



# FCC RF Test Report

**APPLICANT** : Lyve Minds, Inc.  
**EQUIPMENT** : Set Top Box  
**BRAND NAME** : Lyve  
**MODEL NAME** : BPH01  
**MARKETING NAME** : LyveHome  
**FCC ID** : 2ABQW-BPH  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

The product was received on Feb. 13, 2014 and testing was completed on Mar. 17, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



***SPORTON INTERNATIONAL INC.***  
No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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## REVISION HISTORY



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-210 A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	RSS-Gen 4.6.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.5	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 12.79 dB at 2499.640 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 12.70 dB at 0.262 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-



## 1 General Description

### 1.1 Applicant

**Lyve Minds, Inc.**

10001 N. De Anza Blvd, Ste 300 Cupertino, CA 95014

### 1.2 Manufacturer

**FIH Mobile Limited**

No. 4, Mingsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan

### 1.3 Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Set Top Box
<b>Brand Name</b>	Lyve
<b>Model Name</b>	BPH01
<b>Marketing Name</b>	LyveHome
<b>FCC ID</b>	2ABQW-BPH
<b>EUT supports Radios application</b>	WLAN 11a/b/g/n (HT20/HT40) WLAN 11ac (VHT20/VHT40/VHT80) Bluetooth v2.1 + EDR Bluetooth v4.0 + LE
<b>HW Version</b>	DVT
<b>SW Version</b>	V0.150
<b>EUT Stage</b>	Production Unit

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

### 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
<b>Tx/Rx Frequency Range</b>	2402 MHz ~ 2480 MHz
<b>Number of Channels</b>	40
<b>Carrier Frequency of Each Channel</b>	40 Channel(37 hopping + 3 advertising channel)
<b>Maximum Output Power to Antenna</b>	3.87 dBm (0.0024 W)
<b>99% Occupied Bandwidth</b>	1.06MHz
<b>Antenna Type</b>	PIFA Antenna type with gain 4.83 dBi
<b>Type of Modulation</b>	Bluetooth 4.0 - LE : GFSK



## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 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.	Sportun Site No.		FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH08-HY
636805/4086B-2			

**Note:** The test site complies with ANSI C63.4 2003 requirement.

## 1.7 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 KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ANSI C63.4-2003

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.



## 2 Test Configuration of Equipment Under Test

### 2.1 Descriptions of Test Mode

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth 4.0 – LE RF Output Power
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	3.87 dBm
Ch19	2440MHz	2.95 dBm
Ch39	2480MHz	3.47 dBm

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (X plane as worst plane) from all possible combinations.
  
- b. AC power line Conducted Emission was tested under maximum output power.



## 2.2 Test Mode

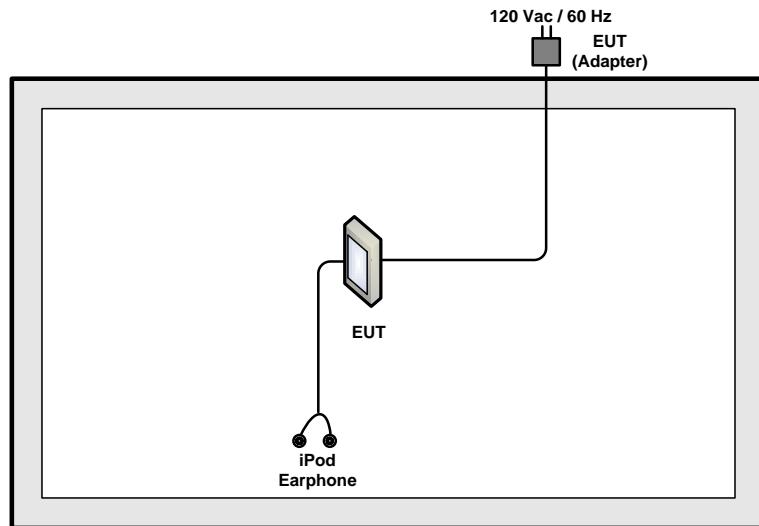
The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1: Bluetooth Link + WLAN (2.4GHz) Link + HDMI + RJ-45 (Load) + Speaker + Mouse + SD Card + MPEG4 + Adapter Mode 2: Bluetooth Link + WLAN (5GHz) Link + HDMI + RJ-45 (Load) + Speaker + Mouse + SD Card + MPEG4 + Adapter

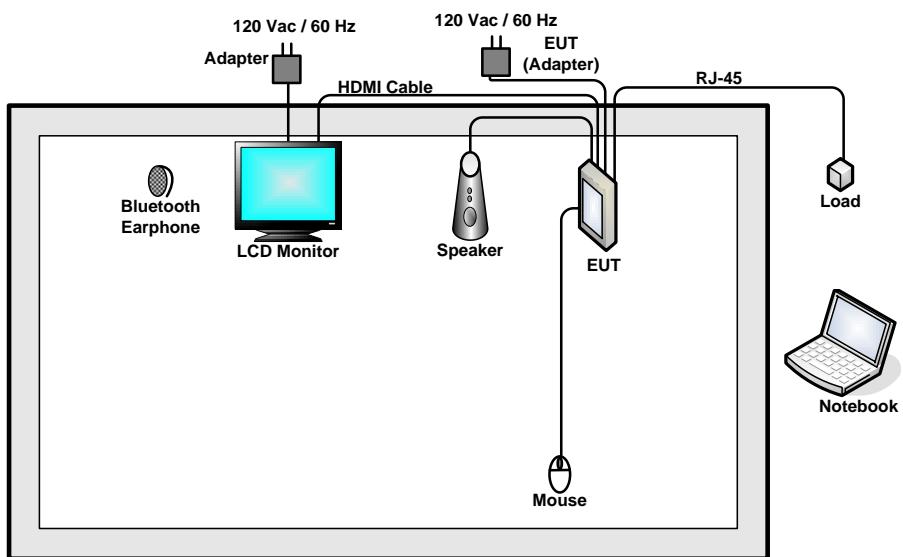
**Remark:** The worst case of conducted emission is mode 1; only the test data of it was reported.

## 2.3 Connection Diagram of Test System

### <Bluetooth 4.0 – LE Tx Mode>



### <AC Conducted Emission Mode>





## 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	LCD Monitor	DELL	ST2220Lb	FCC DoC	Shielded, 1.6m	Unshielded, 1.8m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	(USB) Mouse	Lenovo	M4806	FCC DoC	N/A	Unshielded, 1.8 m
5.	Speaker	N/A	N/A	N/A	N/A	Unshielded, 1.4 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

## 2.5 EUT Operation Test Setup

For Bluetooth function, the RF utility, "BT Test" was installed in EUT which was programmed in order to make the EUT get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

## 2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

## **3 Test Result**

### **3.1 6dB and 99% Bandwidth Measurement**

#### **3.1.1 Limit of 6dB and 99% Bandwidth**

The minimum 6 dB bandwidth shall be at least 500 kHz.

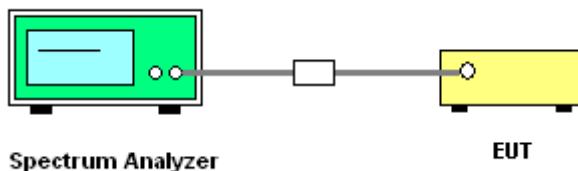
#### **3.1.2 Measuring Instruments**

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### **3.1.3 Test Procedures**

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.
6. Measure and record the results in the test report.

