

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** PDA PHONE

**Brand Name:** HTC

**Model Name:** SAPP500

**Model Difference:** N/A

**FCC ID:** NM8SPRR

**Report No.:** EH/2009/50013

**Issue Date:** May. 14, 2009

**FCC Rule Part:** §15.247

**Prepared for:** HTC Corporation

No. 23 Xinghua Rd., Taoyuan City, Taoyuan  
County 330, Taiwan, ROC

**Prepared by:** SGS Taiwan Ltd.

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## CERTIFICATION OF COMPLIANCE

**Applicant:** HTC Corporation  
 No. 23 Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan, ROC

**Manufacturer:** HTC Corporation  
 No. 23 Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan, ROC

**Product Name:** PDA PHONE

**Brand Name:** HTC

**FCC ID:** NM8SPRR

**Model No.:** SAPP500

**Model Difference:** N/A

**File Number:** EH/2009/50013




**Date of test:** May. 11, 2009 ~ May. 13, 2009

**Date of EUT Received:** May. 11, 2009

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and RSS-Gen. issue 2:2007, the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15C:2007, §15.247.

The test results of this report relate only to the tested sample identified in this report.

|                     |   |              |               |
|---------------------|---|--------------|---------------|
| <b>Test By:</b>     |  | <b>Date:</b> | May. 14, 2009 |
|                     | _____<br><i>Bondi Liu / Engineer</i>  |              | _____         |
| <b>Prepared By:</b> |  | <b>Date:</b> | May. 14, 2009 |
|                     | _____<br><i>Alex Hsieh / Sr.Engineer</i>  |              | _____         |
| <b>Approved By:</b> |  | <b>Date:</b> | May. 14, 2009 |
|                     | _____<br><i>Vincent Su / Manager</i>  |              | _____         |

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## Version

| Version No. | Date          | Description                  |
|-------------|---------------|------------------------------|
| 00          | May. 14, 2009 | Initial creation of document |
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## 1. GENERAL INFORMATION

### 1.1. Product Description

**General:**

|                         |   |  |
|-------------------------|---|--|
| Product Name            | PDA Phone   |  |
| Brand Name              | HTC   |  |
| Model Name              | SAPP500   |  |
| Model Difference        | N/A   |  |
| Data Cable (USB)        | 1. Model No.: DC U200, Supplier: ACON<br>2. Model No.: DC U200, Supplier: MEC<br>3. Model No.: DC U200, Supplier: FoxLink |  |
| Simple Hands-free (SHF) | 1. Model No.: HS S200, Supplier: COTRON<br>2. Model No.: HS S200, Supplier: Kingstate                                     |  |
| Power Supply            | 3.7 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter  |  |
|                         | Battery:  | 1. Model: SAPP160, Supplier: Total Wireless Solution(TWS)<br>2. Model No.: SAPP160, Supplier: WELLDONE |
|                         | Adapter:  | Model No.: PSAA05A-050, Supplier: PHIHONG  |

**GSM and WCDMA:**

|   | Operating Frequency   | Rated Power           |        |
|---|---|-----------------------|--------|
| Cellular Phone Standards<br>Frequency Range and Power | GSM/GPRS/EDGE 850 Class 10  | 824.2 MHz– 848.8 MHz  | 33 dBm |
|   | GSM/GPRS/EDGE 900 Class 10  | 880.2MHz – 914.8MHz   | 33 dBm |
|   | GSM/GPRS/EDGE 1800 Class 10                                       | 1710.2MHz – 1784.8MHz | 30 dBm |
|   | GSM/GPRS/EDGE 1900 Class 10                                       | 1850.2MHz – 1909.8MHz | 30 dBm |
|   | WCDMA/HSDPA/HSUPA Band II   | 1852.4MHz – 1907.6MHz | 24 dBm |
|   | WCDMA/HSDPA/HSUPA Band V  | 826.4MHz –846.6MHz    | 24 dBm |
|   | HSDPA/HSUPA data rate: downlink up to 7.2Mbps ,uplink up to 2Mbps |                       |        |
| IMEI  | 35294903  |                       |        |

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WLAN:

|                        |  |
|------------------------|--|
| Frequency Range:       | 2412 – 2462 MHz  |
| Channel number:        | 11 channels  |
| Max. Output Power:     | 802.11 b: 17.08 dBm (Peak)<br>802.11 g: 13.21 dBm (Peak)           |
| Modulation Technology: | DSSS, OFDM   |
| Modulation type:       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM    |
| Transition Rate:       | 802.11 b: 1/2/5.5/11 Mbps;<br>802.11 g: 6/9/12/18/24/36/48/54 Mbps |
| Antenna Designation:   | PIFA Antenna / 1.1dBi.   |

The EUT is compliance with IEEE 802.11 b/g Standard.

Bluetooth:

|                     |   |
|---------------------|---|
| Bluetooth Version   | <input type="checkbox"/> V1.1 (GFSK)<br><input type="checkbox"/> V1.2 (GFSK)<br><input type="checkbox"/> V2.0 (GFSK)<br><input checked="" type="checkbox"/> V2.0 + EDR (GFSK + $\pi$ /4DQPSK + 8DPSK)<br><input type="checkbox"/> V2.1 + EDR (GFSK + $\pi$ /4DQPSK + 8DPSK) |
| Frequency Range     | 2402 – 2480MHz  |
| Channel number      | 79 channels max.  |
| Rated Power         | 0.01 dBm (Peak)   |
| Modulation type     | Frequency Hopping Spread Spectrum   |
| Antenna Designation | PIFA Antenna / 1.1dBi.  |

The EUT is compliance with Bluetooth Standard.

This test report applies for BT.



## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: NM8SPRR** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

## 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-1.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. Equipment Modifications

Not available for this EUT intended for grant.

## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The HTC PDA PHONE was tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7, 13 of ANSI C63.4-2003 and RSS-Gen:2007. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

## 2.4. Configuration of Tested System

**Fig. 2-1 Configuration of Tested System (Fixed channel)**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | Series No.             | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|------------------------|------------|------------|
| 1    | Soft ware | HTC       | HTC SSD test       | Ver.4.2.3.0.<br>116143 | N/A        | N/A        |

### 3. SUMMARY OF TEST RESULTS

| FCC Rules            | Description Of Test                       | Result    |
|----------------------|---|-----------|
| §15.207(a)           | AC Power line Conducted Emission          | Compliant |
| §15.247(b)(1)        | Peak Output Power                         | Compliant |
| §15.247(d)           | 100 KHz Bandwidth Of Frequency Band Edges | Compliant |
| §15.247(c)           | TX/RX Spurious Emission                   | Compliant |
| §15.247(a)(1)        | Frequency Separation                      | Compliant |
| §15.247(a)(1)(iii)   | Number of hopping frequency               | Compliant |
| §15.247(a)(1)(ii)    | Time of Occupancy                         | Compliant |
| §15.247              | Peak Power Density                        | Compliant |
| §15.247(a)(1)        | 20dB Bandwidth                            | No Limit  |
| §15.203, §15.247(c)/ | Antenna Requirement                       | Compliant |

### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test condition. Test program was used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz) 、mid (2441MHz) and high (2480MHz) with BDR/EDR modes are chosen for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (E1 mode) and lie down position (E1, E2 mode) The worst-case of H position were reported.

## 5. AC POWER LINE CONDUCTED EMISSION TEST

### 5.1. Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

| Frequency range<br>MHz | Limits<br>dB(uV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0.15 to 0.50           | 66 to 56         | 56 to 46 |
| 0.50 to 5              | 56               | 46       |
| 5 to 30                | 60               | 50       |

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 5.2. Measurement Equipment Used:

| AC Power Line Conducted Emission Test Site |            |                         |                  |              |            |
|--|------------|-------------------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE                          | MFR        | MODEL<br>NUMBER         | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| EMI Test Receiver                          | R&S        | ESCS30                  | 828985/004       | 09/16/2008   | 09/15/2009 |
| LISN                                       | Rolf-Heine | NNB-2/16Z               | 99012            | 04/28/2009   | 04/27/2010 |
| LISN                                       | FCC        | FCC-LISN-50/250-25-2-01 | 04034            | 04/28/2009   | 04/27/2010 |
| Coaxial Cables                             | N/A        | WK CE Cable             | N/A              | 10/30/2008   | 10/29/2009 |

### 5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 110Vac/60Hz power source.

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#### 5.4. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

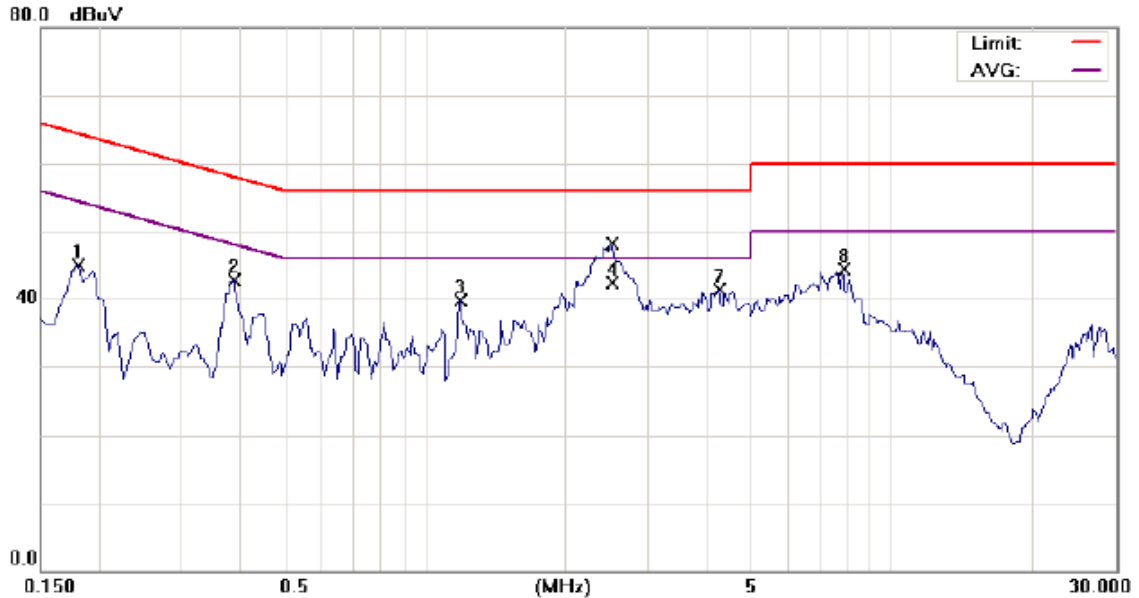
#### 5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

**AC POWER LINE CONDUCTED EMISSION TEST DATA**

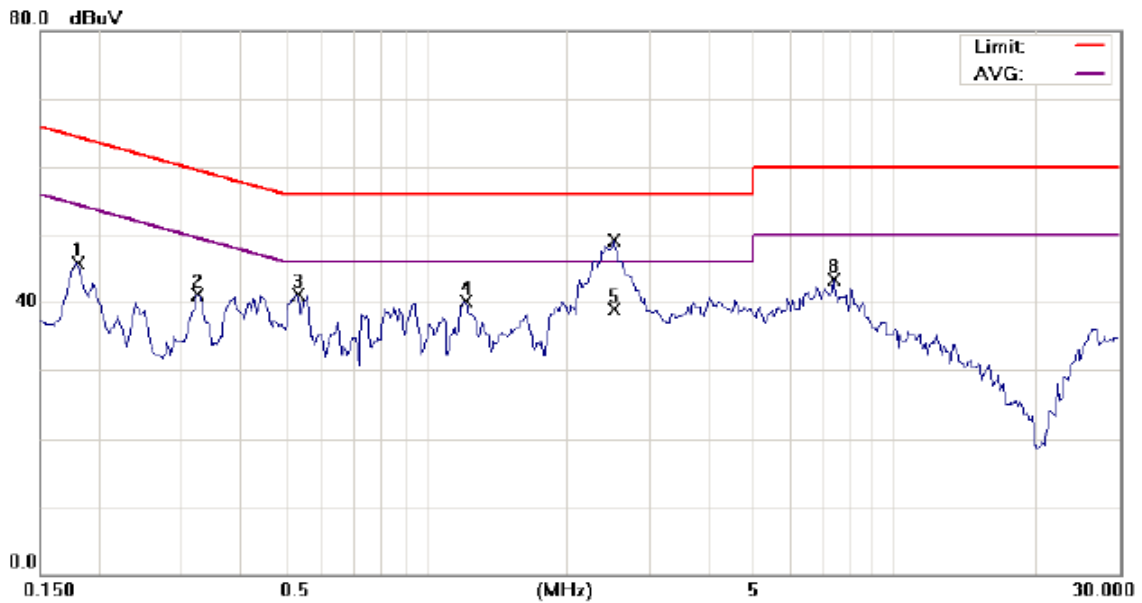
|                 |                            |           |            |               |       |
|-----------------|----------------------------|-----------|------------|---------------|-------|
| Operation Mode: | Worst Case: WLAN & BT Link |           | Test Date: | May. 12, 2009 |       |
| Temperature:    | 23 °C                      | Humidity: | 62%        | Test By:      | Bondi |



Site SGS CONDUCTED #1 Phase: **L1** Temperature: 23 °C  
 Limit: CISPR22/11 Class B Conduction(QP) Power: AC 110V/60Hz Humidity: 62 %  
 EUT: PDA Phone Distance: Air Pressure: hpa  
 M/N: SAPP500  
 Note: WLAN +BT Link mode

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|--------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1800       | 44.86                    | 0.14         | 45.00                    | 64.49         | -19.49     | peak     |         |
| 2   |     | 0.3900       | 42.60                    | 0.08         | 42.68                    | 58.06         | -15.38     | peak     |         |
| 3   |     | 1.1900       | 39.64                    | 0.10         | 39.74                    | 56.00         | -16.26     | peak     |         |
| 4   |     | 2.5062       | 42.22                    | 0.14         | 42.36                    | 56.00         | -13.64     | peak     |         |
| 5   | *   | 2.5062       | 43.22                    | 0.14         | 43.36                    | 56.00         | -12.64     | QP       |         |
| 6   |     | 2.5062       | 32.08                    | 0.14         | 32.22                    | 46.00         | -13.78     | AVG      |         |
| 7   |     | 4.2500       | 41.15                    | 0.15         | 41.30                    | 56.00         | -14.70     | peak     |         |
| 8   |     | 7.8600       | 43.92                    | 0.29         | 44.21                    | 60.00         | -15.79     | peak     |         |

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Site SGS CONDUCTED #1

Phase: **N**

Temperature: 23 °C

Limit: CISPR22/11 Class B Conduction(QP)

Power: AC 110V/60Hz

Humidity: 62 %

EUT: PDA Phone

Distance:

Air Pressure: hpa

M/N: SAPP500

Note: WLAN +BT Link mode

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|--------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1800       | 45.60                    | 0.15         | 45.75                    | 64.49         | -18.74     | peak     |         |
| 2   |     | 0.3250       | 40.94                    | 0.11         | 41.05                    | 59.58         | -18.53     | peak     |         |
| 3   |     | 0.5300       | 41.01                    | 0.08         | 41.09                    | 56.00         | -14.91     | peak     |         |
| 4   |     | 1.2100       | 39.97                    | 0.11         | 40.08                    | 56.00         | -15.92     | peak     |         |
| 5   |     | 2.5214       | 38.76                    | 0.14         | 38.90                    | 56.00         | -17.10     | peak     |         |
| 6   | *   | 2.5214       | 43.22                    | 0.14         | 43.36                    | 56.00         | -12.64     | QP       |         |
| 7   |     | 2.5214       | 31.52                    | 0.14         | 31.66                    | 46.00         | -14.34     | AVG      |         |
| 8   |     | 7.4400       | 42.97                    | 0.28         | 43.25                    | 60.00         | -16.75     | peak     |         |

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## 6. PEAK OUTPUT POWER MEASUREMENT

