

# FCC RF Test Report

APPLICANT : HTC Corporation  
EQUIPMENT : Windows Phone  
MODEL NAME : PC93100  
FCC ID : NM8PC93100  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : Digital Spread Spectrum (DSS)

The product was received on Sep. 16, 2010 and completely tested on Sep. 30, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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:



Anderson Chiu / Deputy 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.**



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### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR091629A	Rev. 01	Initial issue of report	Oct. 18, 2010



### 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	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 1W	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 6.9 dB at 0.262 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.06 dB at 57.81 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

HTC Corporation

1F., No. 6-3, Baoqiang Rd., Xindian City, Taipei, Taiwan

## 1.2 Manufacturer

HTC Corporation

1F., No. 6-3, Baoqiang Rd., Xindian City, Taipei, Taiwan

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Windows Phone
Model Name	PC93100
FCC ID	NM8PC93100
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 0.85 dBm (0.001 W) Bluetooth EDR (2Mbps) : 3.62 dBm (0.002 W) Bluetooth EDR (3Mbps) : 1.44 dBm (0.001 W)
Antenna Type	PIFA Antenna with gain -3.0 dBi
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi$ /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Production Unit

### Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 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, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	CO05-HY	03CH05-HY	TW1022/4086B-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
- ♦ IC RSS-210 Issue 7

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

## 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.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A

## 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	0.41 dBm	3.22 dBm	0.96 dBm
Ch39	2441MHz	0.85 dBm	<b>3.62 dBm</b>	1.44 dBm
Ch78	2480MHz	0.51 dBm	3.20 dBm	0.96 dBm

**Remark:**

1. The data rate was set in 2Mbps for all the test items due to the highest RF output power.
2. 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 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 were conducted to determine the final configuration from all possible combinations.

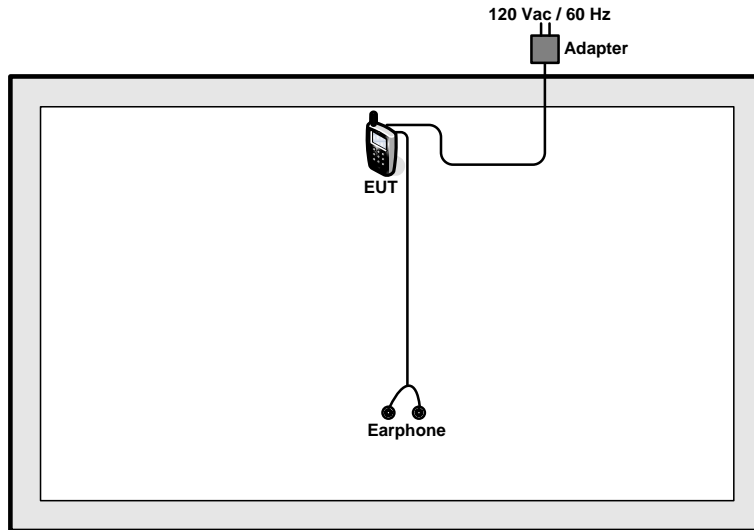
The following tables are showing the test modes as the worst cases and recorded in this report.

<b>Test Cases</b>			
<b>Test Item</b>	<b>Data Rate / Modulation</b>		
	<b>Bluetooth 1Mbps GFSK</b>	<b>Bluetooth EDR 2Mbps <math>\pi</math> /4-DQPSK</b>	<b>Bluetooth EDR 3Mbps 8-DPSK</b>
<b>Conducted TCs</b>	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
<b>Radiated TCs</b>	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	N/A
<b>AC Conducted Emission</b>	Mode 1 : CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + GPS Rx + Earphone 2 + Battery 2 + USB Cable 2 (Charging from Adapter 2)		
<b>Remark:</b> For radiated TCs, the data rate was set in 2Mbps due to the highest RF output power; only the data of these modes was reported.			

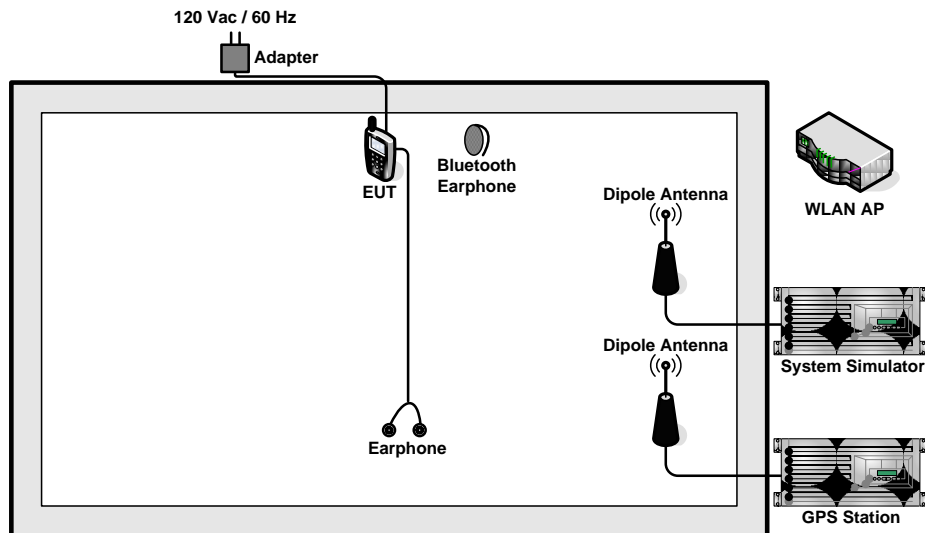


## 2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<EUT with Adapter Mode>



## 2.4 RF Utility

For Bluetooth function, the RF utility, "BT\_Tool" was installed in EUT which was programmed in order to make the EUT transmitting and receiving signals continuously.

### 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.

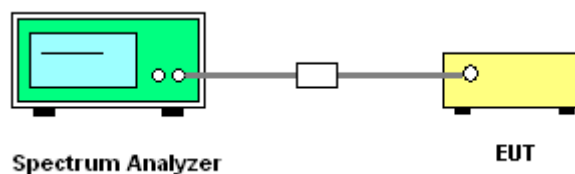
##### 3.1.2 Measuring Instruments

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 a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. 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.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

##### 3.1.4 Test Setup

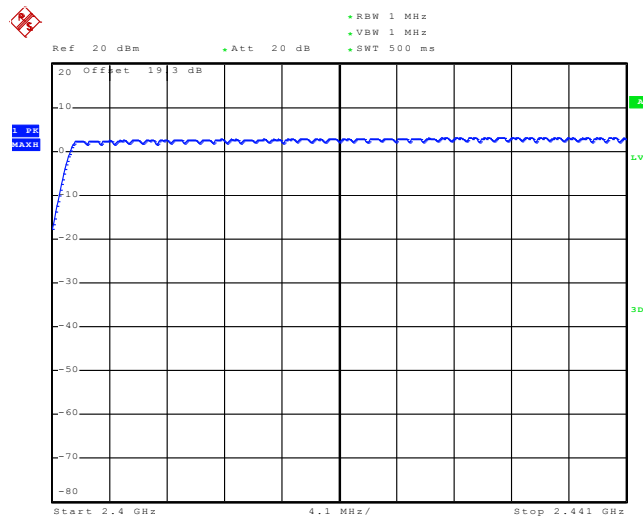




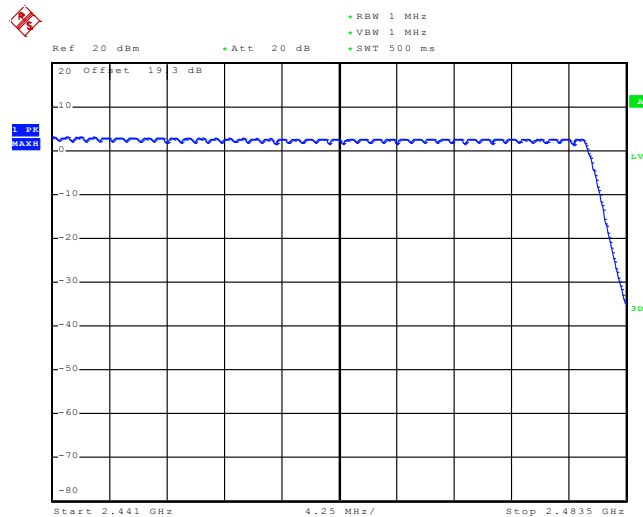
3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 4~6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%
Number of Hopping Channels (Channel)		Limits (Channel)	
79		> 15	
		Pass	

Number of Hopping Channel Plot on Channel 00 - 78



Date: 29.SEP.2010 16:20:14



Date: 29.SEP.2010 16:12:53

## 3.2 20dB Bandwidth Measurement

### 3.2.1 Limit of 20dB Bandwidth

N/A

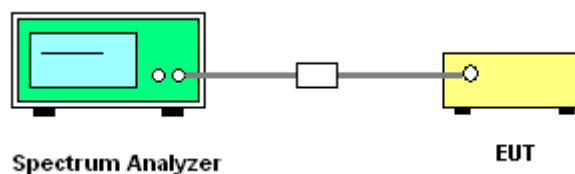
### 3.2.2 Measuring Instruments

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.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:  
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.
5. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

### 3.2.4 Test Setup



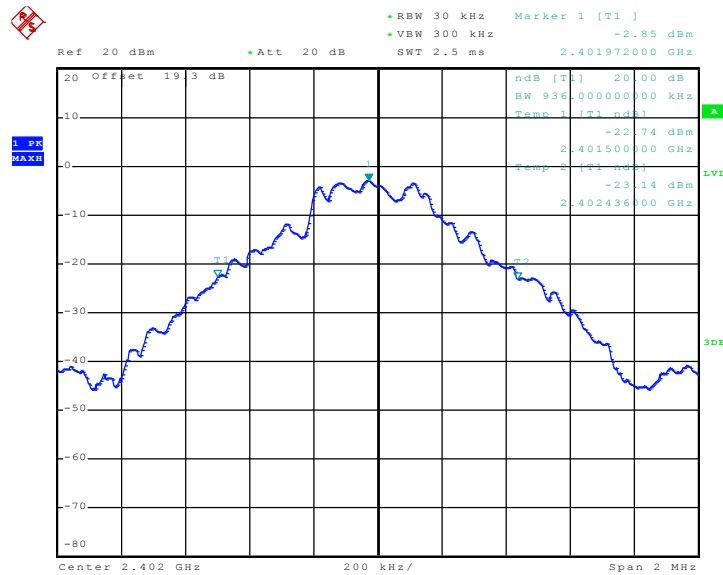


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.936
39	2441	0.940
78	2480	1.008