#### **3.1.4 Test Setup**

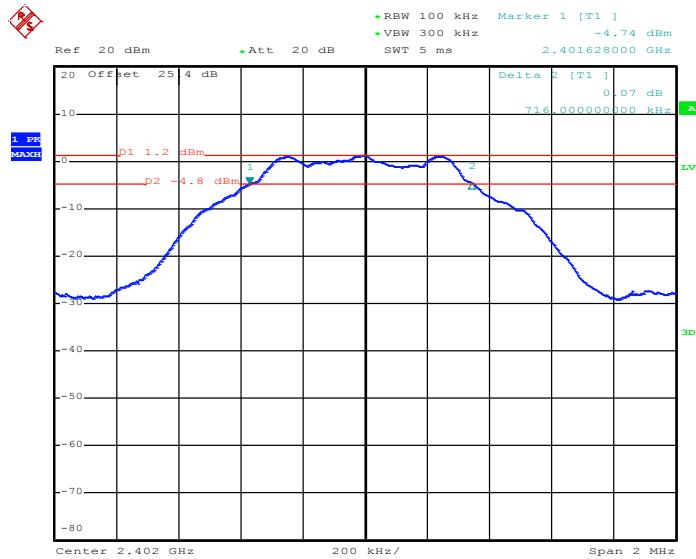


### 3.1.5 Test Result of 6dB Bandwidth

<b>Test Mode :</b>	Bluetooth 4.0 - LE	<b>Temperature :</b>	22~25°C
<b>Test Engineer :</b>	Alex Lee	<b>Relative Humidity :</b>	51~55%

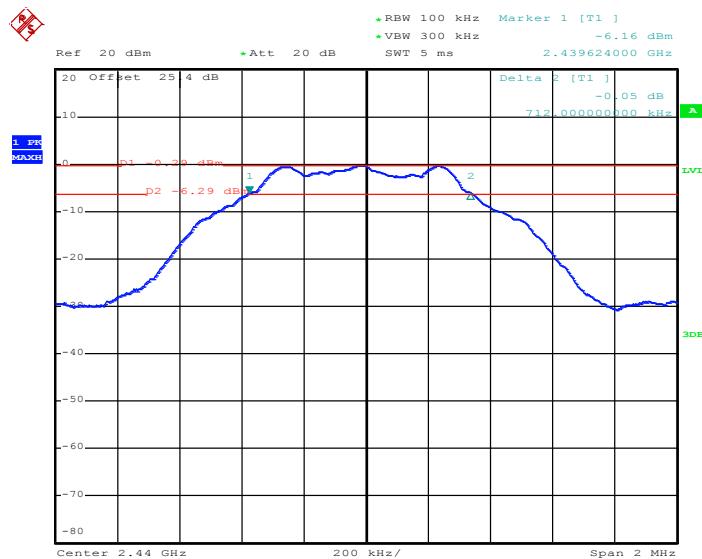
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
00	2402	0.72	0.5	Pass
19	2440	0.71	0.5	Pass
39	2480	0.71	0.5	Pass

**6 dB Bandwidth Plot on Channel 00**



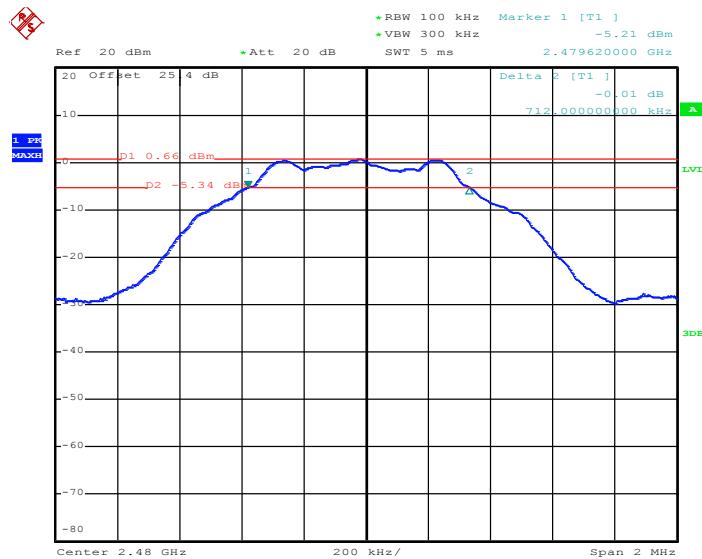
Date: 11.MAR.2014 15:54:50

### 6 dB Bandwidth Plot on Channel 19



Date: 11.MAR.2014 15:58:27

### 6 dB Bandwidth Plot on Channel 39



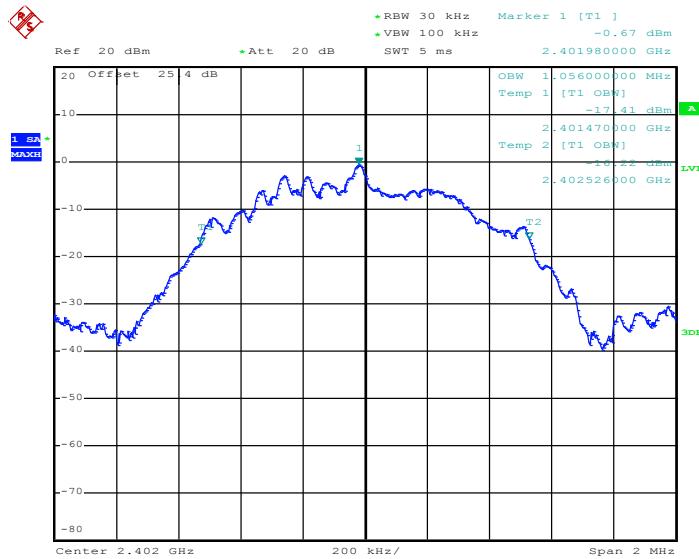
Date: 11.MAR.2014 16:01:20

## 3.1.6 Test Result of 99% Occupied Bandwidth

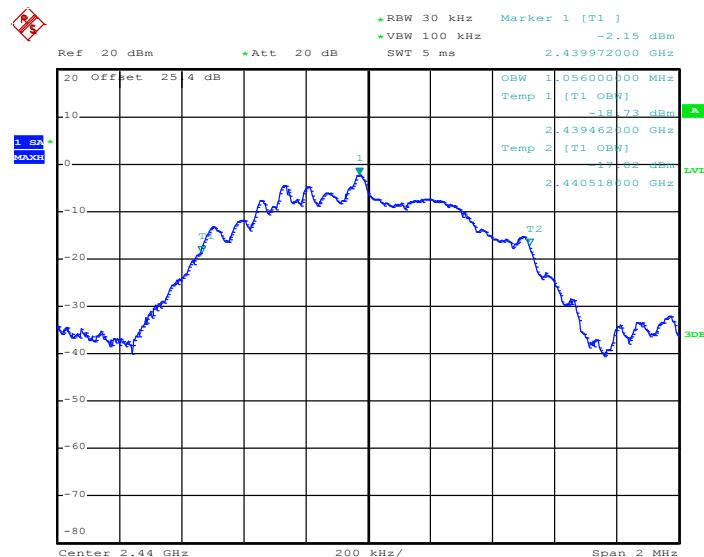
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Engineer :	Alex Lee	Relative Humidity :	51~55%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.06
19	2440	1.06
39	2480	1.06

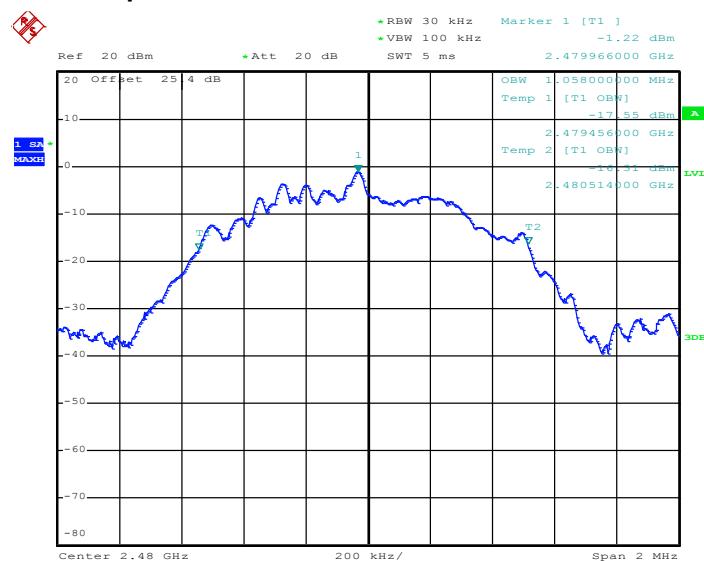
99% Bandwidth Plot on Channel 00



Date: 11.MAR.2014 15:56:22

**99% Occupied Bandwidth Plot on Channel 19**


Date: 11.MAR.2014 15:59:45

**99% Occupied Bandwidth Plot on Channel 39**


Date: 11.MAR.2014 16:02:51

**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## **3.2 Peak Output Power Measurement**

### **3.2.1 Limit of Peak Output Power**

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

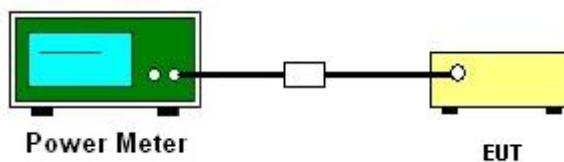
### **3.2.2 Measuring Instruments**

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### **3.2.3 Test Procedures**