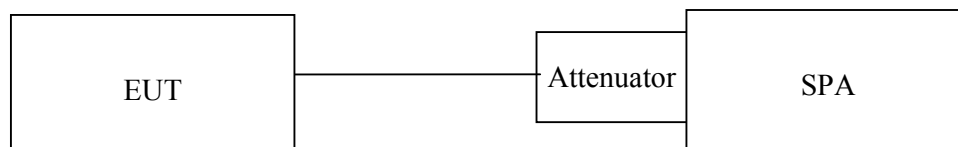
### 6.1. Standard Applicable:

According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

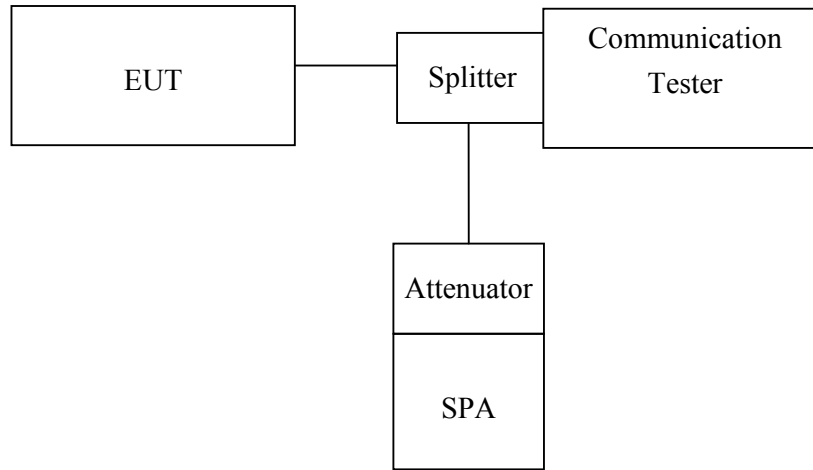
### 6.2. Measurement Equipment Used:

| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 04/19/2008 | 04/18/2010 |
| Spectrum Analyzer            | Agilent      | E4440A          | MY45304525    | 01/23/2008 | 01/22/2010 |
| DC Block                     | Agilent      | BLK-18          | 155452        | 07/05/2008 | 07/04/2009 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | 01/05/2009 | 01/04/2010 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | 001           | 07/05/2008 | 07/04/2009 |
| Attenuator                   | Mini-Circuit | BW-S10W5        | 001           | 07/05/2008 | 07/04/2009 |
| Attenuator                   | Mini-Circuit | BW-S20W5        | 001           | 07/05/2008 | 07/04/2009 |
| Splitter                     | Agilent      | 11636B          | N/A           | 07/05/2008 | 07/04/2009 |

### 6.3. Test Set-up:



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#### 6.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel power function, RBW, VBW = 1MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

**6.5. Measurement Result:**

**BDR mode:**

| Frequency (MHz) | Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|------------|--------------------|------------------|-----------|
| 2402.00         | 0.01                | 0.00       | 0.01               | 0.00100          | 1         |
| 2441.00         | 0.00                | 0.00       | 0.00               | 0.00100          | 1         |
| 2480.00         | 0.01                | 0.00       | 0.01               | 0.00100          | 1         |

*\*Note: offset 0.1dB*

**EDR mode:**

| Frequency (MHz) | Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|------------|--------------------|------------------|-----------|
| 2402.00         | -0.83               | 0.00       | -0.83              | 0.00083          | 1         |
| 2441.00         | -0.77               | 0.00       | -0.77              | 0.00084          | 1         |
| 2480.00         | -1.70               | 0.00       | -1.70              | 0.00068          | 1         |

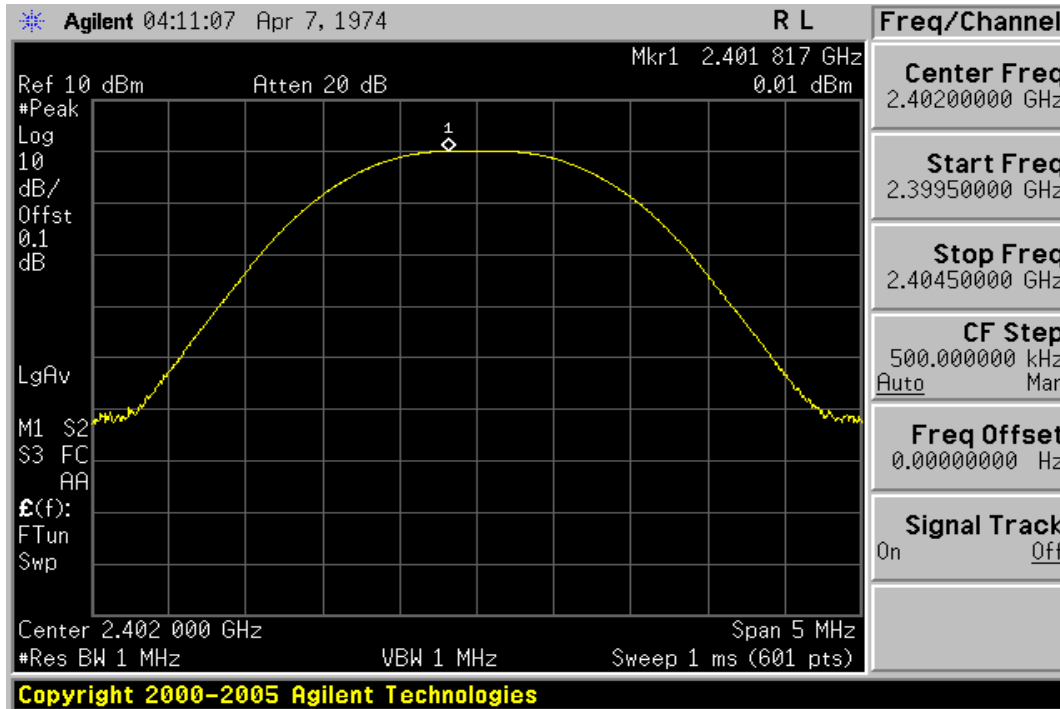
*\*Note: offset 0.1dB*

Note: Refer to next page for plots.

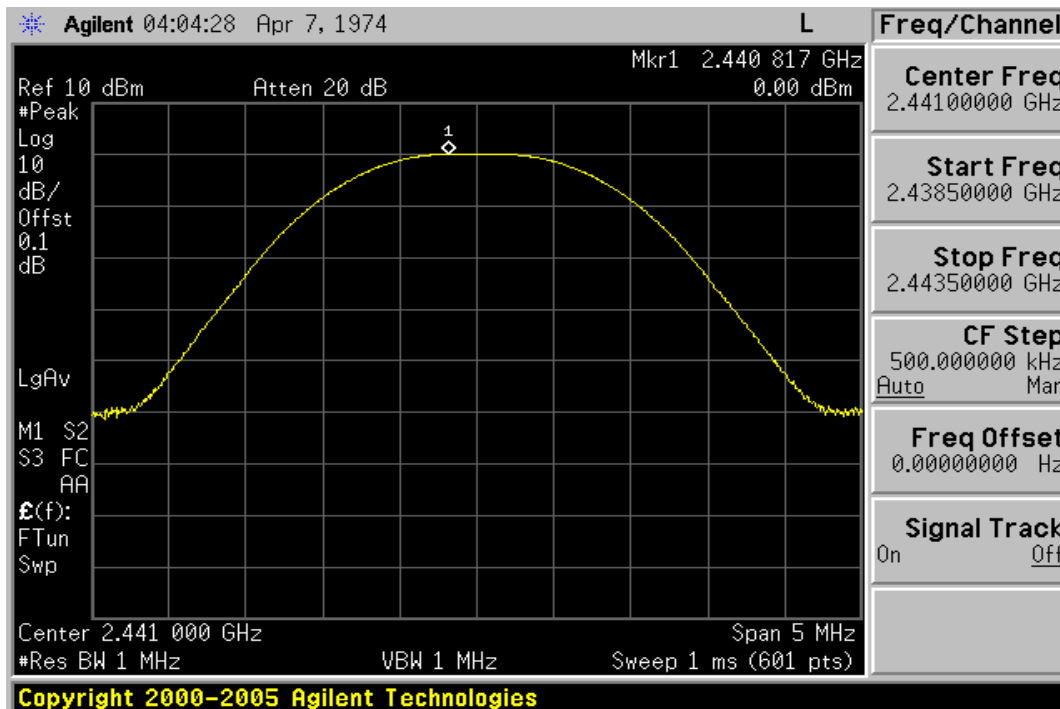
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**BDR Mode**

**Peak Power Output Data Plot (CH Low)**

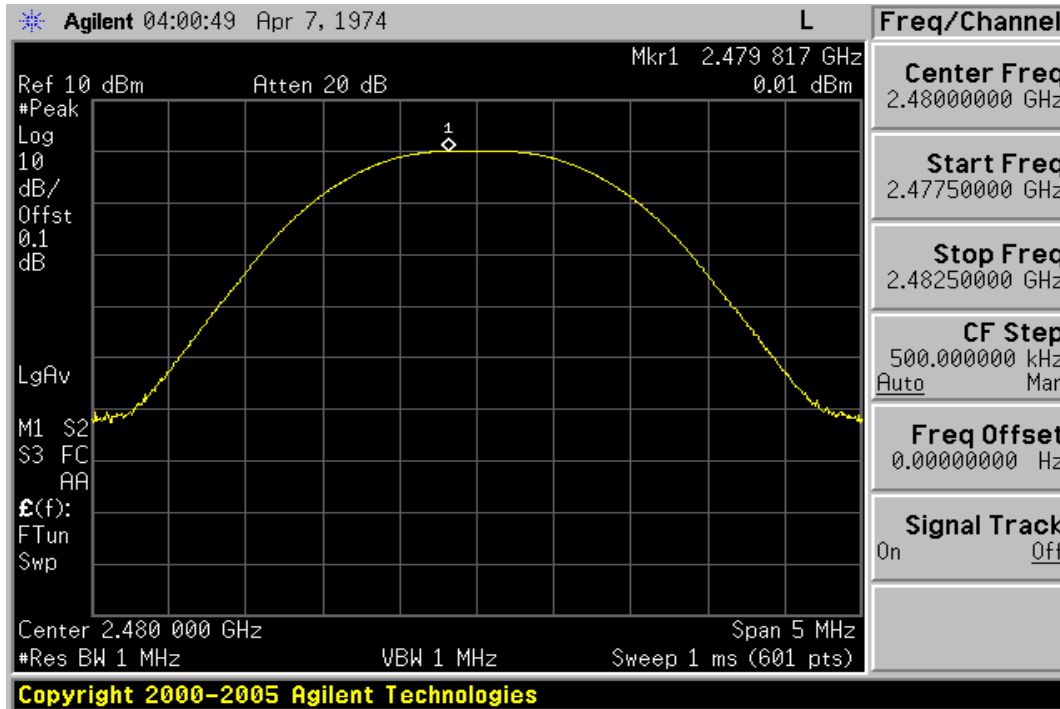


**Peak Power Output Data Plot (CH Mid)**



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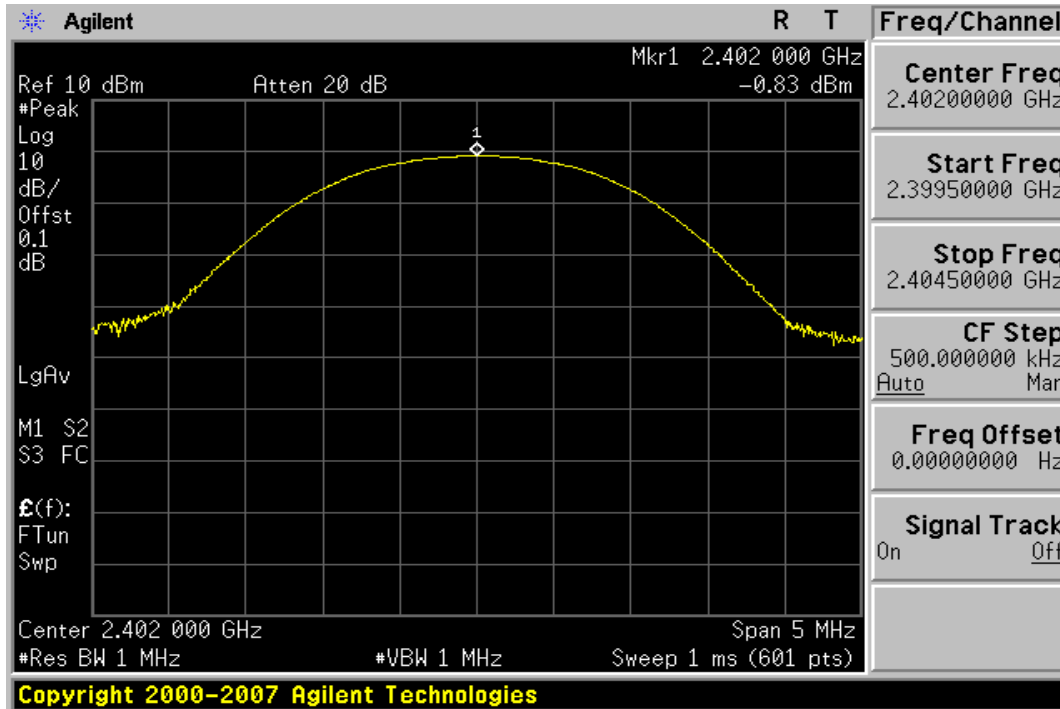
### Peak Power Output Data Plot (CH High)



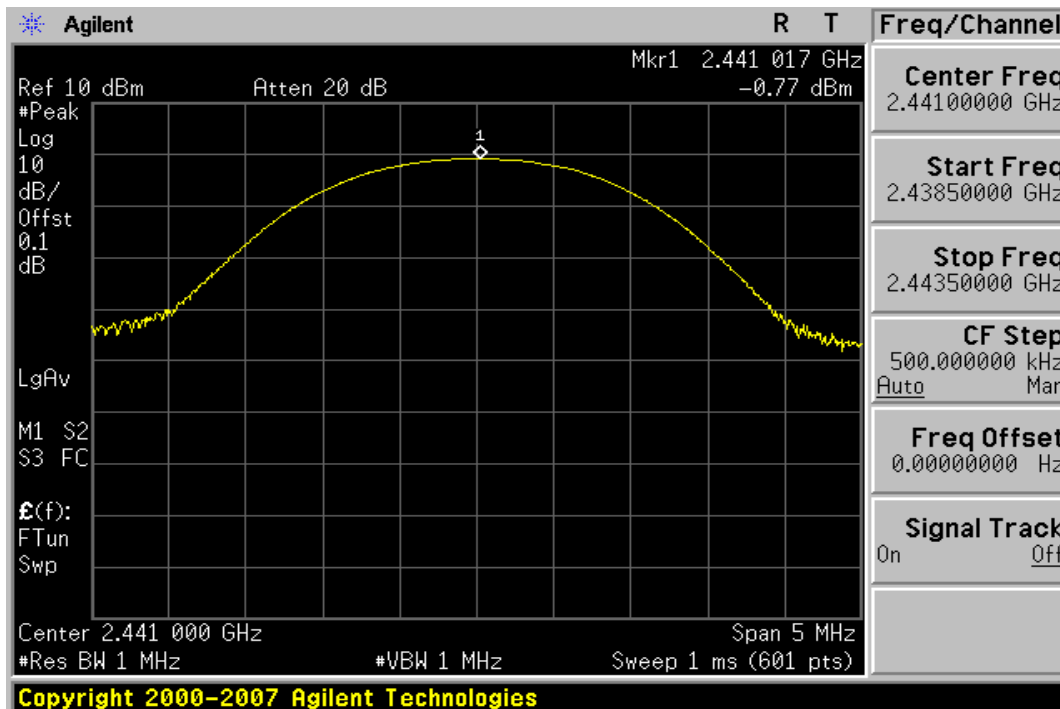
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**EDR Mode**