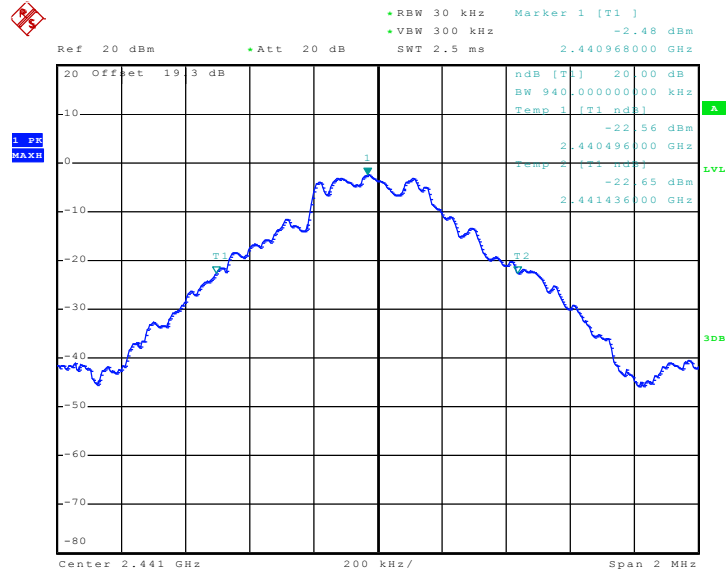
20 dB Bandwidth Plot on Channel 00



Date: 29.SEP.2010 15:05:00

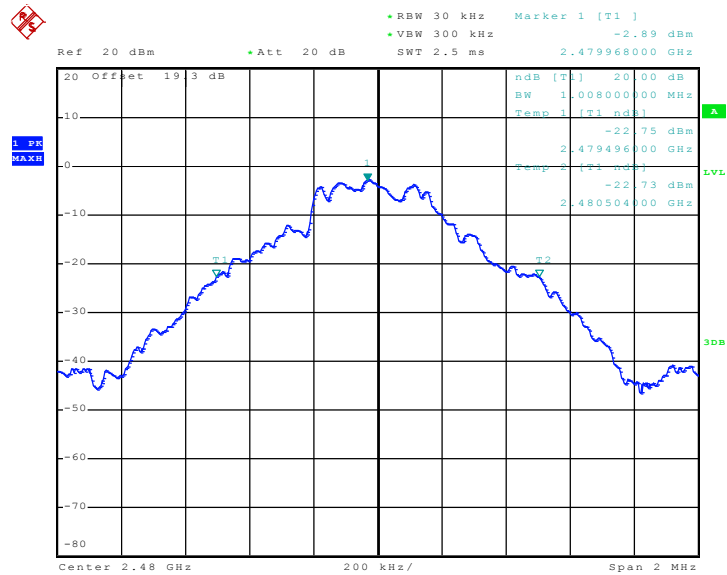


20 dB Bandwidth Plot on Channel 39



Date: 29.SEP.2010 15:05:34

20 dB Bandwidth Plot on Channel 78



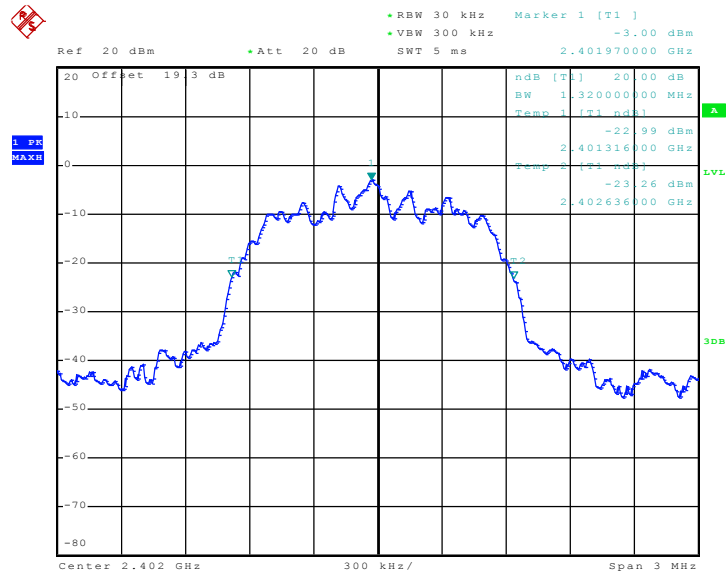
Date: 29.SEP.2010 15:06:04



Test Mode :	Mode 4, 5, 6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.320
39	2441	1.326
78	2480	1.320

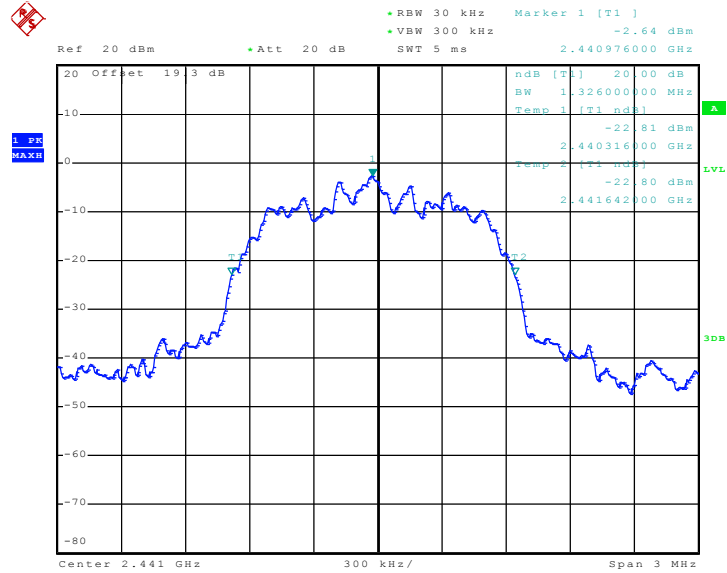
20 dB Bandwidth Plot on Channel 00



Date: 29.SEP.2010 15:07:41

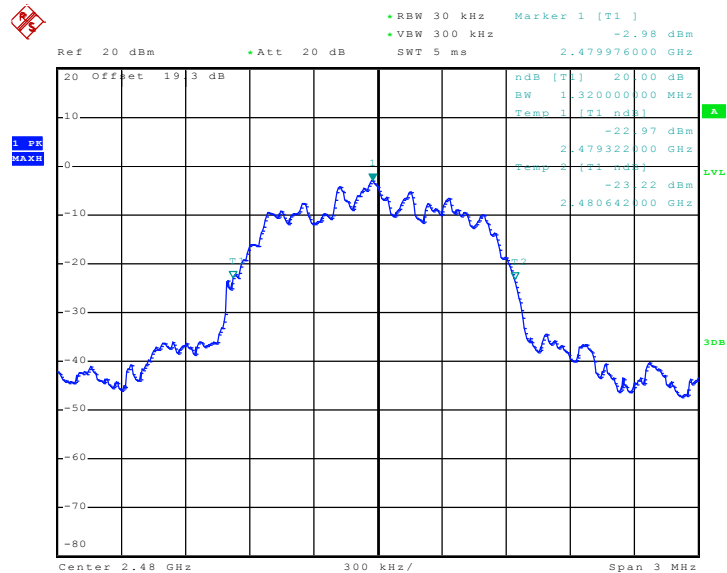


20 dB Bandwidth Plot on Channel 39



Date: 29.SEP.2010 15:07:12

20 dB Bandwidth Plot on Channel 78



Date: 29.SEP.2010 15:06:45

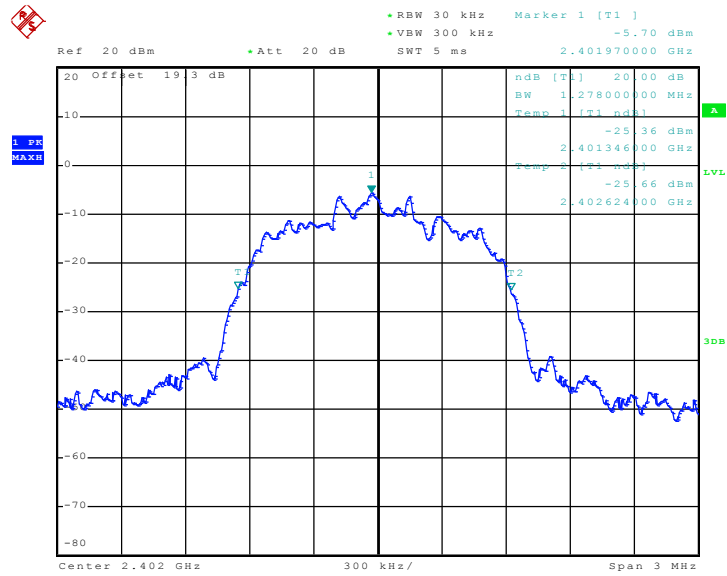




Test Mode :	Mode 7, 8, 9	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.278
39	2441	1.278
78	2480	1.284

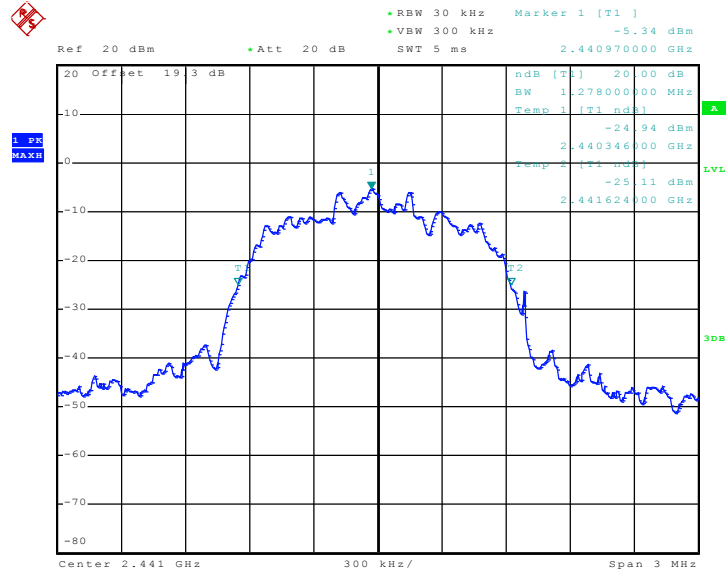
20 dB Bandwidth Plot on Channel 00



Date: 29.SEP.2010 15:08:18

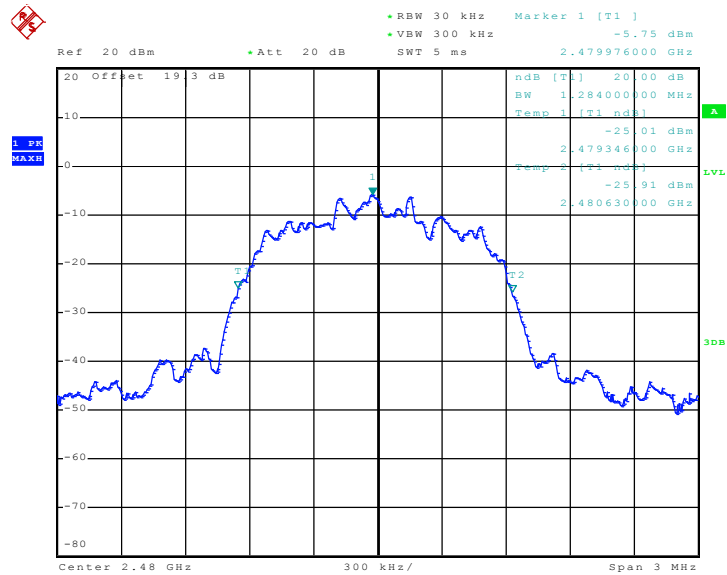


### 20 dB Bandwidth Plot on Channel 39



Date: 29.SEP.2010 15:08:52

### 20 dB Bandwidth Plot on Channel 78



Date: 29.SEP.2010 15:09:27

### 3.3 Hopping Channel Separation Measurement

#### 3.3.1 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.

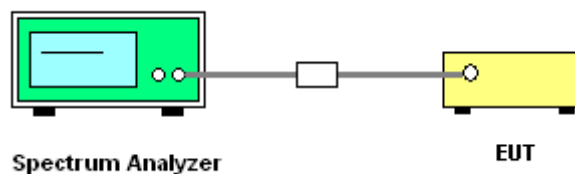
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. 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.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

