

# FCC RF Test Report

**APPLICANT** : Sharp Corporation  
**EQUIPMENT** : Mobile Terminal Equipment  
**BRAND NAME** : SHARP  
**MODEL NAME** : EB-W71LJ-H  
**FCC ID** : APYNAR0075  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : Digital Spread Spectrum (DSS)

The product was received on May 18, 2011 and completely tested on May 25, 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 : APYNAR0075

Page Number : 1 of 61

Report Issued Date : Jun. 14, 2011

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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 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 6.5 dB at 0.17 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.03 dB at 62.67 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

**Sharp Corporation**

22-22 Nagaike-cho, Abeno-ku Osaka, 545-8522, Japan

## 1.2 Manufacturer

**Chi Mei Communication Systems, Inc.**

No. 4, Mingsheng Street, Tucheng City, Taipei County 23678, Taiwan

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile Terminal Equipment
Brand Name	SHARP
Model Name	EB-W71LJ-H
FCC ID	APYNAR0075
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) : 10.03 dBm (0.01 W) Bluetooth EDR (2Mbps) : 12.28 dBm (0.017 W) Bluetooth EDR (3Mbps) : 10.31 dBm (0.011 W)
Antenna Type	PIFA Antenna with gain -3.61 dBi
HW Version	PR1
SW Version	1.06
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	03CH05-HY	722060/4086B-1

### 1.5 Applied Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC Public Notice DA 00-705
- ♦ ANSI C63.4-2003
- ♦ 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 (DoC), recorded in a separate test report.



### 1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
5.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
6.	LCD TV	Dell	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m

## 2 Test Configuration of Equipment Under Test

### 2.1 RF Output Power

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

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	$\pi/4$ -DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	8.85 dBm	11.31 dBm	9.15 dBm
Ch39	2441MHz	10.03 dBm	12.28 dBm	10.31 dBm
Ch78	2480MHz	9.80 dBm	11.95 dBm	10.25 dBm

**Remark:**

1. The data rate was set in 2Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

## 2.2 Test Mode

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

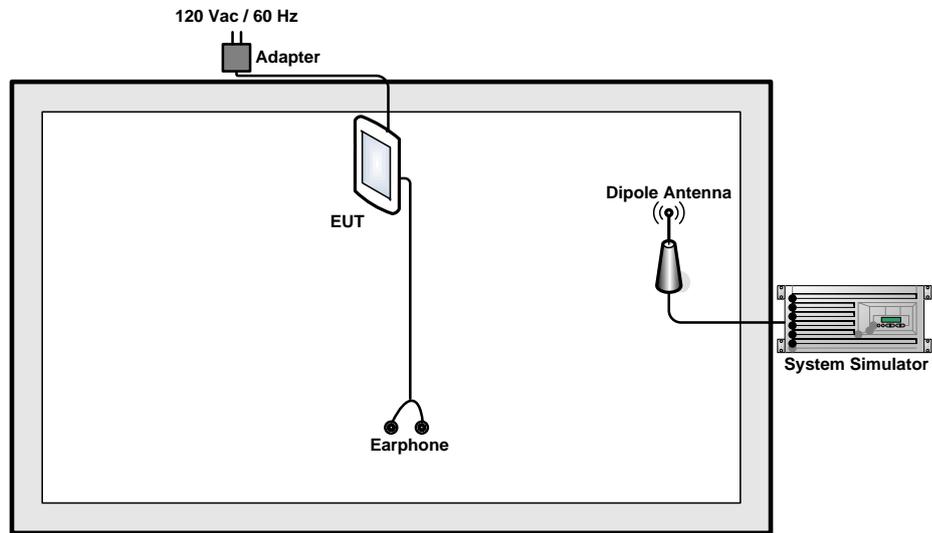
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

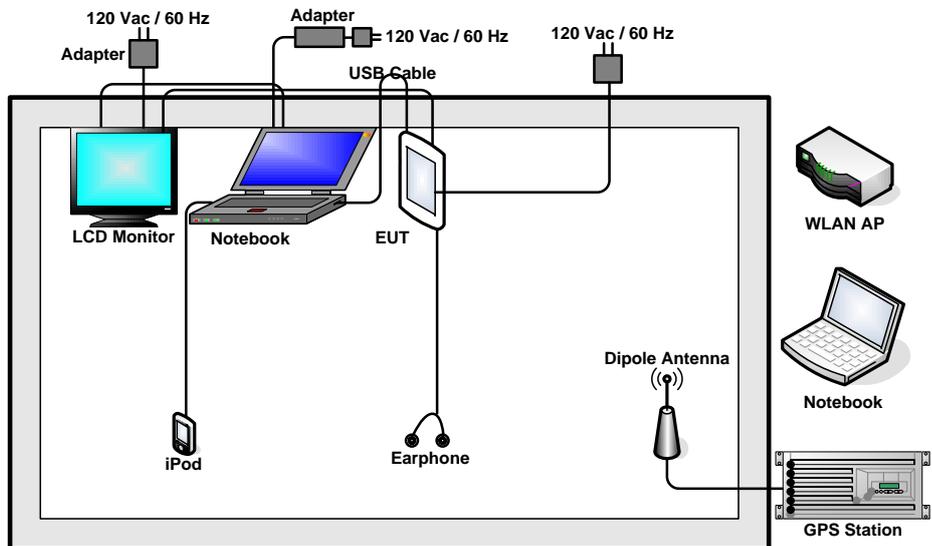
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz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

## 2.3 Connection Diagram of Test System

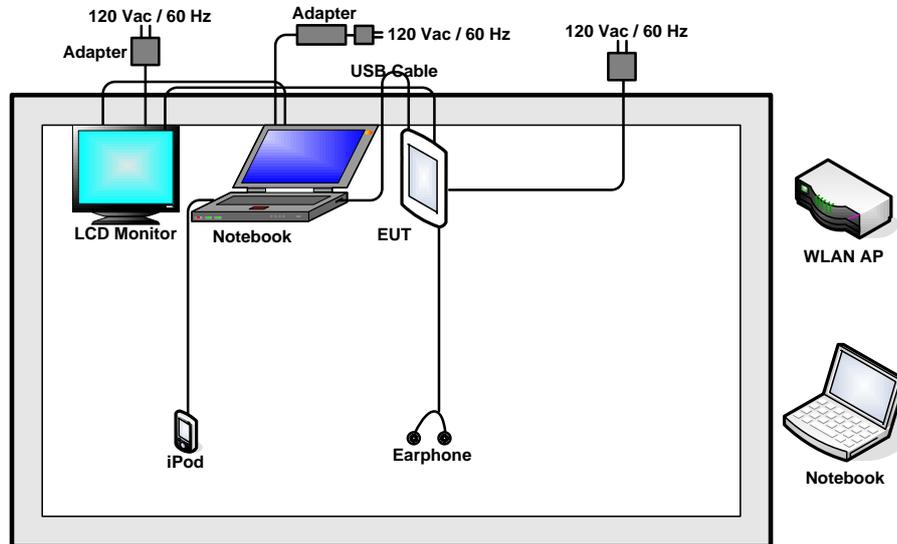
### <Bluetooth Tx Mode>



### <EUT with GPS Rx Mode>



<EUT without GPS Rx Mode>



## 2.4 RF Utility

For Bluetooth function, execute “ADB command” 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.

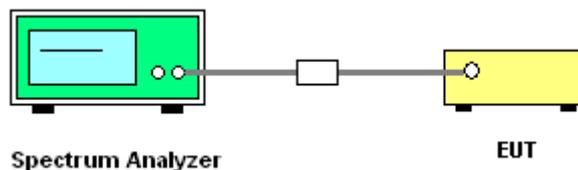
##### 3.1.2 Measuring Instruments

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

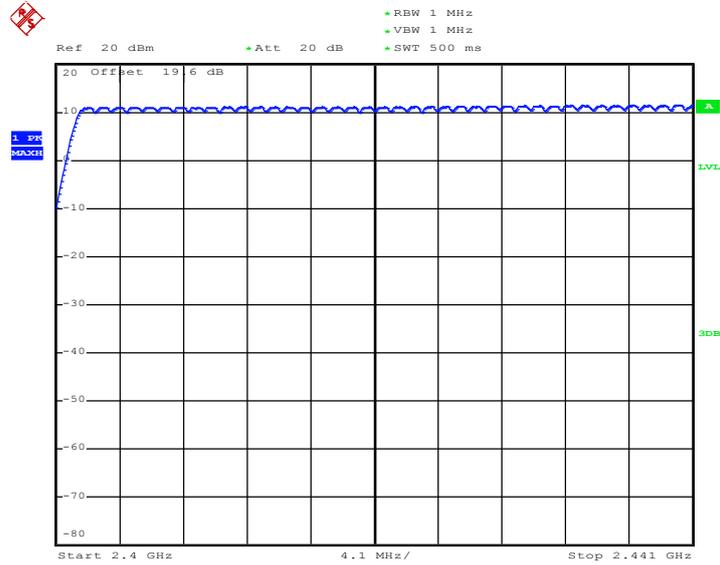


##### 3.1.5 Test Result of Number of Hopping Frequency

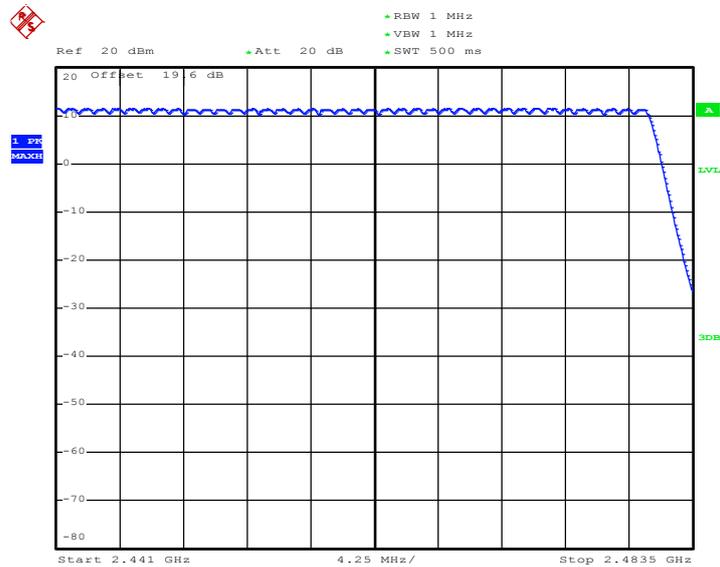
<b>Test Mode :</b>	Mode 4~6	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Hank Yu	<b>Relative Humidity :</b>	50~53%
<b>Number of Hopping Channels (Channel)</b>		<b>Limits (Channel)</b>	<b>Pass/Fail</b>
79		> 15	Pass



Number of Hopping Channel Plot on Channel 00 - 78



Date: 19.MAY.2011 23:37:13



Date: 19.MAY.2011 23:42:30

## 3.2 20dB Bandwidth Measurement

### 3.2.1 Limit of 20dB Bandwidth

N/A

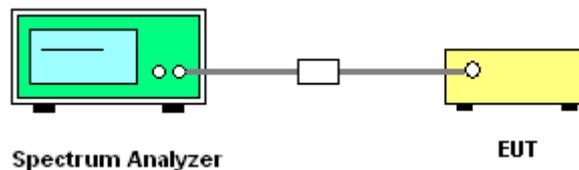
### 3.2.2 Measuring Instruments

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



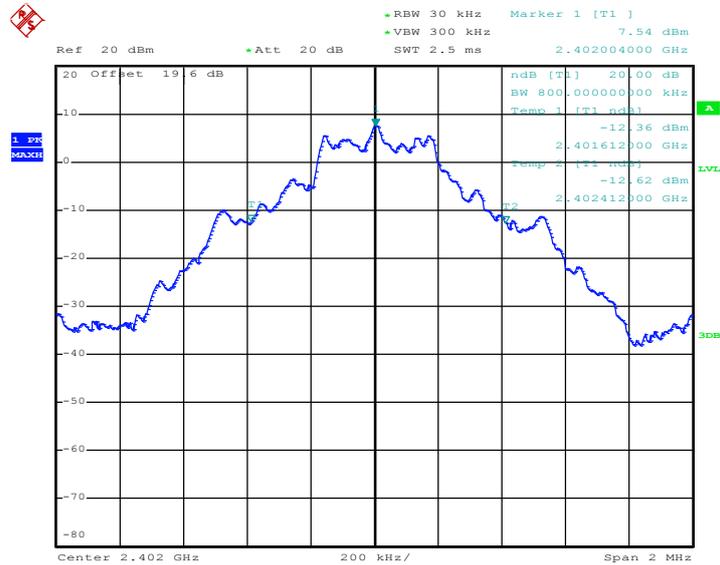


3.2.5 Test Result of 20dB Bandwidth

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

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.800
39	2441	0.800
78	2480	0.756

