

**DIGITAL EMC CO., LTD.**

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<http://www.digitalemc.com>**CERTIFICATION OF COMPLIANCE****LG Electronics USA.**

1000 Sylvan Avenue Englewood Cliffs New Jersey United States

Dates of Tests: September 01~ 08, 2008

Test Report S/N: DR50110809I

Test Site : DIGITAL EMC CO., LTD.

FCC ID

**BEJHBM800**

APPLICANT

**LG Electronics USA.**

**FCC Equipment Class** : **Part 15 Spread Spectrum Transmitter(DSS)**  
**Device name** : **Bluetooth Mono Headset**  
**Manufacturer** : **LG Electronics Inc.**  
**FCC ID** : **BEJHBM800**  
**Model name** : **HBM-800**  
**Test Device Serial number** : **Identical prototype**  
**FCC Rule Part(s)** : **FCC Part 15.247 Subpart C**  
**ANSI C63.4-2003**  
**Frequency Range** : **2402 ~ 2480 MHz**  
**Max. Output power** : **6.14 dBm Conducted**  
**Data of issue** : **September 16, 2008**

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



NVLAP LAB CODE 200559-0

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## 1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

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

**Test operator: Engineer**

September 16, 2008

D.C.Cha



Data

Name

Signature

**Report Reviewed By: Manager**

September 16, 2008

Harvey Sung



Data

Name

Signature

Ordering party:

Company name : LG Electronics Inc.

Address : LG Twin Tower West Tower 22F Yoido-dong, Youngdungpo-gu

City/town : Seoul

Country : Korea

Date of order : August 26, 2008

## 2. Information about test item

### BEJHBM800

#### 2.1 Equipment information

|                      |                        |
|----------------------|------------------------|
| Equipment model no.  | HBM-800                |
| Equipment serial no. | Identical prototype    |
| Type of equipment    | Bluetooth Mono Headset |
| Frequency band       | 2402 ~ 2480 MHz        |
| Type of Modulation   | GFSK                   |
| Spread Spectrum      | Frequency Hopping      |
| Channel Spacing      | 1.0 MHz                |
| Type of antenna      | Monopole Antenna       |

- This device does not have EDR function.

#### 2.2 Tested frequency

| Frequency        | TX      | RX      |
|------------------|---------|---------|
| Low frequency    | 2402MHz | 2402MHz |
| Middle frequency | 2441MHz | 2441MHz |
| High frequency   | 2480MHz | 2480MHz |

#### 2.3 Tested environment

|                           |                |
|---------------------------|----------------|
| Temperature               | : 15 ~ 35 (°C) |
| Relative humidity content | : 20 ~ 75 %    |
| Air pressure              | : 86 ~ 103 kPa |
| Details of power supply   | : 3.7 V DC     |

#### 2.4 Ancillary Equipment

| Equipment | Model No.      | Serial No.     | Manufacturer |
|-----------|----------------|----------------|--------------|
| Adapter   | STA-U32WR      | RA83060294     | SULIN        |
| Cradle    | Headset Cradle | 808BC26C000247 | LG           |

#### 2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

-> None

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part<br>Section(s)                                                  | Parameter                     | Limit<br>(Using in 2400 ~ 2483.5MHz)                                                                              | Test<br>Condition    | Status<br>(note 1) |
|-------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------|--------------------|
| I. Test Items                                                           |                               |                                                                                                                   |                      |                    |
| 15.247(a)                                                               | Carrier Frequency Separation  | >= 20dB BW or >= Two-Thirds of the 20dB BW                                                                        | Conducted            | C                  |
|                                                                         | Number of Hopping Frequencies | >= 15 hops                                                                                                        |                      | C                  |
|                                                                         | 20 dB Bandwidth               | None                                                                                                              |                      | C                  |
|                                                                         | Dwell Time                    | =< 0.4 seconds                                                                                                    |                      | C                  |
| 15.247(b)                                                               | Transmitter Output Power      | =< 1Watt , if CHs >= 75 Others =<0.125W                                                                           |                      | C                  |
| 15.247(c)                                                               | Band-edge /Conducted          | The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density. |                      | C                  |
|                                                                         | Conducted Spurious Emissions  |                                                                                                                   |                      | C                  |
| 15.205<br>15.209                                                        | Radiated Emissions            | FCC 15.209 Limits                                                                                                 | Radiated             | C                  |
| 15.207                                                                  | AC Conducted Emissions        | EN 55022                                                                                                          | AC Line<br>Conducted | C                  |
| Note 1: C=Comply    NC=Not Comply    NT=Not Tested    NA=Not Applicable |                               |                                                                                                                   |                      |                    |

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003, DA00-705

## 3.2 Transmitter requirements

### 3.2.1 Carrier Frequency Separation

#### Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz

Detector function = peak

Trace = max hold

#### Measurement Data:

| Frequency of marker #1<br>(MHz) | Frequency of marker #2<br>(MHz) | Test Results                       |        |
|---------------------------------|---------------------------------|------------------------------------|--------|
|                                 |                                 | Carrier Frequency Separation (MHz) | Result |
| 2439.992                        | 2440.994                        | 1.002                              | Comply |

- See next pages for actual measured spectrum plots.

#### Minimum Standard:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, 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, provided the systems operate with an output power no greater than 125 mW

#### Measurement Setup

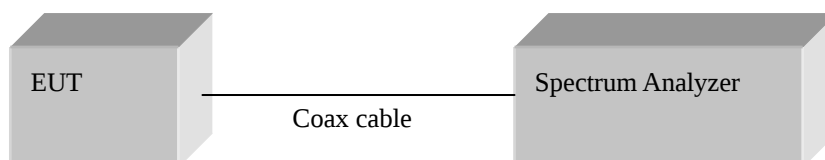
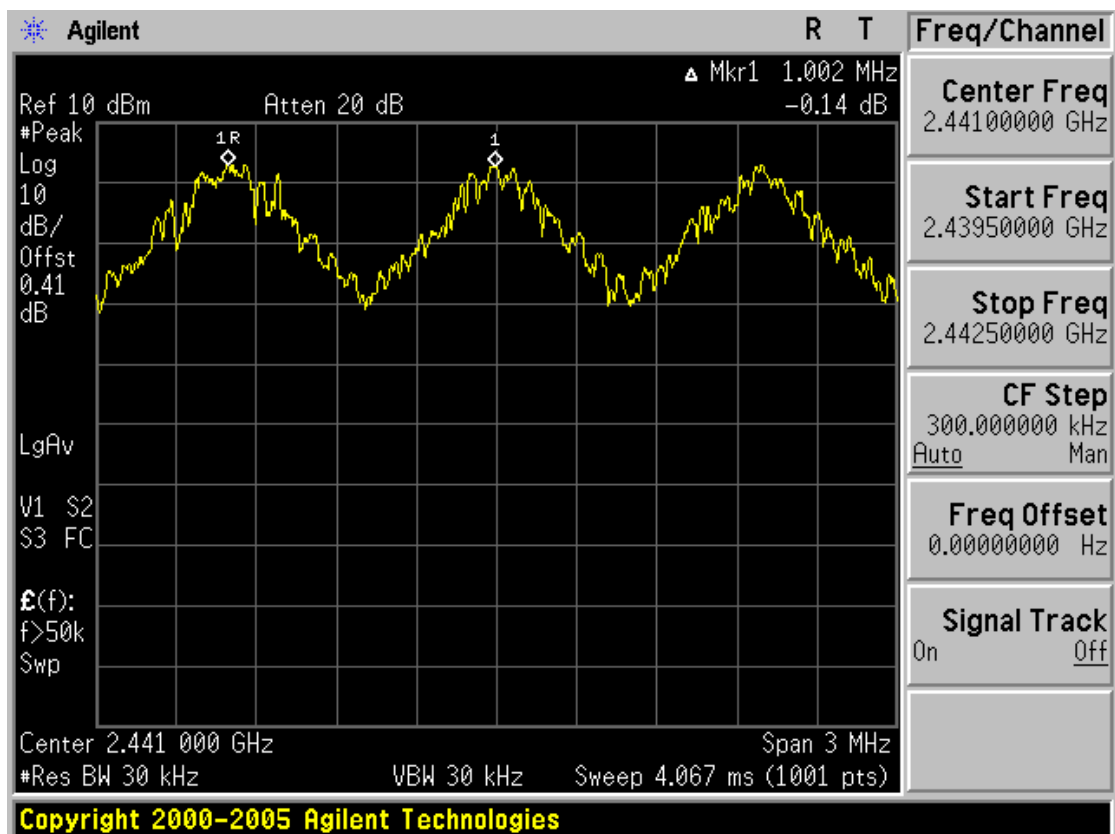


Figure 1: Measurement setup for the carrier frequency separation

## Carrier Frequency Separation



### 3.2.2 Number of Hopping Frequencies

#### Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Frequency range 1: Start = 2389.5MHz, Stop = 2414.5 MHz

2: Start = 2414.5MHz, Stop = 2439.5 MHz

3: Start = 2439.5MHz, Stop = 2464.5 MHz

4: Start = 2464.5MHz, Stop = 2489.5 MHz

RBW = 300 kHz (1% of the span or more) Sweep = auto

VBW = 300 kHz (VBW  $\geq$  RBW) Detector function = peak

Trace = max hold Span = 25MHz

#### Measurement Data: **Comply**

|                                  |    |
|----------------------------------|----|
| Total number of Hopping Channels | 79 |
|----------------------------------|----|

- See next pages for actual measured spectrum plots.

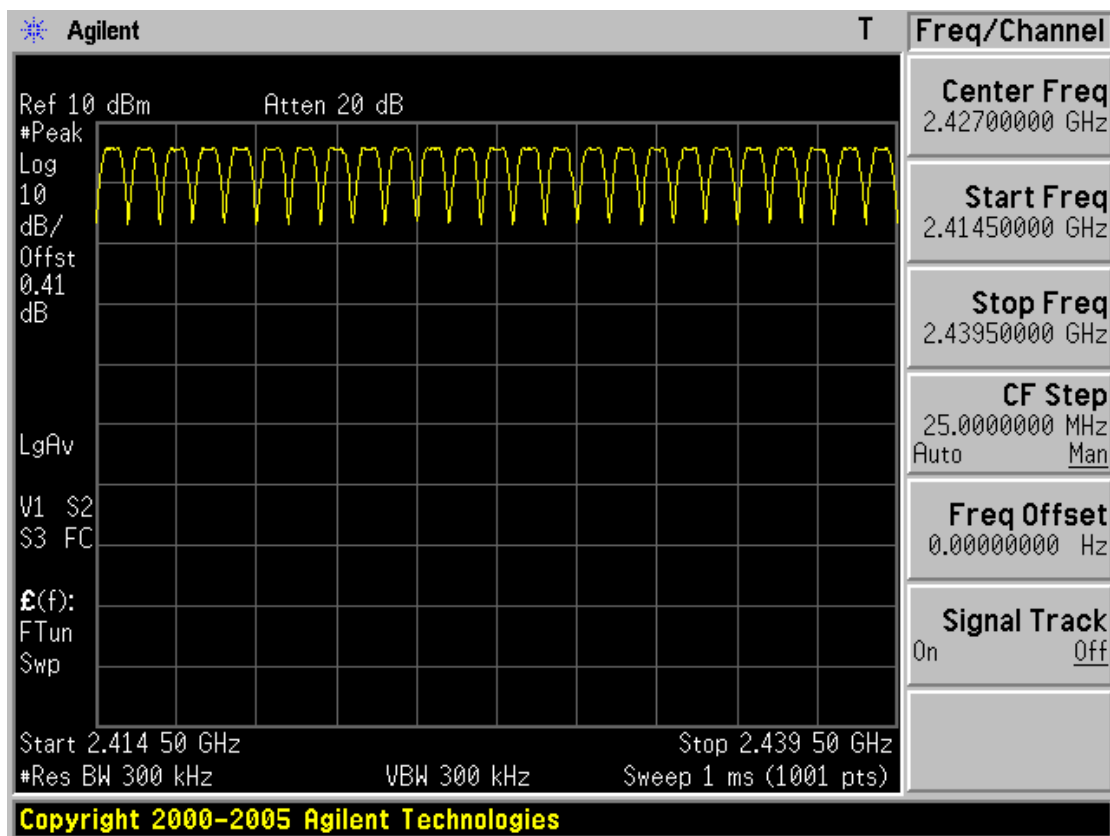
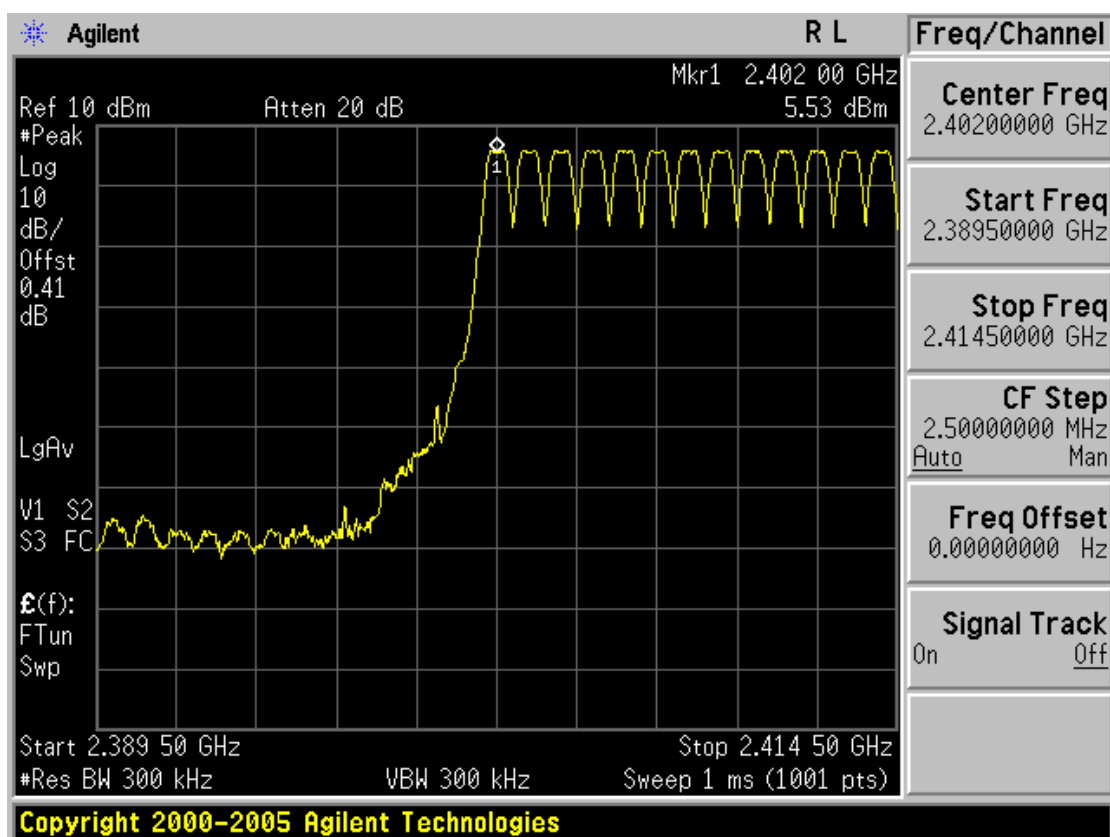
#### Minimum Standard:

|                   |
|-------------------|
| At least 15 hopes |
|-------------------|

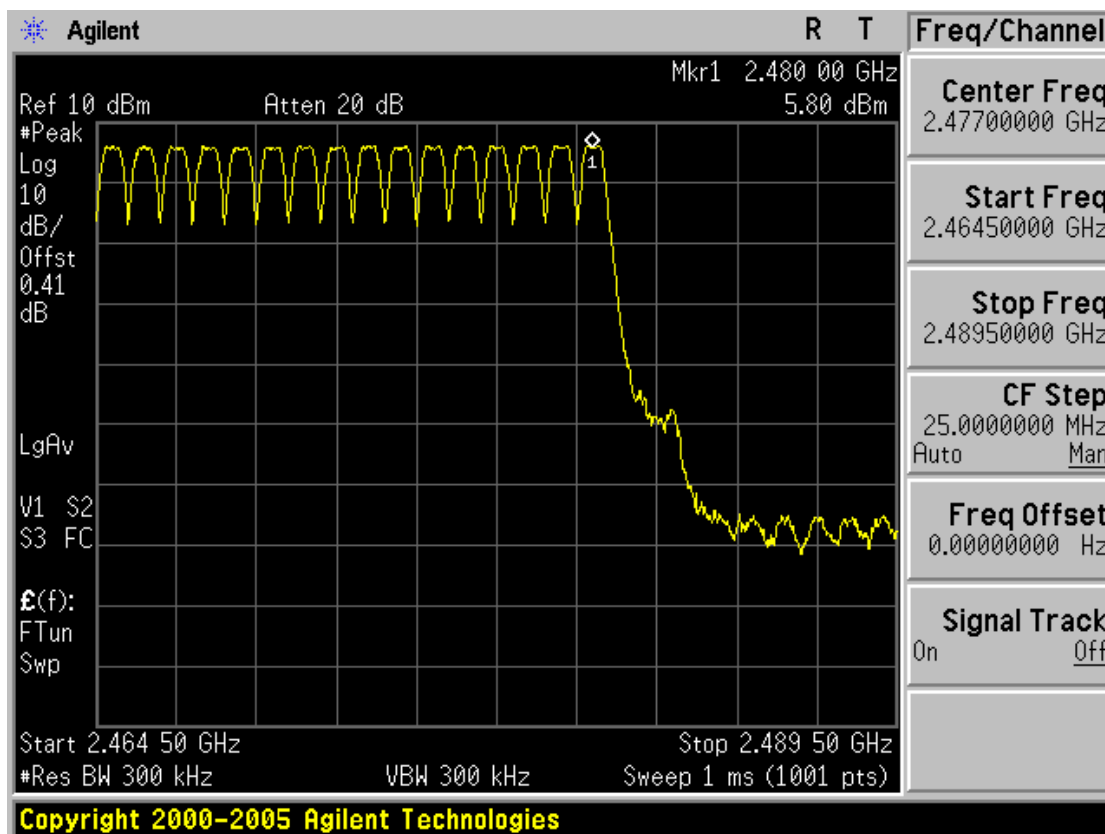
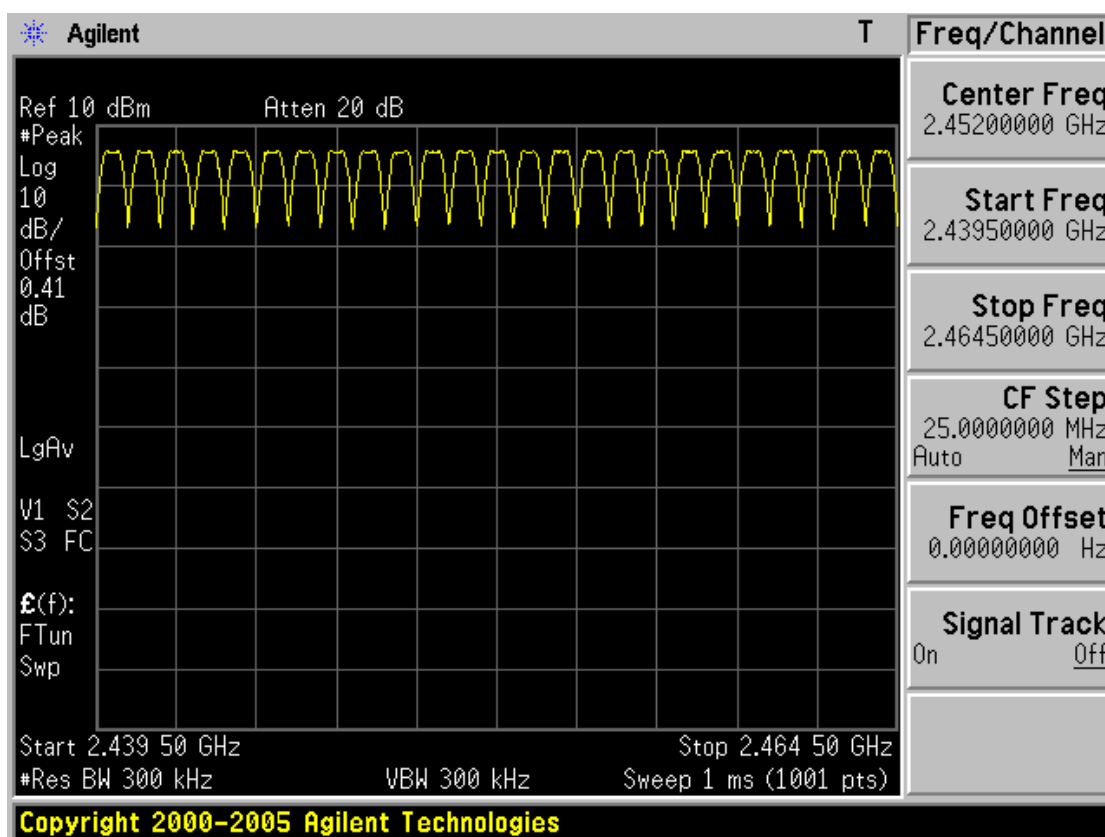
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

# Number of Hopping Frequencies



# Number of Hopping Frequencies



### 3.2.3 20 dB Bandwidth

#### Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 10 kHz (1% of the 20dB bandwidth or more) Sweep = auto

VBW = 10 kHz ( $VBW \geq RBW$ )

Detector function = peak

Trace = max hold

#### Measurement Data:

| Frequency<br>(MHz) | Channel No. | Test Results                |        |
|--------------------|-------------|-----------------------------|--------|
|                    |             | Measured Bandwidth<br>(MHz) | Result |
| 2402               | 1           | 0.930                       | Comply |
| 2441               | 40          | 0.935                       | Comply |
| 2480               | 79          | 0.930                       | Comply |

- See next pages for actual measured spectrum plots.

