

# FCC RF Test Report

APPLICANT : SAMSUNG Electronics Co., LTD.  
EQUIPMENT : Mobile Phone  
BRAND NAME : Samsung  
MODEL NAME : SCH-W2013  
MARKETING NAME : Grande  
FCC ID : A3LSCHW2013  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Sep. 27, 2012 and completely tested on Nov. 06, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



---

Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

---

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : A3LSCHW2013

Page Number : 1 of 75

Report Issued Date : Nov. 12, 2012

Report Version : Rev. 02



## TABLE OF CONTENTS

|                                                                 |           |
|-----------------------------------------------------------------|-----------|
| <b>REVISION HISTORY.....</b>                                    | <b>3</b>  |
| <b>SUMMARY OF TEST RESULT .....</b>                             | <b>4</b>  |
| <b>1 GENERAL DESCRIPTION.....</b>                               | <b>5</b>  |
| 1.1 Applicant.....                                              | 5         |
| 1.2 Manufacturer.....                                           | 5         |
| 1.3 Feature of Equipment Under Test.....                        | 5         |
| 1.4 Testing Site.....                                           | 6         |
| 1.5 Applied Standards .....                                     | 6         |
| 1.6 Ancillary Equipment List .....                              | 6         |
| <b>2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....</b>        | <b>7</b>  |
| 2.1 RF Output Power.....                                        | 7         |
| 2.2 Test Mode.....                                              | 8         |
| 2.3 Connection Diagram of Test System.....                      | 9         |
| 2.4 RF Utility .....                                            | 9         |
| <b>3 TEST RESULT .....</b>                                      | <b>10</b> |
| 3.1 Number of Channel Measurement .....                         | 10        |
| 3.2 Hopping Channel Separation Measurement .....                | 13        |
| 3.3 Dwell Time Measurement.....                                 | 23        |
| 3.4 20dB Bandwidth Measurement .....                            | 27        |
| 3.5 Peak Output Power Measurement .....                         | 37        |
| 3.6 Conducted Band Edges Measurement .....                      | 47        |
| 3.7 Conducted Spurious Emission Measurement .....               | 52        |
| 3.8 Radiated Band Edges and Spurious Emission Measurement ..... | 59        |
| 3.9 AC Conducted Emission Measurement.....                      | 69        |
| 3.10 Antenna Requirements.....                                  | 73        |
| <b>4 LIST OF MEASURING EQUIPMENT.....</b>                       | <b>74</b> |
| <b>5 UNCERTAINTY OF EVALUATION.....</b>                         | <b>75</b> |



## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION                                                                                                                                                                                                                                              | ISSUED DATE   |
|------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| FR2O0932D  | Rev. 01 | Initial issue of report                                                                                                                                                                                                                                  | Nov. 08, 2012 |
| FR2O0932D  | Rev. 02 | Update report by adding descriptions of following test result :<br>1. Number of Channel Measurement at page 11<br>2. Dwell Time Measurement at page 24<br>3. Add AFH mode compliance statement of carrier frequency separation in section 3.2.5, page 14 | Nov. 12, 2012 |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |
|            |         |                                                                                                                                                                                                                                                          |               |

## SUMMARY OF TEST RESULT

| Report Section | FCC Rule              | IC Rule   | Description                                        | Limit                                                            | Result | Remark                                  |
|----------------|-----------------------|-----------|----------------------------------------------------|------------------------------------------------------------------|--------|-----------------------------------------|
| 3.1            | 15.247(a)(1)          | A8.4(2)   | Number of Channels                                 | $\geq 15\text{Chs}$                                              | Pass   | -                                       |
| 3.2            | 15.247(a)(1)          | A8.1(b)   | Hopping Channel Separation                         | $\geq 2/3$ of 20dB BW                                            | Pass   | -                                       |
| 3.3            | 15.247(a)(1)          | A8.1(d)   | Dwell Time of Each Channel                         | $\leq 0.4\text{sec}$ in 31.6sec period                           | Pass   | -                                       |
| 3.4            | 15.247(a)(1)          | A8.1(a)   | 20dB Bandwidth                                     | NA                                                               | Pass   | -                                       |
| 3.5            | 15.247(b)(1)          | A8.1(b)   | Peak Output Power                                  | $\leq 1\text{ w}$ for 1Mbps<br>$\leq 125\text{ Mw}$ for 2, 3Mbps | Pass   | -                                       |
| 3.6            | 15.247(d)             | A8.5      | Conducted Band Edges                               | $\leq 20\text{dBc}$                                              | Pass   | -                                       |
| 3.7            | 15.247(d)             | A8.5      | Conducted Spurious Emission                        | $\leq 20\text{dBc}$                                              | Pass   | -                                       |
| 3.8            | 15.247(d)             | A8.5      | Radiated Band Edges and Radiated Spurious Emission | 15.209(a) & 15.247(d)                                            | Pass   | Under limit<br>8.19 dB at<br>34.860 MHz |
| 3.9            | 15.207                | Gen 7.2.4 | AC Conducted Emission                              | 15.207(a)                                                        | Pass   | Under limit<br>14.90 dB at<br>2.526 MHz |
| 3.10           | 15.203 &<br>15.247(b) | A8.4      | Antenna Requirement                                | N/A                                                              | Pass   | -                                       |

# 1 General Description

## 1.1 Applicant

**SAMSUNG Electronics Co., LTD.**

IT center, 416, Maetan-3dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, Korea

## 1.2 Manufacturer

**SAMSUNG Electronics Co., LTD.**

IT center, 416, Maetan-3dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, Korea

## 1.3 Feature of Equipment Under Test

| Product Feature                 |                                                  |
|---------------------------------|--------------------------------------------------|
| Equipment                       | Mobile Phone                                     |
| Brand Name                      | Samsung                                          |
| Model Name                      | SCH-W2013                                        |
| Marketing Name                  | Grande                                           |
| FCC ID                          | A3LSCHW2013                                      |
| EUT supports Radios application | CDMA/EV-DO/GSM/EGPRS/<br>WLAN 11abgn / Bluetooth |
| HW Version                      | W2013.05                                         |
| SW Version                      | W2013KELG4                                       |
| EUT Stage                       | Identical Prototype                              |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

| Product Specification subjective to this standard |                                                                                                                                       |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Tx/Rx Frequency Range                             | 2402 MHz ~ 2480 MHz                                                                                                                   |
| Number of Channels                                | 79                                                                                                                                    |
| Carrier Frequency of Each Channel                 | 2402+n*1 MHz; n=0~78                                                                                                                  |
| Maximum Output Power to Antenna                   | Bluetooth (1Mbps) : 9.93 dBm (0.0098 W)<br>Bluetooth EDR (2Mbps) : 9.52 dBm (0.0090 W)<br>Bluetooth EDR (3Mbps) : 9.88 dBm (0.0097 W) |
| Antenna Type                                      | FPCB Antenna Type with gain -2.00 dBi                                                                                                 |
| Type of Modulation                                | Bluetooth v4.0(LE, with EDR)                                                                                                          |

## 1.4 Testing Site

|                           |                                                                                                                                                              |         |           |                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|--------------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.                                                                                                                                   |         |           |                                |
| <b>Test Site Location</b> | No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-3273456 / FAX: +886-3-3284978 |         |           |                                |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                      |         |           | <b>FCC/IC Registration No.</b> |
|                           | TH02-HY                                                                                                                                                      | CO05-HY | 03CH05-HY | 722060/4086B-1                 |

## 1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003 and ANSI C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

## 1.6 Ancillary Equipment List

| Item | Equipment              | Trade Name    | Model Name     | FCC ID      | Data Cable | Power Cord                                                 |
|------|------------------------|---------------|----------------|-------------|------------|------------------------------------------------------------|
| 1.   | System Simulator       | R&S           | CMU 200        | N/A         | N/A        | Unshielded, 1.8 m                                          |
| 2.   | Bluetooth Base Station | R&S           | CBT32          | N/A         | N/A        | Unshielded, 1.8 m                                          |
| 3.   | WLAN AP                | D-Link        | DIR-628        | KA2DIR628A2 | N/A        | Unshielded, 1.8 m                                          |
| 4.   | Bluetooth Earphone     | Sony Ericsson | MW600          | PY7DDA-2029 | N/A        | N/A                                                        |
| 5.   | Notebook               | DELL          | Latitude E6320 | FCC DoC     | N/A        | AC I/P:<br>Unshielded, 1.2 m<br>DC O/P:<br>Shielded, 1.8 m |

## 2 Test Configuration of Equipment Under Test

### 2.1 RF Output Power

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

| Channel | Frequency | Bluetooth RF Output Power |                |          |
|---------|-----------|---------------------------|----------------|----------|
|         |           | Data Rate / Modulation    |                |          |
|         |           | GFSK                      | $\pi/4$ -DQPSK | 8-DPSK   |
|         |           | 1Mbps                     | 2Mbps          | 3Mbps    |
| Ch00    | 2402MHz   | 9.55 dBm                  | 9.50 dBm       | 9.87 dBm |
| Ch39    | 2441MHz   | <b>9.93 dBm</b>           | 9.52 dBm       | 9.88 dBm |
| Ch78    | 2480MHz   | 9.89 dBm                  | 9.24 dBm       | 9.59 dBm |

**Remark:**

1. All the test data for each data rate were verified, but only the worst case was reported.
2. The data rate was set in 1Mbps for all the test items due to the highest RF output power.
3. The EUT is programmed to transmit signals continuously for all testing.

## 2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and ANSI C63.10-2009 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 KHz to 30 MHz), radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

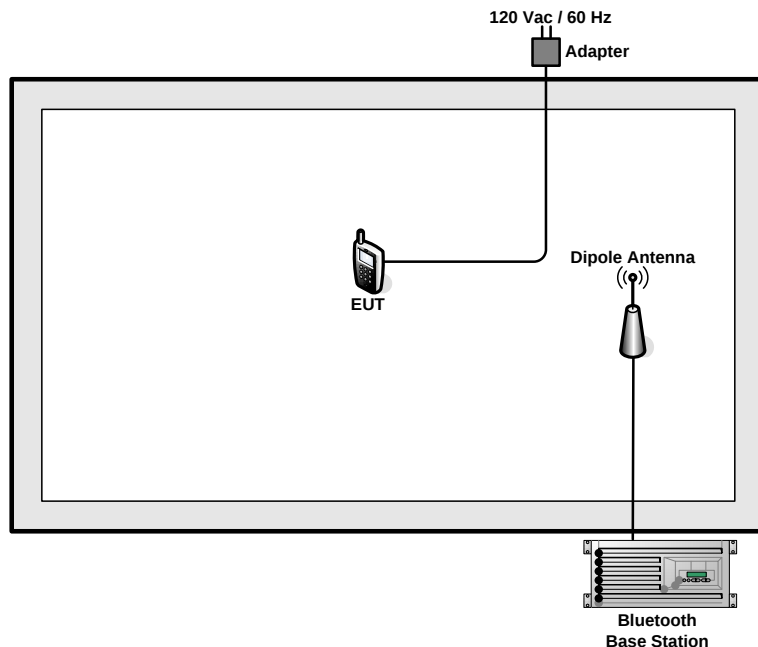
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases (Z plane) and recorded in this report.

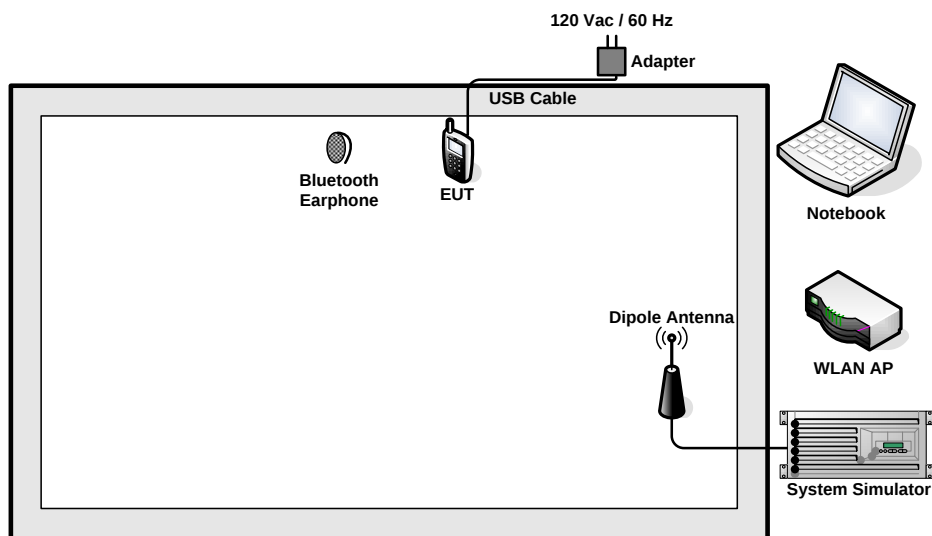
| Test Cases                                                                                                                              |                                                                                                      |                                                                         |                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Test Item                                                                                                                               | Data Rate / Modulation                                                                               |                                                                         |                                                                         |
|                                                                                                                                         | Bluetooth 1Mbps<br>GFSK                                                                              | Bluetooth EDR 2Mbps<br>$\pi/4$ -DQPSK                                   | Bluetooth EDR 3Mbps<br>8-DPSK                                           |
| Conducted<br>TCs                                                                                                                        | Mode 1: CH00_2402 MHz<br>Mode 2: CH39_2441 MHz<br>Mode 3: CH78_2480 MHz                              | Mode 4: CH00_2402 MHz<br>Mode 5: CH39_2441 MHz<br>Mode 6: CH78_2480 MHz | Mode 7: CH00_2402 MHz<br>Mode 8: CH39_2441 MHz<br>Mode 9: CH78_2480 MHz |
| Radiated<br>TCs                                                                                                                         | Mode 1: CH00_2402 MHz<br>Mode 2: CH39_2441 MHz<br>Mode 3: CH78_2480 MHz                              | Pretest                                                                 | Pretest                                                                 |
| AC<br>Conducted<br>Emission                                                                                                             | Mode 1 :GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + MP3 + USB Cable<br>(Charging from Adapter) |                                                                         |                                                                         |
| Remark: For radiated TCs, the data rate was set in 1Mbps due to the highest RF output power; only the data of these modes was reported. |                                                                                                      |                                                                         |                                                                         |

## 2.3 Connection Diagram of Test System

### <Bluetooth Tx Mode>



### <AC Conducted Emission Mode>



## 2.4 RF Utility

For Bluetooth function, key in “\* #232331#” on the EUT directly. Then, the EUT will get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

### 3 Test Result

#### 3.1 Number of Channel Measurement

##### 3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

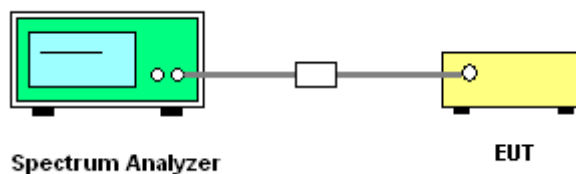
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW  $\geq$  1% of the span; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

