

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS-210

OF

**Product Name:** Car Connect

**Brand Name:** TomTom

**Model Name:** 4V00.006

**IC Number:** 5767A-CARCON

**ID Number:** S4LCARCON

**Report No.:** EF/2006/80016~17

**Issue Date:** Sep. 21, 2006

**Rule Part:** FCC Part 15C:2005 , §15.247, RSS-210 issue 6:2005, Annex 8

**Prepared for** TOMTOM International BV  
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## VERIFICATION OF COMPLIANCE

**Applicant:** TOMTOM International BV  
Rembrandtplein 35, 1017 CT Amsterdam, Netherlands

**Equipment Under Test:** Car Connect

**Brand Name:** TomTom

**IC Number:** 5767A-CARCON

**ID Number:** S4LCARCON

**Model No.:** 4V00.006

**Model Difference:** N/A

**File Number:** EF/2006/80016~17

**Date of test:** Sep. 03, 2006 ~ Sep. 14, 2006

**Date of EUT Received:** Sep. 02, 2006

**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 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:2005, §15.247 and RSS-210 issue 6: 2005 Annex 8.

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

|                     |                                                                                     |             |               |
|---------------------|-------------------------------------------------------------------------------------|-------------|---------------|
| <b>Test By:</b>     |  | <b>Date</b> | Sep. 21, 2006 |
| <hr/>               |                                                                                     | <hr/>       |               |
|                     | <i>Sky Wang/Sr. Engineer</i>                                                        |             |               |
| <b>Prepared By:</b> |  | <b>Date</b> | Sep. 21, 2006 |
| <hr/>               |                                                                                     | <hr/>       |               |
|                     | <i>Elisa Chen/Asst. Supervisor</i>                                                  |             |               |
| <b>Approved By:</b> |  | <b>Date</b> | Sep. 21, 2006 |
| <hr/>               |                                                                                     | <hr/>       |               |
|                     | <i>Vincent Su/Manager</i>                                                           |             |               |

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## Version

| Version No. | Date          |
|-------------|---------------|
| 00          | Sep. 21, 2006 |
|             |               |

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## 1. GENERAL INFORMATION

### 1.1 Product Description

The TOMTOM International BV, Model: 4V00.006 (referred to as the EUT in this report) is Car Connect.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402 – 2480MHz, 79 channels
- B). Rated output power: 0.88 dBm
- C). Modulation type: Frequency Hopping Spread Spectrum (GFSK)
- D). Antenna Designation: Chip Antenna, 4dBi, Non-User Replaceable (Fixed)
- E). Power Supply: 12V from car battery

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

This submittal(s) (test report) is intended for FCC ID: S4LCARCON filing to comply with Section 15.247 of the FCC Part 15C: 2005, Subpart C Rules. And IC: 5767A-CARCON filing to comply with Industry Canada RSS-210 issue 6: 2005 Annex 8.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2005. Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Both OATS and Anechoic chamber (3 meters) was accredited by CNLA (0513).

### 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 EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### 2.3 Test Procedure

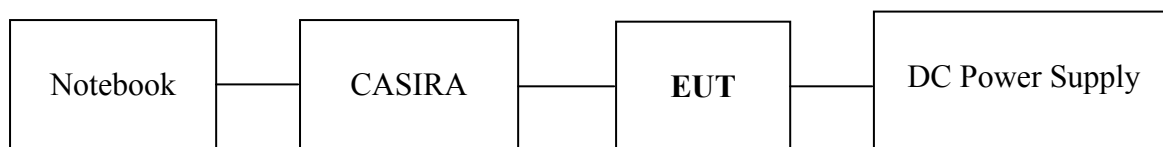
#### 2.3.1 Conducted Emissions

The EUT is placed on a 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:2005. 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 placed on a 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 according to the requirements in Section 8, 13 of ANSI C63.4-2003 and RSS-Gen:2005.

## 2.4 Configuration of Tested System



**Table 2.4.2 Equipment Used in Tested System**

| Item | Equipment       | Mfr/Brand | Model/<br>Type No. | FCC ID | Series No.   |
|------|-----------------|-----------|--------------------|--------|--------------|
| 1.   | Notebook        | IBM       | T40                | N/A    | 99HCYF4      |
| 2.   | CASIRA          | CSR       | BCES301199/1       | N/A    | 8836310305   |
| 3.   | DC Power Supply | Topward   | 3303D              | N/A    | 981327       |
| 4.   | Software        | CSR       | BlueSuite 1.22     | N/A    | Version 1.22 |

### 3. SUMMARY OF TEST RESULTS

| FCC Rules                                                        | Description Of Test                          | Result    |
|------------------------------------------------------------------|----------------------------------------------|-----------|
| §15.207(a)/<br>RSS-Gen §7.2.2                                    | Conducted Emission                           | N/A       |
| §15.247(b)/<br>RSS-210 issue 6, §A8.4(2)                         | Peak Output Power                            | Compliant |
| §15.247(c)<br>RSS-210 issue 6, §A8.5                             | 100 KHz Bandwidth Of<br>Frequency Band Edges | Compliant |
| §15.247(c)<br>RSS-210 issue 6, §A8.5                             | TX/RX Spurious Emission                      | Compliant |
| §15.247(a)(1)/<br>RSS-210 issue 6, §A8.1(2)                      | Frequency Separation                         | Compliant |
| §15.247(a)(1)(iii)/<br>RSS-210 issue 6, §A8.4(2)                 | Number of hopping frequency                  | Compliant |
| §15.247(a)(1)(ii)/<br>RSS-210 issue 6, §A8.1(4)                  | Time of Occupancy                            | Compliant |
| §15.247/<br>RSS-210 issue 6, §A8.3(2)                            | Peak Power Density                           | Compliant |
| RSS-Gen §4.4.1                                                   | 99% Power Bandwidth                          | Compliant |
| §15.203, §15.247(c)/<br>RSS-GEN 7.1.4,<br>RSS-210 issue 6, §A8.4 | Antenna Requirement                          | Compliant |
|                                                                  | 20dB Bandwidth                               | No Limit  |

### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz) 、mid (2441MHz) and high (2480MHz) with 741k highest data rate are chosen for full testing.

## 5. CONDUCTED EMISSION TEST

### 5.1 Standard Applicable

According to §15.207 and RSS-Gen §7.2.2, 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 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 rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 110Vac/60Hz power source.

### 5.3 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.

#### 5.4 Measurement Equipment Used:

| Conducted Emission Test Site |            |              |               |            |            |
|------------------------------|------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR        | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EMC Analyzer                 | HP         | 8594EM       | 3624A00203    | 09/02/2006 | 09/03/2007 |
| EMI Test Receiver            | R&S        | ESCS30       | 828985/004    | 06/09/2006 | 06/10/2007 |
| Transient Limiter            | HP         | 11947A       | 3107A02062    | 09/02/2006 | 09/03/2007 |
| LISN                         | Rolf-Heine | NNB-2/16Z    | 99012         | 12/31/2005 | 12/30/2006 |
| LISN                         | Rolf-Heine | NNB-2/16Z    | 99013         | 12/24/2005 | 12/23/2006 |
| Coaxial Cables               | N/A        | No. 3, 4     | N/A           | 12/01/2005 | 12/01/2206 |

#### 5.5 Measurement Result

N/A

## 6. PEAK OUTPUT POWER MEASUREMENT

### 6.1 Standard Applicable

According to §15.247(b), 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.

According to RSS-210 issue 6, §A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

### 6.2 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.

### 6.3 Measurement Result

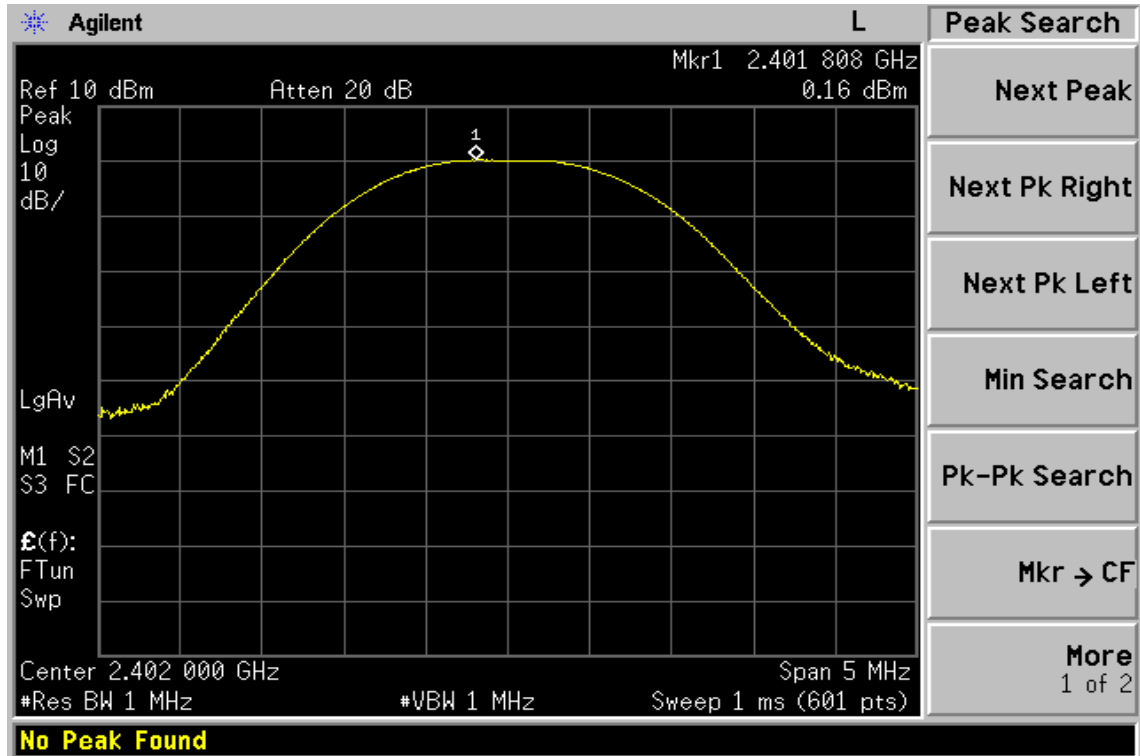
| Frequency (MHz) | Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|------------|--------------------|------------------|-----------|
| 2402.00         | 0.16                | 0.60       | 0.76               | 0.00119          | 1         |
| 2441.00         | 0.20                | 0.60       | 0.80               | 0.00120          | 1         |
| 2480.00         | 0.28                | 0.60       | 0.88               | 0.00122          | 1         |

**6.4 Measurement Equipment Used:**

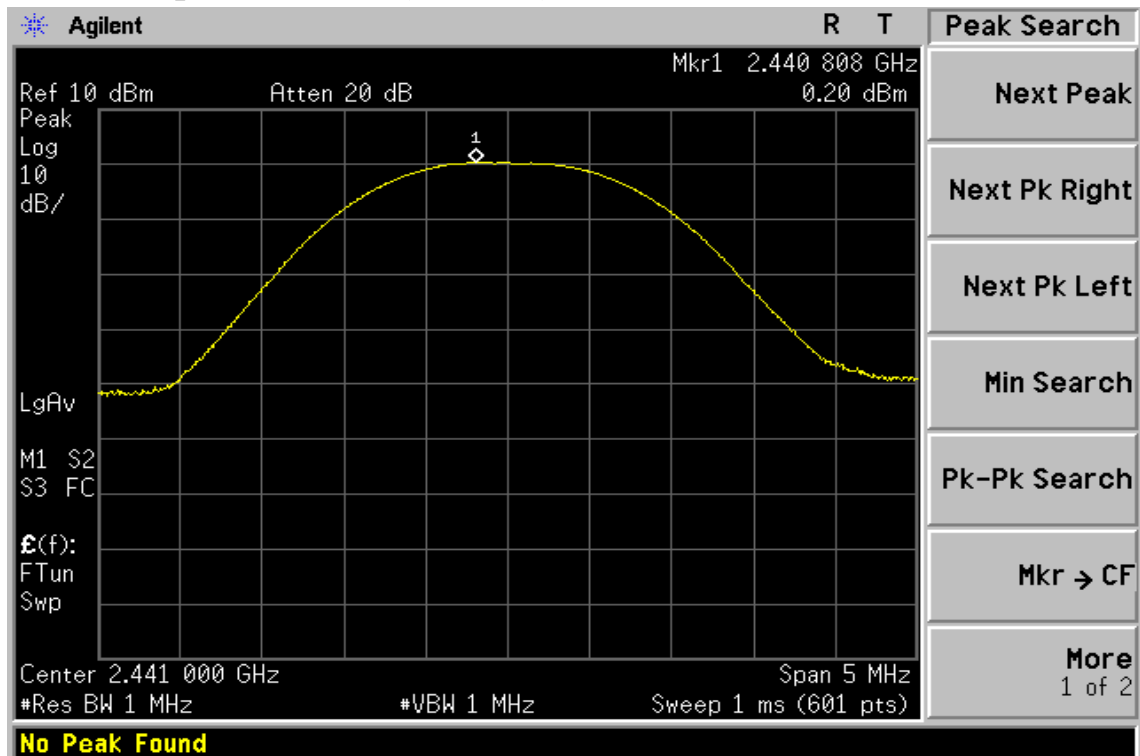
| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

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## Peak Power Output Data Plot (CH Low)

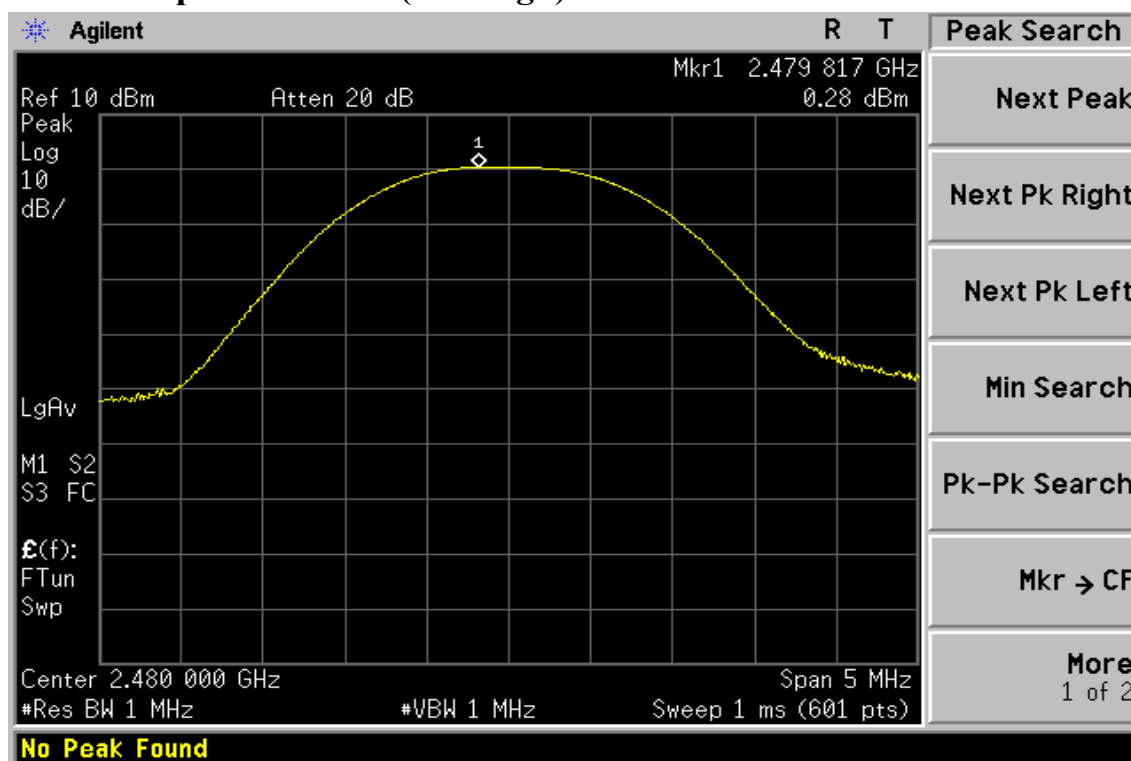


## Peak Power Output Data Plot (CH Mid)



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## Peak Power Output Data Plot (CH High)