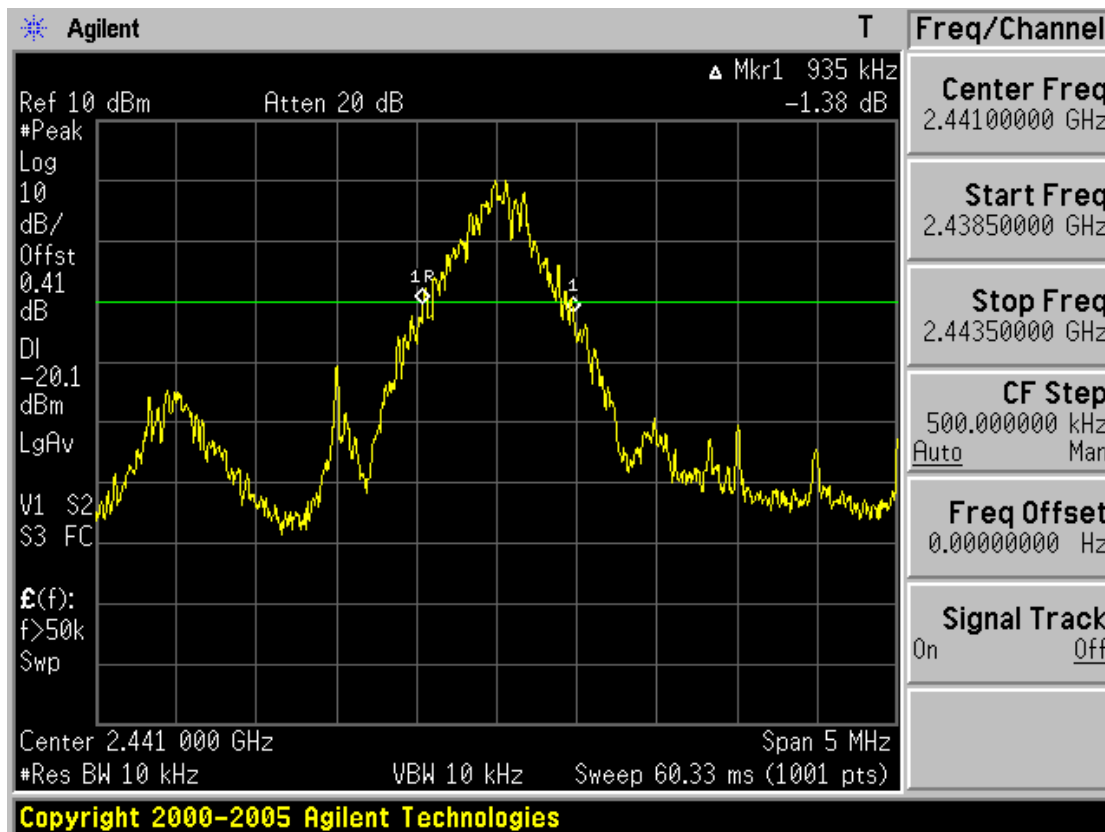
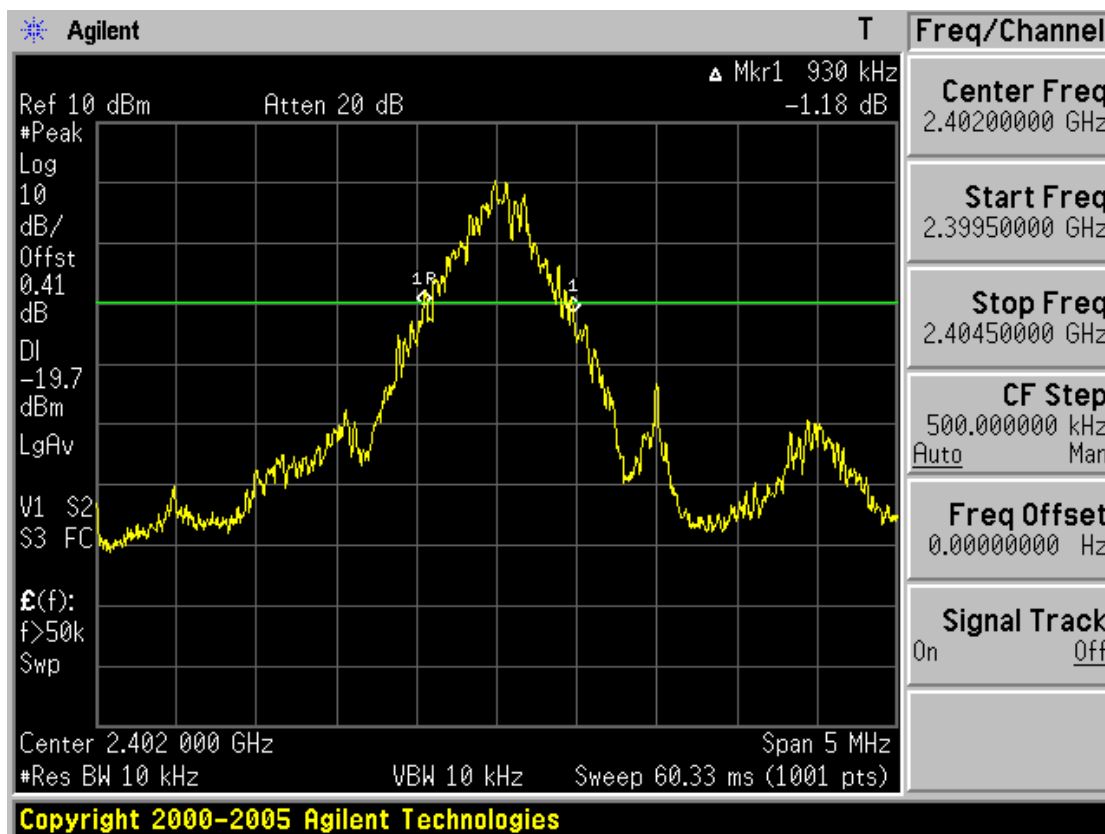
#### Minimum Standard:

None

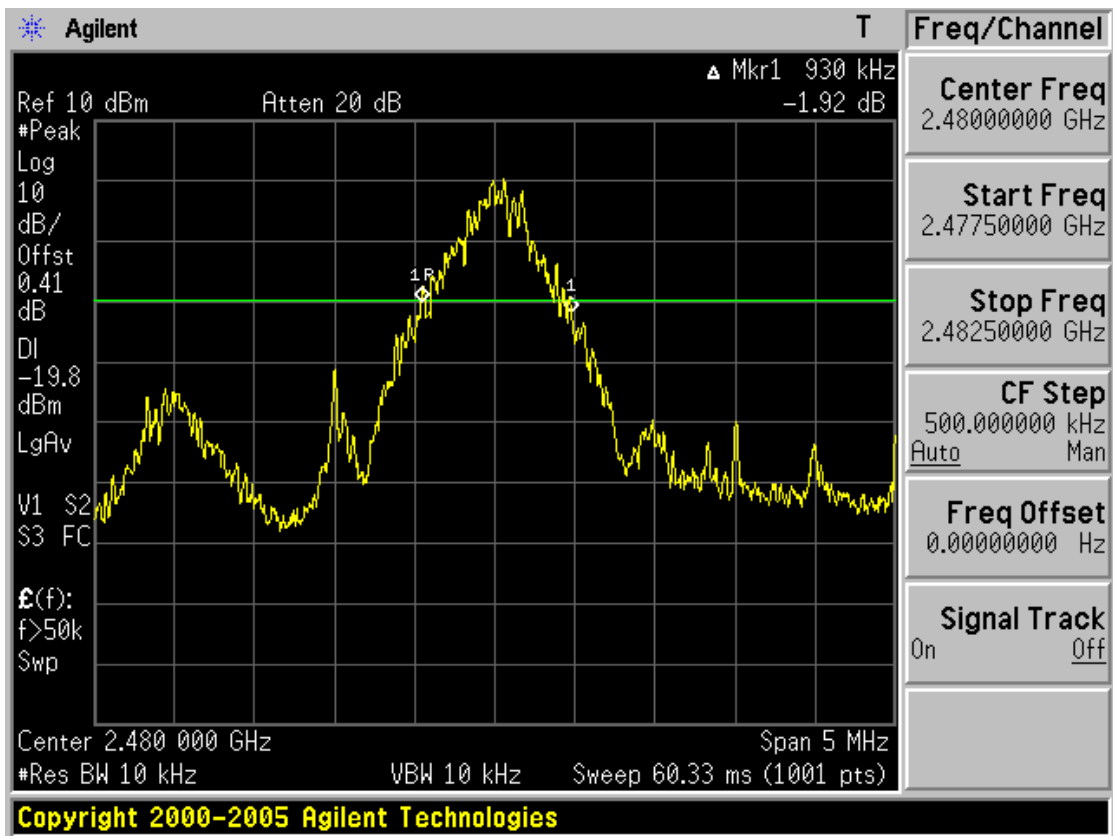
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

# 20 dB Bandwidth



20 dB Bandwidth



### 3.2.4 Time of Occupancy (Dwell Time)

#### Procedure:

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz

Span = zero

RBW = 1 MHz

VBW = 1 MHz (VBW  $\geq$  RBW)

Trace = max hold

Detector function = peak

**Measurement Data:** See next pages for actual measured spectrum plots.

| Packet Type | Burst On Time (ms) | Period (ms) | Number of hopping Channels | DWELL TIME (s) | Result |
|-------------|--------------------|-------------|----------------------------|----------------|--------|
| DH 1        | 0.396              | 1.248       | 79                         | 0.127          | Comply |
| DH 3        | 1.127              | 2.499       | 79                         | 0.180          | Comply |
| DH 5        | 2.900              | 3.750       | 79                         | 0.309          | Comply |

Note : Each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event.  $DWELL\ TIME = (0.4 \times \text{Number of hopping Channels}) \times \text{Burst On time} / (\text{period} \times \text{Number of hopping Channels})$

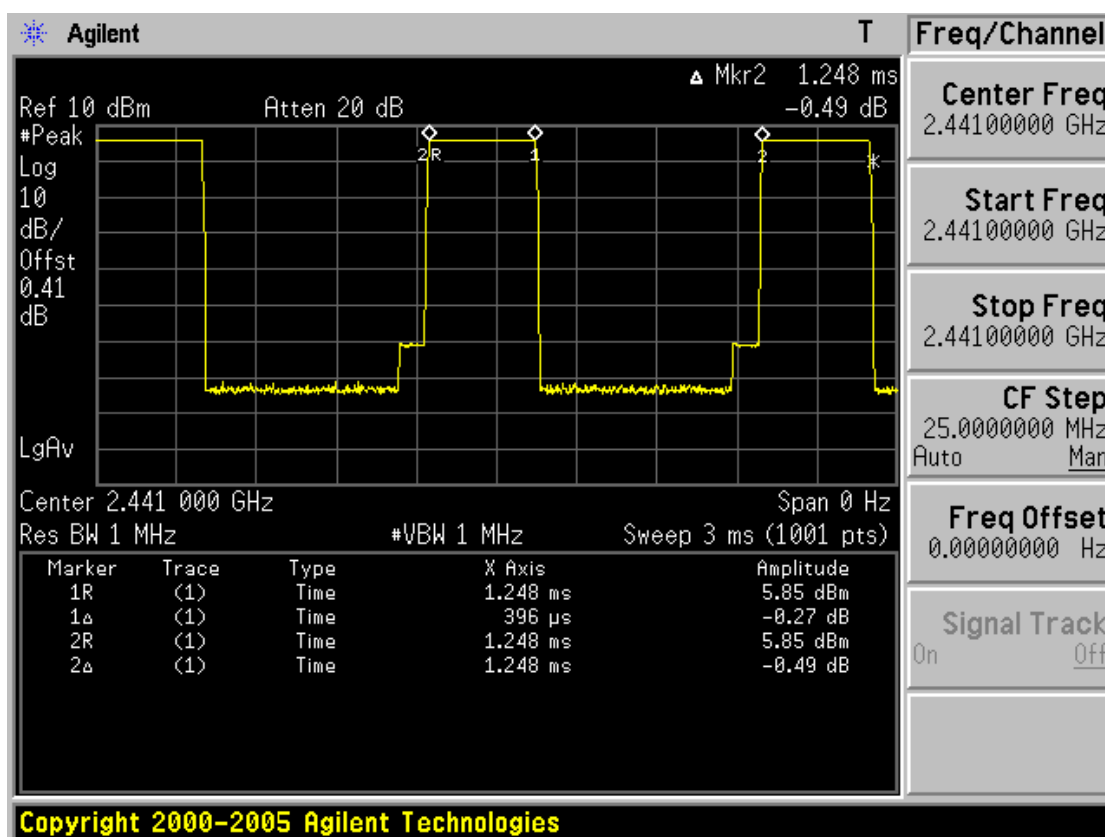
#### Minimum Standard:

|                             |
|-----------------------------|
| No greater than 0.4 seconds |
|-----------------------------|

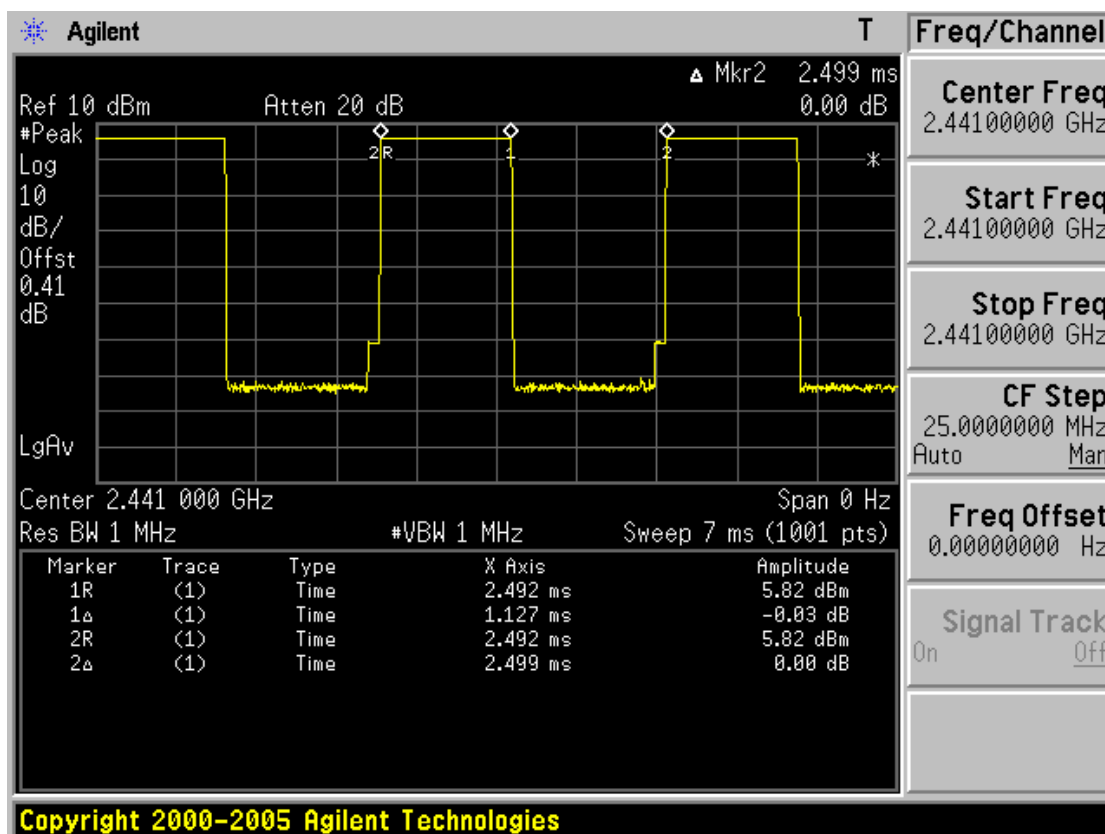
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

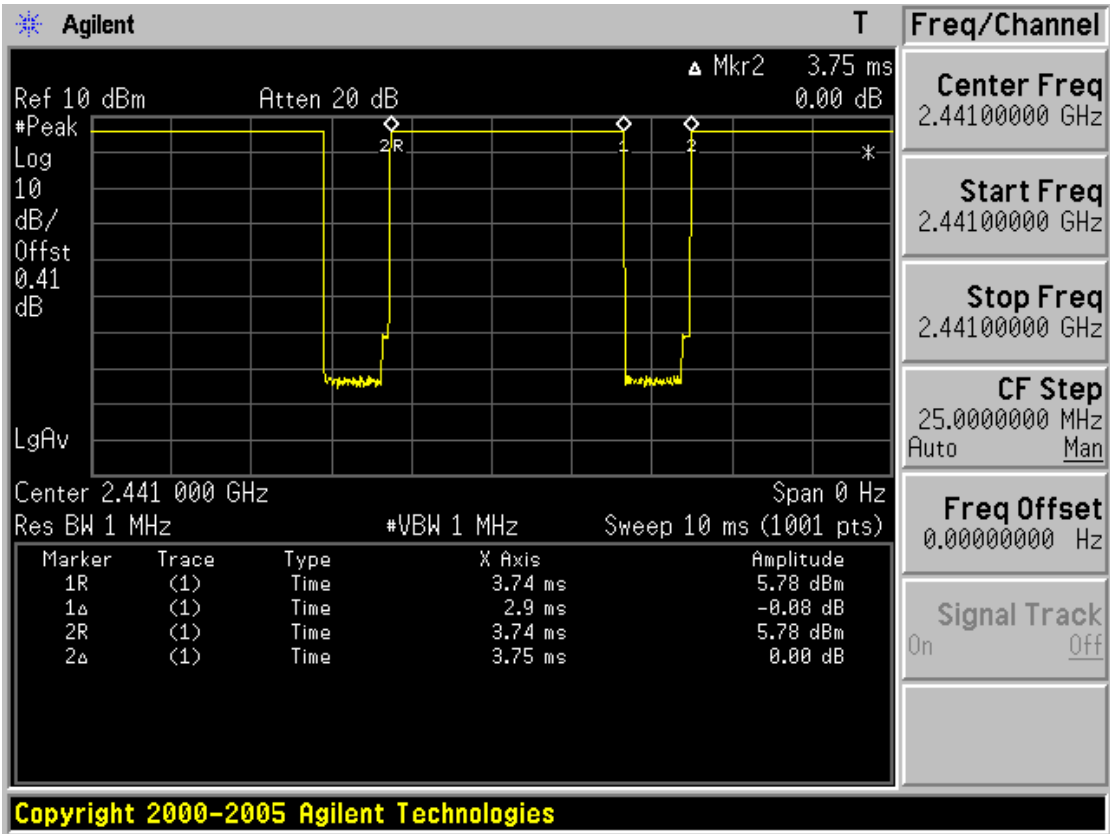
### Time of Occupancy for Packet Type DH 1



### Time of Occupancy for Packet Type DH 3



Time of Occupancy for Packet Type DH 5



### 3.2.5 Peak Output Power

#### Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 1 MHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

Sweep = auto

#### Measurement Data:

| Frequency (MHz) | Ch. | Test Results |       |        |
|-----------------|-----|--------------|-------|--------|
|                 |     | dBm          | mW    | Result |
| 2402            | 1   | 5.81         | 3.811 | Comply |
| 2441            | 40  | 5.81         | 3.811 | Comply |
| 2480            | 79  | 6.14         | 4.111 | Comply |

