



# FCC RF Test Report

APPLICANT : Motorola Mobility, Inc.  
EQUIPMENT : Mobile Phone  
BRAND NAME : MOTOROLA  
MODEL NAME : EX225  
GPPD NUMBER : 3129  
FCC ID : IHDT56MK5  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : Digital Spread Spectrum (DSS)

The product was received on Aug. 26, 2011 and completely tested on Sep. 10, 2011. 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:

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.

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FCC ID : IHDT56MK5

Page Number : 1 of 58

Report Issued Date : Oct. 05, 2011

Report Version : Rev. 02



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### 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	≤ 125 mW	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 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 23.9 dB at 6.06 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.91 dB at 2483.5 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

Motorola Mobility, Inc.

No. 1, Wang Jing East Road, Chao Yang District, 100102 Beijing, P. R. China

## 1.2 Manufacturer

Arima Communications Corp.

6F., No. 866, Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile Phone
Brand Name	MOTOROLA
Model Name	EX225
FCC ID	IHDT56MK5
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) : 6.36 dBm (0.0043 W) Bluetooth EDR (2Mbps) : 6.13 dBm (0.0041 W) Bluetooth EDR (3Mbps) : 6.34 dBm (0.0043 W)
Antenna Type	IFA Antenna with gain -2.21 dBi
HW Version	P2
SW Version	BREA3G_W_07.09.00R_S_WIFI
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi$ /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

### 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	03CH07-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
- ♦ IC RSS-210 Issue 8

### 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 (Certification), 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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	P20G	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	5.28 dBm	5.02 dBm	5.24 dBm
Ch39	2441MHz	<b>6.36 dBm</b>	6.13 dBm	6.34 dBm
Ch78	2480MHz	6.33 dBm	6.08 dBm	6.26 dBm

**Remark:**

1. The data rate was set in 1Mbps 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).

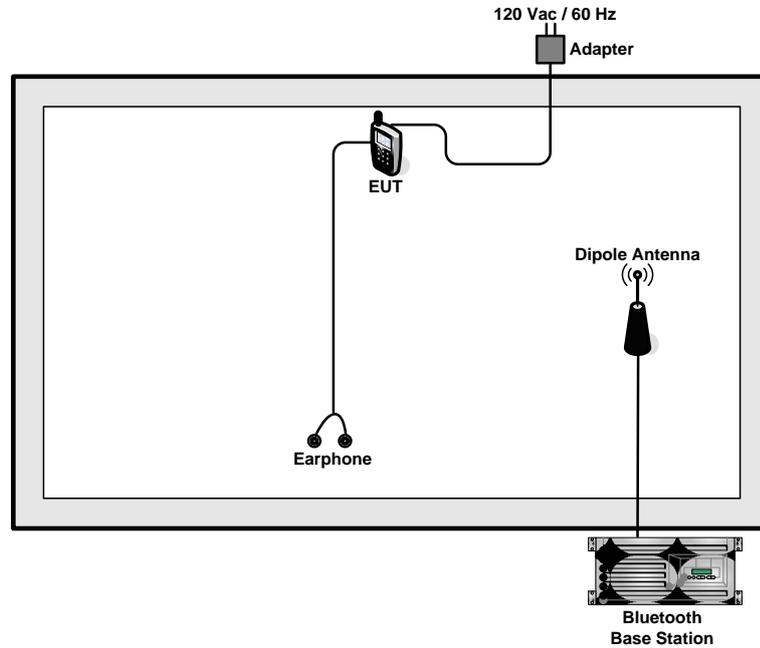
Pre-scanned tests were conducted to determine the final configuration from all possible combinations. Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations, laptop / tablet modes.

The following tables are showing the test modes as the worst cases (E1 panel) and recorded in this report.

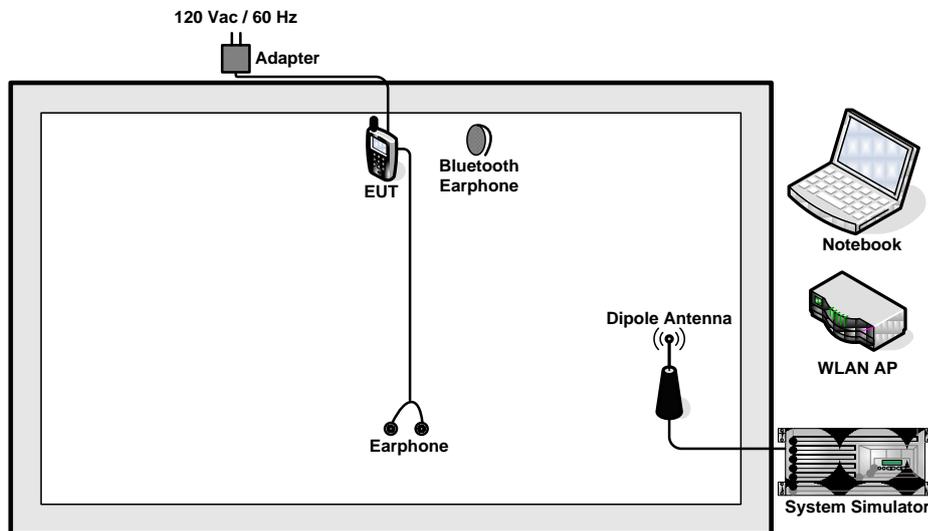
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi$ /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK
<b>Conducted TCs</b>	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
<b>Radiated TCs</b>	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	N/A	N/A
<b>AC Conducted Emission</b>	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + Adapter		
<b>Remark:</b>			
<ol style="list-style-type: none"> <li>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.</li> <li>For radiated TCs, the test was performance with adapter, battery, and earphone.</li> </ol>			

## 2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



## 2.4 RF Utility

For Bluetooth function, key in “\* #3646633 #” on the EUT directly. Then, the EUT will contact with Bluetooth base station for 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.

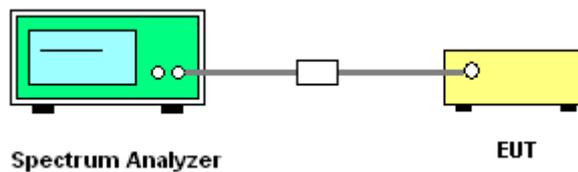
##### 3.1.2 Measuring Instruments

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

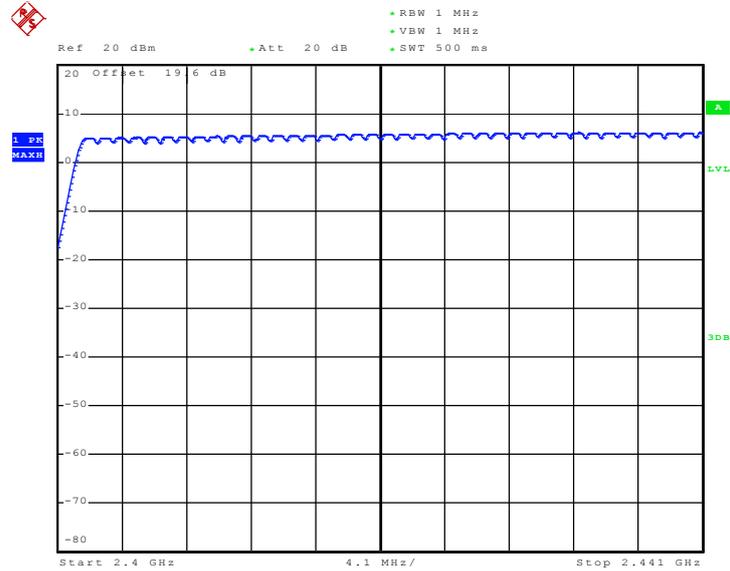


##### 3.1.5 Test Result of Number of Hopping Frequency

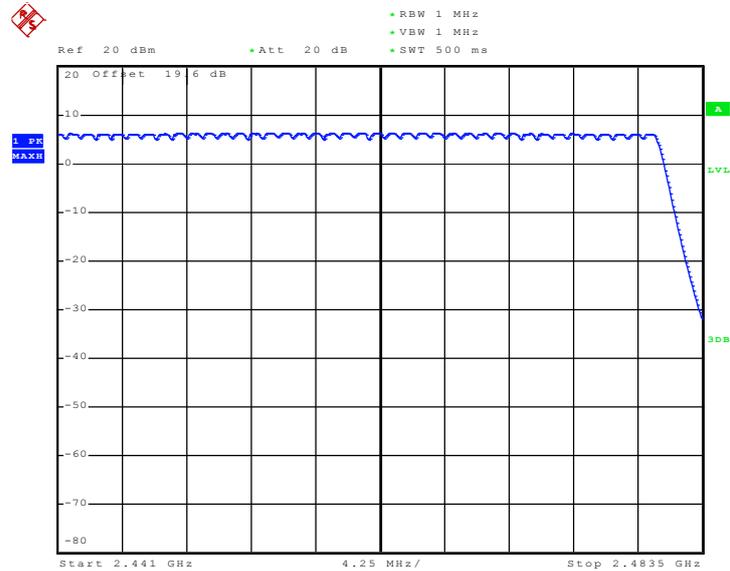
<b>Test Mode :</b>	Mode 1~3	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Pinkston Tu	<b>Relative Humidity :</b>	50~53%
<b>Number of Hopping Channels (Channel)</b>		<b>Limits (Channel)</b>	<b>Pass/Fail</b>
79		> 15	Pass



Number of Hopping Channel Plot on Channel 00 - 78



Date: 2.SEP.2011 10:44:21



Date: 2.SEP.2011 10:49:02

## 3.2 20dB Bandwidth Measurement

### 3.2.1 Limit of 20dB Bandwidth

N/A

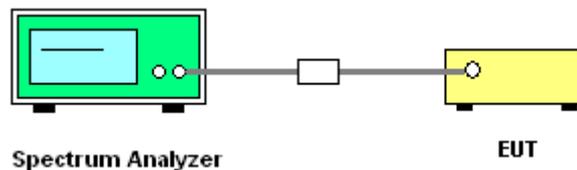
### 3.2.2 Measuring Instruments

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



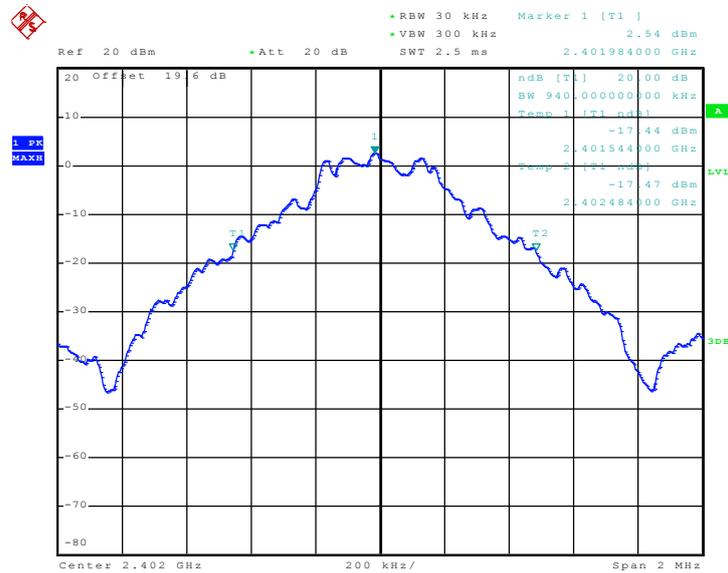


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Pinkston Tu	Relative Humidity :	50~53%