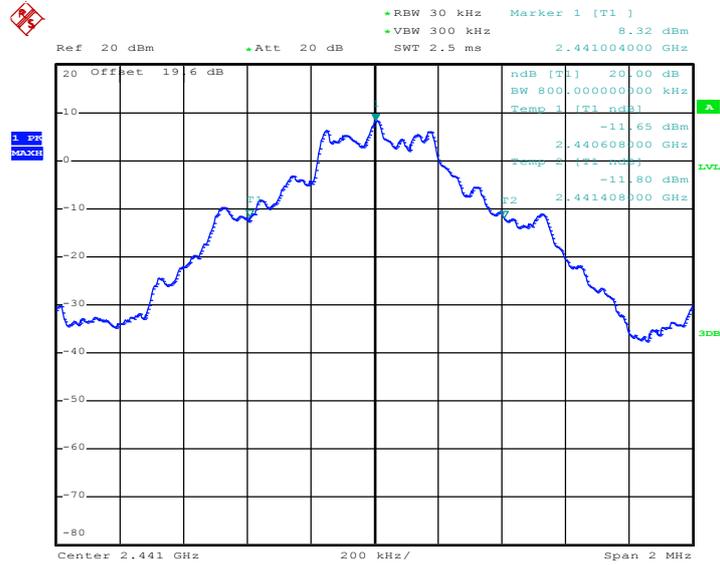
20 dB Bandwidth Plot on Channel 00



Date: 19.MAY.2011 22:54:56

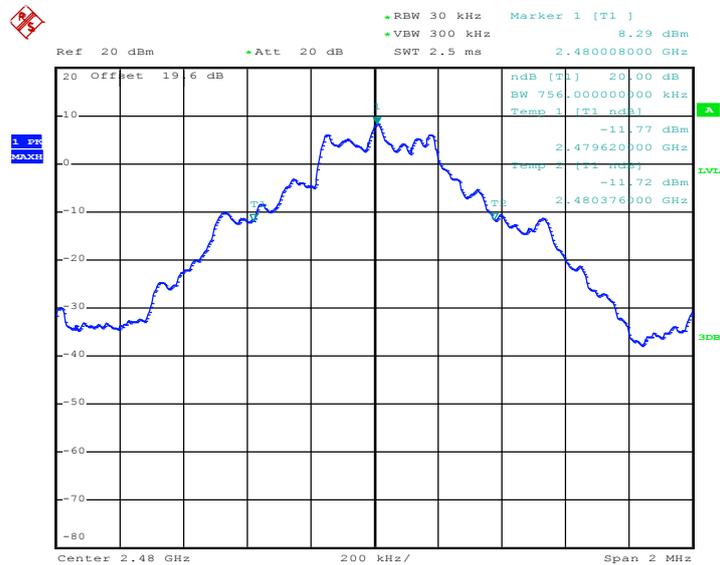


20 dB Bandwidth Plot on Channel 39



Date: 19.MAY.2011 22:46:13

20 dB Bandwidth Plot on Channel 78



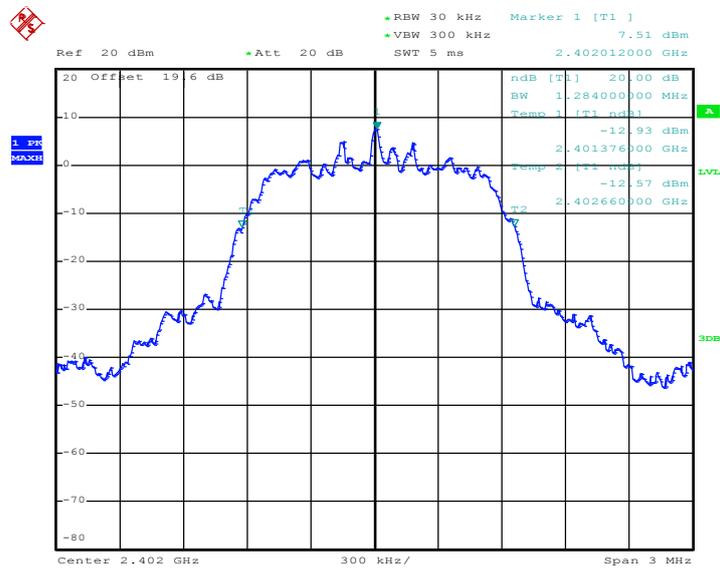
Date: 19.MAY.2011 22:53:36



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

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

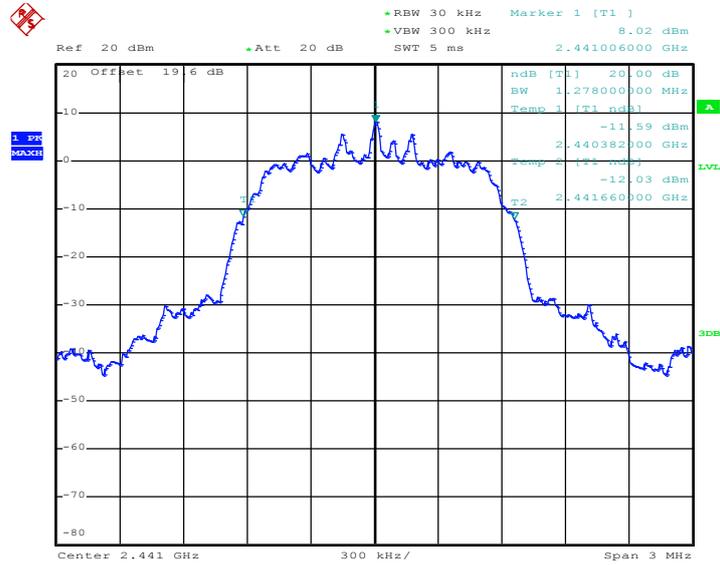
20 dB Bandwidth Plot on Channel 00



Date: 19.MAY.2011 21:57:14

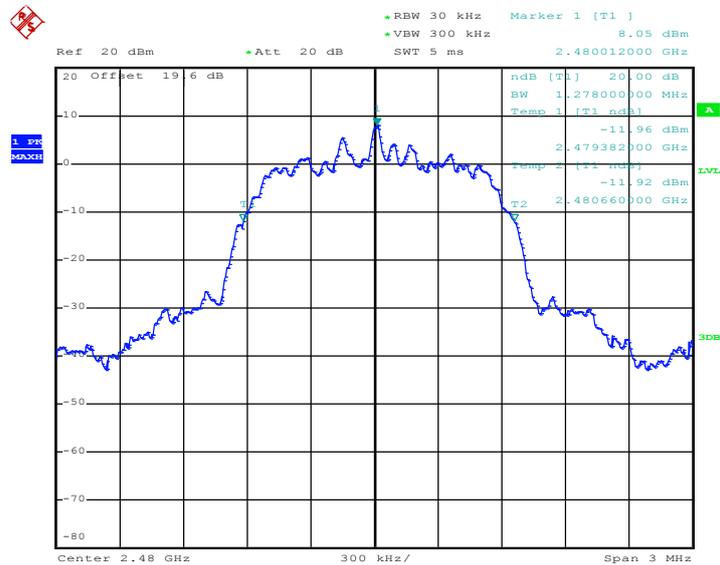


20 dB Bandwidth Plot on Channel 39



Date: 19.MAY.2011 22:59:19

20 dB Bandwidth Plot on Channel 78



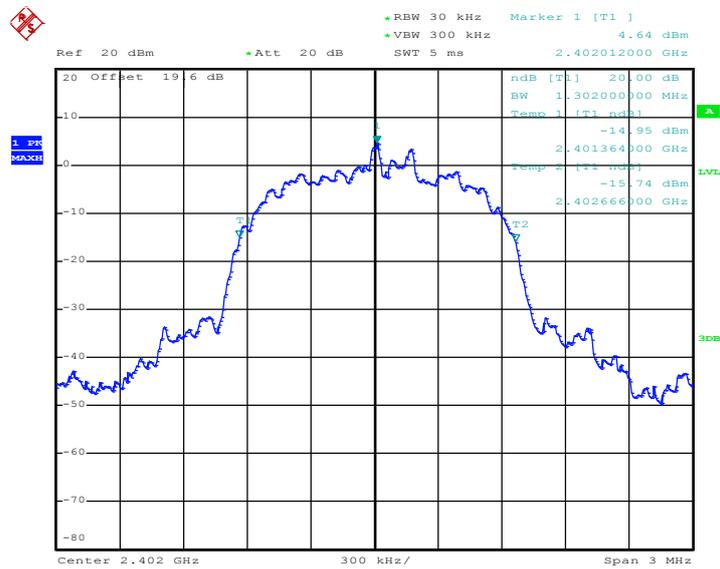
Date: 19.MAY.2011 22:12:48



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

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.302
39	2441	1.290
78	2480	1.290

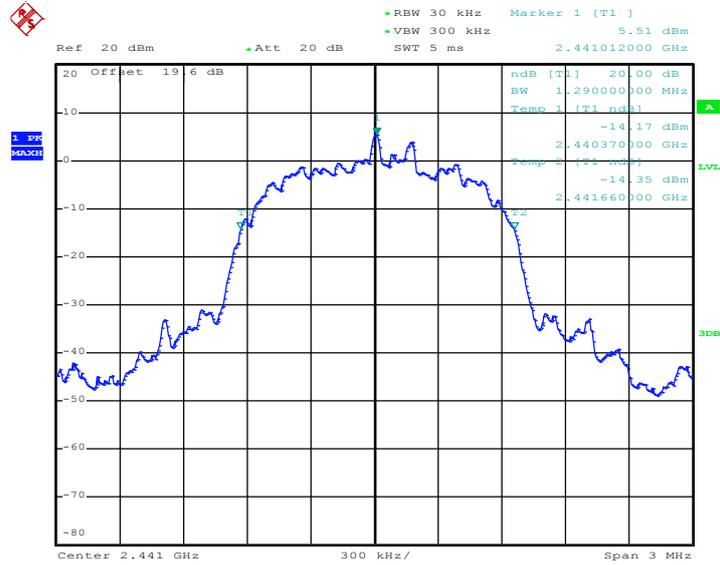
20 dB Bandwidth Plot on Channel 00



Date: 19.MAY.2011 22:24:52

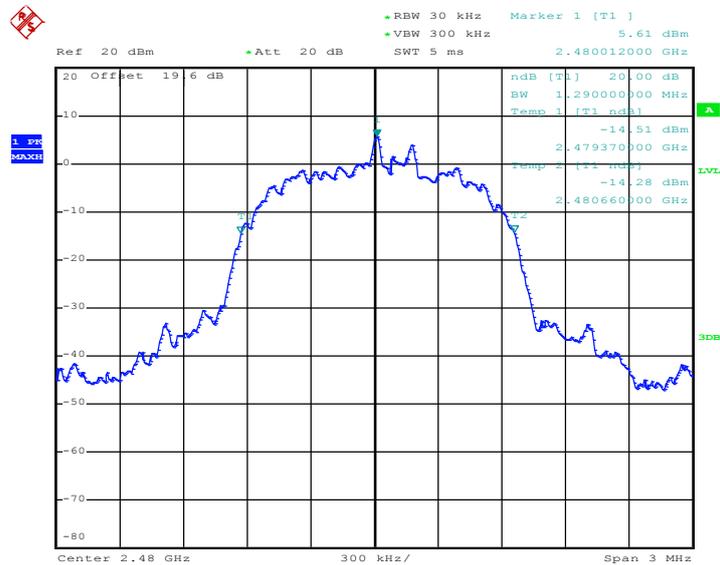


20 dB Bandwidth Plot on Channel 39



Date: 19.MAY.2011 22:28:22

20 dB Bandwidth Plot on Channel 78



Date: 19.MAY.2011 22:19:31

### 3.3 Hopping Channel Separation Measurement

#### 3.3.1 Limit of Hopping Channel Separation

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

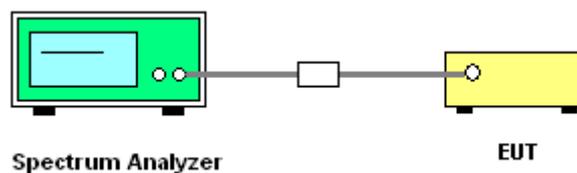
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peaks of two adjacent channels;  $RBW \geq 1\%$  of the span;  
 $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