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## 7. 20dB Bandwidth

### 7.1 Standard Applicable

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

### 7.2 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.

### 7.3 Measurement Result

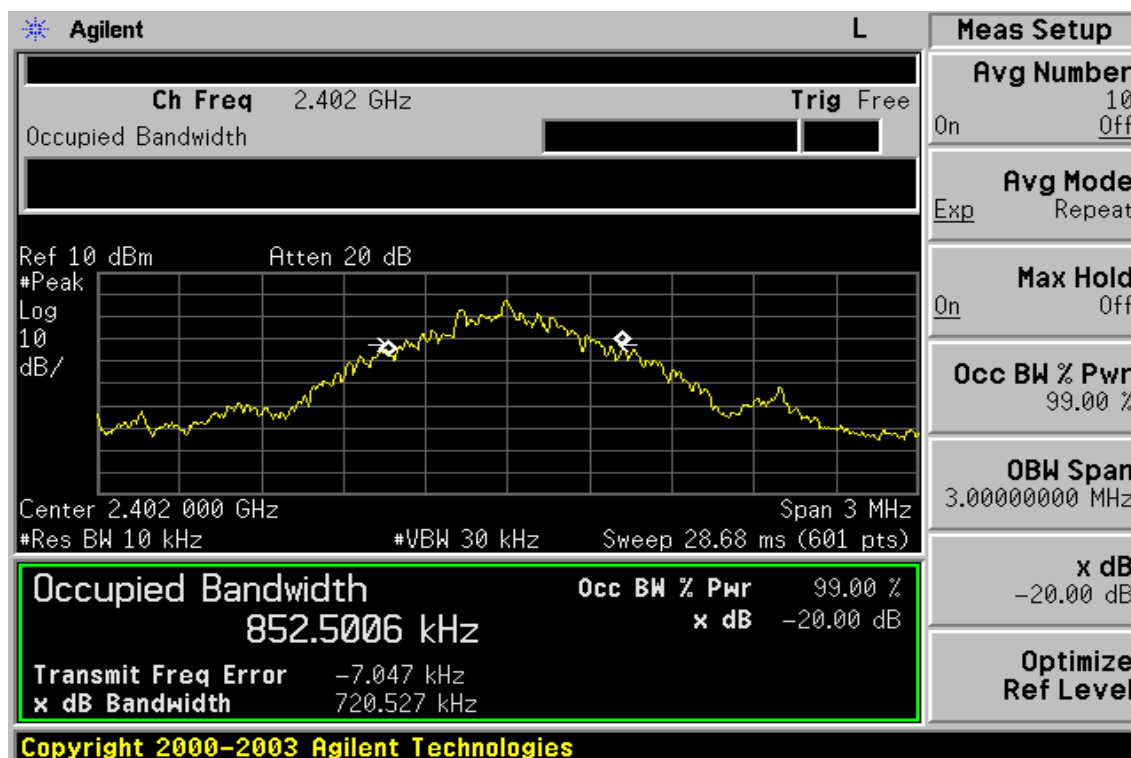
| CH     | Bandwidth<br>(MHz) | Limit<br>(MHz) |
|--------|--------------------|----------------|
| Lower  | 0.721              | 1.000          |
| Mid    | 0.740              | 1.000          |
| Higher | 0.738              | 1.000          |

### 7.4 Measurement Equipment Used:

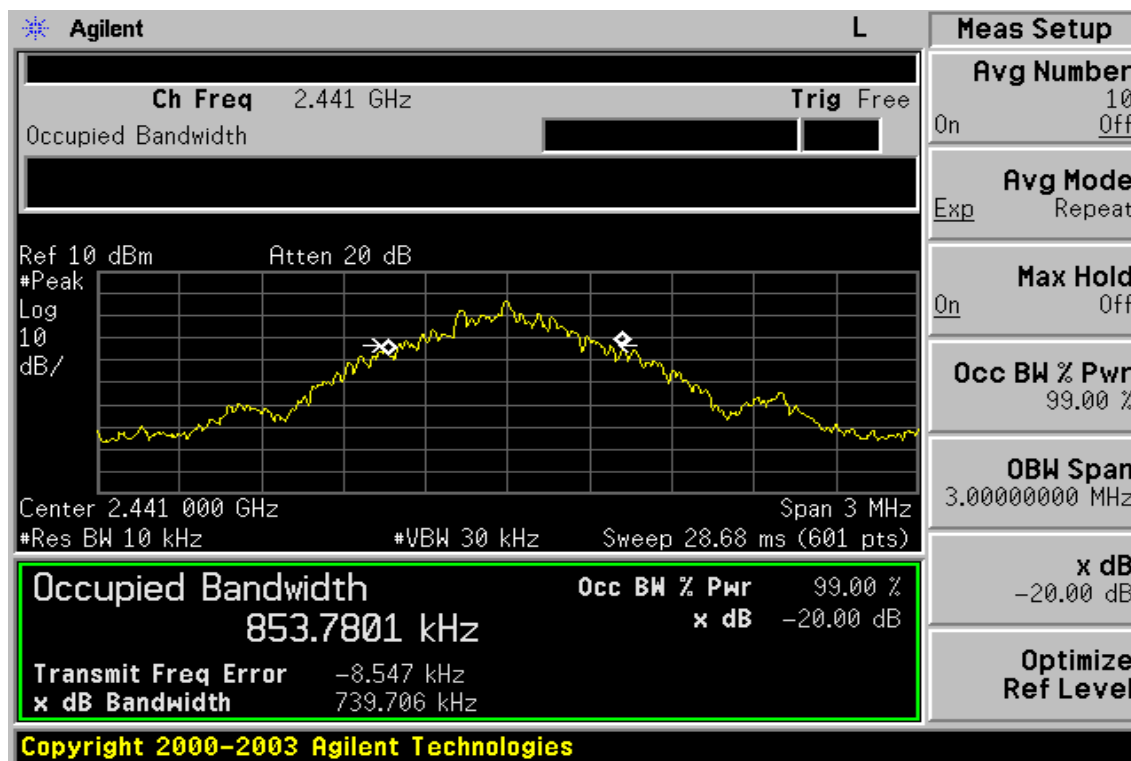
| Conducted Emission Test Site |              |                    |                  |              |            |
|------------------------------|--------------|--------------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR          | MODEL<br>NUMBER    | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A             | MY43360126       | 03/29/2006   | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A              | US41160416       | 06/28/2006   | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40             | 100034           | 11/09/2005   | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX<br>104PEA | N/A              | N/A          | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5           | N/A              | 10/07/2005   | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5            | N/A              | 10/07/2005   | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber      | 51818            | 01/05/2006   | 01/04/2007 |

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## 20dB Band Width Test Data CH-Low

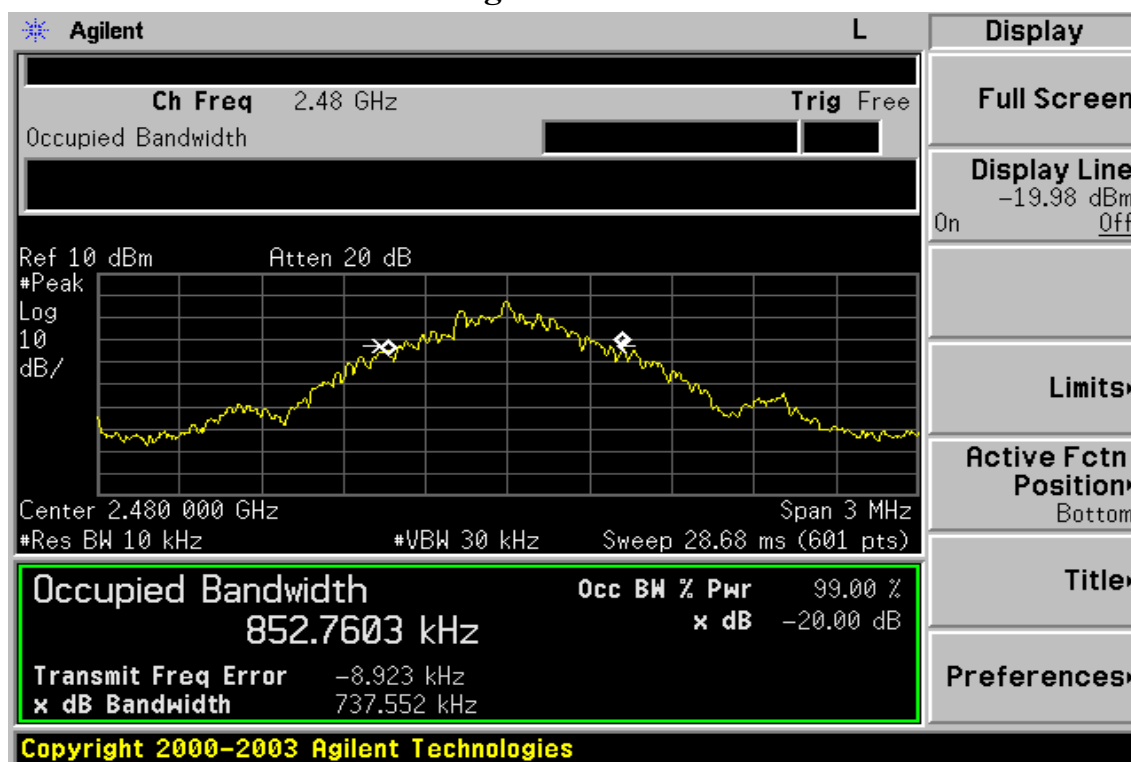


## 20dB Band Width Test Data CH-Mid



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## 20dB Band Width Test Data CH-High



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## 8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 8.1 Standard Applicable

According to §15.247(c), 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).

According to RSS-210 issue 6, §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

### 8.2 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 2.488GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

### 8.3 Measurement Result

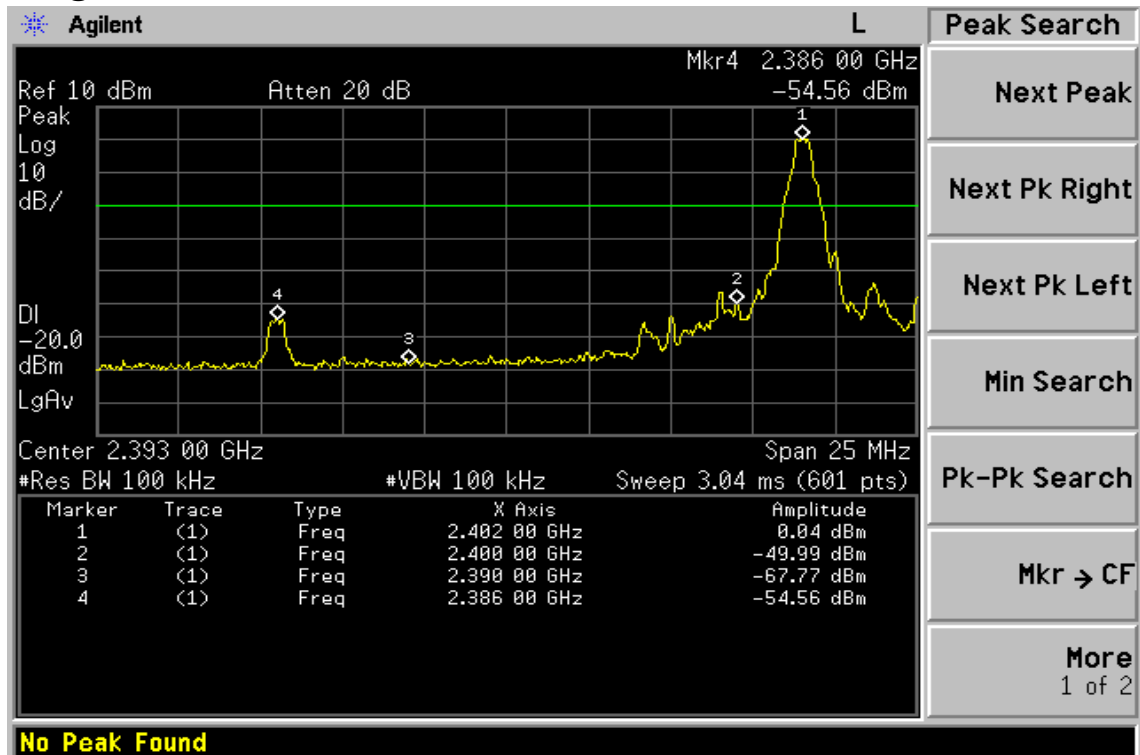
Refer to attach spectrum analyzer data chart.

#### 8.4 Measurement Equipment Used:

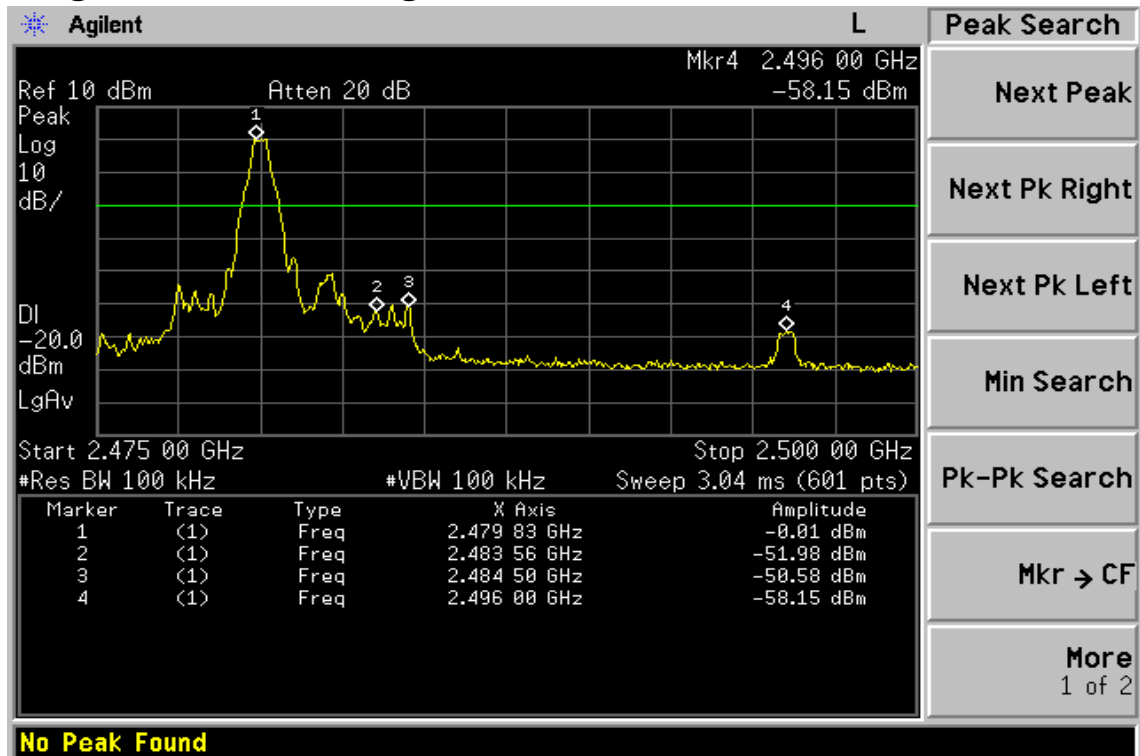
| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

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## Band Edges Test Data CH-Low



## 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 Sep. 05, 2006  
Test By Sky  
Pol Ver.

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) | Remark |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|--------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |        |
| 2386.00        | 37.96           | ---           | -1.40             | 36.56            | ---            | 74.00         | 54.00       | -17.44         | Peak   |
| 2390.00        | 33.14           | ---           | -1.39             | 31.75            | ---            | 74.00         | 54.00       | -22.25         | Peak   |
| 2400.00        | 40.07           | ---           | -1.36             | 38.71            | ---            | 74.00         | 54.00       | -15.29         | Peak   |

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

Test Date Sep. 05, 2006  
Test By Sky  
Pol Hor.