##### 3.1.4 Test Setup



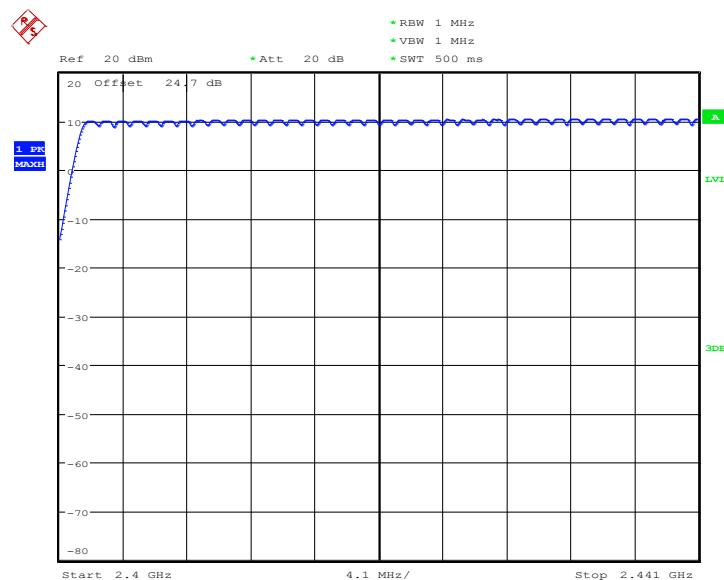
### 3.1.5 Test Result of Number of Hopping Frequency

|                 |          |                     |        |
|-----------------|----------|---------------------|--------|
| Test Mode :     | 1Mbps    | Temperature :       | 24~26℃ |
| Test Engineer : | Bill Kuo | Relative Humidity : | 50~53% |

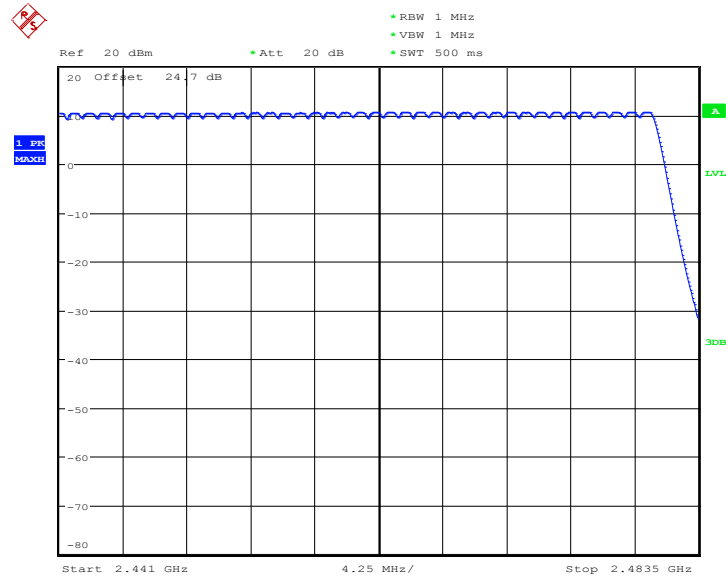
| Number of Hopping Channels (Channel) | Adaptive Frequency Hopping Limits (Channel) | Limits (Channel) | Pass/Fail |
|--------------------------------------|---------------------------------------------|------------------|-----------|
| 79                                   | > 20                                        | > 15             | Pass      |

**Remark:** During AFH mode, the minimum number of hopping channels is 20. The requirement of minimum of 15 channels is met.

#### Number of Hopping Channel Plot on Channel 00 - 78



Date: 6.NOV.2012 20:53:57



Date: 6.NOV.2012 21:10:38

## Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## 3.2 Hopping Channel Separation Measurement

### 3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

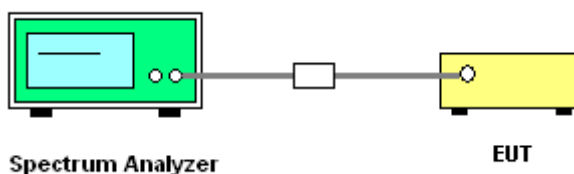
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
8. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
9. Set to the maximum power setting and enable the EUT transmit continuously.
10. Enable the EUT hopping function.
11. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peaks of two adjacent channels;  $RBW \geq 1\%$  of the span;  
 $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold.
12. Measure and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Hopping Channel Separation

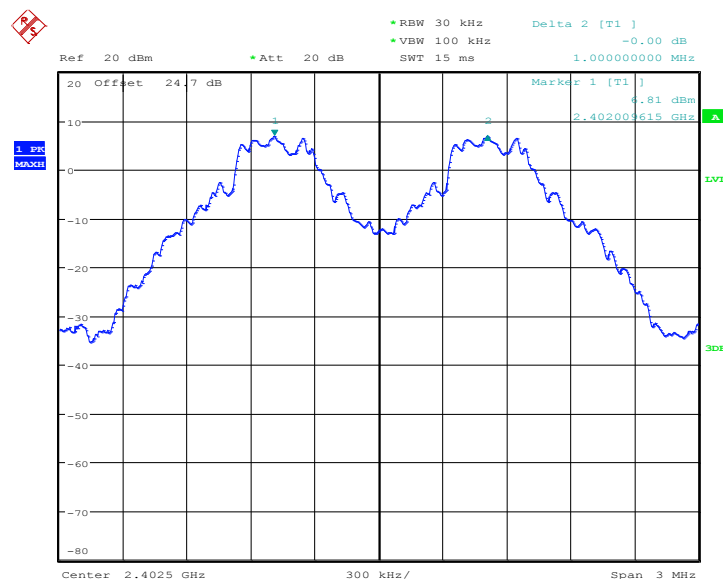
|                 |          |                     |        |
|-----------------|----------|---------------------|--------|
| Test Mode :     | 1Mbps    | Temperature :       | 24~26℃ |
| Test Engineer : | Bill Kuo | Relative Humidity : | 50~53% |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00      | 2402            | 1.000                      | 0.6474                        | Pass      |
| 39      | 2441            | 1.005                      | 0.6474                        | Pass      |
| 78      | 2480            | 1.005                      | 0.6453                        | Pass      |

**Note:**

EUT complies with the minimum channel separation requirement in 1X/EDR mode using 79 channels, and AFH mode using 20 channels. AFH mode was investigated but that the 1x/EDR mode provided a worst case scenario as compared to the AFH mode and therefore the 1x/EDR mode data was provided.

#### Channel Separation Plot on Channel 00 - 01



Date: 6.NOV.2012 19:52:41

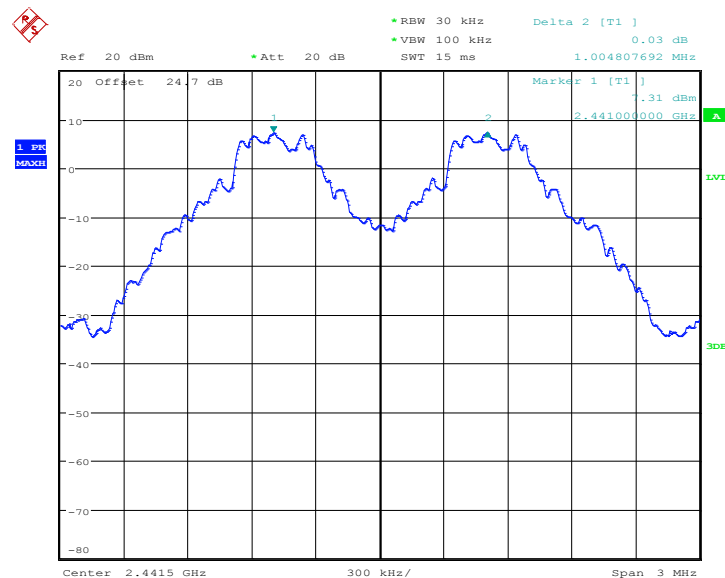
**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level

offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Example: the Hopping Channel Separation test item, the peak point of fundamental signal is 6.81dBm, has added (offset) with the total loss = attenuator factor + cable loss = 24.7dB, where, cable loss = 4.7dB and 20dB attenuator, and then the Hopping Channel Separation is measured and compliance with the limit line. Hereafter, each plot of spectrum analyzer has been added the total loss respectively and to demonstrate in compliance with the limit line.

### Channel Separation Plot on Channel 39 - 40

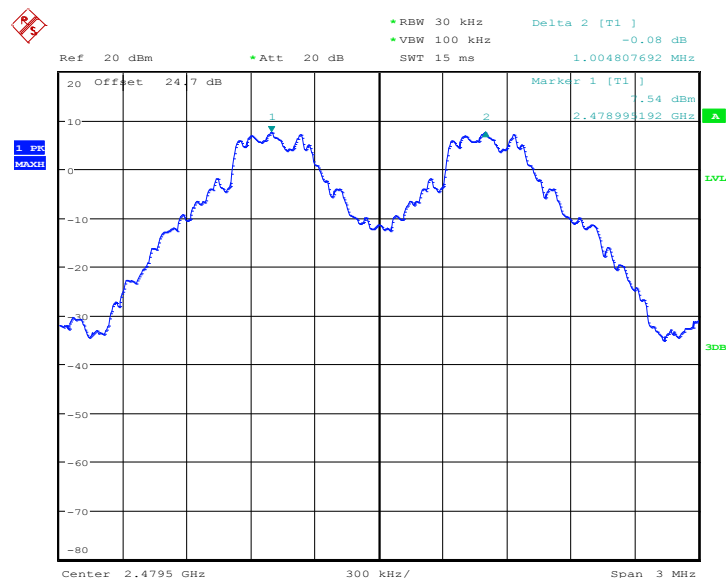


Date: 6.NOV.2012 19:53:40

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### Channel Separation Plot on Channel 77 - 78



Date: 6.NOV.2012 19:54:38

#### Note:

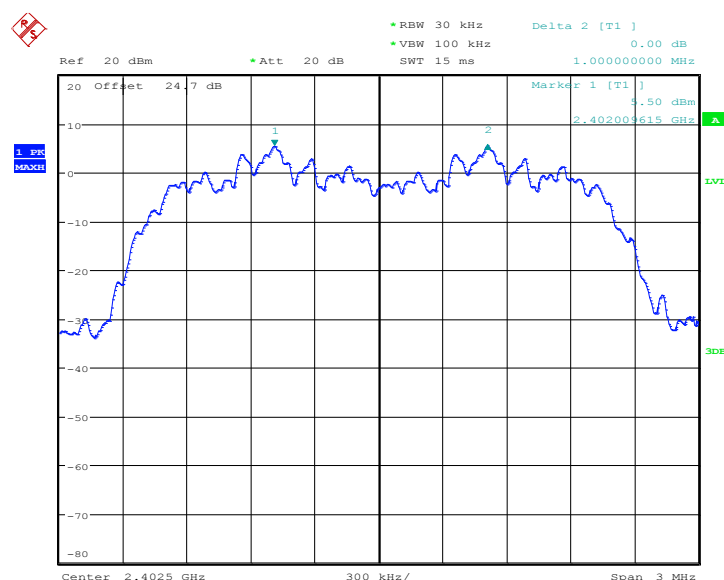
The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



|                 |          |                     |         |
|-----------------|----------|---------------------|---------|
| Test Mode :     | 2Mbps    | Temperature :       | 24~26°C |
| Test Engineer : | Bill Kuo | Relative Humidity : | 50~53%  |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00      | 2402            | 1.000                      | 0.9071                        | Pass      |
| 39      | 2441            | 1.005                      | 0.9033                        | Pass      |
| 78      | 2480            | 1.000                      | 0.9007                        | Pass      |

### Channel Separation Plot on Channel 00 - 01



Date: 6.NOV.2012 20:00:50

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



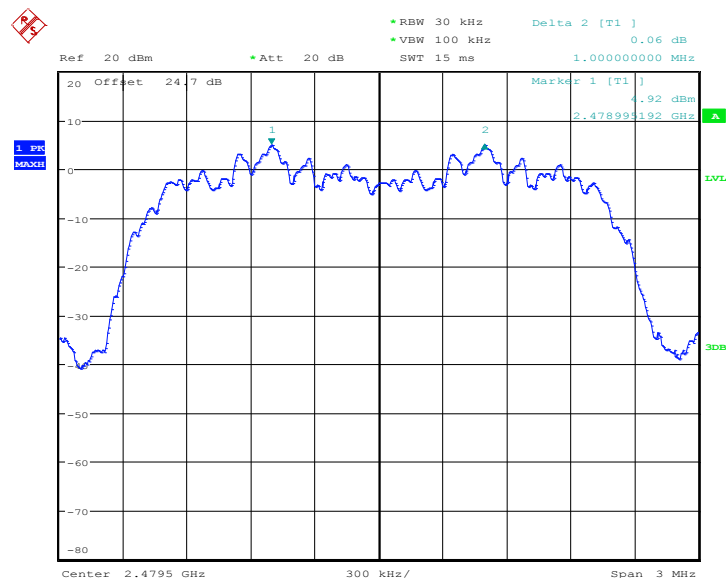
Date: 6.NOV.2012 20:01:36

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



Channel Separation Plot on Channel 77 - 78



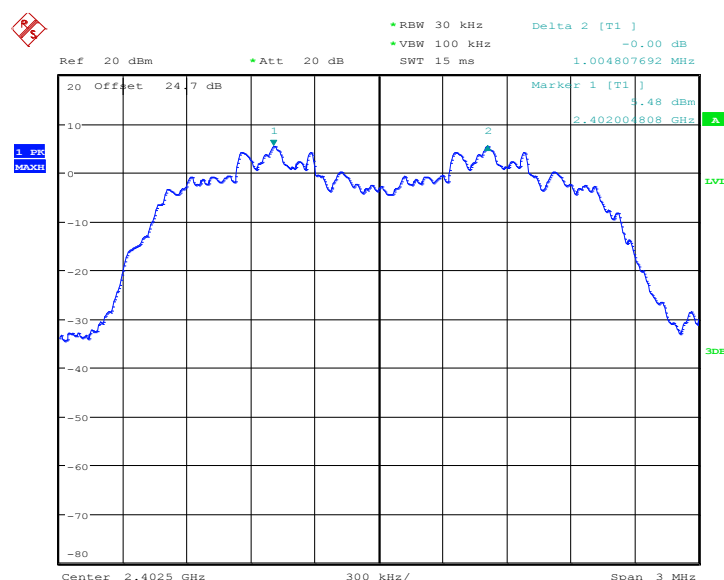
Date: 6.NOV.2012 20:03:35

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                        |          |                            |         |
|------------------------|----------|----------------------------|---------|
| <b>Test Mode :</b>     | 3Mbps    | <b>Temperature :</b>       | 24~26°C |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53%  |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00      | 2402            | 1.005                      | 0.8686                        | Pass      |
| 39      | 2441            | 1.005                      | 0.8718                        | Pass      |
| 78      | 2480            | 1.000                      | 0.8590                        | Pass      |