**Peak Power Output Data Plot (CH Low)**

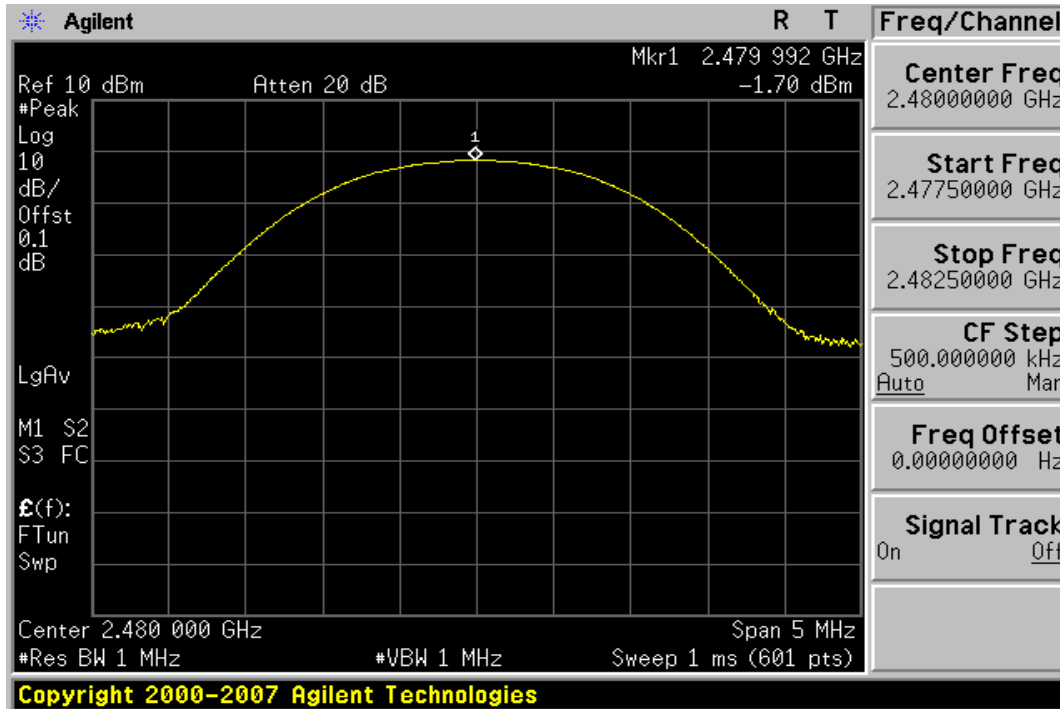


**Peak Power Output Data Plot (CH Mid)**



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### Peak Power Output Data Plot (CH High)



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## 7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 7.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

### 7.2. Measurement Equipment Used:

#### 7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 7.2.2. Radiated emission:

| 966 Chamber       |              |                     |               |            |            |
|-------------------|--------------|---------------------|---------------|------------|------------|
| EQUIPMENT TYPE    | MFR          | MODEL NUMBER        | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer | R&S          | FSP 40              | 100034        | 02/12/2009 | 02/11/2010 |
| Loop antenna      | MESSTEC      | FLA30               | 03/10086      | 06/06/2007 | 06/05/2009 |
| Bilog Antenna     | SCHWAZBECK   | VULB9160            | 9160-3136     | 11/15/2008 | 11/14/2009 |
| Horn antenna      | SCHWAZBECK   | BBHA 9120D          | 9120D-673     | 05/09/2008 | 05/08/2010 |
| Pre-Amplifier     | Agilent      | 8447D               | 1937A02834    | 11/30/2008 | 11/29/2009 |
| Pre-Amplifier     | Agilent      | 8449B               | 3008A01973    | 01/05/2009 | 01/04/2010 |
| Turn Table        | HD           | DT420               | N/A           | N.C.R      | N.C.R      |
| Antenna Tower     | HD           | MA240-N             | 240/657       | N.C.R      | N.C.R      |
| Controller        | HD           | HD100               | N/A           | N.C.R      | N.C.R      |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA-10M | 10m           | 01/05/2009 | 01/04/2010 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA-3M  | 3m            | 01/05/2009 | 01/04/2010 |
| 3m Site           | SGS          | 966 chamber         | N/A           | 11/08/2008 | 11/09/2009 |

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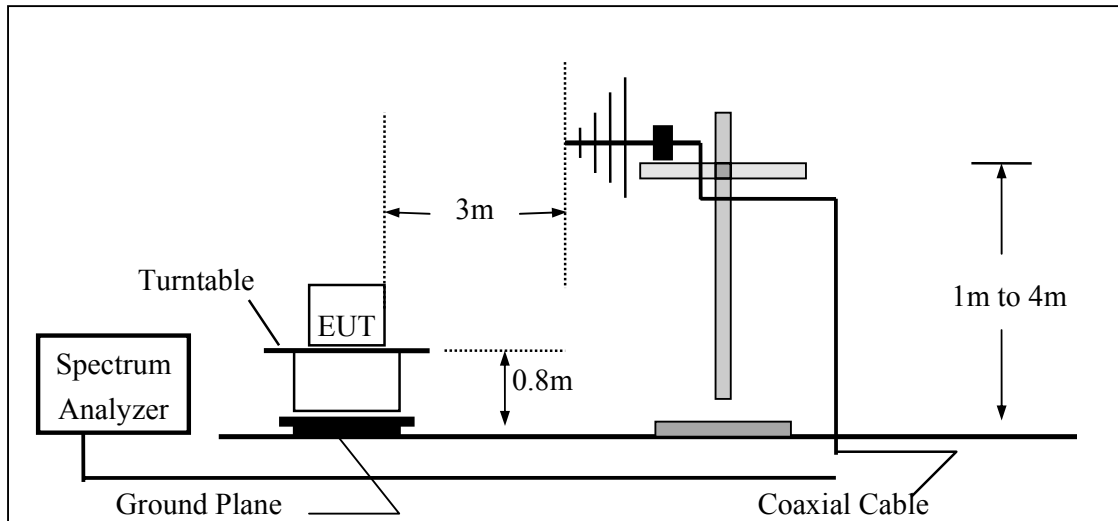
**7.3. Test SET-UP:**

**7.3.1. Conducted Emission at antenna port:**

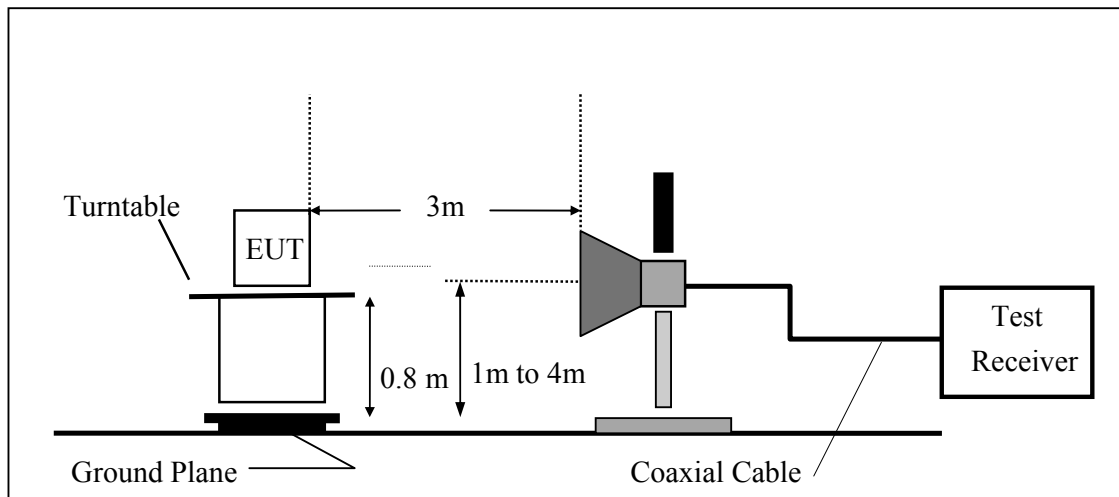
Refer to section 6.3 for details.

**7.3.2. Radiated emission:**

**(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz**



**(B) Radiated Emission Test Set-Up Frequency Over 1 GHz**



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**7.4. Measurement Procedure:**

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

**7.5. Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

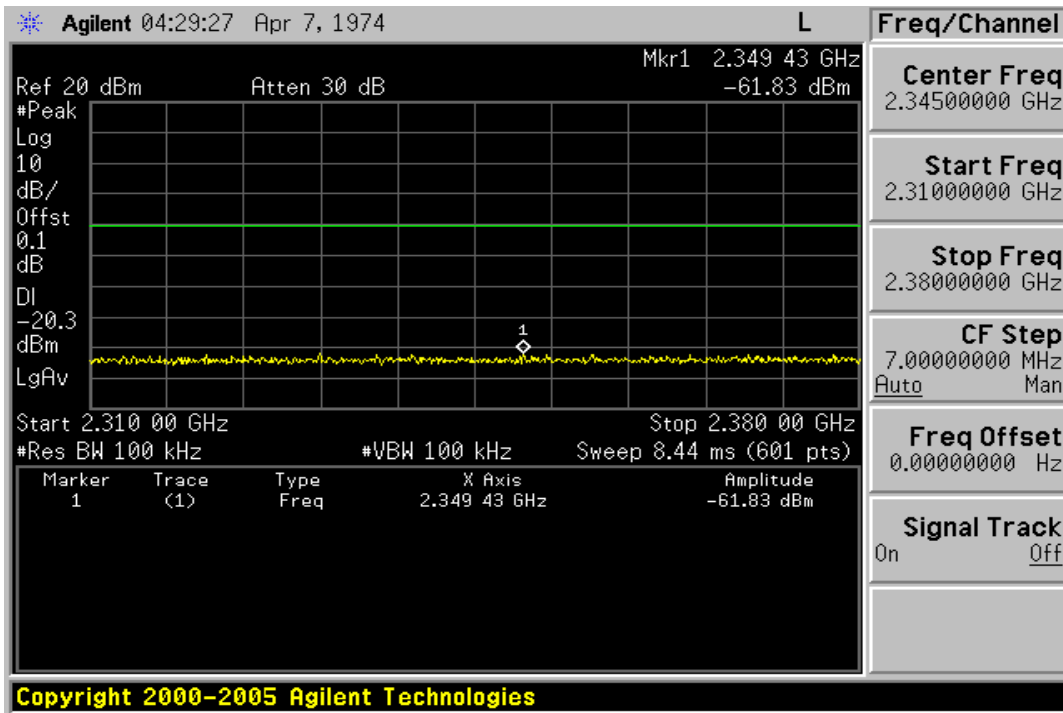
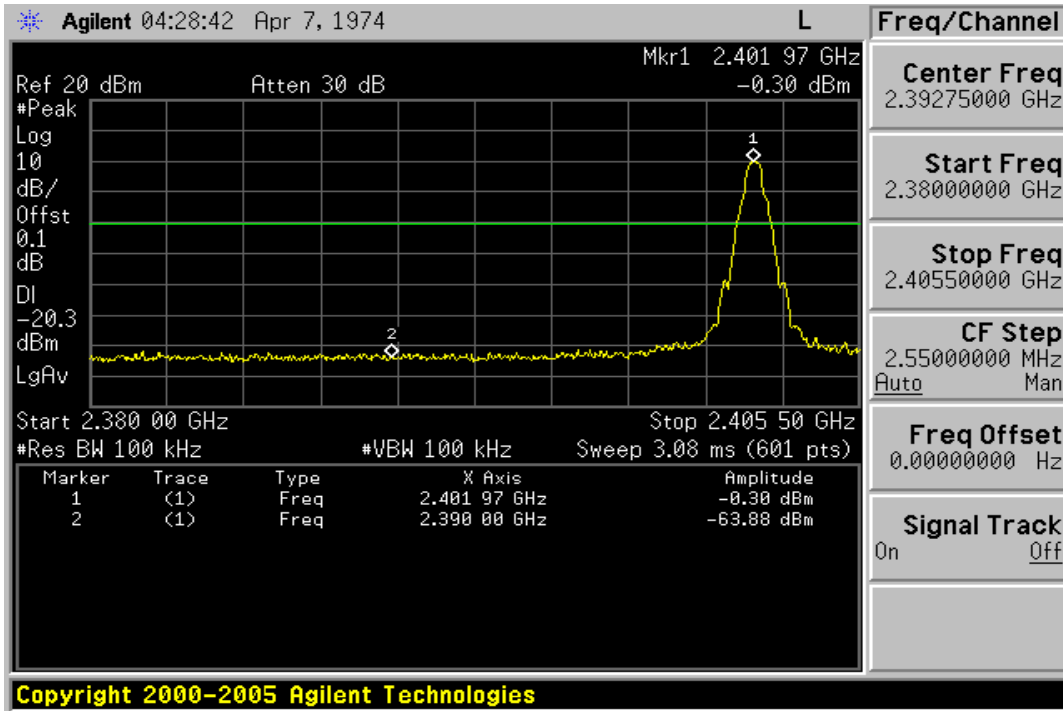
$$FS = RA + AF + CL - AG$$

|       |                        |  |
|-------|------------------------|--|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

**7.6. Measurement Result:**

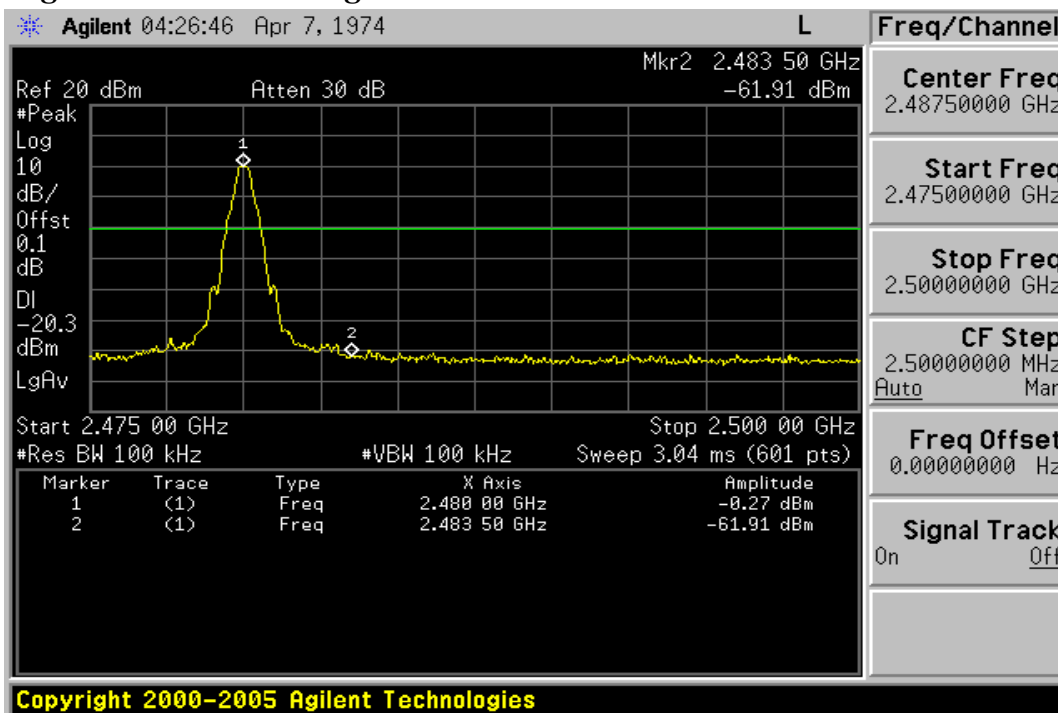
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

**BDR Mode**  
**Band Edges Test Data CH-Low**



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## Band Edges Test Data CH-High



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**Radiated Emission:**

Operation Mode TX CH Low  
 Fundamental Frequency 2402 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date May. 12, 2009  
 Test By Bondi  
 Pol Ver.

| Freq.<br>(MHz) | Peak              | AV                | Actual FS | Peak              | AV               | Peak Limit<br>(dBuV/m) | AV Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------|-------------------|-----------|-------------------|------------------|------------------------|----------------------|----------------|--------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |           | Ant./CL<br>CF(dB) | Peak<br>(dBuV/m) |                        | AV<br>(dBuV/m)       |                |        |
| 2390.00        | 43.42             | ---               | -10.66    | 32.76             | ---              | 74.00                  | 54.00                | -21.24         | Peak   |

Operation Mode TX CH Low  
 Fundamental Frequency 2402 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date May. 12, 2009  
 Test By Bondi  
 Pol Hor.

| Freq.<br>(MHz) | Peak              | AV                | Actual FS | Peak              | AV               | Peak Limit<br>(dBuV/m) | AV Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------|-------------------|-----------|-------------------|------------------|------------------------|----------------------|----------------|--------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |           | Ant./CL<br>CF(dB) | Peak<br>(dBuV/m) |                        | AV<br>(dBuV/m)       |                |        |
| 2390.00        | 42.84             | ---               | -10.66    | 32.18             | ---              | 74.00                  | 54.00                | -21.82         | Peak   |

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Emission:**

Operation Mode TX CH High  
 Fundamental Frequency 2480 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date May. 12, 2009  
 Test By Bondi  
 Pol Ver.

| Freq. (MHz) | Peak Reading (dBuV) | AV Reading (dBuV) | Actual FS Ant./CL CF(dB) | Peak (dBuV/m) | AV (dBuV/m) | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|-------------|---------------------|-------------------|--------------------------|---------------|-------------|---------------------|-------------------|-------------|--------|
|             |                     |                   |                          |               |             |                     |                   |             |        |
| 2483.50     | 43.23               | ---               | -10.36                   | 32.87         | ---         | 74.00               | 54.00             | -21.13      | Peak   |

Operation Mode TX CH High  
 Fundamental Frequency 2480 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date May. 12, 2009  
 Test By Bondi  
 Pol Hor.

| Freq. (MHz) | Peak Reading (dBuV) | AV Reading (dBuV) | Actual FS Ant./CL CF(dB) | Peak (dBuV/m) | AV (dBuV/m) | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|-------------|---------------------|-------------------|--------------------------|---------------|-------------|---------------------|-------------------|-------------|--------|
|             |                     |                   |                          |               |             |                     |                   |             |        |
| 2483.50     | 42.56               | ---               | -10.36                   | 32.20         | ---         | 74.00               | 54.00             | -21.80      | Peak   |

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 8. SPURIOUS EMISSION TEST

### 8.1. Standard Applicable:

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

### 8.2. Measurement Equipment Used:

#### 8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 8.2.2. Radiated emission:

Refer to section 7.2 for details.