#### 3.3.4 Test Setup



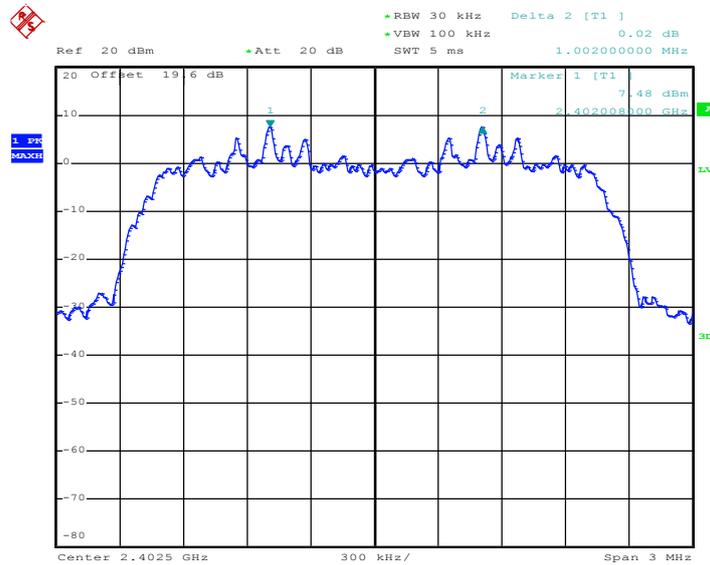


3.3.5 Test Result of Hopping Channel Separation

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

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.856	Pass
39	2441	1.002	0.852	Pass
78	2480	1.002	0.852	Pass

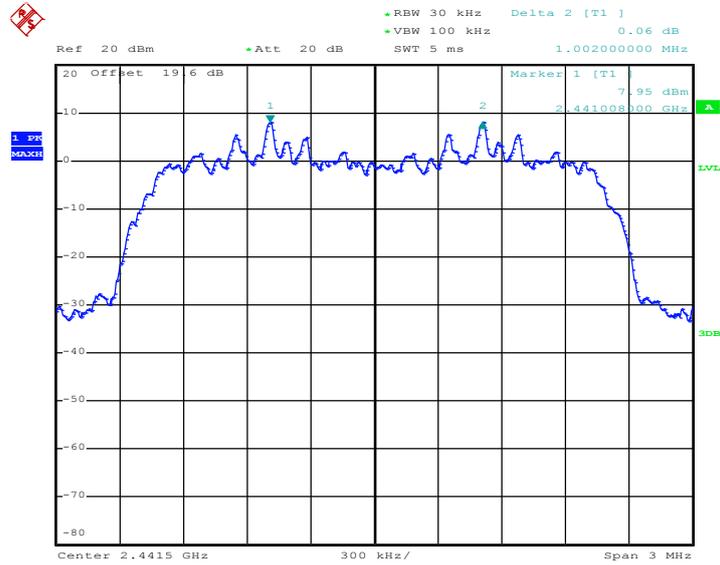
Channel Separation Plot on Channel 00 - 01



Date: 19.MAY.2011 22:03:19

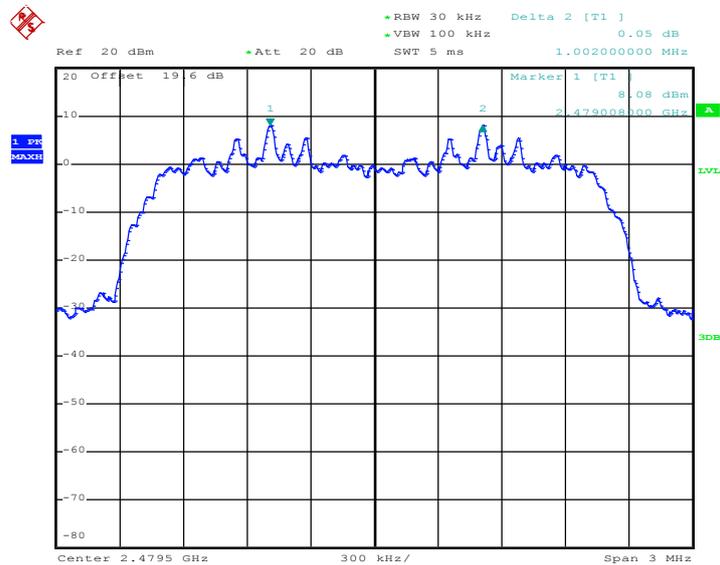


Channel Separation Plot on Channel 39 - 40



Date: 19.MAY.2011 23:03:09

Channel Separation Plot on Channel 77 - 78



Date: 19.MAY.2011 22:16:00

### 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.

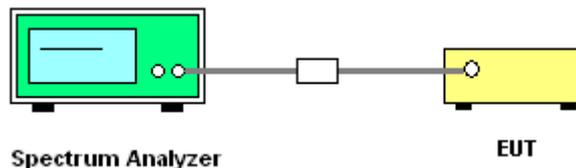
#### 3.4.2 Measuring Instruments

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 5	Temperature :	24~26°C
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

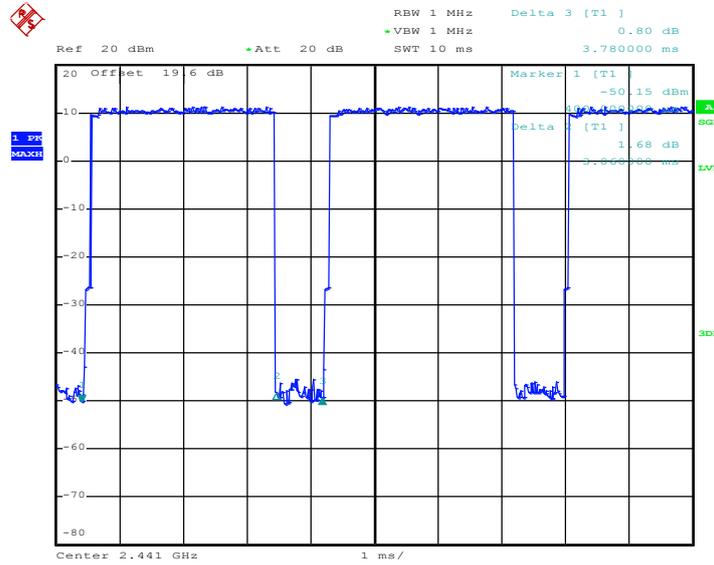
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH5	3.30	3060.00	0.32	0.4	Pass

**Remark:**

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

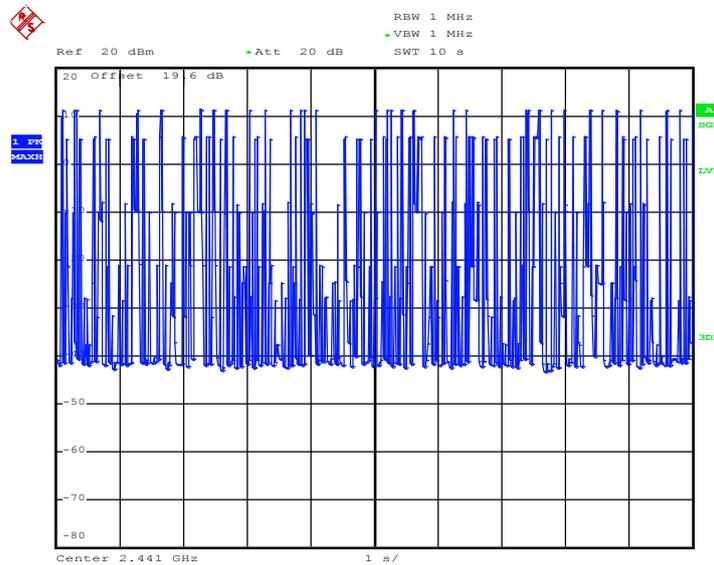


### 2DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 19.MAY.2011 22:35:19

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



Date: 19.MAY.2011 22:33:16

### 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).

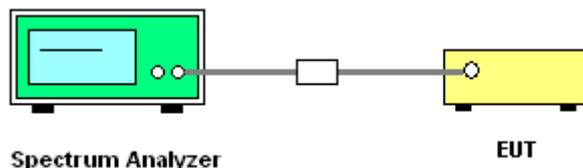
#### 3.5.2 Measuring Instruments

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

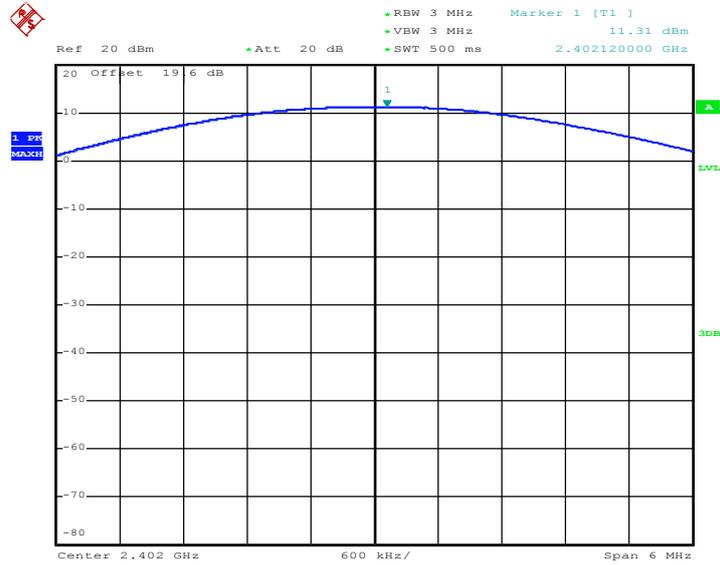


#### 3.5.5 Test Result of Peak Output Power

<b>Test Mode :</b>	Mode 4, 5, 6	<b>Temperature :</b>	24~26°C	
<b>Test Engineer :</b>	Hank Yu	<b>Relative Humidity :</b>	50~53%	
Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	11.31	20.97	Pass
39	2441	12.28	20.97	Pass
78	2480	11.95	20.97	Pass

