

# FCC RF Test Report

APPLICANT : PEGATRON CORPORATION  
EQUIPMENT : Tablet  
BRAND NAME : TOSHIBA, Excite  
MODEL NAME : TOSHIBA AT330, Excite 13 AT330, Excite 13 AT335  
FCC ID : VUIPDT4330LBNFC  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Mar. 15, 2012 and completely tested on Apr. 04, 2012. 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:



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Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

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SPORTON INTERNATIONAL INC.

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FCC ID : VUIPDT4330LBNFC

Page Number : 1 of 58

Report Issued Date : May 04, 2012

Report Version : Rev. 01



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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR232266-05A	Rev. 01	Initial issue of report	May 04, 2012

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	$\geq 15\text{Chs}$	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	$\geq 2/3$ of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	$\leq 125\text{ mW}$	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.8	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 9.20 dB at 0.190 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.12 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

**PEGATRON CORPORATION**

No. 76, Ligong St., Beitou District, Taipei City 11261

## 1.2 Manufacturer

**PEGATRON CORPORATION**

No. 76, Ligong St., Beitou District, Taipei City 11261

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Tablet
Brand Name	TOSHIBA, Excite
Model Name	TOSHIBA AT330, Excite 13 AT330, Excite 13 AT335
FCC ID	VUIPDT4330LBNFC
Sample 1	EUT with 32G eMMC(NFC)
Sample 2	EUT with 16G eMMC
Sample 3	EUT with 32G eMMC
Sample 4	EUT with 64G eMMC
Tx/Rx Frequency Range	Bluetooth : 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) : 2.37 dBm (0.0017 W) Bluetooth EDR (2Mbps) : 2.01 dBm (0.0016 W) Bluetooth EDR (3Mbps) : 2.51 dBm (0.0018 W)
Antenna Type	Chip Antenna with gain 4.20 dBi
HW Version	1.02
SW Version	Android 4.0.3
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

### Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The model names (TOSHIBA AT330, Excite 13 AT330, Excite 13 AT335) are identical on hardware. The only difference is the label of different branding for different customer.

## 1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	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		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH07-HY	722060/4086B-1

## 1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003
- IC RSS-210 Issue 8
- 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.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY70DA2029	N/A	N/A
5.	LCD Monitor	HANNspree	ST19Z00_CN4	N/A	Shielded, 1.6 m	Unshielded, 1.8 m
6.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
8.	iPod Earphone	Apple	N/A	FCC DoC	Unshielded, 1.0 m	N/A
9.	Earphone	Kolin	Kit-7460E	FCC DoC	Unshielded, 1.6 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	1.57	2.51	2.27

**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).

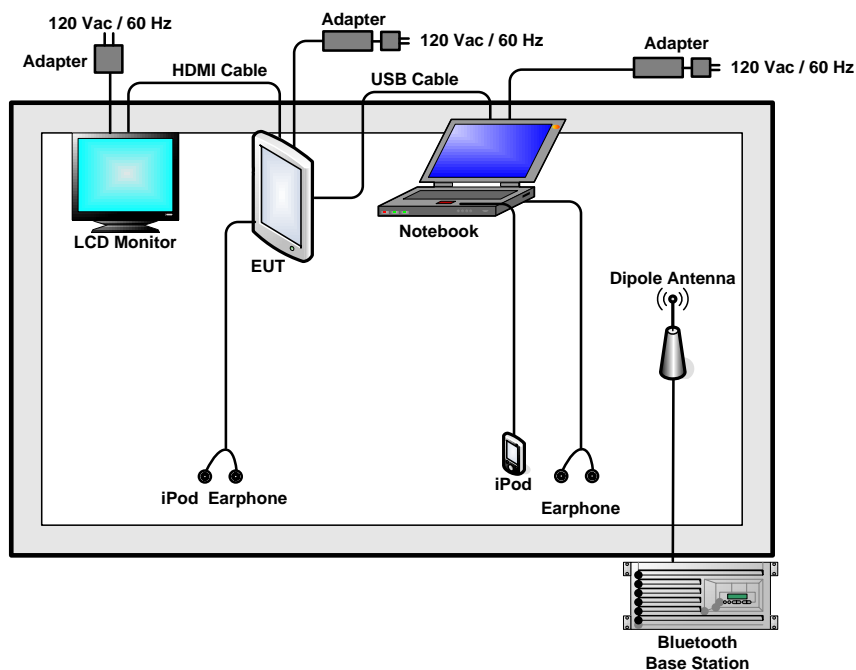
Pre-scanned tests were conducted to determine the final configuration from all possible combinations. Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations, laptop / tablet modes.

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

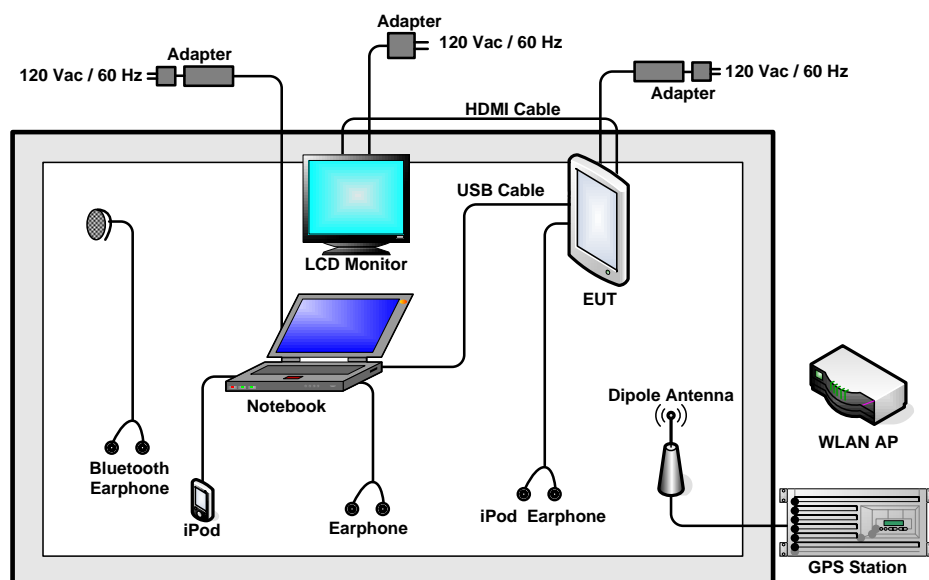
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz 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 : WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1 Mode 2 : WLAN Link + Bluetooth Link + MPEG4 + Adapter 2 + NFC On + TC for Sample 1 Mode 3 : WLAN Link + Bluetooth Link + Camera + Adapter 3 + NFC On + TC for Sample 1 Mode 4 : WLAN Link + Bluetooth Link + H-Pattern + Adapter 4 + NFC On + TC for Sample 1		
Remark: 1. TC stands for Test Configuration, and consists of HDMI Cable, iPod earphone, USB Cable (Data Link with NB), and SD Card. 2. 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. 3. For conducted emission, the worst case is mode 1; only the test data of this mode was reported. 4. For radiated TCs, all the tests were performance with TC, Adapter 1, and Sample 1.			

## 2.3 Connection Diagram of Test System

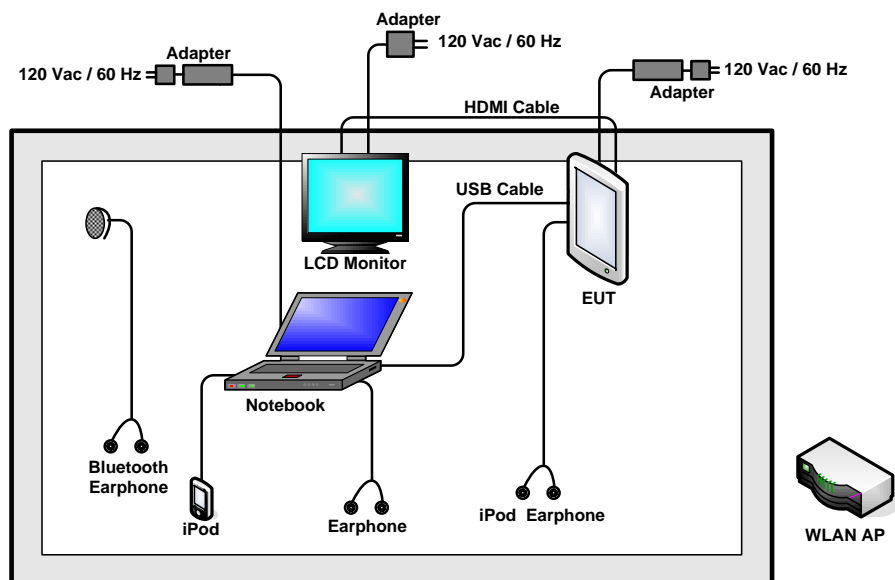
### <Bluetooth Tx Mode>



### <AC Conducted Emission in GPS Rx Mode>



### <AC Conducted Emission Mode>



## 2.4 RF Utility

For Bluetooth function, the RF utility, execute "ADB" was installed in EUT which was programmed in order to make the EUT to contact with Bluetooth base station for transmitting and receiving continuous signals.

### 3 Test Result

#### 3.1 Number of Channel Measurement

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

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

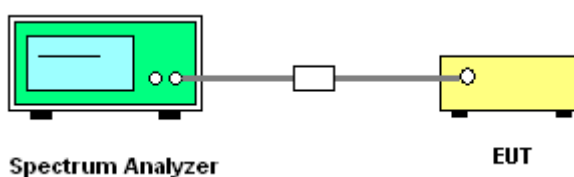
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedure

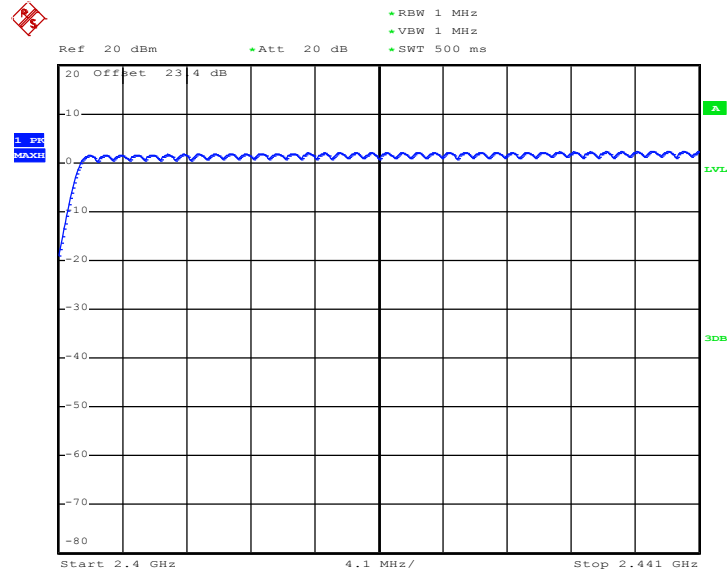
1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use 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

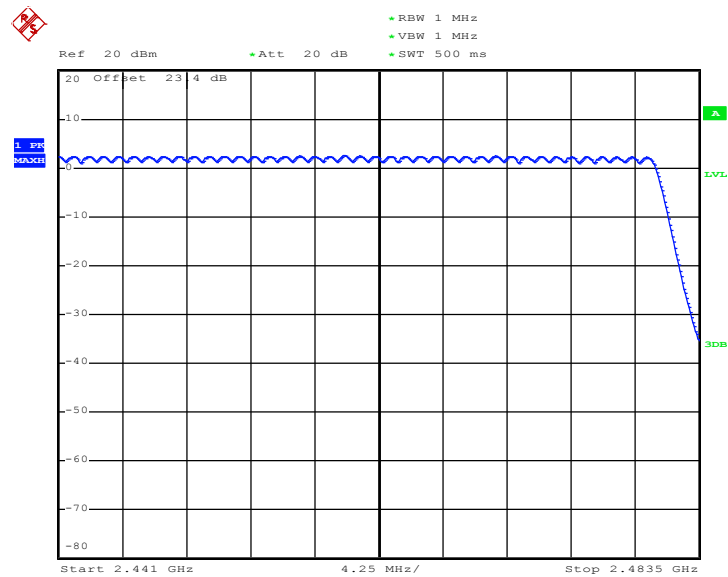


##### 3.1.5 Test Result of Number of Hopping Frequency

<b>Test Mode :</b>	Mode 7~9	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass

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


Date: 19.MAR.2012 21:17:38



Date: 19.MAR.2012 21:24:45

## 3.2 20dB Bandwidth Measurement

### 3.2.1 Limit of 20dB Bandwidth

N/A

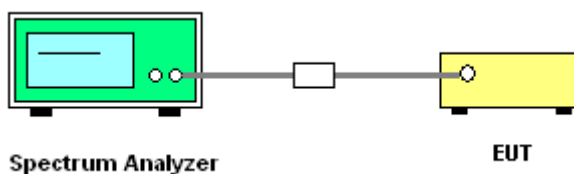
### 3.2.2 Measuring Instruments

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

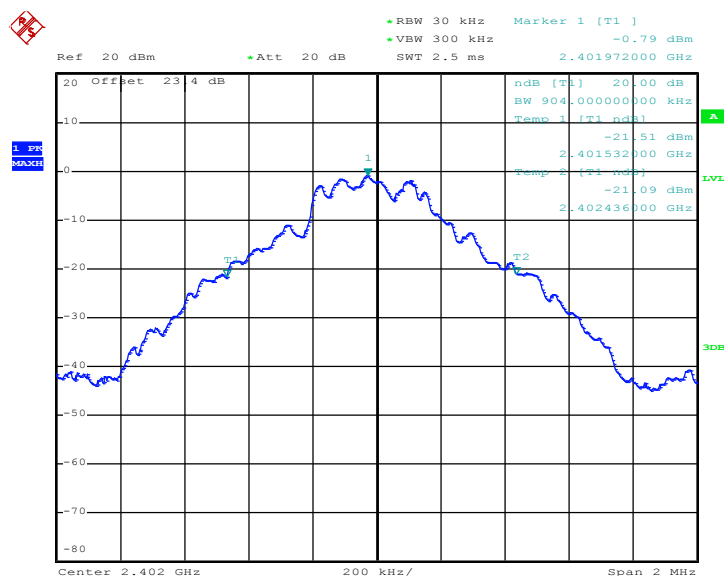


### 3.2.5 Test Result of 20dB Bandwidth

<b>Test Mode :</b>	Mode 1, 2, 3	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.904
39	2441	0.904
78	2480	0.900

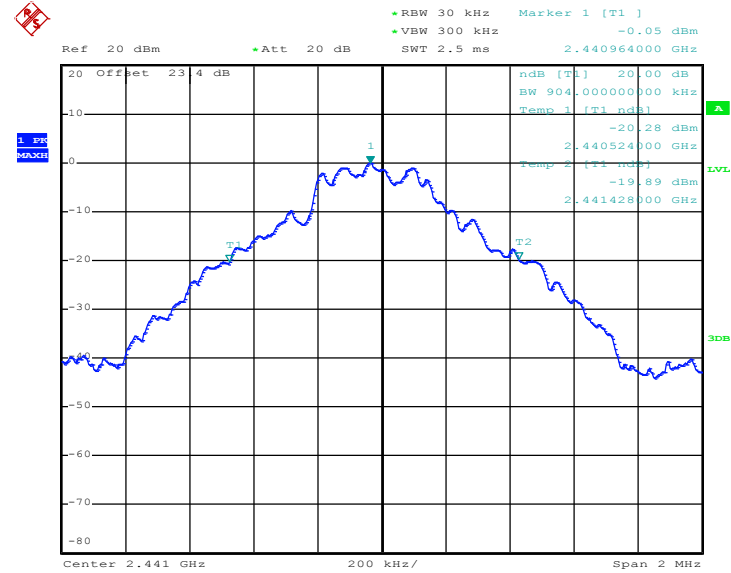
**20 dB Bandwidth Plot on Channel 00**



Date: 19.MAR.2012 20:44:42

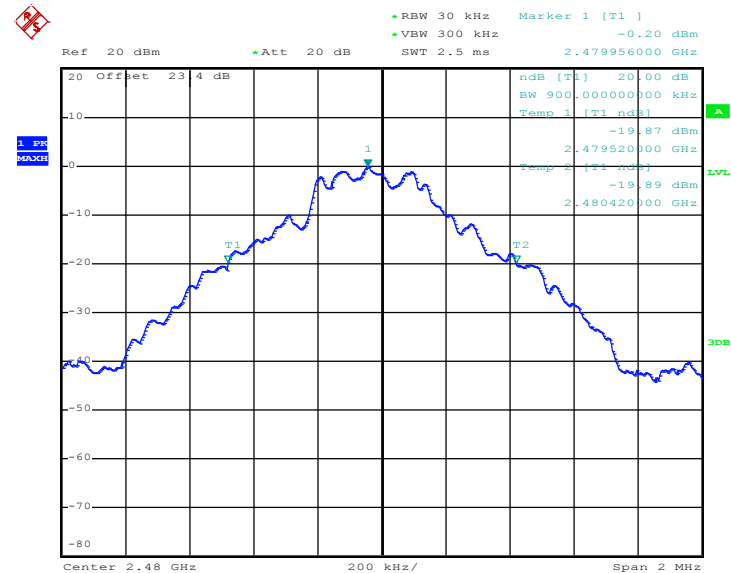


### 20 dB Bandwidth Plot on Channel 39



Date: 19.MAR.2012 20:45:05

### 20 dB Bandwidth Plot on Channel 78

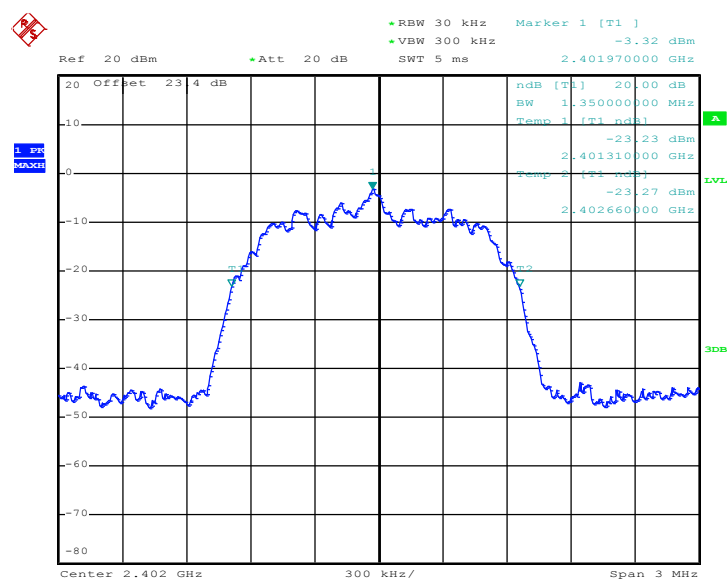


Date: 19.MAR.2012 20:45:43

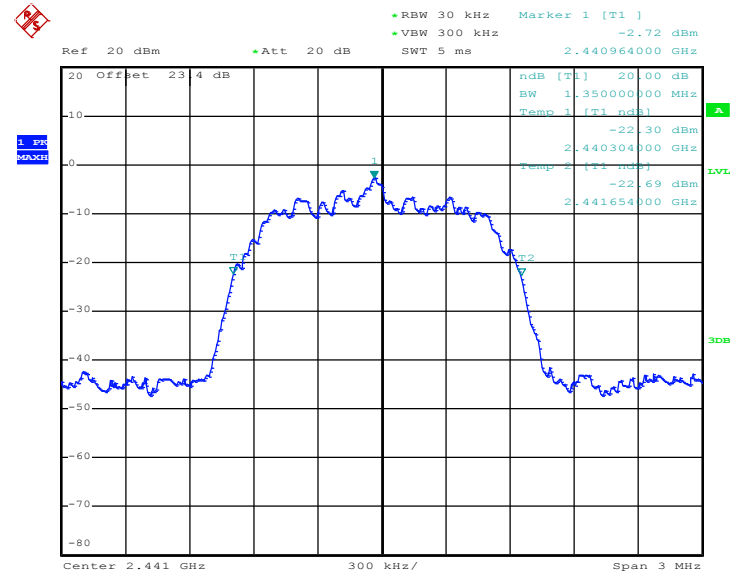


<b>Test Mode :</b>	Mode 4, 5, 6	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%

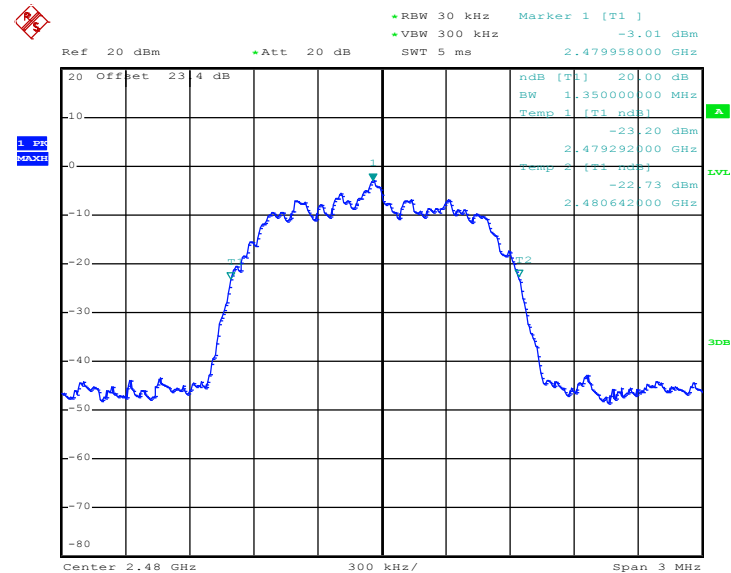
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.350
39	2441	1.350
78	2480	1.350