### 8.3. Test SET-UP:

#### 8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

#### 8.3.2. Radiated emission:

Refer to section 7.3 for details.

**8.4. Measurement Procedure:**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

**8.5. Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

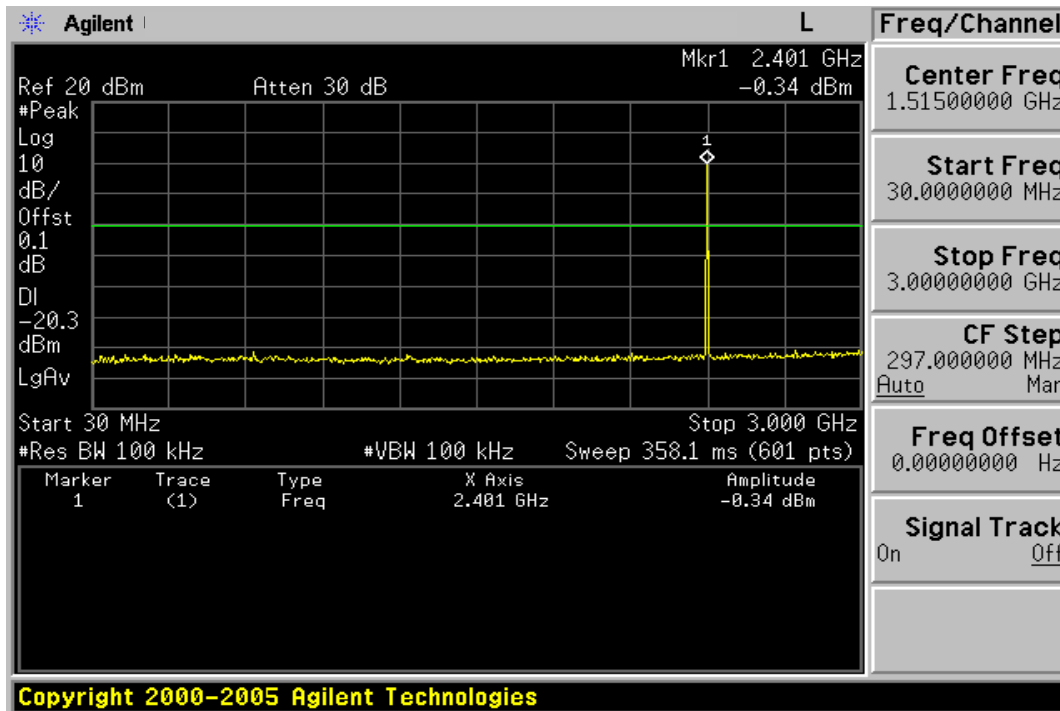
|       |                        |  |
|-------|------------------------|--|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

**8.6. Measurement Result:**

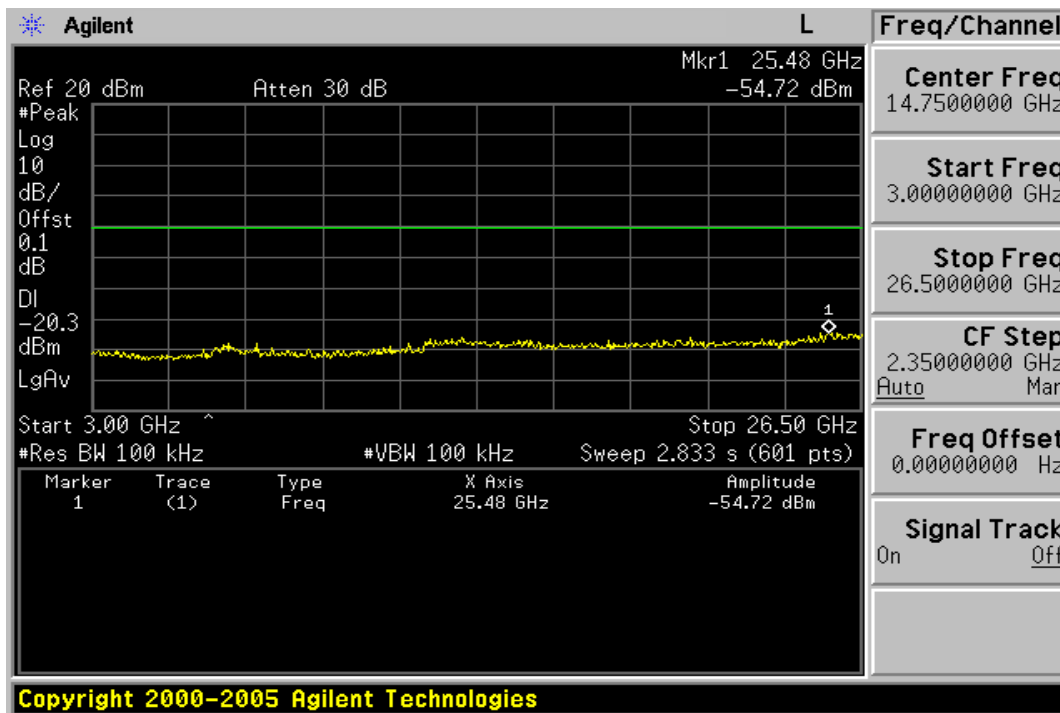
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.



**BDR Mode Conducted Spurious Emission Measurement Result**  
**Ch Low 30MHz – 3GHz**

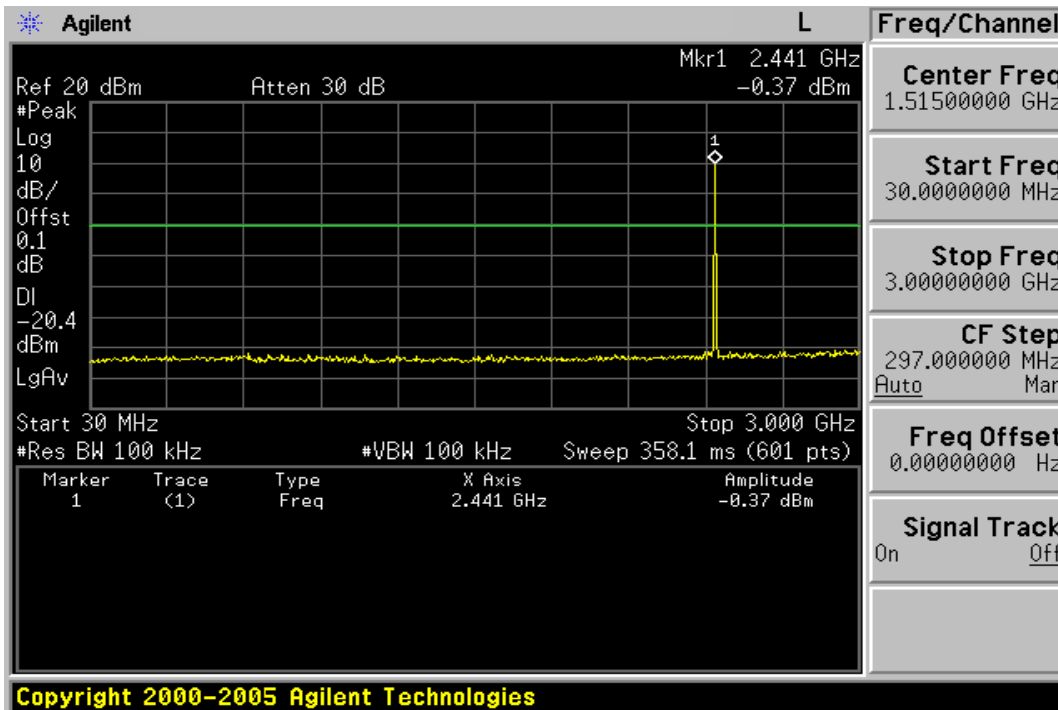


**Ch Low 3GHz – 26.5GHz**

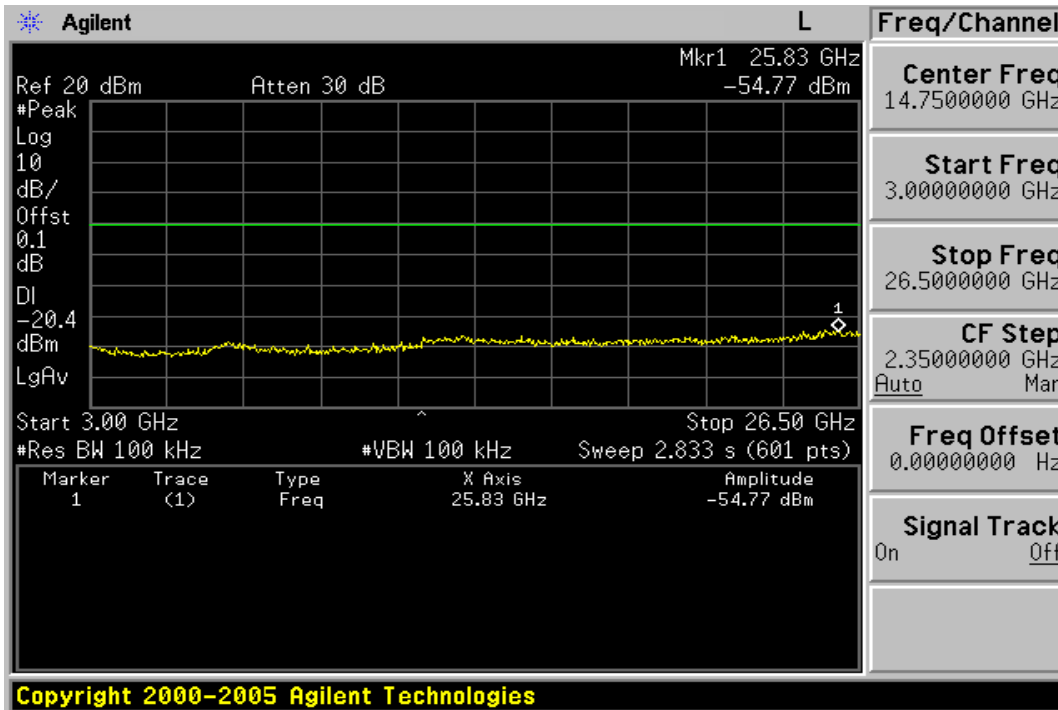


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**Ch Mid 30MHz – 3GHz**

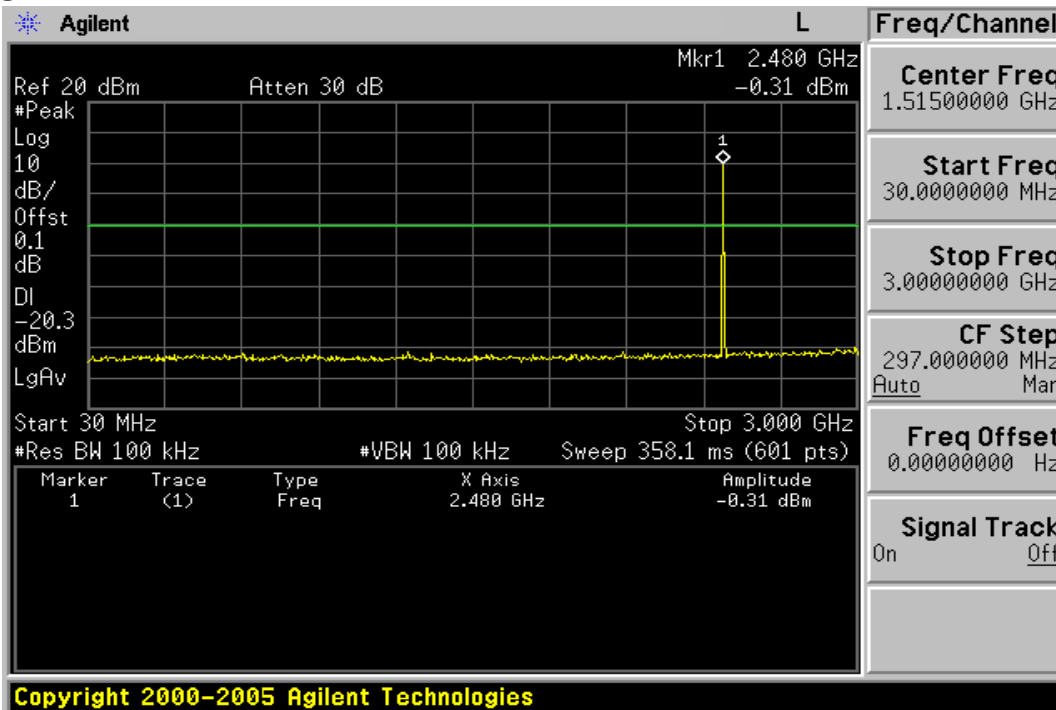


**Ch Mid 3GHz – 26.5GHz**

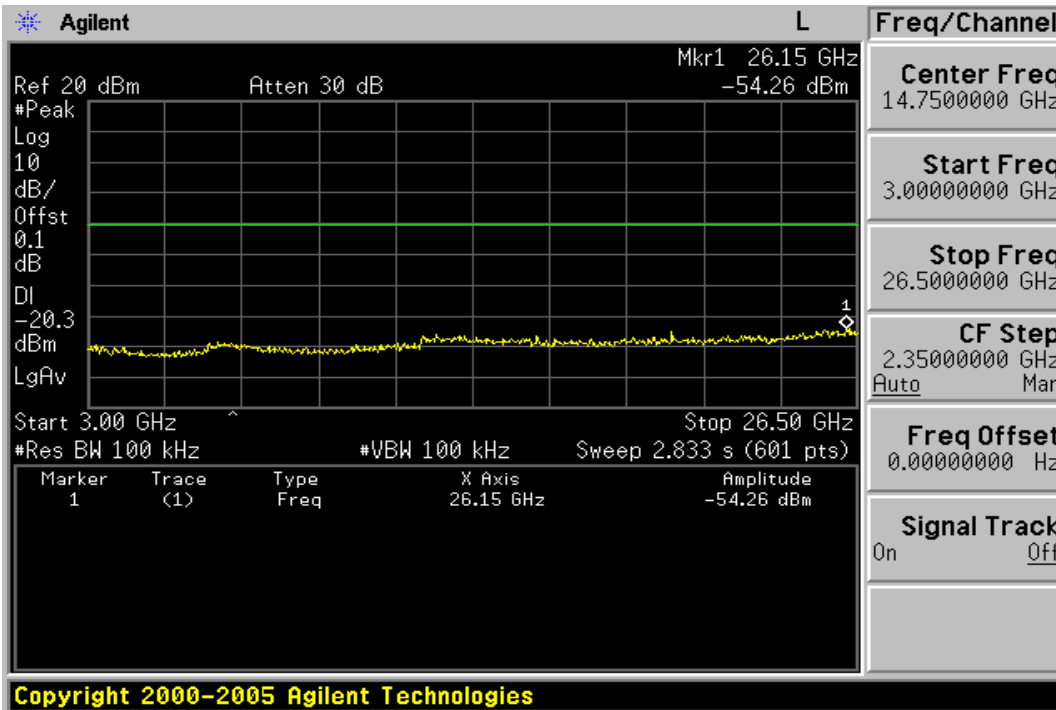


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**Ch High 30MHz – 3GHz**



**Ch High 3GHz – 26.5GHz**



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**BDR Mode**

**Radiated Spurious Emission Measurement Result (below 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Low | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2402MHz   | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Ver./Hor.     |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Detector<br>Mode<br>(PK/QP) | Reading<br>(dBuV) | Factor<br>(dB) | Actual FS<br>(dBuV/m) | Limit3m<br>(dBuV/m) | Safe Margin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 58.13          | V               | Peak                        | 62.82             | -26.70         | 36.12                 | 40.00               | -3.88               |
| 116.33         | V               | Peak                        | 66.12             | -29.04         | 37.08                 | 43.50               | -6.42               |
| 158.04         | V               | Peak                        | 47.42             | -27.80         | 19.62                 | 43.50               | -23.88              |
| 65.89          | H               | Peak                        | 55.25             | -27.92         | 27.33                 | 40.00               | -12.67              |
| 116.33         | H               | Peak                        | 62.22             | -29.04         | 33.18                 | 43.50               | -10.32              |
| 383.08         | H               | Peak                        | 48.51             | -25.80         | 22.71                 | 46.00               | -23.29              |

