

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C AND CANADIAN RSS 210 ISSUE 8 REQUIREMENT**

*OF*

**USB Car Charger with Bluetooth Hands Free**

**MODEL No.: USB-BTA, USB-BTA-11, USB-BTA-13**

**BRAND NAME: XtremeMac**

**FCC ID: PB4-USBBTA11**

**IC ID: 6900A-USBBTA11**

**REPORT NO: ES110408019F**

**ISSUE DATE: March 31, 2011**

*Prepared for*

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*Prepared by*

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**VERIFICATION OF COMPLIANCE**

|                      |                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant:           | Imation Corp.<br>1 Imation Way, Oakdale Minnesota 55128-3414 United States                                                                   |
| Manufacturer:        | CCA Electronic Factory<br>Building 120-121st, Pinghuan Industrial City, Pingshan Town, Longgang District, Shenzhen, Guangdong, China 518118  |
| Product Description: | USB Car Charger with Bluetooth Hands Free                                                                                                    |
| Brand Name:          | XtremeMac                                                                                                                                    |
| Model Number:        | USB-BTA, USB-BTA-11, USB-BTA-13<br>(Note: all the modes are the same, except their model number are different. We take USB-BTA-11 for test.) |
| Serial Number:       | N/A                                                                                                                                          |
| File Number:         | ES110408019F                                                                                                                                 |
| Date of Test:        | March 1, 2011 to March 28, 2011                                                                                                              |

**We hereby certify that:**

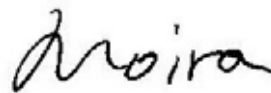
The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009), RSS GEN Issue 2 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247 and RSS 210 Issue 8.

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

Date of Test :

March 1, 2011 to March 28, 2011

Prepared by :



(Engineer)

Reviewer :



(Quality Manager)

Approve &amp; Authorized Signer :



(Manager)

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## **1. General Information**

### **1.1 Product Description**

The Imation Corp.

Model: USB-BTA-11 (referred to as the EUT in this report) The EUT is an short range, lower power, USB Car Charger with Bluetooth Hands Free designed as an Device. It is designed by way of utilizing the GFSK, DQPSK and 8DPSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2402-2480MHz

B). Modulation: GFSK, DQPSK, 8DPSK

(All the modulation modes were tested and the data of the worst modes (8DPSK) are attached within report.)

C). Number of Channel: 79

D). Channel space: 1MHz

E). Rated RF Output Power: 1.22dBm

F). BIT Rate of Transmission: 1Mbps, 2Mbps, 3Mbps

G). Antenna Type: PCB antenna

H). Antenna Gain: 0dBi

I). Power Supply: Input: DC 12V, 1A; Output: DC 5V, 2.1A

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

This submittal(s) (test report) is intended for FCC ID: PB4-USBBTA11, IC ID: 6900A-USBBTA11 filing to comply with Section 15.247 of the FCC Part 15 Subpart C Rules and Canadian RSS 210 Issue 8.0.

### **1.3 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009) and in RSS GEN. Radiated testing was performed at an antenna to EUT distance 3 meters.

### **1.4 Special Accessories**

Not available for this EUT intended for grant.

### **1.5 Equipment Modifications**

Not available for this EUT intended for grant.

## 1.6 Test Facility

### Site Description

#### EMC Lab.

: Accredited by CNAS, 2010.10.29  
The certificate is valid until 2013.10.28  
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006(identical to ISO/IEC17025: 2005)  
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2010.5.25  
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, October 28, 2010  
The Certificate Registration Number is 406365.

Accredited by Industry Canada, March 5, 2010  
The Certificate Registration Number is 46405-4480.

#### Name of Firm

: SHENZHEN EMTEK CO., LTD

#### Site Location

: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## **2. System Test Configuration**

### **2.1 EUT Configuration**

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

### **2.2 EUT Exercise**

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

### **2.3 Test Procedure**

#### **2.3.1 Radiated Emissions**

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009 and RSS GEN.

## 2.4 Limitation

### (1) Channel Separation Test

FCC Part 15, Subpart C Section 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

| Frequency Range (MHz) | Limit(kHz) |
|-----------------------|------------|
| 902-928               | >25kHz     |
| 2400-2483.5           | >25kHz     |
| 5725-5850             | >25kHz     |

### (2) 20dB Bandwidth

| Frequency Range(MHz) | Quantity of Hopping Channel | Limit(kHz) |      |       |       |
|----------------------|-----------------------------|------------|------|-------|-------|
|                      |                             | 50         | 25   | 15    | 75    |
|                      | 902-928                     | <250       | >250 | NA    | NA    |
|                      | 2400-2483.5                 | NA         | NA   | >1000 | <1000 |

### (3) Quantity of Hopping Channel

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | Limit(Quantity of Hopping Channel) |                        |                      |                      |
|-----------------------|------------------------------------|------------------------|----------------------|----------------------|
|                       | 20dB bandwidth <250kHz             | 20dB bandwidth >250kHz | 20dB bandwidth <1MHz | 20dB bandwidth >1MHz |
| 902-928               | 50                                 | 25                     | NA                   | NA                   |
| 2400-2483.5           | NA                                 | NA                     | 75                   | 15                   |
| 5725-5850             | NA                                 | NA                     | 75                   | NA                   |

### (4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | LIMIT(rms)                        |                                   |                                 |
|-----------------------|-----------------------------------|-----------------------------------|---------------------------------|
|                       | 20dB bandwidth <250kHz(50Channel) | 20dB bandwidth >250kHz(25Channel) | 20dB bandwidth <1MHz(75Channel) |
| 902-928               | 400(20S)                          | 400(10S)                          | NA                              |
| 2400-2483.5           | NA                                | NA                                | 400(30S)                        |
| 5725-5850             | NA                                | NA                                | 400(30S)                        |

**Note:** The “()” is all channel’s average time of occupancy.

**(5) Maximum Peak Output Power**

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | Quantity of Hopping Channel | LIMIT(W) |              |              |          |
|-----------------------|-----------------------------|----------|--------------|--------------|----------|
|                       |                             | 50       | 25           | 15           | 75       |
| 902-928               |                             | 1(30dBm) | 0.125(21dBm) | NA           | NA       |
| 2400-2483.5           |                             | NA       | NA           | 0.125(21dBm) | 1(30dBm) |
| 5725-5850             |                             | NA       | NA           | NA           | 1(30dBm) |

**(6) Band edge**

FCC Part15, Subpart C Section 15.247, In any 100kHz bandwidth outside the frequency band in with the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

| Operating Frequency Range(MHz) | Spurious emission frequency | Limit                              |                        |
|--------------------------------|-----------------------------|------------------------------------|------------------------|
|                                |                             | Peak power ration to emission(dBc) | Emission level(dBuV/m) |
| 902-928                        | <902                        | >20                                | NA                     |
|                                | >928                        | >20                                | NA                     |
|                                | 960-1240                    | NA                                 | 54                     |
| 2400-2483.5                    | <2400                       | >20                                | NA                     |
|                                | >2483.5-2500                | NA                                 | 54                     |
| 5725-5850                      | <5350-5460                  | NA                                 | 54                     |
|                                | <5725                       | >20                                | NA                     |
|                                | >5850                       | >20                                | NA                     |

**(7) Radiated Emission**

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

| Frequency<br>(MHz) | Field strength<br>$\mu\text{V/m}$ | Distance(m) | Field strength at 3m<br>$\text{dB}\mu\text{V/m}$ |
|--------------------|-----------------------------------|-------------|--------------------------------------------------|
| 30-88              | 100                               | 3           | 40                                               |
| 88-216             | 150                               | 3           | 43.5                                             |
| 216-960            | 200                               | 3           | 46                                               |
| Above 960          | 500                               | 3           | 54                                               |

Remark: 1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$   
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

**FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000MHz**

| Frequency(MHz) | Class A( $\text{dB}\mu\text{V/m}$ )(at 3m) |         | Class B( $\text{dB}\mu\text{V/m}$ )(at 3m) |         |
|----------------|--------------------------------------------|---------|--------------------------------------------|---------|
|                | PEAK                                       | AVERAGE | PEAK                                       | AVERAGE |
| Above 1000     | 80.0                                       | 60.0    | 74.0                                       | 54.0    |

