

|                                                                                   |                                                                                                                          |                                                                                                                                                                                                                                                                                                                                            |                                                         |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|  | <b>ESTECH Co., Ltd.</b><br>Rm. 1015, World Venture Center II,<br>426-5 Gasan-dong, Guncheon-gu,<br>Seoul, 158-803, Korea |     | <b>Electromagnetic<br/>Interference<br/>Test Report</b> |
|                                                                                   |                                                                                                                          |                                                                                                                                                                                                                                                                                                                                            |                                                         |

## Test Report for FCC

|                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                               |                                                      |                   |                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------|---------------------|
| Report Number                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                               | ESTF150710-005                                       |                   |                     |
| Applicant                                                                                                                                                                                                                                                                                                                                                                                 | Company name                                                                                                                  | LG Electronics Inc.                                  |                   |                     |
|                                                                                                                                                                                                                                                                                                                                                                                           | Address                                                                                                                       | 60-39, Gasan-dong, Gumchon-gu, Seoul, 153-023, Korea |                   |                     |
|                                                                                                                                                                                                                                                                                                                                                                                           | Telephone                                                                                                                     | 82-2-2033-3847                                       |                   |                     |
| Product                                                                                                                                                                                                                                                                                                                                                                                   | Product name                                                                                                                  | GSM Phone with Bluetooth                             |                   |                     |
|                                                                                                                                                                                                                                                                                                                                                                                           | Model No.                                                                                                                     | KM520d                                               | Manufacturer      | LG Electronics Inc. |
|                                                                                                                                                                                                                                                                                                                                                                                           | Serial No.                                                                                                                    | NONE                                                 | Country of origin | KOREA               |
| Test date                                                                                                                                                                                                                                                                                                                                                                                 | 2007-10-09 ~ 2007-10-11                                                                                                       |                                                      | Date of issue     | 12-Oct-07           |
| Testing location                                                                                                                                                                                                                                                                                                                                                                          | ESTECH. Co., Ltd.<br>97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea                                                |                                                      |                   |                     |
| Standard                                                                                                                                                                                                                                                                                                                                                                                  | FCC PART 15 2006 , ANSI C 63.4 2003                                                                                           |                                                      |                   |                     |
| Measurement facility registration number                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                               | 94696                                                |                   |                     |
| Tested by                                                                                                                                                                                                                                                                                                                                                                                 | Senior Engineer M.J.Song  (Signature)     |                                                      |                   |                     |
| Reviewed by                                                                                                                                                                                                                                                                                                                                                                               | Engineering Manager J.M.Yang  (Signature) |                                                      |                   |                     |
| Abbreviation                                                                                                                                                                                                                                                                                                                                                                              | OK, Pass = Passed, Fail = Failed, N/A = not applicable                                                                        |                                                      |                   |                     |
| * Note<br>- Basic Model : KM500d<br>- Additional Models : KM500c<br>- Basic Model and Addition Models are same product,only model name is different.<br>- This test report is not permitted to copy partly without our permission<br>- This test result is dependent on only equipment to be used<br>- This test result based on a single evaluation of one sample of the above mentioned |                                                                                                                               |                                                      |                   |                     |

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Appendix 1. Spectral diagram

## 1. Laboratory Information

### 1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

### 1.2 Test Lab.

Corporation Name : ESTECH Co. Ltd

Head Office : Rm 1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, Korea  
(Safety & Telecom. Test Lab)

EMC Test Lab : 58-1 Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea  
97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

### 1.3 Official Qualification(s)

MIC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

## 2. Description of EUT

### 2.1 Summary of Equipment Under Test (Bluetooth)

Product Name : GSM Phone with Bluetooth  
 Model Number : KM520d  
 Modulation Type : FHSS(GFSK,QPSK)  
 Transfer Rate : 1Mbps  
 Number of Channel : 79 ch  
 Serial Number : NONE  
 Manufacturer : LG Electronics Inc.  
 Country of origin : KOREA  
 Rating : INPUT:AC100~240V , 50/60Hz 0.2A Output:DC 5.1V,...0.7A  
 Receipt Date : 2-Oct-07

### 2.2 General descriptions of EUT

- GSM Phone offers Bluetooth as a feature. The Bluetooth frequency hopping transceiver is designed to operate between 2400 and 2483.5MHz.
- the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) stream. It is also comply with FHSS requirements in Section 15.247(a)(1).  
 : Its hopping sequence is pseudo random, all channels used equally on average.  
 The receiver input bandwidth approximately equal the transmit band bandwidth, and its hop in sequence with the transmit signal.
- the system does not coordinate its channel selection/hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

### 3. Test Standards

#### Test Standard : FCC PART 15 (2006)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

#### Test Method : ANSI C 63.4 (2003)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units.

#### Summary of Test Results

| Applied Standard : 47 CFR Part 15, Subpart C |                                |        |                      |           |
|----------------------------------------------|--------------------------------|--------|----------------------|-----------|
| Standard                                     | Test Type                      | Result | Remark               | Limit     |
| 15.207                                       | AC Power Conducted Emission    | Pass   | Meet the requirement |           |
| 15.209                                       | Intentional Radiated Emission  | Pass   | Meet the requirement |           |
| 15.247(a)(1)                                 | Carrier Frequency Separation & | Pass   | Meet the requirement | >25kHz    |
|                                              | 20 Bandwidth                   |        |                      |           |
| 15.247(b)                                    | Maximum Peak output power      | Pass   | Meet the requirement | 30dBm(1W) |
| 15.247(a)(1)(ii)                             | Number of Hopping Frequency    | Pass   | Meet the requirement | >75       |
| 15.247(c)                                    | Transmitter Radiated Emission  | Pass   | Meet the requirement |           |
| 15.247(a)(1)(iii)                            | Time of Occupancy (Dwell Time) | Pass   | Meet the requirement | <400ms    |
| 15.247(c)                                    | Band Edge Measurement          | Pass   | Meet the requirement |           |

## 4. Measurement Condition

### 4.1 EUT Operation.

#### a. Channel

| Ch. | Frequency | Ch. | Frequency |
|-----|-----------|-----|-----------|
| 0   | 2402 MHz  | 40  | 2442 MHz  |
| 1   | 2403 MHz  | 41  | 2443 MHz  |
| 2   | 2404 MHz  | 42  | 2444 MHz  |
| 3   | 2405 MHz  | 43  | 2445 MHz  |
| 4   | 2406 MHz  | ... | ...       |
| ... | ...       | 78  | 2480 MHz  |
| 39  | 2441 MHz  |     |           |

b. Measurement Channel : Low(2402MHz), Middle(2441MHz),High(2480MHz)

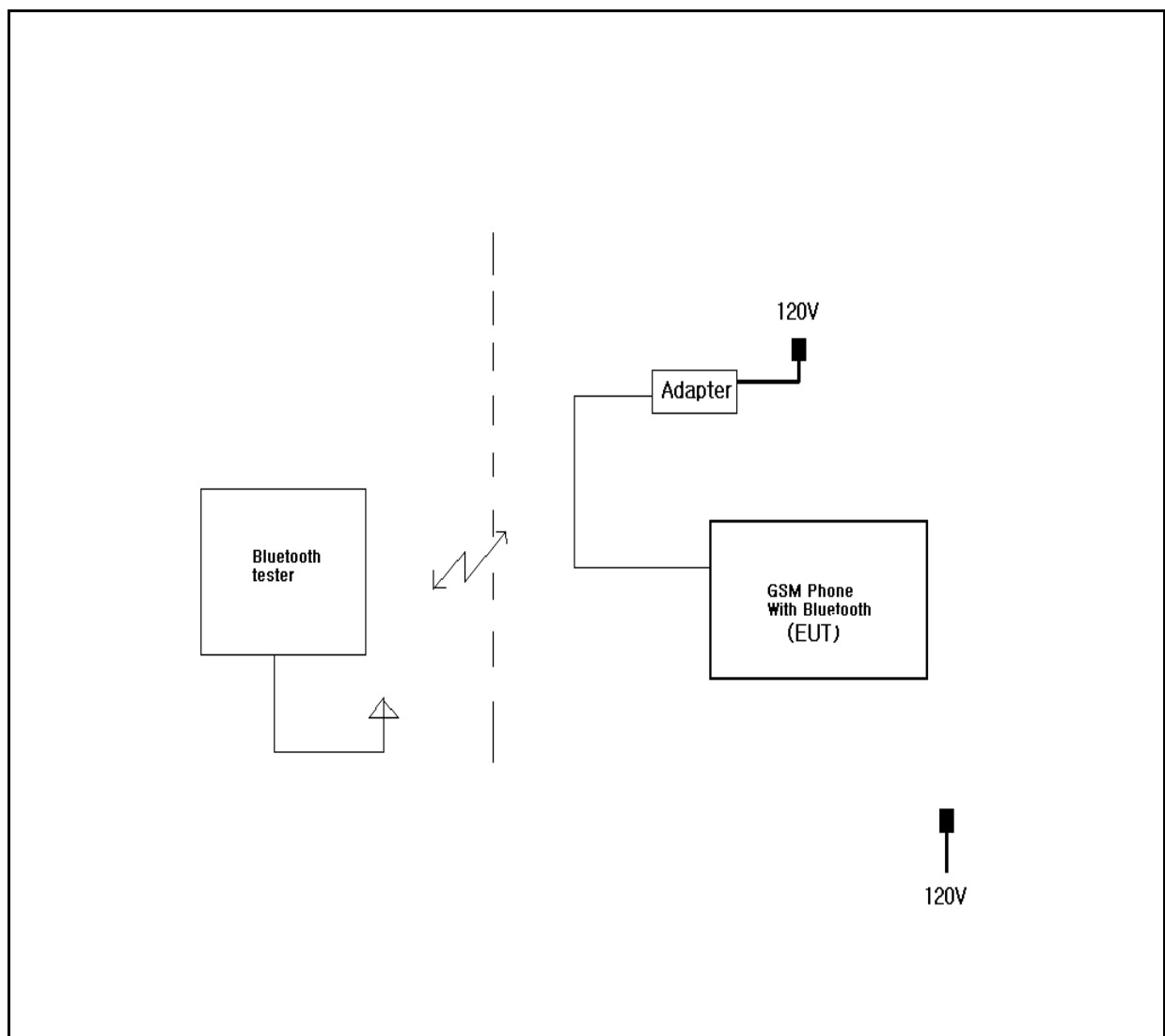
c. Test Mode : FHSS, GFSK

d. Test rate : 1Mbps

## 4.2 EUT Operation.

- \* The EUT was in the following operation mode during all testing
- \* The operational conditions of the EUT was determined by the manufacturer according to the typical use of the EUT with respect to the expected highest level of emission
- \* After setting bluetooth tester and GSM Phone, EUT under transmission/receiving condition continuously at specific channel frequency.
- \* Osilator frequency:26MHz
- \* The supporting equipments used in the Part 15B testing were approved under DoC.

## 4.3 Configuration and Peripherals



#### 4.4 EUT and Support equipment

| Equipment Name           | Model Name | S/N           | Manufacturer        | Remark (FCC ID) |
|--------------------------|------------|---------------|---------------------|-----------------|
| GSM Phone with Bluetooth | KM520d     | NONE          | LG Electronics Inc. | EUT             |
| ADAPTER                  | STA-P52ED  | 070612DE04668 | LG Electronics Inc. |                 |
|                          |            |               |                     |                 |

#### 4.5 Cable Connecting

| Start Equipment          |          | End Equipment |          | Cable Standard |          | Remark |
|--------------------------|----------|---------------|----------|----------------|----------|--------|
| Name                     | I/O port | Name          | I/O port | Length         | Shielded |        |
| GSM Phone with Bluetooth | Power    | Adapter       | –        | 2              | No       |        |
|                          |          |               |          |                |          |        |

## 5. Carrier Frequency Separation

### 5.1 Test procedure

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

### 5.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 300KHz
- . VBW= 300KHz
- . Span= 3MHz
- . Sweep= suitable duration based on the EUT specification.