#### 3.3.4 Test Setup



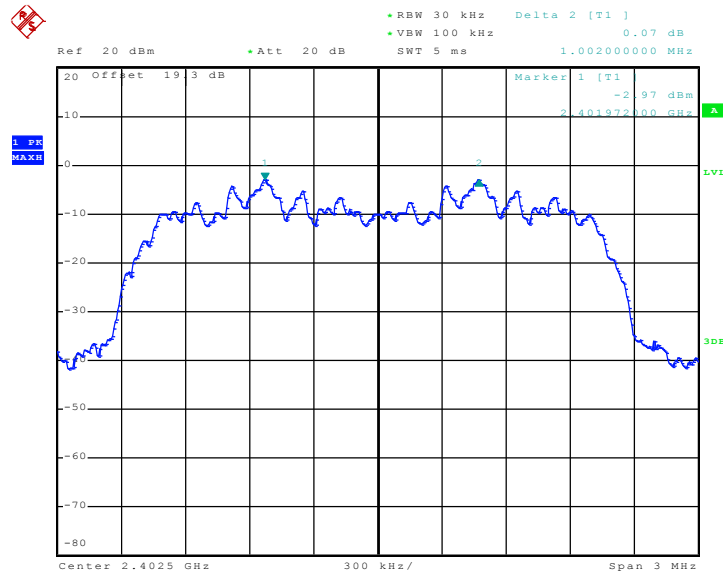


3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 4, 5, 6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.880	Pass
39	2441	1.002	0.884	Pass
78	2480	1.002	0.880	Pass

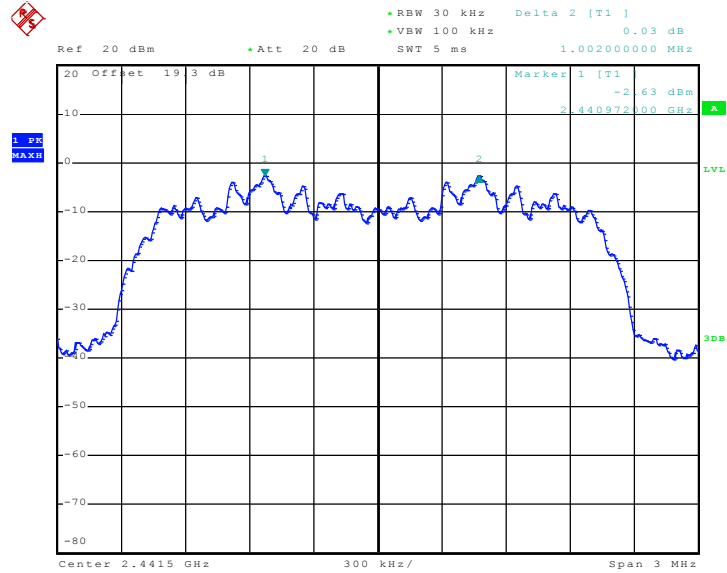
Channel Separation Plot on Channel 00 - 01



Date: 29.SEP.2010 15:19:37

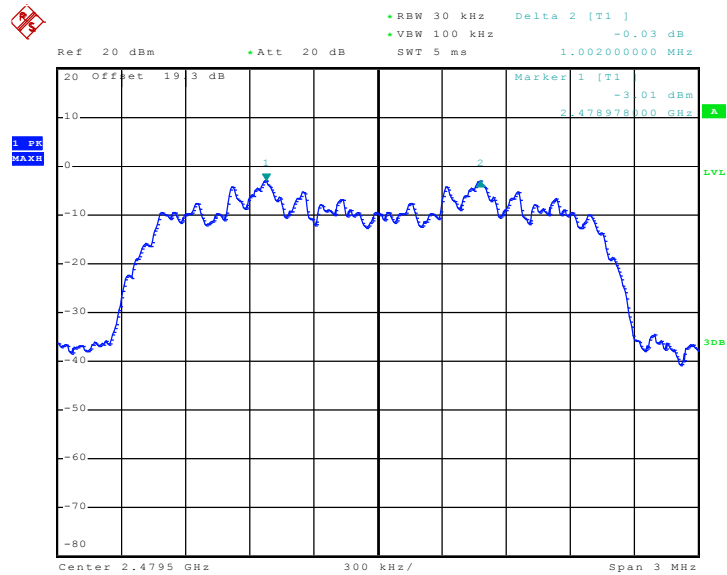


Channel Separation Plot on Channel 39 - 40



Date: 29.SEP.2010 15:17:27

Channel Separation Plot on Channel 77 - 78



Date: 29.SEP.2010 15:16:38

### 3.4 Dwell Time Measurement

#### 3.4.1 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.

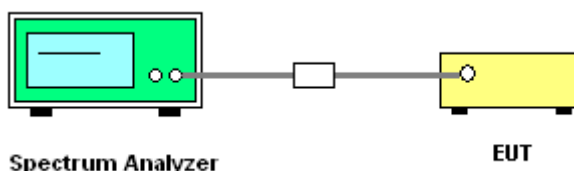
#### 3.4.2 Measuring Instruments

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.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:  
Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of Dwell Time

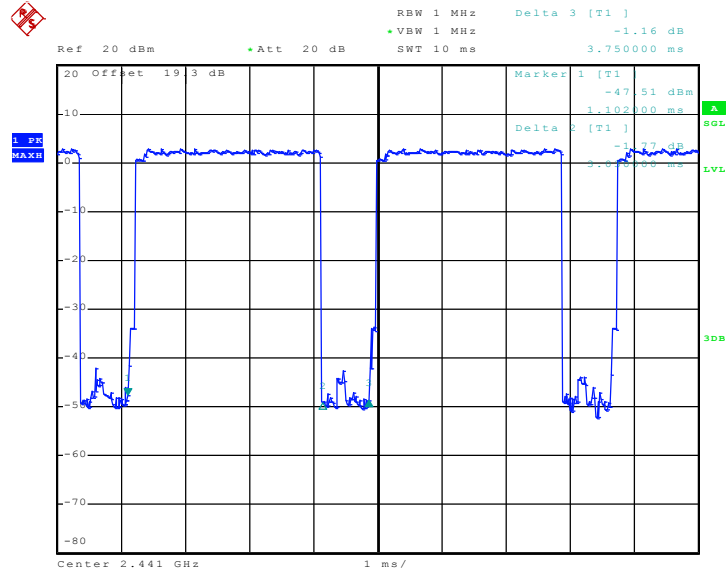
<b>Test Mode :</b>	Mode 5	<b>Temperature :</b>	25~27°C		
<b>Test Engineer :</b>	Andy Yeh	<b>Relative Humidity :</b>	51~54%		
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH5	2.80	3030.00	0.27	0.4	Pass

**Remark:**

1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

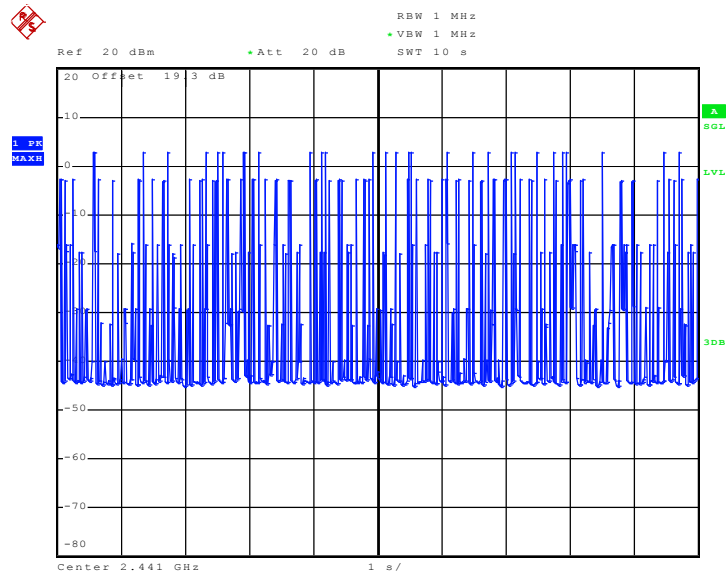


### 2DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 29.SEP.2010 15:45:53

### 2DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 29.SEP.2010 15:57:26

### 3.5 Peak Output Power Measurement

#### 3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1W (30 dBm).

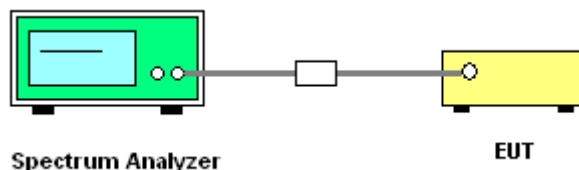
#### 3.5.2 Measuring Instruments

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 a low loss cable.

#### 3.5.4 Test Setup



#### 3.5.5 Test Result of Peak Output Power

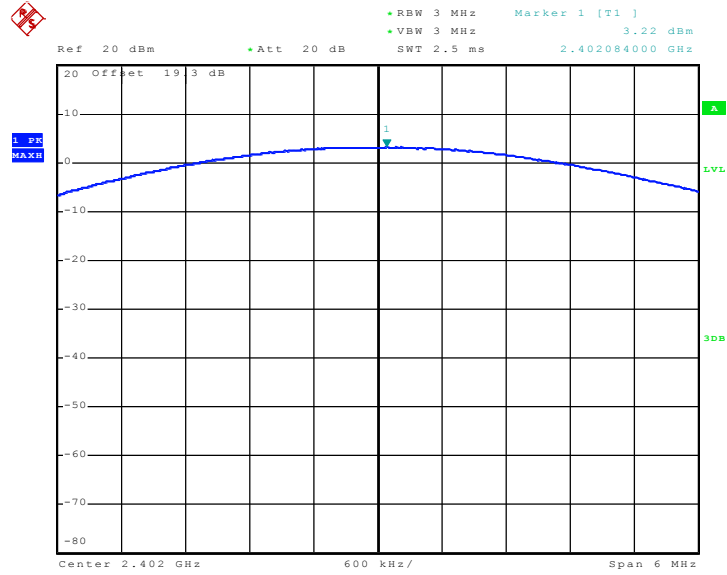
Test Mode :	Mode 4, 5, 6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	51~54%

Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi$ /4-DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	3.22	30	Pass
39	2441	3.62	30	Pass
78	2480	3.20	30	Pass



