



# FCC RF Test Report

APPLICANT : Research In Motion Limited  
EQUIPMENT : LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC  
BRAND NAME : RIM  
MODEL NAME : REF31LW  
MARKETING NAME : P150-32\*\*\*The stars "\*" in model name can be 0 to 9, A to Z or blank, for marking purpose.  
FCC ID : L6AREF30LW  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Oct. 28, 2011 and completely tested on Dec. 20, 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.



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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	-
3.2	-	Gen 4.6.1	99% Bandwidth	-	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 8.50 dB at 0.366 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.52 dB at 2483.500 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

**Research In Motion Limited**  
295 Phillip Street, Waterloo, Ontario, Canada

## 1.2 Manufacturer

**Quanta Computer Inc.**  
No. 188, Wen Hwa 2nd Road, Kuei Shan Hsiang, Tao Yuan Shien, 333 Taiwan

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC
Brand Name	RIM
Model Name	REF31LW
Marketing Name	P150-32***The stars "*" in model name can be 0 to 9, A to Z or blank, for marking purpose.
FCC ID	L6AREF30LW
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) : 8.04 dBm (0.0064 W) Bluetooth EDR (2Mbps) : 8.14 dBm (0.0065 W) Bluetooth EDR (3Mbps) : 8.67 dBm (0.0074 W)
Antenna Type	Fixed Internal Antenna with gain -2.97213 dBi
HW Version	DARU3MB1AD0 REVD
SW Version	1.0.0.0
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

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

### 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	03CH06-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
- ♦ IC RSS-Gen Issue 3

**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, 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.	LCD Monitor	Acer	H223HQ	FCC DoC	N/A	Unshielded, 1.8 m
6.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
7.	Earphone	Ergotech	ET-E200	FCC DoC	Unshielded, 1.8 m	N/A
8.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0 m	N/A
9.	iPod Earphone	Apple	N/A	FCC DoC	Shielded, 1.0 m	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:

Band	Bluetooth RF Output Power		
Channel	00	39	78
Frequency	2402	2441	2480
Peak Power	8.32 dBm	8.67 dBm	8.45 dBm

**Remark:**

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



## 2.2 Test Mode

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

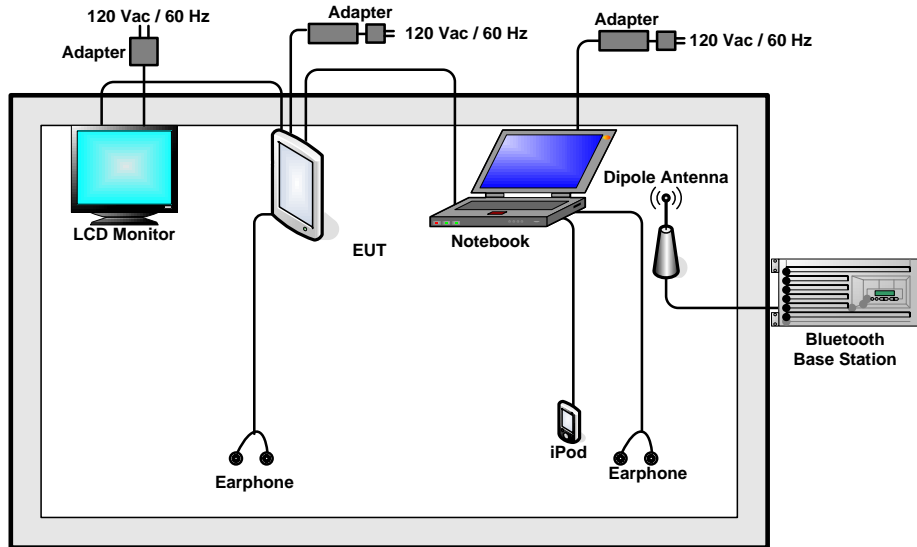
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations, laptop / tablet modes.

The following tables are showing the test modes as the worst cases (E2plane) and recorded in this report.

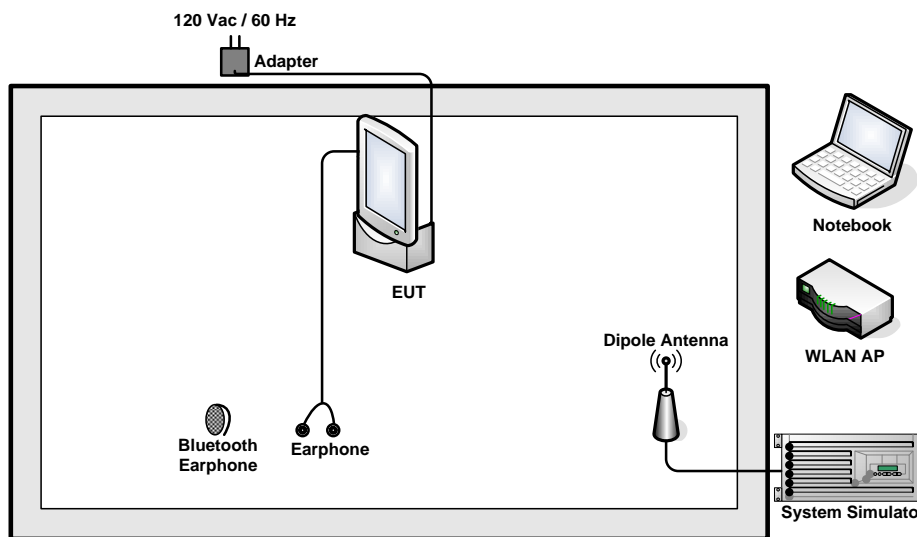
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :CDMA 850 Idle + Bluetooth Link + WLAN (2.4G) Link + Adapter 3 + Battery 1 + H Pattern + Earphone		
<b>Remark:</b> For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported. And all the tests were performance with Adapter 2			

## 2.3 Connection Diagram of Test System

### <Bluetooth Tx Mode>



### <AC Conducted Emission Mode>



## 2.4 RF Utility

For Bluetooth function, the RF utility, "Execute the Bluetooth Function" was installed in EUT which was programmed in order to make the EUT into the engineering modes to 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.

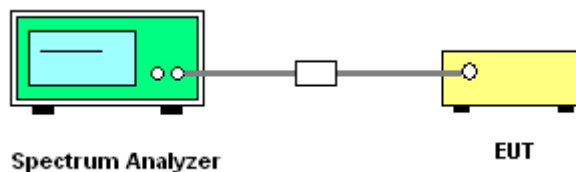
##### 3.1.2 Measuring Instruments

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

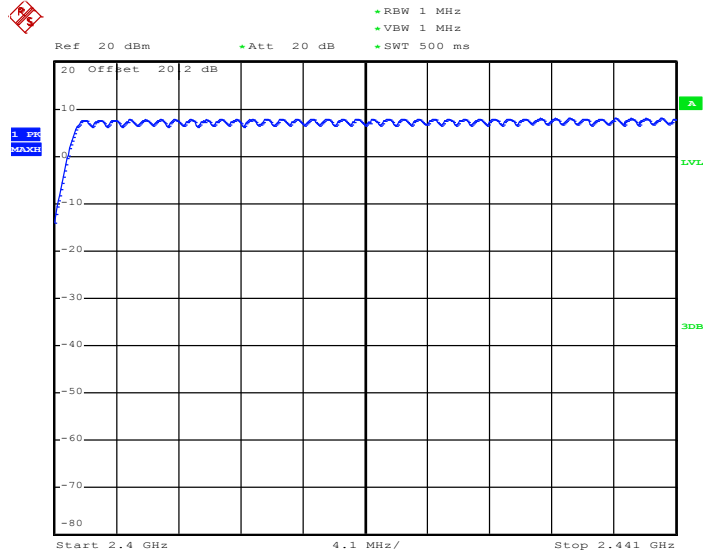


##### 3.1.5 Test Result of Number of Hopping Frequency

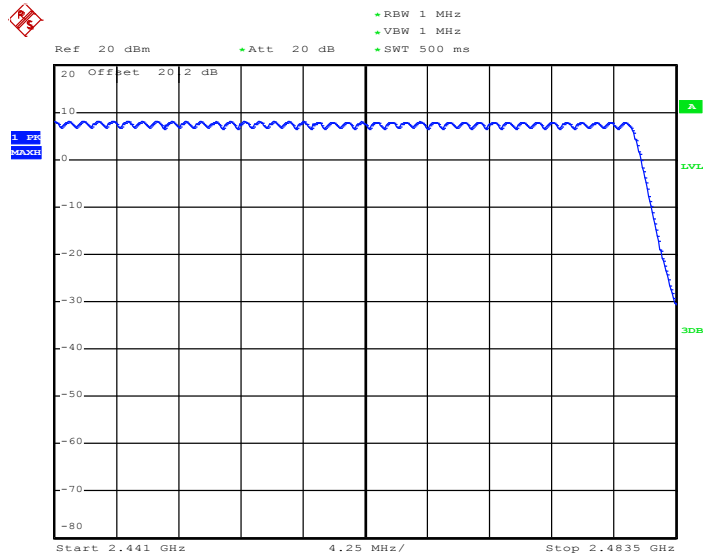
<b>Test Mode :</b>	Mode 7~9	<b>Temperature :</b>	22~24°C
<b>Test Engineer :</b>	Reece Li	<b>Relative Humidity :</b>	53~57%
<b>Number of Hopping Channels (Channel)</b>		<b>Limits (Channel)</b>	<b>Pass/Fail</b>
79		> 15	Pass



Number of Hopping Channel Plot on Channel 00 - 78



Date: 29.NOV.2011 22:15:57



Date: 29.NOV.2011 22:20:19

## 3.2 20dB and 99% Bandwidth Measurement

### 3.2.1 Limit of 20dB Bandwidth

N/A

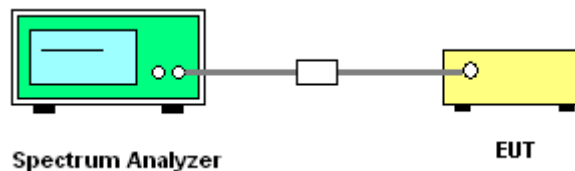
### 3.2.2 Measuring Instruments

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



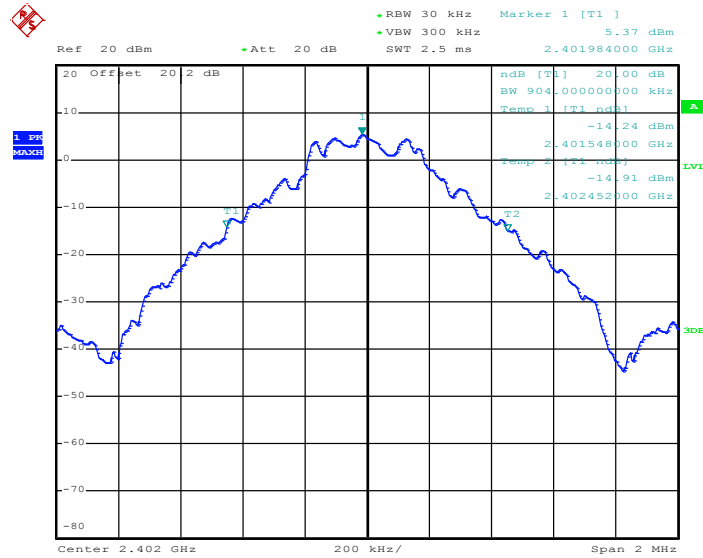


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.904
39	2441	0.904
78	2480	0.904