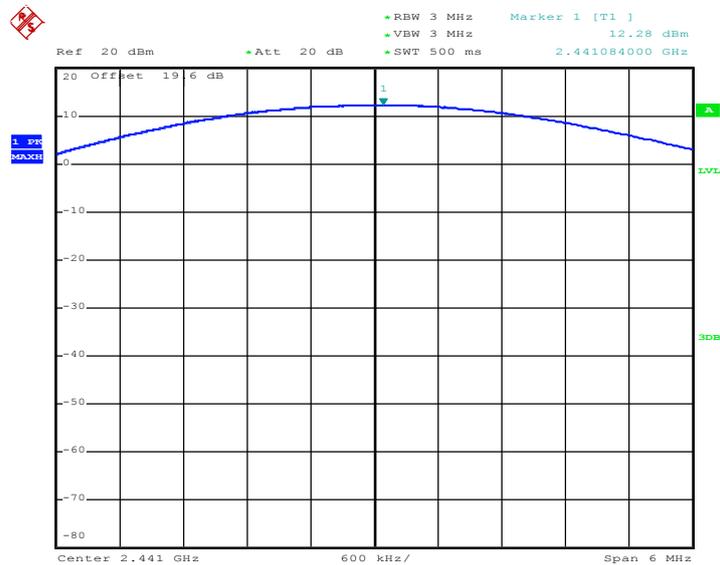


Peak Output Power Plot on Channel 00



Date: 18.MAY.2011 21:53:15

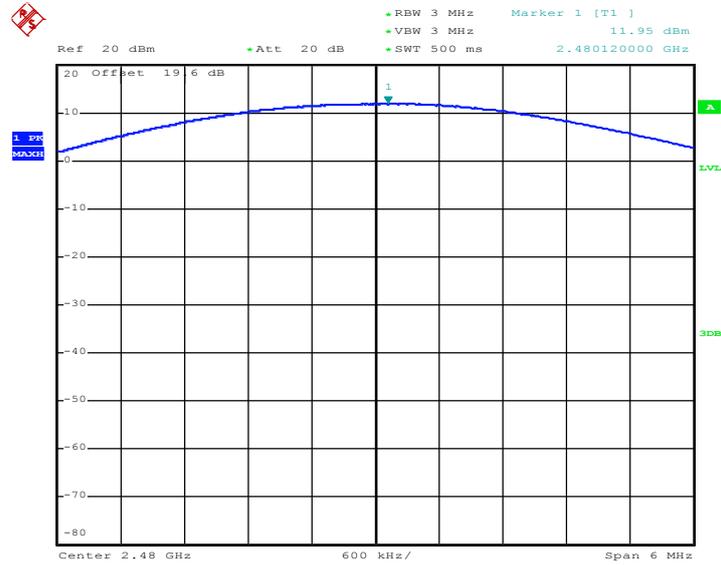
Peak Output Power Plot on Channel 39



Date: 18.MAY.2011 22:04:11



Peak Output Power Plot on Channel 78



Date: 18.MAY.2011 22:02:13



## **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**

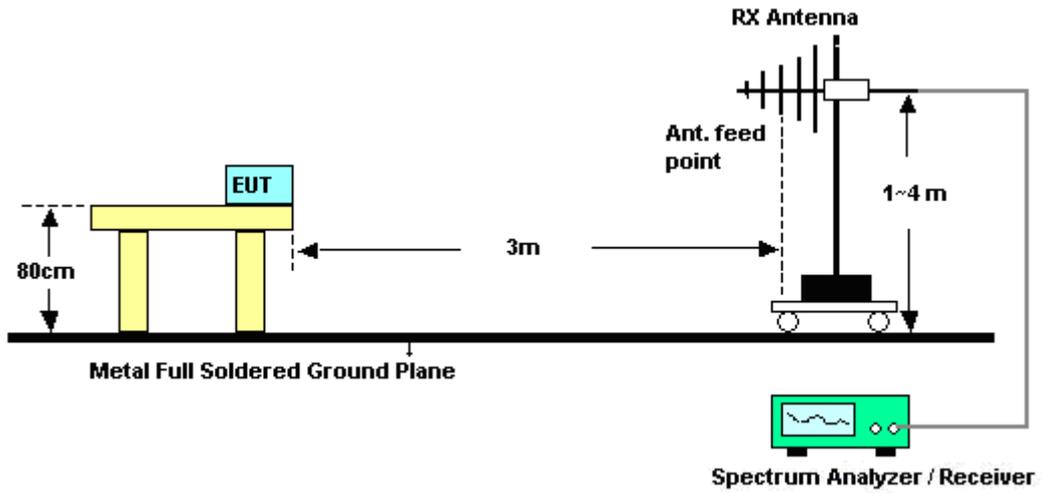
See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

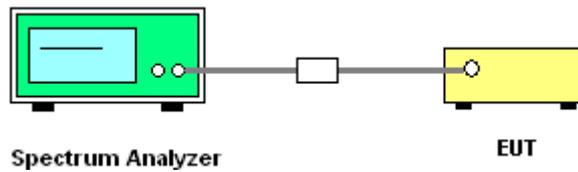
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band 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 :	49~51%
		Test Engineer :	Brian 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
2385.62	49.49	-24.51	74	47.4	31.7	4.47	34.08	100	235	Peak
2385.62	35.94	-18.06	54	33.85	31.7	4.47	34.08	100	235	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
2387.9	48.69	-25.31	74	46.6	31.7	4.47	34.08	100	24	Peak
2387.9	34.96	-19.04	54	32.87	31.7	4.47	34.08	100	24	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
		Test Engineer :	Brian 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	69.23	-4.77	74	66.94	31.78	4.59	34.08	129	206	Peak
2483.5	34.11	-19.89	54	31.82	31.78	4.59	34.08	129	206	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	89.99	55.88	34.11	54	-19.89	Pass
Hopping Mode	89.99	57.01	32.98	54	-21.02	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	67.93	-6.07	74	65.64	31.78	4.59	34.08	100	349	Peak
2483.5	31.61	-22.39	54	29.32	31.78	4.59	34.08	100	349	Average

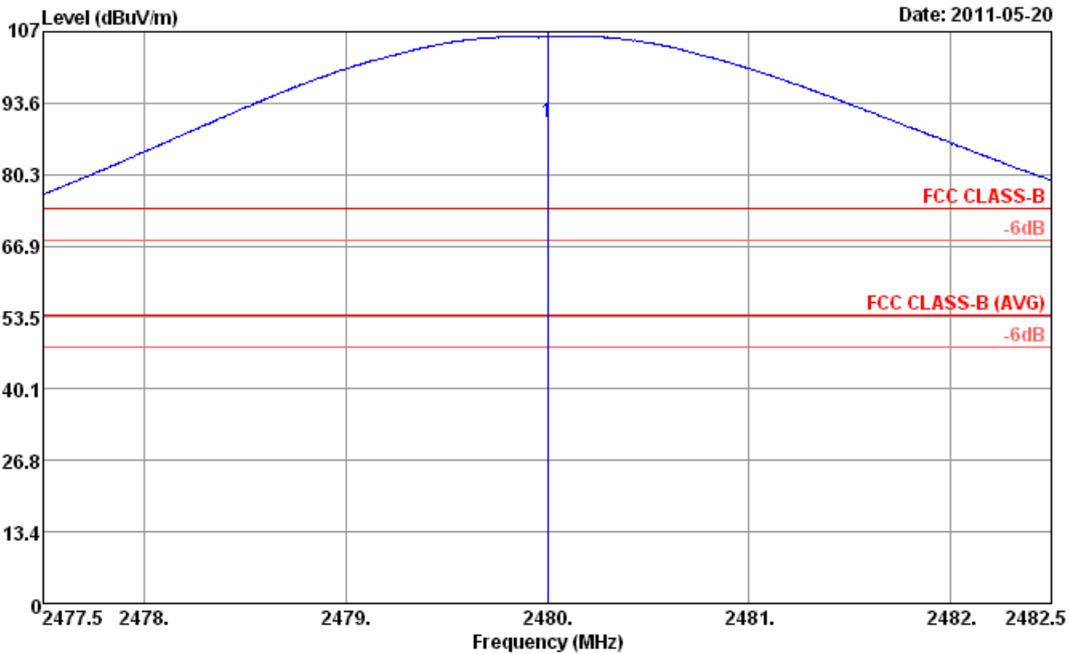
Summary results of marker-delta method:

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	86.94	55.33	31.61	54	-22.39	Pass
Hopping Mode	86.94	57.65	29.29	54	-24.71	Pass

Note : Average result = Maximum field strength – Delta result



Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal



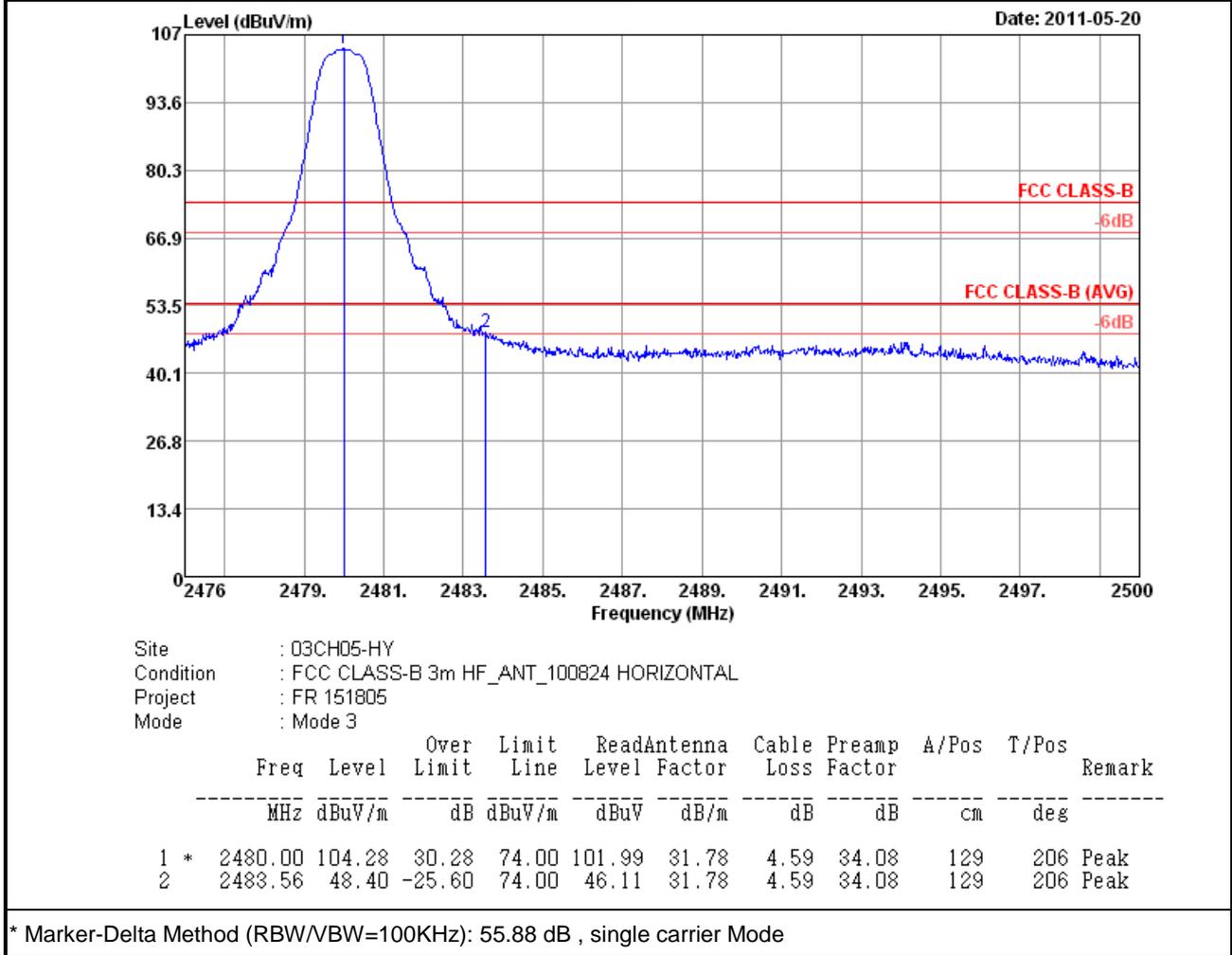
Site : 03CH05-HY  
 Condition : FCC CLASS-B 3m HF\_ANT\_100824 HORIZONTAL  
 Project : FR 151805  
 Mode : Mode 3