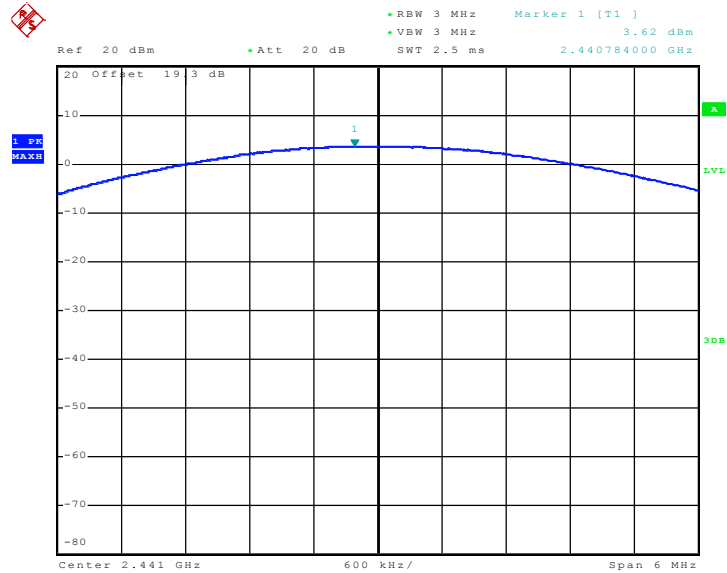


Peak Output Power Plot on Channel 00



Date: 29.SEP.2010 14:40:13

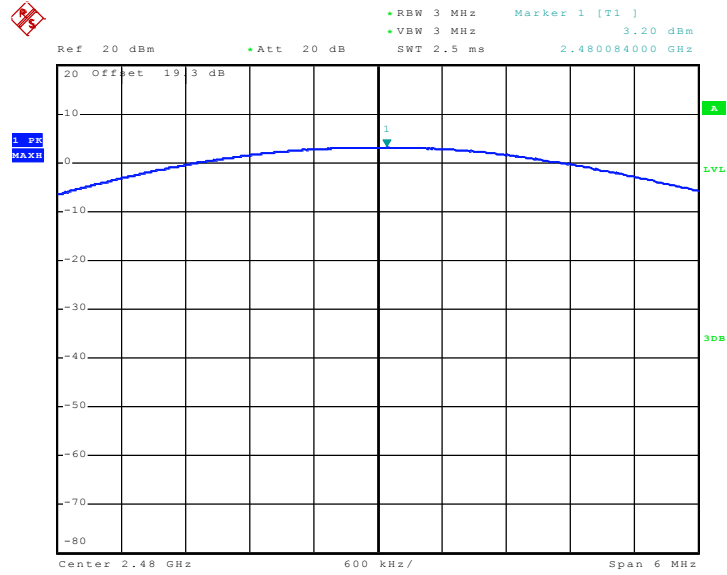
Peak Output Power Plot on Channel 39



Date: 29.SEP.2010 14:39:44



Peak Output Power Plot on Channel 78



Date: 29.SEP.2010 14:39:07



## **3.6 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**

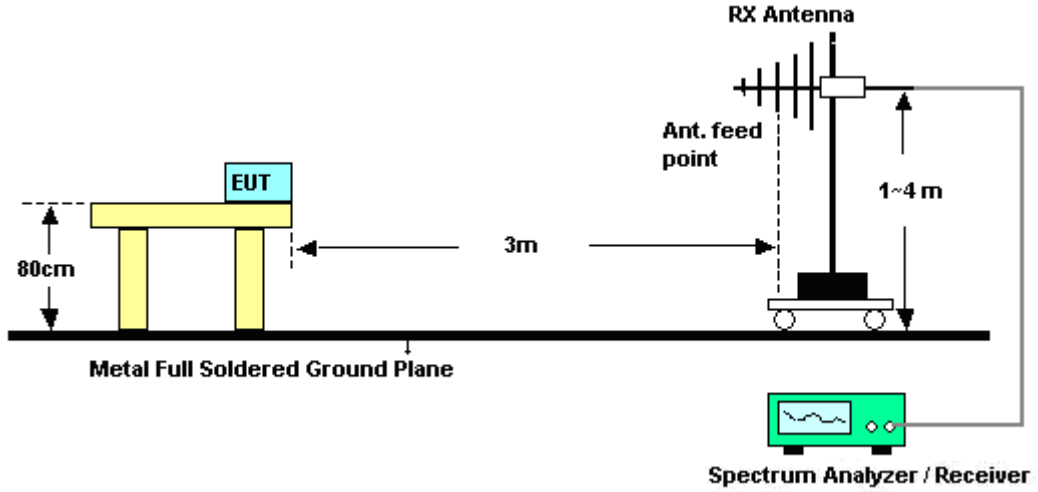
See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

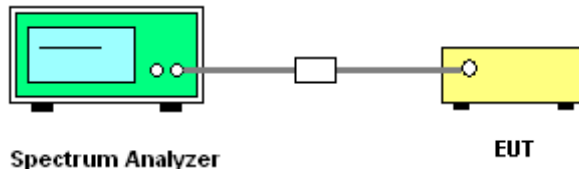
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

### 3.6.4 Test Setup

#### <Radiated Band Edges>



#### <Conducted Band Edges>





3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	00	Relative Humidity :	46~48%
		Test Engineer :	Wii Chang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2387.52	49.66	-24.34	74	47.57	31.7	4.47	34.08	175	311	Peak
2387.52	35.91	-18.09	54	33.82	31.7	4.47	34.08	175	311	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2386.19	46.76	-27.24	74	44.67	31.7	4.47	34.08	100	163	Peak
2386.19	34.51	-19.49	54	32.42	31.7	4.47	34.08	100	163	Average



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
		Test Engineer :	Wii Chang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.5	65.81	-8.19	74	63.52	31.78	4.59	34.08	169	299	Peak
2483.5	29.02	-24.98	54	26.73	31.78	4.59	34.08	169	299	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	83.41	54.39	29.02	54	-24.98	Pass
Hopping Mode	83.41	55.88	27.53	54	-26.47	Pass

Note : Average result = Maximum field strength – Delta result

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.5	53.72	-20.28	74	51.43	31.78	4.59	34.08	100	158	Peak
2483.5	29.93	-24.07	54	27.64	31.78	4.59	34.08	100	158	Average

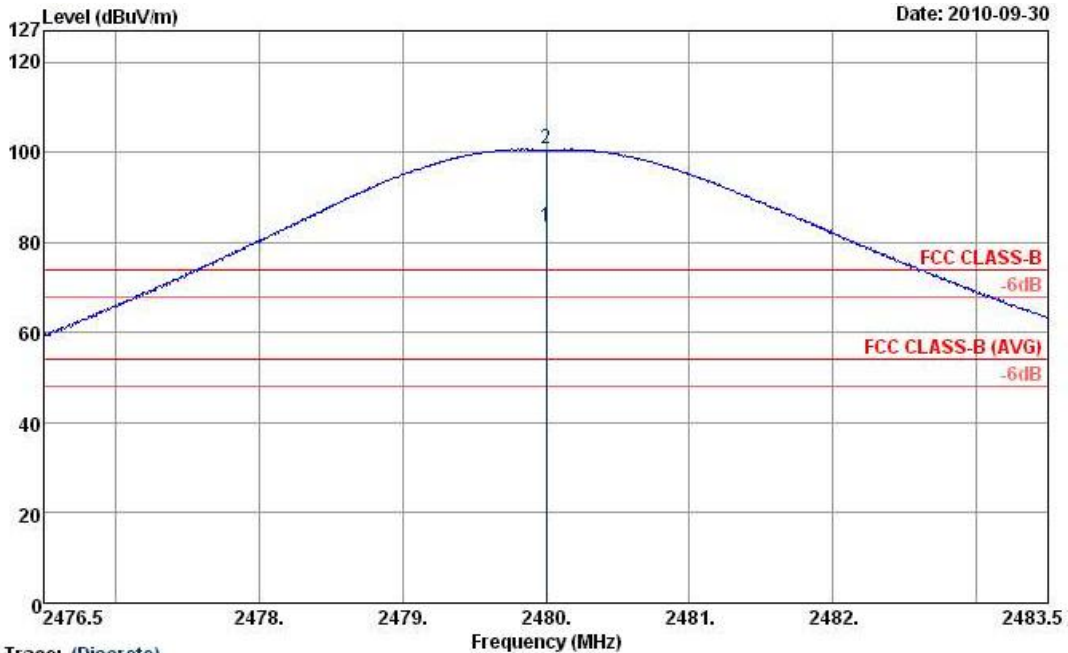
Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBµV/m)	Delta Result (dB)	Average Result (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
Single Carrier Mode	82.23	52.3	29.93	54	-24.07	Pass
Hopping Mode	82.23	54.32	27.91	54	-26.09	Pass

Note : Average result = Maximum field strength – Delta result



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Horizontal



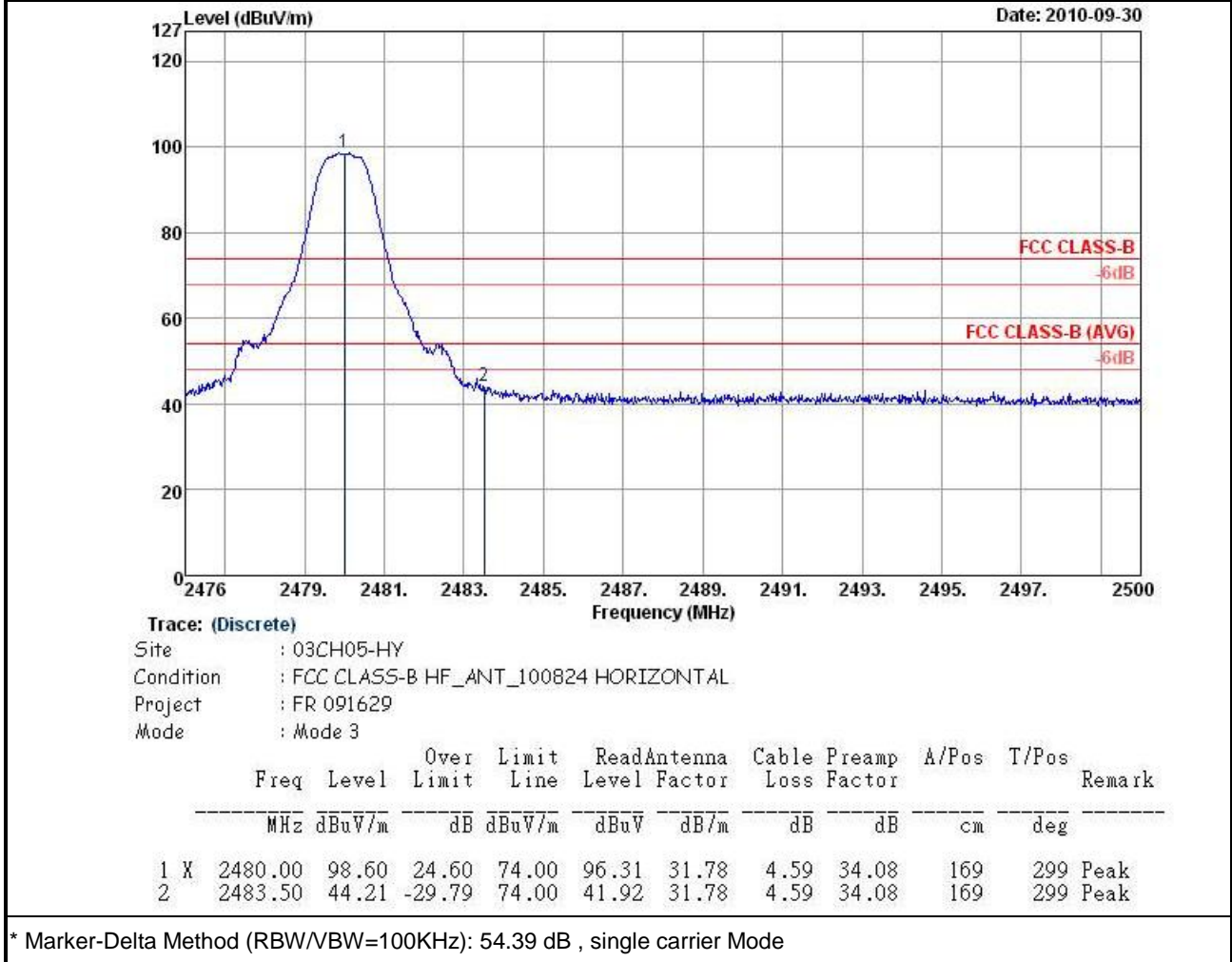
Trace: (Discrete)  
 Site : 03CH05-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 HORIZONTAL  
 Project : FR 091629  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	83.41	29.41	54.00	81.12	31.78	4.59	34.08	169	299 Average
2 X	2480.00	100.71	26.71	74.00	98.42	31.78	4.59	34.08	169	299 Peak