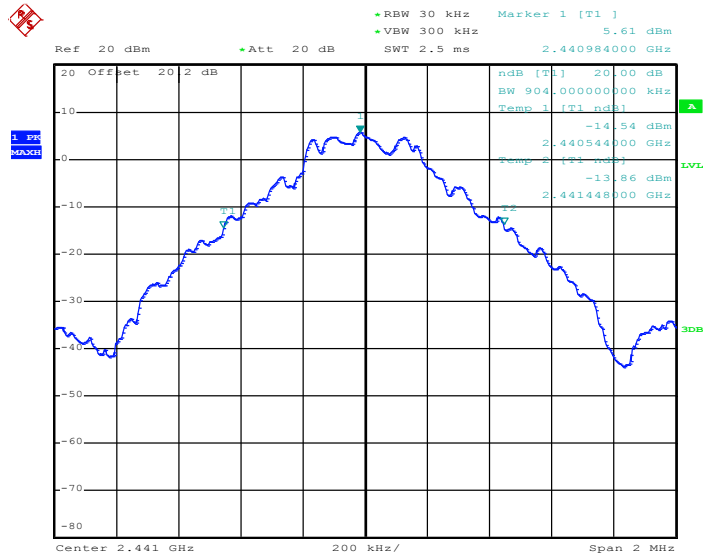
20 dB Bandwidth Plot on Channel 00



Date: 29.NOV.2011 20:42:43

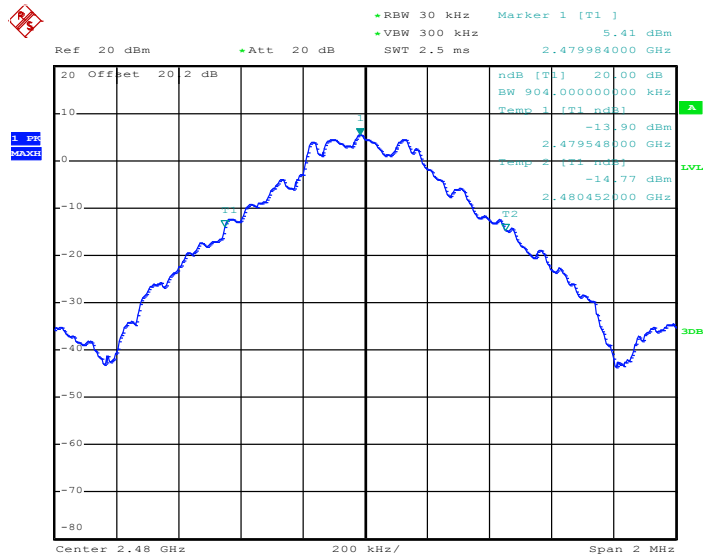


### 20 dB Bandwidth Plot on Channel 39



Date: 29.NOV.2011 20:43:53

### 20 dB Bandwidth Plot on Channel 78



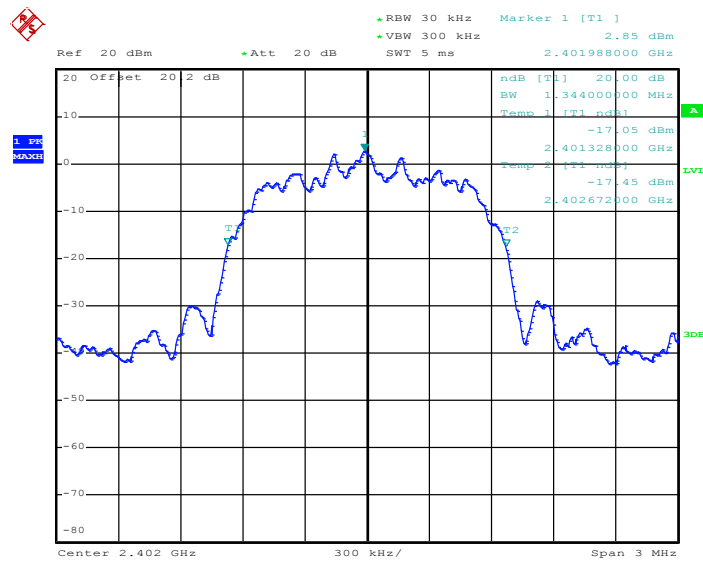
Date: 29.NOV.2011 20:45:00



Test Mode :	Mode 4, 5, 6	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.344
39	2441	1.350
78	2480	1.344

20 dB Bandwidth Plot on Channel 00

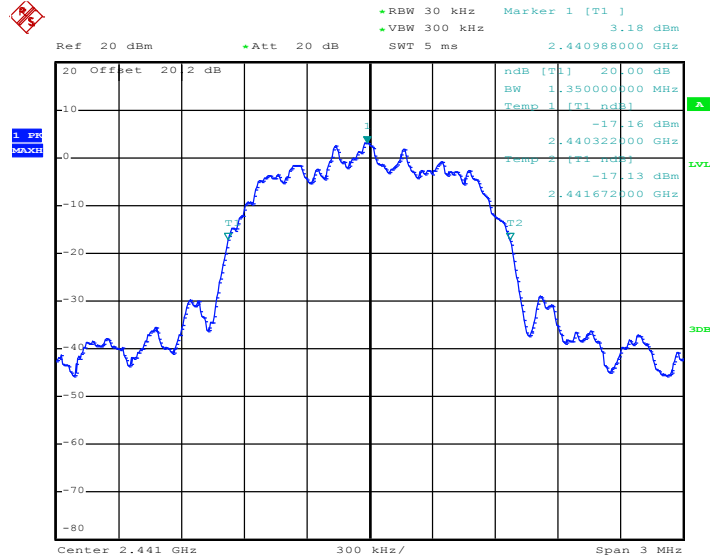


Date: 29.NOV.2011 20:46:04



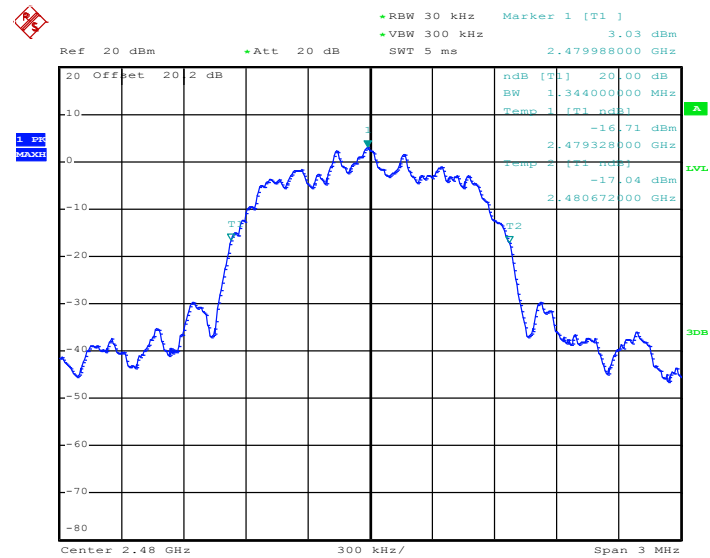


20 dB Bandwidth Plot on Channel 39



Date: 29.NOV.2011 20:46:45

20 dB Bandwidth Plot on Channel 78



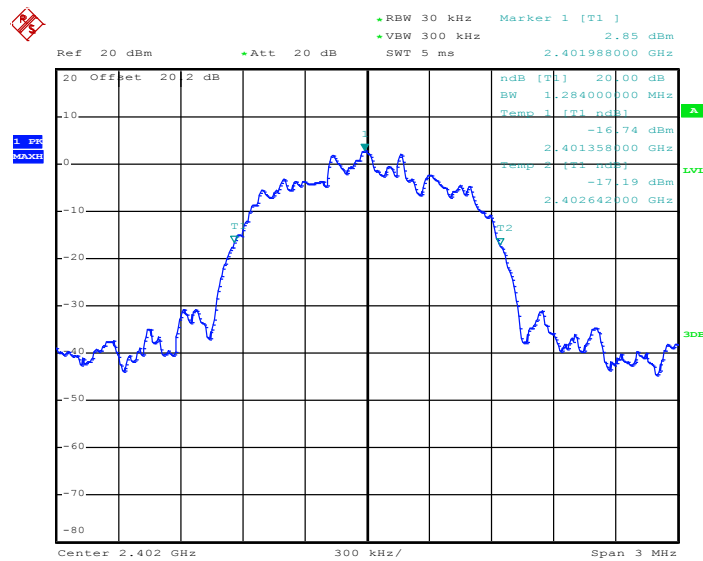
Date: 29.NOV.2011 20:47:49



Test Mode :	Mode 7, 8, 9	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.284
39	2441	1.284
78	2480	1.302