FCC Part 15, Subpart C Section 15.249 The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Frequency(MHz) | Filed Strength of<br>Fundamental(at 3m) |         | Filed Strength of<br>Harmonics(at 3m) |         |
|----------------|-----------------------------------------|---------|---------------------------------------|---------|
|                | PEAK                                    | AVERAGE | PEAK                                  | AVERAGE |
| 902-928        | 114                                     | 94      | 74.0                                  | 54.0    |
| 2400-2483.5    | 114                                     | 94      | 74.0                                  | 54.0    |
| 5725-5875      | 114                                     | 94      | 74.0                                  | 54.0    |
| 24000-24250    | 128                                     | 108     | 88.0                                  | 68.0    |

**2.5 Configuration of Tested System****Fig. 2-1 Configuration of Tested System**

## 2.6 Equipment Used in Tested System

| Item | Equipment                                 | Mfr/Brand | Model/Type No. | FCC ID       | Series No. | Note       |
|------|-------------------------------------------|-----------|----------------|--------------|------------|------------|
| 1.   | USB Car Charger with Bluetooth Hands Free | XtremeMac | USB-BTA-11     | PB4-USBBTA11 | N/A        | <b>EUT</b> |
| 2.   | Notebook                                  | Lenovo    | 20020          | N/A          | EB16076441 |            |

### Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

## 2.7 Description of Test Modes

The EUT (USB Car Charger with Bluetooth Hands Free) has been tested under normal operating condition.

This EUT is a FHSS system, we use blue test to control the EUT with parallel port, Let EUT hopping on and transmit at every channel with highest power, Only output power use conducted method, others are using radiated method. After sirfdemo330R1 send the command to EUT, it can be removed, and the EUT keep hopping. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for best.

| Channel | Frequency(MHz) |
|---------|----------------|
| 1       | 2402           |
| 40      | 2441           |
| 79      | 2480           |

**3. Summary of Test Results**

| <b>FCC Rules</b>   | <b>IC Rules</b>       | <b>Description Of Test</b>     | <b>Result</b> |
|--------------------|-----------------------|--------------------------------|---------------|
| §15.247(a)(1)      | RSS 210 A8.1(2)       | Channel Separation Test        | Compliant     |
| §15.247(a)(1)      | --                    | 20dB Bandwidth                 | Compliant     |
| --                 | RSS 210 A8.1(1)       | 99%dB Bandwidth                | Compliant     |
| §15.247(a)(1)(iii) | RSS 210 A8.1(4)       | Quantity of Hopping Channel    | Compliant     |
| §15.247(a)(1)(iii) | RSS 210 A8.1(4)       | Time of Occupancy (Dwell Time) | Compliant     |
| §15.247(b)         | RSS 210 A8.4          | Max Peak Output Power Test     | Compliant     |
| §15.247(d)         | RSS 210 A8.5          | Band Edge Test                 | Compliant     |
| §15.247(d),§15.209 | RSS 210 A8.5          | Radiated Emission              | Compliant     |
| §15.203            | --                    | Antenna Requirement            | Compliant     |
| §15.109            | RSS GEN 7.2.3 Table 1 | Receiver Spurious Emissions    | Compliant     |

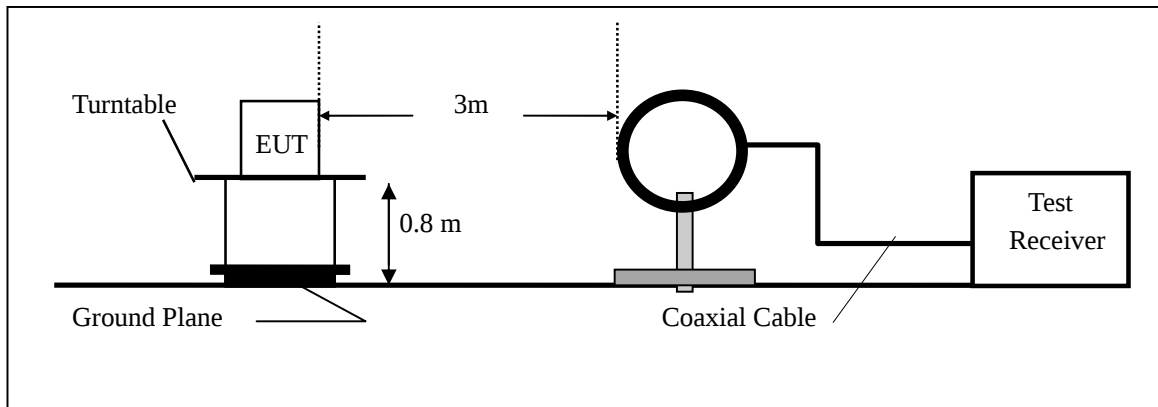
## 4. Radiated Emission Test

### 4.1 Measurement Procedure

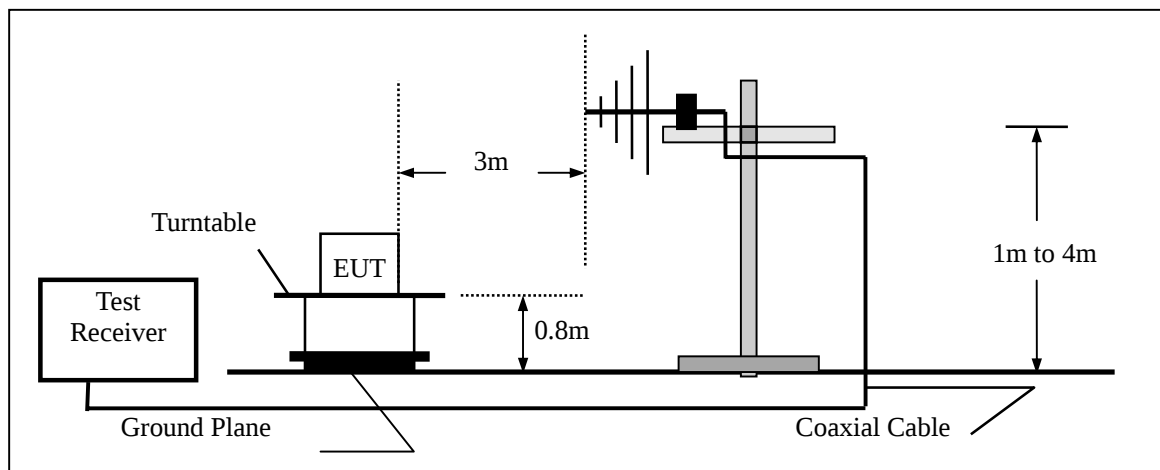
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

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

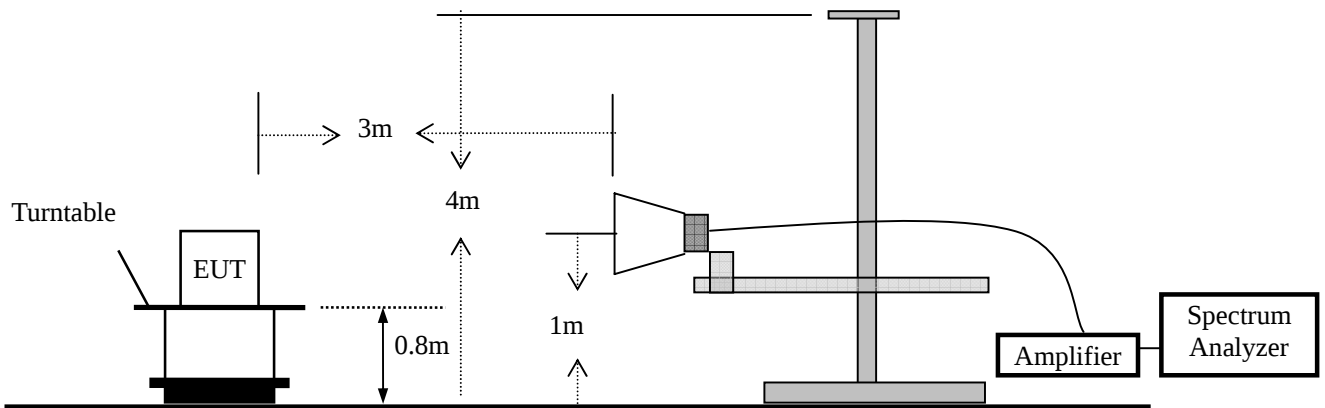
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