#### 6dB Bandwidth Test Instruments

| Description                | Model        | Serial Number | Cal. Due Date |
|----------------------------|--------------|---------------|---------------|
| Spectrum Analyzer          | E4407B       | US42041281    | 2008-03-02    |
| Bluetooth Tester           | TC-3000A     | 3000A570224   | 2007-12-06    |
| Dual Directional Coupler   | 778D         | 16502         | 2008-03-02    |
| -Spectrum Analyzer <=> EUT | Loss: 21.0dB | -             |               |

### 5.3 Measurement results

|             |              |                            |            |
|-------------|--------------|----------------------------|------------|
| EUT         | Bluetooth    | MODEL                      | KM520d     |
| MODE        | FHSS         | ENVIRONMENTAL<br>CONDITION | 25℃, 43%RH |
| INPUT POWER | 120Vac, 60Hz |                            |            |

| CHANNEL | Channel Frequency<br>(MHz) | Bandwidth at<br>20dB below(kHz) | Channel<br>Separation<br>(MHz) | Limit<br>(kHz) | PASS/FAIL |
|---------|----------------------------|---------------------------------|--------------------------------|----------------|-----------|
| 39      | 2441                       | 915.7                           | 1.0                            | >25            | PASS      |

| CHANNEL | Channel Frequency<br>(MHz) | Bandwidth at<br>20dB below(kHz) | Channel<br>Separation<br>(MHz) | Limit<br>(kHz) | PASS/FAIL |
|---------|----------------------------|---------------------------------|--------------------------------|----------------|-----------|
| 39      | 2441                       | 1277.0                          | 1.0                            | >25            | PASS      |



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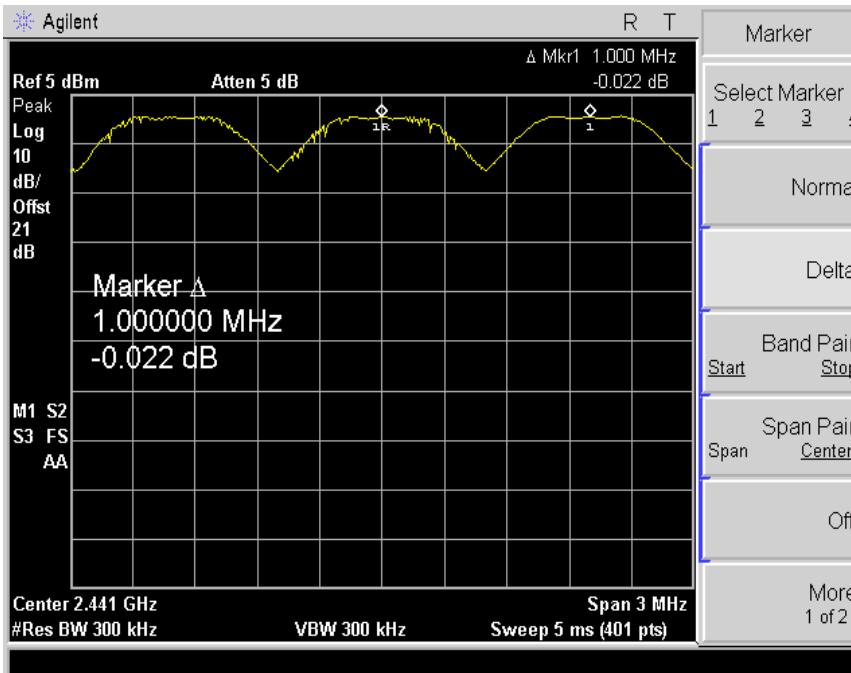
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Seoul, 158-803, Korea



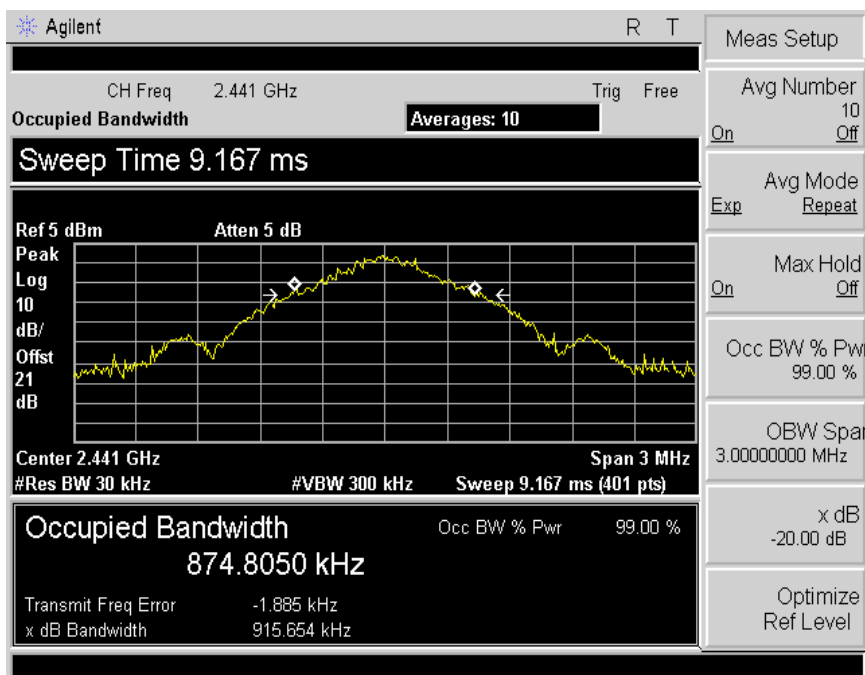
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## 5.4 Trace data

### Channel Separation



### 20dB bandwidth





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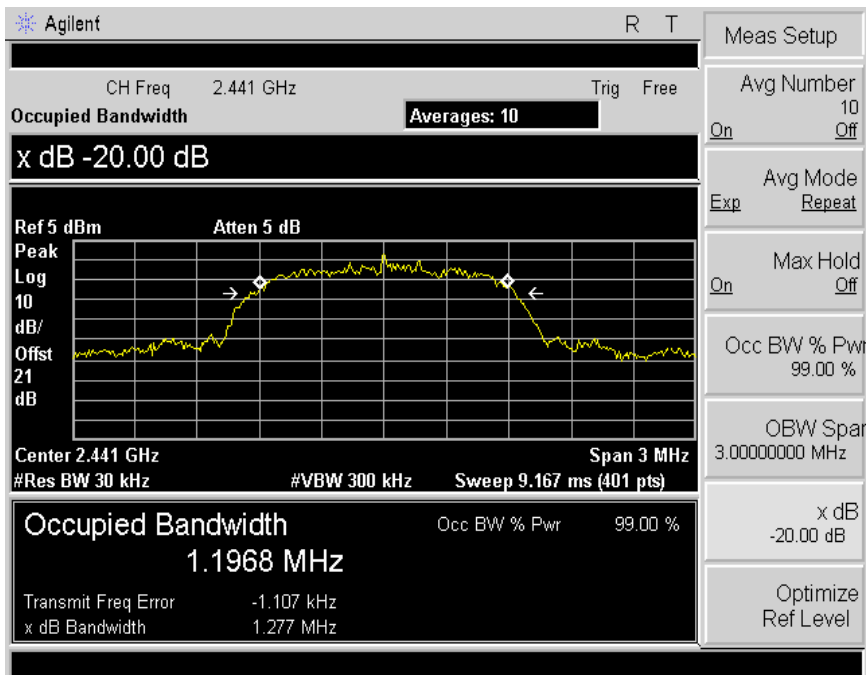
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### 5.4 Trace data

20dBm bandwidth



## 6. MAXIMUM PEAK OUTPUT POWER

### 6.1 Test procedure

The transmitter antenna terminal is connected to the input of a Spectrum Analyzer. Measurement is made while EUT is operating in transmission mode at the appropriate center frequency. The maximum peak output power measurement is 30dBm.

The spectrum analyzer is set to as following.

- . RBW= 1MHz
- . VBW= 1MHz
- . Span= 1MHz
- . Sweep= 1.6s

| Description                | Model        | Serial Number | Cal. Due Date |
|----------------------------|--------------|---------------|---------------|
| Spectrum Analyzer          | E4407B       | US42041281    | 2008-03-02    |
| Bluetooth Tester           | TC-3000A     | 3000A570224   | 2007-12-06    |
| Dual Directional Coupler   | 778D         | 16502         | 2008-03-02    |
| -Spectrum Analyzer <=> EUT | Loss: 21.0dB | -             |               |

### 6.2 Measurement results

|             |              |                            |            |
|-------------|--------------|----------------------------|------------|
| EUT         | Bluetooth    | MODEL                      | KM520d     |
| MODE        | GFSK, DH5    | ENVIRONMENTAL<br>CONDITION | 25℃, 43%RH |
| INPUT POWER | 120Vac, 60Hz |                            |            |

| CHANNEL | Channel<br>Frequency<br>(MHz) | Peak Power Output(dBm) |        | Limit[1W]<br>(dBm) | PASS/<br>FAIL |
|---------|-------------------------------|------------------------|--------|--------------------|---------------|
|         |                               | (dBm)                  | (W)    |                    |               |
| 0       | 2402                          | -0.21                  | 0.0010 | 30.0               | PASS          |
| 39      | 2441                          | 0.63                   | 0.0012 | 30.0               | PASS          |
| 78      | 2480                          | 0.80                   | 0.0012 | 30.0               | PASS          |

| CHANNEL | Channel<br>Frequency<br>(MHz) | Peak Power Output(dBm) |        | Limit[1W]<br>(dBm) | PASS/<br>FAIL |
|---------|-------------------------------|------------------------|--------|--------------------|---------------|
|         |                               | (dBm)                  | (W)    |                    |               |
| 0       | 2402                          | -2.18                  | 0.0006 | 30.0               | PASS          |
| 39      | 2441                          | -0.32                  | 0.0009 | 30.0               | PASS          |
| 78      | 2480                          | 0.14                   | 0.0010 | 30.0               | PASS          |

## 7. Number of Hopping Frequency

### 7.1 Test procedure

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz–2483.5MHz bands shall use at least 75 hopping frequencies.

### 7.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 300KHz
- . VBW= 300KHz
- . Span= the frequency band of operation
- . Sweep= suitable duration based on the EUT specification.

The Number of Hopping Frequency Test Instruments

| Description                | Model        | Serial Number | Cal. Due Date |
|----------------------------|--------------|---------------|---------------|
| Spectrum Analyzer          | E4407B       | US42041281    | 2008-03-02    |
| Bluetooth Tester           | TC-3000A     | 3000A570224   | 2007-12-06    |
| Dual Directional Coupler   | 778D         | 16502         | 2008-03-02    |
| -Spectrum Analyzer <=> EUT | Loss: 21.0dB |               |               |

### 7.3 Measurement results

|              |                      |                            |            |
|--------------|----------------------|----------------------------|------------|
| EUT          | Bluetooth            | MODEL                      | KM520d     |
| MODE         | FHSS                 | ENVIRONMENTAL<br>CONDITION | 25℃, 43%RH |
| INPUT POWER  | 120Vac, 60Hz         |                            |            |
| Number of CH | Limit (Number of CH) | PASS/FAIL                  |            |
| 79           | >75                  | PASS                       |            |



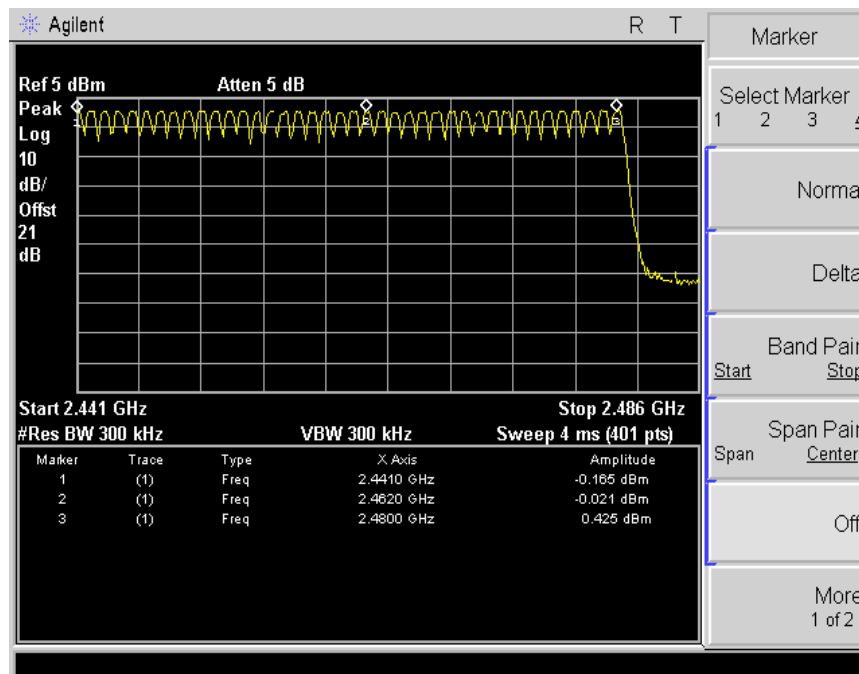
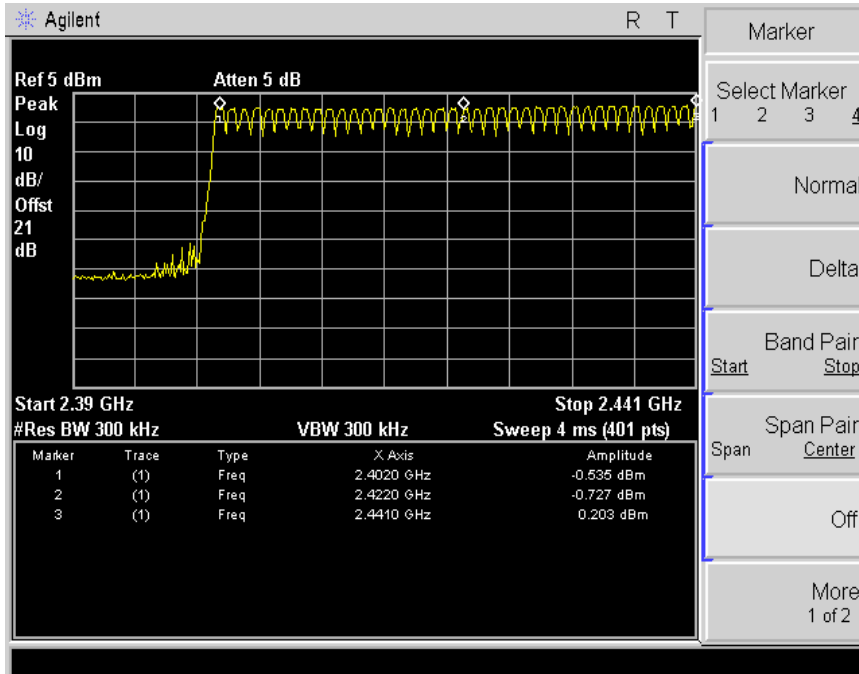
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## 7.4 Trace data