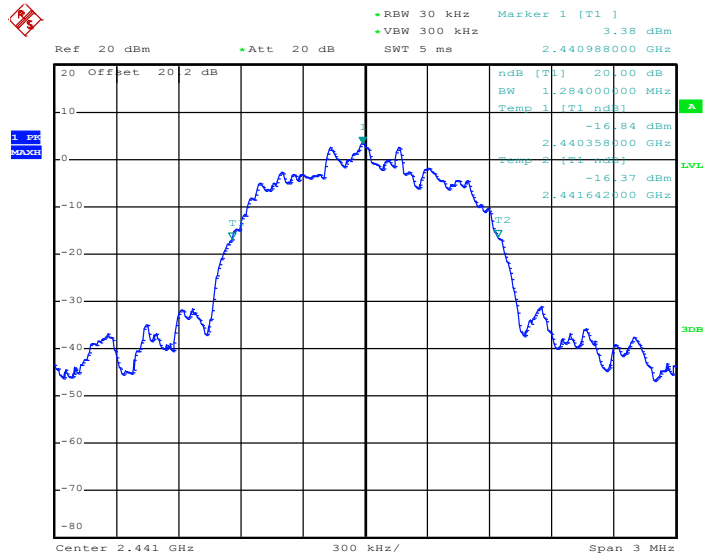
20 dB Bandwidth Plot on Channel 00



Date: 29.NOV.2011 21:39:22

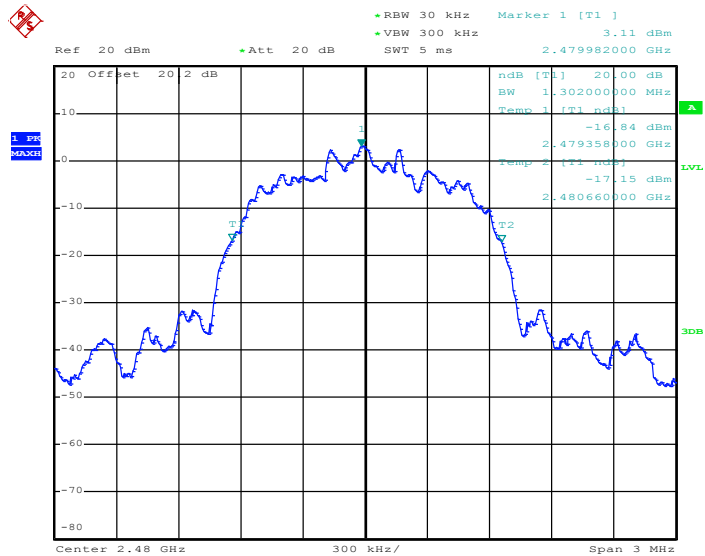


### 20 dB Bandwidth Plot on Channel 39



Date: 29.NOV.2011 21:39:50

### 20 dB Bandwidth Plot on Channel 78



Date: 29.NOV.2011 21:38:53

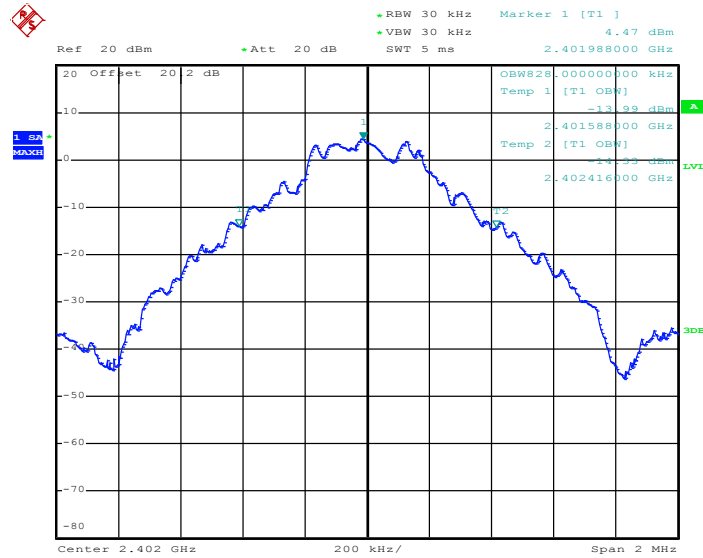


3.2.6 Test Result of 99% Occupied Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.828
39	2441	0.832
78	2480	0.836

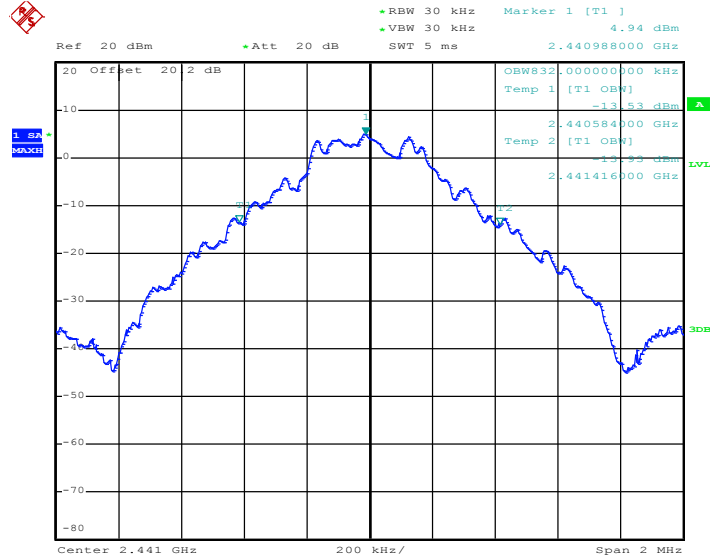
99% Bandwidth Plot on Channel 00



Date: 29.NOV.2011 22:07:48

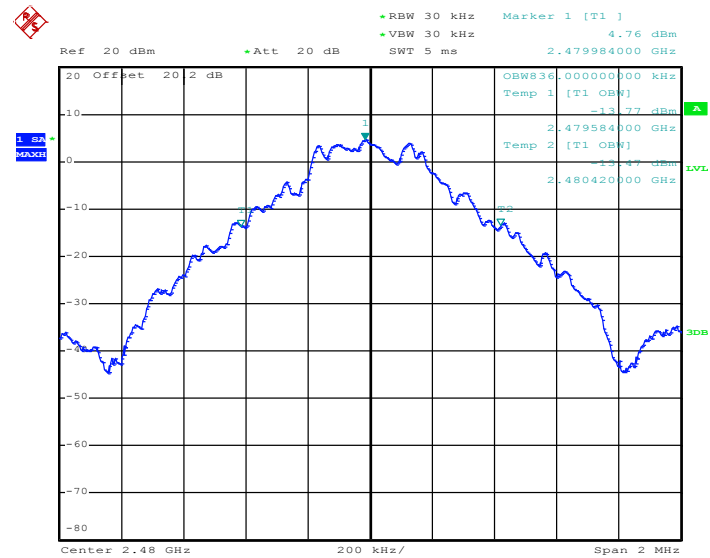


99% Occupied Bandwidth Plot on Channel 39



Date: 29.NOV.2011 22:08:27

99% Occupied Bandwidth Plot on Channel 78



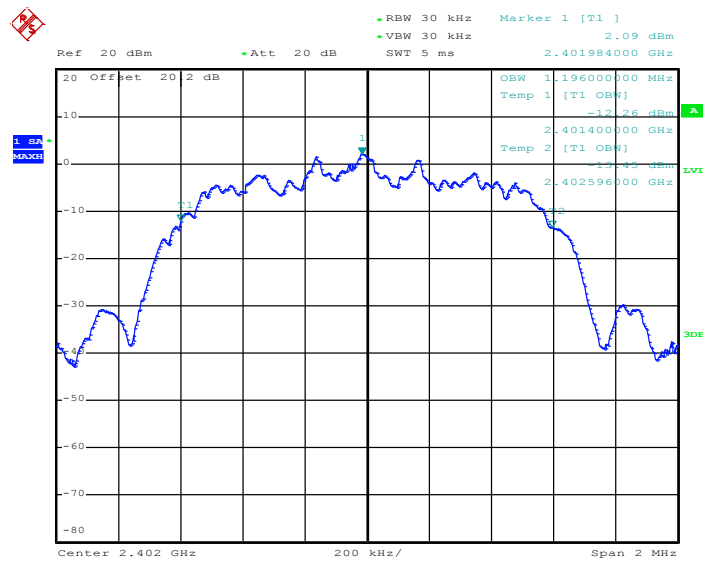
Date: 29.NOV.2011 22:07:12



Test Mode :	Mode 4, 5, 6	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.196
39	2441	1.196
78	2480	1.196

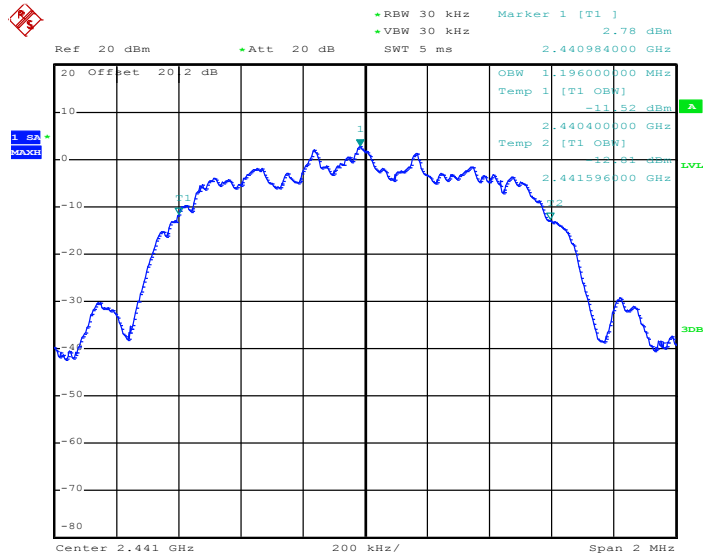
99% Bandwidth Plot on Channel 00



Date: 29.NOV.2011 22:04:56

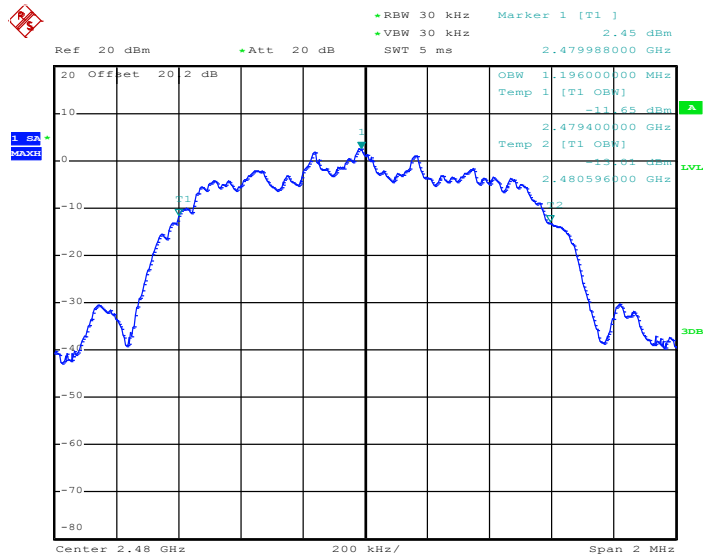


99% Occupied Bandwidth Plot on Channel 39



Date: 29.NOV.2011 22:03:06

99% Occupied Bandwidth Plot on Channel 78



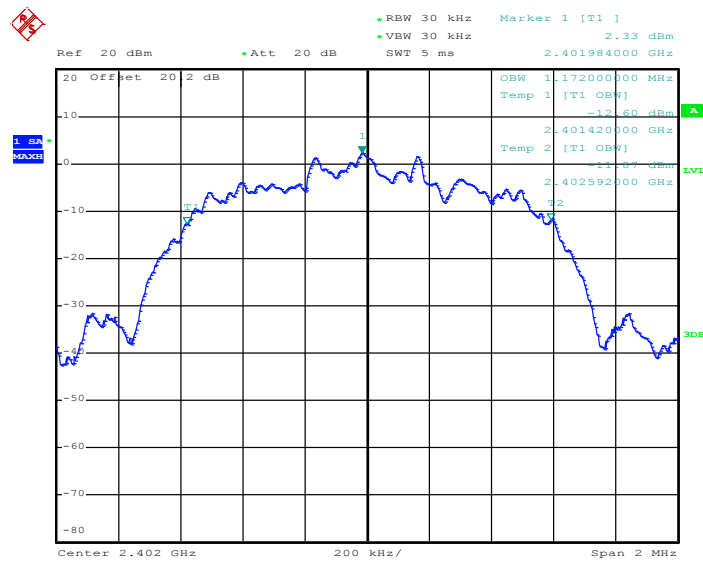
Date: 29.NOV.2011 22:05:38



Test Mode :	Mode 7, 8, 9	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.172
39	2441	1.172
78	2480	1.172

99% Bandwidth Plot on Channel 00

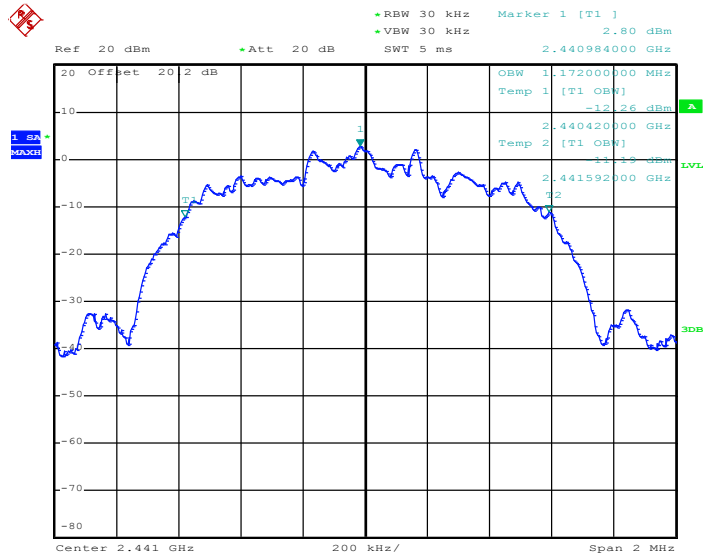


Date: 29.NOV.2011 21:59:49



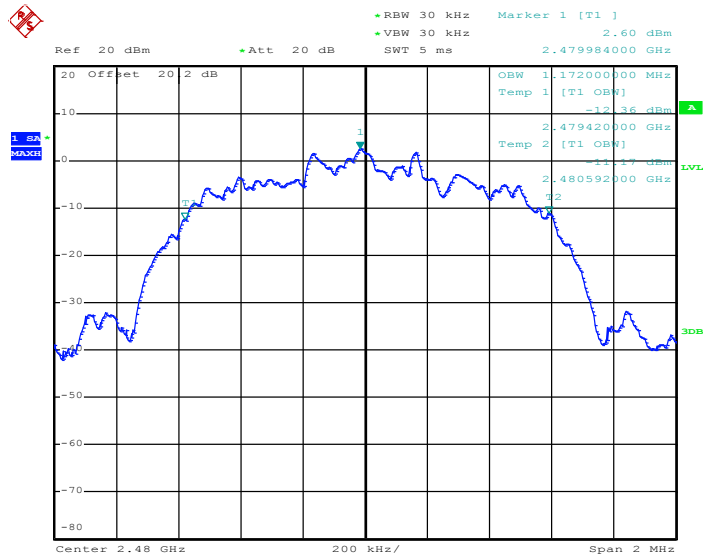


99% Occupied Bandwidth Plot on Channel 39



Date: 29.NOV.2011 22:00:26

99% Occupied Bandwidth Plot on Channel 78



Date: 29.NOV.2011 21:59:08

### 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.

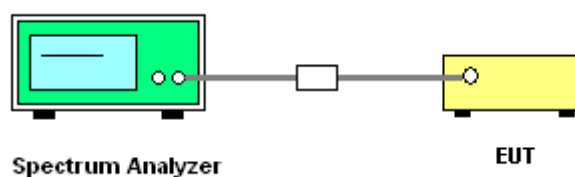
#### 3.3.2 Measuring Instruments

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



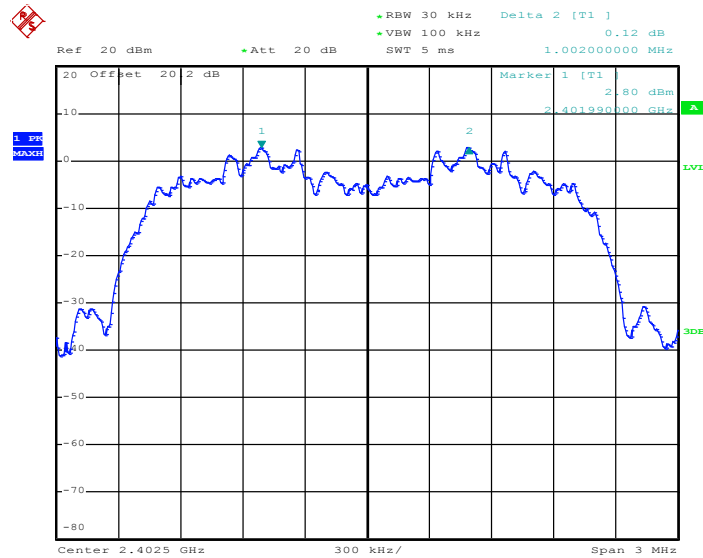


3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 7, 8, 9	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8560	Pass
39	2441	1.002	0.8560	Pass
78	2480	1.002	0.8680	Pass