## (C) Radiated Emission Test Set-Up, Frequency above 1000MHz



## 4.3 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR             | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|-----------------|--------------|---------------|------------|------------|
| Spectrum Analyzer | Rohde & Schwarz | FSP7         | 839511/010    | 05/29/2010 | 05/29/2011 |
| Spectrum Analyzer | HP              | E4407B       | 839840481     | 05/29/2010 | 05/29/2011 |
| EMI Test Receiver | Rohde & Schwarz | ESCS30       | 828985/018    | 05/29/2010 | 05/29/2011 |
| Pre-Amplifier     | HP              | 8447D        | 2944A07999    | 05/29/2010 | 05/29/2011 |
| Bilog Antenna     | Schwarzbeck     | VULB9163     | 142           | 05/29/2010 | 05/29/2011 |
| Loop Antenna      | ARA             | PLA-1030/B   | 1029          | 05/29/2010 | 05/29/2011 |
| Horn Antenna      | Schwarzbeck     | BBHA 9170    | BBHA9170399   | 05/29/2010 | 05/29/2011 |
| Horn Antenna      | Schwarzbeck     | BBHA 9120    | D143          | 05/29/2010 | 05/29/2011 |

## 4.4 Radiated Emission Limit

## FCC Class B Limit at 3m:

| Frequency<br>MHz | Distance<br>Meter | Field Strength<br>uV/m | Field Strength<br>dBuV/m |
|------------------|-------------------|------------------------|--------------------------|
| 30~88            | 3                 | 100                    | 40.0                     |
| 88~216           | 3                 | 150                    | 43.5                     |
| 216~960          | 3                 | 200                    | 46.0                     |
| Above 960        | 3                 | 500                    | 54.0                     |

Note: The frequencies above 1000MHz, as measured using instrumentation with a peak detector function was corresponding to 20dB above maximum permitted average limit.

**4.5 Measurement Result****TX mode:**

Operation Mode: 2402MHz      Test Date : 03/25/2011  
 Frequency Range: 30~1000MHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: KL

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV) | Limit 3m<br>(dBuV/m) | Margin<br>(dB) | Note |
|----------------|-----------------|--------------------------|----------------------|----------------|------|
| 30             | V               | 26.63                    | 40                   | -13.37         | PK   |
| 143.4          | V               | 28.12                    | 43.5                 | -15.38         | PK   |
| 191.66         | V               | 28.58                    | 43.5                 | -14.92         | PK   |
| 432.61         | V               | 28.28                    | 46                   | -17.72         | PK   |
| 493.23         | V               | 30.59                    | 46                   | -15.41         | PK   |
| 692.21         | V               | 35.19                    | 46                   | -10.81         | PK   |
| 67.3           | H               | 24.98                    | 40                   | -15.02         | PK   |
| 143.47         | H               | 25.89                    | 43.5                 | -17.61         | PK   |
| 288.04         | H               | 33.07                    | 46                   | -12.93         | PK   |
| 483.25         | H               | 31.17                    | 46                   | -14.83         | PK   |
| 692.28         | H               | 32.68                    | 46                   | -13.32         | PK   |
| 892.06         | H               | 34.28                    | 46                   | -11.72         | PK   |

Operation Mode: 2441MHz      Test Date : 03/25/2011  
 Frequency Range: 30~1000MHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: KL

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV) | Limit 3m<br>(dBuV/m) | Margin<br>(dB) | Note |
|----------------|-----------------|--------------------------|----------------------|----------------|------|
| 30.17          | V               | 25.58                    | 40                   | -14.42         | PK   |
| 143.66         | V               | 27.49                    | 43.5                 | -16.01         | PK   |
| 192.44         | V               | 27.37                    | 43.5                 | -16.13         | PK   |
| 431.9          | V               | 29.06                    | 46                   | -16.94         | PK   |
| 494.88         | V               | 29.93                    | 46                   | -16.07         | PK   |
| 692.38         | V               | 35.31                    | 46                   | -10.69         | PK   |
| 68.37          | H               | 23.64                    | 40                   | -16.36         | PK   |
| 145.08         | H               | 24.26                    | 43.5                 | -19.24         | PK   |
| 288.4          | H               | 32.72                    | 46                   | -13.28         | PK   |
| 484.28         | H               | 30.06                    | 46                   | -15.94         | PK   |
| 693.39         | H               | 30.52                    | 46                   | -15.48         | PK   |
| 892.81         | H               | 32.65                    | 46                   | -13.35         | PK   |

Operation Mode: 2480MHz      Test Date : 03/25/2011  
 Frequency Range: 30~1000MHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: KL

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV) | Limit 3m<br>(dBuV/m) | Margin<br>(dB) | Note |
|----------------|-----------------|--------------------------|----------------------|----------------|------|
| 30.15          | V               | 25.46                    | 40                   | -14.54         | PK   |
| 143.56         | V               | 28.62                    | 43.5                 | -14.88         | PK   |
| 192.71         | V               | 27.95                    | 43.5                 | -15.55         | PK   |
| 431.88         | V               | 29.06                    | 46                   | -16.94         | PK   |
| 493.92         | V               | 30.7                     | 46                   | -15.3          | PK   |
| 692.08         | V               | 35.31                    | 46                   | -10.69         | PK   |
| 68.42          | H               | 25.1                     | 40                   | -14.9          | PK   |
| 145.1          | H               | 26.12                    | 43.5                 | -17.38         | PK   |
| 288.41         | H               | 32.72                    | 46                   | -13.28         | PK   |
| 484.33         | H               | 29.93                    | 46                   | -16.07         | PK   |
| 693.51         | H               | 32.51                    | 46                   | -13.49         | PK   |
| 893.84         | H               | 32.65                    | 46                   | -13.35         | PK   |

- Note:**
- (1) All Readings are Peak Value.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) The average measurement was not performed when the peak measured data under the limit of average detection.
  - (4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

**TX mode:**

Operation Mode: CH1: 2402MHz      Test Date : 03/25/2011  
 Frequency Range: 1-25GHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: Andy

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level(dBuV) |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|-----------------|----------------------|-------|------------------|----|------------|--------|
|                |                 | PK                   | AV    | PK               | AV | PK         | AV     |
| 4830.12        | V               | 57.76                | 45.04 | 74               | 54 | -16.24     | -8.96  |
| 4926.28        | V               | 57.49                | 44.37 | 74               | 54 | -16.51     | -9.63  |
| 7346.15        | V               | 56.92                | 43.96 | 74               | 54 | -17.08     | -10.04 |
| --             | V               | --                   | --    | --               | -- | --         | --     |
| 4830.25        | H               | 58.86                | 44.48 | 74               | 54 | -15.14     | -9.52  |
| 4928.33        | H               | 58.54                | 44.06 | 74               | 54 | -15.46     | -9.94  |
| 7346.15        | H               | 58.82                | 43.7  | 74               | 54 | -15.18     | -10.3  |

Operation Mode: CH40: 2441MHz      Test Date : 03/25/2011  
 Frequency Range: 1-25GHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: Andy

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level(dBuV) |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|-----------------|----------------------|-------|------------------|----|------------|--------|
|                |                 | PK                   | AV    | PK               | AV | PK         | AV     |
| 4846.17        | V               | 58.04                | 43.8  | 74               | 54 | -15.96     | -10.2  |
| 4943.31        | V               | 56.22                | 41.69 | 74               | 54 | -17.78     | -12.31 |
| 7358.66        | V               | 57.73                | 44.08 | 74               | 54 | -16.27     | -9.92  |
| --             | V               | --                   | --    | --               | -- | --         | --     |
| 4843.27        | H               | 58.3                 | 45.1  | 74               | 54 | -15.7      | -8.9   |
| 4942.64        | H               | 58.79                | 46.44 | 74               | 54 | -15.21     | -7.56  |
| 7364.81        | H               | 57.55                | 43.62 | 74               | 54 | -16.45     | -10.38 |
| --             | H               | --                   | --    | --               | -- | --         | --     |

Operation Mode: CH79: 2480MHz      Test Date : 03/25/2011  
 Frequency Range: 1-25GHz      Temperature : 28 °C  
 Test Result: PASS      Humidity : 65 %  
 Measured Distance: 3m      Test By: Andy