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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**Radiated Spurious Emission Measurement Result (below 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Mid | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2441MHz   | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Ver./Hor.     |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Detector<br>Mode<br>(PK/QP) | Reading<br>(dBuV) | Factor<br>(dB) | Actual FS<br>(dBuV/m) | Limit3m<br>(dBuV/m) | Safe Margin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 58.13          | V               | Peak                        | 62.07             | -26.70         | 35.37                 | 40.00               | -4.63               |
| 114.39         | V               | Peak                        | 63.47             | -29.18         | 34.29                 | 43.50               | -9.21               |
| 143.49         | V               | Peak                        | 46.19             | -27.36         | 18.83                 | 43.50               | -24.67              |
| 65.89          | H               | Peak                        | 55.10             | -27.92         | 27.18                 | 40.00               | -12.82              |
| 119.24         | H               | Peak                        | 61.20             | -29.15         | 32.05                 | 43.50               | -11.45              |
| 383.08         | H               | Peak                        | 49.12             | -25.80         | 23.32                 | 46.00               | -22.68              |

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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**Radiated Spurious Emission Measurement Result (below 1GHz)**

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2480MHz    | Test By   | Bondi         |
| Temperature           | 25 °C      | Pol       | Ver./Hor.     |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Detector<br>Mode<br>(PK/QP) | Reading<br>(dBuV) | Factor<br>(dB) | Actual FS<br>(dBuV/m) | Limit3m<br>(dBuV/m) | Safe Margin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 58.13          | V               | Peak                        | 62.64             | -26.70         | 35.94                 | 40.00               | -4.06               |
| 114.39         | V               | Peak                        | 62.78             | -29.18         | 33.60                 | 43.50               | -9.90               |
| 150.28         | V               | Peak                        | 45.84             | -27.25         | 18.59                 | 43.50               | -24.91              |
| 62.98          | H               | Peak                        | 53.19             | -26.79         | 26.40                 | 40.00               | -13.60              |
| 116.33         | H               | Peak                        | 59.32             | -29.04         | 30.28                 | 43.50               | -13.22              |
| 256.98         | H               | Peak                        | 47.36             | -29.28         | 18.08                 | 46.00               | -27.92              |

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Low | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2402 MHz  | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Ver.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Actual FS         |                  | Peak           | AV                | Margin<br>(dB) |                   |      |
|----------------|-------------------|-------------------|-------------------|------------------|----------------|-------------------|----------------|-------------------|------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) | Ant./CL<br>CF(dB) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Limit<br>(dBuV/m) |                | Limit<br>(dBuV/m) |      |
| 1663.0         | 42.85             |                   | -13.66            | 29.19            |                | 74.00             | 54.00          | -24.81            | Peak |
| 4804.0         | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 7206.0         | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 9608.0         | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 12010.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 14412.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 16814.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 19216.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 21618.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |
| 24020.0        | ----              |                   |                   |                  |                | 74.00             | 54.00          |                   |      |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Low | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2402 MHz  | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Hor.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Ant./CL<br>CF(dB) | Actual FS        |                | Peak              | AV                | Margin<br>(dB) |
|----------------|-------------------|-------------------|-------------------|------------------|----------------|-------------------|-------------------|----------------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Limit<br>(dBuV/m) | Limit<br>(dBuV/m) |                |
| 1500.5         | 43.38             |                   | -14.30            | 29.08            |                | 74.00             | 54.00             | -24.92 Peak    |
| 4804.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 7206.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 9608.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 12010.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 14412.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 16814.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 19216.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 21618.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 24020.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Mid | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2441 MHz  | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Ver.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Actual FS<br>Ant./CL<br>CF(dB) | Peak             | AV             | Peak<br>Limit<br>(dBuV/m) | AV                | Margin<br>(dB) |
|----------------|-------------------|-------------------|--------------------------------|------------------|----------------|---------------------------|-------------------|----------------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |                                | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           | Limit<br>(dBuV/m) |                |
| 1871.0         | 43.03             |                   | -13.01                         | 30.02            |                | 74.00                     | 54.00             | -23.98 Peak    |
| 4882.0         | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 7323.0         | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 9764.0         | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 12205.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 14646.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 17087.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 19528.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 21969.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |
| 24410.0        | ----              |                   |                                |                  |                | 74.00                     | 54.00             |                |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Mid | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2441 MHz  | Test By   | Bondi         |
| Temperature           | 25 °C     | Pol       | Hor.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Ant./CL<br>CF(dB) | Actual FS        |                | Peak              | AV                | Margin<br>(dB) |
|----------------|-------------------|-------------------|-------------------|------------------|----------------|-------------------|-------------------|----------------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Limit<br>(dBuV/m) | Limit<br>(dBuV/m) |                |
| 1546.0         | 43.87             |                   | -14.12            | 29.75            |                | 74.00             | 54.00             | -24.25 Peak    |
| 4882.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 7323.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 9764.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 12205.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 14646.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 17087.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 19528.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 21969.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 24410.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2480 MHz   | Test By   | Bondi         |
| Temperature           | 25 °C      | Pol       | Ver.          |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Actual FS<br>Ant./CL<br>CF(dB) | Peak                | AV                  | Peak<br>Limit<br>(dBuV/m) | AV    | Margin<br>(dB) |
|----------------|-------------------|-------------------|--------------------------------|---------------------|---------------------|---------------------------|-------|----------------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |                                | Reading<br>(dBuV/m) | Reading<br>(dBuV/m) |                           |       |                |
| 1929.5         | 41.96             |                   | -12.85                         | 29.11               |                     | 74.00                     | 54.00 | -24.89 Peak    |
| 4960.0         | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 7440.0         | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 9920.0         | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 12400.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 14880.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 17360.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 19840.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 22320.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |
| 24800.0        | ----              |                   |                                |                     |                     | 74.00                     | 54.00 |                |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | May. 11, 2009 |
| Fundamental Frequency | 2480 MHz   | Test By   | Bondi         |
| Temperature           | 25 °C      | Pol       | Hor.          |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak              | AV                | Ant./CL<br>CF(dB) | Actual FS        |                | Peak              | AV                | Margin<br>(dB) |
|----------------|-------------------|-------------------|-------------------|------------------|----------------|-------------------|-------------------|----------------|
|                | Reading<br>(dBuV) | Reading<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Limit<br>(dBuV/m) | Limit<br>(dBuV/m) |                |
| 1968.5         | 43.40             |                   | -12.74            | 30.66            |                | 74.00             | 54.00             | -23.34 Peak    |
| 4960.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 7440.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 9920.0         | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 12400.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 14880.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 17360.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 19840.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 22320.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |
| 24800.0        | ----              |                   |                   |                  |                | 74.00             | 54.00             |                |

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 9. FREQUENCY SEPARATION

### 9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

### 9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 9.3. Test Set-up:

Refer to section 6.3 for details.

### 9.4. Measurement Procedure:

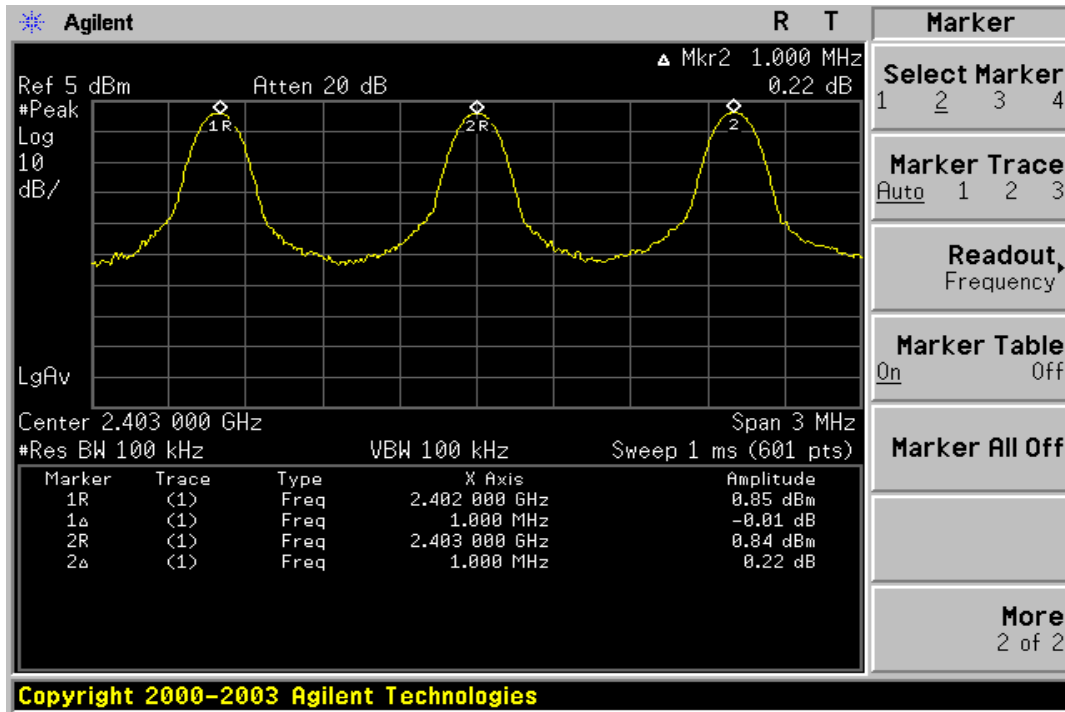
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=3KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

### 9.5. Measurement Result:

| Channel separation (MHz) | Limit  | Result |
|--------------------------|--|--------|
| 1                        | $\geq 25\text{KHz}$ or<br>2/3 times 20dB bandwidth | PASS   |

Note: Refer to next page for plots.

### Frequency Separation Test Data



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## 10. NUMBER OF HOPPING FREQUENCY

### 10.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

### 10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 10.3. Test Set-up:

Refer to section 6.3 for details.

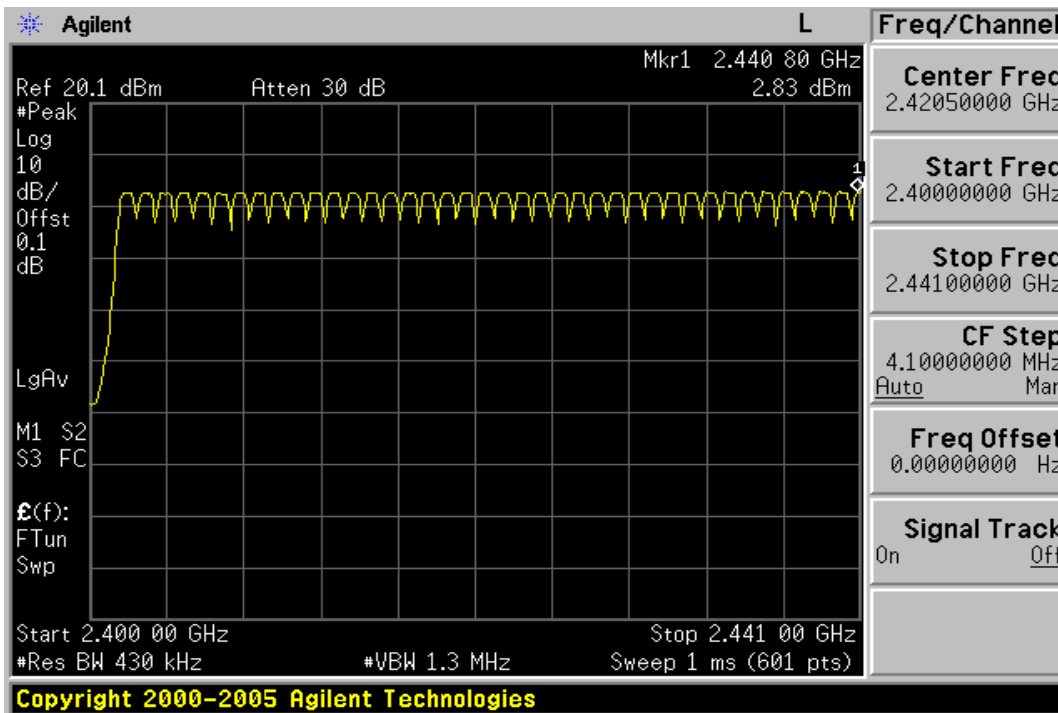
### 10.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=100KHz,
5. Max hold, view and count how many channel in the band.

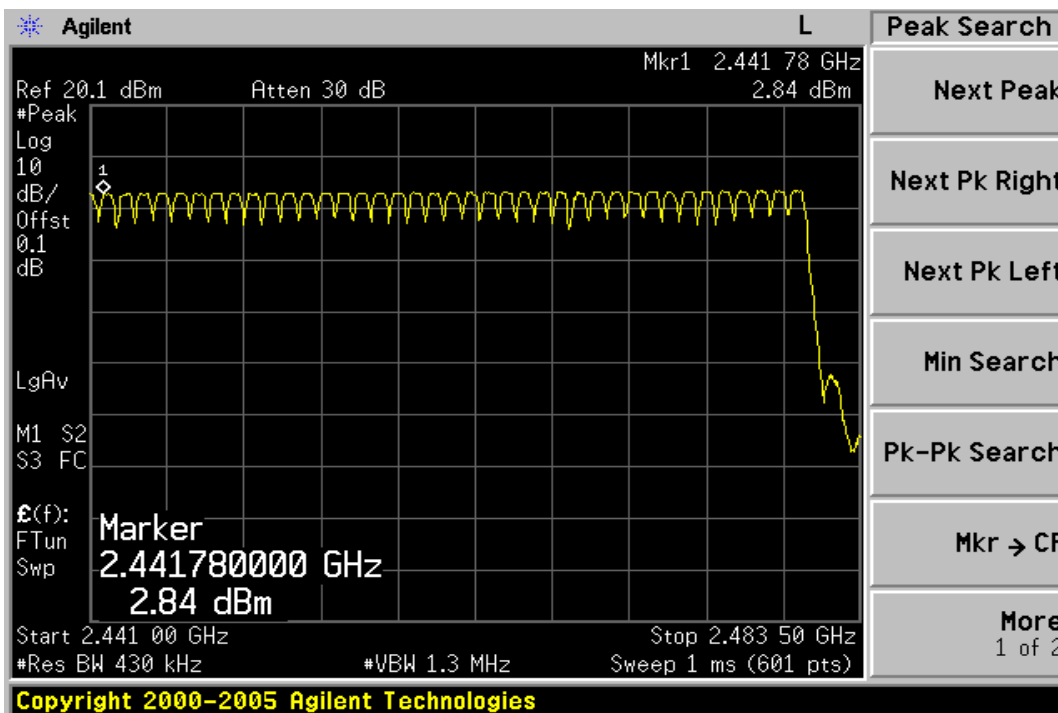
### 10.5. Measurement Result:

Note: Refer to next page for plots.