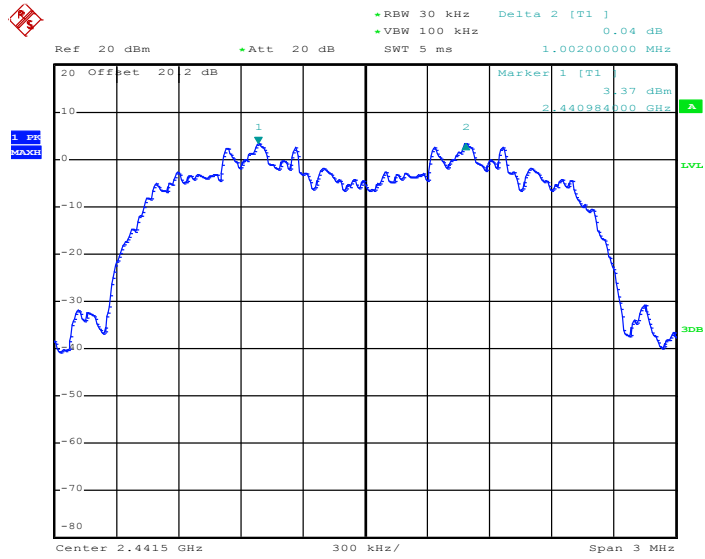
Channel Separation Plot on Channel 00 - 01



Date: 29.NOV.2011 21:17:48

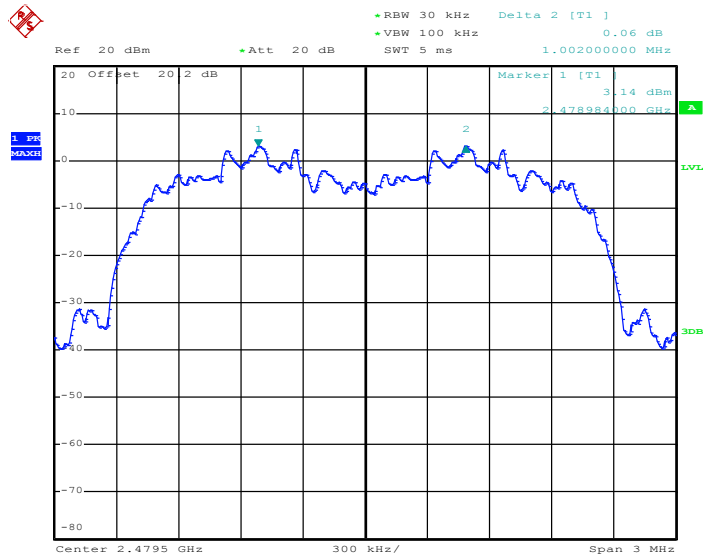


### Channel Separation Plot on Channel 39 - 40



Date: 29.NOV.2011 21:18:49

### Channel Separation Plot on Channel 77 - 78



Date: 29.NOV.2011 21:24:54

### 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.

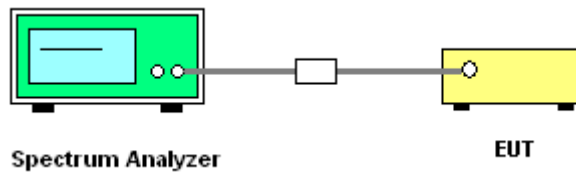
#### 3.4.2 Measuring Instruments

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

Test Mode :	Mode 8	Temperature :	22~24°C
Test Engineer :	Reece Li	Relative Humidity :	53~57%

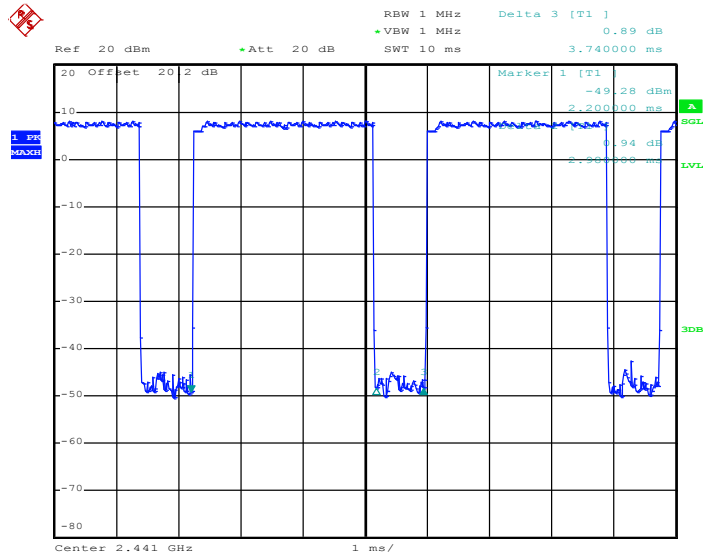
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	3.10	2980.00	0.29	0.4	Pass

**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)

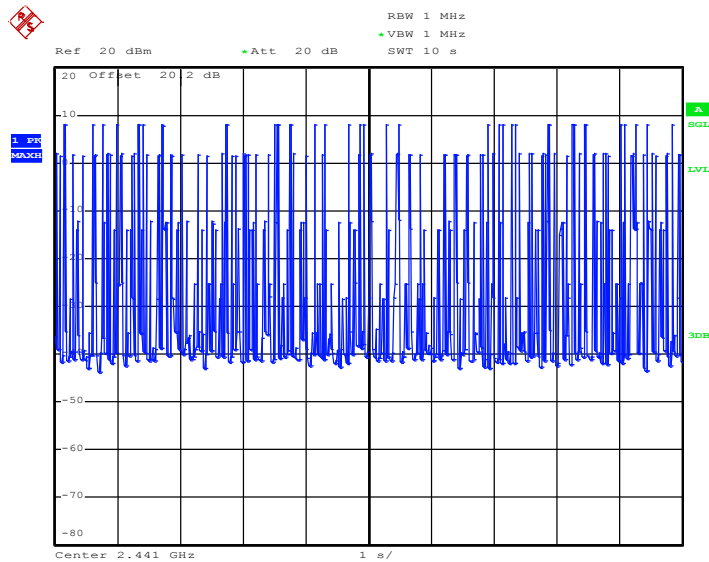


### 3DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 29.NOV.2011 21:11:59

### 3DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 29.NOV.2011 21:10:01

### 3.5 Peak Output Power Measurement

#### 3.5.1 Limit of Peak Output Power

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

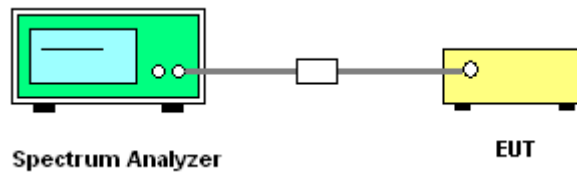
#### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.

#### 3.5.4 Test Setup



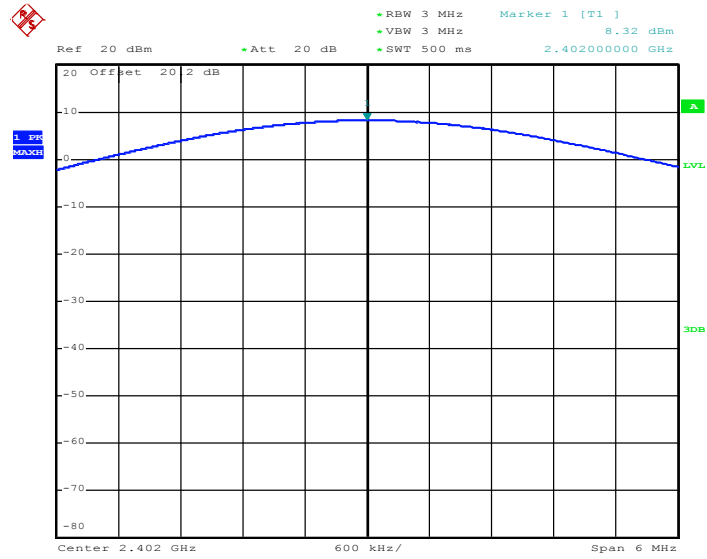
#### 3.5.5 Test Result of Peak Output Power

<b>Test Mode :</b>	Mode 7, 8, 9	<b>Temperature :</b>	22~24°C
<b>Test Engineer :</b>	Reece Li	<b>Relative Humidity :</b>	53~57%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	8.32	20.97	Pass
39	2441	8.67	20.97	Pass
78	2480	8.45	20.97	Pass

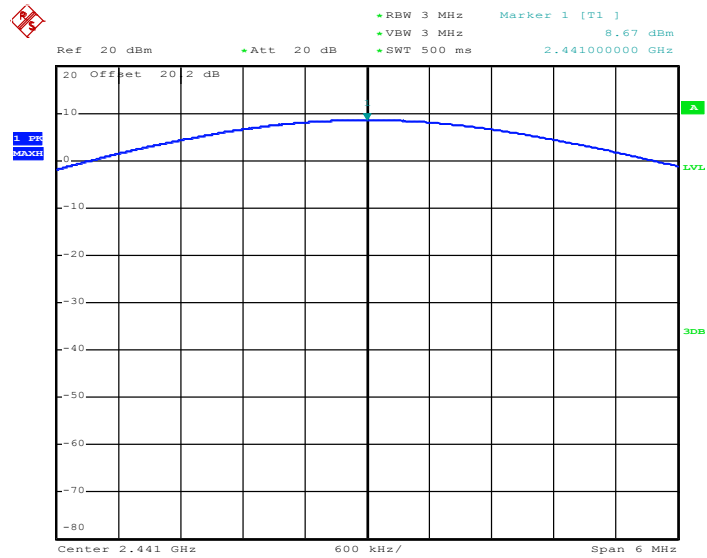


### Peak Output Power Plot on Channel 00



Date: 29.NOV.2011 20:30:06

### Peak Output Power Plot on Channel 39

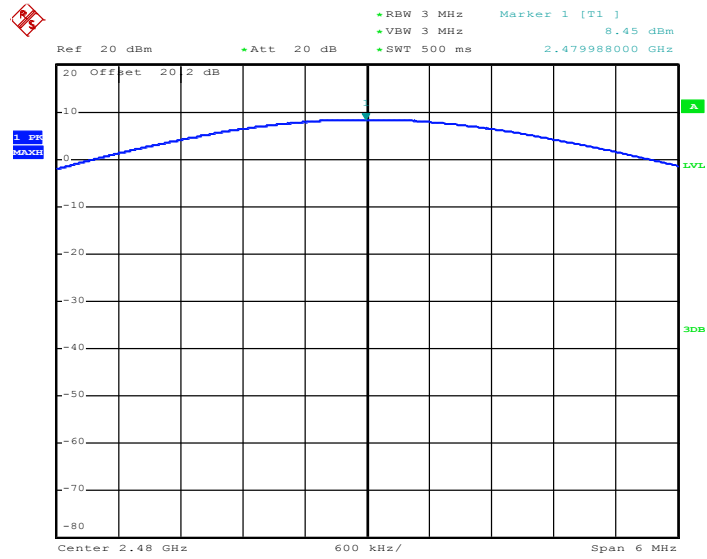


Date: 29.NOV.2011 20:31:20





Peak Output Power Plot on Channel 78



Date: 29.NOV.2011 20:32:34



## **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**

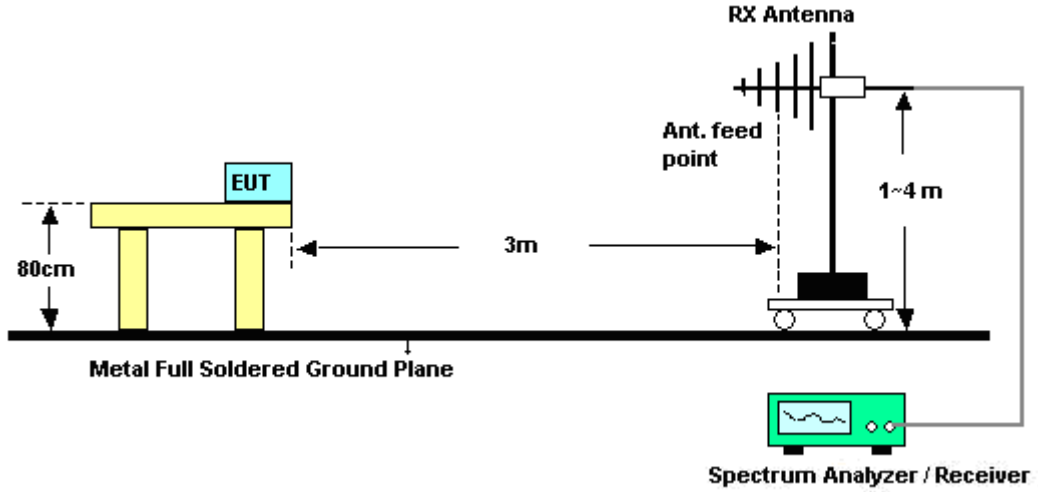
See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