## 8. Time of Occupancy (Dwell Time)

### 8.1 Test procedure

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

### 8.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 1MHz
- . VBW≥RBW
- . Span= zero span, centered on a hopping channel
- . Sweep = as necessary to capture the entire dwell time per hopping channel
- . Detector function = Peak
- . Trace = Max hold

The Time of Occupancy Test Instruments

| Description                | Model        | Serial Number | Cal. Due Date |
|----------------------------|--------------|---------------|---------------|
| Spectrum Analyzer          | E4407B       | US42041281    | 2008-03-02    |
| Bluetooth Tester           | TC-3000A     | 3000A570224   | 2007-12-06    |
| Dual Directional Coupler   | 778D         | 16502         | 2008-03-02    |
| -Spectrum Analyzer <=> EUT | Loss: 21.0dB | —             |               |

### 8.3 Measurement results

|             |              |                            |            |
|-------------|--------------|----------------------------|------------|
| EUT         | Bluetooth    | MODEL                      | KM520d     |
| MODE        | FHSS         | ENVIRONMENTAL<br>CONDITION | 24℃, 43%RH |
| INPUT POWER | 120Vac, 60Hz |                            |            |

## 8.3 Measurement Data

### A. DH1 Mode

One period for each particular channel :  $0.439 \text{ ms} \times 320.1 = 140.5 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 0.439          | 400        | PASS      |

### B. DH3 Mode

One period for each particular channel :  $1.710 \text{ ms} \times 159.9 = 273.4 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 1.720          | 400        | PASS      |

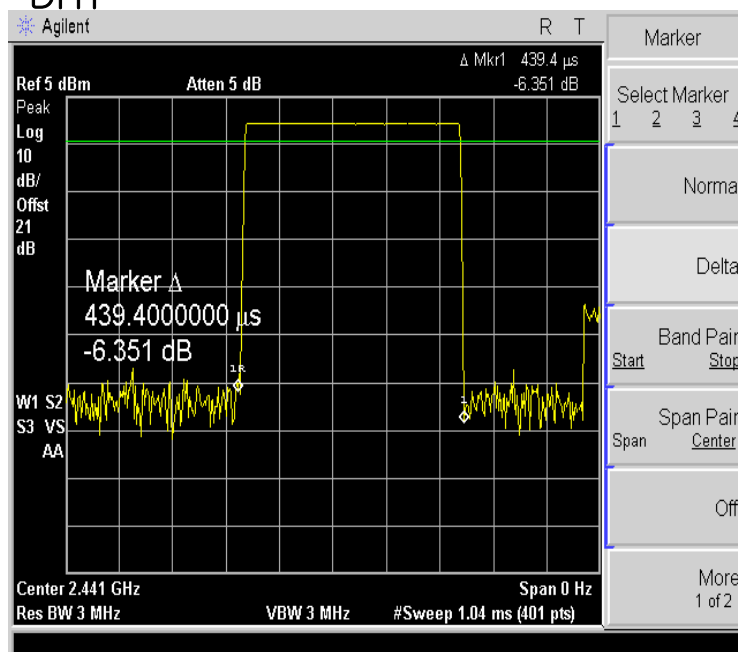
### C. DH5 Mode

One period for each particular channel :  $2.975 \text{ ms} \times 106.81 = 317.8 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 2.975          | 400        | PASS      |

## 8.4 Trace data

### DH1





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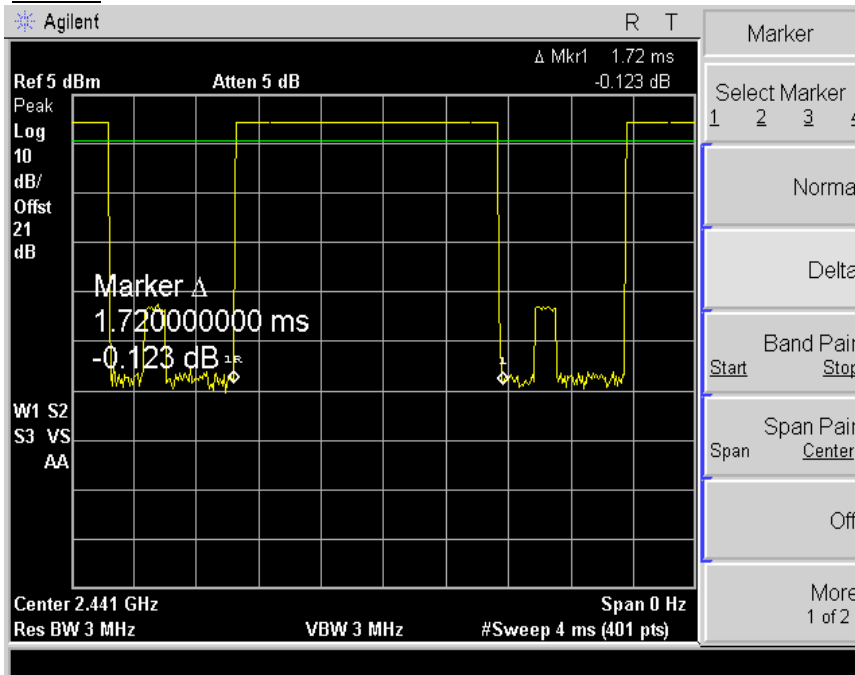
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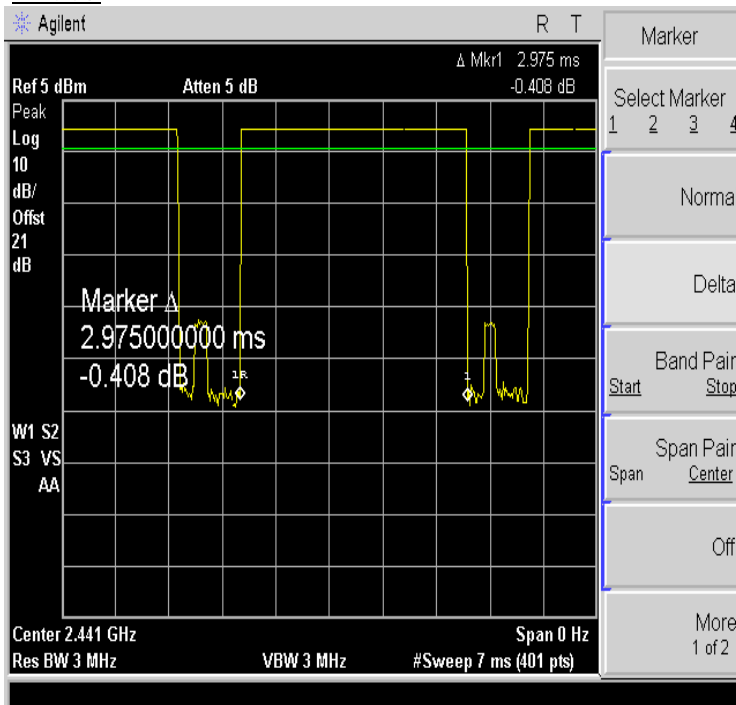
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## 8.4 Trace data

### DH3



### DH5



## 8.3 Measurement Data(EDR)

### A. DH1 Mode

One period for each particular channel :  $0.436 \text{ ms} \times 320.1 = 141.5 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 0.442          | 400        | PASS      |

### B. DH3 Mode

One period for each particular channel :  $1.710 \text{ ms} \times 159.9 = 272.1 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 1.702          | 400        | PASS      |

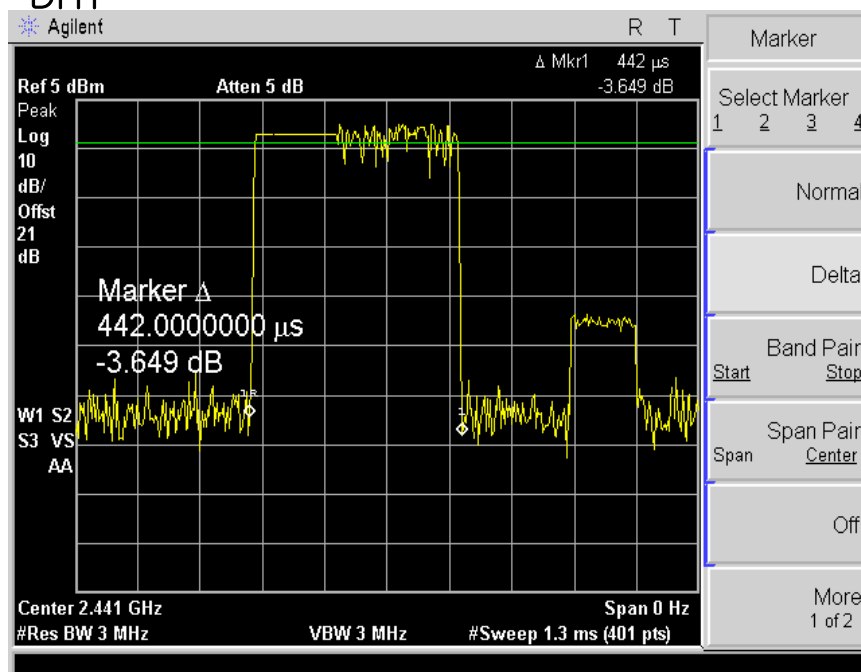
### C. DH5 Mode

One period for each particular channel :  $2.980 \text{ ms} \times 106.81 = 320.4 \text{ ms}$

| Channel | Pulse Time(ms) | Limit (ms) | PASS/FAIL |
|---------|----------------|------------|-----------|
| 39      | 3.000          | 400        | PASS      |

## 8.4 Trace data

### DH1





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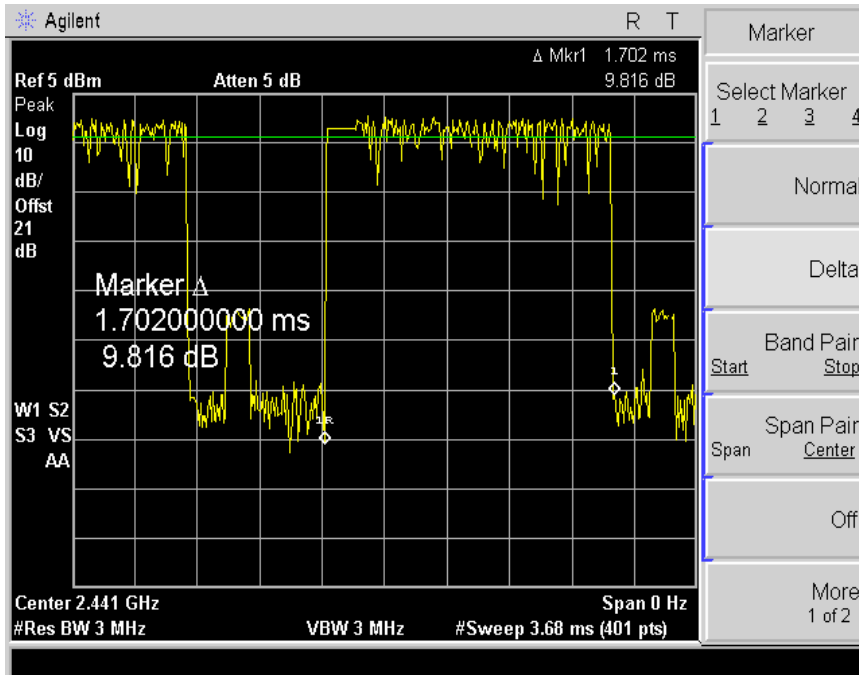
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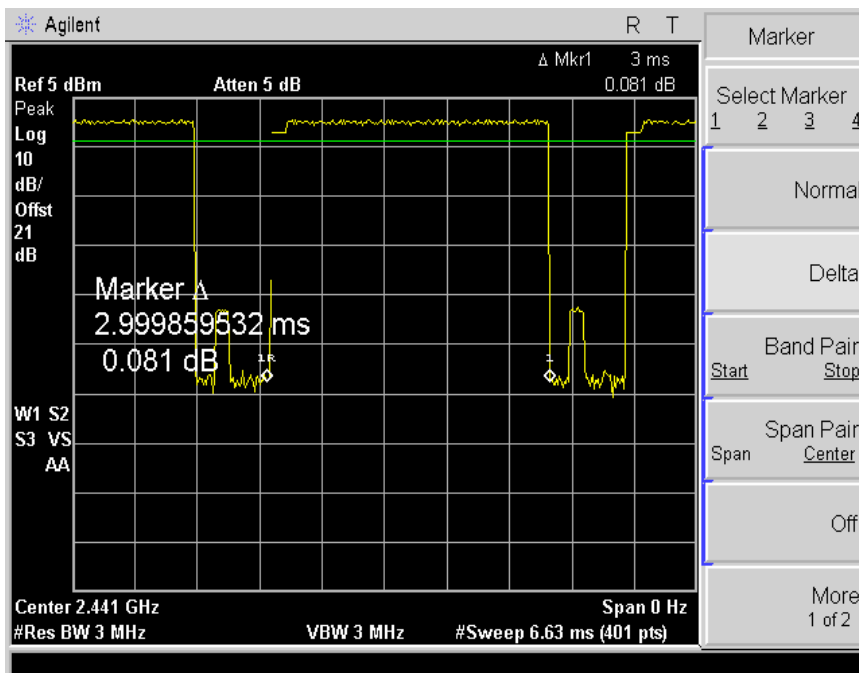
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## 8.4 Trace data(EDR)

### DH3



### DH5



## 9. band-edge and out of band emissions.

### 9.1 Test procedure

The radio frequency power at 20dB down from the highest inband power level is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The band edge&out of band emission shall be at least 20dB below of the highest inband power level.