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

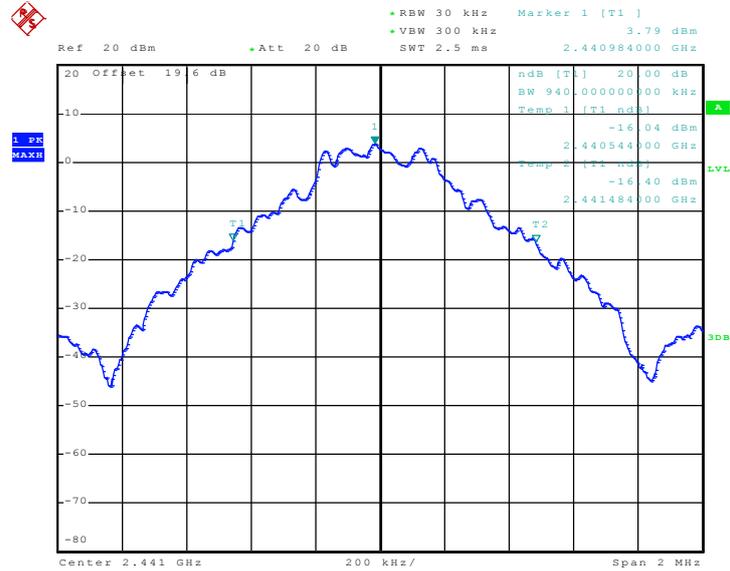
20 dB Bandwidth Plot on Channel 00



Date: 2.SEP.2011 10:15:58

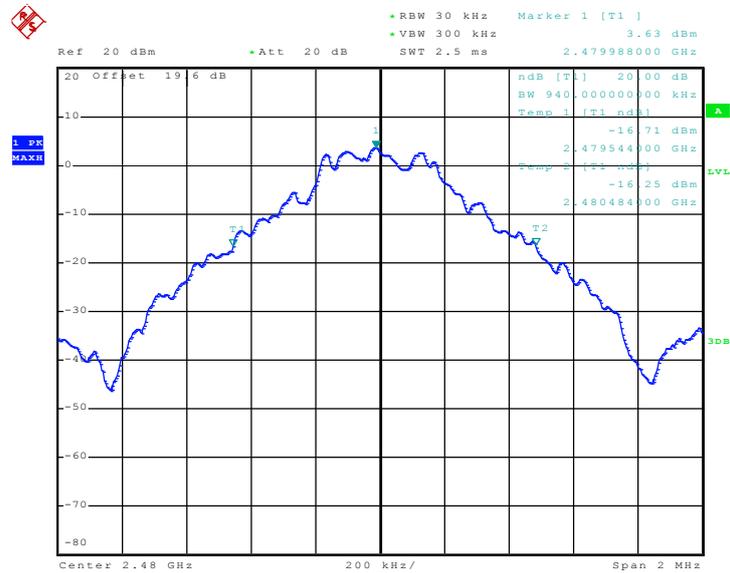


### 20 dB Bandwidth Plot on Channel 39



Date: 2.SEP.2011 10:17:02

### 20 dB Bandwidth Plot on Channel 78



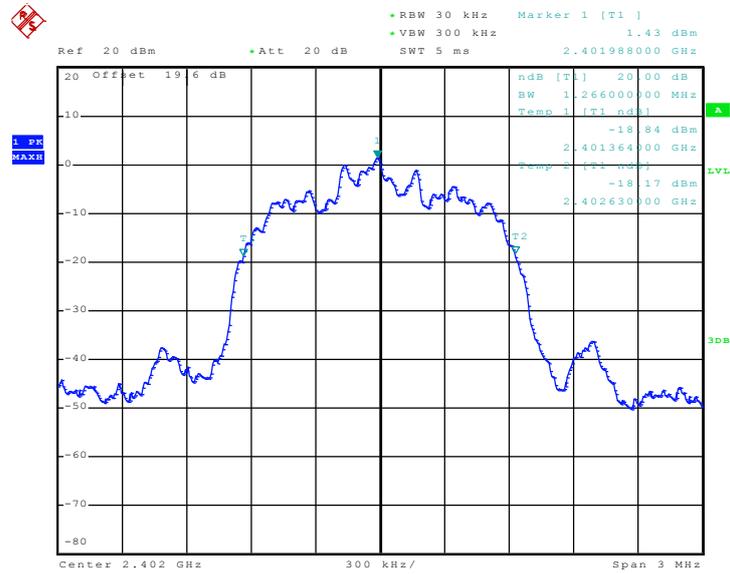
Date: 2.SEP.2011 10:18:35



Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Pinkston Tu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.266
39	2441	1.272
78	2480	1.266

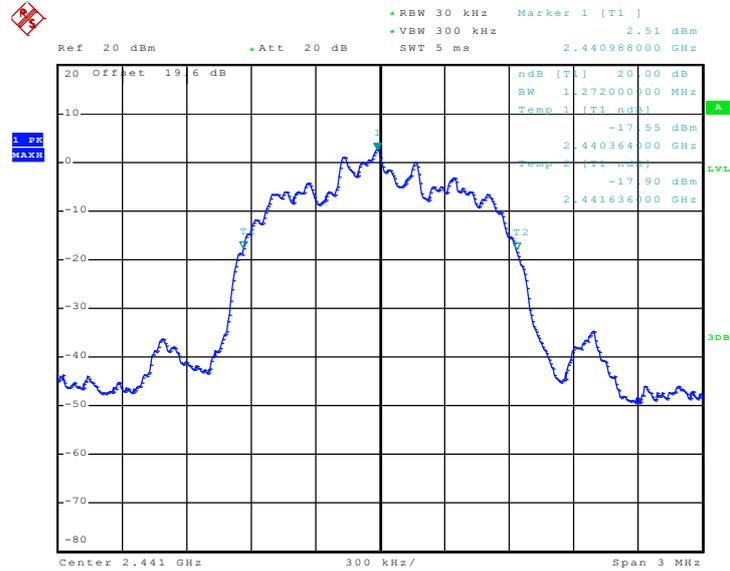
20 dB Bandwidth Plot on Channel 00



Date: 2.SEP.2011 10:19:37

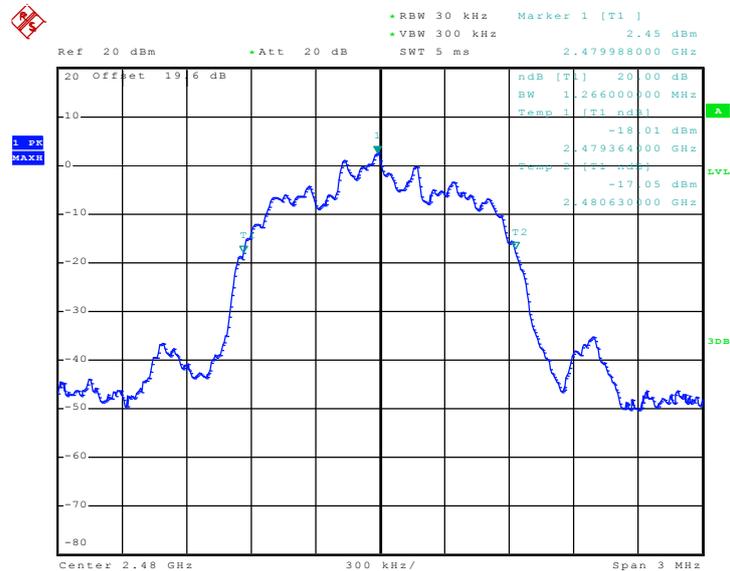


20 dB Bandwidth Plot on Channel 39



Date: 2.SEP.2011 10:21:34

20 dB Bandwidth Plot on Channel 78



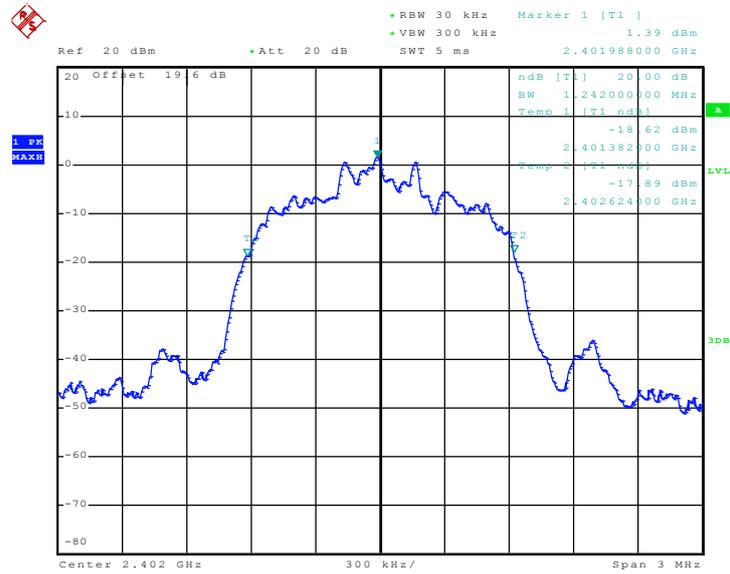
Date: 2.SEP.2011 10:22:47



Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Pinkston Tu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.242
39	2441	1.236
78	2480	1.230