\* Maximum field strength of the fundamental emission



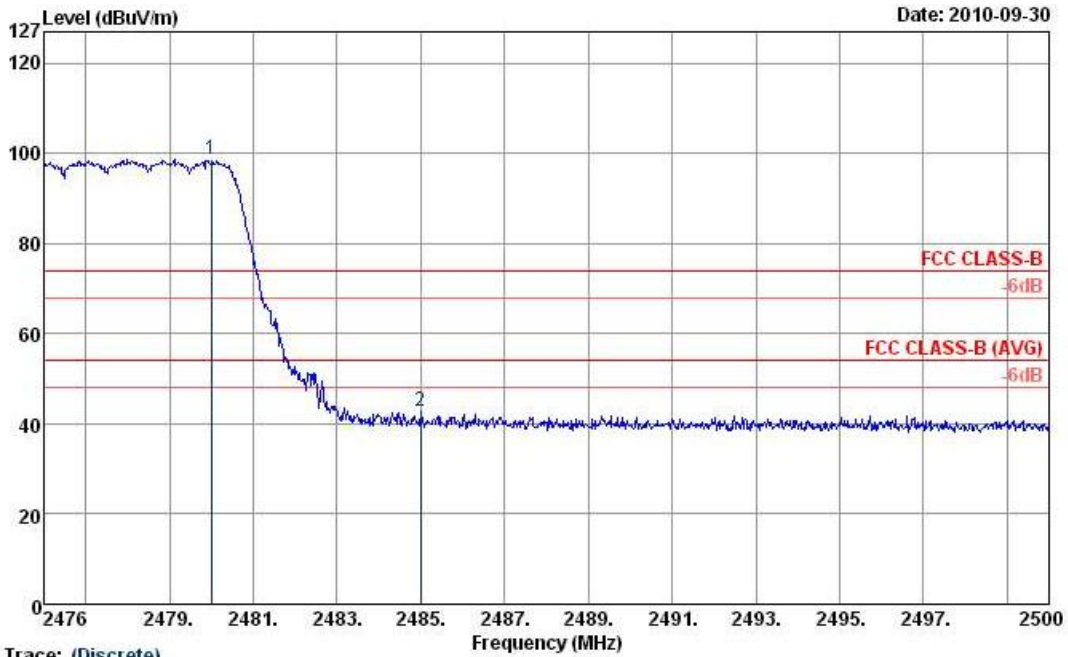
Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Horizontal







Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Horizontal



Trace: (Discrete)

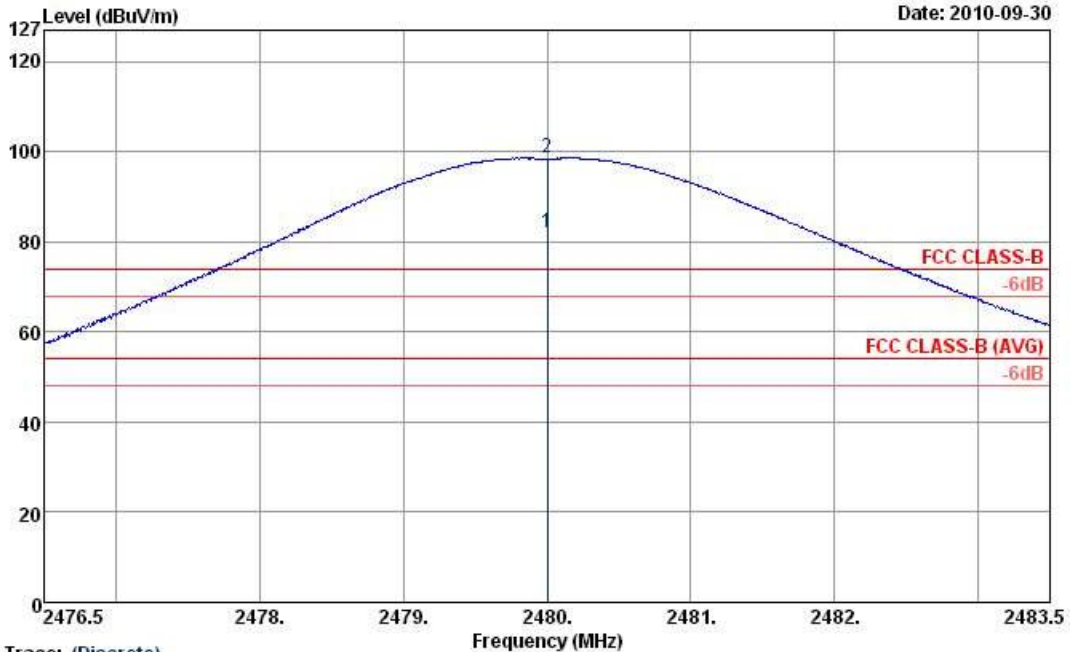
Site : 03CH05-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 HORIZONTAL  
 Project : FR 091629  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	98.58	24.58	74.00	96.29	31.78	4.59	34.08	169	299	Peak
2	2485.00	42.70	-31.30	74.00	40.41	31.78	4.59	34.08	169	299	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 55.88 dB , Hopping Mode



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Vertical



Trace: (Discrete)

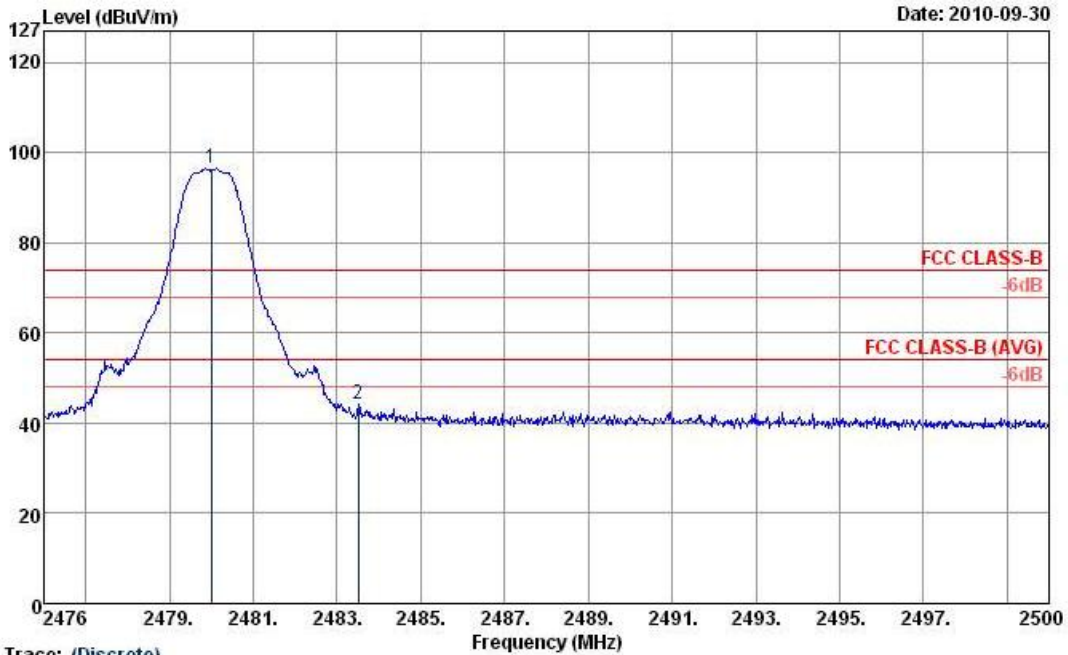
Site : 03CH05-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 VERTICAL  
 Project : FR 091629  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	82.23	28.23	54.00	79.94	31.78	4.59	34.08	100	158	Average
2 X	2480.00	98.60	24.60	74.00	96.31	31.78	4.59	34.08	100	158	Peak

\* Maximum field strength of the fundamental emission



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Vertical



Trace: (Discrete)

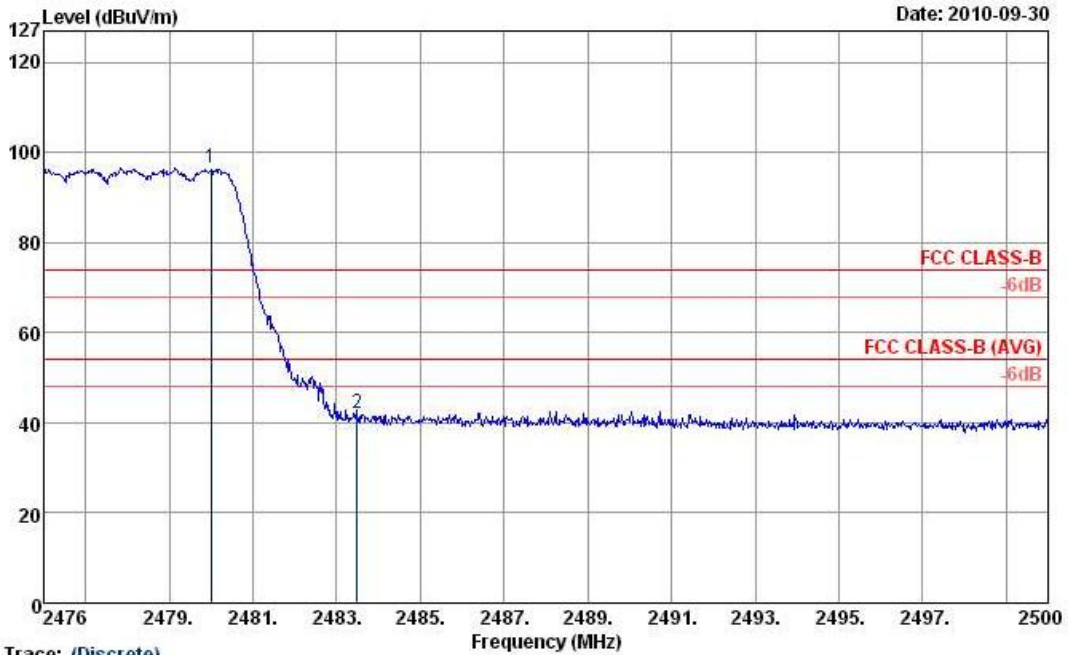
Site : 03CH05-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 VERTICAL  
 Project : FR 091629  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	96.50	22.50	74.00	94.21	31.78	4.59	34.08	100	158	Peak
2	2483.51	44.20	-29.80	74.00	41.91	31.78	4.59	34.08	100	158	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 52.30 dB , single carrier Mode