**Channel Separation Plot on Channel 00 - 01**


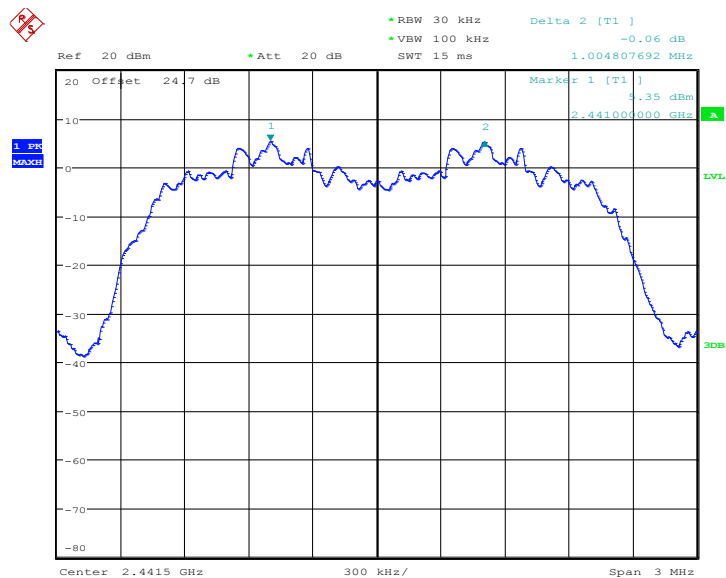
Date: 6.NOV.2012 20:06:32

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



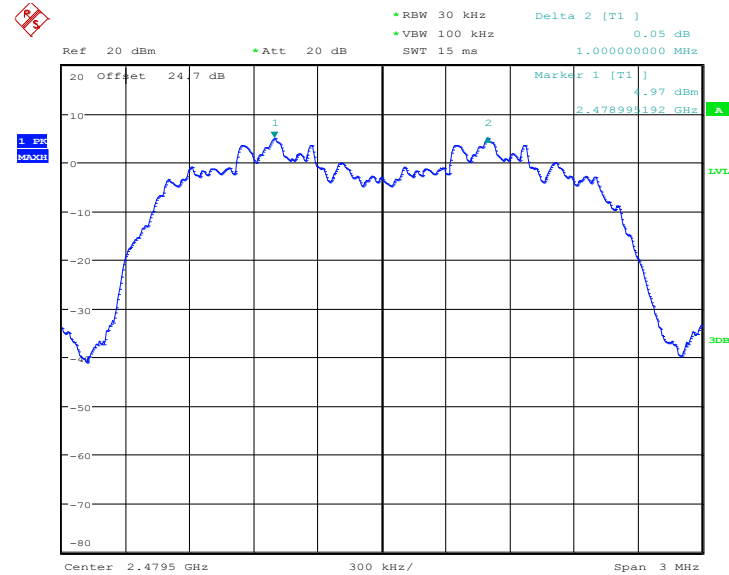
Channel Separation Plot on Channel 39 - 40



Date: 6.NOV.2012 20:09:25

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

**Channel Separation Plot on Channel 77 - 78**


Date: 6.NOV.2012 20:12:01

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### 3.3 Dwell Time Measurement

#### 3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

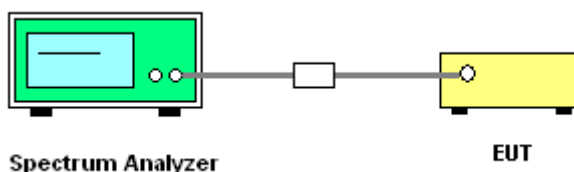
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW  $\geq$  RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

#### 3.3.4 Test Setup



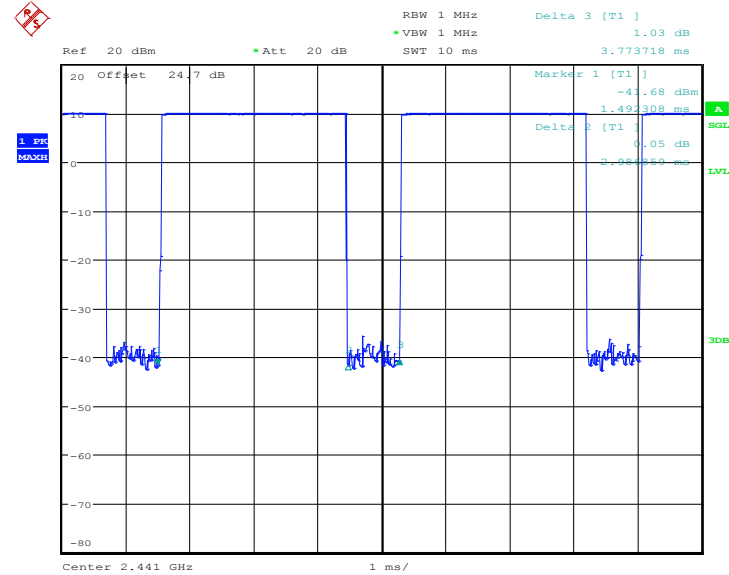
### 3.3.5 Test Result of Dwell Time

|                        |          |                            |        |
|------------------------|----------|----------------------------|--------|
| <b>Test Mode :</b>     | DH5      | <b>Temperature :</b>       | 24~26℃ |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53% |

| Package Mode | Average Hopping Channel | Package Transfer Time (usec) | Dwell Time (sec) | Limits (sec) | Pass/Fail |
|--------------|-------------------------|------------------------------|------------------|--------------|-----------|
| DH5          | 3.30                    | 2986.86                      | 0.31             | 0.4          | Pass      |

**Remark:**

- Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
- 79 channels come from the Hopping Channel number.
- Average Hopping Channel = hops/sweep time
- T: Package Transfer Time(us)
- In Bluetooth hopping operation, basic mode, the hopping rate is 1600Hz. The largest dwell time DH1/DH3/DH5 is 0.31 second of DH5, and the average time of occupancy on any channel would not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
- In Bluetooth hopping operation, AFH mode, the hopping rate is 800Hz, and the minimum hopping channel number is 20. AFH mode uses 6 total slots so the Bluetooth transmitter hops at  $800/6=133.3$  hops/s/slot.
  - a)  $400\text{msec} \times 20 \text{ channels} = 8 \text{ seconds}$
  - b)  $133.3/20=6.67 \text{ hops/second}$ , for each channel
  - c)  $6.67 \times 8\text{seconds} \times 2.98686\text{msec}$  (of DH5, representative as the worst case)= 159.38 msec;  
this is the worst case dwell time for one channel in AFH mode.

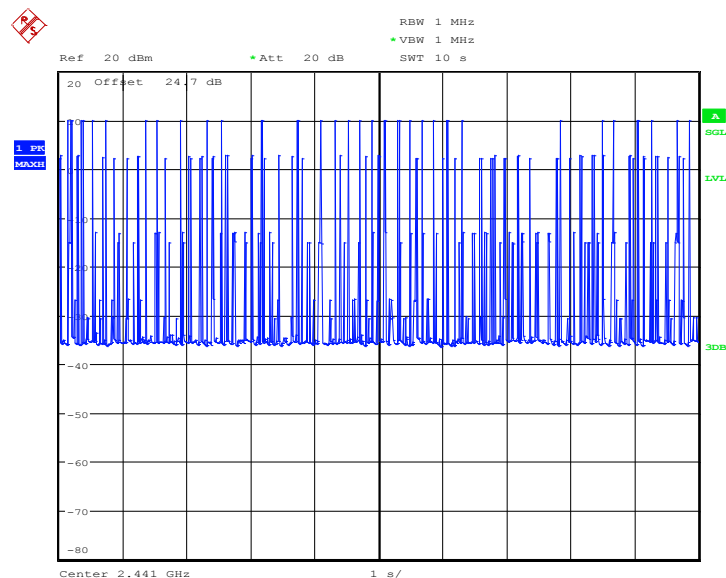
**DH5 Dwell Time (One Pulse) Plot on Channel 39**


Date: 6.NOV.2012 19:49:29

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 6.NOV.2012 20:12:45

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### 3.4 20dB Bandwidth Measurement

#### 3.4.1 Limit of 20dB Bandwidth

Reporting only

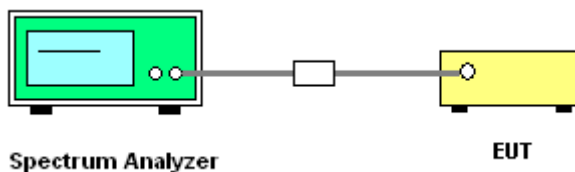
#### 3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.4.3 Test Procedures

- (1) The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
7. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
8. Set to the maximum power setting and enable the EUT transmit continuously.
9. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.  
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;  
RBW  $\geq$  1% of the 20 dB bandwidth; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak;  
Trace = max hold.
10. Measure and record the results in the test report.

#### 3.4.4 Test Setup

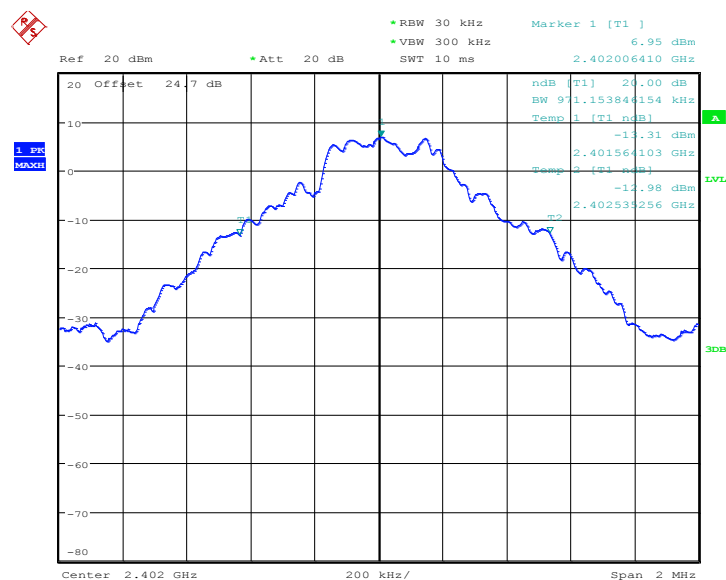


### 3.4.5 Test Result of 20dB Bandwidth

|                 |          |                     |        |
|-----------------|----------|---------------------|--------|
| Test Mode :     | 1Mbps    | Temperature :       | 24~26℃ |
| Test Engineer : | Bill Kuo | Relative Humidity : | 50~53% |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00      | 2402            | 0.971                |
| 39      | 2441            | 0.971                |
| 78      | 2480            | 0.968                |

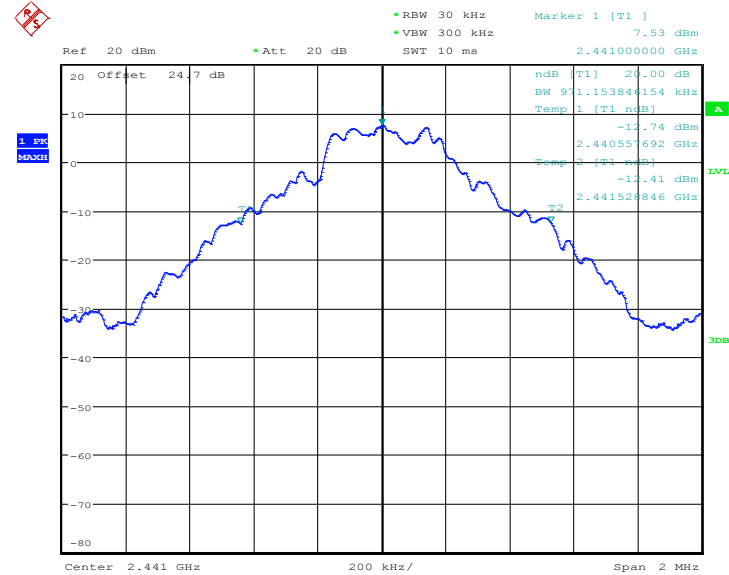
**20 dB Bandwidth Plot on Channel 00**



Date: 6.NOV.2012 20:14:51

**Note:**

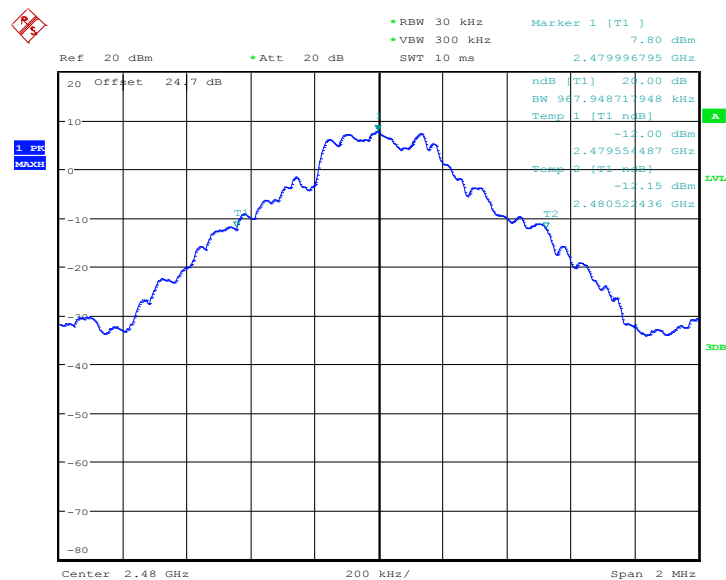
The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

**20 dB Bandwidth Plot on Channel 39**


Date: 6.NOV.2012 20:15:23

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

**20 dB Bandwidth Plot on Channel 78**


Date: 6.NOV.2012 20:16:23

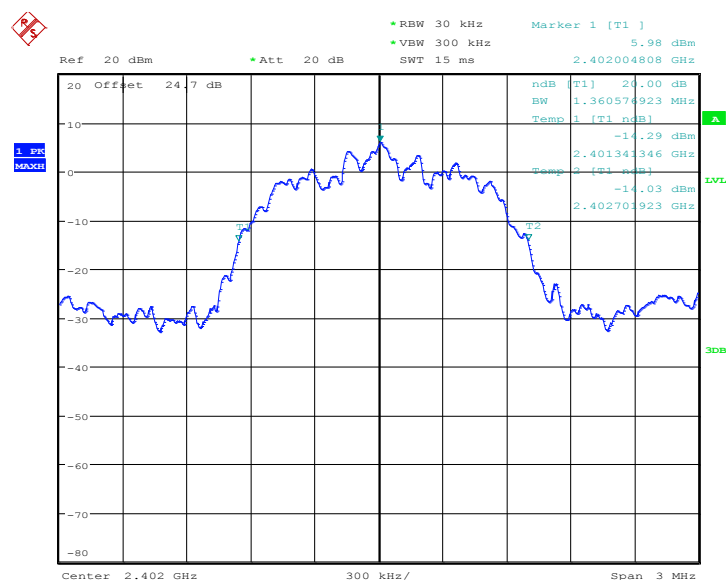
**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                        |          |                            |         |
|------------------------|----------|----------------------------|---------|
| <b>Test Mode :</b>     | 2Mbps    | <b>Temperature :</b>       | 24~26°C |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53%  |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00      | 2402            | 1.361                |
| 39      | 2441            | 1.356                |
| 78      | 2480            | 1.351                |

