

# FCC TEST REPORT

## (PART 27)

**REPORT NO.:** RF991116C07A

**MODEL NO.:** BM1012

**FCC ID:** QIS-BM1012

**RECEIVED:** Jun. 23, 2011

**TESTED:** Jul. 08 ~ Jul. 29, 2011

**ISSUED:** Sep. 06, 2011

**APPLICANT:** Huawei Technologies co., Ltd.

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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
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## RELEASE CONTROL RECORD

| ISSUE NO.        | REASON FOR CHANGE | DATE ISSUED   |
|------------------|-------------------|---------------|
| Original release | N/A               | Sep. 06, 2011 |

## 1 CERTIFICATION

**PRODUCT:** WiMAX USB Dongle

**MODEL:** BM1012

**BRAND:** Huawei

**APPLICANT:** Huawei Technologies co., Ltd.

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED:** Jul. 08 ~ Jul. 29, 2011

**TEST STANDARDS:** FCC Part 27, Subpart C & M

The above equipment (Model: BM1012) 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** : Polly Chien , **DATE** : Sep. 06, 2011  
Polly Chien / Specialist

**APPROVED BY** : Gary Chang , **DATE** : Sep. 06, 2011  
Gary Chang / Technical Manager

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| STANDARD SECTION         | TEST TYPE AND LIMIT                                                | RESULT | REMARK                                                                            |
|--------------------------|--------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|
| FCC Part 27 & Part 2     |                                                                    |        |                                                                                   |
| 2.1046<br>27.50(h)(2)    | Maximum Output Power Limit:<br>max. 2 watts e.i.r.p peak power     | PASS   | Meet the requirement of limit.<br>Minimum passing margin is 26.9dBm at 4898MHz.   |
| 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.<br>Minimum passing margin is -28.4dB at 1000.0MHz. |

### 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:

| MEASUREMENT         | FREQUENCY        | UNCERTAINTY |
|---------------------|------------------|-------------|
| Conducted emissions | 9kHz~30MHz       | 2.44 dB     |
| Radiated emissions  | 30MHz ~ 200MHz   | 3.19 dB     |
|                     | 200MHz ~ 1000MHz | 3.21 dB     |
|                     | 1GHz ~ 18GHz     | 2.26 dB     |
|                     | 18GHz ~ 40GHz    | 1.94 dB     |

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

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### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                                    |                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>                         | WiMAX USB Dongle                                                                                                                    |
| <b>MODEL NO.</b>                   | BM1012                                                                                                                              |
| <b>FCC ID</b>                      | QIS-BM1012                                                                                                                          |
| <b>POWER SUPPLY</b>                | 5Vdc (host equipment)                                                                                                               |
| <b>MODULATION TYPE</b>             | UL: QPSK1/2, QPSK 3/4, 16QAM1/2, 16QAM 3/4<br>DL: QPSK1/2, QPSK 3/4, 16QAM1/2, 16QAM 3/4,<br>64QAM1/2, 64QAM2/3, 64QAM3/4, 64QAM5/6 |
| <b>MODULATION TECHNOLOGY</b>       | OFDMA                                                                                                                               |
| <b>MULTIPLE ACCESS METHOD</b>      | TDMA                                                                                                                                |
| <b>DUPLEX METHOD</b>               | TDD                                                                                                                                 |
| <b>OPERATING RANGE</b>             | 2498.5MHz ~ 2687.5MHz                                                                                                               |
| <b>CHANNEL BANDWIDTH</b>           | 5MHz, 10MHz                                                                                                                         |
| <b>MAX. EIRP POWER</b>             | 26.9dBm                                                                                                                             |
| <b>ANTENNA TYPE</b>                | Monopole antenna with 2dBi gain                                                                                                     |
| <b>OPERATION TEMPERATURE RANGE</b> | -5°C ~ 45°C                                                                                                                         |
| <b>DATA CABLE</b>                  | NA                                                                                                                                  |
| <b>I/O PORTS</b>                   | USB                                                                                                                                 |
| <b>ACCESSORY DEVICES</b>           | NA                                                                                                                                  |

**NOTE:**

1. The EUT can supports different UL / DL ratio, max transmit ratio is up to 18 (UL): 29 (DL). After pretesting of output power and spurious emission, 18 (UL): 29 (DL) was found to be worst case and was selected for the final test configuration.

| Bandwidth | Frequency(MHz) | Modulation | Average Power (dBm) |           |
|-----------|----------------|------------|---------------------|-----------|
|           |                |            | Antenna 1           | Antenna 2 |
| 5MHz      | 2498.5         | QPSK 1/2   | 23.72               | 23.88     |
|           |                | QPSK 3/4   | 23.64               | 23.70     |
|           |                | 16QAM 1/2  | 22.32               | 22.47     |
|           |                | 16QAM 3/4  | 22.31               | 22.40     |
|           | 2593.0         | QPSK 1/2   | 23.87               | 23.97     |
|           |                | QPSK 3/4   | 23.71               | 23.81     |
|           |                | 16QAM 1/2  | 22.36               | 22.42     |
|           |                | 16QAM 3/4  | 22.35               | 22.37     |
|           | 2687.5         | QPSK 1/2   | 23.82               | 23.93     |
|           |                | QPSK 3/4   | 23.63               | 23.82     |
|           |                | 16QAM 1/2  | 22.30               | 22.42     |
|           |                | 16QAM 3/4  | 22.30               | 22.35     |
| 10MHz     | 2501           | QPSK 1/2   | 23.87               | 23.95     |
|           |                | QPSK 3/4   | 23.64               | 23.76     |
|           |                | 16QAM 1/2  | 22.42               | 22.46     |
|           |                | 16QAM 3/4  | 22.37               | 22.39     |
|           | 2593           | QPSK 1/2   | 23.89               | 23.97     |
|           |                | QPSK 3/4   | 23.74               | 23.80     |
|           |                | 16QAM 1/2  | 22.44               | 22.47     |
|           |                | 16QAM 3/4  | 22.35               | 22.38     |
|           | 2685           | QPSK 1/2   | 23.85               | 23.95     |
|           |                | QPSK 3/4   | 23.74               | 23.83     |
|           |                | 16QAM 1/2  | 22.45               | 22.47     |
|           |                | 16QAM 3/4  | 22.33               | 22.34     |

\*After pretest of conducted power and spurious emission of 2 antennas under all modulations and coding rates, found the worst case is antenna 2 with QPSK 1/2. Therefore, select antenna 2 with QPSK 1/2 to do final test.

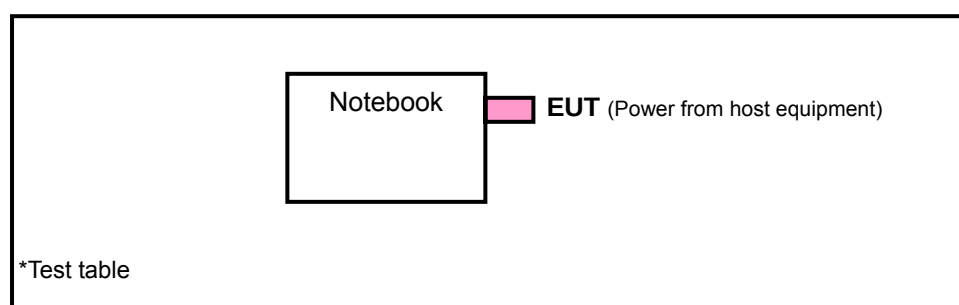
2. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

Three channels had been tested for each channel bandwidth.

| CHANNEL BANDWIDTH: 5MHz       | CHANNEL BANDWIDTH: 10MHz       |
|-------------------------------|--------------------------------|
| Low channel (L): 2498.5MHz    | Low channel (L): 2501.0MHz     |
| Middle channel (M): 2593.0MHz | Middle channel (M): 2593.0 MHz |
| High channel (H): 2687.5MHz   | High channel (H): 2685.0 MHz   |

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO |    |    |    |     |       |       | DESCRIPTION |
|--------------------|---------------|----|----|----|-----|-------|-------|-------------|
|                    | OP            | FS | EB | CE | CSE | RE<1G | RE≥1G |             |
| -                  | √             | √  | √  | √  | √   | √     | √     | -           |

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, coding rate, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE | AXIS |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|------|
| -                  | L, M, H        | OFDMA                 | 5MHz              | QPSK            | 1/2         | X    |
| -                  | L, M, H        | OFDMA                 | 10MHz             | QPSK            | 1/2         | X    |

#### FREQUENCY STABILITY MEASUREMENT:

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

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|
| -                  | L              | OFDMA                 | 5MHz              | QPSK            | 1/2         |
| -                  | L              | OFDMA                 | 10MHz             | QPSK            | 1/2         |

#### EMISSION BANDWIDTH MEASUREMENT:

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

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|
| -                  | L, M, H        | OFDMA                 | 5MHz              | QPSK            | 1/2         |
| -                  | L, M, H        | OFDMA                 | 10MHz             | QPSK            | 1/2         |

### CHANNEL EDGE MEASUREMENT:

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

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|
| -                  | L, M, H        | OFDMA                 | 5MHz              | QPSK            | 1/2         |
| -                  | L, M, H        | OFDMA                 | 10MHz             | 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, coding rate, and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|
| -                  | L, M, H        | OFDMA                 | 5MHz              | QPSK            | 1/2         |
| -                  | L, M, H        | OFDMA                 | 10MHz             | 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, coding rate, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE | AXIS |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|------|
| -                  | M              | OFDMA                 | 5MHz              | QPSK            | 1/2         | X    |
| -                  | M              | OFDMA                 | 10MHz             | QPSK            | 1/2         | X    |

### 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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CHANNEL | MODULATION TECHNOLOGY | CHANNEL BANDWIDTH | MODULATION TYPE | CODING RATE | AXIS |
|--------------------|----------------|-----------------------|-------------------|-----------------|-------------|------|
| -                  | L, M, H        | OFDMA                 | 5MHz              | QPSK            | 1/2         | X    |
| -                  | L, M, H        | OFDMA                 | 10MHz             | QPSK            | 1/2         | X    |

### **TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER  | TESTED BY |
|---------------|--------------------------|--------------|-----------|
| OP            | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |
| FS            | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |
| EB            | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |
| CE            | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |
| CSE           | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |
| RE≥1G         | 26deg. C, 65%RH          | 120Vac, 60Hz | Brad Wu   |
| RE<1G         | 26deg. C, 65%RH          | 120Vac, 60Hz | Mark Liao |

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a WiMAX 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**

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 | DELL  | D531      | CN-0XM006-4864<br>3-81U-2973 | QDS-BRCM1020 |

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

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

## 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

##### CONDUCTED POWER MEASUREMENT:

| DESCRIPTION & MANUFACTURER  | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|-----------------------------|-----------|------------|---------------------|-------------------------|
| High Speed Peak Power Meter | ML2495A   | 0842014    | Apr. 26, 2011       | Apr. 25, 2012           |
| Power Sensor                | MA2411B   | 0738138    | Aug. 19, 2010       | Aug. 18, 2011           |

##### 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. Measurement Bandwidth of ML2495A is 65MHz greater than 26dB bandwidth of emission.

**A D T****EIRP POWER MEASUREMENT:**

| DESCRIPTION & MANUFACTURER              | MODEL NO.                    | SERIAL NO.  | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|-----------------------------------------|------------------------------|-------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ        | ESI7                         | 838496/016  | Dec. 27, 2010       | Dec. 26, 2011           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ    | FSP40                        | 100039      | Feb. 23, 2011       | Feb. 22, 2012           |
| BILOG Antenna<br>SCHWARZBECK            | VULB9168                     | 9168-155    | Apr. 12, 2011       | Apr. 11, 2012           |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9120D                   | 9120D-408   | Jan. 06, 2011       | Jan. 05, 2012           |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9170                    | BBHA9170243 | Dec. 27, 2010       | Dec. 26, 2011           |
| Preamplifier<br>Agilent                 | 8449B                        | 3008A01961  | Nov. 02, 2010       | Nov. 01, 2011           |
| Preamplifier<br>Agilent                 | 8447D                        | 2944A10738  | Nov. 02, 2010       | Nov. 01, 2011           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 250792/4    | Aug. 19, 2011       | Aug. 18, 2012           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 283397/4    | Aug. 19, 2011       | Aug. 18, 2012           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 295012/4    | Aug. 19, 2011       | Aug. 18, 2012           |
| Software<br>ADT.                        | ADT_Radiated_<br>V7.6.15.9.2 | NA          | NA                  | NA                      |
| Antenna Tower<br>inn-co GmbH            | MA 4000                      | 010303      | NA                  | NA                      |
| Antenna Tower Controller<br>inn-co GmbH | CO2000                       | 019303      | NA                  | NA                      |
| Turn Table<br>ADT.                      | TT100.                       | TT93021704  | NA                  | NA                      |
| Turn Table Controller<br>ADT.           | SC100.                       | SC93021704  | NA                  | NA                      |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 4.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 988962.
  5. The IC Site Registration No. is IC7450F-4.

#### 4.1.3 TEST PROCEDURES

##### CONDUCTED POWER MEASUREMENT:

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

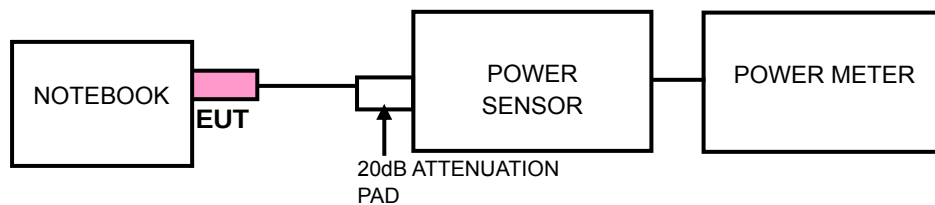
##### EIRP POWER MEASUREMENT:

- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range.)
- b. The conducted peak output power used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The path loss included the splitter loss, cable loss and 20dB pad loss. The spectrum set RB/VB 3MHz, then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data.)
- c. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- d. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- e.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

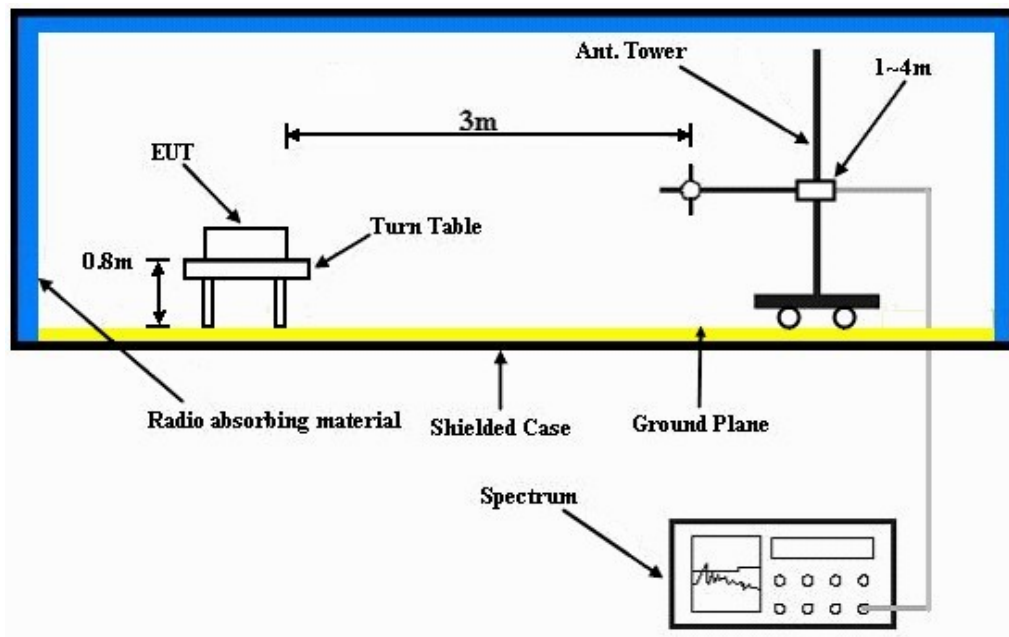
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10MHz/10MHz.