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Vertical



Trace: (Discrete)  
 Site : 03CH05-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 VERTICAL  
 Project : FR 091629  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	96.45	22.45	74.00	94.16	31.78	4.59	34.08	100	158	Peak
2	2483.49	42.13	-31.87	74.00	39.84	31.78	4.59	34.08	100	158	Peak

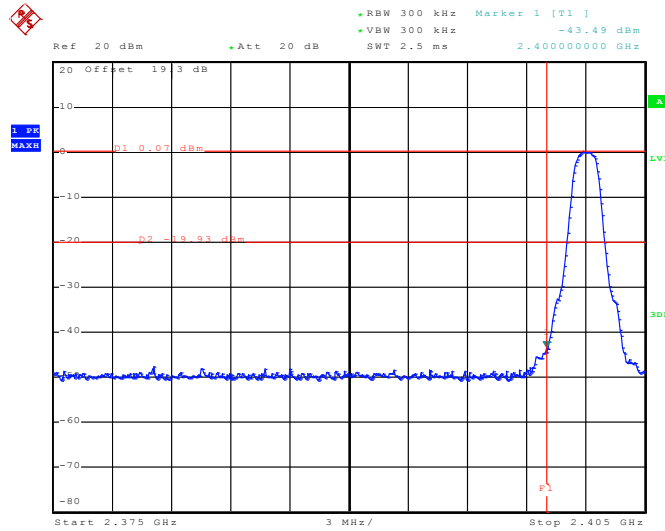
\* Marker-Delta Method (RBW/VBW=100KHz): 54.32 dB , Hopping Mode



### 3.6.6 Test Result of Conducted Band Edges

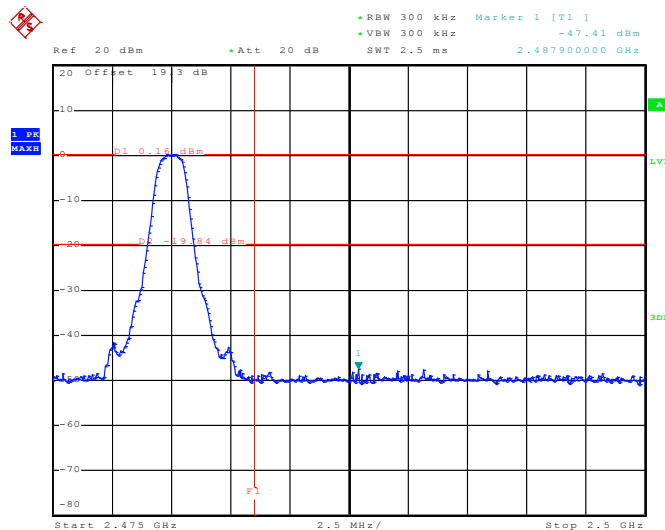
Test Mode :	Mode 4 and 6	Temperature :	25~27°C
Test Channel :	00 and 78	Relative Humidity :	51~54%
		Test Engineer :	Andy Yeh

Low Band Edge Plot on Channel 00



Date: 29.SEP.2010 15:31:07

High Band Edge Plot on Channel 78



Date: 29.SEP.2010 15:25:57

## 3.7 Spurious Emission Measurement

### 3.7.1 Limit of Spurious Emission Measurement

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

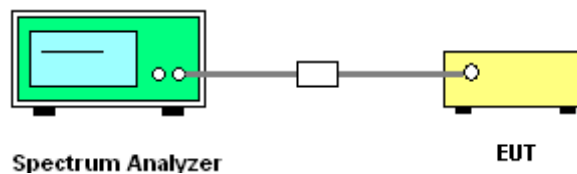
### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.7.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW)  $\geq$  RBW, 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.

### 3.7.4 Test Setup

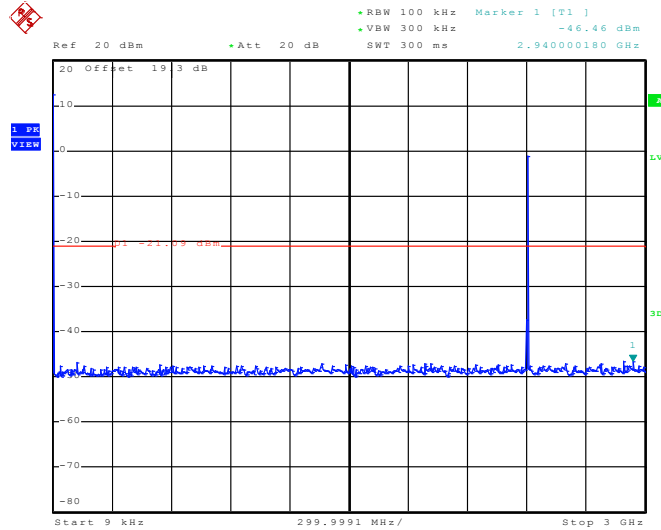




### 3.7.5 Test Result

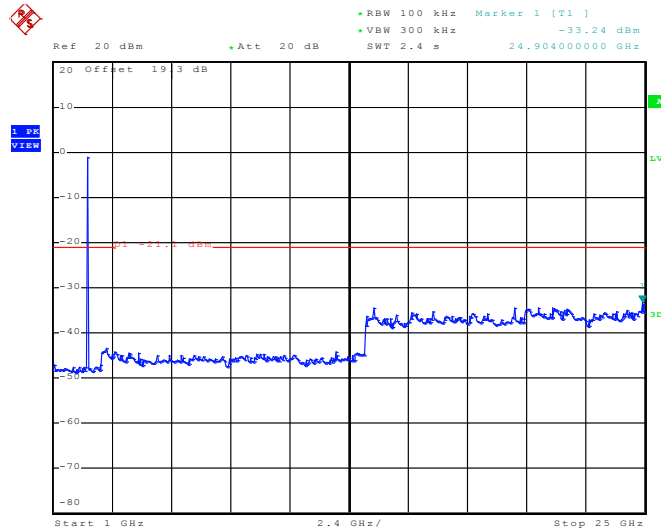
Test Mode :	Mode 4	Temperature :	25~27°C
Test Channel :	00	Relative Humidity :	51~54%
		Test Engineer :	Andy Yeh

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 29.SEP.2010 17:30:50

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

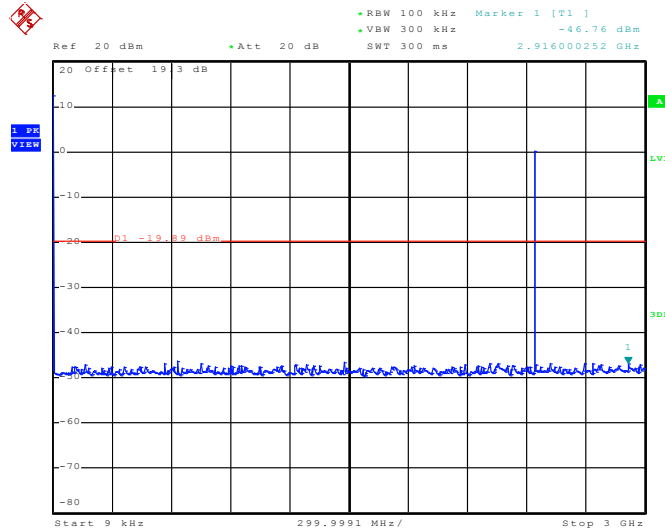


Date: 29.SEP.2010 17:32:27



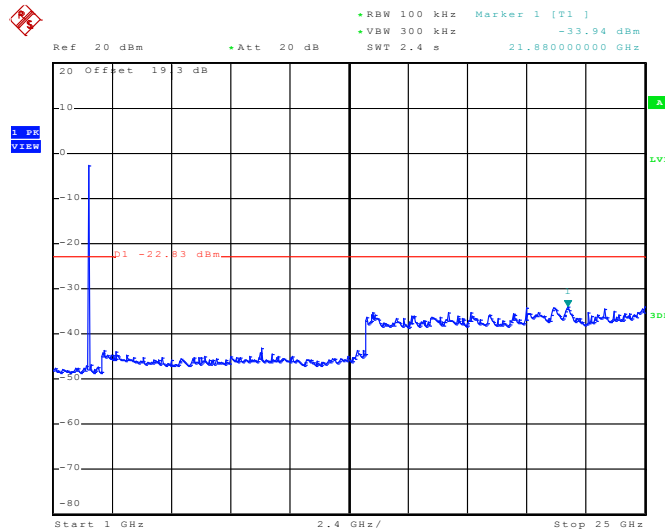
Test Mode :	Mode 5	Temperature :	25~27°C
Test Channel :	39	Relative Humidity :	51~54%
		Test Engineer :	Andy Yeh

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 29.SEP.2010 17:29:57

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



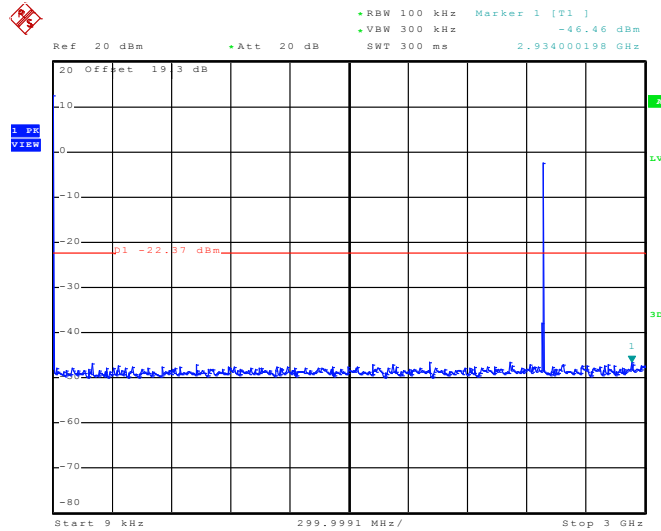
Date: 29.SEP.2010 17:33:49





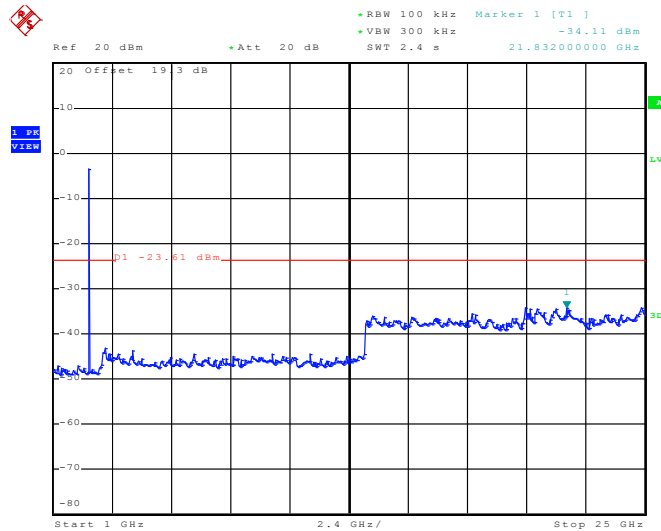
Test Mode :	Mode 6	Temperature :	25~27°C
Test Channel :	78	Relative Humidity :	51~54%
		Test Engineer :	Andy Yeh