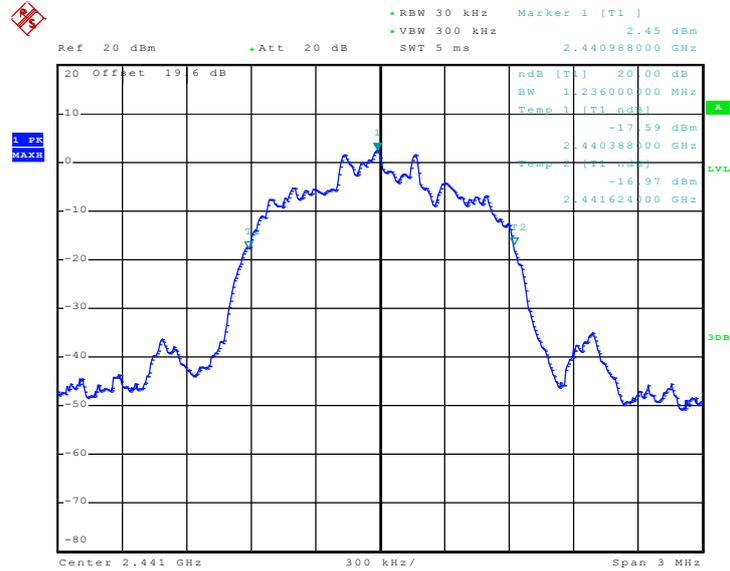
20 dB Bandwidth Plot on Channel 00



Date: 2.SEP.2011 10:23:43

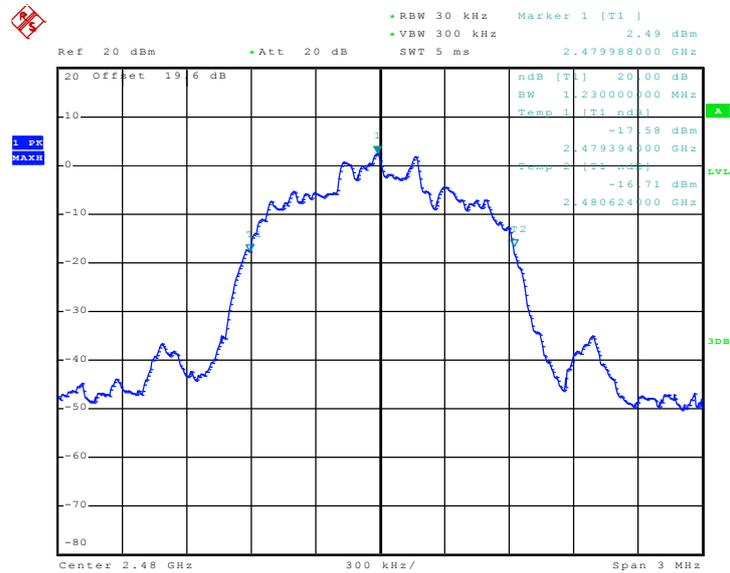


20 dB Bandwidth Plot on Channel 39



Date: 2.SEP.2011 10:24:26

20 dB Bandwidth Plot on Channel 78



Date: 2.SEP.2011 10:25:16

### 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.

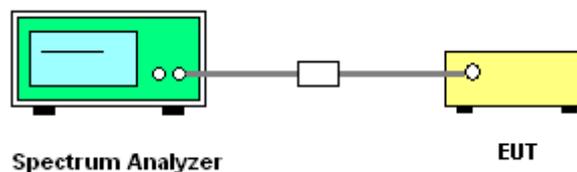
#### 3.3.2 Measuring Instruments

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



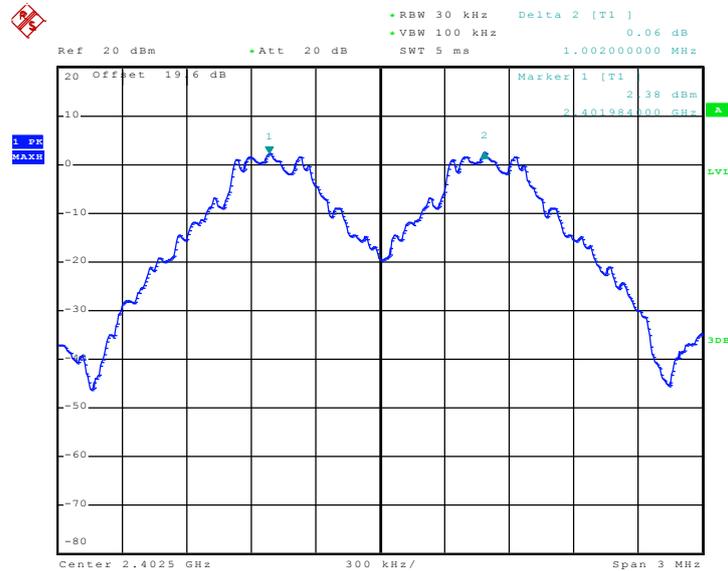


### 3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Pinkston Tu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.6267	Pass
39	2441	1.002	0.6267	Pass
78	2480	1.002	0.6267	Pass

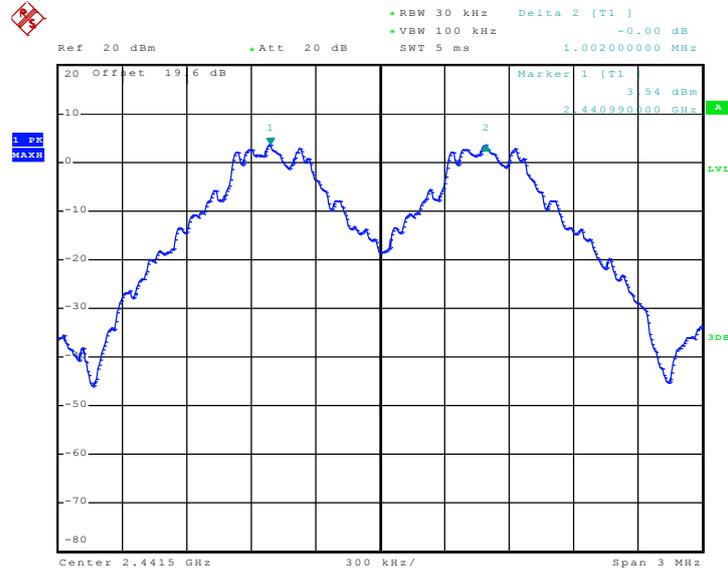
Channel Separation Plot on Channel 00 - 01



Date: 2.SEP.2011 10:05:44

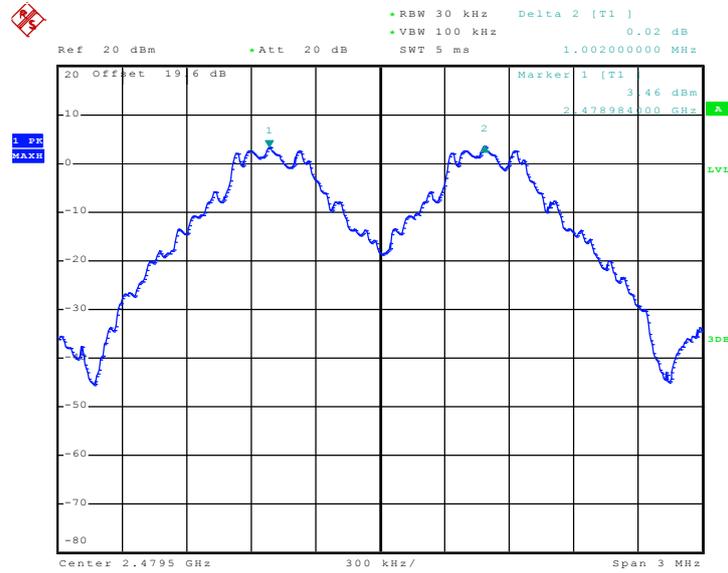


Channel Separation Plot on Channel 39 - 40



Date: 2.SEP.2011 10:06:24

Channel Separation Plot on Channel 77 - 78



Date: 2.SEP.2011 10:07:05

### 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.

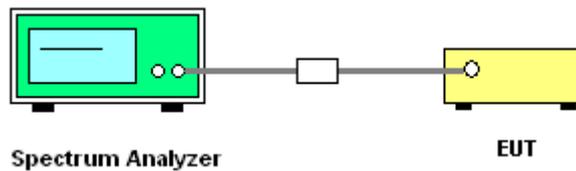
#### 3.4.2 Measuring Instruments

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 2	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Pinkston Tu	<b>Relative Humidity :</b>	50~53%

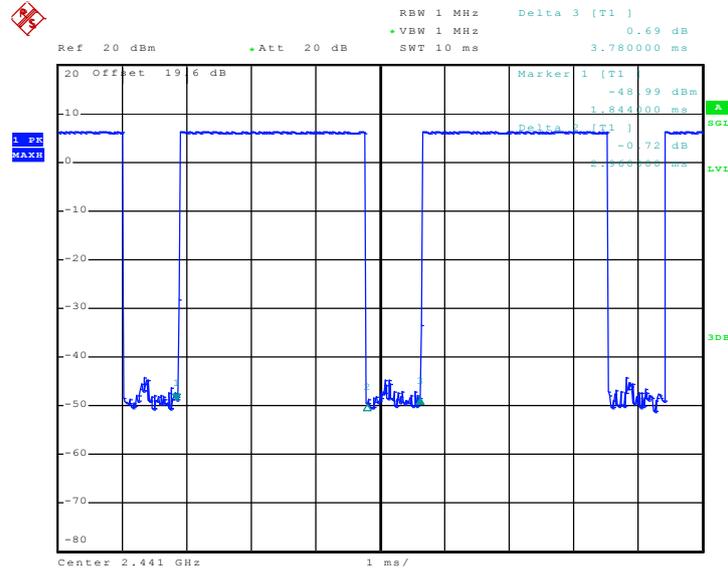
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH5	2.90	2960.00	0.27	0.4	Pass

**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)

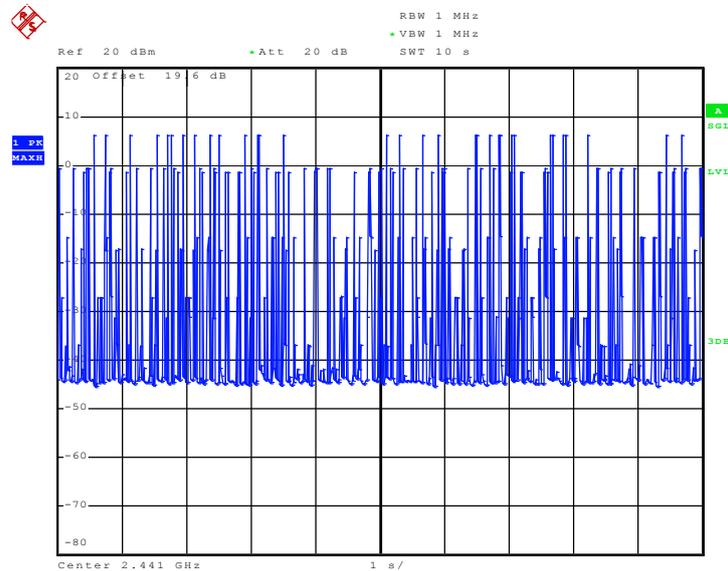


### DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 2.SEP.2011 10:00:27

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



Date: 2.SEP.2011 10:13:16

### 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 may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW (20.97dBm).

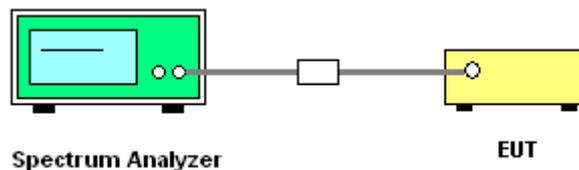
#### 3.5.2 Measuring Instruments

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

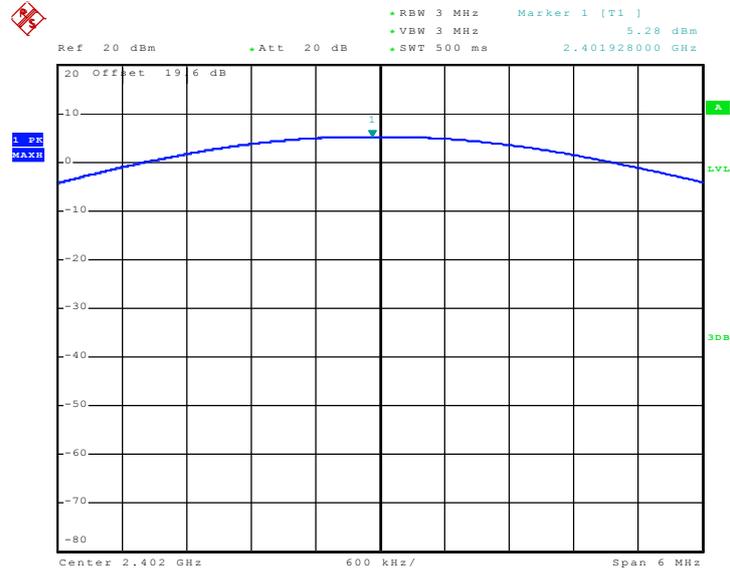


#### 3.5.5 Test Result of Peak Output Power

<b>Test Mode :</b>	Mode 1, 2, 3	<b>Temperature :</b>	24~26°C	
<b>Test Engineer :</b>	Pinkston Tu	<b>Relative Humidity :</b>	50~53%	
Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	5.28	30	Pass
39	2441	6.36	30	Pass
78	2480	6.33	30	Pass