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level(dBuV) |       | Limit 3m(dBuV/m) |    | Margin(dB) |       |
|----------------|-----------------|----------------------|-------|------------------|----|------------|-------|
|                |                 | PK                   | AV    | PK               | AV | PK         | AV    |
| 4846.39        | V               | 56.82                | 44.05 | 74               | 54 | -17.18     | -9.95 |
| 4943.75        | V               | 57.19                | 45.45 | 74               | 54 | -16.81     | -8.55 |
| 7358.63        | V               | 57.25                | 44.45 | 74               | 54 | -16.75     | -9.55 |
| --             | V               | --                   | --    | --               | -- | --         | --    |
| 4844.91        | H               | 57.77                | 44.48 | 74               | 54 | -16.23     | -9.52 |
| 4940.99        | H               | 57.45                | 44.25 | 74               | 54 | -16.55     | -9.75 |
| 7359.5         | H               | 58.35                | 46.17 | 74               | 54 | -15.65     | -7.83 |

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss
  - (3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
  - (4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

**RX Mode:**

Operation Mode: RX                      Test Date : 03/25/2011  
 Frequency Range: 30~1000MHz          Temperature : 28  
 Test Result: PASS                      Humidity : 65 %  
 Measured Distance: 3m                  Test By: WOLF

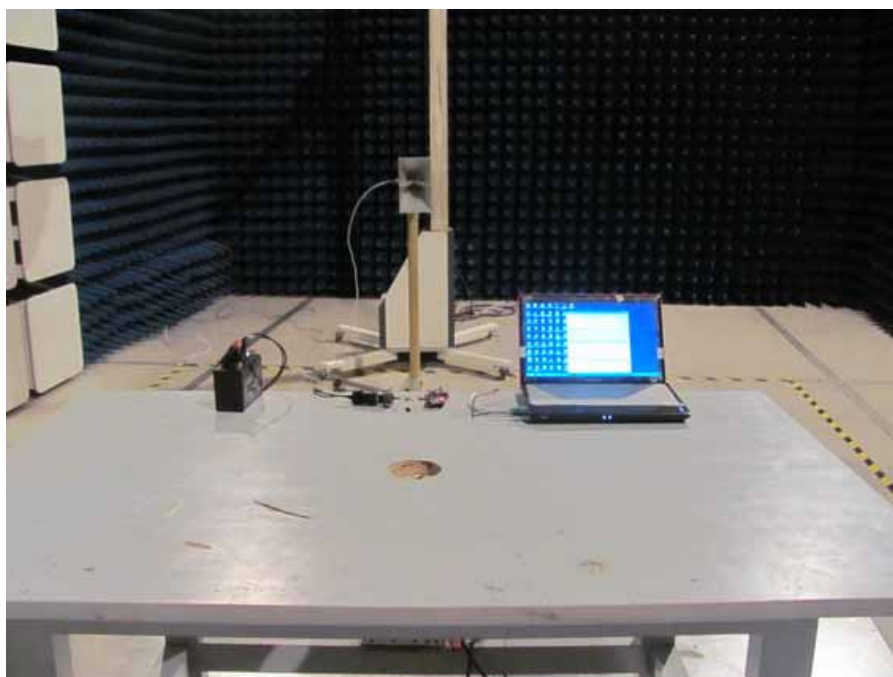
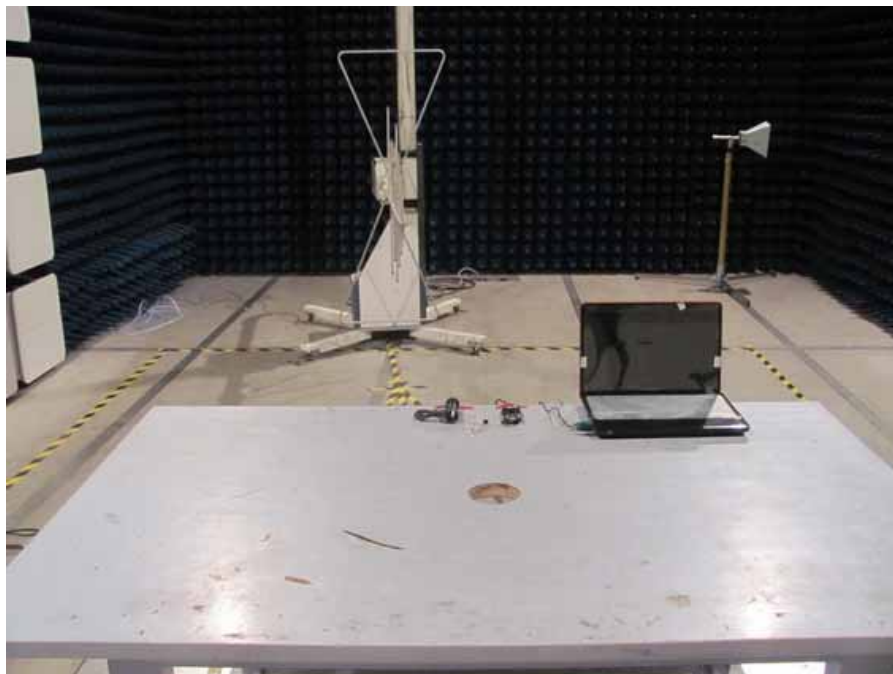
| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV) | Limit 3m<br>(dBuV/m) | Over<br>(dB) | Note |
|----------------|-----------------|--------------------------|----------------------|--------------|------|
| 33.109         | V               | 34.53                    | 40                   | -5.47        | PK   |
| 37.7724        | V               | 34.47                    | 40                   | -5.53        | PK   |
| 62.6442        | V               | 33.19                    | 40                   | -6.81        | PK   |
| 93.734         | V               | 32.54                    | 43.5                 | -10.96       | PK   |
| 129.4871       | V               | 40.45                    | 43.5                 | -3.05        | PK   |
| 406.186        | V               | 42.46                    | 46                   | -3.54        | PK   |
| 73.5256        | H               | 32.17                    | 40                   | -7.83        | PK   |
| 194.7756       | H               | 27.1                     | 43.5                 | -16.4        | PK   |
| 232.0833       | H               | 29.02                    | 46                   | -16.98       | PK   |
| 260.0641       | H               | 35.38                    | 46                   | -10.62       | PK   |
| 404.6314       | H               | 40.82                    | 46                   | -5.18        | PK   |
| 446.6026       | H               | 36.45                    | 46                   | -9.55        | PK   |

Operation Mode: RX                      Test Date : 03/25/2011  
 Frequency Range: 1-25GHz              Temperature : 28  
 Test Result: PASS                      Humidity : 65 %  
 Measured Distance: 3m                  Test By: WOLF

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level(dBuV) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|-----------------|----------------------|-------|------------------|----|----------|--------|
|                |                 | PK                   | AV    | PK               | AV | PK       | AV     |
| 11052.88       | V               | 56.75                | 44.18 | 74               | 54 | -17.25   | -9.82  |
| 14512.82       | V               | 51.21                | 38.97 | 74               | 54 | -22.79   | -15.03 |
| 180000         | V               | 54.78                | 39.55 | 74               | 54 | -29.22   | -14.45 |
| --             | V               | --                   | --    | --               | -- | --       | --     |
| --             | V               | --                   | --    | --               | -- | --       | --     |
| 10371.79       | H               | 56.96                | 44.57 | 74               | 54 | -17.04   | -9.43  |
| 14594.55       | H               | 50.87                | 38.96 | 74               | 54 | -23.13   | -15.04 |
| 18000          | H               | 55.20                | 36.35 | 74               | 54 | -18.8    | -17.65 |

**Note:** (1) All Readings are Peak Value and AV.  
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss  
 (3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

#### 4.6 Radiated Measurement Photos

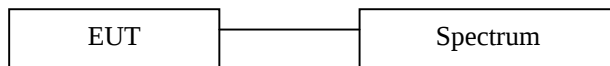


## 5. Channel Separation Test

### 5.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

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



### 5.3 Measurement Equipment Used

Same as 4.3 Radiated Emission Measurement.