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 29.SEP.2010 17:28:39

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 29.SEP.2010 17:34:56

## 3.8 AC Conducted Emission Measurement

### 3.8.1 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.

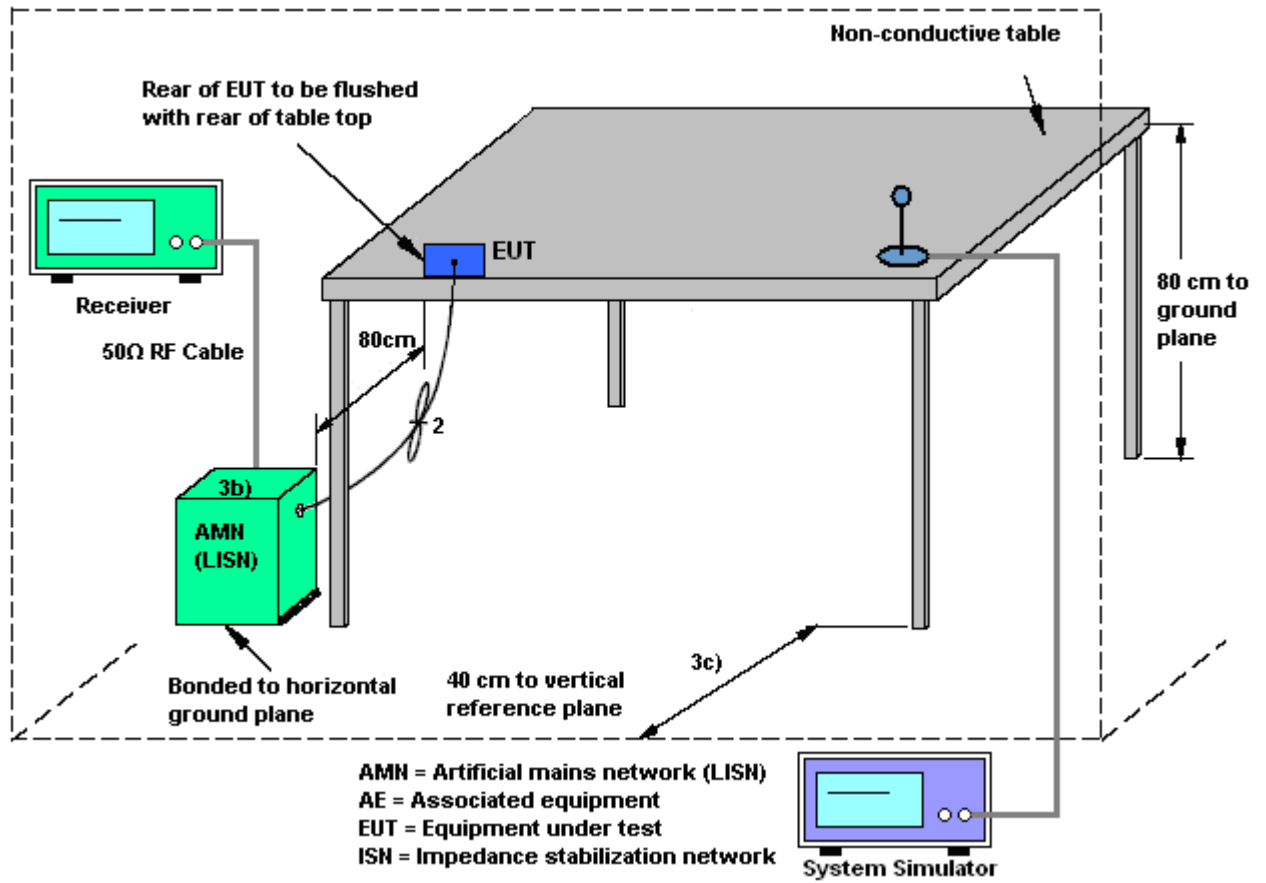
### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.8.3 Test Procedures

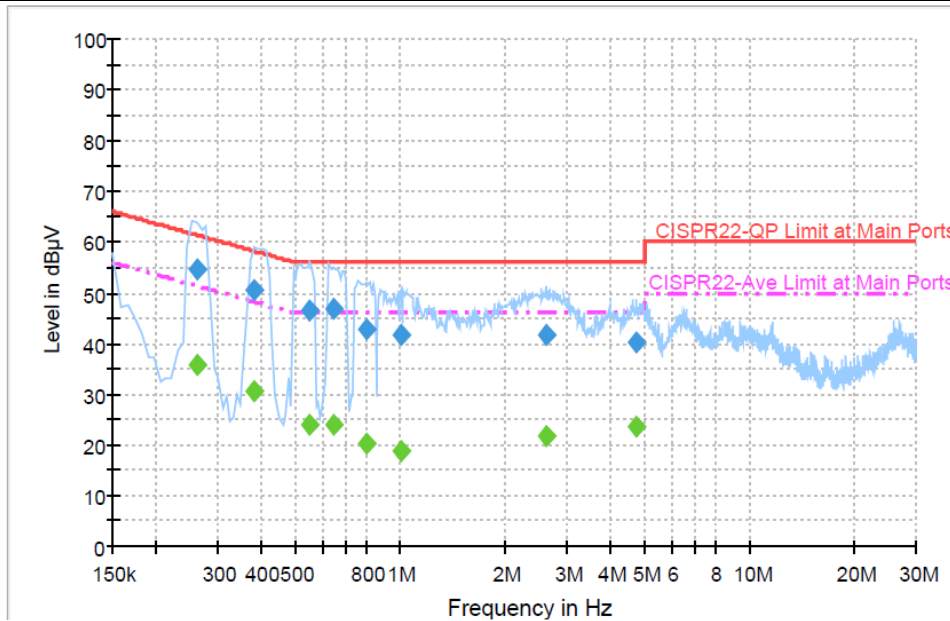
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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.

### 3.8.4 Test Setup



### 3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + GPS Rx + Earphone 2 + Battery 2 + USB Cable 2 (Charging from Adapter 2)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



#### Final Result 1

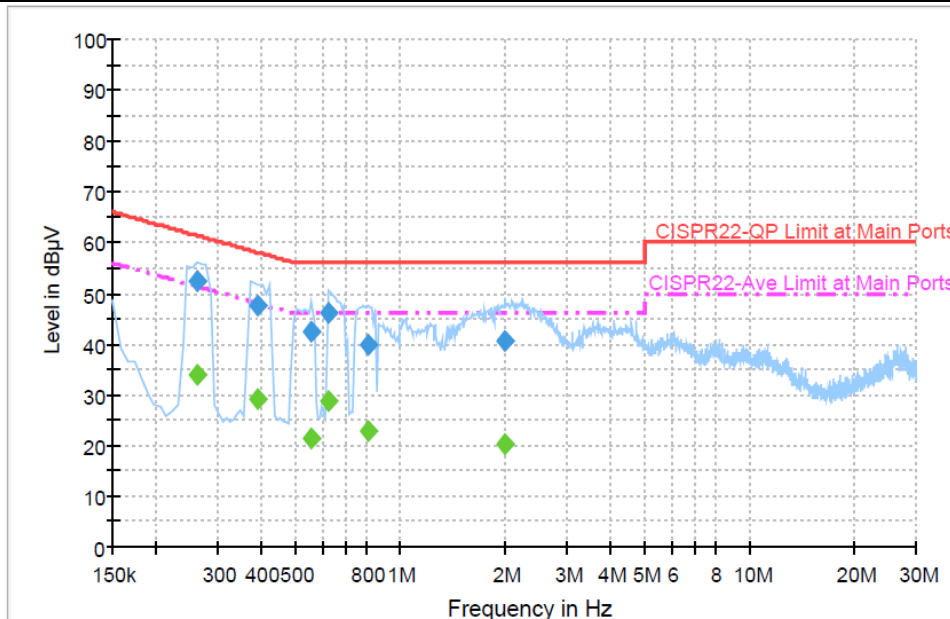
Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	54.5	Off	L1	19.3	6.9	61.4
0.382000	50.7	Off	L1	19.4	7.5	58.2
0.550000	46.5	Off	L1	19.3	9.5	56.0
0.646000	46.7	Off	L1	19.3	9.3	56.0
0.798000	42.9	Off	L1	19.4	13.1	56.0
1.006000	41.7	Off	L1	19.4	14.3	56.0
2.606000	41.6	Off	L1	19.5	14.4	56.0
4.726000	40.1	Off	L1	19.5	15.9	56.0

#### Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	35.9	Off	L1	19.3	15.5	51.4
0.382000	30.8	Off	L1	19.4	17.4	48.2
0.550000	24.2	Off	L1	19.3	21.8	46.0
0.646000	23.9	Off	L1	19.3	22.1	46.0
0.798000	20.1	Off	L1	19.4	25.9	46.0
1.006000	18.6	Off	L1	19.4	27.4	46.0
2.606000	21.7	Off	L1	19.5	24.3	46.0
4.726000	23.8	Off	L1	19.5	22.2	46.0



Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + GPS Rx + Earphone 2 + Battery 2 + USB Cable 2 (Charging from Adapter 2)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	52.3	Off	N	19.4	9.1	61.4
0.390000	47.5	Off	N	19.4	10.6	58.1
0.558000	42.4	Off	N	19.3	13.6	56.0
0.622000	46.3	Off	N	19.3	9.7	56.0
0.806000	39.7	Off	N	19.4	16.3	56.0
1.990000	40.7	Off	N	19.5	15.3	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	33.9	Off	N	19.4	17.5	51.4
0.390000	29.0	Off	N	19.4	19.1	48.1
0.558000	21.3	Off	N	19.3	24.7	46.0
0.622000	28.9	Off	N	19.3	17.1	46.0
0.806000	22.7	Off	N	19.4	23.3	46.0
1.990000	20.4	Off	N	19.5	25.6	46.0

### 3.9 Radiated Emission Measurement

#### 3.9.1 Limit of Radiated 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 (MHz)	Field Strength (microvolts/meter)	Measurement Distance (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

#### 3.9.2 Measuring Instruments

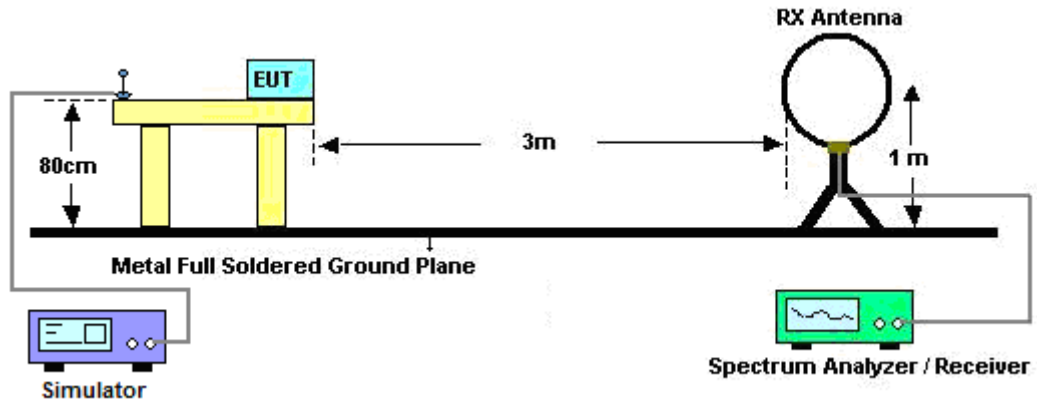
See list of measuring instruments of this test report.

