683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
Tel: +82-31-321-2664 Fax: +82-31-321-1664
http://www.digitalemc.com

# CERTIFICATE OF COMPLIANCE
# FCC Part 27 Certification

Dates of Tests: April 24 ~ 28, 2008
Test Report S/N: DR50110804AJ
Test Site : DIGITAL EMC CO., LTD.

FCC ID. **V7M-SWU11**

APPLICANT **SEOWON INTECH CO., LTD.**

| | | |
|---|---|---|
| **Classification** | : | **Licensed Non-Broadcast Transmitter(TNB)** |
| **FCC Rule Part(s)** | : | **§27(M), §2** |
| **EUT Type** | : | **WiMAX CPE (Wave 1)** |
| **Model name** | : | **SWC-1104** |
| **Serial number** | : | **Identical prototype** |
| **TX Frequency Range** | : | **2501 ~ 2610MHz (5 &10MHz OBW)** |
| **RX Frequency Range** | : | **2501 ~ 2610MHz (5 & 10MHz OBW)** |
| **Max. RF Output Power** | : | **OBW: 5MHz - 0.646W EIRP (28.10 dBm)** |
| | | **OBW: 10MHz - 0.684W EIRP(28.35 dBm)** |
| **Emission Designators:** | : | **4M49G7D(QPSK)** |
| | | **4M50W7D(16QAM)** |
| | | **9M08G7D(QPSK)** |
| | | **9M06W7D(16QAM)** |
| **Date of Issue** | : | **April 29, 2008** |

# TABLE OF CONTENTS

## ◈ MEASUREMENT REPORT



# MEASUREMENT REPORT

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

## §2.1033 General Information

Applicant: **SEOWON INTECH CO., LTD.**
Address: 689-47, Kumjung-Dong, Kunpo-City, Kyunggi-Do, 435-862, Korea
Attention: CHOUN-SUP,KIM

| | |
|---|---|
| ● FCC ID: | V7M-SWU11 |
| ● Quantity: | Quantity production is planned |
| ● Emission Designators: | 4M49G7D(QPSK), 4M50W7D(16QAM) |
| | 9M08G7D(QPSK), 9M06W7D(16QAM) |
| ● Tx Freq. Range: | 2501 ~2610 MHz (5 & 10MHz OBW) |
| ● Rx Freq. Range: | 2501 - 2610 MHz (5 & 10MHz OBW) |
| ● Max. Power Rating: | OBW: 5MHz – 0.646W EIRP (28.10 dBm) |
| | OBW: 10MHz - 0.684W EIRP (28.35 dBm) |
| ● FCC Classification(s): | Licensed Non-Broadcast Transmitter(TNB) |
| ● Equipment (EUT) Type: | WiMAX CPE (Wave 1) |
| ● Modulation(s): | QPSK, 16QAM |
| ● Data rates: | QPSK1/2, QPSK3/4, 16QAM1/2, 16QAM3/4 |
| ● Antenna Type | Dipole Antenna(5.1dBi ±1) |
| ● FCC Rule Part(s): | §27(M), §2 |
| ● Dates of Tests: | April 24 ~ 28, 2008 |
| ● Place of Tests: | DIGITAL EMC |
| ● Test Report S/N: | DR50110804AJ |

## 2.1. General Information

This report contains the result of tests performed by:
DIGITAL EMC CO., LTD.
Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
http://www.digitalemc.com E-mail : harveysung@digitalemc.com
Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".
This laboratory is accredited by NVLAP for NVLAP Lab. Code: 200559-0.

**Test operator: Engineer**

| | | |
|---|---|---|
| April 29, 2008 | Won-Jung LEE | |
| Data | Name | Signature |

**Report Reviewed By: Director**

| | | |
|---|---|---|
| April 29, 2008 | Harvey Sung | |
| Data | Name | Signature |

Ordering party:

| | | |
|---|---|---|
| Company name | : | SEOWON INTECH CO., LTD. |
| Address | : | 689-47, Kumjung-Dong |
| Zipcode | : | 435-862 |
| City/town | : | Kunpo-City, Kyunggi-Do |
| Country | : | Korea |
| Date of order | : | April 11, 2008 |

## 3.1 DESCRIPTION OF TESTS

### 3.1.1 Occupied Bandwidth Emission Limits
**- Part §2.1049, §27.53.(l)(2), (6)**

(a) For fixed and temporary fixed digital stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz 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. The 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 emission are attenuated at least 26 dB below the transmitter power.

### 3.1.2 Spurious and Harmonic Emissions at Antenna Terminal
**- Part§2.1051, §27.53.(l)(2), (6)**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

### 3.1.3 Radiation Spurious and Harmonic Emissions
**- Part §2.1053, §27.53.(l), (2), (6)**

Spurious and harmonic emissions between the lowest frequency generated in this device and up to $10^{th}$ harmonic of the highest generated in this device are measured at 3-meter OATS. The equipment under test is placed on a wooden turntable located at 3-meters from the receive antenna. The receive antenna height and turntable rotations are adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole is substituted in place of the EUT. This dipole antenna is driven by a vector signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using the horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

## 3.1.4 Frequency Stability/Temperature Variation.

**- Part §2.1055, §27.54**

The frequency stability of the transmitter is measured by:

a) **Temperature** : The temperature is varied from -30°C to + 50°C using an environmental chamber with 10°C increments.
b) **Primary Supply Voltage** : The primary supply voltage is varied from 85% to 115% of the nominal voltage at the input to the device or at the power supply terminals if cables are not normally supplied.

**Specification – The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.**

**Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

# 4.1 TEST DATA

## 4.1.1 Conducted Output Power

A vector signal generator was used to supply the WiMAX signal sources to a EUT and an external trigger source to a spectrum analyzer. The trigger was set in such a way that the analyzer recorded power measurements only during the times in which the EUT was transmitting. The WiMAX conducted powers are reported below as well as a test setup diagram.

A PC(or Notebook) controlled EUT to transmit rated output power under appropriate transmission mode and specific frequency.

- Measurement data

| Bandwidth | Frequency (MHz) | QPSK 1/2 (dBm) | QPSK 3/4 (dBm) | 16QAM 1/2 (dBm) | 16QAM 3/4 (dBm) |
|---|---|---|---|---|---|
| 5MHz | 2501 | **22.44** | 22.36 | 22.33 | 22.20 |
| | 2560 | **21.89** | 21.77 | 21.85 | 21.83 |
| | 2610 | **20.89** | 20.65 | 20.81 | 20.77 |
| 10MHz | 2501 | 22.84 | 22.73 | **22.96** | 22.86 |
| | 2560 | 22.33 | 22.16 | **22.44** | 22.26 |
| | 2610 | 21.35 | 21.11 | **21.21** | 21.10 |

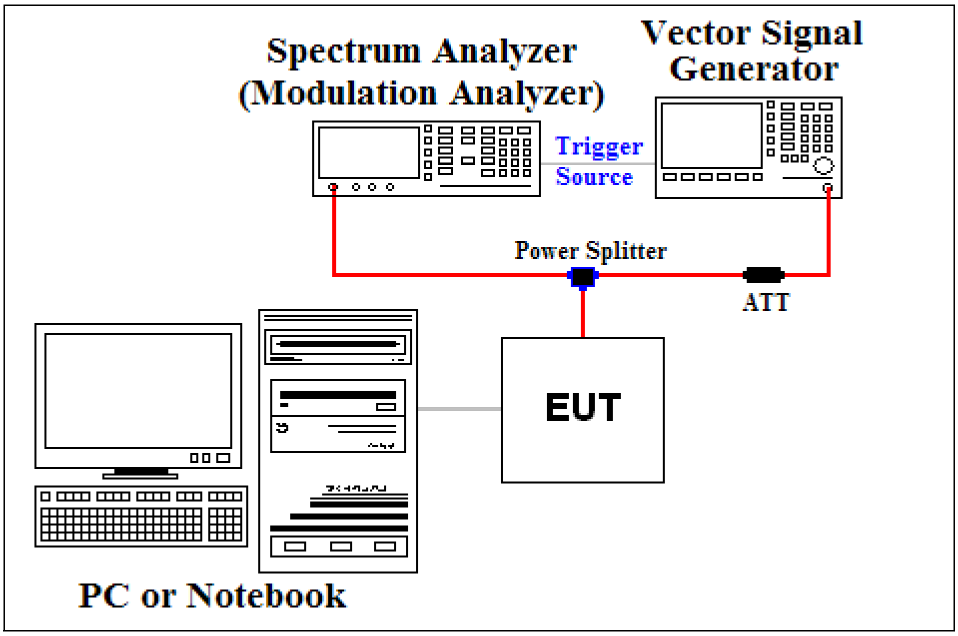



Figure1. WiMAX Coducted Power Test Setup Diagram

## 4.1.2 Equivalent Isotropic Radiated Power Output

A. POWER: Maximum **(BW 5MHz)**

| **Frequency** (MHz) | **Modulation Type** | **POL** (H/V) | **Reading Level** (dBm) | **Result Level (dBm)** | **Antenna Gain** (dBi) | **EIRP** (dBm) | **EIRP** (W) | **Supplied Power** |
|---|---|---|---|---|---|---|---|---|
| 2501.00 | QPSK 1/2 | V | -21.99 | 16.81 | 9.76 | 26.57 | 0.454 | Adaptor |
| **2560.00** | **QPSK 1/2** | **V** | **-20.56** | **18.55** | **9.55** | **28.10** | **0.646** | **Adaptor** |
| 2610.00 | QPSK 1/2 | V | -21.92 | 16.95 | 9.66 | 26.61 | 0.458 | Adaptor |
| 2560.00 | QPSK 3/4 | V | -20.90 | 18.21 | 9.55 | 27.76 | 0.597 | Adaptor |
| 2560.00 | 16QAM 1/2 | V | -20.79 | 18.32 | 9.55 | 27.87 | 0.612 | Adaptor |
| 2560.00 | 16QAM 3/4 | V | -20.90 | 18.21 | 9.55 | 27.76 | 0.597 | Adaptor |

B. POWER: Maximum **(BW 10MHz)**

| **Frequency** (MHz) | **Modulation Type** | **POL** (H/V) | **Reading Level** (dBm) | **Result Level (dBm)** | **Antenna Gain** (dBi) | **EIRP** (dBm) | **EIRP** (W) | **Supplied Power** |
|---|---|---|---|---|---|---|---|---|
| 2501.00 | 16QAM 1/2 | V | -25.33 | 16.38 | 9.76 | 26.14 | 0.411 | Adaptor |
| **2560.00** | **16QAM 1/2** | **V** | **-23.40** | **18.80** | **9.55** | **28.35** | **0.684** | **Adaptor** |
| 2610.00 | 16QAM 1/2 | V | -24.91 | 17.07 | 9.66 | 26.73 | 0.471 | Adaptor |
| 2560.00 | 16QAM 3/4 | V | -23.57 | 18.63 | 9.55 | 28.18 | 0.658 | Adaptor |
| 2560.00 | QPSK 1/2 | V | -23.63 | 18.57 | 9.55 | 28.12 | 0.649 | Adaptor |
| 2560.00 | QPSK 3/4 | V | -23.68 | 18.52 | 9.55 | 28.07 | 0.641 | Adaptor |

**NOTES:**

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A horn antenna was substituted in place of the EUT. This horn antenna was driven by a vector signal generator with WiMAX signal source and the level of the signal generator was adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the horn antenna is measured and this conducted power was corrected with antenna gain in dBi for EIRP .

### 4.1.3 Radiated Measurements

Field Strength of SPURIOUS Radiation

MODULATION SIGNAL : WiMAX

MODULATION TYPE : QPSK 1/2

BANDWIDTH : 5 MHz

OPERATING FREQUENCY : 2501 MHz

MEASURED OUTPUT POWER : 26.57 dBm = 0.454 W

DISTANCE : 3 meters

LIMIT $43 + 10\log_{10}(W)$ = 39.57 dBc

| **Freq.** (MHz) | **POL** (H/V) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBi) | **CORRECT GENERATOR LEVEL** (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5002 | V | -53.84 | 10.89 | -42.95 | 69.52 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

### 4.1.3 Radiated Measurements **(Continued…)**

Field Strength of SPURIOUS Radiation

MODULATION SIGNAL : WiMAX
MODULATION TYPE : QPSK 1/2
BANDWIDTH : 5 MHz
OPERATING FREQUENCY : 2560 MHz
MEASURED OUTPUT POWER : 28.10 dBm = 0.646 W
DISTANCE : 3 meters
LIMIT $43 + 10\log_{10}(W)$ = 41.10 dBc

| **Freq.** (MHz) | **POL** (H/V) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBi) | **CORRECT GENERATOR LEVEL** (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5120 | V | -51.74 | 10.80 | -40.94 | 69.04 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

### 4.1.3 Radiated Measurements **(Continued…)**

Field Strength of SPURIOUS Radiation

| | | |
|---|---|---|
| MODULATION SIGNAL | : | WiMAX |
| MODULATION TYPE | : | QPSK 1/2 |
| BANDWIDTH | : | 5 MHz |
| OPERATING FREQUENCY | : | 2610 MHz |
| MEASURED OUTPUT POWER | : | 26.61 dBm = 0.458 W |
| DISTANCE | : | 3 meters |
| LIMIT | | $43 + 10 \log_{10} (W)$ = 39.61 dBc |

| **Freq.** (MHz) | **POL** (H/V) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBi) | **CORRECT GENERATOR LEVEL** (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5220 | V | -52.40 | 10.82 | -41.58 | 68.19 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

### 4.1.3 Radiated Measurements (Continued…)

Field Strength of SPURIOUS Radiation

MODULATION TYPE : 16QAM 1/2

BANDWIDTH : 10 MHz

OPERATING FREQUENCY : 2501 MHz

MEASURED OUTPUT POWER : 26.14 dBm = 0.411 W

MODULATION SIGNAL : WiMAX (Internal)

DISTANCE : 3 meters

LIMIT $43 + 10 \log_{10} (W)$ = 39.14 dBc

| **Freq.** (MHz) | **POL** (H/V) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBi) | **CORRECT GENERATOR LEVEL** (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5002 | V | -52.91 | 10.89 | -42.02 | 68.16 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer’s reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

### 4.1.3 Radiated Measurements (Continued…)

Field Strength of SPURIOUS Radiation

| | | |
|---|---|---|
| MODULATION SIGNAL | : | WiMAX |
| MODULATION TYPE | : | 16QAM 1/2 |
| BANDWIDTH | : | 10 MHz |
| OPERATING FREQUENCY | : | 2560 MHz |
| MEASURED OUTPUT POWER | : | 28.35 dBm = 0.684 W |
| DISTANCE | : | 3 meters |
| LIMIT | | $43 + 10\log_{10}(W)$ = 41.35 dBc |

| **Freq.** (MHz) | **POL** (H/V) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBi) | **CORRECT GENERATOR LEVEL** (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5120 | V | -52.09 | 10.80 | -41.29 | 69.64 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer’s reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

### 4.1.3 Radiated Measurements (Continued…)

Field Strength of SPURIOUS Radiation

MODULATION SIGNAL : WiMAX
MODULATION TYPE : 16QAM 1/2
BANDWIDTH : 10 MHz
OPERATING FREQUENCY : 2610 MHz
MEASURED OUTPUT POWER : 26.73 dBm = 0.471 W
DISTANCE : 3 meters
LIMIT $43 + 10 \log_{10}(W)$ = 39.73 dBc

| Freq. (MHz) | POL (H/V) | LEVEL@ ANTENNA TERMINALS (dBm) | SUBSTITUTE ANTENNA GAIN (dBi) | CORRECT GENERATOR LEVEL (dBm) | (dBc) |
|---|---|---|---|---|---|
| 5220 | V | -52.72 | 10.82 | -41.90 | 68.63 |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table located at 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the spectrum analyzer. A antenna was substituted in place of the EUT. This antenna was driven by a vector signal generator with WiMAX signal source for harmonics and with CW signal for narrow band spurious emissions. The level of the signal generator was adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna was measured and this conducted power was corrected with antenna gain in dBi.
This spurious level was recorded.

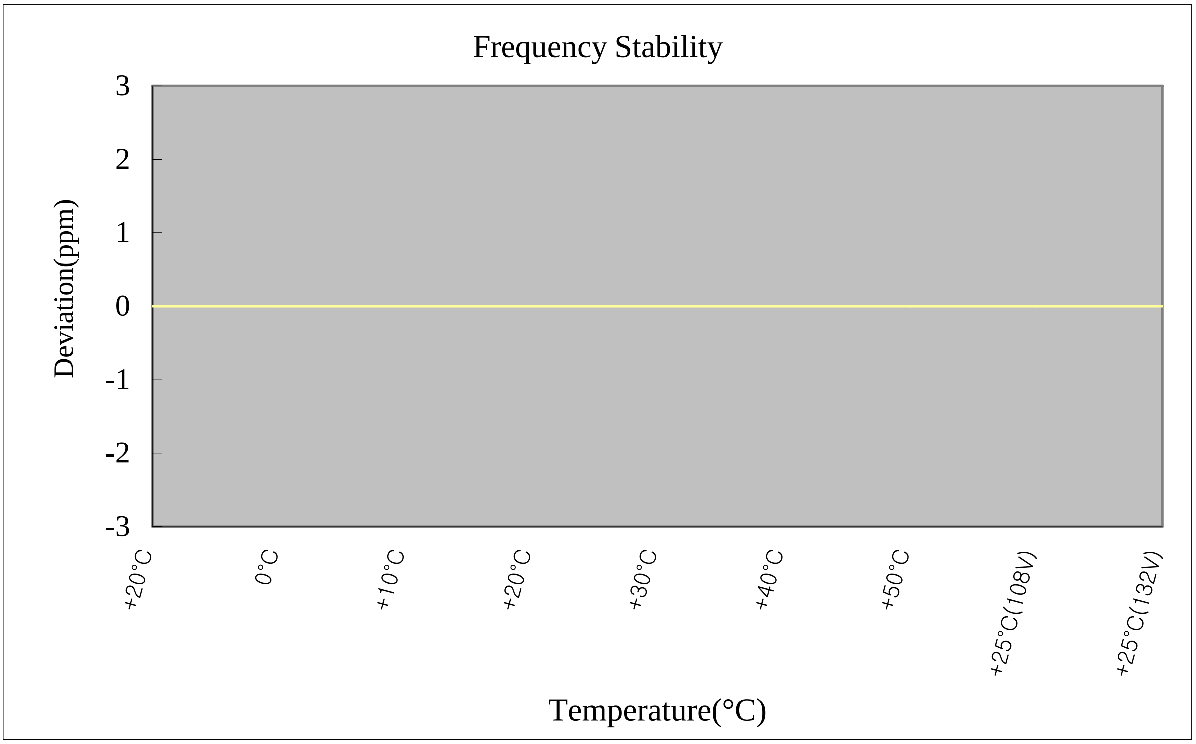
## 4.1.4 Frequency Stability

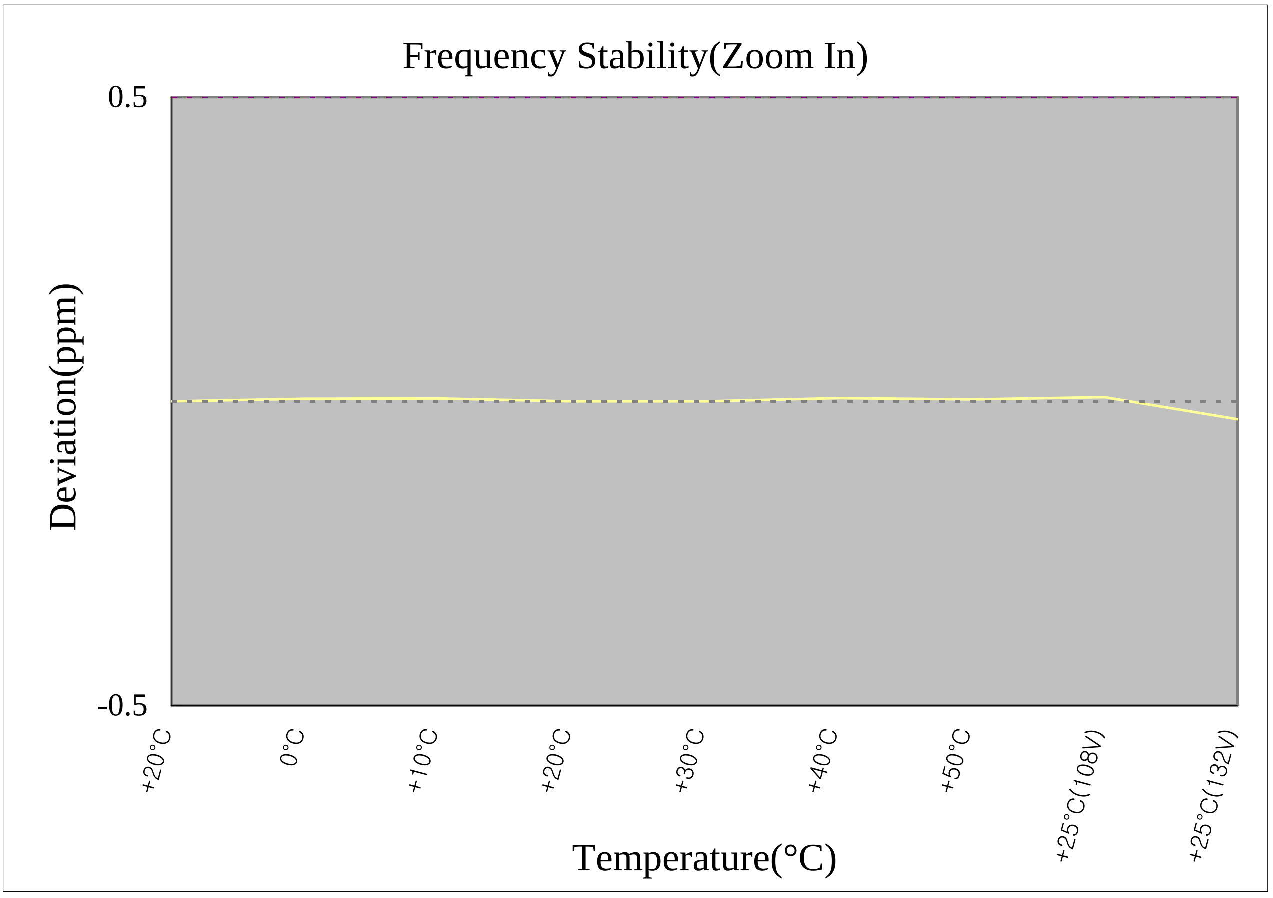
| | | | |
|---|---|---|---|
| Band Width | : | 5 | MHz |
| OPERATING FREQUENCY | : | 2,560,000,018 | Hz |
| REFERENCE VOLTAGE | : | 120 | VDC |

| VOLTAGE (%) | POWER (VAC) | TEMP (dB) | FREQ (Hz) | Deviation (%) |
|---|---|---|---|---|
| 100% | 120 | +20(Ref) | 2,560,000,018 | 0.000000 |
| 100% | | 0 | 2,560,000,029 | 0.000000 |
| 100% | | +10 | 2,560,000,030 | 0.000000 |
| 100% | | +20 | 2,560,000,018 | 0.000000 |
| 100% | | +30 | 2,560,000,018 | 0.000000 |
| 100% | | +40 | 2,560,000,031 | 0.000001 |
| 100% | | +50 | 2,560,000,026 | 0.000000 |
| 85% | 108 | +25 | 2,560,000,035 | 0.000001 |
| 115% | 132 | +25 | 2,559,999,943 | -0.000003 |
| BATT.ENDPOINT | - | - | - | - |

Note : Since this device is a fixed device and indoor use device. So the frequency stability is tested by $0^{o}C$

### 4.1.4 Frequency Stability **(Continued…)**



## 4.1.4 Frequency Stability **(Continued…)**

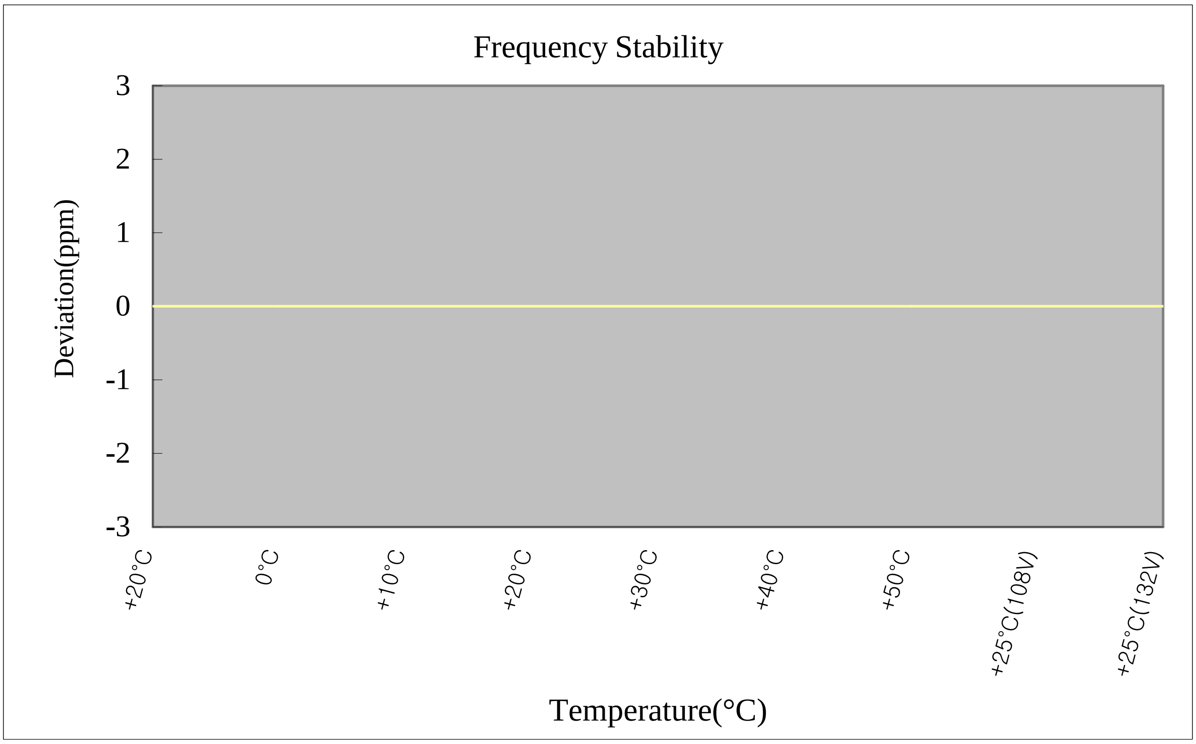
Band Width : 10 MHz
OPERATING FREQUENCY : 2,560,000,023 Hz
REFERENCE VOLTAGE : 120 VDC