**20 dB Bandwidth Plot on Channel 00**


Date: 19.MAR.2012 20:46:26

**20 dB Bandwidth Plot on Channel 39**


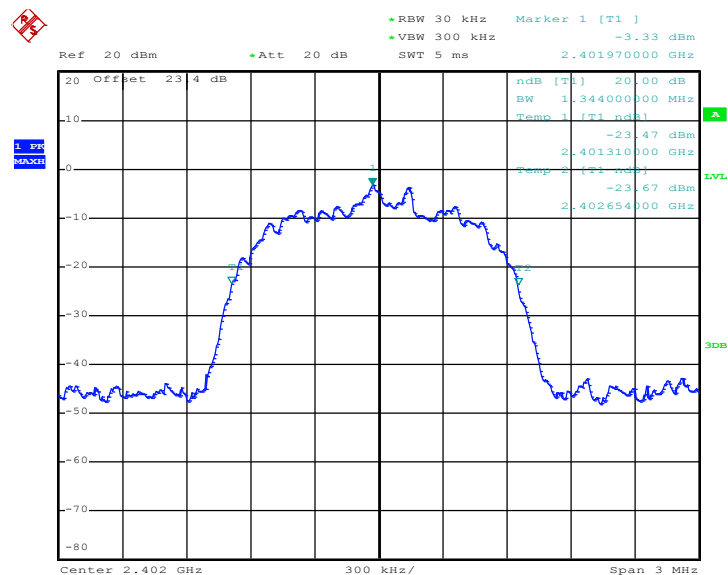
Date: 19.MAR.2012 20:47:09

**20 dB Bandwidth Plot on Channel 78**


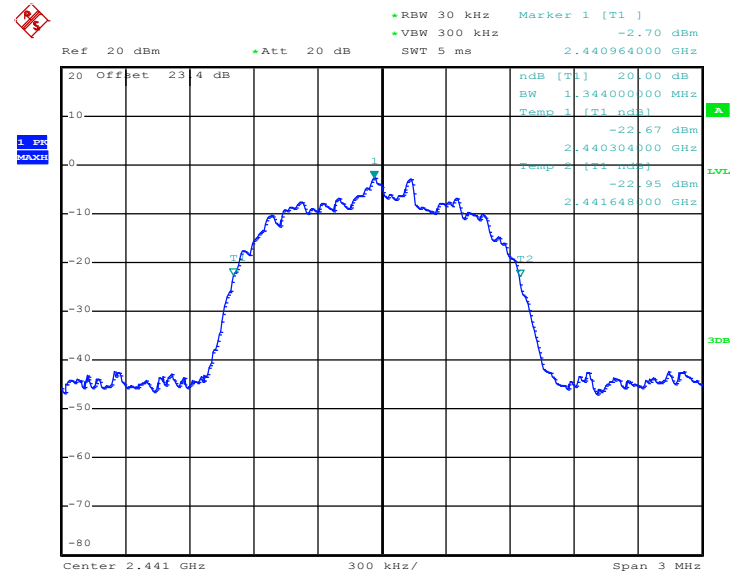
Date: 19.MAR.2012 20:47:38

<b>Test Mode :</b>	Mode 7, 8, 9	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%

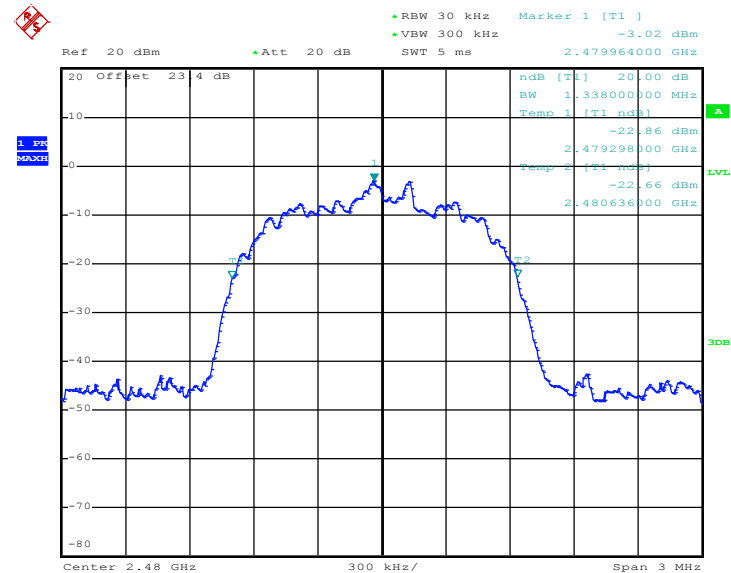
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.344
39	2441	1.344
78	2480	1.338

**20 dB Bandwidth Plot on Channel 00**


Date: 19.MAR.2012 20:48:26

**20 dB Bandwidth Plot on Channel 39**


Date: 19.MAR.2012 20:49:31

**20 dB Bandwidth Plot on Channel 78**


Date: 19.MAR.2012 20:49:53

### 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.

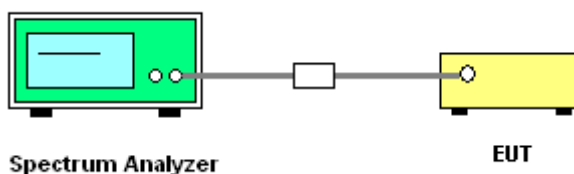
#### 3.3.2 Measuring Instruments

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

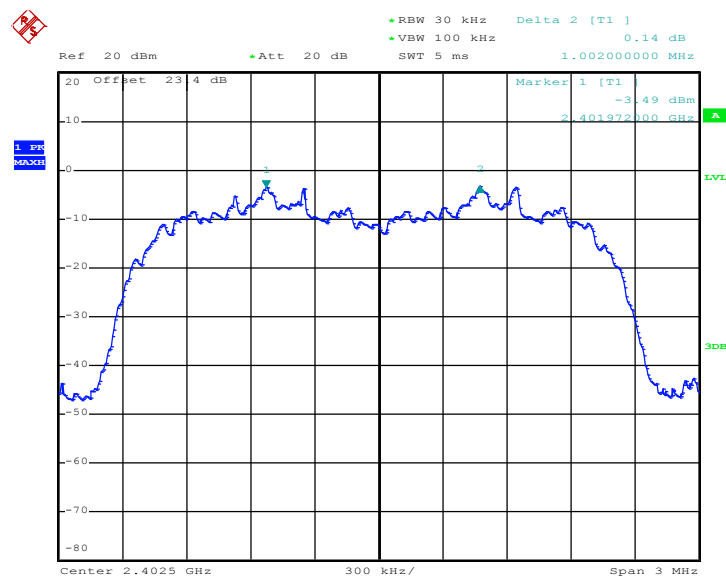


### 3.3.5 Test Result of Hopping Channel Separation

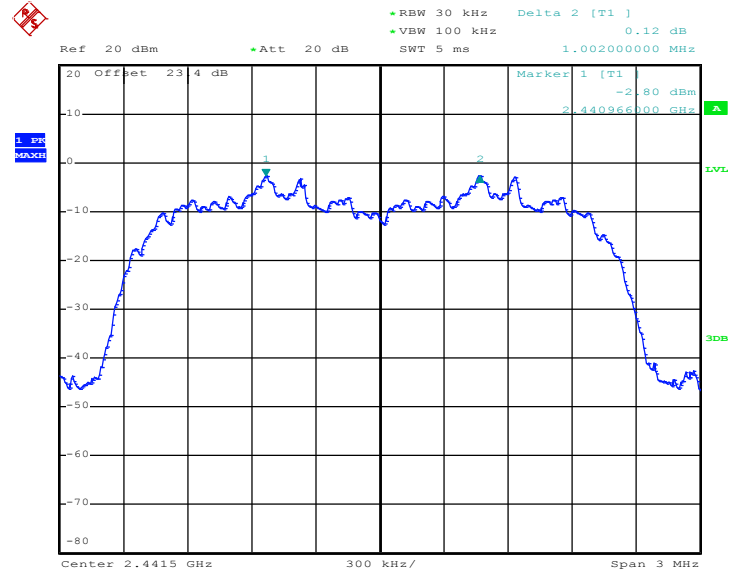
<b>Test Mode :</b>	Mode 7, 8, 9	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8960	Pass
39	2441	1.002	0.8960	Pass
78	2480	1.008	0.8920	Pass

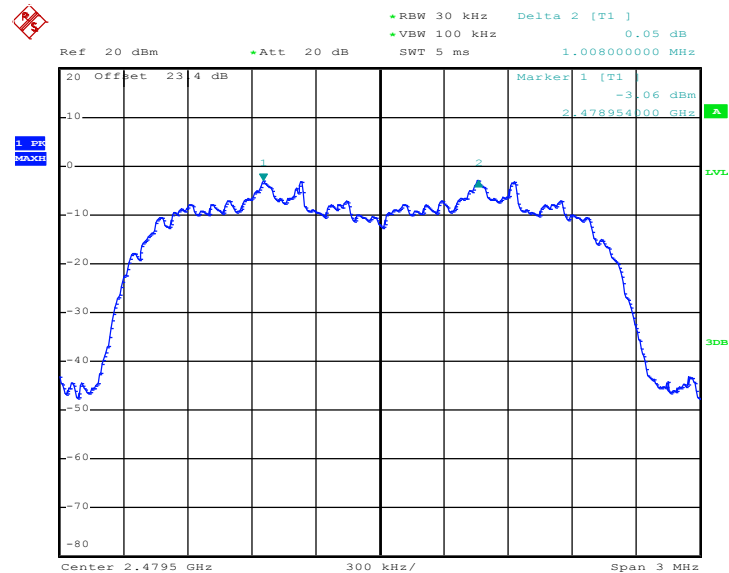
**Channel Separation Plot on Channel 00 - 01**



Date: 19.MAR.2012 20:42:27

**Channel Separation Plot on Channel 39 - 40**


Date: 19.MAR.2012 20:43:24

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


Date: 19.MAR.2012 20:44:16

### 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.

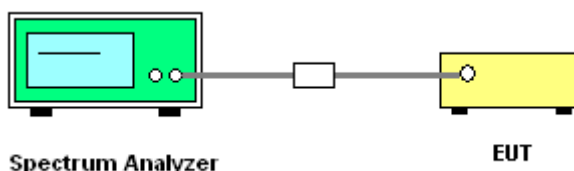
#### 3.4.2 Measuring Instruments

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  $\geq$  RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of Dwell Time

<b>Test Mode :</b>	Mode 8	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Book Lin	<b>Relative Humidity :</b>	50~53%