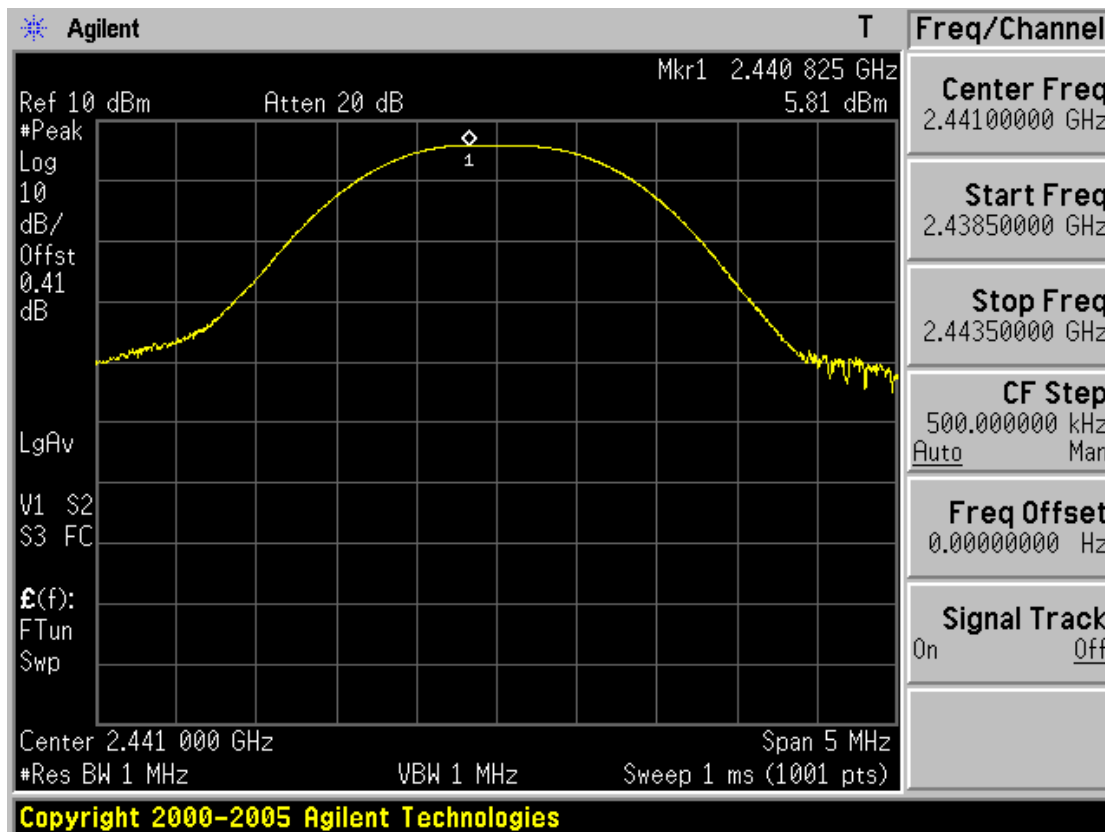
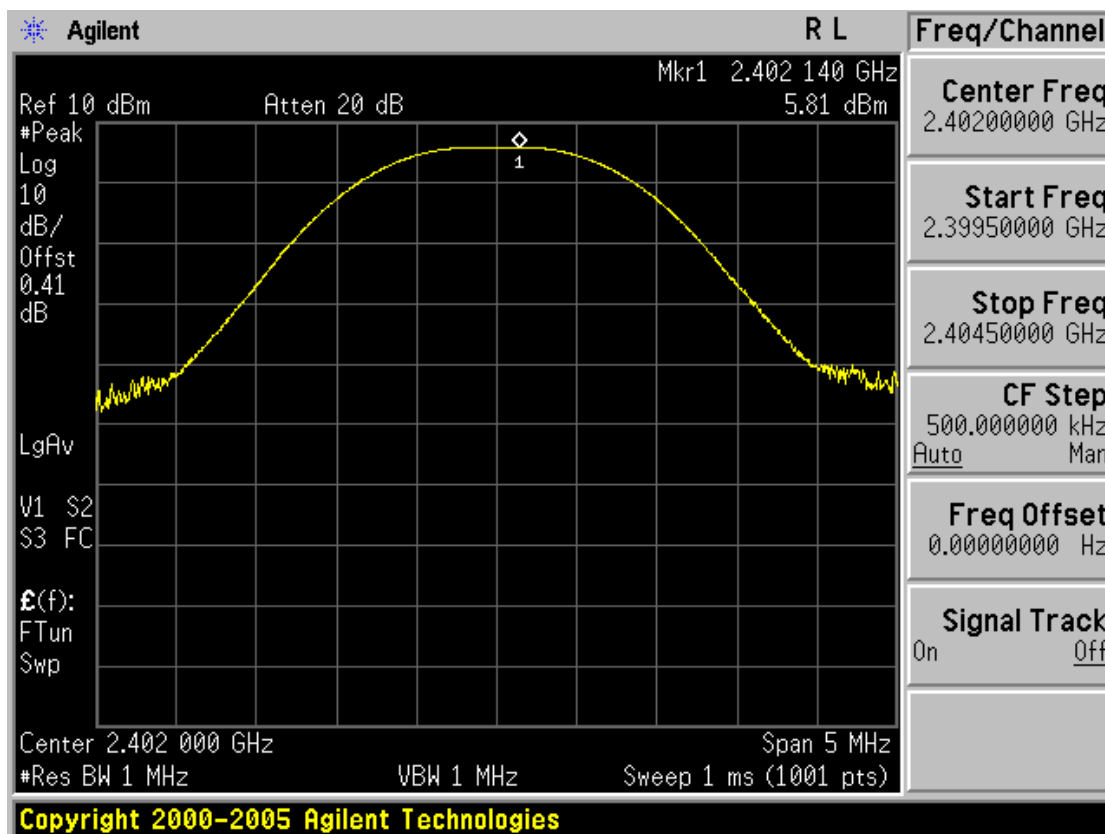
- See next pages for actual measured spectrum plots.

|                          |                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Minimum Standard:</b> | For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: <b>1 Watt</b> . For all other frequency hopping systems in the 2400-2483.5 MHz band: <b>0.125 Watts</b> |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

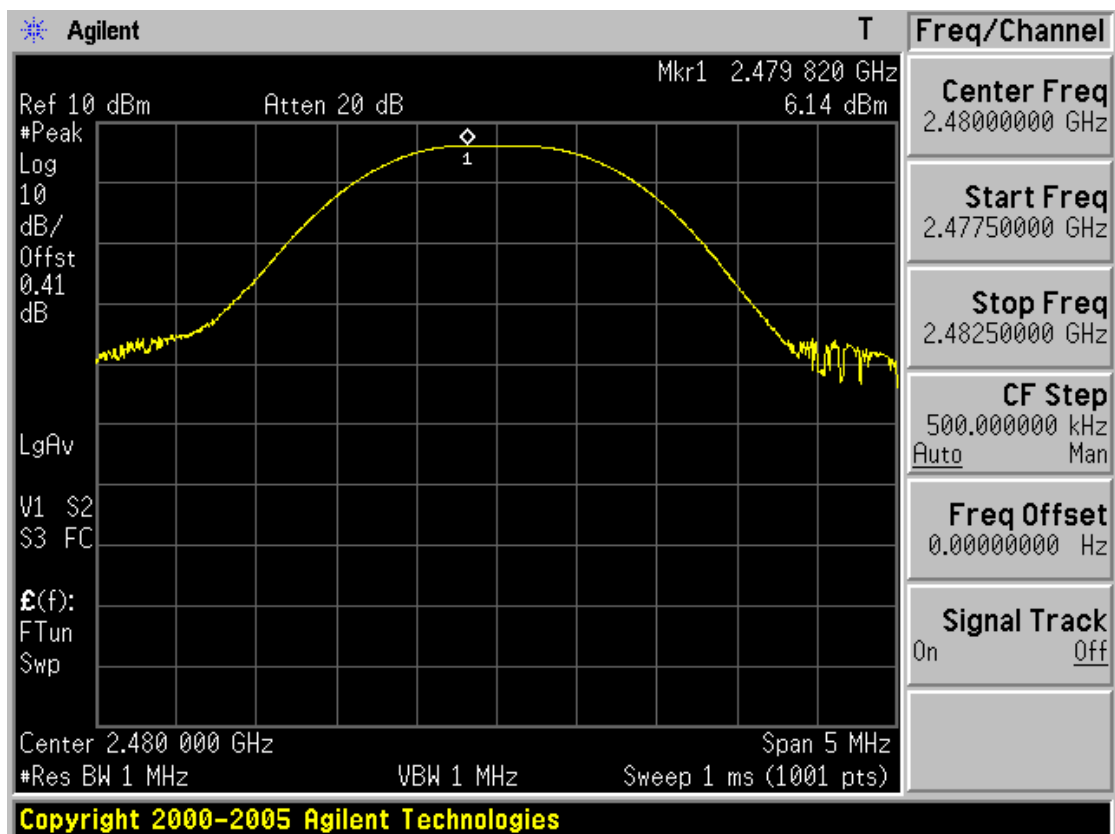
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

# Peak Output Power



# Peak Output Power



### 3.2.6 Conducted Spurious Emissions

**Procedure:**

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 100 kHz

Detector function = peak

Trace = max hold

Sweep = auto

**Measurement Data: Comply**

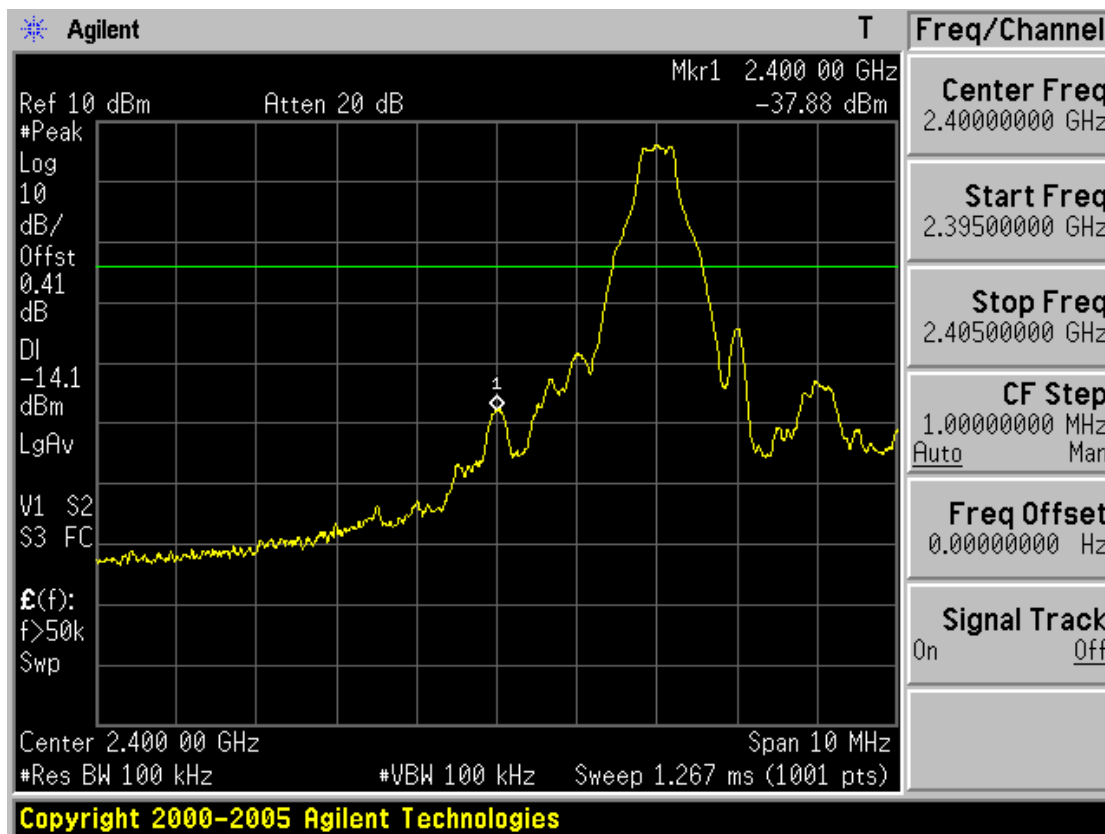
- See next pages for actual measured spectrum plots.

|                          |          |
|--------------------------|----------|
| <b>Minimum Standard:</b> | > 20 dBc |
|--------------------------|----------|

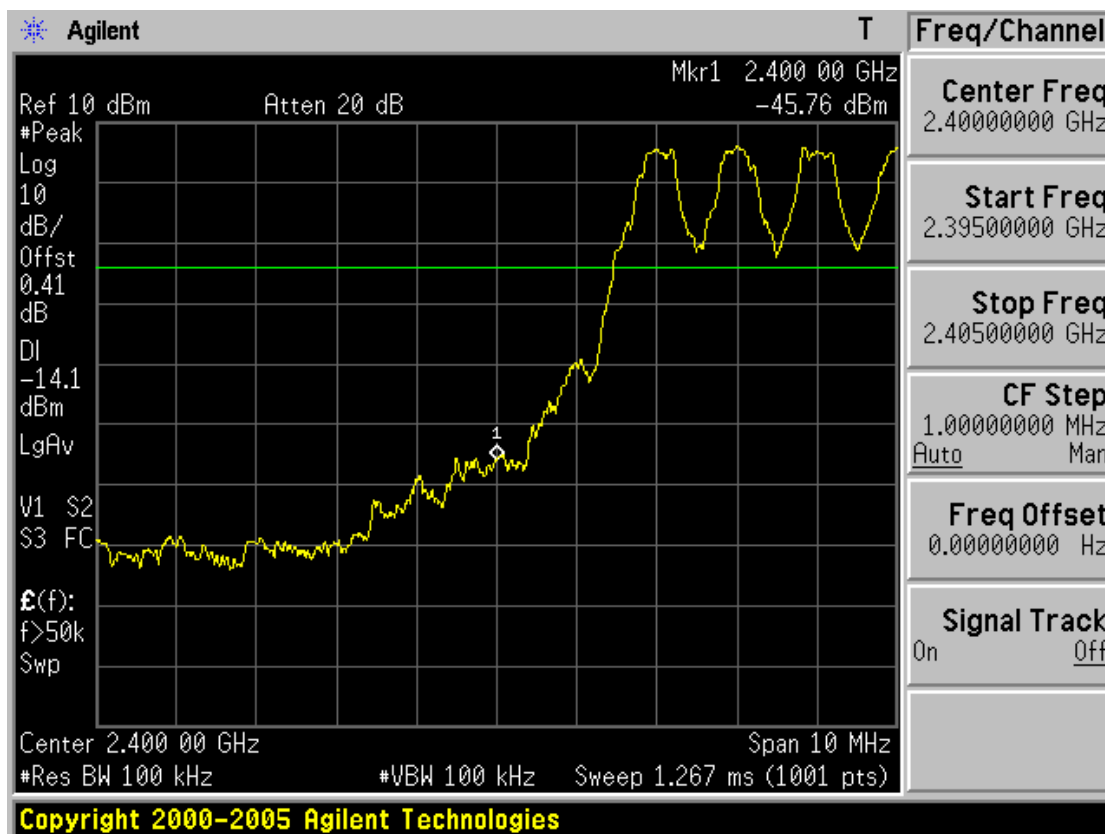
**Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