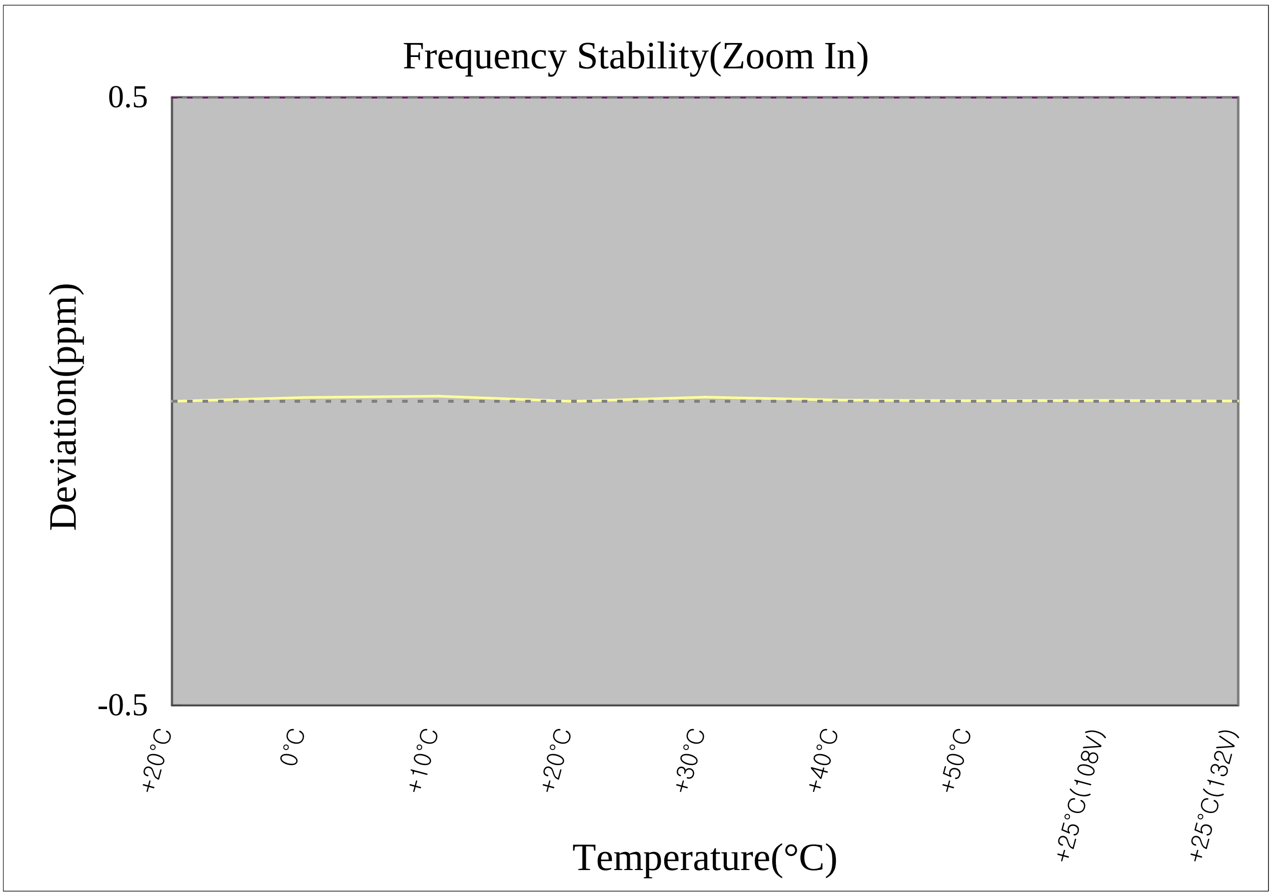
| VOLTAGE (%) | POWER (VAC) | TEMP (dB) | FREQ (Hz) | Deviation (%) |
|---|---|---|---|---|
| 100% | 120 | +20(Ref) | 2,560,000,023 | 0.000000 |
| 100% | | 0 | 2,560,000,039 | 0.000001 |
| 100% | | +10 | 2,560,000,044 | 0.000001 |
| 100% | | +20 | 2,560,000,023 | 0.000000 |
| 100% | | +30 | 2,560,000,041 | 0.000001 |
| 100% | | +40 | 2,560,000,029 | 0.000000 |
| 100% | | +50 | 2,560,000,026 | 0.000000 |
| 85% | 108 | +25 | 2,560,000,027 | 0.000000 |
| 115% | 132 | +25 | 2,560,000,025 | 0.000000 |
| BATT.ENDPOINT | - | - | - | - |

Note : Since this device is a fixed device and indoor use device. So the frequency stability is tested by 0$^{o}$C