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 *	2480.00	89.99	35.99	54.00	87.70	31.78	4.59	34.08	129	206 Average
2 *	2480.00	108.22	34.22	74.00	105.93	31.78	4.59	34.08	129	206 Peak

\* Maximum field strength of the fundamental emission

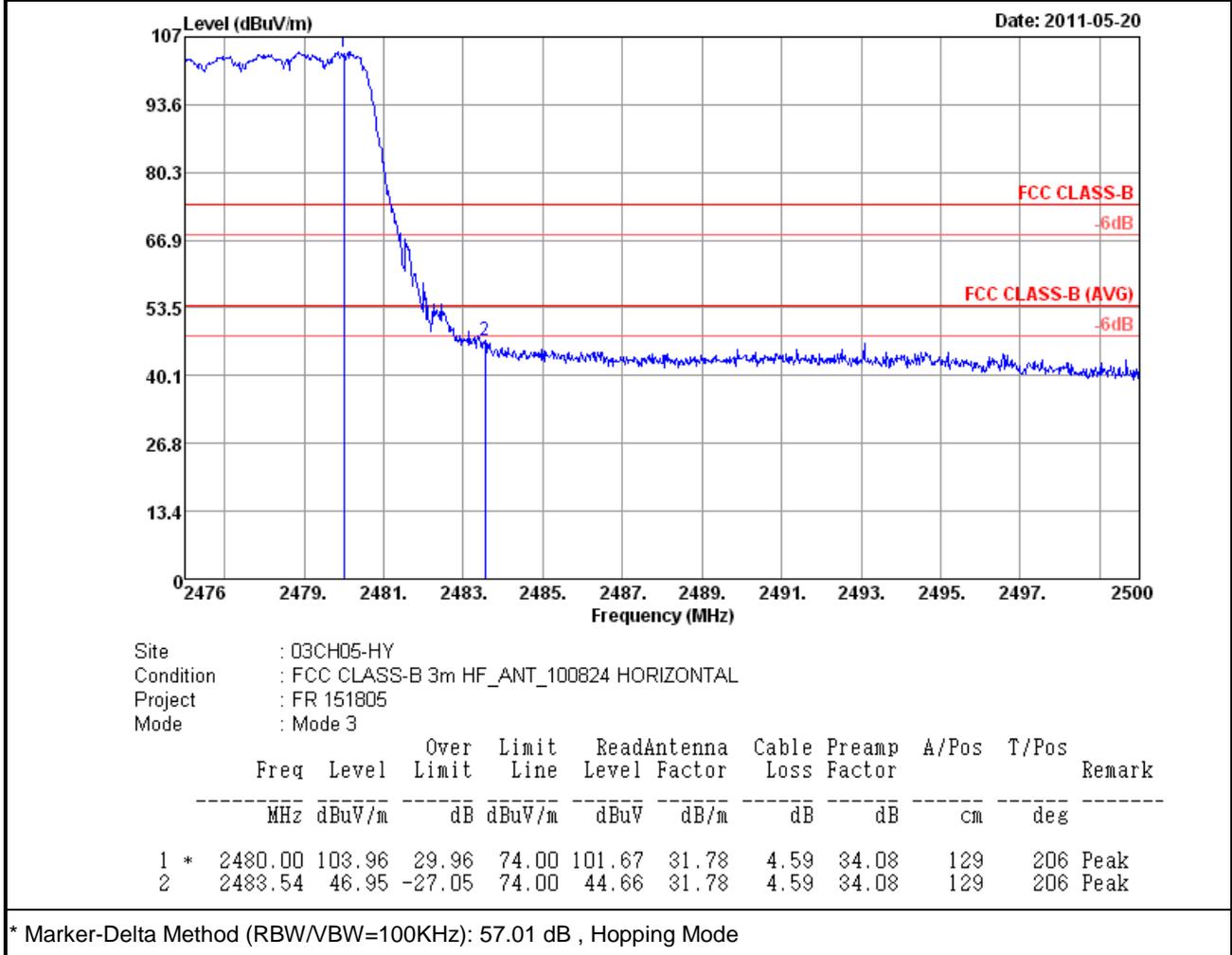


Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal



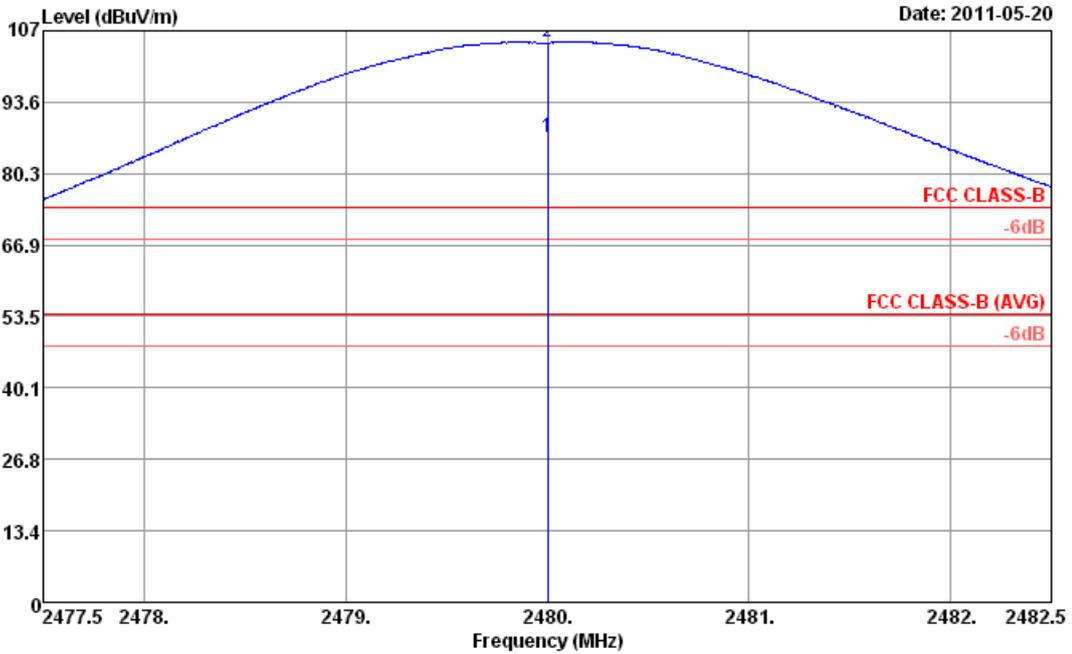


Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal





Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical



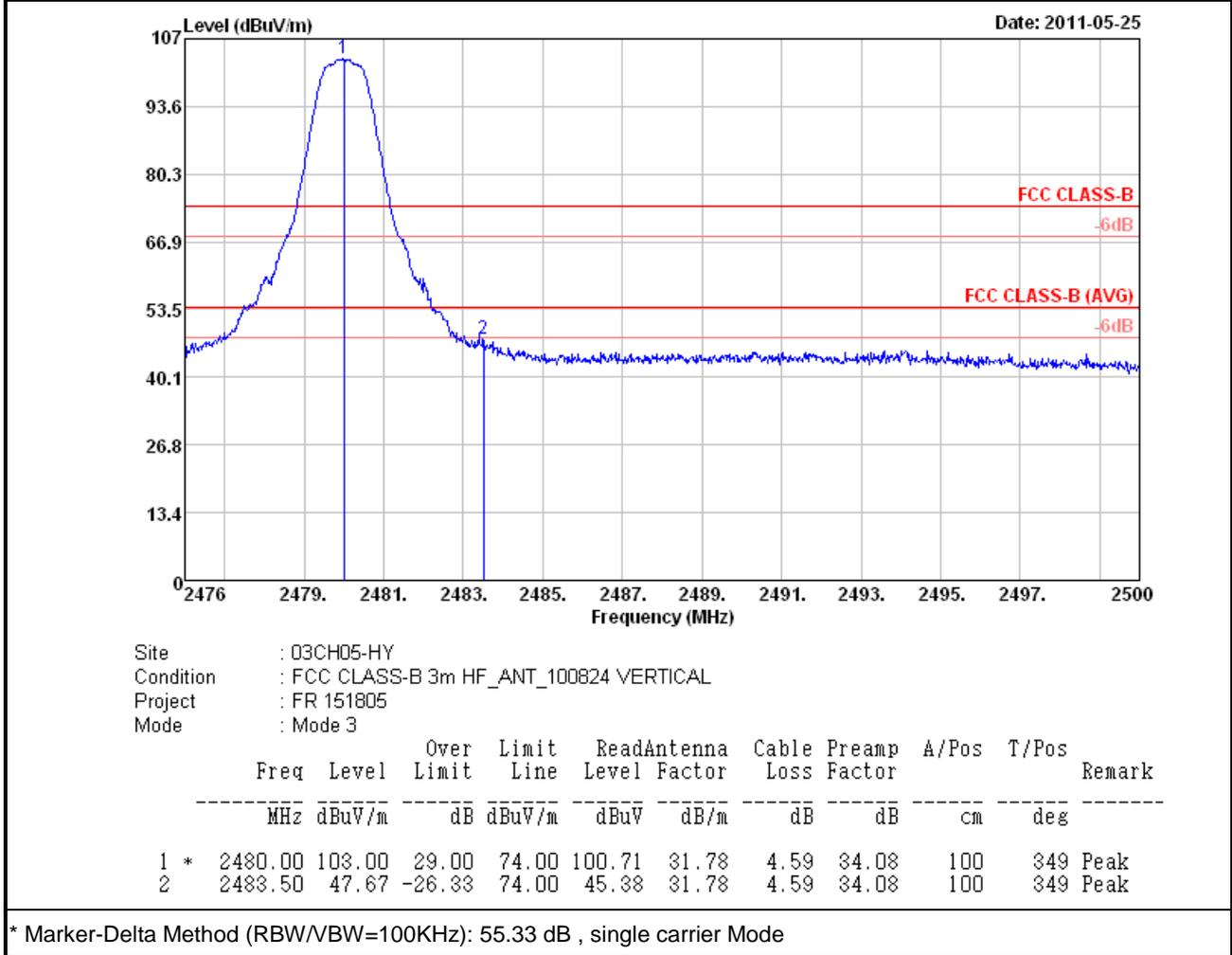
Site : 03CH05-HY  
 Condition : FCC CLASS-B 3m HF\_ANT\_100824 VERTICAL  
 Project : FR 151805  
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2480.00	86.94	32.94	54.00	84.65	31.78	4.59	34.08	100	349	Average
2 *	2480.00	104.91	30.91	74.00	102.62	31.78	4.59	34.08	100	349	Peak