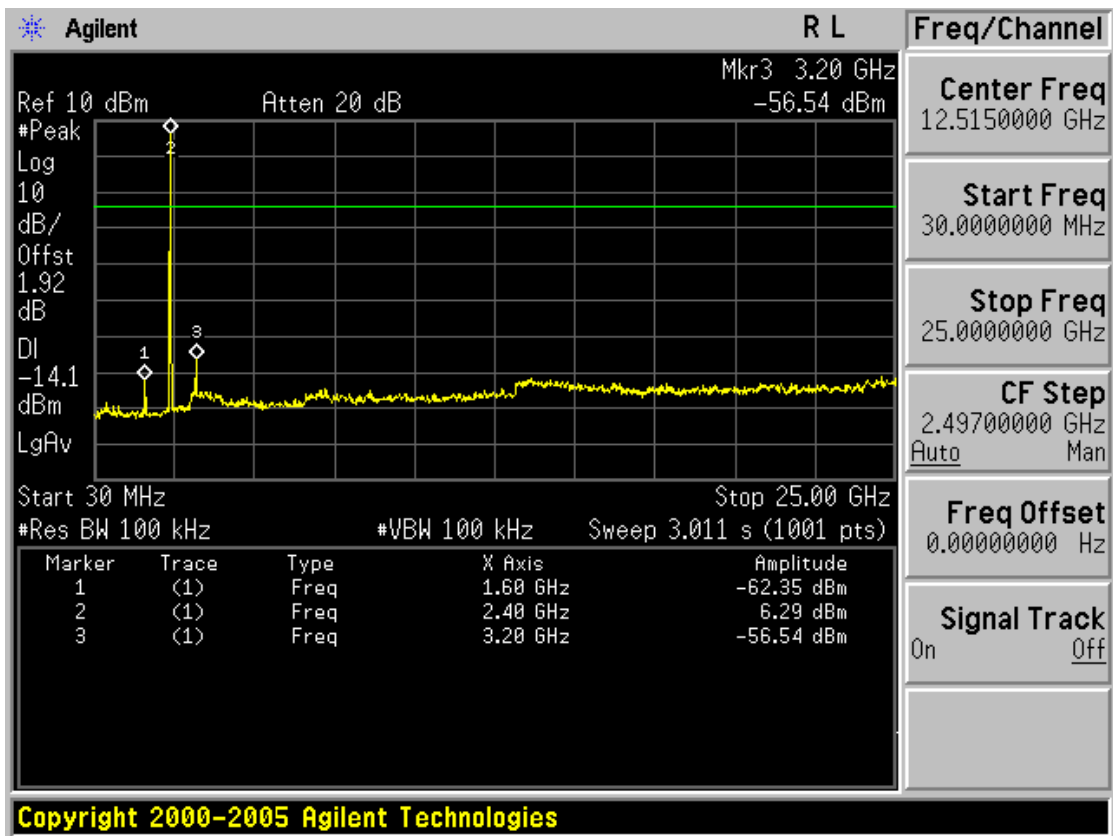
### Low band with hopping disabled



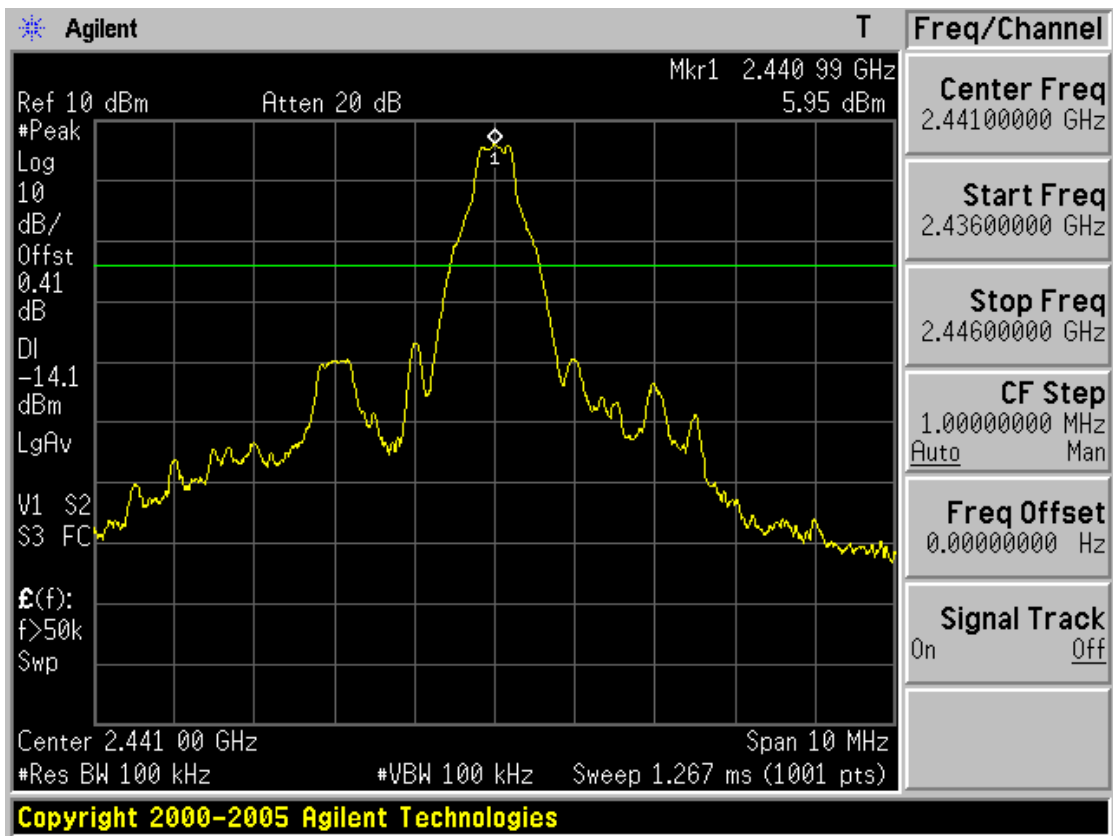
### Low band with hopping enabled



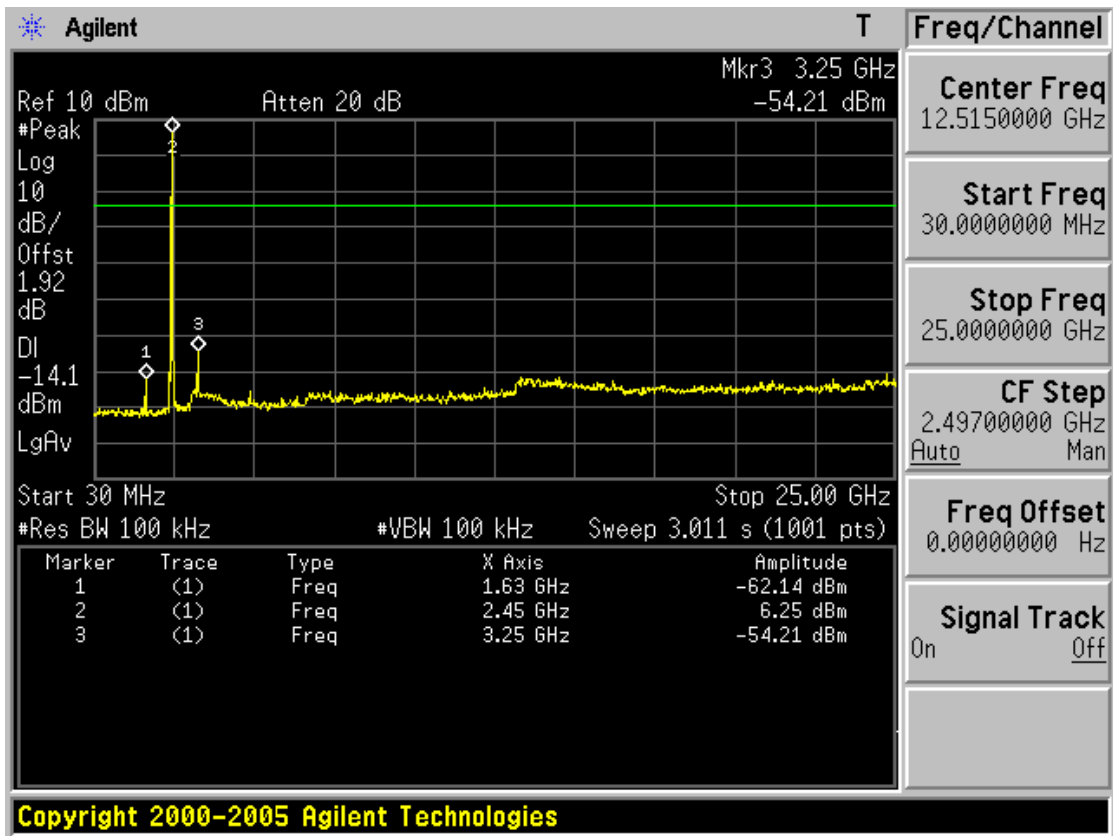
Low channel spurious



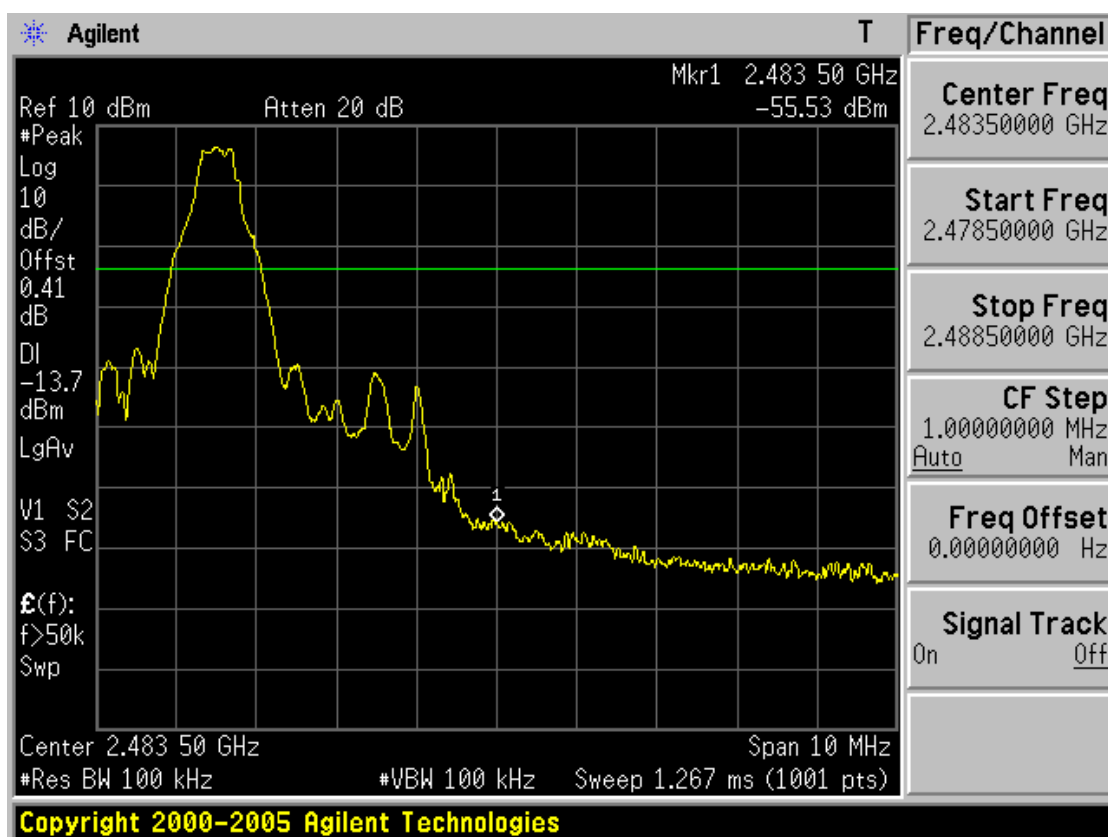
Mid channel ref



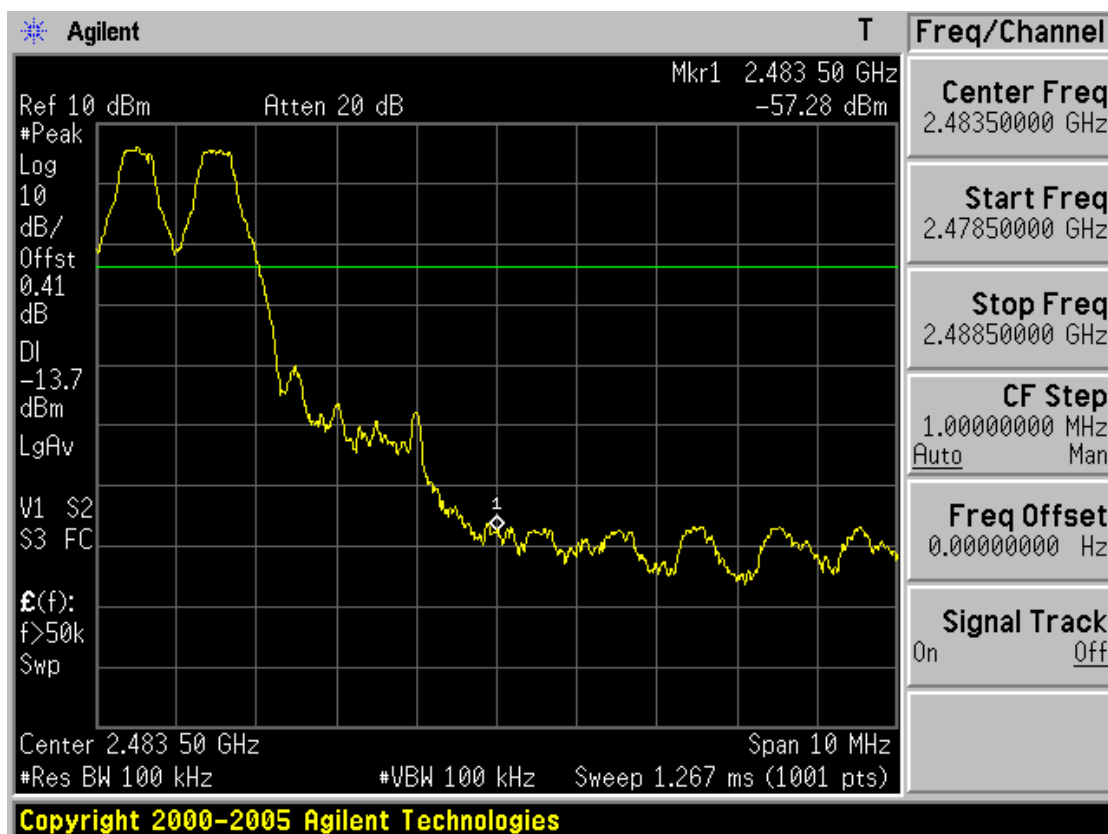
Mid channel spurious



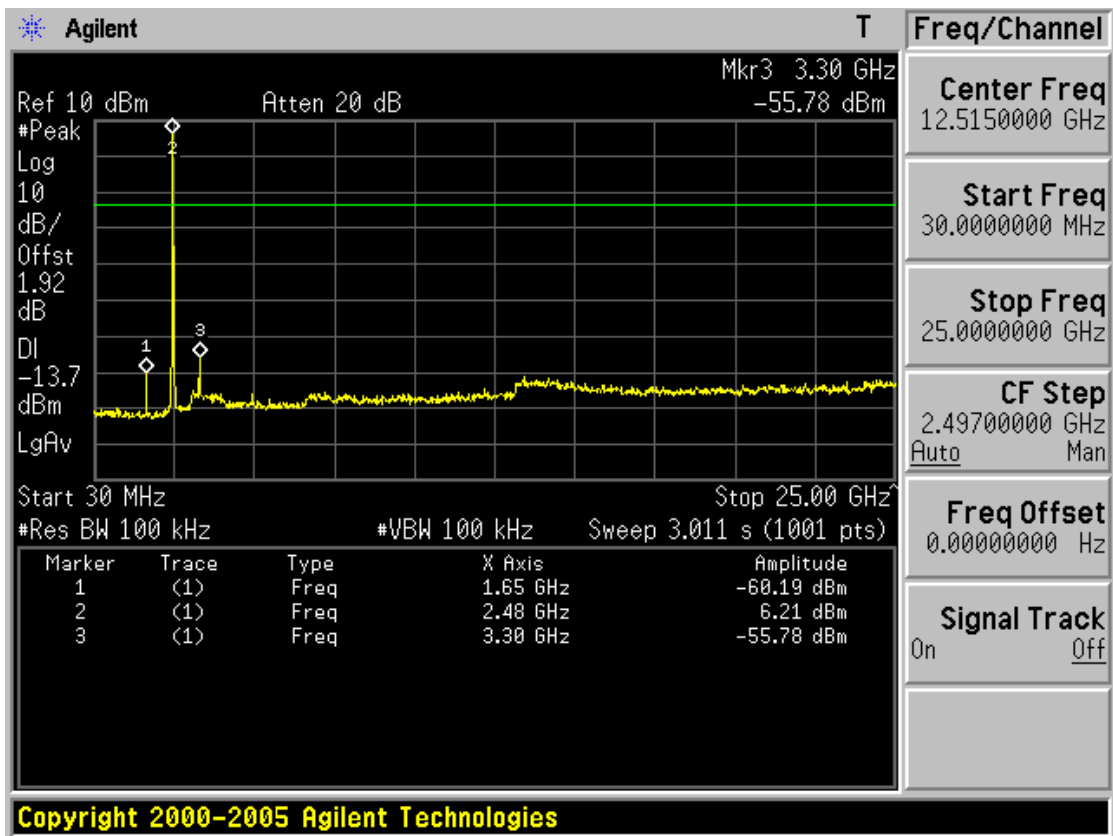
### High band with hopping disabled



### High band with hopping enabled



High channel spurious



### 3.2.7 Radiated Emissions

**Procedure:**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

RBW = 120 kHz ( 30MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic )

Trace = max hold

VBW ≥ RBW (Peak)

VBW = 10Hz (Average)

Sweep = auto

**Measurement Data: Comply**

- Refer to the next page.
- This test items were performed with following 3 configurations.
  1. Only Bluetooth Headset
  2. Bluetooth Headset + Cradle
  3. Bluetooth Headset + Cradle+ Adapter

**Note. : Marker 1's emissions of the low band edge test plots are WIMAX downlink signal in Korea.**

**So it's not an emission from this device.**

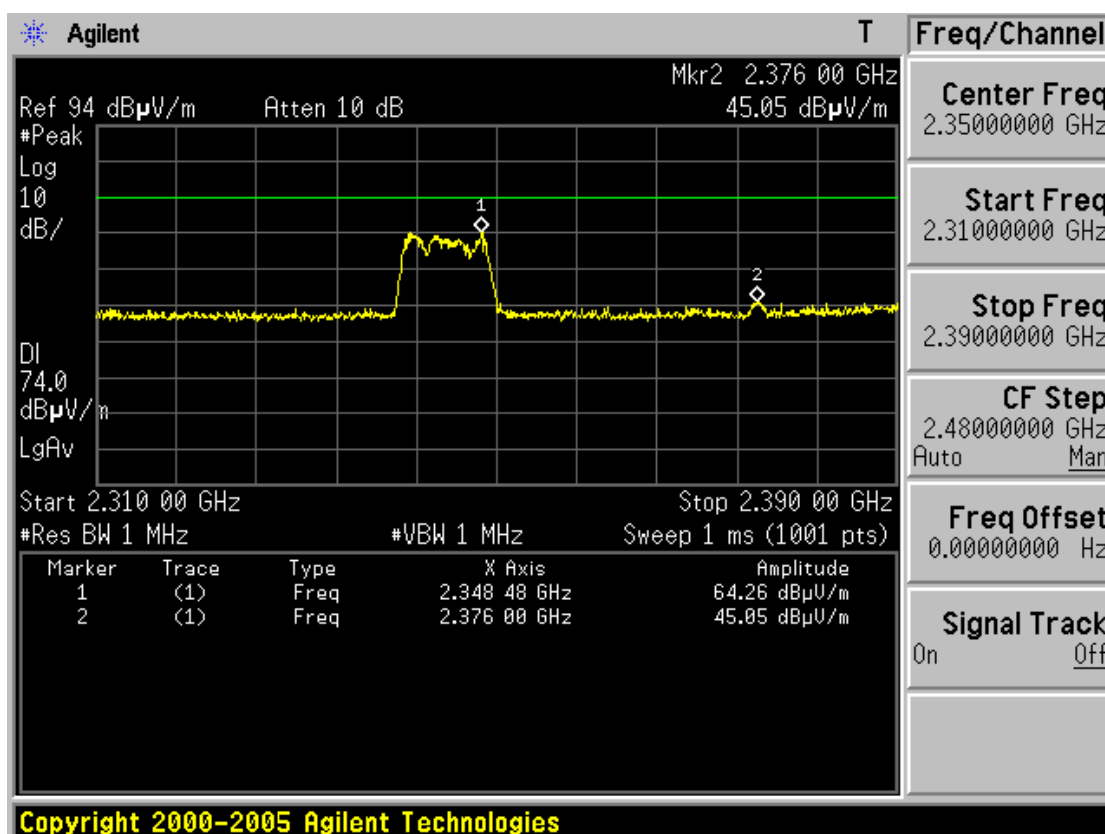
**Minimum Standard: FCC Part 15.205 (a), 15.205(b), 15.209(a) and (b)**

**Limit : FCC P15.209(a)**

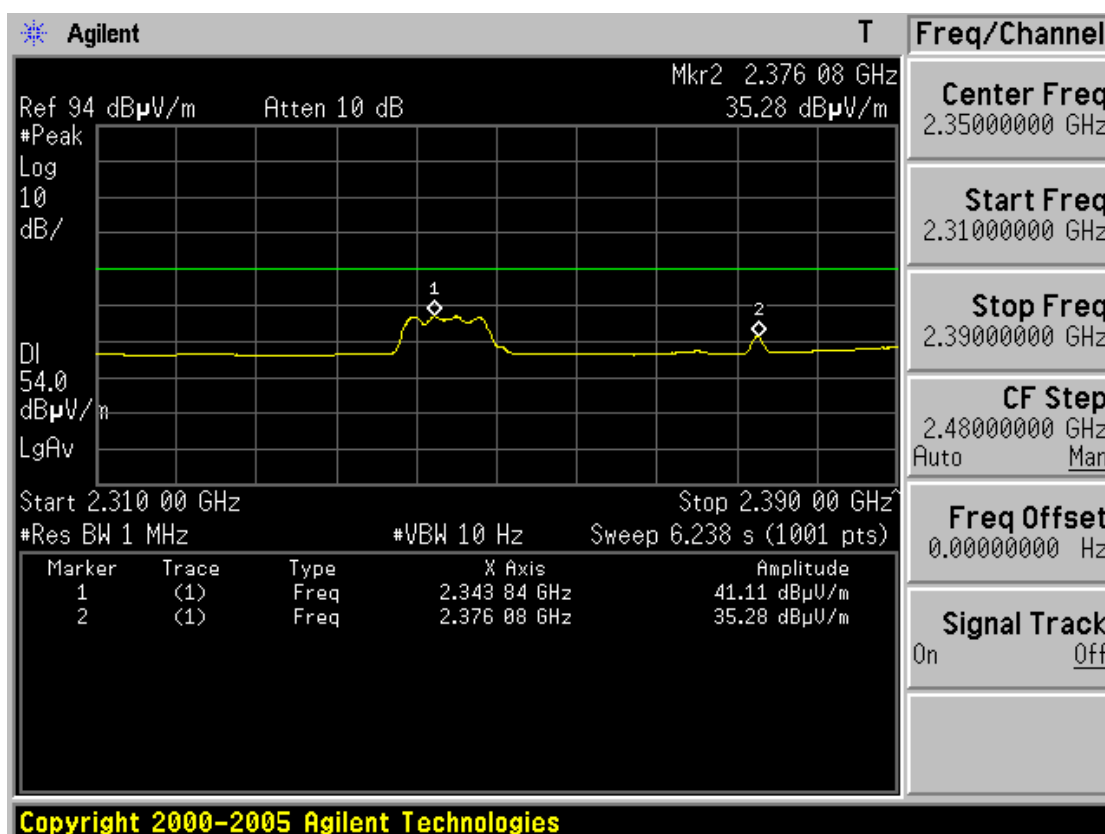
| Frequency (MHz) | Limit (uV/m) @ 3m |
|-----------------|-------------------|
| 30 ~ 88         | 100 **            |
| 88 ~ 216        | 150 **            |
| 216 ~ 960       | 200 **            |
| Above 960       | 500               |

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

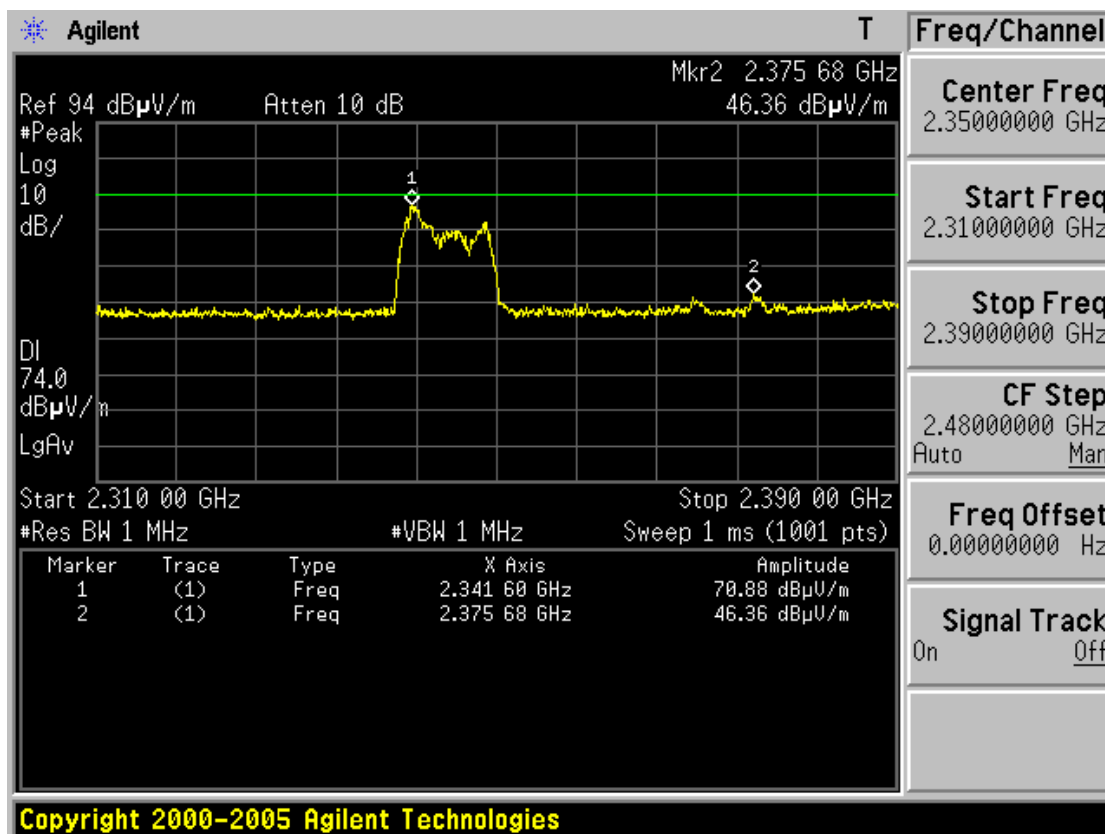
# Restricted Band Edge: Low Channel (Peak, Horizontal) - Headset Mode -



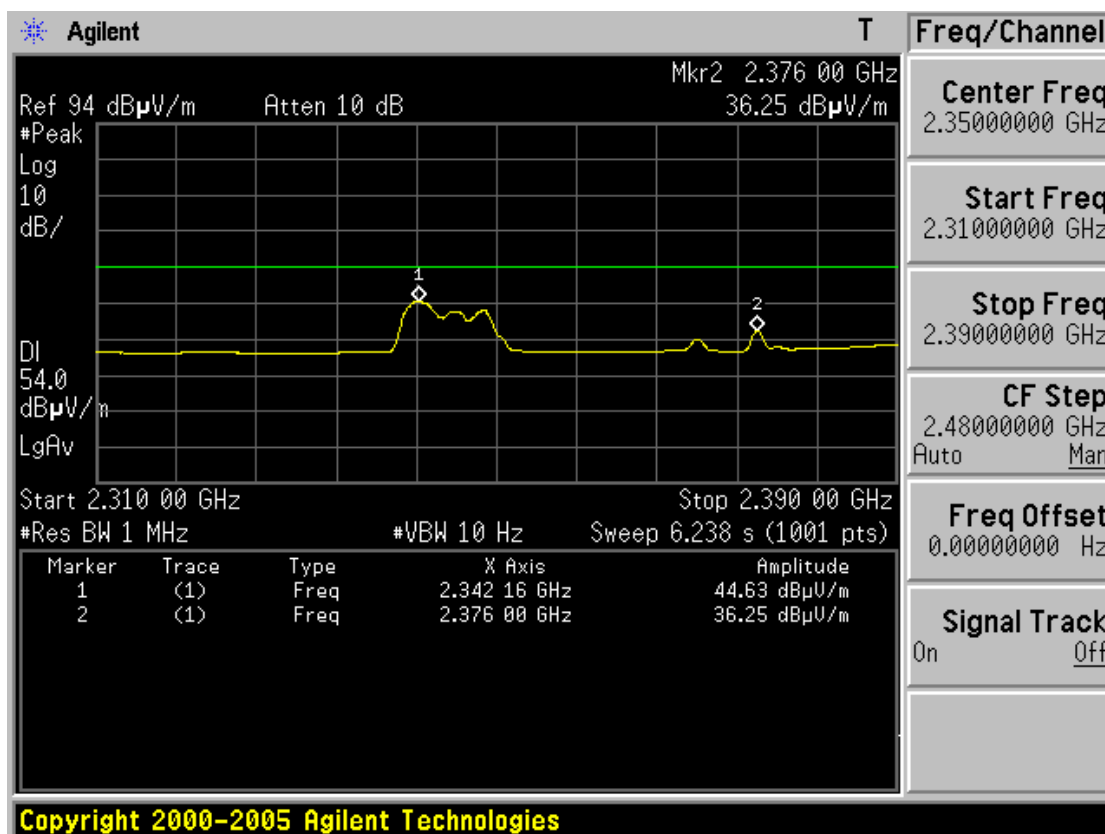
# Restricted Band Edge: Low Channel (Average, Horizontal) - Headset Mode -