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) | Remark |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|--------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |        |
| 2386.00        | 42.48           | ---           | -1.40             | 41.08            | ---            | 74.00         | 54.00       | -12.92         | Peak   |
| 2390.00        | 32.70           | ---           | -1.39             | 31.31            | ---            | 74.00         | 54.00       | -22.69         | Peak   |
| 2400.00        | 46.41           | ---           | -1.36             | 45.05            | ---            | 74.00         | 54.00       | -8.95          | Peak   |

## Remark :

- (1) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 3MHz, VBW= 10Hz, Sweep time= 200 ms.

# Radiated Emission:

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

Test Date Sep. 05, 2006  
Test By Sky  
Pol Ver.

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) | Remark |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|--------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |        |
| 2483.56        | 42.27           | ---           | -0.92             | 41.35            | ---            | 74.00         | 54.00       | -12.65         | Peak   |
| 2484.50        | 45.05           | ---           | -0.92             | 44.13            | ---            | 74.00         | 54.00       | -9.87          | Peak   |
| 2496.00        | 37.58           | ---           | ---               | ---              | ---            | 74.00         | 54.00       | ---            | Peak   |

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

Test Date Sep. 05, 2006  
Test By Sky  
Pol Hor.

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) | Remark |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|--------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |        |
| 2483.56        | 48.31           | ---           | -0.92             | 47.39            | ---            | 74.00         | 54.00       | -6.61          | Peak   |
| 2484.50        | 50.30           | ---           | -0.92             | 49.38            | ---            | 74.00         | 54.00       | -4.62          | Peak   |
| 2496.00        | 42.12           | ---           | ---               | ---              | ---            | 74.00         | 54.00       | ---            | Peak   |

## Remark :

- (1) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 3MHz, VBW= 10Hz, Sweep time= 200 ms.

## 9. SPURIOUS RADIATED EMISSION TEST

### 9.1 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.

According to RSS-210 issue 6, §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

### 9.2 EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2003.
2. The EUT was put in the front of the test table. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The spacing between the peripherals was 10 centimeters.
4. External I/O cables were draped along the edge of the test table and bundle when necessary.

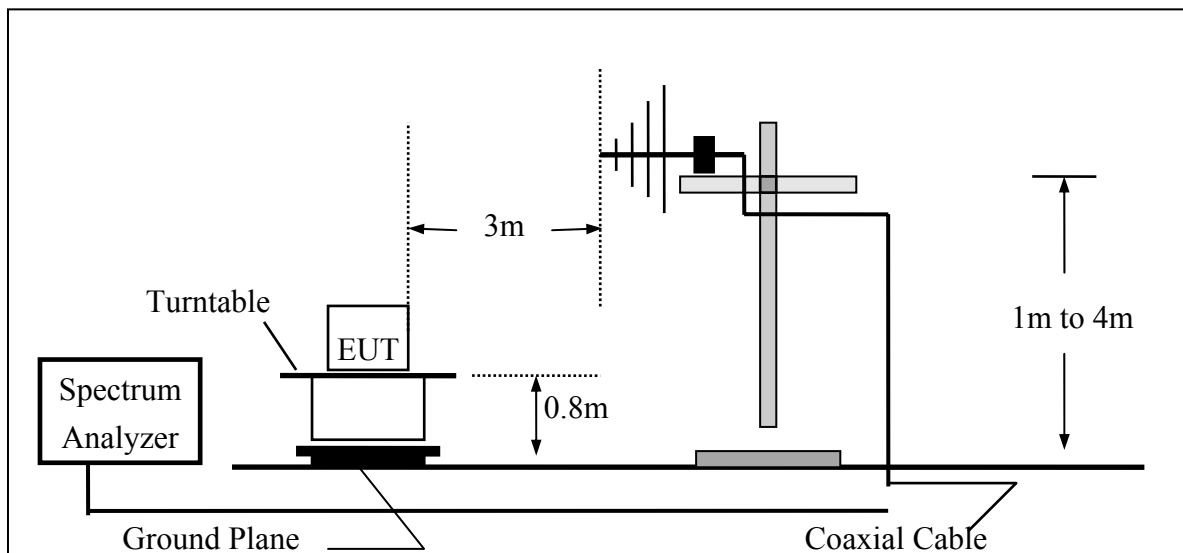
### 9.3 Measurement Procedure

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. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

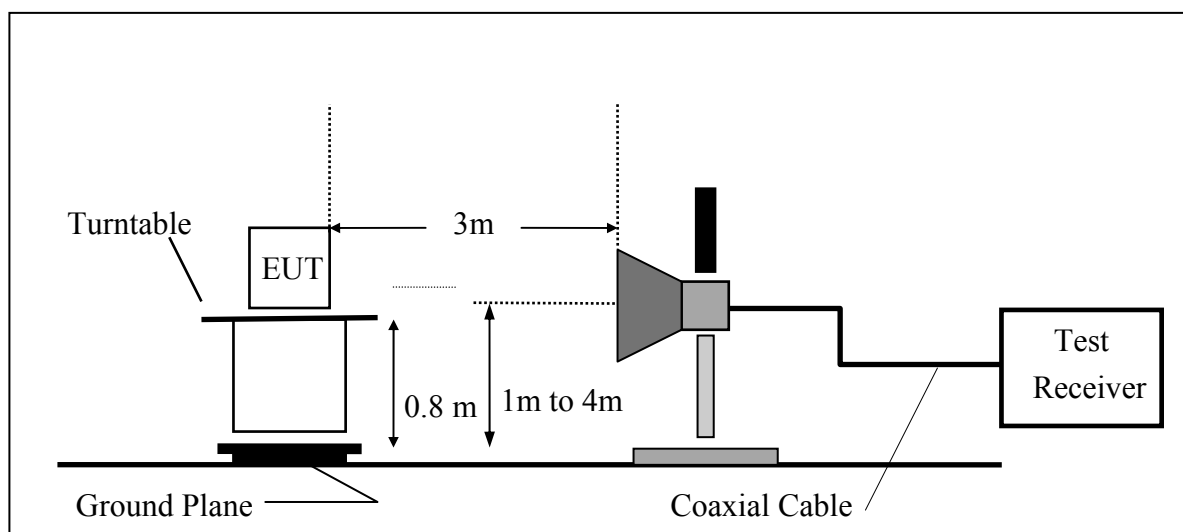
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## 9.4 Test SET-UP (Block Diagram of Configuration)

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



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



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## 9.5 Measurement Equipment Used:

| 966 Chamber       |              |                     |               |            |            |
|-------------------|--------------|---------------------|---------------|------------|------------|
| EQUIPMENT TYPE    | MFR          | MODEL NUMBER        | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer | R&S          | FSP 40              | 100034        | 05/27/2006 | 05/26/2007 |
| Spectrum Analyzer | Agilent      | E7405A              | US41160416    | 08/27/2006 | 08/27/2007 |
| Spectrum Analyzer | Agilent      | E4446A              | MY43360126    | 03/29/2006 | 03/27/2007 |
| Bilog Antenna     | SCHWAZBECK   | VULB9163            | 152           | 06/03/2006 | 06/02/2007 |
| Horn antenna      | Schwarzbeck  | BBHA 9120D          | 309/320       | 08/16/2006 | 08/15/2007 |
| Horn antenna      | Schwarzbeck  | BBHA 9170           | 184/185       | 07/04/2006 | 07/03/2007 |
| Pre-Amplifier     | HP           | 8447D               | 2944A09469    | 07/19/2006 | 07/18/2007 |
| Pre-Amplifier     | HP           | 8494B               | 3008A00578    | 02/26/2006 | 02/25/2007 |
| 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           | 10/09/2005 | 10/08/2006 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA-3M  | 3m            | 10/09/2005 | 10/08/2006 |
| Site NSA          | SGS          | 966 chamber         | N/A           | 11/17/2005 | 11/16/2006 |

## 9.6 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:

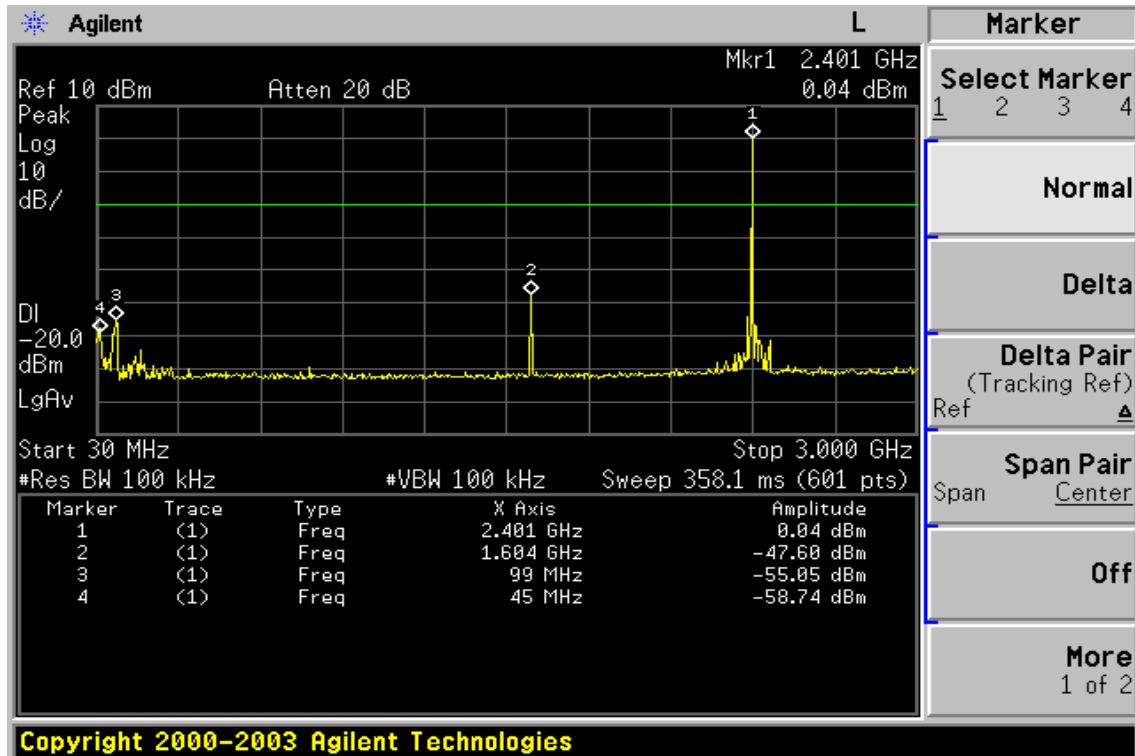
$$FS = RA + AF + CL - AG$$

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

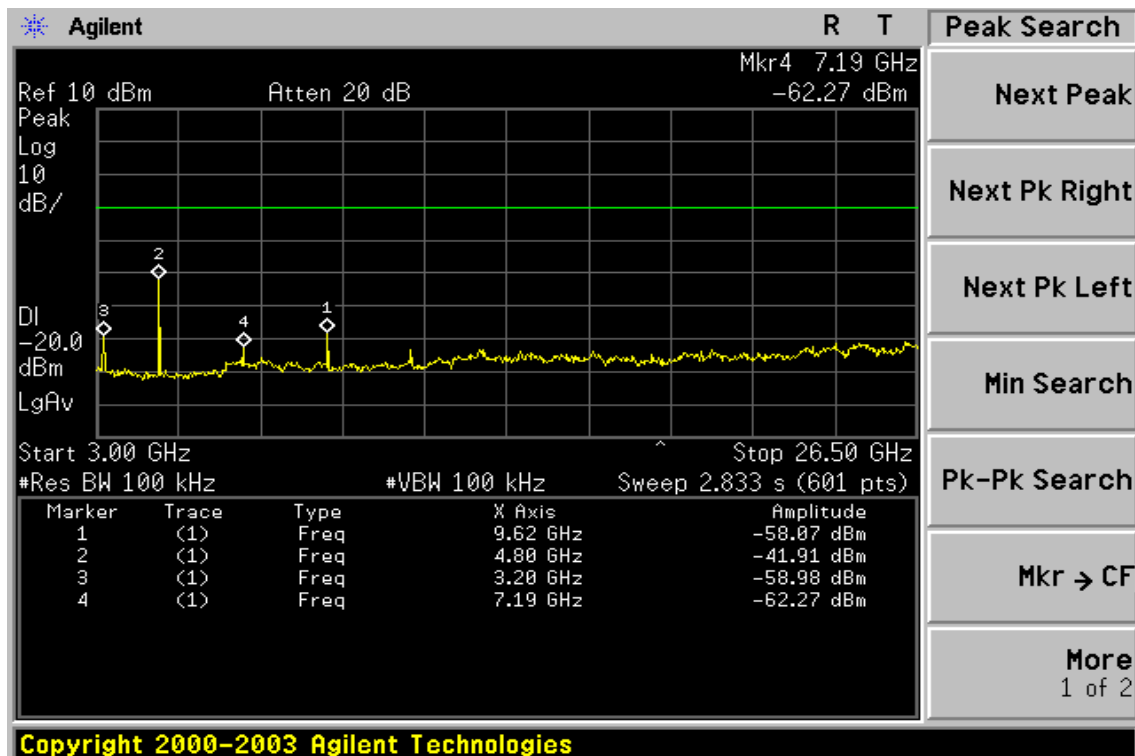
## 9.7 Measurement Result

Refer to attach tabular data sheets.