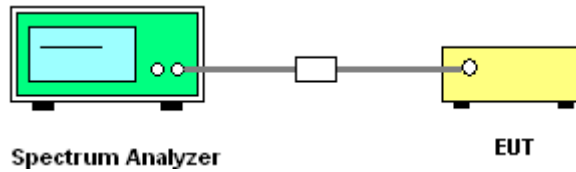
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300KHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band 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 :	23~25°C
Test Channel :	00	Relative Humidity :	50~51%
		Test Engineer :	Luke 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
2385.05	56.8	-17.2	74	55.38	31.88	5.4	35.86	100	123	Peak
2385.05	34.08	-19.92	54	32.66	31.88	5.4	35.86	100	123	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
2385.62	53.33	-20.67	74	51.89	31.9	5.4	35.86	100	278	Peak
2385.62	33.15	-20.85	54	31.71	31.9	5.4	35.86	100	278	Average



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
		Test Engineer :	Luke 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	68.48	-5.52	74	66.78	31.98	5.52	35.8	100	132	Peak
2483.5	36.14	-17.86	54	34.44	31.98	5.52	35.8	100	132	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	85.89	49.75	36.14	54	-17.86	Pass
Hopping Mode	85.89	51.84	34.05	54	-19.95	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	65.18	-8.82	74	63.48	31.98	5.52	35.8	185	278	Peak
2483.5	34.33	-19.67	54	32.63	31.98	5.52	35.8	185	278	Average

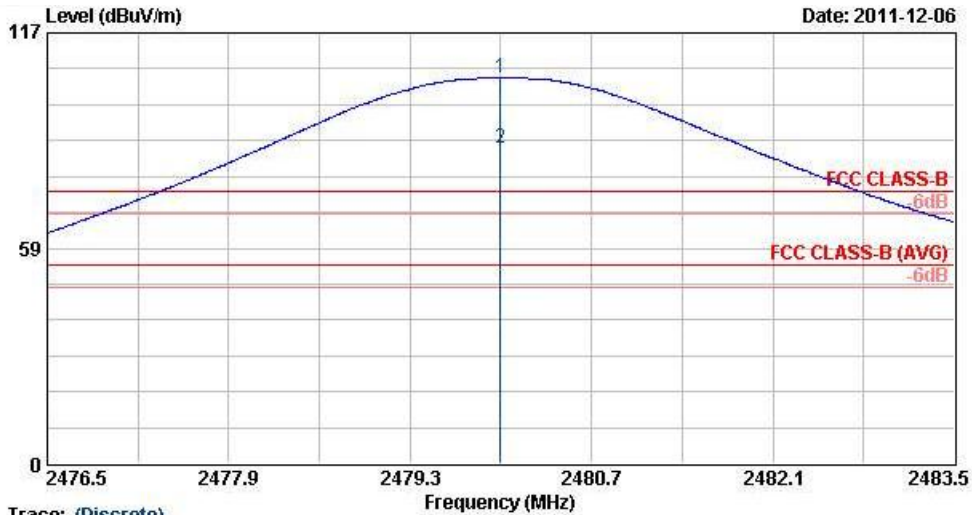
Summary results of marker-delta method:

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	83.33	49	34.33	54	-19.67	Pass
Hopping Mode	83.33	51.09	32.24	54	-21.76	Pass

Note : Average result = Maximum field strength – Delta result



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Horizontal



Trace: (Discrete)

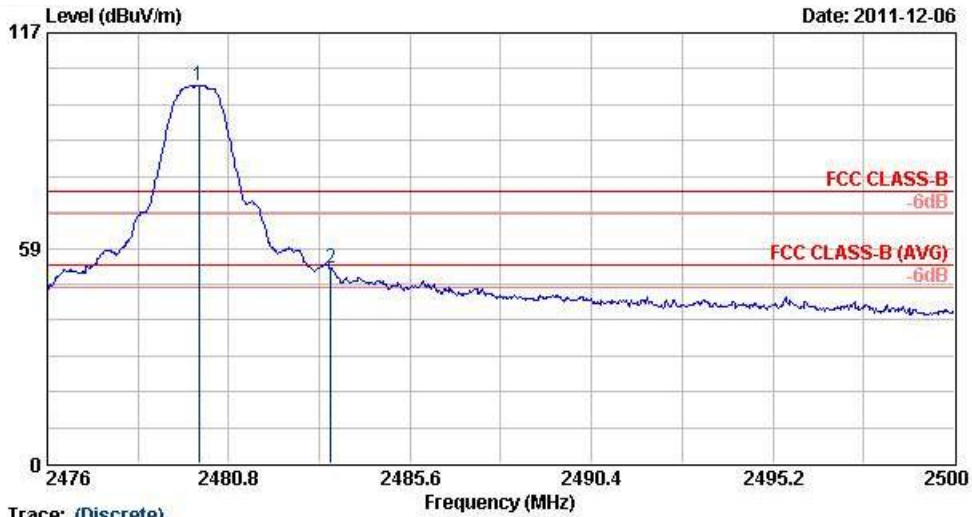
Site : 03CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 HORIZONTAL  
 Project : FR 102838  
 Memo : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	104.96	30.96	74.00	103.26	31.98	5.52	35.80	100	132 Peak
2 @	2480.00	85.89	31.89	54.00	84.19	31.98	5.52	35.80	100	132 Average

\* Maximum field strength of the fundamental emission



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Horizontal



Trace: (Discrete)

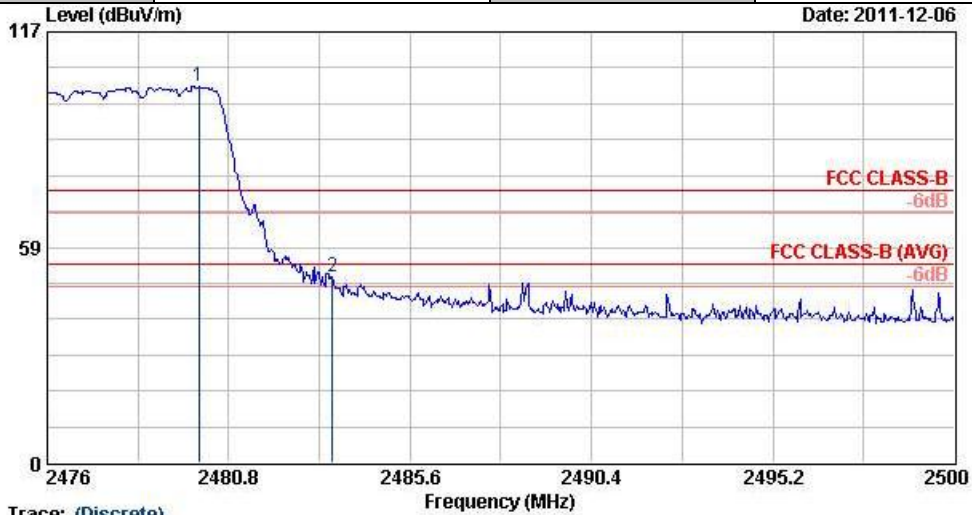
Site : 03CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 HORIZONTAL  
 Project : FR 102838  
 Memo : Mode 3

	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 X	2480.00	102.65	28.65	74.00	100.95	31.98	5.52	35.80	100	132	Peak
2	2483.50	52.90	-21.10	74.00	51.20	31.98	5.52	35.80	100	132	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 49.75 dB , single carrier Mode



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Horizontal



Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 HORIZONTAL  
 Project : FR 102838  
 Memo : Mode 3

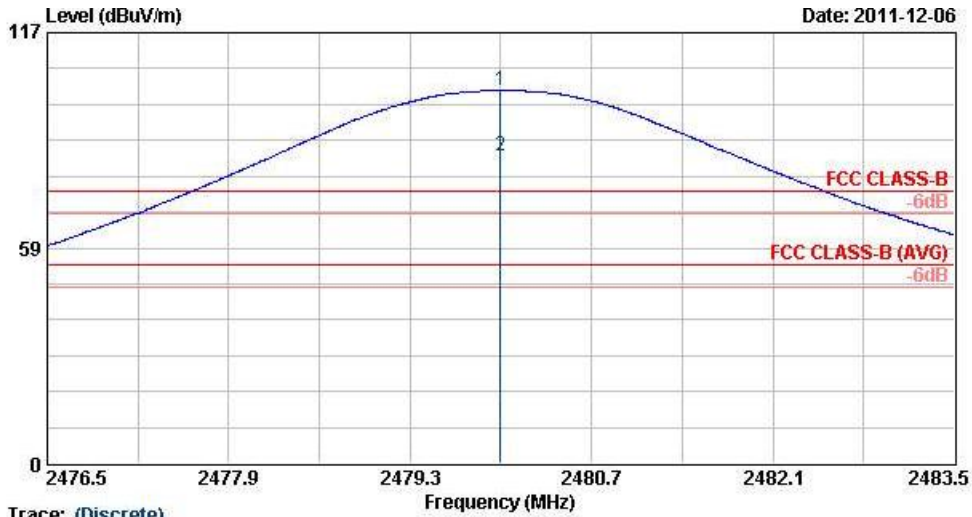
	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBUV/m	dB	dBUV/m	dBUV	dB/m	dB	dB	cm	deg	
1 X	2480.00	102.33	28.33	74.00	100.62	31.98	5.52	35.80	100	132	Peak
2	2483.54	50.49	-23.51	74.00	48.78	31.98	5.52	35.80	100	132	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 51.84 dB , Hopping Mode





Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Vertical



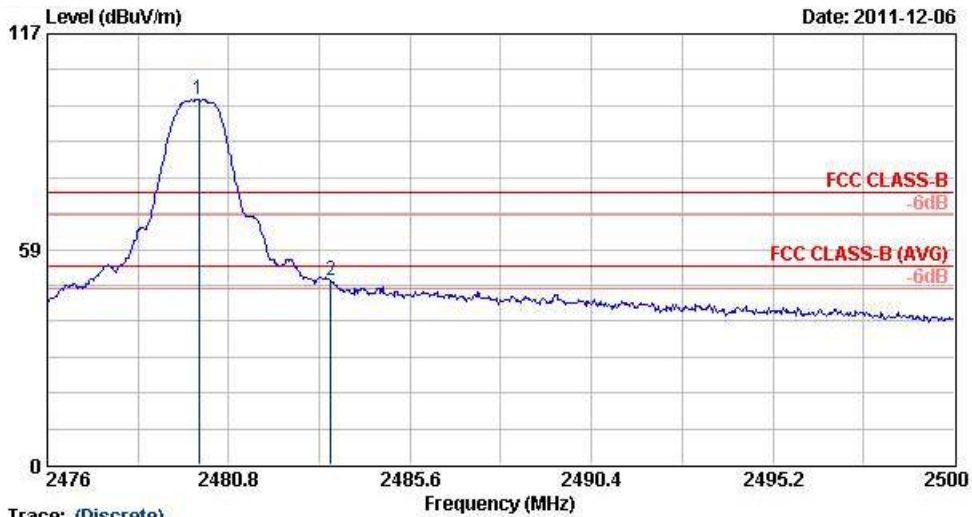
Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 VERTICAL  
 Project : FR 102838  
 Memo : Mode 3

	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 X	2480.00	101.40	27.40	74.00	99.70	31.98	5.52	35.80	185	278	Peak
2 X	2480.00	83.33	29.33	54.00	81.63	31.98	5.52	35.80	185	278	Average

\* Maximum field strength of the fundamental emission



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Vertical



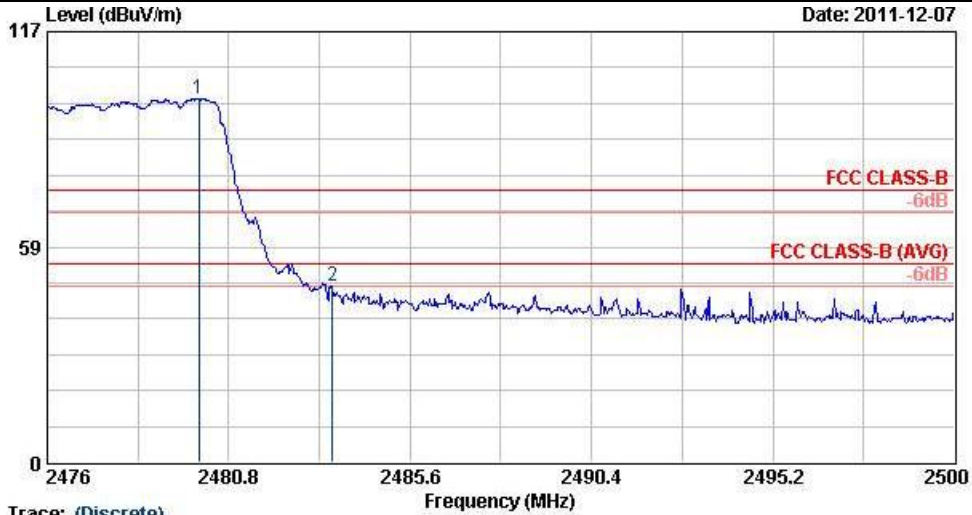
Trace: (Discrete)  
 Site : 03CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 VERTICAL  
 Project : FR 102838  
 Memo : Mode 3