#### 4.1.4 TEST SETUP

##### CONDUCTED POWER MEASUREMENT:



##### EIRP POWER MEASUREMENT:



#### 4.1.5 EUT OPERATING CONDITIONS

- Plugged the EUT into the notebook and on the testing table.
- Notebook used tool to control EUT to transmit at specific frequency, modulation and output power level via telnet utility.

#### 4.1.6 TEST RESULTS

##### CHANNEL BANDWIDTH: 5MHz

| CONDUCTED POWER (RMS) |                 |          |                           |             |           |
|-----------------------|-----------------|----------|---------------------------|-------------|-----------|
| CHANNEL               | FREQUENCY (MHz) | C.F (dB) | POWER METER READING (dBm) | POWER (dBm) | POWER (W) |
| Low                   | 2498.5          | 21.0     | 2.9                       | 23.88       | 0.2443    |
| Middle                | 2593.0          | 21.0     | 3.0                       | 23.97       | 0.2495    |
| High                  | 2687.5          | 21.0     | 2.9                       | 23.93       | 0.2472    |

**NOTE:** C.F = attenuator + cable loss

| EIRP POWER |                 |                 |                        |              |        |
|------------|-----------------|-----------------|------------------------|--------------|--------|
| CHANNEL    | FREQUENCY (MHz) | S.G VALUE (dBm) | CORRECTION FACTOR (dB) | OUTPUT POWER |        |
|            |                 |                 |                        | dBm          | Watt   |
| Low        | 2498.5          | 17.3            | 8.3                    | 25.6         | 0.3631 |
| Middle     | 2593.0          | 17.9            | 8.5                    | 26.4         | 0.4365 |
| High       | 2687.5          | 17.5            | 8.5                    | 26.0         | 0.3981 |

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

2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

# CHANNEL BANDWIDTH: 10MHz

| CONDUCTED POWER (RMS) |                 |          |                           |             |           |
|-----------------------|-----------------|----------|---------------------------|-------------|-----------|
| CHANNEL               | FREQUENCY (MHz) | C.F (dB) | POWER METER READING (dBm) | POWER (dBm) | POWER (W) |
| Low                   | 2501            | 21.0     | 3.0                       | 23.95       | 0.2483    |
| Middle                | 2593            | 21.0     | 3.0                       | 23.97       | 0.2495    |
| High                  | 2685            | 21.0     | 3.0                       | 23.95       | 0.2483    |

**NOTE:** C.F = attenuator + cable loss

| EIRP POWER |                 |                 |                        |              |        |
|------------|-----------------|-----------------|------------------------|--------------|--------|
| CHANNEL    | FREQUENCY (MHz) | S.G VALUE (dBm) | CORRECTION FACTOR (dB) | OUTPUT POWER |        |
|            |                 |                 |                        | dBm          | Watt   |
| Low        | 2501            | 18.6            | 8.3                    | 26.9         | 0.4898 |
| Middle     | 2593            | 18.0            | 8.5                    | 26.5         | 0.4467 |
| High       | 2685            | 17.2            | 8.5                    | 25.7         | 0.3715 |

**REMARKS:** 1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).  
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



## 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  $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .

### 4.2.2 TEST INSTRUMENTS

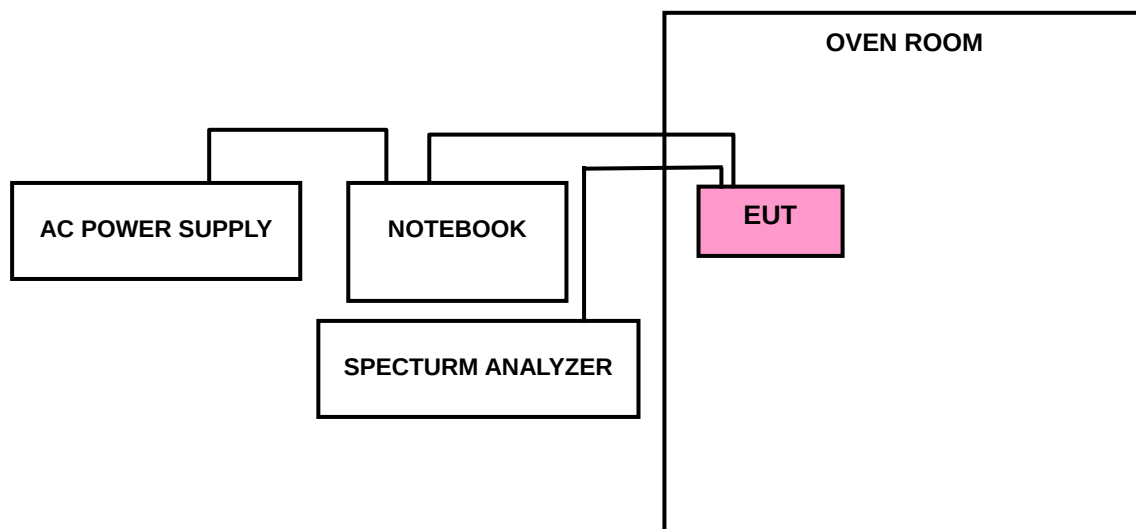
| DESCRIPTION & MANUFACTURER                        | MODEL NO.       | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---------------------------------------------------|-----------------|------------|---------------------|-------------------------|
| Spectrum Analyzer<br>Agilent                      | E4446A          | MY44360124 | Dec. 29, 2010       | Dec. 28, 2011           |
| RF cable                                          | SUCOFLEX<br>104 | 257029     | Jan. 27, 2011       | Jan. 26, 2012           |
| WIT<br>Standard Temperature &<br>Humidity Chamber | MHU-225AU       | 920409     | Jun. 15, 2011       | Jun. 14, 2012           |

**NOTE:** 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

- 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.
- EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 93.5 Volts to 126.5 Volts. Each step shall be record the frequency error rate.
- 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.
- 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 EUT OPERATING CONDITIONS

Same as 4.1.5

## 4.2.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

| AFC FREQUENCY ERROR VS. VOLTAGE |            |                 |                       |
|---------------------------------|------------|-----------------|-----------------------|
| VOLTAGE (Volts)                 | TEMP. (°C) | FREQUENCY (MHz) | FREQUENCY ERROR (ppm) |
| 93.5                            | 20         | 2498.501102     | 0.441                 |
| 110.0                           | 20         | 2498.500713     | 0.285                 |
| 126.5                           | 20         | 2498.500922     | 0.369                 |

| AFC FREQUENCY ERROR VS. TEMP. |            |                 |                       |
|-------------------------------|------------|-----------------|-----------------------|
| VOLTAGE (Volts)               | TEMP. (°C) | FREQUENCY (MHz) | FREQUENCY ERROR (ppm) |
| 110.0                         | 50         | 2498.500691     | 0.277                 |
| 110.0                         | 40         | 2498.500879     | 0.352                 |
| 110.0                         | 30         | 2498.500731     | 0.293                 |
| 110.0                         | 20         | 2498.500713     | 0.285                 |
| 110.0                         | 10         | 2498.500746     | 0.299                 |
| 110.0                         | 0          | 2498.500586     | 0.235                 |
| 110.0                         | -10        | 2498.500373     | 0.149                 |
| 110.0                         | -20        | 2498.500827     | 0.331                 |
| 110.0                         | -30        | 2498.500371     | 0.148                 |



## CHANNEL BANDWIDTH: 10MHz

| AFC FREQUENCY ERROR VS. VOLTAGE |            |                 |                       |
|---------------------------------|------------|-----------------|-----------------------|
| VOLTAGE (Volts)                 | TEMP. (°C) | FREQUENCY (MHz) | FREQUENCY ERROR (ppm) |
| 93.5                            | 20         | 2501.000683     | 0.273                 |
| 110.0                           | 20         | 2501.000997     | 0.399                 |
| 126.5                           | 20         | 2501.001326     | 0.530                 |

| AFC FREQUENCY ERROR VS. TEMP. |            |                 |                       |
|-------------------------------|------------|-----------------|-----------------------|
| VOLTAGE (Volts)               | TEMP. (°C) | FREQUENCY (MHz) | FREQUENCY ERROR (ppm) |
| 110.0                         | 50         | 2501.000843     | 0.337                 |
| 110.0                         | 40         | 2501.000740     | 0.296                 |
| 110.0                         | 30         | 2501.000530     | 0.212                 |
| 110.0                         | 20         | 2501.000997     | 0.399                 |
| 110.0                         | 10         | 2501.000846     | 0.338                 |
| 110.0                         | 0          | 2501.000269     | 0.108                 |
| 110.0                         | -10        | 2501.000195     | 0.078                 |
| 110.0                         | -20        | 2501.000540     | 0.216                 |
| 110.0                         | -30        | 2501.000799     | 0.319                 |

### 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

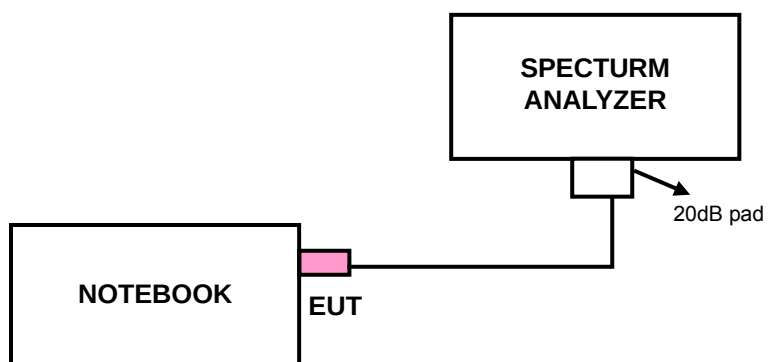
| DESCRIPTION & MANUFACTURER                        | MODEL NO.       | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---------------------------------------------------|-----------------|------------|---------------------|-------------------------|
| Spectrum Analyzer<br>Agilent                      | E4446A          | MY44360124 | Dec. 29, 2010       | Dec. 28, 2011           |
| RF cable                                          | SUCOFLEX<br>104 | 257029     | Jan. 27, 2011       | Jan. 26, 2012           |
| WIT<br>Standard Temperature &<br>Humidity Chamber | MHU-225AU       | 920409     | Jun. 15, 2011       | Jun. 14, 2012           |

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

#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 51kHz, VBW = 160kHz. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

#### 4.3.4 TEST SETUP



#### 4.3.5 EUT OPERATING CONDITIONS

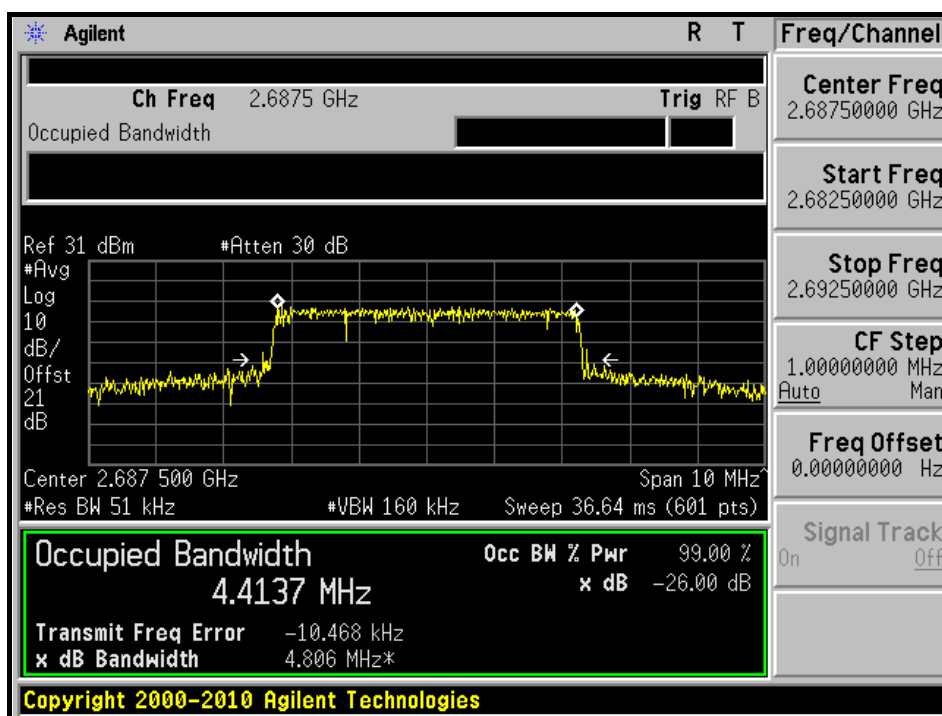
Same as 4.1.5

### 4.3.6 TEST RESULTS

#### CHANNEL BANDWIDTH: 5MHz

| CHANNEL | -26dBc BANDWIDTH (MHz) |
|---------|------------------------|
| Low     | 4.804                  |
| Middle  | 4.804                  |
| High    | 4.806                  |