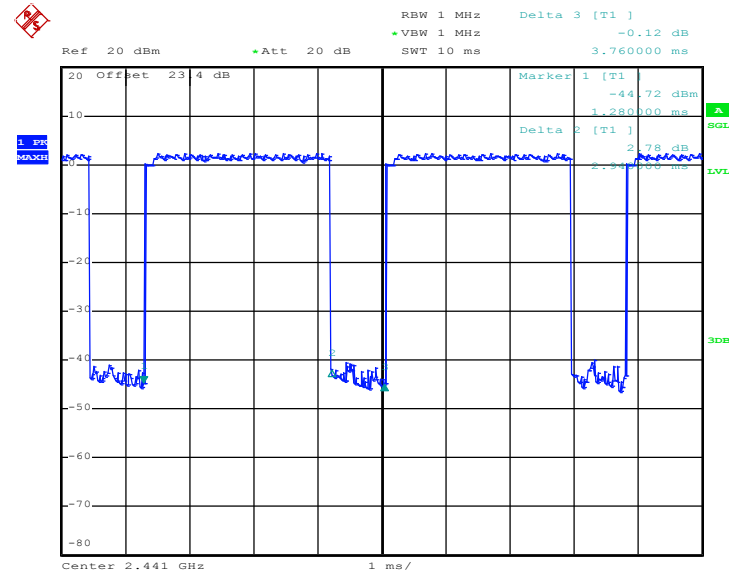
  

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	2.70	2940.00	0.25	0.4	Pass

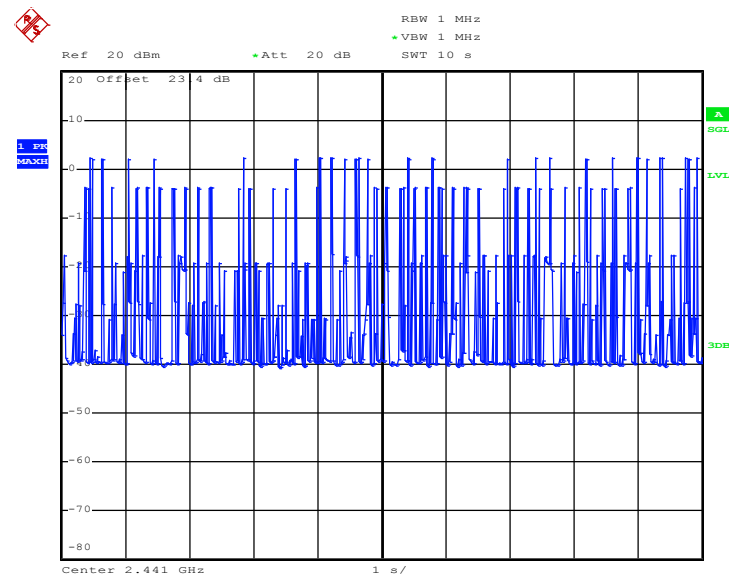
**Remark:**

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: 19.MAR.2012 22:00:18

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


Date: 19.MAR.2012 21:07:02

### 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.

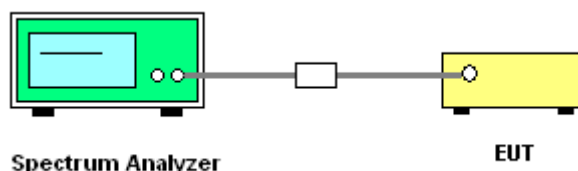
#### 3.5.2 Measuring Instruments

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



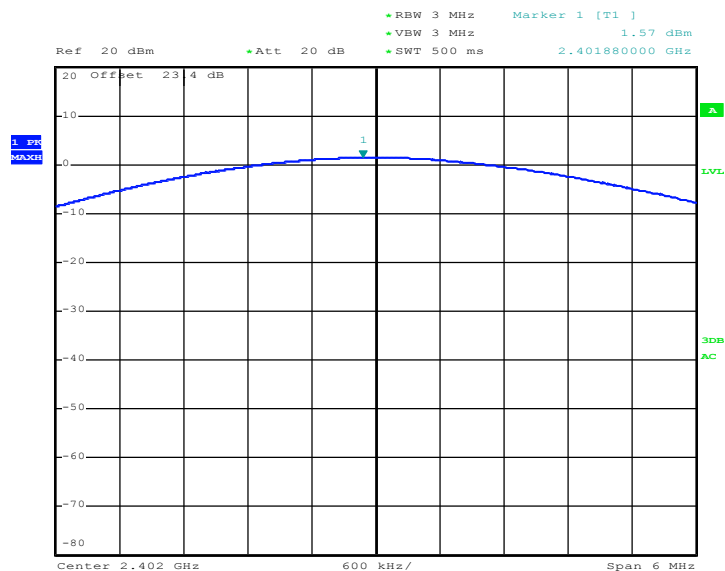
#### 3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 7, 8, 9	Temperature :	24~26℃	
Test Engineer :	Book Lin	Relative Humidity :	50~53%	

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	1.57	20.97	Pass
39	2441	2.51	20.97	Pass
78	2480	2.27	20.97	Pass

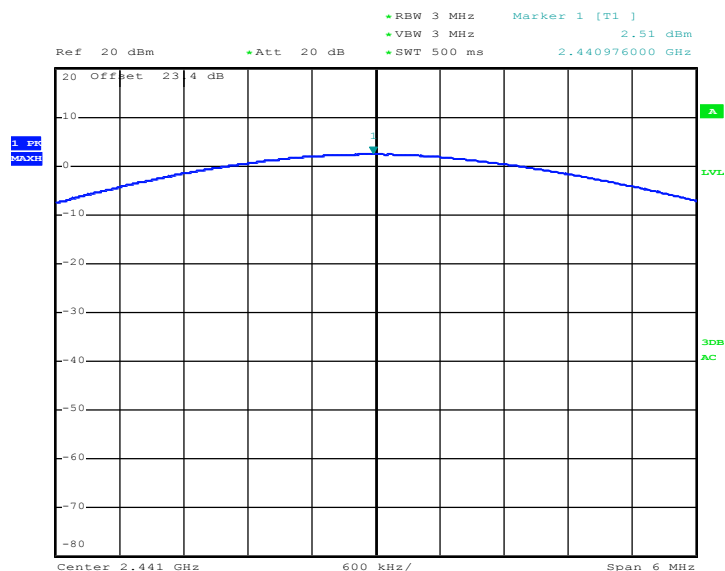


### Peak Output Power Plot on Channel 00



Date: 15.MAR.2012 12:32:52

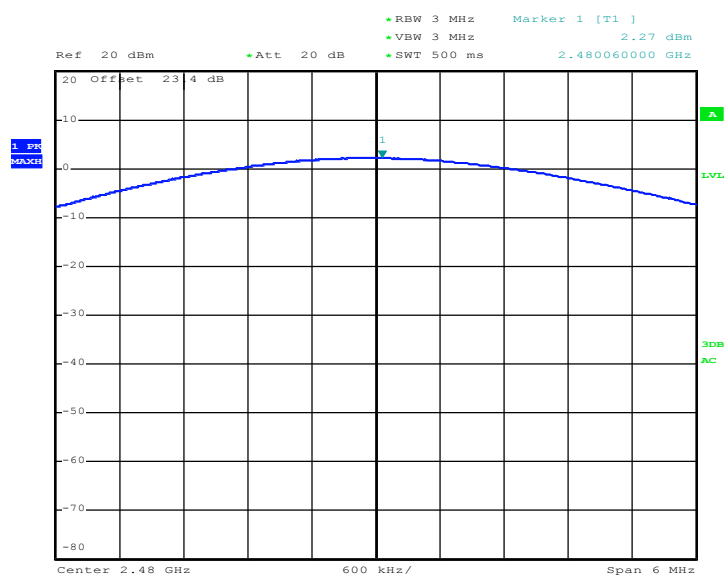
### Peak Output Power Plot on Channel 39



Date: 15.MAR.2012 12:34:10



Peak Output Power Plot on Channel 78



Date: 15.MAR.2012 12:35:27

## **3.6 Band Edges Measurement**

### **3.6.1 Limit of Band Edges**

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

### **3.6.2 Measuring Instruments**

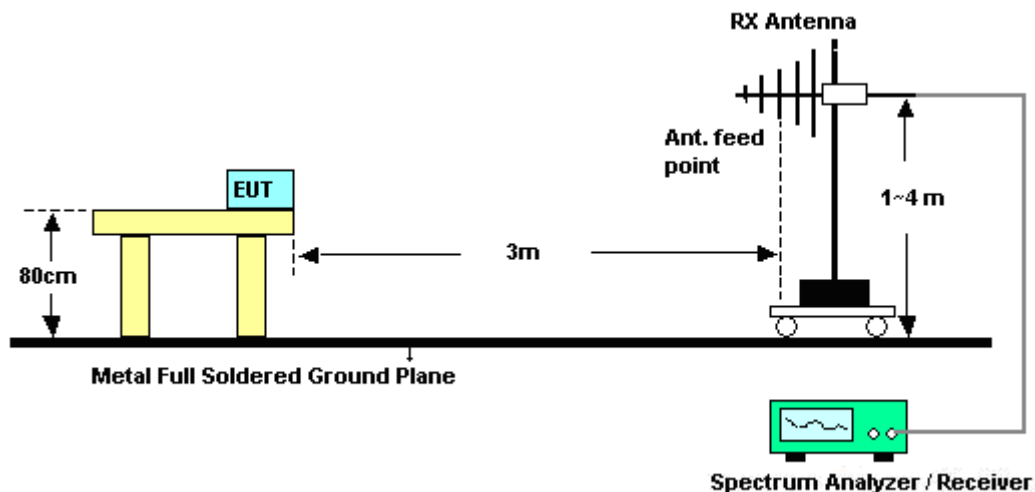
See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

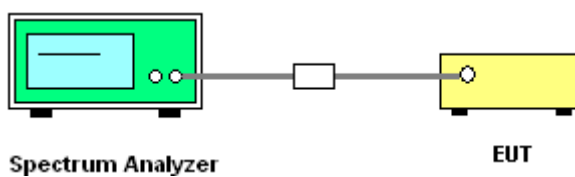
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300KHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band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

### 3.6.4 Test Setup

#### <Radiated Band Edges>



#### <Conducted Band Edges>



**3.6.5 Test Result of Radiated Band Edges**

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	53~55%
		<b>Test Engineer :</b>	Kyle Zhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2359.97	45.56	-28.44	74	41.51	32.01	5.99	33.95	126	70	Peak
2359.97	33.16	-20.84	54	29.11	32.01	5.99	33.95	126	70	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2372.7	46.08	-27.92	74	42.01	32.03	5.99	33.95	130	95	Peak
2372.7	33.18	-20.82	54	29.11	32.03	5.99	33.95	130	95	Average

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
		<b>Test Engineer :</b>	Kyle Zhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.5	66.88	-7.12	74	62.52	32.18	6.18	34	120	69	Peak
2483.5	27.04	-26.96	54	22.68	32.18	6.18	34	120	69	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	84.46	58.23	26.23	54.00	-27.77	Pass
Hopping Mode	84.46	57.42	27.04	54.00	-26.96	Pass

**Note :** Average result = Maximum field strength – Delta result

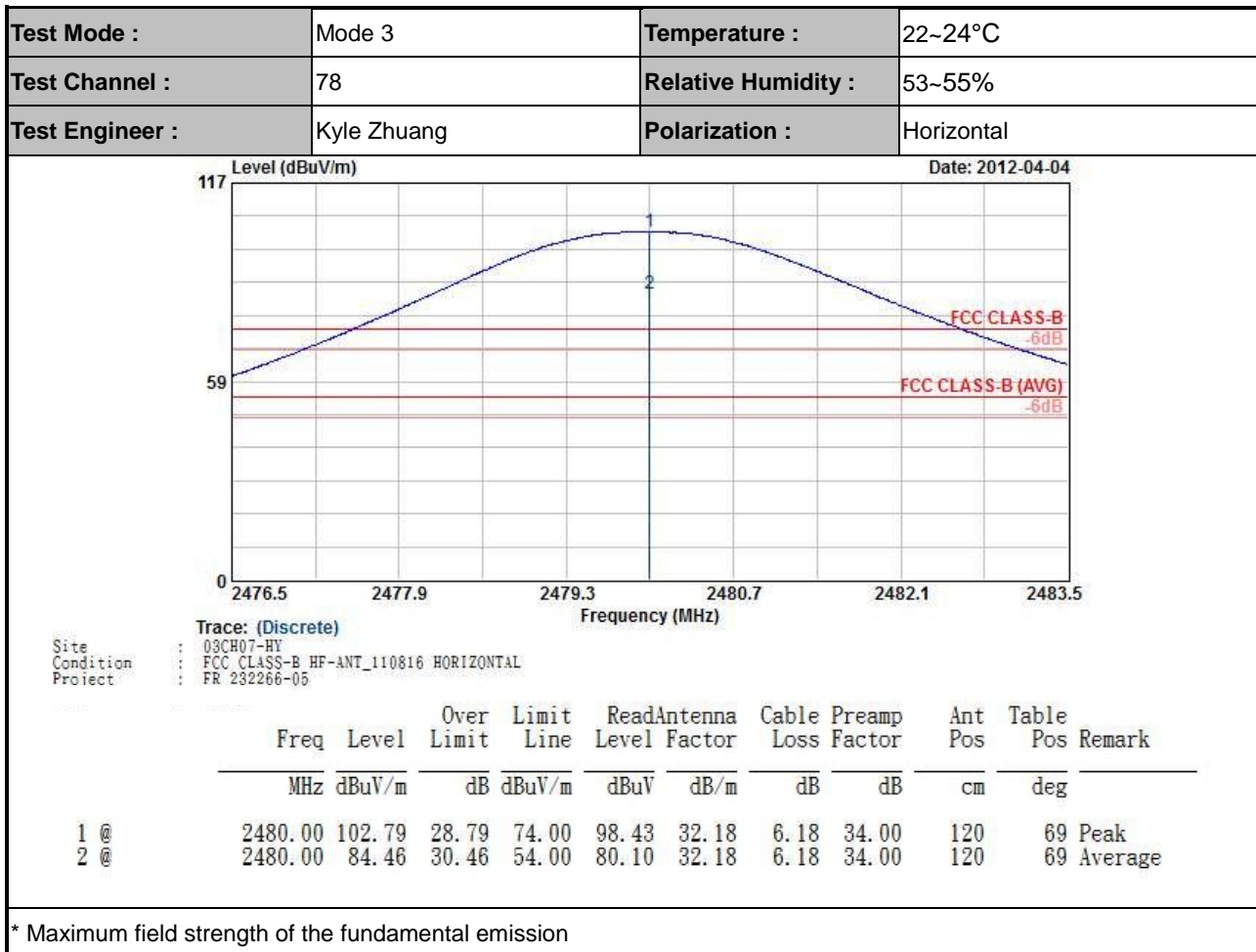
ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.5	65.72	-8.28	74	61.36	32.18	6.18	34	124	92	Peak
2483.5	26.86	-27.14	54	22.5	32.18	6.18	34	124	92	Average