### 20 dB Bandwidth Plot on Channel 00

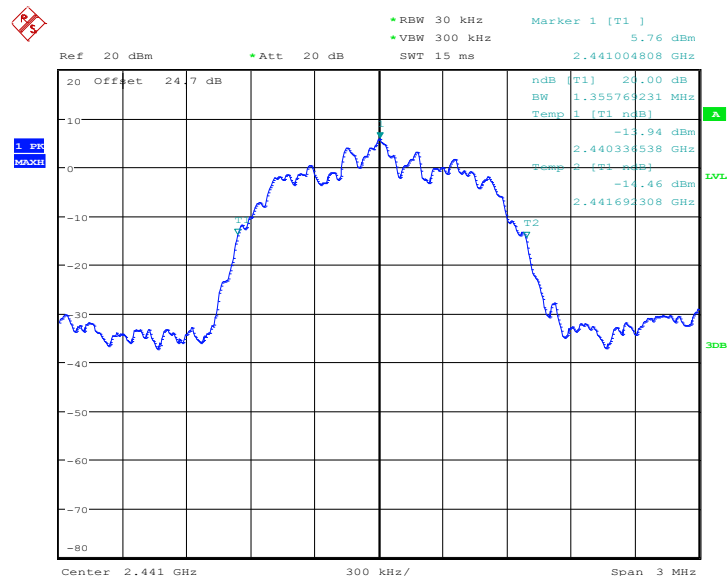


Date: 6.NOV.2012 20:17:21

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

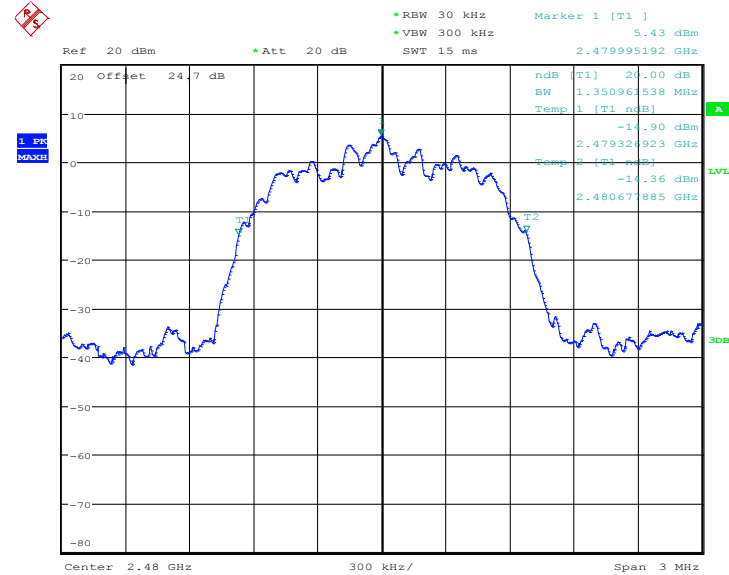
## 20 dB Bandwidth Plot on Channel 39



Date: 6.NOV.2012 20:18:20

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

**20 dB Bandwidth Plot on Channel 78**


Date: 6.NOV.2012 20:27:32

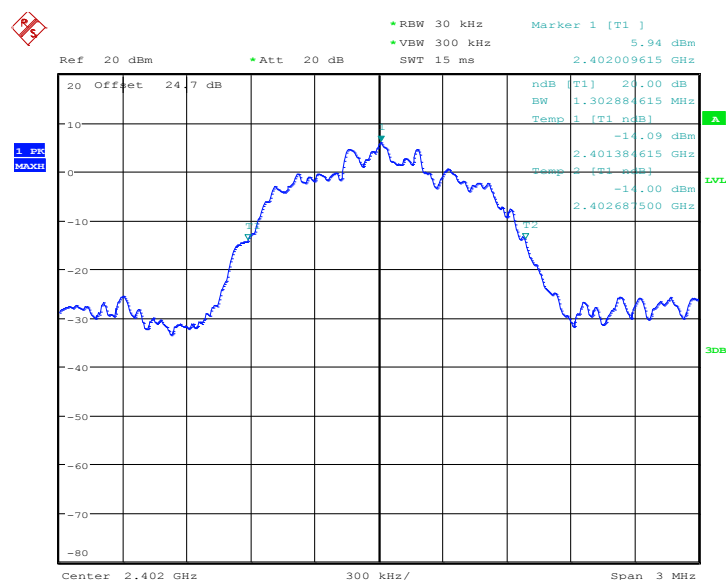
**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                        |          |                            |         |
|------------------------|----------|----------------------------|---------|
| <b>Test Mode :</b>     | 3Mbps    | <b>Temperature :</b>       | 24~26°C |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53%  |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00      | 2402            | 1.303                |
| 39      | 2441            | 1.308                |
| 78      | 2480            | 1.289                |

### 20 dB Bandwidth Plot on Channel 00

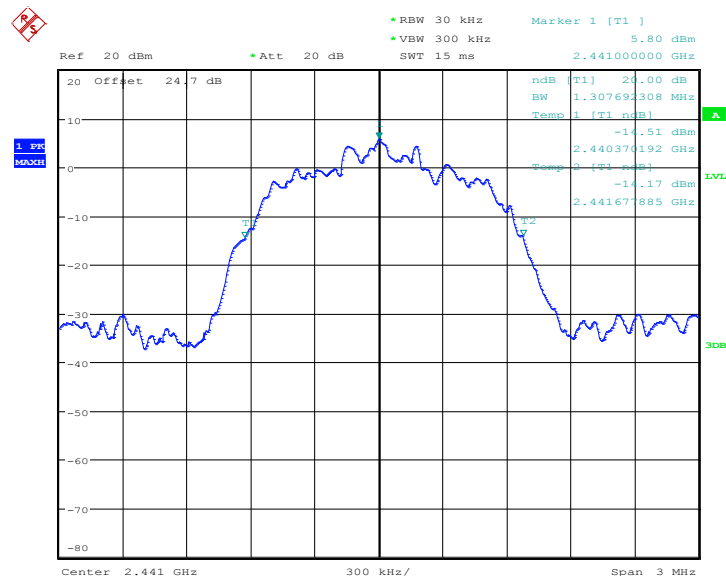


Date: 6.NOV.2012 20:28:17

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## 20 dB Bandwidth Plot on Channel 39

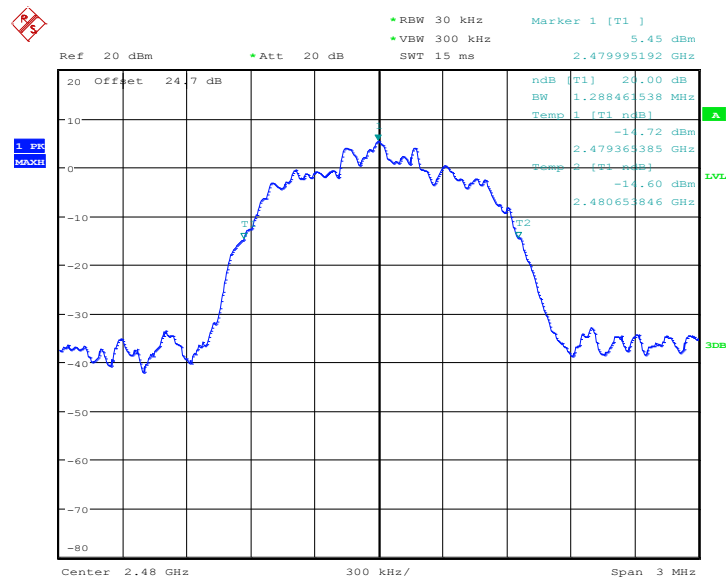


Date: 6.NOV.2012 20:28:59

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## 20 dB Bandwidth Plot on Channel 78



Date: 6.NOV.2012 20:30:00

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### 3.5 Peak Output Power Measurement

#### 3.5.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps is 1watt, and for 2Mbps, and 3Mbps are 0.125 watts.

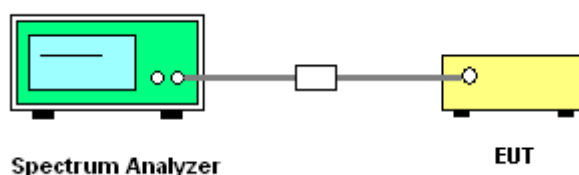
#### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

#### 3.5.4 Test Setup

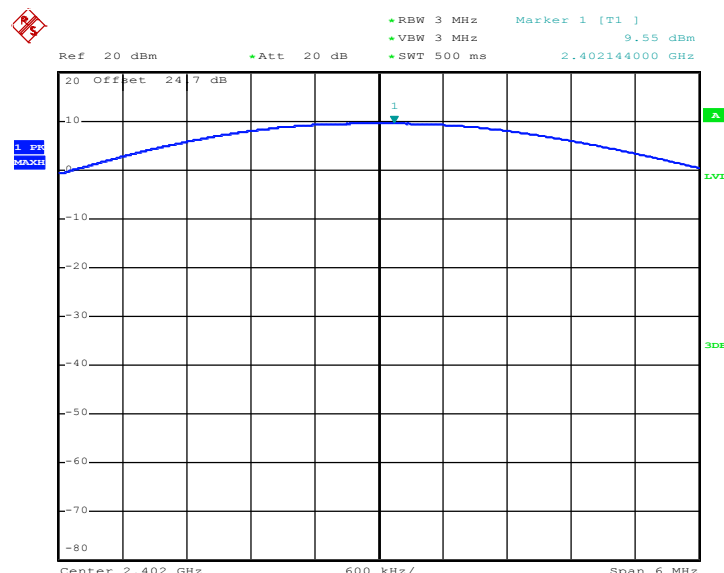


### 3.5.5 Test Result of Peak Output Power

|                 |          |                     |        |
|-----------------|----------|---------------------|--------|
| Test Mode :     | 1Mbps    | Temperature :       | 24~26℃ |
| Test Engineer : | Bill Kuo | Relative Humidity : | 50~53% |

| Channel | Frequency (MHz) | RF Power (dBm) |                   |           |
|---------|-----------------|----------------|-------------------|-----------|
|         |                 | GFSK           | Max. Limits (dBm) | Pass/Fail |
|         |                 | 1 Mbps         |                   |           |
| 00      | 2402            | 9.55           | 30.00             | Pass      |
| 39      | 2441            | 9.93           | 30.00             | Pass      |
| 78      | 2480            | 9.89           | 30.00             | Pass      |

**Peak Output Power Plot on Channel 00**

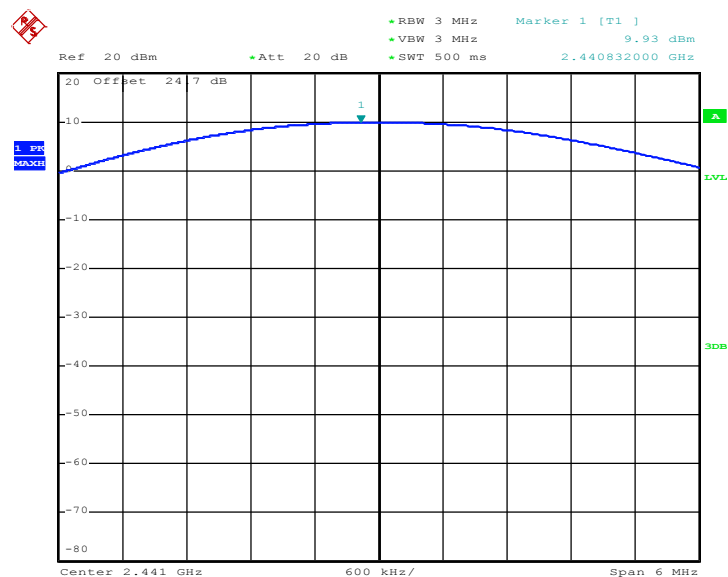


Date: 6.NOV.2012 15:54:16

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### Peak Output Power Plot on Channel 39

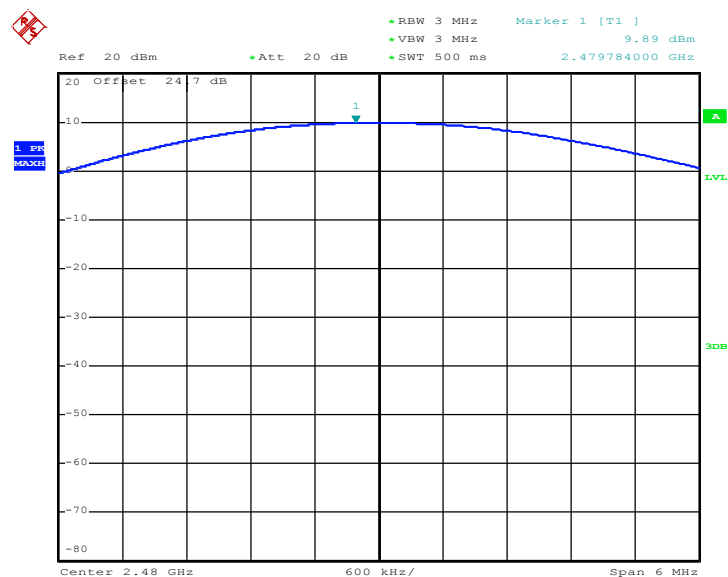


Date: 6.NOV.2012 15:55:31

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### Peak Output Power Plot on Channel 78



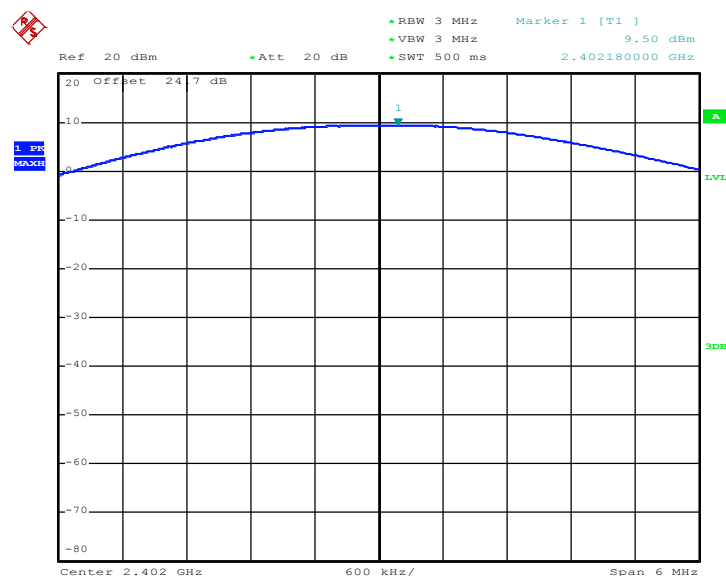
Date: 6.NOV.2012 15:56:47

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                        |          |                            |         |
|------------------------|----------|----------------------------|---------|
| <b>Test Mode :</b>     | 2Mbps    | <b>Temperature :</b>       | 24~26°C |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53%  |

| Channel | Frequency<br>(MHz) | RF Power (dBm) |                      |           |
|---------|--------------------|----------------|----------------------|-----------|
|         |                    | $\pi/4$ -DQPSK | Max. Limits<br>(dBm) | Pass/Fail |
|         |                    | 2 Mbps         |                      |           |
| 00      | 2402               | 9.50           | 20.97                | Pass      |
| 39      | 2441               | 9.52           | 20.97                | Pass      |
| 78      | 2480               | 9.24           | 20.97                | Pass      |