### 4.1.4 Frequency Stability (Continued…)



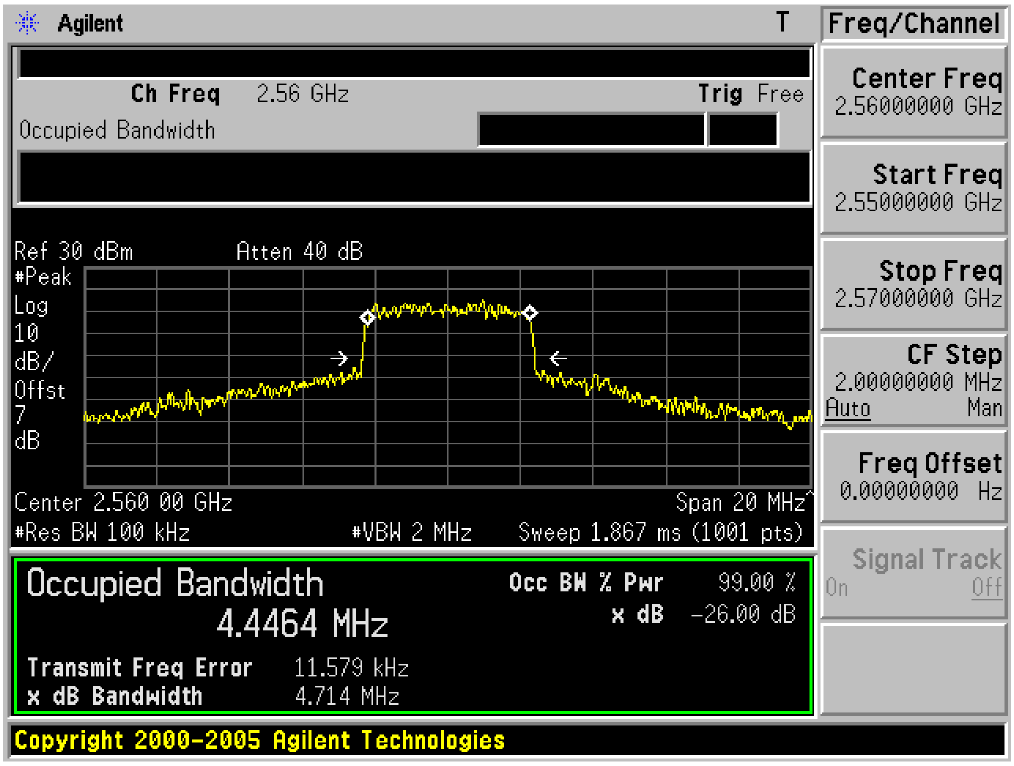



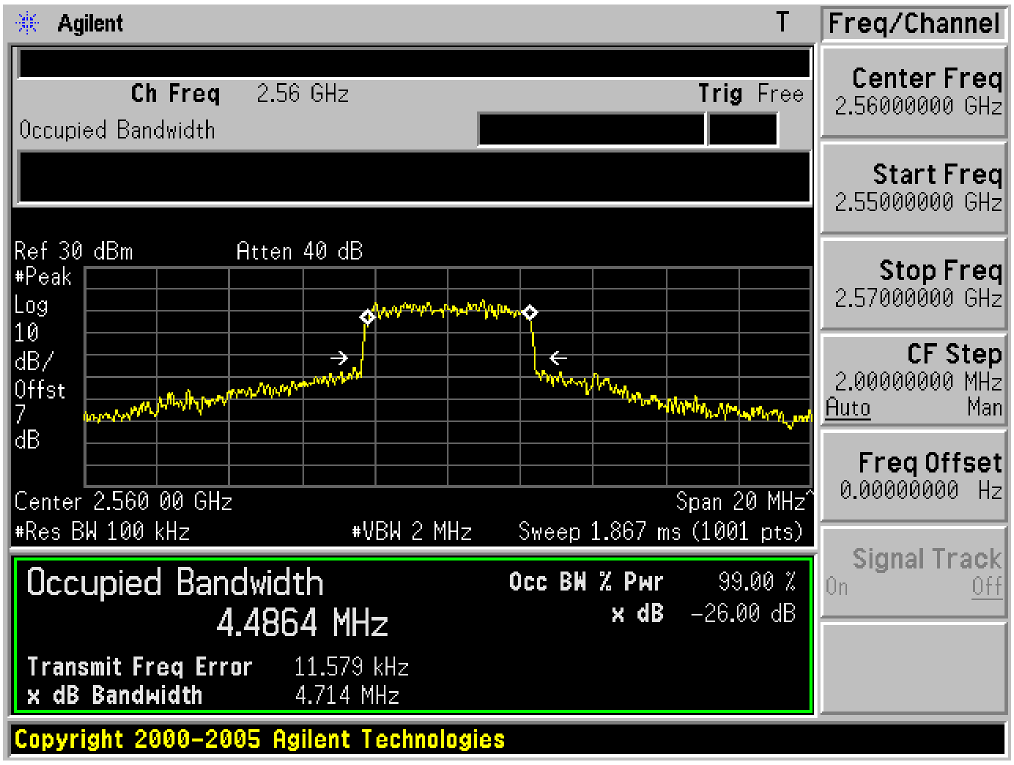
## 5.1 PLOTS OF EMISSIONS

### 5.1.1 Occupied Bandwidth(BW: 5MHz)

**- Middle Channel(2560MHz) & QPSK 1/2**

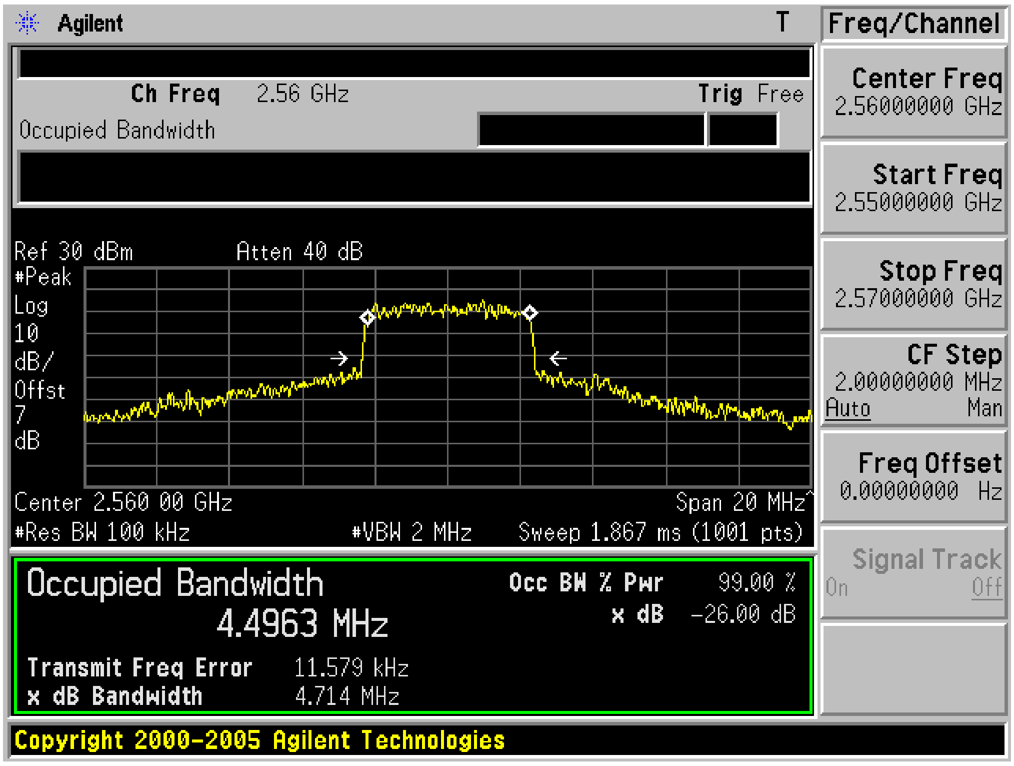



**- Middle Channel(2560MHz) & QPSK 3/4**

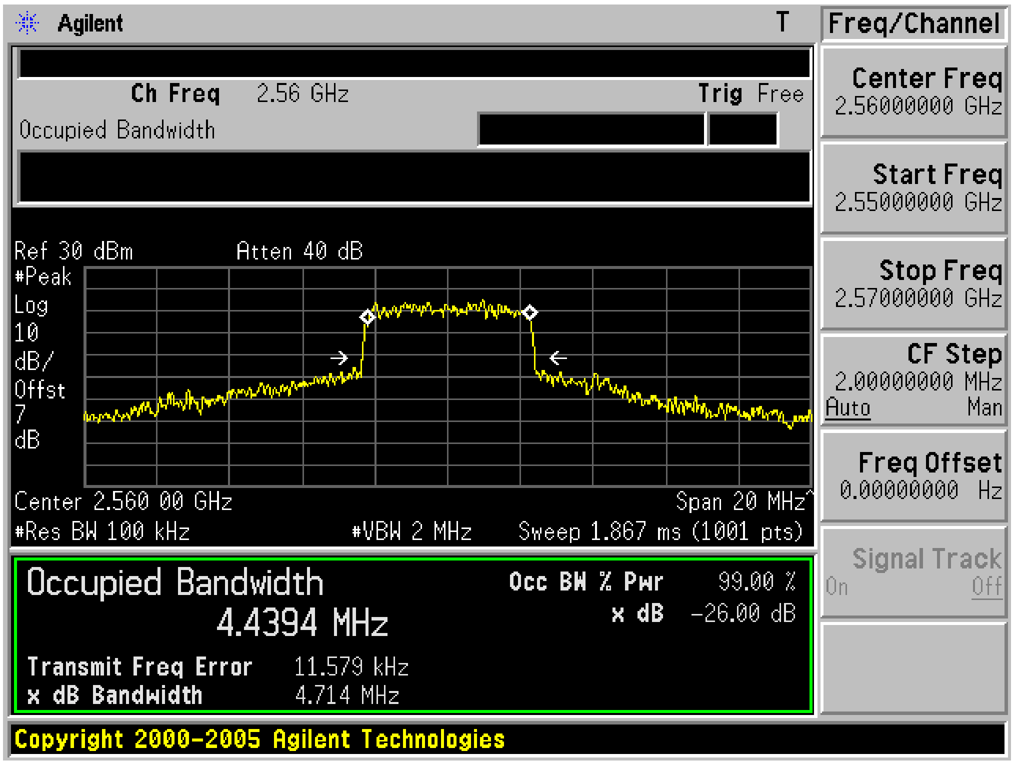


## 5.1.1 Occupied Bandwidth(BW: 5MHz) (Continued…)

### - Middle Channel(2560MHz) & 16QAM 1/2

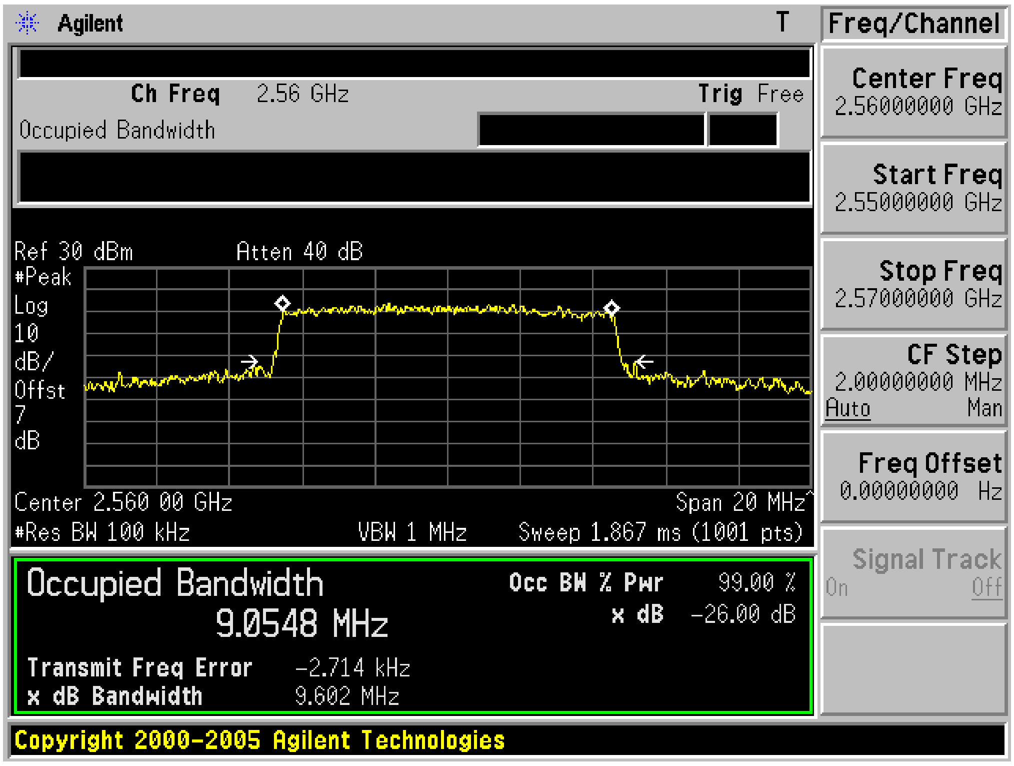



### - Middle Channel(2560MHz) & 16QAM 3/4

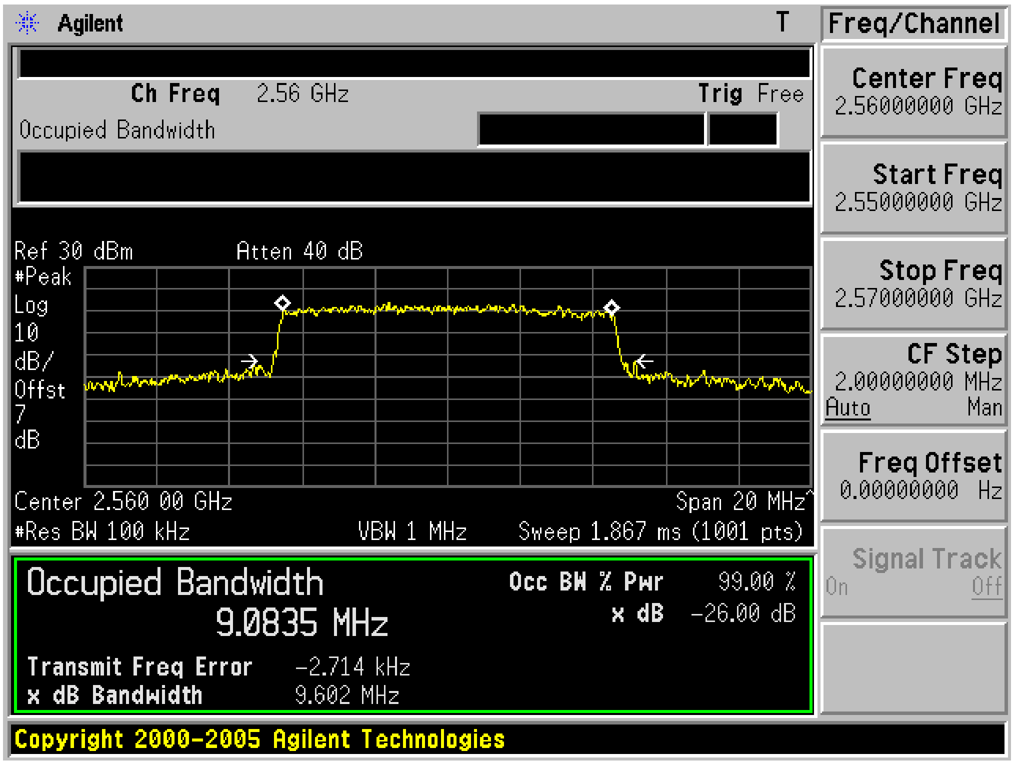


## 5.1.1 Occupied Bandwidth(BW: 10MHz) (Continued…)

**- Middle Channel(2560MHz) & QPSK 1/2**

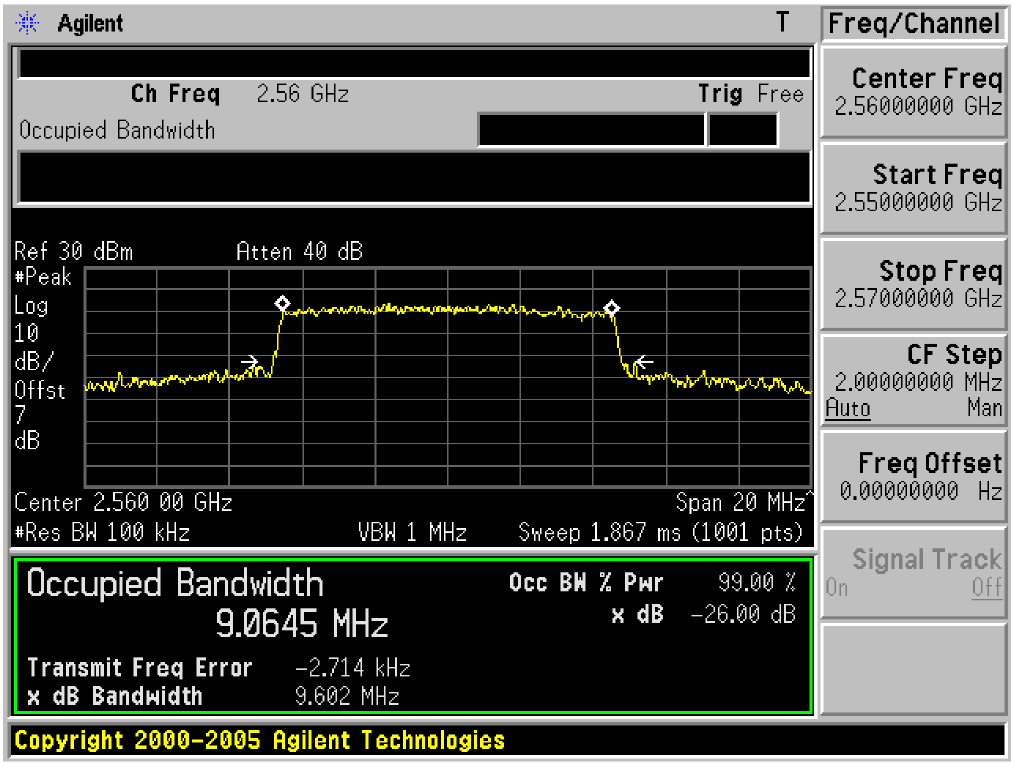



**- Middle Channel(2560MHz) & QPSK 3/4**

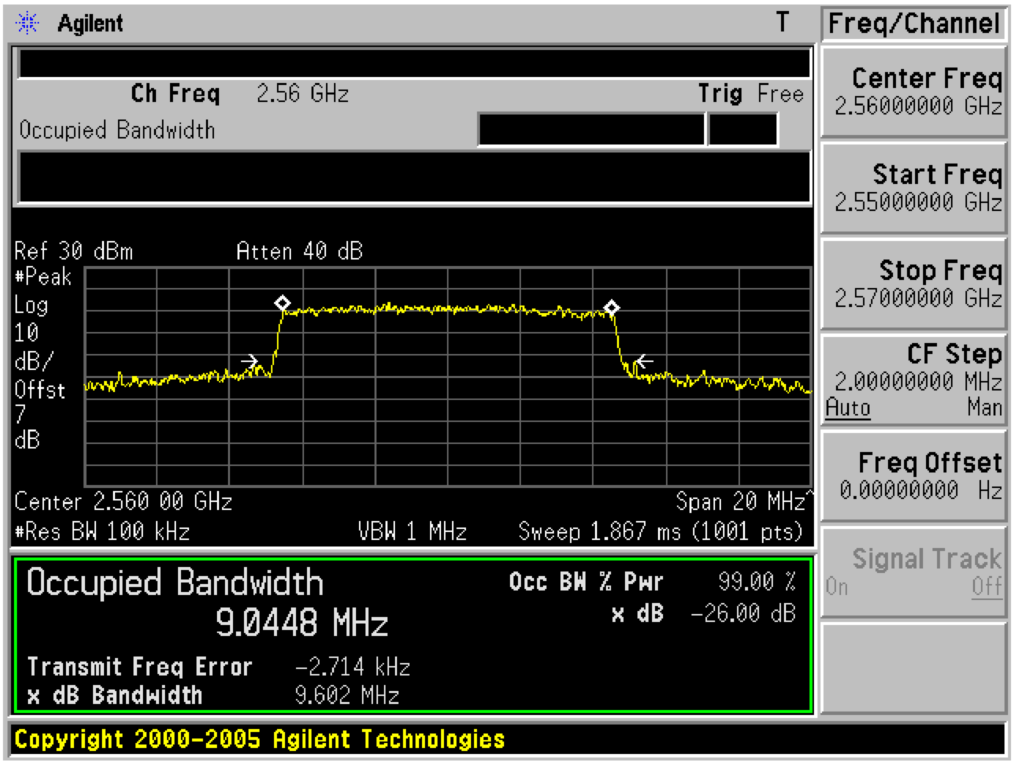


## 5.1.1 Occupied Bandwidth(BW: 10MHz) (Continued…)

**- Middle Channel(2560MHz) & 16QAM 1/2**

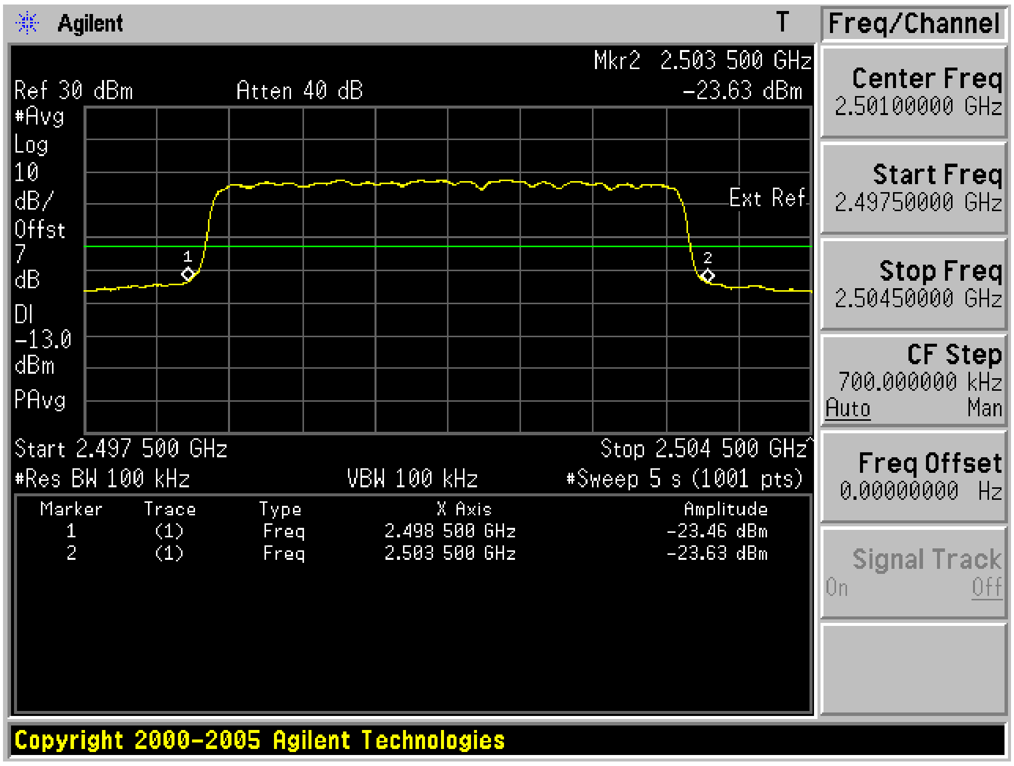


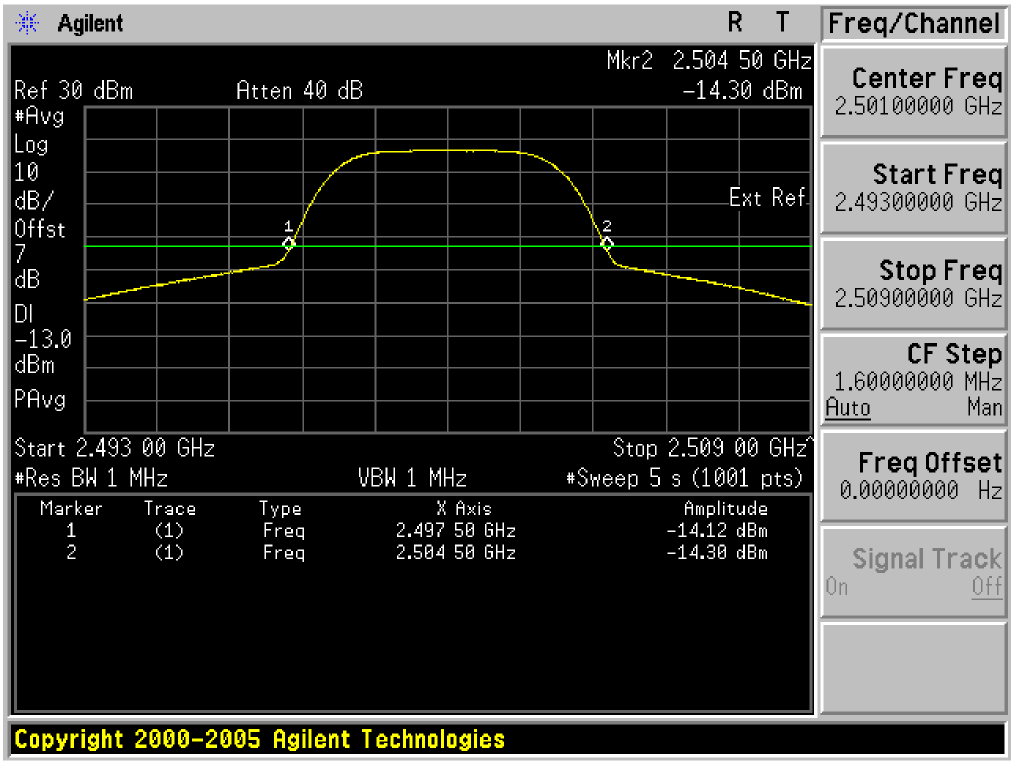

**- Middle Channel(2560MHz) & 16QAM 3/4**



## 5.1.2 Band Edge(BW: 5MHz)

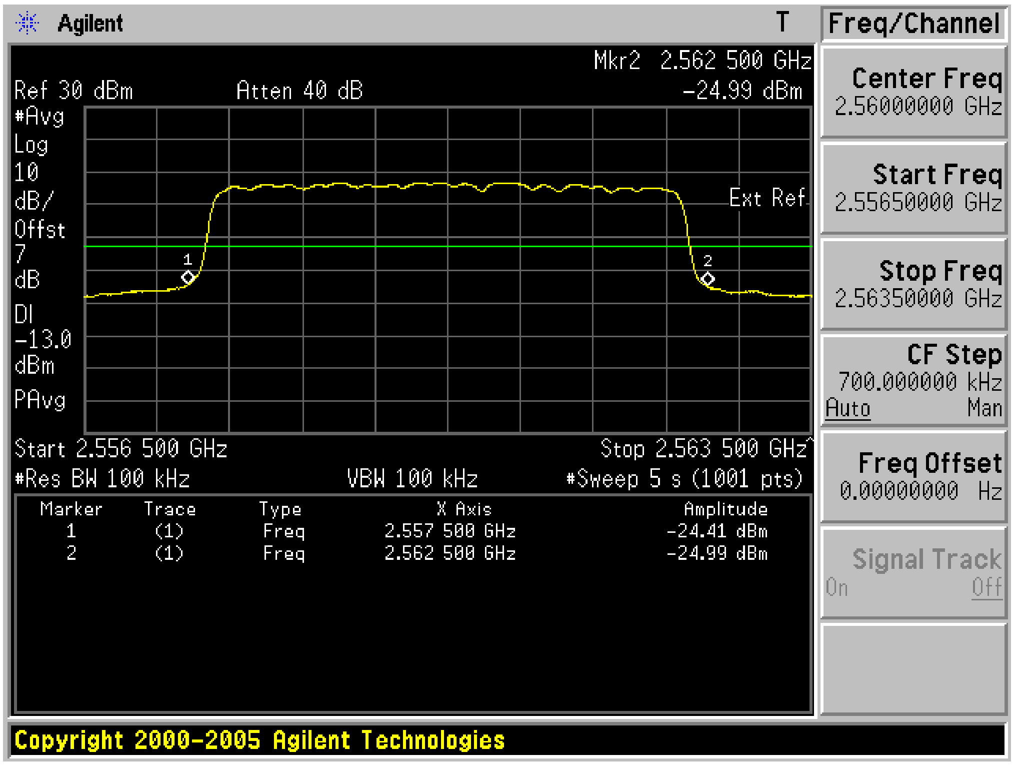
**- Low Channel(2501MHz)**

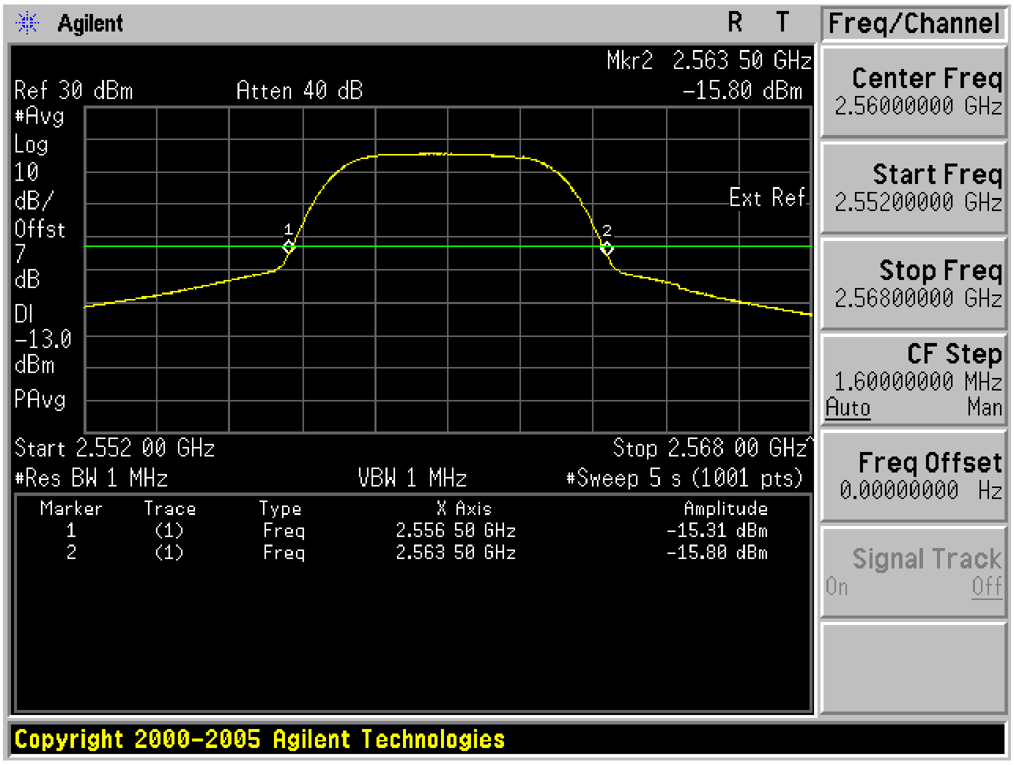


## 5.1.2 Band Edge(BW: 5MHz) (Continued…)

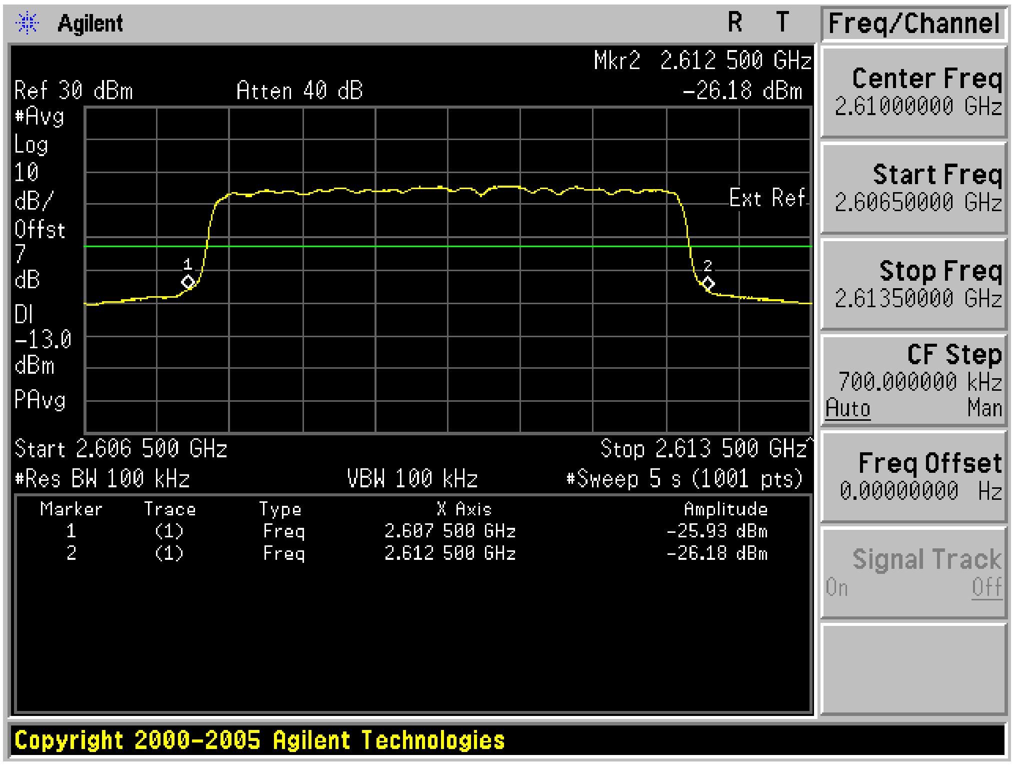
**- Middle Channel(2560MHz)**

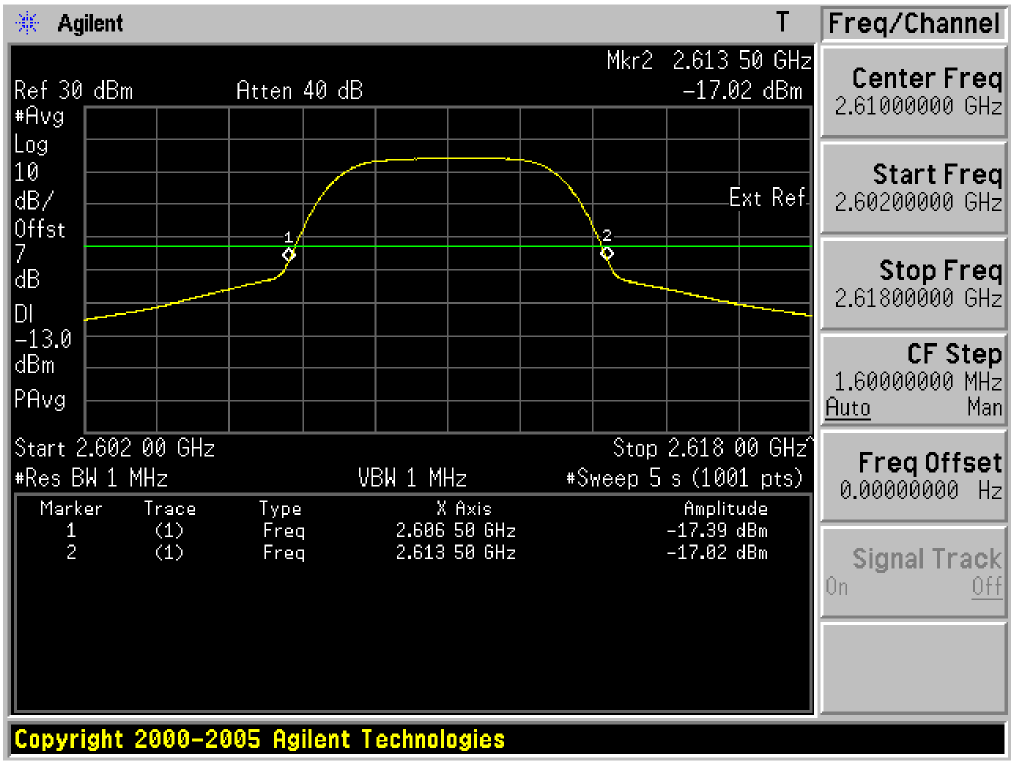


## 5.1.2 Band Edge(BW: 5MHz) (Continued…)

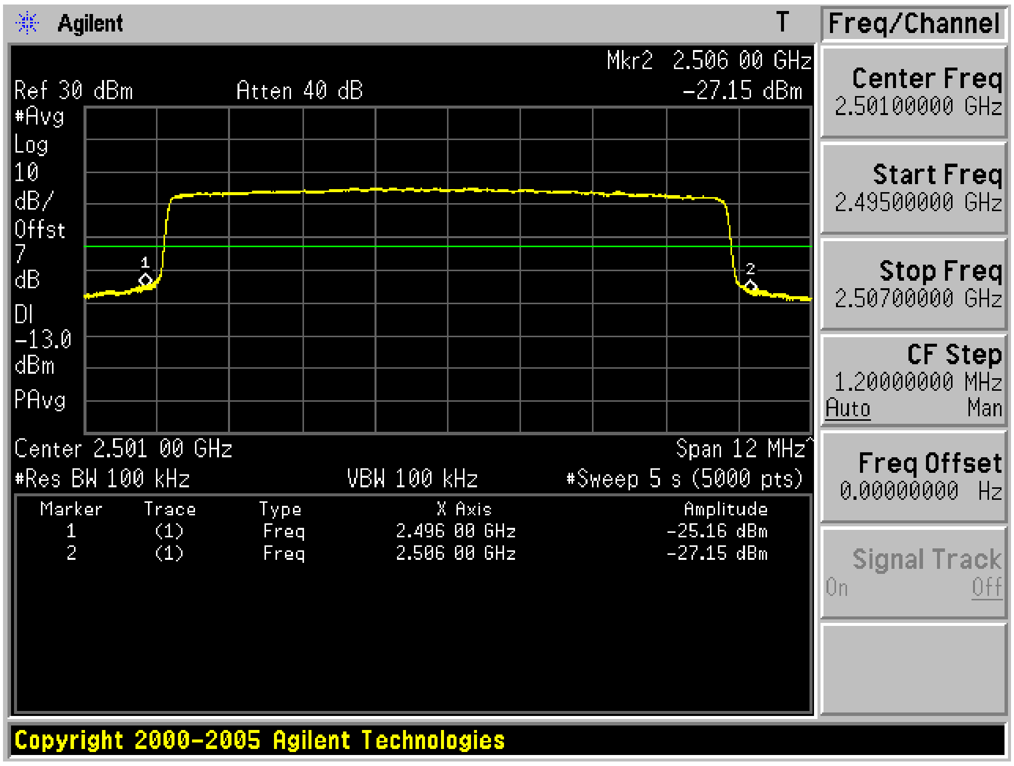
**- High Channel(2610MHz)**

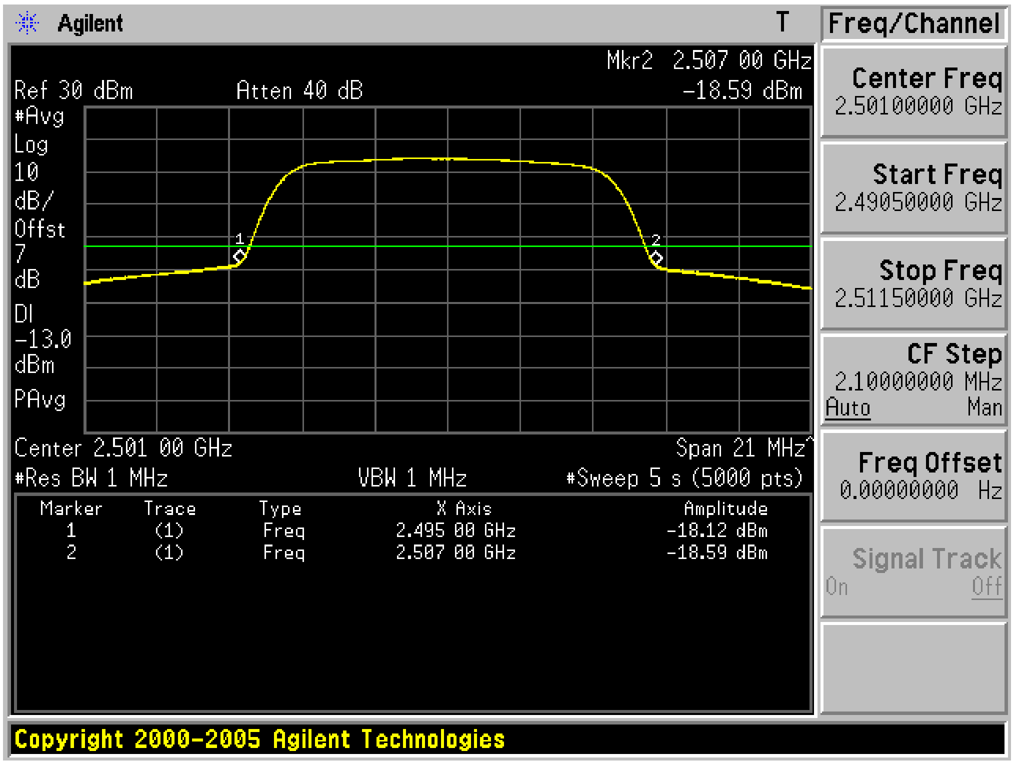


## 5.1.2 Band Edge(BW: 10MHz) (Continued…)

- Low Channel(2501MHz)