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

### **3.2.4 Test Setup**





## 3.2.5 Test Result of Peak Output Power

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Engineer :	Alex Lee	Relative Humidity :	51~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	3.87	30.00	Pass
19	2440	2.95	30.00	Pass
39	2480	3.47	30.00	Pass

### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

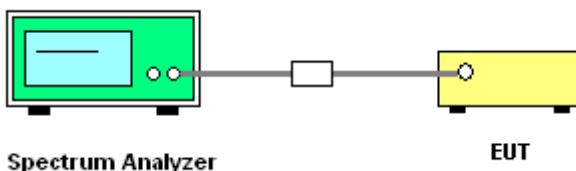
#### 3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

#### 3.3.4 Test Setup





### 3.3.5 Test Result of Power Spectral Density

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Engineer :	Alex Lee	Relative Humidity :	51~55%

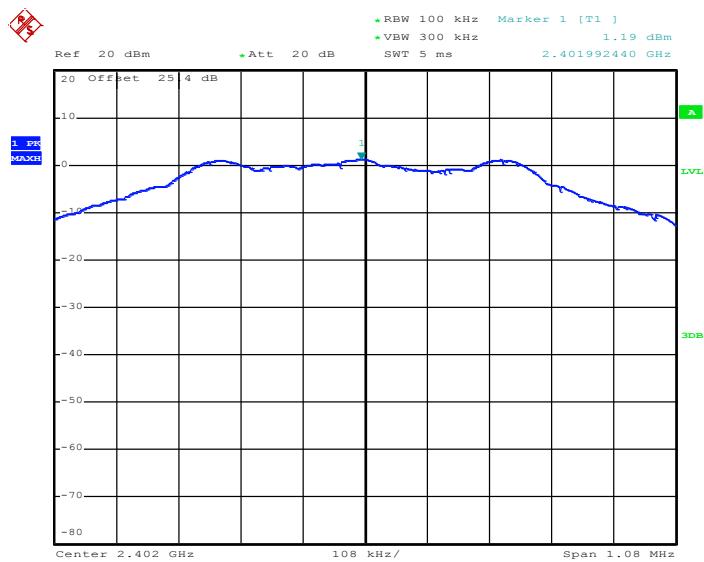
Channel	Frequency (MHz)	Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
00	2402	1.19	-12.39	8	Pass
19	2440	-0.32	-13.96	8	Pass
39	2480	0.64	-13.00	8	Pass

**Note:**

1. Measured power density (dBm) has offset with cable loss.
2. The Measured power density (dBm)/ 100kHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.

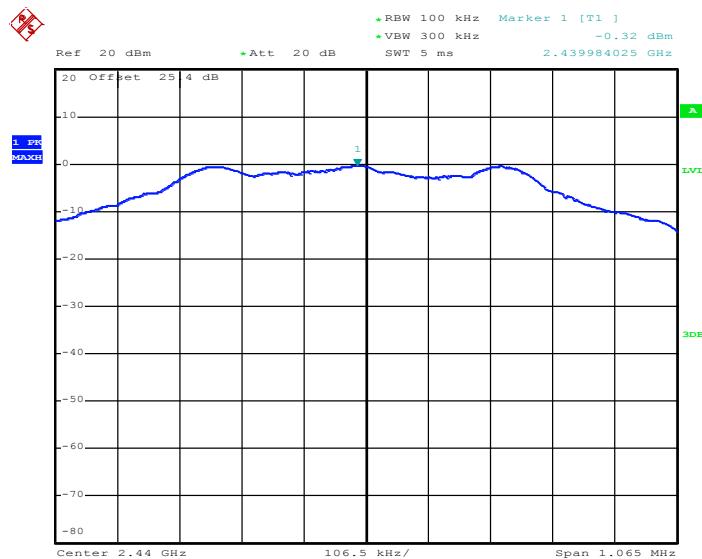
### 3.3.6 Test Result of Power Spectral Density Plots (100kHz)

**PSD 100kHz Plot on Channel 00**



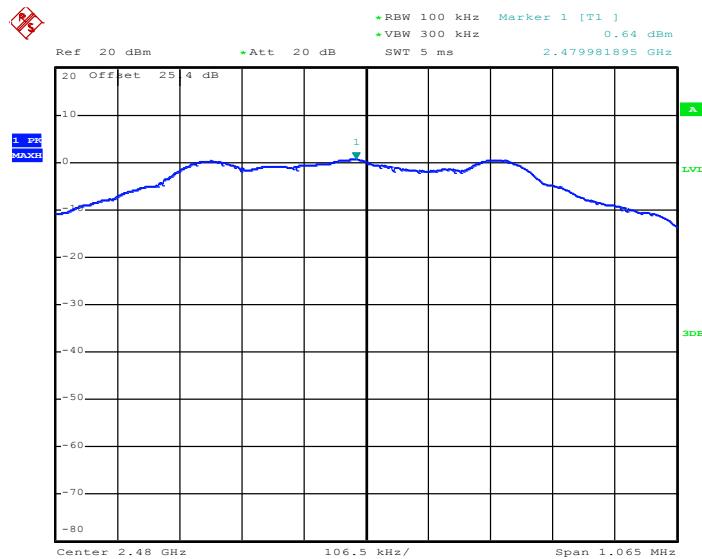
Date: 11.MAR.2014 15:55:19

**PSD 100kHz Plot on Channel 19**



Date: 11.MAR.2014 15:58:56

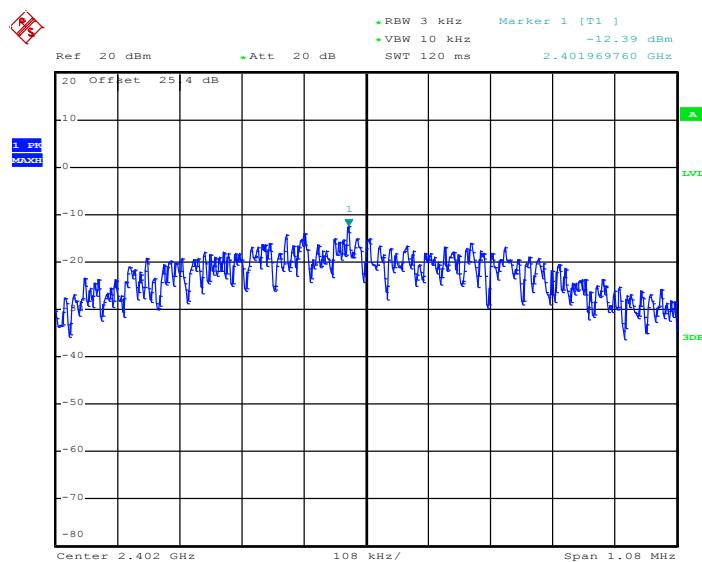
**PSD 100kHz Plot on Channel 39**



Date: 11.MAR.2014 16:01:48

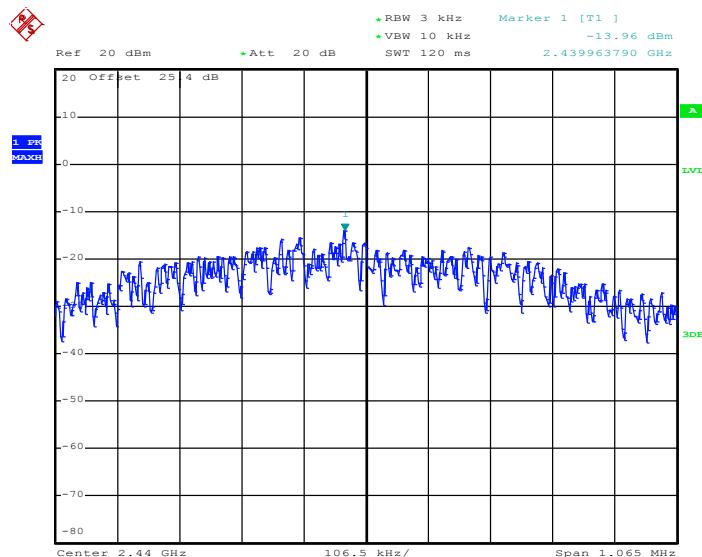
### 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