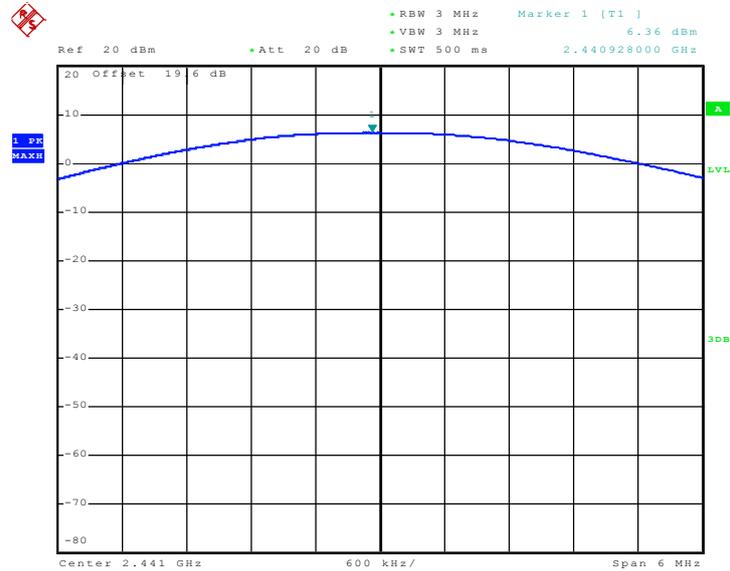


### Peak Output Power Plot on Channel 00



Date: 2.SEP.2011 09:53:26

### Peak Output Power Plot on Channel 39



Date: 2.SEP.2011 09:50:27





## **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**

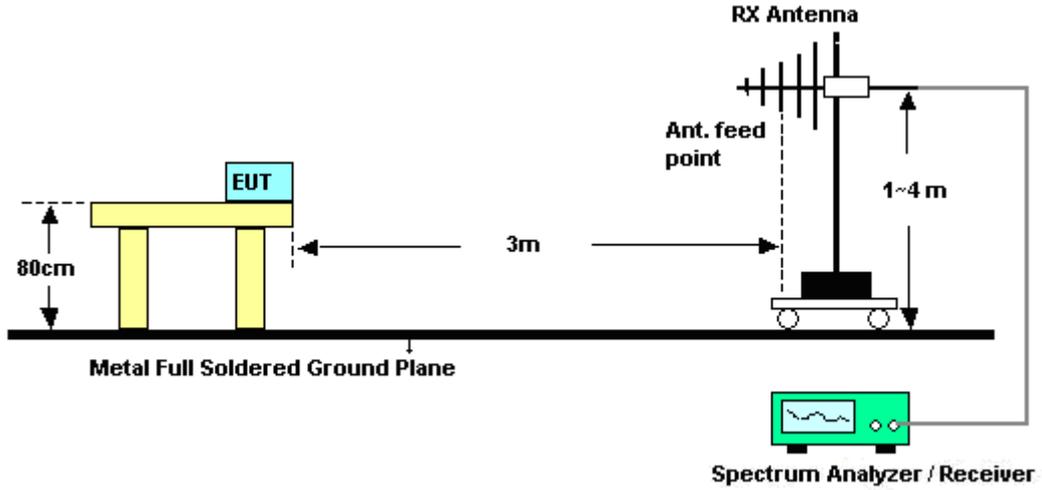
See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

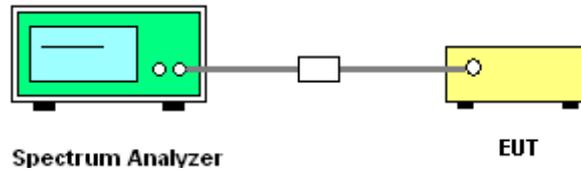
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band 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 :	22~24°C
Test Channel :	00	Relative Humidity :	47~49%
		Test Engineer :	David Yang

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
2388.09	47.37	-26.63	74	43.13	32.06	6.03	33.85	108	27	Peak
2388.09	34.94	-19.06	54	30.7	32.06	6.03	33.85	108	27	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
2388.09	45.67	-28.33	74	41.43	32.06	6.03	33.85	102	96	Peak
2388.09	34.29	-19.71	54	30.05	32.06	6.03	33.85	102	96	Average



Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
		Test Engineer :	David Yang

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	66.09	-7.91	74	61.63	32.18	6.18	33.9	102	18	Peak
2483.5	30.38	-23.62	54	25.92	32.18	6.18	33.9	102	18	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	86.6	56.22	30.38	54	-23.62	Pass
Hopping Mode	86.6	56.26	30.34	54	23.66	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	64.62	-9.38	74	60.16	32.18	6.18	33.9	100	90	Peak
2483.5	30.39	-23.61	54	25.93	32.18	6.18	33.9	100	90	Average

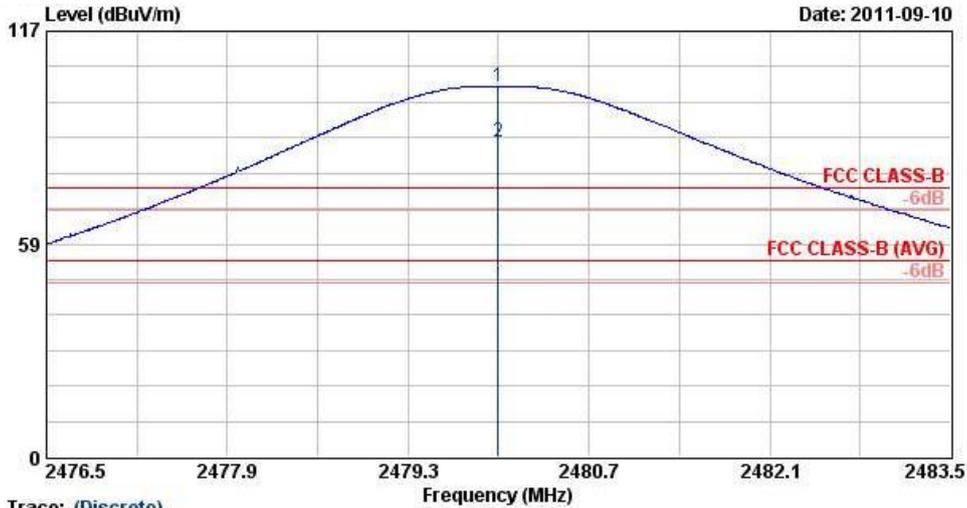
Summary results of marker-delta method:

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	85.67	55.28	30.39	54	-23.61	Pass
Hopping Mode	85.67	56	29.67	54	-24.33	Pass

Note : Average result = Maximum field strength – Delta result



Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Horizontal



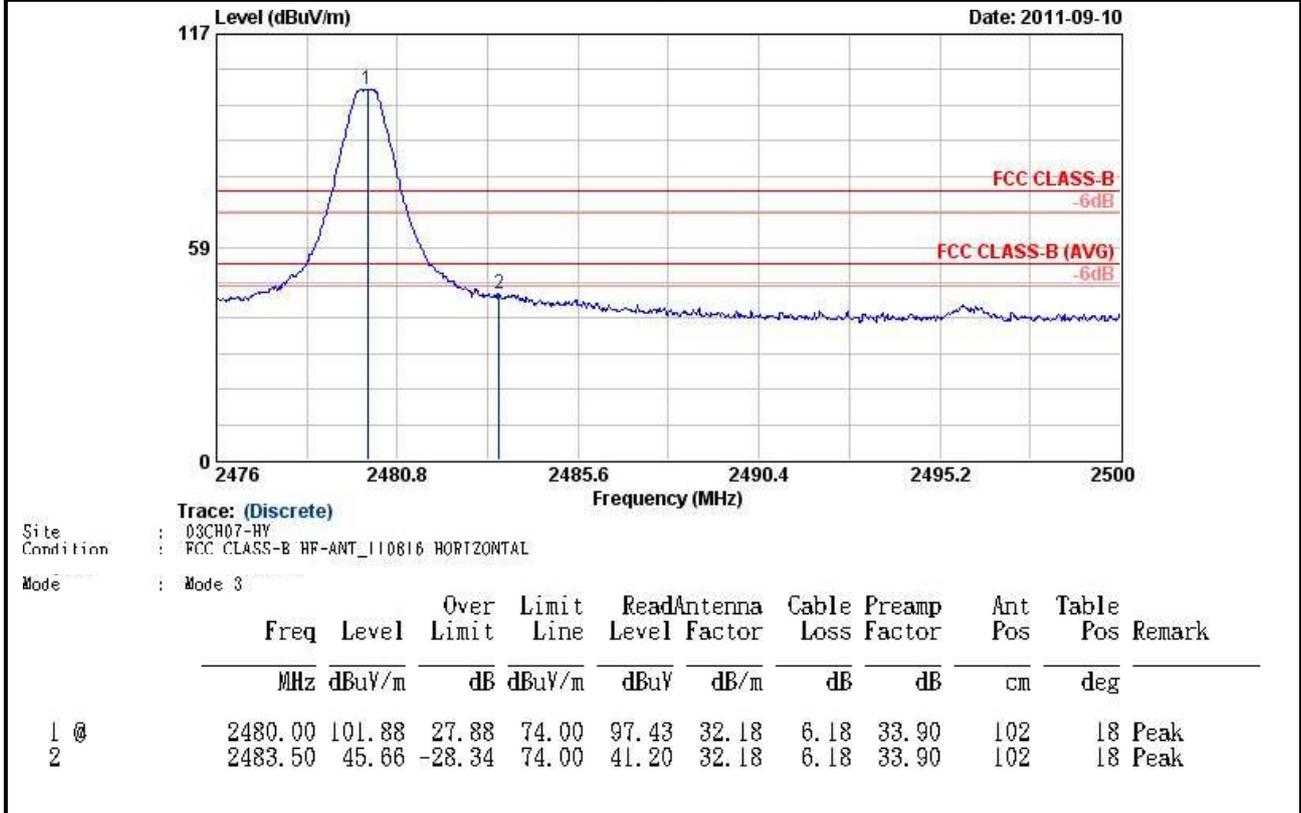
Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC CLASS-B HF-ANT\_110816 HORIZONTAL  
 Mode : Mode 3

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	101.84	27.84	74.00	97.39	32.18	6.18	33.90	102	18	Peak
2 @	2480.00	86.60	32.60	54.00	82.14	32.18	6.18	33.90	102	18	Average