## Conducted Spurious Emission Measurement Result Ch Low 30MHz – 3GHz

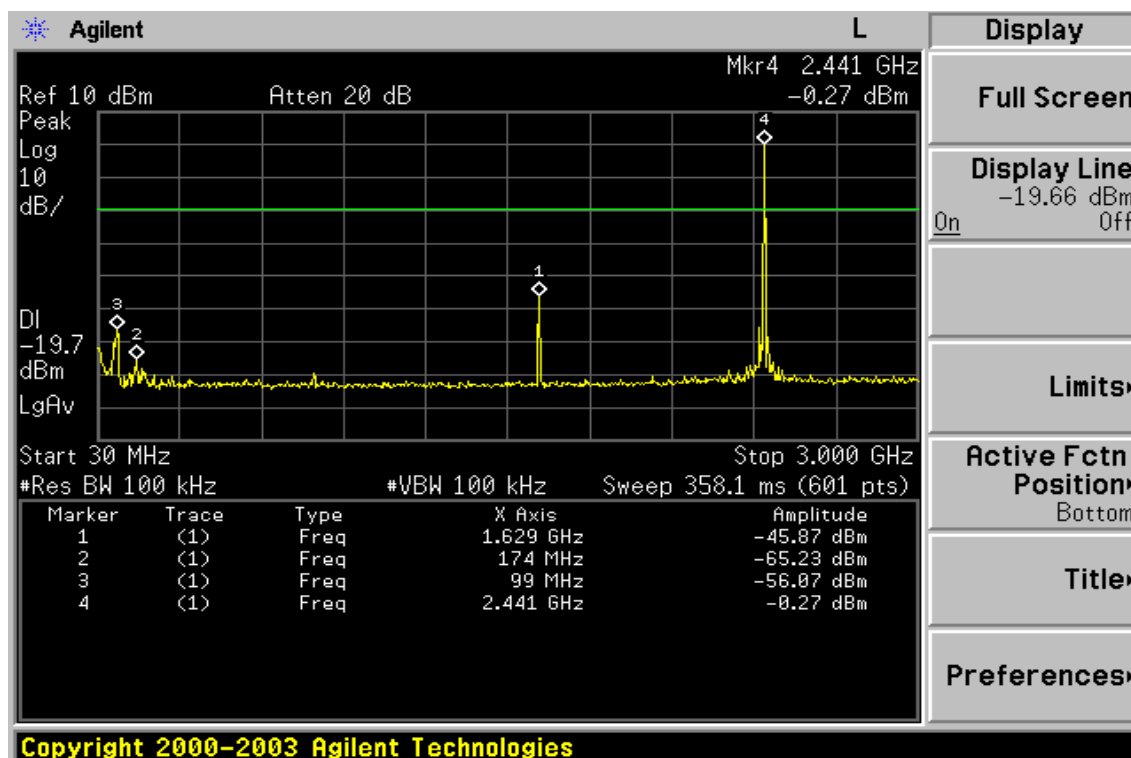


## Ch Low 3GHz – 26.5GHz

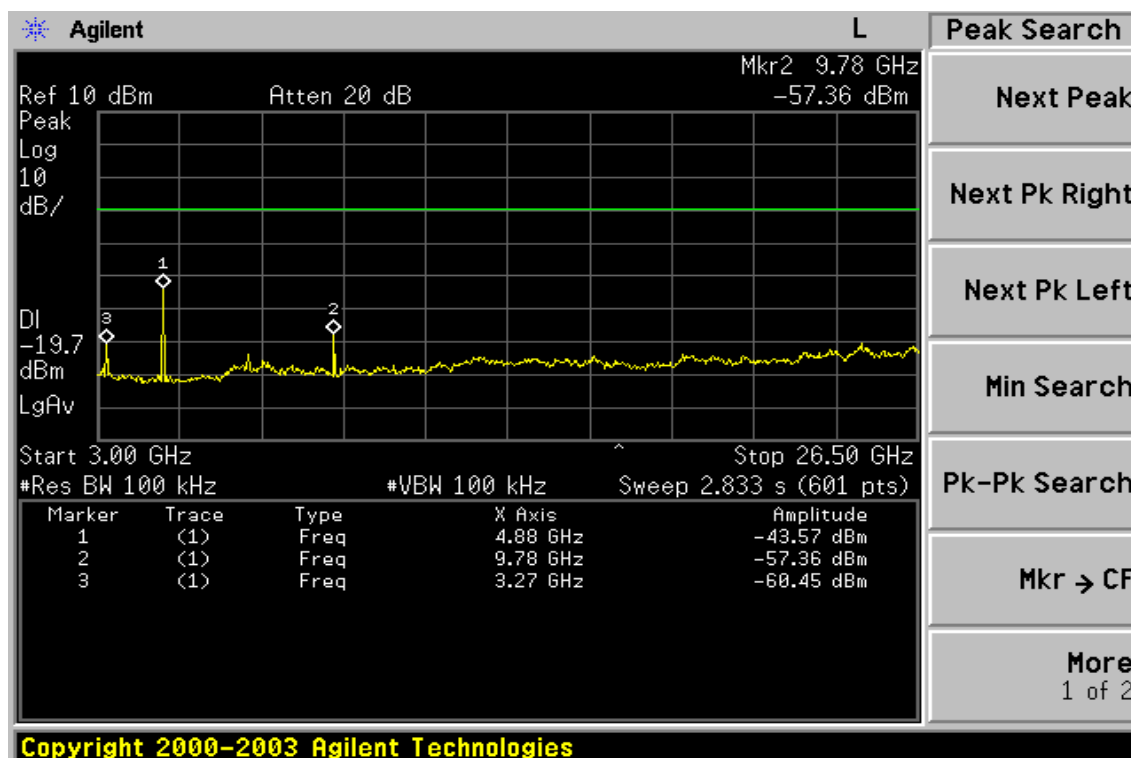


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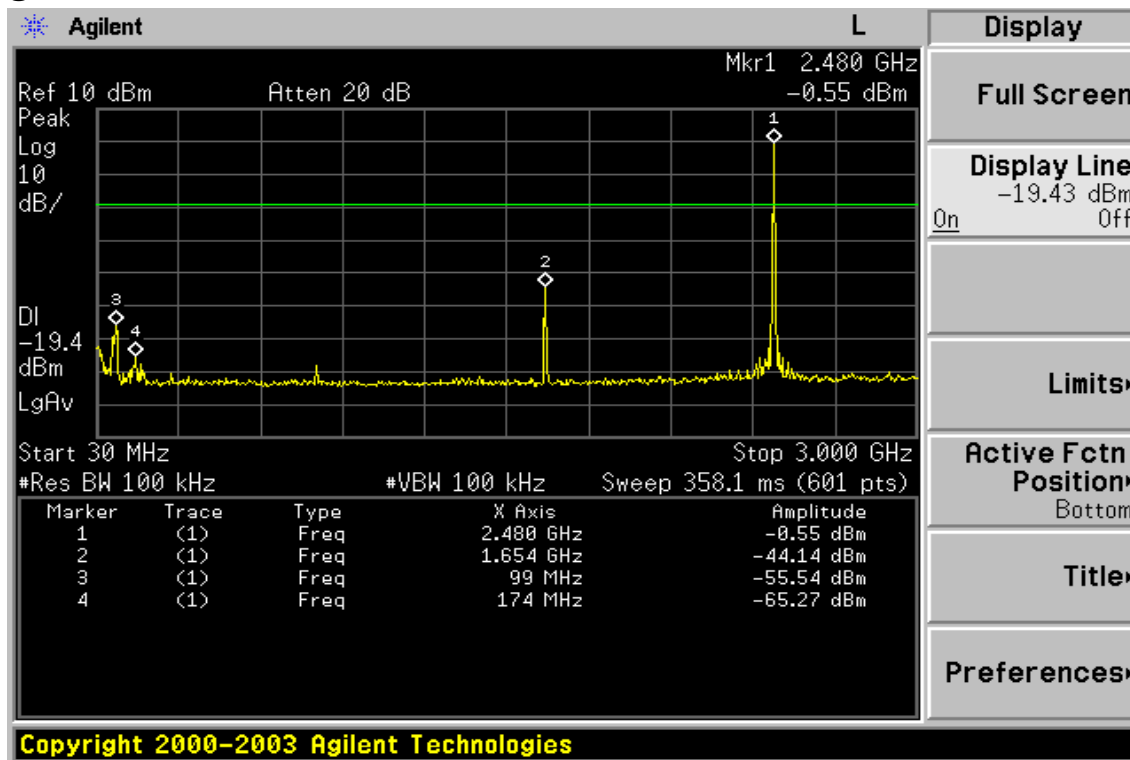
## Ch Mid 30MHz – 3GHz



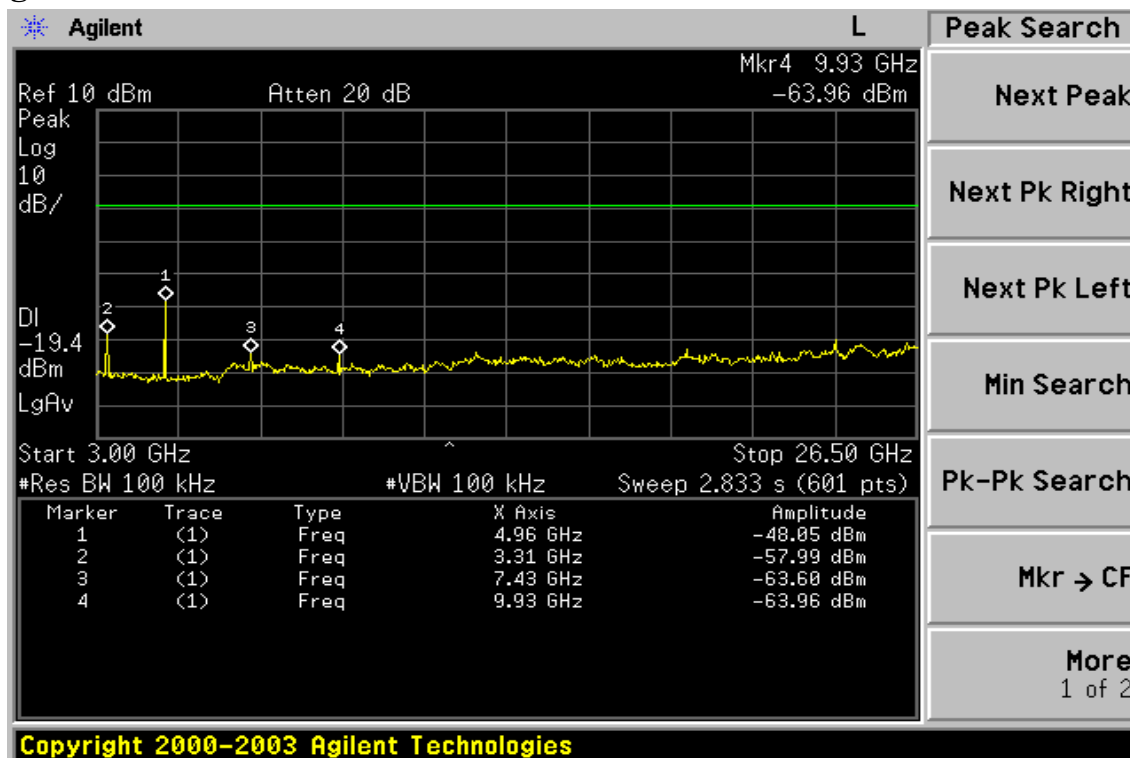
## Ch Mid 3GHz – 26.5GHz



## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Low | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2402MHz   | Test By   | Sky           |
| 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 Mar-<br>gin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|--------------------------|
| 35.82          | V               | Peak                        | 42.53             | -14.47         | 28.06                 | 40.00               | -11.94                   |
| 55.22          | V               | Peak                        | 43.43             | -14.61         | 28.82                 | 40.00               | -11.18                   |
| 233.70         | V               | Peak                        | 37.02             | -14.34         | 22.68                 | 46.00               | -23.32                   |
| 71.71          | H               | Peak                        | 46.86             | -16.45         | 30.41                 | 40.00               | -9.59                    |
| 333.61         | H               | Peak                        | 41.44             | -12.14         | 29.3                  | 46.00               | -16.70                   |

## 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 Datas 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.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Mid | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2441MHz   | Test By   | Sky           |
| 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 Mar-<br>gin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|--------------------------|
| 55.22          | V               | Peak                        | 43.76             | -14.61         | 29.15                 | 40.00               | -10.85                   |
| 500.45         | V               | Peak                        | 32.29             | -8.50          | 23.79                 | 46.00               | -22.21                   |
| 71.71          | H               | Peak                        | 44.06             | -16.45         | 27.61                 | 40.00               | -12.39                   |
| 288.02         | H               | Peak                        | 41.57             | -13.24         | 28.33                 | 46.00               | -17.67                   |
| 331.67         | H               | Peak                        | 39.42             | -12.20         | 27.22                 | 46.00               | -18.78                   |

**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 Datas 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.

# Radiated Spurious Emission Measurement Result (below 1GHz)

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480MHz    | Test By   | Sky           |
| 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 Mar-<br>gin<br>(dB) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|--------------------------|
| 55.22          | V               | Peak                        | 43.19             | -14.61         | 28.58                 | 40.00               | -11.42                   |
| 233.70         | V               | Peak                        | 36.53             | -14.34         | 22.19                 | 46.00               | -23.81                   |
| 71.71          | H               | Peak                        | 46.66             | -16.45         | 30.21                 | 40.00               | -9.79                    |
| 288.02         | H               | Peak                        | 41.55             | -13.24         | 28.31                 | 46.00               | -17.69                   |
| 598.42         | H               | Peak                        | 36.42             | -6.06          | 30.36                 | 46.00               | -15.64                   |

## 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 Datas 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.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Low | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2402 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Ver.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1604.5         | 45.08           | --            | -5.37             | 39.71            | --             | 74.00         | 54.00       | -14.29         | Peak |
| 4804.0         | 44.45           | --            | 6.02              | 50.47            | --             | 74.00         | 54.00       | -3.53          | Peak |
| 7206.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9608.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12010.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14412.0        | ----            |               |                   |                  |                |               |             |                |      |
| 16814.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19216.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21618.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24020.0        | ----            |               |                   |                  |                |               |             |                |      |

## Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- 2 Datas 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= 1MHz, 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 | Sep. 08, 2006 |
| Fundamental Frequency | 2402 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Hor           |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1344.5         | 42.58           | --            | -6.58             | 36.00            | --             | 74.00         | 54.00       | -18.00         | Peak |
| 1604.5         | 48.47           | --            | -5.37             | 43.10            | --             | 74.00         | 54.00       | -10.90         | Peak |
| 4804.0         | 40.63           | --            | 6.02              | 46.65            | --             | 74.00         | 54.00       | -7.35          | Peak |
| 7206.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9608.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12010.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14412.0        | ----            |               |                   |                  |                |               |             |                |      |
| 16814.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19216.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21618.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24020.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency。
- 2 Datas 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= 1MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | TX CH Mid | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2441 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Ver           |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1624.0         | 50.80           | --            | -5.34             | 45.46            | --             | 74.00         | 54.00       | -8.54          | Peak |
| 4874.0         | 40.58           | --            | 6.17              | 46.75            | --             | 74.00         | 54.00       | -7.25          | Peak |
| 4884.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7326.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9768.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12210.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14652.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17094.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19536.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21978.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24420.0        | ----            |               |                   |                  |                |               |             |                |      |

## Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- 2 Datas 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= 1MHz, 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 | Sep. 08, 2006 |
| Fundamental Frequency | 2441 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Hor           |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1344.5         | 43.61           | --            | -6.58             | 37.03            | --             | 74.00         | 54.00       | -16.97         | Peak |
| 1624.0         | 55.38           | --            | -5.34             | 50.04            | --             | 74.00         | 54.00       | -3.96          | Peak |
| 4874.0         | 39.60           | --            | 6.17              | 45.77            | --             | 74.00         | 54.00       | -8.23          | Peak |
| 4884.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7326.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9768.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12210.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14652.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17094.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19536.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21978.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24420.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency。
- 2 Datas 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= 1MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480 MHz   | Test By   | Sky           |
| Temperature           | 25 °C      | Pol       | Ver           |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1650.0         | 50.11           | --            | -5.22             | 44.89            | --             | 74.00         | 54.00       | -9.11          | Peak |
| 4960.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7440.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9920.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12400.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14880.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17360.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19840.0        | ----            |               |                   |                  |                |               |             |                |      |
| 22320.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24800.0        | ----            |               |                   |                  |                |               |             |                |      |

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- 2 Datas 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= 1MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | TX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480 MHz   | Test By   | Sky           |
| Temperature           | 25 °C      | Pol       | Hor           |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1052.0         | 41.49           | --            | -7.91             | 33.58            | --             | 74.00         | 54.00       | -20.42         | Peak |
| 1344.5         | 44.36           | --            | -6.58             | 37.78            | --             | 74.00         | 54.00       | -16.22         | Peak |
| 1650.0         | 54.39           | --            | -5.22             | 49.17            | --             | 74.00         | 54.00       | -4.83          | Peak |
| 4960.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7440.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9920.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12400.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14880.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17360.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19840.0        | ----            |               |                   |                  |                |               |             |                |      |
| 22320.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24800.0        | ----            |               |                   |                  |                |               |             |                |      |