### 9.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 100KHz
- . VBW= 100KHz
- . Span= suitable frequency span
- . Sweep= suitable duration based on the EUT specification.

#### Band Edge&Out of Emission Test Instruments

| Description                | Model        | Serial Number | Cal. Due Date |
|----------------------------|--------------|---------------|---------------|
| Spectrum Analyzer          | E4407B       | US42041281    | 2008-03-02    |
| Bluetooth Tester           | TC-3000A     | 3000A570224   | 2007-12-06    |
| Dual Directional Coupler   | 778D         | 16502         | 2008-03-02    |
| -Spectrum Analyzer <=> EUT | Loss: 21.0dB |               |               |

### 9.3 Measurement results of band-edge & out of emission

|             |              |                            |            |
|-------------|--------------|----------------------------|------------|
| EUT         | Bluetooth    | MODEL                      | KM520d     |
| MODE        | GFSK         | ENVIRONMENTAL<br>CONDITION | 25℃, 43%RH |
| INPUT POWER | 120Vac, 60Hz |                            |            |

\* Refer to attach spectrum analyzer data chart.



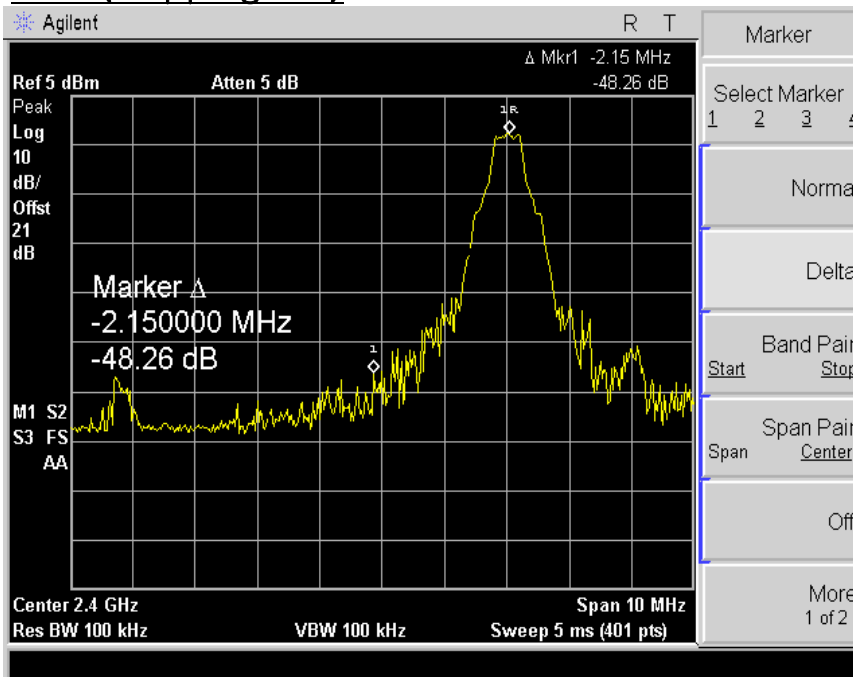
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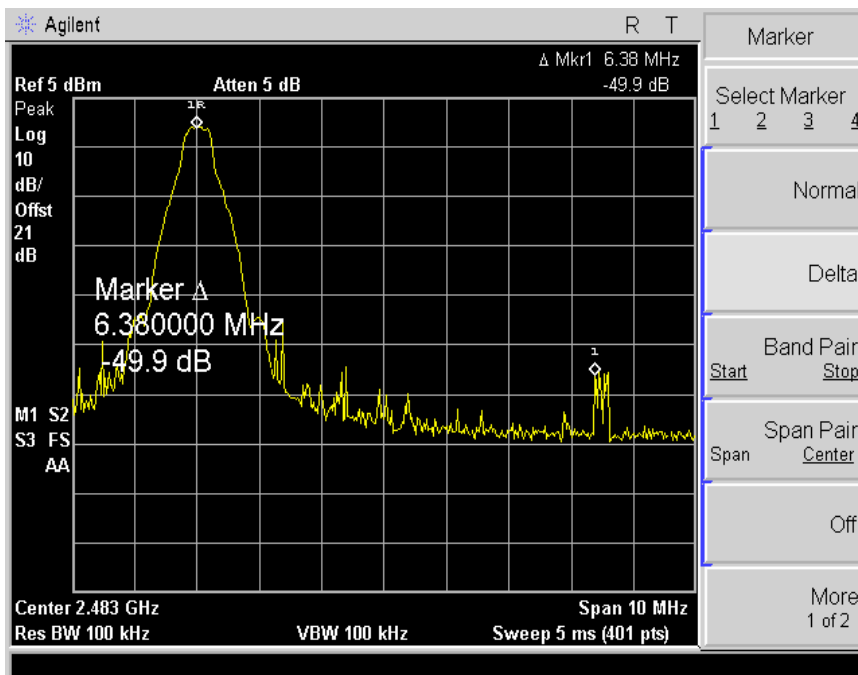


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## 9.4 Trace data of band-edge & Out of Emission band-edge \_CH0(Hopping Off)



## \_CH78(Hopping Off)





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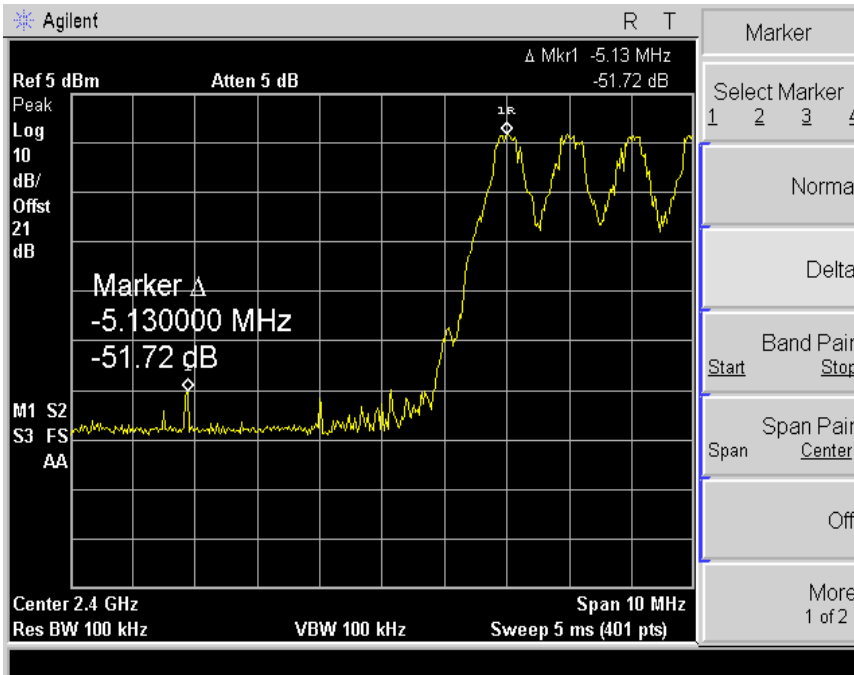
Rm 1015, World Venture Center II,  
426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea



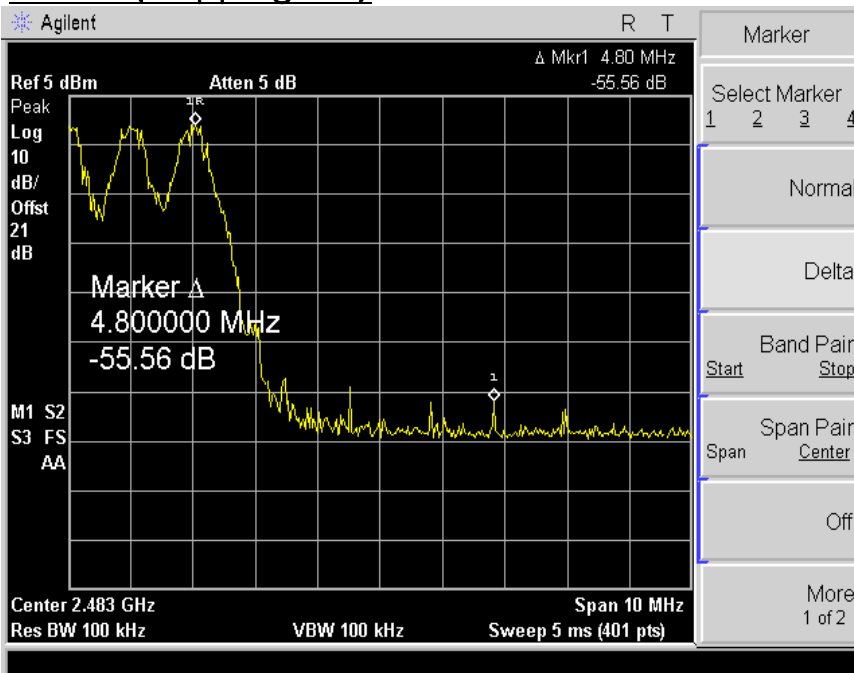
**Electromagnetic  
Interference  
Test Report**

band-edge

CH0 (Hopping On)



CH78 (Hopping On)





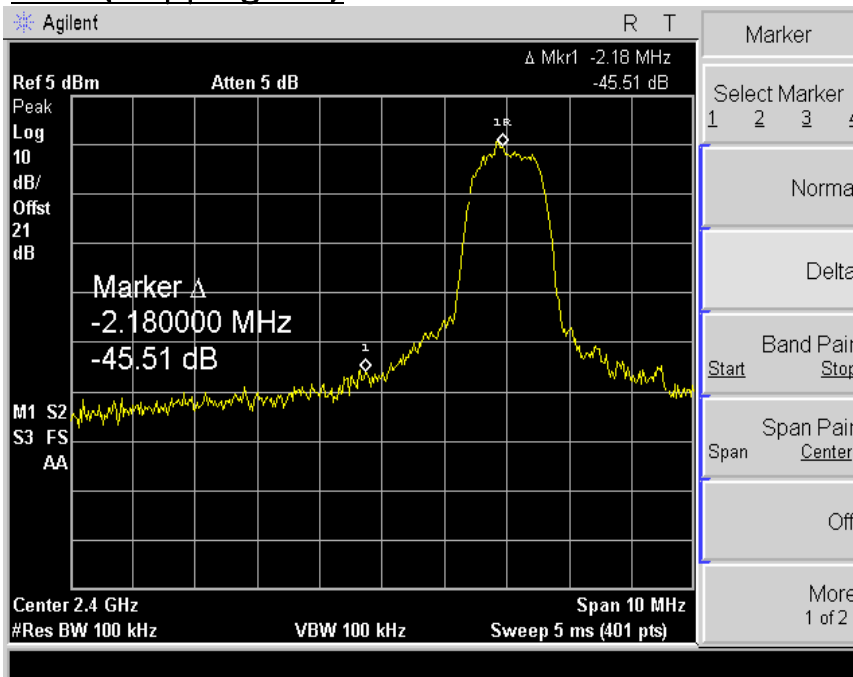
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426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea

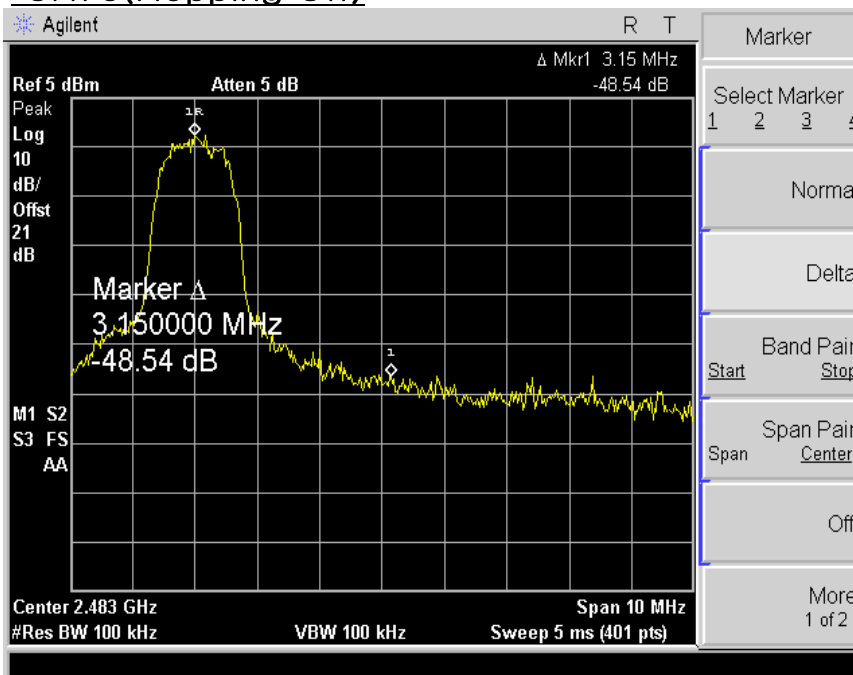


**Electromagnetic  
Interference  
Test Report**

## 9.4 Trace data of band-edge & Out of Emission band-edge(EDR) \_CH0(Hopping Off)



## CH78(Hopping Off)





**ESTECH Co., Ltd.**

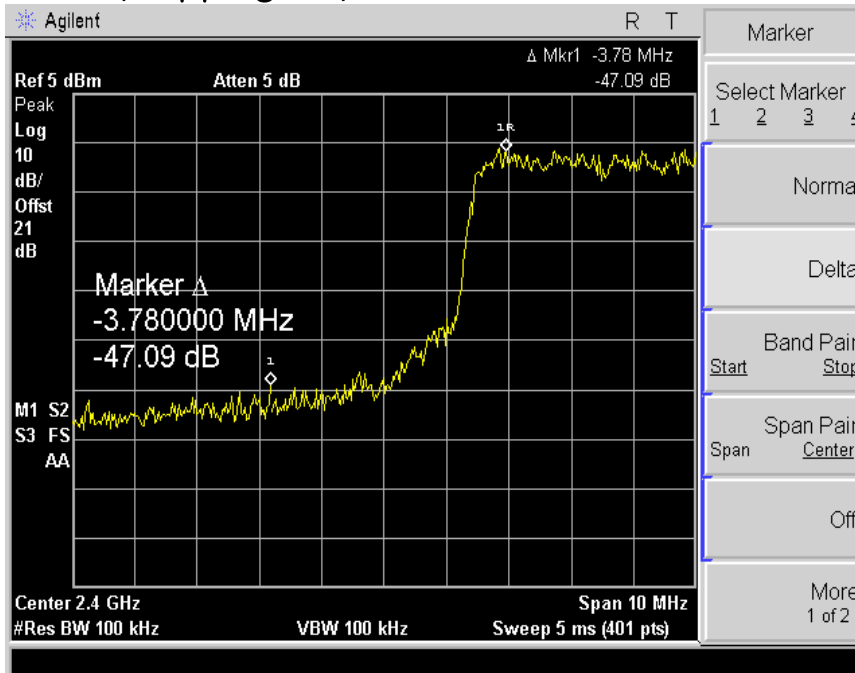
Rm. 1015, World Venture Center II,  
426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea



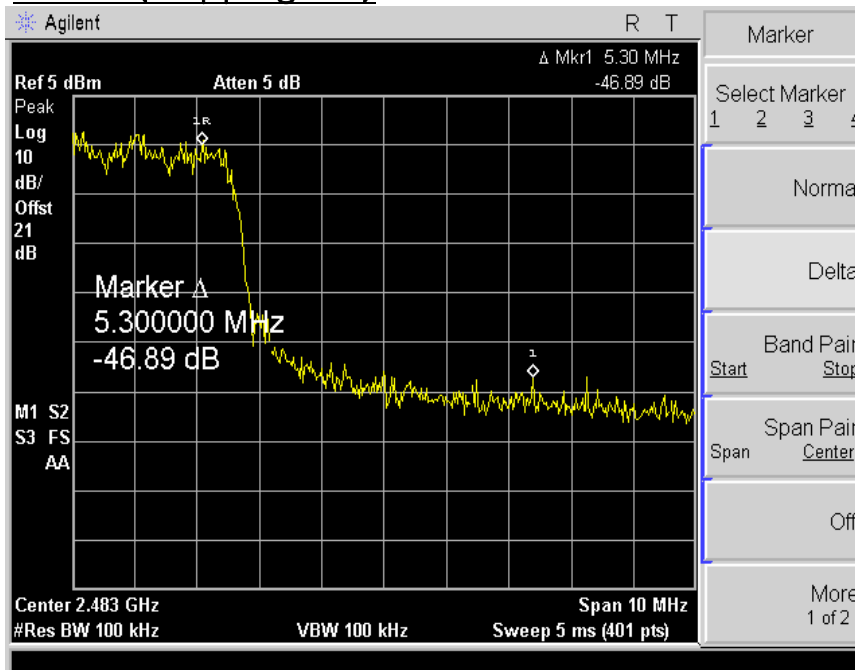
**Electromagnetic  
Interference  
Test Report**

band-edge(EDR)

CH0 (Hopping On)



CH78 (Hopping On)





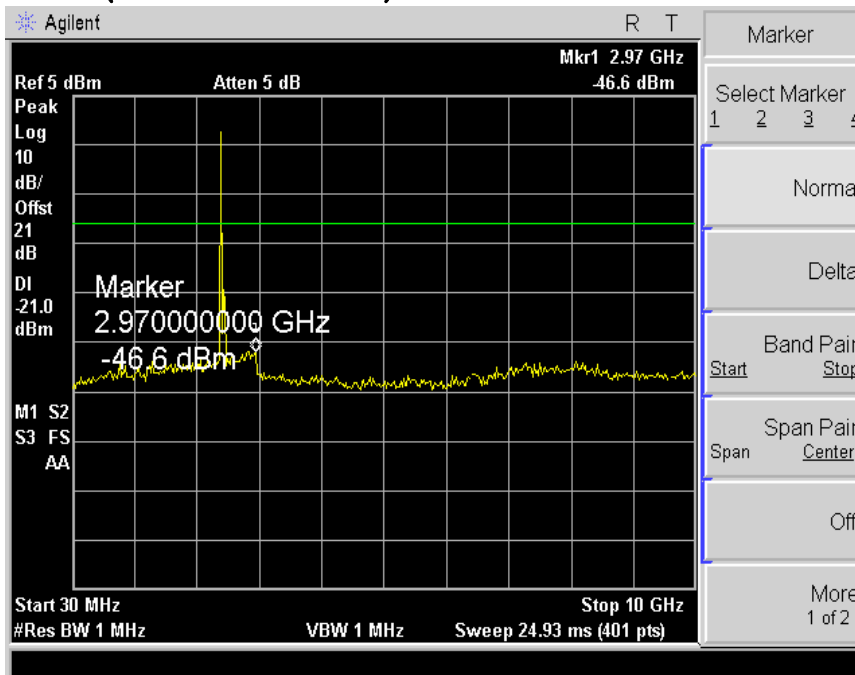
**ESTECH Co., Ltd.**

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426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea

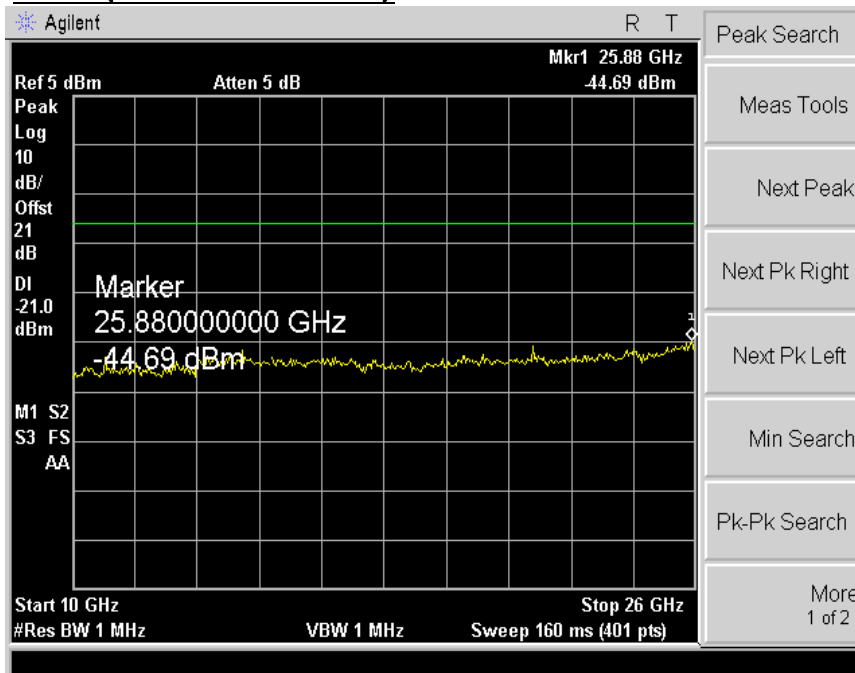


**Electromagnetic  
Interference  
Test Report**

## Out of Band Emissions CH0 (30MHz~10GHz)



## CH0 (10GHz~25GHz)





**ESTECH Co., Ltd.**

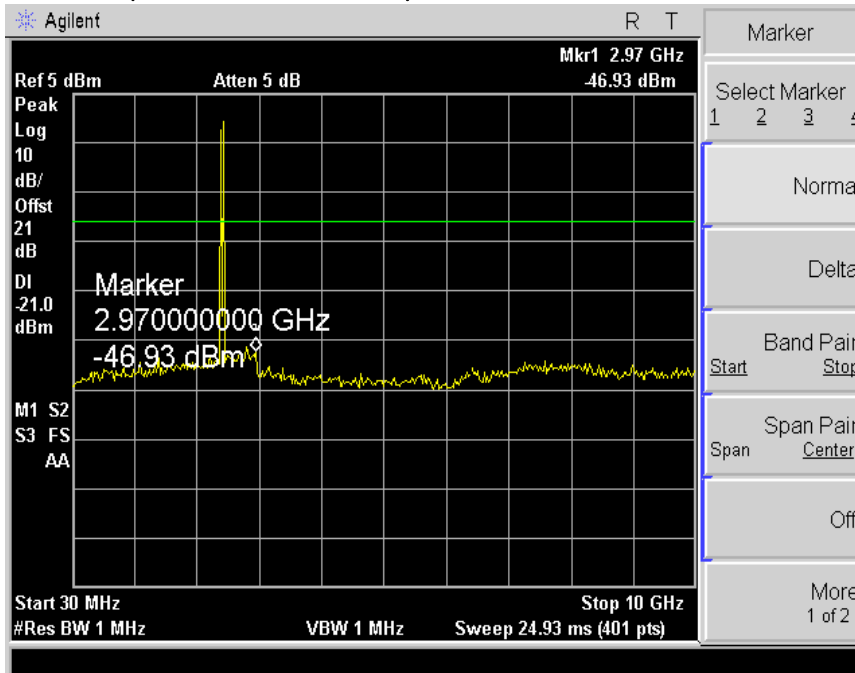
Rm 1015, World Venture Center II,  
426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea



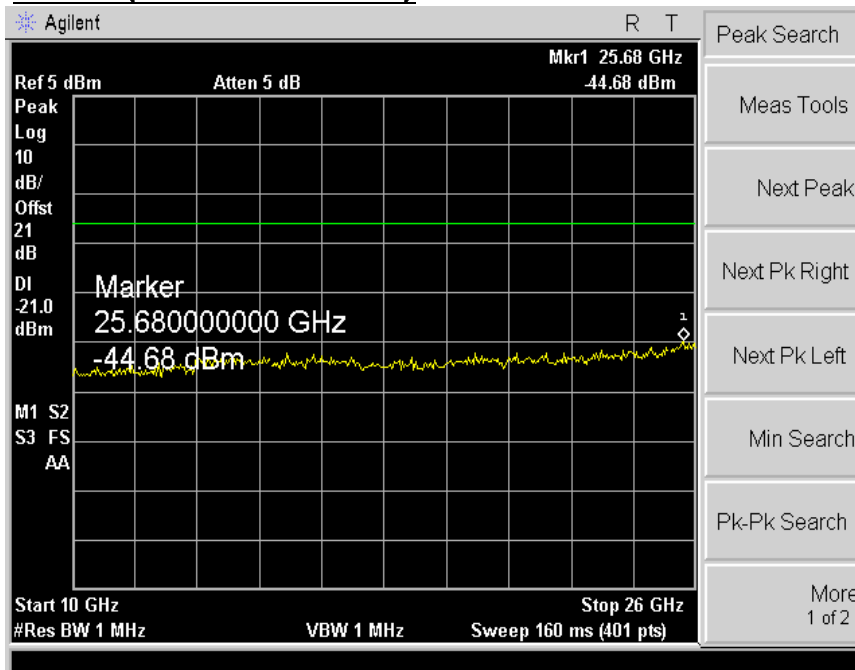
**Electromagnetic  
Interference  
Test Report**

## Out of Band Emissions

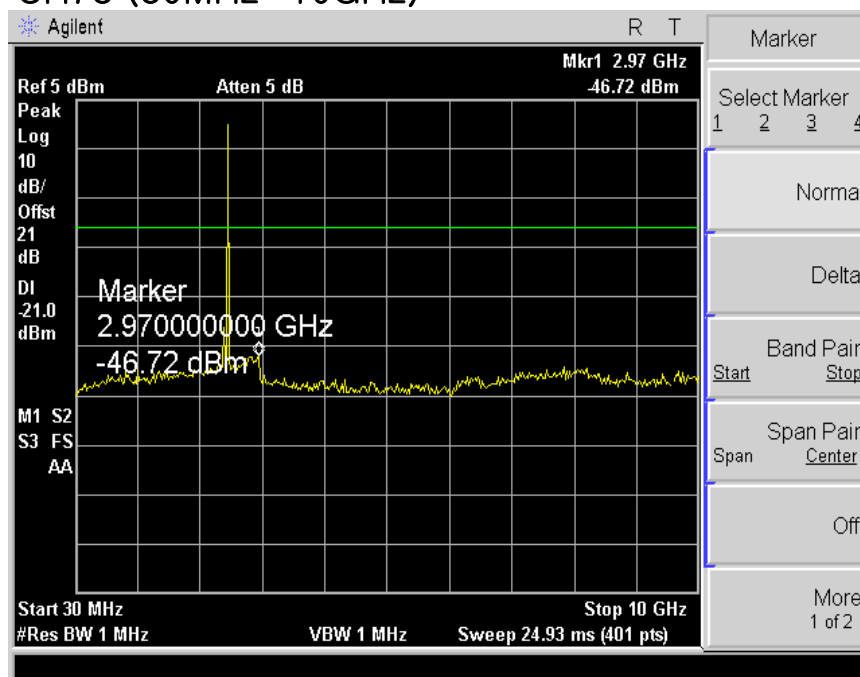
### CH39 (30MHz~10GHz)



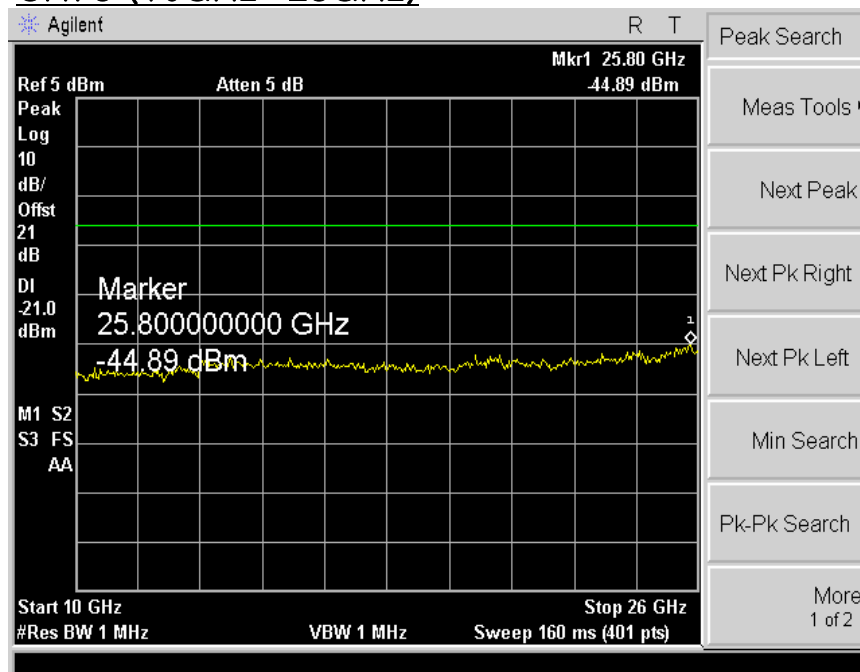
### CH39 (10GHz~25GHz)



## Out of Band Emissions CH78 (30MHz~10GHz)



## CH78 (10GHz~25GHz)





**ESTECH Co., Ltd.**

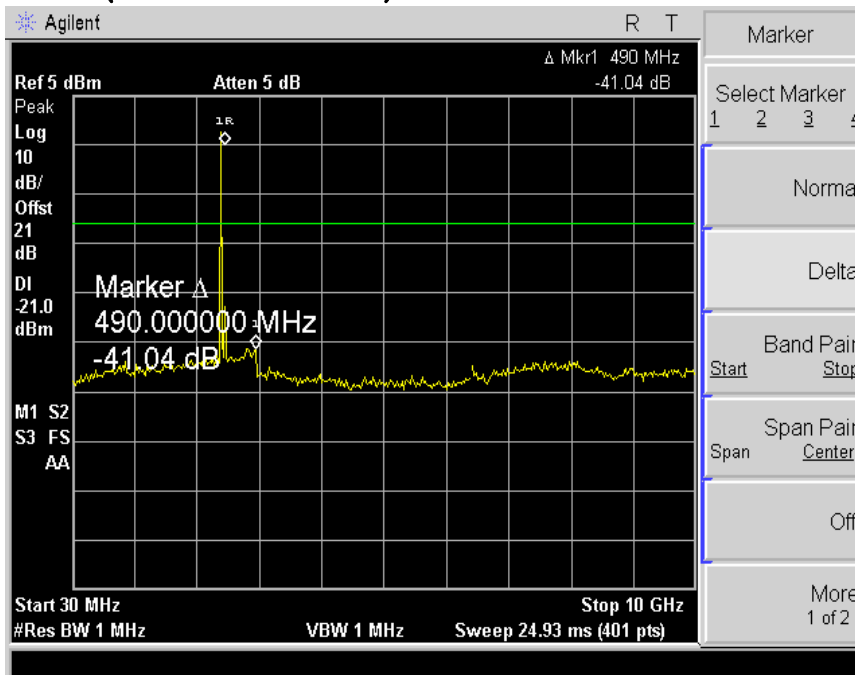
Rm 1015, World Venture Center II,  
426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea



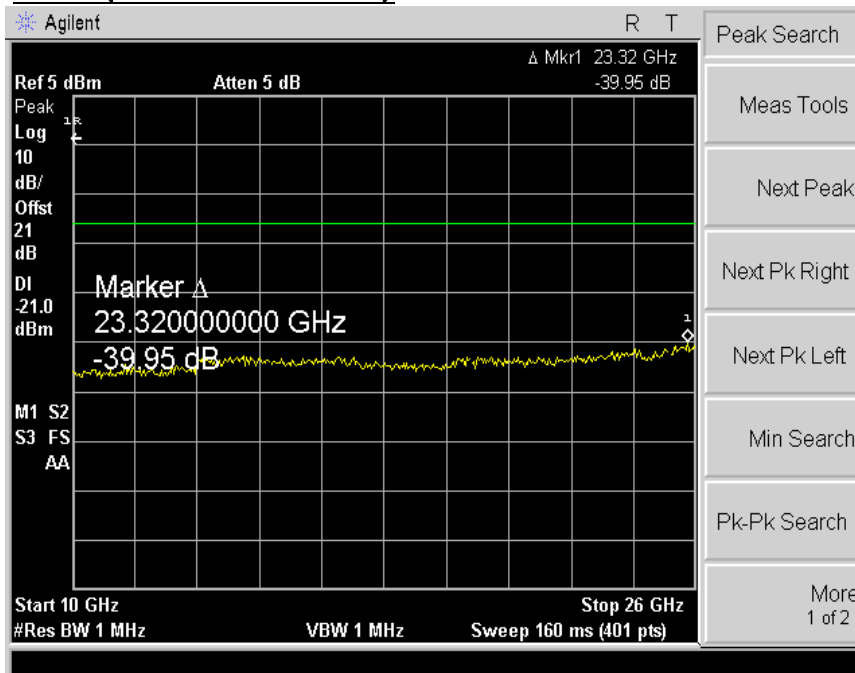
**Electromagnetic  
Interference  
Test Report**

## Out of Band Emissions(EDR)

### CH0 (30MHz~10GHz)



### CH0 (10GHz~25GHz)





**ESTECH Co., Ltd.**

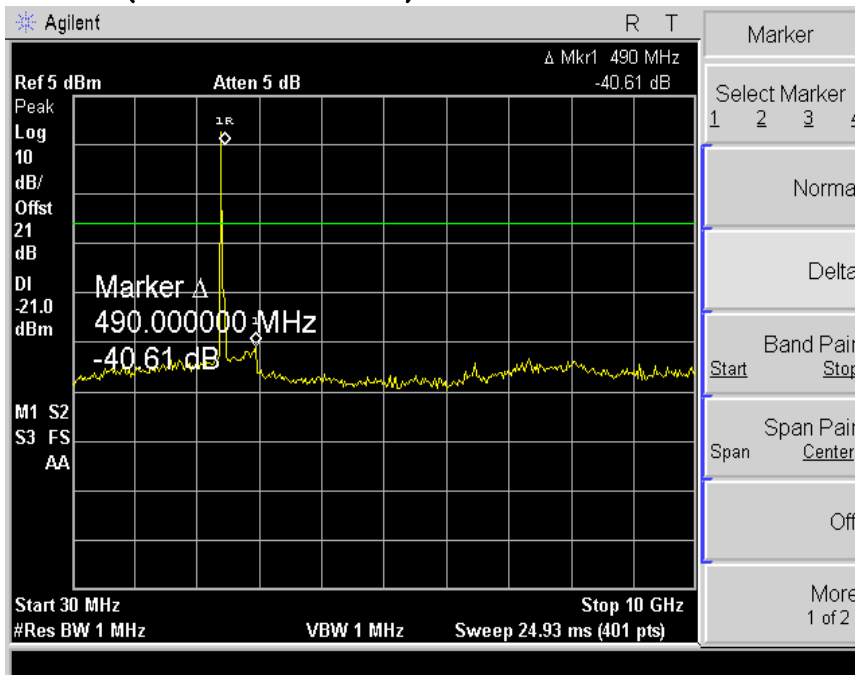
Rm 1015, World Venture Center II,  
426-5 Gasan-dong, Guncheon-gu,  
Seoul, 158-803, Korea



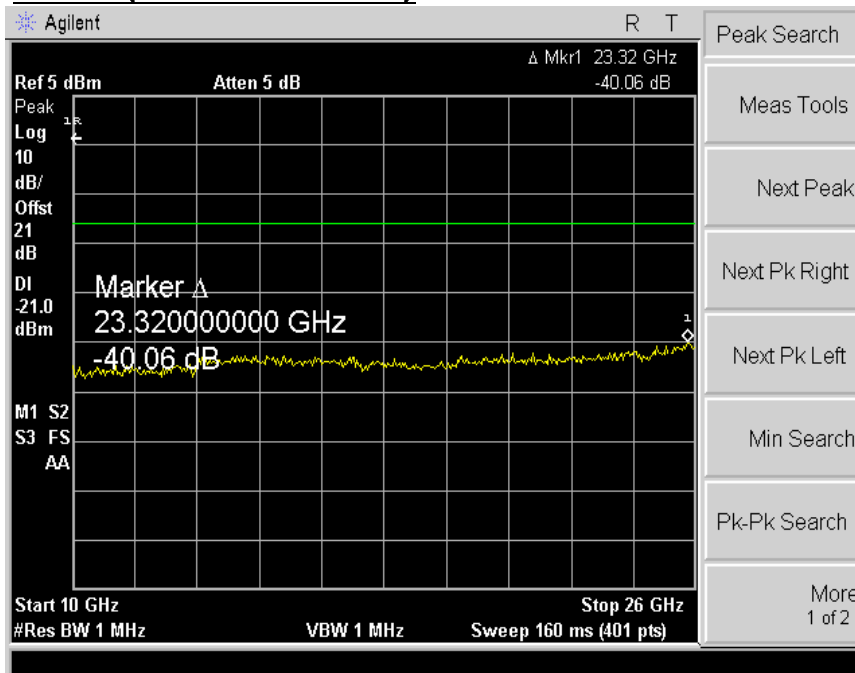
**Electromagnetic  
Interference  
Test Report**