\* Maximum field strength of the fundamental emission



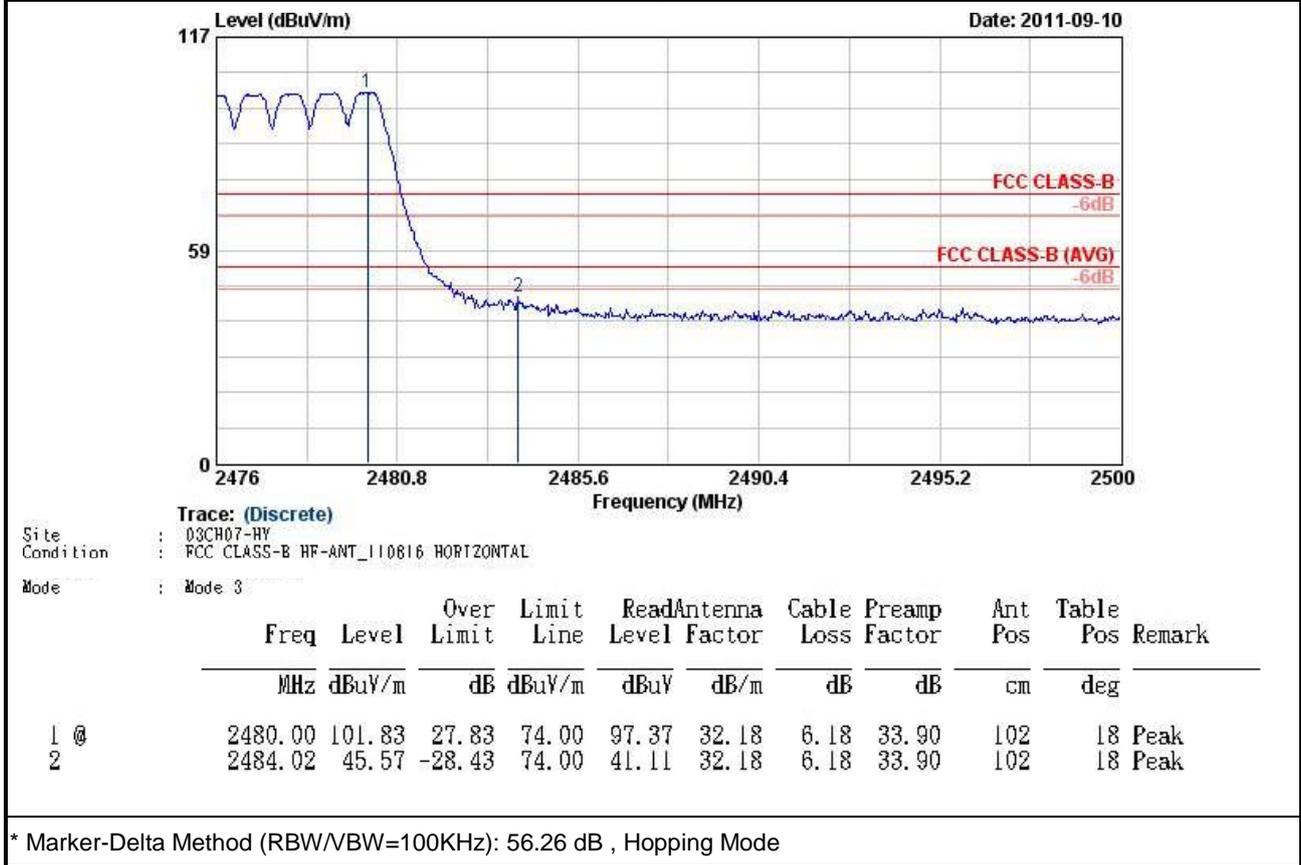
Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Horizontal



\* Marker-Delta Method (RBW/VBW=100KHz): 56.22 dB , single carrier Mode

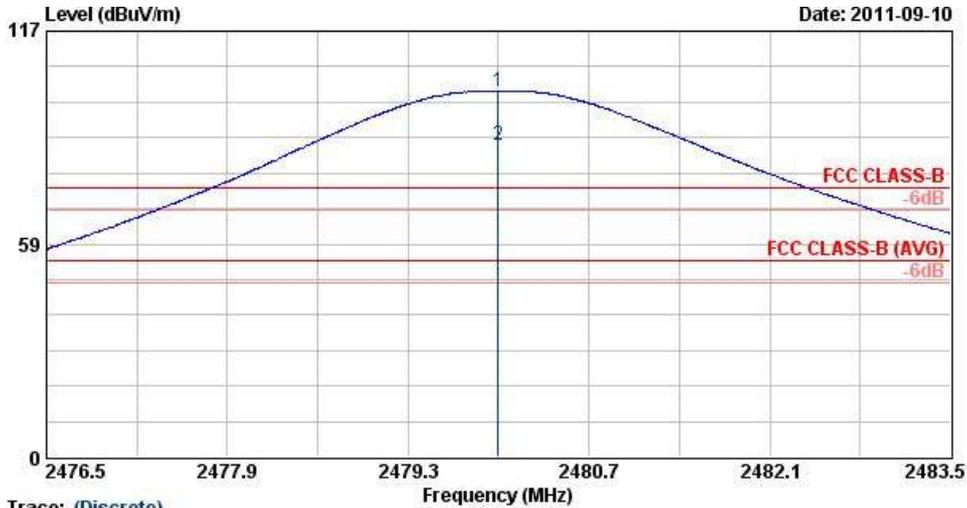


Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Horizontal





Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Vertical



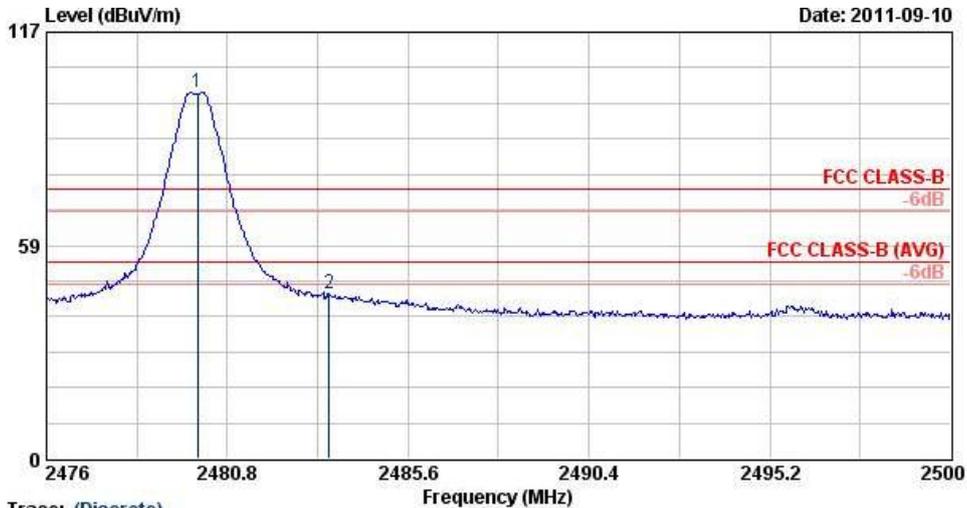
Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC CLASS-B HF-ANT\_110816 VERTICAL  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	100.48	26.48	74.00	96.02	32.18	6.18	33.90	100	90	Peak
2 @	2480.00	85.67	31.67	54.00	81.21	32.18	6.18	33.90	100	90	Average

\* Maximum field strength of the fundamental emission



Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Vertical



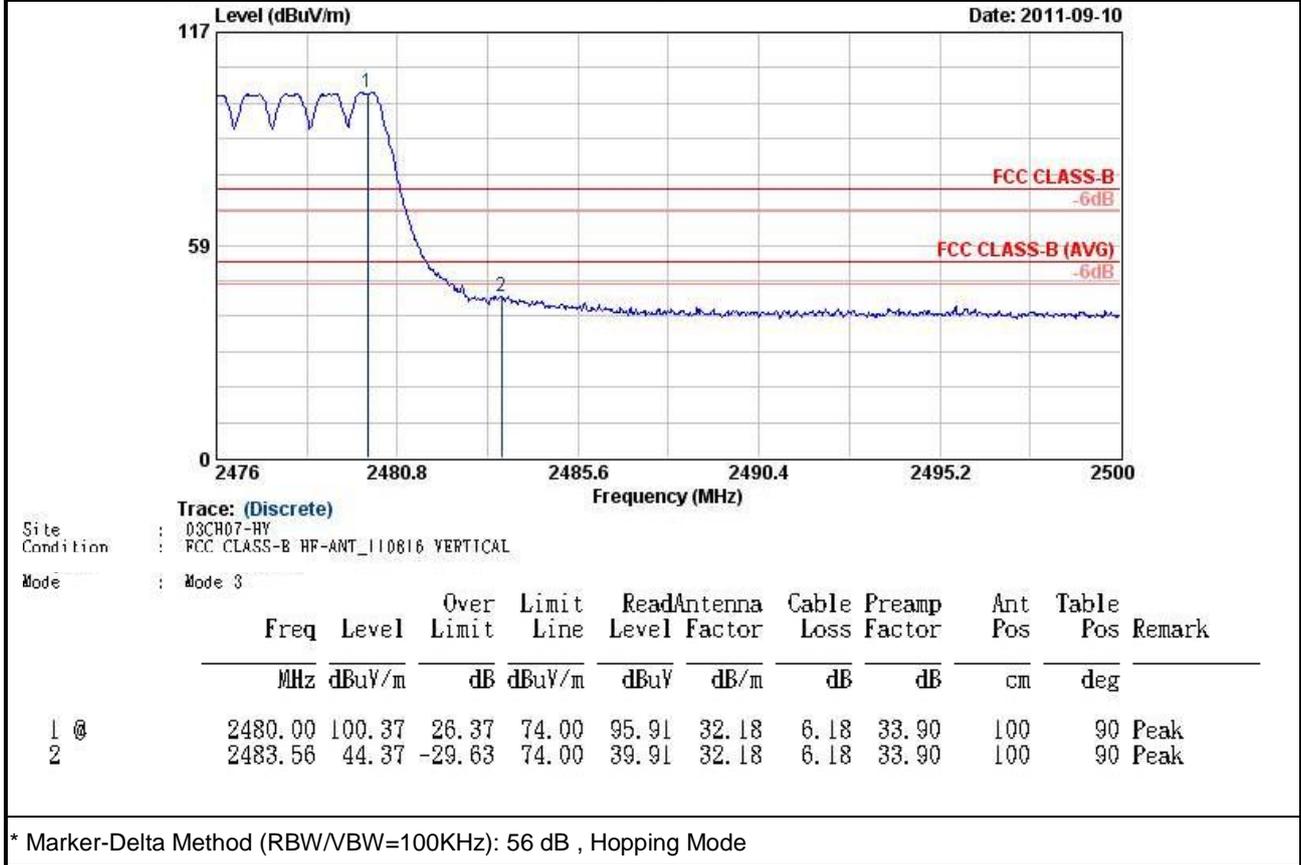
Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC CLASS-B HF-ANT\_110816 VERTICAL  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	100.40	26.40	74.00	95.94	32.18	6.18	33.90	100	90	Peak
2	2483.50	45.12	-28.88	74.00	40.67	32.18	6.18	33.90	100	90	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 55.28 dB , single carrier Mode



Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	47~49%
Test Engineer :	David Yang	Polarization :	Vertical