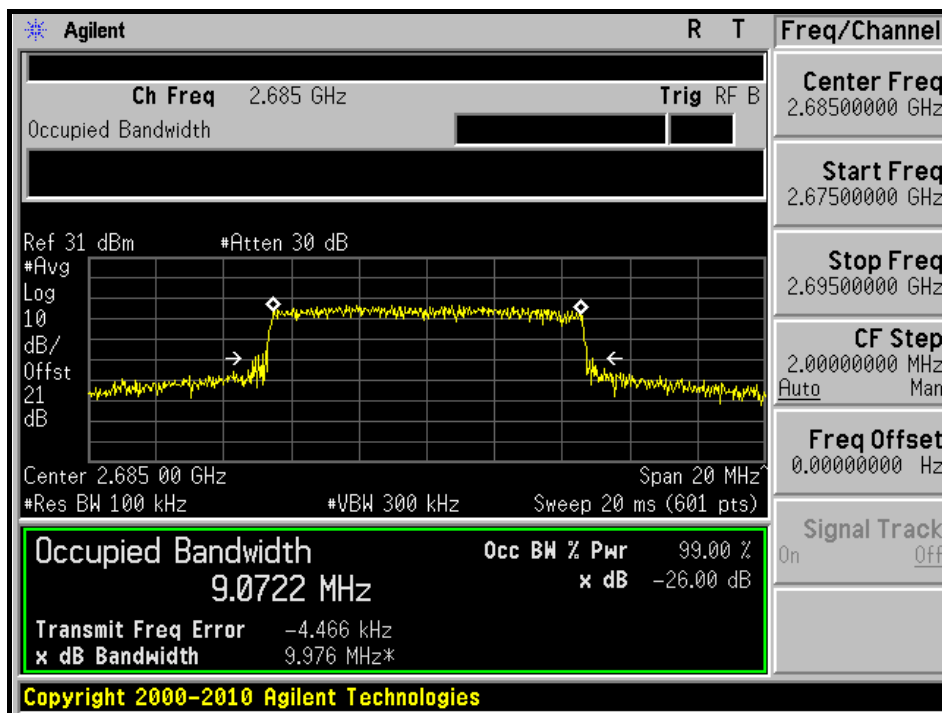
#### HIGH CHANNEL



### CHANNEL BANDWIDTH: 10MHz

| CHANNEL | -26dBc BANDWIDTH (MHz) |
|---------|------------------------|
| Low     | 9.975                  |
| Middle  | 9.973                  |
| High    | 9.976                  |

### 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 shall be not less than  $43 + 10 \log (P)$  dB at the channel edge, the limit of emission equal to  $-13\text{dBm}$ . And  $55 + 10 \log (P)$  dB at 5.5 MHz from the channel edges, the limit of emission equal to  $-25\text{dBm}$ . 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. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---------------------------------------------------|--------------|------------|---------------------|-------------------------|
| Spectrum Analyzer<br>Agilent                      | E4446A       | MY44360124 | Dec. 29, 2010       | Dec. 28, 2011           |
| RF cable                                          | SUCOFLEX 104 | 257029     | Jan. 27, 2011       | Jan. 26, 2012           |
| WIT<br>Standard Temperature &<br>Humidity Chamber | MHU-225AU    | 920409     | Jun. 15, 2011       | Jun. 14, 2012           |

**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. “\*” = These equipments are used for the final measurement.

### 4.4.3 TEST SETUP

Same as Item 4.3.4

#### 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. The center frequency of spectrum is the band edge frequency and span is 20MHz (Channel Bandwidth: 5MHz) / 30MHz (Channel Bandwidth: 10MHz). RBW of the spectrum is 51kHz (Channel Bandwidth: 5MHz) / 100kHz (Channel Bandwidth: 10MHz).
- c. Record the max trace plot into the test report.

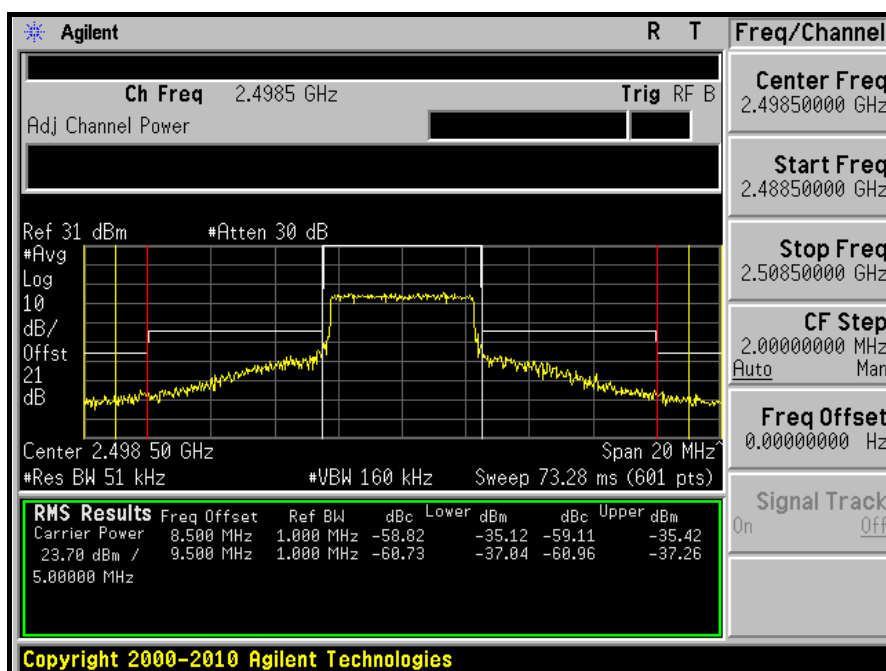
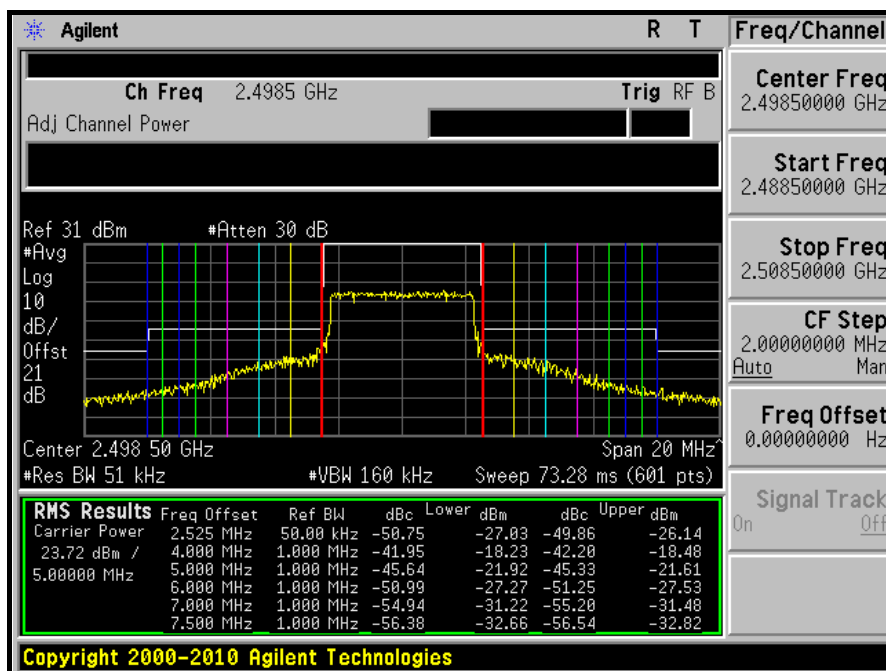
#### 4.4.5 EUT OPERATING CONDITION

Same as 4.1.5

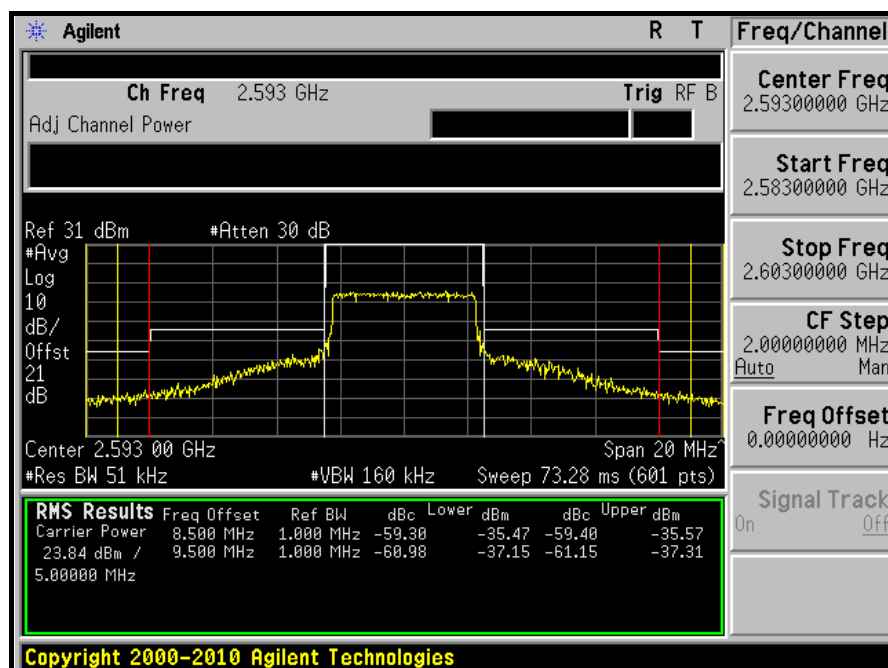
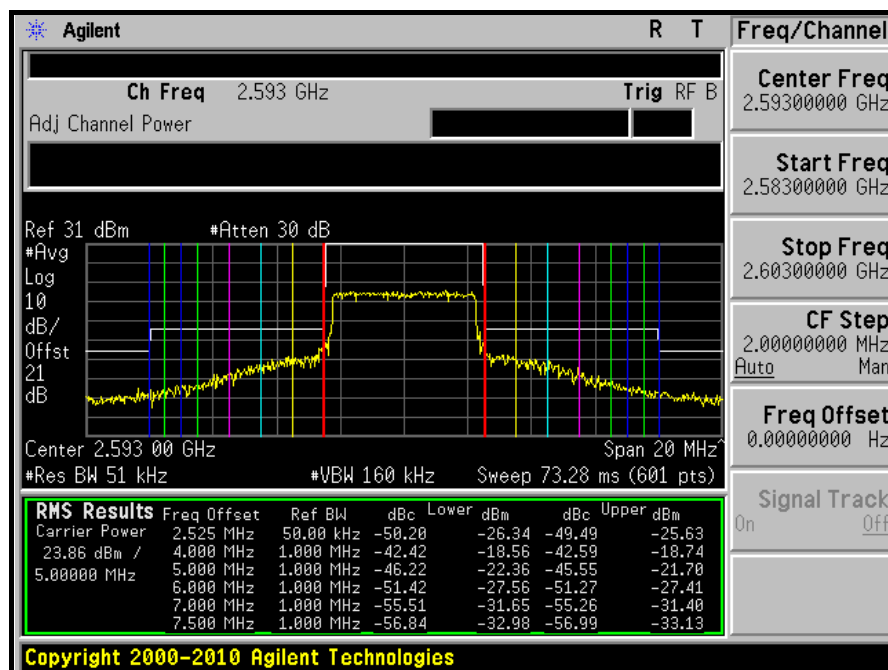
## 4.4.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

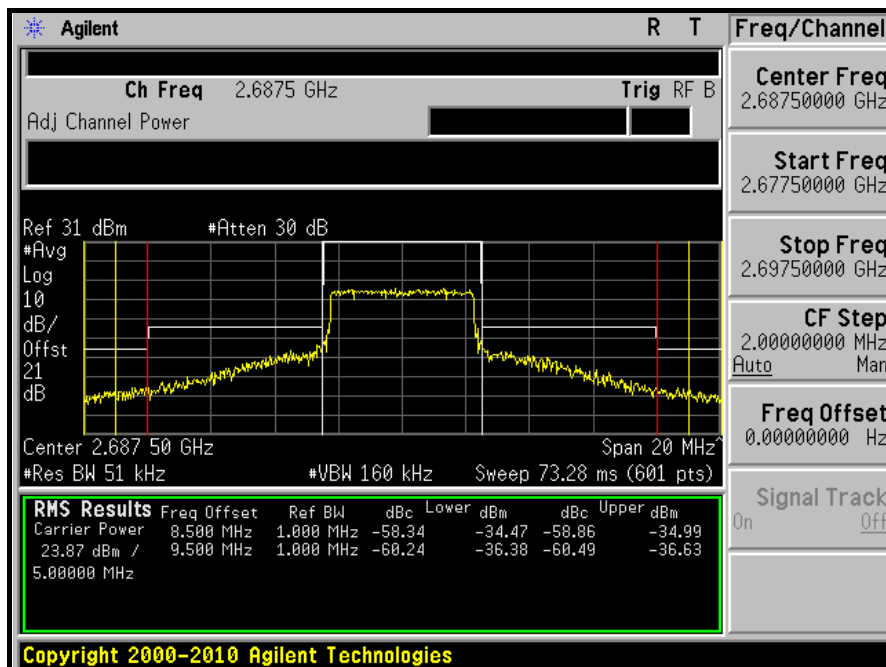
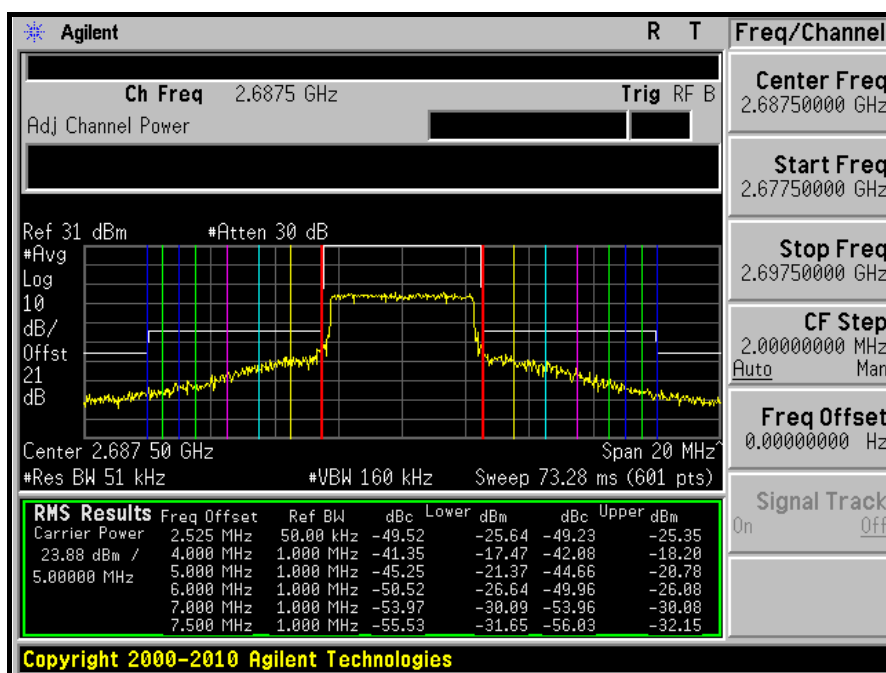
LOW CHANNEL



