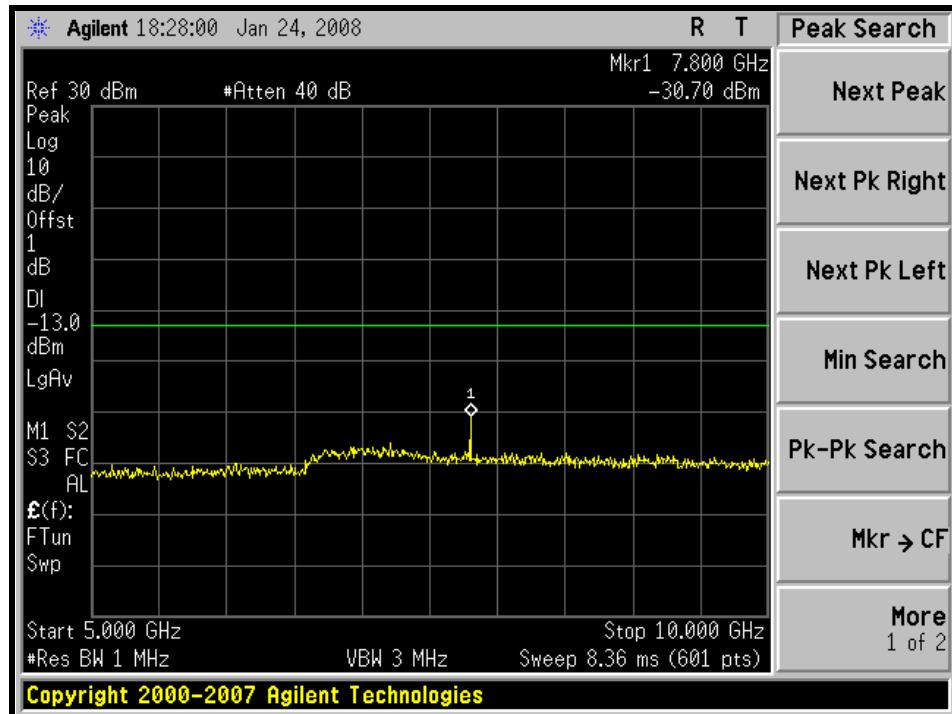
MIDDLE CHANNEL: 30MHz ~ 1GHz:



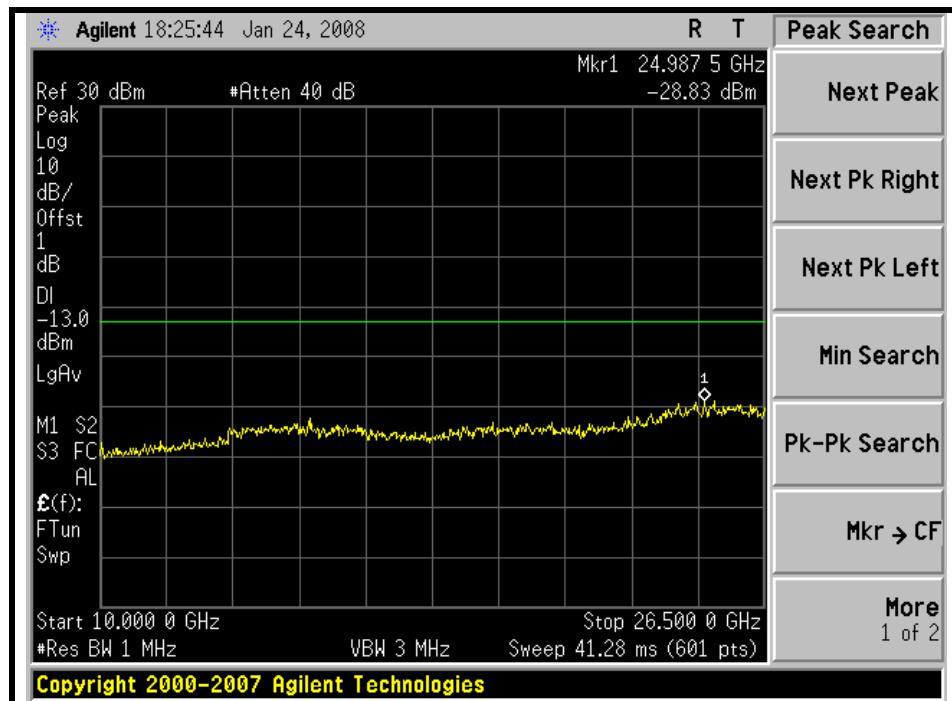
1GHz ~ 5GHz:



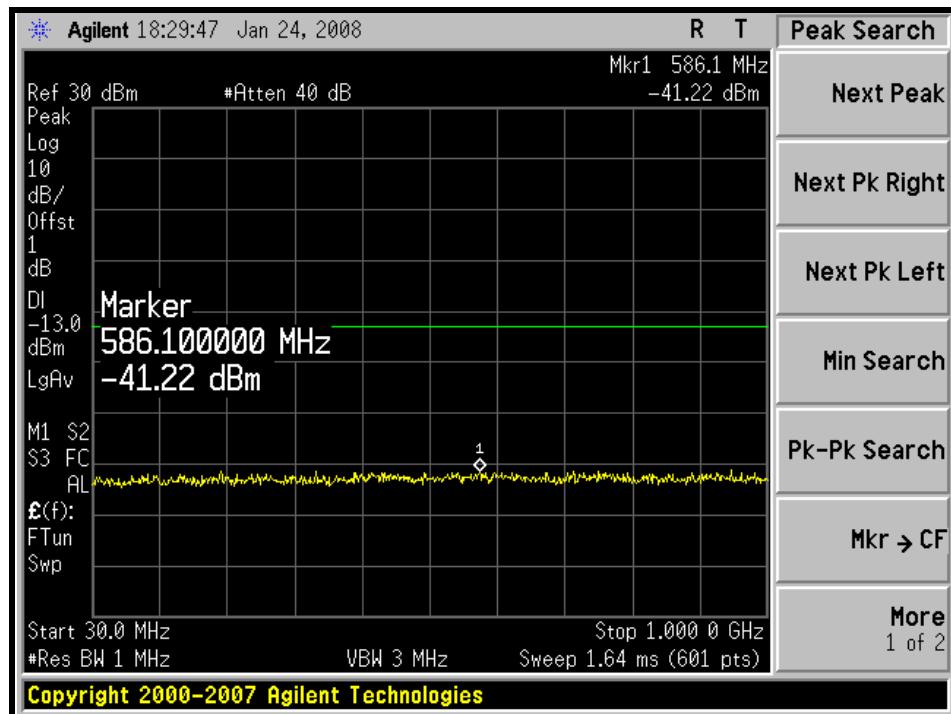
5GHz ~ 10GHz:



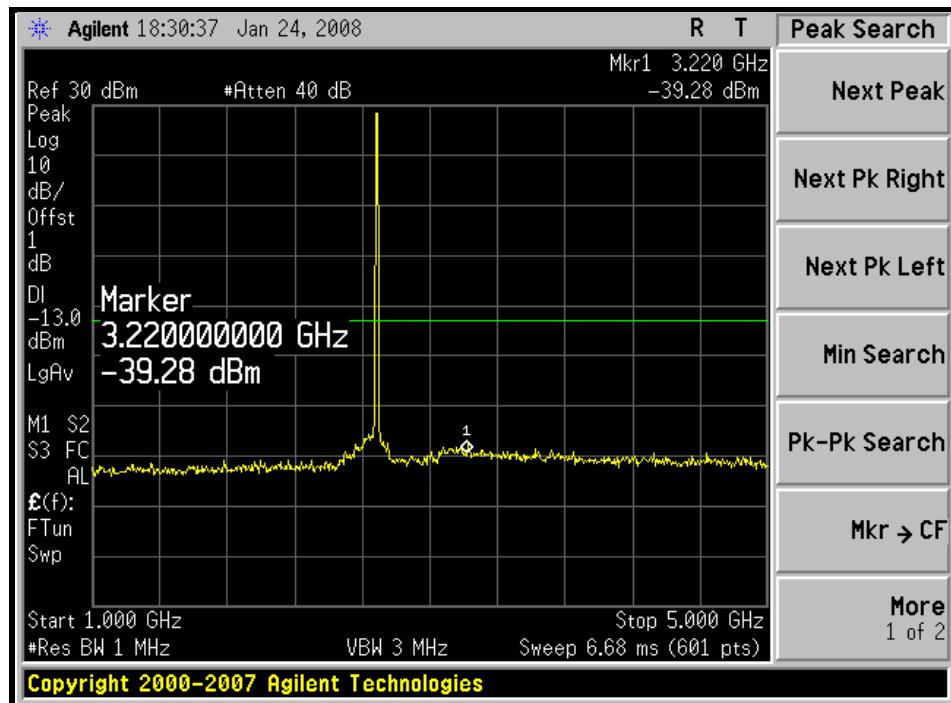
10GHz ~ 26.5GHz:



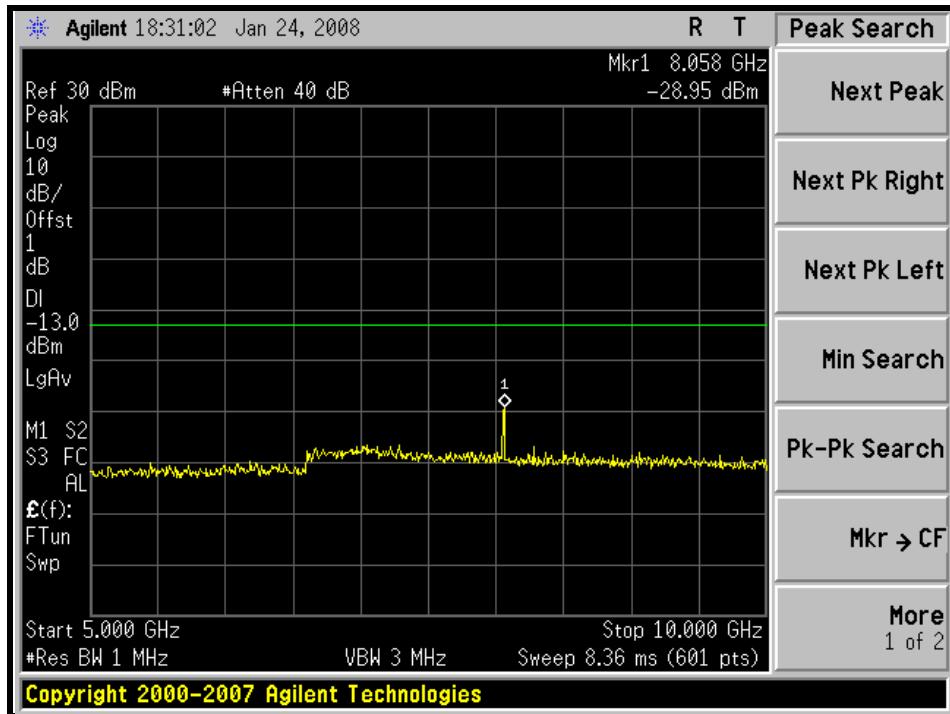
HIGH CHANNEL: 30MHz ~ 1GHz:



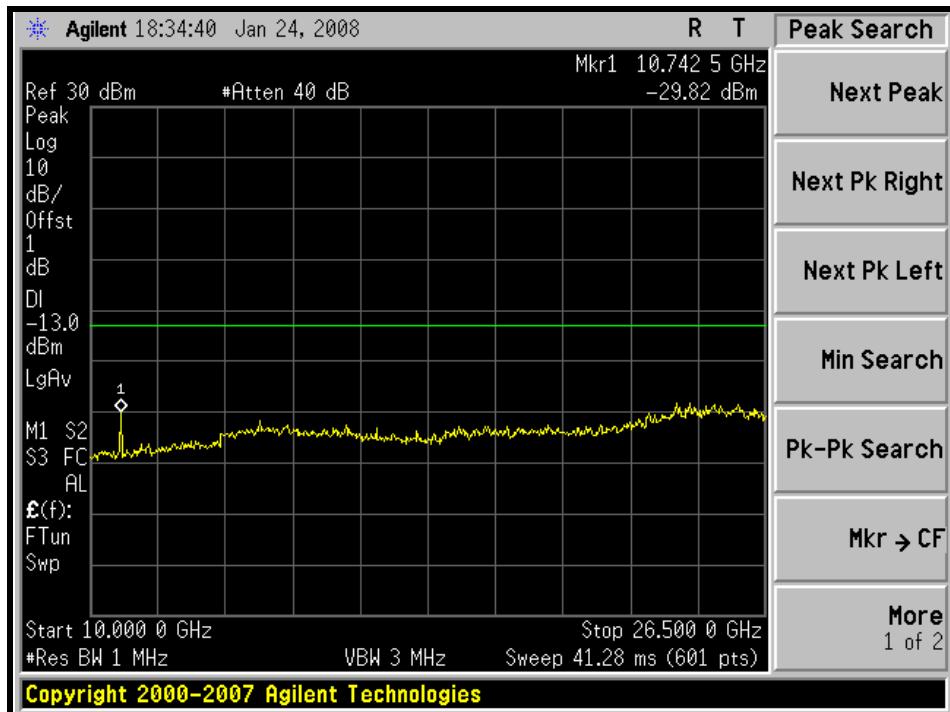
1GHz ~ 5GHz:



5GHz ~ 10GHz:

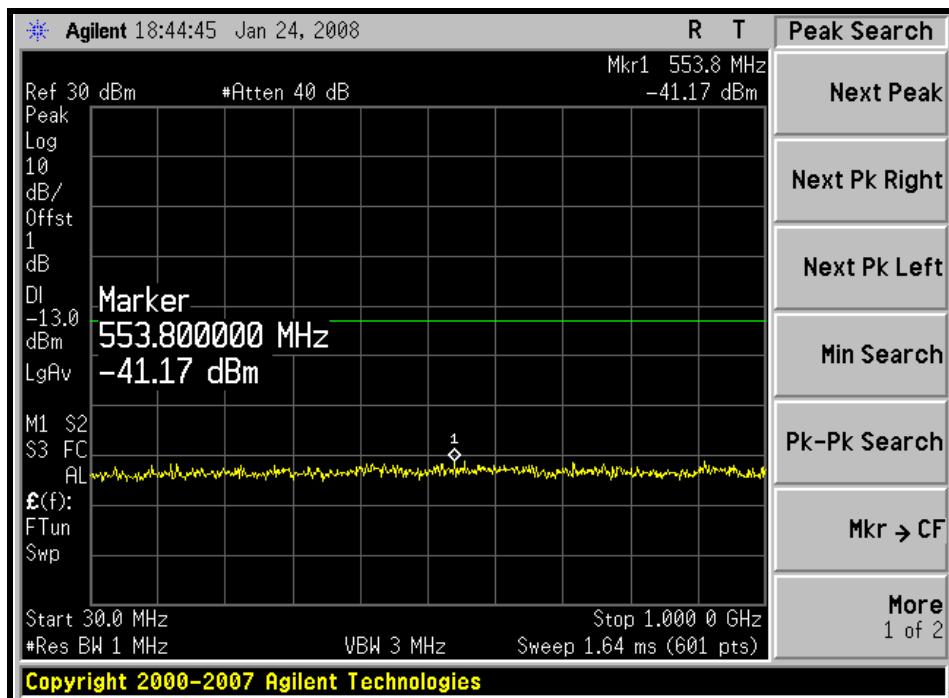


10GHz ~ 26.5GHz:

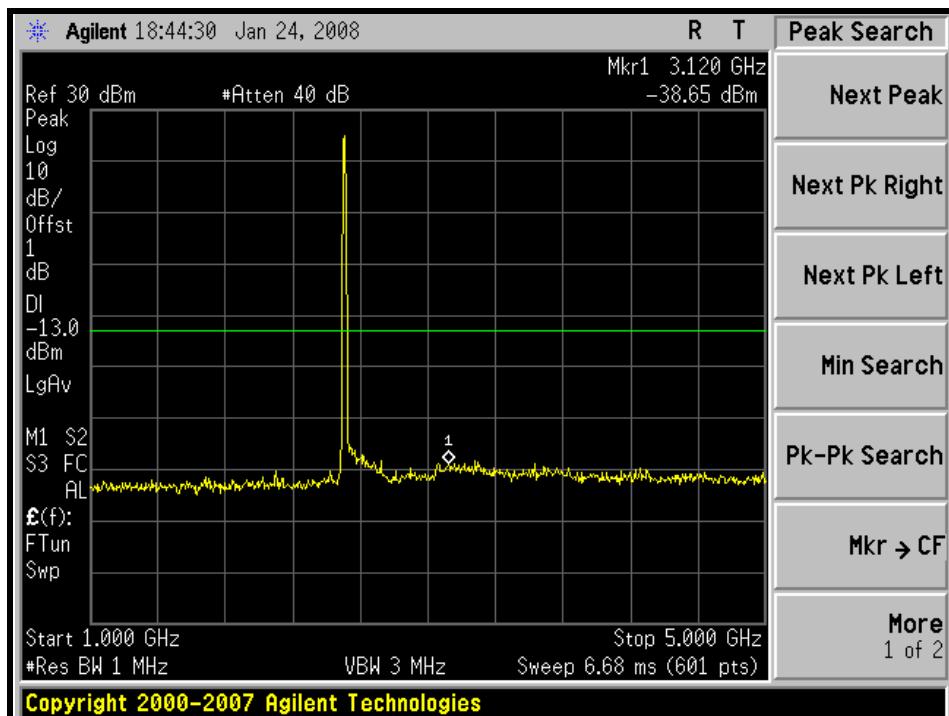


CHANNEL BANDWIDTH: 10MHz

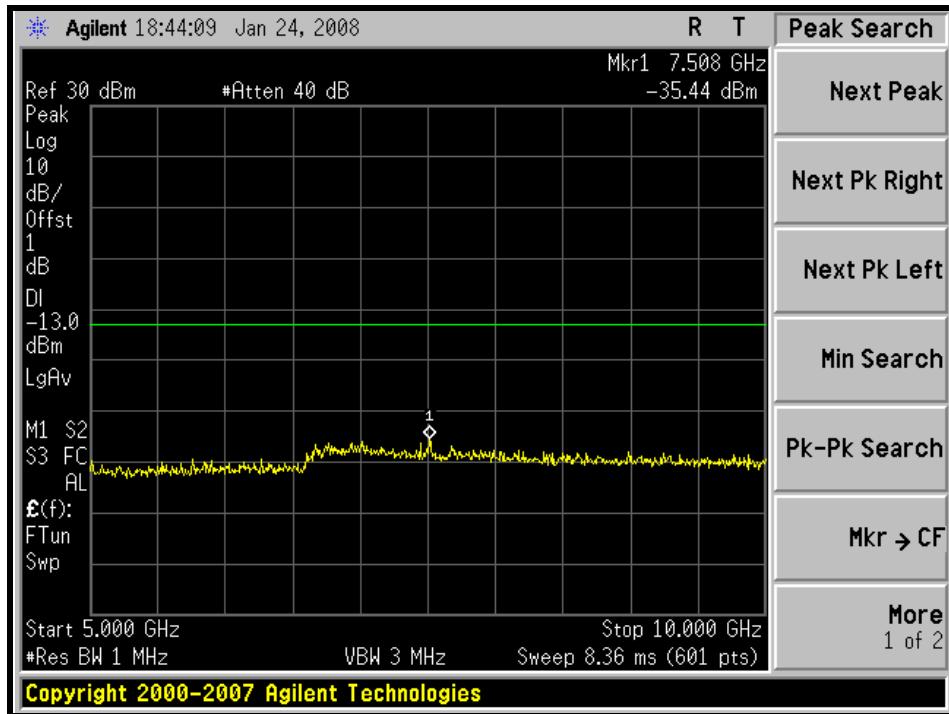
LOW CHANNEL: 30MHz ~ 1GHz:



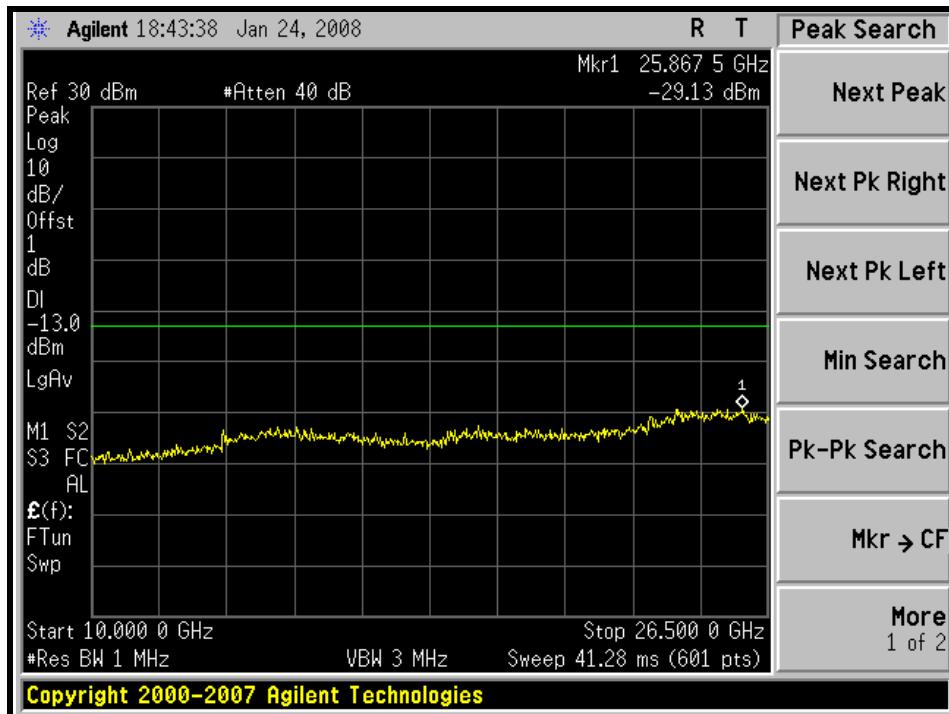
1GHz ~ 5GHz:



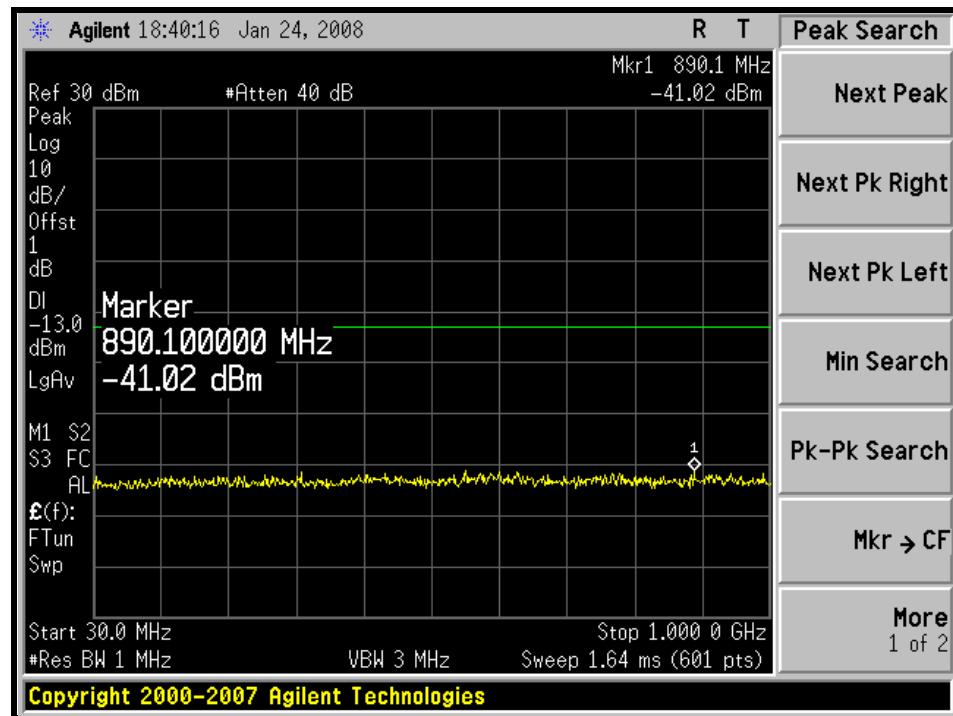
5GHz ~ 10GHz:



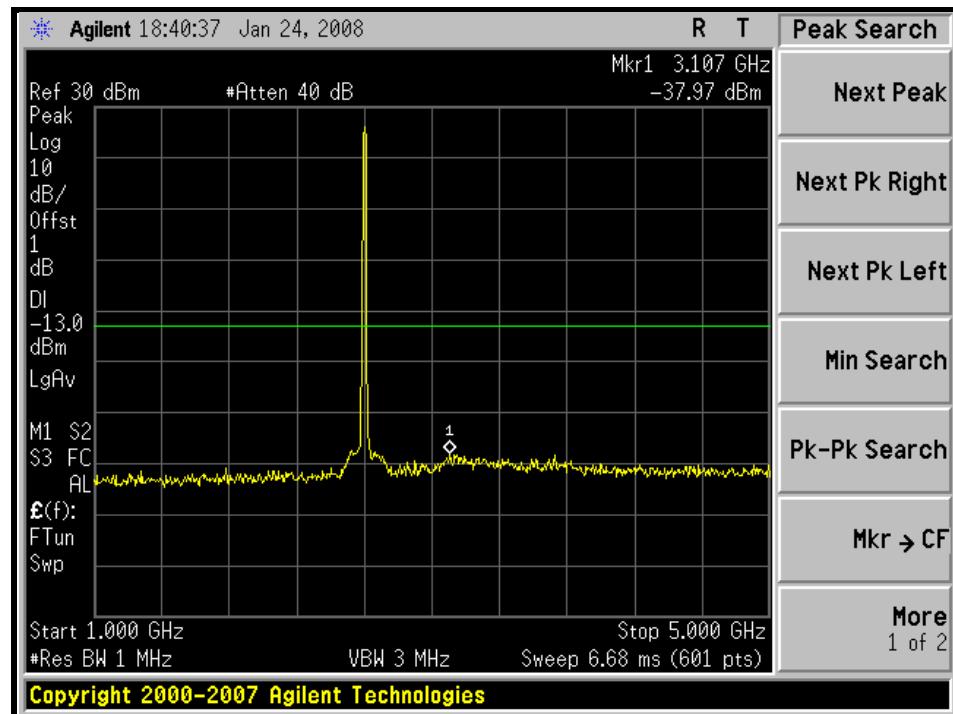
10GHz ~ 26.5GHz:



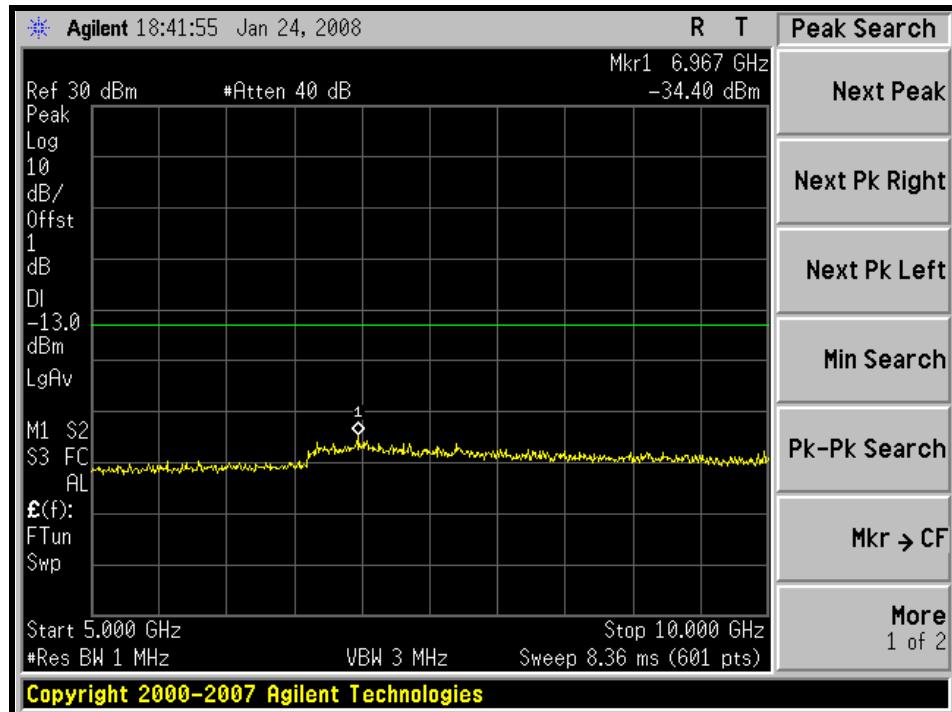
MIDDLE CHANNEL: 30MHz ~ 1GHz:



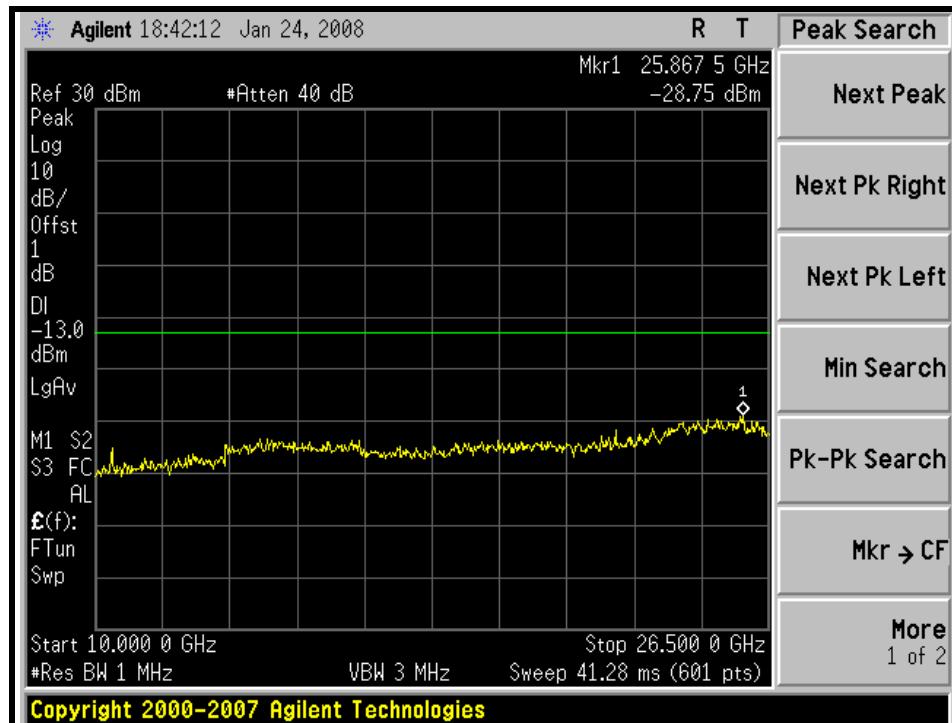
1GHz ~ 5GHz:



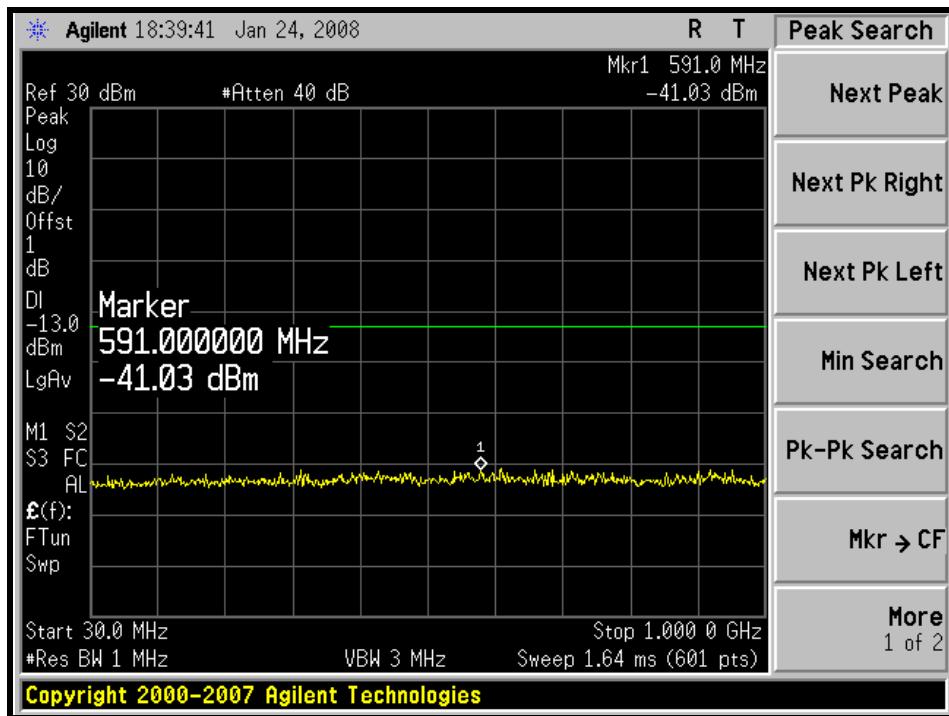
5GHz ~ 10GHz:



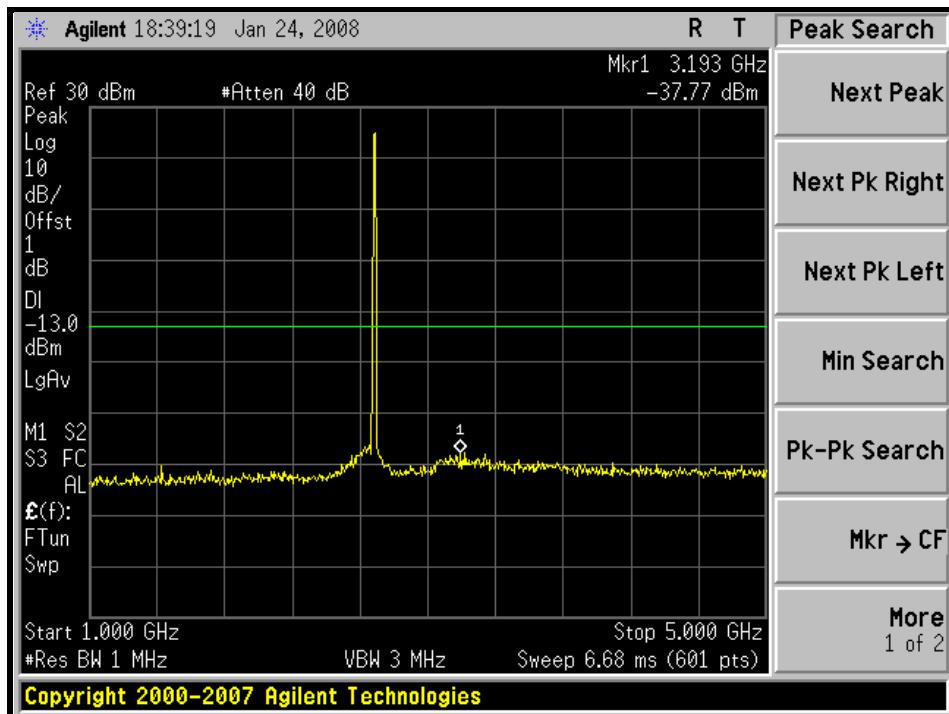
10GHz ~ 26.5GHz:



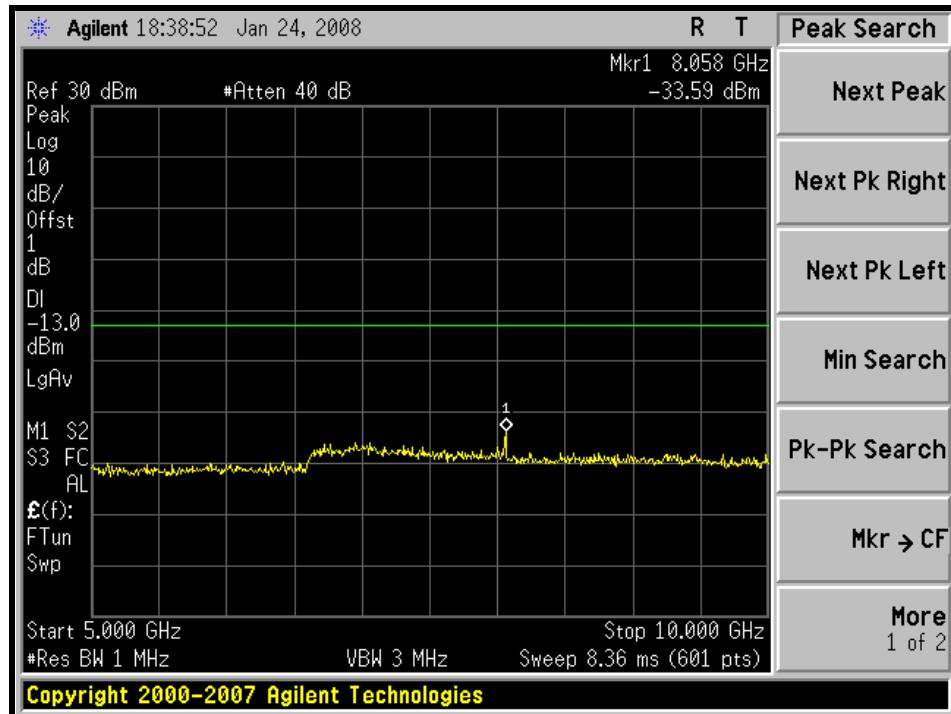
HIGH CHANNEL: 30MHz ~ 1GHz:



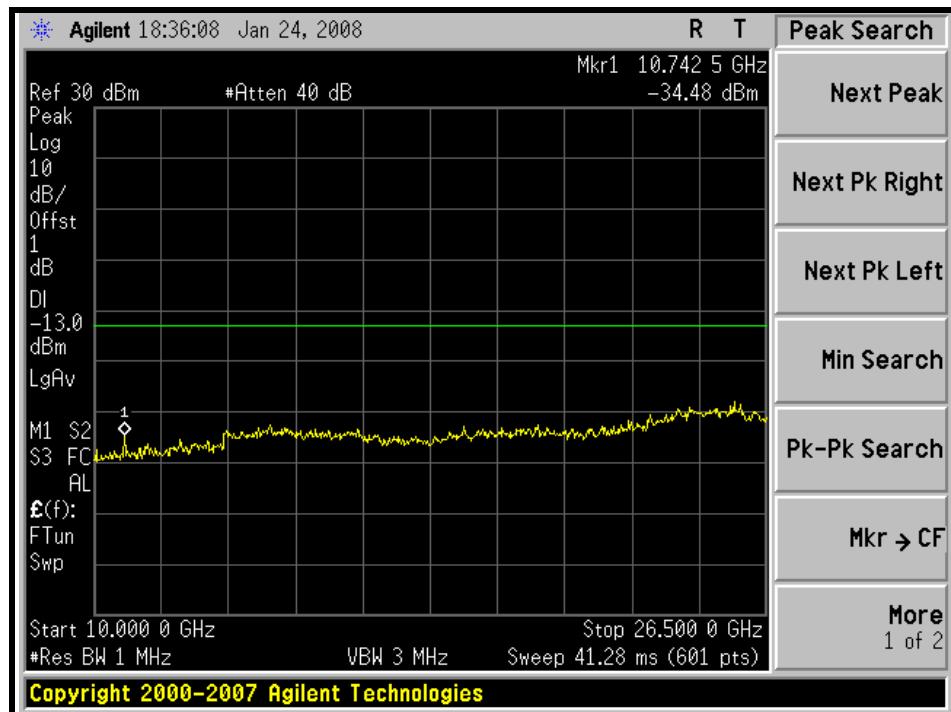
1GHz ~ 5GHz:



5GHz ~ 10GHz:



10GHz ~ 26.5GHz:



4.6 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (4), 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.