**PSD 3kHz Plot on Channel 00**



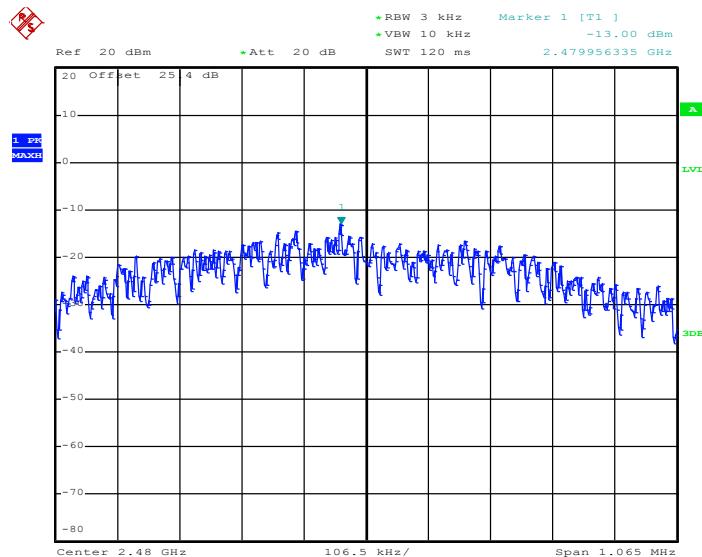
Date: 11.MAR.2014 15:55:10

### PSD 3kHz Plot on Channel 19



Date: 11.MAR.2014 15:58:47

### PSD 3kHz Plot on Channel 39



Date: 11.MAR.2014 16:01:39

## **3.4 Conducted Band Edges and Spurious Emission Measurement**

### **3.4.1 Limit of Conducted Band Edges and Spurious Emission**

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

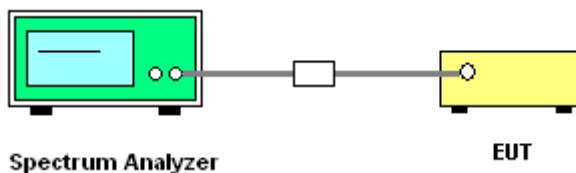
### **3.4.2 Measuring Instruments**

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### **3.4.3 Test Procedure**

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

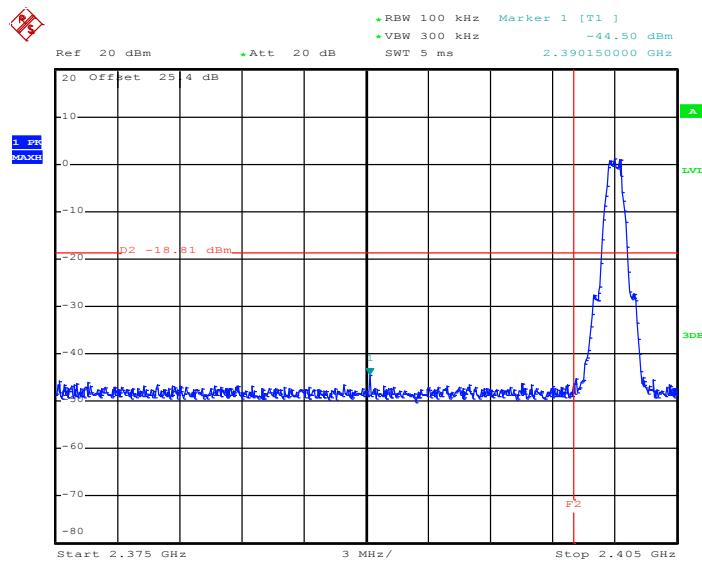
### **3.4.4 Test Setup**



### 3.4.5 Test Result of Conducted Band Edges

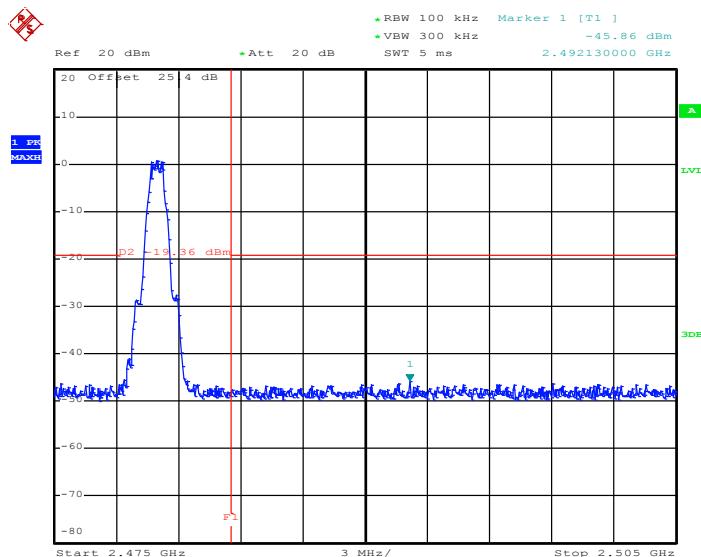
<b>Test Mode :</b>	Bluetooth 4.0 - LE	<b>Temperature :</b>	22~25°C
<b>Test Channel :</b>	00 and 39	<b>Relative Humidity :</b>	51~55%
		<b>Test Engineer :</b>	Alex Lee

**Low Band Edge Plot on Channel 00**



Date: 11.MAR.2014 15:55:33

### High Band Edge Plot on Channel 39



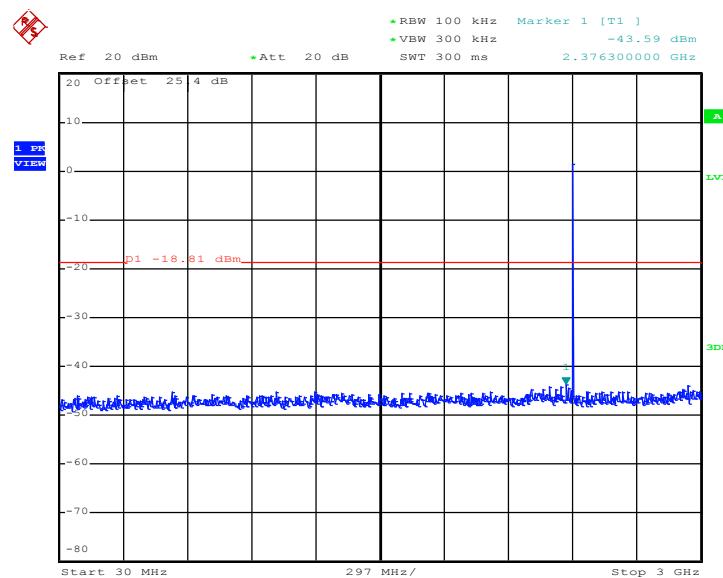
Date: 11.MAR.2014 16:02:02

### 3.4.6 Test Result of Conducted Spurious Emission

<b>Test Mode :</b>	Bluetooth 4.0 - LE	<b>Temperature :</b>	22~25°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	51~55%
		<b>Test Engineer :</b>	Alex Lee