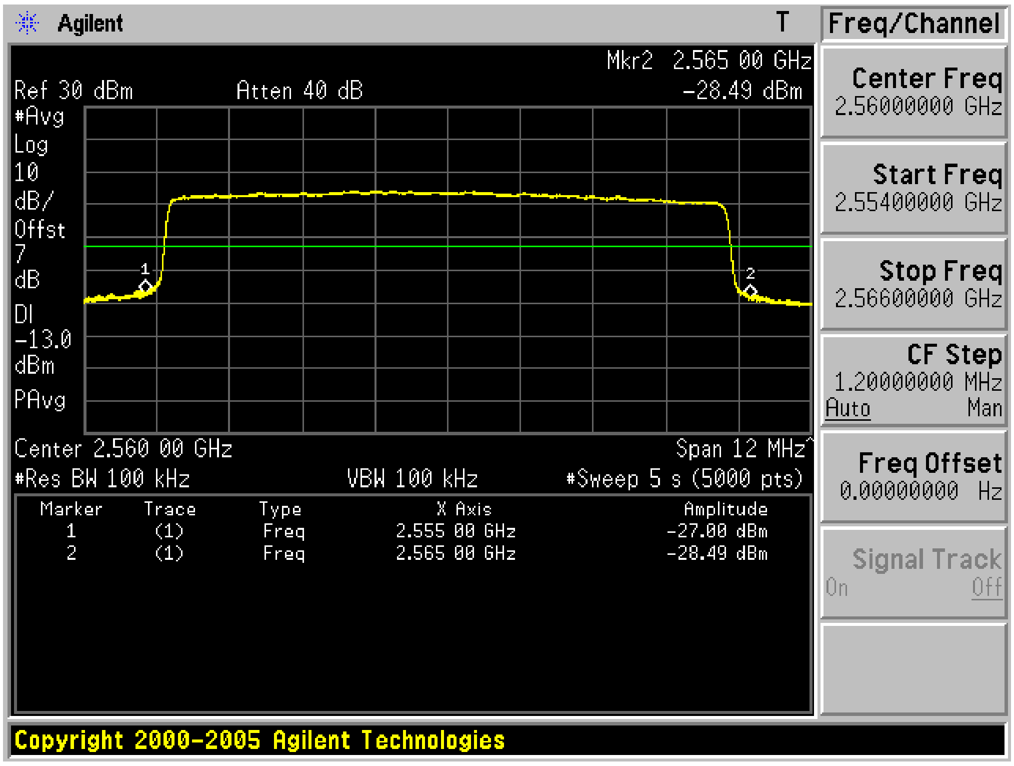


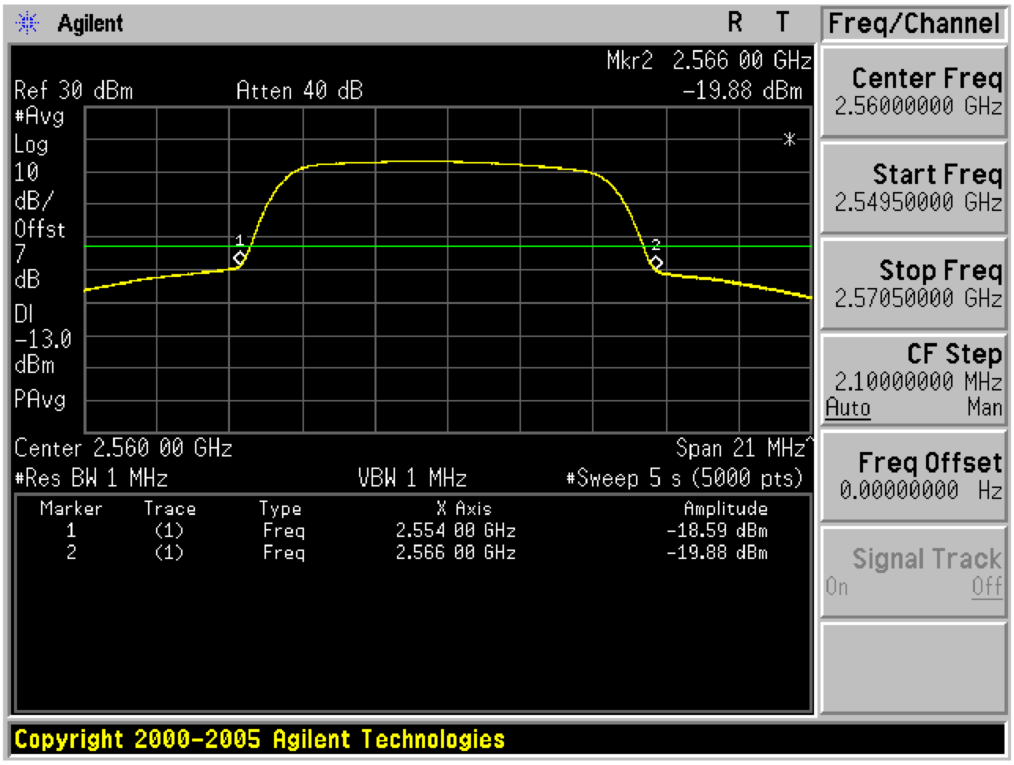



## 5.1.2 Band Edge(BW: 10MHz) (Continued…)

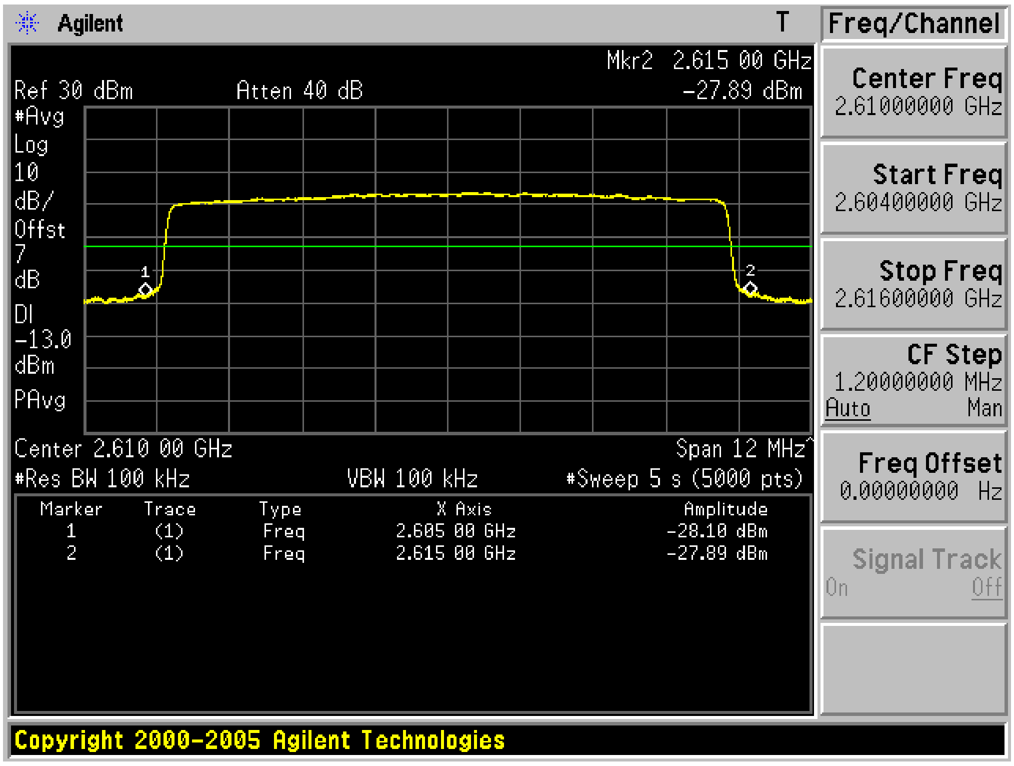
**- Middle Channel(2560MHz)**

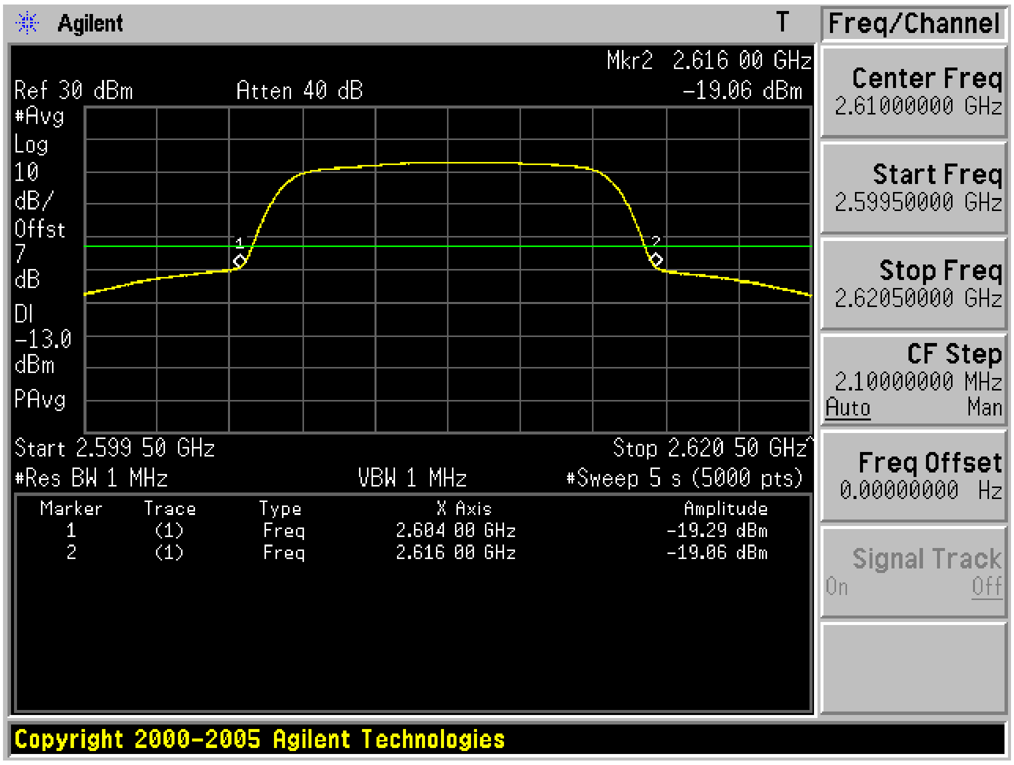


## 5.1.2 Band Edge(BW: 10MHz) (Continued…)

**- High Channel(2610MHz)**

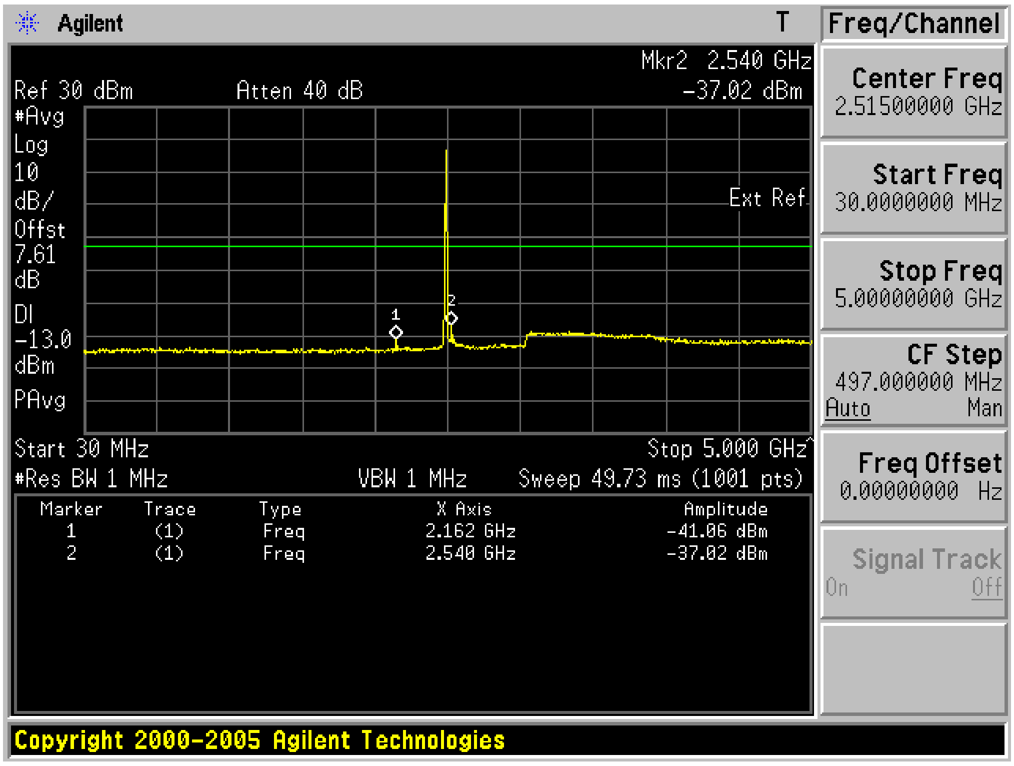


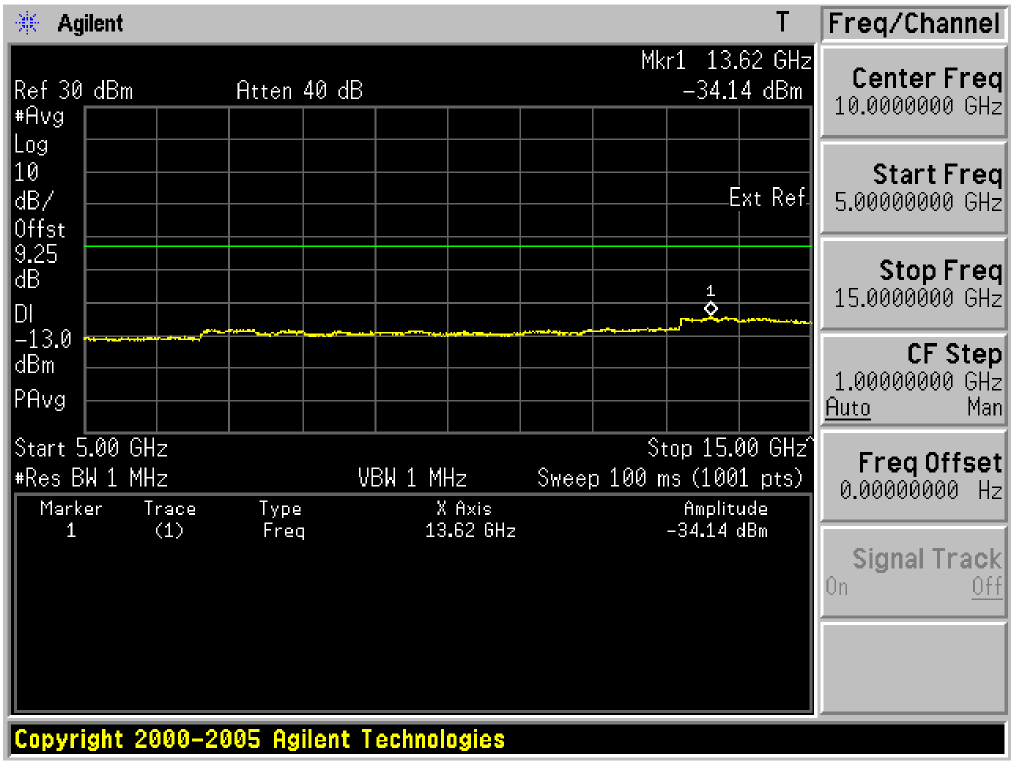



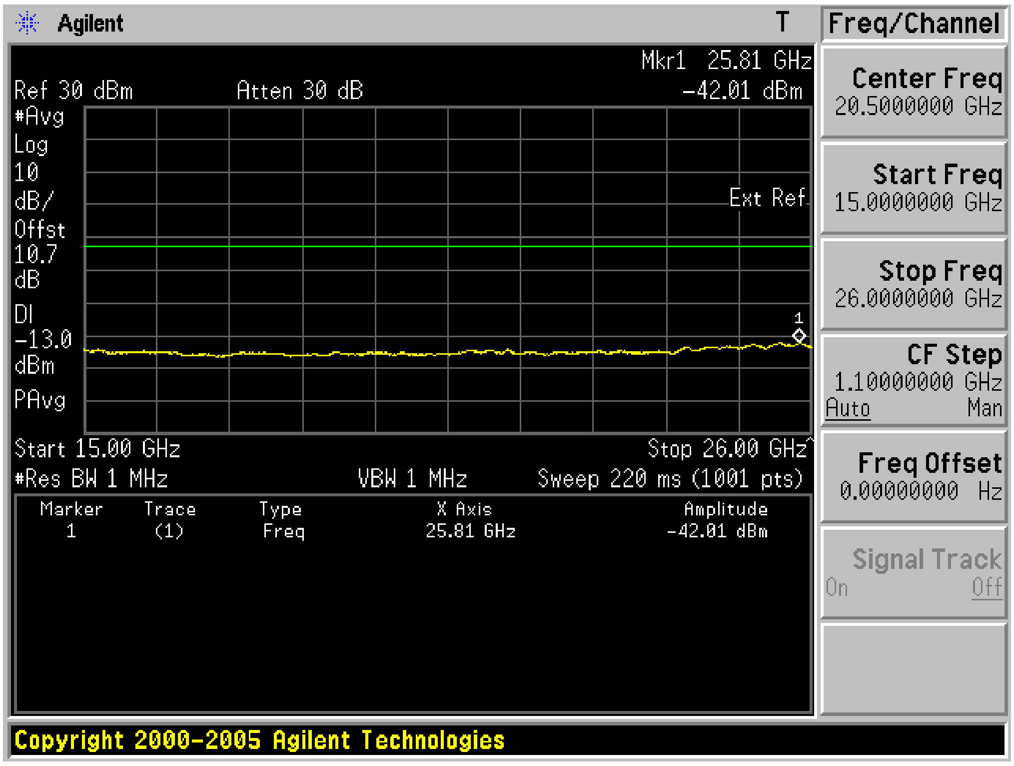

 

## 5.1.3 Conducted Spurious Emissions(BW: 5MHz)

**- Low Channel(2501MHz)**

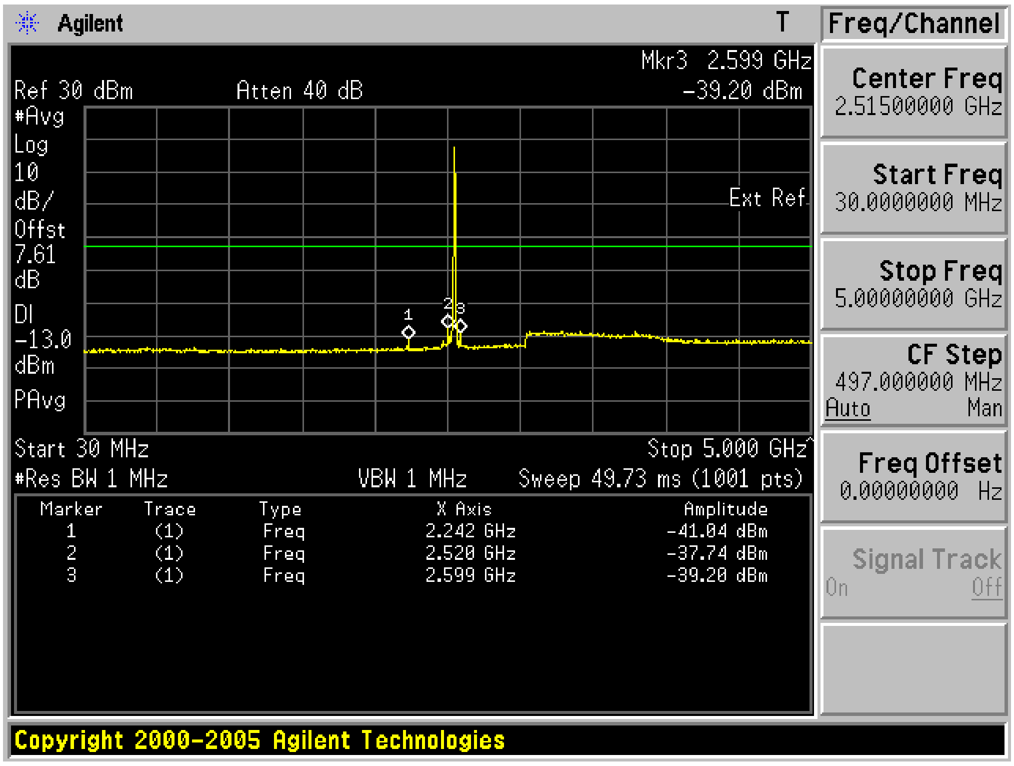


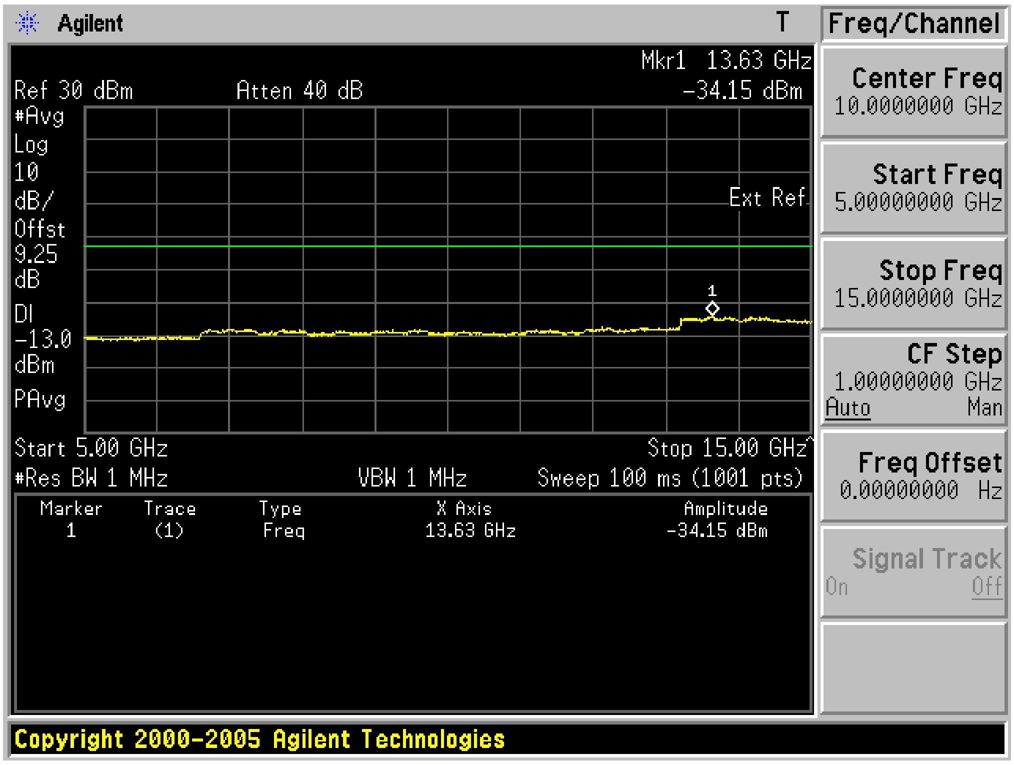



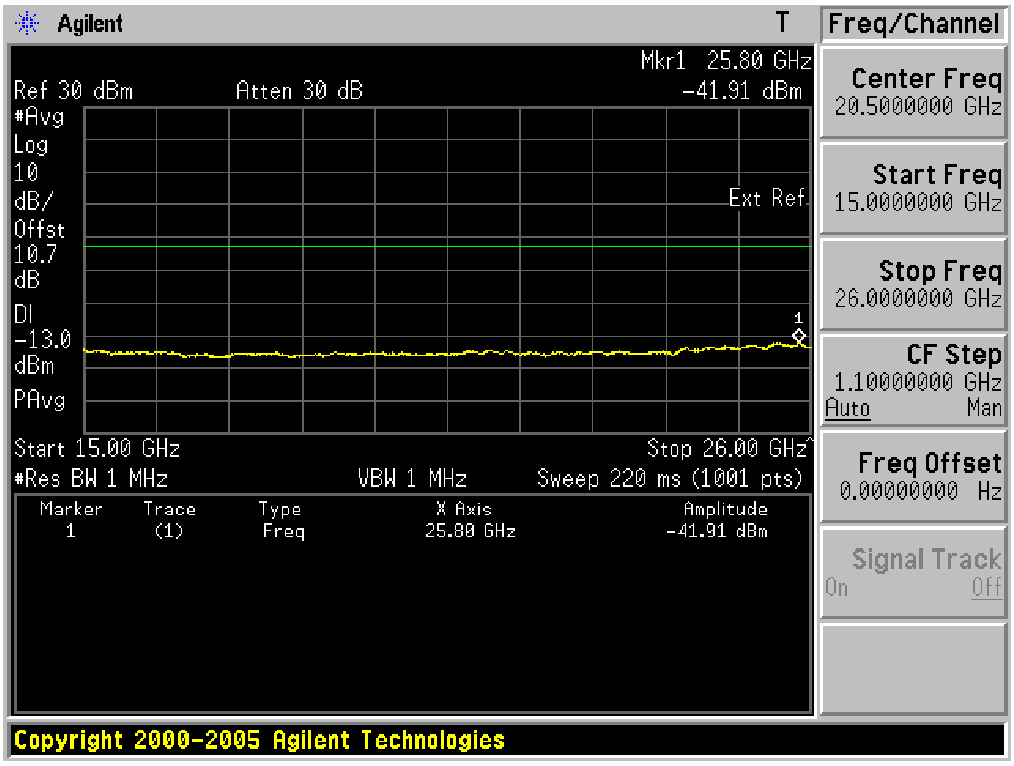

Agilent
T
Freq/Channel
Mkr1 25.81 GHz
Ref 30 dBm
Atten 30 dB
-42.01 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
Ext Ref
DI
-13.0
dBm
PAvg
Start 15.00 GHz
Stop 26.00 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 220 ms (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 25.81 GHz -42.01 dBm
Center Freq
20.5000000 GHz
Start Freq
15.0000000 GHz
Stop Freq
26.0000000 GHz
CF Step
1.10000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2005 Agilent Technologies

