



# DIGITAL EMC CO., LTD.

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

Tel: +82-31-321-2664 Fax: +82-31-321-1664

<http://www.digitalemc.com>

## CERTIFICATION OF COMPLIANCE

**TELIAN CORPORATION.**  
4th Fl, Nam Jeun B/D 53-3 Haan-Dong,  
Kwang Myung-Si, Kyung Gi-Do, Korea

Dates of Tests: January 8~ 11 2008  
Test Report S/N: DR50110801K  
Test Site : DIGITAL EMC CO., LTD.

FCC ID

**NPQK1000**

APPLICANT

**TELIAN CORPORATION.**

|                                  |                                                                            |
|----------------------------------|----------------------------------------------------------------------------|
| <b>FCC Classification</b>        | : <b>Frequency Hopping Spread Spectrum (FHSS)</b>                          |
| <b>Device name</b>               | : <b>GSM850 / PCS1900 Dual Band GPRS Terminal Equipment with Bluetooth</b> |
| <b>Manufacturer</b>              | : <b>TELIAN CORPORATION.</b>                                               |
| <b>FCC ID</b>                    | : <b>NPQK1000</b>                                                          |
| <b>Model name</b>                | : <b>K1000</b>                                                             |
| <b>Test Device Serial number</b> | : <b>Identical prototype</b>                                               |
| <b>FCC Rule Part(s)</b>          | : <b>FCC Part 15.247 Subpart C<br/>ANSI C-63.4-2003</b>                    |
| <b>Frequency Range</b>           | : <b>2402 ~ 2480 MHz</b>                                                   |
| <b>Max. Output power</b>         | : <b>-1.99 dBm Conducted</b>                                               |
| <b>Data of issue</b>             | : <b>January 15, 2008</b>                                                  |

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

## **TABLE OF CONTENTS**

|                                      |       |    |
|--------------------------------------|-------|----|
| 1. GENERAL INFORMATION               | ----- | 3  |
| 2. INFORMATION ABOUT TEST ITEM       | ----- | 4  |
| 3. TEST REPORT                       | ----- | 5  |
| 3.1 SUMMARY OF TESTS                 | ----- | 5  |
| 3.2 TRANSMITTER REQUIREMENTS         | ----- | 6  |
| 3.2.1 CARRIER FREQUENCY SEPARATION   | ----- | 6  |
| 3.2.2 NUMBER OF HOPPING FREQUENCIES  | ----- | 8  |
| 3.2.3 20 dB BANDWIDTH                | ----- | 11 |
| 3.2.4 TIME OF OCCUPANCY (Dwell Time) | ----- | 14 |
| 3.2.5 PEAK OUTPUT POWER              | ----- | 18 |
| 3.2.6 CONDUCTED SPURIOUS EMISSIONS   | ----- | 21 |
| 3.2.7 RADIATED EMISSIONS             | ----- | 28 |
| 3.2.8 AC LINE CONDUCTED EMISSIONS    | ----- | 35 |
| APPENDIX TEST EQUIPMENT FOR TESTS    | ----- | 38 |

## 1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

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

<http://www.digitalemccom> E-mail : [Harveysung@digitalemccom](mailto:Harveysung@digitalemccom)

Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".

This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

**Test operator: engineer**

January 15, 2008

Won-Jung LEE

Data

Name

Signature

**Report Reviewed By: manager**

January 15, 2008

Harvey Sung

Data

Name

Signature

Ordering party:

Company name : TELIAN CORPORATION

Address : 4th Fl, Nam Jeun B/D 53-3 Haan-Dong, Kwang Myung-Si

City/town : Kyung Gi-Do

Country : Korea

Date of order : December 24, 2007

## 2. Information about test item

### NPQK1000

#### 2.1 Equipment information

|                         |                                                                  |
|-------------------------|------------------------------------------------------------------|
| Equipment model no.     | K1000                                                            |
| Equipment serial no.    | Identical prototype                                              |
| Type of equipment       | GSM850 / PCS1900 Dual Band GSM Terminal Equipment with Bluetooth |
| Frequency band          | 2402 ~ 2480 MHz                                                  |
| Type of Modulation      | GFSK                                                             |
| Channel Access Protocol | Frequency Hopping                                                |
| Channel Spacing         | 1.0 MHz                                                          |
| Type of antenna         | Chip Antenna                                                     |

#### 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 |
|-----------|-----------|------------|--------------|
| -         | -         | -          | -            |
| -         | -         | -          | -            |

#### 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 within a 30 second period per any frequency                                                           |                      | 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=Complies    NC=Not Complies    NT=Not Tested    NA=Not Applicable |                               |                                                                                                                   |                      |                    |

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

## 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 (1% of the span or more)      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        |
| 2440.970                        | 2441.990                        | 1.020                              | <b>Comply</b> |

- 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

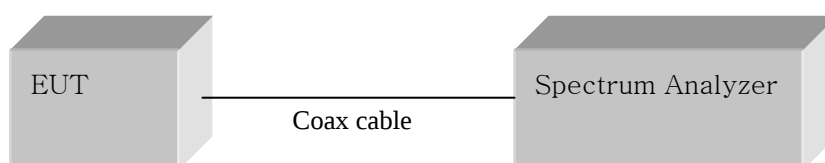
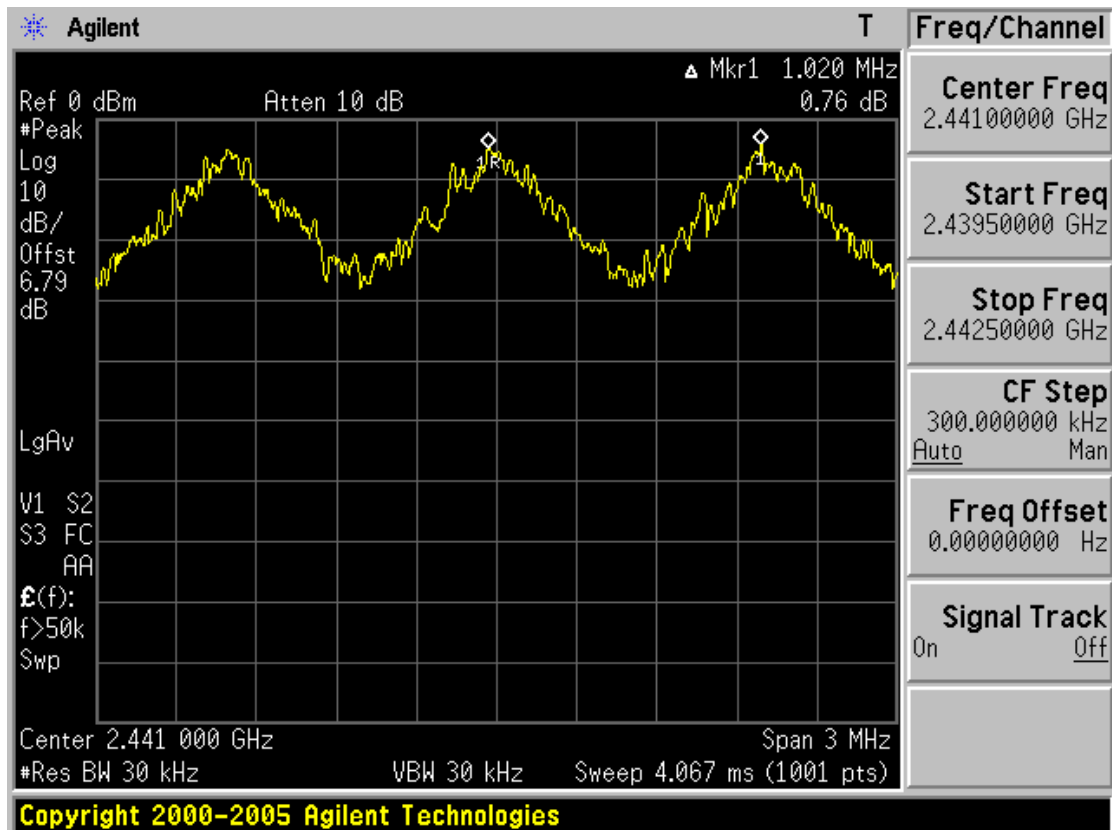


Figure 1: Measurement setup for the carrier frequency separation

# 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: **Complies**

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

- See next pages for actual measured spectrum plots.

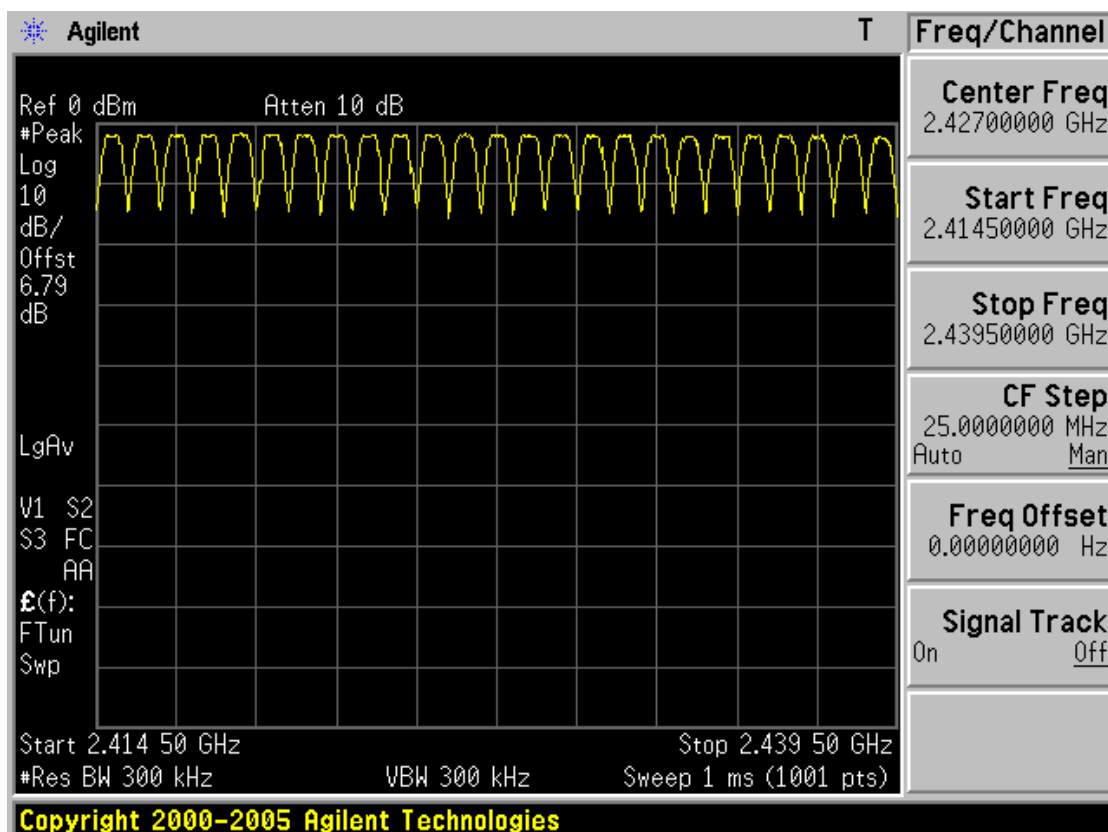
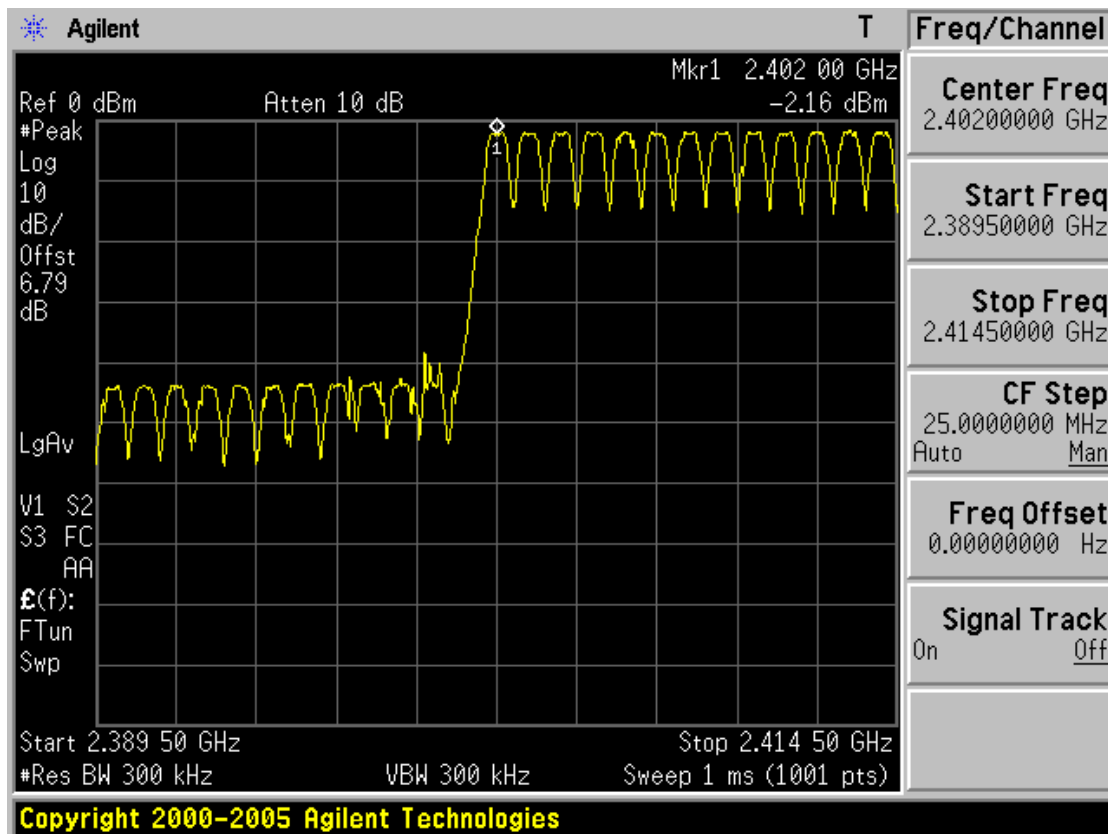
#### Minimum Standard:

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

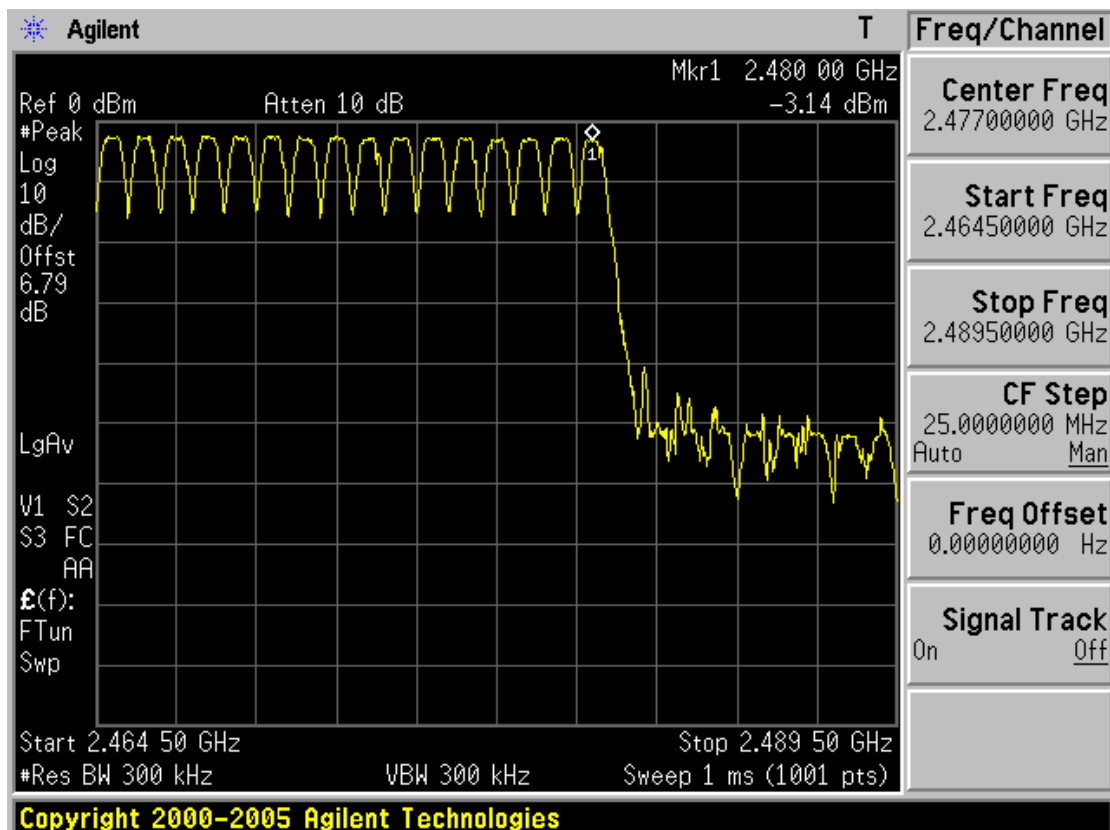
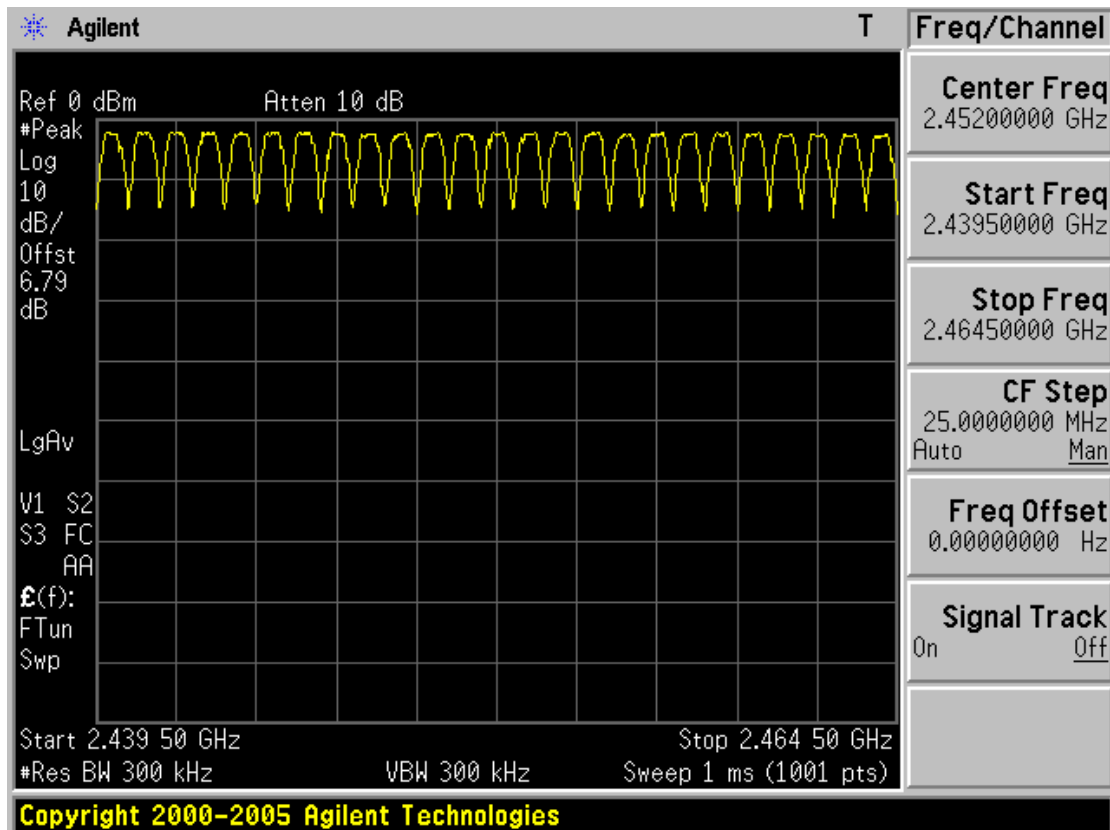
#### Measurement Setup

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

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

VBW = 30 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          | 0.930                       | Comply |
| 2480               | 79          | 0.935                       | Comply |

- See next pages for actual measured spectrum plots.

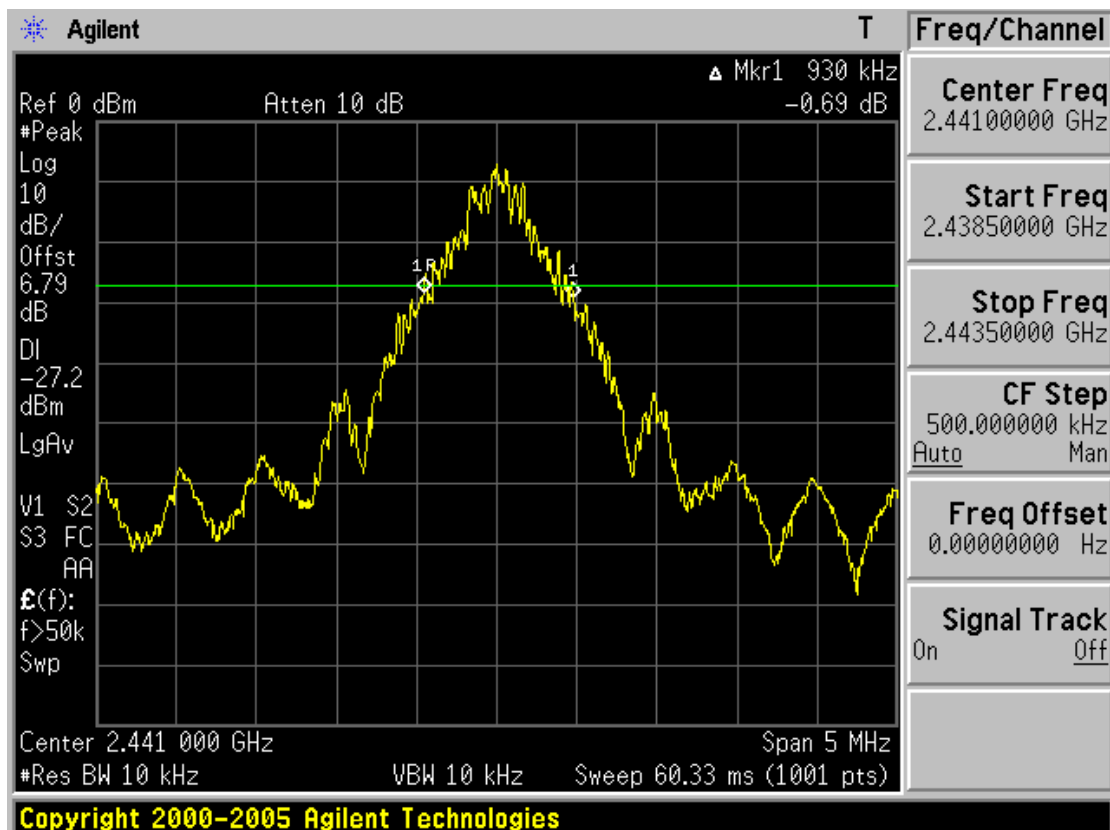
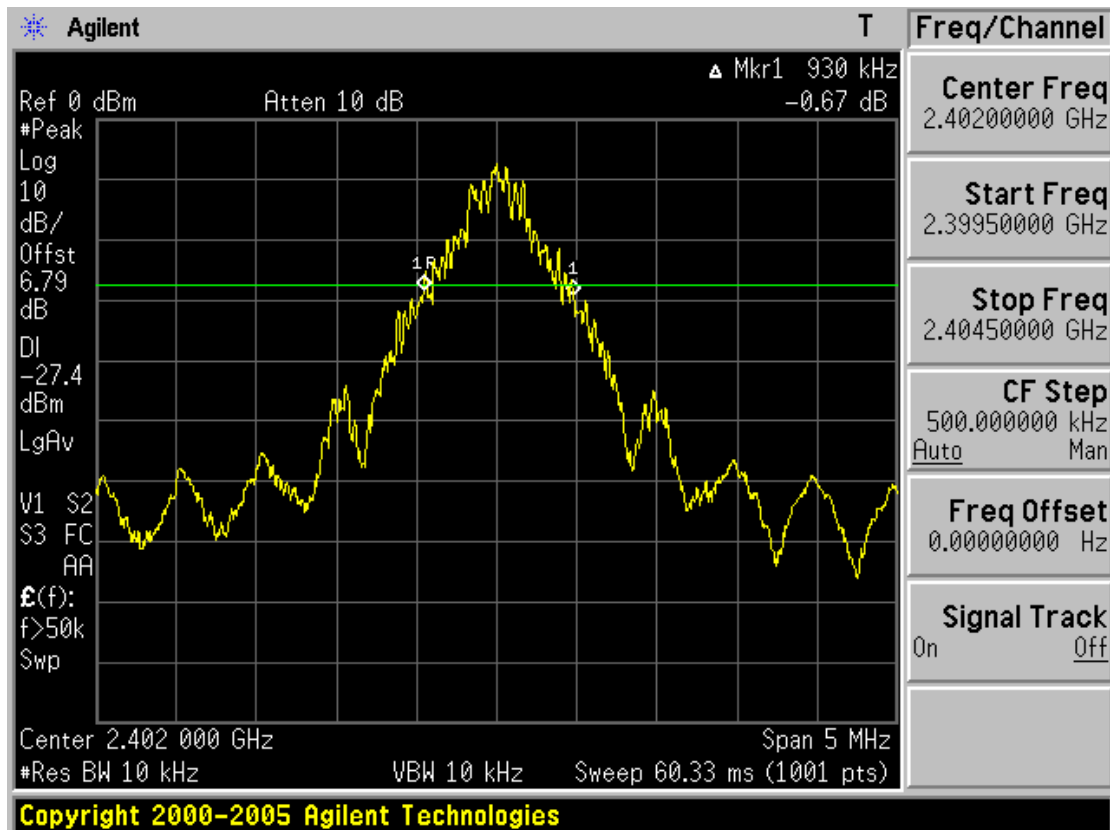
#### Minimum Standard:

None

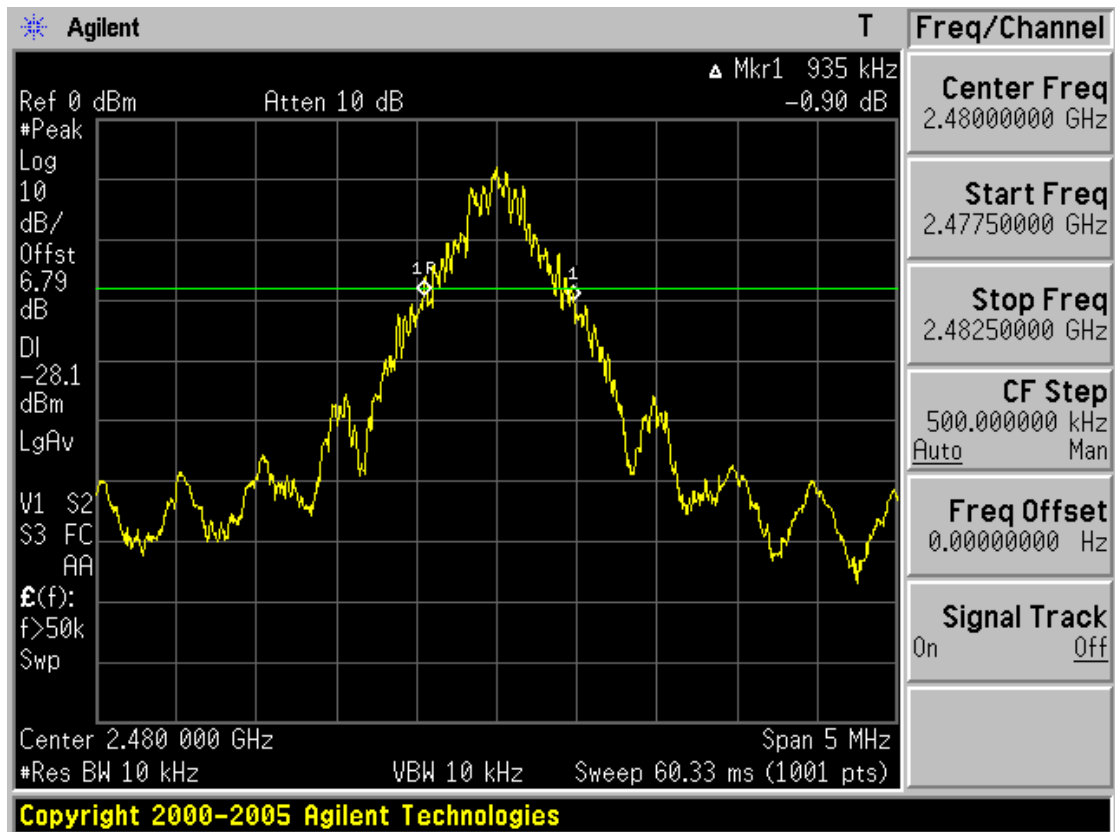
#### Measurement Setup

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:

| Packet Type | Burst duration in one hop (us) | Test Results    |        |
|-------------|--------------------------------|-----------------|--------|
|             |                                | Dwell Time (ms) | Result |
| DH 1        | 441                            | 141.169         | Comply |
| DH 3        | 1708                           | 275.261         | Comply |
| DH 5        | 2950                           | 314.146         | Comply |

- See next pages for actual measured spectrum plots.