**Peak Output Power Plot on Channel 00**


Date: 6.NOV.2012 15:54:41

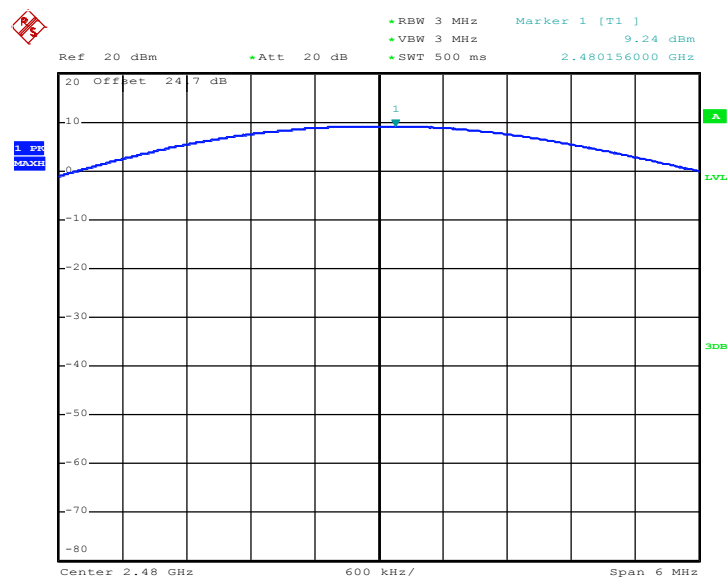
**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### Peak Output Power Plot on Channel 78



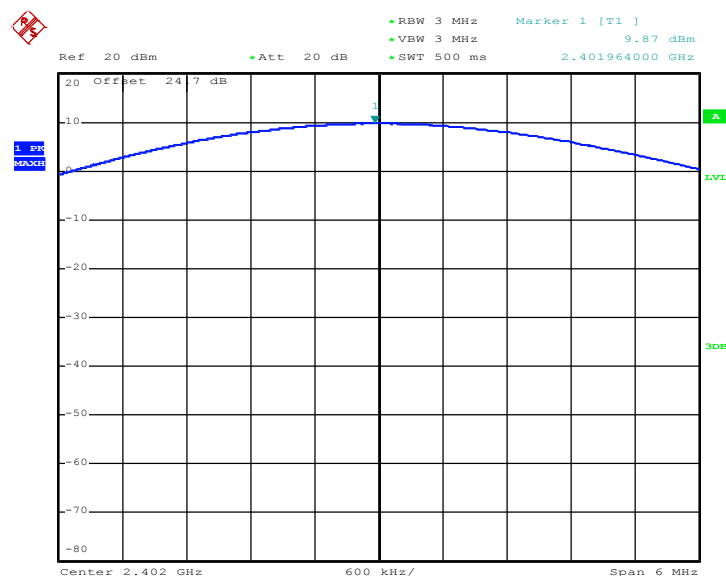
Date: 6.NOV.2012 15:57:12

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                        |          |                            |         |
|------------------------|----------|----------------------------|---------|
| <b>Test Mode :</b>     | 3Mbps    | <b>Temperature :</b>       | 24~26°C |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53%  |

| Channel | Frequency (MHz) | RF Power (dBm) |                   |           |
|---------|-----------------|----------------|-------------------|-----------|
|         |                 | 8-DPSK         | Max. Limits (dBm) | Pass/Fail |
|         |                 | 3 Mbps         |                   |           |
| 00      | 2402            | 9.87           | 20.97             | Pass      |
| 39      | 2441            | 9.88           | 20.97             | Pass      |
| 78      | 2480            | 9.59           | 20.97             | Pass      |

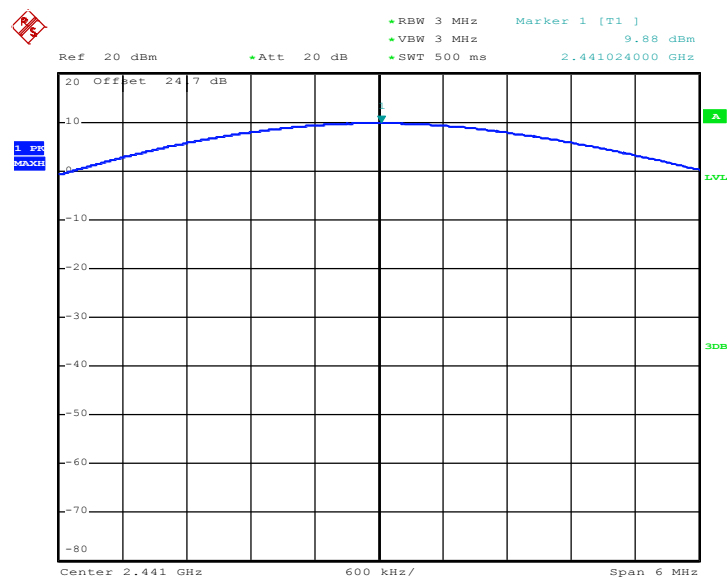
**Peak Output Power Plot on Channel 00**


Date: 6.NOV.2012 15:55:06

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

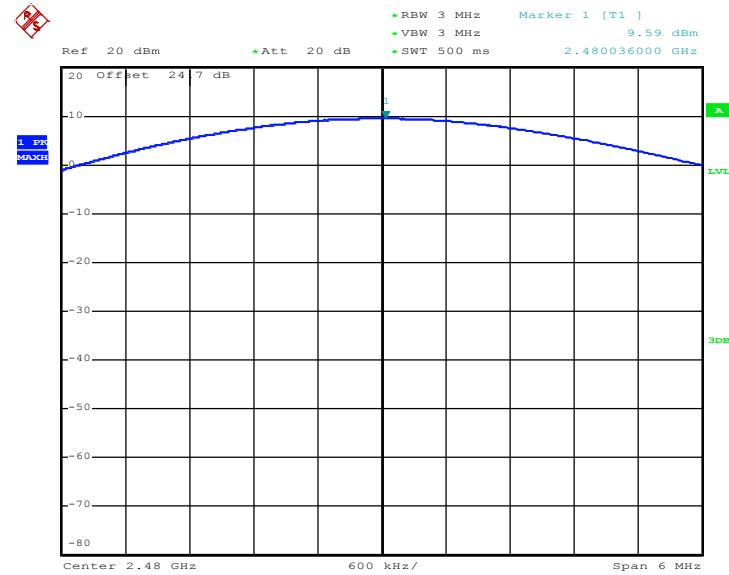
### Peak Output Power Plot on Channel 39



Date: 6.NOV.2012 15:56:22

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

**Peak Output Power Plot on Channel 78**


Date: 6.NOV.2012 15:57:37

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## 3.6 Conducted Band Edges Measurement

### 3.6.1 Limit of Band Edges

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

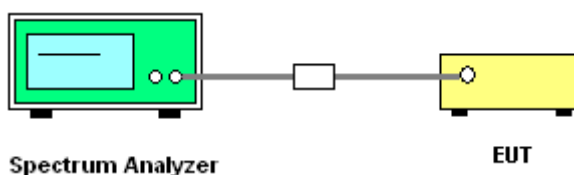
### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 300KHz ( $\geq 1\%$  span=30MHz ), VBW = 300KHz ( $\geq$  RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300KHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

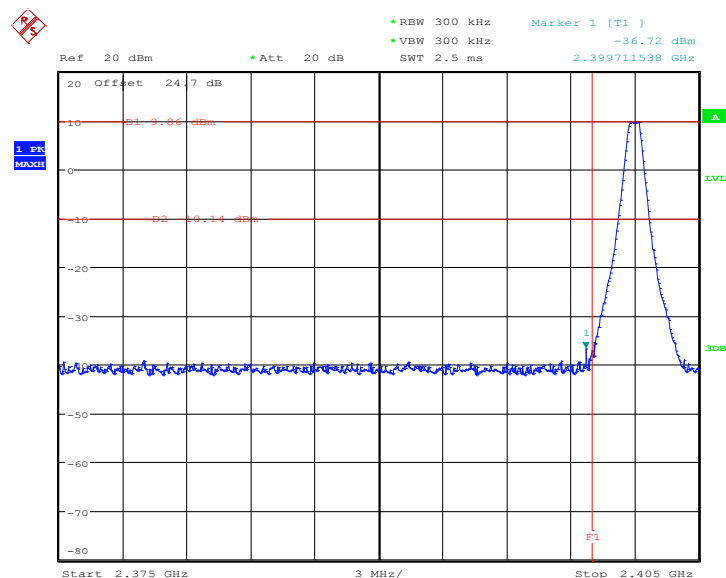
### 3.6.4 Test Setup



### 3.6.5 Test Result of Conducted Band Edges

|                |           |                     |          |
|----------------|-----------|---------------------|----------|
| Test Mode :    | 1Mbps     | Temperature :       | 24~26℃   |
| Test Channel : | 00 and 78 | Relative Humidity : | 50~53%   |
|                |           | Test Engineer :     | Bill Kuo |

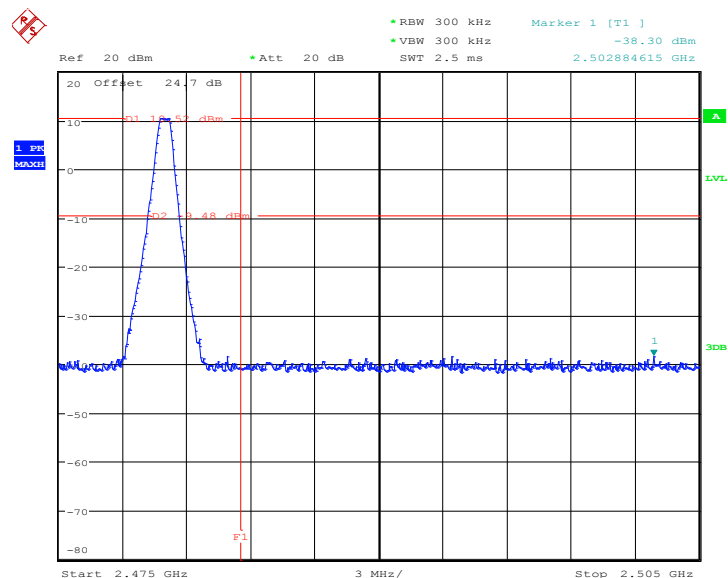
**Low Band Edge Plot on Channel 00**



Date: 6.NOV.2012 20:31:21

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.



Date: 6.NOV.2012 20:32:05

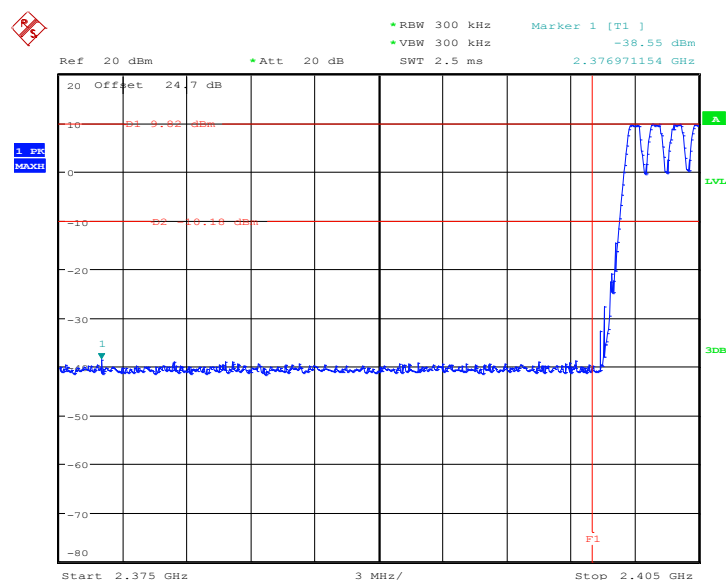
**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### 3.6.6 Test Result of Conducted Hopping Mode Band Edges

|                        |          |                            |        |
|------------------------|----------|----------------------------|--------|
| <b>Test Mode :</b>     | 1Mbps    | <b>Temperature :</b>       | 24~26℃ |
| <b>Test Engineer :</b> | Bill Kuo | <b>Relative Humidity :</b> | 50~53% |

### Hopping Mode Low Band Edge Plot

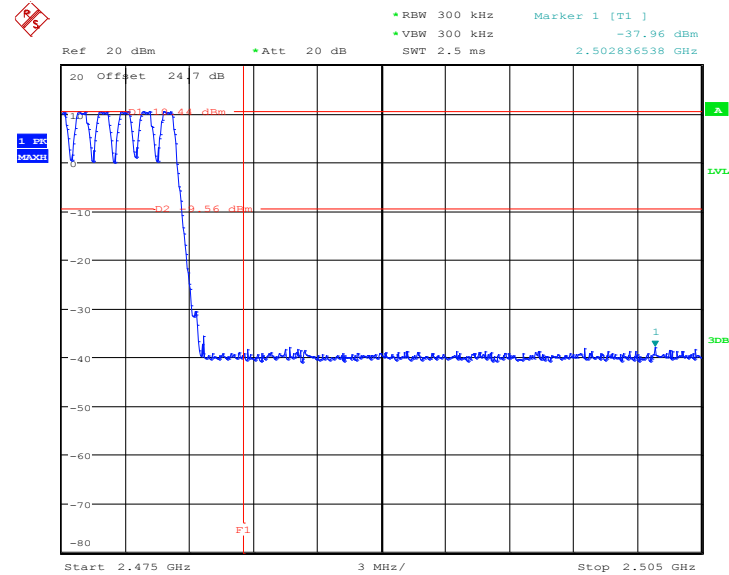


Date: 6.NOV.2012 22:55:53

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### Hopping Mode High Band Edge Plot



Date: 6.NOV.2012 22:57:00

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

### 3.7 Conducted Spurious Emission Measurement

#### 3.7.1 Limit of Spurious Emission Measurement

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

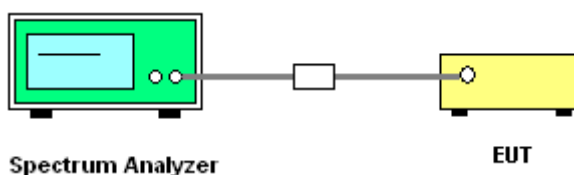
#### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.7.3 Test Procedure

1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, VBW = 300KHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 KHz RBW.
5. Measure and record the results in the test report.