## Out of Band Emissions(EDR)

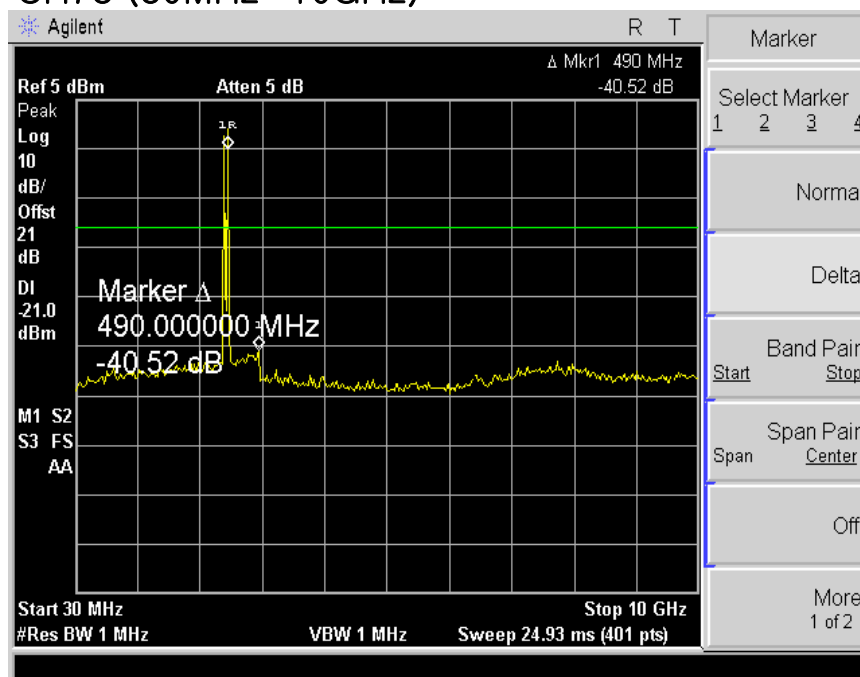
### CH39 (30MHz~10GHz)



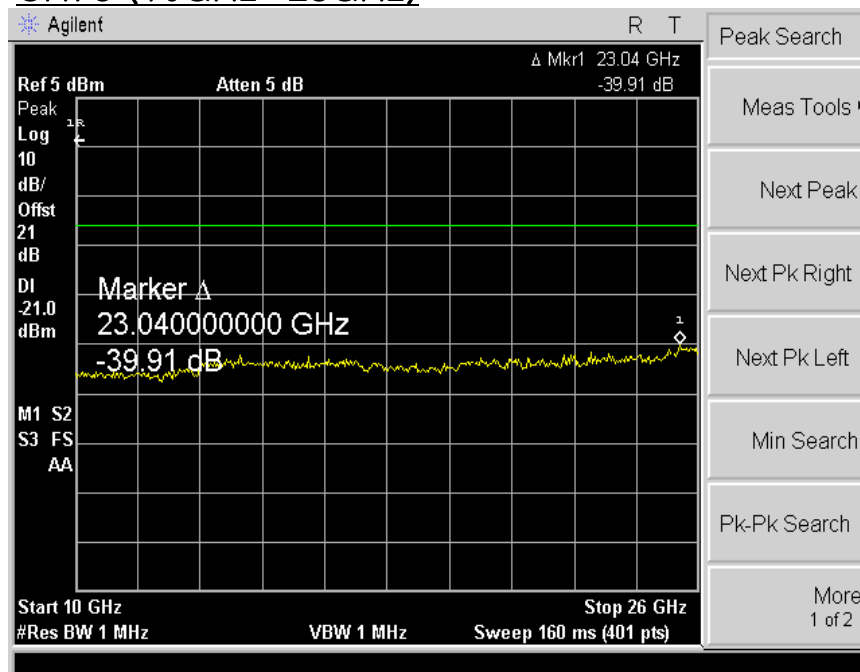
### CH39 (10GHz~25GHz)



## Out of Band Emissions(EDR) CH78 (30MHz~10GHz)



## CH78 (10GHz~25GHz)



## 10. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2006) & ANSI C 63.4 (2003). The test setup was made according to FCC Part 15 (2006) & ANSI C 63.4 (2003) on an open test site, which allows a 3m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

### 10.1 Measurement equipments

| Equipment Name        | Type        | Manufacturer    | Serial No. | Next Calibration date |
|-----------------------|-------------|-----------------|------------|-----------------------|
| TEST Receiver         | ESPC        | Rohde & Schwarz | 84596/021  | 2008. 9. 21           |
| Spectrum Analyzer     | R3261C      | ADVANTEST       | 61720116   | 2008. 4. 20           |
| LogBicon Antenna      | VULB 9160   | Schwarzbeck     | 3142       | 2008. 5. 07           |
| Amplifier             | 8447F       | HP              | 2805A02972 | 2008. 6. 26           |
| Spectrum Analyzer     | R3273       | ADVANTEST       | 121200664  | 2007.11.27            |
| PREAMPLIFIER          | 8449B       | HP              | 3008A00581 | 2008. 5. 06           |
| Horn Antenna          | BBHA 9120 D | Schwarzbeck     | 352        | 2008. 1. 05           |
| Turn Table            | 2087        | EMCO            | 2129       | –                     |
| Antenna Mast          | 2070-01     | EMCO            | 9702-203   | –                     |
| ANT Mast Controller   | 2090        | EMCO            | 1535       | –                     |
| Turn Table Controller | 2090        | EMCO            | 1535       | –                     |

### 10.2 Environmental Condition

Test Place : Open site(3m)  
 Temperature (°C) : 23 °C  
 Humidity (%) : 50 %

## 10.3-1 Test data

Test Date : 10-Oct-07

Measurement Distance : 3 m

| Frequency<br>(MHz) | Reading<br>(dB $\mu$ V)                                                                                                                                                                                                                                                                                                                                      | Position<br>(V/H) | Height<br>(m) | Correction Factor  |               | Result Value            |                          |                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|----------------|
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               | Ant Factor<br>(dB) | Cable<br>(dB) | Limit<br>(dB $\mu$ V/m) | Result<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| 31.90              | 21.80                                                                                                                                                                                                                                                                                                                                                        | V                 | 1.0           | 12.24              | 0.9           | 40.0                    | 34.91                    | -5.09          |
| 62.90              | 10.90                                                                                                                                                                                                                                                                                                                                                        | V                 | 1.0           | 12.68              | 1.2           | 40.0                    | 24.81                    | -15.19         |
| 95.96              | 12.80                                                                                                                                                                                                                                                                                                                                                        | V                 | 1.0           | 9.31               | 1.5           | 43.5                    | 23.60                    | -19.90         |
| 146.40             | 10.10                                                                                                                                                                                                                                                                                                                                                        | V                 | 1.0           | 13.37              | 1.9           | 43.5                    | 25.33                    | -18.17         |
| 286.10             | 13.90                                                                                                                                                                                                                                                                                                                                                        | V                 | 1.0           | 12.82              | 2.8           | 46.0                    | 29.52                    | -16.48         |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
|                    |                                                                                                                                                                                                                                                                                                                                                              |                   |               |                    |               |                         |                          |                |
| Remark             | H : Horizontal, V : Vertical<br>*Checked in all 3 axis and the maximum measured data were reported.<br>*CL = Cable Loss-Amplifier Gain(In case of above1000Mhz)<br>*CL = Cable Loss(In case of below1000Mhz)<br>*The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Quasi-peak detection at frequency below 1GHz. |                   |               |                    |               |                         |                          |                |

## 10.3-2 Test data(CH0)

Test Date : 9-Oct-07

Measurement Distance : 3 m

| Frequency<br>(MHz)      | Reading<br>(dB $\mu$ V)                                                                                                                                                                                                                                                                                          | Position<br>(V/H) | Height<br>(m) | Correction Factor  |               | Result Value            |                          |                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|----------------|
|                         |                                                                                                                                                                                                                                                                                                                  |                   |               | Ant Factor<br>(dB) | Cable<br>(dB) | Limit<br>(dB $\mu$ V/m) | Result<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| PEAK(RBW / VBW-1MHz)    |                                                                                                                                                                                                                                                                                                                  |                   |               |                    |               |                         |                          |                |
| 2380.08                 | 42.41                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 27.56              | -22.4         | 74.0                    | 47.57                    | -26.43         |
| 2380.08                 | 42.63                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 27.56              | -22.4         | 74.0                    | 47.79                    | -26.21         |
| 2402.00                 | 86.20                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 27.31              | -20.8         | *OB                     | 92.71                    | -              |
| 2402.00                 | 85.04                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 27.31              | -20.8         | *OB                     | 91.55                    | -              |
| 4804.00                 | 44.09                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 31.21              | -15.4         | 74.0                    | 59.90                    | -14.10         |
| 4804.00                 | 43.65                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 31.21              | -15.4         | 74.0                    | 59.46                    | -14.54         |
| AV(RBW 1MHz / VBW 3KHz) |                                                                                                                                                                                                                                                                                                                  |                   |               |                    |               |                         |                          |                |
| 2380.08                 | 33.78                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 27.56              | -22.4         | 54.0                    | 38.94                    | -15.06         |
| 2380.08                 | 32.77                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 27.56              | -22.4         | 54.0                    | 37.93                    | -16.07         |
| 2402.00                 | 83.25                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 27.31              | -20.8         | *OB                     | 89.76                    | -              |
| 2402.00                 | 82.11                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 27.31              | -20.8         | *OB                     | 88.62                    | -              |
| 4804.00                 | 32.54                                                                                                                                                                                                                                                                                                            | H                 | 2.0           | 31.21              | -15.4         | 54.0                    | 48.35                    | -5.65          |
| 4804.00                 | 32.45                                                                                                                                                                                                                                                                                                            | V                 | 1.0           | 31.21              | -15.4         | 54.0                    | 48.26                    | -5.74          |
| Remark                  | H : Horizontal, V : Vertical TEST MODE : CH 0(2402MHz)<br>*The TX signal isn't detected from 2th harmonics. *OB = Operating band<br>*Checked in all 3 axis and the maximum measured data were reported.<br>*CL = Cable Loss-Amplifier Gain(In case of above1000Mhz)<br>*CL = Cable Loss(In case of below1000Mhz) |                   |               |                    |               |                         |                          |                |

### 10.3-3 Test data(CH39)

Test Date : 9-Oct-07

Measurement Distance : 3 m

| Frequency<br>(MHz)      | Reading<br>(dB $\mu$ V)                                                                                                                                                                                                                                                                                            | Position<br>(V/H) | Height<br>(m) | Correction Factor  |               | Result Value            |                          |                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|----------------|
|                         |                                                                                                                                                                                                                                                                                                                    |                   |               | Ant Factor<br>(dB) | Cable<br>(dB) | Limit<br>(dB $\mu$ V/m) | Result<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| PEAK(RBW / VBW-1MHz)    |                                                                                                                                                                                                                                                                                                                    |                   |               |                    |               |                         |                          |                |
| 2441.00                 | 85.05                                                                                                                                                                                                                                                                                                              | H                 | 2.0           | 27.42              | -21.6         | *OB                     | 90.87                    | -              |
| 2441.00                 | 84.82                                                                                                                                                                                                                                                                                                              | V                 | 1.9           | 27.42              | -21.6         | *OB                     | 90.64                    | -              |
| 4882.00                 | 44.09                                                                                                                                                                                                                                                                                                              | H                 | 2.0           | 31.37              | -15.9         | 74.0                    | 59.56                    | -14.44         |
| 4882.00                 | 43.25                                                                                                                                                                                                                                                                                                              | V                 | 1.9           | 31.37              | -15.9         | 74.0                    | 58.72                    | -15.28         |
| AV(RBW 1MHz / VBW 3KHz) |                                                                                                                                                                                                                                                                                                                    |                   |               |                    |               |                         |                          |                |
| 2441.00                 | 81.85                                                                                                                                                                                                                                                                                                              | H                 | 2.0           | 27.42              | -21.6         | *OB                     | 87.67                    | -              |
| 2441.00                 | 81.76                                                                                                                                                                                                                                                                                                              | V                 | 1.9           | 27.42              | -21.6         | *OB                     | 87.58                    | -              |
| 4882.00                 | 32.09                                                                                                                                                                                                                                                                                                              | H                 | 2.0           | 31.37              | -15.9         | 54.0                    | 47.56                    | -6.44          |
| 4882.00                 | 32.19                                                                                                                                                                                                                                                                                                              | V                 | 1.9           | 31.37              | -15.9         | 54.0                    | 47.66                    | -6.34          |
| Remark                  | H : Horizontal, V : Vertical TEST MODE : CH 39 (2441MHz)<br>*The TX signal isn't detected from 2th harmonics. *OB = Operating band<br>*Checked in all 3 axis and the maximum measured data were reported.<br>*CL = Cable Loss-Amplifier Gain(In case of above1000Mhz)<br>*CL = Cable Loss(In case of below1000Mhz) |                   |               |                    |               |                         |                          |                |