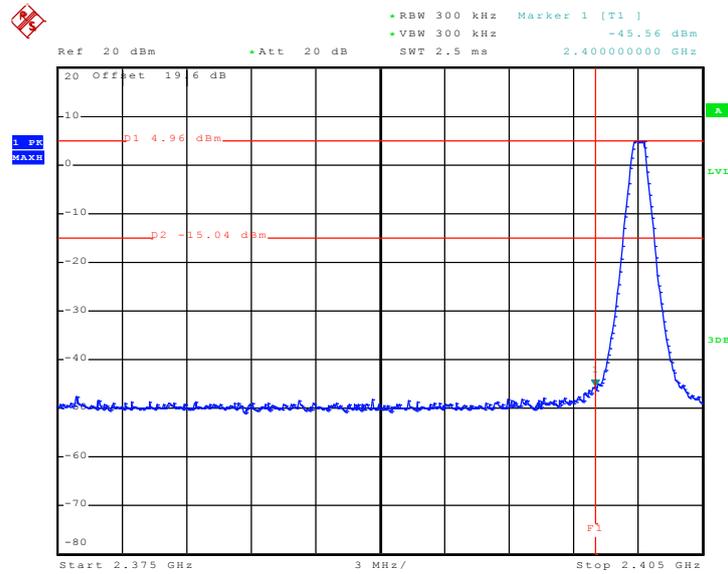




### 3.6.6 Test Result of Conducted Band Edges

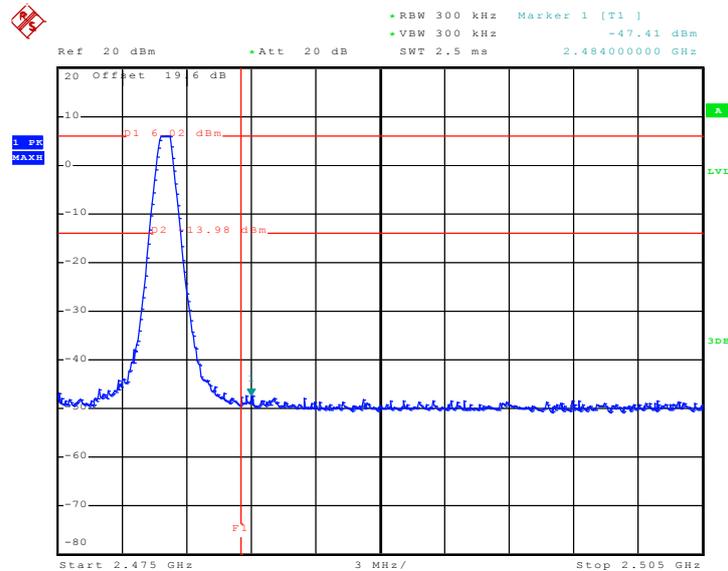
Test Mode :	Mode 1 and 3	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Pinkston Tu

Low Band Edge Plot on Channel 00



Date: 2.SEP.2011 10:26:10

High Band Edge Plot on Channel 78



Date: 2.SEP.2011 10:27:13

## 3.7 Spurious Emission Measurement

### 3.7.1 Limit of Spurious Emission Measurement

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

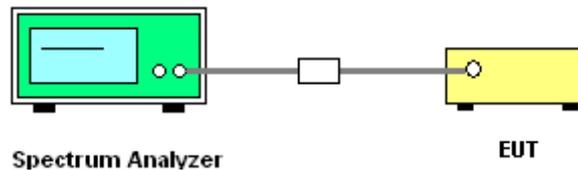
### 3.7.2 Measuring Instruments

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

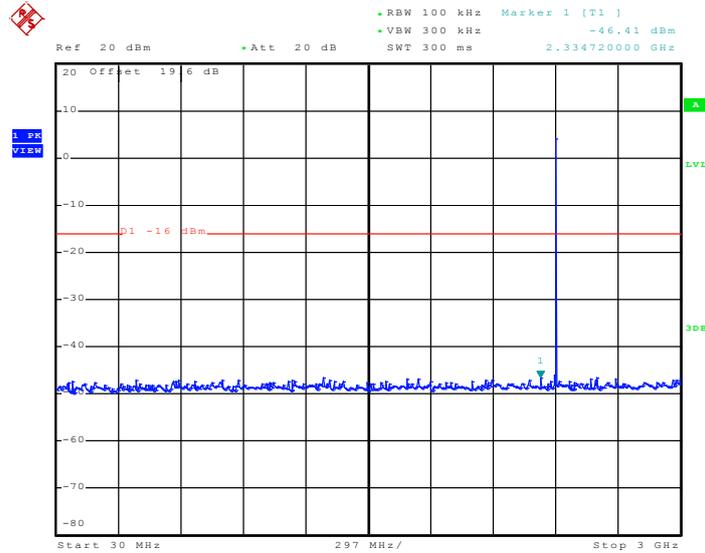




### 3.7.5 Test Result

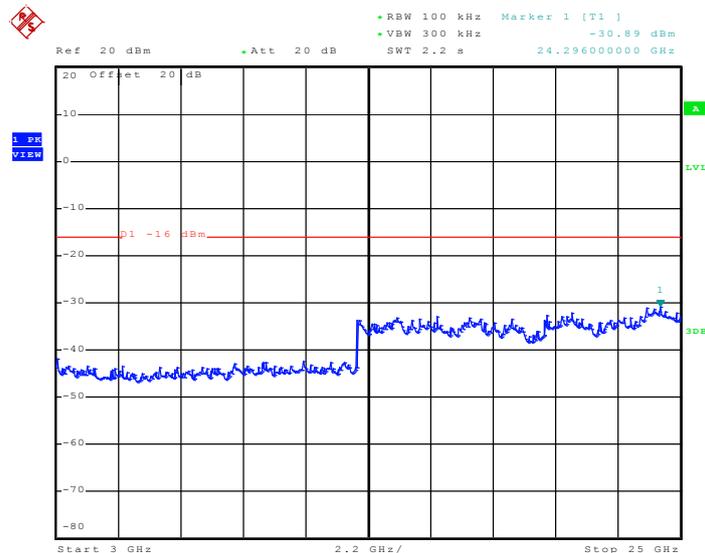
Test Mode :	Mode 1	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Pinkston Tu

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



Date: 2.SEP.2011 10:37:25

#### Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

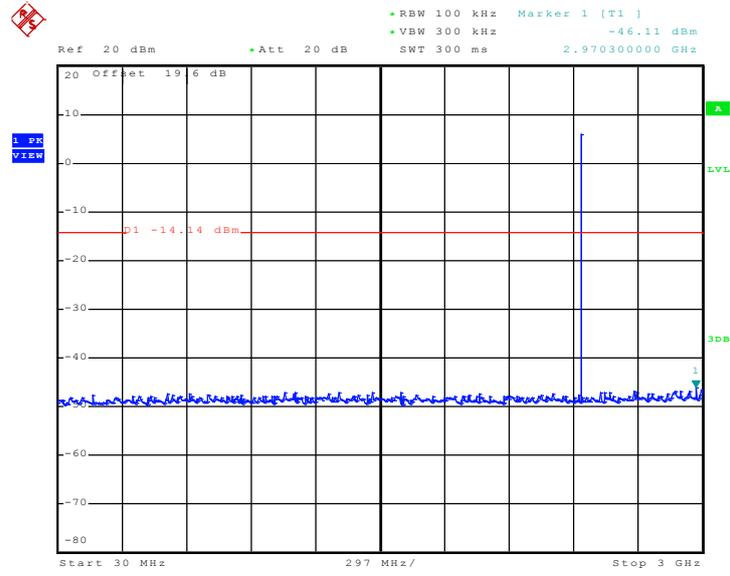


Date: 2.SEP.2011 10:37:38



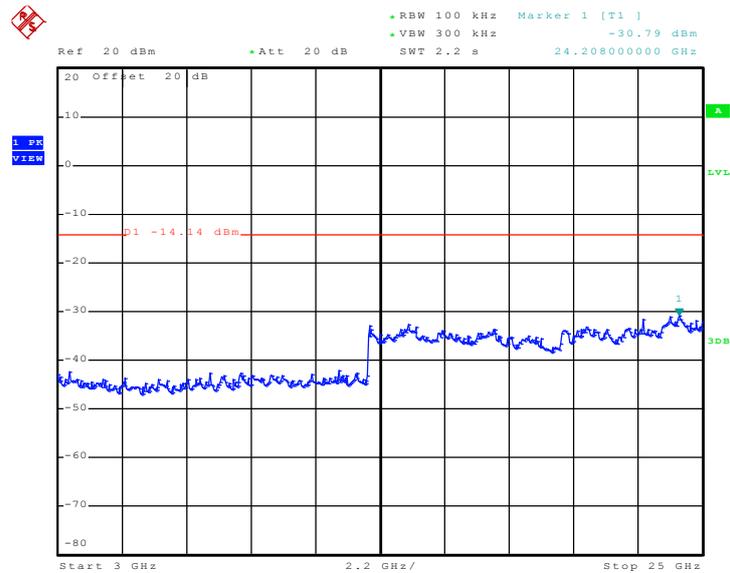
Test Mode :	Mode 2	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Pinkston Tu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.SEP.2011 10:38:30

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

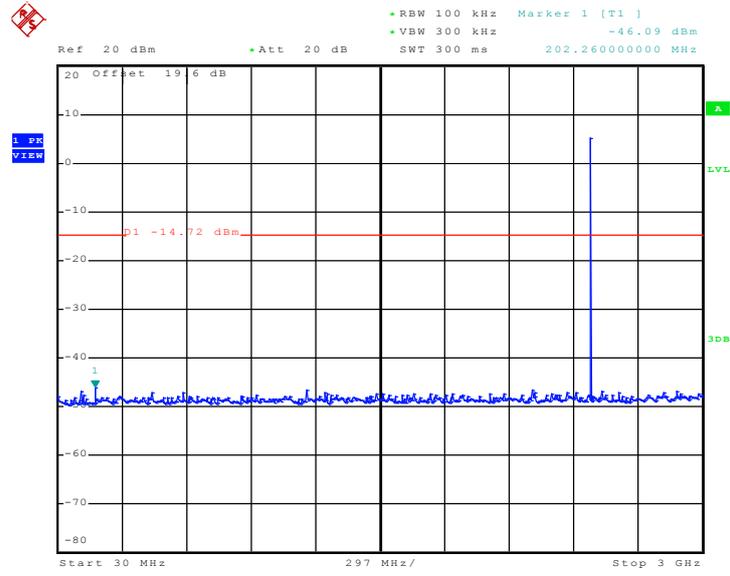


Date: 2.SEP.2011 10:38:43



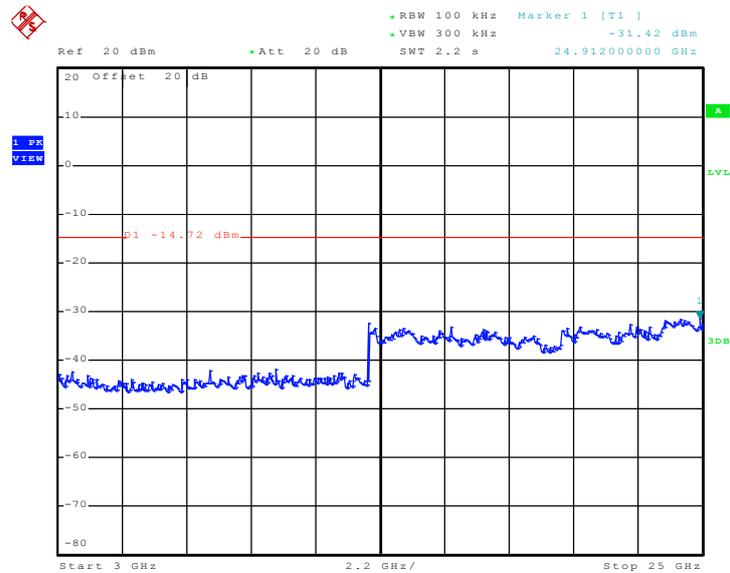
Test Mode :	Mode 3	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Pinkston Tu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.SEP.2011 10:39:35