**Summary results of marker-delta method:**

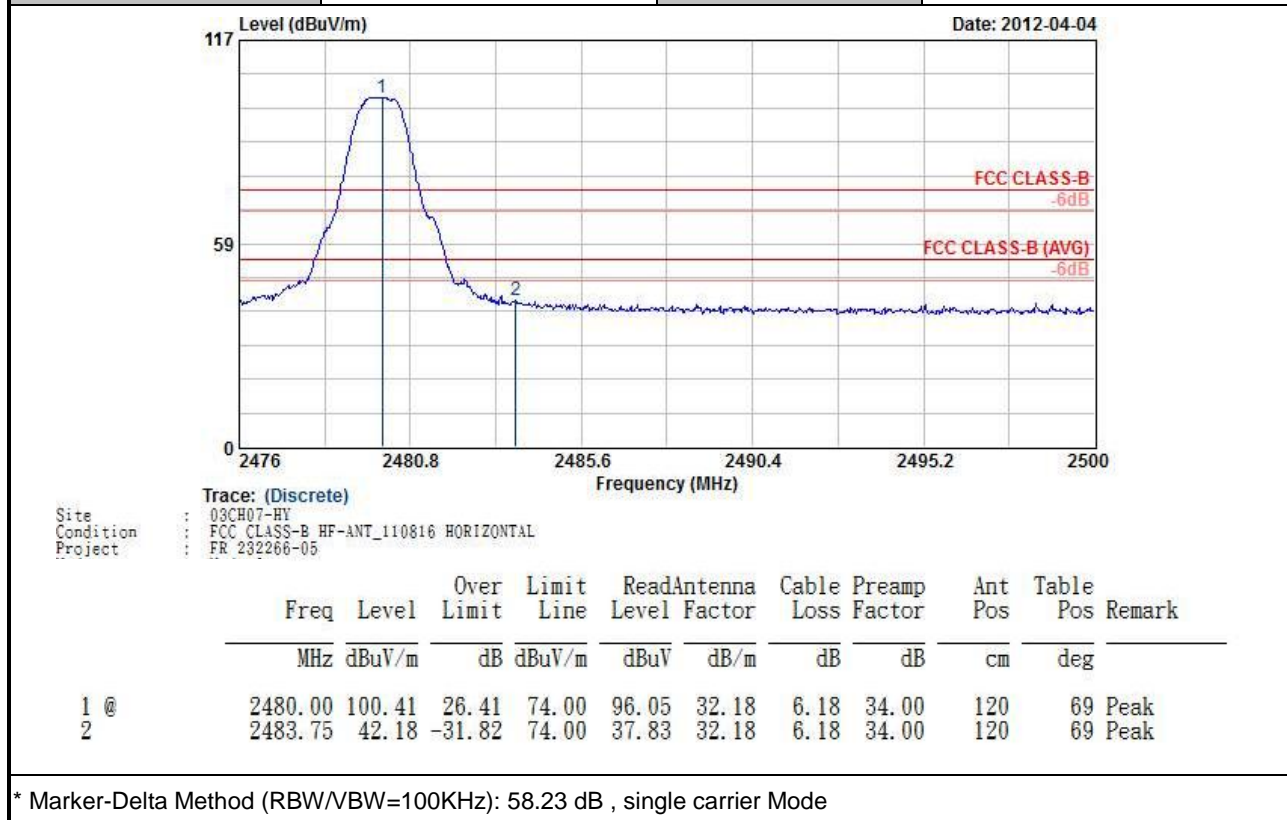
Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	83.46	56.60	26.86	54.00	-27.14	Pass
Hopping Mode	83.46	58.91	24.55	54.00	-29.45	Pass

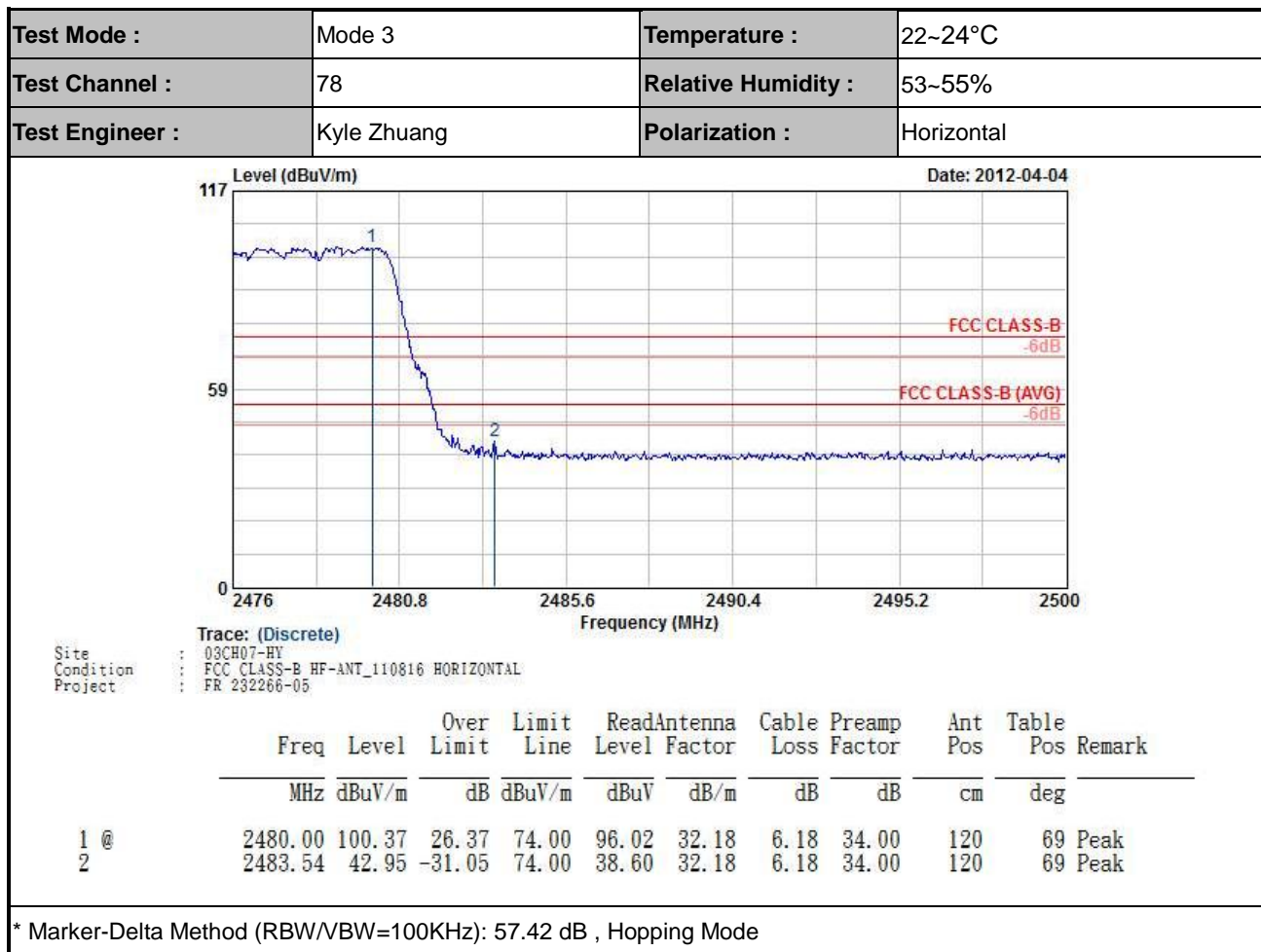
**Note :** Average result = Maximum field strength – Delta result



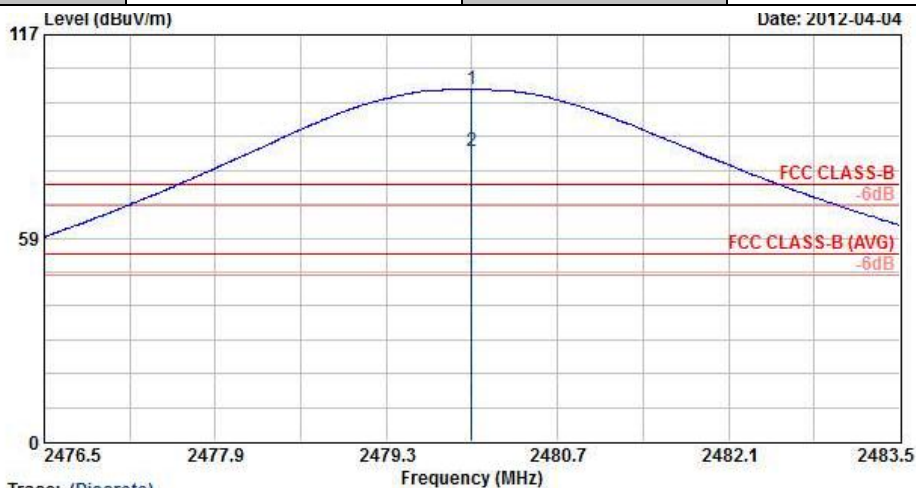


<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal





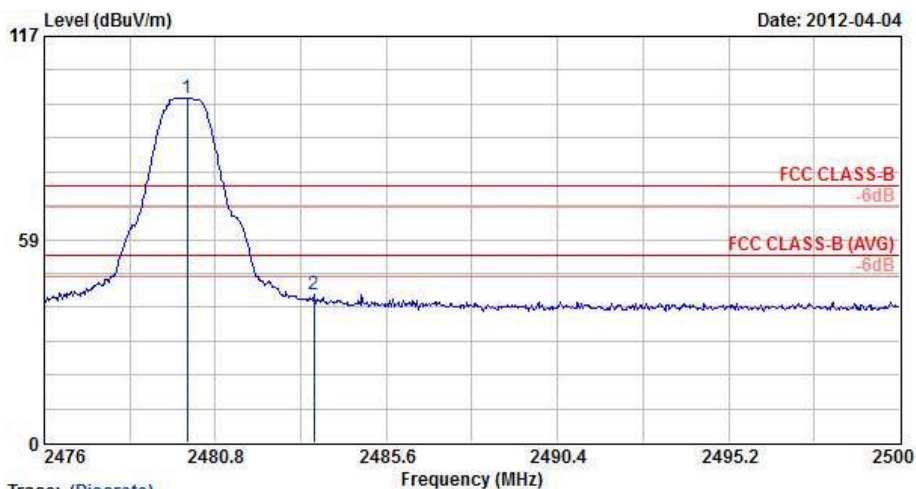
<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical



	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	
					dBuV	dB/m	dB	dB	cm	deg
1 @	2480.00	101.43	27.43	74.00	97.07	32.18	6.18	34.00	124	92 Peak
2 @	2480.00	83.46	29.46	54.00	79.10	32.18	6.18	34.00	124	92 Average