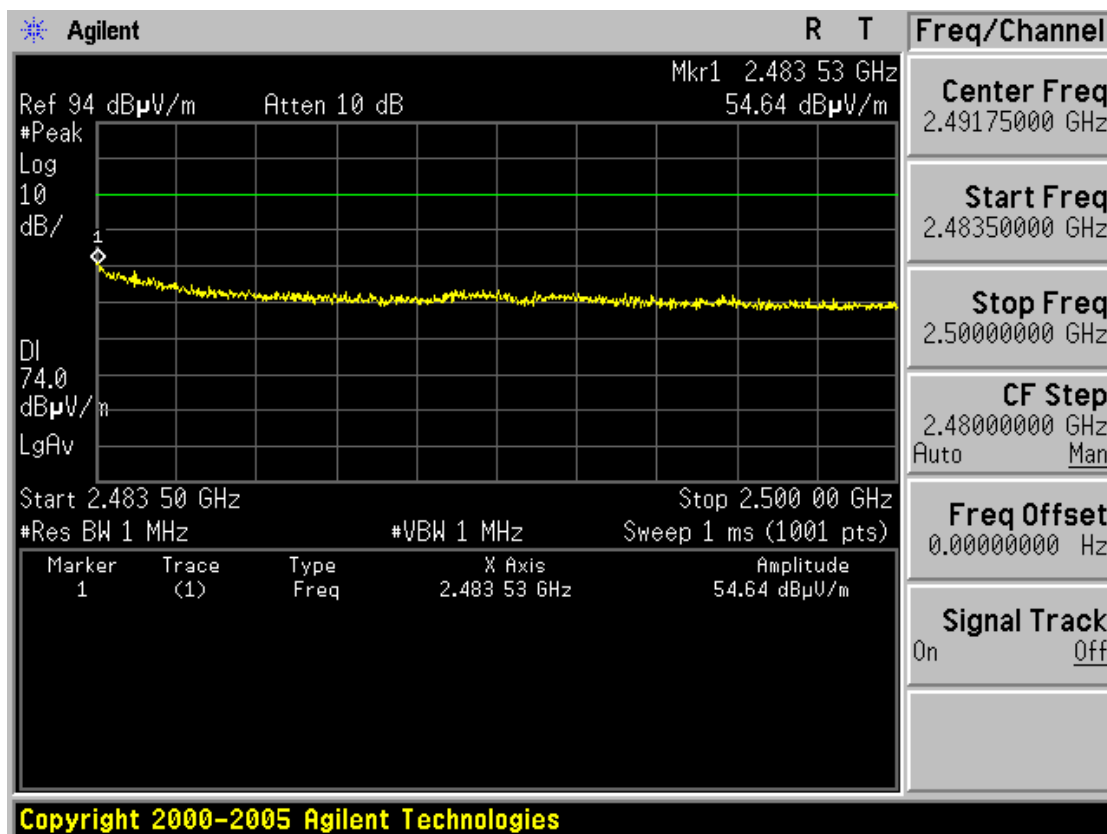
Restricted Band Edge: Low Channel (Peak, Vertical) - Headset Mode -



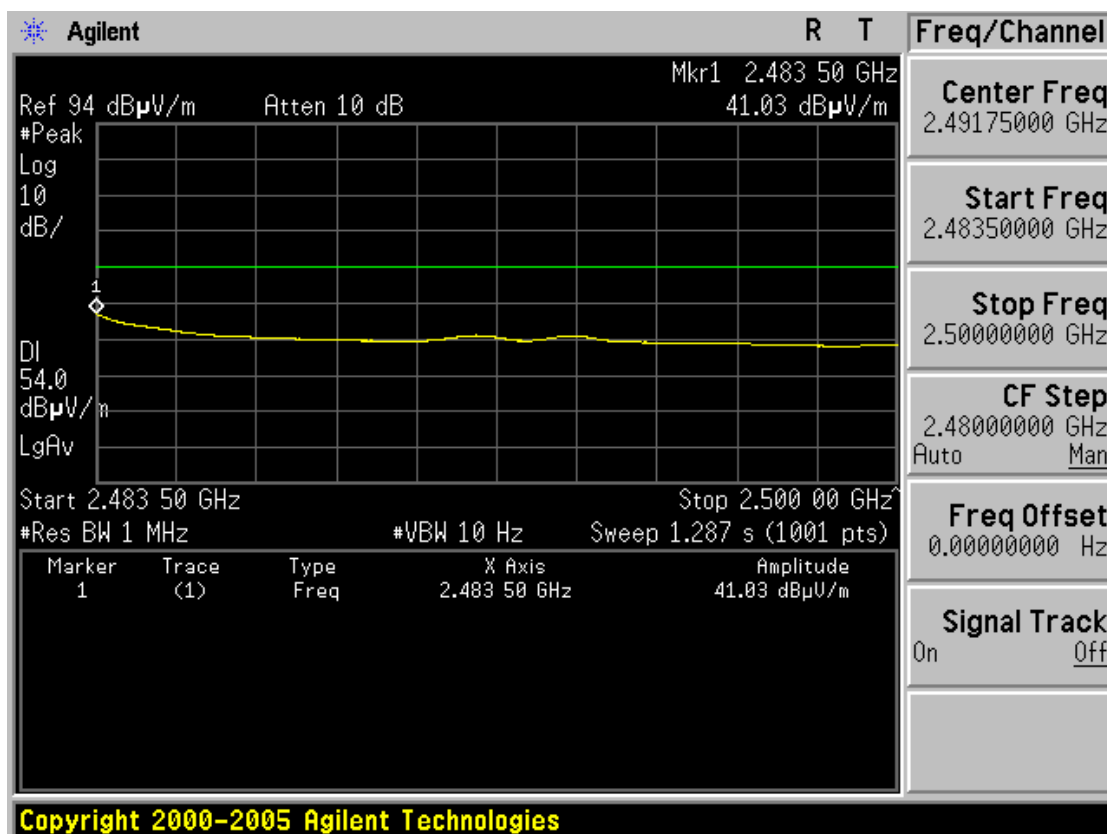
Restricted Band Edge: Low Channel (Average, Vertical) - Headset Mode -



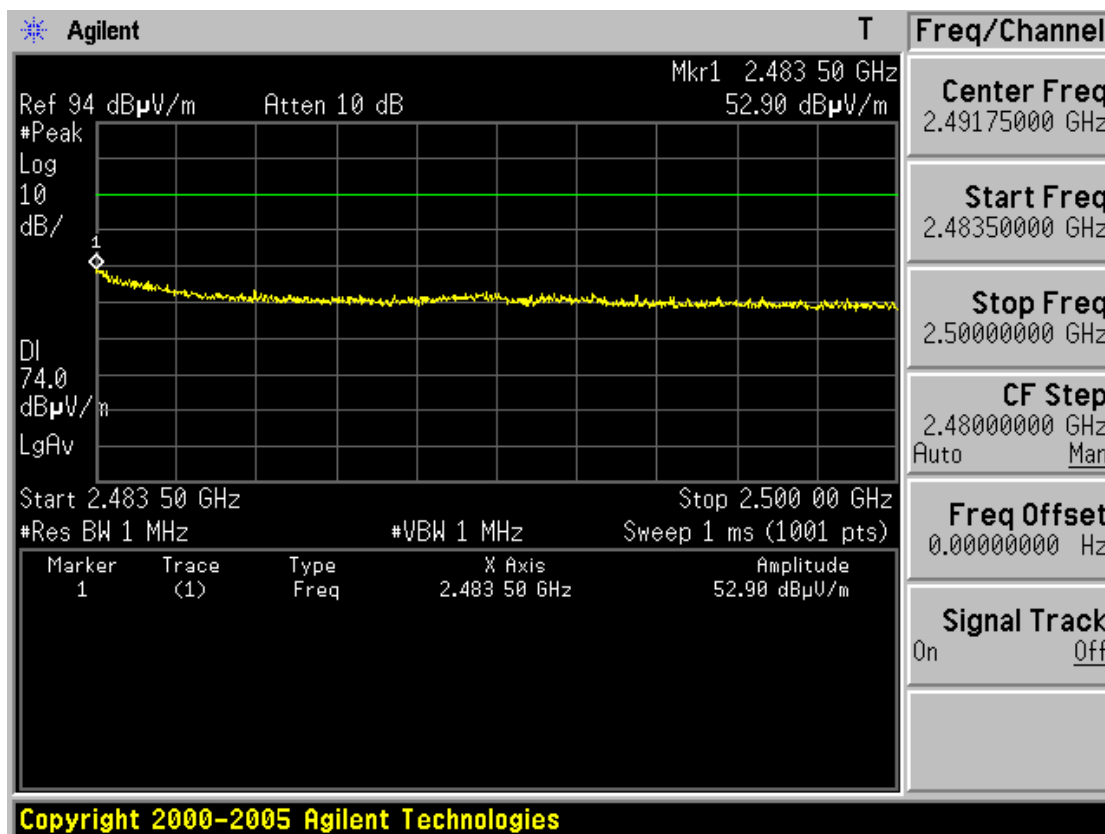
**Restricted Band Edge: High Channel (Peak, Horizontal) - Headset Mode -**



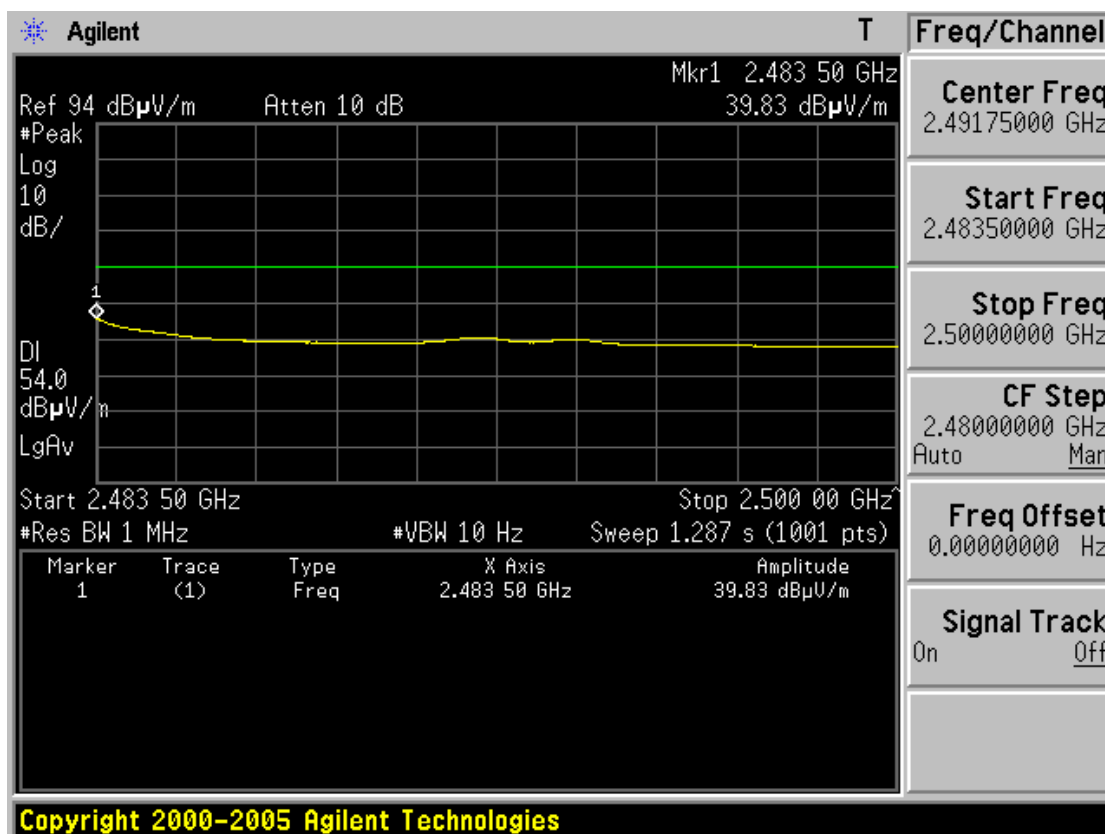
**Restricted Band Edge: High Channel (Average, Horizontal) - Headset Mode -**



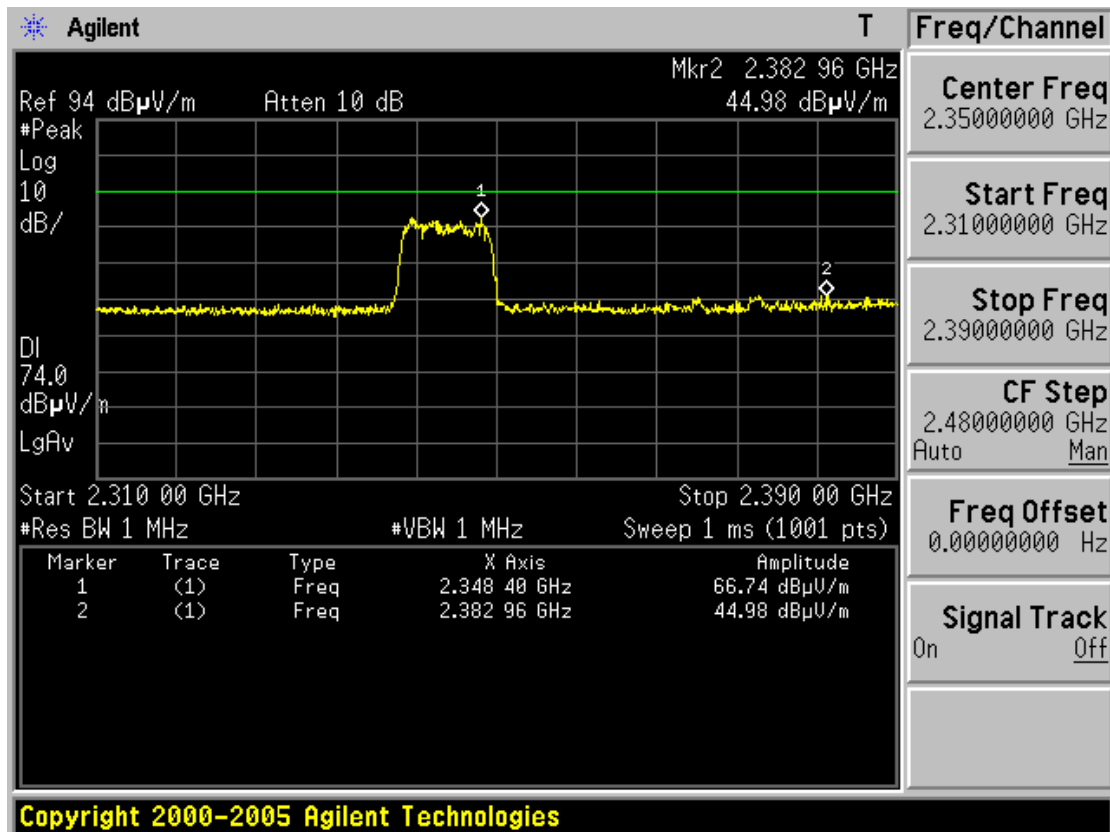
Restricted Band Edge: High Channel (Peak, Vertical) - Headset Mode -



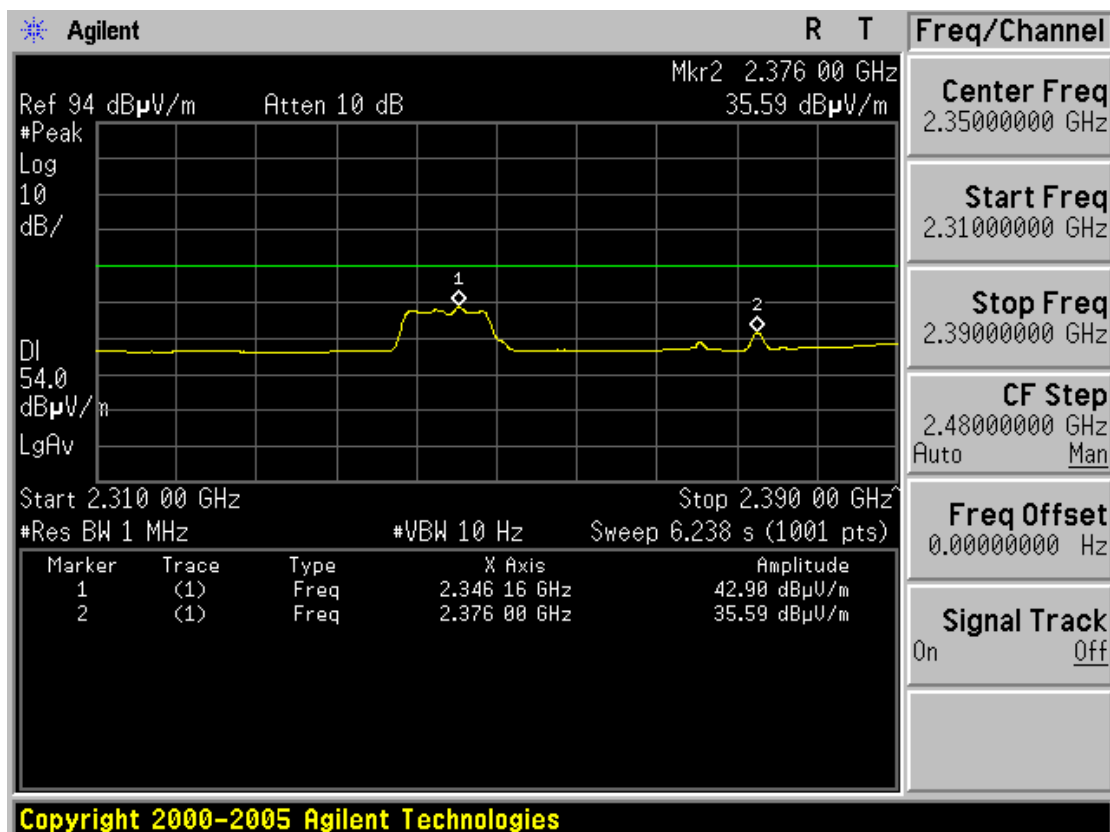
Restricted Band Edge: High Channel (Average, Vertical) - Headset Mode -



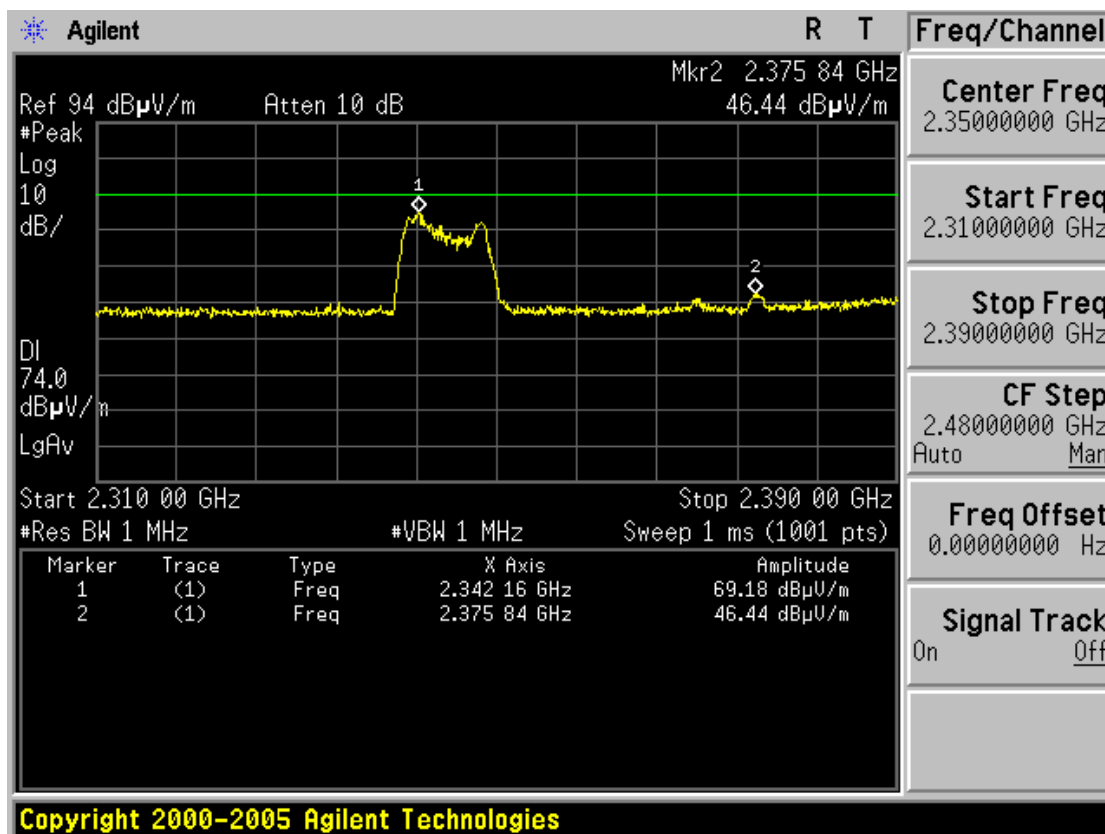
**Restricted Band Edge: Low Channel (Peak, Horizontal) - Headset+Cradle Mode -**