#### Minimum Standard:

|                                                         |
|---------------------------------------------------------|
| 0.4 seconds within a 30 second period per any frequency |
|---------------------------------------------------------|

#### Measurement Setup

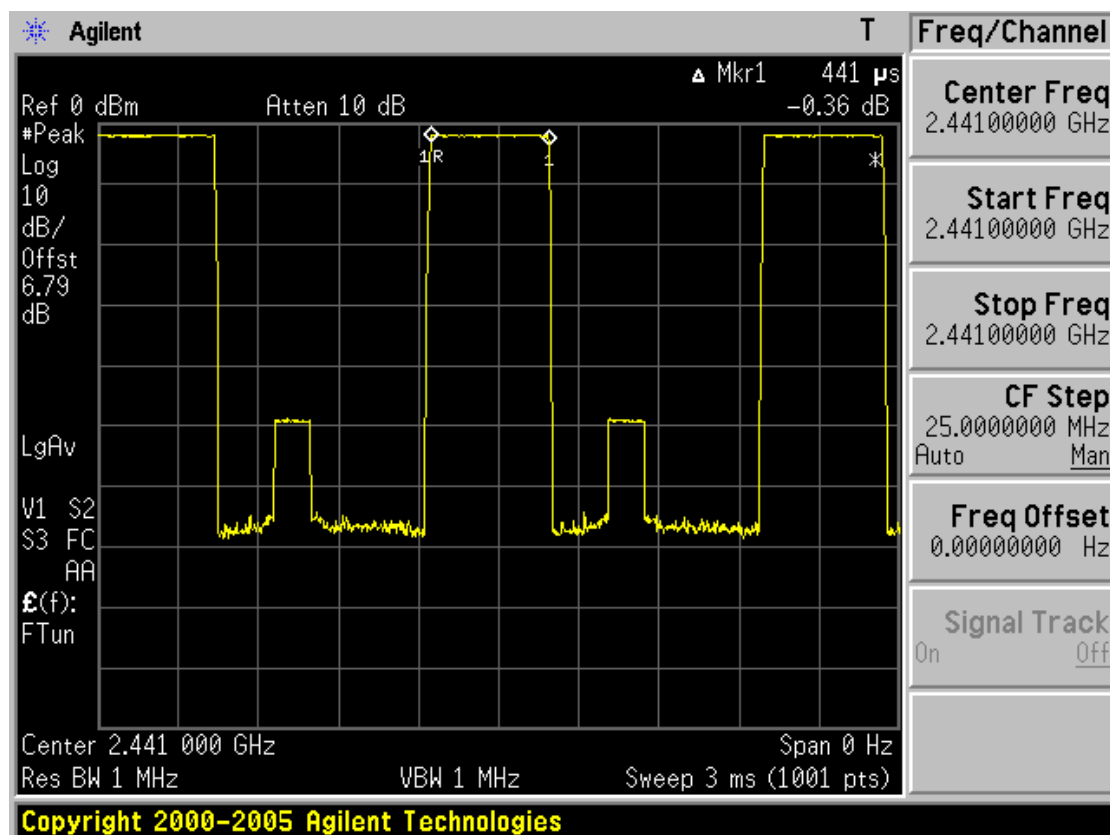
Same as the Chapter 3.2.1 (Figure 1)

### Time of Occupancy for Packet Type DH 1

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/2 = 800$  hops per second with 79 channels. So you have each channel  $800/79 = 10.13$  times per second and so for a period of  $0.4 \times 79 = 31.6$  seconds you have  $10.13 \times 31.6 = 320.11$  times of appearance.

Each Tx-time per appearance is 441 us

So we have  $320.11 \times 441\mu s = 141.169$  ms per 31.6 seconds.

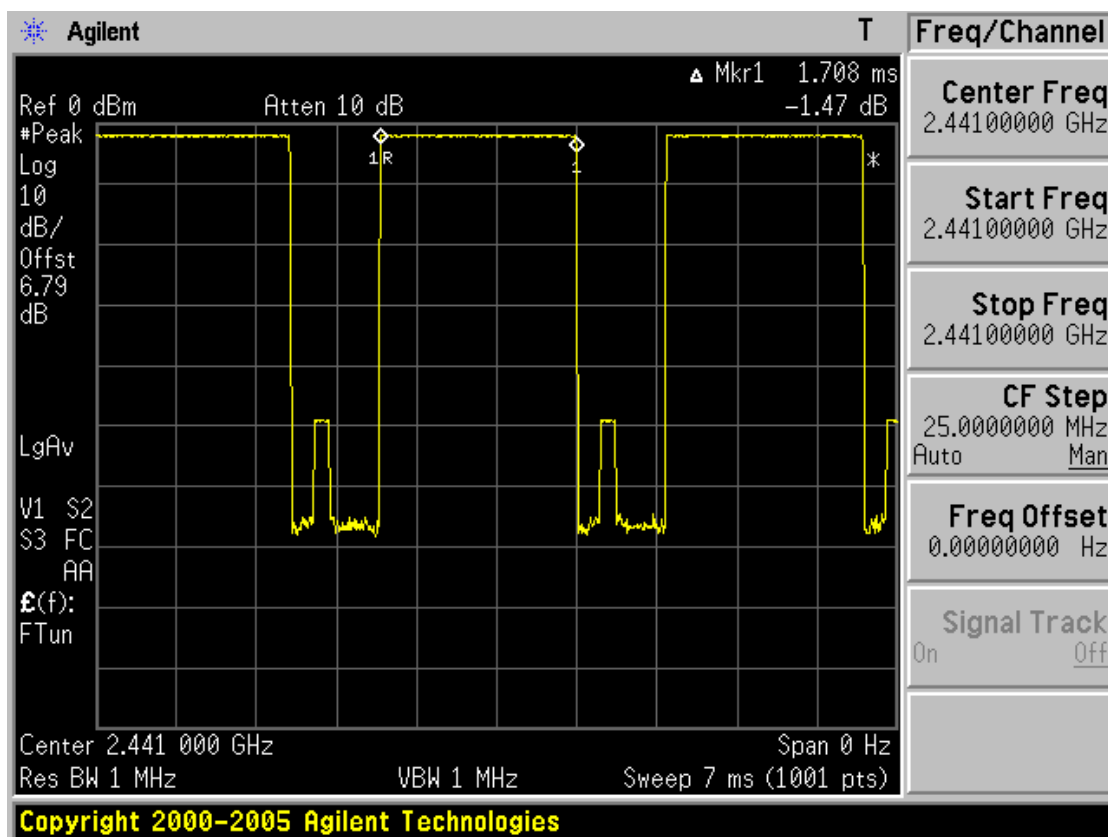


### Time of Occupancy for Packet Type DH 3

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/4 = 400$  hops per second with 79 channels. So you have each channel  $400/79 = 5.1$  times per second and so for a period of  $0.4 \times 79 = 31.6$  seconds you have  $5.1 \times 31.6 = 161.16$  times of appearance.

Each Tx-time per appearance is 1.708 ms

So we have  $161.16 \times 1.708 \text{ ms} = 275.261 \text{ ms}$  per 31.6 seconds.

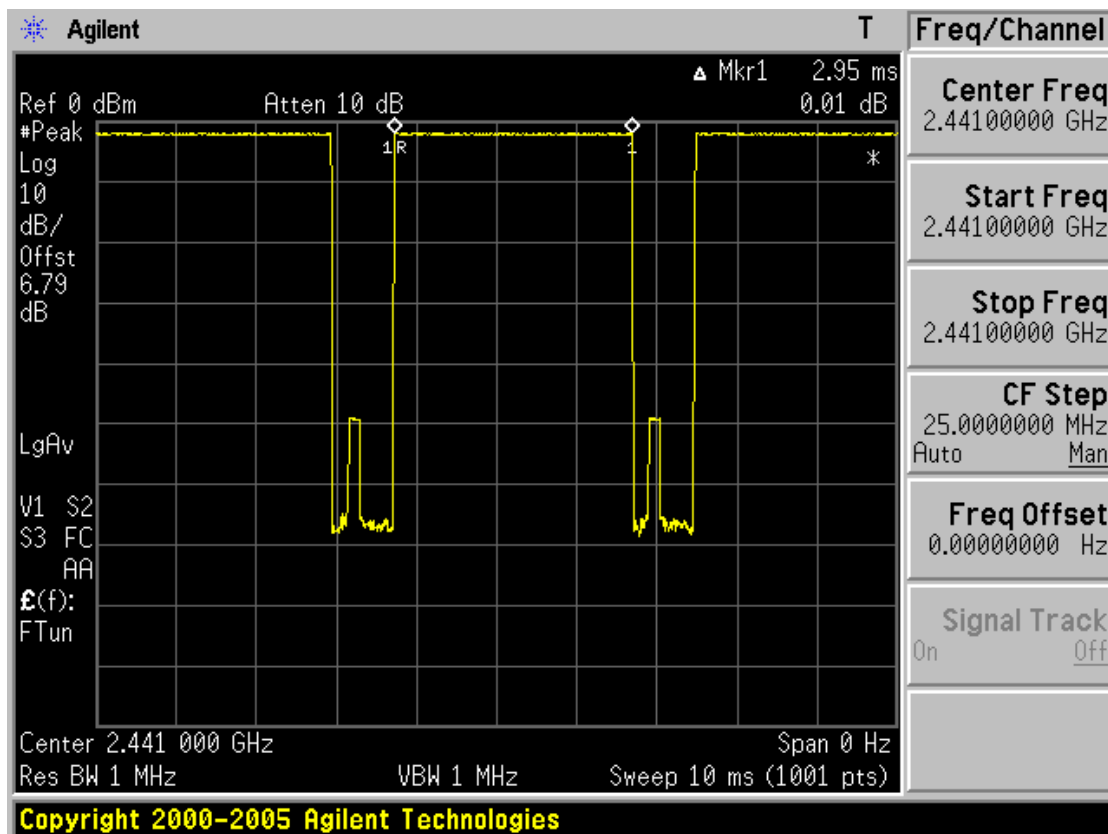


### Time of Occupancy for Packet Type DH 5

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/6 = 266.67$  hops per second with 79 channels. So you have each channel  $266.67/79 = 3.37$  times per second and so for a period of  $0.4 \times 79 = 31.6$  seconds you have  $3.37 \times 31.6 = 106.49$  times of appearance.

Each Tx-time per appearance is 2.95 ms

So we have  $106.49 \times 2.95 \text{ ms} = 314.146 \text{ ms}$  per 31.6 seconds.



### 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   | -2.05        | 0.624 | Comply |
| 2441            | 40  | -1.99        | 0.632 | Comply |
| 2480            | 79  | -2.82        | 0.522 | Comply |

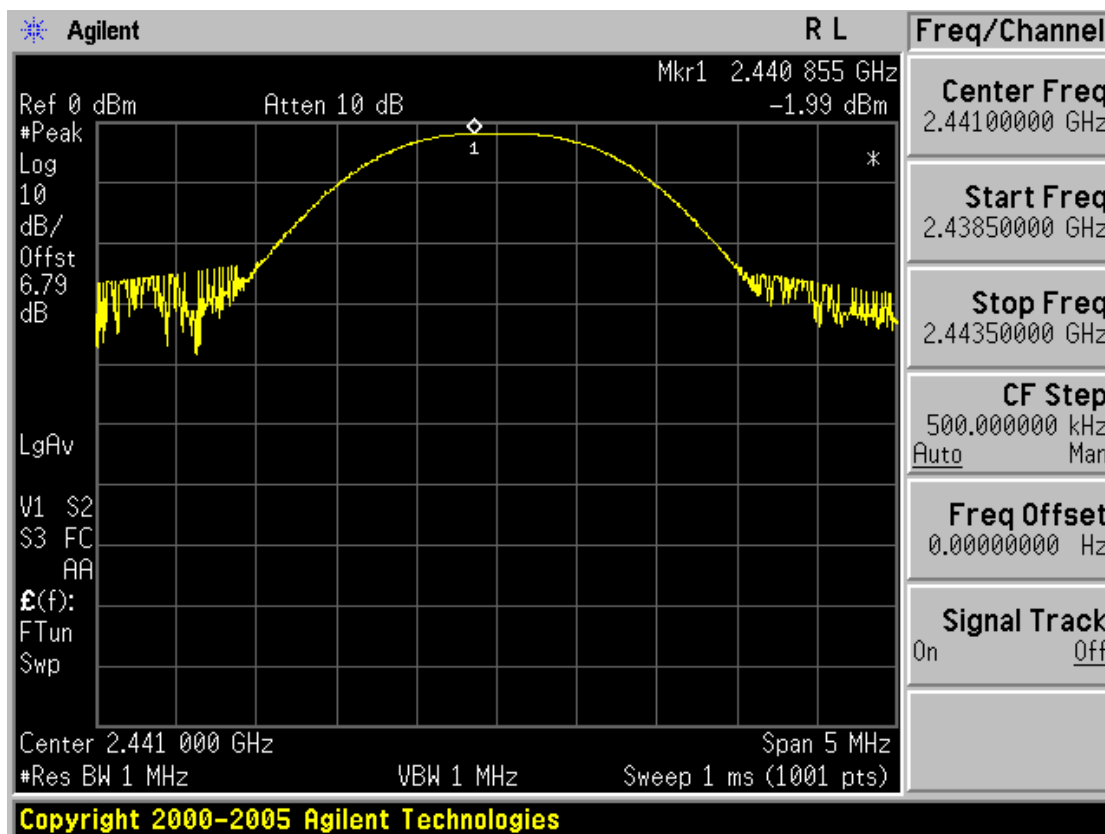
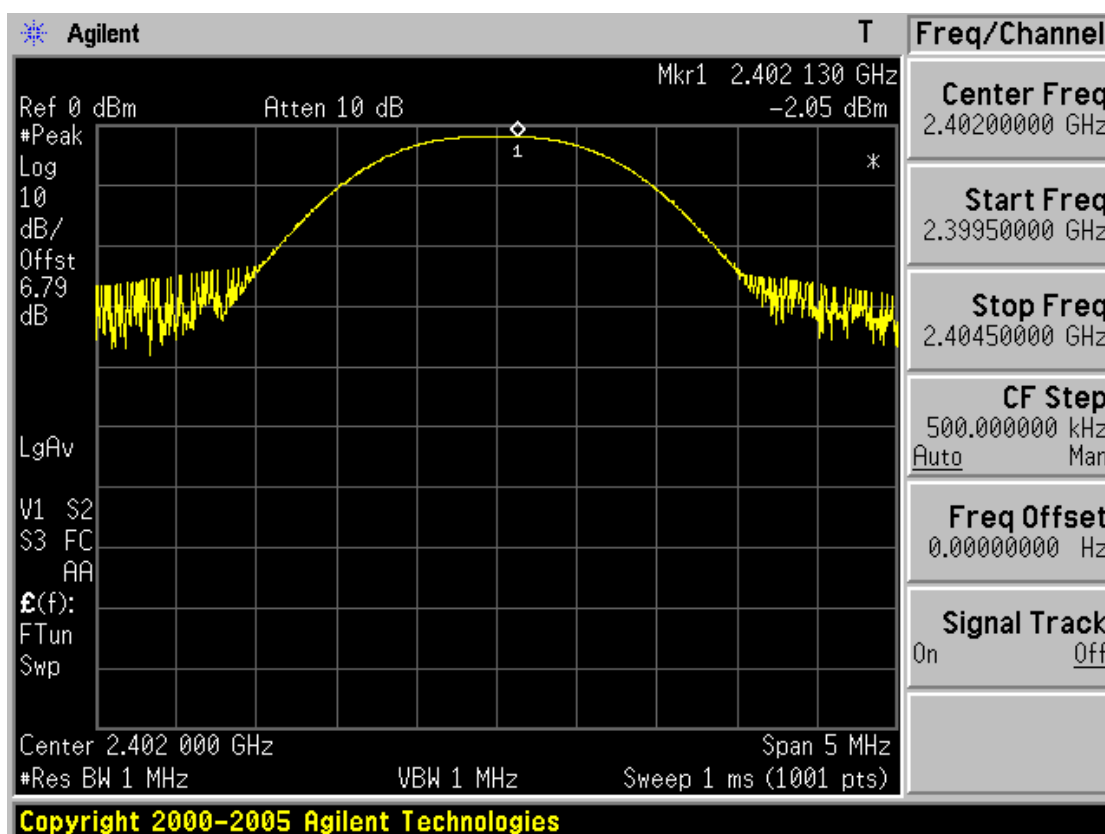
- See next pages for actual measured spectrum plots.