# MIDDLE CHANNEL

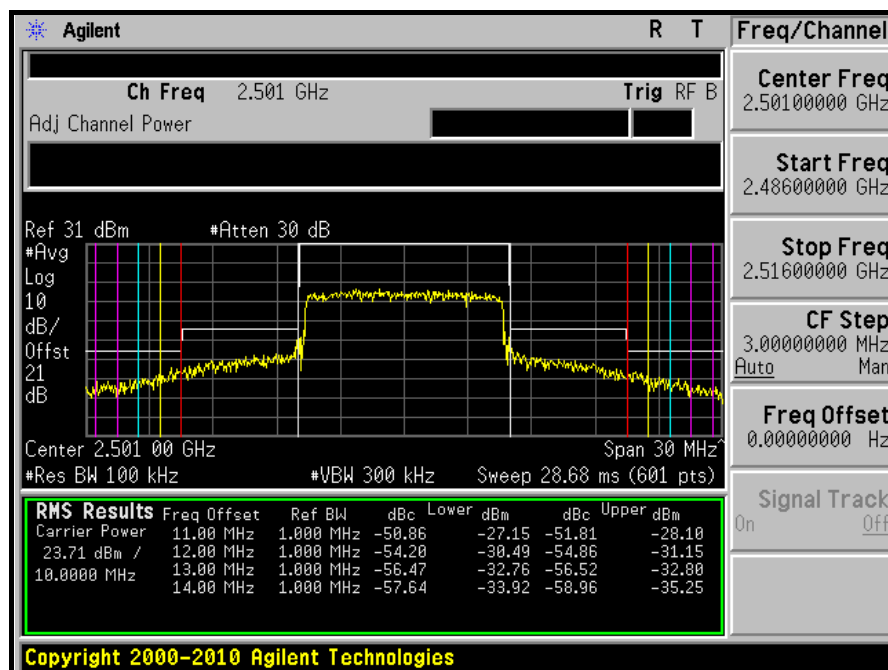
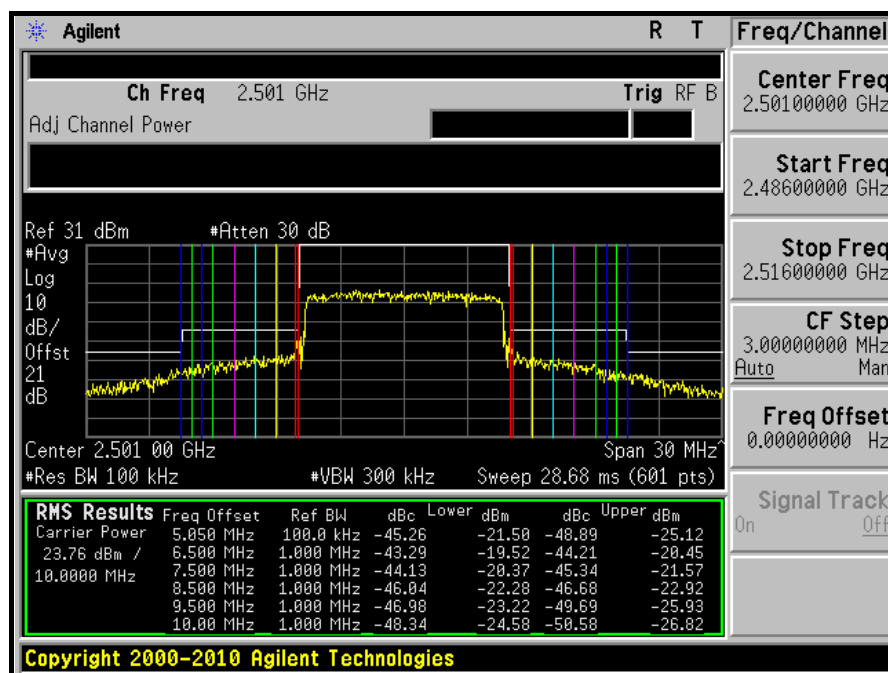


# HIGH CHANNEL

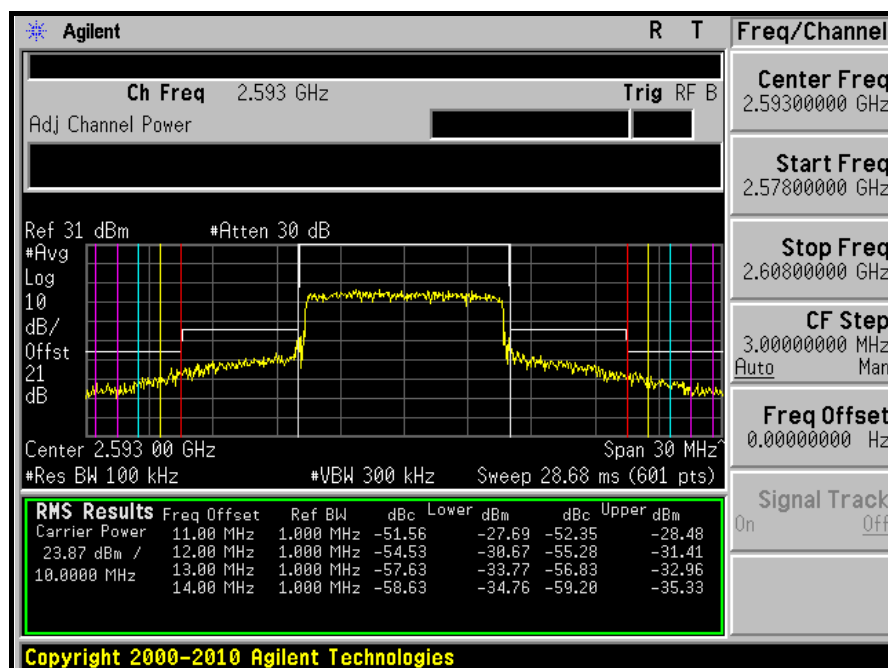
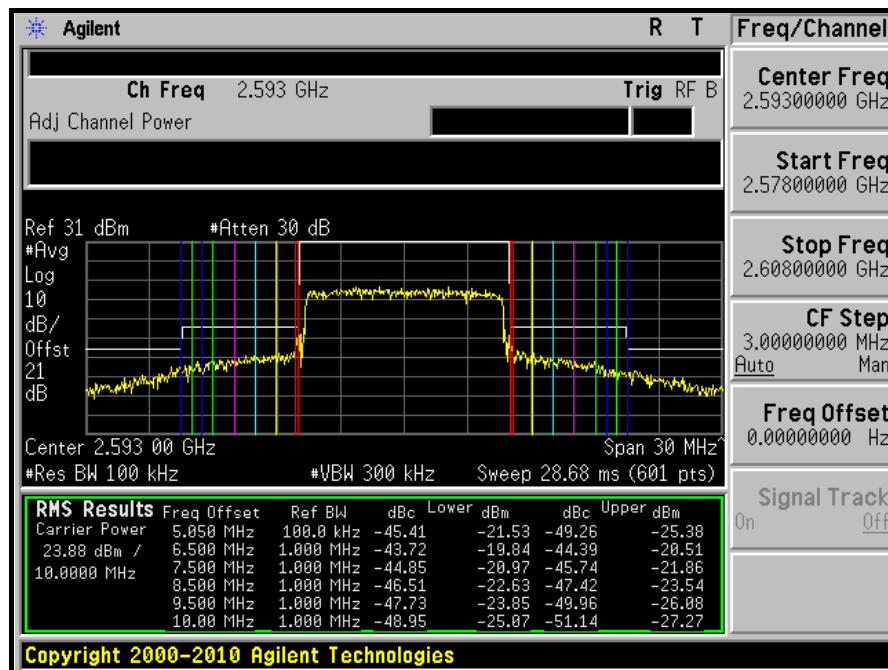


## CHANNEL BANDWIDTH: 10MHz

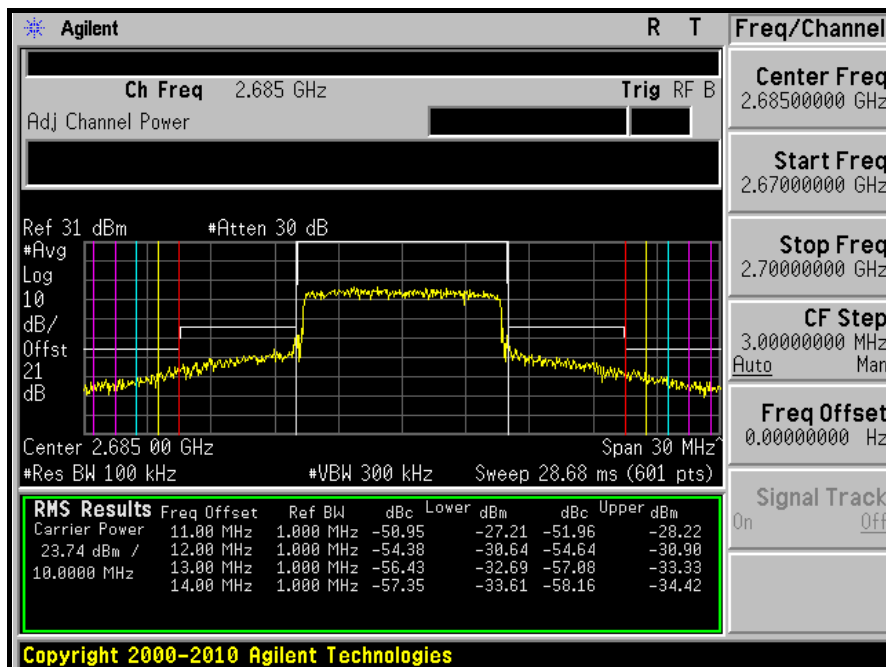
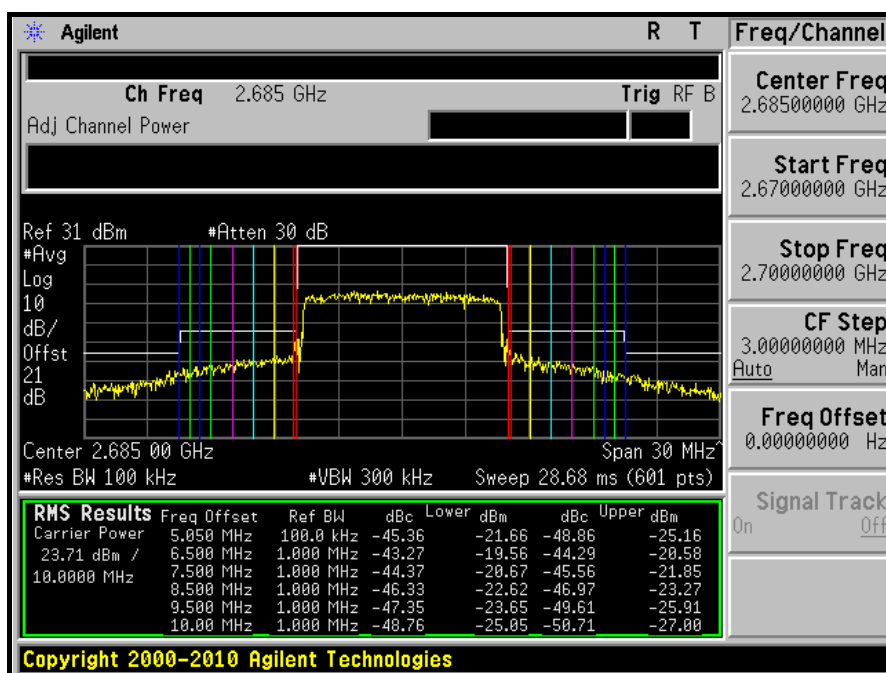
### LOW CHANNEL



# MIDDLE CHANNEL



# HIGH CHANNEL



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## 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  $55 + 10 \log (P)$  dB. The limit of emission equal to  $-25$  dBm.

### 4.5.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                 | MODEL NO.       | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|--------------------------------------------|-----------------|------------|---------------------|-------------------------|
| Spectrum Analyzer<br>Agilent               | E4446A          | MY44360124 | Dec. 29, 2010       | Dec. 28, 2011           |
| Wainwright Instruments<br>High Pass Filter | WHK3.1/18G-10SS | ZZ-010096  | Mar. 24, 2011       | Mar. 23, 2012           |
| JFW 20dB attenuation                       | 50HF-020-SMA    | NA         | NA                  | NA                      |
| RF cable                                   | SUCOFLEX 104    | 257029     | Jan. 27, 2011       | Jan. 26, 2012           |

**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. All measurements were done at 3 channels: low, middle and high operational frequency range.
- b. When the spectrum scanned from 30MHz to 27GHz, it shall be connected to the 20dB pad attenuated the carried frequency. The spectrum set  $RB = 1\text{MHz}$ ,  $VB = 3\text{MHz}$ .