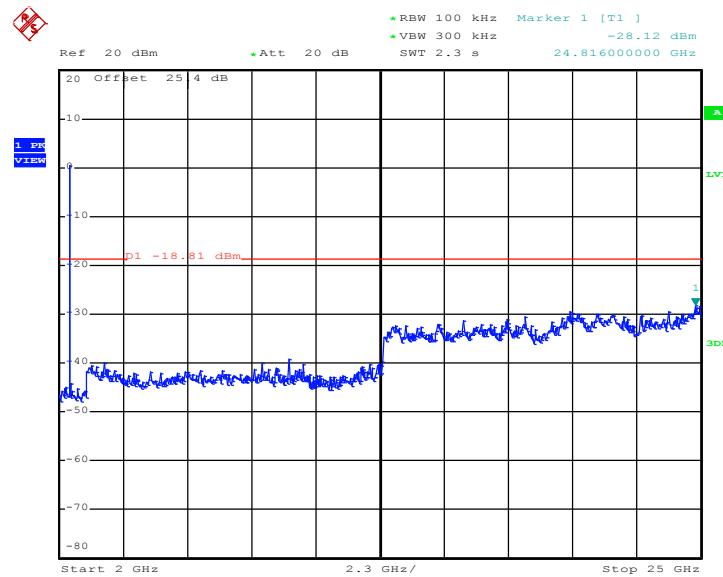
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps**

**GFSK Channel 00**



Date: 17.MAR.2014 14:50:37

**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps  
GFSK Channel 00**

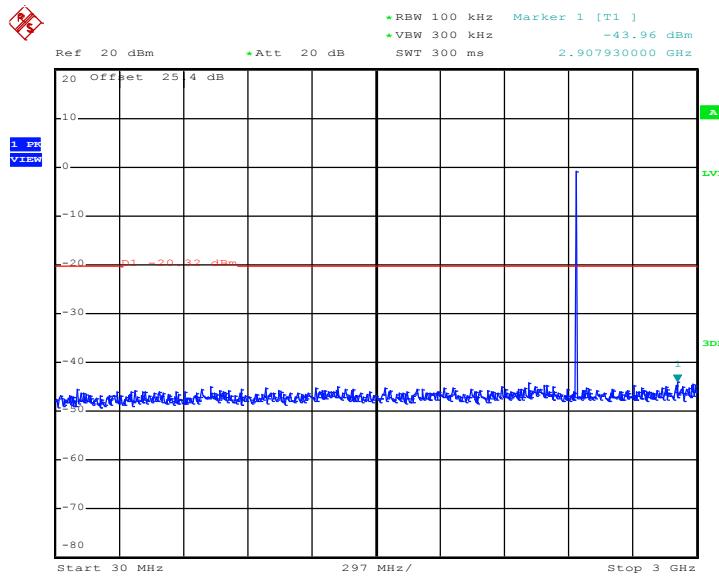


Date: 17.MAR.2014 14:50:56



<b>Test Mode :</b>	Bluetooth 4.0 - LE	<b>Temperature :</b>	22~25°C
<b>Test Channel :</b>	19	<b>Relative Humidity :</b>	51~55%
		<b>Test Engineer :</b>	Alex Lee

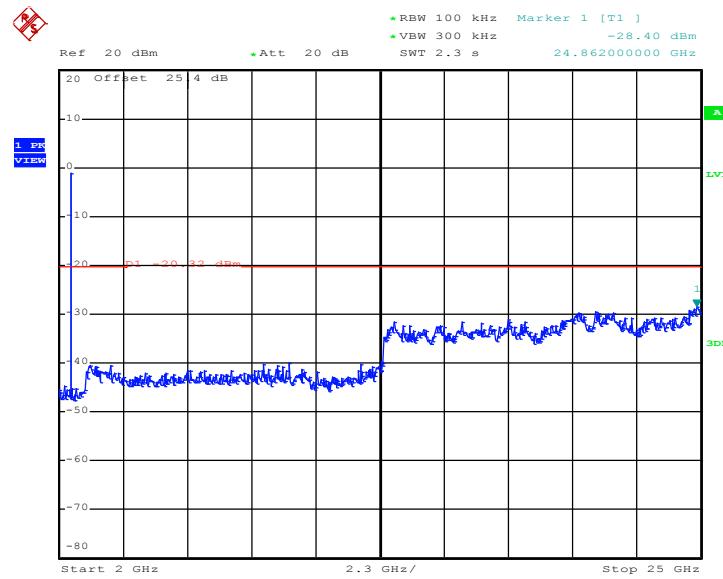
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps  
GFSK Channel 19**



Date: 17.MAR.2014 14:52:00



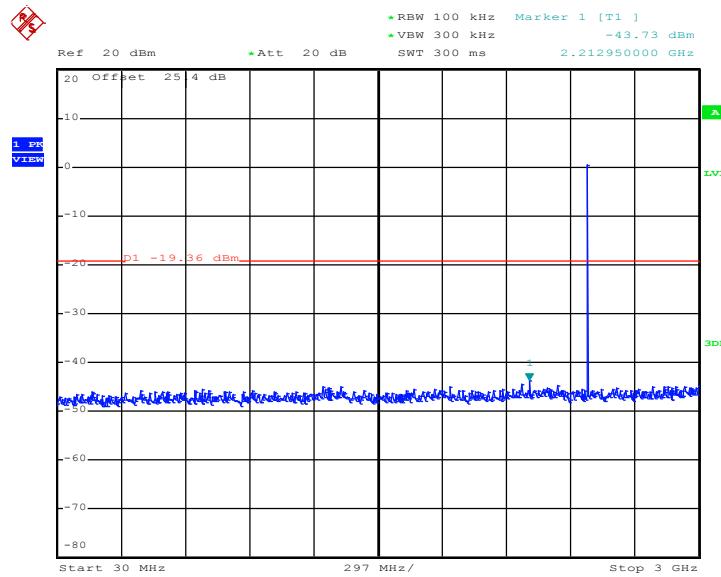
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps  
GFSK Channel 19**



Date: 17.MAR.2014 14:52:18

<b>Test Mode :</b>	Bluetooth 4.0 - LE	<b>Temperature :</b>	22~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	51~55%
		<b>Test Engineer :</b>	Alex Lee

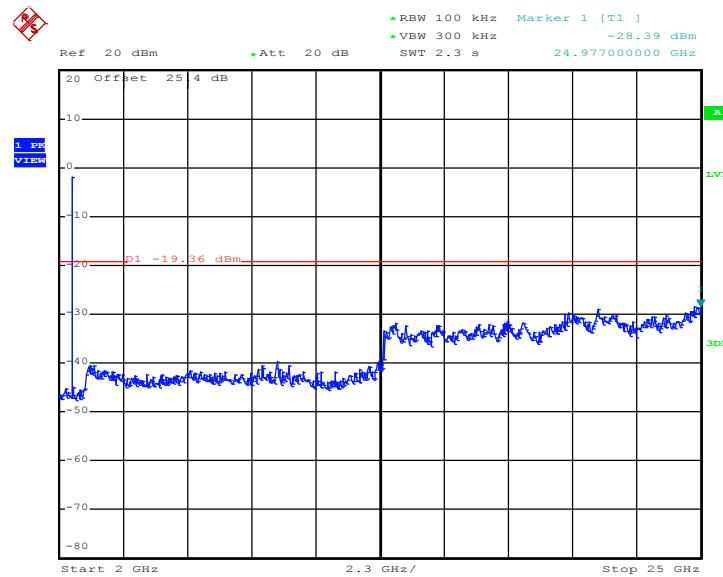
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps  
GFSK Channel 39**



Date: 17.MAR.2014 14:53:03



**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps  
GFSK Channel 39**



Date: 17.MAR.2014 14:53:21



### 3.5 Radiated Band Edges and Spurious Emission Measurement

#### 3.5.1 Limit of Radiated Band Edges and Spurious 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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. 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