|                          |                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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> |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

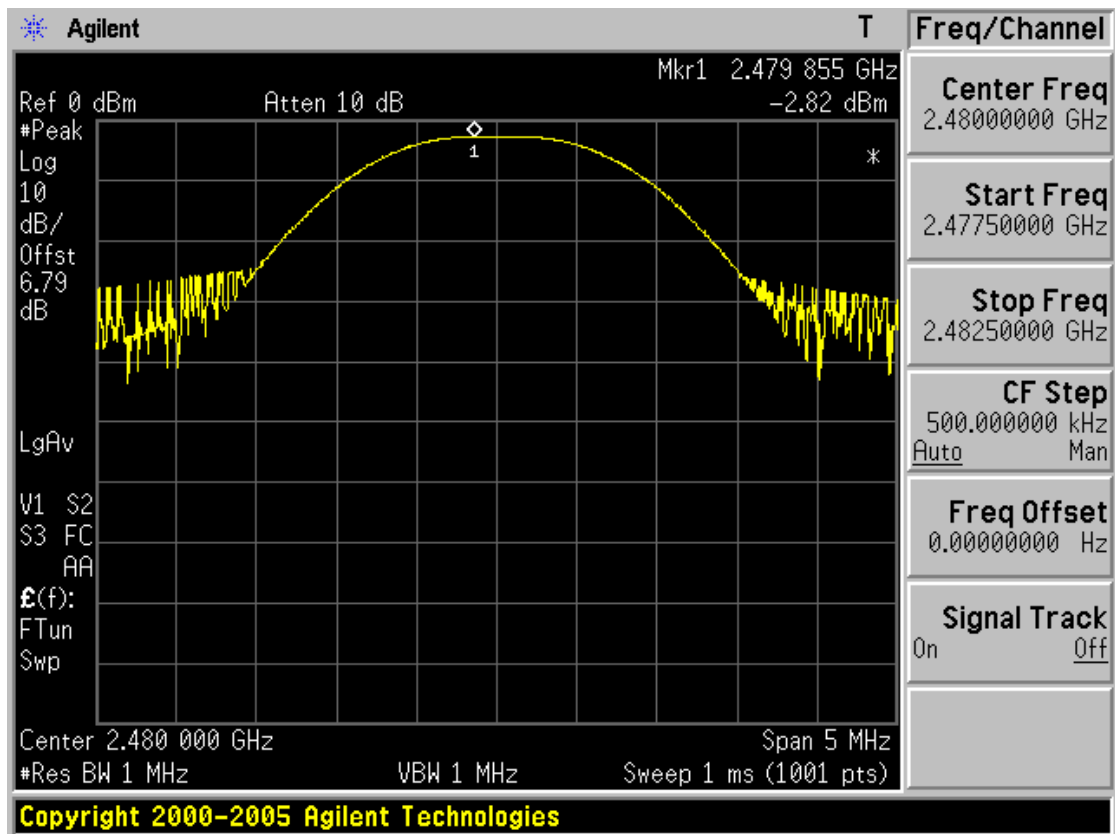
#### Measurement Setup

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

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

**Measurement Data: Comply**

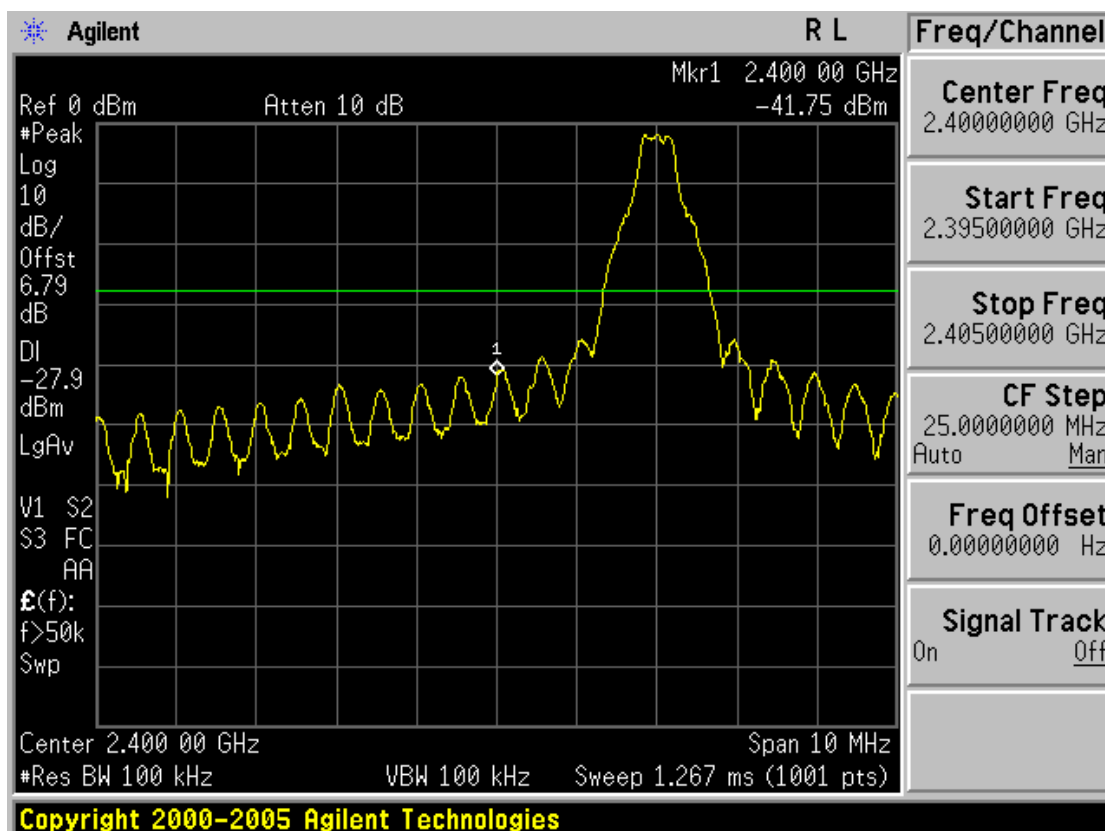
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density..
- See next pages for actual measured spectrum plots.

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

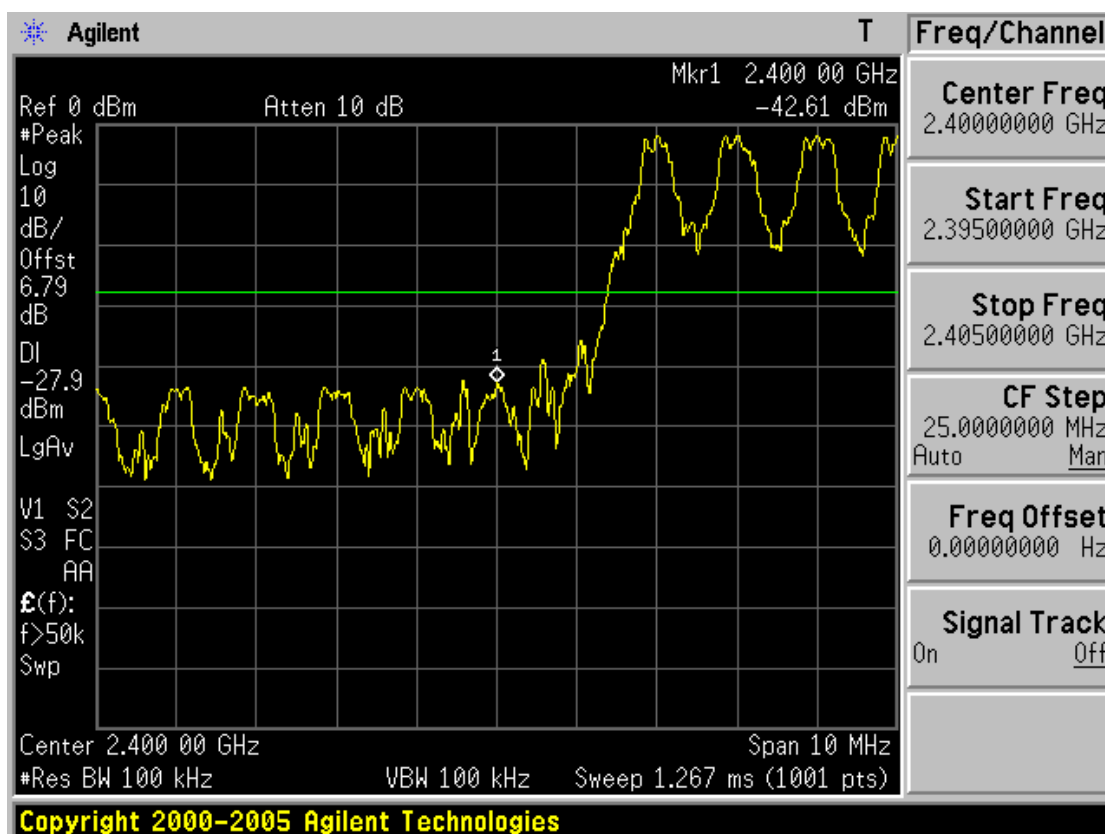
**Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

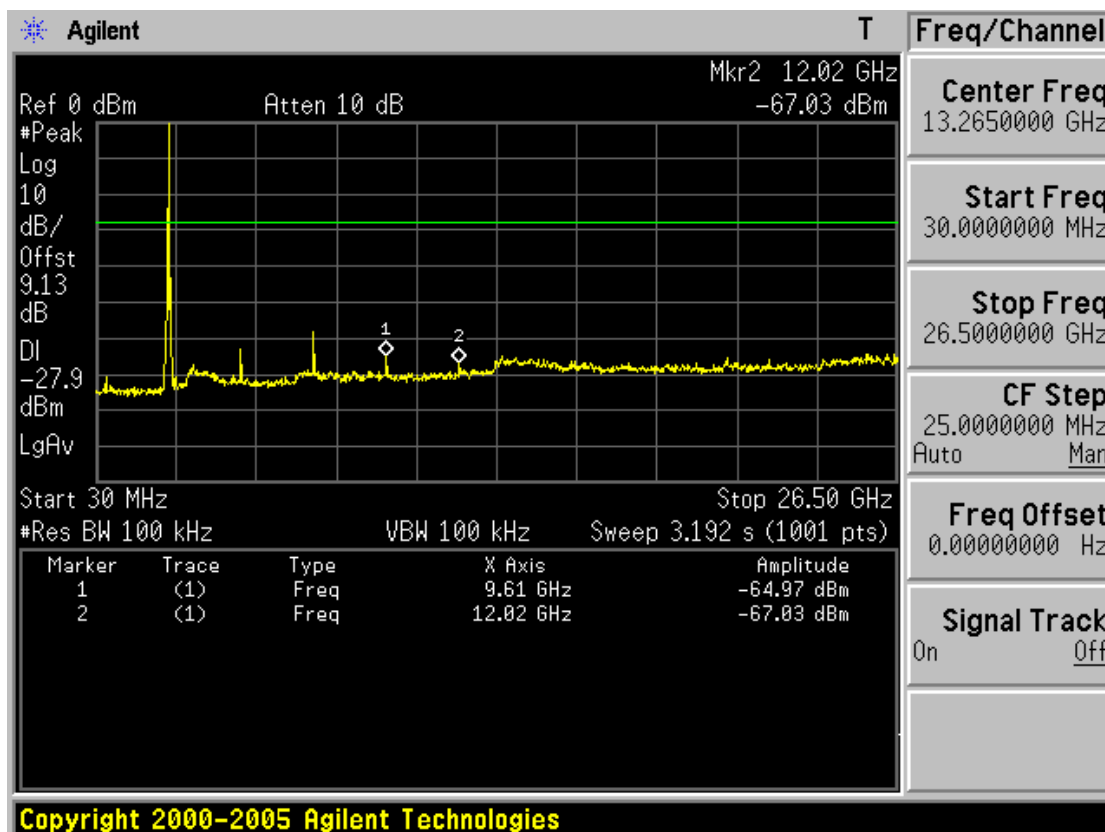
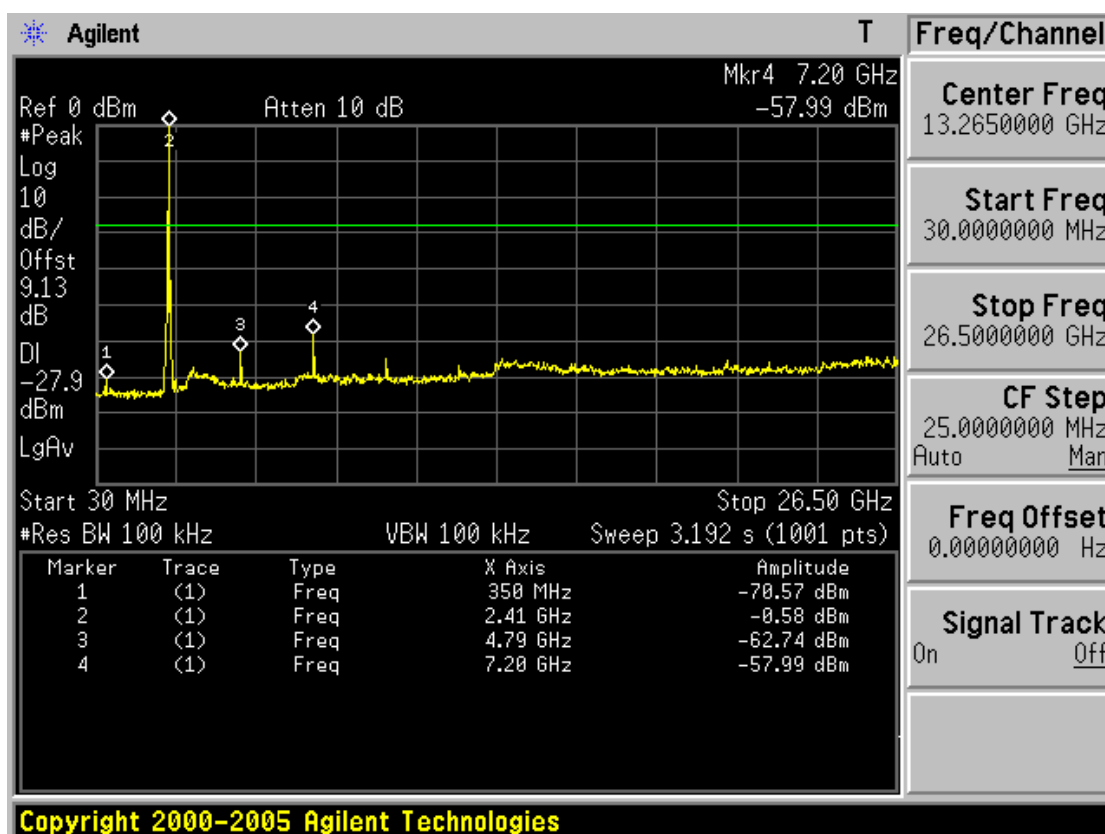
### Low band with hopping disabled