#### 4.5.4 TEST SETUP

Same as 4.3.4

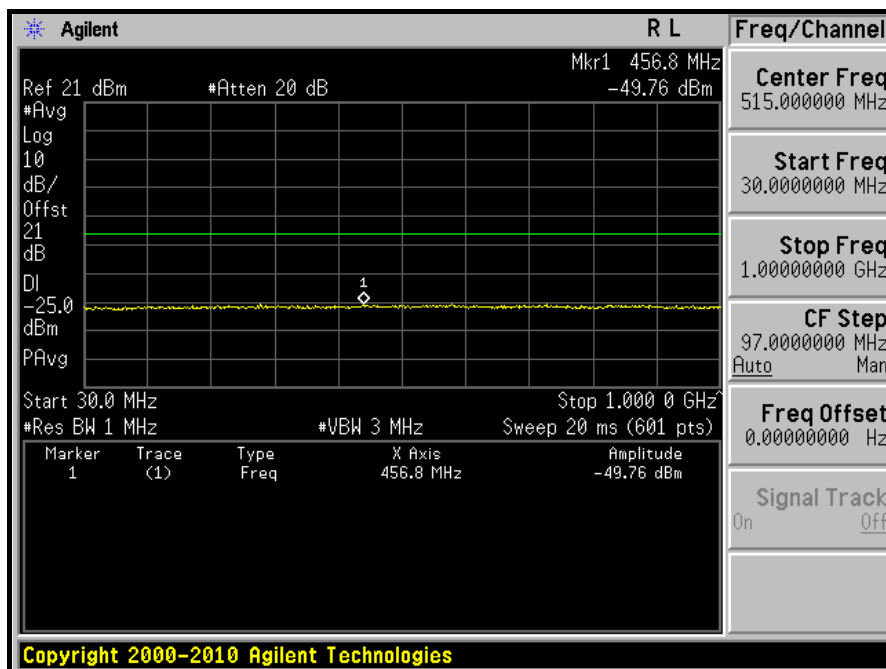
#### 4.5.5 EUT OPERATING CONDITIONS

Same as 4.1.5

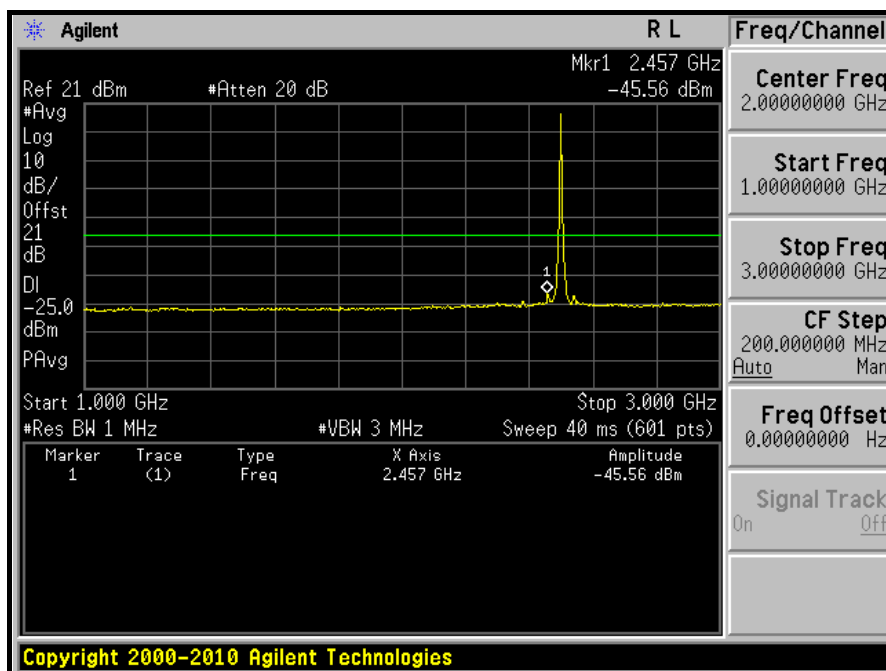
## 4.5.6 TEST RESULTS

**CHANNEL BANDWIDTH: 5MHz**

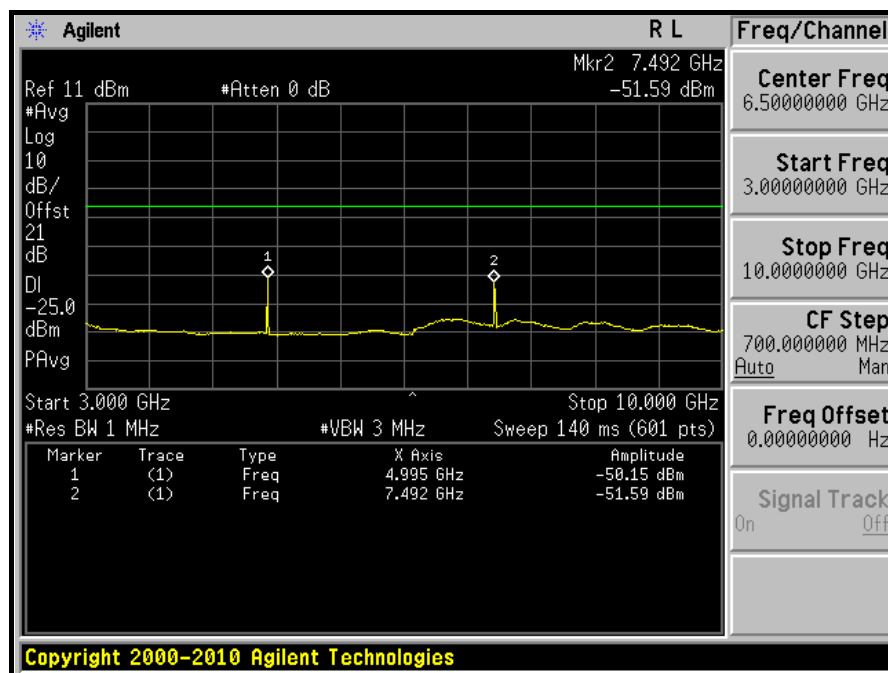
**LOW CHANNEL: 30MHz ~ 1GHz:**



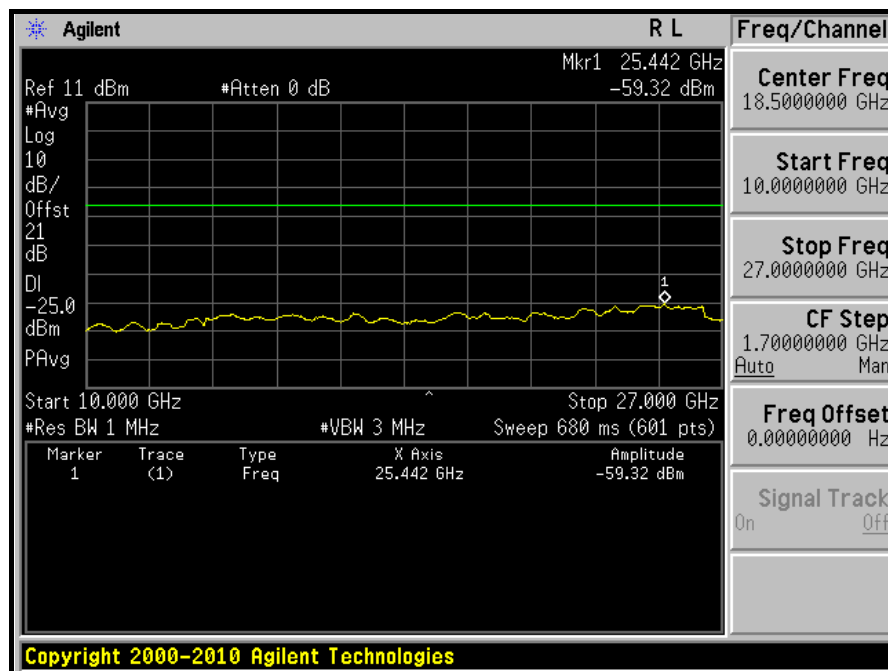
**1GHz ~ 3GHz:**



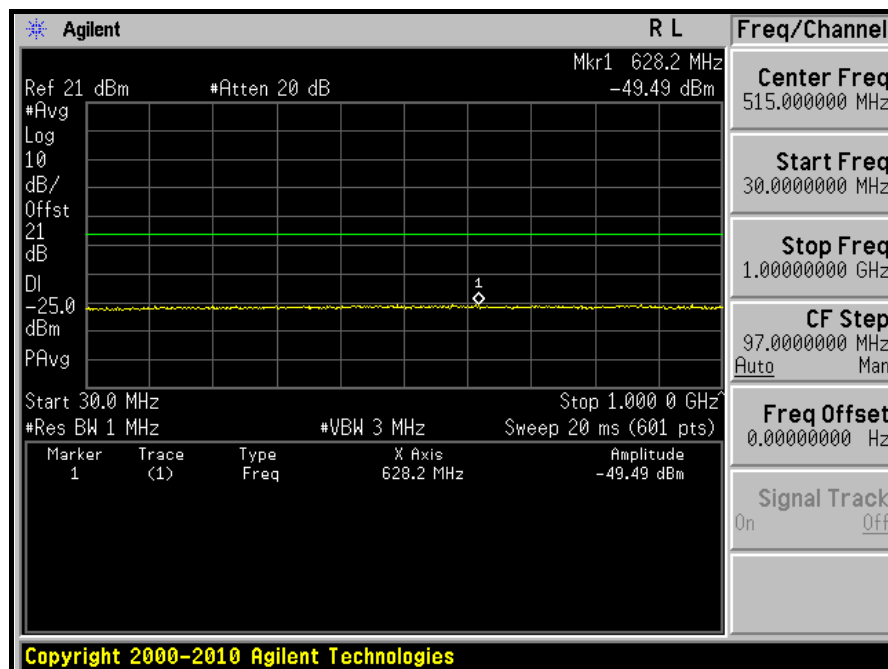
3GHz ~ 10GHz:



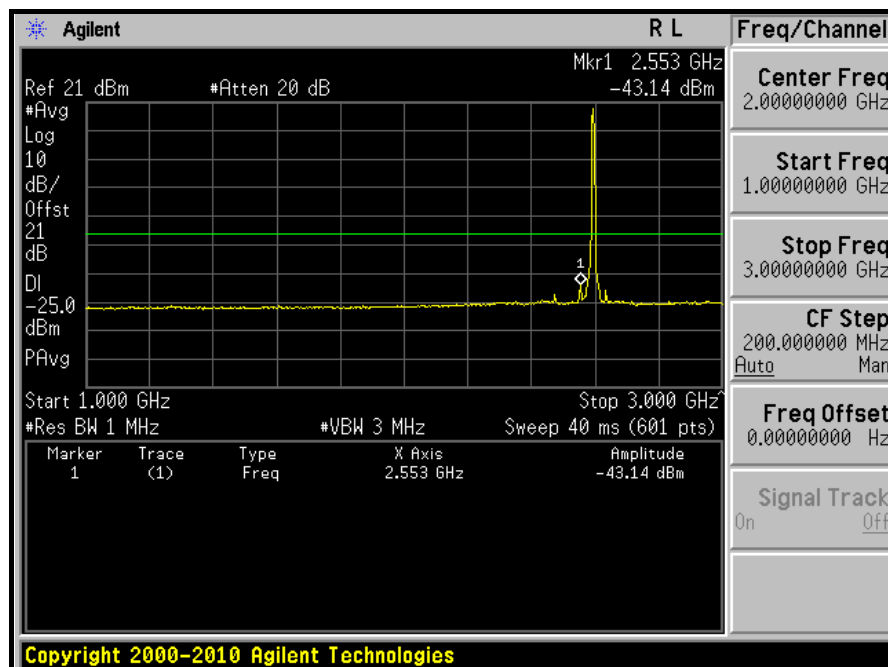
10GHz ~ 27GHz:



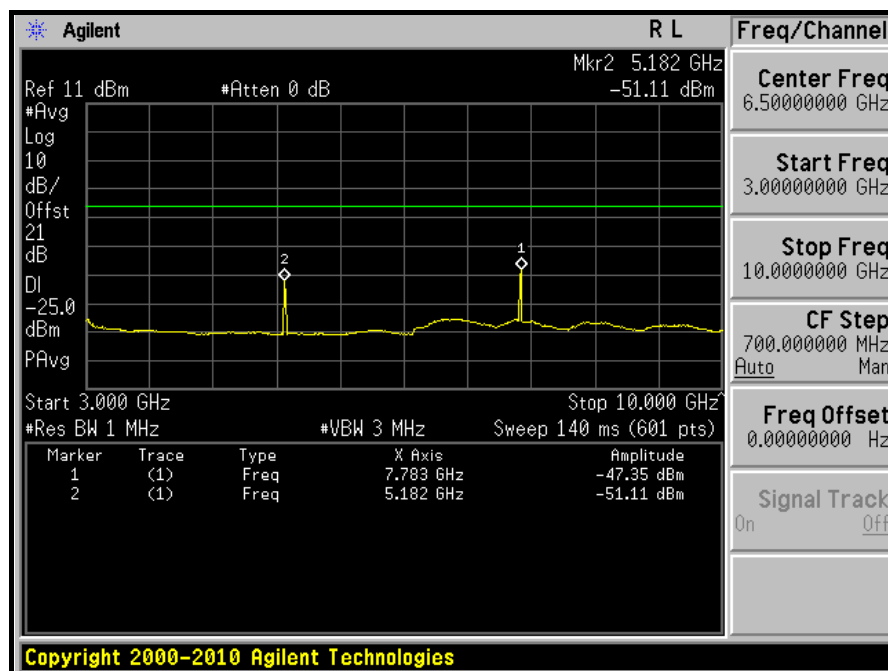
MIDDLE CHANNEL: 30MHz ~ 1GHz:



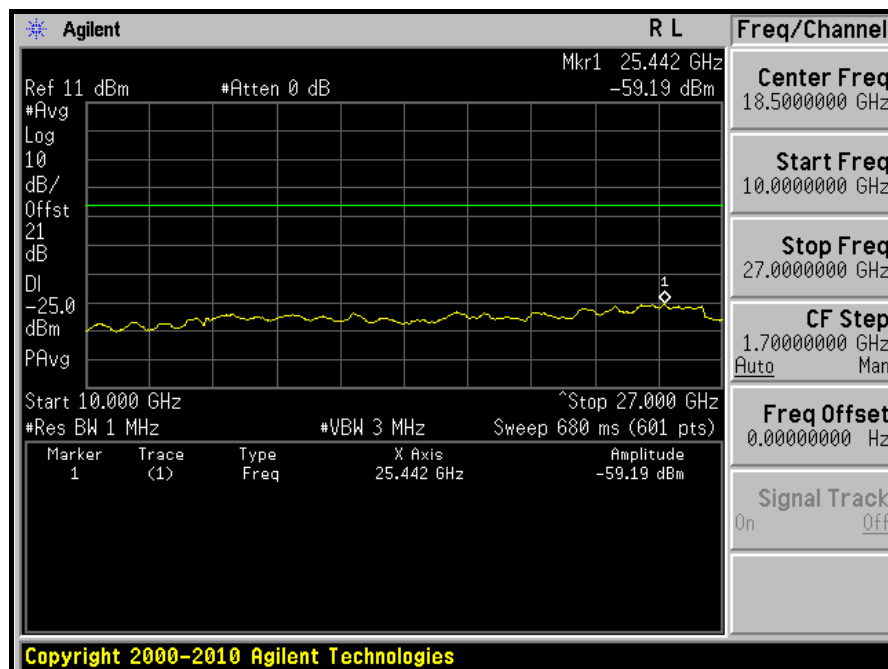
1GHz ~ 3GHz:



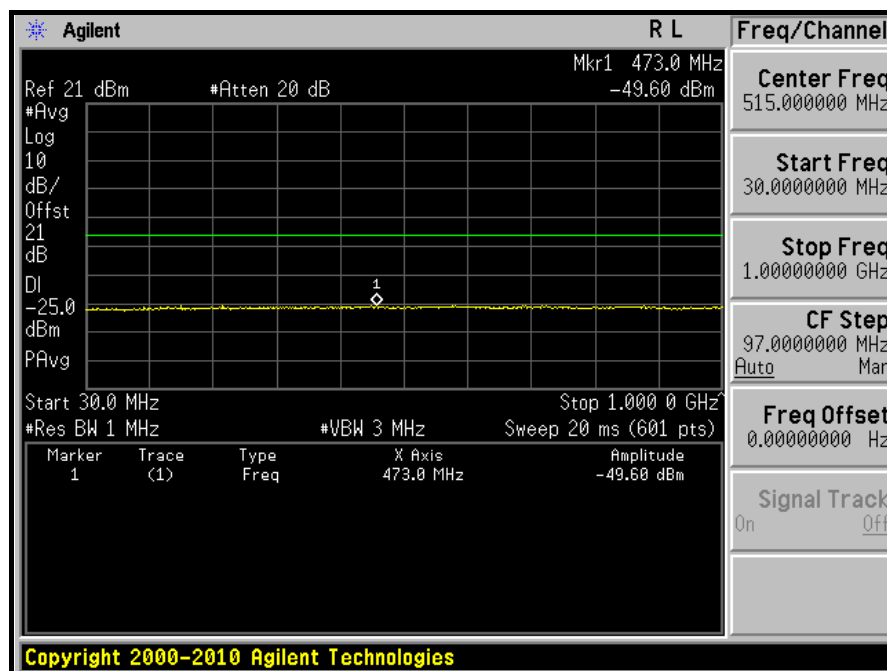
3GHz ~ 10GHz:



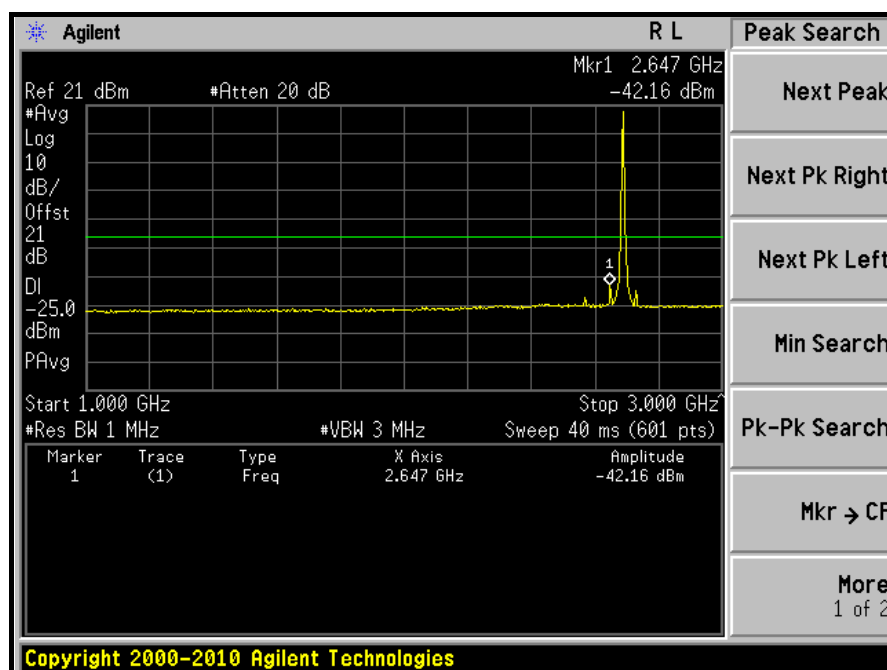
10GHz ~ 27GHz:



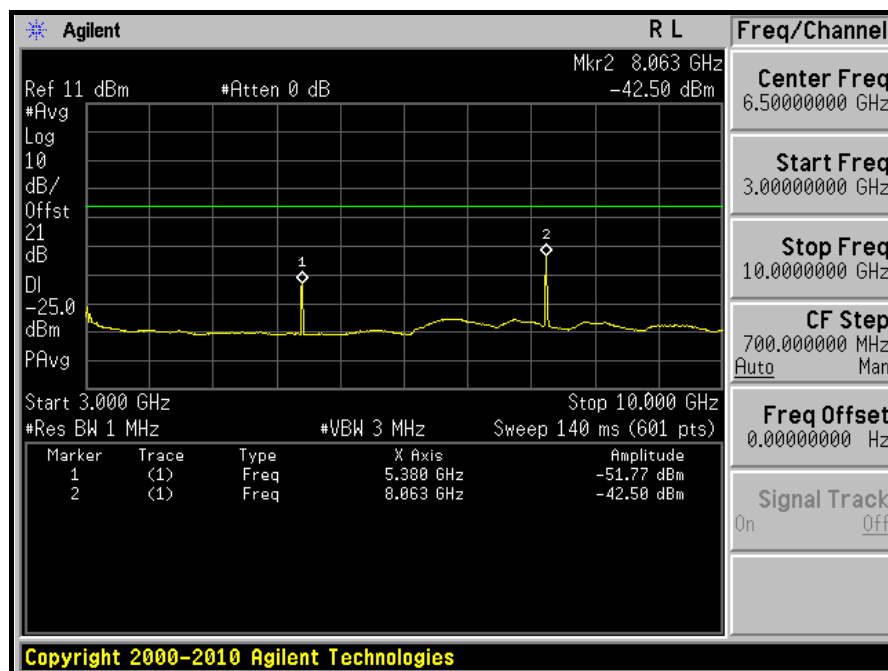
HIGH CHANNEL: 30MHz ~ 1GHz:



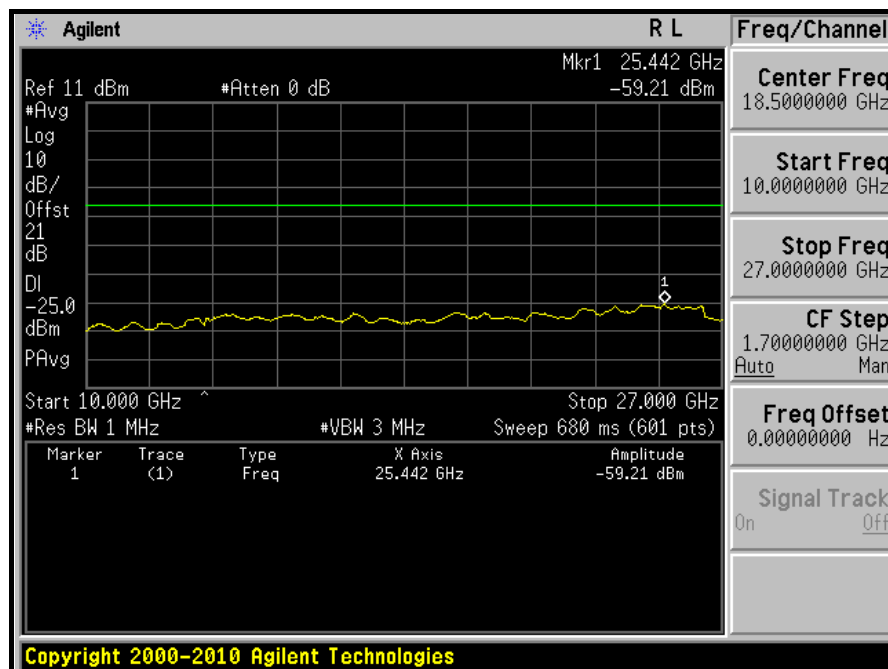
1GHz ~ 3GHz:



3GHz ~ 10GHz:

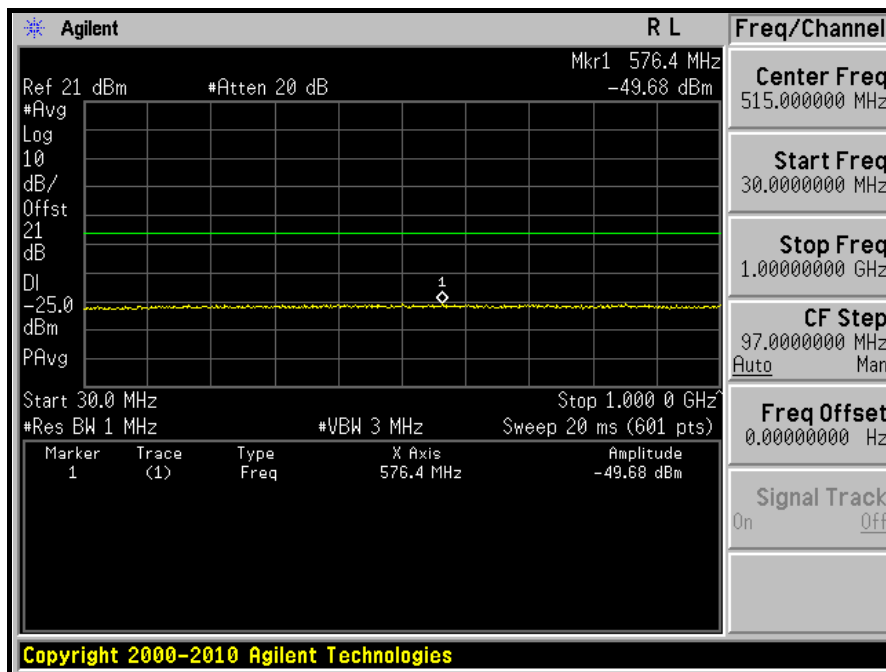


10GHz ~ 27GHz:

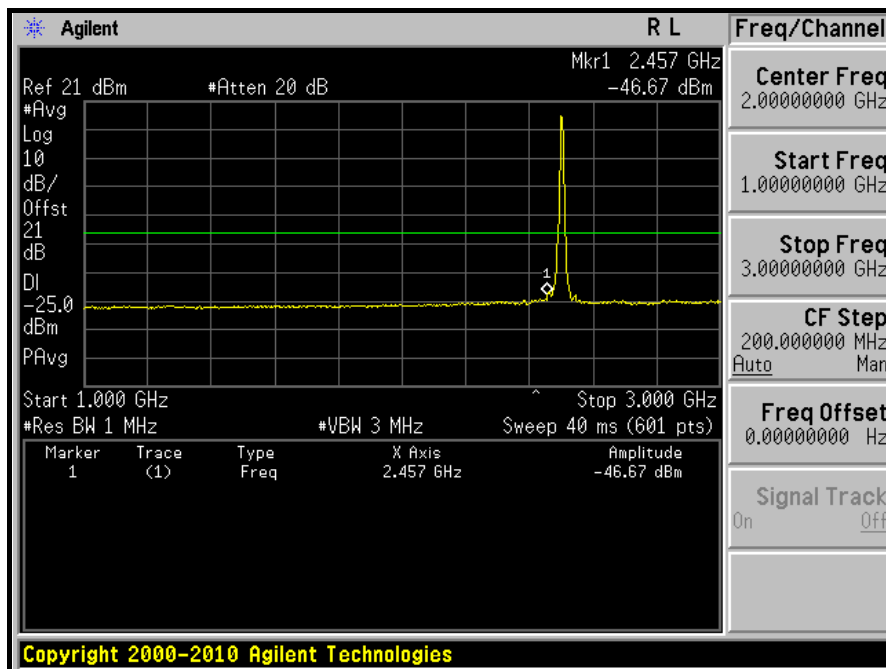


## CHANNEL BANDWIDTH: 10MHz

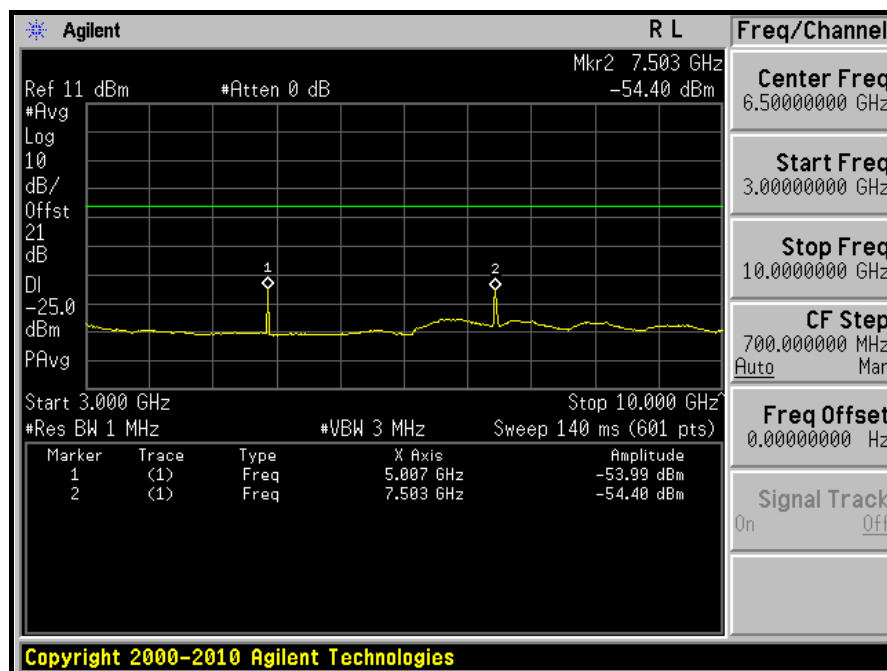
### LOW CHANNEL: 30MHz ~ 1GHz:



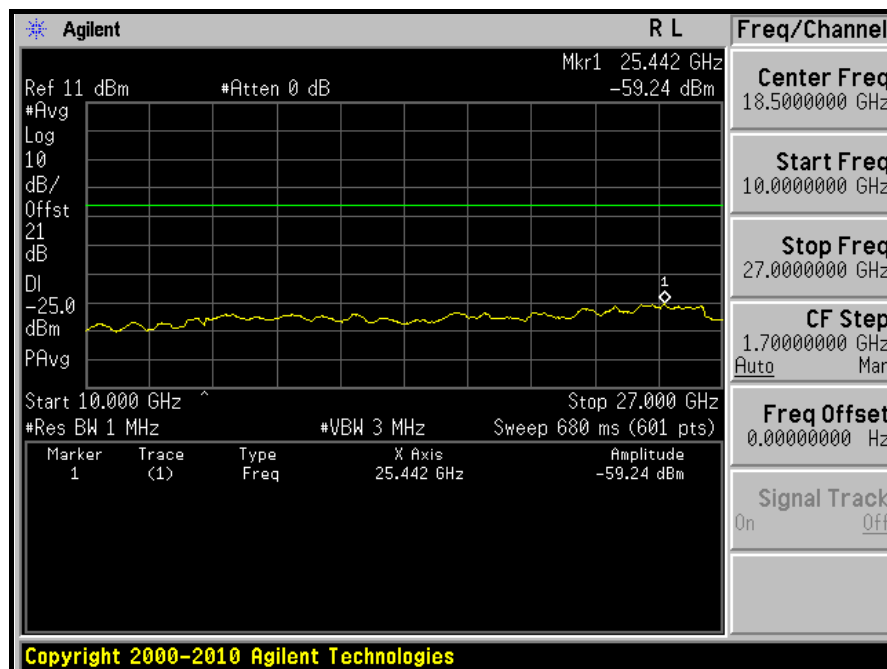
### 1GHz ~ 3GHz:



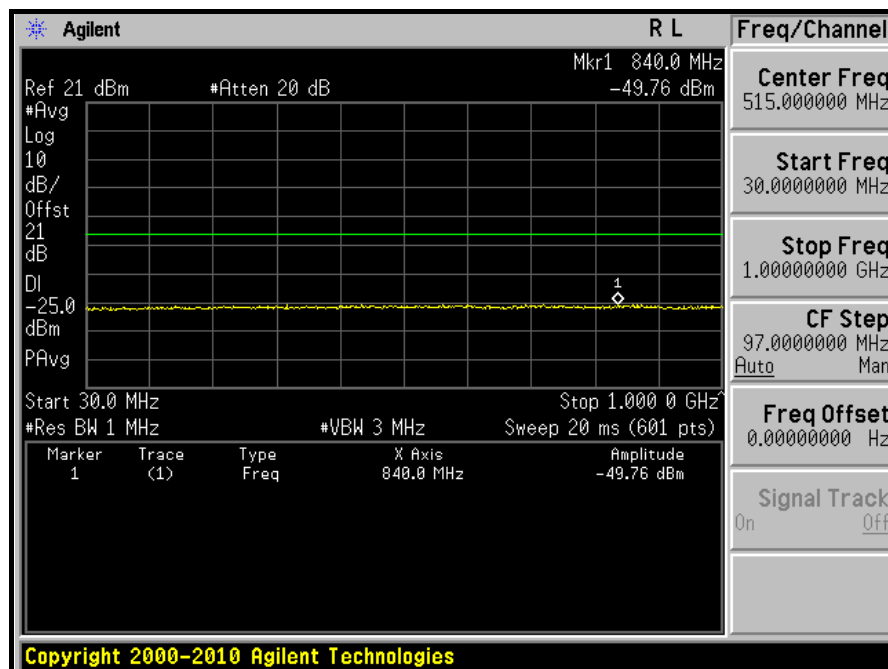
3GHz ~ 10GHz:



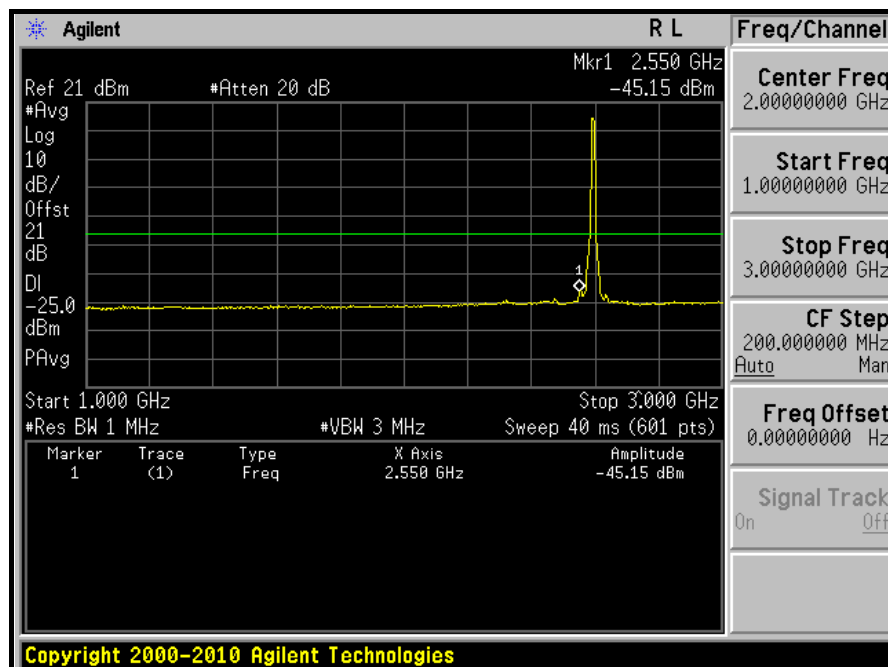
10GHz ~ 27GHz:



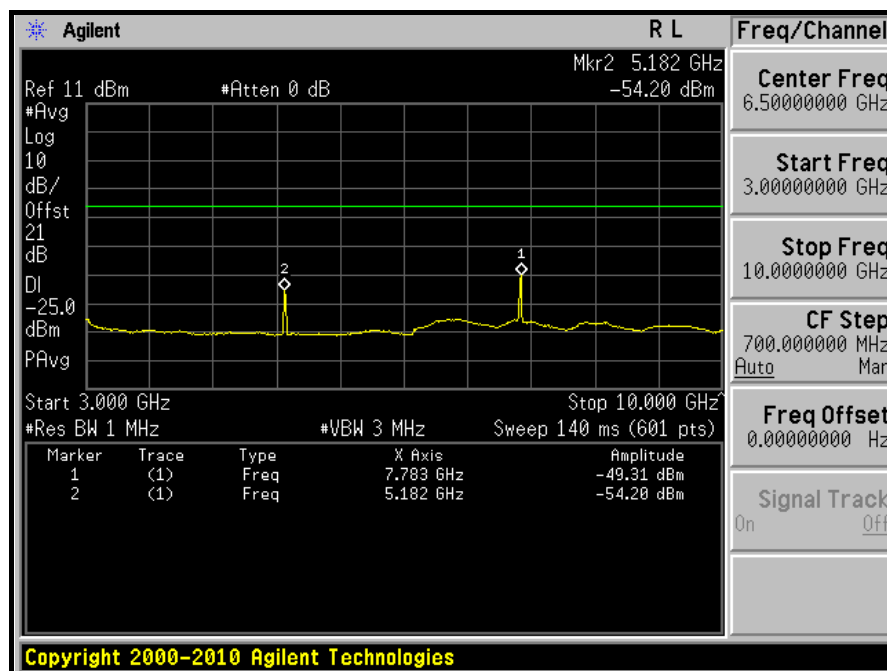
MIDDLE CHANNEL: 30MHz ~ 1GHz:



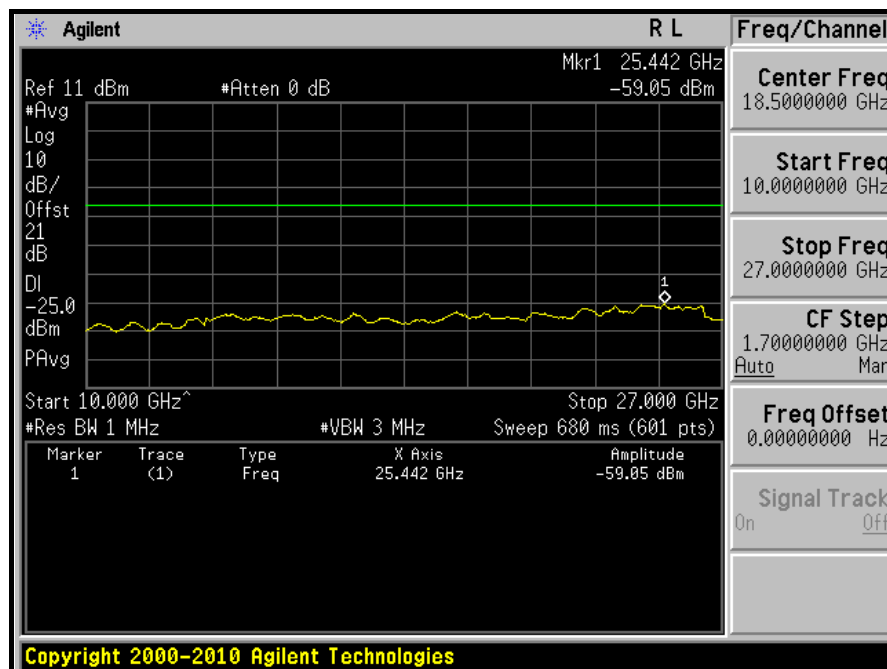
1GHz ~ 3GHz:



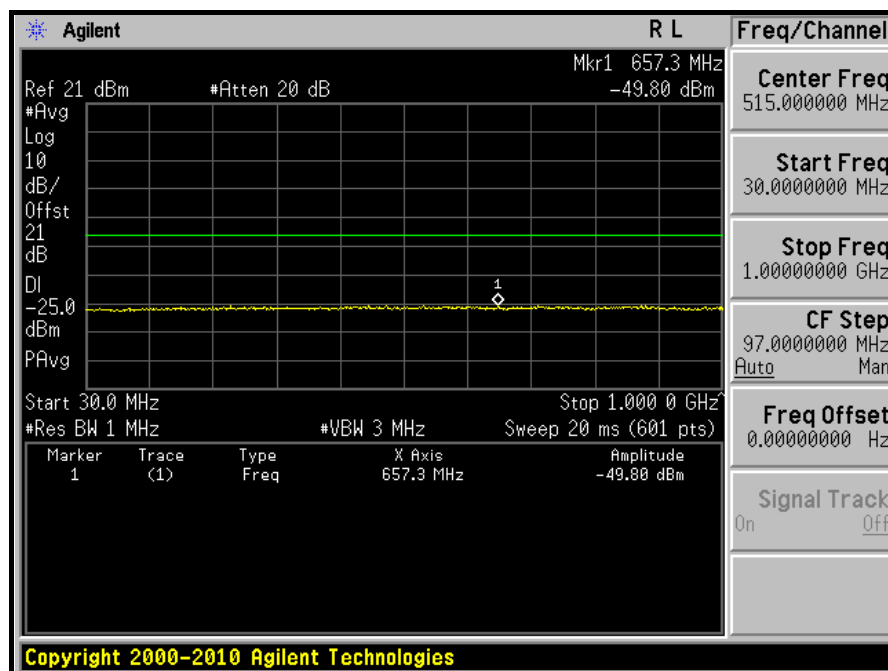
3GHz ~ 10GHz:



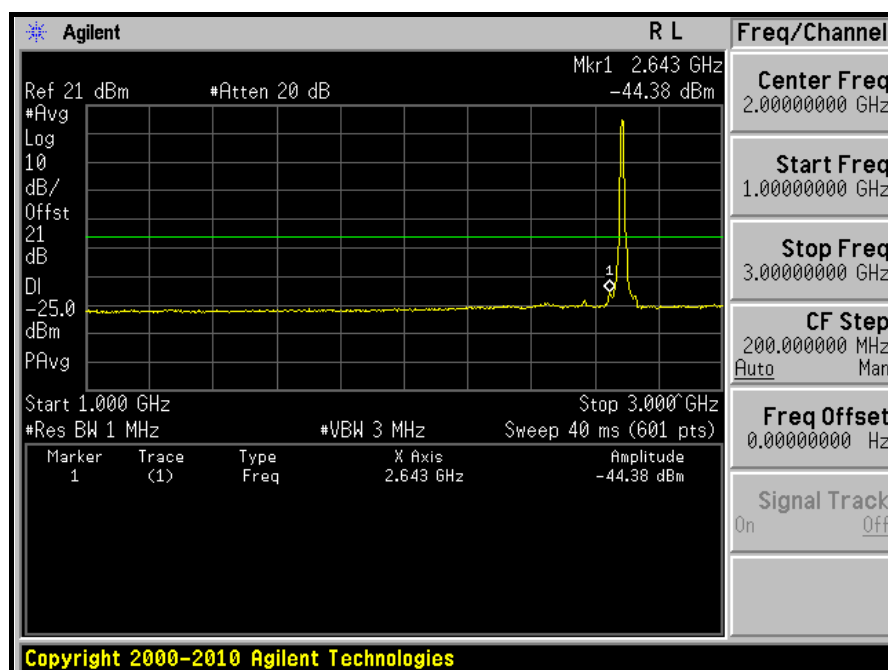
10GHz ~ 27GHz:



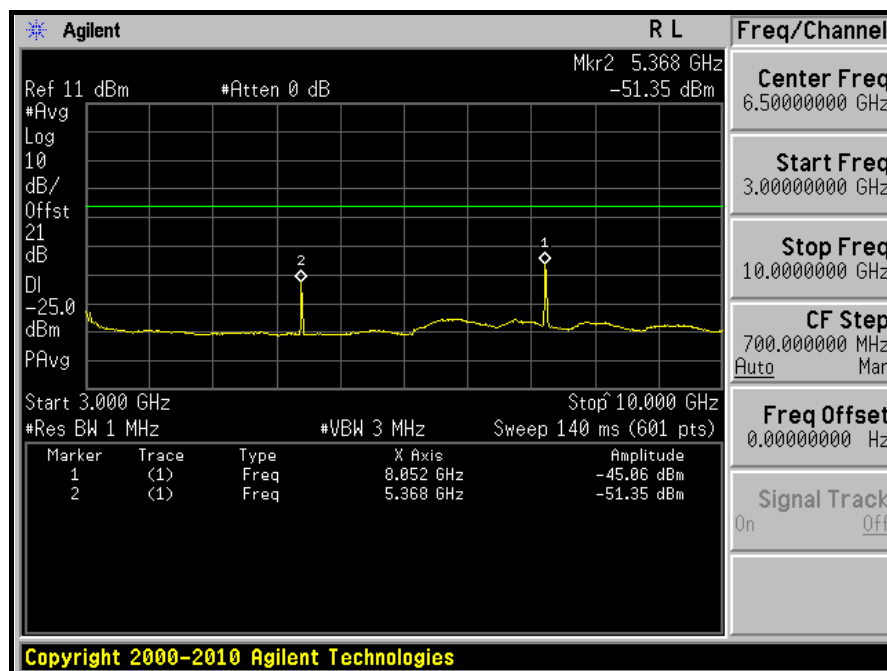
HIGH CHANNEL: 30MHz ~ 1GHz:



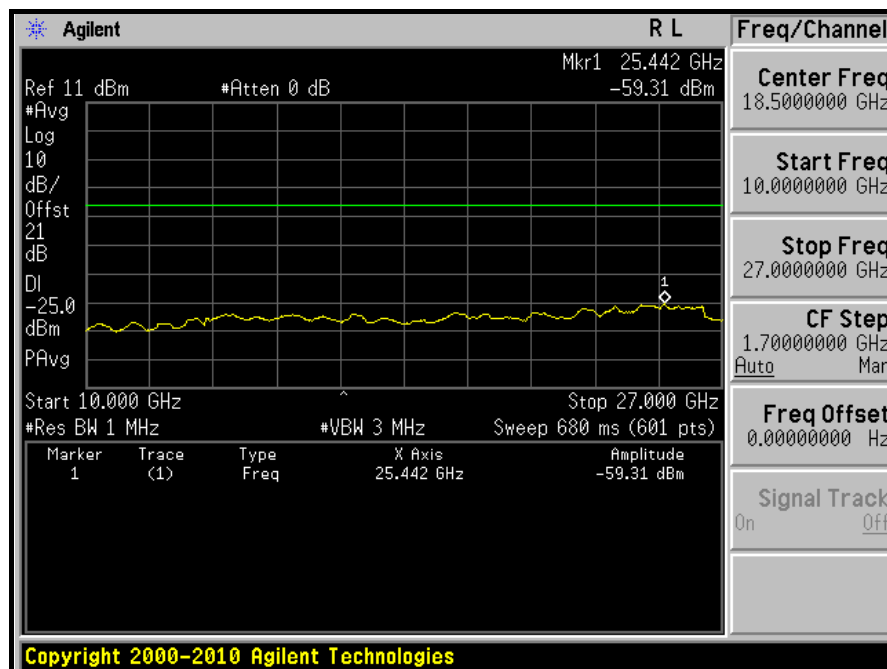
1GHz ~ 3GHz:



3GHz ~ 10GHz:



10GHz ~ 27GHz:



## 4.6 RADIATED EMISSION MEASUREMENT

### 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  $55 + 10 \log (P)$  dB. The limit of emission equal to  $-25$  dBm.