4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|--------------------------------------|-------------------------|----------------------|------------------|
| ROHDE & SCHWARZ Spectrum Analyzer | FSP40 | 100060 | April 20, 2008 |
| HP Pre_Amplifier | 8449B | 3008A01922 | Sep. 18, 2008 |
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 100375 | Sep. 20, 2008 |
| SCHWARZBECK TRILOG Broadband Antenna | VULB 9168 | 138 | July 17, 2008 |
| Schwarzbeck Horn_Antenna | BBHA9120 | D124 | Jan. 01, 2009 |
| RF Switches (ARNITSU) | MP59B | 6200283544 | NA |
| RF CABLE (Chaintek) 1GHz-20GHz | SF102 | 22054-2 | Nov. 14. 2008 |
| RF Cable(RICHTEC) | 9913-30M | STCCAB-30M-1 GHz-021 | Aug. 13, 2008 |
| Software | ADT_Radiated_V 7.6.15.8 | NA | NA |
| CHANCE MOST Antenna Tower | AT-100 | 0203 | NA |
| *CHANCE MOST Turn Table | TT-100 | 0203 | 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: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT 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 4824A-3.

4.6.3 TEST PROCEDURES

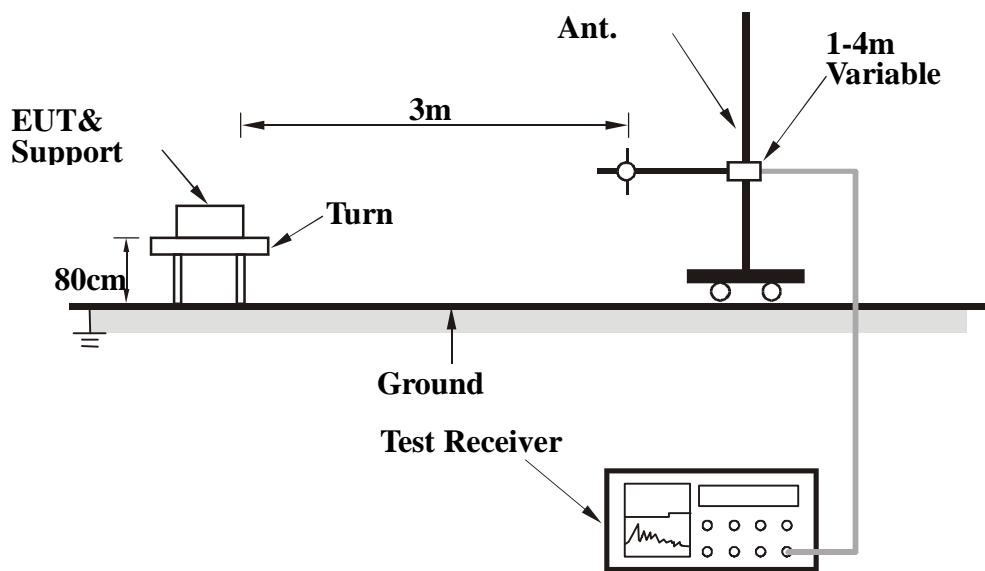
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the 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

- The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

4.6.7 TEST RESULTS

CHANNEL BANDWIDTH: 5MHZ

| | | | |
|----------------------|--------------|--------------------------|--------------------------|
| MODE | Low channel | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|----------------|----------------------|----------------|--------------------|--------------|-------------------------------|
| 1 | 69.00 | -41.23 | -13.00 | -36.26 | -4.97 | 51.26 |
| 2 | 137.00 | -57.28 | -13.00 | -55.99 | -1.29 | 37.30 |
| 3 | 300.00 | -51.58 | -13.00 | -55.29 | 3.71 | 40.49 |
| 4 | 500.00 | -51.88 | -13.00 | -54.77 | 2.89 | 40.75 |
| 5 | 625.00 | -49.74 | -13.00 | -51.51 | 1.77 | 43.30 |
| 6 | 875.00 | -44.66 | -13.00 | -45.42 | 0.76 | 51.27 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|----------------|----------------------------|----------------|--------------------|--------------|-------------------------------|
| 1 | 69.00 | -52.73 | -13.00 | -47.76 | -4.97 | 39.76 |
| 2 | 137.00 | -52.32 | -13.00 | -51.03 | -1.29 | 42.26 |
| 3 | 300.00 | -48.08 | -13.00 | -51.79 | 3.71 | 43.99 |
| 4 | 500.00 | -46.38 | -13.00 | -49.27 | 2.89 | 46.25 |
| 5 | 625.00 | -49.94 | -13.00 | -51.71 | 1.77 | 43.10 |
| 6 | 875.00 | -48.30 | -13.00 | -49.06 | 0.76 | 47.63 |

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 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 69.00 | -53.03 | -13.00 | -48.06 | -4.97 | 39.46 |
| 2 | 137.00 | -51.96 | -13.00 | -50.67 | -1.29 | 42.62 |
| 3 | 300.00 | -48.18 | -13.00 | -51.89 | 3.71 | 43.89 |
| 4 | 500.00 | -45.98 | -13.00 | -48.87 | 2.89 | 46.65 |
| 5 | 625.00 | -49.54 | -13.00 | -51.31 | 1.77 | 43.50 |
| 6 | 875.00 | -48.56 | -13.00 | -49.32 | 0.76 | 47.37 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 69.00 | -40.93 | -13.00 | -35.96 | -4.97 | 51.56 |
| 2 | 137.00 | -57.78 | -13.00 | -56.49 | -1.29 | 36.80 |
| 3 | 300.00 | -51.78 | -13.00 | -55.49 | 3.71 | 40.29 |
| 4 | 500.00 | -51.98 | -13.00 | -54.87 | 2.89 | 40.65 |
| 5 | 625.00 | -49.44 | -13.00 | -51.21 | 1.77 | 43.60 |
| 6 | 875.00 | -44.16 | -13.00 | -44.92 | 0.76 | 51.77 |

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) (4), 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.

4.7.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|--------------------------------------|-------------------------|----------------------|------------------|
| ROHDE & SCHWARZ Spectrum Analyzer | FSP40 | 100060 | April 20, 2008 |
| HP Pre_Amplifier | 8449B | 3008A01922 | Sep. 18, 2008 |
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 100375 | Sep. 20, 2008 |
| SCHWARZBECK TRILOG Broadband Antenna | VULB 9168 | 138 | July 17, 2008 |
| Schwarzbeck Horn_Antenna | BBHA9120 | D124 | Jan. 01, 2009 |
| RF Switches (ARNITSU) | MP59B | 6200283544 | NA |
| RF CABLE (Chaintek) 1GHz-20GHz | SF102 | 22054-2 | Nov. 14. 2008 |
| RF Cable(RICHTEC) | 9913-30M | STCCAB-30M-1 GHz-021 | Aug. 13, 2008 |
| Software | ADT_Radiated_V 7.6.15.8 | NA | NA |
| CHANCE MOST Antenna Tower | AT-100 | 0203 | NA |
| *CHANCE MOST Turn Table | TT-100 | 0203 | 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: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT 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 4824A-3.