**Channel Number**  
**2.4 GHz – 2.441GHz**



**2.441 GHz – 2.4835GHz**



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## 11. TIME OF OCCUPANCY (DWELL TIME)

### 11.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

### 11.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 11.3. Test Set-up:

Refer to section 6.3 for details.

### 11.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Span = 0Hz , Adjust Sweep = 30s.
5. Repeat above procedures until all frequency measured were complete.

### 11.5. Measurement Result:

A period time = 0.4 (ms) \* 79 = 31.6 (s)

CH Low: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

CH Mid: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

CH High: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

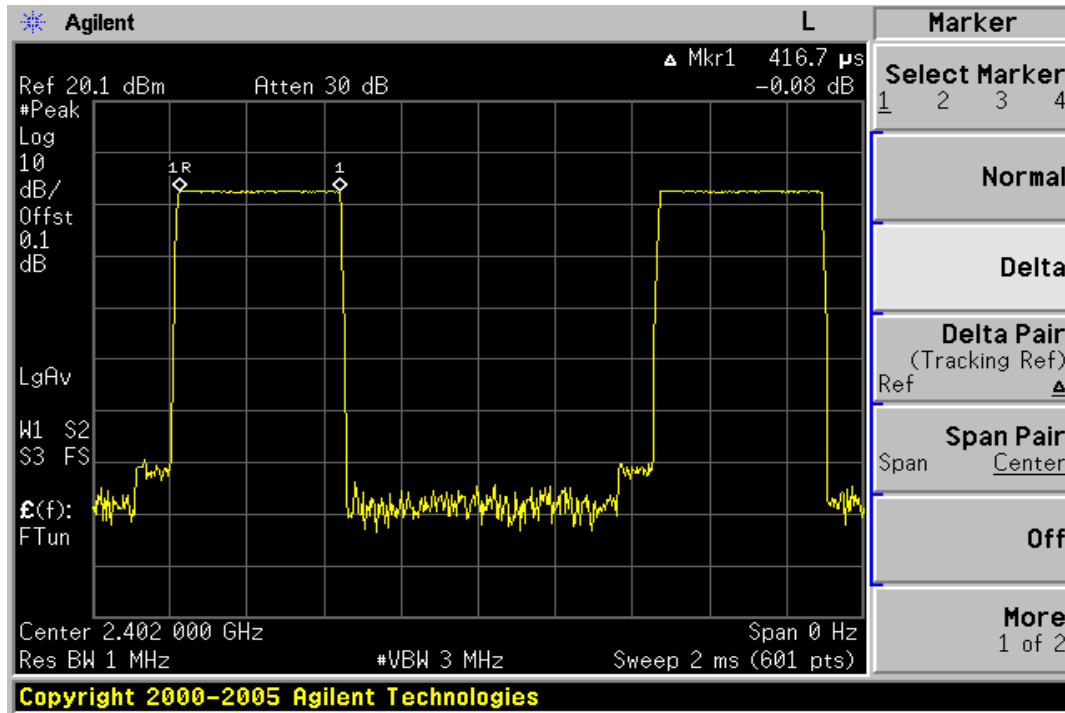
Note: Refer to next page for plots.

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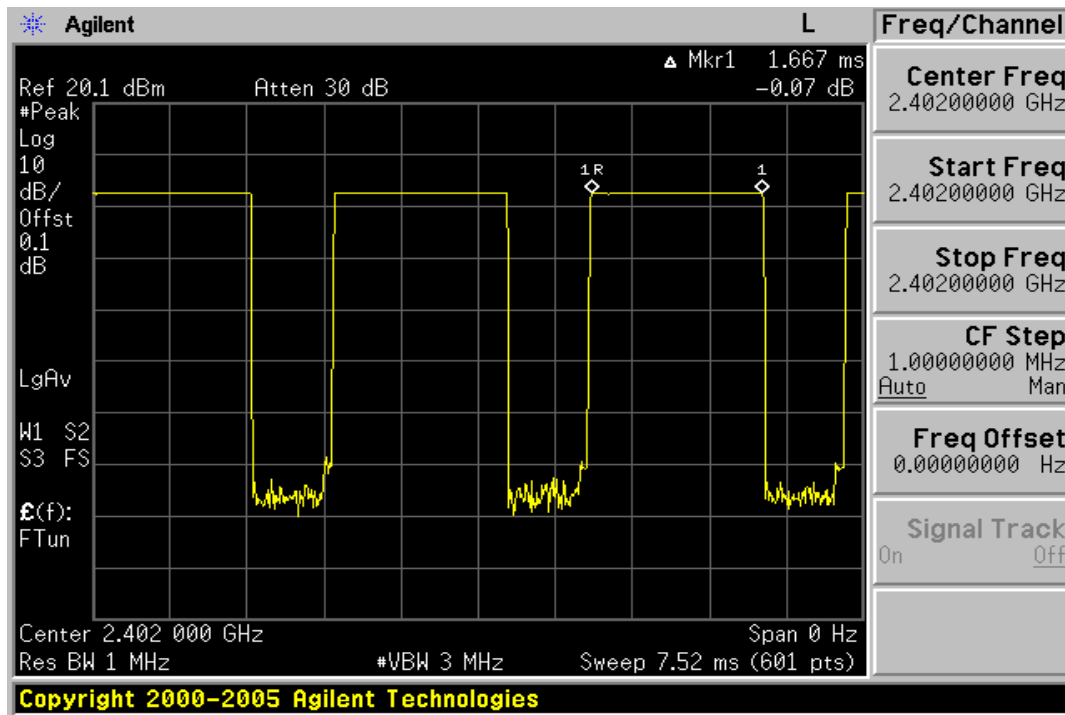
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## CH-Low

### DH1

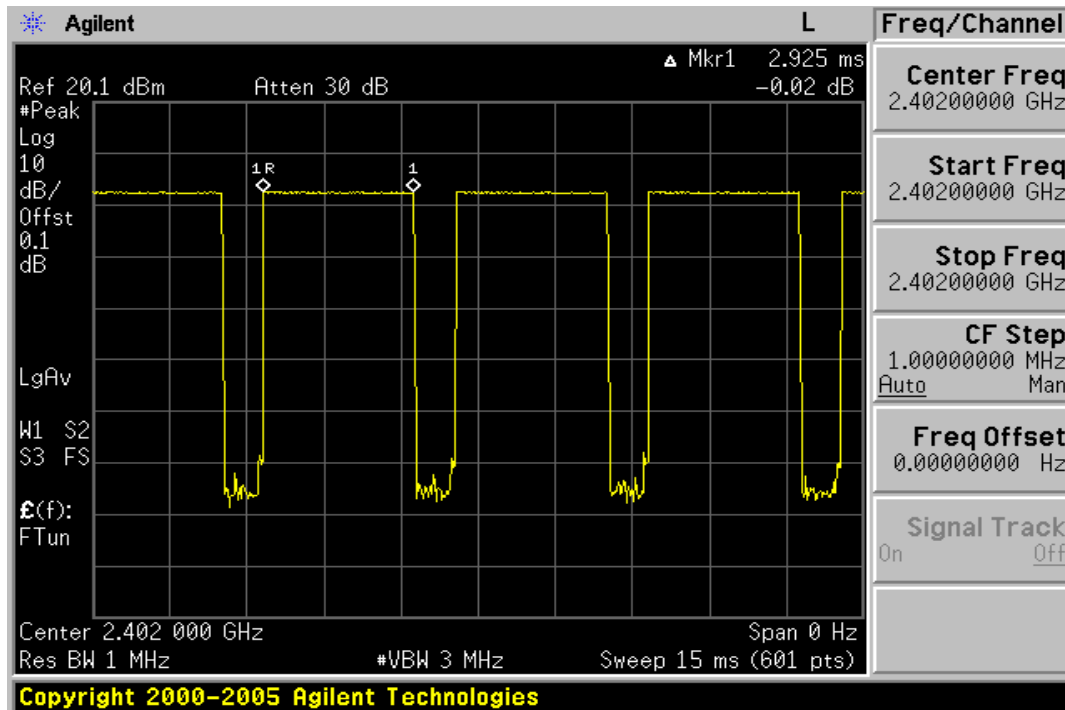


### DH3



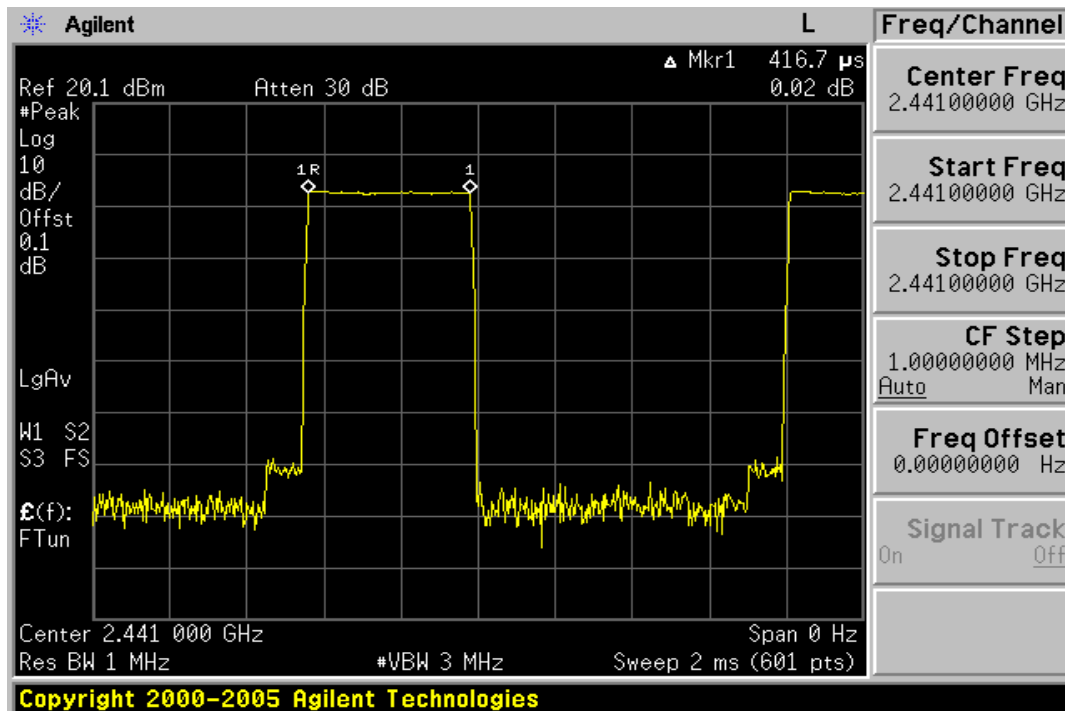
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## DH5



## CH-Mid

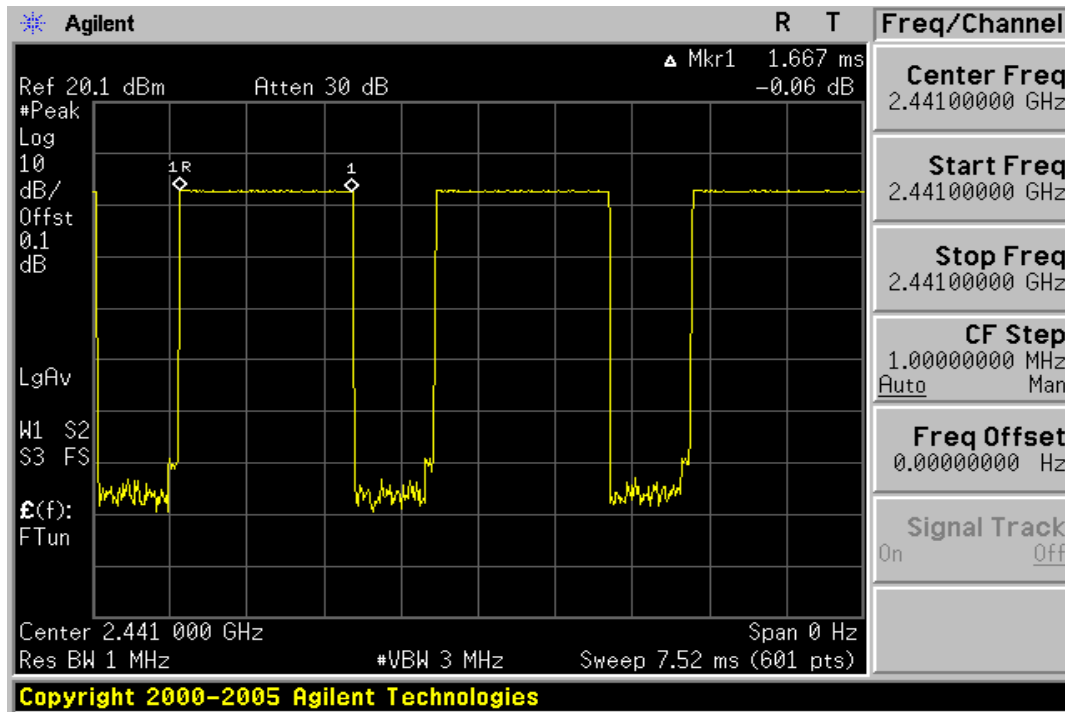
## DH1



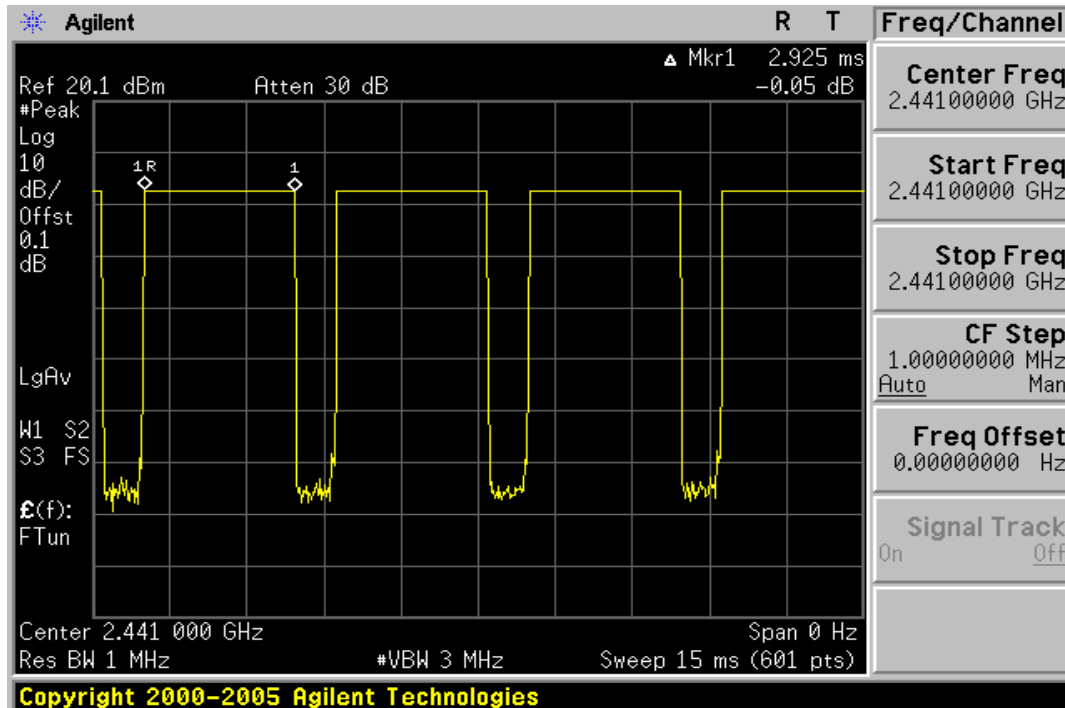
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### DH3