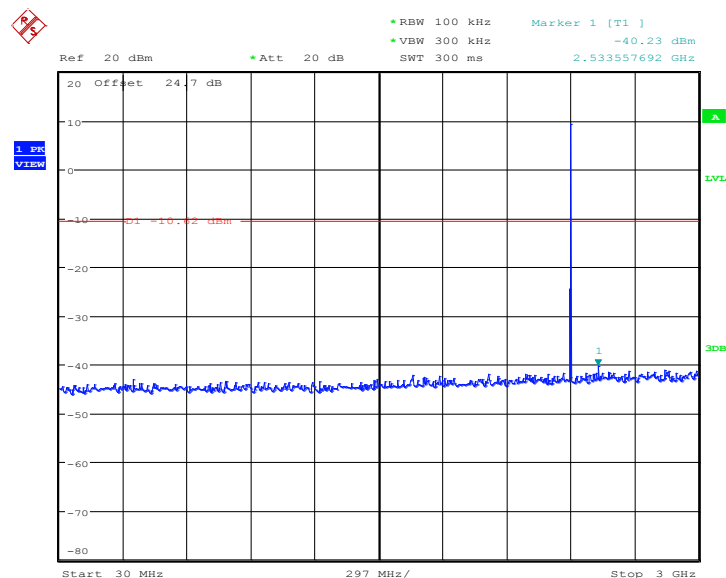
#### 3.7.4 Test Setup



### 3.7.5 Test Result

|                |       |                     |          |
|----------------|-------|---------------------|----------|
| Test Mode :    | 1Mbps | Temperature :       | 24~26℃   |
| Test Channel : | 00    | Relative Humidity : | 50~53%   |
|                |       | Test Engineer :     | Bill Kuo |

#### Conducted Spurious Emission Plot between 30MHz ~ 3 GHz

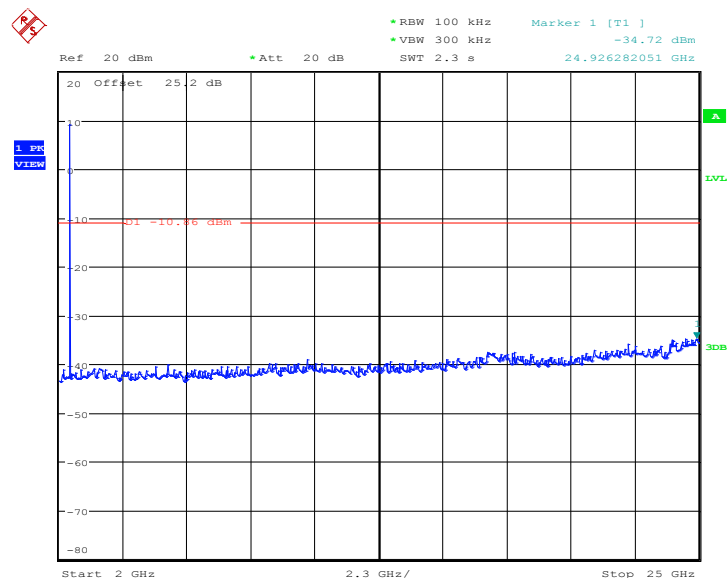


Date: 6.NOV.2012 20:40:42

#### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz



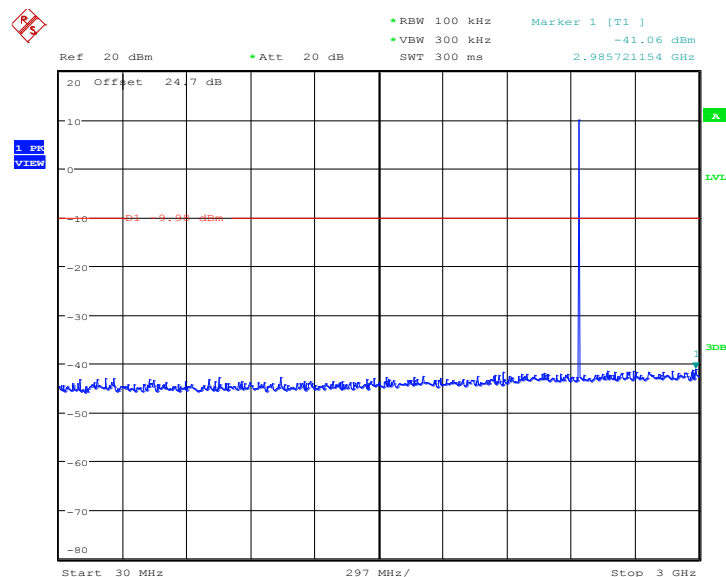
Date: 6.NOV.2012 20:41:04

### Note:

The total loss is 25.2dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                |       |                     |          |
|----------------|-------|---------------------|----------|
| Test Mode :    | 1Mbps | Temperature :       | 24~26°C  |
| Test Channel : | 39    | Relative Humidity : | 50~53%   |
|                |       | Test Engineer :     | Bill Kuo |

## Conducted Spurious Emission Plot between 30MHz ~ 3 GHz

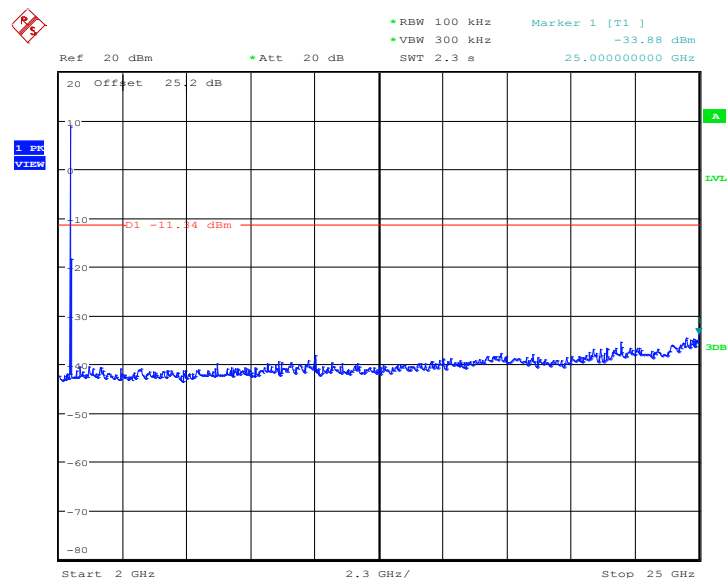


Date: 6.NOV.2012 20:41:50

### Note:

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

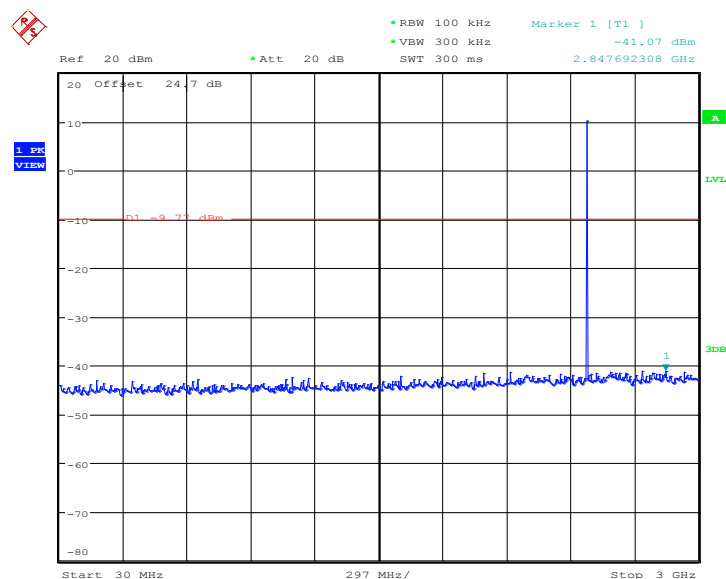


Date: 6.NOV.2012 20:42:11

### Note:

The total loss is 25.2dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

|                |       |                     |          |
|----------------|-------|---------------------|----------|
| Test Mode :    | 1Mbps | Temperature :       | 24~26°C  |
| Test Channel : | 78    | Relative Humidity : | 50~53%   |
|                |       | Test Engineer :     | Bill Kuo |

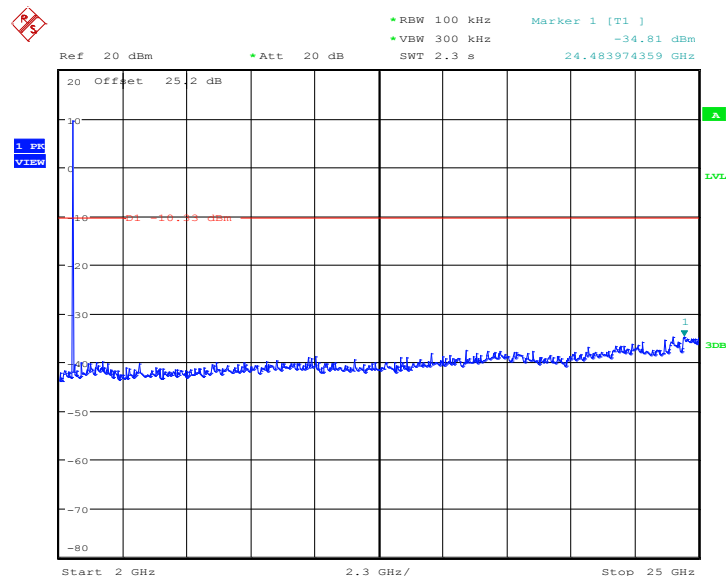
**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**


Date: 6.NOV.2012 20:44:04

**Note:**

The total loss is 24.7dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz



Date: 6.NOV.2012 20:44:25

### Note:

The total loss is 25.2dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

## 3.8 Radiated Band Edges and Spurious Emission Measurement

### 3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 KHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 0.009 – 0.490      | 2400/F(KHz)                          | 300                              |
| 0.490 – 1.705      | 24000/F(KHz)                         | 30                               |
| 1.705 – 30.0       | 30                                   | 30                               |
| 30 – 88            | 100                                  | 3                                |
| 88 – 216           | 150                                  | 3                                |
| 216 - 960          | 200                                  | 3                                |
| Above 960          | 500                                  | 3                                |

### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.8.3 Test Procedures

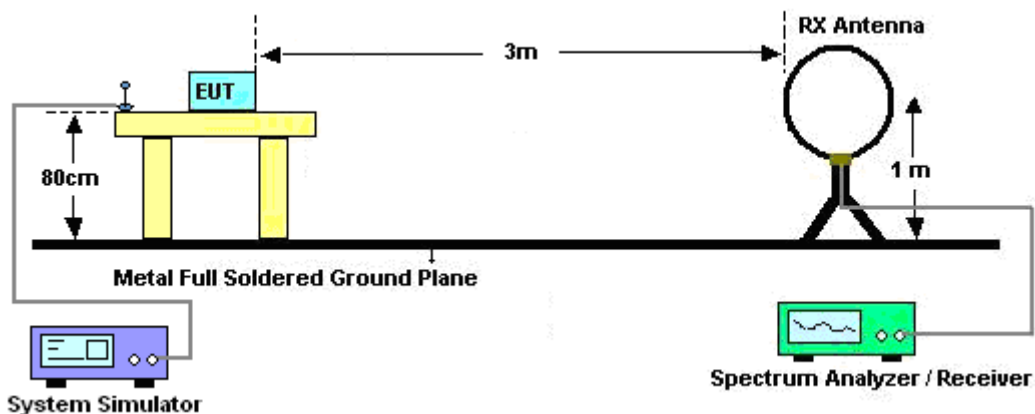
1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
  - a. Span shall wide enough to fully capture the emission being measured;
  - b. Set RBW=100 KHz for  $f < 1 \text{ GHz}$ , RBW=1MHz for  $f > 1 \text{ GHz}$ ; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - c. For average measurement: use duty cycle correction factor method per 15.35(c).  
Duty cycle = On time/100 milliseconds  
On time =  $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$   
Where  $N_1$  is number of type 1 pulses,  $L_1$  is length of type 1 pulses, etc.  
Average Level = Peak Level +  $20 * \log(\text{Duty cycle})$
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.73dB) derived from  $20 \log(\text{dwell time}/100\text{ms})$ .

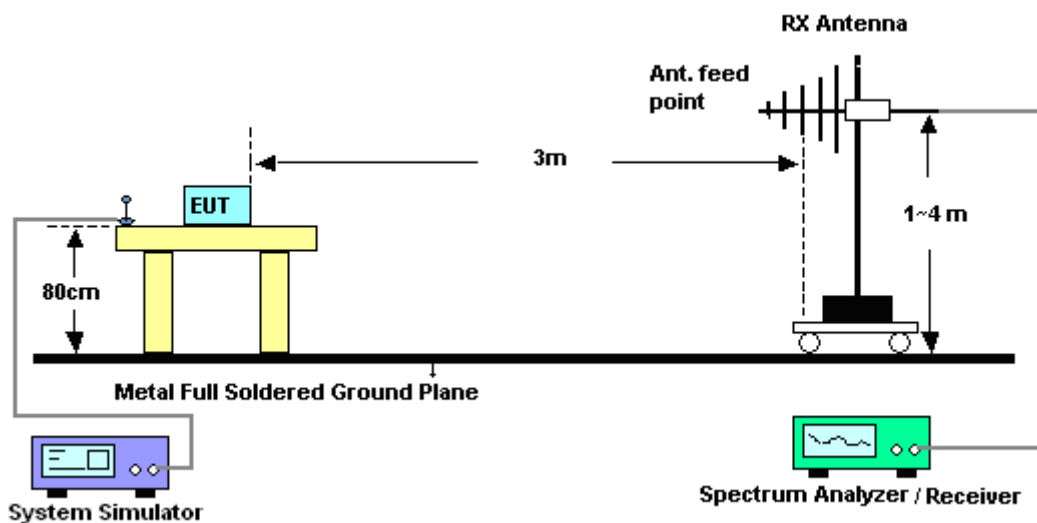
For example: Average level =  $46.19\text{dBuV/m} - 24.73 \text{ (dB)} = 21.46\text{dBuV/m}$ .