4.7.3 TEST PROCEDURES

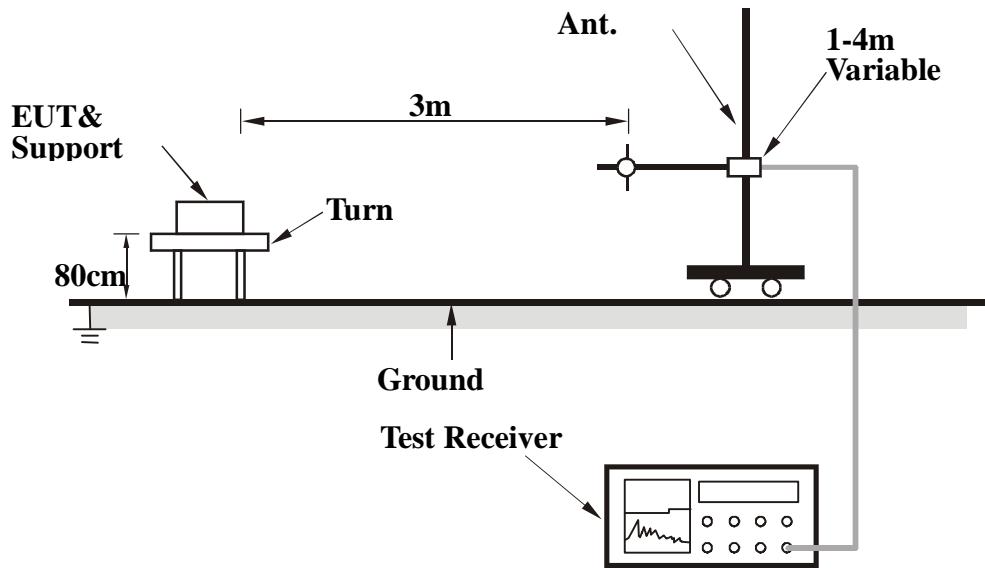
- h. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- i. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.
- j. 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.
- k. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.
- l. The signal generator level has to be adjusted to have the same emission nature.
- m. The radiated power can be calculated via the factor and antenna gain.
- n. 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

- The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

4.7.7 TEST RESULTS

CHANNEL BANDWIDTH: 5MHZ

| | | | |
|----------------------|--------------|--------------------------|------------------------|
| MODE | Low channel | FREQUENCY RANGE | Above 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 20deg°C, 60%RH, 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5010.00 | -27.98 PK | -13.00 | -35.00 | 7.01 | 69.25 |
| 2 | 7515.00 | -32.83 PK | -13.00 | -37.36 | 4.53 | 65.26 |
| 3 | 10020.00 | -34.69 PK | -13.00 | -38.71 | 4.02 | 62.87 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5010.00 | -31.53 PK | -13.00 | -38.55 | 7.01 | 65.70 |
| 2 | 7515.00 | -32.31 PK | -13.00 | -36.84 | 4.53 | 65.78 |
| 3 | 10020.00 | -32.54 PK | -13.00 | -36.56 | 4.02 | 65.02 |

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, 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5200.00 | -30.28 PK | -13.00 | -37.33 | 7.05 | 67.19 |
| 2 | 7800.00 | -38.80 PK | -13.00 | -43.09 | 4.29 | 59.53 |
| 3 | 10400.00 | -34.24 PK | -13.00 | -37.91 | 3.66 | 64.10 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5200.00 | -33.82 PK | -13.00 | -40.87 | 7.05 | 63.65 |
| 2 | 7800.00 | -28.49 PK | -13.00 | -32.78 | 4.29 | 69.84 |
| 3 | 10400.00 | -33.23 PK | -13.00 | -36.90 | 3.66 | 65.11 |

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, 965hPa |
| TESTED BY | Morgan Chen | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5370.00 | -29.95 PK | -13.00 | -37.05 | 7.09 | 67.74 |
| 2 | 8050.00 | -41.78 PK | -13.00 | -45.91 | 4.13 | 56.71 |
| 3 | 10735.00 | -42.79 PK | -13.00 | -46.13 | 3.35 | 55.72 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5370.00 | -37.43 PK | -13.00 | -44.53 | 7.09 | 60.26 |
| 2 | 8050.00 | -40.48 PK | -13.00 | -44.61 | 4.13 | 58.01 |
| 3 | 10735.00 | -41.36 PK | -13.00 | -44.70 | 3.35 | 57.15 |

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, 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5010.00 | -32.37 PK | -13.00 | -39.39 | 7.01 | 64.86 |
| 2 | 7515.00 | -39.05 PK | -13.00 | -43.58 | 4.53 | 59.04 |
| 3 | 10020.00 | -40.38 PK | -13.00 | -44.40 | 4.02 | 57.18 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5010.00 | -37.53 PK | -13.00 | -44.55 | 7.01 | 59.70 |
| 2 | 7515.00 | -38.83 PK | -13.00 | -43.36 | 4.53 | 59.26 |
| 3 | 10020.00 | -37.43 PK | -13.00 | -41.45 | 4.02 | 60.13 |

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, 965hPa |
| TESTED BY | Rex Huang | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5200.00 | -33.57 PK | -13.00 | -40.62 | 7.05 | 63.90 |
| 2 | 7800.00 | -41.97 PK | -13.00 | -46.26 | 4.29 | 56.36 |
| 3 | 10400.00 | -41.28 PK | -13.00 | -44.95 | 3.66 | 57.06 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5200.00 | -39.16 PK | -13.00 | -46.21 | 7.05 | 58.31 |
| 2 | 7800.00 | -36.28 PK | -13.00 | -40.57 | 4.29 | 62.05 |
| 3 | 10400.00 | -39.53 PK | -13.00 | -43.20 | 3.66 | 58.81 |

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, 965hPa |
| TESTED BY | Morgan Chen | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Power level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|-------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5370.00 | -35.29 PK | -13.00 | -42.34 | 7.05 | 62.18 |
| 2 | 8050.00 | -43.64 PK | -13.00 | -47.93 | 4.29 | 54.69 |
| 3 | 10735.00 | -42.38 PK | -13.00 | -46.05 | 3.66 | 55.96 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBm) | Limit (dBm) | S.G level (dBm) | C.F. (dB) | Emission Level (dBuV/m) |
|-----|-------------|----------------------|-------------|-----------------|-----------|-------------------------|
| 1 | 5370.00 | -40.69 PK | -13.00 | -47.74 | 7.05 | 56.78 |
| 2 | 8050.00 | -43.09 PK | -13.00 | -47.38 | 4.29 | 55.24 |
| 3 | 10735.00 | -41.53 PK | -13.00 | -45.20 | 3.66 | 56.81 |

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, 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.

| | |
|--------------------|-----------------------|
| USA | FCC, UL, A2LA |
| 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: **Web Site:** www.adt.com.tw

Tel: 886-3-3183232
Fax: 886-3-3185050

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