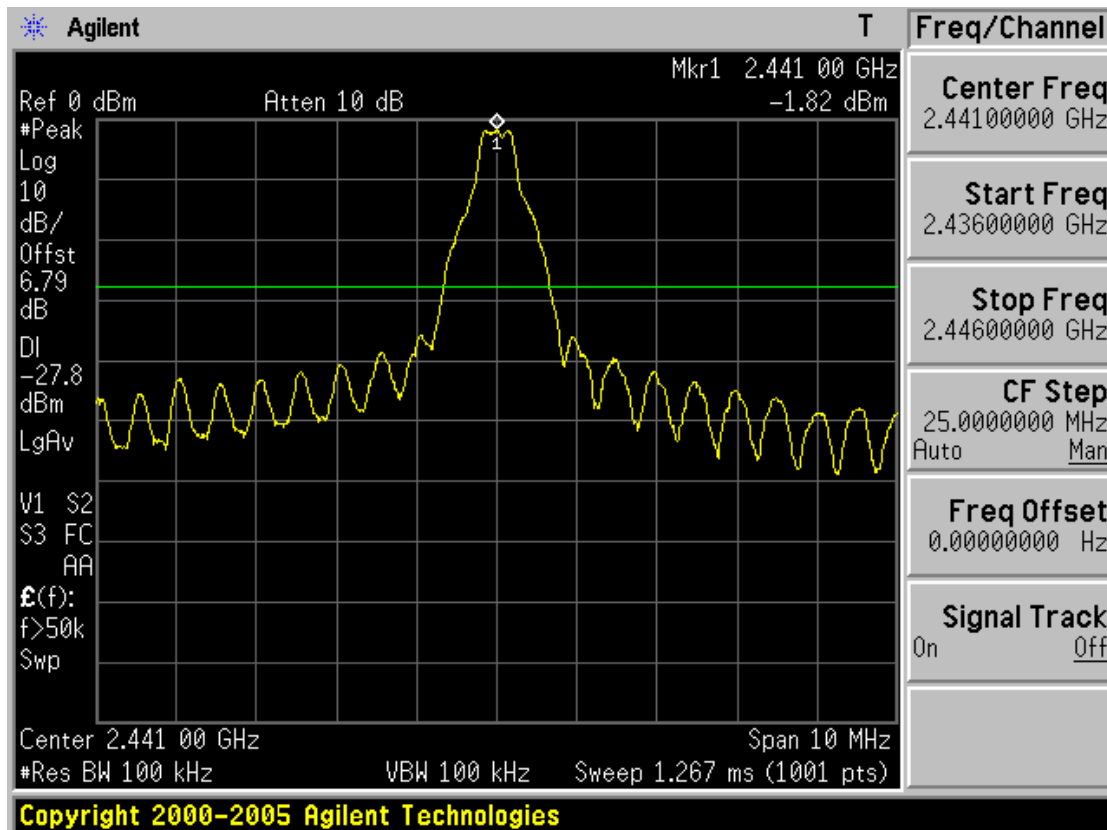
### Low band with hopping enabled



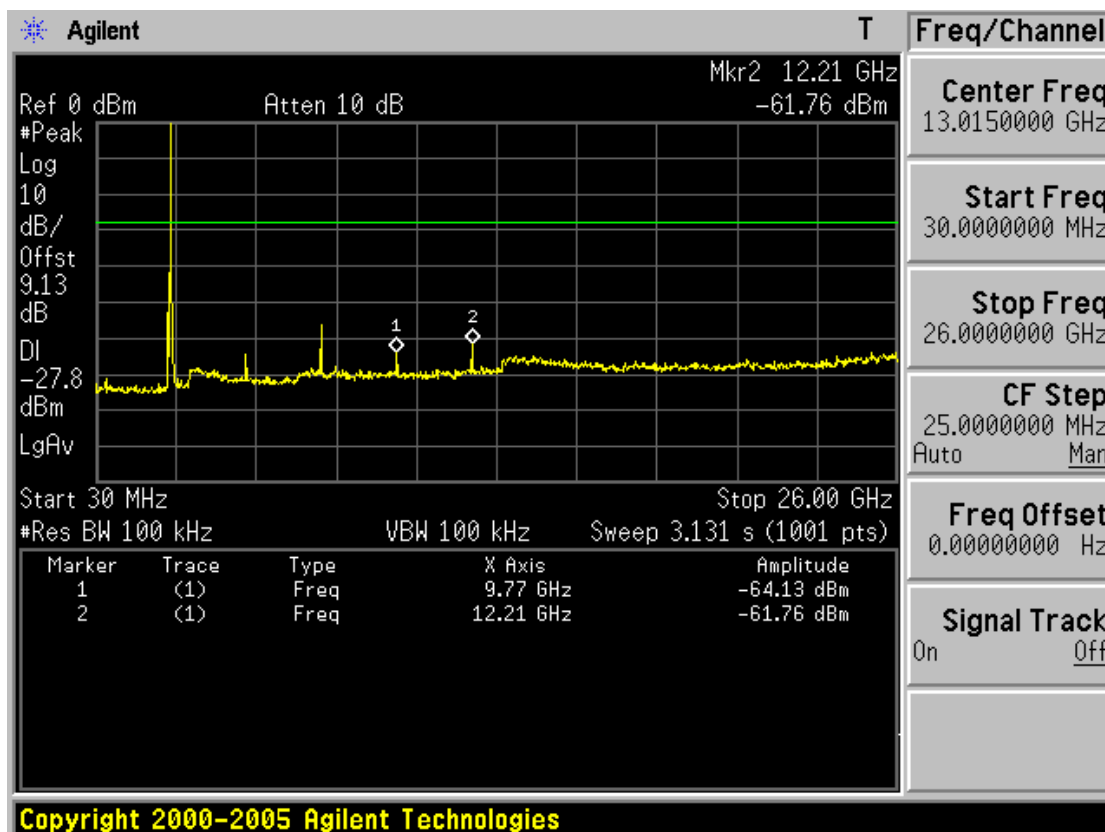
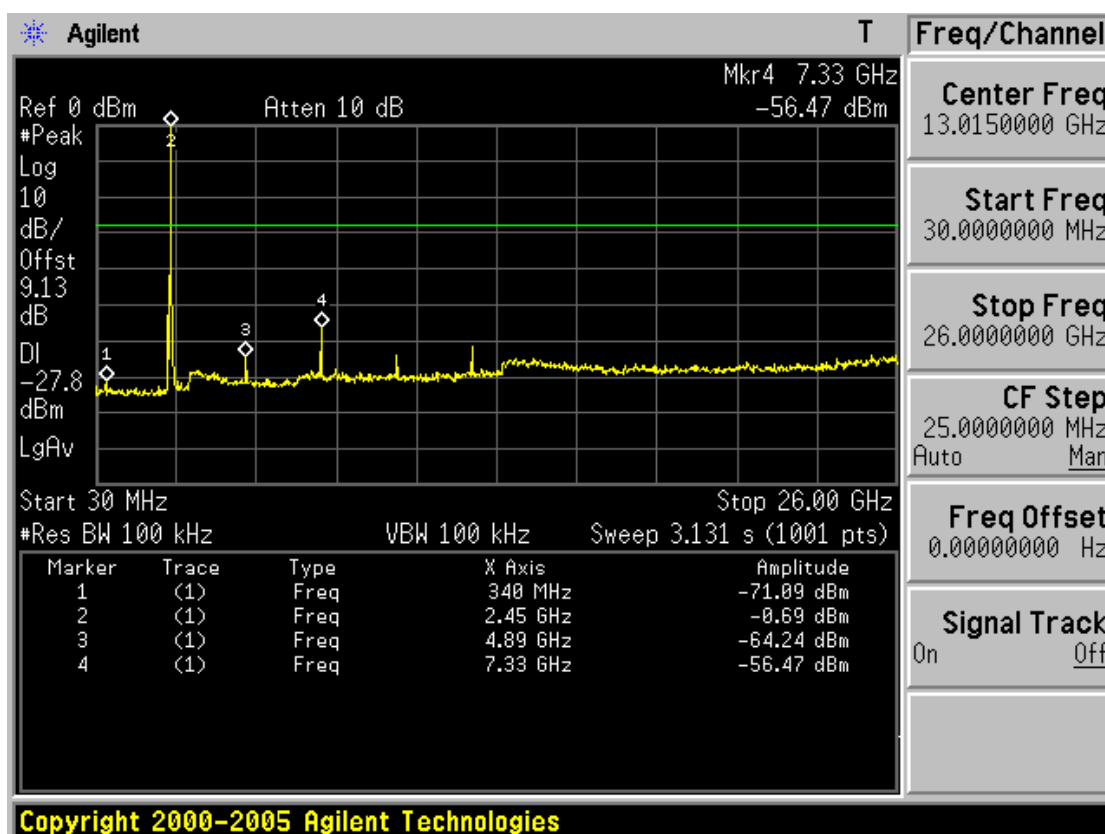
# Low channel spurious