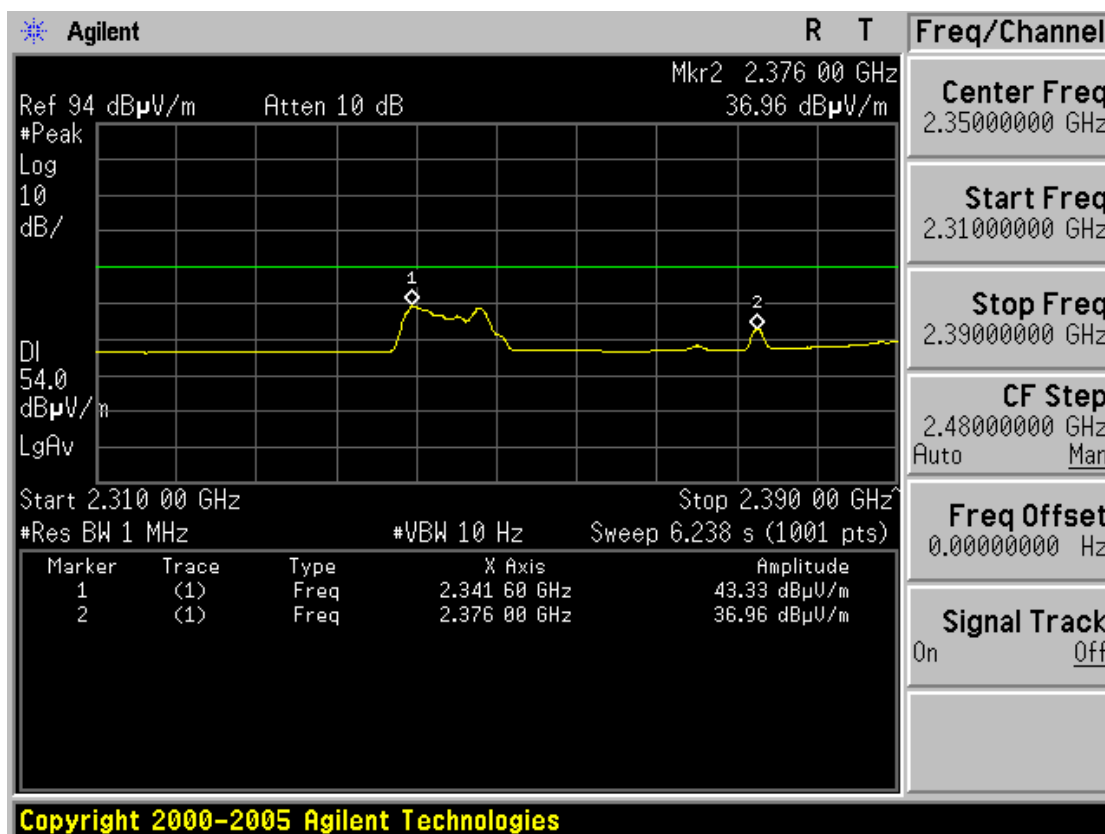
**Restricted Band Edge: Low Channel (Average, Horizontal) - Headset+Cradle Mode -**



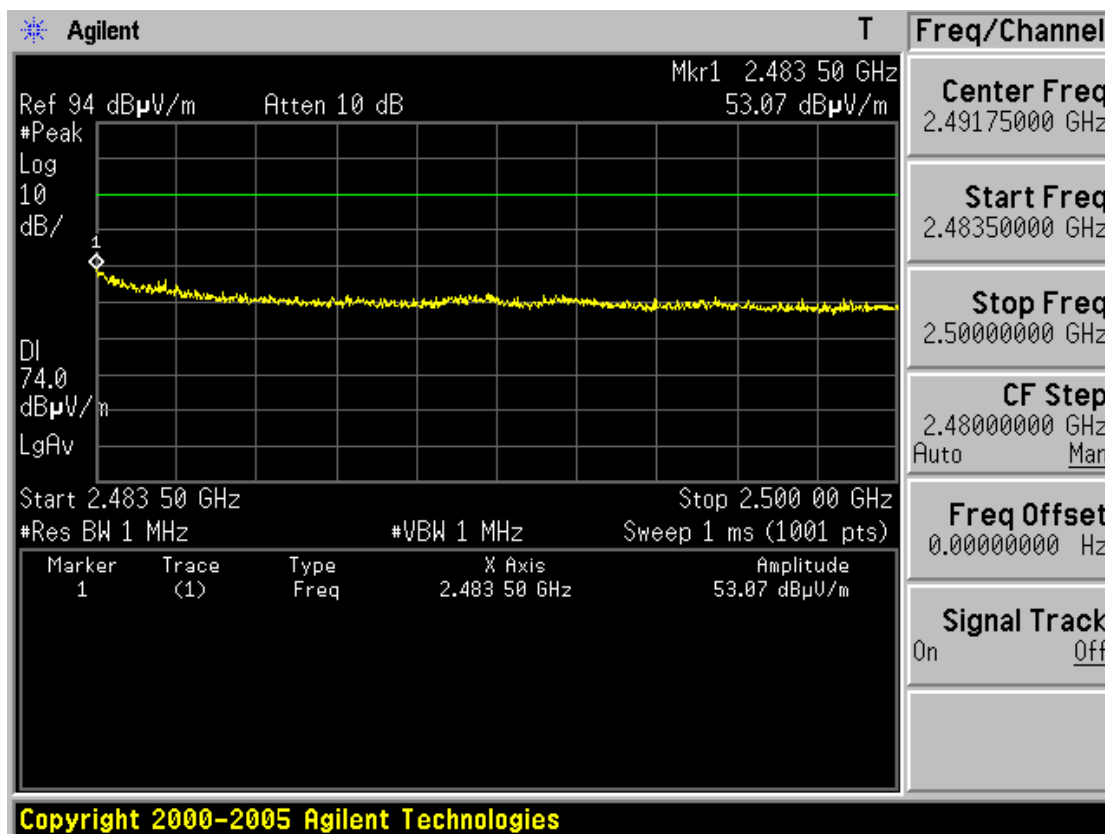
**Restricted Band Edge: Low Channel (Peak, Vertical) - Headset+Cradle Mode -**



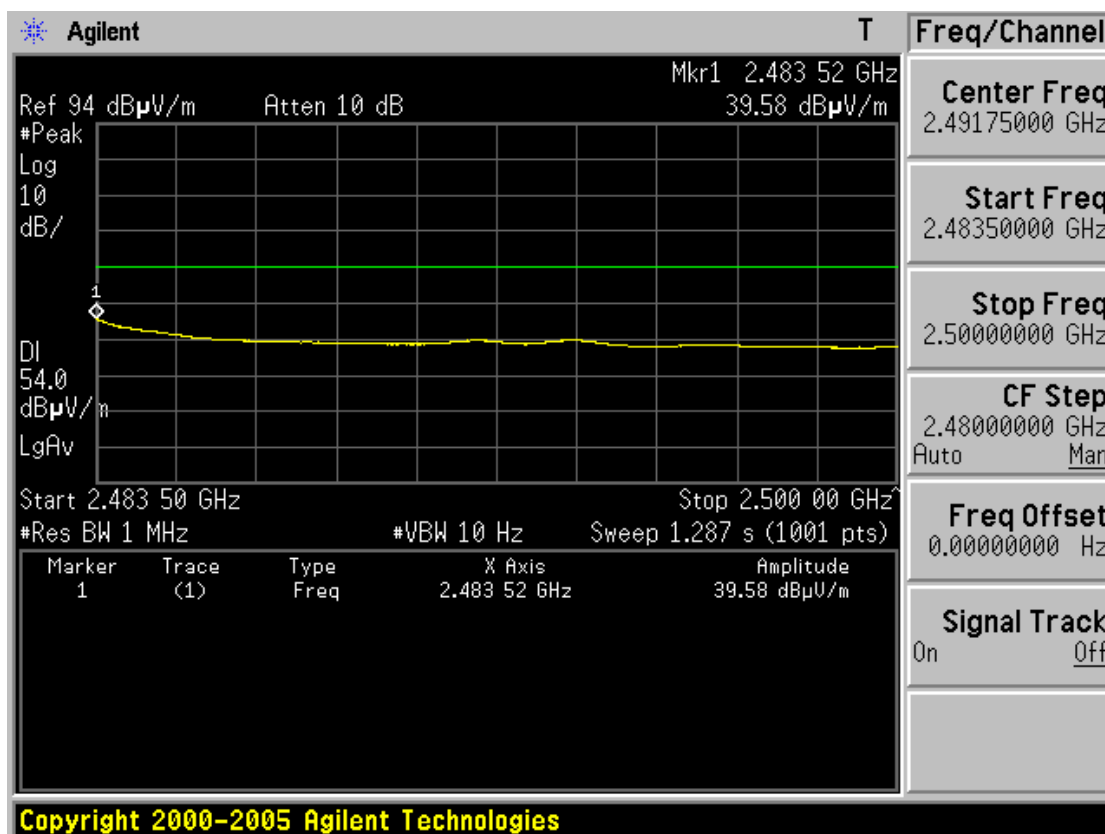
**Restricted Band Edge: Low Channel (Average, Vertical) - Headset+Cradle Mode -**



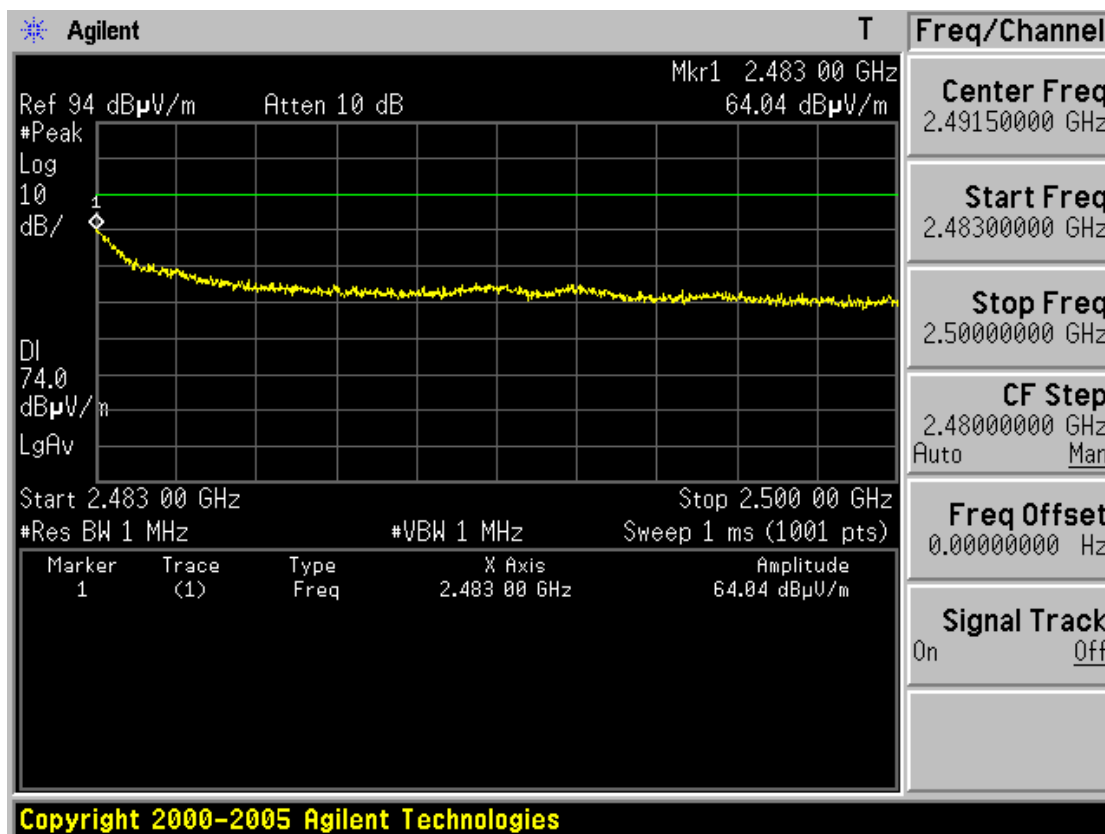
**Restricted Band Edge: High Channel (Peak, Horizontal) - Headset+Cradle Mode -**



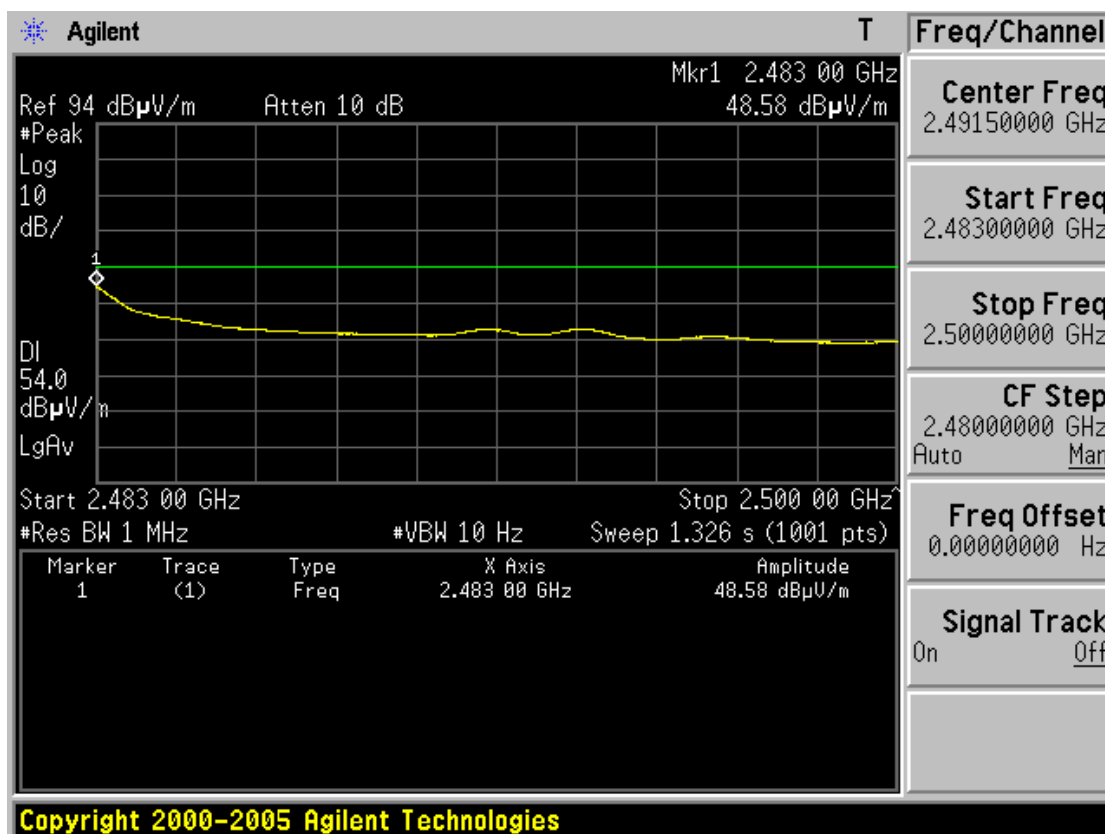
**Restricted Band Edge: High Channel (Average, Horizontal) - Headset+Cradle Mode -**



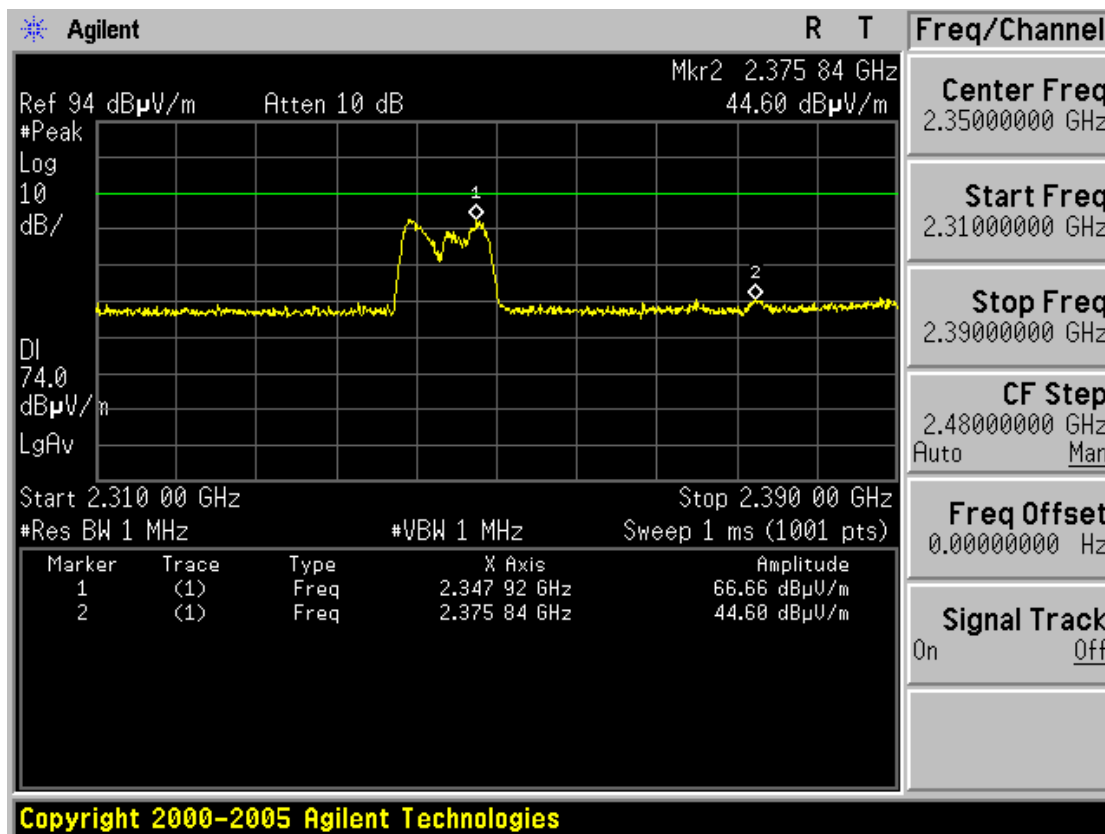
**Restricted Band Edge: High Channel (Peak, Vertical) - Headset+Cradle Mode -**



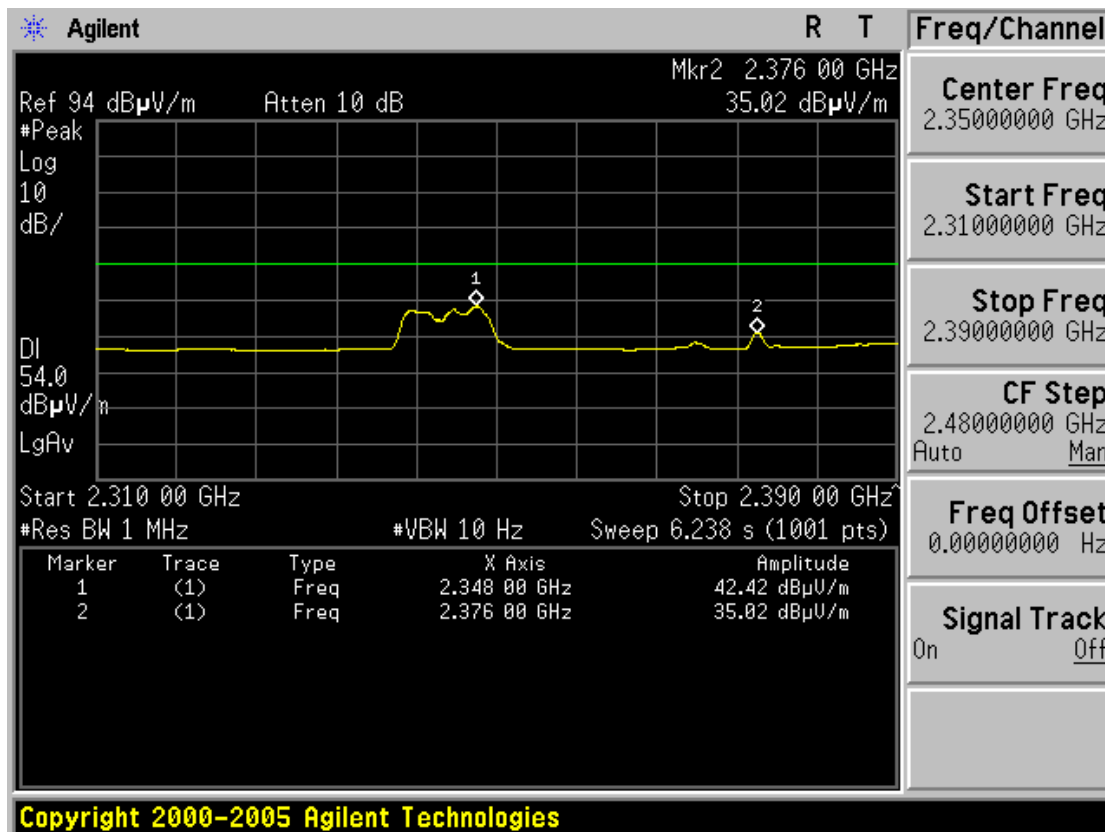
**Restricted Band Edge: High Channel (Average, Vertical) - Headset+Cradle Mode -**