#### 3.5.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.



### 3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.

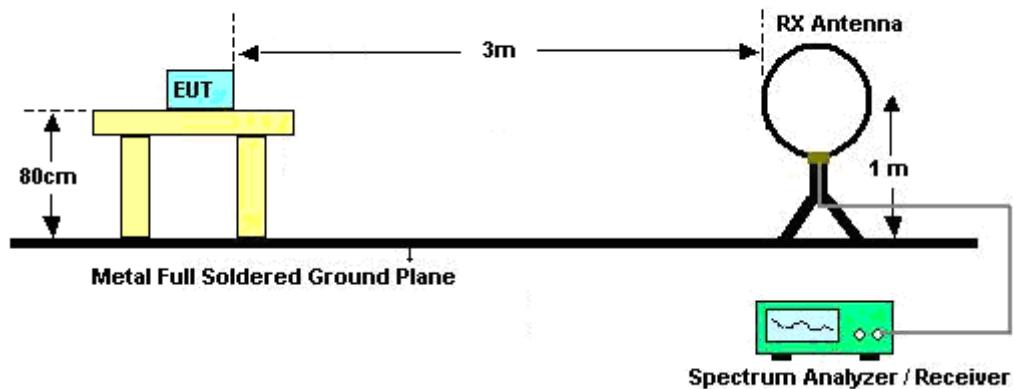
For average measurement:

  - VBW = 10 Hz, when duty cycle is no less than 98 percent.
  - VBW  $\geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

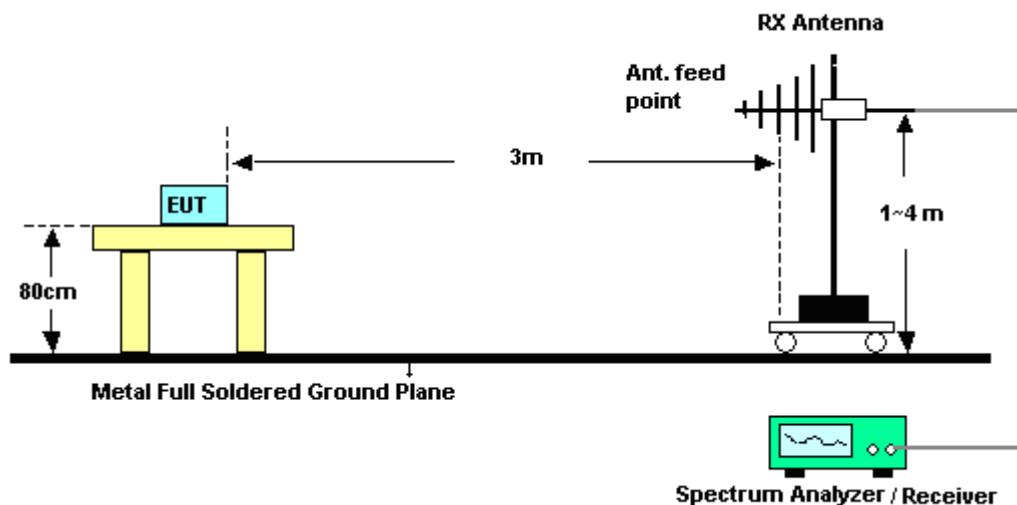
Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	62.66	396	2.525	3kHz

### 3.5.4 Test Setup

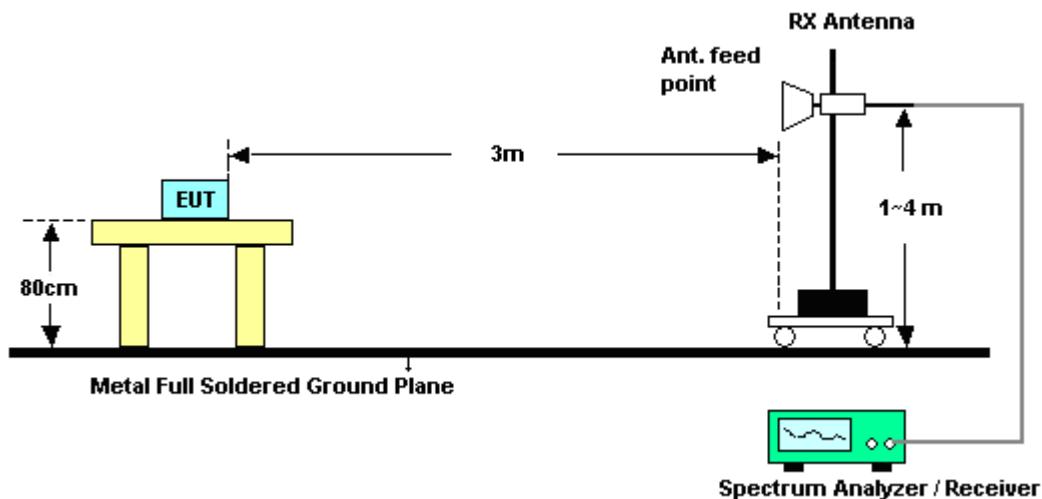
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



**For radiated emissions above 1GHz**



### 3.5.5 Test Results of Radiated Spurious 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.



## 3.5.6 Test Result of Radiated Spurious at Band Edges

Test Mode :	Mode 1			Temperature :		22~24°C		
Test Channel :	00			Relative Humidity :		50~52%		
				Test Engineer :		Kyle Jhuang		

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dB $\mu$ V / m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V / m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2340.51	51.06	-22.94	74	48.23	32.19	6.19	35.55	100	187	Peak
2379.39	40.47	-13.53	54	37.53	32.26	6.21	35.53	100	187	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dB $\mu$ V / m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V / m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2321.61	51.22	-22.78	74	48.45	32.16	6.18	35.57	122	40	Peak
2372.37	40.19	-13.81	54	37.25	32.26	6.21	35.53	122	40	Average

Test Mode :	Mode 3			Temperature :		22~24°C		
Test Channel :	39			Relative Humidity :		50~52%		
				Test Engineer :		Kyle Jhuang		

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dB $\mu$ V / m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V / m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2499.19	51.48	-22.52	74	47.94	32.5	6.45	35.41	100	165	Peak
2483.62	40.88	-13.12	54	37.39	32.47	6.45	35.43	100	165	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dB $\mu$ V / m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V / m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2499.88	51.16	-22.84	74	47.62	32.5	6.45	35.41	152	42	Peak
2499.64	41.21	-12.79	54	37.67	32.5	6.45	35.41	152	42	Average



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

**Note:** Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2402	102.85	-	-	99.84	32.29	6.22	35.5	100	187	Average
2402	103.97	-	-	100.96	32.29	6.22	35.5	100	187	Peak
4803	39.61	-34.39	74	55.69	34.89	8	58.97	100	0	Peak

**Note:** Other harmonics are lower than background noise.

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2402	95.24	-	-	92.23	32.29	6.22	35.5	122	40	Average
2402	96.36	-	-	93.35	32.29	6.22	35.5	122	40	Peak
4806	40.21	-33.79	74	56.25	34.89	8.04	58.97	100	0	Peak

**Note:** Other harmonics are lower than background noise.



<b>Test Mode :</b>	Mode 2		<b>Temperature :</b>		22~24°C				
<b>Test Channel :</b>	19		<b>Relative Humidity :</b>		50~52%				
<b>Test Engineer :</b>	Kyle Jhuang		<b>Polarization :</b>		Horizontal				
<b>Remark :</b>	1. 2440 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.								

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2440	102.37	-	-	99.11	32.4	6.34	35.48	150	179	Average
2440	103.46	-	-	100.2	32.4	6.34	35.48	150	179	Peak
4881	39.02	-34.98	74	54.81	34.93	8.15	58.87	100	0	Peak
7320	40.56	-33.44	74	51.95	36.63	10.47	58.49	100	0	Peak

**Note:** Other harmonics are lower than background noise.

<b>Test Mode :</b>	Mode 2		<b>Temperature :</b>		22~24°C				
<b>Test Channel :</b>	19		<b>Relative Humidity :</b>		50~52%				
<b>Test Engineer :</b>	Kyle Jhuang		<b>Polarization :</b>		Vertical				
<b>Remark :</b>	1. 2440 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.								