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#### 4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.                    | SERIAL NO.  | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|-----------------------------------------|------------------------------|-------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ        | ESI7                         | 838496/016  | Dec. 27, 2010       | Dec. 26, 2011           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ    | FSP40                        | 100039      | Feb. 23, 2011       | Feb. 22, 2012           |
| BILOG Antenna<br>SCHWARZBECK            | VULB9168                     | 9168-155    | Apr. 12, 2011       | Apr. 11, 2012           |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9120D                   | 9120D-408   | Jan. 06, 2011       | Jan. 05, 2012           |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9170                    | BBHA9170243 | Dec. 27, 2010       | Dec. 26, 2011           |
| Preamplifier<br>Agilent                 | 8449B                        | 3008A01961  | Nov. 02, 2010       | Nov. 01, 2011           |
| Preamplifier<br>Agilent                 | 8447D                        | 2944A10738  | Nov. 02, 2010       | Nov. 01, 2011           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 250792/4    | Sep. 03, 2010       | Sep. 02, 2011           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 283397/4    | Sep. 03, 2010       | Sep. 02, 2011           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 295012/4    | Sep. 03, 2010       | Sep. 02, 2011           |
| Software<br>ADT.                        | ADT_Radiated_<br>V7.6.15.9.2 | NA          | NA                  | NA                      |
| Antenna Tower<br>inn-co GmbH            | MA 4000                      | 010303      | NA                  | NA                      |
| Antenna Tower Controller<br>inn-co GmbH | CO2000                       | 019303      | NA                  | NA                      |
| Turn Table<br>ADT.                      | TT100.                       | TT93021704  | NA                  | NA                      |
| Turn Table Controller<br>ADT.           | SC100.                       | SC93021704  | NA                  | NA                      |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 4.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 988962.
  5. The IC Site Registration No. is IC7450F-4.

#### 4.6.3 TEST PROCEDURES

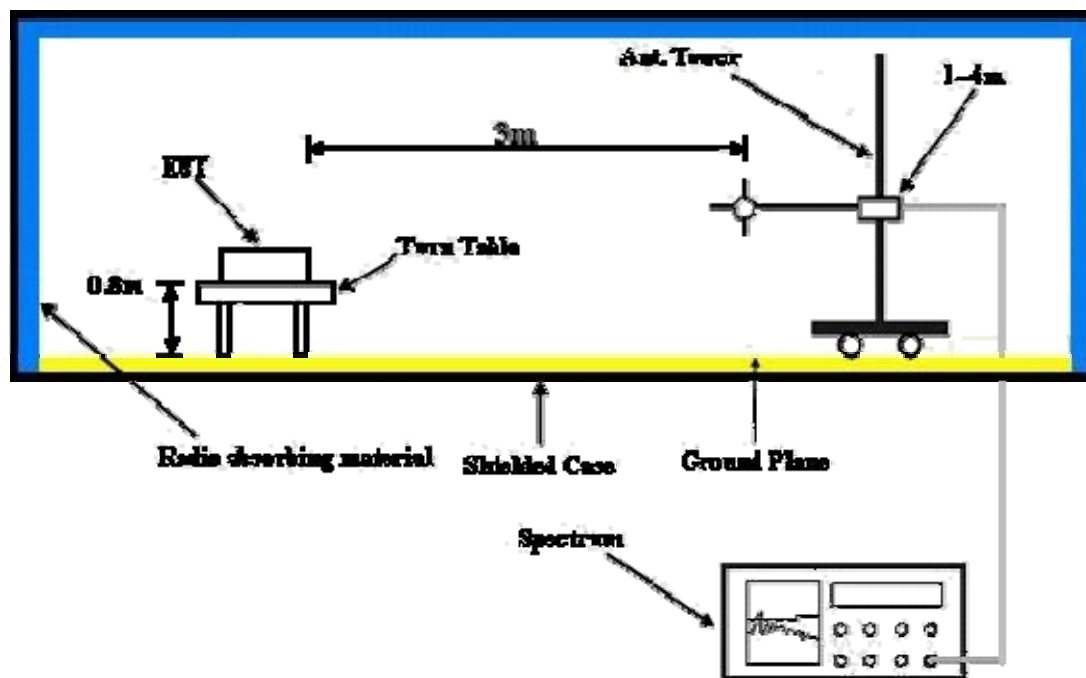
- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution antenna}.$

**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/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 4.1.5



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## 4.6.7 TEST RESULTS

## BELOW 1GHz

|                   |              |                          |                |
|-------------------|--------------|--------------------------|----------------|
| MODE              | Mid. channel | FREQUENCY RANGE          | Below 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 5MHz         | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 238.00      | 48.3                  | -13.0       | -38.1                 | -7.7                   | -45.8             |
| 2                                                  | 354.63      | 43.7                  | -13.0       | -42.5                 | -7.8                   | -50.3             |
| 3                                                  | 480.98      | 47.7                  | -13.0       | -38.7                 | -7.8                   | -46.5             |
| 4                                                  | 570.40.     | 40.2                  | -13.0       | -46.8                 | -7.8                   | -54.6             |
| 5                                                  | 665.65      | 47.5                  | -13.0       | -39.5                 | -7.8                   | -47.3             |
| 6                                                  | 1000.00     | 47.4                  | -13.0       | -39.5                 | -7.7                   | -47.2             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 30.00       | 48.4                  | -13.0       | -38.3                 | -7.7                   | -46.0             |
| 2                                                  | 228.28      | 42.6                  | -13.0       | -44.1                 | -7.7                   | -51.8             |
| 3                                                  | 432.38      | 43.6                  | -13.0       | -43.3                 | -7.8                   | -51.1             |
| 4                                                  | 480.98      | 48.9                  | -13.0       | -37.4                 | -7.8                   | -45.2             |
| 5                                                  | 665.65      | 48.2                  | -13.0       | -38.4                 | -7.8                   | -46.2             |
| 6                                                  | 1000.00     | 53.3                  | -13.0       | -33.7                 | -7.7                   | -41.4             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



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|                   |              |                          |                |
|-------------------|--------------|--------------------------|----------------|
| MODE              | Mid. channel | FREQUENCY RANGE          | Below 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 10MHz        | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 245.77      | 47.7                  | -13.0       | -38.4                 | -7.7                   | -46.1             |
| 2                                                  | 424.61      | 45.8                  | -13.0       | -40.6                 | -7.8                   | -48.4             |
| 3                                                  | 480.98      | 52.5                  | -13.0       | -34.5                 | -7.8                   | -42.3             |
| 4                                                  | 667.60      | 47.8                  | -13.0       | -39.1                 | -7.8                   | -46.9             |
| 5                                                  | 780.34      | 40.9                  | -13.0       | -45.6                 | -7.9                   | -53.5             |
| 6                                                  | 998.06      | 48.4                  | -13.0       | -38.1                 | -7.9                   | -46.0             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 51.38       | 44.6                  | -13.0       | -41.7                 | -7.7                   | -49.4             |
| 2                                                  | 228.28      | 42.0                  | -13.0       | -45.0                 | -7.7                   | -52.7             |
| 3                                                  | 432.38      | 43.9                  | -13.0       | -42.6                 | -7.8                   | -50.4             |
| 4                                                  | 480.98      | 47.2                  | -13.0       | -39.1                 | -7.8                   | -46.9             |
| 5                                                  | 667.60      | 47.8                  | -13.0       | -38.3                 | -7.8                   | -46.1             |
| 6                                                  | 998.06      | 49.0                  | -13.0       | -37.6                 | -7.9                   | -45.5             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss

**A D T****ABOVE 1GHz**

|                          |              |                                 |                |
|--------------------------|--------------|---------------------------------|----------------|
| <b>MODE</b>              | Low channel  | <b>FREQUENCY RANGE</b>          | Above 1000MHz  |
| <b>INPUT POWER</b>       | 120Vac, 60Hz | <b>ENVIRONMENTAL CONDITIONS</b> | 26degoC, 65%RH |
| <b>CHANNEL BANDWIDTH</b> | 5MHz         | <b>TESTED BY</b>                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 4997.0      | 43.1                  | -25.0       | -60.8                 | 9.5                    | -51.3             |
| 2                                                  | 7495.5      | 45.6                  | -25.0       | -56.7                 | 7.8                    | -48.9             |
| 3                                                  | 9994.0      | 49.2                  | -25.0       | -52.6                 | 7.5                    | -45.1             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 4997.0      | 42.9                  | -25.0       | -61.0                 | 9.5                    | -51.5             |
| 2                                                  | 7495.5      | 47.2                  | -25.0       | -55.1                 | 7.8                    | -47.3             |
| 3                                                  | 9994.0      | 52.3                  | -25.0       | -49.5                 | 7.5                    | -42.0             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



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|                   |                |                          |                |
|-------------------|----------------|--------------------------|----------------|
| MODE              | Middle channel | FREQUENCY RANGE          | Above 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz   | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 5MHz           | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5186.0      | 43.3                  | -25.0       | -60.7                 | 9.7                    | -51.0             |
| 2                                                  | 7779.0      | 47.4                  | -25.0       | -54.8                 | 7.8                    | -47.0             |
| 3                                                  | 10372.0     | 51.6                  | -25.0       | -49.6                 | 7.1                    | -42.5             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5186.0      | 42.6                  | -25.0       | -61.4                 | 9.7                    | -51.7             |
| 2                                                  | 7779.0      | 46.2                  | -25.0       | -56.0                 | 7.8                    | -48.2             |
| 3                                                  | 10372.0     | 51.6                  | -25.0       | -49.6                 | 7.1                    | -42.5             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



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|                   |              |                          |                |
|-------------------|--------------|--------------------------|----------------|
| MODE              | High channel | FREQUENCY RANGE          | Above 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 5MHz         | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5375.0      | 42.9                  | -25.0       | -61.2                 | 9.7                    | -51.5             |
| 2                                                  | 8062.5      | 46.2                  | -25.0       | -55.9                 | 7.8                    | -48.1             |
| 3                                                  | 10750.0     | 51.1                  | -25.0       | -49.8                 | 6.7                    | -43.1             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5375.0      | 43.2                  | -25.0       | -60.9                 | 9.7                    | -51.2             |
| 2                                                  | 8062.5      | 47.4                  | -25.0       | -54.7                 | 7.8                    | -46.9             |
| 3                                                  | 10750.0     | 52.0                  | -25.0       | -48.9                 | 6.7                    | -42.2             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



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|                   |              |                          |                |
|-------------------|--------------|--------------------------|----------------|
| MODE              | Low channel  | FREQUENCY RANGE          | Above 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 10MHz        | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5002        | 46.7                  | -25.0       | -57.2                 | 9.5                    | -47.7             |
| 2                                                  | 7503        | 46.4                  | -25.0       | -55.9                 | 7.8                    | -48.1             |
| 3                                                  | 10004       | 49.8                  | -25.0       | -52.0                 | 7.5                    | -44.5             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5002        | 44.5                  | -25.0       | -59.4                 | 9.5                    | -49.9             |
| 2                                                  | 7503        | 45.1                  | -25.0       | -57.2                 | 7.8                    | -49.4             |
| 3                                                  | 10004       | 51.2                  | -25.0       | -50.6                 | 7.5                    | -43.1             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



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|                   |                |                          |                |
|-------------------|----------------|--------------------------|----------------|
| MODE              | Middle channel | FREQUENCY RANGE          | Above 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz   | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 10MHz          | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5186        | 47.2                  | -25.0       | -56.8                 | 9.7                    | -47.1             |
| 2                                                  | 7779        | 47.6                  | -25.0       | -54.6                 | 7.8                    | -46.8             |
| 3                                                  | 10372       | 50.6                  | -25.0       | -50.6                 | 7.1                    | -43.5             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5186        | 45.9                  | -25.0       | -58.1                 | 9.7                    | -48.4             |
| 2                                                  | 7779        | 46.3                  | -25.0       | -55.9                 | 7.8                    | -48.1             |
| 3                                                  | 10372       | 49.8                  | -25.0       | -51.4                 | 7.1                    | -44.3             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss



A D T

|                   |              |                          |                |
|-------------------|--------------|--------------------------|----------------|
| MODE              | High channel | FREQUENCY RANGE          | Above 1000MHz  |
| INPUT POWER       | 120Vac, 60Hz | ENVIRONMENTAL CONDITIONS | 26degoC, 65%RH |
| CHANNEL BANDWIDTH | 10MHz        | TESTED BY                | Mark Liao      |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m |             |                       |             |                       |                        |                   |
|----------------------------------------------------|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5370        | 48.3                  | -25.0       | -55.8                 | 9.7                    | -46.1             |
| 2                                                  | 8055        | 48.6                  | -25.0       | -53.5                 | 7.8                    | -45.7             |
| 3                                                  | 10740       | 51.9                  | -25.0       | -49.0                 | 6.7                    | -42.3             |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m   |             |                       |             |                       |                        |                   |
| NO.                                                | FREQ. (MHz) | EMISSION LEVEL (dBuV) | LIMIT (dBm) | S.G POWER VALUE (dBm) | CORRECTION FACTOR (dB) | POWER VALUE (dBm) |
| 1                                                  | 5370        | 46.2                  | -25.0       | -57.9                 | 9.7                    | -48.2             |
| 2                                                  | 8055        | 47.5                  | -25.0       | -54.6                 | 7.8                    | -46.8             |
| 3                                                  | 10740       | 50.7                  | -25.0       | -50.2                 | 6.7                    | -43.5             |

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

**NOTE 2:** Correction Factor = Antenna gain of substitution antenna- tx cable loss

## 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 according to ISO/IEC 17025.

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

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

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

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

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