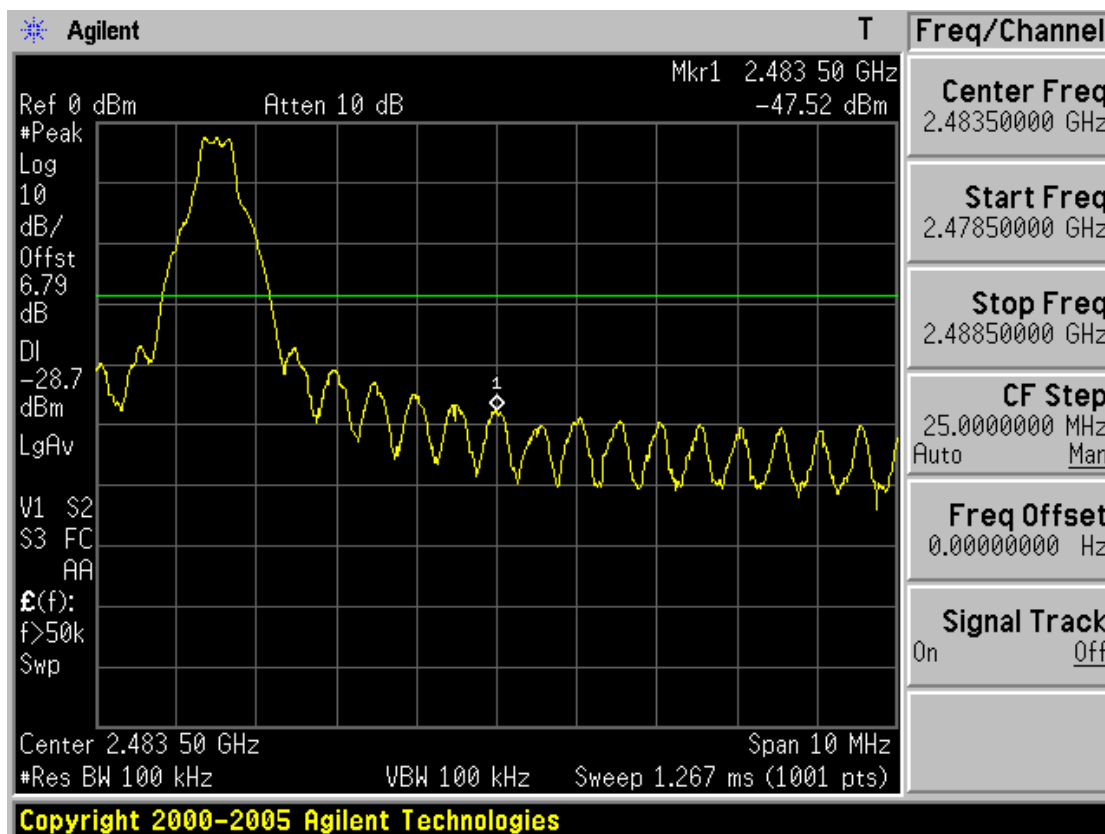
# Mid channel ref



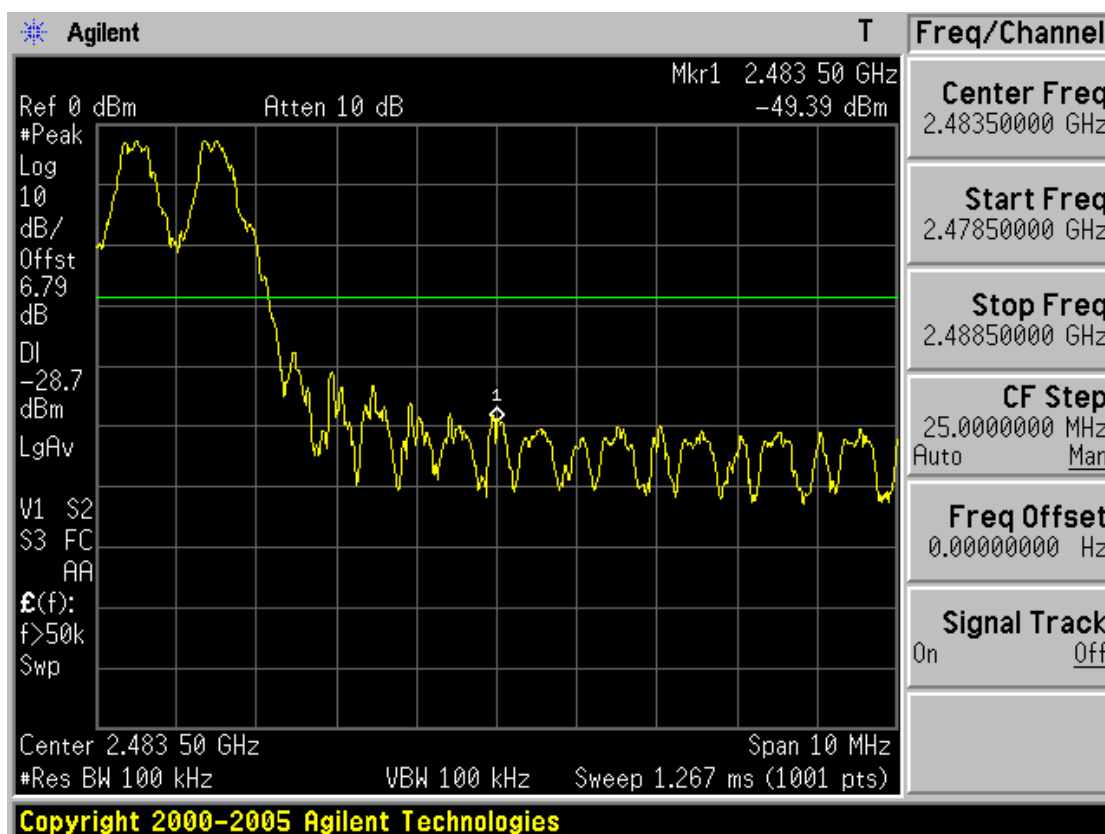
# Mid channel spurious



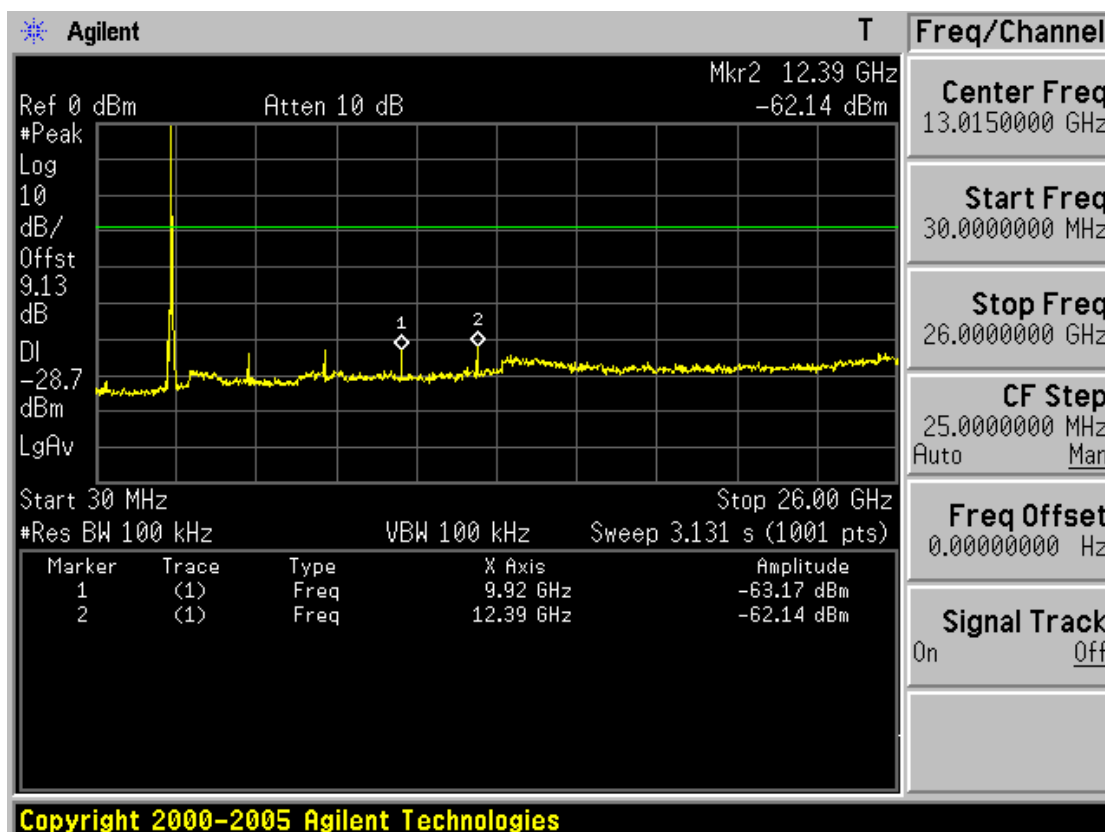
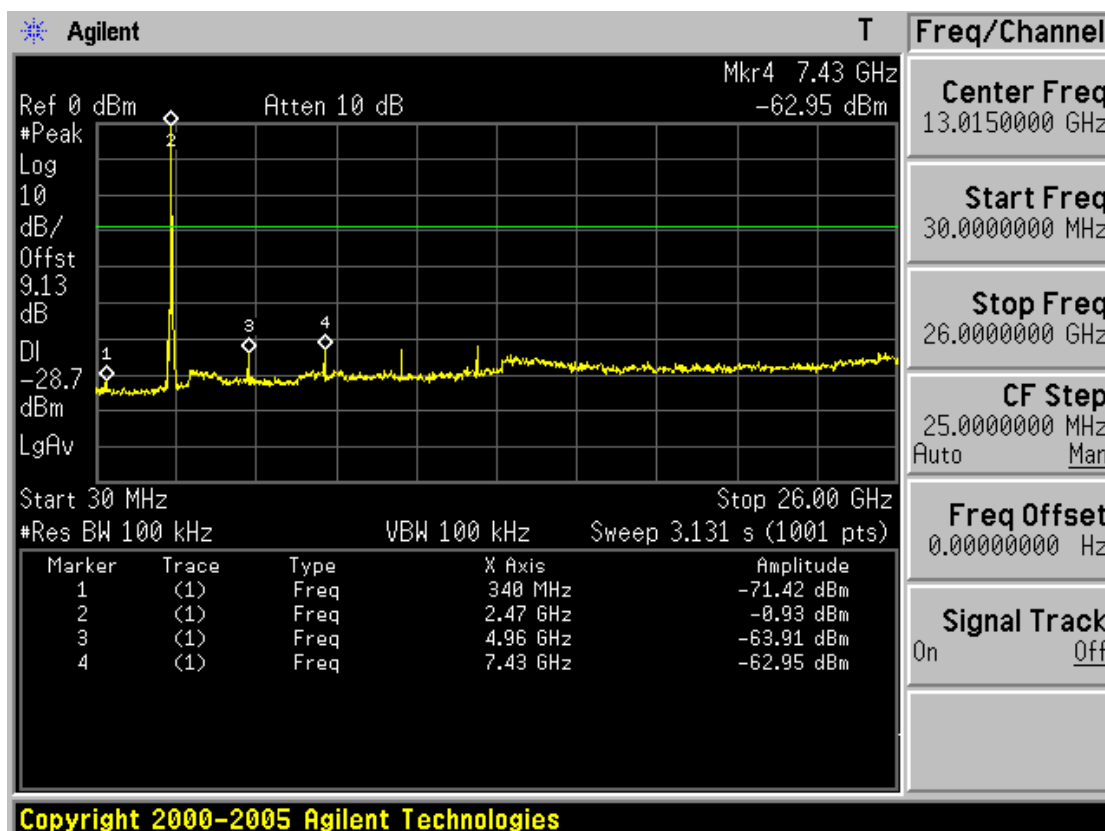
### High band with hopping disabled



### 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.

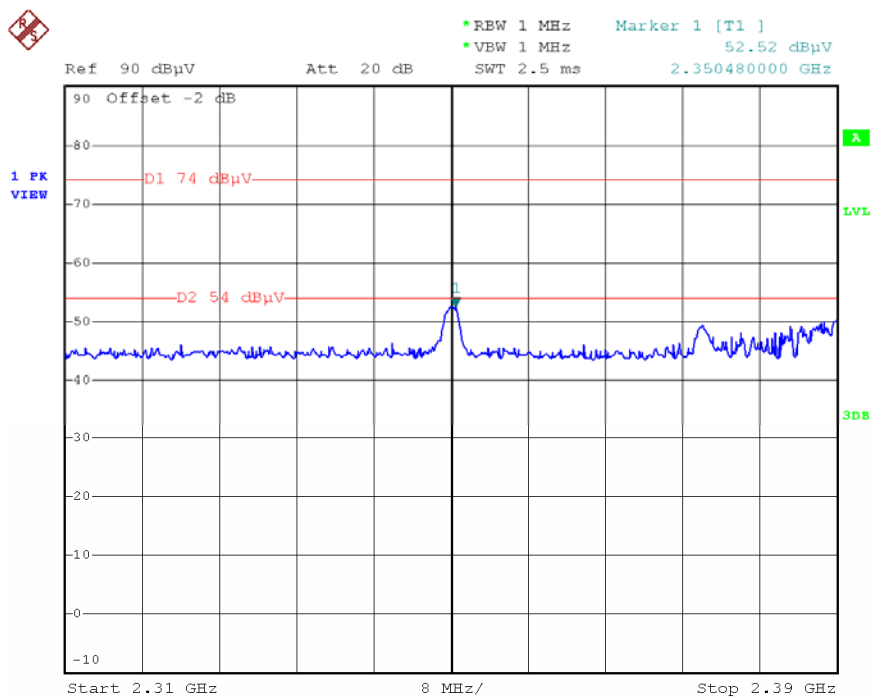
**Minimum Standard: FCC Part 15.205 (a), 15.205(b), 15.209(a) and (b)**

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

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

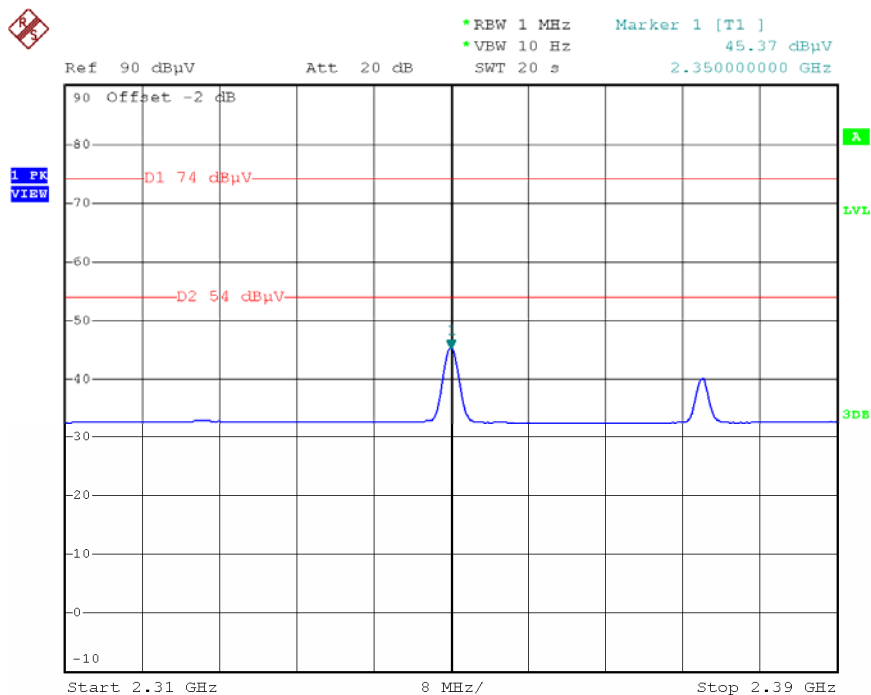
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