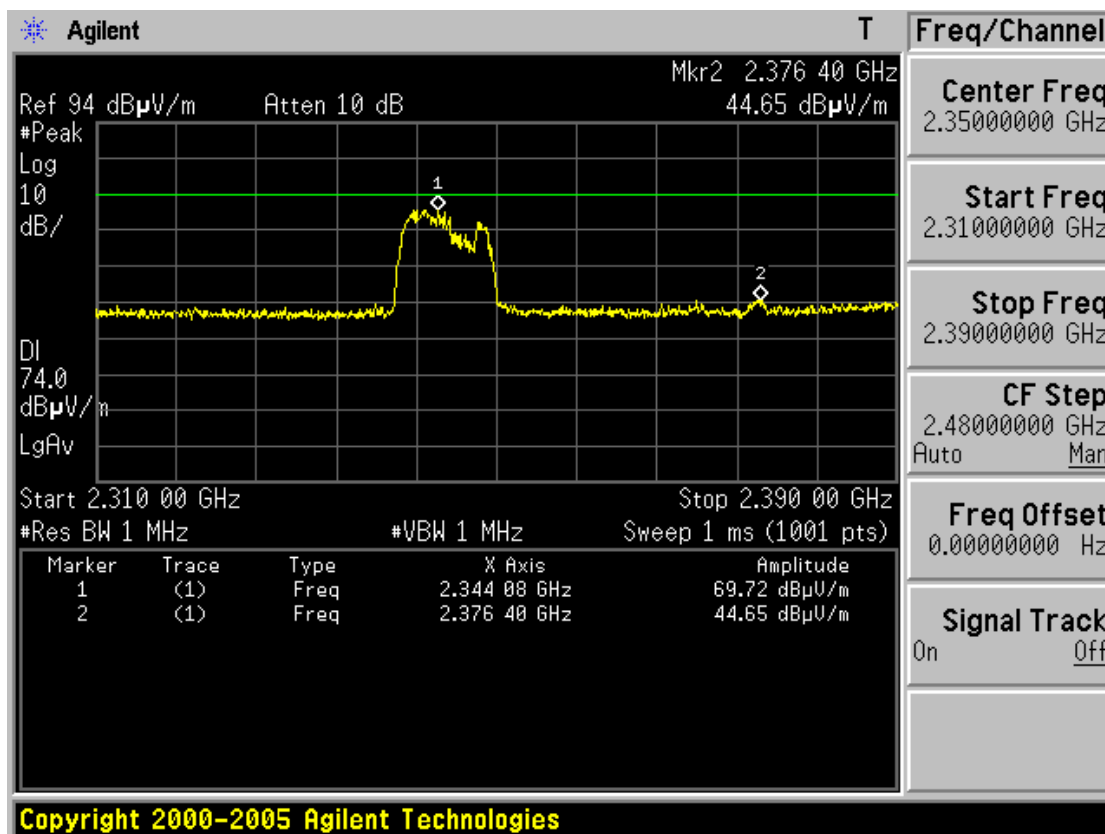
**Restricted Band Edge: Low Channel (Peak, Horizontal) - Headset+Cradle+Adapter Mode -**



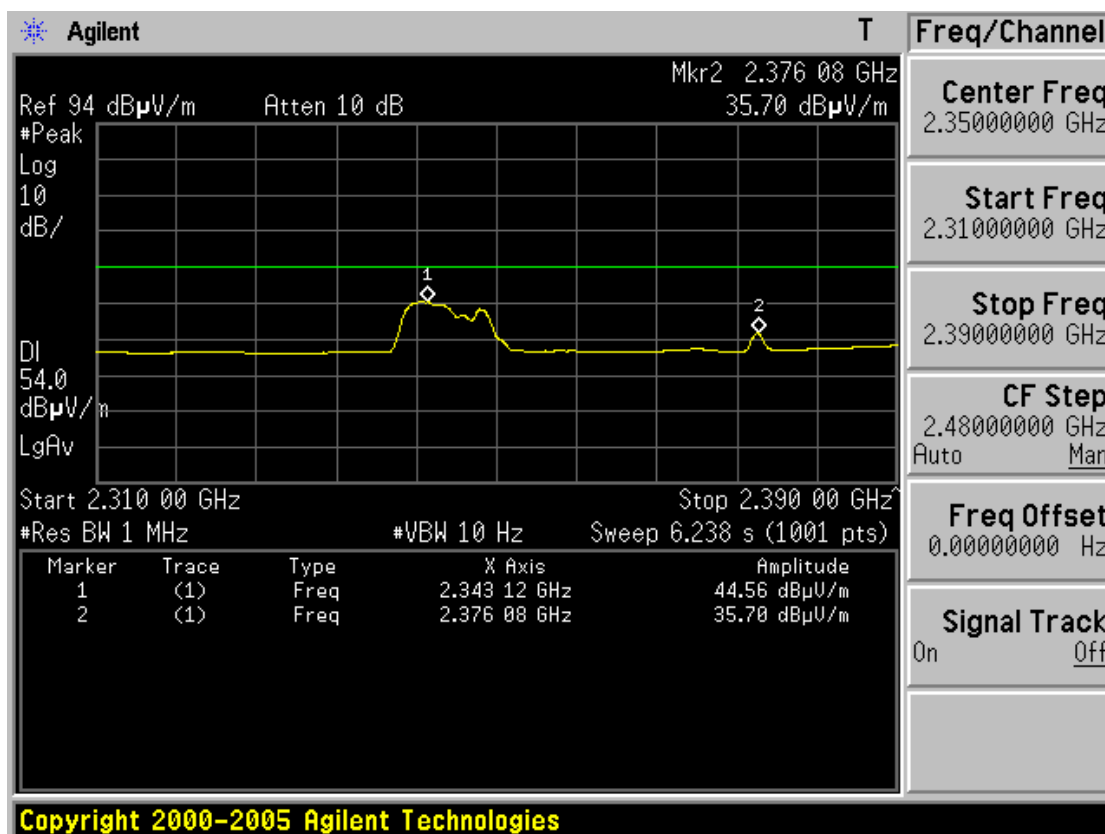
**Restricted Band Edge: Low Channel (Average, Horizontal) - Headset+Cradle+Adapter Mode -**



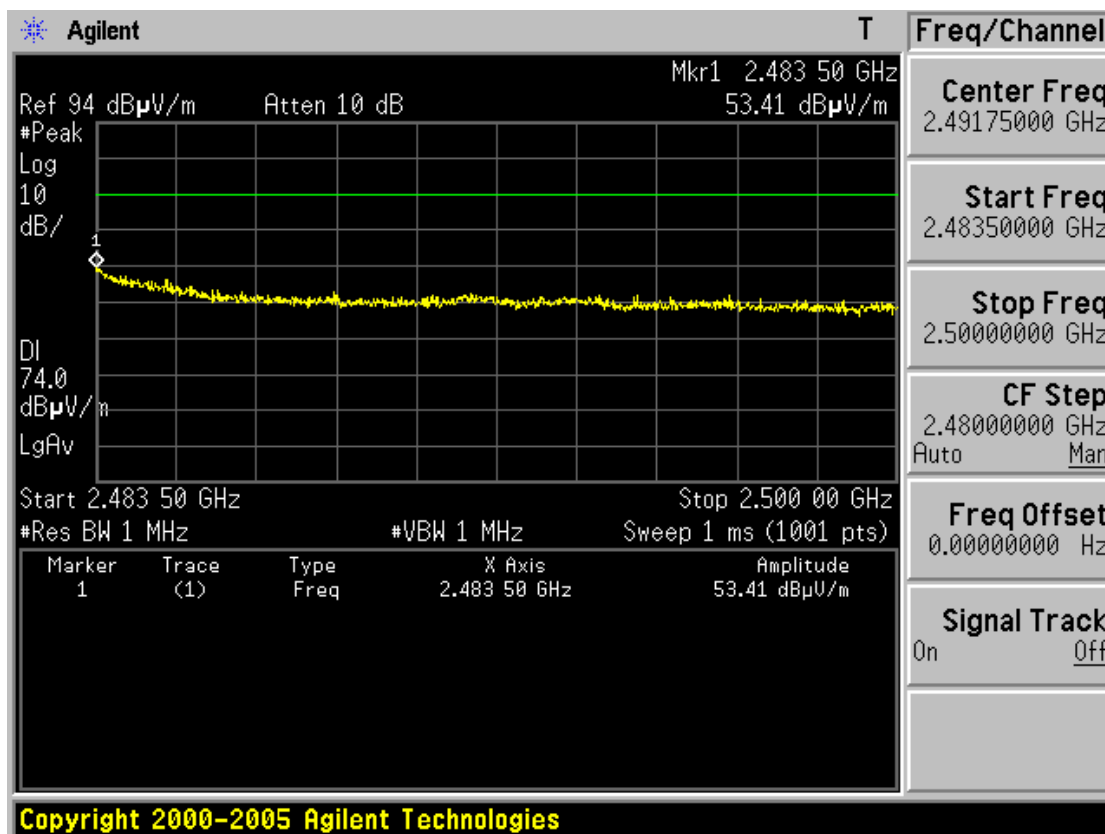
Restricted Band Edge: Low Channel (Peak, Vertical) - Headset+Cradle+Adapter Mode -



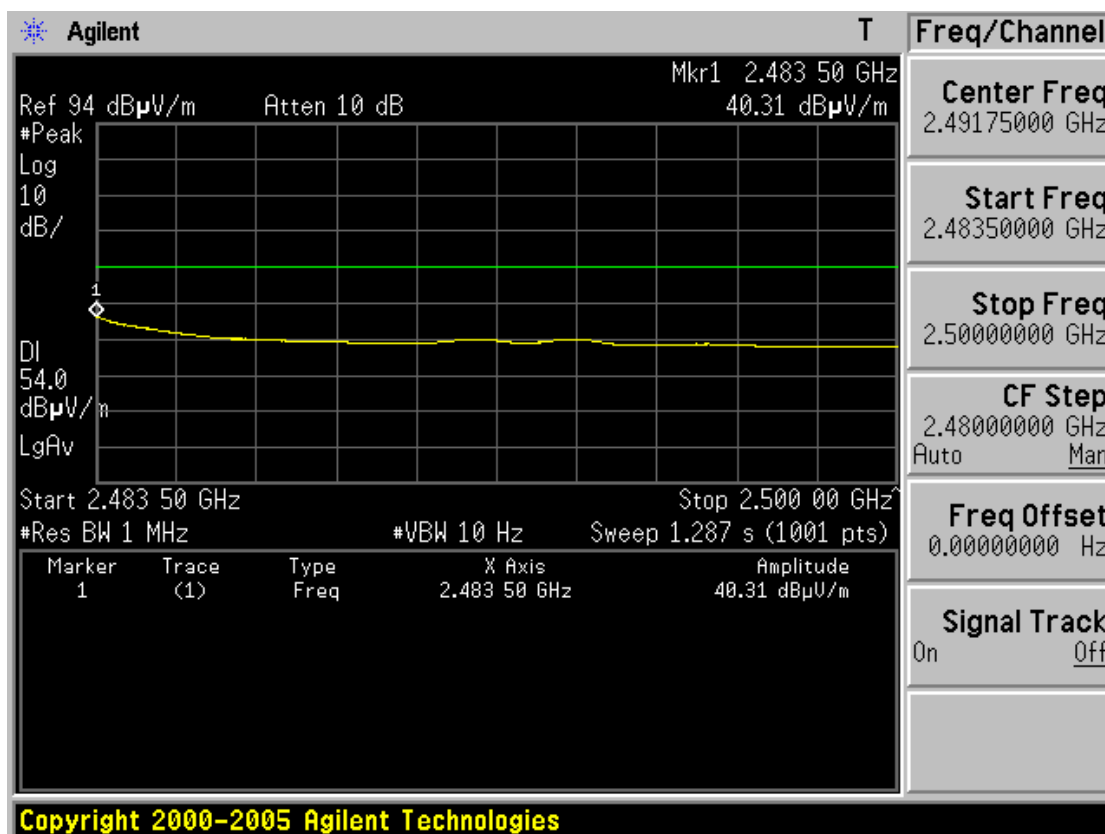
Restricted Band Edge: Low Channel (Average, Vertical) - Headset+Cradle+Adapter Mode -



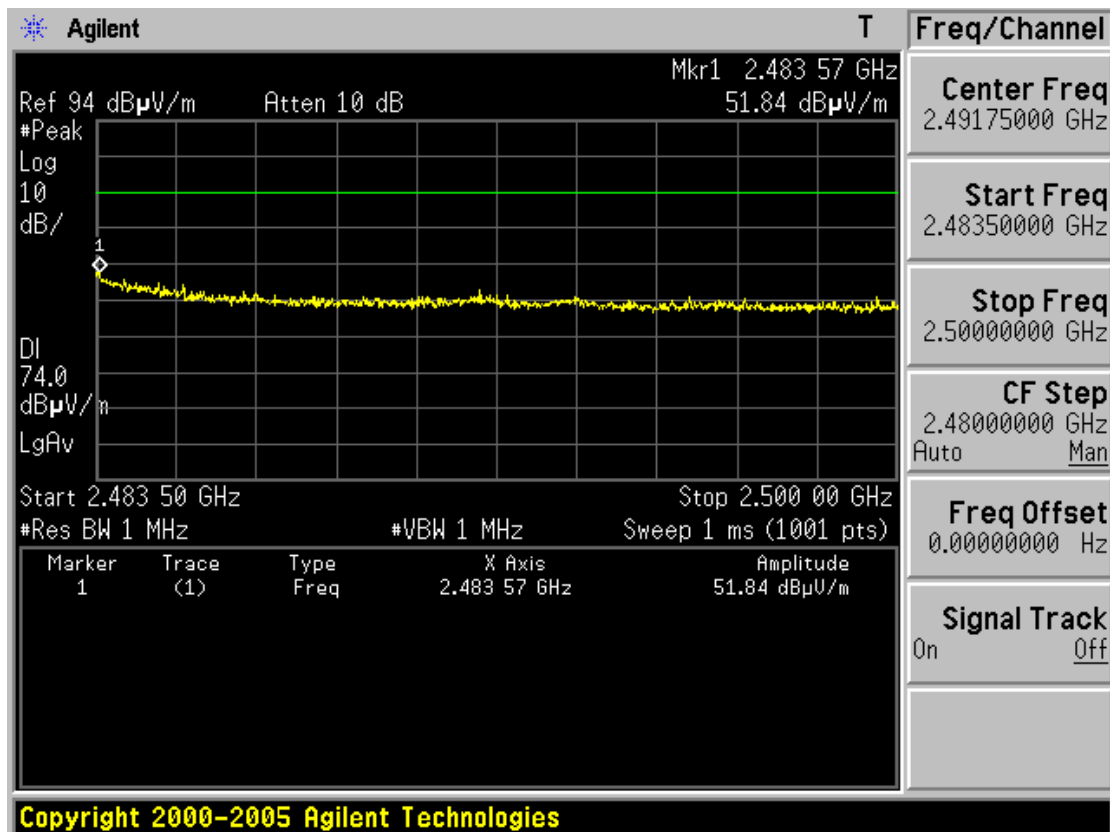
**Restricted Band Edge: High Channel (Peak, Horizontal) - Headset+Cradle+Adapter Mode -**



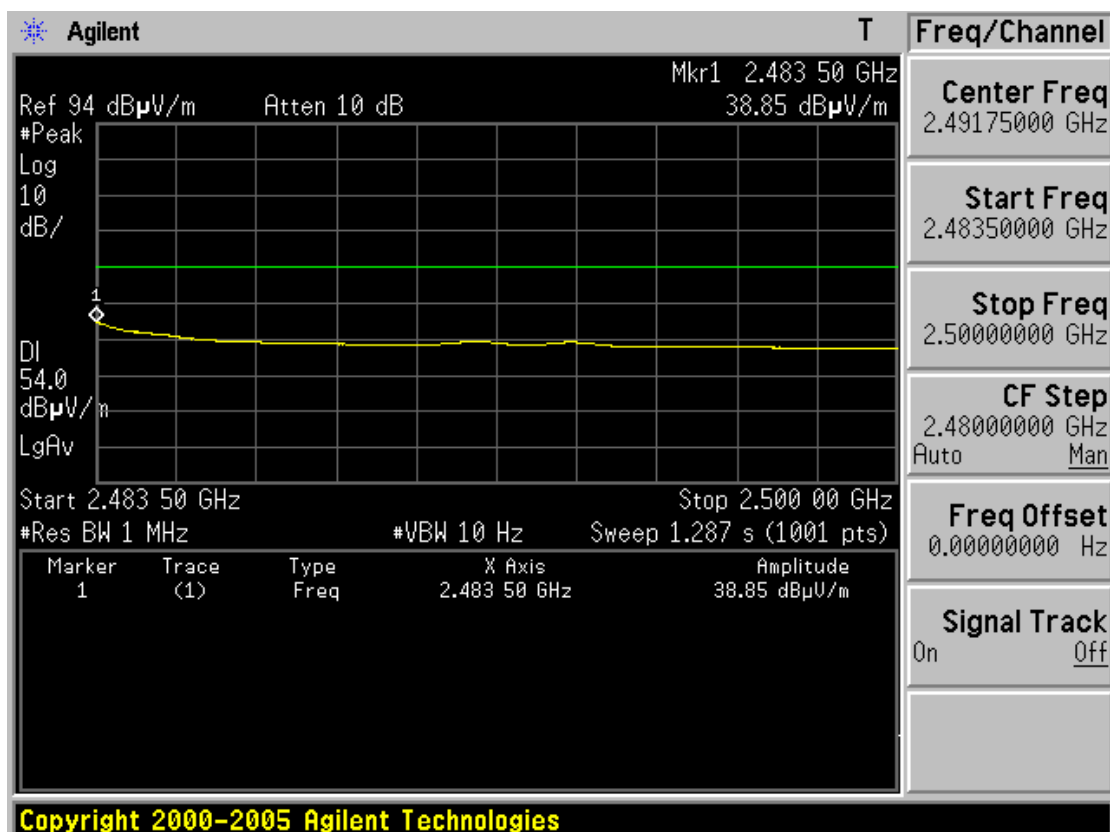
**Restricted Band Edge: High Channel (Average, Horizontal) - Headset+Cradle+Adapter Mode -**



**Restricted Band Edge: High Channel (Peak, Vertical) - Headset+Cradle+Adapter Mode -**



**Restricted Band Edge: High Channel (Average, Vertical) - Headset+Cradle+Adapter Mode -**



## Headset Mode

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2402MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4804            | Hor     | -             | 59.90 | 32.72 | 7.00     | -              | 66.90 | 39.72 | -             | 74.00 | 54.00 | -          | 7.10 | 14.28 |
| 4804            | Ver     | -             | 63.13 | 33.07 | 7.00     | -              | 70.13 | 40.07 | -             | 74.00 | 54.00 | -          | 3.87 | 13.93 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2441MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4882            | Hor     | -             | 60.75 | 31.64 | 7.32     | -              | 68.07 | 38.96 | -             | 74.00 | 54.00 | -          | 5.93 | 15.04 |
| 4882            | Ver     | -             | 64.71 | 34.09 | 7.32     | -              | 72.03 | 41.41 | -             | 74.00 | 54.00 | -          | 1.97 | 12.59 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2480MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4960            | Hor     | -             | 60.23 | 33.74 | 7.73     | -              | 67.96 | 41.47 | -             | 74.00 | 54.00 | -          | 6.04 | 12.53 |
| 4960            | Ver     | -             | 63.13 | 38.83 | 7.73     | -              | 70.86 | 46.56 | -             | 74.00 | 54.00 | -          | 3.14 | 7.44  |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

### Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. If peak result meet AV limit, AV measurement is omitted.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

## Headset+Cradle Mode

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2402MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4804            | Hor     | -             | 61.63 | 31.91 | 7.00     | -              | 68.63 | 38.91 | -             | 74.00 | 54.00 | -          | 5.37 | 15.09 |
| 4804            | Ver     | -             | 62.59 | 32.23 | 7.00     | -              | 69.59 | 39.23 | -             | 74.00 | 54.00 | -          | 4.41 | 14.77 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2441MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4882            | Hor     | -             | 63.31 | 32.23 | 7.32     | -              | 70.63 | 39.55 | -             | 74.00 | 54.00 | -          | 3.37 | 14.45 |
| 4882            | Ver     | -             | 63.84 | 32.86 | 7.32     | -              | 71.16 | 40.18 | -             | 74.00 | 54.00 | -          | 2.84 | 13.82 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2480MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4960            | Hor     | -             | 59.34 | 37.79 | 7.73     | -              | 67.07 | 45.52 | -             | 74.00 | 54.00 | -          | 6.93 | 8.48  |
| 4960            | Ver     | -             | 59.90 | 35.97 | 7.73     | -              | 67.63 | 43.70 | -             | 74.00 | 54.00 | -          | 6.37 | 10.30 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

### Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. If peak result meet AV limit, AV measurement is omitted.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

## Headset+Cradle+Adapter Mode

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2402MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4804            | Hor     | -             | 61.81 | 34.37 | 7.00     | -              | 68.81 | 41.37 | -             | 74.00 | 54.00 | -          | 5.19 | 12.63 |
| 4804            | Ver     | -             | 62.25 | 35.13 | 7.00     | -              | 69.25 | 42.13 | -             | 74.00 | 54.00 | -          | 4.75 | 11.87 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2441MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4882            | Hor     | -             | 62.53 | 35.29 | 7.32     | -              | 69.85 | 42.61 | -             | 74.00 | 54.00 | -          | 4.15 | 11.39 |
| 4882            | Ver     | -             | 64.92 | 37.75 | 7.32     | -              | 72.24 | 45.07 | -             | 74.00 | 54.00 | -          | 1.76 | 8.93  |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

Harmonic and other emissions Measurement Data: Fundamental Frequency = 2480MHz

| Frequency (MHz) | ANT Pol | Reading(dBuV) |       |       | T.F (dB) | Result(dBuV/m) |       |       | Limit(dBuV/m) |       |       | Margin(dB) |      |       |
|-----------------|---------|---------------|-------|-------|----------|----------------|-------|-------|---------------|-------|-------|------------|------|-------|
|                 |         | QP            | PK    | AV    |          | QP             | PK    | AV    | QP            | PK    | AV    | QP         | PK   | AV    |
| 4960            | Hor     | -             | 61.79 | 37.63 | 7.73     | -              | 69.52 | 45.36 | -             | 74.00 | 54.00 | -          | 4.48 | 8.64  |
| 4960            | Ver     | -             | 59.69 | 35.57 | 7.73     | -              | 67.42 | 43.30 | -             | 74.00 | 54.00 | -          | 6.58 | 10.70 |
| -               | -       | -             | -     | -     | -        | -              | -     | -     | -             | -     | -     | -          | -    | -     |

### Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. If peak result meet AV limit, AV measurement is omitted.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

### 3.2.8 AC Line Conducted Emissions

#### Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak and average detector mode with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

**Measurement Data:** **Comply** (See next pages for actual measured spectrum plots.)

- This test item was performed with headset + cradle + adaptor.