\* Maximum field strength of the fundamental emission

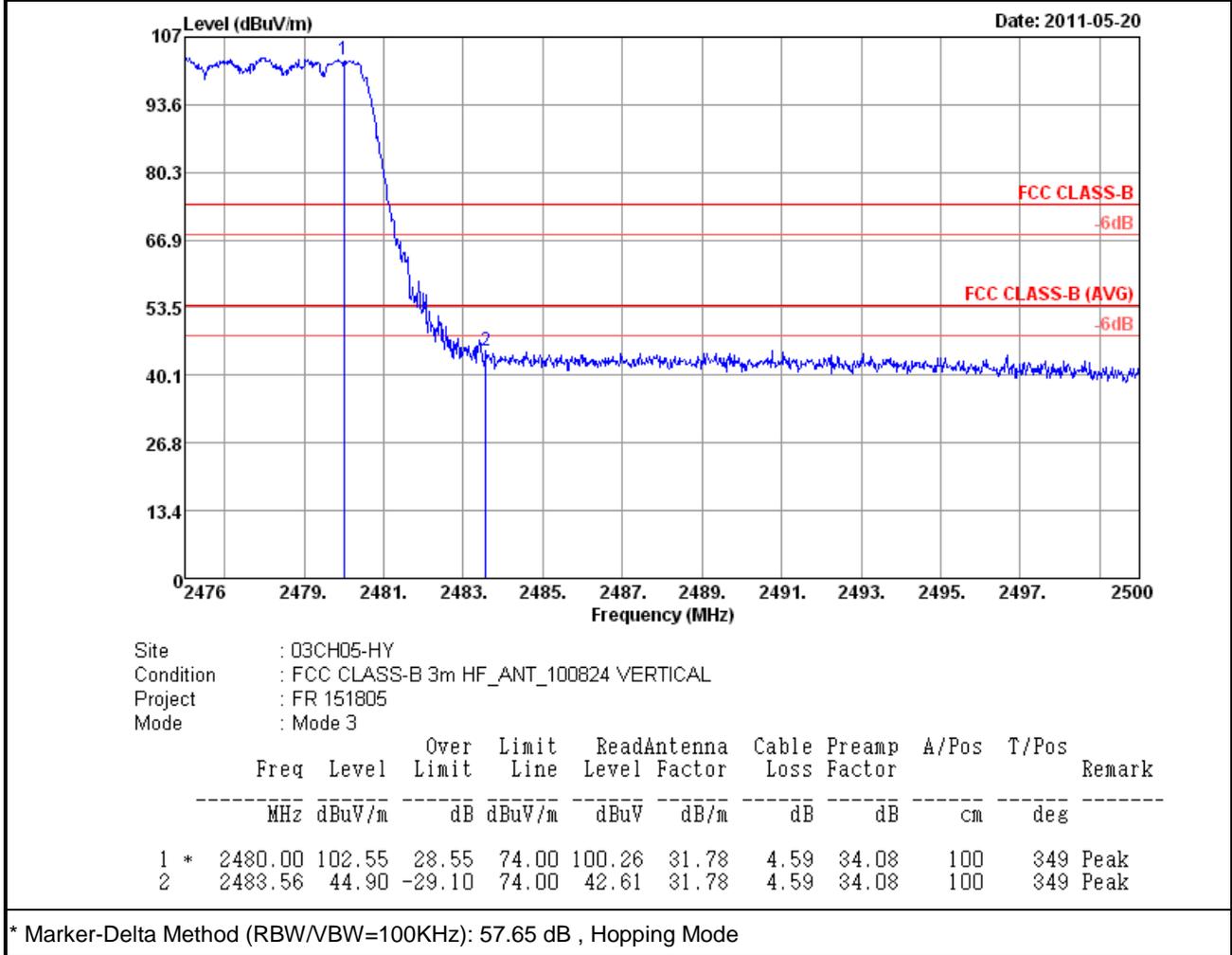


Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical





Test Mode :	Mode 3	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical

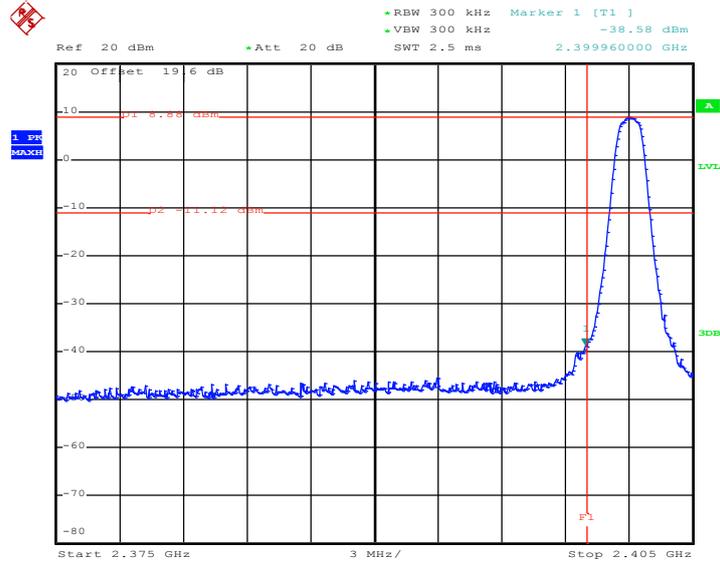




Test Result of Conducted Band Edges

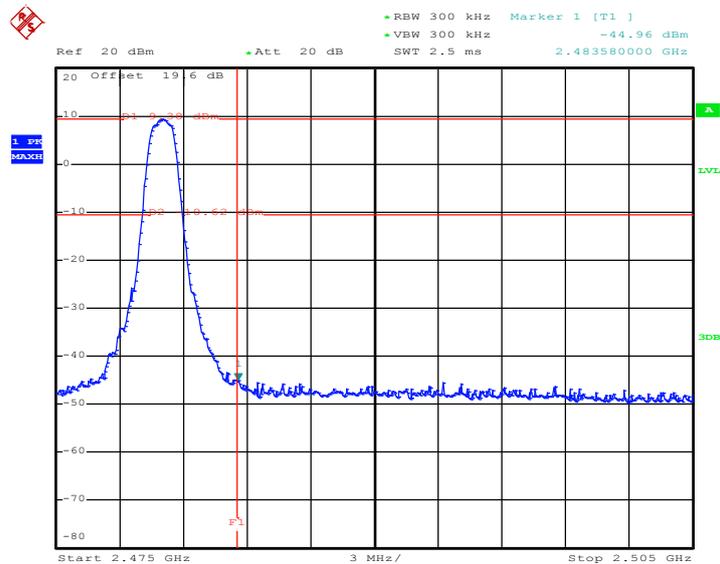
Test Mode :	Mode 4 and 6	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Hank Yu

Low Band Edge Plot on Channel 00



Date: 19.MAY.2011 21:57:34

High Band Edge Plot on Channel 78



Date: 19.MAY.2011 22:13:23

## 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.

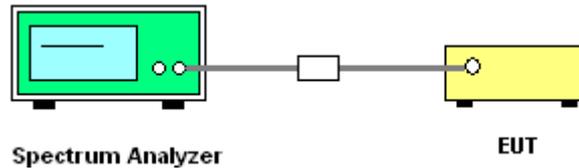
### 3.7.2 Measuring Instruments

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

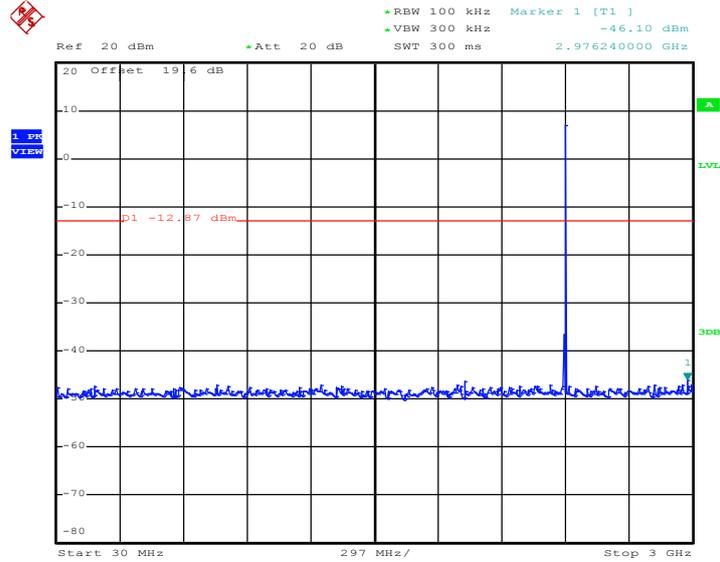




3.7.5 Test Result

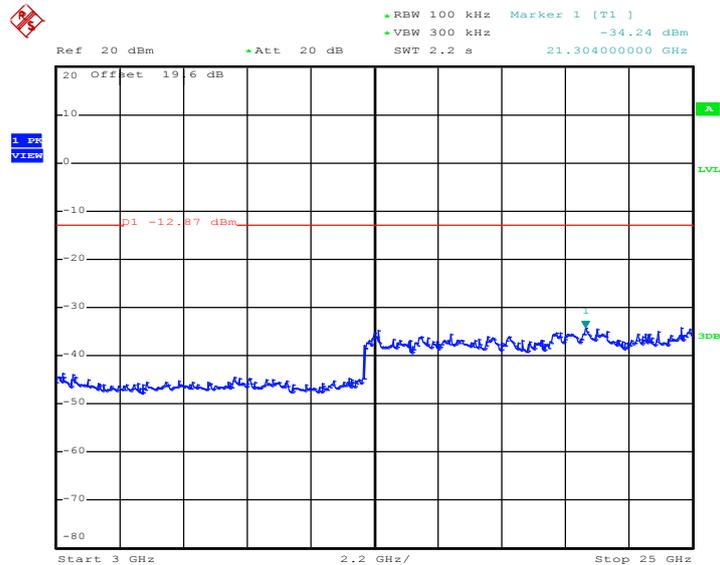
Test Mode :	Mode 4	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 19.MAY.2011 21:59:05

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

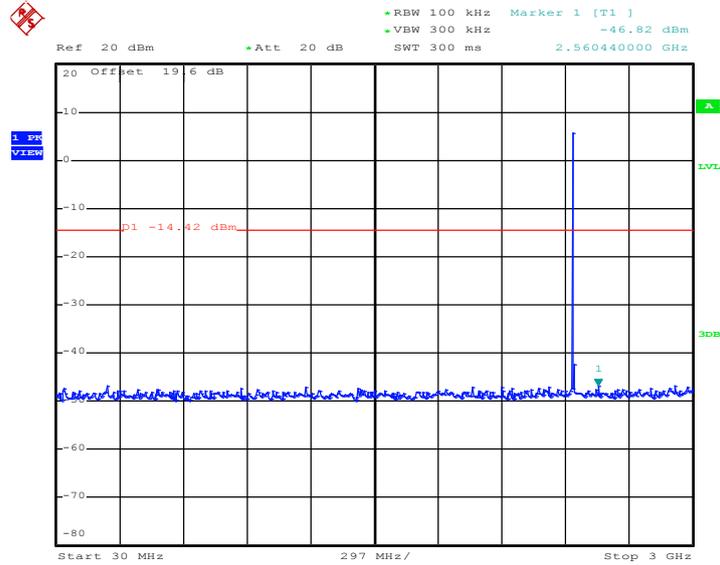


Date: 19.MAY.2011 21:59:27



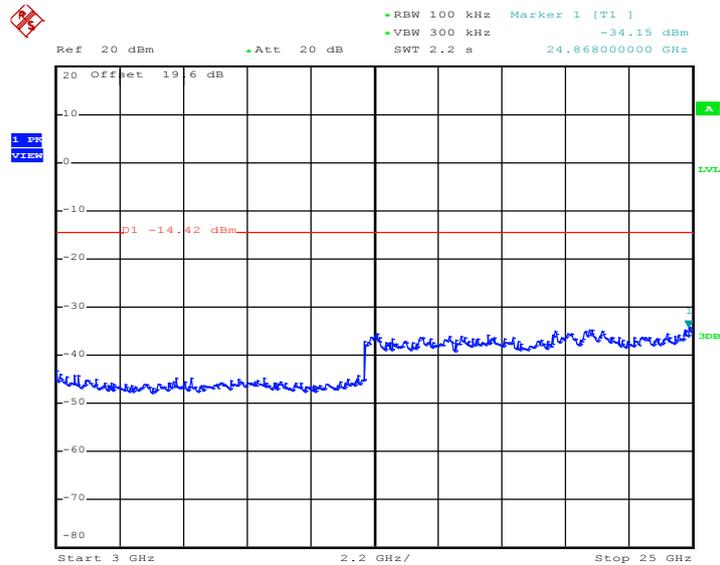
Test Mode :	Mode 5	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 19.MAY.2011 23:01:03