	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 X	2480.00	99.13	25.13	74.00	97.42	31.98	5.52	35.80	185	278	Peak
2	2483.50	50.13	-23.87	74.00	48.43	31.98	5.52	35.80	185	278	Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 49.00 dB , single carrier Mode



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	50~51%
Test Engineer :	Luke Chang	Polarization :	Vertical



Trace: (Discrete)  
 Site : D3CH06-HY  
 Condition : FCC CLASS-B HF-ANT\_110802 VERTICAL  
 Project : FR 102838  
 Memo : 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 X	2480.00	98.85	24.85	74.00	97.15	31.98	5.52	35.80	185	278	Peak
2	2483.54	47.76	-26.24	74.00	46.05	31.98	5.52	35.80	185	278	Peak

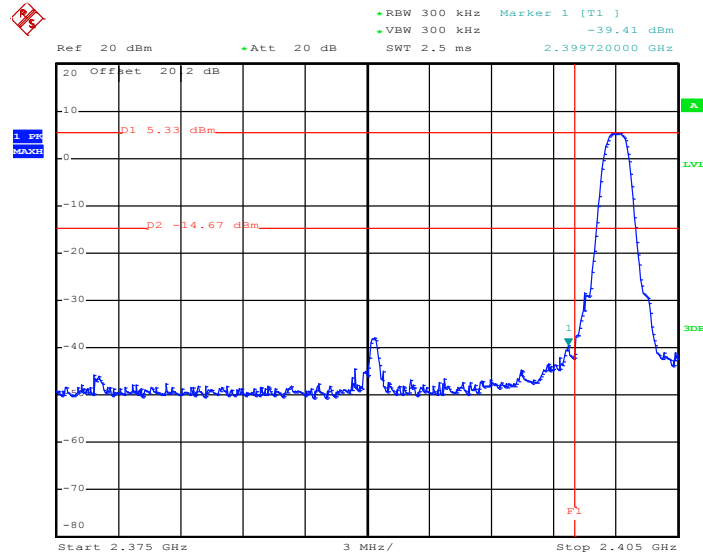
\* Marker-Delta Method (RBW/VBW=100KHz): 51.09 dB , Hopping Mode



### 3.6.6 Test Result of Conducted Band Edges

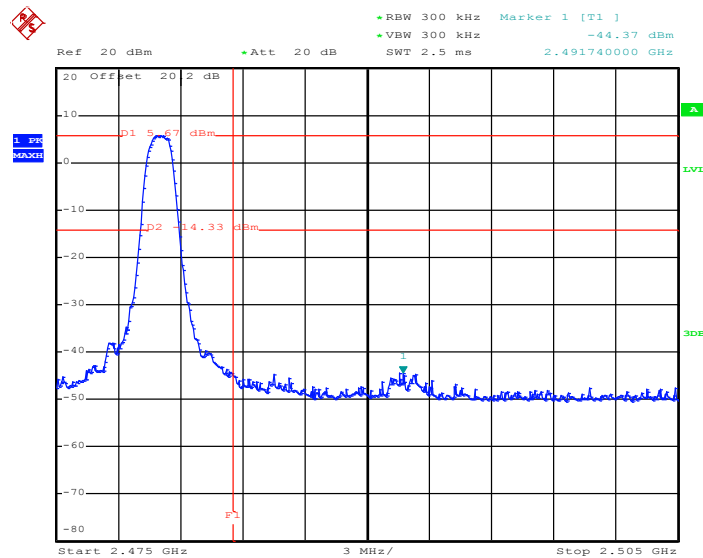
Test Mode :	Mode 7 and 9	Temperature :	22~24°C
Test Channel :	00 and 78	Relative Humidity :	53~57%
		Test Engineer :	Reece Li

Low Band Edge Plot on Channel 00



Date: 29.NOV.2011 21:57:16

High Band Edge Plot on Channel 78



Date: 29.NOV.2011 21:58:20

## 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.

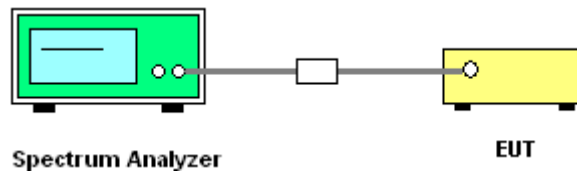
### 3.7.2 Measuring Instruments

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

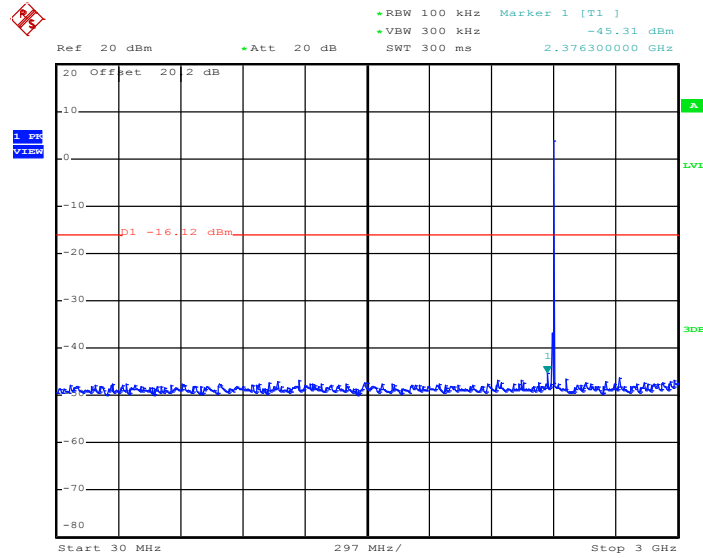




### 3.7.5 Test Result

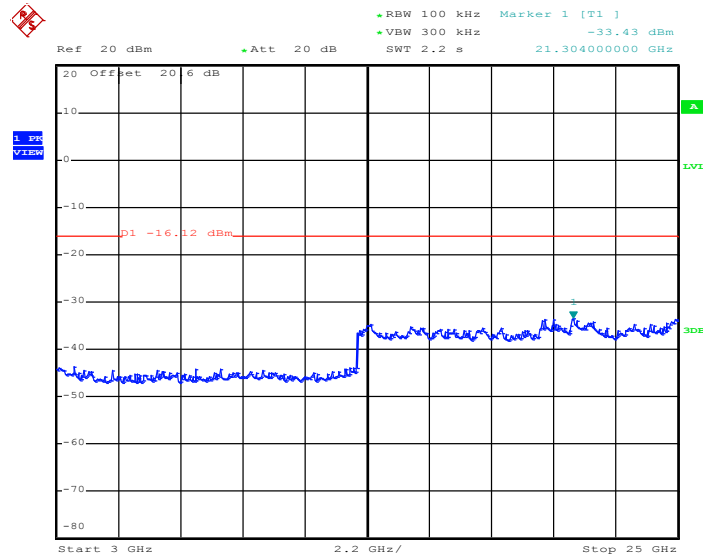
Test Mode :	Mode 7	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	53~57%
		Test Engineer :	Reece Li

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



Date: 29.NOV.2011 22:10:17

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

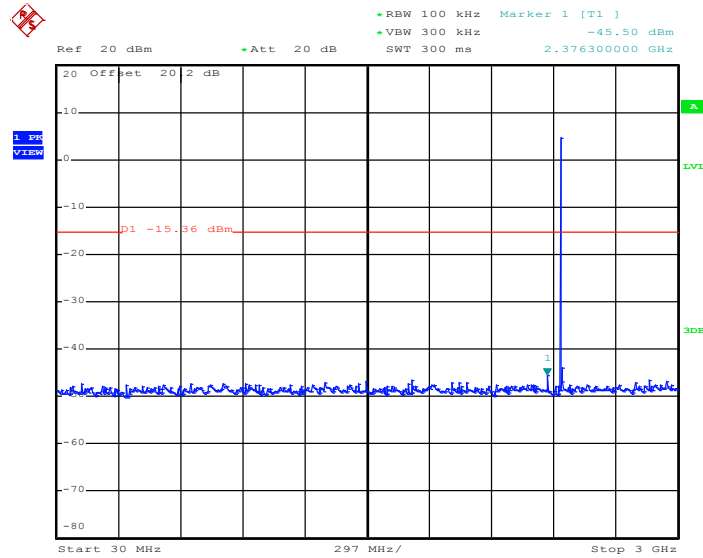


Date: 29.NOV.2011 22:10:39



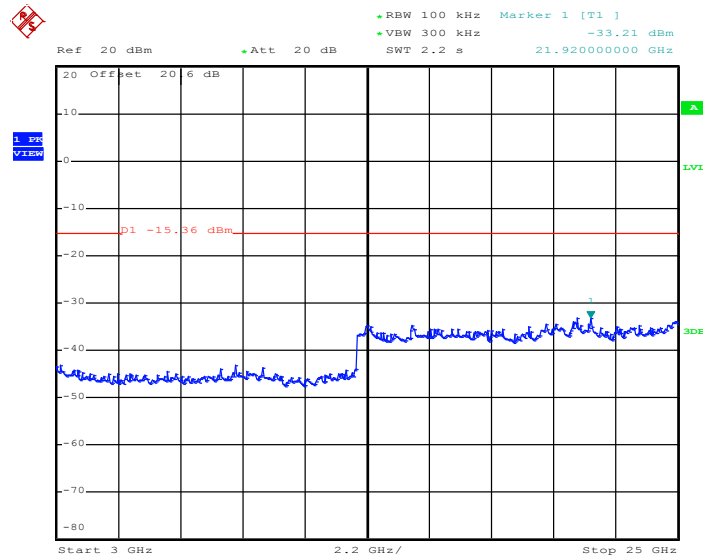
Test Mode :	Mode 8	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	53~57%
		Test Engineer :	Reece Li

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 29.NOV.2011 22:09:24

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

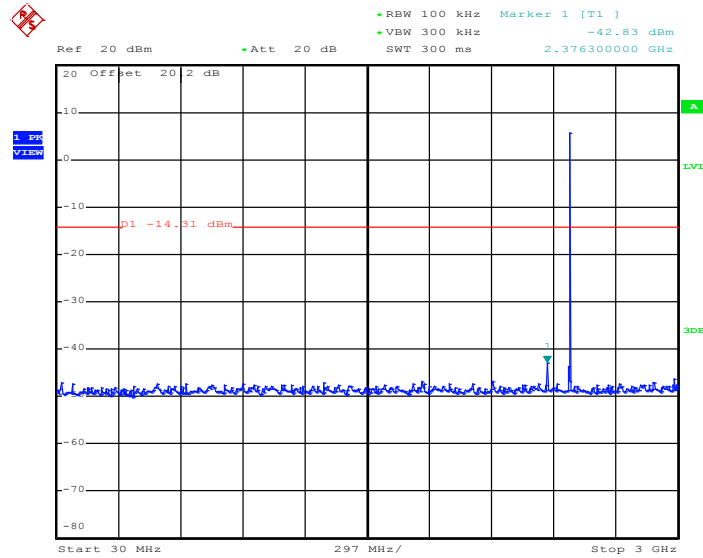


Date: 29.NOV.2011 22:09:46



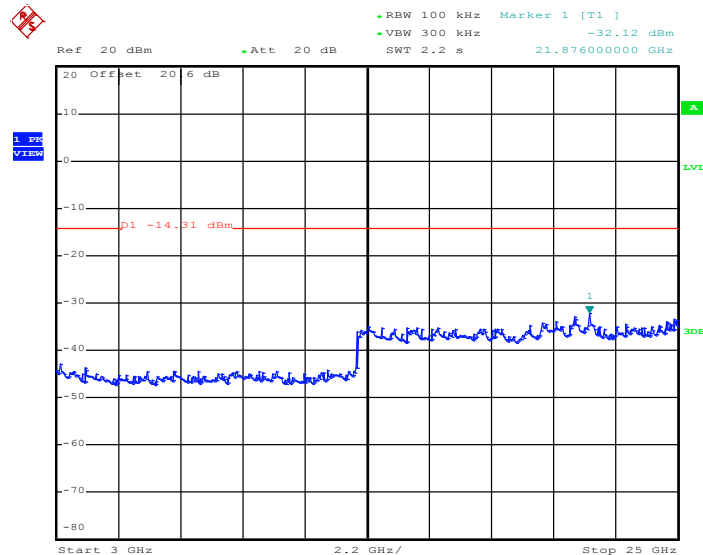
Test Mode :	Mode 9	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	53~57%
		Test Engineer :	Reece Li