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency。
- 2 Datas 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= 1MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | RX CH Low | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2402MHz   | Test By   | Sky           |
| 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) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 69.77          | V               | Peak                        | 45.71             | -16.11         | 29.60                 | 40.00               | -10.40              |
| 103.72         | V               | Peak                        | 41.52             | -16.71         | 24.81                 | 43.50               | -18.69              |
| 71.71          | H               | Peak                        | 46.61             | -16.45         | 30.16                 | 40.00               | -9.84               |
| 105.66         | H               | Peak                        | 41.43             | -16.56         | 24.87                 | 43.50               | -18.63              |

## 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 Datas 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.

# Radiated Spurious Emission Measurement Result (below 1GHz)

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | RX CH Mid | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2441MHz   | Test By   | Sky           |
| 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) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 35.82          | V               | Peak                        | 43.42             | -14.47         | 28.95                 | 40.00               | -11.05              |
| 55.22          | V               | Peak                        | 42.66             | -14.61         | 28.05                 | 40.00               | -11.95              |
| 71.71          | H               | Peak                        | 48.39             | -16.45         | 31.94                 | 40.00               | -8.06               |
| 333.61         | H               | Peak                        | 39.82             | -12.14         | 27.68                 | 46.00               | -18.32              |

## 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 Datas 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.

# Radiated Spurious Emission Measurement Result (below 1GHz)

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | RX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480MHz    | Test By   | Sky           |
| 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) |
|----------------|-----------------|-----------------------------|-------------------|----------------|-----------------------|---------------------|---------------------|
| 30.00          | V               | Peak                        | 43.58             | -14.97         | 28.61                 | 40.00               | -11.39              |
| 55.22          | V               | Peak                        | 43.41             | -14.61         | 28.8                  | 40.00               | -11.20              |
| 71.71          | H               | Peak                        | 46.36             | -16.45         | 29.91                 | 40.00               | -10.09              |
| 331.67         | H               | Peak                        | 40.10             | -12.20         | 27.9                  | 46.00               | -18.10              |

## 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 Datas 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.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | RX CH Low | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2402 MHz  | Test By   | Sky           |
| Temperature           | 25°C      | Pol       | Ver.          |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1591.5         | 42.98           | ----          | -5.48             | 37.50            | ----           | 74.00         | 54.00       | -16.50         | Peak |
| 1799.5         | 40.02           | ----          | -4.47             | 35.55            | ----           | 74.00         | 54.00       | -18.45         | Peak |
| 4804.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7206.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9608.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12010.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14412.0        | ----            |               |                   |                  |                |               |             |                |      |
| 16814.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19216.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21618.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24020.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | RX CH Low | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2402 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Hor           |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant./CL<br>CF(dB) | Actual FS<br>Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) |      |
|----------------|---------------------------|-------------------------|-------------------|-------------------------------|----------------|---------------------------|-------------------------|----------------|------|
| 1344.5         | 43.02                     | ----                    | -6.58             | 36.44                         | ----           | 74.00                     | 54.00                   | -17.56         | Peak |
| 1799.5         | 40.33                     | ----                    | -4.47             | 35.86                         | ----           | 74.00                     | 54.00                   | -18.14         | Peak |
| 2397.5         | 41.36                     | ----                    | -1.36             | 40.00                         | ----           | 74.00                     | 54.00                   | -14.00         | Peak |
| 4804.0         | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 7206.0         | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 9608.0         | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 12010.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 14412.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 16814.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 19216.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 21618.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |
| 24020.0        | ----                      |                         |                   |                               |                |                           |                         |                |      |

**Remark :**

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, 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        | RX CH Mid | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2441 MHz  | Test By   | Sky           |
| Temperature           | 25 °C     | Pol       | Ver           |
| Humidity              | 65 %      |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1624.0         | 45.14           | ----          | -5.34             | 39.80            | ----           | 74.00         | 54.00       | -14.20         | Peak |
| 4882.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7323.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9764.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12205.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14646.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17087.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19528.0        | ----            |               |                   |                  |                |               |             |                |      |
| 21969.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24410.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |           |           |               |
|-----------------------|-----------|-----------|---------------|
| Operation Mode        | RX CH Mid | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2441 MHz  | Test By   | Sky           |
| 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) |                |      |
| 1344.5         | 43.69             | ----              | -6.58             | 37.11            | ----           | 74.00             | 54.00             | -16.89         | Peak |
| 1624.0         | 48.17             | ----              | -5.34             | 42.83            | ----           | 74.00             | 54.00             | -11.17         | Peak |
| 2436.5         | 42.69             | ----              | -1.19             | 41.50            | ----           | 74.00             | 54.00             | -12.50         | Peak |
| 4882.0         | ----              |                   |                   |                  |                |                   |                   |                |      |
| 7323.0         | ----              |                   |                   |                  |                |                   |                   |                |      |
| 9764.0         | ----              |                   |                   |                  |                |                   |                   |                |      |
| 12205.0        | ----              |                   |                   |                  |                |                   |                   |                |      |
| 14646.0        | ----              |                   |                   |                  |                |                   |                   |                |      |
| 17087.0        | ----              |                   |                   |                  |                |                   |                   |                |      |
| 19528.0        | ----              |                   |                   |                  |                |                   |                   |                |      |
| 21969.0        | ----              |                   |                   |                  |                |                   |                   |                |      |
| 24410.0        | ----              |                   |                   |                  |                |                   |                   |                |      |

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, 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        | RX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480 MHz   | Test By   | Sky           |
| Temperature           | 25 °C      | Pol       | Ver           |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1650.0         | 45.71           | ----          | -5.22             | 40.49            | ----           | 74.00         | 54.00       | -13.51         | Peak |
| 4960.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7440.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9920.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12400.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14880.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17360.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19840.0        | ----            |               |                   |                  |                |               |             |                |      |
| 22320.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24800.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

|                       |            |           |               |
|-----------------------|------------|-----------|---------------|
| Operation Mode        | RX CH High | Test Date | Sep. 08, 2006 |
| Fundamental Frequency | 2480 MHz   | Test By   | Sky           |
| Temperature           | 25 °C      | Pol       | Hor           |
| Humidity              | 65 %       |           |               |

| Freq.<br>(MHz) | Peak<br>Reading | AV<br>Reading | Ant./CL<br>CF(dB) | Actual FS        |                | Peak<br>Limit | AV<br>Limit | Margin<br>(dB) |      |
|----------------|-----------------|---------------|-------------------|------------------|----------------|---------------|-------------|----------------|------|
|                | (dBuV)          | (dBuV)        |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | (dBuV/m)      | (dBuV/m)    |                |      |
| 1344.5         | 43.07           | ----          | -6.58             | 36.49            | ----           | 74.00         | 54.00       | -17.51         | Peak |
| 1650.0         | 51.21           | ----          | -5.22             | 45.99            | ----           | 74.00         | 54.00       | -8.01          | Peak |
| 2469.0         | 42.56           | ----          | -1.02             | 41.54            | ----           | 74.00         | 54.00       | -12.46         | Peak |
| 4960.0         | ----            |               |                   |                  |                |               |             |                |      |
| 7440.0         | ----            |               |                   |                  |                |               |             |                |      |
| 9920.0         | ----            |               |                   |                  |                |               |             |                |      |
| 12400.0        | ----            |               |                   |                  |                |               |             |                |      |
| 14880.0        | ----            |               |                   |                  |                |               |             |                |      |
| 17360.0        | ----            |               |                   |                  |                |               |             |                |      |
| 19840.0        | ----            |               |                   |                  |                |               |             |                |      |
| 22320.0        | ----            |               |                   |                  |                |               |             |                |      |
| 24800.0        | ----            |               |                   |                  |                |               |             |                |      |

### Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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= 3MHz, VBW= 1MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 10. FREQUENCY SEPARATION

### 10.1 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.

According to RSS 210 issue 6, A8.1(2), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 10.2 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.

### 10.3 Measurement Result

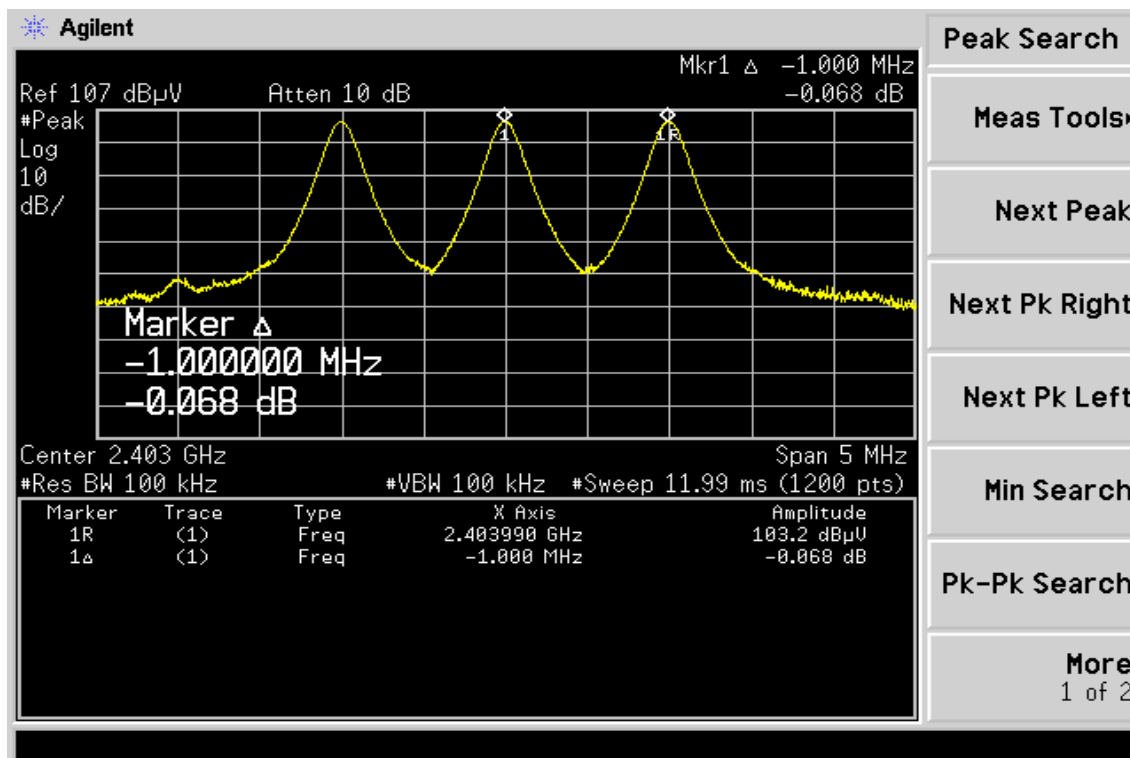
| Channel separation<br>(MHz) | Limit                                              | Result |
|-----------------------------|----------------------------------------------------|--------|
| 1                           | $\geq 25\text{KHz}$ or<br>2/3 times 20dB bandwidth | PASS   |

### 10.4 Measurement Equipment Used:

| Conducted Emission Test Site |              |                    |                  |              |            |
|------------------------------|--------------|--------------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR          | MODEL<br>NUMBER    | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A             | MY43360126       | 03/29/2006   | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A              | US41160416       | 06/28/2006   | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40             | 100034           | 11/09/2005   | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX<br>104PEA | N/A              | N/A          | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5           | N/A              | 10/07/2005   | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5            | N/A              | 10/07/2005   | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber      | 51818            | 01/05/2006   | 01/04/2007 |

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## Frequency Separation Test Data



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## 11. NUMBER OF HOPPING FREQUENCY

### 11.1 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.

According to RSS-210 issue 6, §A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

### 11.2 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.

### 11.3 Measurement Result

Refer to next page for the plots.

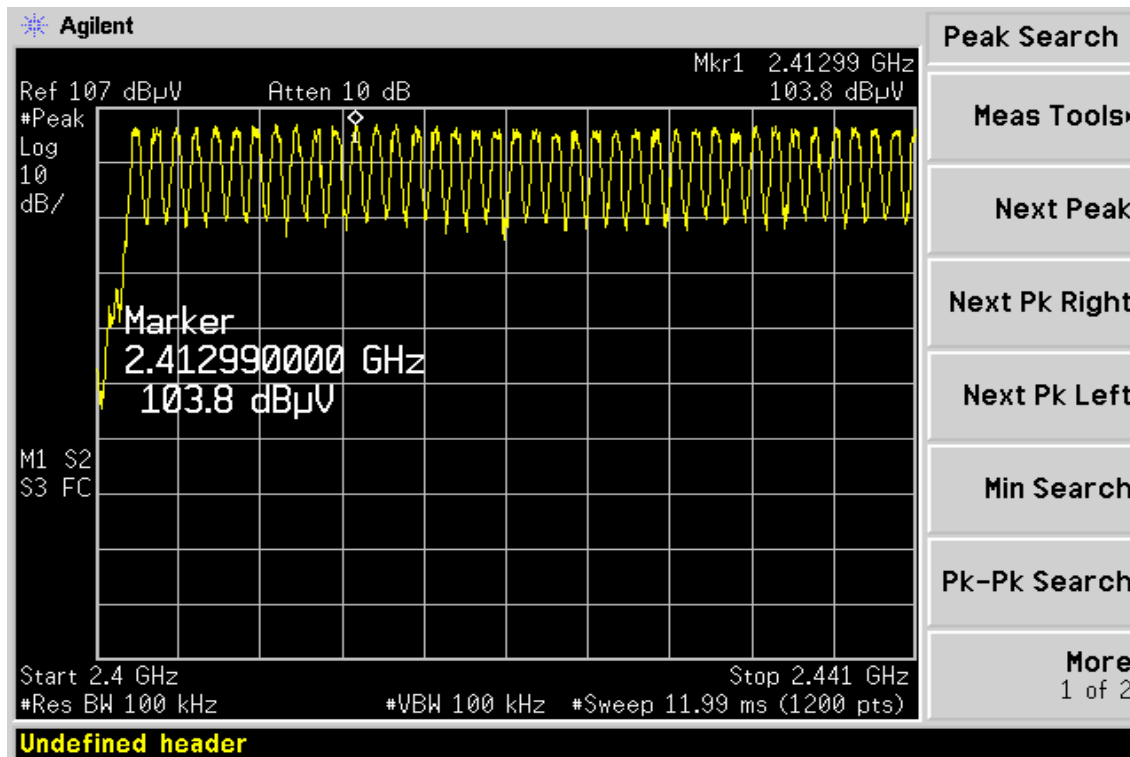
### 11.4 Measurement Equipment Used:

| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

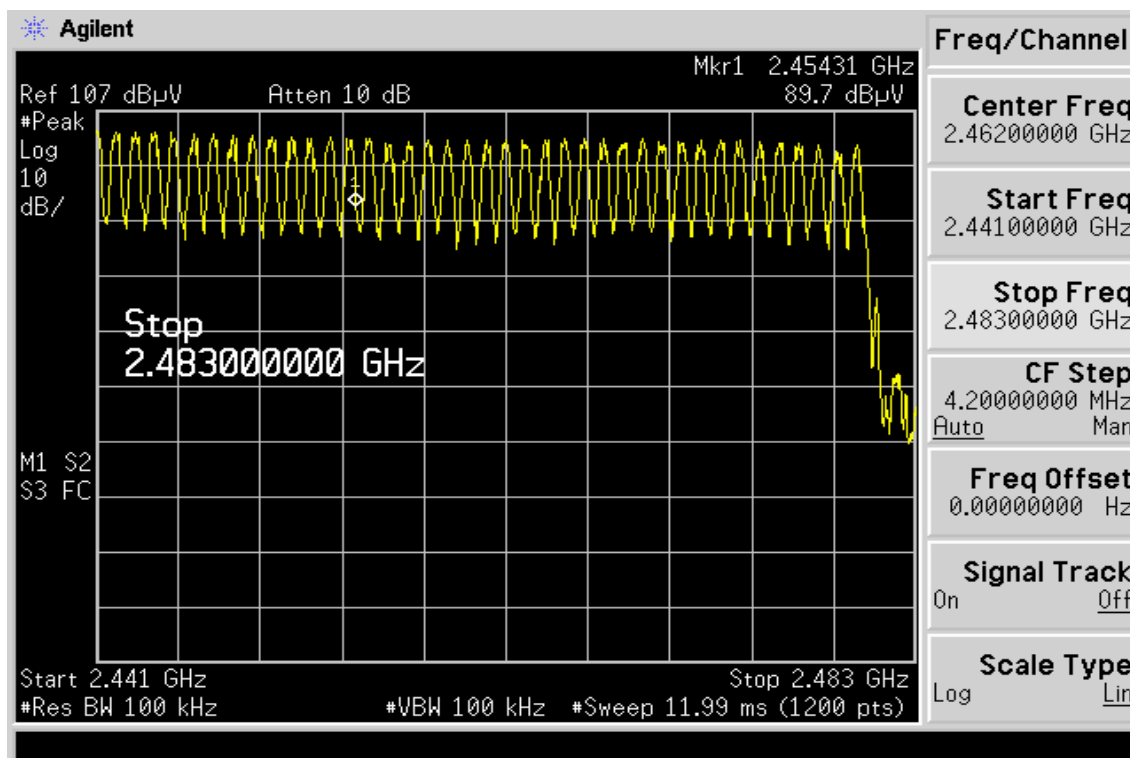
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## Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