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



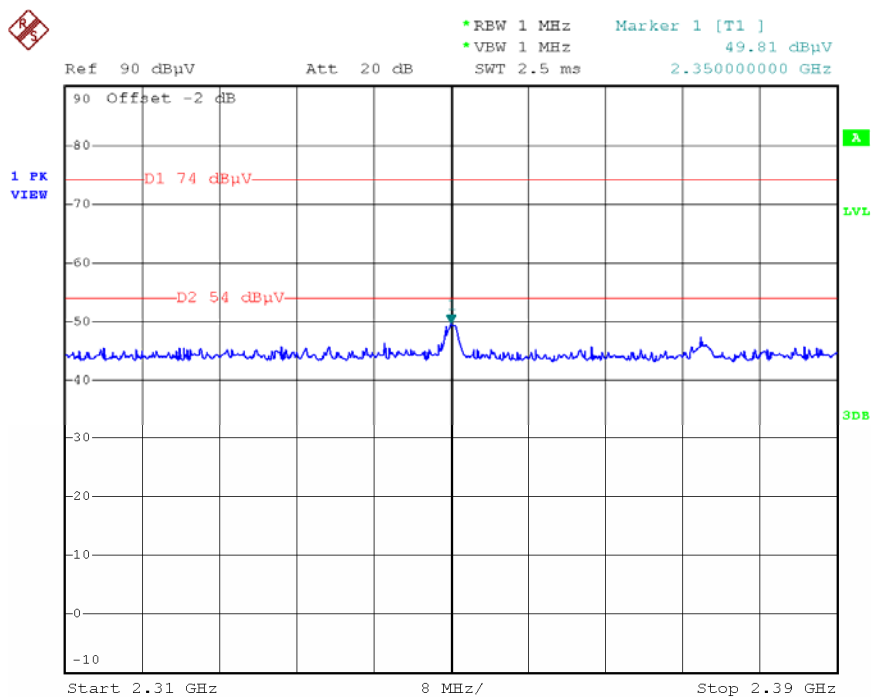
Date: 8.JAN.2008 00:37:37

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



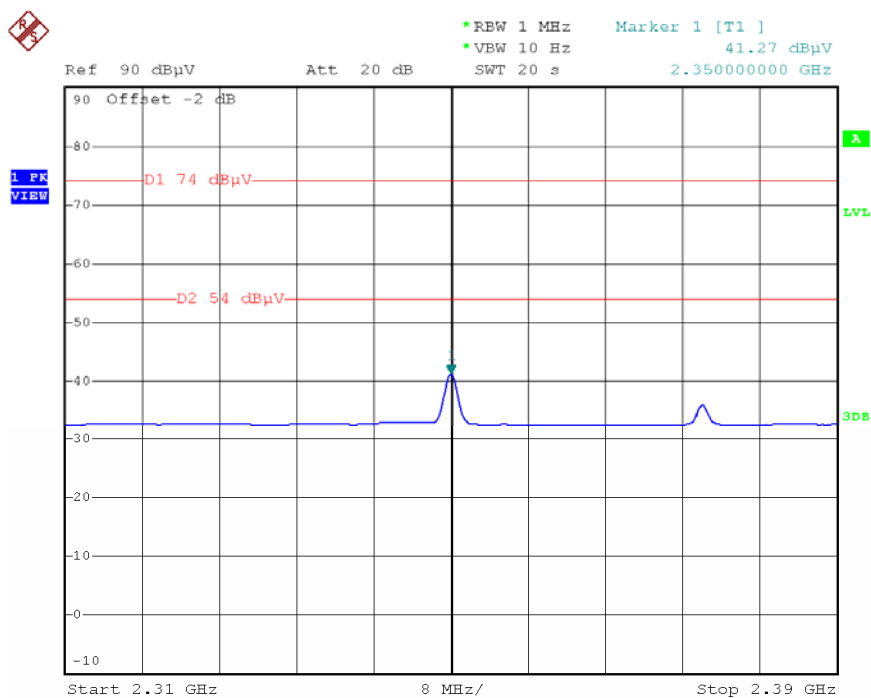
Date: 8.JAN.2008 00:39:10

### Restricted Band Edge: Low Channel (Peak, Vertical)



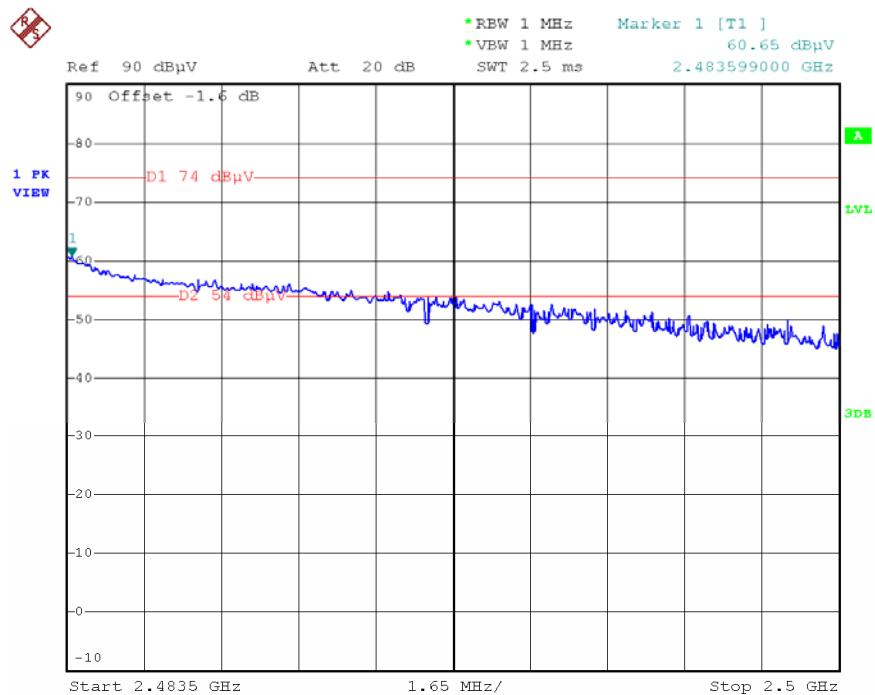
Date: 8.JAN.2008 00:49:14

### Restricted Band Edge: Low Channel (Average, Vertical)



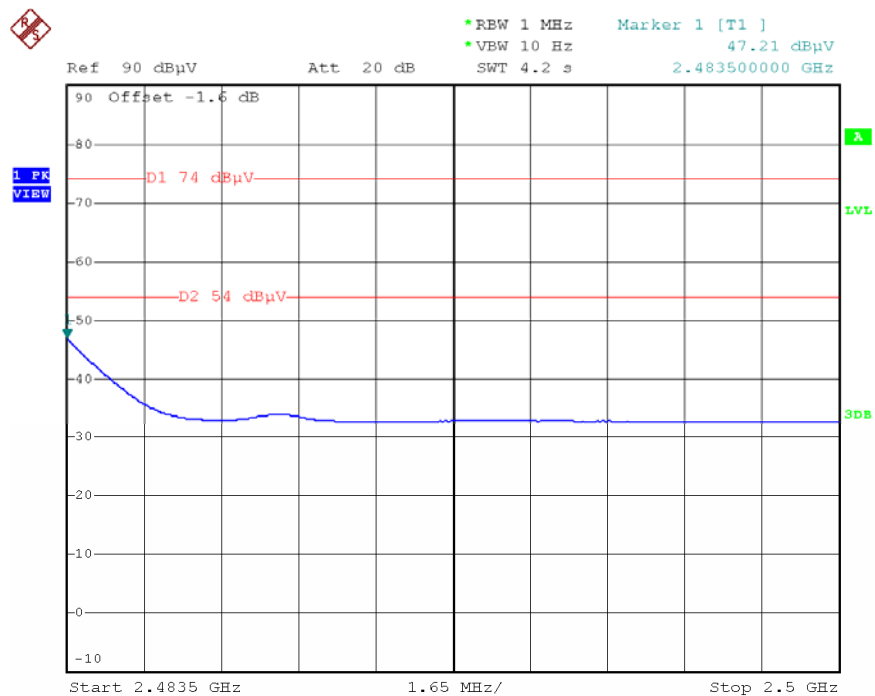
Date: 8.JAN.2008 00:50:45

## Restricted Band Edge: High Channel (Peak, Horizontal)



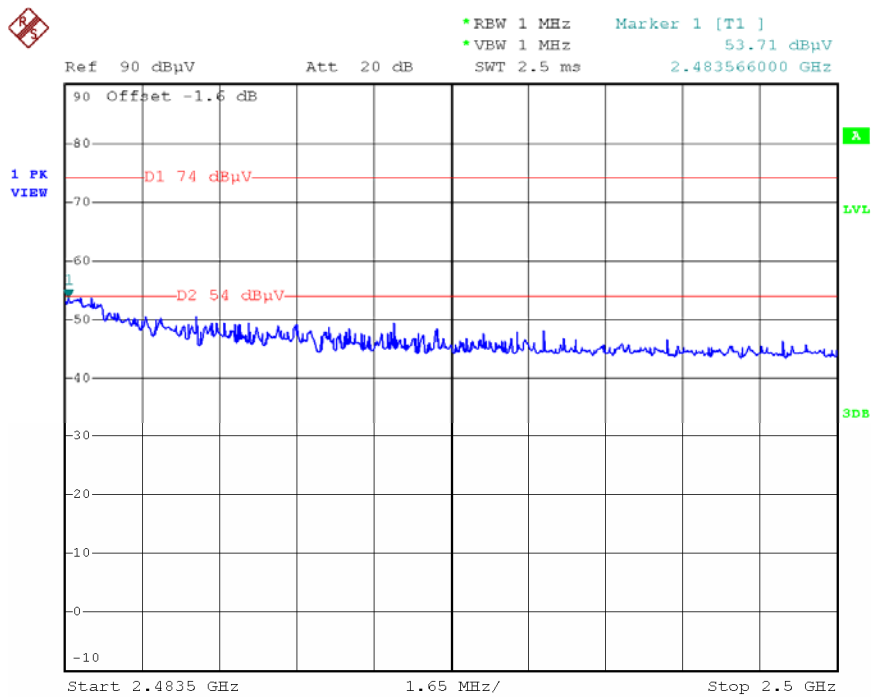
Date: 8.JAN.2008 01:12:04

## Restricted Band Edge: High Channel (Average, Horizontal)



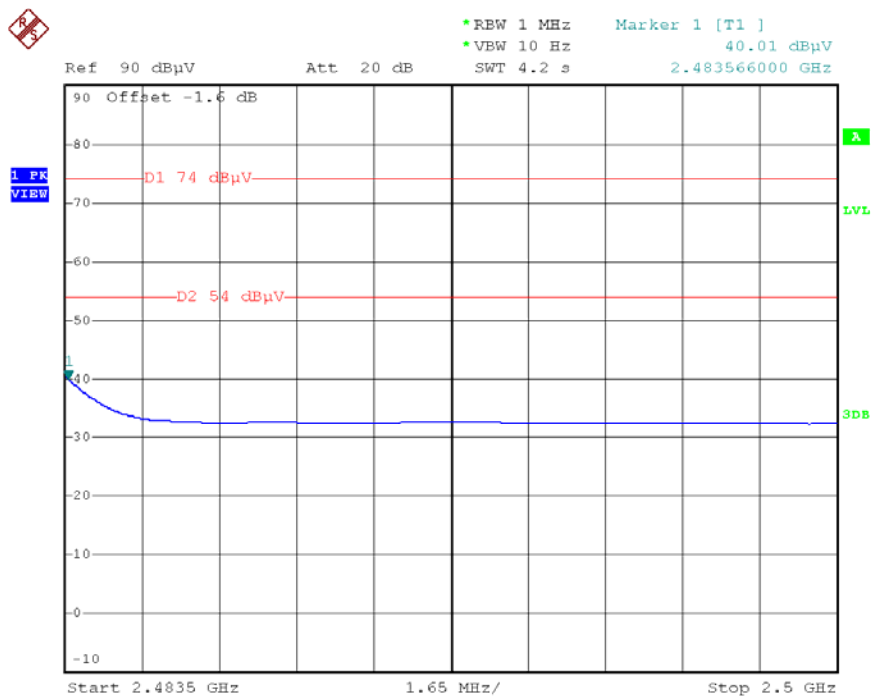
Date: 8.JAN.2008 01:12:46

### Restricted Band Edge: High Channel (Peak, Vertical)



Date: 8.JAN.2008 02:38:16

### Restricted Band Edge: High Channel (Average, Vertical)



Date: 8.JAN.2008 02:39:10

**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            | H       | -             | 45.84 | -  | 5.81     | -              | 51.65 | -  | -             | 74 | 54 | -          | 16.62 | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |

**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 |
| 71.880          | V       | 35.0          | -     | -  | -14.70   | 20.30          | -     | -  | 40            | -  | -  | 19.70      | -     | -  |
| 4882            | H       | -             | 45.77 | -  | 6.39     | -              | 52.16 | -  | -             | 74 | 54 | -          | 16.14 | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |

**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            | H       | -             | 44.60 | -  | 6.51     | -              | 50.97 | -  | -             | 74 | 54 | -          | 15.67 | -  |
|                 |         |               |       |    |          |                |       |    |               |    |    |            |       |    |
|                 |         |               |       |    |          |                |       |    |               |    |    |            |       |    |
|                 |         |               |       |    |          |                |       |    |               |    |    |            |       |    |
| -               | -       | -             | -     | -  | -        | -              | -     | -  | -             | -  | -  | -          | -     | -  |

**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**

- Refer to the next page.

#### 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

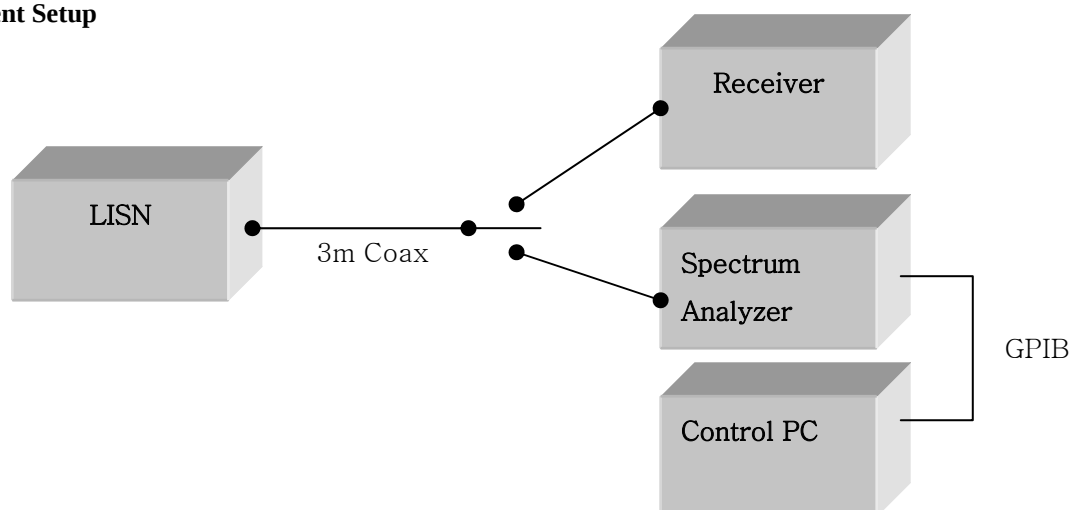
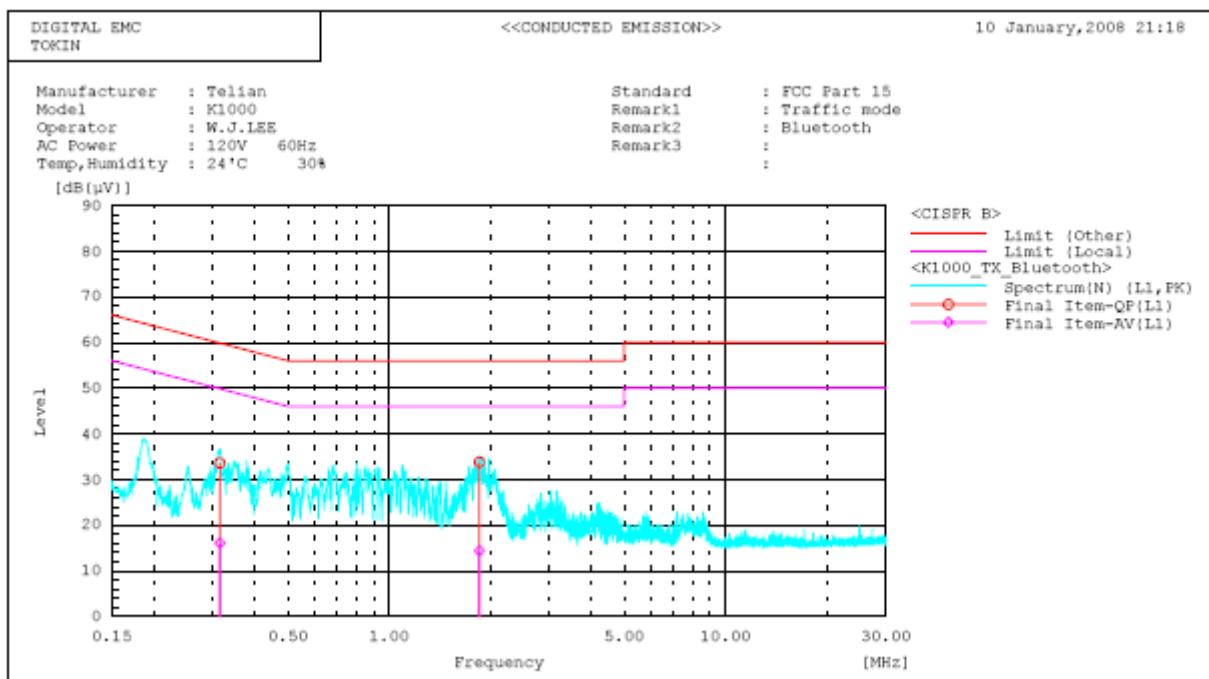
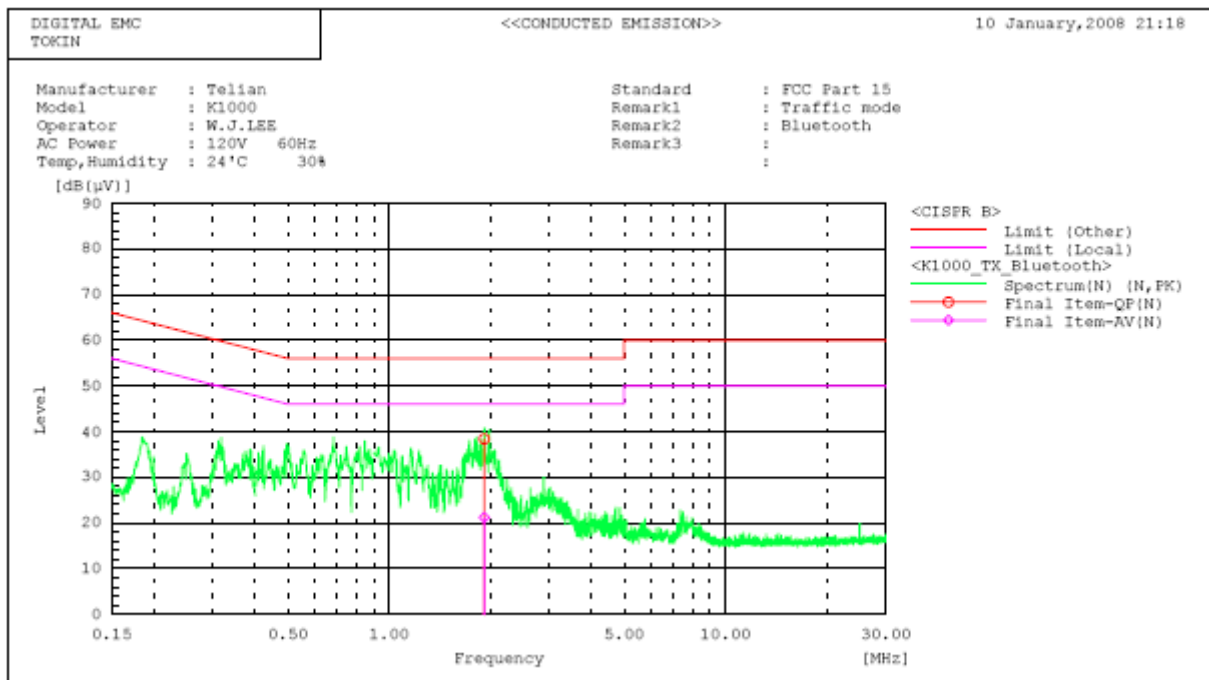