## 5.1.3 Conducted Spurious Emissions(BW: 5MHz) (Continued…)

**- Middle Channel(2560MHz)**

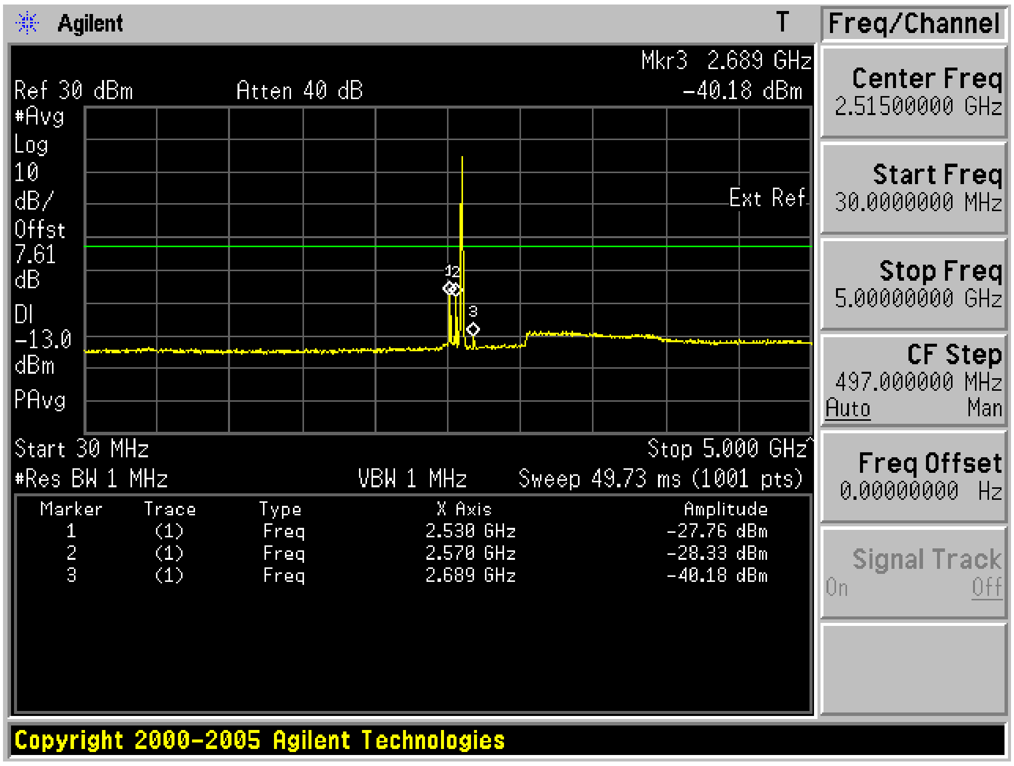


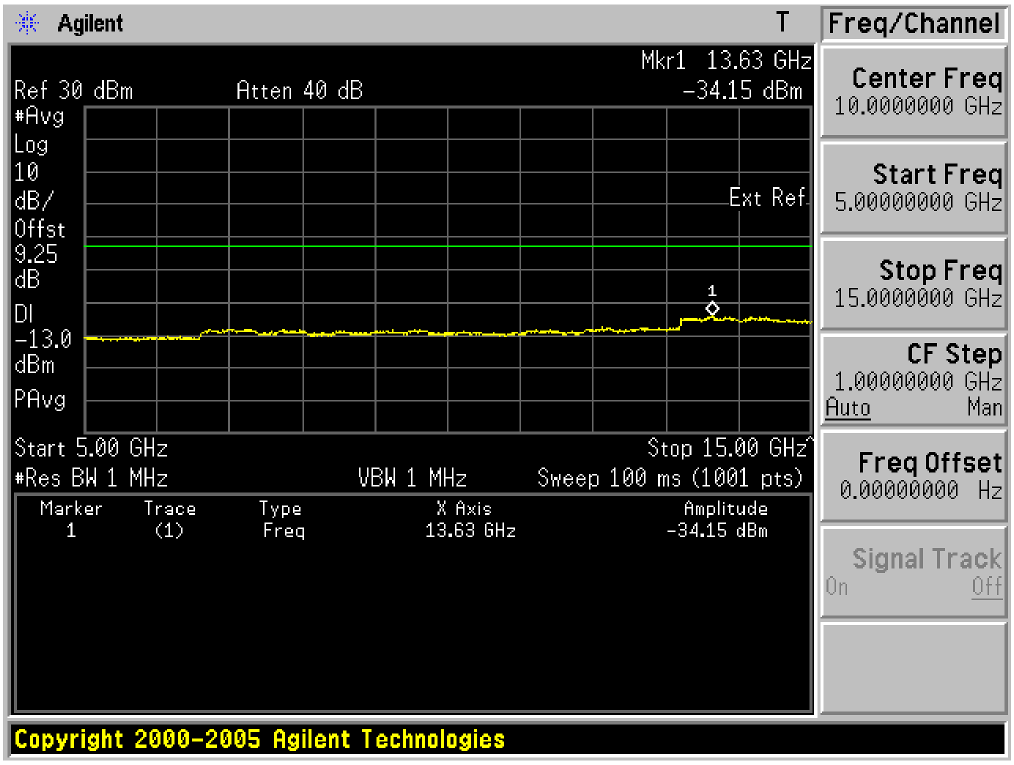



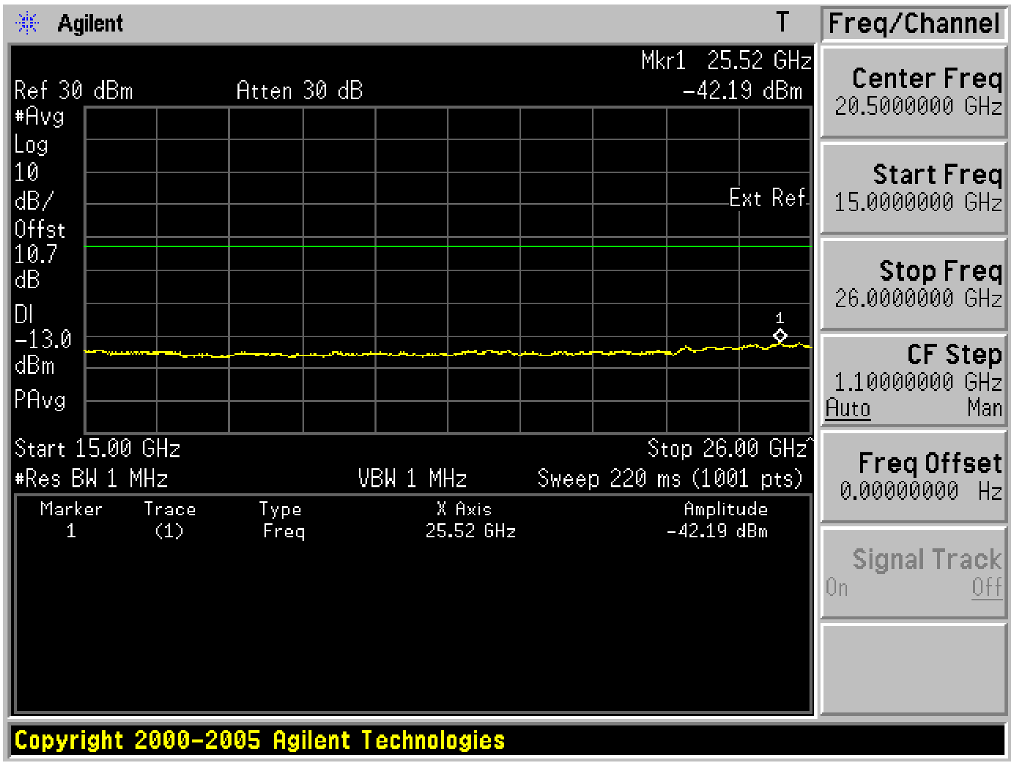

Agilent
T
Freq/Channel
Mkr1 25.80 GHz
Ref 30 dBm Atten 30 dB -41.91 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
Ext Ref
Dl
-13.0
dBm
PAvg
Start 15.00 GHz Stop 26.00 GHz
#Res BW 1 MHz VBW 1 MHz Sweep 220 ms (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 25.80 GHz -41.91 dBm
Center Freq 20.5000000 GHz
Start Freq 15.0000000 GHz
Stop Freq 26.0000000 GHz
CF Step 1.10000000 GHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off
Copyright 2000-2005 Agilent Technologies

## 5.1.3 Conducted Spurious Emissions(BW: 5MHz) (Continued…)

**- High Channel(2610MHz)**

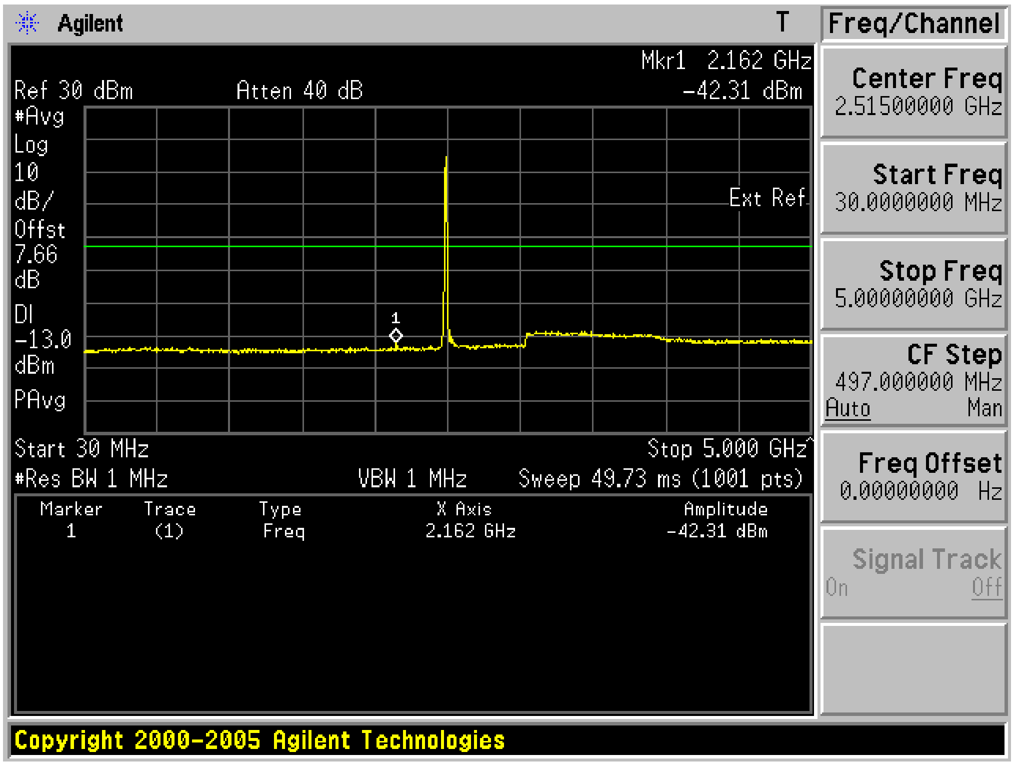


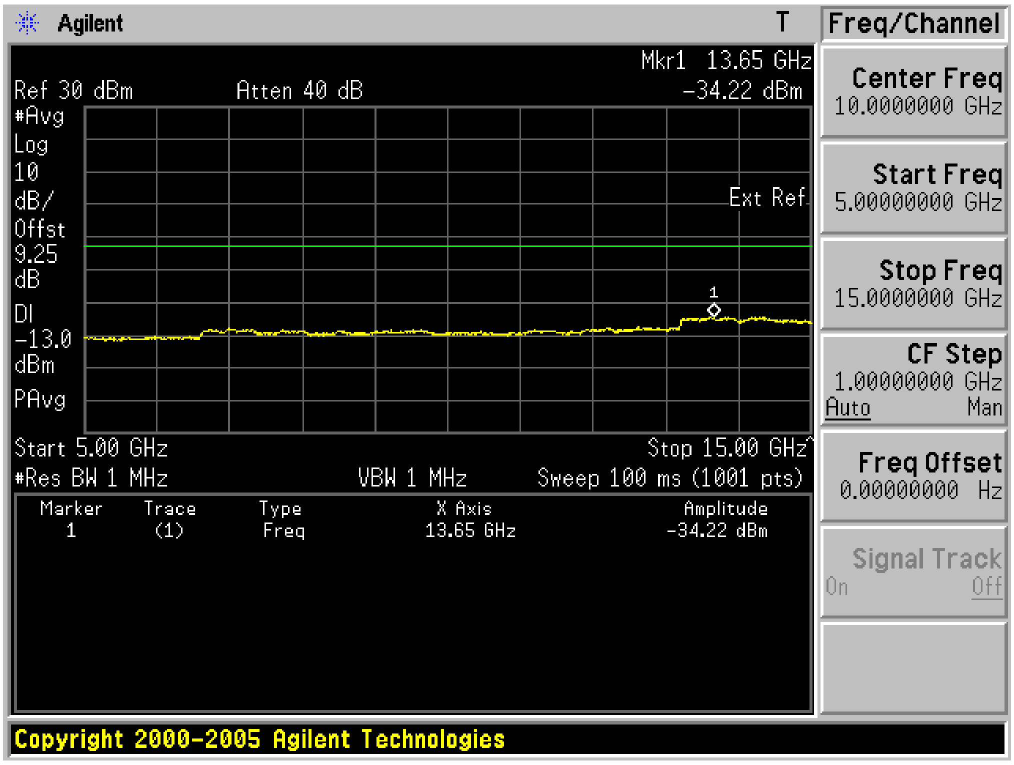



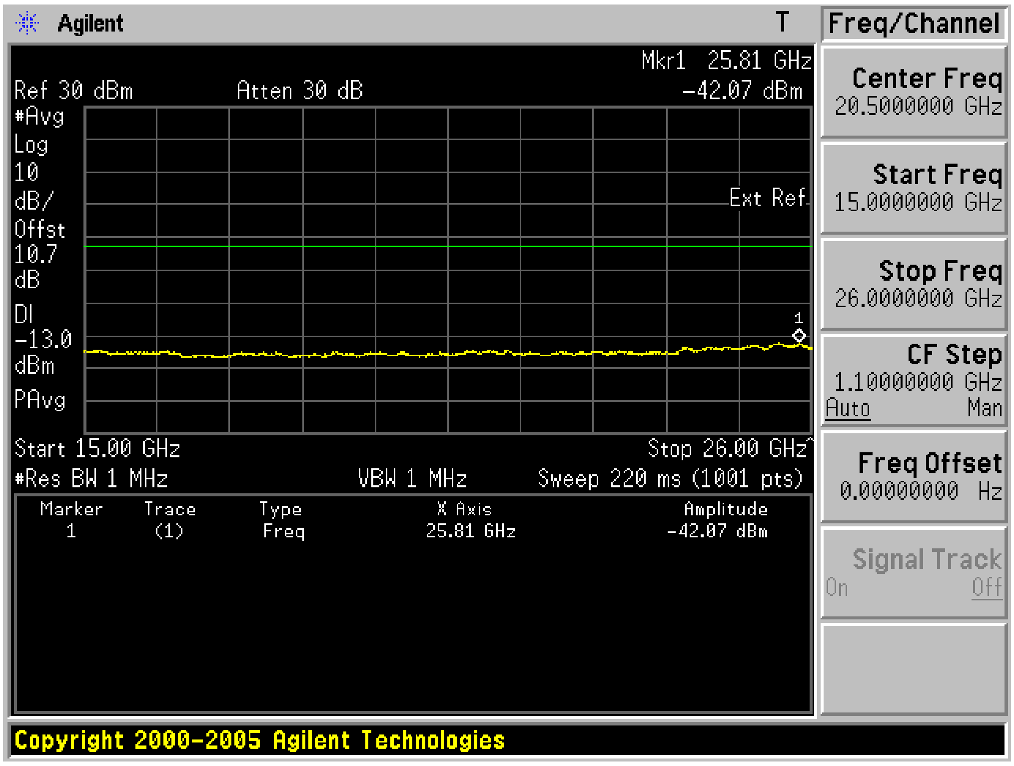

Agilent
T
Freq/Channel
Mkr1 25.52 GHz
Ref 30 dBm
Atten 30 dB
-42.19 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
Ext Ref
Dl
-13.0
dBm
PAvg
Center Freq
20.5000000 GHz
Start Freq
15.0000000 GHz
Stop Freq
26.0000000 GHz
CF Step
1.10000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 15.00 GHz
Stop 26.00 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 220 ms (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 25.52 GHz -42.19 dBm
Copyright 2000-2005 Agilent Technologies

## 5.1.3 Conducted Spurious Emissions(BW: 10MHz) (Continued…)

**- Low Channel(2501MHz)**

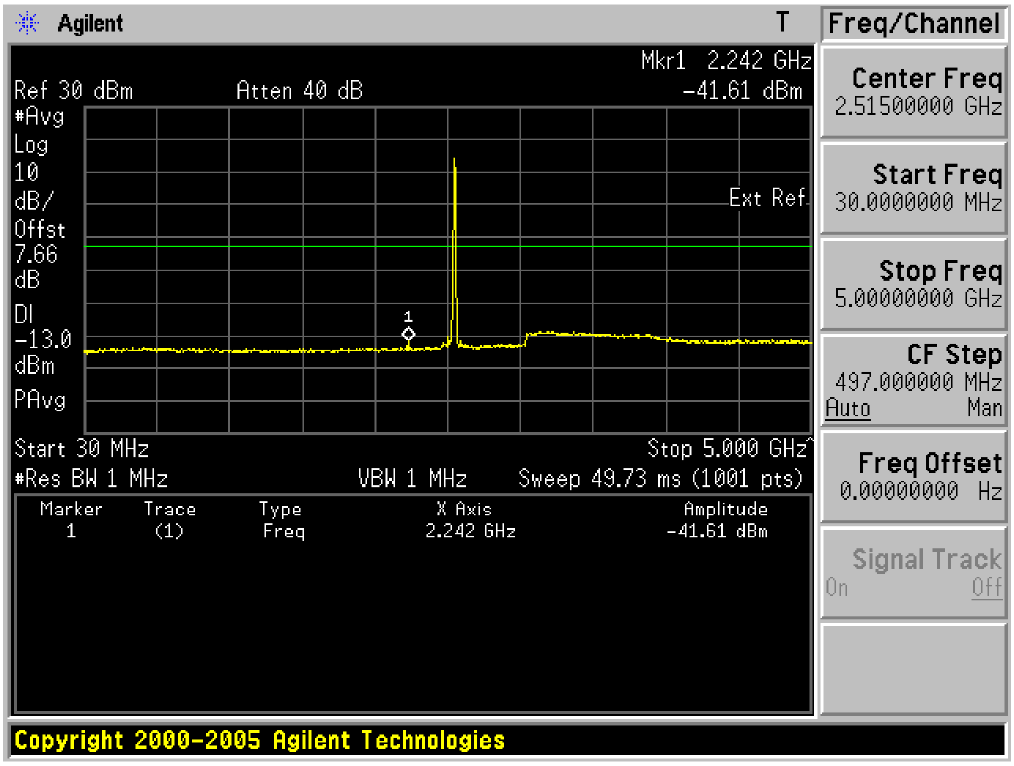


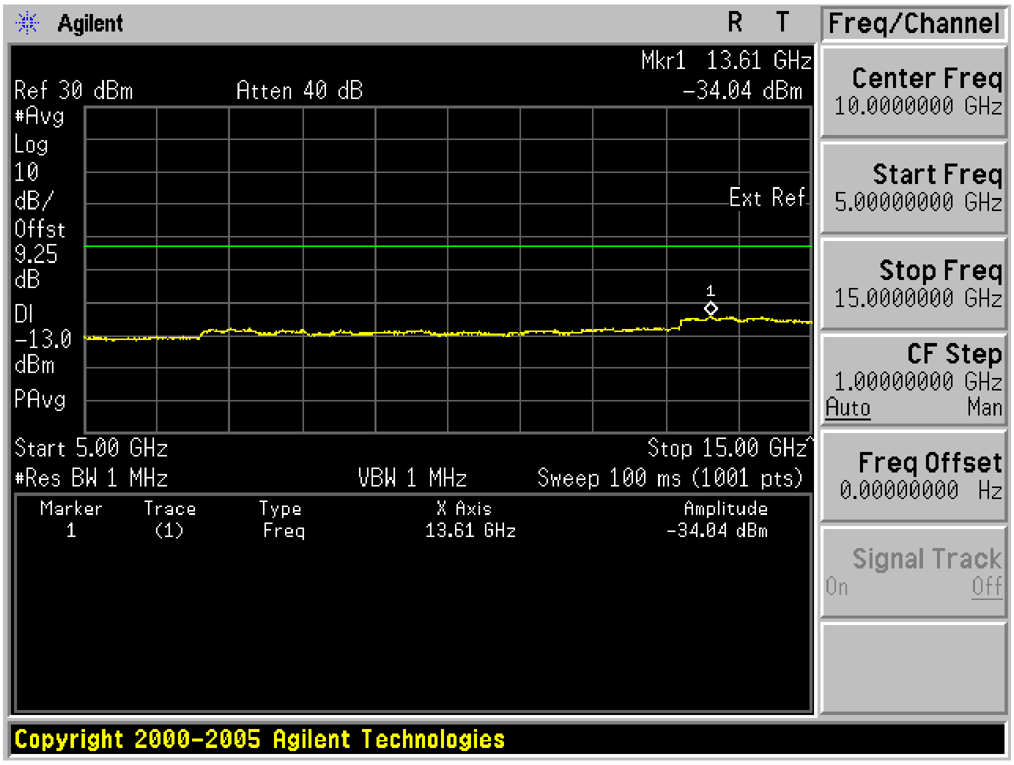



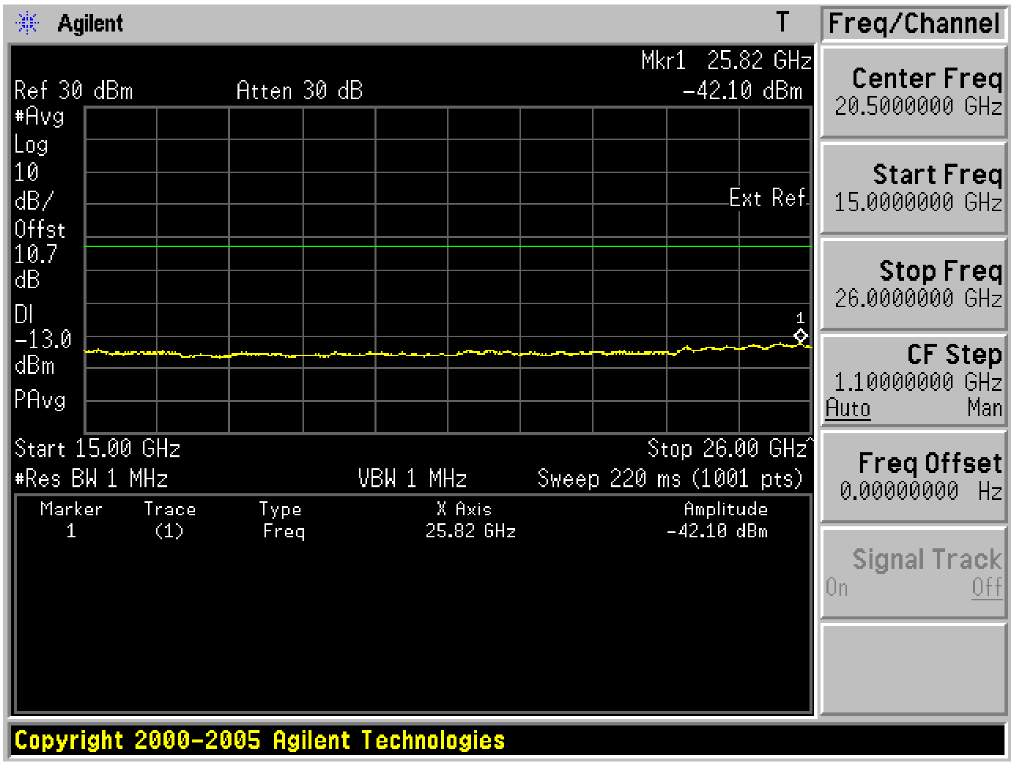

Agilent
T
Freq/Channel
Mkr1 25.81 GHz
Ref 30 dBm
Atten 30 dB
-42.07 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
DI
-13.0
dBm
PAvg
Ext Ref
Center Freq
20.5000000 GHz
Start Freq
15.0000000 GHz
Stop Freq
26.0000000 GHz
CF Step
1.10000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 15.00 GHz
Stop 26.00 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 220 ms (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 25.81 GHz -42.07 dBm
Copyright 2000-2005 Agilent Technologies