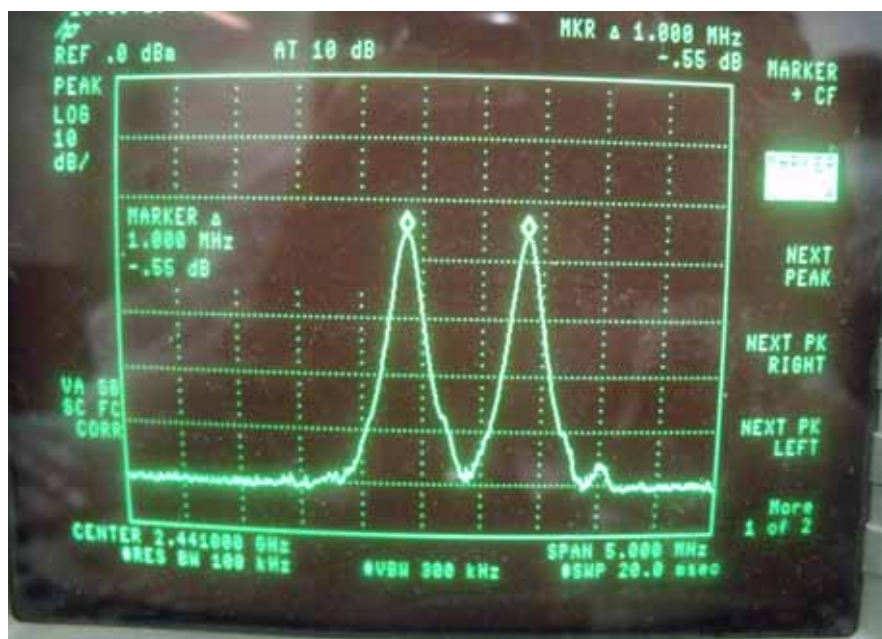
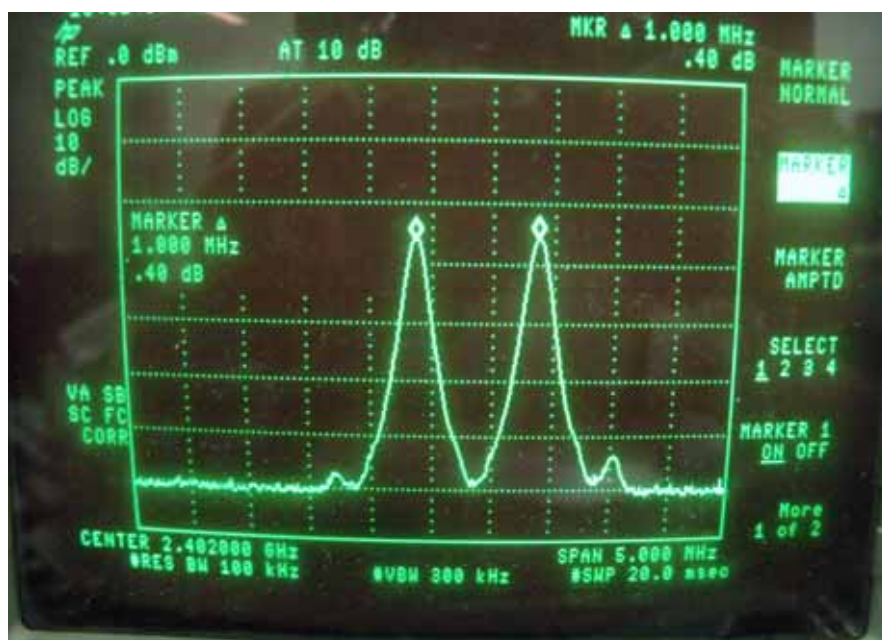
### 5.4 Measurement Results

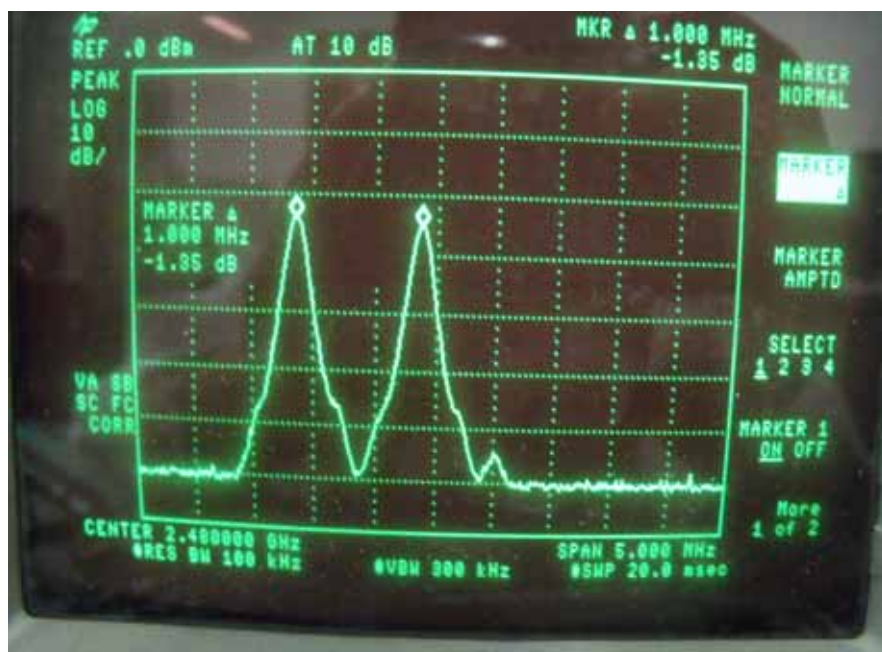
Refer to attached data chart.

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 03/25/2011 |
| Test By:           | Andy | Temperature : | 28 °C      |
| Test Result:       | PASS | Humidity :    | 65 %       |

| Channel number | Channel frequency (MHz) | Separation Read Value (kHz) | Separation Limit 2/3 20dB Down BW(kHz) |
|----------------|-------------------------|-----------------------------|----------------------------------------|
| 1              | 2402                    | 1000.00                     | >733 kHz                               |
| 40             | 2441                    | 1000.00                     | >742 kHz                               |
| 79             | 2480                    | 1000.00                     | >725 kHz                               |

NOTE: For two-third of the 20dB bandwidth (page 24) is greater than 25kHz. So the limit of Separation Limit is just as the above table.



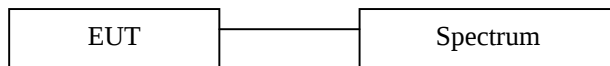


## 6. Bandwidth Test

### 6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

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



### 6.3 Measurement Equipment Used

Same as 4.3 Radiated Emission Measurement.

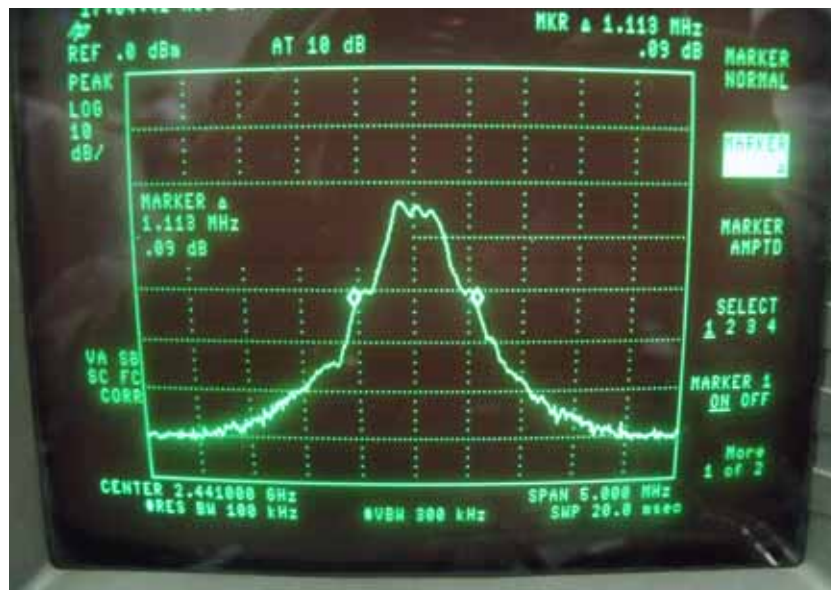
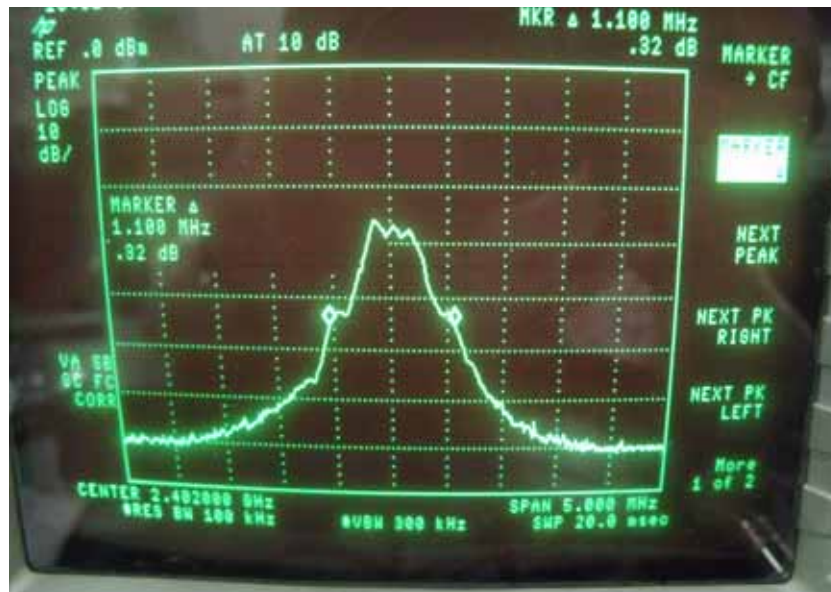
### 6.4 Measurement Results