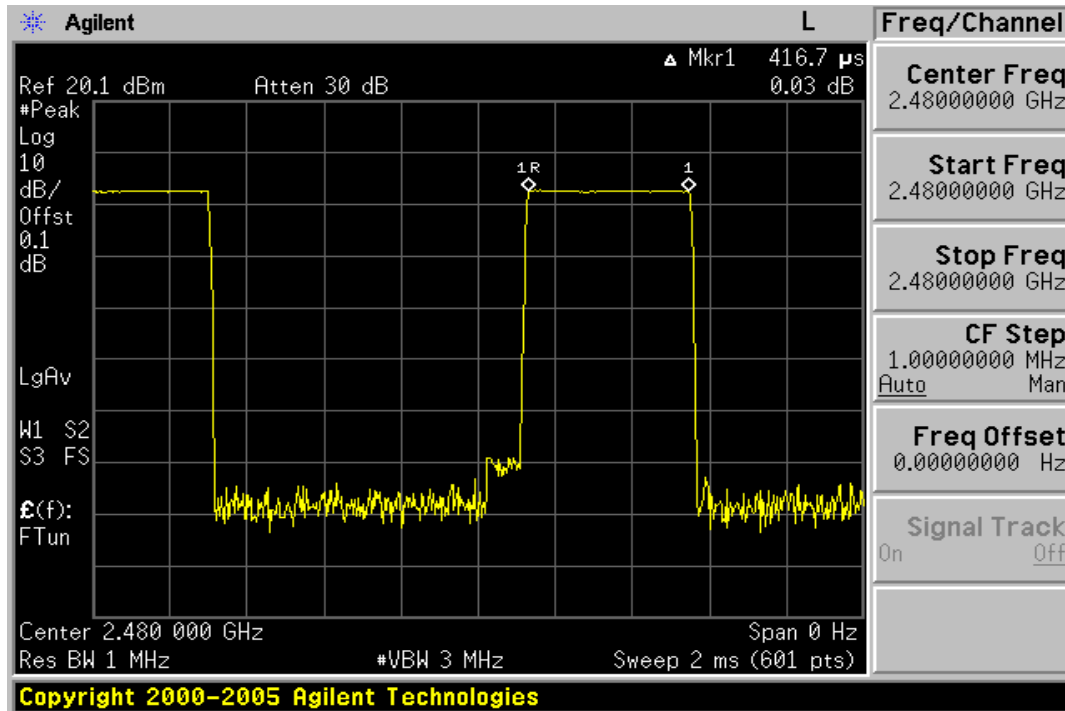


### DH5

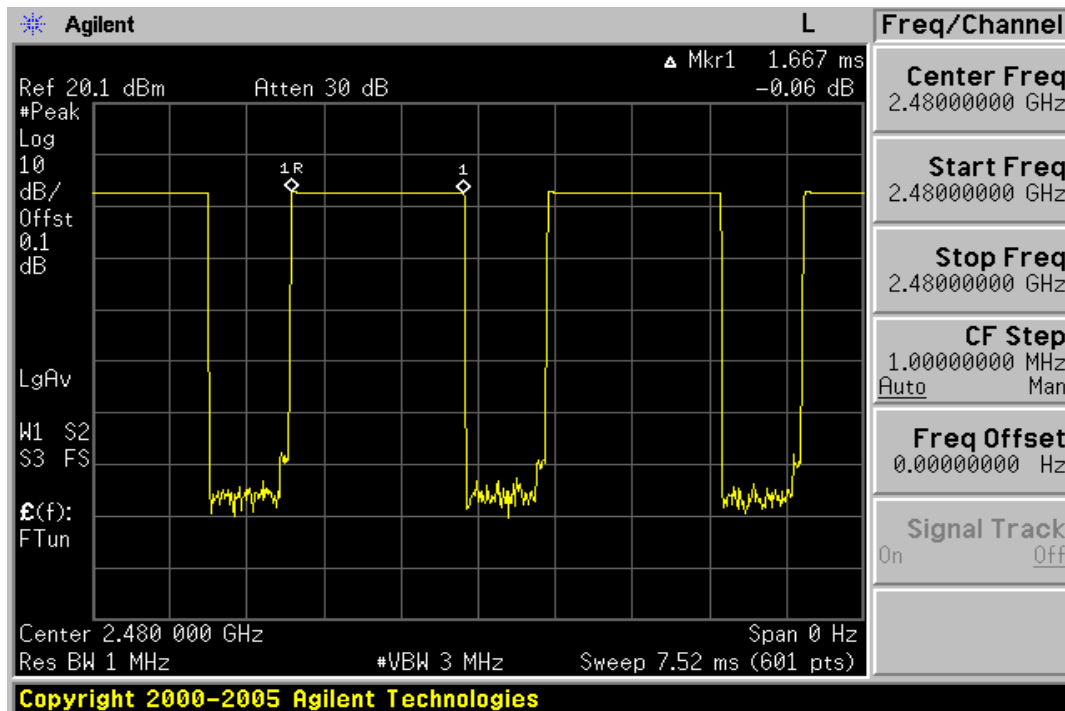


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## CH-High DH1

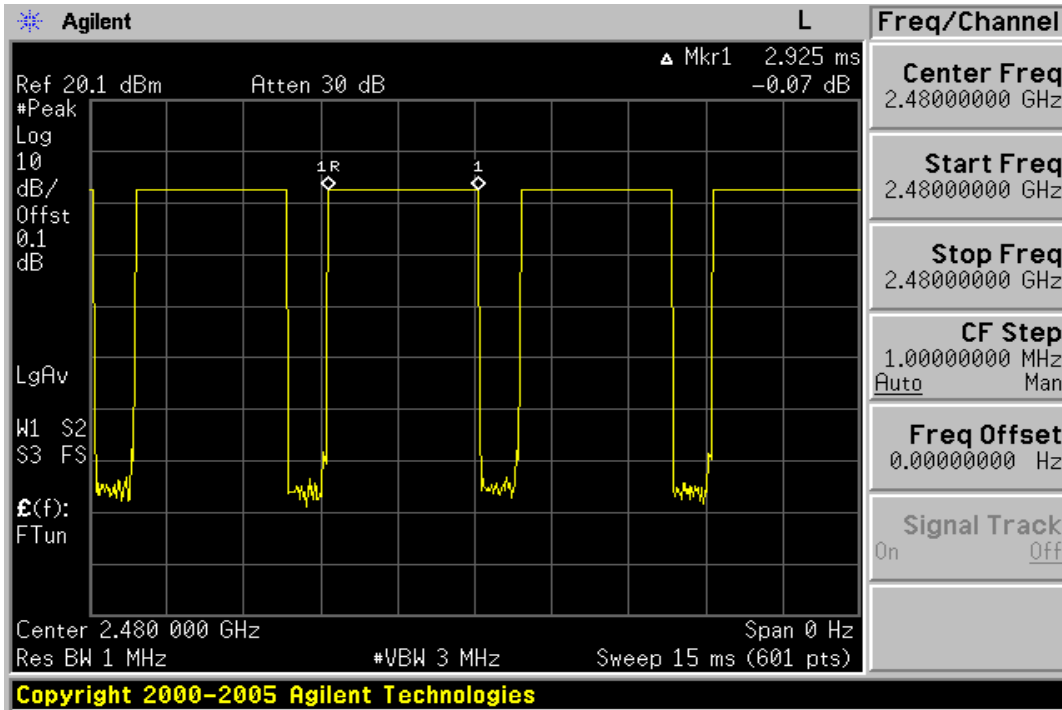


## DH3



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## DH5



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## 12. Peak Power Spectral Density

### 12.1. Standard Applicable:

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

### 12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 12.3. Test Set-up:

Refer to section 6.3 for details.

### 12.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.



**12.5. Measurement Result:**

BDR Mode

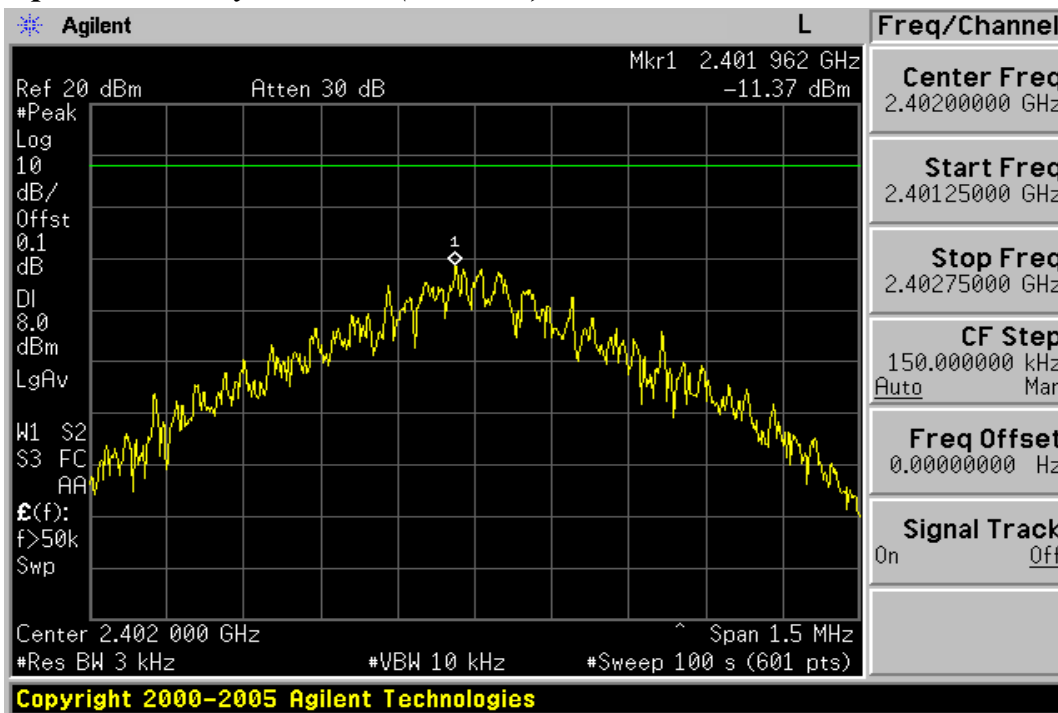
| CH   | RF Power Density Reading (dBm) | Cable loss (dB) | RF Power Density Level (dBm) | Maximum Limit (dBm) |
|------|--------------------------------|-----------------|------------------------------|---------------------|
| Low  | -11.37                         | 0.00            | -11.37                       | 8                   |
| Mid  | -11.43                         | 0.00            | -11.43                       | 8                   |
| High | -11.39                         | 0.00            | -11.39                       | 8                   |

Note: offset 0.1dB for path lose.

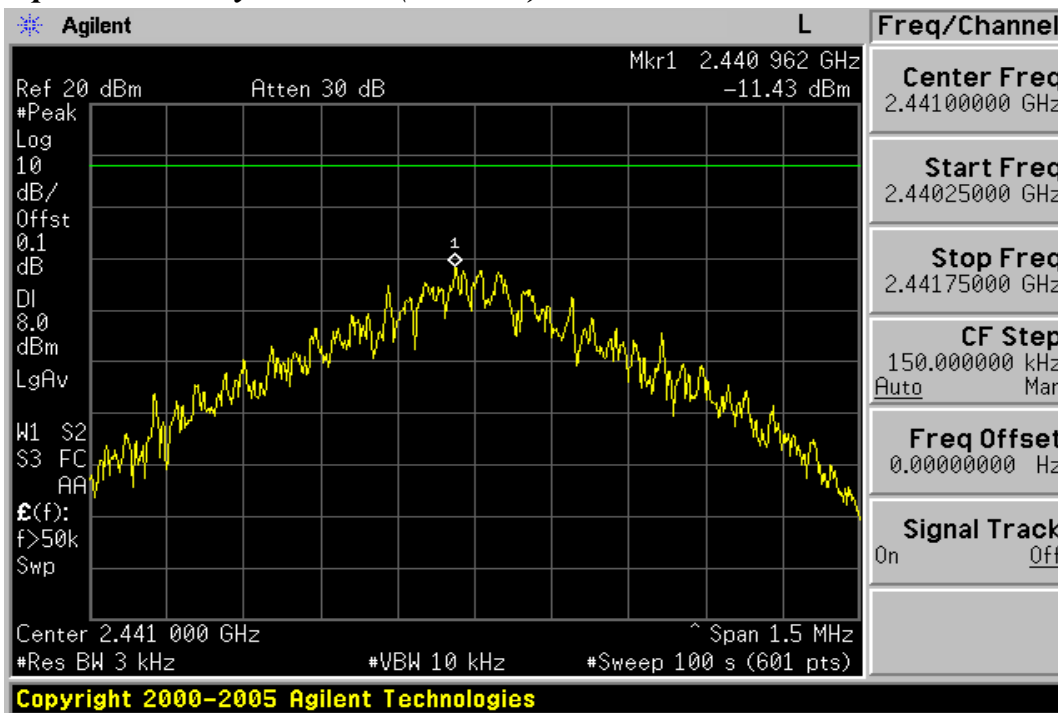
Note: Refer to next page for plots.

**BDR Mode**

**Power Spectral Density Test Plot (CH-Low)**

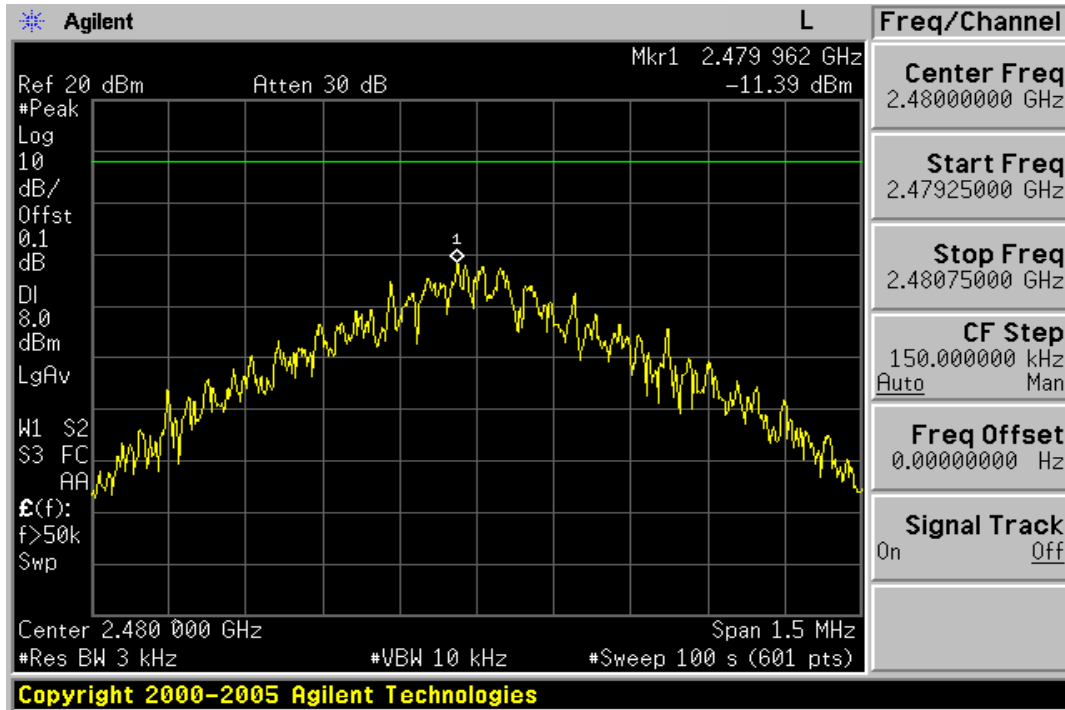


**Power Spectral Density Test Plot (CH-Mid)**



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**Power Spectral Density Test Plot (CH-High)**



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## 13. 20dB Bandwidth

### 13.1. Standard Applicable:

According to §15.247(a)(1), for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

### 13.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 13.3. Test Set-up:

Refer to section 6.3 for details.