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## 12. TIME OF OCCUPANCY (DWELL TIME)

### 12.1. 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.

According to RSS-210 issue 6, §A8.1(4), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

### 12.2. 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.

### 12.3. Measurement Result

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

CH Low: DH1 time slot = 0.405 (ms) \* (1600/(1\*79)) \* 31.6 = 259.1 (ms)  
DH3 time slot = 1.675 (ms) \* (1600/(3\*79)) \* 31.6 = 357.2 (ms)  
DH5 time slot = 2.925 (ms) \* (1600/(5\*79)) \* 31.6 = 374.3 (ms)

CH Mid: DH1 time slot = 0.405 (ms) \* (1600/(1\*79)) \* 31.6 = 259.1 (ms)  
DH3 time slot = 1.675 (ms) \* (1600/(3\*79)) \* 31.6 = 357.2 (ms)  
DH5 time slot = 2.906 (ms) \* (1600/(5\*79)) \* 31.6 = 371.9 (ms)

CH High: DH1 time slot = 0.416 (ms) \* (1600/(1\*79)) \* 31.6 = 266.1 (ms)  
DH3 time slot = 1.662 (ms) \* (1600/(3\*79)) \* 31.6 = 354.5 (ms)  
DH5 time slot = 2.906 (ms) \* (1600/(5\*79)) \* 31.6 = 371.9 (ms)

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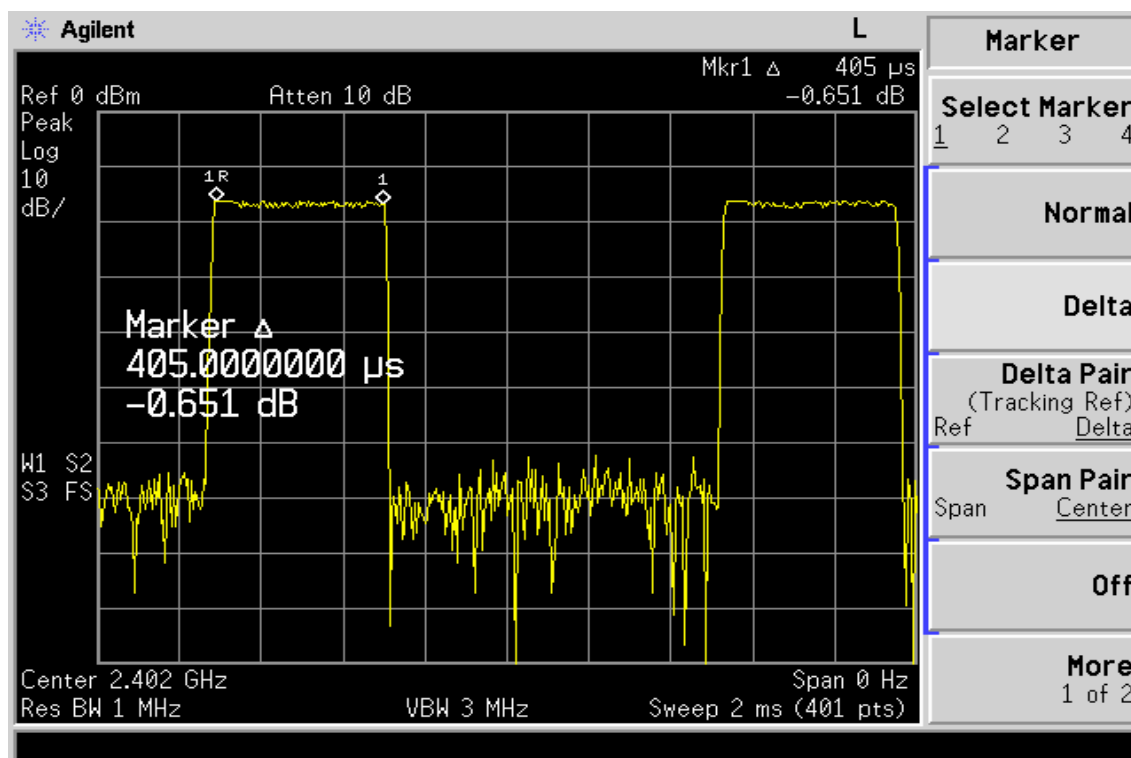
## 12.4. Measurement Equipment Used:

| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

## Dwell Time Test Data

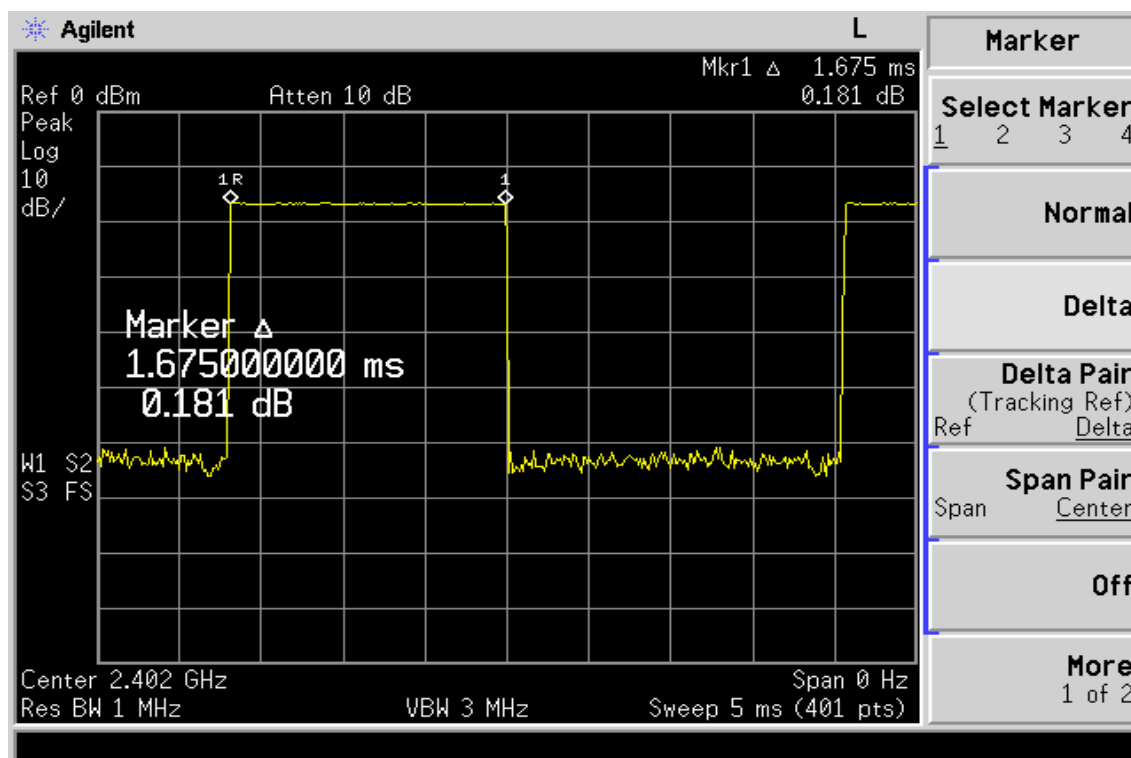
### CH-Low

#### DH1

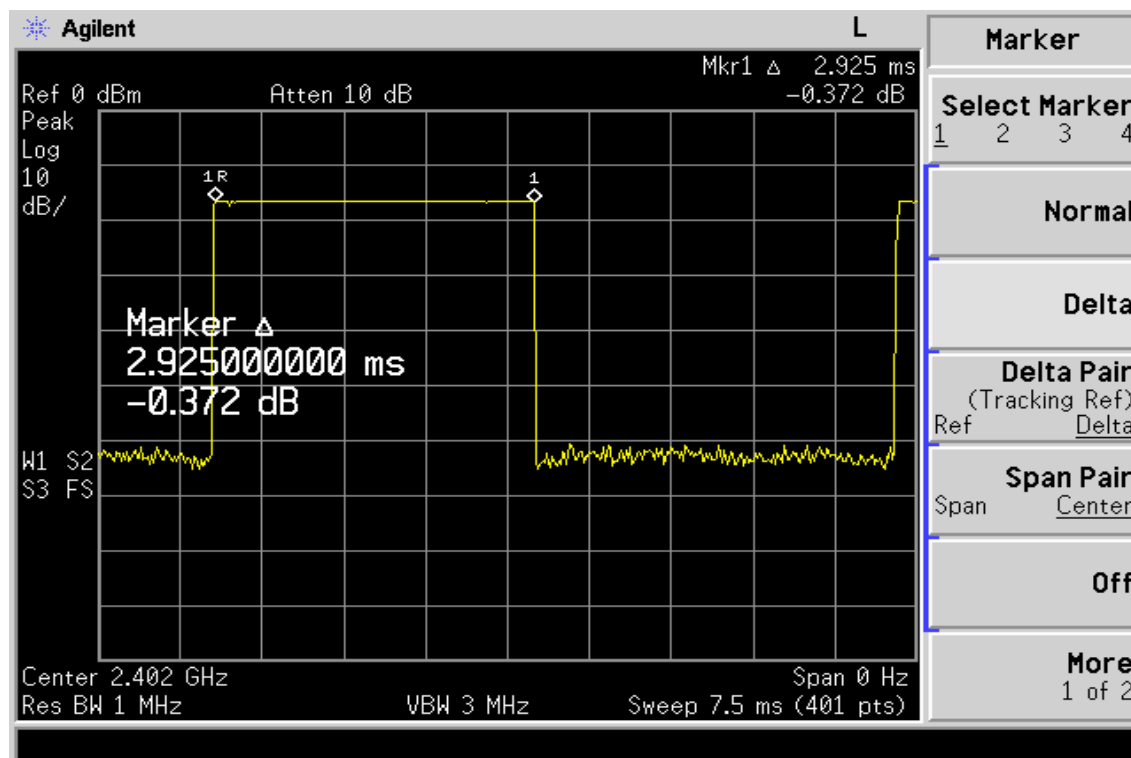


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## DH3



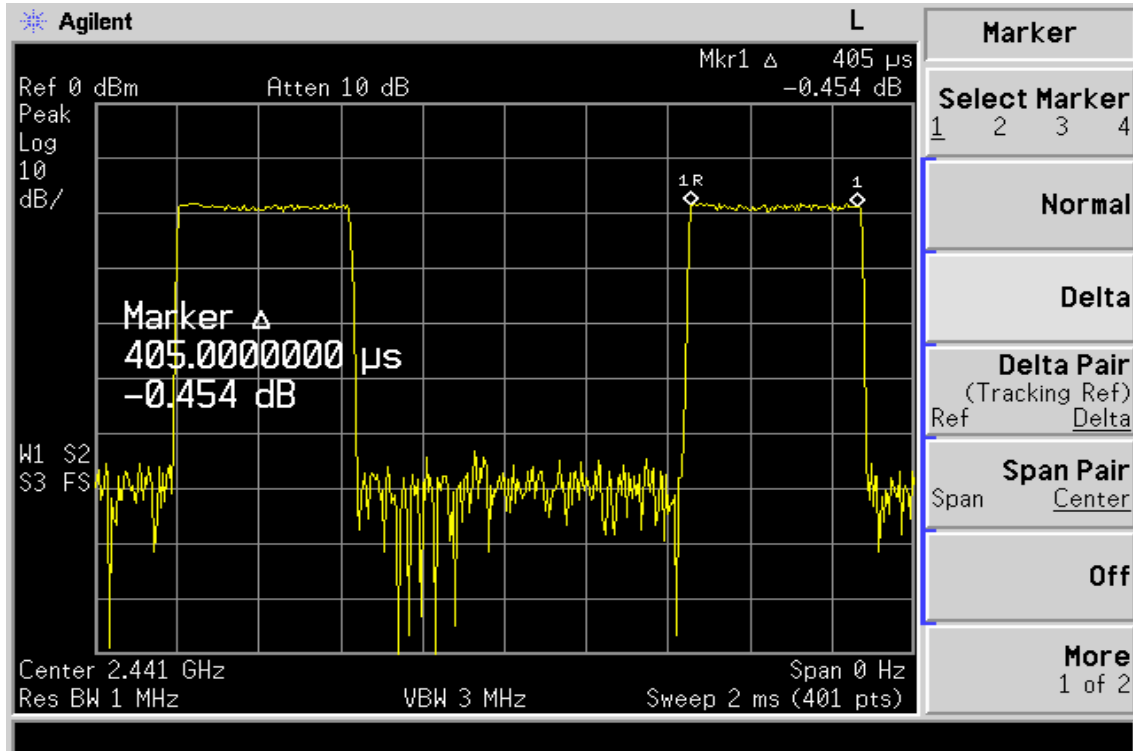
## DH5



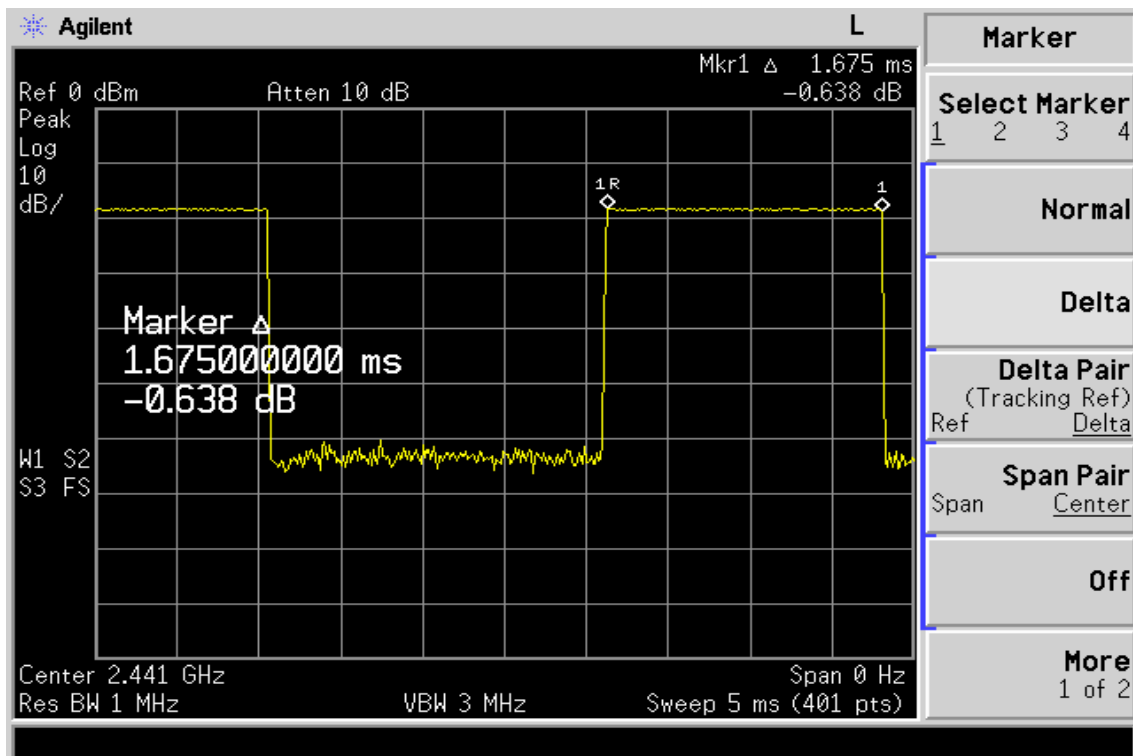
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## CH-Mid