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 2.SEP.2011 10:39:48

### 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.

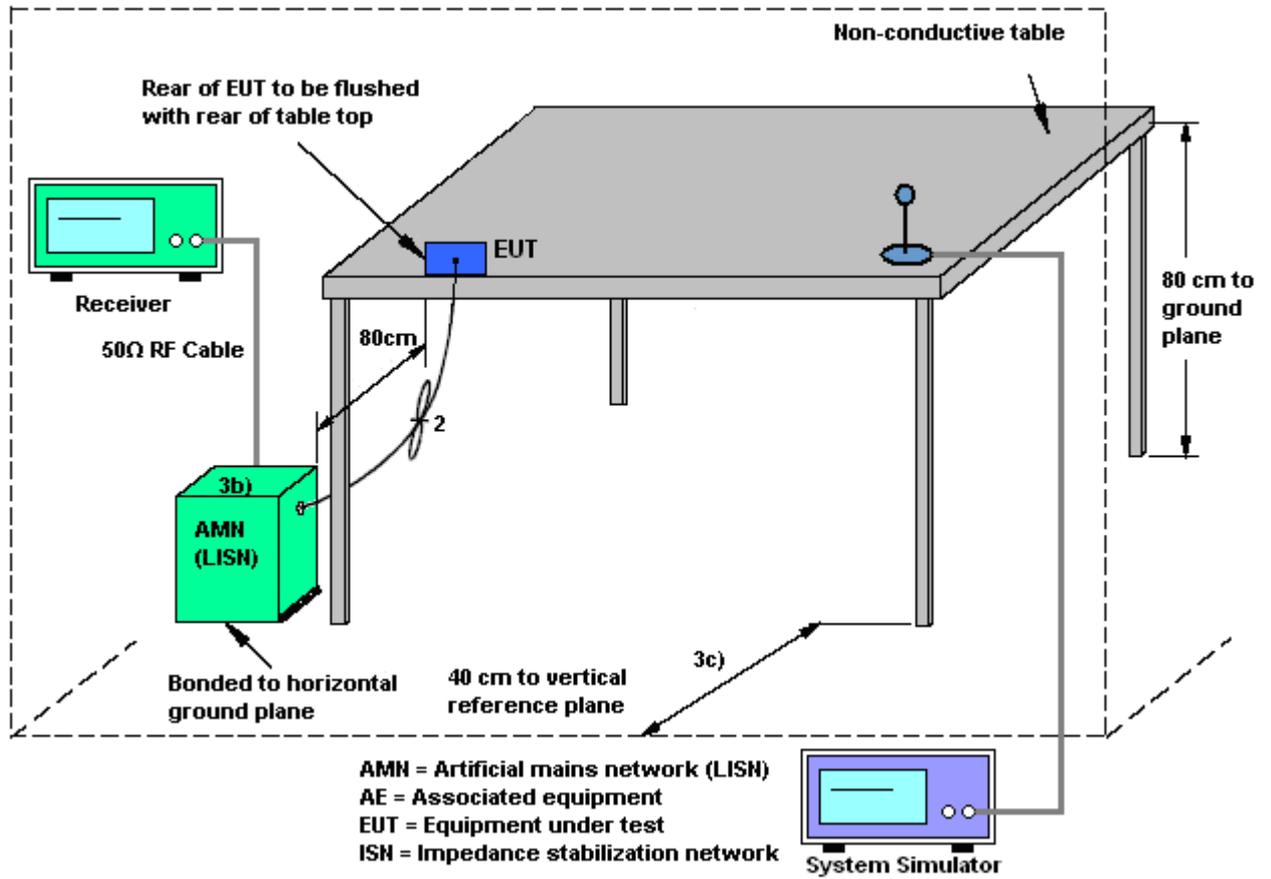
#### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.8.3 Test Procedures

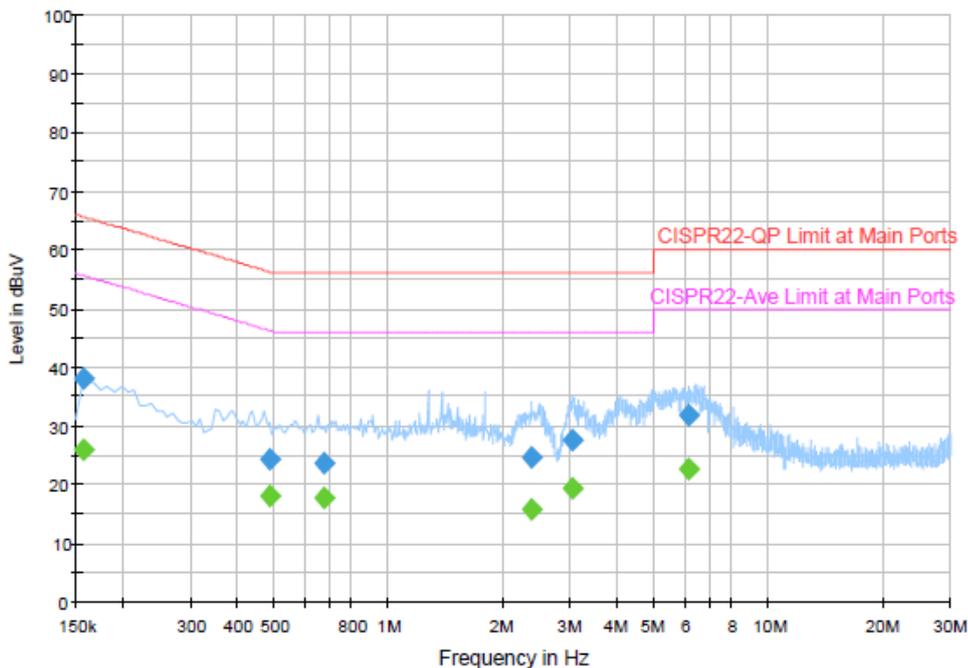
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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 :	21~23°C
Test Engineer :	Novic Chiang	Relative Humidity :	41~43%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result 1

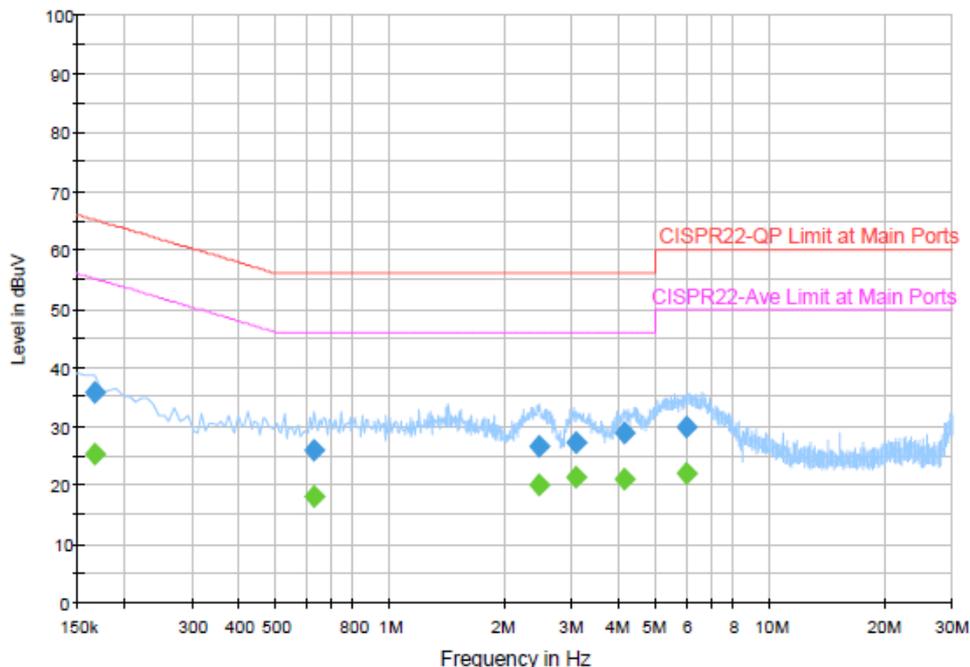
Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	37.9	Off	L1	19.4	27.7	65.6
0.486000	24.1	Off	L1	19.4	32.1	56.2
0.678000	23.6	Off	L1	19.4	32.4	56.0
2.366000	24.5	Off	L1	19.4	31.5	56.0
3.038000	27.5	Off	L1	19.5	28.5	56.0
6.158000	31.9	Off	L1	19.6	28.1	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	25.9	Off	L1	19.4	29.7	55.6
0.486000	18.0	Off	L1	19.4	28.2	46.2
0.678000	17.6	Off	L1	19.4	28.4	46.0
2.366000	15.8	Off	L1	19.4	30.2	46.0
3.038000	19.3	Off	L1	19.5	26.7	46.0
6.158000	22.7	Off	L1	19.6	27.3	50.0



Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Novic Chiang	Relative Humidity :	41~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + Adapter		
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)
0.166000	35.8	Off	N	19.4	29.4	65.2
0.630000	25.8	Off	N	19.4	34.2	60.0
2.470000	26.7	Off	N	19.5	29.3	56.0
3.078000	27.1	Off	N	19.5	28.9	56.0
4.102000	28.8	Off	N	19.5	27.2	56.0
6.006000	29.8	Off	N	19.5	26.2	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	25.3	Off	N	19.4	29.9	55.2
0.630000	18.0	Off	N	19.4	32.0	50.0
2.470000	20.1	Off	N	19.5	25.9	46.0
3.078000	21.3	Off	N	19.5	24.7	46.0
4.102000	21.0	Off	N	19.5	25.0	46.0
6.006000	22.1	Off	N	19.5	23.9	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

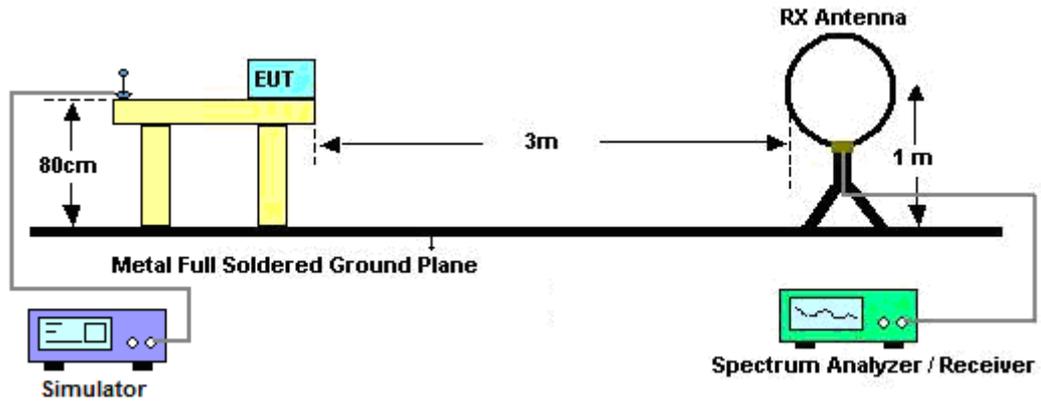
See list of measuring instruments of this test report.