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2440	94.21	-	-	90.95	32.4	6.34	35.48	151	38	Average
2440	95.34	-	-	92.08	32.4	6.34	35.48	151	38	Peak
4881	39.19	-34.81	74	54.98	34.93	8.15	58.87	100	0	Peak
7320	39.85	-34.15	74	51.24	36.63	10.47	58.49	100	0	Peak

**Note:** Other harmonics are lower than background noise.



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	50~52%
<b>Test Engineer :</b>	Kyle Jhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
163.11	13.2	-30.3	43.5	34.03	9.43	1.49	31.75	-	-	Peak
197.67	19.25	-24.25	43.5	40.55	8.82	1.63	31.75	-	-	Peak
230.07	25.36	-20.64	46	45.53	9.8	1.77	31.74	-	-	Peak
639.5	27.92	-18.08	46	38.22	18.82	2.92	32.04	-	-	Peak
689.9	32.08	-13.92	46	42.25	18.82	3.03	32.02	100	25	Peak
743.1	31.57	-14.43	46	40.59	19.83	3.14	31.99	-	-	Peak
2480	102.43	-	-	98.94	32.47	6.45	35.43	100	165	Average
2480	103.48	-	-	99.99	32.47	6.45	35.43	100	165	Peak
4959	40.8	-33.2	74	56.31	34.98	8.26	58.75	100	0	Peak
7440	40.73	-33.27	74	52.36	36.61	10.47	58.71	100	0	Peak

**Note:** Other harmonics are lower than background noise.



<b>Test Mode :</b>	Mode 3			<b>Temperature :</b>		22~24°C					
<b>Test Channel :</b>	39			<b>Relative Humidity :</b>		50~52%					
<b>Test Engineer :</b>	Kyle Jhuang			<b>Polarization :</b>		Vertical					
<b>Remark :</b>	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.										
<b>Frequency ( MHz )</b>	<b>Level ( dB<math>\mu</math>V/m )</b>	<b>Over Limit ( dB )</b>	<b>Limit Line ( dB<math>\mu</math>V/m )</b>	<b>Read Level ( dB<math>\mu</math>V )</b>	<b>Antenna Factor ( dB )</b>	<b>Cable Loss ( dB )</b>	<b>Preamp Factor ( dB )</b>	<b>Ant Pos ( cm )</b>	<b>Table Pos ( deg )</b>	<b>Remark</b>	
55.92	21.1	-18.9	40	46.41	5.59	0.88	31.78	-	-	Peak	
75.36	19.18	-20.82	40	43.52	6.41	1.02	31.77	-	-	Peak	
230.07	28.12	-17.88	46	47.96	10.13	1.77	31.74	-	-	Peak	
600.3	26.51	-19.49	46	36.83	18.91	2.83	32.06	-	-	Peak	
689.9	28.25	-17.75	46	38.38	18.86	3.03	32.02	100	163	Peak	
820.1	24.52	-21.48	46	32.84	20.25	3.3	31.87	-	-	Peak	
2480	94.32	-	-	90.83	32.47	6.45	35.43	152	42	Average	
2480	95.35	-	-	91.86	32.47	6.45	35.43	152	42	Peak	
4959	39.53	-34.47	74	55.04	34.98	8.26	58.75	100	0	Peak	
7440	39.59	-34.41	74	51.22	36.61	10.47	58.71	100	0	Peak	

**Note:** Other harmonics are lower than background noise.

## **3.6 AC Conducted Emission Measurement**

### **3.6.1 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.

<b>Frequency of emission (MHz)</b>	<b>Conducted limit (dB<math>\mu</math>V)</b>	
	<b>Quasi-peak</b>	<b>Average</b>
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.

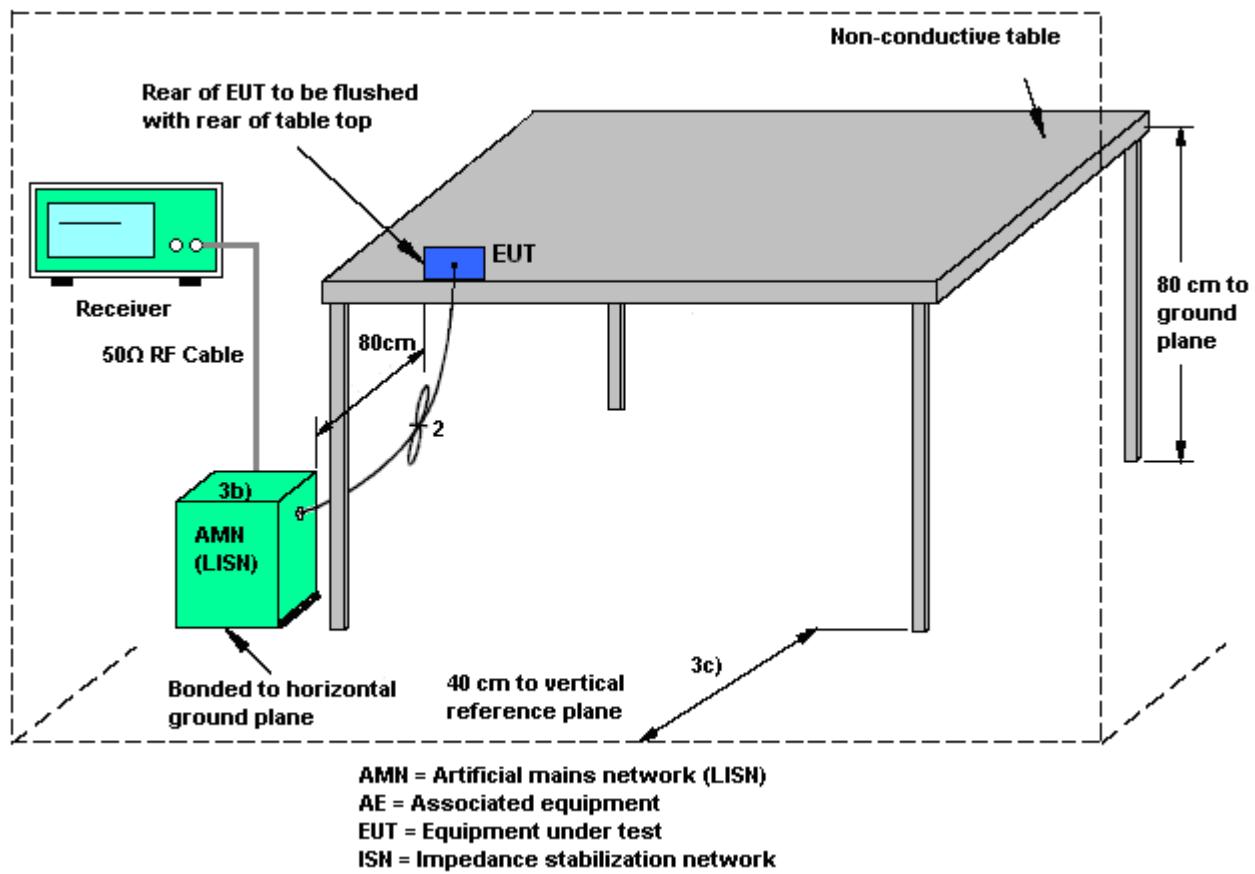
### **3.6.2 Measuring Instruments**

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### **3.6.3 Test Procedures**