## 5.1.3 Conducted Spurious Emissions(BW: 10MHz) (Continued…)

**- Middle Channel(2560MHz)**

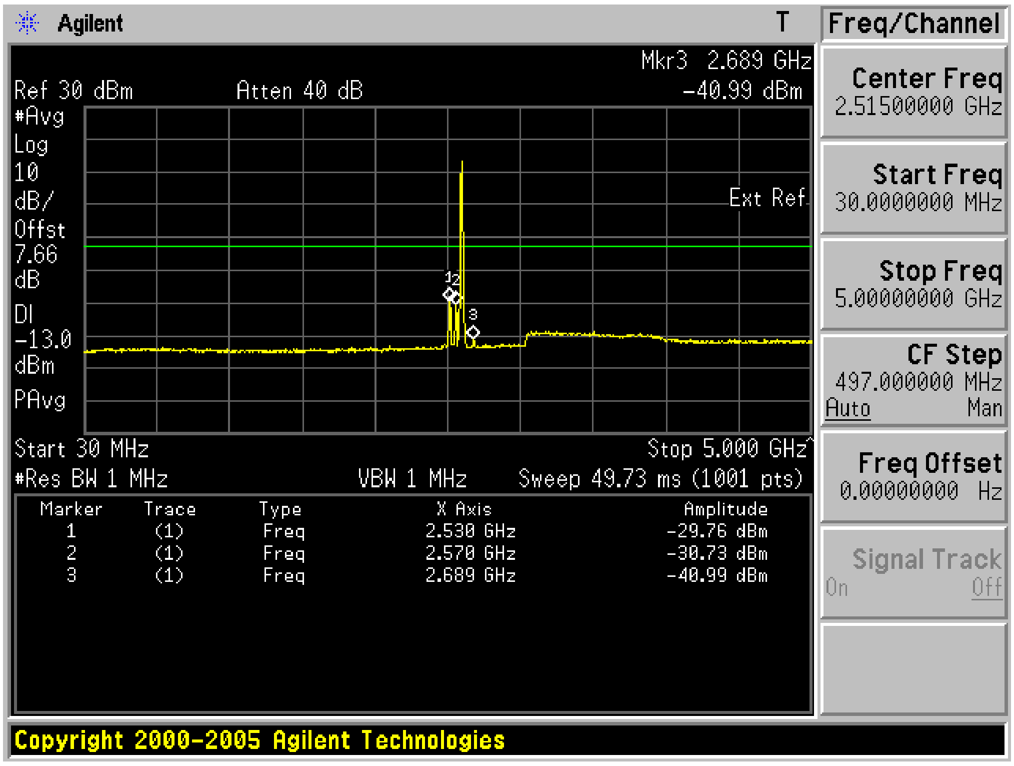


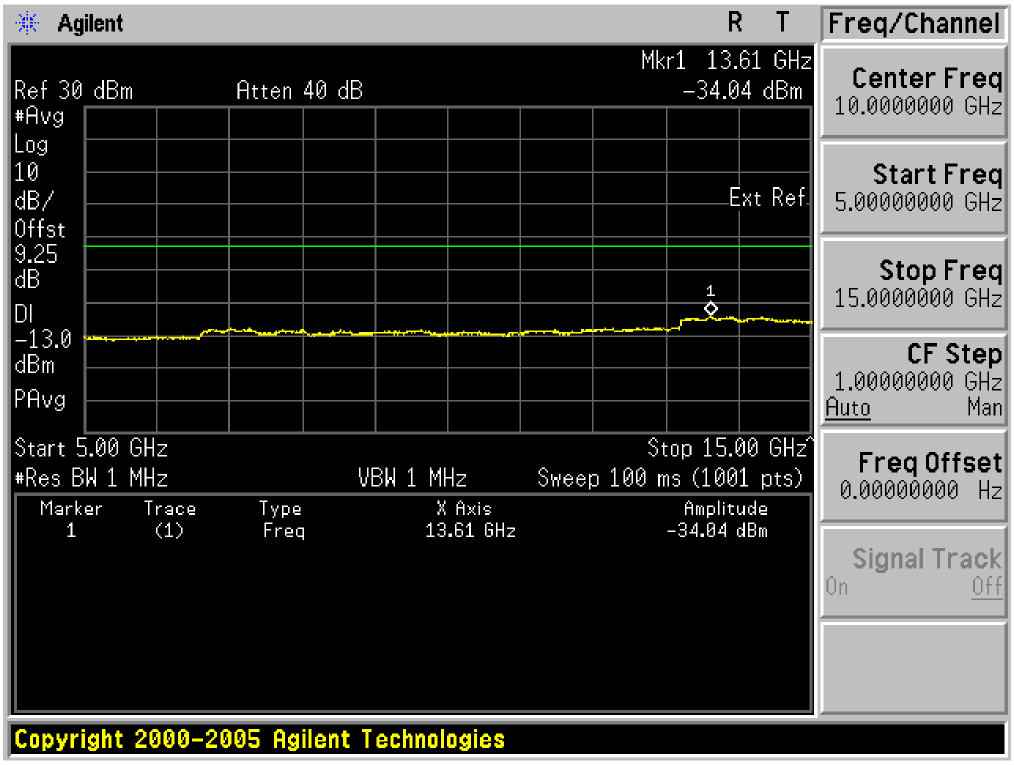



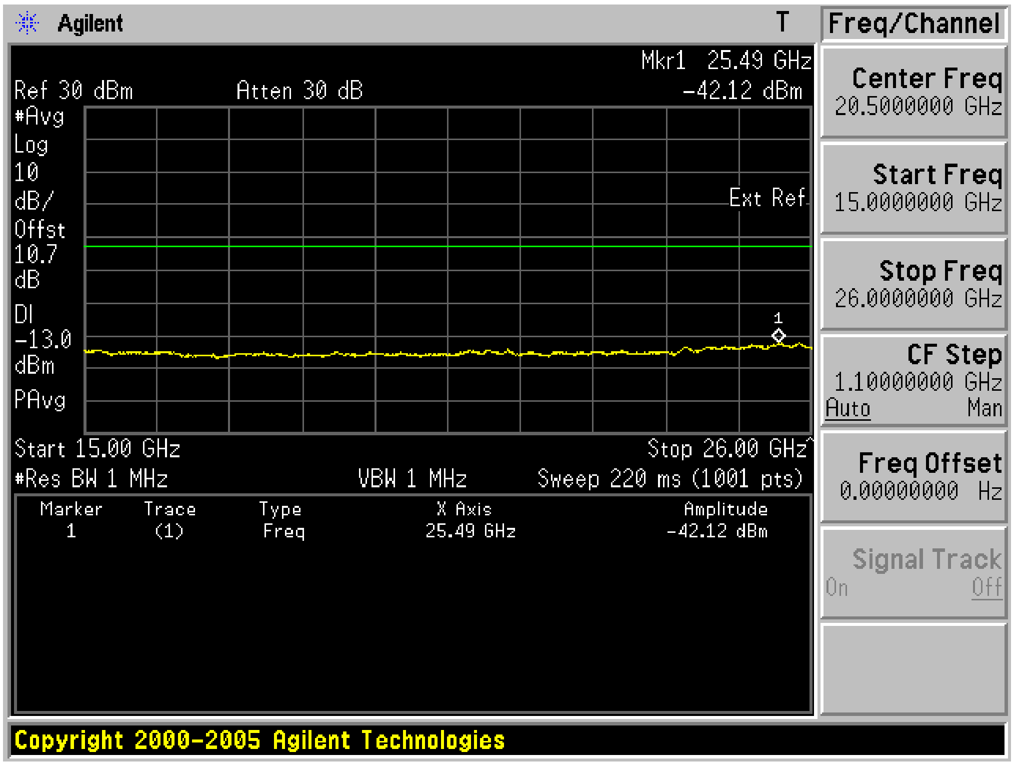

Agilent
T
Freq/Channel
Mkr1 25.82 GHz
Ref 30 dBm
Atten 30 dB
-42.10 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
DI
-13.0
dBm
PAvg
Ext Ref
Start 15.00 GHz
Stop 26.00 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 220 ms (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 25.82 GHz -42.10 dBm
Center Freq
20.5000000 GHz
Start Freq
15.0000000 GHz
Stop Freq
26.0000000 GHz
CF Step
1.10000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2005 Agilent Technologies

## 5.1.3 Conducted Spurious Emissions(BW: 10MHz) (Continued…)

**- High Channel(2610MHz)**

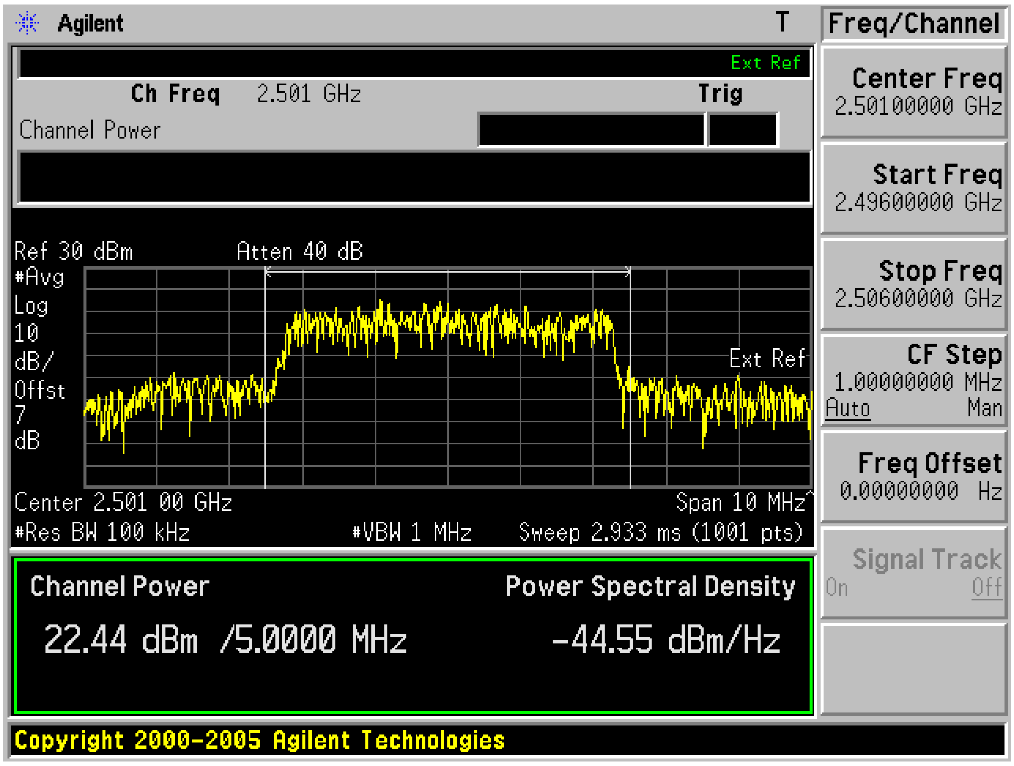


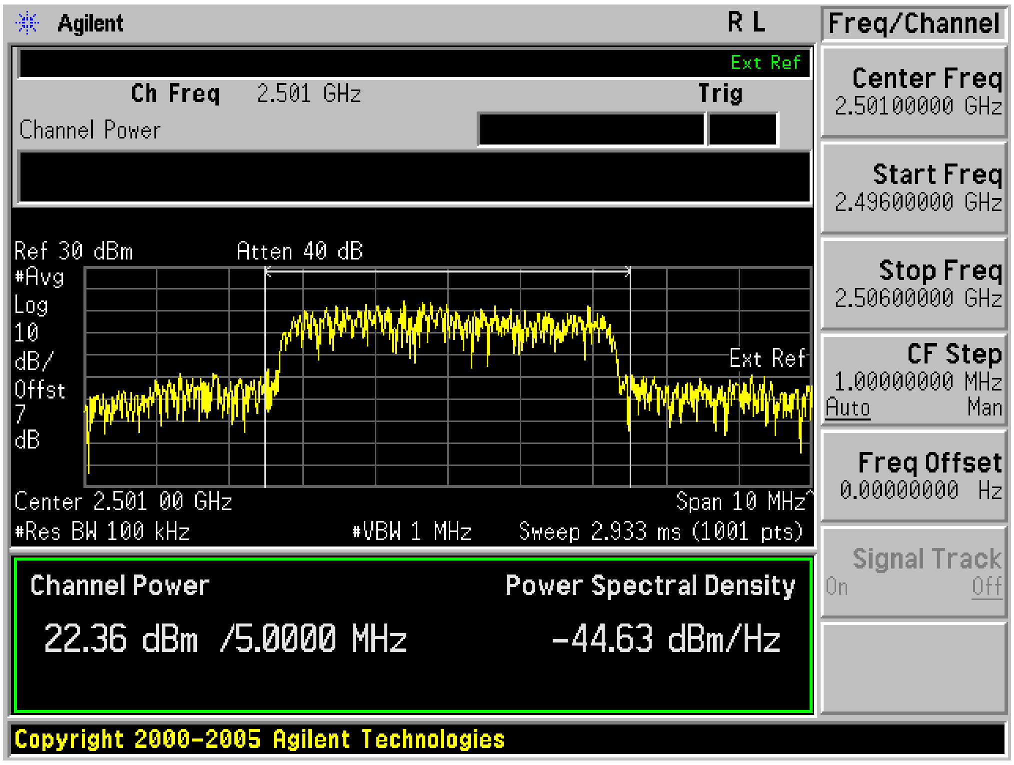

Agilent
T
Freq/Channel
Mkr1 25.49 GHz
Ref 30 dBm
Atten 30 dB
-42.12 dBm
#Avg
Log
10
dB/
Offst
10.7
dB
Ext Ref
Dl
-13.0
dBm
PAvg
Start 15.00 GHz
Stop 26.00 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 220 ms (1001 pts)
Marker 1
Trace (1)
Type Freq
X Axis 25.49 GHz
Amplitude -42.12 dBm
Center Freq 20.5000000 GHz
Start Freq 15.0000000 GHz
Stop Freq 26.0000000 GHz
CF Step 1.10000000 GHz
Auto Man
Freq Offset 0.00000000 Hz
Signal Track
On Off
Copyright 2000-2005 Agilent Technologies