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 29.NOV.2011 22:11:08

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 29.NOV.2011 22:11:29



## 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.

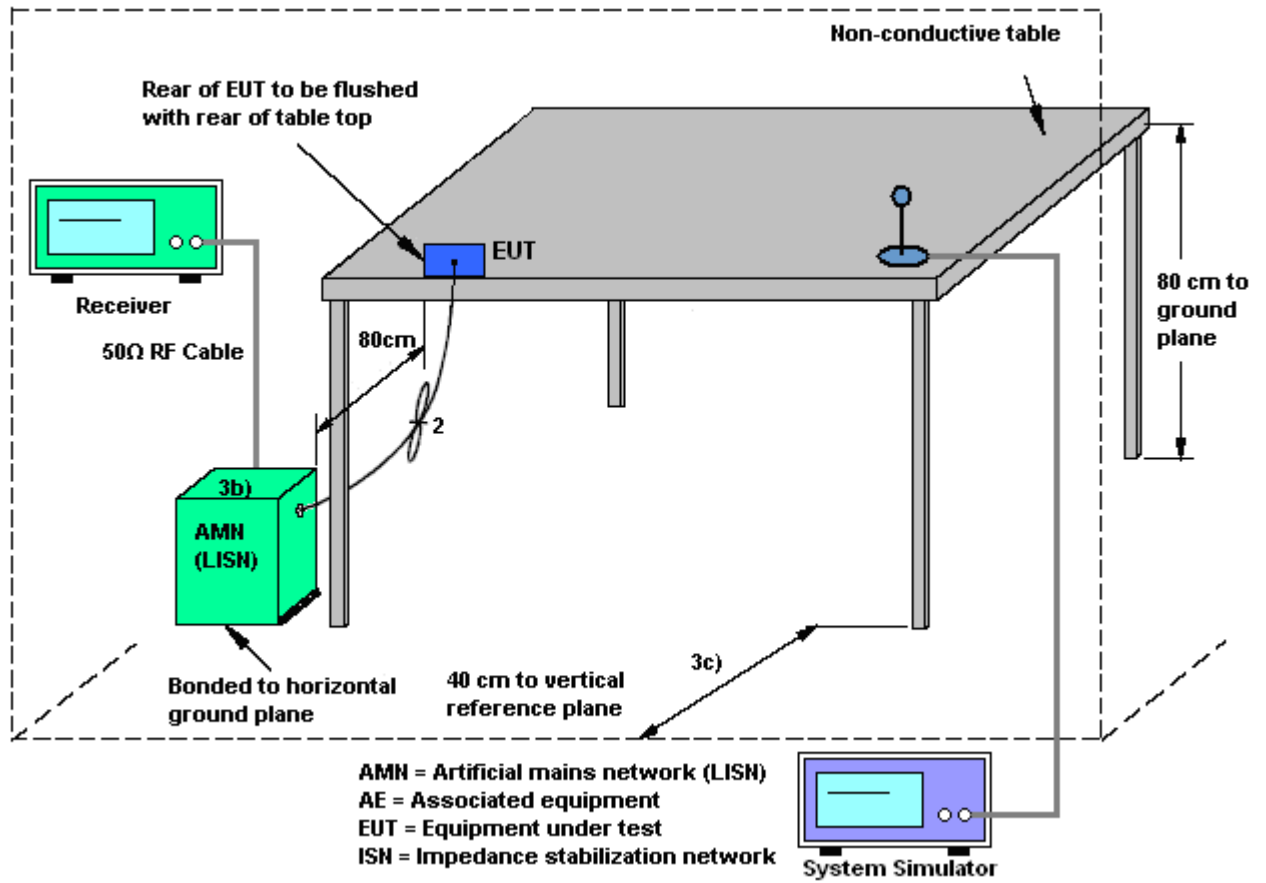
### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.8.3 Test Procedures

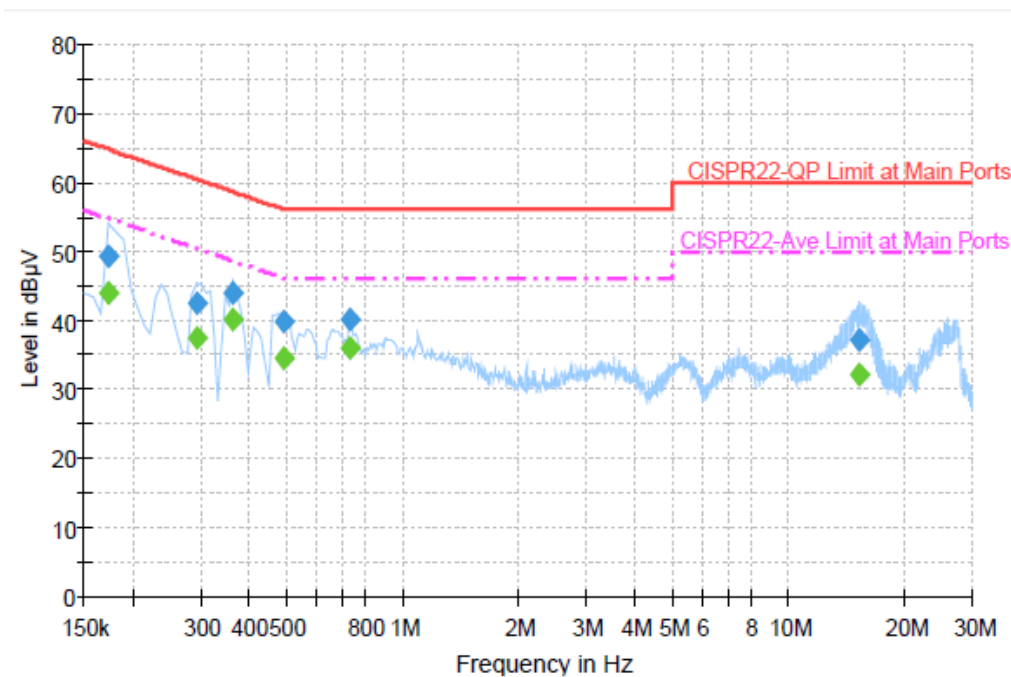
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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 :	20~23°C
Test Engineer :	Aslen Chiu	Relative Humidity :	42~45%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	CDMA 850 Idle + Bluetooth Link + WLAN (2.4G) Link + Adapter 3 + Battery 1 + H Pattern + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



#### Final Result 1

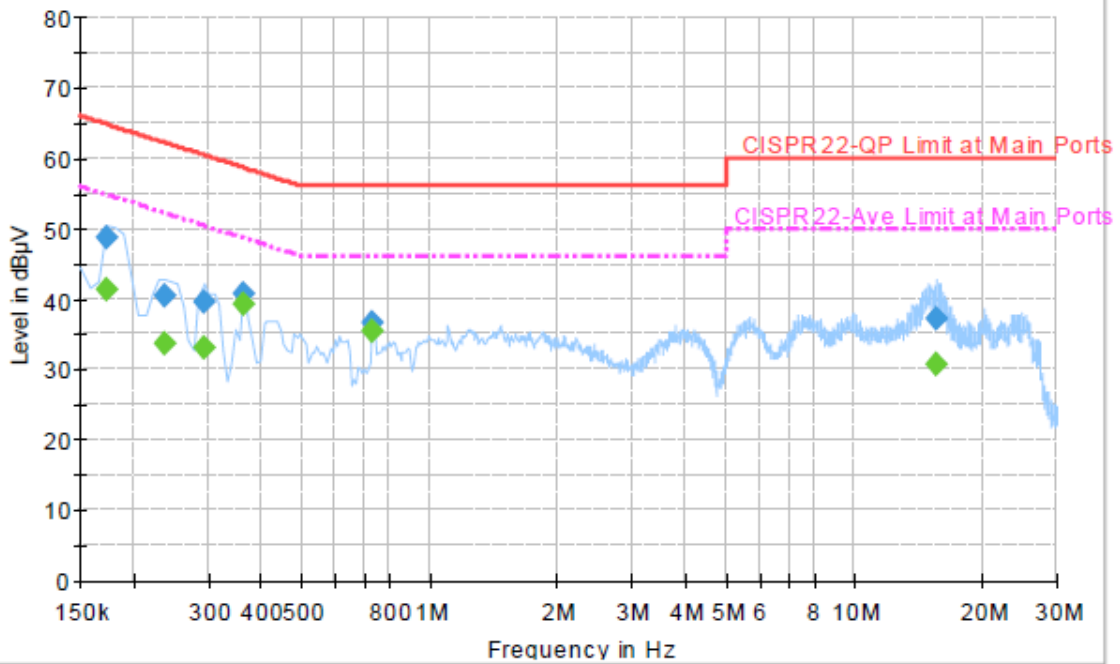
Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.174000	49.3	Off	L1	19.4	15.5	64.8
0.294000	42.5	Off	L1	19.4	17.9	60.4
0.366000	44.1	Off	L1	19.4	14.5	58.6
0.494000	39.8	Off	L1	19.4	16.3	56.1
0.734000	40.2	Off	L1	19.4	15.8	56.0
15.238000	37.3	Off	L1	19.7	22.7	60.0

#### Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.174000	44.1	Off	L1	19.4	10.7	54.8
0.294000	37.6	Off	L1	19.4	12.8	50.4
0.366000	40.1	Off	L1	19.4	8.5	48.6
0.494000	34.4	Off	L1	19.4	11.7	46.1
0.734000	36.0	Off	L1	19.4	10.0	46.0
15.238000	32.3	Off	L1	19.7	17.7	50.0



Test Mode :	Mode 1	Temperature :	20~23°C
Test Engineer :	Aslen Chiu	Relative Humidity :	42~45%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA 850 Idle + Bluetooth Link + WLAN (2.4G) Link + Adapter 3 + Battery 1 + H Pattern + Earphone		
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)
0.174000	48.7	Off	N	19.4	16.1	64.8
0.238000	40.4	Off	N	19.4	21.8	62.2
0.294000	39.6	Off	N	19.4	20.8	60.4
0.366000	40.7	Off	N	19.4	17.9	58.6
0.734000	36.7	Off	N	19.4	19.3	56.0
15.566000	37.3	Off	N	19.7	22.7	60.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	41.4	Off	N	19.4	13.4	54.8
0.238000	33.6	Off	N	19.4	18.6	52.2
0.294000	33.1	Off	N	19.4	17.3	50.4
0.366000	39.2	Off	N	19.4	9.4	48.6
0.734000	35.4	Off	N	19.4	10.6	46.0
15.566000	30.6	Off	N	19.7	19.4	50.0

### 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

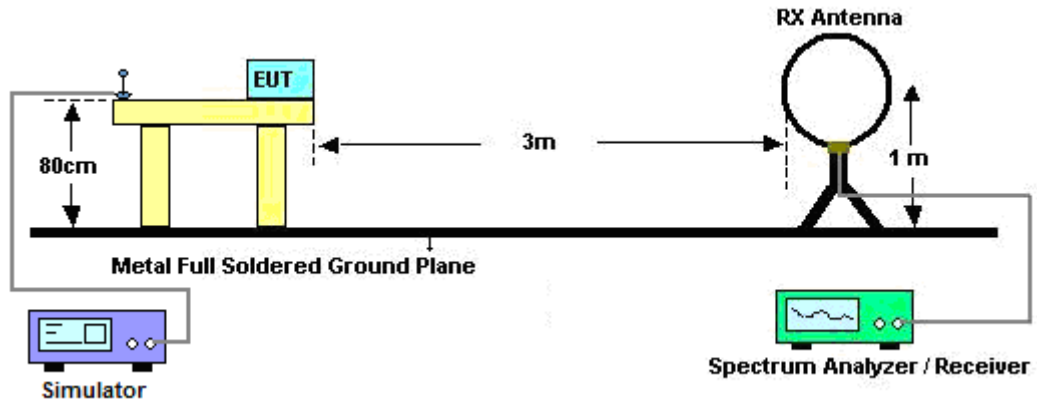
See list of measuring instruments of this test report.