#### 3.9.3 Test Procedures

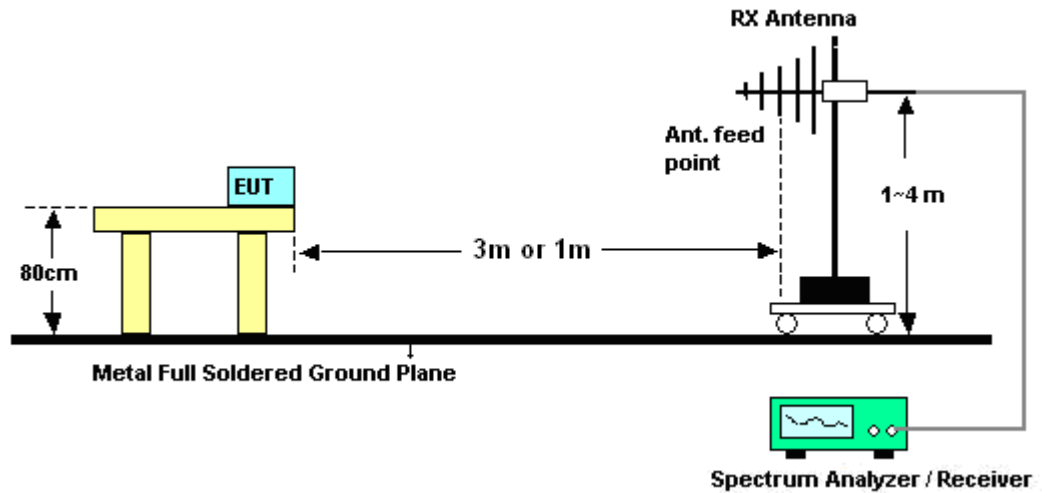
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
  - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
  - (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.  
 Distance extrapolation factor =  $20 \log(\text{specific distance [3m]} / \text{test distance [1m]})$  (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

### 3.9.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz





3.9.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Test Engineer :	Wii Chang	Temperature :	24~25°C	
		Relative Humidity :	46~48%	
Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.





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

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	00	Relative Humidity :	46~48%
Test Engineer :	Wii Chang	Polarization :	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
52.41	23.8	-16.2	40	46.93	7.69	0.73	31.55	100	59	Peak
97.5	19.2	-24.3	43.5	39.12	10.69	0.95	31.56	-	-	Peak
158.79	25.47	-18.03	43.5	45.75	10.08	1.14	31.5	-	-	Peak
457.5	18.53	-27.47	46	30.5	17.25	1.92	31.14	-	-	Peak
584.9	20.69	-25.31	46	30.1	19.3	2.18	30.89	-	-	Peak
823.6	22.39	-23.61	46	29.51	20.79	2.61	30.52	-	-	Peak
2387.52	35.91	-18.09	54	33.82	31.7	4.47	34.08	175	311	Average
2387.52	49.66	-24.34	74	47.57	31.7	4.47	34.08	175	311	Peak
2402	83.47	-	-	81.35	31.7	4.5	34.08	175	311	Average
2402	100.74	-	-	98.62	31.7	4.5	34.08	175	311	Peak
2486	32.76	-21.24	54	30.47	31.78	4.59	34.08	175	311	Average
2486	44.51	-29.49	74	42.22	31.78	4.59	34.08	175	311	Peak



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	46~48%
<b>Test Engineer :</b>	Wii Chang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2402 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
35.4	35.59	-4.41	40	51.59	14.94	0.58	31.52	100	24	Peak
57	35.27	-4.73	40	59.23	6.85	0.73	31.54	-	-	Peak
90.75	29.84	-13.66	43.5	51.04	9.5	0.84	31.54	-	-	Peak
360.2	16.87	-29.13	46	31.19	15.25	1.71	31.28	-	-	Peak
567.4	20.46	-25.54	46	29.9	19.3	2.18	30.92	-	-	Peak
862.8	22.86	-23.14	46	29.81	20.89	2.65	30.49	-	-	Peak
2386.19	34.51	-19.49	54	32.42	31.7	4.47	34.08	100	163	Average
2386.19	46.76	-27.24	74	44.67	31.7	4.47	34.08	100	163	Peak
2402	82.85	-	-	80.73	31.7	4.5	34.08	100	163	Average
2402	99.28	-	-	97.16	31.7	4.5	34.08	100	163	Peak
2484	32.77	-21.23	54	30.48	31.78	4.59	34.08	100	163	Average
2484	45.18	-28.82	74	42.89	31.78	4.59	34.08	100	163	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	46~48%
<b>Test Engineer :</b>	Wii Chang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2441 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
51.87	25.67	-14.33	40	48.8	7.69	0.73	31.55	100	55	Peak
148.26	27.79	-15.71	43.5	47.46	10.69	1.14	31.5	-	-	Peak
255.99	29.57	-16.43	46	46.37	13.28	1.42	31.5	-	-	Peak
419.7	21.03	-24.97	46	33.05	17.28	1.87	31.17	-	-	Peak
555.5	21.87	-24.13	46	31.36	19.3	2.15	30.94	-	-	Peak
822.9	24.25	-21.75	46	31.37	20.79	2.61	30.52	-	-	Peak
2352	33.47	-20.53	54	31.46	31.66	4.44	34.09	177	297	Average
2352	45.3	-28.7	74	43.29	31.66	4.44	34.09	177	297	Peak
2441	83.44	-	-	81.21	31.75	4.56	34.08	177	297	Average
2441	101.37	-	-	99.14	31.75	4.56	34.08	177	297	Peak
2500	32.96	-21.04	54	30.62	31.8	4.62	34.08	177	297	Average
2500	44.83	-29.17	74	42.49	31.8	4.62	34.08	177	297	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	46~48%
<b>Test Engineer :</b>	Wii Chang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2441 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
35.4	36.43	-3.57	40	52.43	14.94	0.58	31.52	-	-	Peak
51.06	36.49	-3.51	40	59.46	7.86	0.73	31.56	-	-	Peak
57.81	36.94	-3.06	40	61.06	6.69	0.73	31.54	100	11	Peak
402.2	19.92	-26.08	46	32.72	16.56	1.82	31.18	-	-	Peak
516.3	20.81	-25.19	46	31.31	18.5	2.04	31.04	-	-	Peak
768.3	24.06	-21.94	46	31.33	20.73	2.54	30.54	-	-	Peak
2360	33.17	-20.83	54	31.15	31.66	4.44	34.08	100	158	Average
2360	44.87	-29.13	74	42.85	31.66	4.44	34.08	100	158	Peak
2441	82.41	-	-	80.18	31.75	4.56	34.08	100	158	Average
2441	98.87	-	-	96.64	31.75	4.56	34.08	100	158	Peak
2484	32.84	-21.16	54	30.55	31.78	4.59	34.08	100	158	Average
2484	44.33	-29.67	74	42.04	31.78	4.59	34.08	100	158	Peak



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	46~48%
<b>Test Engineer :</b>	Wii Chang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2480 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
59.7	21.94	-18.06	40	46.42	6.35	0.73	31.56	-	-	Peak
146.1	28.91	-14.59	43.5	48.39	10.88	1.14	31.5	100	91	Peak
219.54	21.71	-24.29	46	42.7	9.15	1.34	31.48	-	-	Peak
510	21.06	-24.94	46	31.73	18.34	2.04	31.05	-	-	Peak
556.9	22.01	-23.99	46	31.5	19.3	2.15	30.94	-	-	Peak
900.6	24.89	-21.11	46	31.63	21.04	2.7	30.48	-	-	Peak
2344	33.27	-20.73	54	31.28	31.64	4.44	34.09	169	299	Average
2344	46.95	-27.05	74	44.96	31.64	4.44	34.09	169	299	Peak
2480	83.41	-	-	81.12	31.78	4.59	34.08	169	299	Average
2480	100.67	-	-	98.38	31.78	4.59	34.08	169	299	Peak
2483.5	29.02	-24.98	54	26.73	31.78	4.59	34.08	169	299	Average
2483.5	65.81	-8.19	74	63.52	31.78	4.59	34.08	169	299	Peak



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	46~48%
<b>Test Engineer :</b>	Wii Chang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2480 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
35.13	35.19	-4.81	40	50.6	15.53	0.58	31.52	100	77	Peak
50.79	32.4	-7.6	40	55.21	8.03	0.73	31.57	-	-	Peak
166.35	30.09	-13.41	43.5	50.64	9.84	1.14	31.53	-	-	Peak
573.7	21.94	-24.06	46	31.37	19.3	2.18	30.91	-	-	Peak
769.7	24.27	-21.73	46	31.54	20.73	2.54	30.54	-	-	Peak
952.4	25.24	-20.76	46	31.47	21.31	2.85	30.39	-	-	Peak
2360	33.23	-20.77	54	31.21	31.66	4.44	34.08	100	158	Average
2360	45.28	-28.72	74	43.26	31.66	4.44	34.08	100	158	Peak
2480	82.23	-	-	79.94	31.78	4.59	34.08	100	158	Average
2480	98.48	-	-	96.19	31.78	4.59	34.08	100	158	Peak
2483.5	29.93	-24.07	54	27.64	31.78	4.59	34.08	100	158	Average
2483.5	53.72	-20.28	74	51.43	31.78	4.59	34.08	100	158	Peak



## **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**

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

### **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	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 20, 2009	Oct. 19, 2010	Radiation (03CH05-HY)
Amplifier	COM-POWER	PA-103	161069	1KHz - 1GHz	Mar. 29, 2010	Mar. 28, 2011	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Nov. 11, 2009	Nov. 10, 2010	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 - 360 degree	N/A	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m - 4 m	N/A	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	00066584	1GHz ~ 18GHz	Aug. 05, 2010	Aug. 04, 2011	Radiation (03CH05-HY)
Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Nov. 02, 2009	Nov. 01, 2010	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH05-HY)



## 5 Uncertainty of Evaluation

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

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.13</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.26</b>		

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

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		

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

Contribution	Uncertainty of $X_i$		$u(X_i)$	$C_i$	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				