\* Maximum field strength of the fundamental emission

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical



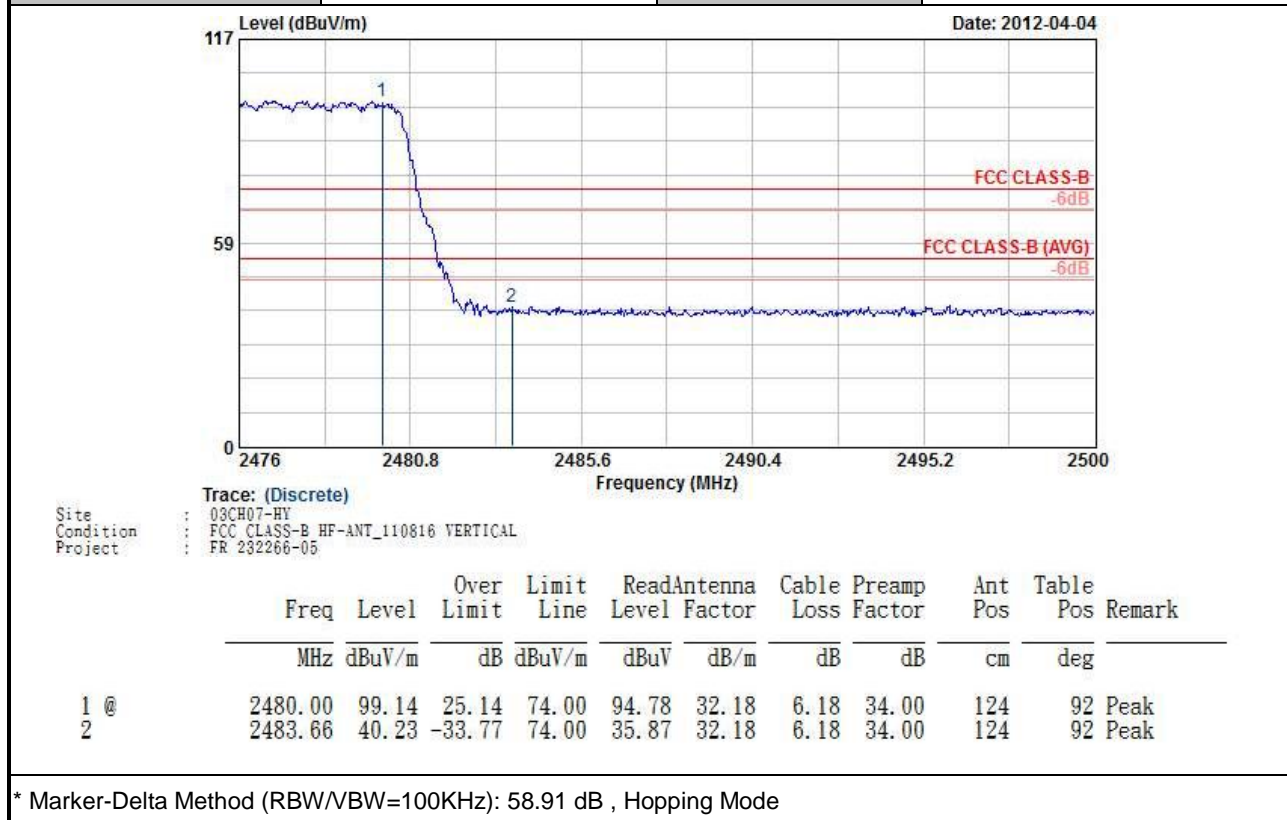
Trace: (Discrete)

Site : 03CH07-HY  
Condition : FCC CLASS-B HF-ANT\_110816 VERTICAL  
Project : FR 232266-05

	Freq	Level	Over	Limit	ReadAntenna	Cable Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg
1 @	2480.00	99.23	25.23	74.00	94.87	32.18	6.18	34.00	124 92 Peak
2	2483.56	42.63	-31.37	74.00	38.28	32.18	6.18	34.00	124 92 Peak

\* Marker-Delta Method (RBW/VBW=100KHz): 56.60 dB , single carrier Mode

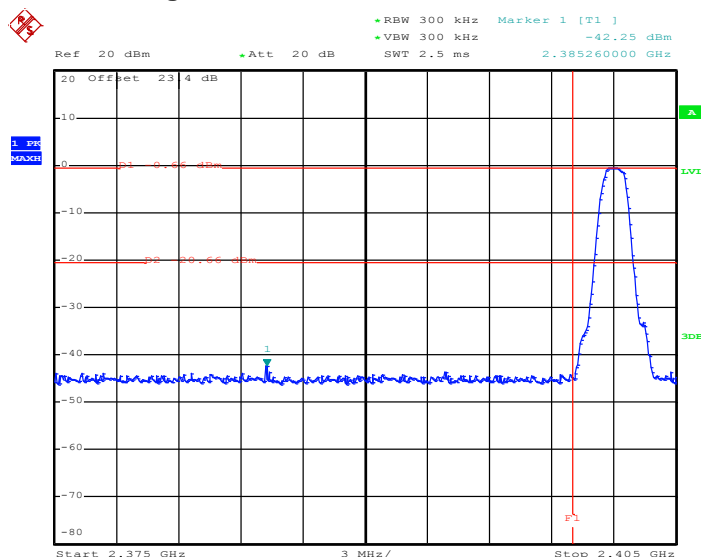
<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical



### 3.6.6 Test Result of Conducted Band Edges

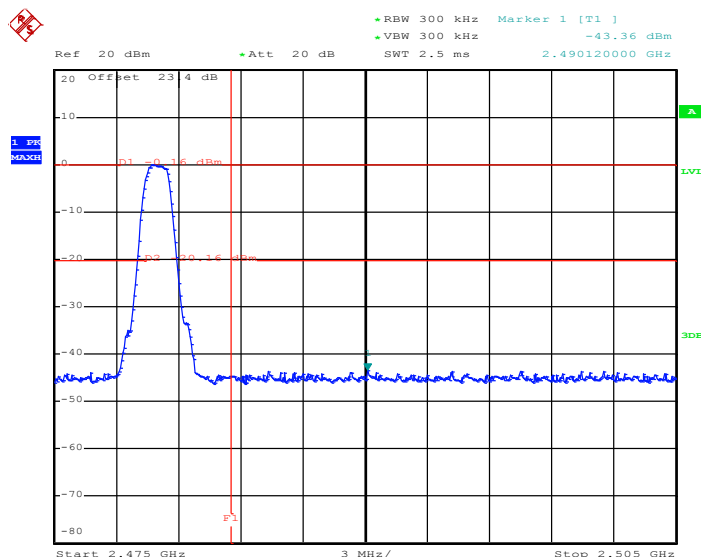
<b>Test Mode :</b>	Mode 7 and 9	<b>Temperature :</b>	24~26°C
<b>Test Channel :</b>	00 and 78	<b>Relative Humidity :</b>	50~53%
		<b>Test Engineer :</b>	Book Lin

**Low Band Edge Plot on Channel 00**



Date: 19.MAR.2012 20:54:38

**High Band Edge Plot on Channel 78**



Date: 19.MAR.2012 20:55:43

## 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.

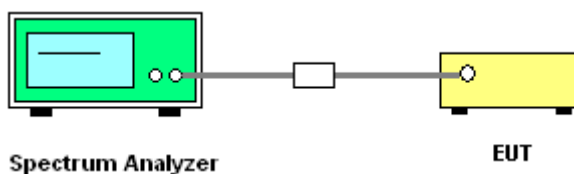
### 3.7.2 Measuring Instruments

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

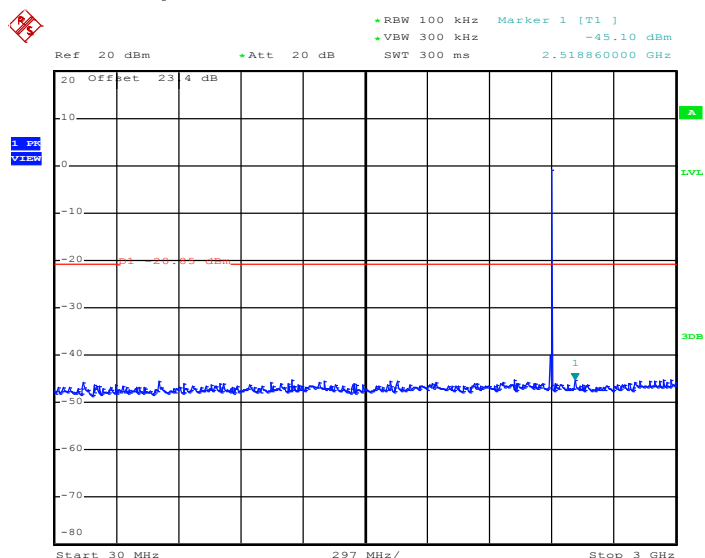




### 3.7.5 Test Result

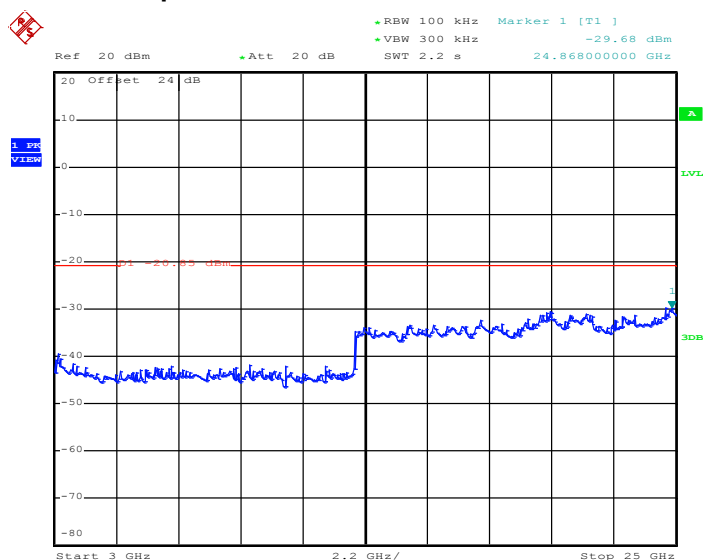
Test Mode :	Mode 7	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Book Lin

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



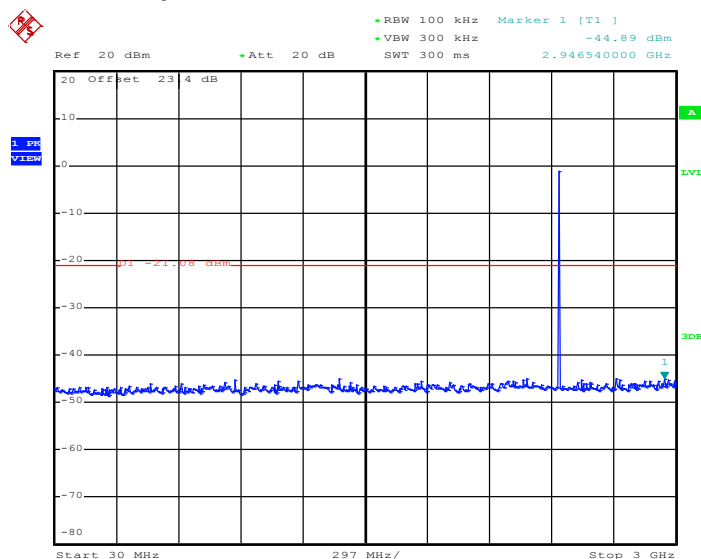
Date: 19.MAR.2012 21:02:05

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

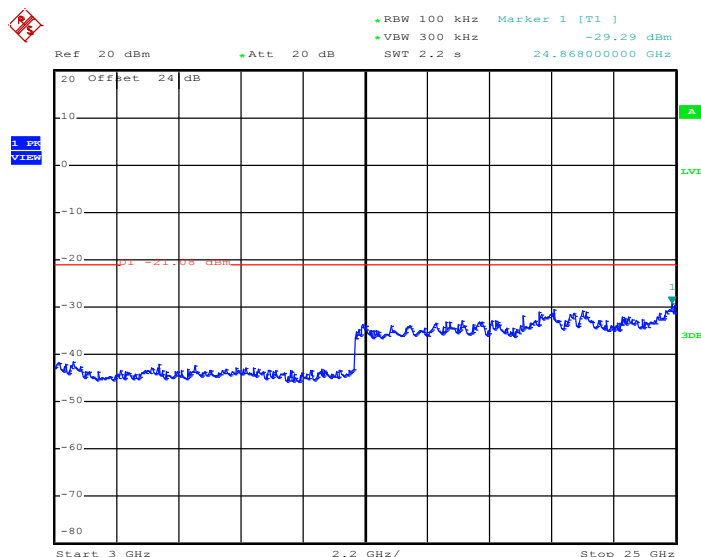


Date: 19.MAR.2012 21:02:18

<b>Test Mode :</b>	Mode 8	<b>Temperature :</b>	24~26°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	50~53%
		<b>Test Engineer :</b>	Book Lin