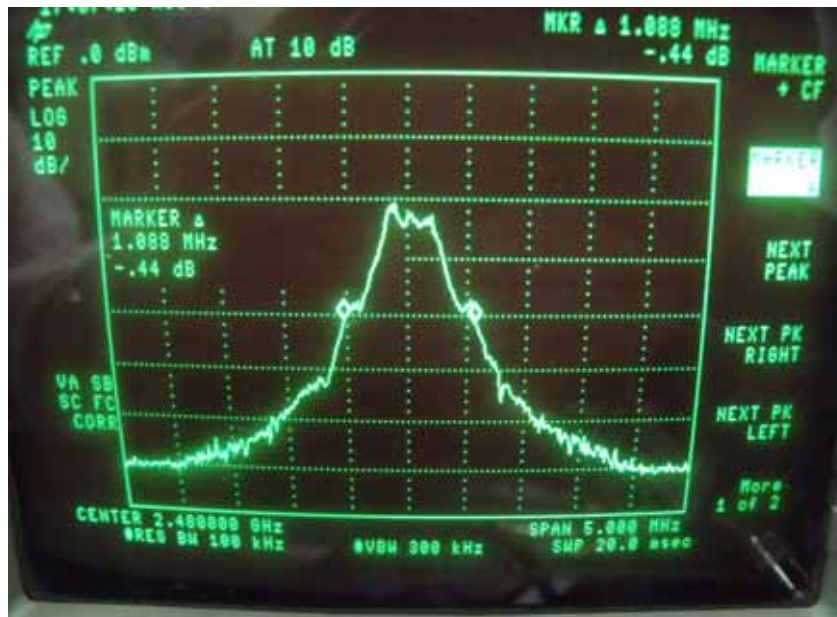
6.4.1. 20dB Bandwidth test data Chart:

Refer to attached data chart.

|                    |      |              |            |
|--------------------|------|--------------|------------|
| Spectrum Detector: | PK   | Test Date:   | 03/25/2011 |
| Test By:           | Andy | Temperature: | 28 °C      |
| Test Result:       | PASS | Humidity:    | 65 %       |

| Channel number | Channel frequency<br>(MHz) | 20dB Down BW(kHz) |
|----------------|----------------------------|-------------------|
| 1              | 2402                       | 1100              |
| 40             | 2441                       | 1113              |
| 79             | 2480                       | 1088              |

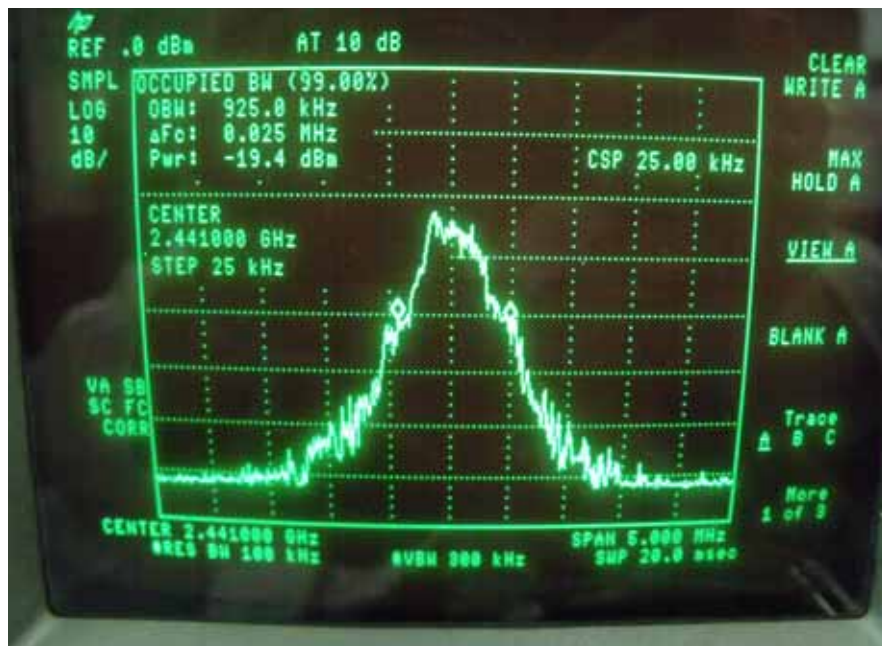
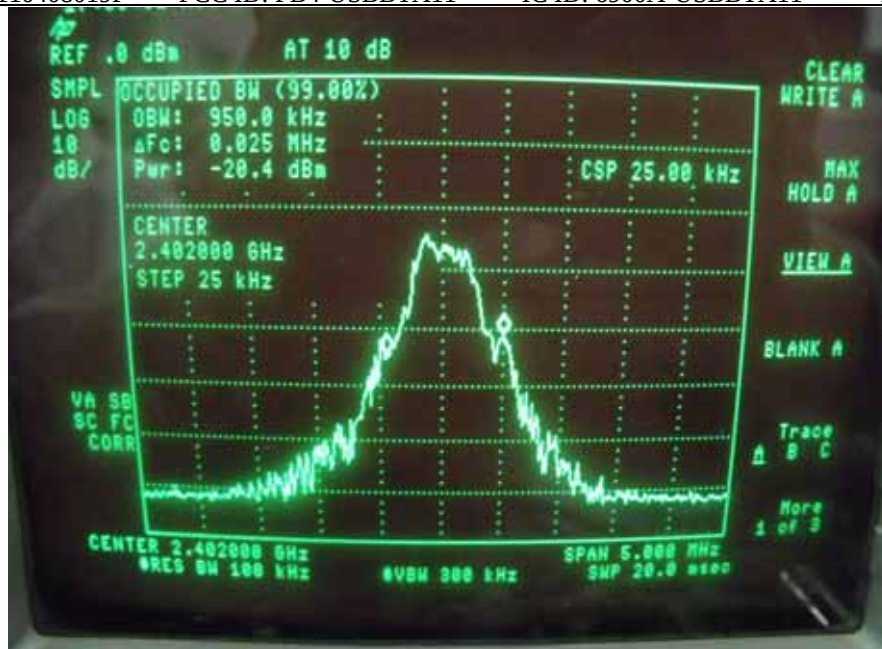


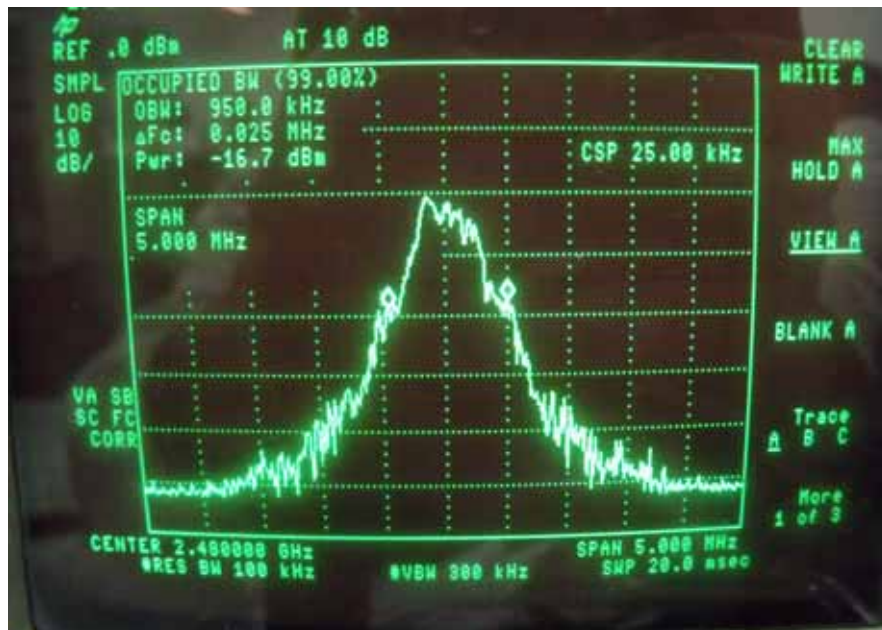


6.4.2. 99% Bandwidth test data Chart:  
Refer to attached data chart.