### DH1

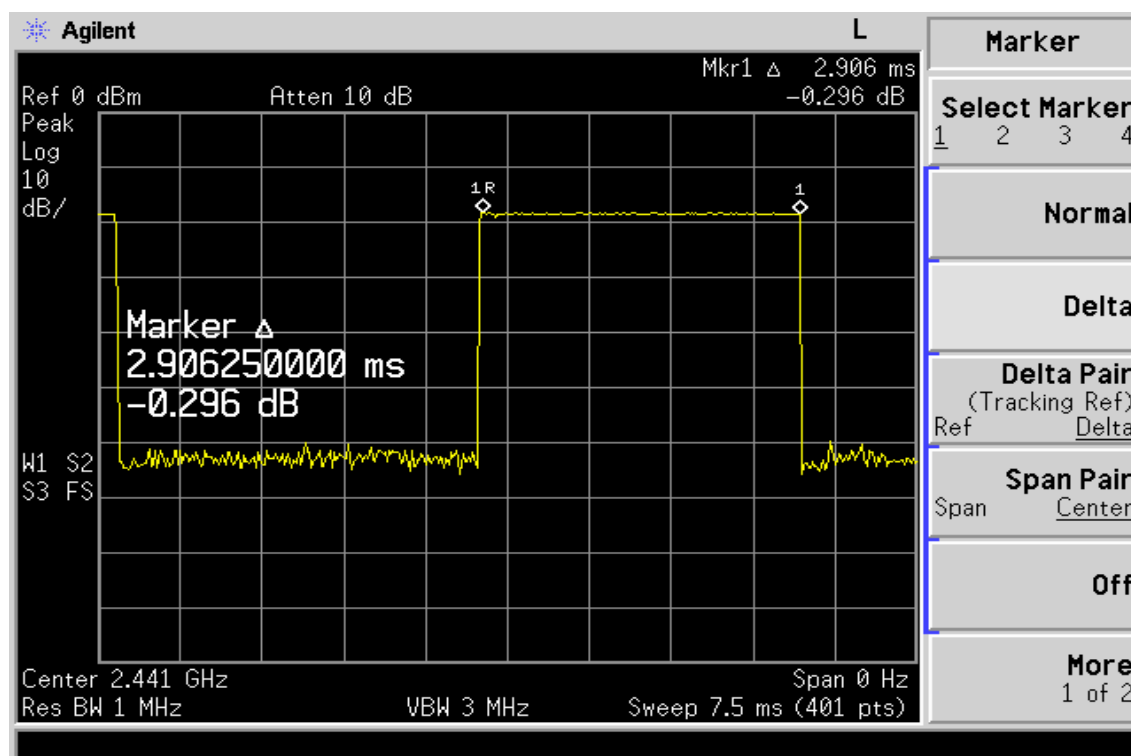


### DH3



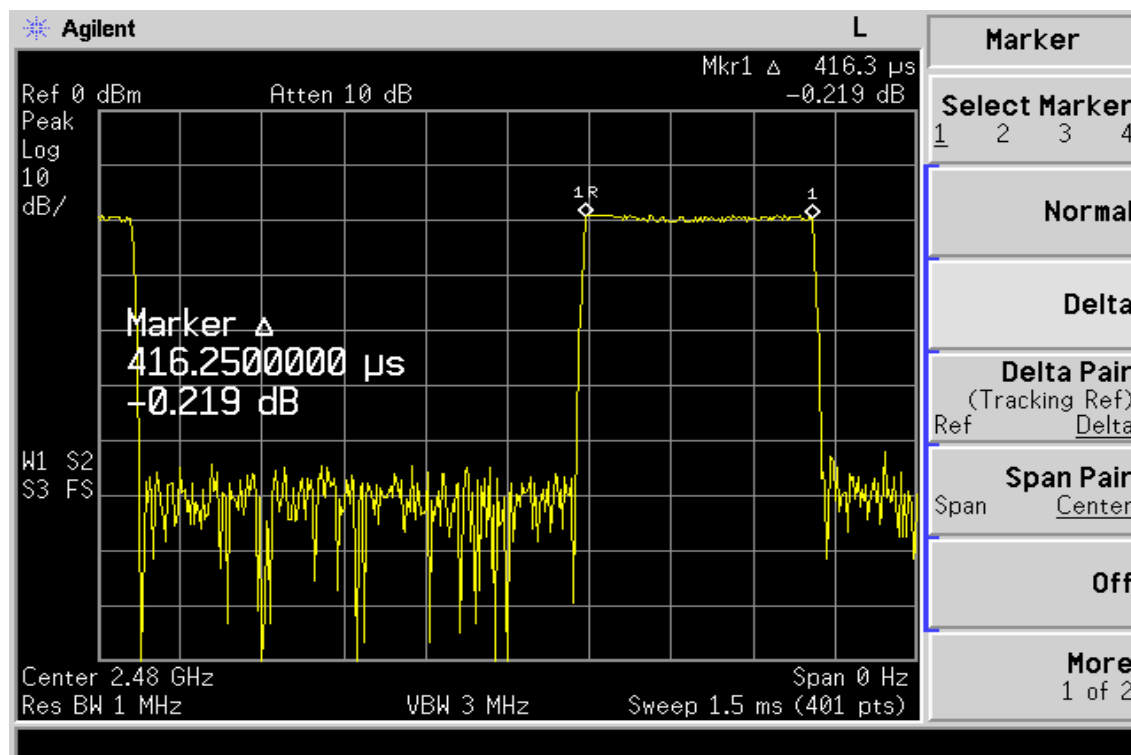
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## DH5



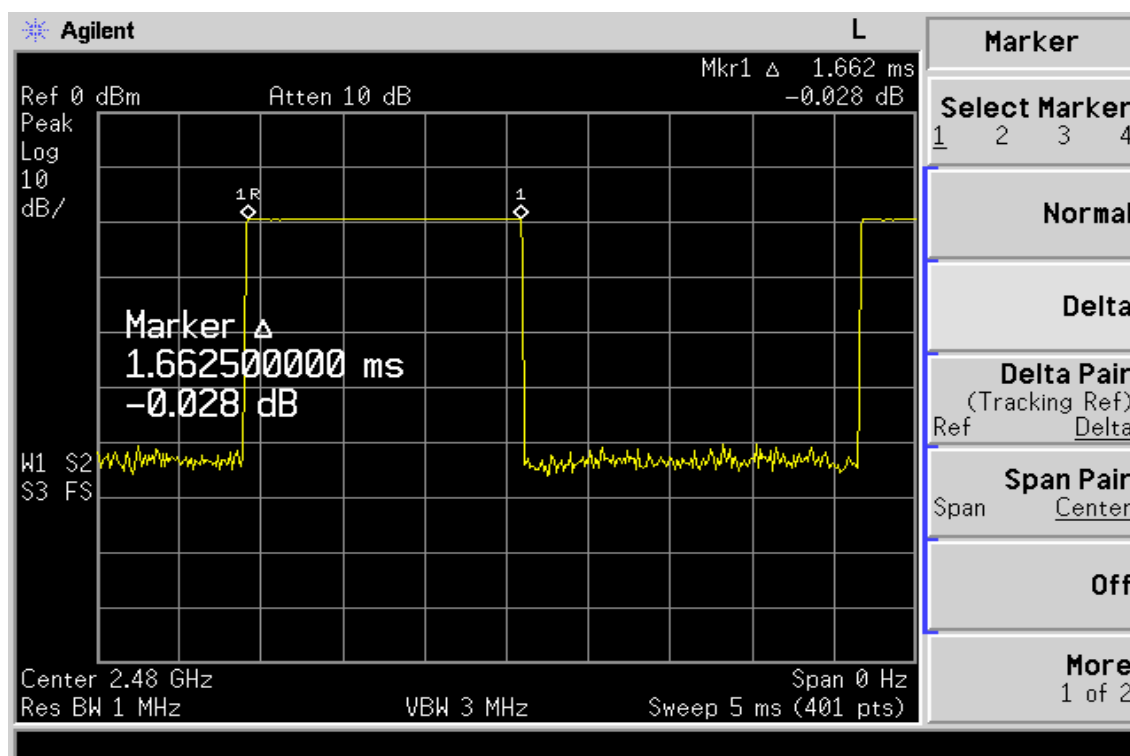
## CH-High

### DH1

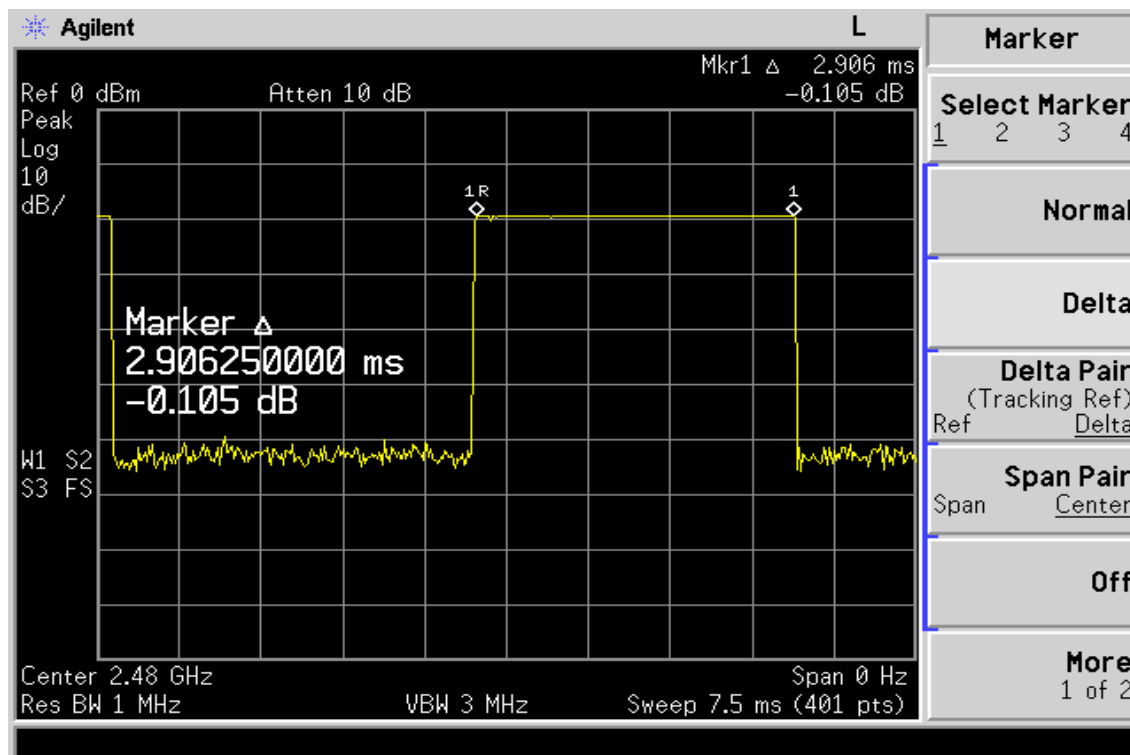


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## DH3



## DH5



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## 13. Peak Power Spectral Density

### 13.1. 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.

According to RSS-210 issue 6, §A8.2(2) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

### 13.2. 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 = 3KHz, Span = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

### 13.3. Measurement Result

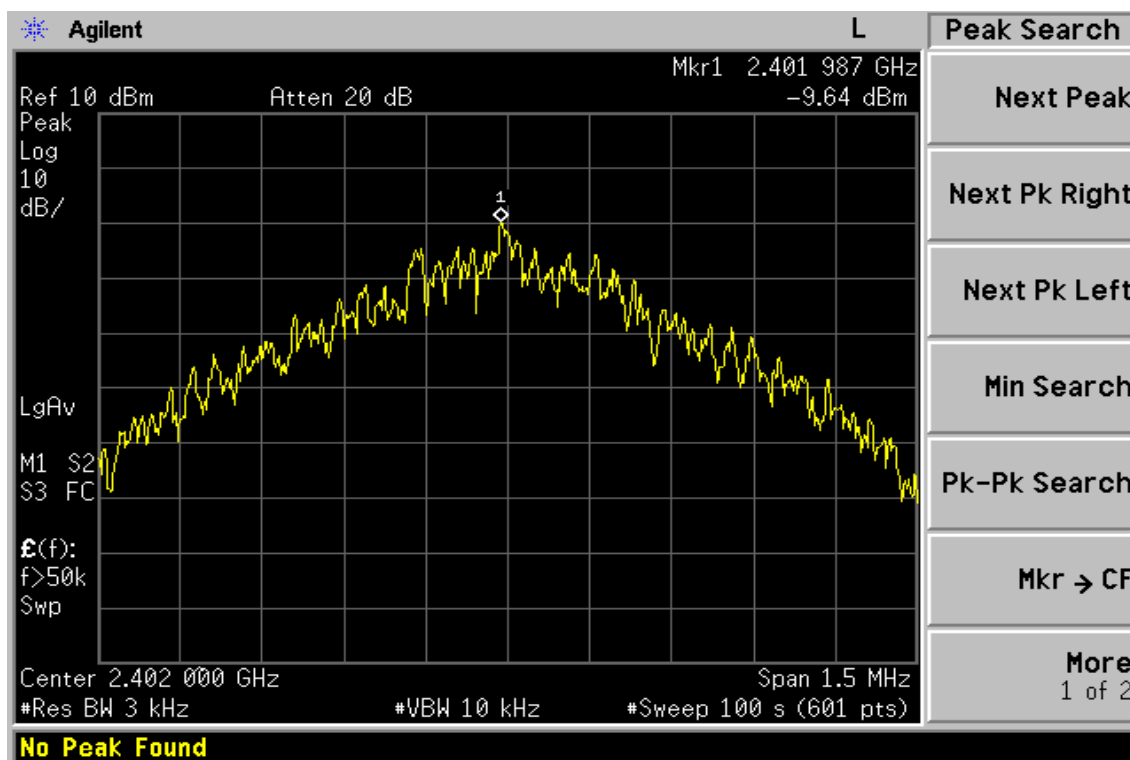
| CH   | RF Power Density Reading (dBm) | Cable loss (dB) | RF Power Density Level (dBm) | Maximum Limit (dBm) |
|------|--------------------------------|-----------------|------------------------------|---------------------|
| Low  | -9.64                          | 0.60            | -9.04                        | 8                   |
| Mid  | -9.90                          | 0.60            | -9.30                        | 8                   |
| High | -9.89                          | 0.60            | -9.29                        | 8                   |