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

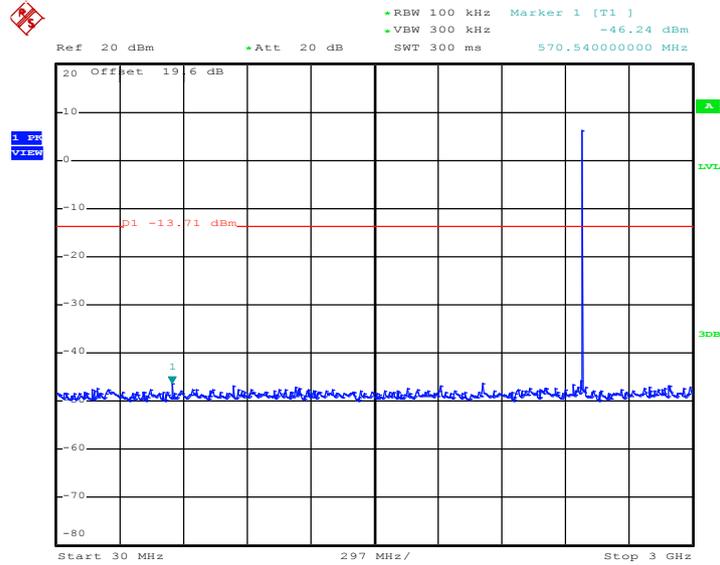


Date: 19.MAY.2011 23:01:24



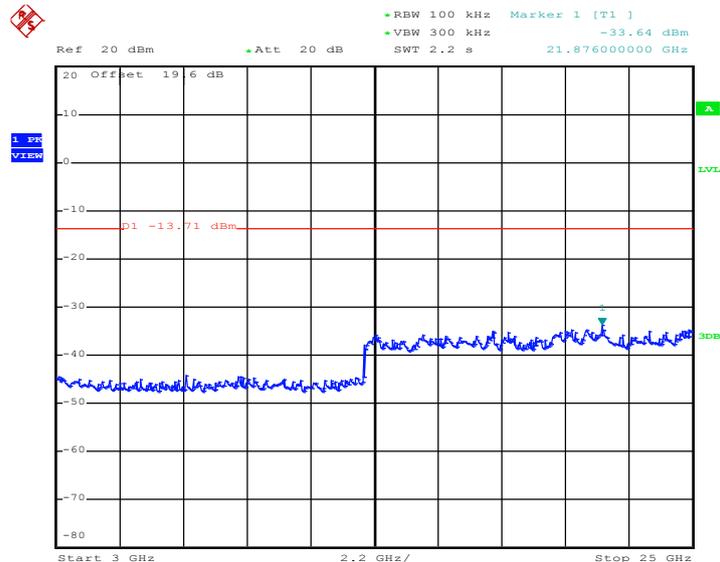
Test Mode :	Mode 6	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 19.MAY.2011 22:13:57

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 19.MAY.2011 22:14:18

## 3.8 AC Conducted Emission Measurement

### 3.8.1 Limit of AC Conducted Emission

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

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

\*Decreases with the logarithm of the frequency.

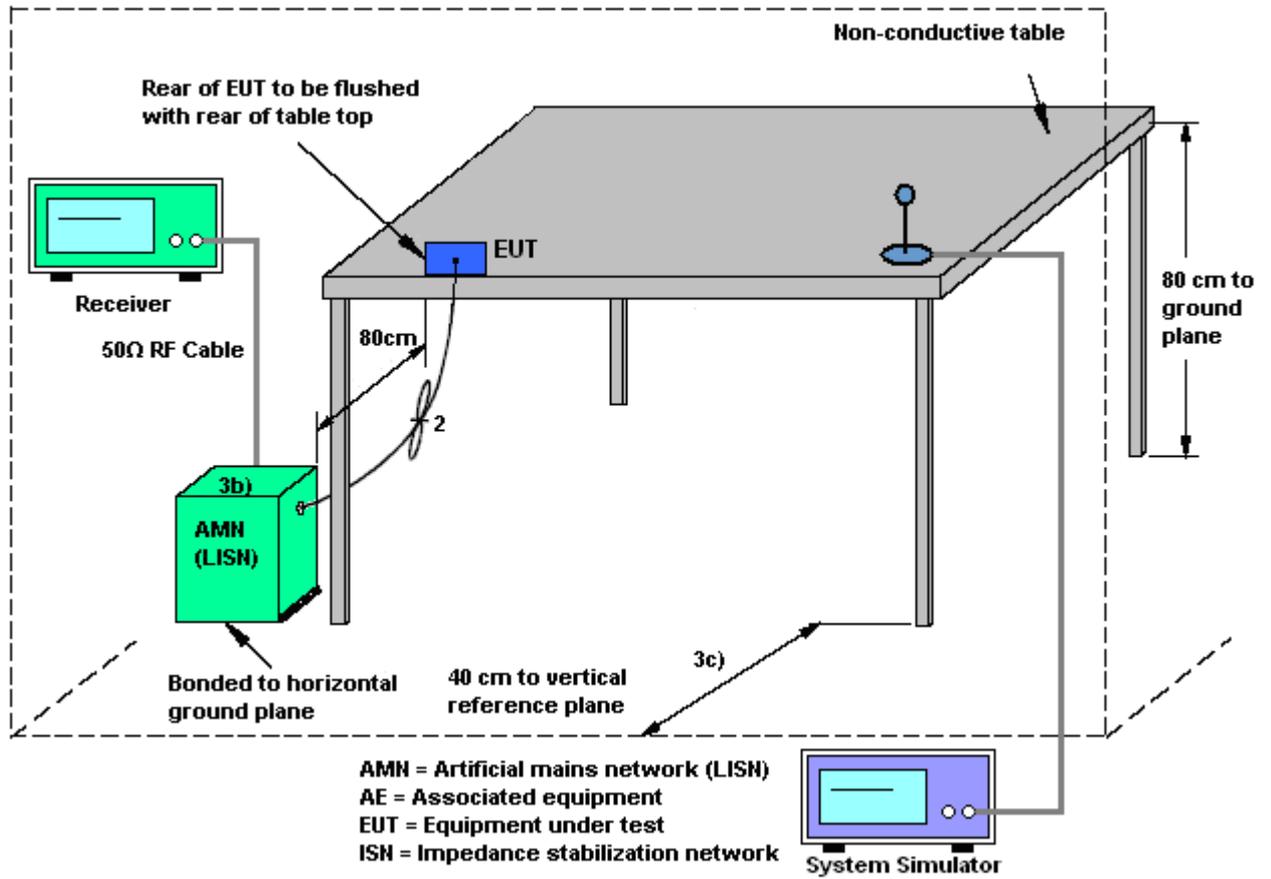
### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.8.3 Test Procedures

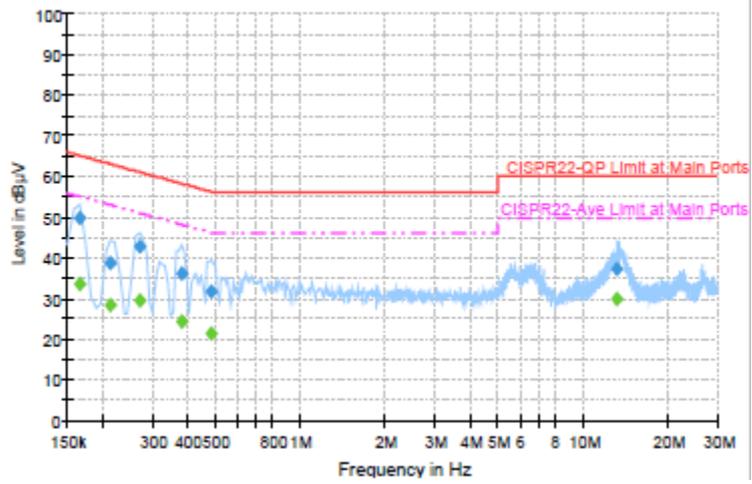
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All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

### 3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

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



Final Result 1

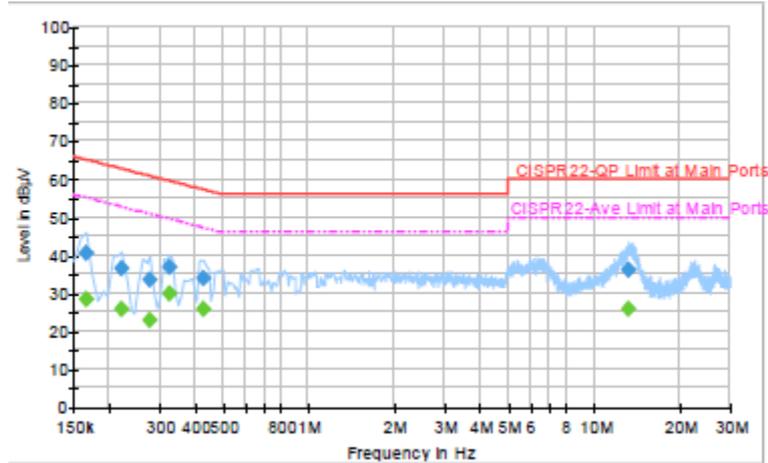
Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	49.8	Off	L1	19.4	15.8	65.6
0.214000	38.6	Off	L1	19.4	24.4	63.0
0.270000	42.7	Off	L1	19.4	18.2	60.9
0.382000	36.3	Off	L1	19.4	22.1	58.4
0.486000	31.6	Off	L1	19.4	24.6	56.2
13.190000	37.4	Off	L1	19.6	22.6	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	33.5	Off	L1	19.4	22.1	55.6
0.214000	28.2	Off	L1	19.4	24.8	53.0
0.270000	29.6	Off	L1	19.4	21.3	50.9
0.382000	24.5	Off	L1	19.4	23.9	48.4
0.486000	21.5	Off	L1	19.4	24.7	46.2
13.190000	30.0	Off	L1	19.6	20.0	50.0



Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Chiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + Bluetooth Link + USB Link + Battery + HDMI Cable + GPS Rx + HDMI TV + Earphone + USB Cable (Charging from 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	40.5	Off	N	19.4	25.1	65.6
0.222000	36.5	Off	N	19.4	26.5	63.0
0.278000	33.6	Off	N	19.4	27.8	61.4
0.326000	36.9	Off	N	19.4	22.7	59.6
0.430000	34.0	Off	N	19.5	23.3	57.3
13.262000	36.0	Off	N	19.7	24.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	28.5	Off	N	19.4	27.1	55.6
0.222000	25.7	Off	N	19.4	27.3	53.0
0.278000	22.7	Off	N	19.4	28.7	51.4
0.326000	29.9	Off	N	19.4	19.7	49.6
0.430000	26.0	Off	N	19.5	21.3	47.3
13.262000	25.9	Off	N	19.7	24.1	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

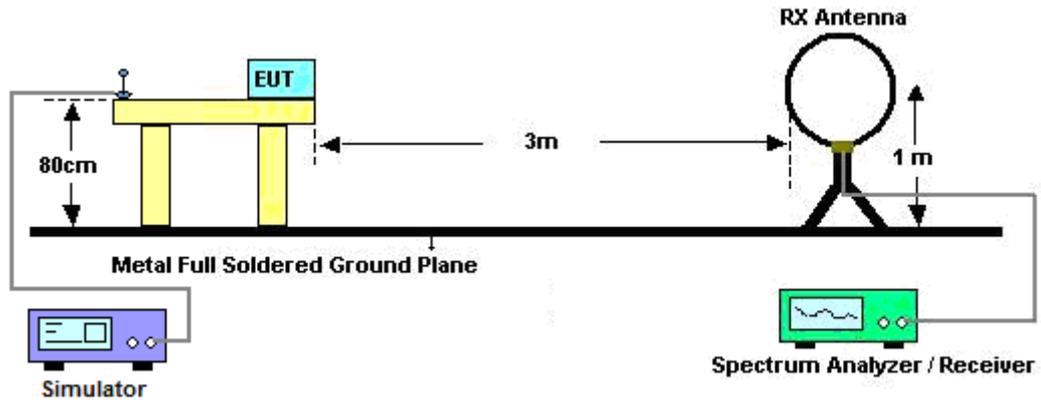
See list of measuring instruments of this test report.