#### Minimum Standard: FCC Part 15.207(a)/EN 55022

| Frequency Range<br>(MHz) | Conducted Limit (dBuV) |            |
|--------------------------|------------------------|------------|
|                          | Quasi-Peak             | Average    |
| 0.15 ~ 0.5               | 66 to 56 *             | 56 to 46 * |
| 0.5 ~ 5                  | 56                     | 46         |
| 5 ~ 30                   | 60                     | 50         |

\* Decreases with the logarithm of the frequency

#### Measurement Setup

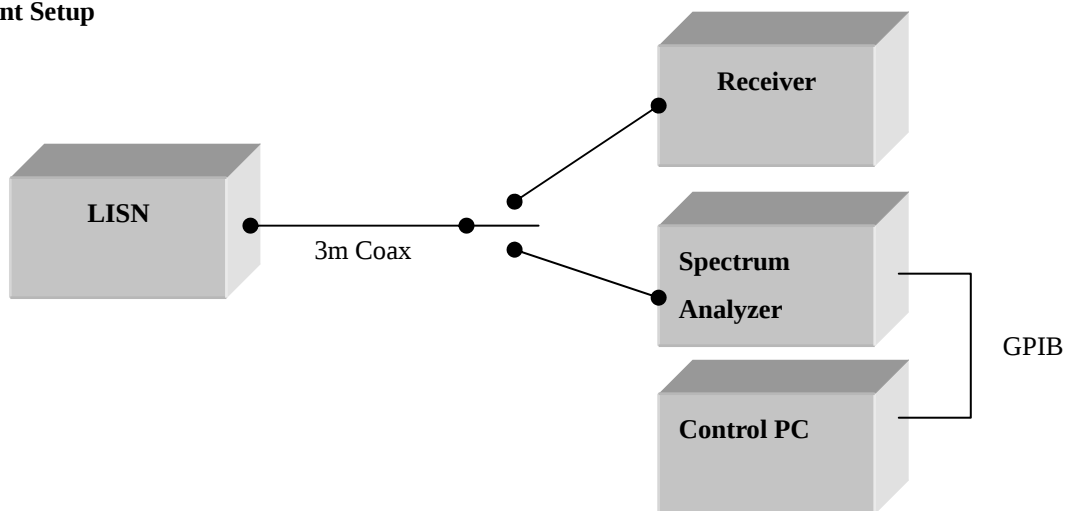
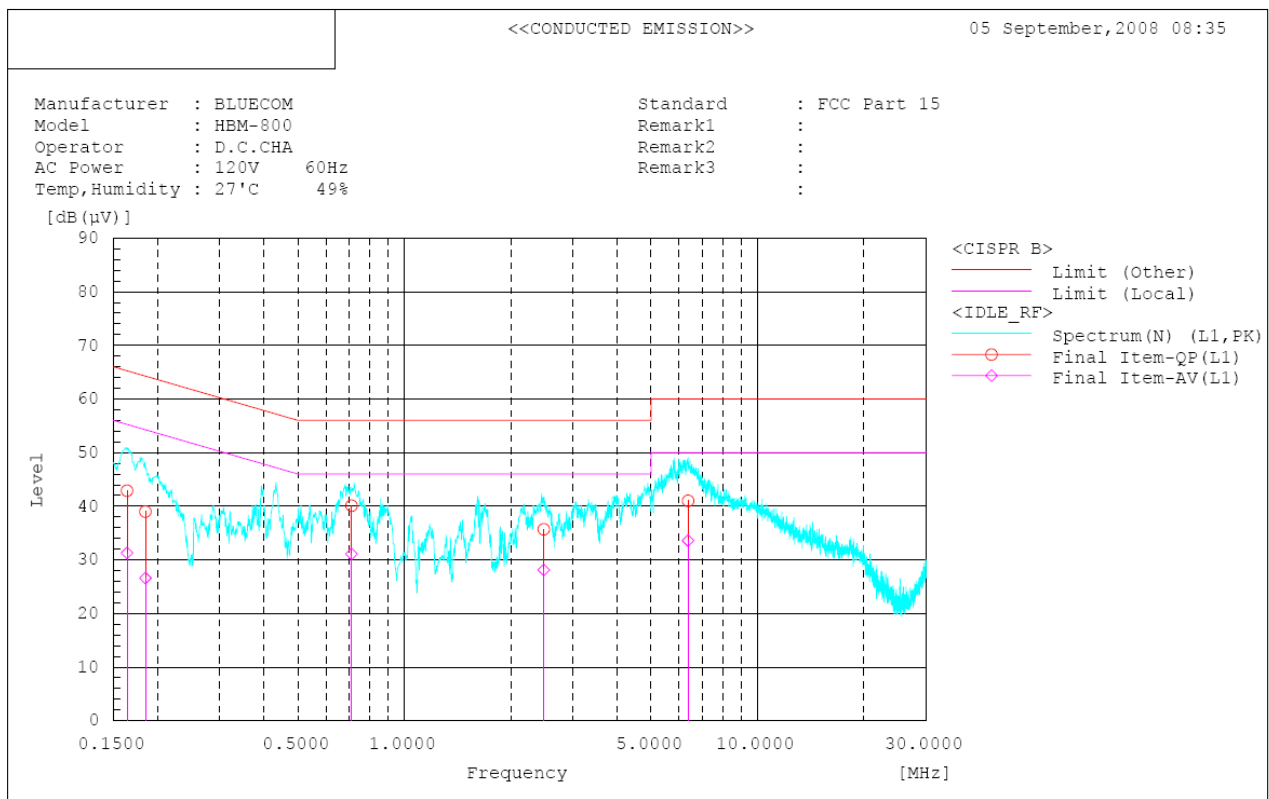
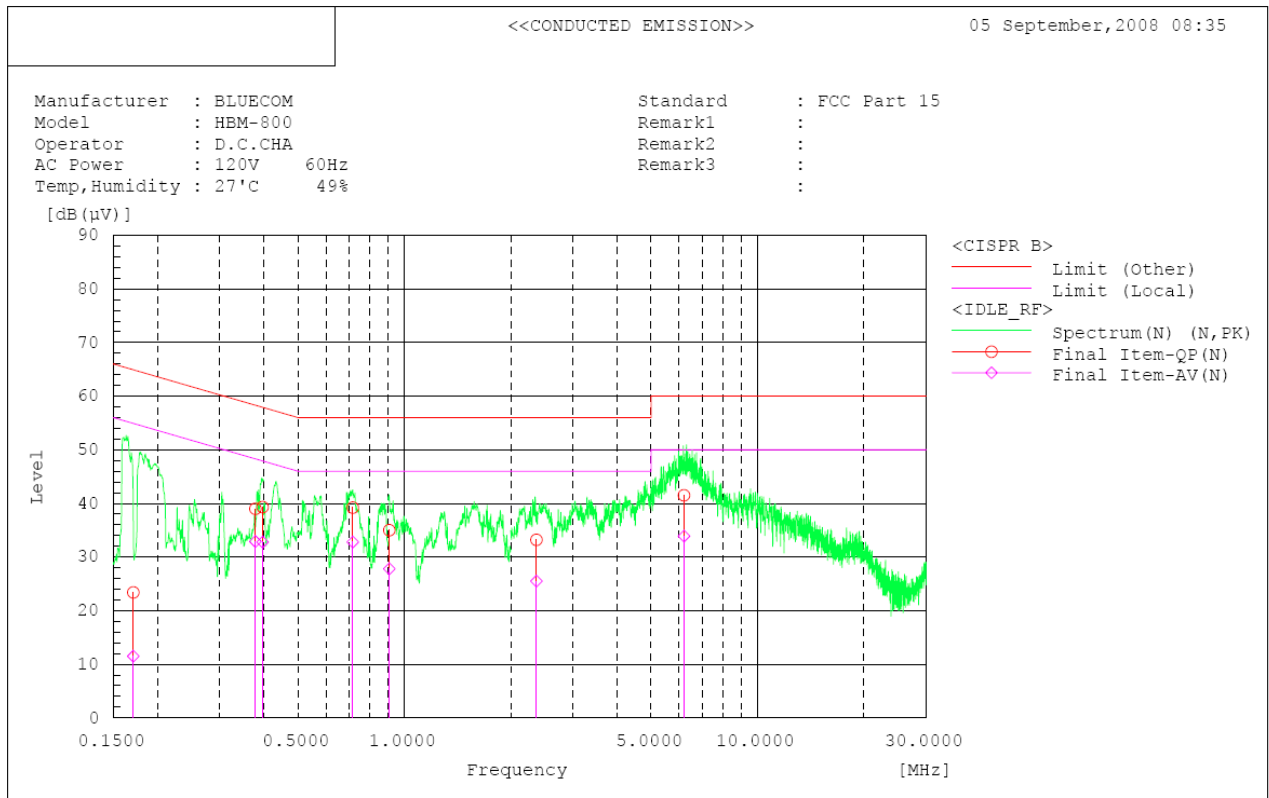


Figure 2: Measurement setup for AC Conducted Emission

- Conducted Emission Graph -



-Conducted Emission List -

\*\*\*\*\*  
 <<CONDUCTED EMISSION>>  
 \*\*\*\*\*

05 September, 2008 08:35

Standard : FCC Part 15  
 Manufacturer : BLUECOM  
 Model : HBM-800  
 Operator : D.C. CHA  
 AC Power : 120V 60Hz  
 Temp, Humidity : 27°C 49%  
 Remark1 :  
 Remark2 :  
 Remark3 :

Final Result

--- N Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV | Remark |
|-----|-----------|---------------|---------------|-----|--------------|--------------|-------------|-------------|--------------|--------------|--------|
|     | [MHz]     | [dB (μV)]     | [dB (μV)]     |     | [dB (μV)]    | [dB (μV)]    | [dB (μV)]   | [dB (μV)]   | [dB]         | [dB]         |        |
| 1   | 0.171     | 22.2          | 11.4          | 0.1 | 22.4         | 11.5         | 64.9        | 54.9        | 41.5         | 43.4         |        |
| 2   | 0.379     | 38.9          | 32.8          | 0.1 | 39.0         | 32.9         | 58.3        | 48.3        | 19.3         | 15.4         |        |
| 3   | 0.397     | 39.2          | 32.7          | 0.1 | 39.3         | 32.8         | 57.9        | 47.9        | 18.6         | 15.1         |        |
| 4   | 0.715     | 39.1          | 32.7          | 0.1 | 39.2         | 32.8         | 56.0        | 46.0        | 16.8         | 13.2         |        |
| 5   | 0.907     | 34.8          | 27.6          | 0.2 | 35.0         | 27.8         | 56.0        | 46.0        | 21.0         | 18.2         |        |
| 6   | 6.192     | 41.1          | 33.5          | 0.4 | 41.5         | 33.9         | 60.0        | 50.0        | 18.5         | 16.1         |        |
| 7   | 2.368     | 32.9          | 25.2          | 0.3 | 33.2         | 25.5         | 56.0        | 46.0        | 22.8         | 20.5         |        |

--- L1 Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV | Remark |
|-----|-----------|---------------|---------------|-----|--------------|--------------|-------------|-------------|--------------|--------------|--------|
|     | [MHz]     | [dB (μV)]     | [dB (μV)]     |     | [dB (μV)]    | [dB (μV)]    | [dB (μV)]   | [dB (μV)]   | [dB]         | [dB]         |        |
| 1   | 0.164     | 42.7          | 31.1          | 0.2 | 42.9         | 31.3         | 65.3        | 55.3        | 22.4         | 24.0         |        |
| 2   | 0.185     | 35.8          | 26.4          | 0.2 | 39.0         | 26.6         | 64.3        | 54.3        | 25.3         | 27.7         |        |
| 3   | 0.709     | 39.8          | 30.8          | 0.3 | 40.1         | 31.1         | 56.0        | 46.0        | 15.9         | 14.9         |        |
| 4   | 6.363     | 40.5          | 33.1          | 0.5 | 41.0         | 33.6         | 60.0        | 50.0        | 19.0         | 16.4         |        |
| 5   | 2.483     | 35.3          | 27.7          | 0.4 | 35.7         | 28.1         | 56.0        | 46.0        | 20.3         | 17.9         |        |

APPENDIX

**TEST EQUIPMENT FOR TESTS**

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

|    | Type                                       | Manufacturer       | Model     | Cal.Due.Date<br>(dd/mm/yy) | Next.Due.Date<br>(dd/mm/yy) | S/N           |
|----|--------------------------------------------|--------------------|-----------|----------------------------|-----------------------------|---------------|
| 01 | Spectrum Analyzer                          | Agilent            | E4404B    | 21/03/08                   | 21/03/09                    | US41061134    |
| 02 | Spectrum Analyzer                          | Agilent            | E4440A    | 15/11/07                   | 15/11/08                    | MY45304199    |
| 03 | Spectrum Analyzer                          | H.P                | 8563E     | 09/10/07                   | 09/10/09                    | 3551A04634    |
| 04 | Spectrum Analyzer                          | H.P                | 8591E     | 26/04/08                   | 26/04/09                    | 3649A05889    |
| 05 | Spectrum Analyzer                          | Rohde Schwarz      | FSP       | 09/09/08                   | 09/09/09                    | 100385        |
| 06 | EMI TEST RECEIVER                          | R&S                | ESU       | 11/01/08                   | 11/01/09                    | 100014        |
| 07 | EMI TEST RECEIVER                          | R&S                | ESCI      | 13/05/08                   | 13/05/09                    | 100364        |
| 08 | Power Meter                                | H.P                | EMP-442A  | 10/07/08                   | 10/07/09                    | GB37170413    |
| 09 | Power Sensor                               | H.P                | 8481A     | 14/07/08                   | 14/07/09                    | 3318A96566    |
| 10 | Power Divider                              | Agilent            | 11636B    | 07/12/07                   | 07/12/08                    | 56471         |
| 11 | Signal Generator                           | Rohde Schwarz      | SMR20     | 02/04/08                   | 02/04/09                    | 101251        |
| 12 | Signal Generator                           | H.P                | ESG-3000A | 09/07/08                   | 09/07/09                    | US37230529    |
| 13 | Vector Signal Generator                    | Rohde Schwarz      | SMJ100A   | 17/01/08                   | 17/01/09                    | 100148        |
| 14 | Audio Analyzer                             | H.P                | 8903B     | 09/07/08                   | 09/07/09                    | 3011A09448    |
| 15 | Modulation Analyzer                        | H.P                | 8901B     | 18/07/08                   | 18/07/09                    | 3028A03029    |
| 16 | Oscilloscope                               | Tektronix          | TDS3052   | 02/11/07                   | 02/11/08                    | B016821       |
| 17 | 8960 Series 10<br>Wireless Comms. Test Set | Agilent            | E5515C    | 31/07/07                   | 31/07/09                    | GB43461134    |
| 18 | Universal Radio communication<br>Tester    | Rohde Schwarz      | CMU 200   | 02/04/08                   | 02/04/09                    | 107631        |
| 19 | Bluetooth Tester                           | TESCOM             | TC-3000A  | 01/08/08                   | 01/08/09                    | 3000A4A0121   |
| 20 | Power Splitter                             | WEINSCHEL          | 1593      | 05/10/07                   | 05/10/08                    | 332           |
| 21 | Power Splitter                             | Anritsu            | K241B     | 19/10/07                   | 19/10/08                    | 020611        |
| 22 | BAND Reject Filter                         | Microwave Circuits | N0308372  | 18/10/07                   | 18/10/08                    | 3125-01DC0312 |
| 23 | BAND Reject Filter                         | Wainwright         | WRCG1750  | 18/10/07                   | 18/10/08                    | SN2           |
| 24 | AC Power supply                            | DAEKWANG           | 5KVA      | 20/03/08                   | 20/03/09                    | N/A           |
| 25 | DC Power Supply                            | H.P                | 6622A     | 20/03/08                   | 20/03/09                    | 465487        |
| 26 | DC Power Supply                            | HP                 | 6633A     | 20/03/08                   | 20/03/09                    | 3524A06634    |
| 27 | HORN ANT                                   | ETS                | 3115      | 13/06/08                   | 13/06/09                    | 6419          |
| 28 | HORN ANT                                   | ETS                | 3115      | 09/10/07                   | 09/10/08                    | 21097         |
| 29 | HORN ANT                                   | A.H.Systems        | SAS-574   | 13/06/08                   | 13/06/09                    | 154           |
| 30 | HORN ANT                                   | A.H.Systems        | SAS-574   | 13/06/08                   | 13/06/09                    | 155           |
| 31 | Dipole Antenna                             | Schwarzbeck        | VHA9103   | 19/12/07                   | 19/12/08                    | 2116          |

|    | Type                      | Manufacturer       | Model       | Cal.Due.Date<br>(dd/mm/yy) | Next.Due.Date<br>(dd/mm/yy) | S/N            |
|----|---------------------------|--------------------|-------------|----------------------------|-----------------------------|----------------|
| 32 | Dipole Antenna            | Schwarzbeck        | VHA9103     | 19/12/07                   | 19/12/08                    | 2117           |
| 33 | Dipole Antenna            | Schwarzbeck        | UHA9105     | 20/12/07                   | 20/12/08                    | 2261           |
| 34 | Dipole Antenna            | Schwarzbeck        | UHA9105     | 20/12/07                   | 20/12/08                    | 2262           |
| 35 | TEMP & HUMIDITY Chamber   | JISCO              | J-RHC2      | 02/10/07                   | 02/10/08                    | 021031         |
| 36 | Log Periodic Antenna      | Schwarzbeck        | UHALP9108A1 | 01/10/07                   | 01/10/08                    | 1098           |
| 37 | Biconical Antenna         | Schwarzbeck        | VHA9103     | 01/10/07                   | 01/10/08                    | 2233           |
| 38 | Digital Multimeter        | H.P                | 34401A      | 20/03/08                   | 20/03/09                    | 3146A13475     |
| 39 | Attenuator (10dB)         | WEINSCHTEL         | 23-10-34    | 05/10/07                   | 05/10/08                    | BP4386         |
| 40 | Attenuator (10dB)         | WEINSCHTEL         | 23-10-34    | 30/01/08                   | 30/01/09                    | BP4387         |
| 41 | High-Pass Filter          | ANRITSU            | MP526D      | 08/10/07                   | 08/10/08                    | MP27756        |
| 42 | Attenuator (3dB)          | Agilent            | 8491B       | 01/08/08                   | 01/08/09                    | MY39260700     |
| 43 | 20dB Attenuator           | Aeroflex/Weinschel | 86-20-11    | 25/10/07                   | 25/10/08                    | 432            |
| 44 | 10dB Attenuator           | Aeroflex/Weinschel | 86-10-11    | 25/10/07                   | 25/10/08                    | 446            |
| 45 | 10dB Attenuator           | Aeroflex/Weinschel | 86-10-11    | 25/10/07                   | 25/10/08                    | 408            |
| 46 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE     | 0088CAN     | 11/07/08                   | 11/07/09                    | 788            |
| 47 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE     | 0185CAN     | 11/07/08                   | 11/07/09                    | 790            |
| 48 | Type N Coaxial CIRCULATOR | NOVA MICROWAVE     | 0215CAN     | 11/07/08                   | 11/07/09                    | 112            |
| 49 | Amplifier (25dB)          | Agilent            | 8447D       | 21/05/08                   | 21/05/09                    | 2944A10144     |
| 50 | Amplifier (30dB)          | Agilent            | 8449B       | 25/10/07                   | 25/10/08                    | 3008A01590     |
| 51 | Amplifier (22dB)          | H.P                | 8447E       | 27/02/08                   | 27/02/09                    | 2945A02865     |
| 52 | Attenuator (20dB)         | Aeroflex/Weinschel | 86-20-11    | 25/10/07                   | 25/10/08                    | 432            |
| 53 | Attenuator (10dB)         | Aeroflex/Weinschel | 86-10-11    | 25/10/07                   | 25/10/08                    | 446            |
| 54 | Attenuator (10dB)         | Aeroflex/Weinschel | 86-10-11    | 25/10/07                   | 25/10/08                    | 408            |
| 55 | Position Controller       | TOKIN              | 5901T       | N/A                        | N/A                         | 14173          |
| 56 | Driver                    | TOKIN              | 5902T2      | N/A                        | N/A                         | 14174          |
| 57 | LISN                      | Kyorits            | KNW-407     | 04/08/08                   | 04/08/09                    | 8-317-8        |
| 58 | LISN                      | Kyorits            | KNW-242     | 06/10/07                   | 06/10/08                    | 8-654-15       |
| 59 | CVCF                      | NF Electronic      | 4400        | N/A                        | N/A                         | 344536 4420064 |
| 60 | Software                  | ToYo EMI           | EP5/RE      | N/A                        | N/A                         | Ver 2.0.800    |
| 61 | Software                  | ToYo EMI           | EP5/CE      | N/A                        | N/A                         | Ver 2.0.801    |
| 62 | Software                  | AUDIX              | e3          | N/A                        | N/A                         | Ver 3.0        |
| 63 | Software                  | Agilent            | Benchlink   | N/A                        | N/A                         | A.01.09 021211 |