**13.4. Measurement Equipment Used:**

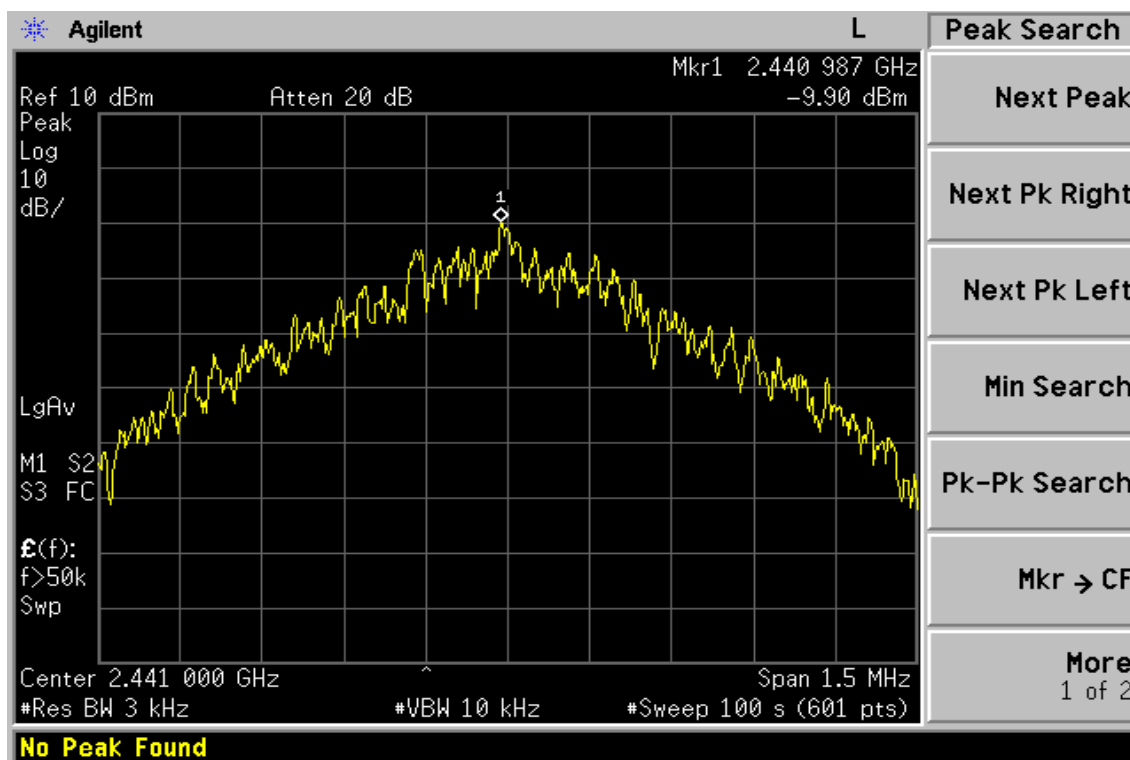
| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

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

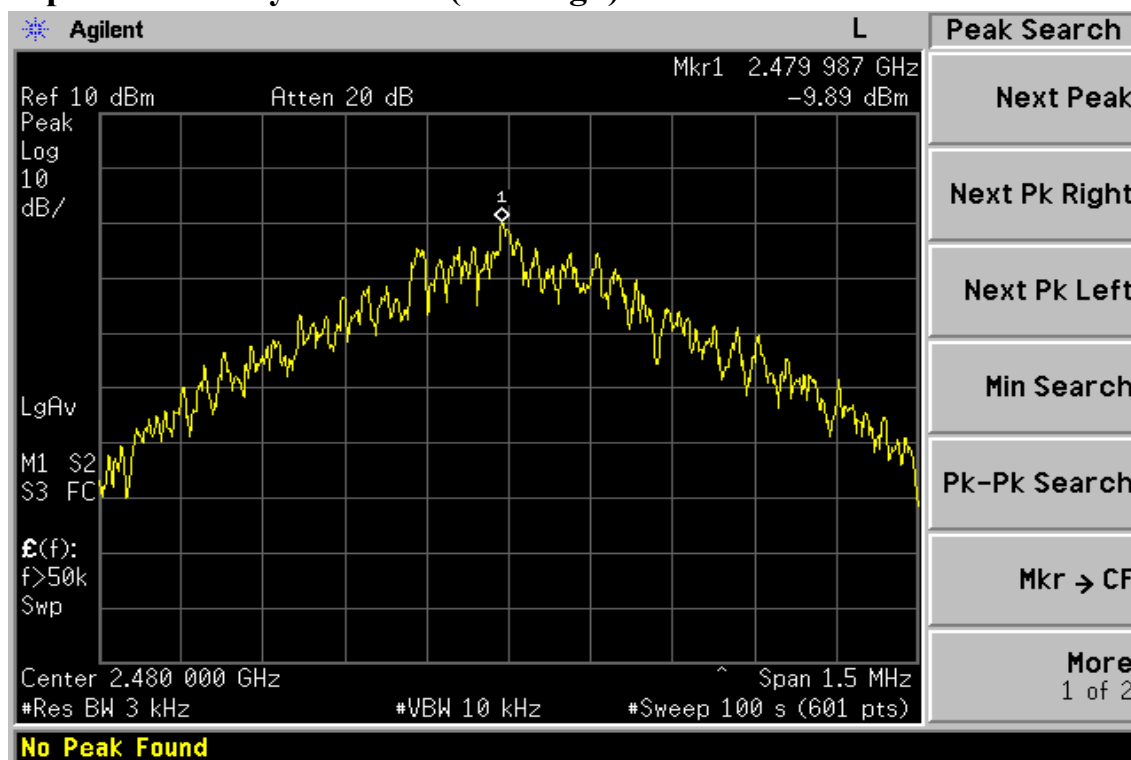


## Power Spectral Density Test Plot (CH-Mid)



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



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## 14. 99% Bandwidth Measurement

### 14.1. Standard Applicable

RSS-Gen §4.4.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

### 14.2. Measurement Equipment Used:

| Conducted Emission Test Site |              |                 |               |            |            |
|------------------------------|--------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer            | Agilent      | E4446A          | MY43360126    | 03/29/2006 | 03/28/2007 |
| Spectrum Analyzer            | Agilent      | 7405A           | US41160416    | 06/28/2006 | 06/29/2007 |
| Spectrum Analyzer            | R&S          | FSP 40          | 100034        | 11/09/2005 | 11/10/2006 |
| Low Loss Cable               | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator                   | Mini-Circuit | BW-S10W5        | N/A           | 10/07/2005 | 10/06/2006 |
| Attenuator                   | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2005 | 10/06/2006 |
| Splitter                     | Agilent      | Power Biviber   | 51818         | 01/05/2006 | 01/04/2007 |

### 14.3. Test Set-up:

Refer to section 2.4.

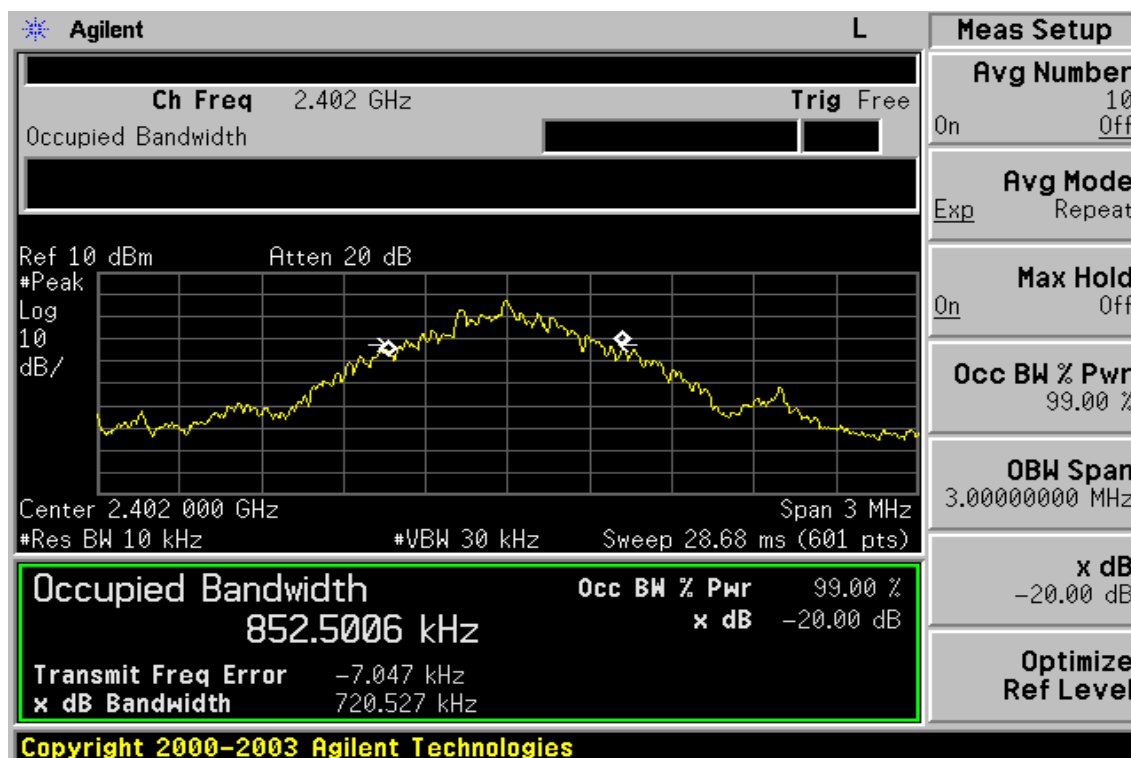
#### 14.4. Measurement Procedure

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=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
4. Turn on the 99% bandwidth function, max reading..
5. Repeat above procedures until all frequency measured were complete.

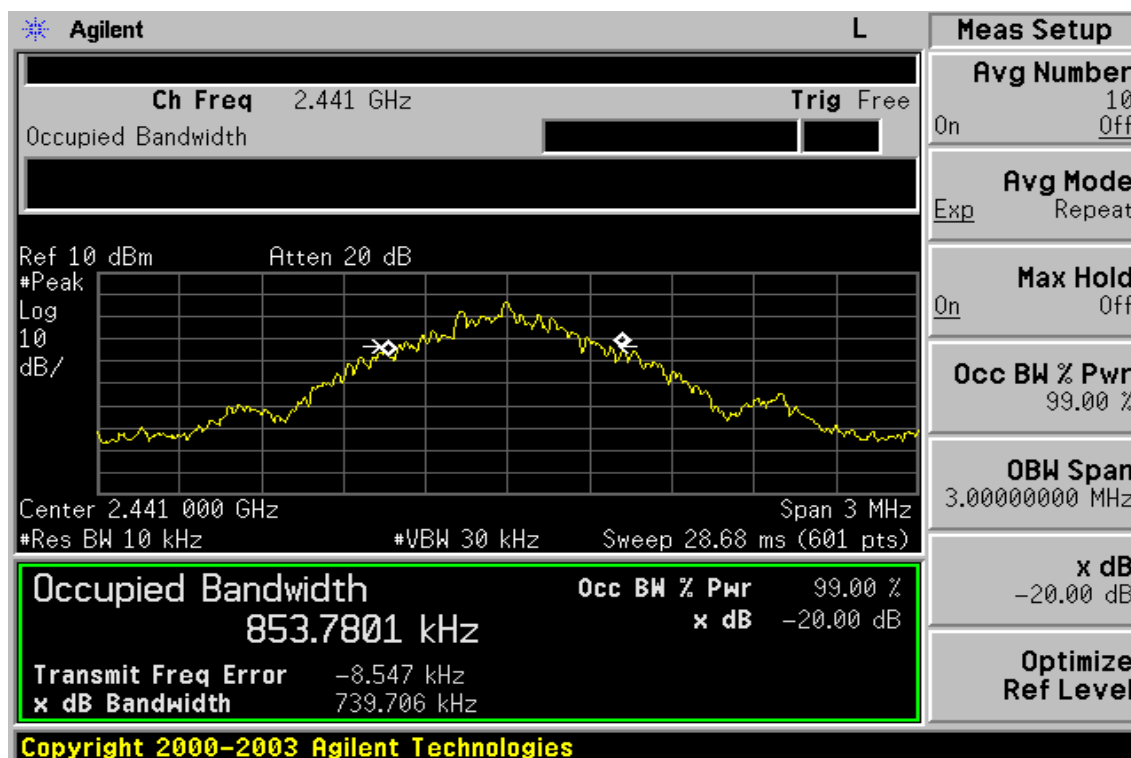
#### 14.5. Measurement Result

| CH     | Bandwidth<br>(kHz) |
|--------|--------------------|
| Lower  | 852.5006           |
| Mid    | 853.7801           |
| Higher | 852.7603           |

## 99% Band Width Test Data CH-Low

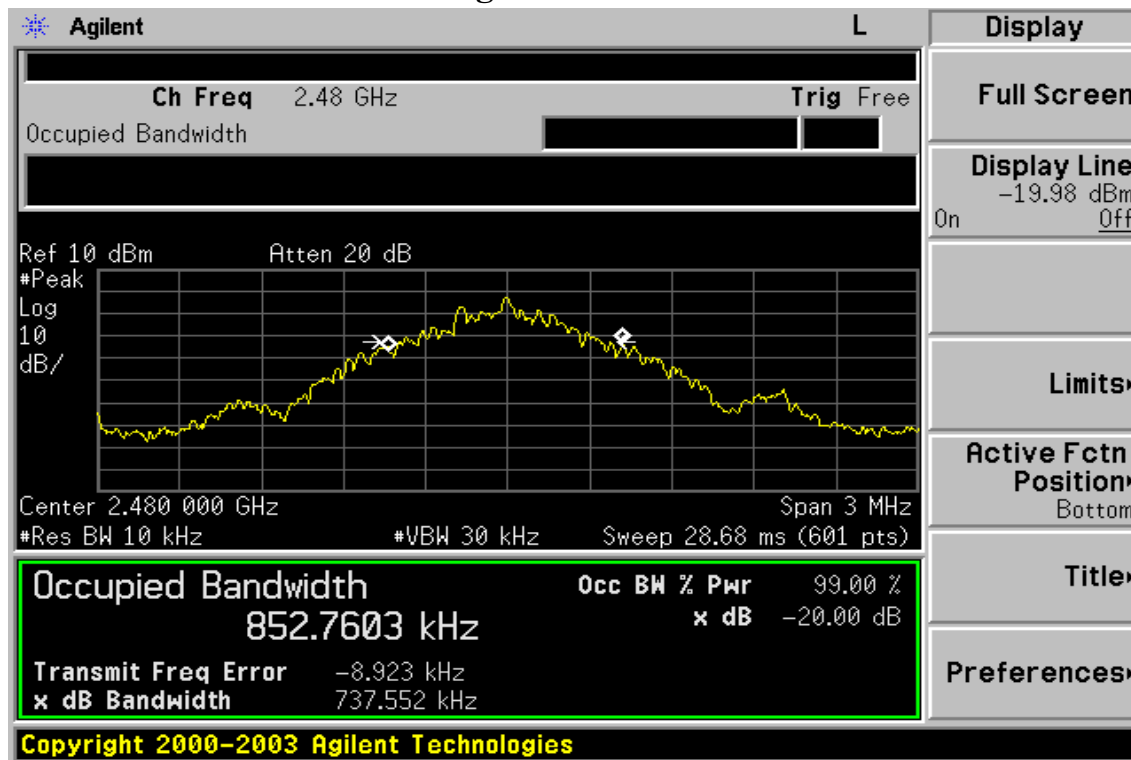


## 99% Band Width Test Data CH-Mid



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## 99% Band Width Test Data CH-High



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## 15. ANTENNA REQUIREMENT

### 15.1. 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.

According to RSS-GEN 7.1.4, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

### 15.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 4 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.