#### 3.9.3 Test Procedures

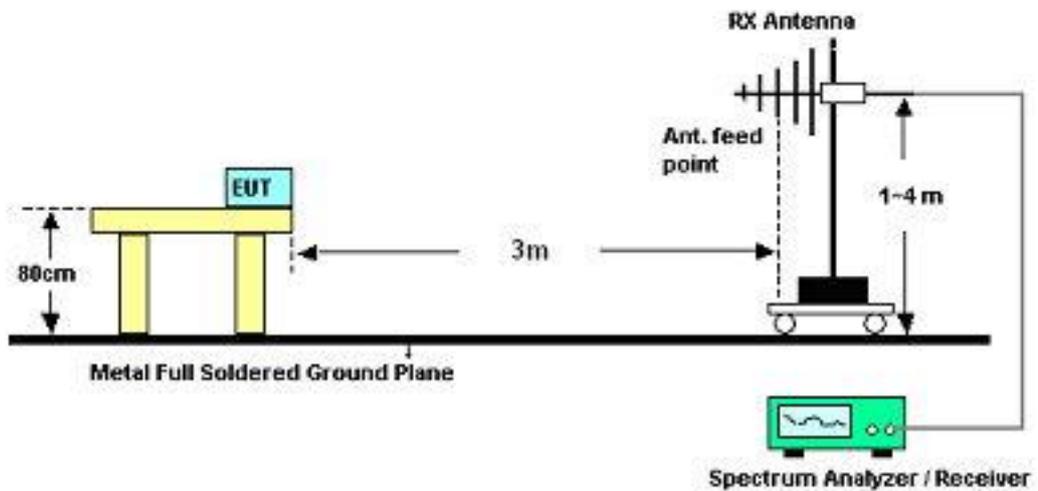
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
  - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep =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

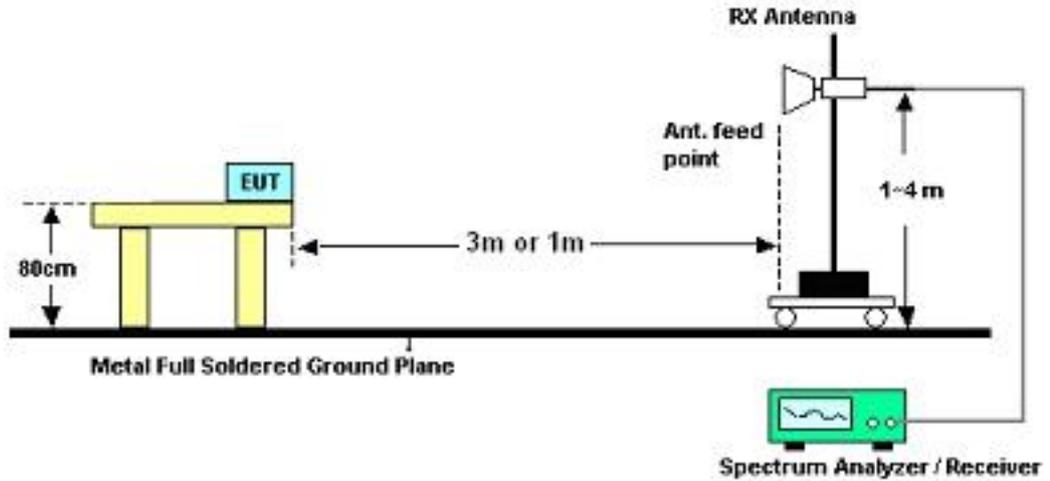
For radiated emissions below 30MHz



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 :	Brian Chang	Temperature :	23~25°C	
		Relative Humidity :	49~51%	
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 :	49~51%
Test Engineer :	Brian 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
216.03	30.91	-15.09	46	51.83	9.3	1.26	31.48	-	-	Peak
235.74	28.86	-17.14	46	48.38	10.65	1.34	31.51	-	-	Peak
259.23	31.17	-14.83	46	49.47	11.76	1.42	31.48	-	-	Peak
302.1	34.3	-11.7	46	51.78	12.24	1.55	31.27	-	-	Peak
345.5	32.05	-13.95	46	48.3	13.35	1.71	31.31	-	-	Peak
388.9	34.41	-11.59	46	49.37	14.48	1.77	31.21	128	310	Peak
2385.62	35.94	-18.06	54	33.85	31.7	4.47	34.08	100	235	Average
2385.62	49.49	-24.51	74	47.4	31.7	4.47	34.08	100	235	Peak
2402	86.42	-	-	84.3	31.7	4.5	34.08	100	235	Average
2402	103.55	-	-	101.43	31.7	4.5	34.08	100	235	Peak
2484	31.98	-22.02	54	29.69	31.78	4.59	34.08	100	235	Average
2484	47.51	-26.49	74	45.22	31.78	4.59	34.08	100	235	Peak



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	49~51%
<b>Test Engineer :</b>	Brian 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
62.67	35.97	-4.03	40	61.31	5.46	0.73	31.53	102	55	Peak
132.6	24.84	-18.66	43.5	44.47	10.82	1.07	31.52	-	-	Peak
216.03	30.89	-15.11	46	51.81	9.3	1.26	31.48	-	-	Peak
302.1	27.26	-18.74	46	44.74	12.24	1.55	31.27	-	-	Peak
345.5	28.18	-17.82	46	44.43	13.35	1.71	31.31	-	-	Peak
431.6	27.06	-18.94	46	40.85	15.5	1.87	31.16	-	-	Peak
2387.9	34.96	-19.04	54	32.87	31.7	4.47	34.08	100	24	Average
2387.9	48.69	-25.31	74	46.6	31.7	4.47	34.08	100	24	Peak
2402	84.54	-	-	82.42	31.7	4.5	34.08	100	24	Average
2402	102.13	-	-	100.01	31.7	4.5	34.08	100	24	Peak
2486	31.9	-22.1	54	29.61	31.78	4.59	34.08	100	24	Average
2486	45.11	-28.89	74	42.82	31.78	4.59	34.08	100	24	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	49~51%
<b>Test Engineer :</b>	Brian 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
216.03	30.69	-15.31	46	51.61	9.3	1.26	31.48	-	-	Peak
238.44	28.29	-17.71	46	47.6	10.86	1.34	31.51	-	-	Peak
259.23	30.96	-15.04	46	49.26	11.76	1.42	31.48	-	-	Peak
302.1	33.47	-12.53	46	50.95	12.24	1.55	31.27	-	-	Peak
345.5	31.58	-14.42	46	47.83	13.35	1.71	31.31	-	-	Peak
388.9	34.92	-11.08	46	49.88	14.48	1.77	31.21	176	255	Peak
2364	31.64	-22.36	54	29.62	31.66	4.44	34.08	161	244	Average
2364	44.74	-29.26	74	42.72	31.66	4.44	34.08	161	244	Peak
2441	87.32	-	-	85.09	31.75	4.56	34.08	161	244	Average
2441	105.02	-	-	102.79	31.75	4.56	34.08	161	244	Peak
2486	32.29	-21.71	54	30	31.78	4.59	34.08	161	244	Average
2486	45.04	-28.96	74	42.75	31.78	4.59	34.08	161	244	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	49~51%
<b>Test Engineer :</b>	Brian 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
62.67	35.27	-4.73	40	60.61	5.46	0.73	31.53	100	123	Peak
98.85	27.82	-15.68	43.5	49.15	9.29	0.95	31.57	-	-	Peak
216.03	30.1	-15.9	46	51.02	9.3	1.26	31.48	-	-	Peak
302.1	26.83	-19.17	46	44.31	12.24	1.55	31.27	-	-	Peak
345.5	28.92	-17.08	46	45.17	13.35	1.71	31.31	-	-	Peak
431.6	28	-18	46	41.79	15.5	1.87	31.16	-	-	Peak
2350	31.59	-22.41	54	29.6	31.64	4.44	34.09	100	16	Average
2350	44.95	-29.05	74	42.96	31.64	4.44	34.09	100	16	Peak
2441	86.32	-	-	84.09	31.75	4.56	34.08	100	16	Average
2441	104.31	-	-	102.08	31.75	4.56	34.08	100	16	Peak
2494	32.26	-21.74	54	29.92	31.8	4.62	34.08	100	16	Average
2494	45.63	-28.37	74	43.29	31.8	4.62	34.08	100	16	Peak



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	49~51%
<b>Test Engineer :</b>	Brian 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
216.03	31.76	-14.24	46	52.68	9.3	1.26	31.48	-	-	Peak
238.44	28.68	-17.32	46	47.99	10.86	1.34	31.51	-	-	Peak
259.23	31.2	-14.8	46	49.5	11.76	1.42	31.48	-	-	Peak
302.1	33.83	-12.17	46	51.31	12.24	1.55	31.27	-	-	Peak
345.5	32.35	-13.65	46	48.6	13.35	1.71	31.31	-	-	Peak
388.2	34.15	-11.85	46	49.13	14.46	1.77	31.21	145	23	Peak
2370	31.57	-22.43	54	29.5	31.68	4.47	34.08	129	206	Average
2370	44.45	-29.55	74	42.38	31.68	4.47	34.08	129	206	Peak
2480	90.16	-	-	87.87	31.78	4.59	34.08	129	206	Average
2480	108.04	-	-	105.75	31.78	4.59	34.08	129	206	Peak
2483.5	34.11	-19.89	54	31.82	31.78	4.59	34.08	129	206	Average
2483.5	69.23	-4.77	74	66.94	31.78	4.59	34.08	129	206	Peak



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	49~51%
<b>Test Engineer :</b>	Brian 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
62.67	34.68	-5.32	40	60.02	5.46	0.73	31.53	101	196	Peak
131.52	23.62	-19.88	43.5	43.23	10.84	1.07	31.52	-	-	Peak
216.03	30.07	-15.93	46	50.99	9.3	1.26	31.48	-	-	Peak
302.1	27.03	-18.97	46	44.51	12.24	1.55	31.27	-	-	Peak
345.5	28.59	-17.41	46	44.84	13.35	1.71	31.31	-	-	Peak
431.6	28.23	-17.77	46	42.02	15.5	1.87	31.16	-	-	Peak
2310	31.39	-22.61	54	29.49	31.61	4.38	34.09	100	349	Average
2310	44	-30	74	42.1	31.61	4.38	34.09	100	349	Peak
2480	86.73	-	-	84.44	31.78	4.59	34.08	100	349	Average
2480	104.71	-	-	102.42	31.78	4.59	34.08	100	349	Peak
2483.5	31.61	-22.39	54	29.32	31.78	4.59	34.08	100	349	Average
2483.5	67.93	-6.07	74	65.64	31.78	4.59	34.08	100	349	Peak



## **3.10 Antenna Requirements**

### **3.10.1 Standard Applicable**

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

### **3.10.2 Antenna Connected Construction**

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

### **3.10.3 Antenna Gain**

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

## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jun. 08, 2009	Jun. 07, 2011	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 11, 2010	Jun. 10, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 30, 2010	Jul. 29, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	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)
ISN	Teseq GmbH	ISN T400A	25696	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T800	27134	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000485	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000484	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101352	9KHz-40GHz	Nov. 03, 2010	Nov. 02, 2011	Radiation (03CH05-HY)
Amplifier	COM-POWER	PA-103	161075	1KHz - 1GHz	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 1GHz	Nov. 06, 2010	Nov. 05, 2011	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 14, 2011	Apr. 13, 2012	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 - 360 degree	N/A	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m - 4 m	N/A	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	00066584	1GHz ~ 18GHz	Aug. 05, 2010	Aug. 04, 2011	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH05-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan.13, 2011	Jan.13, 2013	Radiation (03CH05-HY)

## 5 Uncertainty of Evaluation

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

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

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

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



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

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



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

Please refer to Sporton report number EP151805-01 as below.