## 5.1.4 Conducted Output Power(BW: 5MHz)

**- Low Channel(2501MHz) & QPSK 1/2**

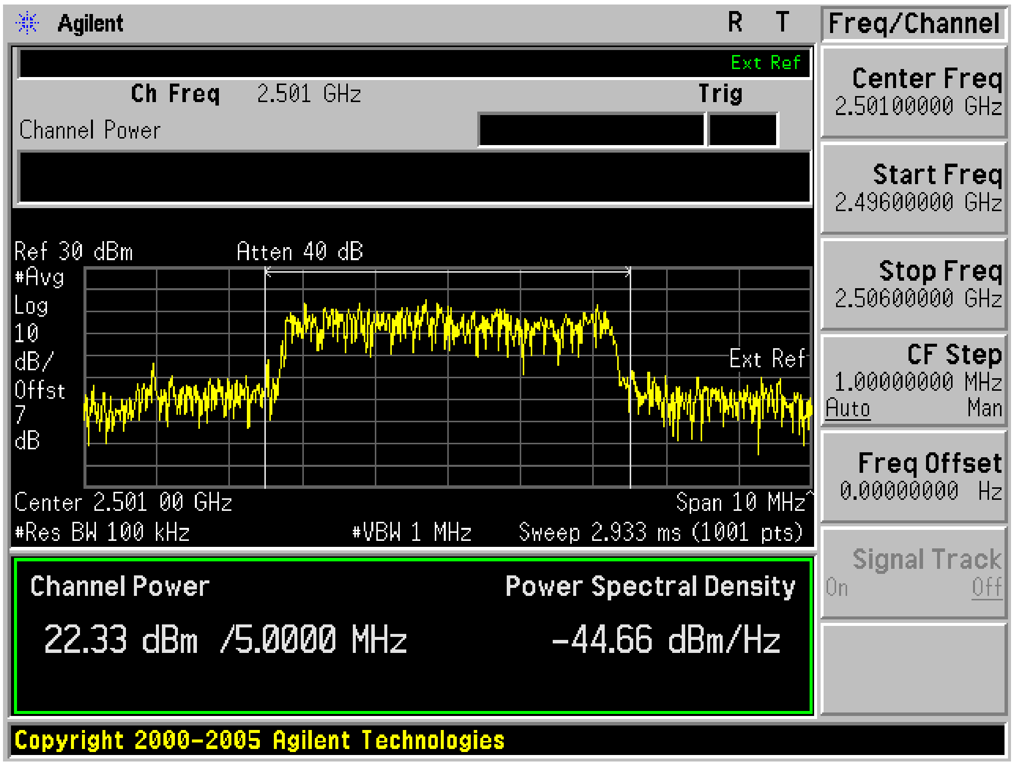



**- Low Channel(2501MHz) & QPSK 3/4**

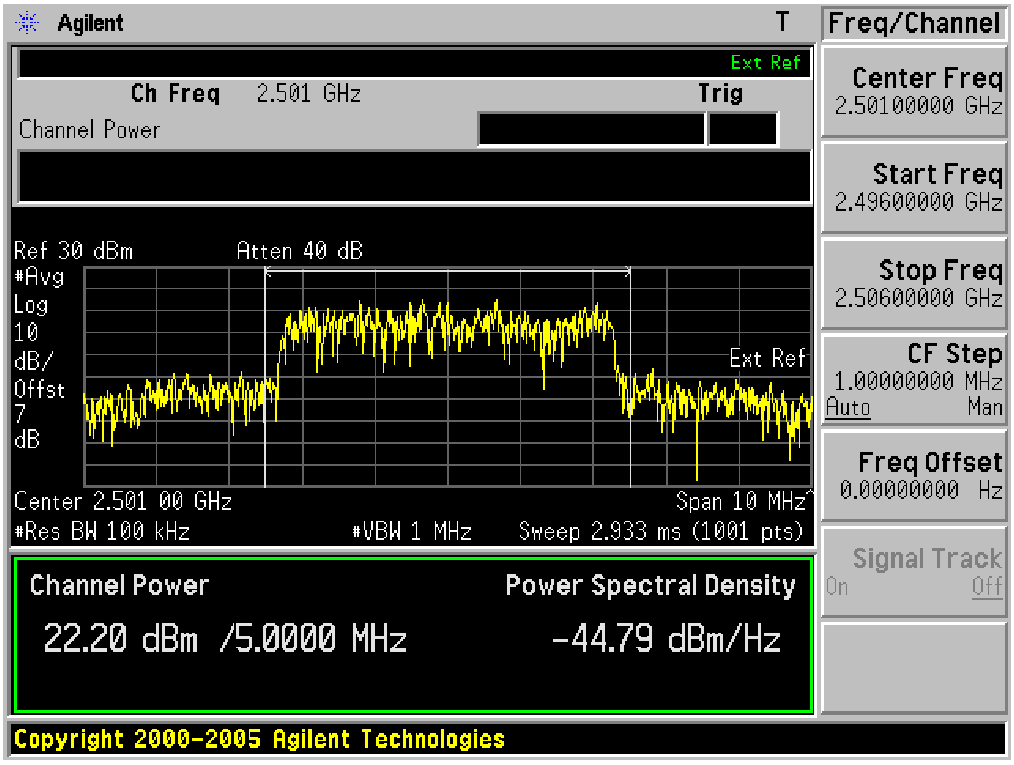


## 5.1.4 Conducted Output Power(BW: 5MHz) (Continued…)

**- Low Channel(2501MHz) & 16QAM 1/2**

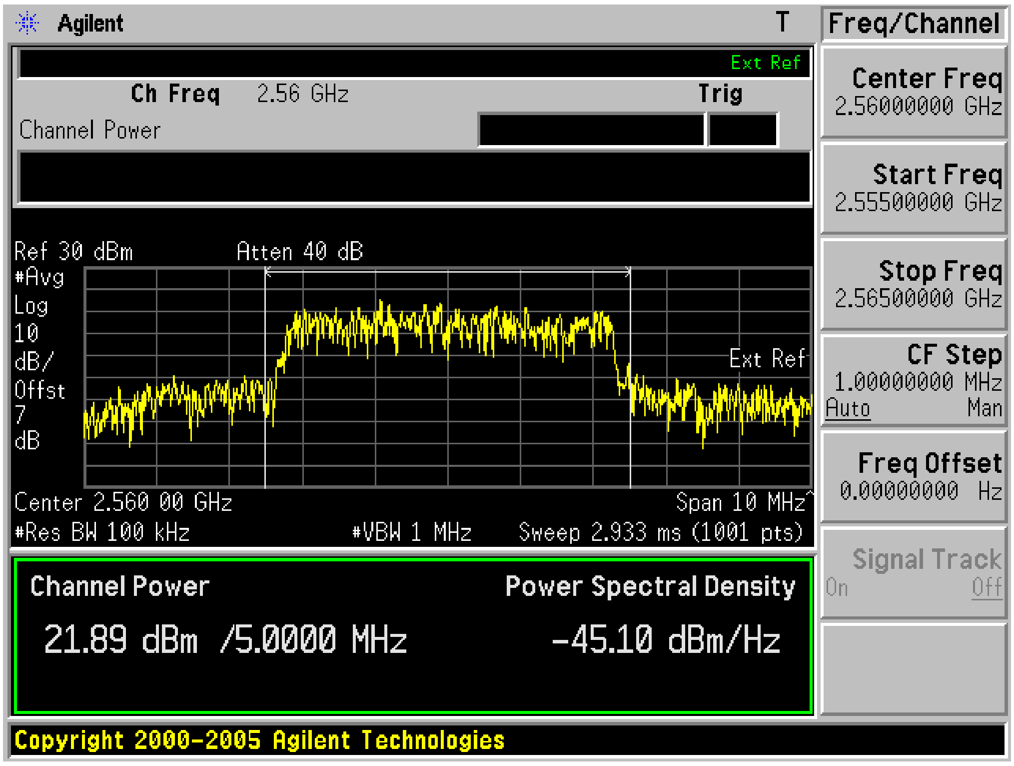



**- Low Channel(2501MHz) & 16QAM 3/4**

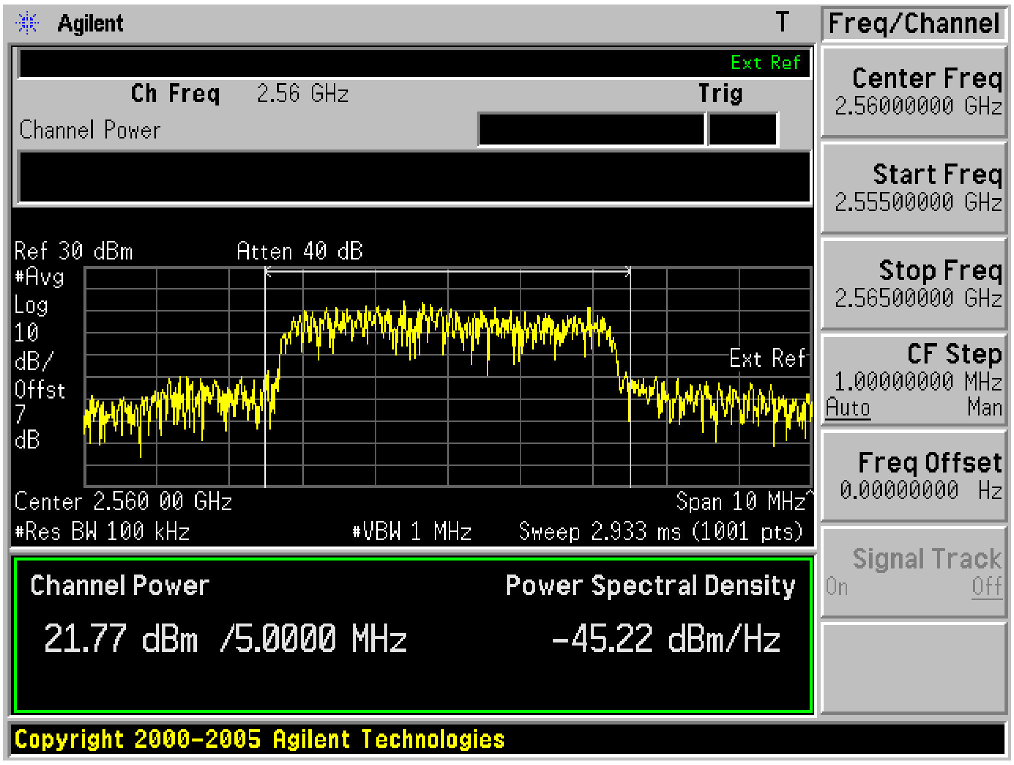


## 5.1.4 Conducted Output Power(BW: 5MHz) (Continued…)

**- Middle Channel(2560MHz) & QPSK 1/2**

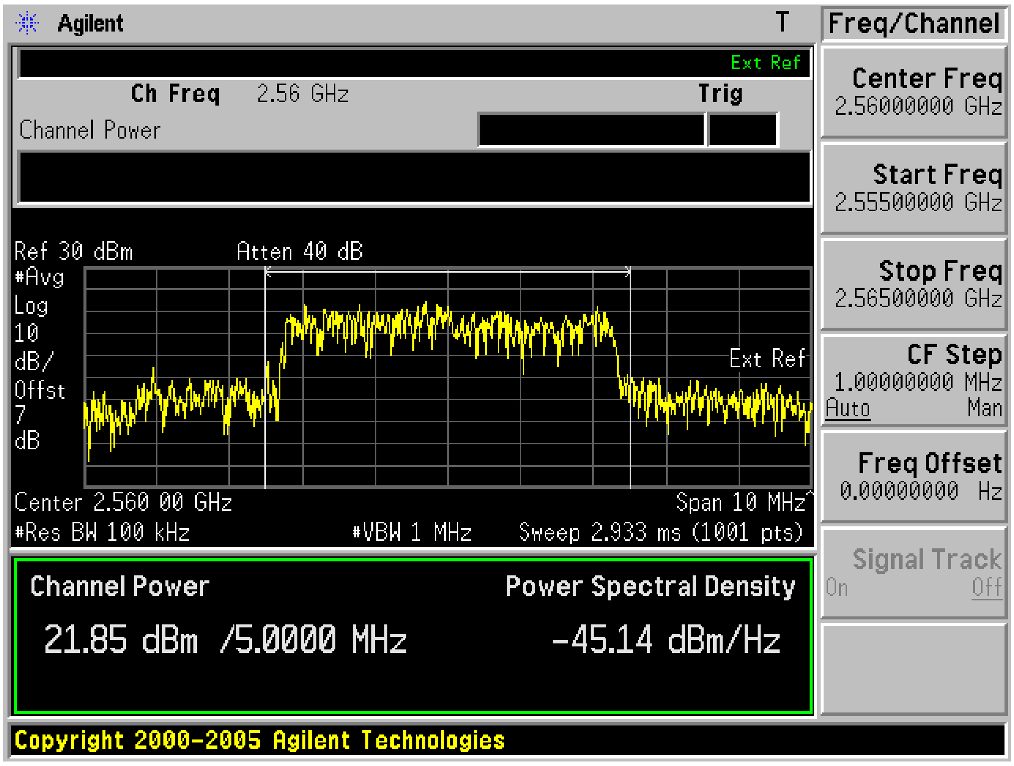



**- Middle Channel(2560MHz) & QPSK 3/4**

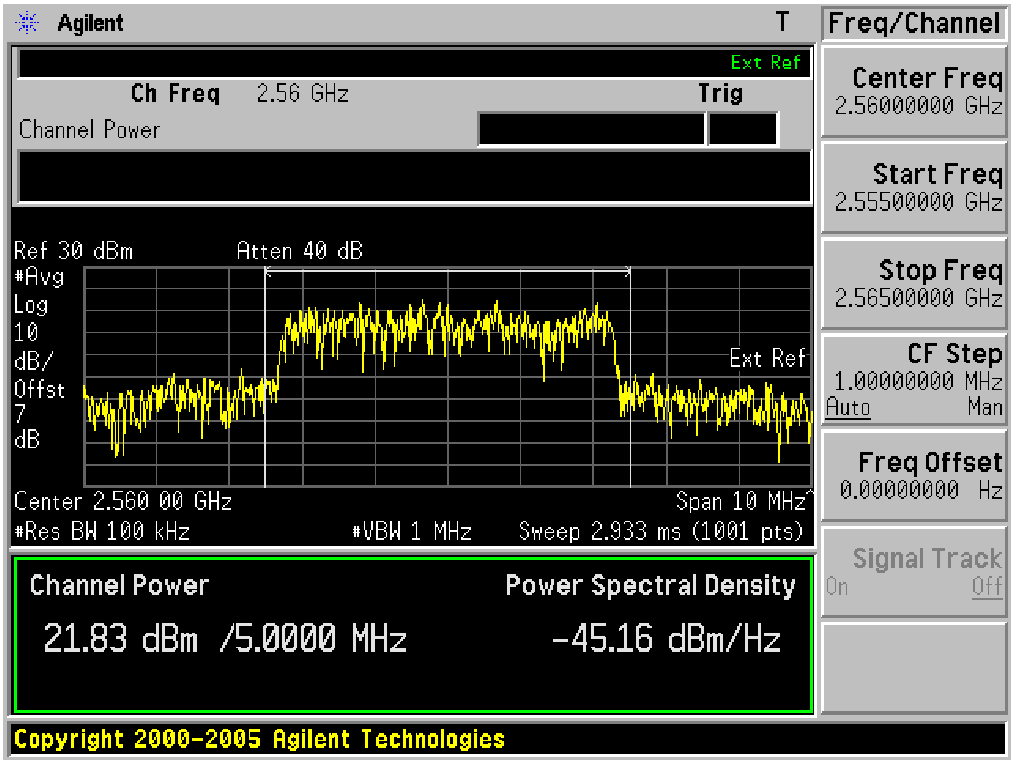


## 5.1.4 Conducted Output Power(BW: 5MHz) (Continued…)

**- Middle Channel(2560MHz) & 16QAM 1/2**

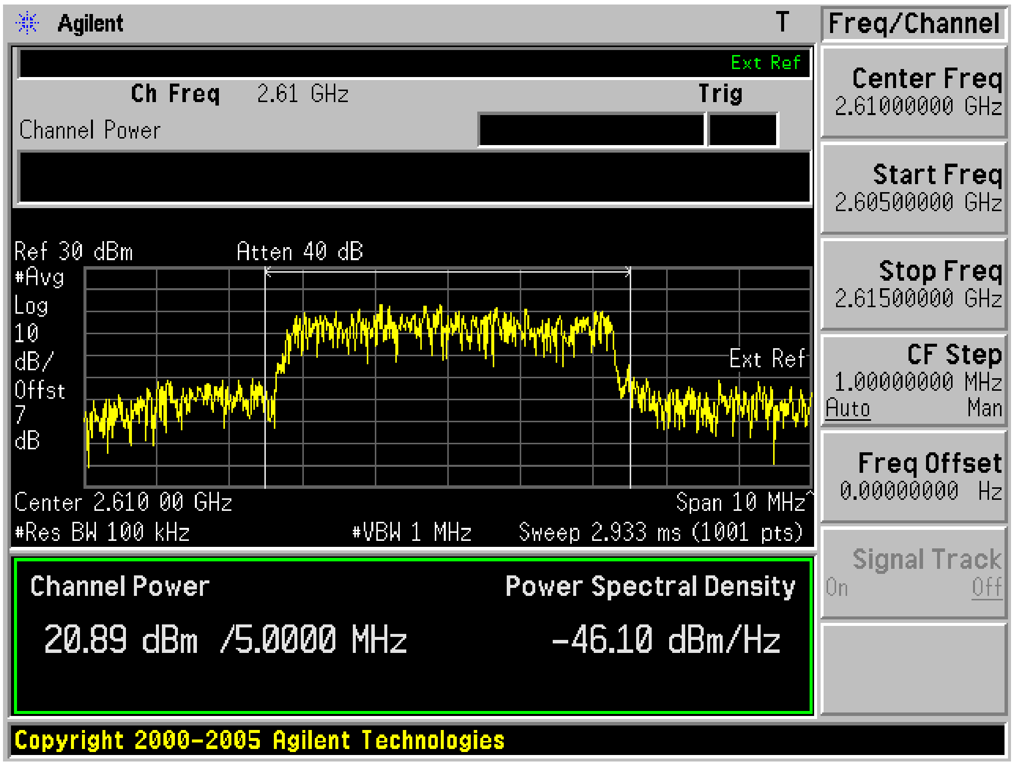



**- Middle Channel(2560MHz) & 16QAM 3/4**

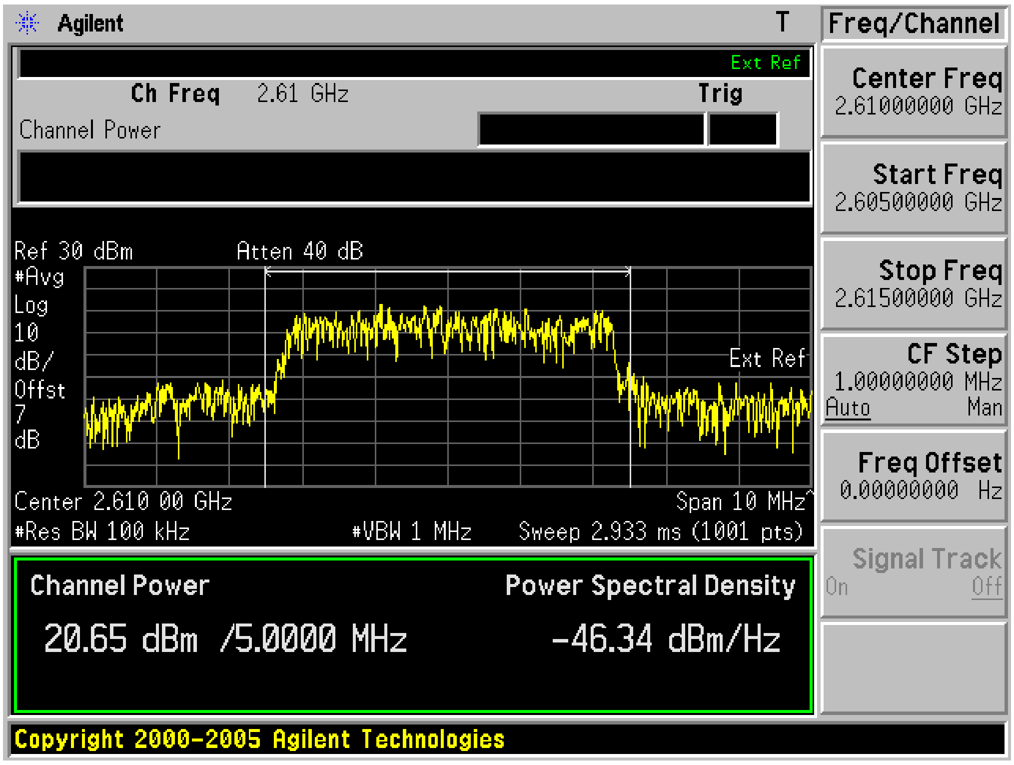


## 5.1.4 Conducted Output Power(BW: 5MHz) (Continued…)

**- High Channel(2610MHz) & QPSK 1/2**

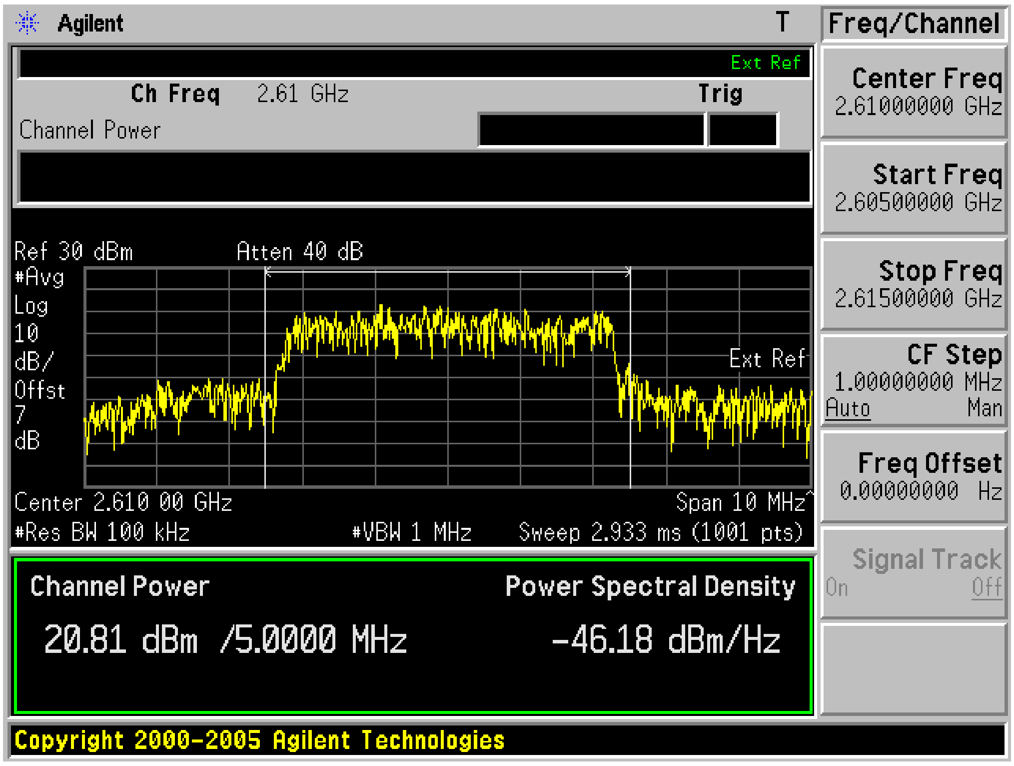



**- High Channel(2610MHz) & QPSK 3/4**

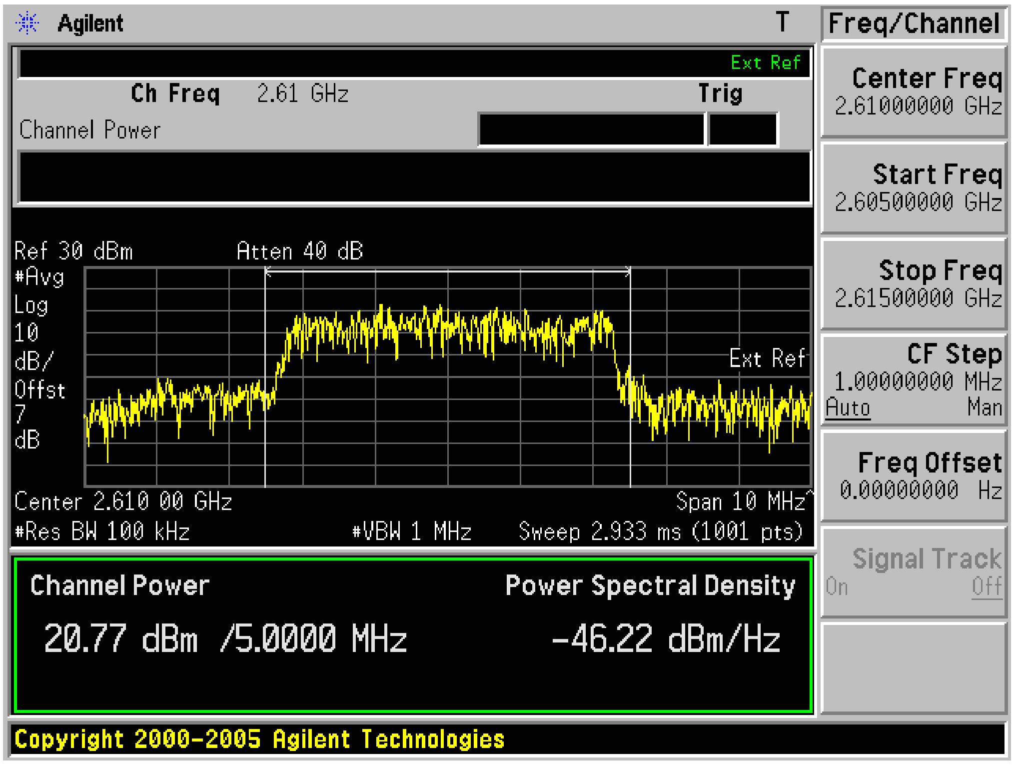


## 5.1.4 Conducted Output Power(BW: 5MHz) (Continued…)

**- High Channel(2610MHz) & 16QAM 1/2**

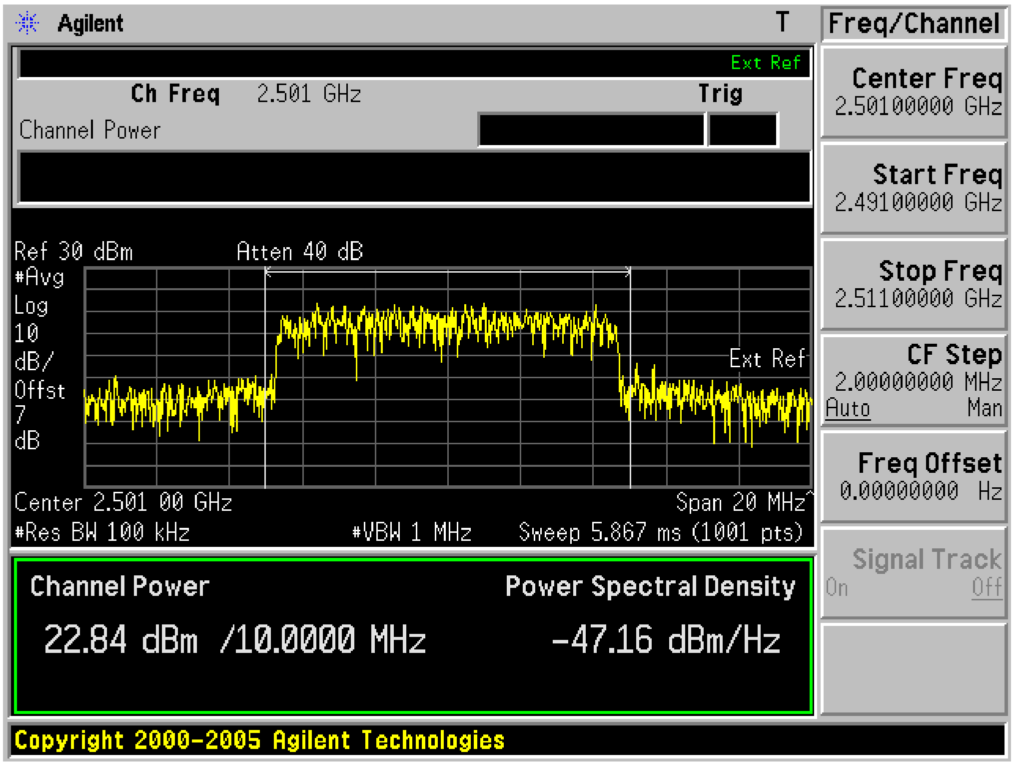



**- High Channel(2610MHz) & 16QAM 3/4**

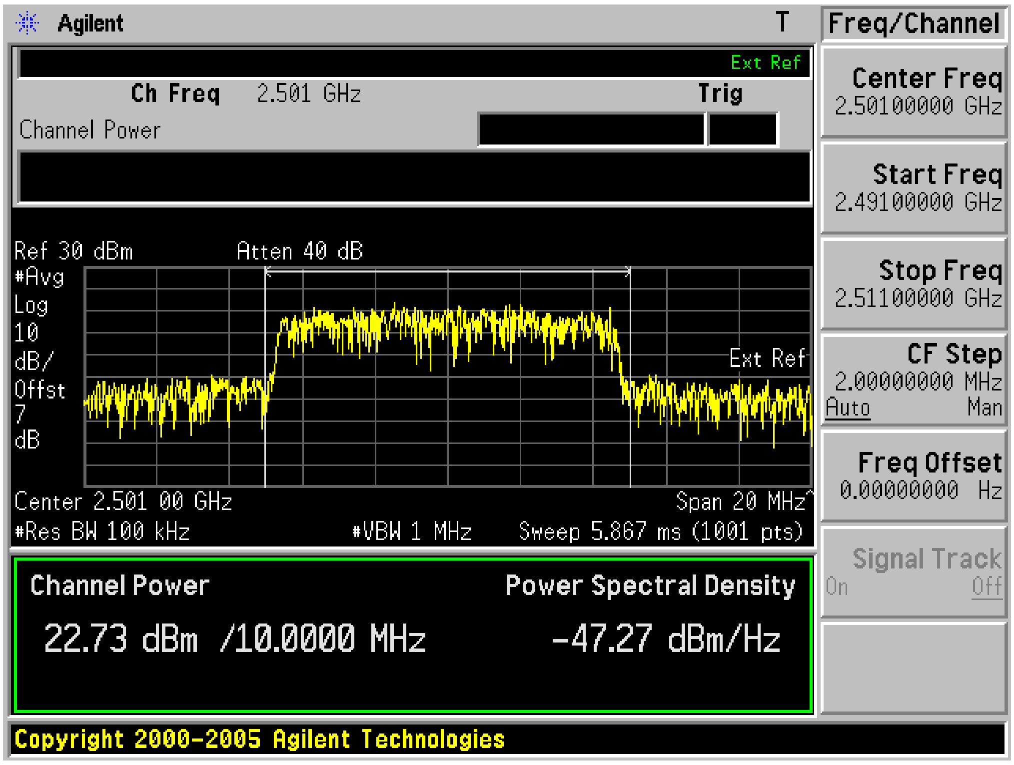


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- Low Channel(2501MHz) & QPSK 1/2**

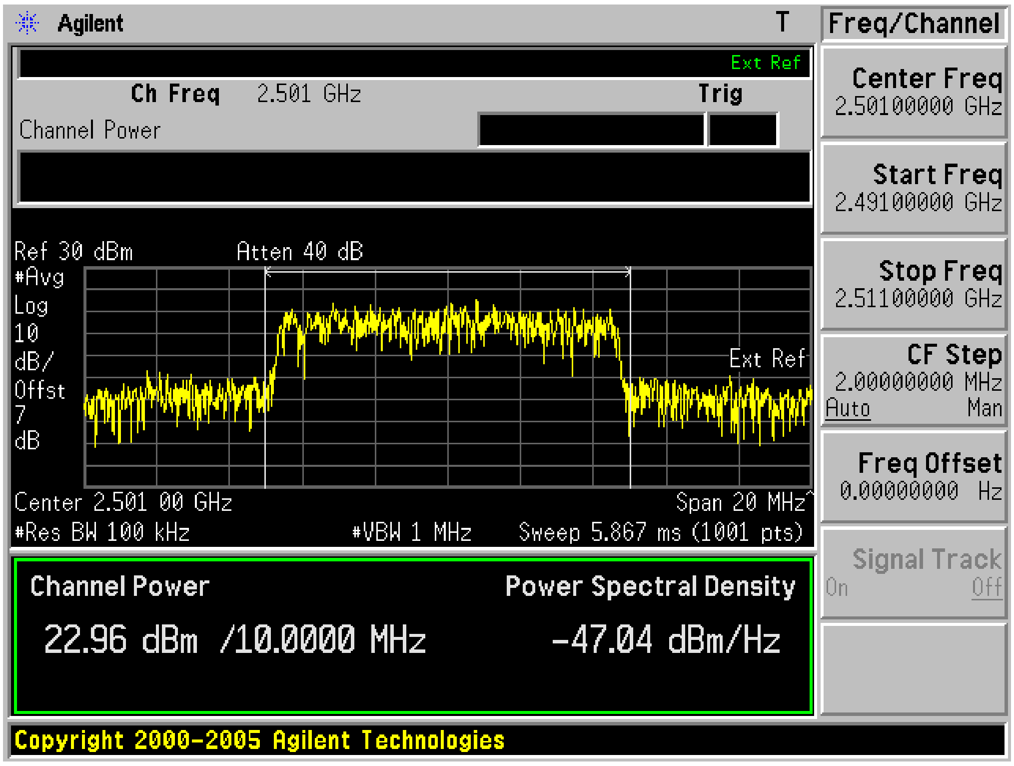



**- Low Channel(2501MHz) & QPSK 3/4**

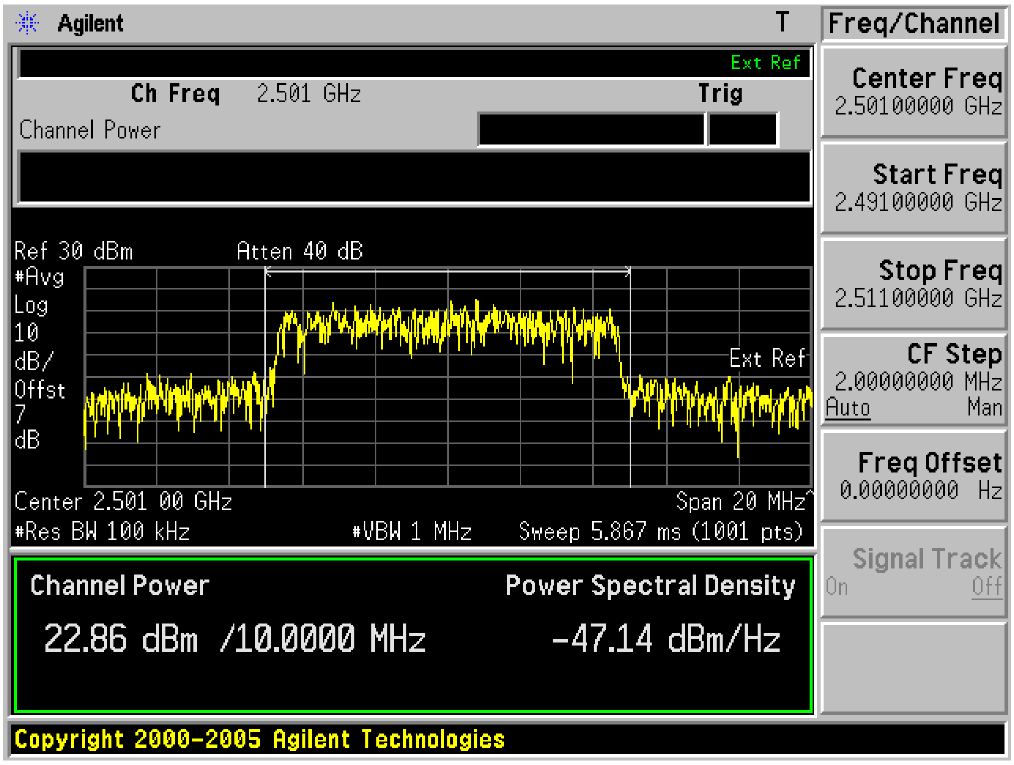


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- Low Channel(2501MHz) & 16QAM 1/2**

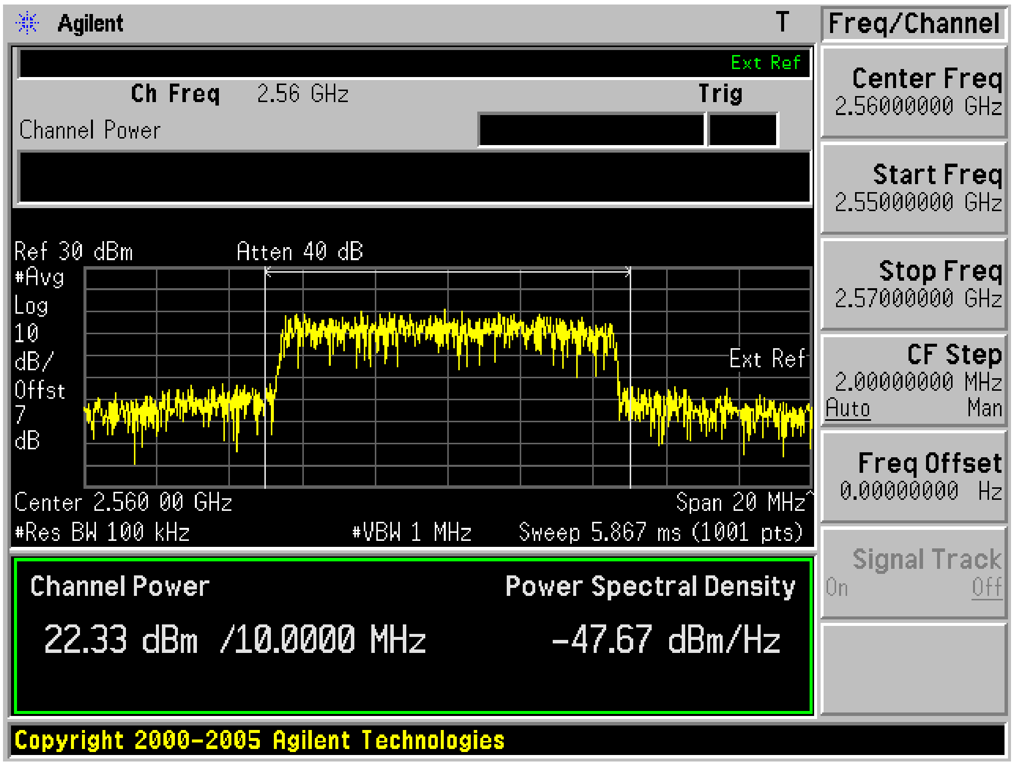



**- Low Channel(2501MHz) & 16QAM 3/4**

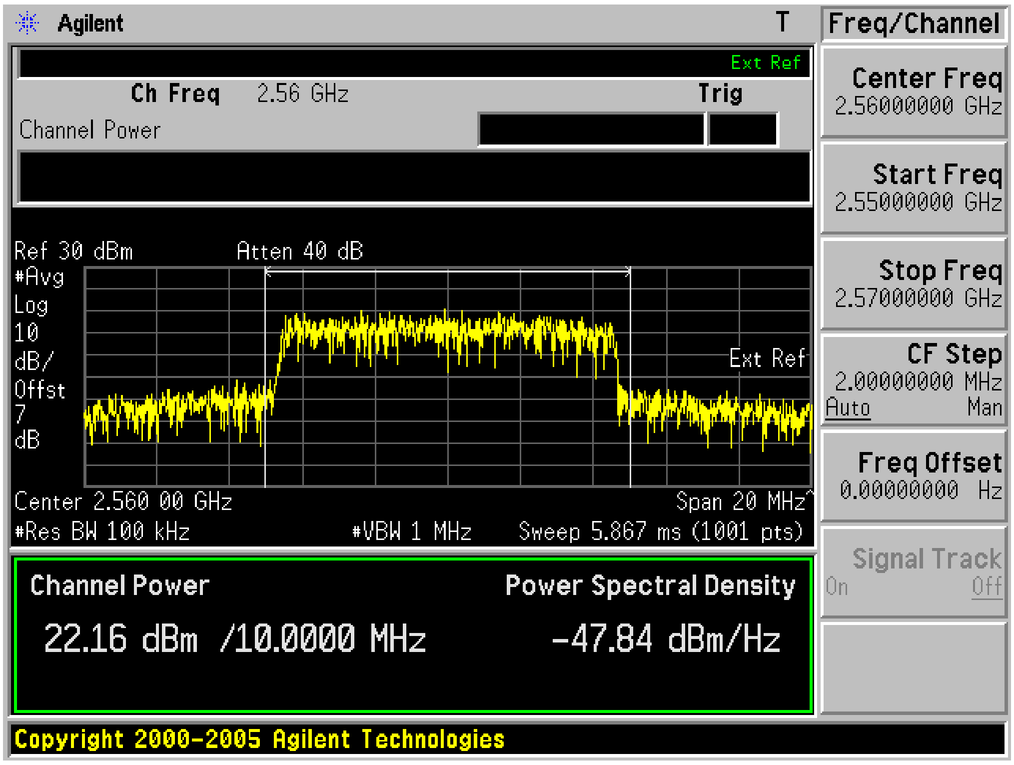


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- Middle Channel(2560MHz) & QPSK 1/2**