### 10.3-4 Test data(CH78)

Test Date : 9-Oct-07

Measurement Distance : 3 m

| Frequency<br>(MHz)      | Reading<br>(dB $\mu$ V)                                                                                                                                                                                                                                                                                            | Position<br>(V/H) | Height<br>(m) | Correction Factor  |               | Result Value            |                          |                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|----------------|
|                         |                                                                                                                                                                                                                                                                                                                    |                   |               | Ant Factor<br>(dB) | Cable<br>(dB) | Limit<br>(dB $\mu$ V/m) | Result<br>(dB $\mu$ V/m) | Margin<br>(dB) |
| PEAK(RBW / VBW-1MHz)    |                                                                                                                                                                                                                                                                                                                    |                   |               |                    |               |                         |                          |                |
| 2480.00                 | 86.20                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 27.53              | -22.4         | *OB                     | 91.33                    | -              |
| 2480.00                 | 87.47                                                                                                                                                                                                                                                                                                              | V                 | 1.4           | 27.53              | -22.4         | *OB                     | 92.60                    | -              |
| 2483.57                 | 47.88                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 27.54              | -22.4         | 75.0                    | 53.02                    | -21.98         |
| 2483.57                 | 52.37                                                                                                                                                                                                                                                                                                              | V                 | 1.5           | 27.54              | -22.4         | 74.0                    | 57.51                    | -16.49         |
| 4960.00                 | 43.65                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 31.47              | -15.3         | 74.0                    | 59.82                    | -14.18         |
| 4960.00                 | 43.67                                                                                                                                                                                                                                                                                                              | V                 | 1.5           | 31.47              | -15.3         | 74.0                    | 59.84                    | -14.16         |
| AV(RBW 1MHz / VBW 3KHz) |                                                                                                                                                                                                                                                                                                                    |                   |               |                    |               |                         |                          |                |
| 2480.00                 | 83.53                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 27.53              | -22.4         | *OB                     | 88.66                    | -              |
| 2480.00                 | 83.52                                                                                                                                                                                                                                                                                                              | V                 | 1.4           | 27.53              | -22.4         | *OB                     | 88.65                    | -              |
| 2483.57                 | 42.38                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 27.54              | -22.4         | 54.0                    | 47.52                    | -6.48          |
| 2483.57                 | 43.59                                                                                                                                                                                                                                                                                                              | V                 | 1.5           | 27.54              | -22.4         | 54.0                    | 48.73                    | -5.27          |
| 4960.00                 | 32.20                                                                                                                                                                                                                                                                                                              | H                 | 1.8           | 31.47              | -15.3         | 54.0                    | 48.37                    | -5.63          |
| 4960.00                 | 32.34                                                                                                                                                                                                                                                                                                              | V                 | 1.5           | 31.47              | -15.3         | 54.0                    | 48.51                    | -5.49          |
| Remark                  | H : Horizontal, V : Vertical TEST MODE : CH 78 (2480MHz)<br>*The TX signal isn't detected from 2th harmonics. *OB = Operating band<br>*Checked in all 3 axis and the maximum measured data were reported.<br>*CL = Cable Loss-Amplifier Gain(In case of above1000Mhz)<br>*CL = Cable Loss(In case of below1000Mhz) |                   |               |                    |               |                         |                          |                |

## 11. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 to 30 MHz was measured in accordance to FCC Part 15 (2006) & ANSI C 63.4 (2003). The test setup was made according to FCC Part 15 (2006) & ANSI C 63.4 (2003) in a shielded. The EUT was placed on a non-conductive table at least 80 above the ground plane. A grounded vertical reference plane was positioned in a distance of 40cm from the EUT. The distance from the EUT to other metal surfaces was at least 0.8m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0m.. The test receiver with Quasi Peak detector complies with CISPR 16.

### 11.1 Measurement equipments

| Equipment Name | Type      | Manufacturer    | Serial No. | Next Calibration date |
|----------------|-----------|-----------------|------------|-----------------------|
| LISN           | ESH3-Z5   | Schwarzbeck     | 838979/010 | 2008. 2. 28           |
| LISN           | NNLA8120A | Schwarzbeck     | 8120161    | 2008. 2. 28           |
| TEST Receiver  | ESPI7     | Rohde & Schwarz | 100185     | 2008. 8. 27           |
| Pulse Limiter  | ESH3Z2    | Rohde & Schwarz | NONE       | —                     |

### 11.2 Environmental Condition

Test Place : Shield Room  
 Temperature (°C) : 22 °C  
 Humidity (%) : 60 %

### 11.3 Test data(CH39)

Test Date : 11-Oct-07

| Frequency<br>(MHz) | Correction Factor                                          |               | Line<br>(H/N) | Quasi-peak Value      |                         |                        | Average Value         |                         |                |
|--------------------|------------------------------------------------------------|---------------|---------------|-----------------------|-------------------------|------------------------|-----------------------|-------------------------|----------------|
|                    | Lisn<br>(dB)                                               | Cable<br>(dB) |               | Limit<br>(dB $\mu$ V) | Reading<br>(dB $\mu$ V) | Result<br>(dB $\mu$ V) | Limit<br>(dB $\mu$ V) | Reading<br>(dB $\mu$ V) | Result<br>(dB) |
| 0.16               | 0.17                                                       | 0.0           | H             | 65.46                 | 40.84                   | 41.05                  | 55.46                 | 25.52                   | 25.73          |
| 0.18               | 0.08                                                       | 0.0           | H             | 64.49                 | 37.89                   | 37.98                  | 54.49                 | 23.07                   | 23.16          |
| 0.20               | 0.15                                                       | 0.0           | H             | 63.61                 | 35.57                   | 35.77                  | 53.61                 | —                       | —              |
| 0.22               | 0.15                                                       | 0.0           | V             | 62.82                 | 36.81                   | 37.00                  | 52.82                 | —                       | —              |
| 0.23               | 0.14                                                       | 0.0           | V             | 62.45                 | 36.87                   | 37.06                  | 52.45                 | 22.42                   | 22.61          |
| 0.27               | 0.13                                                       | 0.0           | V             | 61.12                 | 36.96                   | 37.14                  | 51.12                 | —                       | —              |
| 0.71               | 0.16                                                       | 0.1           | H             | 56.00                 | 29.08                   | 29.36                  | 46.00                 | —                       | —              |
| 1.22               | 0.26                                                       | 0.2           | H             | 56.00                 | 30.09                   | 30.53                  | 46.00                 | —                       | —              |
| 1.42               | 0.27                                                       | 0.2           | H             | 56.00                 | 29.41                   | 29.87                  | 46.00                 | —                       | —              |
| 1.53               | 0.27                                                       | 0.2           | H             | 56.00                 | 29.53                   | 30.01                  | 46.00                 | —                       | —              |
| 1.70               | 0.28                                                       | 0.2           | H             | 56.00                 | 29.08                   | 29.58                  | 46.00                 | —                       | —              |
| 2.30               | 0.30                                                       | 0.3           | H             | 56.00                 | 28.77                   | 29.34                  | 46.00                 | —                       | —              |
| 5.90               | 0.42                                                       | 0.5           | H             | 60.00                 | 23.48                   | 24.43                  | 50.00                 | —                       | —              |
| 6.94               | 0.46                                                       | 0.6           | H             | 60.00                 | 23.24                   | 24.27                  | 50.00                 | 14.56                   | 15.59          |
| 7.18               | 0.47                                                       | 0.6           | H             | 60.00                 | 22.86                   | 23.92                  | 50.00                 | —                       | —              |
| 15.04              | 0.83                                                       | 1.0           | H             | 60.00                 | 23.90                   | 25.71                  | 50.00                 | —                       | —              |
| 16.46              | 0.86                                                       | 1.0           | H             | 60.00                 | 23.67                   | 25.56                  | 50.00                 | —                       | —              |
| 17.67              | 0.88                                                       | 1.1           | H             | 60.00                 | 23.33                   | 25.29                  | 50.00                 | —                       | —              |
| Remark             | H : Hot Line, N : Neutral Line TEST MODE : CH 39 (2441MHz) |               |               |                       |                         |                        |                       |                         |                |

## 12. Antenna Requirement

### 12.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

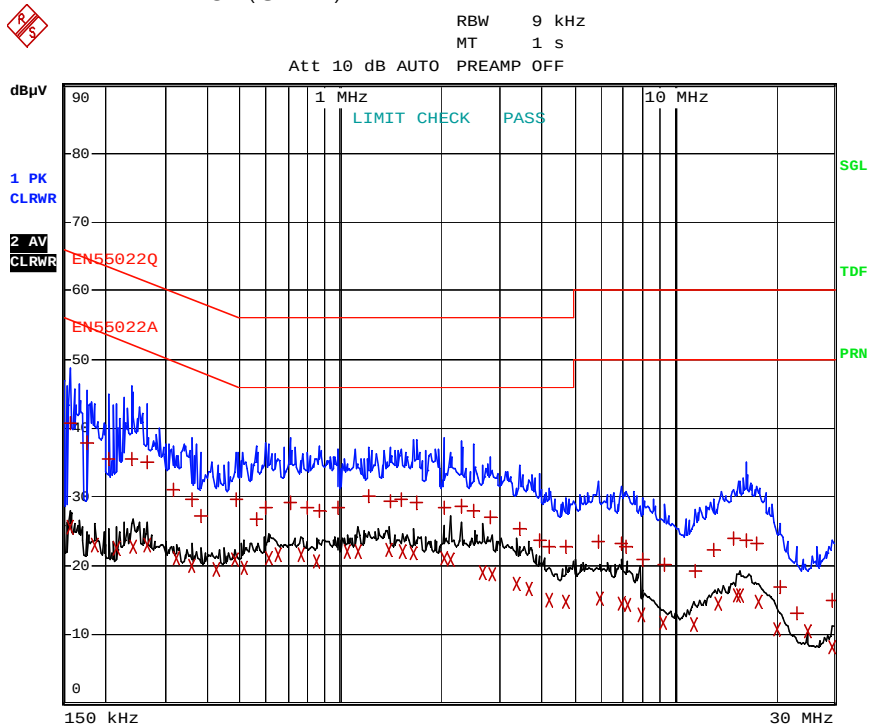
And according to FCC 47 CFR Section 15.24

### 12.2 Antenna Connected Construction

The antenna types used in this product are internal Antenna. The maximum Gain of this antenna is – 4.26dBi.

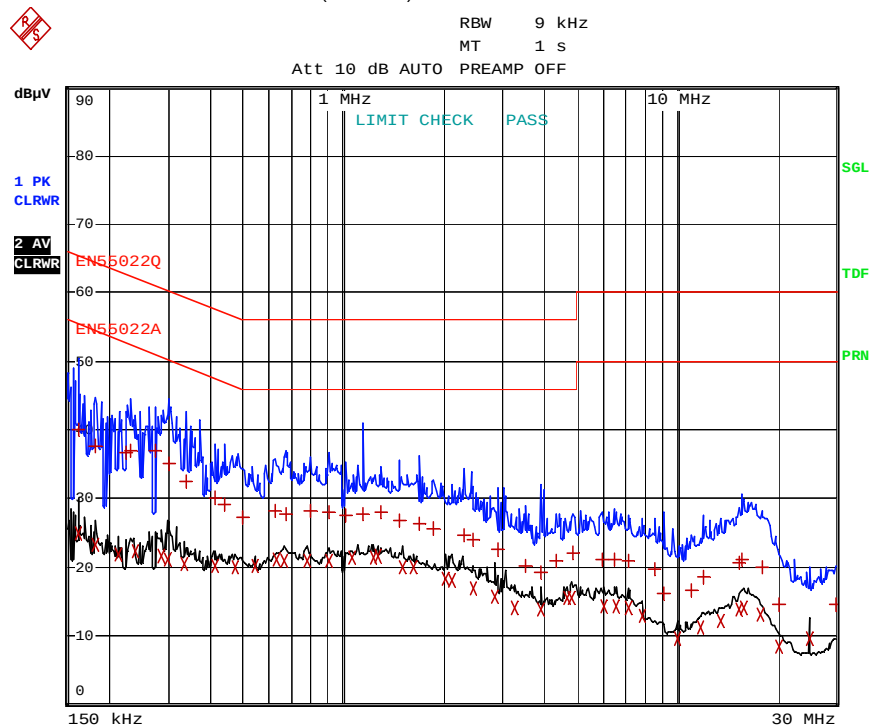
# Appendix 1. Spectral diagram

\*HOT(CH39)



Comment: KM500d - HOT  
Date: 11.OCT.2007 19:06:24

\*NEUTRAL(CH39)



Comment: KM500d - NEUTRAL  
Date: 11.OCT.2007 19:29:59