Figure 2: Measurement setup for AC Conducted Emission

# AC Conducted Emissions



# AC Conducted Emissions

```

***** DIGITAL EMC *****
<<CONDUCTED EMISSION>>
10 January, 2008 21:18

Standard      : FCC Part 15
Manufacturer  : Telian
Model         : K1000
Operator      : W.J.LEE
AC Power      : 120V 60Hz
Temp, Humidity : 24°C 30%
Remark1       : Traffic mode
Remark2       : Bluetooth
Remark3       :
:

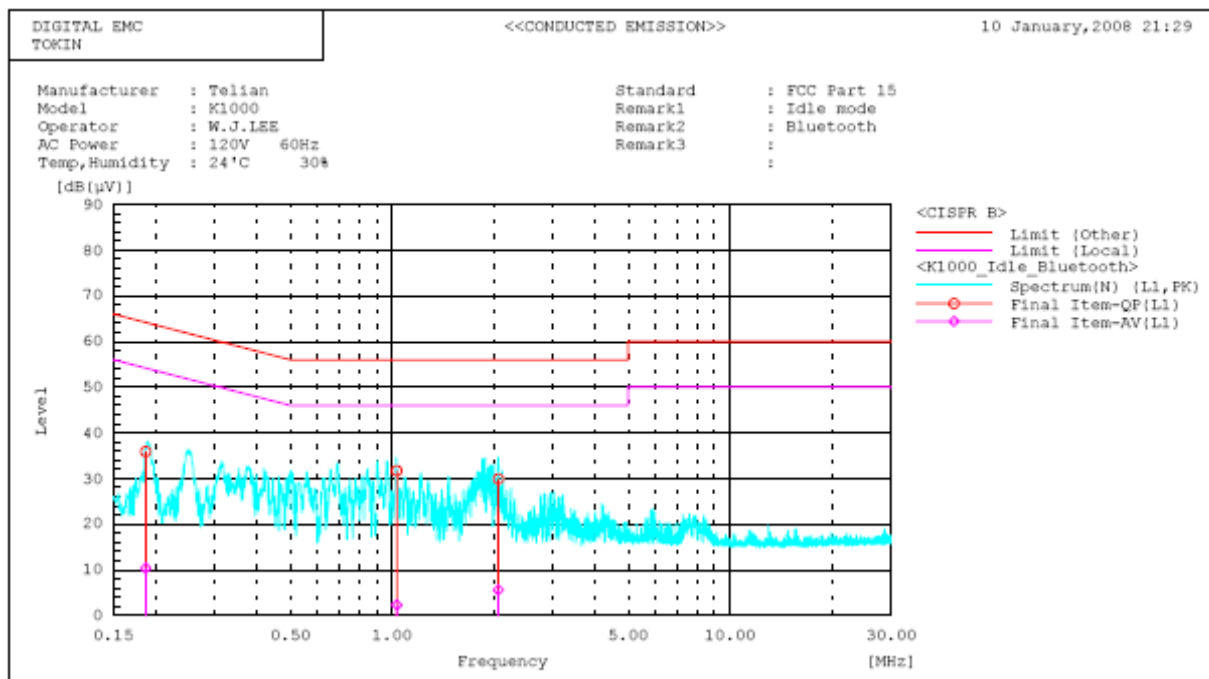
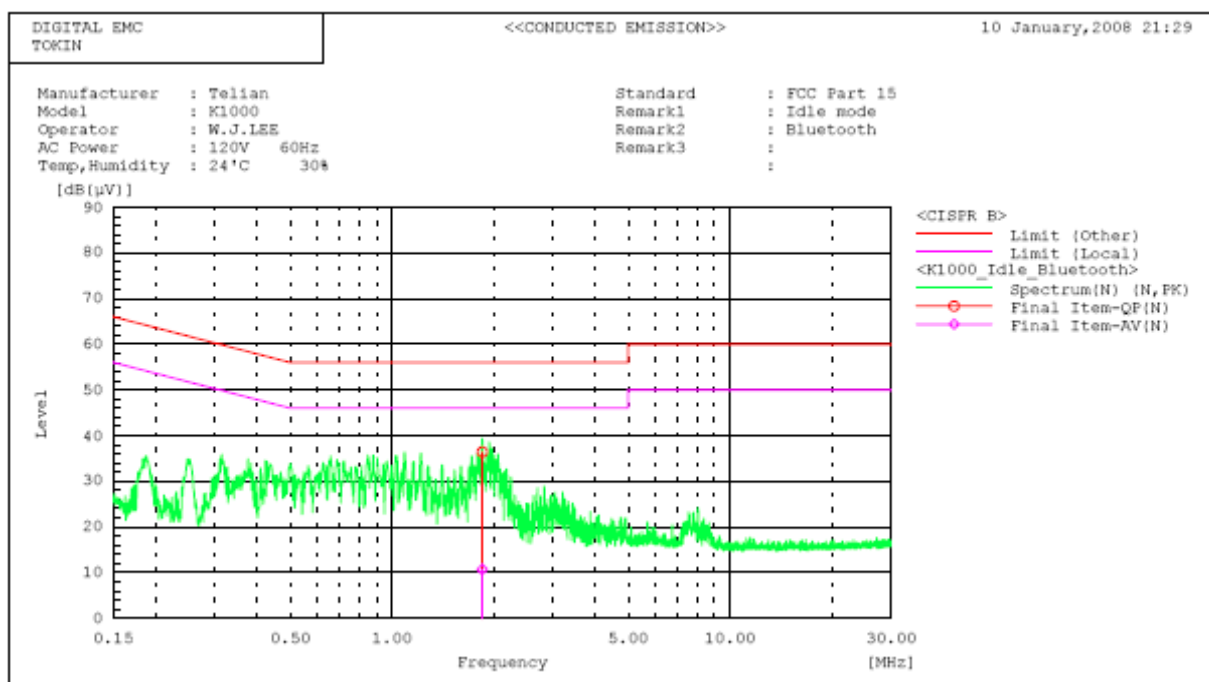
*****
Final Result

---- N Phase ----
No.  Frequency  Reading  Reading  c.f  Result  Result  Limit  Limit  Margin  Margin  Remark
      [MHz]    [dB(μV)]  [dB(μV)]  [dB]  [dB(μV)] [dB(μV)] [dB(μV)] [dB(μV)] [dB]  [dB]
1    1.918      38.3      21.1    0.1   38.4      21.2    56.0    46.0    17.6    24.8

---- L1 Phase ----
No.  Frequency  Reading  Reading  c.f  Result  Result  Limit  Limit  Margin  Margin  Remark
      [MHz]    [dB(μV)]  [dB(μV)]  [dB]  [dB(μV)] [dB(μV)] [dB(μV)] [dB(μV)] [dB]  [dB]
1    0.314      33.4      15.9    0.2   33.6      16.1    59.9    49.9    26.3    33.8
2    1.856      33.6      14.2    0.2   33.8      14.4    56.0    46.0    22.2    31.6

```

# AC Conducted Emissions



## AC Conducted Emissions

```
***** DIGITAL EMC *****
<<CONDUCTED EMISSION>>
10 January, 2008 21:29

Standard      : FCC Part 15
Manufacturer  : Telian
Model         : K1000
Operator      : W.J.LEE
AC Power      : 120V 60Hz
Temp, Humidity : 24°C 30%
Remark1       : Idle mode
Remark2       : Bluetooth
Remark3       :
:

*****
Final Result

=== N Phase ===
No.  Frequency  Reading  Reading  c.f  Result  Result  Limit  Limit  Margin  Margin  Remark
      [MHz]    [dB[μV]] [dB[μV]] [dB]  [dB[μV]] [dB[μV]] [dB[μV]] [dB[μV]] [dB]    [dB]
1    1.851      36.3      10.6   0.1   36.4      10.7   56.0   46.0   19.6   35.3

=== L1 Phase ===
No.  Frequency  Reading  Reading  c.f  Result  Result  Limit  Limit  Margin  Margin  Remark
      [MHz]    [dB[μV]] [dB[μV]] [dB]  [dB[μV]] [dB[μV]] [dB[μV]] [dB[μV]] [dB]    [dB]
1    0.187      35.7      10.2   0.2   35.9      10.4   54.2   44.2   26.3   43.8
2    1.034      31.5       2.1   0.2   31.7       2.3   56.0   46.0   24.3   43.7
3    2.065      29.6       5.3   0.3   29.9       5.6   56.0   46.0   26.1   40.4
```

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    | 17/04/07                   | 17/04/08                    | 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 | Power Meter                                | H.P                | EMP-442A  | 23/03/07                   | 23/03/08                    | GB37170413    |
| 05 | Power Sensor                               | H.P                | 8481A     | 23/03/07                   | 23/03/08                    | 3318A96566    |
| 06 | Frequency Counter                          | H.P                | 5342A     | 06/09/07                   | 06/09/08                    | 2119A04450    |
| 07 | Signal Generator                           | Rohde Schwarz      | SMR20     | 21/03/07                   | 21/03/08                    | 101251        |
| 08 | Signal Generator                           | H.P                | ESG-3000A | 10/07/07                   | 10/07/08                    | US37230529    |
| 09 | Audio Analyzer                             | H.P                | 8903B     | 10/07/07                   | 10/07/08                    | 3011A09448    |
| 10 | Modulation Analyzer                        | H.P                | 8901B     | 14/07/07                   | 14/07/08                    | 3028A03029    |
| 11 | Oscilloscope                               | Tektronix          | TDS3052   | 02/11/07                   | 02/11/08                    | B016821       |
| 12 | Universal Radio<br>Communication tester    | Rohde Schwarz      | CMU200    | 24/04/07                   | 24/04/08                    | 107631        |
| 13 | 8960 Series 10<br>Wireless Comms. Test Set | Agilent            | E5515C    | 18/07/07                   | 18/07/09                    | GB43461134    |
| 14 | Bluetooth Tester                           | TESCOM             | TC-3000A  | 28/03/07                   | 28/03/08                    | 3000A4A0121   |
| 15 | Power Splitter                             | WEINSCHL           | 1593      | 05/10/07                   | 05/10/08                    | 332           |
| 16 | BAND Reject Filter                         | Microwave Circuits | N0308372  | 18/10/07                   | 18/10/08                    | 3125-01DC0312 |
| 17 | BAND Reject Filter                         | Wainwright         | WRCG1750  | 18/10/07                   | 18/10/08                    | SN2           |
| 18 | AC Power supply                            | DAEKWANG           | 5KVA      | 20/03/07                   | 20/03/08                    | N/A           |
| 19 | DC Power Supply                            | H.P                | 6622A     | 20/03/07                   | 20/03/08                    | 465487        |
| 20 | Attenuator (10dB)                          | WEINSCHL           | 23-10-34  | 26/01/07                   | 26/01/08                    | BP4387        |
| 21 | HORN ANT                                   | EMCO               | 3115      | 10/08/07                   | 10/08/08                    | 6419          |
| 22 | HORN ANT                                   | EMCO               | 3115      | 09/10/07                   | 09/10/08                    | 21097         |
| 23 | HORN ANT                                   | A.H.Systems        | SAS-574   | 20/08/07                   | 20/08/08                    | 154           |
| 24 | HORN ANT                                   | A.H.Systems        | SAS-574   | 20/08/07                   | 20/08/08                    | 155           |
| 25 | Dipole Antenna                             | Schwarzbeck        | VHA9103   | 19/12/07                   | 19/12/08                    | 2116          |
| 26 | Dipole Antenna                             | Schwarzbeck        | VHA9103   | 19/12/07                   | 19/12/08                    | 2117          |
| 27 | Dipole Antenna                             | Schwarzbeck        | UHA9105   | 20/12/07                   | 20/12/08                    | 2261          |
| 28 | Dipole Antenna                             | Schwarzbeck        | UHA9105   | 20/12/07                   | 20/12/08                    | 2262          |

|    | Type                         | Manufacturer  | Model           | Cal.Due.Date<br>(dd/mm/yy) | Next.Due.Date<br>(dd/mm/yy) | S/N            |
|----|------------------------------|---------------|-----------------|----------------------------|-----------------------------|----------------|
| 29 | RFI/FIELD Intensity Meter    | Kyorits       | KNM-504D        | 06/09/07                   | 06/09/08                    | SN-161-4       |
| 30 | Frequency Converter          | Kyorits       | KCV-604C        | 21/07/07                   | 21/07/08                    | 4-230-3        |
| 31 | TEMP & HUMIDITY Chamber      | JISCO         | J-RHC2          | 02/10/07                   | 02/10/08                    | 021031         |
| 32 | Log Periodic Antenna         | Schwarzbeck   | UHALP9108<br>A1 | 08/06/07                   | 08/06/08                    | 1098           |
| 33 | Biconical Antenna            | Schwarzbeck   | VHA9103         | 08/06/07                   | 08/06/08                    | 2233           |
| 34 | Digital Multimeter           | H.P           | 34401A          | 20/03/07                   | 20/03/08                    | 3146A13475     |
| 35 | Attenuator (10dB)            | WEINSCHEL     | 23-10-34        | 05/10/07                   | 05/10/08                    | BP4386         |
| 36 | High-Pass Filter             | ANRITSU       | MP526D          | 08/10/07                   | 08/10/08                    | MP27756        |
| 37 | Attenuator (3dB)             | Agilent       | 8491B           | 12/07/07                   | 12/07/08                    | 58177          |
| 38 | Amplifier (25dB)             | Agilent       | 8447D           | 08/08/07                   | 08/08/08                    | 2944A10144     |
| 39 | Amplifier (30dB)             | Agilent       | 8449B           | 25/10/07                   | 25/10/08                    | 3008A01590     |
| 40 | Position Controller          | TOKIN         | 5901T           | N/A                        | N/A                         | 14173          |
| 41 | Driver                       | TOKIN         | 5902T2          | N/A                        | N/A                         | 14174          |
| 42 | Spectrum Analyzer            | H.P           | 8591E           | 16/04/07                   | 16/04/08                    | 3649A05889     |
| 43 | RFI/FIELD Intensity<br>Meter | Kyorits       | KNW-2402        | 06/10/07                   | 06/10/08                    | 4N-170-3       |
| 44 | LISN                         | Kyorits       | KNW-407         | 30/08/07                   | 30/08/08                    | 8-317-8        |
| 45 | LISN                         | Kyorits       | KNW-242         | 06/10/07                   | 06/10/08                    | 8-654-15       |
| 46 | CVCF                         | NF Electronic | 4400            | N/A                        | N/A                         | 344536 4420064 |
| 47 | Software                     | ToYo EMI      | EP5/RE          | N/A                        | N/A                         | Ver 2.0.800    |
| 48 | Software                     | ToYo EMI      | EP5/CE          | N/A                        | N/A                         | Ver 2.0.801    |
| 49 | Software                     | AUDIX         | e3              | N/A                        | N/A                         | Ver 3.0        |
| 50 | Software                     | Agilent       | Benchlink       | N/A                        | N/A                         | A.01.09 021211 |