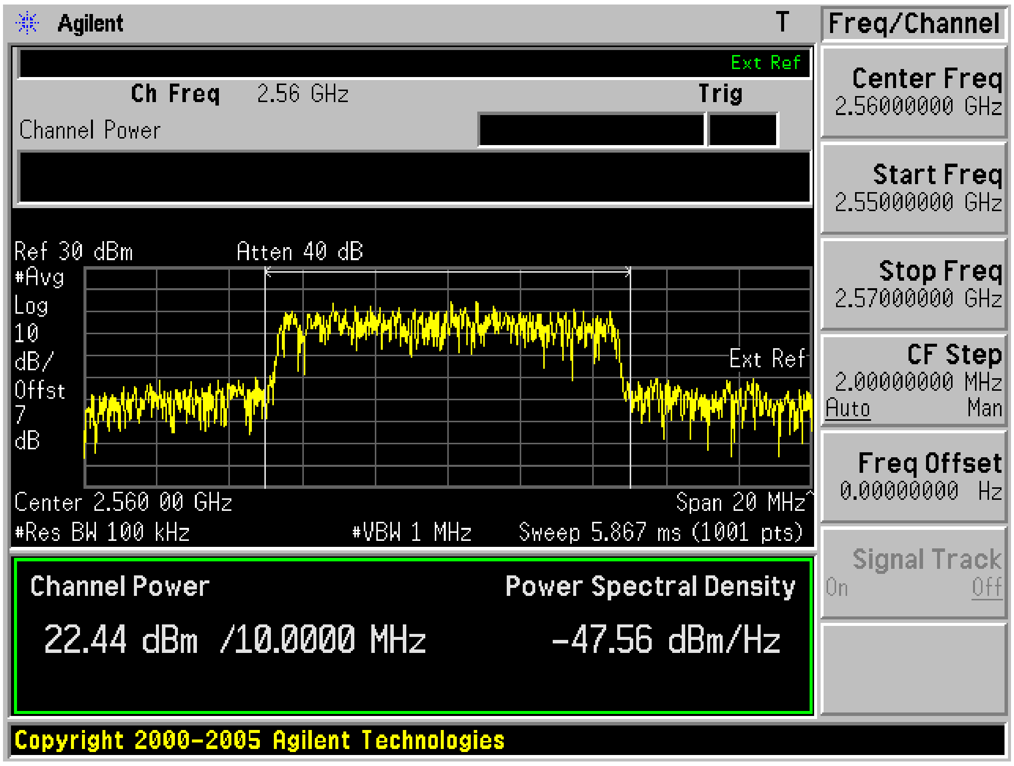



**- Middle Channel(2560MHz) & QPSK 3/4**

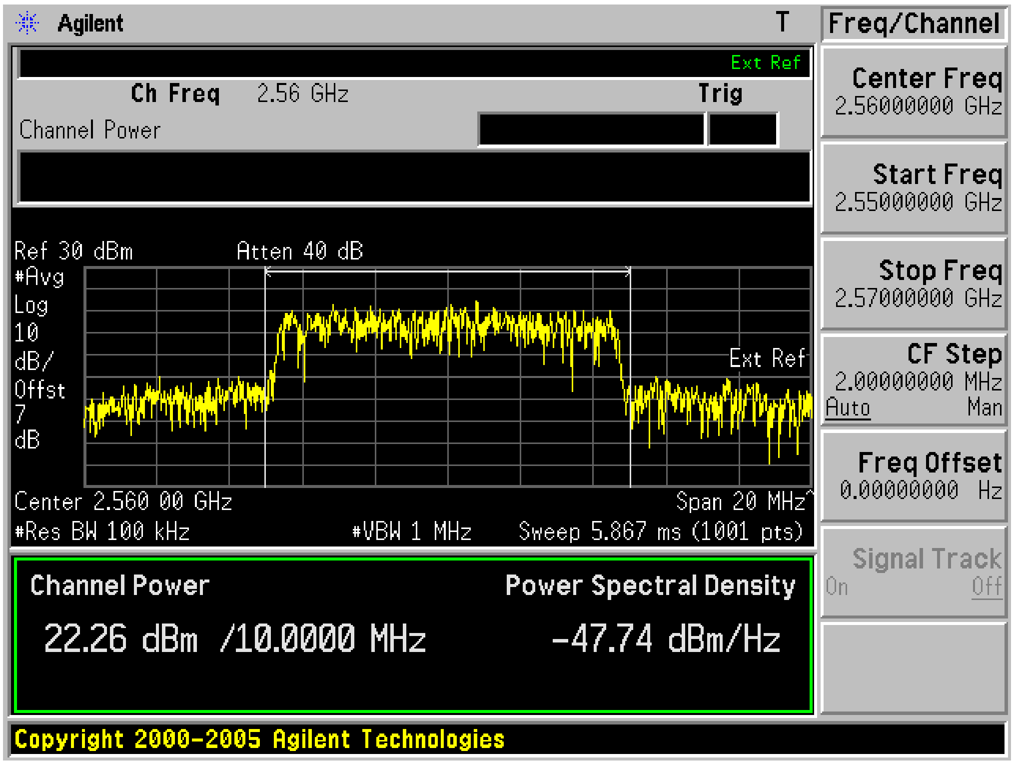


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- Middle Channel(2560MHz) & 16QAM 1/2**

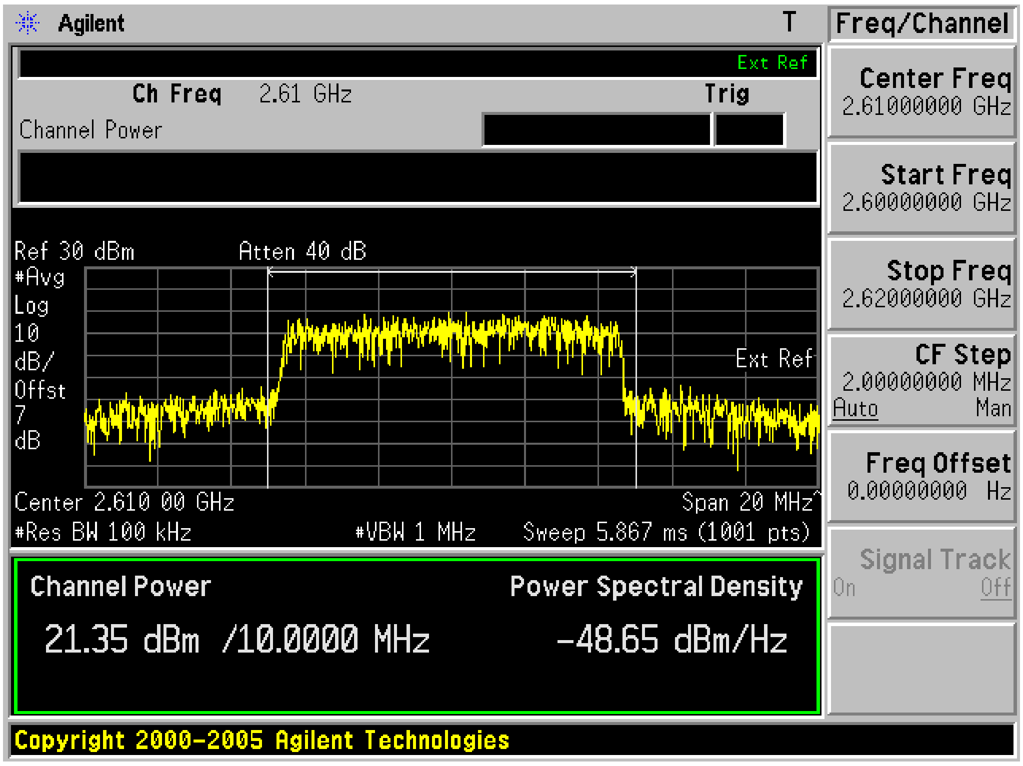



**- Middle Channel(2560MHz) & 16QAM 3/4**

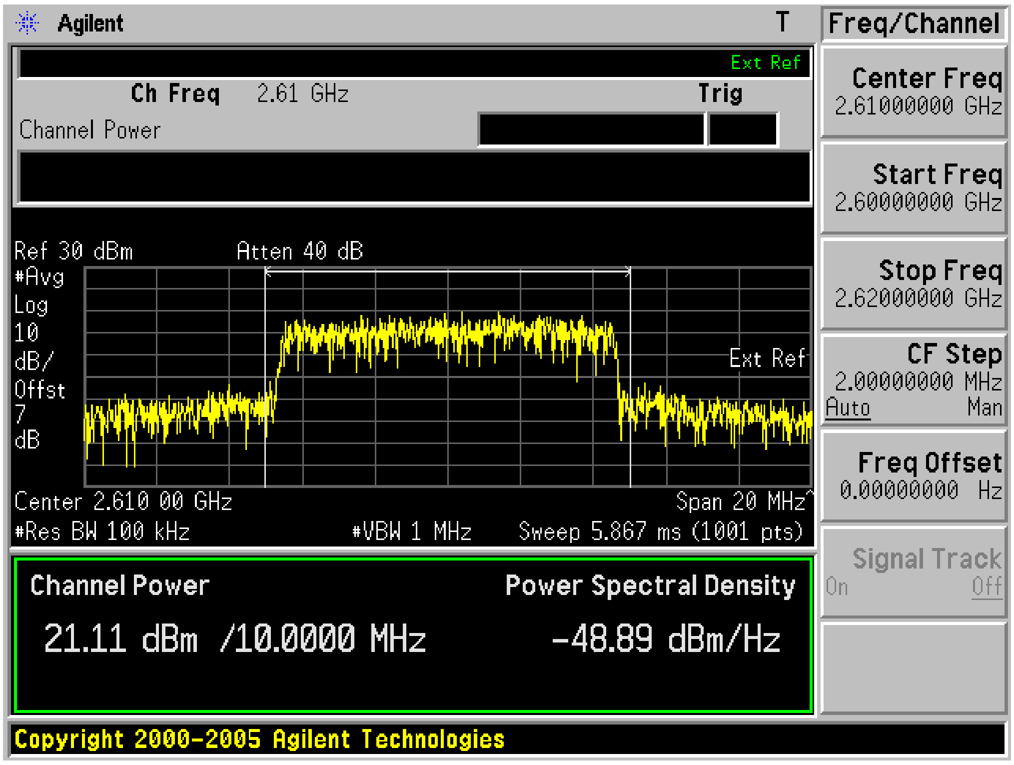


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- High Channel(2610MHz) & QPSK 1/2**

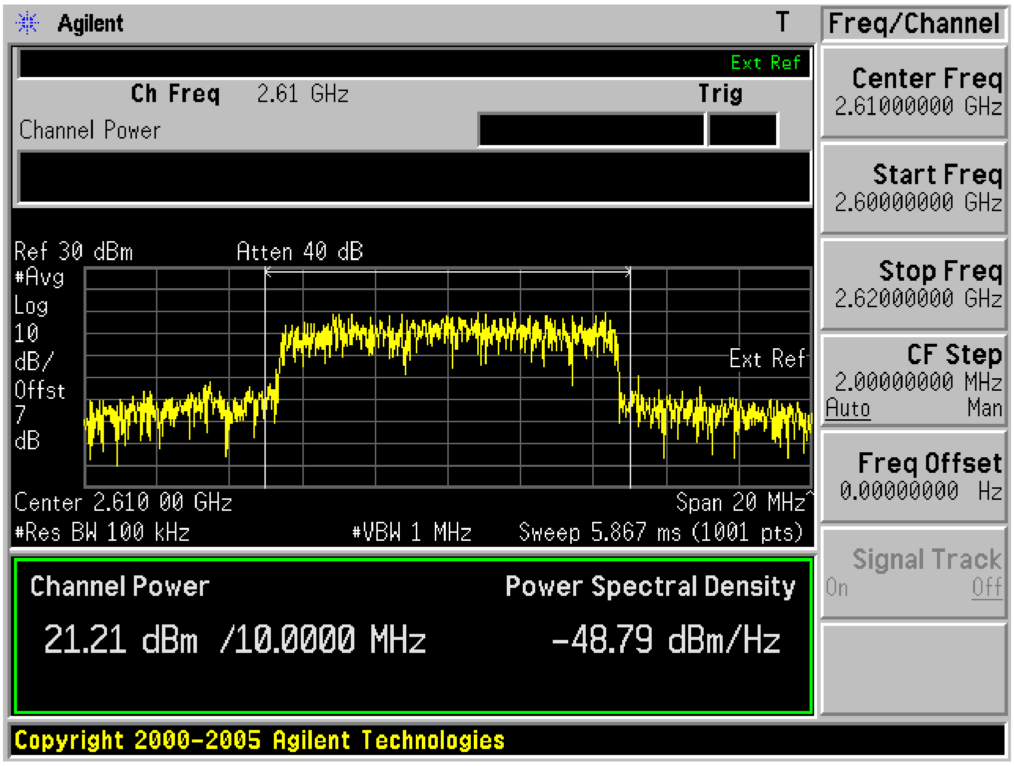



**- High Channel(2610MHz) & QPSK 3/4**

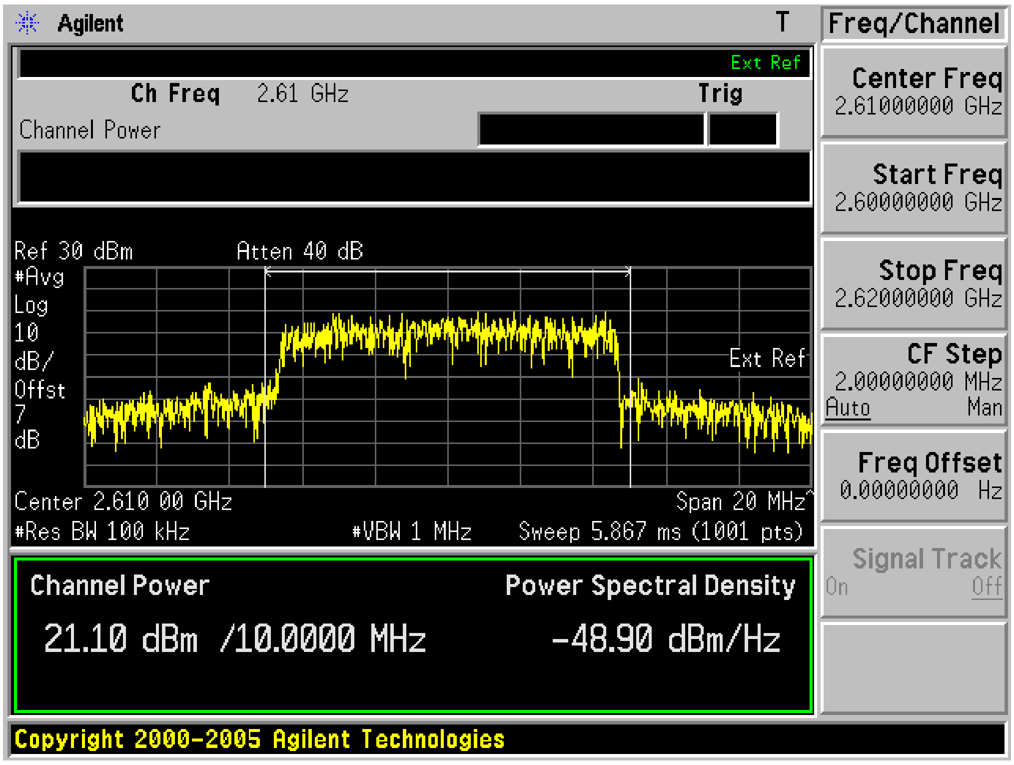


## 5.1.4 Conducted Output Power(BW: 10MHz) (Continued…)

**- High Channel(2610MHz) & 16QAM 1/2**




**- High Channel(2610MHz) & 16QAM 3/4**



## 6.1 LIST OF TEST EQUIPMENT

| | Type | Manufacturer | Model | Cal.Due.Date (dd/mm/yy) | Next.Due.Date (dd/mm/yy) | S/N |
|---|---|---|---|---|---|---|
| 01 | Spectrum Analyzer | Agilent | E4404B | 21/03/08 | 21/03/09 | US41061134 |
| 02 | Spectrum Analyzer | Agilent | E4440A | 15/11/07 | 15/11/08 | MY45304199 |
| 03 | Spectrum Analyzer | H.P | 8563E | 09/10/07 | 09/10/09 | 3551A04634 |
| 04 | Spectrum Analyzer | Rohde Schwarz | FSQ26 | 27/02/08 | 27/02/09 | 200347 |
| 05 | EMI TEST RECEIVER | R&S | ESU | 11/01/08 | 11/01/09 | 100014 |
| 06 | Power Meter | H.P | EMP-442A | 10/07/07 | 10/07/08 | GB37170413 |
| 07 | Power Sensor | H.P | 8481A | 11/03/08 | 11/03/09 | 3318A96566 |
| 08 | Frequency Counter | H.P | 5342A | 06/09/07 | 06/09/08 | 2119A04450 |
| 09 | Signal Generator | Rohde Schwarz | SMR20 | 02/04/08 | 02/04/09 | 101251 |
| 10 | Signal Generator | H.P | ESG-3000A | 10/07/07 | 10/07/08 | US37230529 |
| 11 | Vector Signal Generator | Rohde Schwarz | SMJ100A | 17/01/08 | 17/01/09 | 100148 |
| 12 | Audio Analyzer | H.P | 8903B | 10/07/07 | 10/07/08 | 3011A09448 |
| 13 | Modulation Analyzer | H.P | 8901B | 14/07/07 | 14/07/08 | 3028A03029 |
| 14 | Oscilloscope | Tektronix | TDS3052 | 02/11/07 | 02/11/08 | B016821 |
| 15 | Universal Radio Communication tester | Rohde Schwarz | CMU200 | 02/04/08 | 02/04/09 | 107631 |
| 16 | 8960 Series 10 Wireless Comms. Test Set | Agilent | E5515C | 18/07/07 | 18/07/09 | GB43461134 |
| 17 | Universal Radio communication Tester | Rohde Schwarz | CMU 200 | 02/04/08 | 02/04/09 | 107631 |
| 18 | Bluetooth Tester | TESCOM | TC-3000A | 02/11/08 | 02/11/09 | 3000A4A0121 |
| 19 | Power Splitter | WEINSCHEL | 1593 | 05/10/07 | 05/10/08 | 332 |
| 20 | Power Splitter | Anritsu | K241B | 19/10/07 | 19/10/08 | 020611 |
| 21 | BAND Reject Filter | Microwave Circuits | N0308372 | 18/10/07 | 18/10/08 | 3125-01DC0312 |
| 22 | BAND Reject Filter | Wainwright | WRCG1750 | 18/10/07 | 18/10/08 | SN2 |
| 23 | AC Power supply | DAEKWANG | 5KVA | 20/03/08 | 20/03/09 | N/A |
| 24 | DC Power Supply | H.P | 6622A | 20/03/08 | 20/03/09 | 465487 |
| 25 | TEMP & HUMIDITY Chamber | JISCO | J-RHC2 | 02/10/07 | 02/10/08 | 021031 |
| 26 | HORN ANT | EMCO | 3115 | 10/08/07 | 10/08/08 | 6419 |
| 27 | HORN ANT | EMCO | 3115 | 09/10/07 | 09/10/08 | 21097 |
| 28 | HORN ANT | A.H.Systems | SAS-574 | 20/08/07 | 20/08/08 | 154 |
| 29 | HORN ANT | A.H.Systems | SAS-574 | 20/08/07 | 20/08/08 | 155 |

## 6.1 LIST OF TEST EQUIPMENT (Continued…)

| | Type | Manufacturer | Model | Cal.Due.Date (dd/mm/yy) | Next.Due.Date (dd/mm/yy) | S/N |
|---|---|---|---|---|---|---|
| 30 | Dipole Antenna | Schwarzbeck | VHA9103 | 19/12/07 | 19/12/08 | 2116 |
| 31 | Dipole Antenna | Schwarzbeck | VHA9103 | 19/12/07 | 19/12/08 | 2117 |
| 32 | Dipole Antenna | Schwarzbeck | UHA9105 | 20/12/07 | 20/12/08 | 2261 |
| 33 | Dipole Antenna | Schwarzbeck | UHA9105 | 20/12/07 | 20/12/08 | 2262 |
| 34 | Log Periodic Antenna | Schwarzbeck | UHALP9108A1 | 01/10/07 | 01/10/08 | 1098 |
| 35 | Biconical Antenna | Schwarzbeck | VHA9103 | 08/06/07 | 08/06/08 | 2233 |
| 36 | Digital Multimeter | H.P | 34401A | 20/03/08 | 20/03/09 | 3146A13475 |
| 37 | Attenuator (10dB) | WEINSCHEL | 23-10-34 | 05/10/07 | 05/10/08 | BP4386 |
| 38 | Attenuator (10dB) | WEINSCHEL | 23-10-34 | 30/01/08 | 30/01/09 | BP4387 |
| 39 | High-Pass Filter | ANRITSU | MP526D | 08/10/07 | 08/10/08 | MP27756 |
| 40 | Attenuator (3dB) | Agilent | 8491B | 12/07/07 | 12/07/08 | 58177 |
| 41 | 20dB Attenuator | Aeroflex/Weinschel | 86-20-11 | 25/10/07 | 25/10/08 | 432 |
| 42 | 10dB Attenuator | Aeroflex/Weinschel | 86-10-11 | 25/10/07 | 25/10/08 | 446 |
| 43 | 10dB Attenuator | Aeroflex/Weinschel | 86-10-11 | 25/10/07 | 25/10/08 | 408 |
| 44 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE | 0088CAN | 05/07/07 | 05/07/08 | 788 |
| 45 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE | 0185CAN | 05/07/07 | 05/07/08 | 790 |
| 46 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE | 0215CAN | 05/07/07 | 05/07/08 | 112 |
| 47 | Amplifier (25dB) | Agilent | 8447D | 24/04/08 | 24/04/09 | 2944A10144 |
| 48 | Amplifier (30dB) | Agilent | 8449B | 25/10/07 | 25/10/08 | 3008A01590 |
| 49 | Amplifier (22dB) | H.P | 8447E | 27/02/08 | 27/02/09 | 2945A02865 |
| 50 | Position Controller | TOKIN | 5901T | N/A | N/A | 14173 |
| 51 | Driver | TOKIN | 5902T2 | N/A | N/A | 14174 |
| 52 | Spectrum Analyzer | H.P | 8591E | 16/04/08 | 16/04/09 | 3649A05889 |
| 53 | RFI/FIELD Intensity Meter | Kyorits | KNW-2402 | 06/09/07 | 06/09/08 | 4N-170-3 |
| 54 | LISN | Kyorits | KNW-407 | 30/08/07 | 30/08/08 | 8-317-8 |
| 55 | LISN | Kyorits | KNW-242 | 06/10/07 | 06/10/08 | 8-654-15 |
| 56 | CVCF | NF Electronic | 4400 | N/A | N/A | 344536 4420064 |
| 57 | Software | ToYo EMI | EP5/RE | N/A | N/A | Ver 2.0.800 |
| 58 | Software | ToYo EMI | EP5/CE | N/A | N/A | Ver 2.0.801 |
| 59 | Software | AUDIX | e3 | N/A | N/A | Ver 3.0 |
| 60 | Software | Agilent | Benchlink | N/A | N/A | A.01.09 021211 |

# 7.1 SAMPLE CALCULATIONS

## A. Emission Designator

**- Bandwidth: 5MHz**

**QPSK Modulation**

Emission Designator = 4M49G7D

WiMAX BW = 4.4864 MHz
G = Phase Modulation
7 = Quantized/Digital Information
D = Data Transmission

**16QAM Modulation**

Emission Designator = 4M50W7D

WiMAX BW = 4.4963 MHz
W = Composite – Quadrature Amplitude Modulation
7 = Quantized/Digital Information
D = Data Transmission

**- Bandwidth: 10MHz**

**QPSK Modulation**

Emission Designator = 9M08G7D

WiMAX BW = 9.0835 MHz
G = Phase Modulation
7 = Quantized/Digital Information
D = Data Transmission

**16QAM Modulation**

Emission Designator = 9M06W7D

WiMAX BW = 9.0645 MHz
W = Composite – Quadrature Amplitude Modulation
7 = Quantized/Digital Information
D = Data Transmission

# 8.1 CONCLUSION

The data collected shows that the **SEOWONINTECH CO., LTD.** WiMAX CPE (**FCC ID: V7M-SWU11)** complies with all the requirements of Parts 2 and 27 of the FCC rules.