|                    |      |              |            |
|--------------------|------|--------------|------------|
| Spectrum Detector: | PK   | Test Date:   | 03/25/2011 |
| Test By:           | Andy | Temperature: | 28 °C      |
| Test Result:       | PASS | Humidity:    | 65 %       |

| Channel number | Channel frequency (MHz) | 99% Down BW(kHz) |
|----------------|-------------------------|------------------|
| 1              | 2402                    | 950              |
| 40             | 2441                    | 925              |
| 79             | 2480                    | 950              |



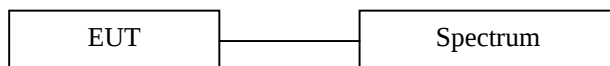


## 7. Quantity of Hopping Channel Test

### 7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

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



### 7.3 Measurement Equipment Used

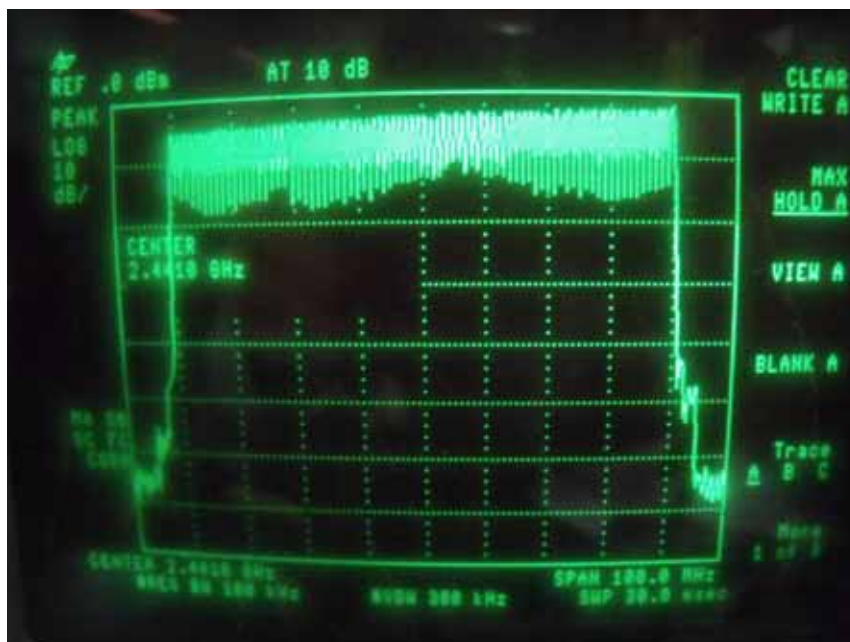
Same as 4.3 Radiated Emission Measurement.

### 7.4 Measurement Results

Refer to attached data chart.

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 03/25/2011 |
| Test By:           | Andy | Temperature : | 28 °C      |
| Test Result:       | PASS | Humidity :    | 65 %       |

| Hopping Channel<br>Frequency Range | Quantity of Hopping Channel | Quantity of Hopping Channel |
|------------------------------------|-----------------------------|-----------------------------|
| 2402-2480                          | 79                          | 79                          |

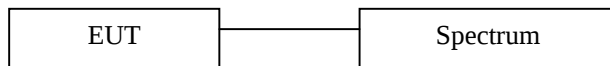


## 8. Time of Occupancy (Dwell Time) Test

### 8.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

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



### 8.3 Measurement Equipment Used

Same as 4.3 Radiated Emission Measurement.

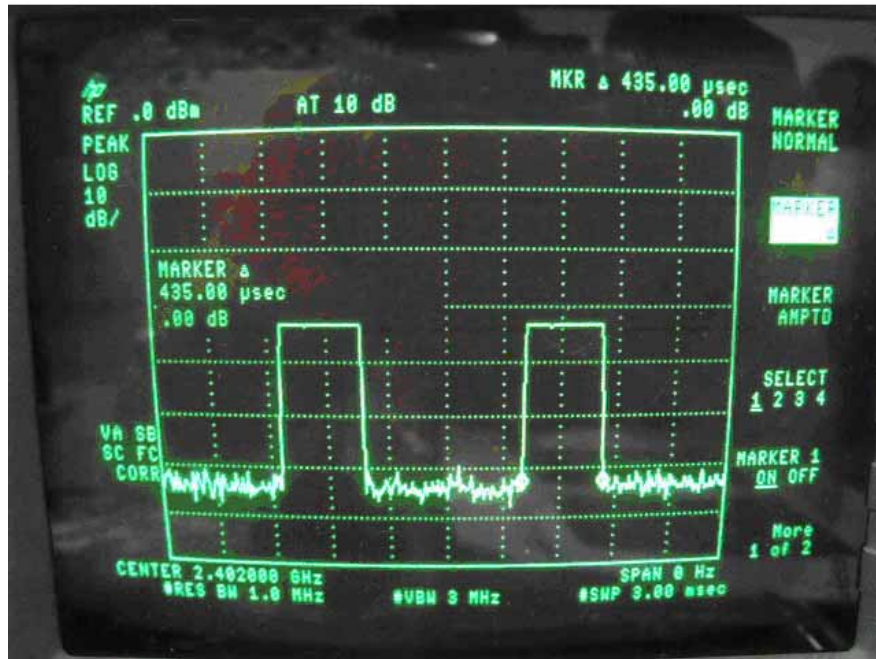
### 8.4 Measurement Results

Refer to attached data chart.

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 03/25/2011 |
| Test By:           | Andy | Temperature : | 28 °C      |
| Test Result:       | PASS | Humidity :    | 65 %       |

| mode | Number of transmission in a<br>31.6( 79 Hopping*0.4) | Length of<br>transmissions<br>time(msec) | Result<br>(msec) | Limit<br>(msec) |
|------|------------------------------------------------------|------------------------------------------|------------------|-----------------|
| DH1  | 51(times/5 sec)*6.32=322.32 times                    | 0.435                                    | 140.2092         | 400             |
| DH3  | 26(times/5 sec)*6.32=164.32 times                    | 1.616                                    | 265.5411         | 400             |
| DH5  | 15(times/5 sec)*6.32=94.80 times                     | 2.717                                    | 257.5716         | 400             |

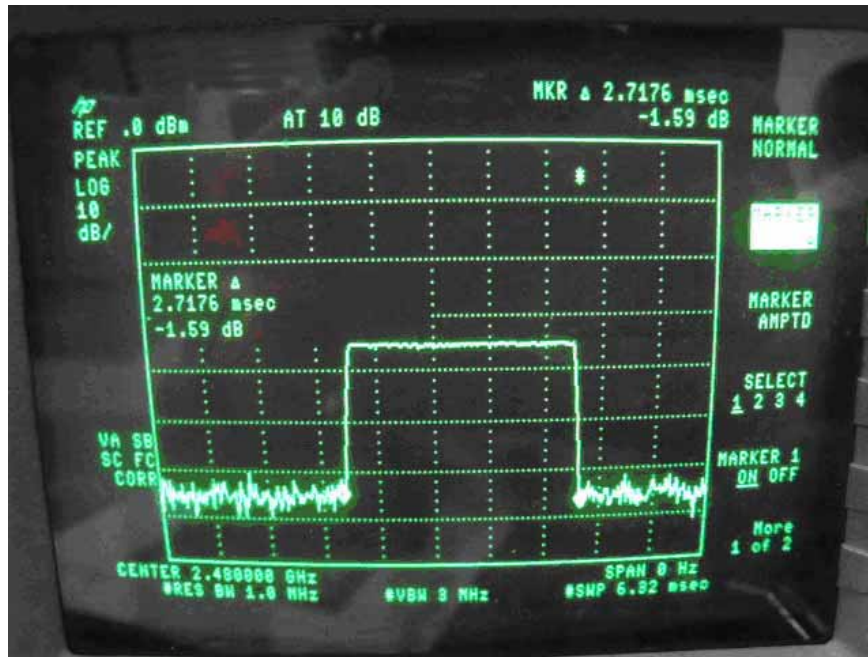
DH1



DH3



DH5

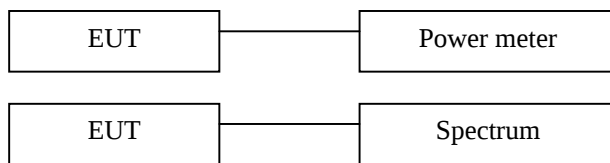


## 9. Maximum Peak Output Power Test

### 9.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

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



### 9.3 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR             | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|-----------------|--------------|---------------|------------|------------|
| Spectrum Analyzer | Rohde & Schwarz | FSP7         | 839511/010    | 05/29/2010 | 05/29/2011 |
| Power meter       | Boonton         | 4232A        | 29001         | 05/29/2010 | 05/29/2011 |
| Power sensor      | Boonton         | 51011-EMC    | 31184         | 05/29/2010 | 05/29/2011 |

### 9.4 Measurement Results

Refer to attached data chart.