#### 3.9.3 Test Procedures

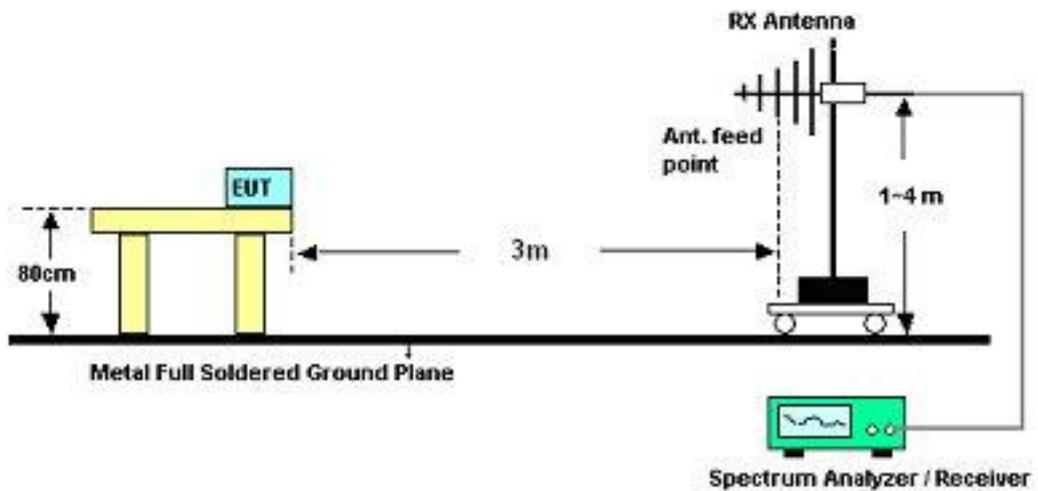
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
  - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = 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.
4. Measured average value for the peak value is greater than 54 dBuV/m

### 3.9.4 Test Setup

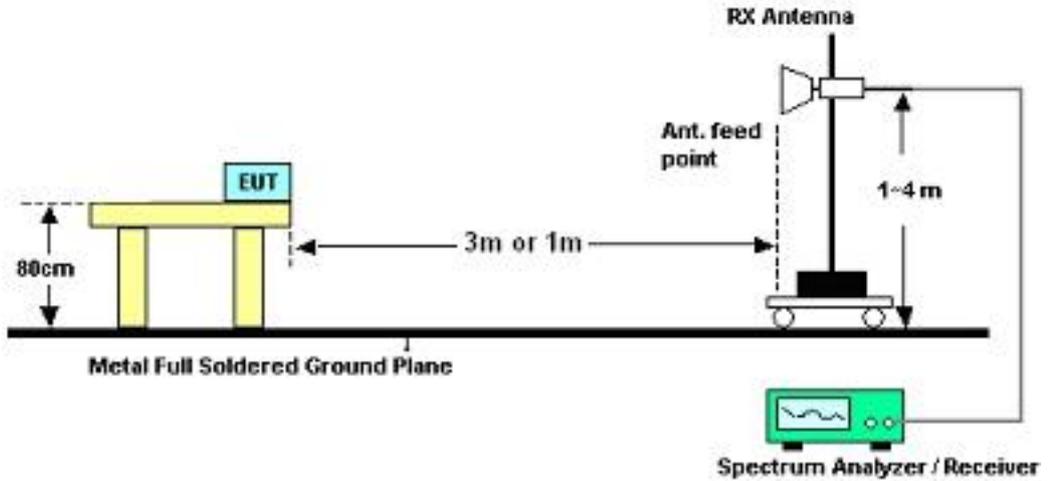
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

Test Engineer :	David Yang	Temperature :	22~24°C
		Relative Humidity :	47~49%

Frequency	Measurement Distance	Field Strength	Antenna Factor	Distance Factor	Limit Distance	Field Strength at Limit Distance (30m)	Limit (30m)
(MHz)	(m)	(dBuV/m)	(dB/m)	(dB/decade)	(m)	(dBuV/m)	(dBuV/m)
26	3	9.81	19.7	40	30	-30.19	29.54

**Note:**

- In accordance with 15.33 (a): For each frequency at which a measurement is made at only one distance, the square of an inverse linear distance extrapolation factor (40 dB/decade) is applied.  
 Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);  
 Limit line = specific limits (dBuV) + distance extrapolation factor.
- The field strength measured is direct conversion of all parameters (antenna factor and distance extrapolation factor) and loaded into the spectrum.
- For example:  
 Field Strength at 3m=10 (dBuV/m)  
 Field Strength at 30m= $10 - 40 \cdot \log(30\text{m}/3\text{m}) = -30$  (dBuV/m)



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

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	47~49%
Test Engineer :	David Yang	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
48.9	21.09	-18.91	40	42.86	9.08	0.68	31.53	128	241	Peak
126.66	15.94	-27.56	43.5	34.81	11.57	1.13	31.57	-	-	Peak
233.58	16.78	-29.22	46	35.21	11.5	1.5	31.43	-	-	Peak
396.6	17.82	-28.18	46	30.41	16.47	2.13	31.19	-	-	Peak
579.3	20.72	-25.28	46	29.59	19.44	2.63	30.94	-	-	Peak
749.4	23.04	-22.96	46	29.01	21.67	3.06	30.7	-	-	Peak
2388.09	47.37	-26.63	74	43.13	32.06	6.03	33.85	108	27	Peak
2388.09	34.94	-19.06	54	30.7	32.06	6.03	33.85	108	27	Average
2402	102.44	-	-	98.18	32.08	6.03	33.85	108	27	Peak
2402	87.32	-	-	83.08	32.06	6.03	33.85	108	27	Average
2492	32.54	-21.46	54	28.06	32.2	6.18	33.9	108	27	Average
2492	44.98	-29.02	74	40.5	32.2	6.18	33.9	108	27	Peak



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	47~49%
<b>Test Engineer :</b>	David Yang	<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
37.02	25.02	-14.98	40	41.53	14.38	0.6	31.49	-	-	Peak
51.33	25.06	-14.94	40	47.87	8.02	0.71	31.54	109	174	Peak
106.41	21.57	-21.93	43.5	41.72	10.37	1.03	31.55	-	-	Peak
411.3	17.89	-28.11	46	30.12	16.75	2.18	31.16	-	-	Peak
573.7	20.96	-25.04	46	29.92	19.37	2.62	30.95	-	-	Peak
729.8	23.54	-22.46	46	29.93	21.35	3.01	30.75	-	-	Peak
2388.09	45.67	-28.33	74	41.43	32.06	6.03	33.85	102	96	Peak
2388.09	34.29	-19.71	54	30.05	32.06	6.03	33.85	102	96	Average
2402	100.46	-	-	96.2	32.08	6.03	33.85	102	96	Peak
2402	85.62	-	-	81.38	32.06	6.03	33.85	102	96	Average
2500	32.54	-21.46	54	28.06	32.2	6.18	33.9	102	96	Average
2500	45.32	-28.68	74	40.84	32.2	6.18	33.9	102	96	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	47~49%
<b>Test Engineer :</b>	David Yang	<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
49.17	20.98	-19.02	40	43.14	8.68	0.69	31.53	122	100	Peak
150.42	15.89	-27.61	43.5	35.14	11.1	1.21	31.56	-	-	Peak
268.14	17.27	-28.73	46	34.06	12.96	1.63	31.38	-	-	Peak
411.3	19.14	-26.86	46	31.37	16.75	2.18	31.16	-	-	Peak
621.3	23.17	-22.83	46	31.31	20.01	2.75	30.9	-	-	Peak
775.3	24.44	-21.56	46	29.96	22.07	3.1	30.69	-	-	Peak
2316	45.1	-28.9	74	41.07	31.93	5.92	33.82	104	23	Peak
2316	32.96	-21.04	54	28.93	31.93	5.92	33.82	104	23	Average
2441	102.2	-	-	97.84	32.13	6.11	33.88	104	23	Peak
2441	87.34	-	-	82.98	32.13	6.11	33.88	104	23	Average
2494	44.86	-29.14	74	40.38	32.2	6.18	33.9	104	23	Peak
2494	32.9	-21.1	54	28.42	32.2	6.18	33.9	104	23	Average



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	47~49%
<b>Test Engineer :</b>	David Yang	<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
34.05	24.67	-15.33	40	40	15.57	0.57	31.47	102	33	Peak
51.33	24.35	-15.65	40	47.16	8.02	0.71	31.54	-	-	Peak
106.41	21.63	-21.87	43.5	41.78	10.37	1.03	31.55	-	-	Peak
341.3	19.56	-26.44	46	34.21	14.75	1.9	31.3	-	-	Peak
556.9	20.94	-25.06	46	30.24	19.1	2.57	30.97	-	-	Peak
735.4	22.89	-23.11	46	29.16	21.44	3.02	30.73	-	-	Peak
2350	44.64	-29.36	74	40.54	31.98	5.95	33.83	100	85	Peak
2350	33	-21	54	28.9	31.98	5.95	33.83	100	85	Average
2441	85.75	-	-	81.39	32.13	6.11	33.88	100	85	Average
2441	100.49	-	-	96.13	32.13	6.11	33.88	100	85	Peak
2500	44.64	-29.36	74	40.16	32.2	6.18	33.9	100	85	Peak
2500	32.63	-21.37	54	28.15	32.2	6.18	33.9	100	85	Average



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	47~49%
<b>Test Engineer :</b>	David Yang	<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
49.17	21.01	-18.99	40	43.17	8.68	0.69	31.53	129	341	Peak
121.53	16.51	-26.99	43.5	35.42	11.54	1.11	31.56	-	-	Peak
237.9	17.65	-28.35	46	35.78	11.78	1.52	31.43	-	-	Peak
449.8	18.63	-27.37	46	30.03	17.4	2.3	31.1	-	-	Peak
710.2	23.24	-22.76	46	30.03	21.04	2.96	30.79	-	-	Peak
857.9	25.5	-20.5	46	29.8	23.15	3.28	30.73	-	-	Peak
2380	45.67	-28.33	74	41.46	32.03	6.03	33.85	102	18	Peak
2380	33.03	-20.97	54	28.82	32.03	6.03	33.85	102	18	Average
2480	86.6	-	-	82.14	32.18	6.18	33.9	102	18	Average
2480	101.86	-	-	97.4	32.18	6.18	33.9	102	18	Peak
2483.5	66.09	-7.91	74	61.63	32.18	6.18	33.9	102	18	Peak
2483.5	30.38	-23.62	54	25.92	32.18	6.18	33.9	102	18	Average



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	47~49%
<b>Test Engineer :</b>	David Yang	<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
34.05	24.86	-15.14	40	40.19	15.57	0.57	31.47	100	152	Peak
52.14	24.51	-15.49	40	47.58	7.76	0.71	31.54	-	-	Peak
106.41	21.56	-21.94	43.5	41.71	10.37	1.03	31.55	-	-	Peak
410.6	19.11	-26.89	46	31.36	16.74	2.18	31.17	-	-	Peak
626.9	21.63	-24.37	46	29.69	20.06	2.77	30.89	-	-	Peak
780.2	23.99	-22.01	46	29.42	22.15	3.11	30.69	-	-	Peak
2332	45.62	-28.38	74	41.54	31.96	5.95	33.83	100	90	Peak
2332	32.91	-21.09	54	28.83	31.96	5.95	33.83	100	90	Average
2480	85.67	-	-	81.21	32.18	6.18	33.9	100	90	Average
2480	100.45	-	-	95.99	32.18	6.18	33.9	100	90	Peak
2483.5	64.62	-9.38	74	60.16	32.18	6.18	33.9	100	90	Peak
2483.5	30.39	-23.61	54	25.93	32.18	6.18	33.9	100	90	Average



## **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 IFA 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	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Jun. 12, 2012	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)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan. 13, 2011	Jan. 12, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 27, 2011	Jul. 26, 2012	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Aug. 21, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117591	N/A	Oct. 18, 2010	Oct. 17, 2011	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 30, 2010	Oct. 29, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB.GAIN	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159088	1GHz ~ 18GHz	Feb. 21, 2011	Feb. 20, 2012	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan. 13, 2011	Jan. 12, 2012	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 29, 2010	Jul. 28, 2012	Radiation (03CH07-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>				