### 3.8.4 Test Setup

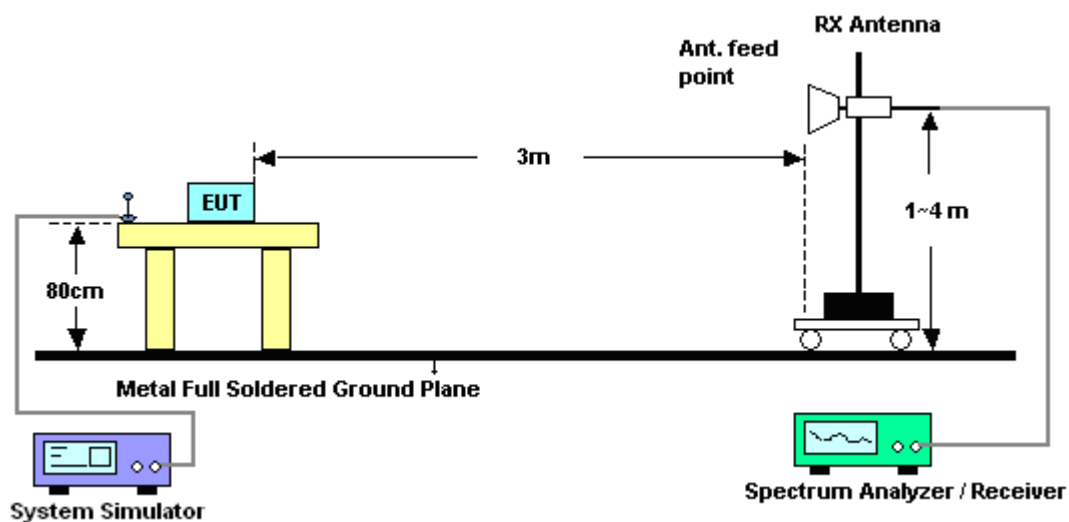
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

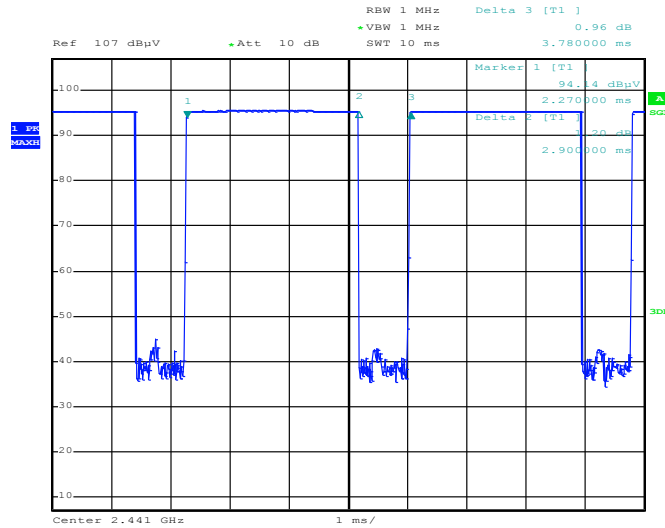


### 3.8.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

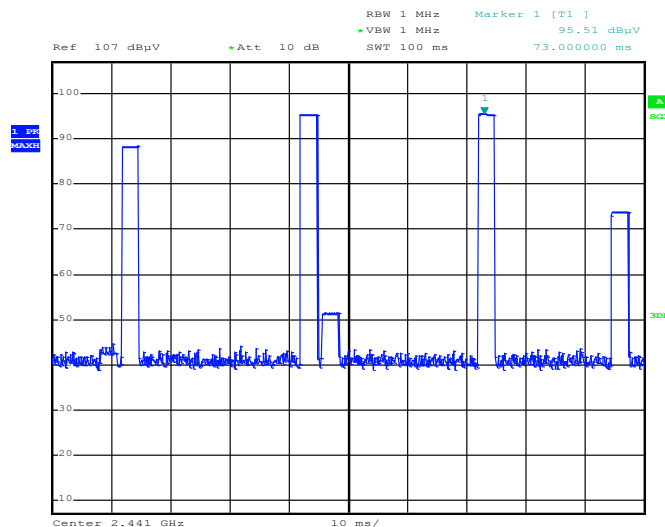
### 3.8.6 Duty cycle correction factor for average measurement

#### DH5 on time/100ms (One Pulse) Plot on Channel 39



Date: 6.NOV.2012 19:28:37

#### DH5 on time/100ms (Count Pulses) Plot on Channel 39



Date: 6.NOV.2012 19:26:13

#### Note:

1. Duty cycle = on time/100 milliseconds =  $2 * 2.90 / 100 = 5.80 \%$
2. Duty cycle correction factor =  $20 * \log(\text{Duty cycle}) = -24.73 \text{ dB}$
3. DH5 has the highest duty cycle and is reported.

### 3.8.7 Test Result of Radiated Band Edges

|                       |       |                            |          |
|-----------------------|-------|----------------------------|----------|
| <b>Test Mode :</b>    | 1Mbps | <b>Temperature :</b>       | 23~25°C  |
| <b>Test Channel :</b> | 00    | <b>Relative Humidity :</b> | 50~52%   |
|                       |       | <b>Test Engineer :</b>     | David Ke |

| ANTENNA POLARITY : HORIZONTAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-------------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )          | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2377.86                       | 46.19               | -27.81                  | 74                          | 45.34                     | 32.16                       | 4.57                    | 35.88                      | 105                  | 299                     | Peak    |
| 2377.86                       | 21.46               | -32.54                  | 54                          | -                         | -                           | -                       | -                          | -                    | -                       | Average |

| ANTENNA POLARITY : VERTICAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-----------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )        | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2376.33                     | 46.61               | -27.39                  | 74                          | 45.76                     | 32.16                       | 4.57                    | 35.88                      | 100                  | 260                     | Peak    |
| 2376.33                     | 21.88               | -32.12                  | 54                          | -                         | -                           | -                       | -                          | -                    | -                       | Average |

**Note:** The average levels were calculated from the peak level corrected with duty cycle correction factor (24.73dB) derived from  $20\log(\text{dwell time}/100\text{ms})$ .

For example: Average level = 46.19dBuV/m – 24.73 (dB) = 21.46dBuV/m.

|                       |       |                            |          |
|-----------------------|-------|----------------------------|----------|
| <b>Test Mode :</b>    | 1Mbps | <b>Temperature :</b>       | 23~25°C  |
| <b>Test Channel :</b> | 78    | <b>Relative Humidity :</b> | 50~52%   |
|                       |       | <b>Test Engineer :</b>     | David Ke |

| ANTENNA POLARITY : HORIZONTAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-------------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )          | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2483.5                        | 63.85               | -10.15                  | 74                          | 62.74                     | 32.28                       | 4.64                    | 35.81                      | 102                  | 302                     | Peak    |
| 2483.5                        | 39.12               | -14.88                  | 54                          | -                         | -                           | -                       | -                          | -                    | -                       | Average |

| ANTENNA POLARITY : VERTICAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-----------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )        | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2483.5                      | 59.77               | -14.23                  | 74                          | 58.66                     | 32.28                       | 4.64                    | 35.81                      | 119                  | 259                     | Peak    |
| 2483.5                      | 35.04               | -18.96                  | 54                          | -                         | -                           | -                       | -                          | -                    | -                       | Average |

**3.8.8 Test Result of Radiated Emission (30 MHz ~ 10<sup>th</sup> Harmonic)**

|                        |                                                                                                                                                                                                                        |                            |            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------|
| <b>Test Mode :</b>     | 1Mbps                                                                                                                                                                                                                  | <b>Temperature :</b>       | 23~25°C    |
| <b>Test Channel :</b>  | 00                                                                                                                                                                                                                     | <b>Relative Humidity :</b> | 50~52%     |
| <b>Test Engineer :</b> | David Ke                                                                                                                                                                                                               | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | 1. 2402 MHz is fundamental signal which can be ignored.<br>2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 105.38 dBuV/m - 20dB = 85.38 dBuV/m. |                            |            |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2402                 | 105.38              | -                       | -                           | 104.48                  | 32.18                       | 4.58                    | 35.86                      | 105                  | 299                     | Peak    |
| 2402                 | 80.65               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7206                 | 50.75               | -34.63                  | 85.38                       | 64.25                   | 36.06                       | 8.25                    | 57.81                      | 100                  | 0                       | Peak    |

**Note:** The average levels were calculated from the peak level corrected with duty cycle correction factor (24.73dB) derived from  $20\log(\text{dwell time}/100\text{ms})$ .

For example: Average level = 105.38 dBuV/m – 24.73 (dB) = 80.65 dBuV/m.

|                        |                                                                                                                                                                      |                            |          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------|
| <b>Test Mode :</b>     | 1Mbps                                                                                                                                                                | <b>Temperature :</b>       | 23~25°C  |
| <b>Test Channel :</b>  | 00                                                                                                                                                                   | <b>Relative Humidity :</b> | 50~52%   |
| <b>Test Engineer :</b> | David Ke                                                                                                                                                             | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | 1. 2402 MHz is fundamental signal which can be ignored.<br>2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. |                            |          |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2402                 | 101.9               | -                       | -                           | 101                     | 32.18                       | 4.58                    | 35.86                      | 100                  | 260                     | Peak    |
| 2402                 | 77.17               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7206                 | 53.53               | -28.37                  | 81.9                        | 67.03                   | 36.06                       | 8.25                    | 57.81                      | 100                  | 0                       | Peak    |

|                        |                                                      |                            |            |
|------------------------|------------------------------------------------------|----------------------------|------------|
| <b>Test Mode :</b>     | 1Mbps                                                | <b>Temperature :</b>       | 23~25°C    |
| <b>Test Channel :</b>  | 39                                                   | <b>Relative Humidity :</b> | 50~52%     |
| <b>Test Engineer :</b> | David Ke                                             | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | 2441 MHz is fundamental signal which can be ignored. |                            |            |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2441                 | 106.3               | -                       | -                           | 105.28                  | 32.24                       | 4.61                    | 35.83                      | 108                  | 297                     | Peak    |
| 2441                 | 81.57               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7323                 | 54.29               | -19.71                  | 74                          | 67.85                   | 36.03                       | 8.42                    | 58.01                      | 100                  | 0                       | Peak    |
| 7323                 | 29.56               | -24.44                  | 54                          | -                       | -                           | -                       | -                          | -                    | -                       | Average |

|                        |                                                      |                            |          |
|------------------------|------------------------------------------------------|----------------------------|----------|
| <b>Test Mode :</b>     | 1Mbps                                                | <b>Temperature :</b>       | 23~25°C  |
| <b>Test Channel :</b>  | 39                                                   | <b>Relative Humidity :</b> | 50~52%   |
| <b>Test Engineer :</b> | David Ke                                             | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | 2441 MHz is fundamental signal which can be ignored. |                            |          |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2441                 | 102.69              | -                       | -                           | 101.67                  | 32.24                       | 4.61                    | 35.83                      | 123                  | 259                     | Peak    |
| 2441                 | 77.96               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7323                 | 57.54               | -16.46                  | 74                          | 71.1                    | 36.03                       | 8.42                    | 58.01                      | 100                  | 0                       | Peak    |
| 7323                 | 32.81               | -21.19                  | 54                          | -                       | -                           | -                       | -                          | -                    | -                       | Average |

|                        |                                                      |                            |            |
|------------------------|------------------------------------------------------|----------------------------|------------|
| <b>Test Mode :</b>     | 1Mbps                                                | <b>Temperature :</b>       | 23~25°C    |
| <b>Test Channel :</b>  | 78                                                   | <b>Relative Humidity :</b> | 50~52%     |
| <b>Test Engineer :</b> | David Ke                                             | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | 2480 MHz is fundamental signal which can be ignored. |                            |            |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 30.81                | 21.3                | -18.7                   | 40                          | 34.07                   | 18.16                       | 0.71                    | 31.64                      | -                    | -                       | Peak    |
| 168.78               | 29.16               | -14.34                  | 43.5                        | 49.3                    | 9.62                        | 1.36                    | 31.12                      | -                    | -                       | Peak    |
| 224.94               | 35.42               | -10.58                  | 46                          | 55.15                   | 9.65                        | 1.56                    | 30.94                      | 111                  | 174                     | Peak    |
| 321                  | 33.43               | -12.57                  | 46                          | 49.09                   | 13.42                       | 1.83                    | 30.91                      | -                    | -                       | Peak    |
| 433.7                | 26.75               | -19.25                  | 46                          | 38.88                   | 16.77                       | 2.1                     | 31                         | -                    | -                       | Peak    |
| 638.8                | 22.88               | -23.12                  | 46                          | 30.1                    | 20.4                        | 2.55                    | 30.17                      | -                    | -                       | Peak    |
| 2480                 | 103.44              | -                       | -                           | 102.33                  | 32.28                       | 4.64                    | 35.81                      | 102                  | 302                     | Peak    |
| 2480                 | 78.71               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7440                 | 45.34               | -28.66                  | 74                          | 58.91                   | 36.01                       | 8.63                    | 58.21                      | 100                  | 0                       | Peak    |
| 7440                 | 20.61               | -33.39                  | 54                          | -                       | -                           | -                       | -                          | -                    | -                       | Average |



|                        |                                                      |                            |          |
|------------------------|------------------------------------------------------|----------------------------|----------|
| <b>Test Mode :</b>     | 3Mbps                                                | <b>Temperature :</b>       | 23~25°C  |
| <b>Test Channel :</b>  | 78                                                   | <b>Relative Humidity :</b> | 50~52%   |
| <b>Test Engineer :</b> | David Ke                                             | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | 2480 MHz is fundamental signal which can be ignored. |                            |          |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 34.86                | 31.81               | -8.19                   | 40                          | 46.7                    | 16                          | 0.74                    | 31.63                      | 100                  | 114                     | Peak    |
| 51.87                | 28.39               | -11.61                  | 40                          | 51.29                   | 7.74                        | 0.82                    | 31.46                      | -                    | -                       | Peak    |
| 220.89               | 33.24               | -12.76                  | 46                          | 53.28                   | 9.37                        | 1.54                    | 30.95                      | -                    | -                       | Peak    |
| 312.6                | 29.5                | -16.5                   | 46                          | 45.29                   | 13.32                       | 1.81                    | 30.92                      | -                    | -                       | Peak    |
| 429.5                | 23.4                | -22.6                   | 46                          | 35.63                   | 16.7                        | 2.09                    | 31.02                      | -                    | -                       | Peak    |
| 755.7                | 24.47               | -21.53                  | 46                          | 29.76                   | 22.1                        | 2.76                    | 30.15                      | -                    | -                       | Peak    |
| 2480                 | 99.28               | -                       | -                           | 98.17                   | 32.28                       | 4.64                    | 35.81                      | 119                  | 259                     | Peak    |
| 2480                 | 74.55               | -                       | -                           | -                       | -                           | -                       | -                          | -                    | -                       | Average |
| 7440                 | 50.4                | -23.6                   | 74                          | 63.97                   | 36.01                       | 8.63                    | 58.21                      | 100                  | 0                       | Peak    |
| 7440                 | 25.67               | -28.33                  | 54                          | -                       | -                           | -                       | -                          | -                    | -                       | Average |

## 3.9 AC Conducted Emission Measurement

### 3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBuV) |           |
|-----------------------------|------------------------|-----------|
|                             | Quasi-peak             | Average   |
| 0.15-0.5                    | 66 to 56*              | 56 to 46* |
| 0.5-5                       | 56                     | 46        |
| 5-30                        | 60                     | 50        |

\*Decreases with the logarithm of the frequency.