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 03/25/2011 |
| Test By:           | Andy | Temperature : | 28 °C      |
| Test Result:       | PASS | Humidity :    | 65 %       |

| Channel number | Channel Frequency (MHz) | Peak Power output(dBm) | Peak Power output(mW) | Peak Power Limit(mW) | Pass/Fail |
|----------------|-------------------------|------------------------|-----------------------|----------------------|-----------|
| 1              | 2402.00                 | 1.08                   | 1.28                  | 125                  | PASS      |
| 40             | 2441.00                 | 1.22                   | 1.32                  | 125                  | PASS      |
| 79             | 2480.00                 | 1.19                   | 1.31                  | 125                  | PASS      |

## 10. Band Edge Test

### 10.1 Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

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

As 4.2 Test set up (B) and (C)

### 10.3 Measurement Equipment Used

Same as 4.3 Radiated Emission Measurement.

### 10.4 Measurement Results

|                    |       |               |            |
|--------------------|-------|---------------|------------|
| Spectrum Detector: | PK/AV | Test Date :   | 03/25/2011 |
| Test By:           | Andy  | Temperature : | 28 °C      |
| Test channel:      | `1    | Humidity :    | 65 %       |

| Frequency<br>(MHz) | Polarity | Level<br>(dBuV/m) |       | Limited<br>(dBuV/m) |    |
|--------------------|----------|-------------------|-------|---------------------|----|
|                    |          | PK                | AV    | PK                  | AV |
| 2385.56            | H        | 48.69             | 35.28 | 74                  | 54 |
| 2384.78            | V        | 49.87             | 36.12 | 74                  | 54 |

|                    |       |               |            |
|--------------------|-------|---------------|------------|
| Spectrum Detector: | PK/AV | Test Date :   | 03/25/2011 |
| Test By:           | Andy  | Temperature : | 28 °C      |
| Test channel:      | 79    | Humidity :    | 65 %       |

| Frequency<br>(MHz) | Polarity | Level<br>(dBuV/m) |       | Limited<br>(dBuV/m) |    |
|--------------------|----------|-------------------|-------|---------------------|----|
|                    |          | PK                | AV    | PK                  | AV |
| 2484.35            | H        | 51.05             | 38.53 | 74                  | 54 |
| 2483.63            | V        | 50.46             | 37.34 | 74                  | 54 |

## 11. Antenna Port Emission

### 11.1 Test Equipment

| EQUIPMENT TYPE    | MFR             | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|-----------------|--------------|---------------|------------|------------|
| EMI Test Receiver | Rohde & Schwarz | ESU          | 1302.6005.26  | 05/29/2010 | 05/29/2011 |

### 11.2 Measuring Instruments and setting

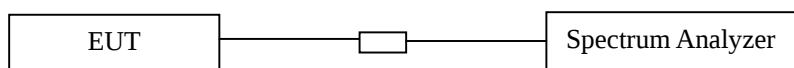
The following table is the setting of spectrum analyzer.

|                   |          |
|-------------------|----------|
| Spectrum analyzer | Setting  |
| Attenuation       | Auto     |
| RB                | 100kHz   |
| VB                | 300kHz   |
| Detector          | Peak     |
| Trace             | Max hold |

### 11.3 Test Procedures

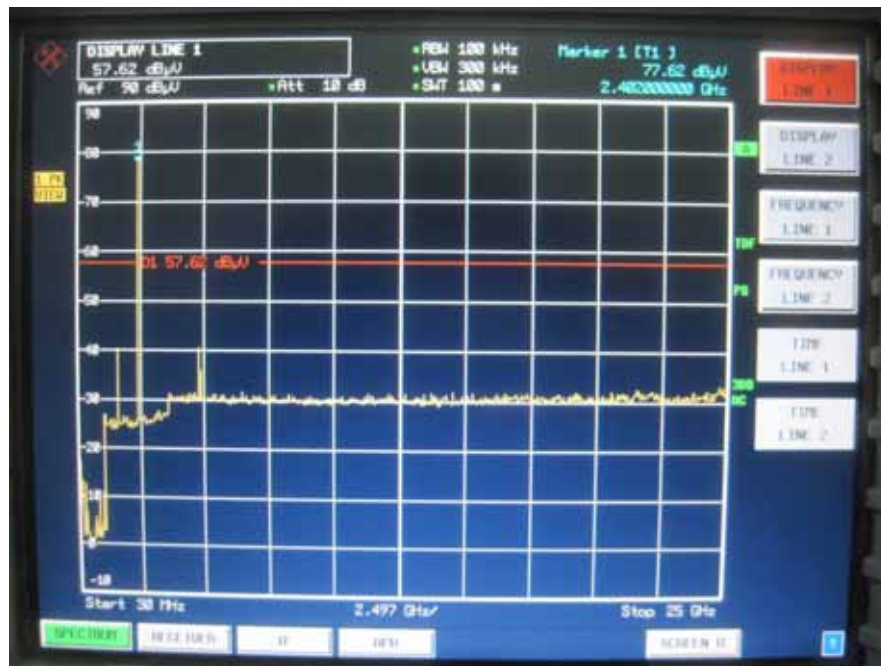
The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels, The limit was determined by attenuation 20dB of the RF peak power output.

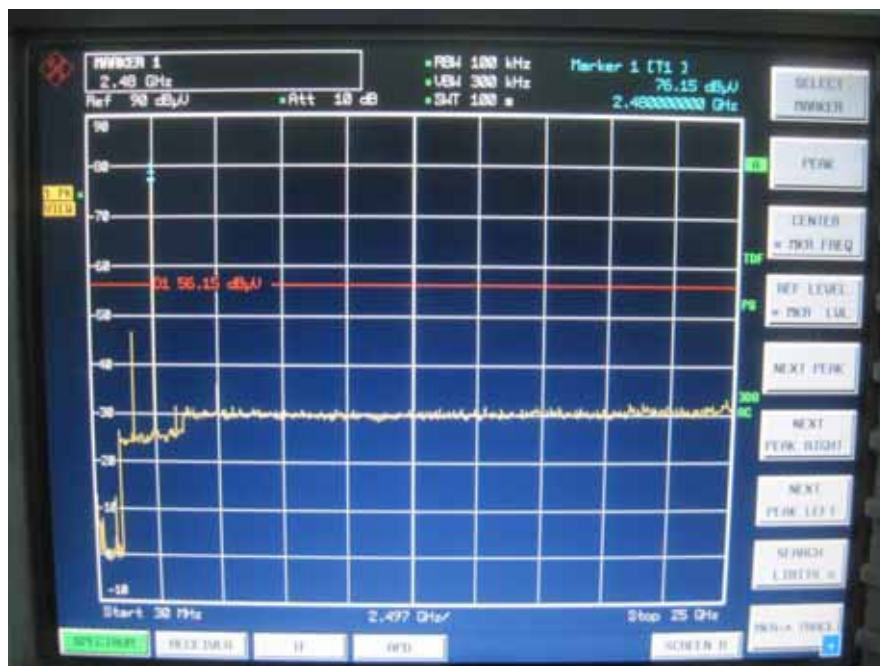
### 11.4 Block Diagram of Test setup



### 11.5 Test Result

PASS.





## **12. Antenna Application**

### **12.1 Antenna requirement**

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

FCC part 15C section 15.247 requirements:

Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### **12.2 Result**

The EUT's antenna used a chip antenna and integrated on PCB, The antenna's gain is 0dBi and meets the requirement.