### 13.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

**13.5. Measurement Result:**

BDR mode:

| CH     | Bandwidth<br>(kHz) |
|--------|--------------------|
| Lower  | 919.172            |
| Mid    | 920.318            |
| Higher | 920.074            |

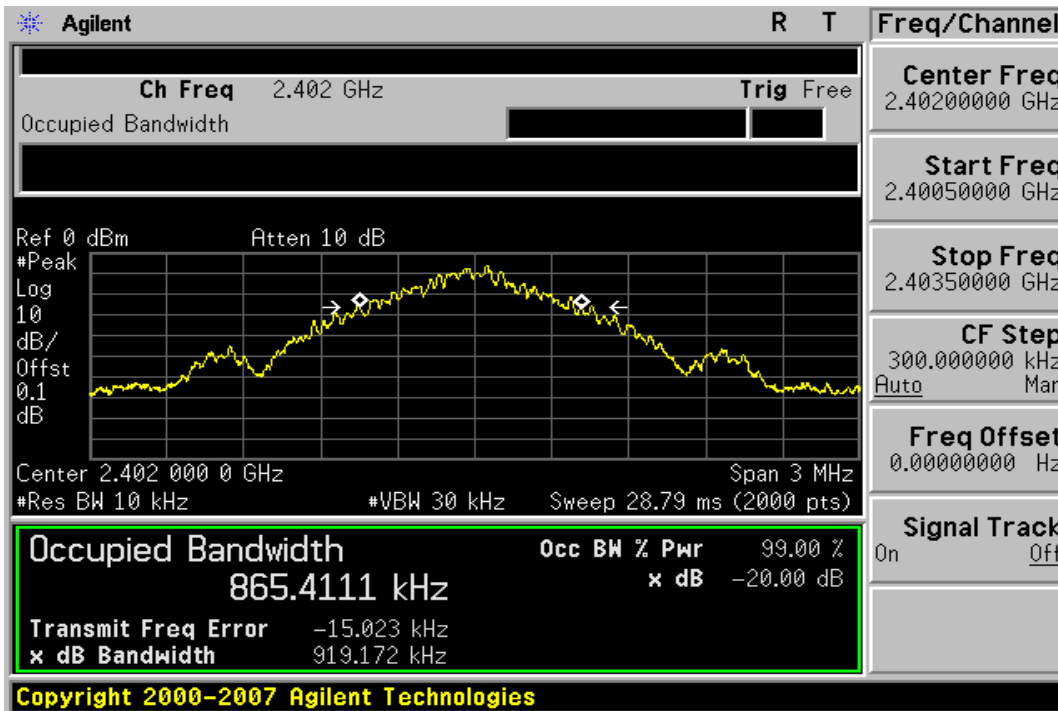
EDR mode:

| CH     | Bandwidth<br>(MHz) | 2/3 Bandwidth<br>(MHz) |
|--------|--------------------|------------------------|
| Lower  | 1.358              | 0.905                  |
| Mid    | 1.360              | 0.907                  |
| Higher | 1.361              | 0.907                  |

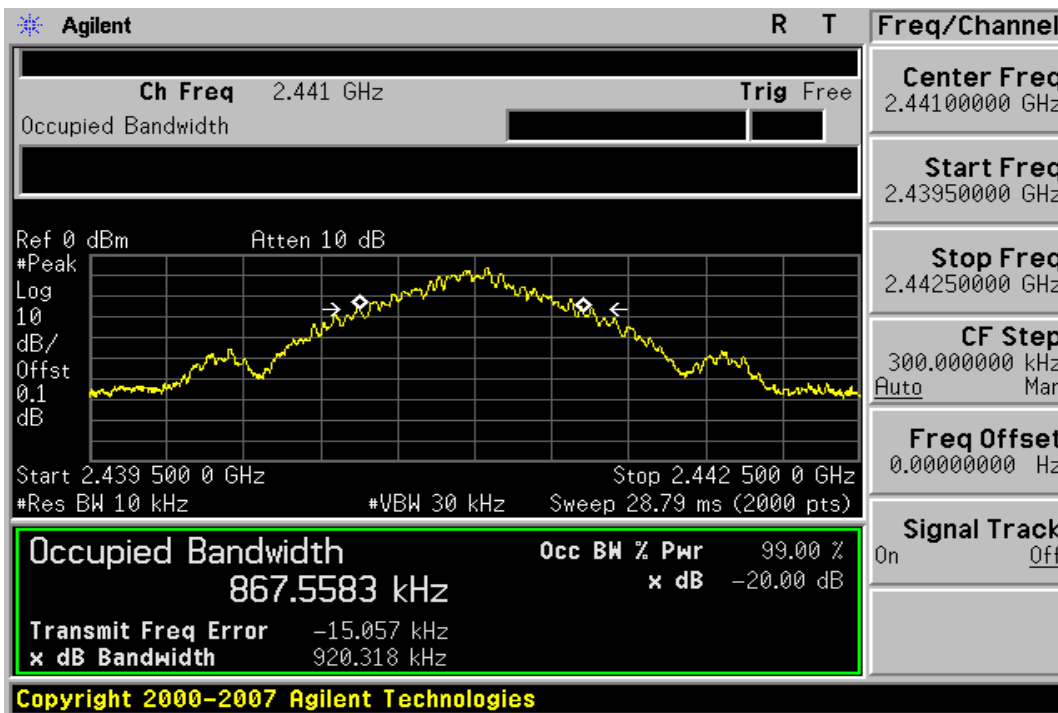
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**BDR Mode**

**20dB Bandwidth Test Data CH-Low**

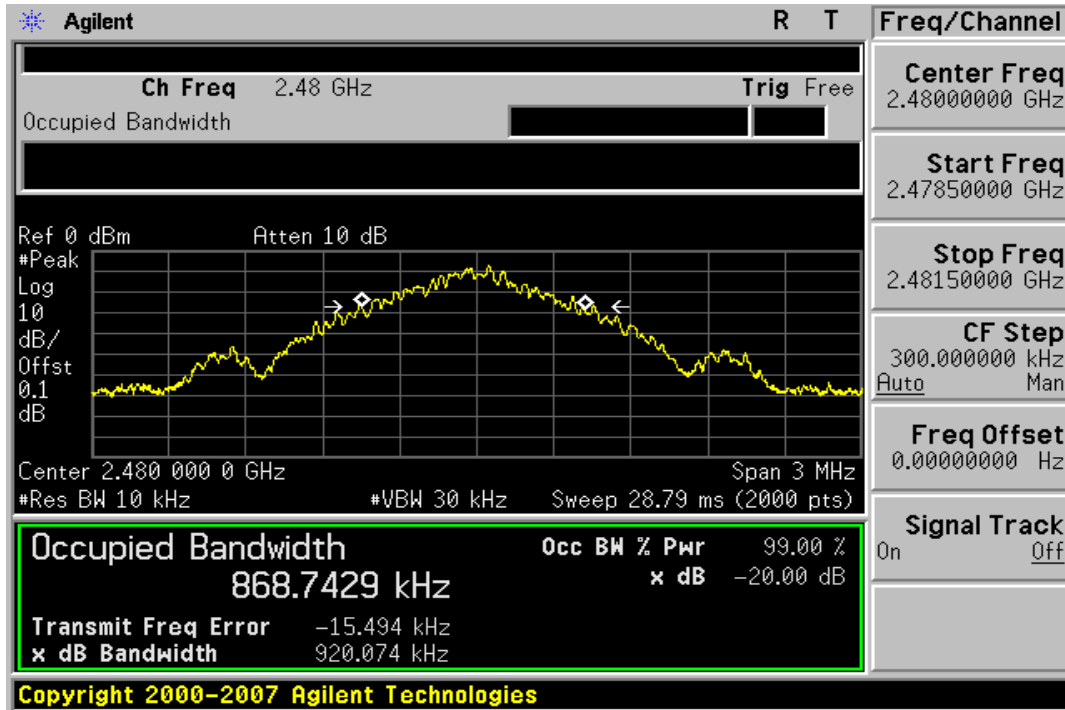


**20dB Bandwidth Test Data CH-Mid**



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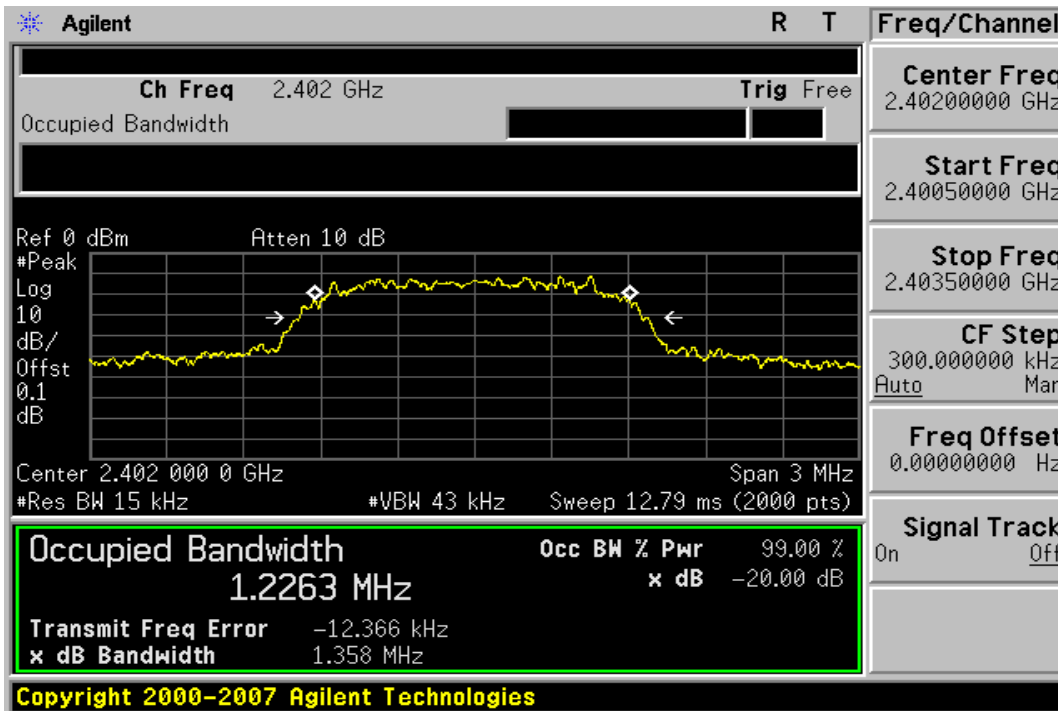
**20dB Bandwidth Test Data CH-High**



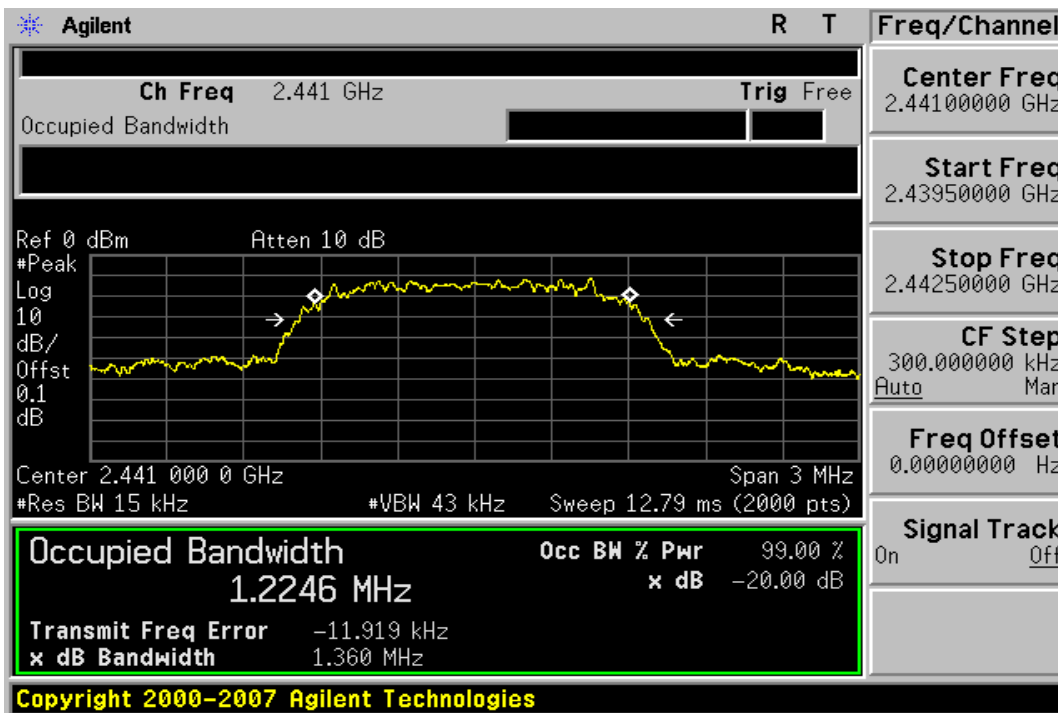
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**EDR Mode**

**20dB Bandwidth Test Data CH-Low**



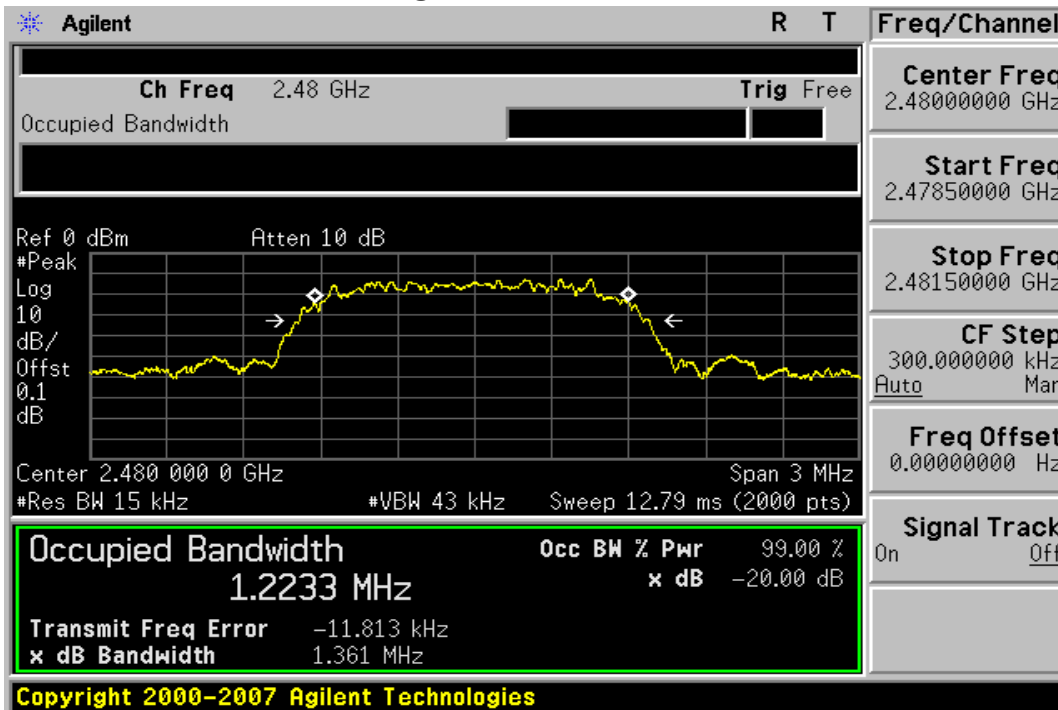
**20dB Bandwidth Test Data CH-Mid**



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## 20dB Bandwidth Test Data CH-High



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## 14. ANTENNA REQUIREMENT

### 14.1. Standard Applicable:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.246(1), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 14.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is 1.1dBi and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.