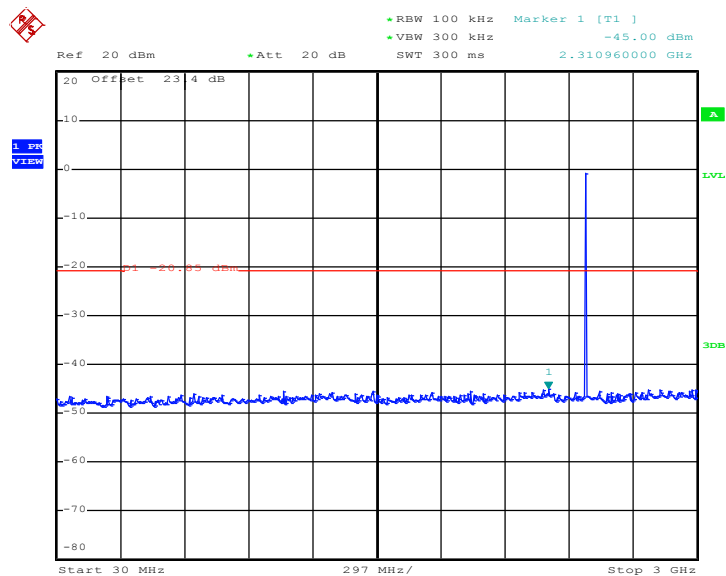
**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**


Date: 19.MAR.2012 21:03:10

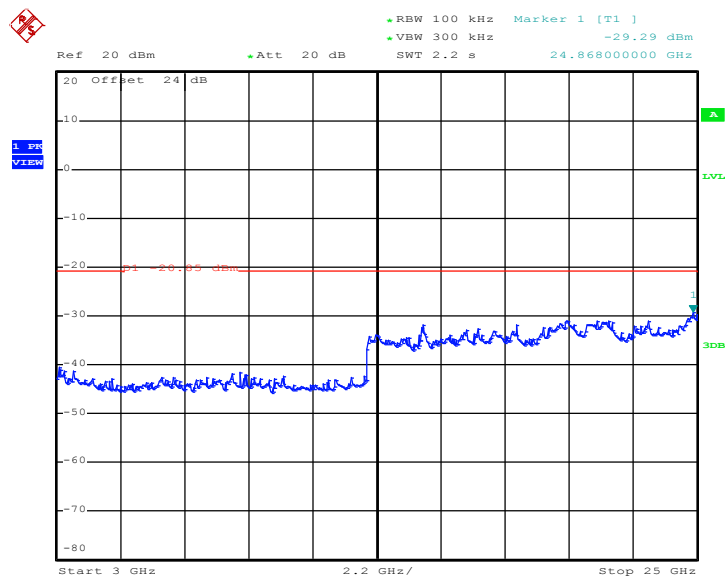
**Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz**


Date: 19.MAR.2012 21:03:23

<b>Test Mode :</b>	Mode 9	<b>Temperature :</b>	24~26°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	50~53%
		<b>Test Engineer :</b>	Book Lin

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


Date: 19.MAR.2012 21:04:16

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


Date: 19.MAR.2012 21:04:28

### 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.

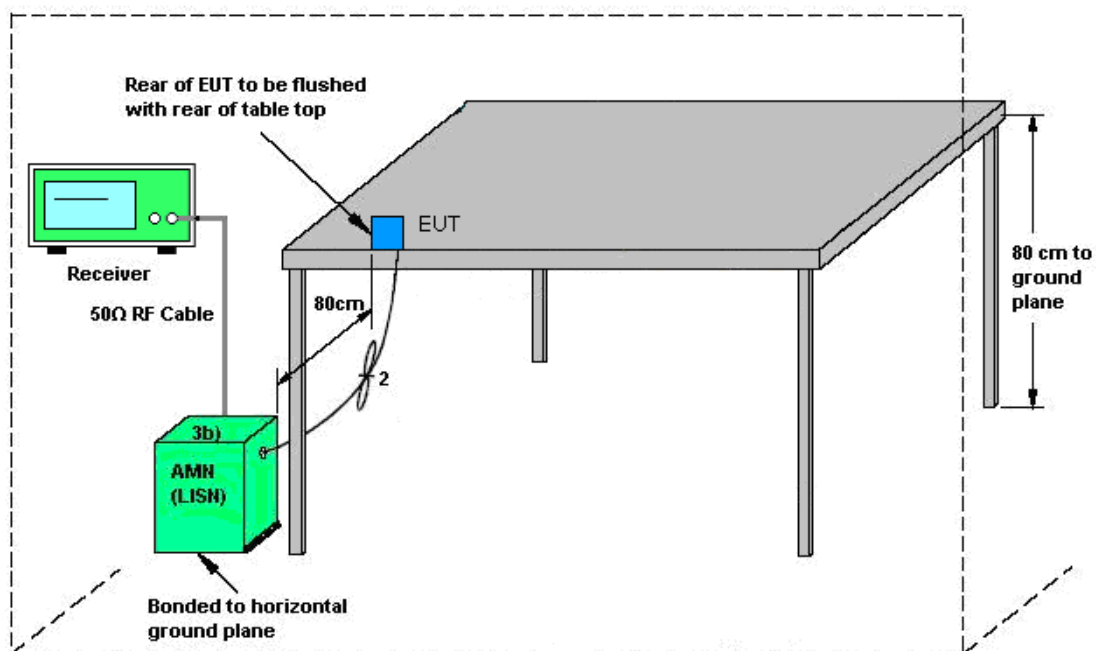
#### 3.8.2 Measuring Instruments

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.

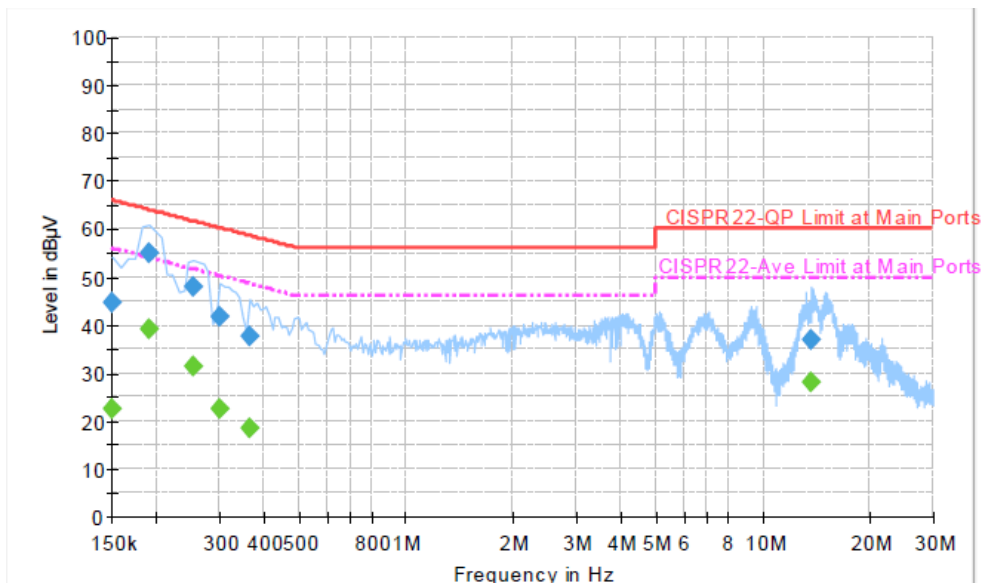
### 3.8.4 Test Setup



AMN = Artificial mains network (LISN)  
 AE = Associated equipment  
 EUT = Equipment under test  
 ISN = Impedance stabilization network

### 3.8.5 Test Result of AC Conducted Emission

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Slash Huang	<b>Relative Humidity :</b>	40~42%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Line
<b>Function Type :</b>	WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1		
<b>Remark :</b>	All emissions not reported here are more than 10 dB below the prescribed limit.		



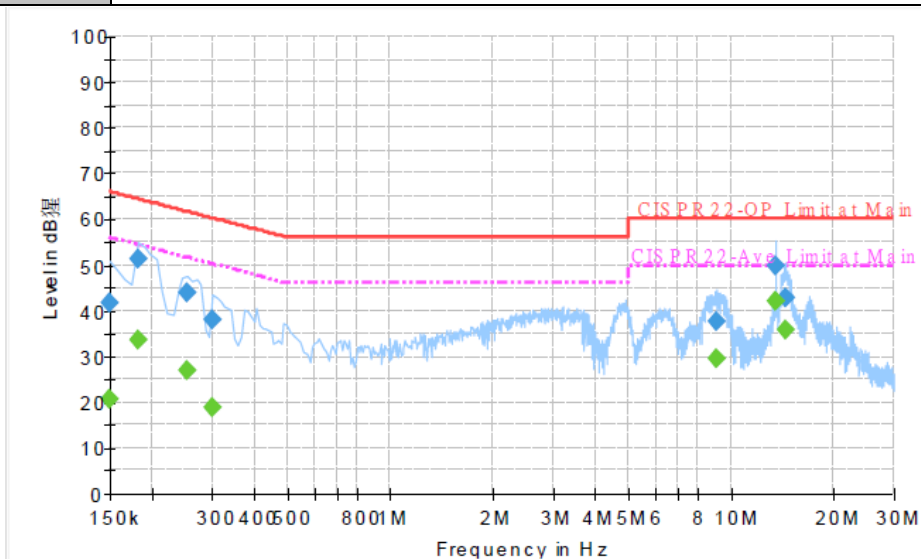
#### Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	44.7	Off	L1	19.4	21.3	66.0
0.190000	54.8	Off	L1	19.4	9.2	64.0
0.254000	48.0	Off	L1	19.3	13.6	61.6
0.302000	41.6	Off	L1	19.3	18.6	60.2
0.366000	37.6	Off	L1	19.3	21.0	58.6
13.726000	36.8	Off	L1	19.6	23.2	60.0

#### Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	22.6	Off	L1	19.4	33.4	56.0
0.190000	39.0	Off	L1	19.4	15.0	54.0
0.254000	31.3	Off	L1	19.3	20.3	51.6
0.302000	22.7	Off	L1	19.3	27.5	50.2
0.366000	18.6	Off	L1	19.3	30.0	48.6
13.726000	28.2	Off	L1	19.6	21.8	50.0

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Slash Huang	<b>Relative Humidity :</b>	40~42%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Neutral
<b>Function Type :</b>	WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1		
<b>Remark :</b>	1. All emissions not reported here are more than 10 dB below the prescribed limit. 2. 13.558 MHz is fundamental signal of RFID which can be ignored.		