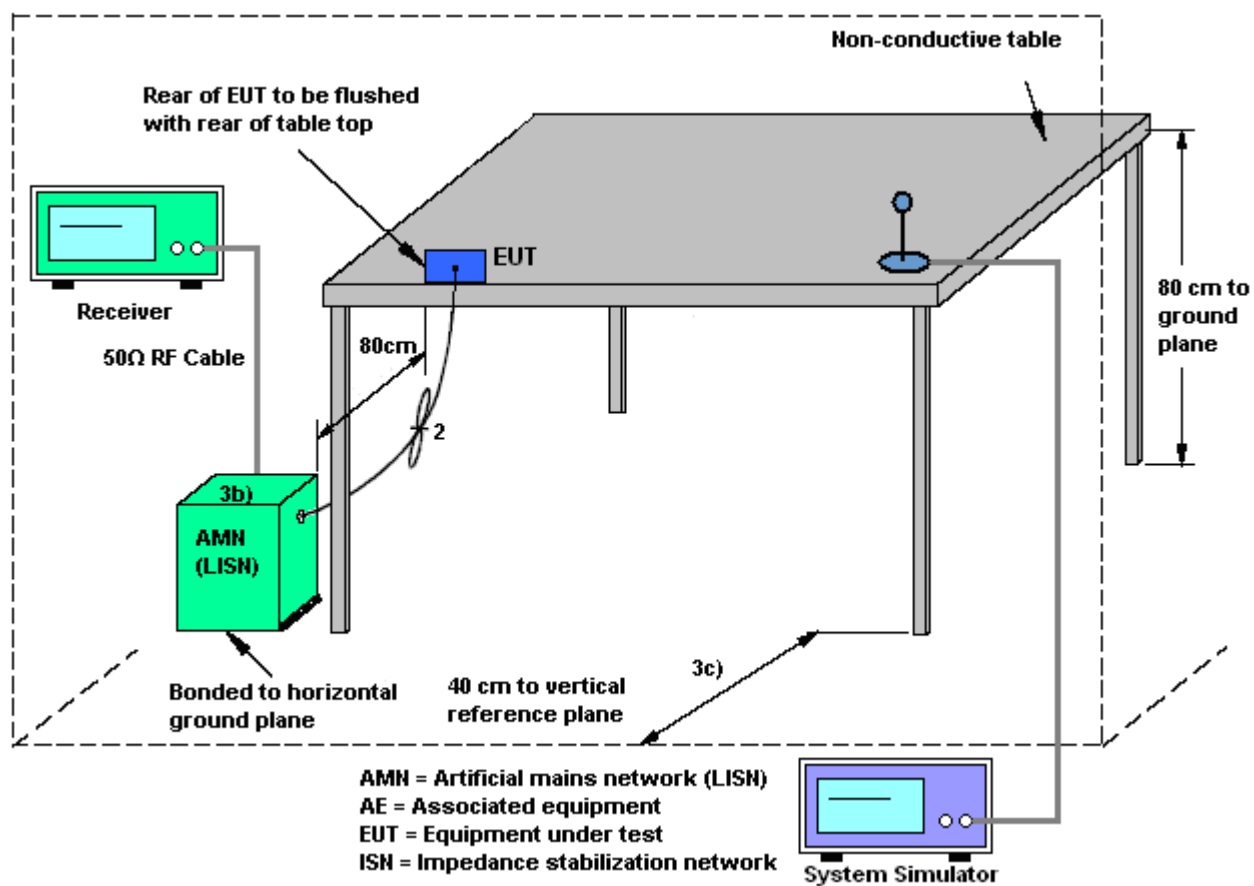
### 3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.9.3 Test Procedures

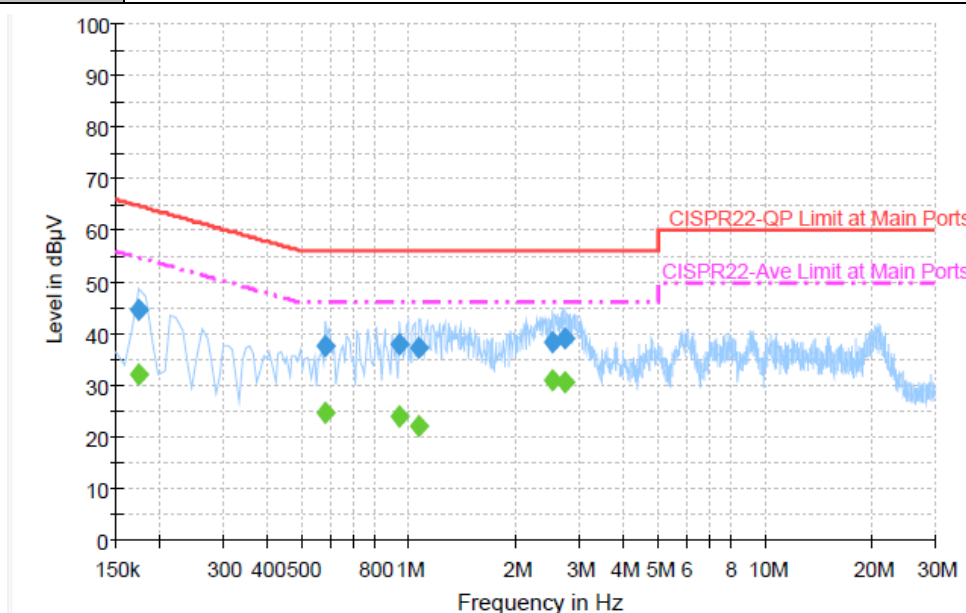
1. The test follows the guidelines in ANSI C63.4-2003 and ANSI C63.10-2009 test site requirement.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 KHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

### 3.9.4 Test Setup



### 3.9.5 Test Result of AC Conducted Emission

|                        |                                                                                           |                            |        |
|------------------------|-------------------------------------------------------------------------------------------|----------------------------|--------|
| <b>Test Mode :</b>     | Mode 1                                                                                    | <b>Temperature :</b>       | 20~22℃ |
| <b>Test Engineer :</b> | Slash Huang                                                                               | <b>Relative Humidity :</b> | 45~47% |
| <b>Test Voltage :</b>  | 120Vac / 60Hz                                                                             | <b>Phase :</b>             | Line   |
| <b>Function Type :</b> | GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + MP3 + USB Cable (Charging from Adapter) |                            |        |
| <b>Remark :</b>        | All emissions not reported here are more than 10 dB below the prescribed limit.           |                            |        |



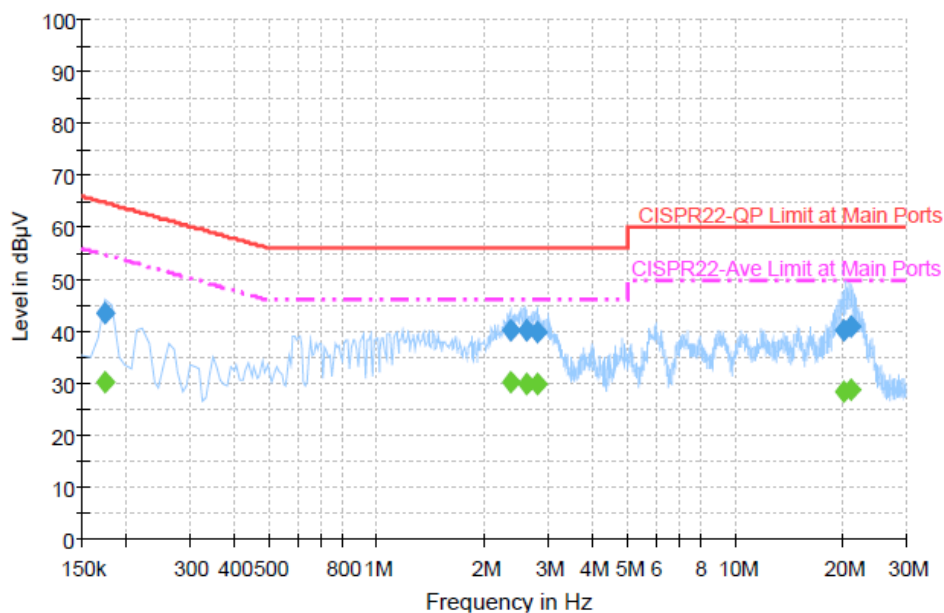
#### Final Result : Quasi-Peak

| Frequency (MHz) | Quasi-Peak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 0.174000        | 44.8              | Off    | L1   | 19.4       | 20.0        | 64.8         |
| 0.582000        | 37.6              | Off    | L1   | 19.4       | 18.4        | 56.0         |
| 0.942000        | 37.8              | Off    | L1   | 19.4       | 18.2        | 56.0         |
| 1.070000        | 37.3              | Off    | L1   | 19.4       | 18.7        | 56.0         |
| 2.526000        | 38.5              | Off    | L1   | 19.6       | 17.5        | 56.0         |
| 2.742000        | 39.1              | Off    | L1   | 19.6       | 16.9        | 56.0         |

#### Final Result : Average

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.174000        | 32.1           | Off    | L1   | 19.4       | 22.7        | 54.8         |
| 0.582000        | 24.7           | Off    | L1   | 19.4       | 21.3        | 46.0         |
| 0.942000        | 24.0           | Off    | L1   | 19.4       | 22.0        | 46.0         |
| 1.070000        | 22.2           | Off    | L1   | 19.4       | 23.8        | 46.0         |
| 2.526000        | 31.1           | Off    | L1   | 19.6       | 14.9        | 46.0         |
| 2.742000        | 30.6           | Off    | L1   | 19.6       | 15.4        | 46.0         |

|                        |                                                                                           |                            |         |
|------------------------|-------------------------------------------------------------------------------------------|----------------------------|---------|
| <b>Test Mode :</b>     | Mode 1                                                                                    | <b>Temperature :</b>       | 20~22℃  |
| <b>Test Engineer :</b> | Slash Huang                                                                               | <b>Relative Humidity :</b> | 45~47%  |
| <b>Test Voltage :</b>  | 120Vac / 60Hz                                                                             | <b>Phase :</b>             | Neutral |
| <b>Function Type :</b> | GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + MP3 + USB Cable (Charging from Adapter) |                            |         |
| <b>Remark :</b>        | All emissions not reported here are more than 10 dB below the prescribed limit.           |                            |         |


**Final Result : Quasi-Peak**

| Frequency (MHz) | Quasi-Peak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 0.174000        | 43.7              | Off    | N    | 19.4       | 21.1        | 64.8         |
| 2.358000        | 40.3              | Off    | N    | 19.6       | 15.7        | 56.0         |
| 2.622000        | 40.4              | Off    | N    | 19.6       | 15.6        | 56.0         |
| 2.798000        | 39.9              | Off    | N    | 19.7       | 16.1        | 56.0         |
| 20.166000       | 40.3              | Off    | N    | 20.0       | 19.7        | 60.0         |
| 21.046000       | 41.0              | Off    | N    | 19.9       | 19.0        | 60.0         |

**Final Result : Average**

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.174000        | 30.3           | Off    | N    | 19.4       | 24.5        | 54.8         |
| 2.358000        | 30.1           | Off    | N    | 19.6       | 15.9        | 46.0         |
| 2.622000        | 29.7           | Off    | N    | 19.6       | 16.3        | 46.0         |
| 2.798000        | 29.8           | Off    | N    | 19.7       | 16.2        | 46.0         |
| 20.166000       | 28.5           | Off    | N    | 20.0       | 21.5        | 50.0         |
| 21.046000       | 28.7           | Off    | N    | 19.9       | 21.3        | 50.0         |



## **3.10 Antenna Requirements**

### **3.10.1 Standard Applicable**

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

### **3.10.2 Antenna Connected Construction**

Non-standard connector used.

### **3.10.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

## 4 List of Measuring Equipment

| Instrument             | Manufacturer | Model No.    | Serial No.   | Characteristics      | Calibration Date | Test Date                     | Due Date      | Remark                |
|------------------------|--------------|--------------|--------------|----------------------|------------------|-------------------------------|---------------|-----------------------|
| Spectrum Analyzer      | R&S          | FSP40        | 100055       | 9kHz~40GHz           | Jun. 06, 2012    | Nov. 06, 2012                 | Jun. 05, 2013 | Conducted (TH02-HY)   |
| Bluetooth Base Station | R&S          | CBT32        | 100519       | N/A                  | Jun. 05, 2012    | Nov. 06, 2012                 | Jun. 04, 2013 | Conducted (TH02-HY)   |
| EMI Test Receiver      | R&S          | ESCI 7       | 100724       | 9kHz~7GHz            | Sep. 03, 2012    | Oct. 19, 2012                 | Sep. 02, 2013 | Conduction (CO05-HY)  |
| Two-LISN               | R&S          | ENV216       | 11-100081    | 9KHz ~ 30MHz         | Dec. 09, 2011    | Oct. 19, 2012                 | Dec. 08, 2012 | Conduction (CO05-HY)  |
| Two-LISN               | R&S          | ENV216       | 11-100080    | 9KHz ~ 30MHz         | Dec. 06, 2011    | Oct. 19, 2012                 | Dec. 05, 2012 | Conduction (CO05-HY)  |
| AC Power Source        | APC          | APC-1000W    | N/A          | N/A                  | N/A              | Oct. 19, 2012                 | N/A           | Conduction (CO05-HY)  |
| System Simulator       | R&S          | CMU200       | 117995       | N/A                  | Jul. 28, 2011    | Oct. 19, 2012                 | Jul. 27, 2013 | Conduction (CO05-HY)  |
| Spectrum Analyzer      | R&S          | ESU26        | 100390       | 20Hz ~ 26.5GHz       | Dec. 22, 2011    | Nov. 06, 2012 ~ Nov. 07, 2012 | Dec. 21, 2012 | Radiation (03CH05-HY) |
| Bilog Antenna          | Schaffner    | CBL6111C     | 2725         | 30MHz~2GHz           | Oct. 06, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Oct. 05, 2013 | Radiation (03CH05-HY) |
| Turn Table             | HD           | Deis HD 2000 | 420/611      | 0 ~ 360 degree       | N/A              | Nov. 06, 2012 ~ Nov. 07, 2012 | N/A           | Radiation (03CH05-HY) |
| Antenna Mast           | HD           | MA 240       | 240/666      | 1 m ~ 4 m            | N/A              | Nov. 06, 2012 ~ Nov. 07, 2012 | N/A           | Radiation (03CH05-HY) |
| Horn Antenna           | ESCO         | 3117         | 66584        | 1GHz~18GHz           | Aug. 10, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Aug. 09, 2013 | Radiation (03CH05-HY) |
| Pre Amplifier          | Agilent      | 8449B        | 3008A02665   | 1GHz~26.5GHz         | Aug. 28, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Aug. 27, 2013 | Radiation (03CH05-HY) |
| SHF-EHF Horn Antenna   | SCHWARZBECK  | BBHA 9170    | BBHA91702 51 | 15GHz ~ 40GHz        | Sep. 28, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Sep. 27, 2013 | Radiation (03CH05-HY) |
| Pre Amplifier          | COM-POWER    | PA-103       | 161075       | 10-1000MHz.32dB.GAIN | Feb. 27, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Feb. 26, 2013 | Radiation (03CH05-HY) |
| Loop Antenna           | R&S          | HFH2-Z2      | 860004/001   | 9KHz ~ 30MHz         | Jul. 03, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Jul. 02, 2014 | Radiation (03CH05-HY) |
| Bluetooth Base Station | R&S          | CBT32        | 100522       | N/A                  | Feb. 09, 2012    | Nov. 06, 2012 ~ Nov. 07, 2012 | Feb. 08, 2014 | Radiation (03CH05-HY) |

## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

|                                                                         |      |
|-------------------------------------------------------------------------|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 2.26 |
|-------------------------------------------------------------------------|------|

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

|                                                                         |      |
|-------------------------------------------------------------------------|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 2.54 |
|-------------------------------------------------------------------------|------|

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

|                                                                         |      |
|-------------------------------------------------------------------------|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 4.72 |
|-------------------------------------------------------------------------|------|