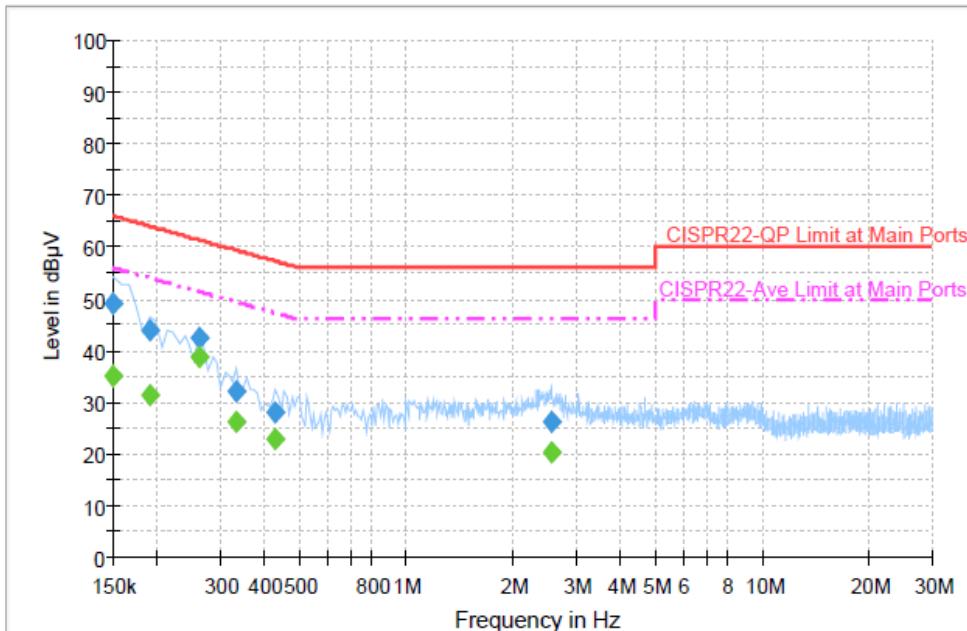
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

### 3.6.4 Test Setup



### 3.6.5 Test Result of AC Conducted Emission

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Cosmo Xu	<b>Relative Humidity :</b>	45~47%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Line
<b>Function Type :</b>	Bluetooth Link + WLAN (2.4GHz) Link + HDMI + RJ-45 (Load) + Speaker + Mouse + SD Card + MPEG4 + Adapter		



#### Final Result : Quasi-Peak

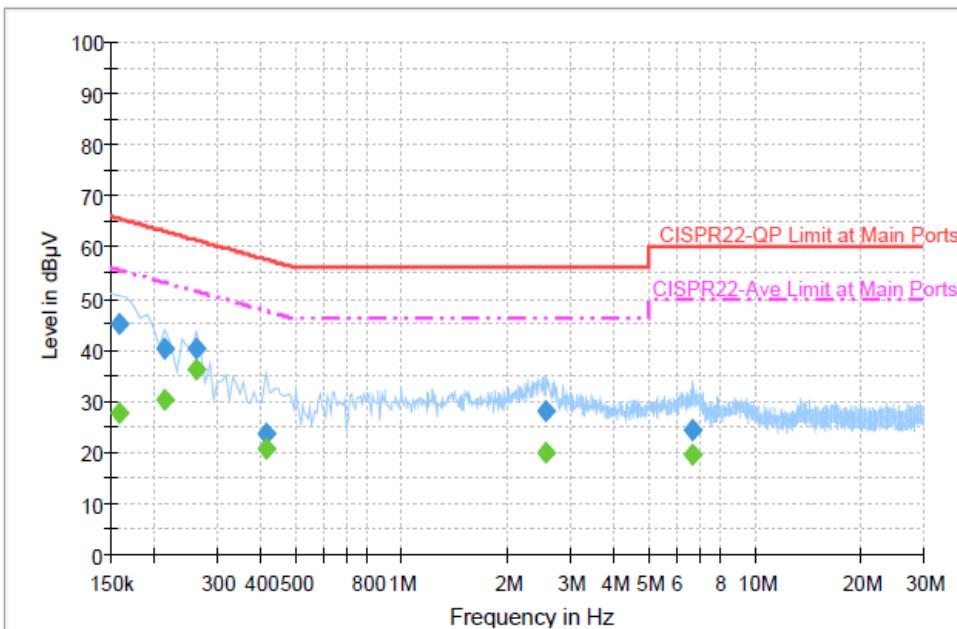
Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	49.0	Off	L1	19.4	17.0	66.0
0.190000	44.1	Off	L1	19.4	19.9	64.0
0.262000	42.3	Off	L1	19.3	19.1	61.4
0.334000	32.0	Off	L1	19.4	27.4	59.4
0.430000	28.1	Off	L1	19.4	29.2	57.3
2.550000	26.1	Off	L1	19.6	29.9	56.0

#### Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	35.1	Off	L1	19.4	20.9	56.0
0.190000	31.3	Off	L1	19.4	22.7	54.0
0.262000	38.7	Off	L1	19.3	12.7	51.4
0.334000	26.3	Off	L1	19.4	23.1	49.4
0.430000	23.1	Off	L1	19.4	24.2	47.3
2.550000	20.2	Off	L1	19.6	25.8	46.0



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Cosmo Xu	<b>Relative Humidity :</b>	45~47%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Neutral
<b>Function Type :</b>	Bluetooth Link + WLAN (2.4GHz) Link + HDMI + RJ-45 (Load) + Speaker + Mouse + SD Card + MPEG4 + Adapter		

**Final Result : Quasi-Peak**

Frequency (MHz)	Quasi-Peak (dB $\mu$ V)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.158000	45.2	Off	N	19.3	20.4	65.6
0.214000	40.2	Off	N	19.4	22.8	63.0
0.262000	40.1	Off	N	19.4	21.3	61.4
0.414000	23.6	Off	N	19.4	34.0	57.6
2.566000	28.0	Off	N	19.6	28.0	56.0
6.702000	24.3	Off	N	19.6	35.7	60.0

**Final Result : Average**

Frequency (MHz)	Average (dB $\mu$ V)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.158000	27.8	Off	N	19.3	27.8	55.6
0.214000	30.4	Off	N	19.4	22.6	53.0
0.262000	36.3	Off	N	19.4	15.1	51.4
0.414000	20.7	Off	N	19.4	26.9	47.6
2.566000	20.0	Off	N	19.6	26.0	46.0
6.702000	19.5	Off	N	19.6	30.5	50.0



## **3.7 Antenna Requirements**

### **3.7.1 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.

### **3.7.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.7.3 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	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Mar. 06, 2014 ~ Mar. 17, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Jan. 28, 2014	Mar. 06, 2014 ~ Mar. 17, 2014	Jan. 27, 2015	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Jan. 28, 2014	Mar. 06, 2014 ~ Mar. 17, 2014	Jan. 27, 2015	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz – 26.5GHz	Jan. 15, 2014	Mar. 07, 2014	Jan. 14, 2015	Radiation (03CH08-HY)
Bilog Antenna	Teseq GmbH	CBL6112D	35379	30MHz~2GHz	Oct. 10, 2013	Mar. 07, 2014	Oct. 09, 2014	Radiation (03CH08-HY)
Horn Antenna	ESCO	3117	000143261	1GHz~18GHz	Jan. 16, 2014	Mar. 07, 2014	Jan. 15, 2015	Radiation (03CH08-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA917025	1	15GHz~40GHz	Oct. 03, 2013	Mar. 07, 2014	Oct. 02, 2014	Radiation (03CH08-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	May 15, 2013	Mar. 07, 2014	May 14, 2014	Radiation (03CH08-HY)
Preamplifier	MITEQ	AMF-7D-00 101800-30-10P	1590074	1GHz~18GHz	Jul. 09, 2013	Mar. 07, 2014	Jul. 08, 2014	Radiation (03CH08-HY)
Pre Amplifier	Agilent	8449B	3008A02665	1GHz~26.5GHz	Sep. 04, 2013	Mar. 07, 2014	Sep. 03, 2014	Radiation (03CH08-HY)
Turn Table	Chaintek	Chaintek 3000	N/A	0~360 Degree	N/A	Mar. 07, 2014	N/A	Radiation (03CH08-HY)
Antenna Mast	MF	MFA520BS	N/A	1m~4m	N/A	Mar. 07, 2014	N/A	Radiation (03CH08-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MHz	Jul. 03, 2012	Mar. 07, 2014	Jul. 03, 2014	Radiation (03CH08-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Mar. 06, 2014	Nov. 14, 2014	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Mar. 06, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Mar. 06, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 06, 2014	N/A	Conduction (CO05-HY)



## 5 Uncertainty of Evaluation

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

<b>Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))</b>	<b>2.26</b>
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

<b>Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))</b>	<b>4.30</b>
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