#### 3.9.3 Test Procedures

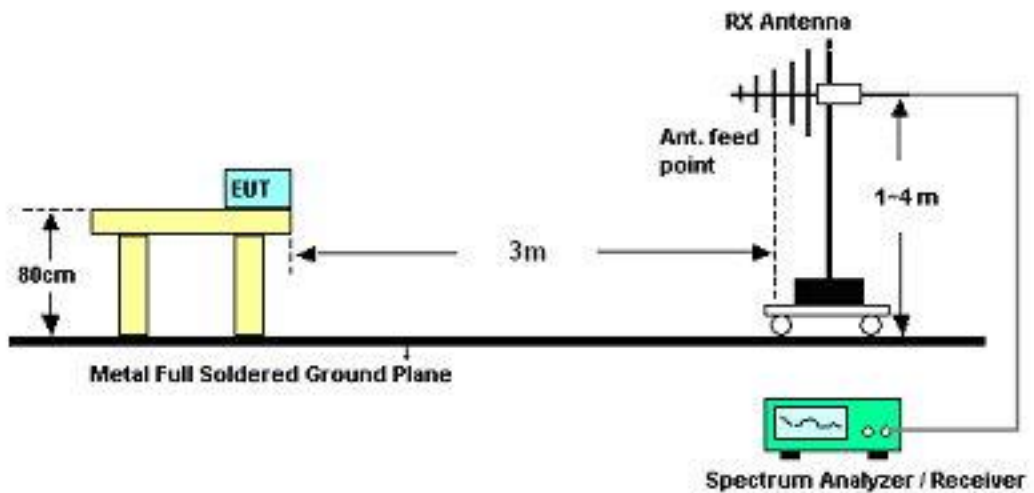
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
  - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 KHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = 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

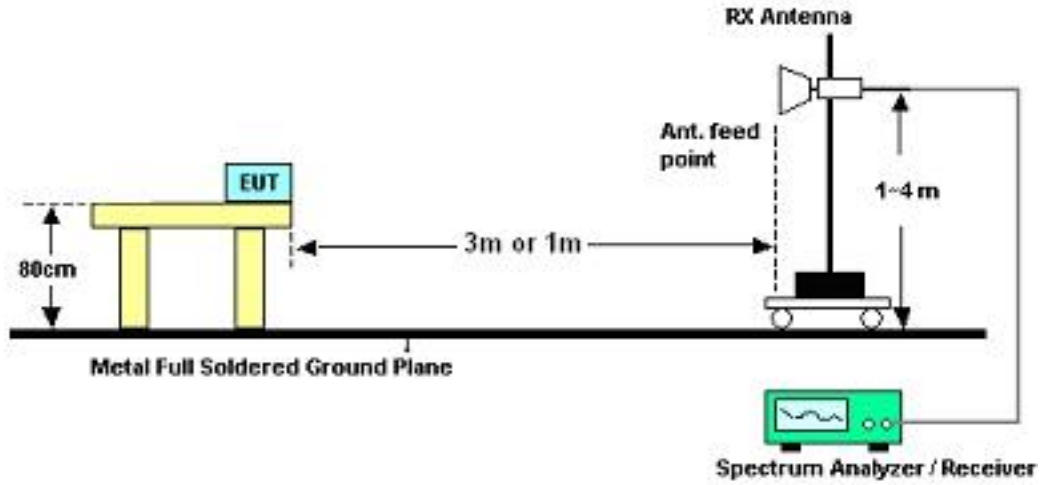
For radiated emissions below 30MHz



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 :	Luke Chang	Temperature :	23~25°C	
		Relative Humidity :	50~51%	
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 (specific distance / 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 :	23~25°C
Test Channel :	00	Relative Humidity :	50~51%
Test Engineer :	Luke 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
30	16.83	-23.17	40	29.35	18.8	0.4	31.72	-	-	Peak
265.98	25.07	-20.93	46	41.35	13.22	2.2	31.7	-	-	Peak
272.73	27.8	-18.2	46	44.37	12.9	2.22	31.69	-	-	Peak
365.8	34.73	-11.27	46	49.28	14.71	2.36	31.62	100	37	Peak
778.8	24.73	-21.27	46	33.37	19.9	3.49	32.03	-	-	Peak
941.9	24.83	-21.17	46	31.39	20.82	3.82	31.2	-	-	Peak
2385.05	34.08	-19.92	54	32.66	31.88	5.4	35.86	100	123	Average
2385.05	56.8	-17.2	74	55.38	31.88	5.4	35.86	100	123	Peak
2402	104.08	-	-	102.63	31.91	5.4	35.86	100	123	Peak
2402	85.55	-	-	84.11	31.9	5.4	35.86	100	123	Average
2494	32.37	-21.63	54	30.65	32	5.52	35.8	100	123	Average
2494	44.75	-29.25	74	43.03	32	5.52	35.8	100	123	Peak
4804	47.84	-26.16	74	61.32	34.41	7.95	55.84	100	0	Peak





<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	50~51%
<b>Test Engineer :</b>	Luke 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
33.24	25.12	-14.88	40	39.96	16.46	0.41	31.71	-	-	Peak
39.18	30.99	-9.01	40	49.06	13.14	0.49	31.7	100	52	Peak
93.99	26.9	-16.6	43.5	47.69	9.78	1.11	31.68	-	-	Peak
365.8	31.82	-14.18	46	46.37	14.71	2.36	31.62	-	-	Peak
799.8	24.25	-21.75	46	32.78	20	3.44	31.97	-	-	Peak
941.9	25.12	-20.88	46	31.68	20.82	3.82	31.2	-	-	Peak
2385.62	33.15	-20.85	54	31.71	31.9	5.4	35.86	100	278	Average
2385.62	53.33	-20.67	74	51.89	31.9	5.4	35.86	100	278	Peak
2402	99.48	-	-	98.03	31.91	5.4	35.86	100	278	Peak
2402	81.82	-	-	80.38	31.9	5.4	35.86	100	278	Average
2494	32.14	-21.86	54	30.42	32	5.52	35.8	100	278	Average
2494	45.5	-28.5	74	43.78	32	5.52	35.8	100	278	Peak
4804	45.6	-28.4	74	59.08	34.41	7.95	55.84	100	0	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	50~51%
<b>Test Engineer :</b>	Luke 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
30.54	16.15	-23.85	40	29.45	18.02	0.4	31.72	-	-	Peak
99.39	20.08	-23.42	43.5	39.55	11.2	1.01	31.68	-	-	Peak
272.19	21.21	-24.79	46	37.78	12.9	2.22	31.69	-	-	Peak
367.9	25.39	-20.61	46	39.92	14.75	2.36	31.64	-	-	Peak
908.3	25.19	-20.81	46	32.25	20.7	3.76	31.52	-	-	Peak
953.8	25.99	-20.01	46	32.31	20.94	3.84	31.1	100	12	Peak
2388	56.58	-17.42	74	55.14	31.9	5.4	35.86	100	128	Peak
2388	32.69	-21.31	54	31.25	31.9	5.4	35.86	100	128	Average
2441	104.87	-	-	103.29	31.95	5.46	35.83	100	128	Peak
2441	86.26	-	-	84.68	31.95	5.46	35.83	100	128	Average
2492	48.92	-25.08	74	47.2	32	5.52	35.8	100	128	Peak
2492	32.2	-21.8	54	30.48	32	5.52	35.8	100	128	Average



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	50~51%
<b>Test Engineer :</b>	Luke 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
31.08	25.2	-14.8	40	38.5	18.02	0.4	31.72	-	-	Peak
39.18	29.67	-10.33	40	47.74	13.14	0.49	31.7	100	2	Peak
52.68	21.33	-18.67	40	44.56	7.8	0.66	31.69	-	-	Peak
630.4	22.84	-23.16	46	32.41	19.2	3.26	32.03	-	-	Peak
771.8	24.3	-21.7	46	32.94	19.9	3.51	32.05	-	-	Peak
952.4	25.39	-20.61	46	31.73	20.93	3.84	31.11	-	-	Peak
2388	52.06	-21.94	74	50.62	31.9	5.4	35.86	100	329	Peak
2388	32.75	-21.25	54	31.31	31.9	5.4	35.86	100	329	Average
2441	99.23	-	-	97.65	31.95	5.46	35.83	100	329	Peak
2441	81.69	-	-	80.11	31.95	5.46	35.83	100	329	Average
2500	44.04	-29.96	74	42.32	32	5.52	35.8	100	329	Peak
2500	32.12	-21.88	54	30.4	32	5.52	35.8	100	329	Average



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	50~51%
<b>Test Engineer :</b>	Luke 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
30	18.07	-21.93	40	30.59	18.8	0.4	31.72	-	-	Peak
71.58	14.8	-25.2	40	39.24	6.48	0.78	31.7	-	-	Peak
101.28	17.31	-26.19	43.5	36.69	11.28	1.02	31.68	-	-	Peak
556.9	22.25	-23.75	46	32.08	19.1	2.99	31.92	-	-	Peak
749.4	23.5	-22.5	46	32.24	19.8	3.57	32.11	-	-	Peak
848.8	24.9	-21.1	46	32.52	20.39	3.9	31.91	100	207	Peak
2390	56.86	-17.14	74	55.42	31.9	5.4	35.86	100	132	Peak
2390	32.83	-21.17	54	31.39	31.9	5.4	35.86	100	132	Average
2480	104.71	-	-	103.01	31.98	5.52	35.8	100	132	Peak
2480	85.89	-	-	84.19	31.98	5.52	35.8	100	132	Average
2483.5	68.48	-5.52	74	66.78	31.98	5.52	35.8	100	132	Peak
2483.5	36.14	-17.86	54	34.44	31.98	5.52	35.8	100	132	Average



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	50~51%
<b>Test Engineer :</b>	Luke 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
31.08	28.83	-11.17	40	42.13	18.02	0.4	31.72	100	136	Peak
39.99	26.55	-13.45	40	45.04	12.7	0.51	31.7	-	-	Peak
170.13	23.87	-19.63	43.5	44.01	9.7	1.83	31.67	-	-	Peak
551.3	22.89	-23.11	46	32.7	19.1	2.98	31.89	-	-	Peak
782.3	24.18	-21.82	46	32.81	19.9	3.49	32.02	-	-	Peak
955.9	26.35	-19.65	46	32.62	20.96	3.85	31.08	-	-	Peak
2390	52.77	-21.23	74	51.33	31.9	5.4	35.86	185	278	Peak
2390	32.74	-21.26	54	31.3	31.9	5.4	35.86	185	278	Average
2480	101.24	-	-	99.54	31.98	5.52	35.8	185	278	Peak
2480	83.33	-	-	81.63	31.98	5.52	35.8	185	278	Average
2483.5	65.18	-8.82	74	63.48	31.98	5.52	35.8	185	278	Peak
2483.5	34.33	-19.67	54	32.63	31.98	5.52	35.8	185	278	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 Fixed Internal 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	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Nov. 29, 2011	Jun. 12, 2012	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 18, 2011	Nov. 29, 2011	Sep. 17, 2012	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 18, 2011	Nov. 29, 2011	Sep. 17, 2012	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 18, 2011	Nov. 29, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 18, 2011	Nov. 29, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan. 13, 2011	Nov. 29, 2011	Jan. 12, 2012	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Dec. 20, 2011	Aug. 21, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz~30MHz	Dec. 09, 2011	Dec. 20, 2011	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz~30MHz	Dec. 06, 2011	Dec. 20, 2011	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Dec. 20, 2011	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117997	N/A	Aug. 22, 2011	Dec. 20, 2011	Aug. 21, 2012	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz~40GHz	Oct. 27, 2011	Dec. 07, 2011	Oct. 26, 2012	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz~1000M Hz	May 10, 2011	Dec. 07, 2011	May 09, 2012	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz~2GHz	Oct. 22, 2011	Dec. 07, 2011	Oct. 21, 2012	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz~18GHz	Aug. 01, 2011	Dec. 07, 2011	Jul. 31, 2012	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz~40GHz	Oct. 21, 2011	Dec. 07, 2011	Oct. 20, 2012	Radiation (03CH06-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Apr. 14, 2011	Dec. 07, 2011	Apr. 13, 2012	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz~1GHz	Apr. 14, 2011	Dec. 07, 2011	Apr. 13, 2012	Radiation (03CH06-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan. 13, 2011	Dec. 07, 2011	Jan. 12, 2012	Radiation (03CH06-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>				



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP1O2838 as below.