**Final Result : QuasiPeak**

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	41.8	Off	N	19.4	24.2	66.0
0.182000	51.4	Off	N	19.4	13.0	64.4
0.254000	43.7	Off	N	19.4	17.9	61.6
0.302000	37.9	Off	N	19.3	22.3	60.2
9.078000	37.7	Off	N	19.6	22.3	60.0
13.558000	49.7	Off	N	19.8	10.3	60.0
14.486000	42.9	Off	N	19.8	17.1	60.0

**Final Result : Average**

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	20.6	Off	N	19.4	35.4	56.0
0.182000	33.7	Off	N	19.4	20.7	54.4
0.254000	27.1	Off	N	19.4	24.5	51.6
0.302000	18.7	Off	N	19.3	31.5	50.2
9.078000	29.4	Off	N	19.6	20.6	50.0
13.558000	42.0	Off	N	19.8	8.0	50.0
14.486000	35.9	Off	N	19.8	14.1	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.

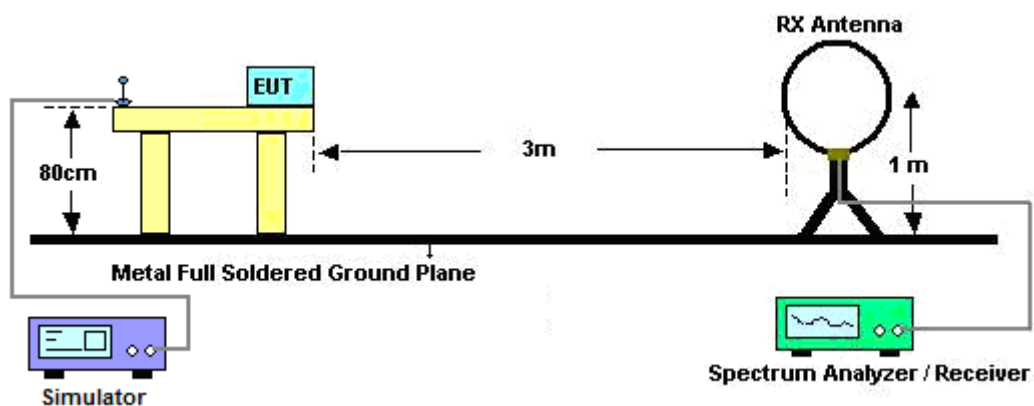
### 3.9.3 Test Procedures

- The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
- Use the following spectrum analyzer settings:
  - 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.
  - 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)
- 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.
- Measured average value for the peak value is greater than 54 dBuV/m

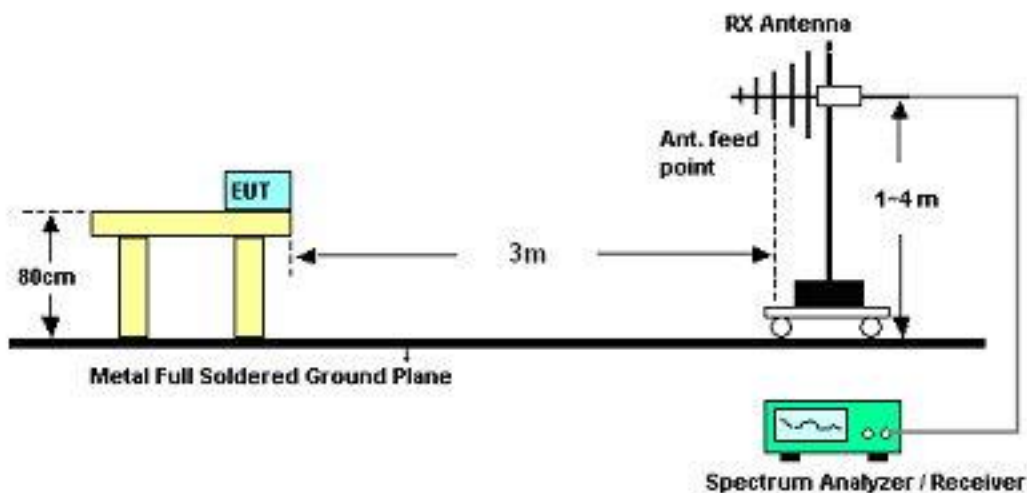


### 3.9.4 Test Setup

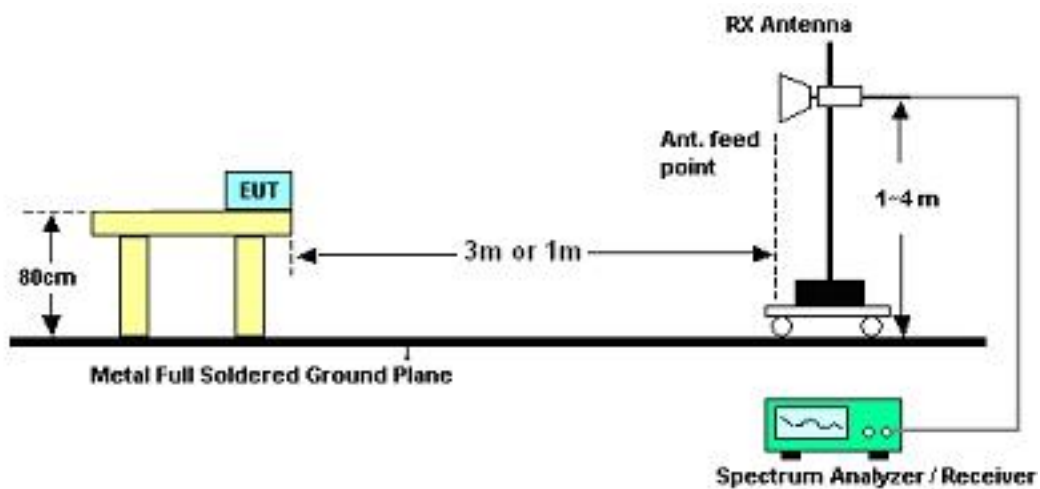
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2402 MHz is fundamental signals which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2359.97	45.56	-28.44	74	41.51	32.01	5.99	33.95	126	70	Peak
2359.97	33.16	-20.84	54	29.11	32.01	5.99	33.95	126	70	Average
2402	101.02	-	-	96.87	32.08	6.03	33.96	126	70	Peak
2402	83.49	-	-	79.36	32.06	6.03	33.96	126	70	Average
2500	32.82	-21.18	54	28.44	32.2	6.18	34	126	70	Average
2500	44.81	-29.19	74	40.43	32.2	6.18	34	126	70	Peak

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2402 MHz is fundamental signals which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2372.7	46.08	-27.92	74	42.01	32.03	5.99	33.95	130	95	Peak
2372.7	33.18	-20.82	54	29.11	32.03	5.99	33.95	130	95	Average
2402	100.18	-	-	96.03	32.08	6.03	33.96	130	95	Peak
2402	83.02	-	-	78.89	32.06	6.03	33.96	130	95	Average
2484	32.78	-21.22	54	28.42	32.18	6.18	34	130	95	Average
2484	45.31	-28.69	74	40.95	32.18	6.18	34	130	95	Peak

<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2441 MHz is fundamental signals which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2310	45.87	-28.13	74	41.95	31.93	5.92	33.93	124	79	Peak
2310	32.99	-21.01	54	29.07	31.93	5.92	33.93	124	79	Average
2441	102.5	-	-	98.24	32.13	6.11	33.98	124	79	Peak
2441	84.61	-	-	80.35	32.13	6.11	33.98	124	79	Average
2484	45.52	-28.48	74	41.16	32.18	6.18	34	124	79	Peak
2484	32.79	-21.21	54	28.43	32.18	6.18	34	124	79	Average

<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2441 MHz is fundamental signals which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2350	44.97	-29.03	74	40.98	31.98	5.95	33.94	154	92	Peak
2350	33.08	-20.92	54	29.09	31.98	5.95	33.94	154	92	Average
2441	102.18	-	-	97.92	32.13	6.11	33.98	154	92	Peak
2441	84.33	-	-	80.07	32.13	6.11	33.98	154	92	Average
2494	44.78	-29.22	74	40.4	32.2	6.18	34	154	92	Peak
2494	32.83	-21.17	54	28.45	32.2	6.18	34	154	92	Average

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2480 MHz is fundamental signals which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
48.09	29.81	-10.19	40	51.75	8.9	0.68	31.52	135	117	Peak
194.7	16.71	-26.79	43.5	37.85	9.05	1.3	31.49	-	-	Peak
295.41	19.09	-26.91	46	35.43	13.25	1.74	31.33	-	-	Peak
304.9	20.71	-25.29	46	36.83	13.43	1.78	31.33	-	-	Peak
542.2	20.31	-25.69	46	29.96	18.81	2.53	30.99	-	-	Peak
766.2	22.8	-23.2	46	28.81	21.59	3.09	30.69	-	-	Peak
2356	44.49	-29.51	74	40.47	32.01	5.95	33.94	120	69	Peak
2356	33.03	-20.97	54	29.01	32.01	5.95	33.94	120	69	Average
2480	102.72	-	-	98.36	32.18	6.18	34	120	69	Peak
2480	84.38	-	-	80.02	32.18	6.18	34	120	69	Average
2483.5	66.88	-7.12	74	62.52	32.18	6.18	34	120	69	Peak
2483.5	27.04	-26.96	54	22.68	32.18	6.18	34	120	69	Average

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2480 MHz is fundamental signal which can be ignored.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
30	26.32	-13.68	40	37.25	20	0.53	31.46	103	87	Peak
45.93	26.23	-13.77	40	46.98	10.1	0.66	31.51	-	-	Peak
106.41	23.75	-19.75	43.5	43.84	10.43	1.03	31.55	-	-	Peak
307.7	18.54	-27.46	46	34.57	13.51	1.79	31.33	-	-	Peak
491.8	18.74	-27.26	46	29.47	17.92	2.42	31.07	-	-	Peak
722.1	22.67	-23.33	46	29.52	20.93	2.99	30.77	-	-	Peak
2316	46	-28	74	42.08	31.93	5.92	33.93	124	92	Peak
2316	32.92	-21.08	54	29	31.93	5.92	33.93	124	92	Average
2480	101.43	-	-	97.07	32.18	6.18	34	124	92	Peak
2480	83.65	-	-	79.29	32.18	6.18	34	124	92	Average
2483.5	65.72	-8.28	74	61.36	32.18	6.18	34	124	92	Peak
2483.5	26.86	-27.14	54	22.5	32.18	6.18	34	124	92	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 Chip 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	Mar. 15, 2012~ Mar. 19, 2012	Jun. 12, 2012	Conducted (TH02-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	Jun. 01, 2011	Mar. 15, 2012~ Mar. 19, 2012	May 31, 2012	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	Apr. 02, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Apr. 02, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Apr. 02, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Apr. 02, 2012	N/A	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	Apr. 02, 2012	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 22, 2011	Apr. 04, 2012	Oct. 21, 2012	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Apr. 04, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Apr. 04, 2012	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A023 62	1GHz ~ 26.5GHz	Dec. 05, 2011	Apr. 04, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	Apr. 04, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz ~ 7GHz	Aug. 22, 2011	Apr. 04, 2012	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Apr. 04, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Feb. 09, 2012	Apr. 04, 2012	Feb. 08, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/00 1	9 kHz~30 MHz	Jul. 29, 2010	Apr. 04, 2012	Jul. 28, 2012	Radiation (03CH07-HY)



## 5 Uncertainty of Evaluation

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

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

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

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

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

Contribution	Uncertainty of $X_i$		$u(X_i)$	$C_i$	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	$\pm 0.10$	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	$\pm 1.70$	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	$\pm 0.50$	Normal (k=2)	0.25	1	0.25
Receiver Correction	$\pm 2.00$	Rectangular	1.15	1	1.15
Antenna Factor Directional	$\pm 1.50$	Rectangular	0.87	1	0.87
Site Imperfection	$\pm 2.80$	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 EP232266-05 as below.