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# FCC Test Report

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Report No.: AGC00610131102FE02

**FCC ID** : 2AAKT-HB030  
**APPLICATION PURPOSE** : Class II Permissive Change  
**PRODUCT DESIGNATION** : Bluetooth keyboard  
**BRAND NAME** : N/A  
**MODEL NAME** : HB033  
**CLIENT** : Shenzhen Hastech Technology Co.,Ltd  
**DATE OF ISSUE** : Nov.09, 2013  
**STANDARD(S)** : FCC Part 15 Rules  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**REPORT REVISE RECORD**

<b>Report Version</b>	<b>Revise Time</b>	<b>Issued Date</b>	<b>Valid Version</b>	<b>Notes</b>
V1.0	/	Nov.09, 2013	Valid	Class II Permissive Change

**PRODUCT CHANGE RECORD**

1. This is a variant report based on model HB030.
2. Two Models all the same except for the size and different color compare to the original equipment.  
The outer material add coating and the button circuit changed as well.
3. The original report can be referred to AGC00610130705FE02.
4. Only Radiated Emission and band edge were verified for the differences  
based on the original product.

## TABLE OF CONTENTS

<b>1. VERIFICATION OF CONFORMITY.....</b>	<b>5</b>
<b>2. GENERAL INFORMATION.....</b>	<b>6</b>
2.1. PRODUCT DESCRIPTION.....	6
2.2. TABLE OF CARRIER FREQUENCIES.....	6
2.3. RECEIVER INPUT BANDWIDTH.....	7
2.4. EXAMPLE OF A HOPPING SEQUENCE IN DATA MODE.....	7
2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR.....	7
2.6. RELATED SUBMITTAL(S) / GRANT (S).....	8
2.7. TEST METHODOLOGY.....	8
2.8. SPECIAL ACCESSORIES.....	8
2.9. EQUIPMENT MODIFICATIONS.....	8
<b>3. MEASUREMENT UNCERTAINTY .....</b>	<b>9</b>
<b>4. DESCRIPTION OF TEST MODES .....</b>	<b>9</b>
<b>5. SYSTEM TEST CONFIGURATION.....</b>	<b>10</b>
5.1. CONFIGURATION OF EUT SYSTEM.....	10
5.2. EQUIPMENT USED IN EUT SYSTEM .....	10
5.3. SUMMARY OF TEST RESULTS.....	10
<b>6. TEST FACILITY.....</b>	<b>11</b>
<b>7. RADIATED EMISSION.....</b>	<b>13</b>
7.1. MEASUREMENT PROCEDURE .....	13
7.2. TEST SETUP .....	15
7.3. TEST RESULT.....	16
<b>8. BAND EDGE EMISSION .....</b>	<b>20</b>
8.1. MEASUREMENT PROCEDURE .....	20
8.2. TEST SET-UP .....	20
8.3. TEST RESULT.....	21
<b>APPENDIX A: PHOTOGRAPHS OF TEST SETUP.....</b>	<b>25</b>
<b>APPENDIX B: PHOTOGRAPHS OF EUT .....</b>	<b>26</b>

## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Shenzhen Hastech Technology Co.,Ltd
<b>Address</b>	G-A1 BLDG, Democracy West Industry Park, Shajing town, Bao'an District, Shenzhen, China
<b>Manufacturer</b>	Shenzhen Hastech Technology Co.,Ltd
<b>Address</b>	G-A1 BLDG, Democracy West Industry Park, Shajing town, Bao'an District, Shenzhen, China
<b>Product Designation</b>	Bluetooth keyboard
<b>Brand Name</b>	N/A
<b>Test Model</b>	HB033
<b>Date of test</b>	Nov.07, 2013 to Nov.08, 2013
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-US-BR/RF (2013-03-01)

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By

*water zuo*

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Water Zuo Nov.09, 2013

Checked By

*forrest lei*

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Forrest Lei Nov.09, 2013

Authorized By

*Solger Zhang*

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Solger Zhang Nov.09, 2013

## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is a **Bluetooth keyboard** designed as a “Communication Device”. It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.402 GHz to 2.480GHz
<b>RF Output Power</b>	0.85dBm(Max)
<b>Bluetooth Version</b>	V 3.0
<b>Modulation</b>	GFSK
<b>Number of channels</b>	79
<b>Antenna Designation</b>	Integrated Antenna
<b>Antenna Gain</b>	0dBi
<b>Power Supply</b>	DC3.7V by Built-in Li-ion Battery

Note: 1.BT is active when charging. The USB port is only used for charging and can't be used to transfer data with PC.  
2. The EUT is equipped with the Bluetooth Chip BCM20730 which complies with Bluetooth V3.0. BUT for this device the functionality is limited to GFSK (1 MBit/s) by the firmware. End-user is not able to change the settings and enable any additional functionality by himself.

### 2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

### 2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ, In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

### 2.4. EXAMPLE OF A HOPPING SEQUENCE IN DATA MODE

Example of a 79 hopping sequence in data mode:

40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67  
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59  
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75  
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06  
01, 51, 03, 55, 05, 04

### 2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.
2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD\_ADDRESS. The BD\_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD\_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For behavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures(permuations, additions, XOR-operations)are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always Differ from the first one.

## **2.6. RELATED SUBMITTAL(S) / GRANT (S)**

This submittal(s) (test report) is intended for **FCC ID: 2AAKT-HB030** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## **2.7. TEST METHODOLOGY**

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003).

Radiated testing was performed at an antenna to EUT distance 3 meters.

## **2.8. SPECIAL ACCESSORIES**

Refer to section 5.2.

## **2.9. EQUIPMENT MODIFICATIONS**

Not available for this EUT intended for grant.

### 3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

### 4. DESCRIPTION OF TEST MODES

TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	Low channel TX	
2	Middle channel TX	
3	High channel TX	
4	Normal Hopping	V

Note:

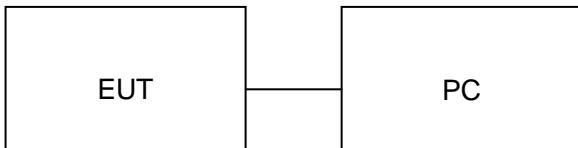
1. V means EMI worst mode.
2. All the test modes can be supply by Built-in Li-ion battery and adapter, only the result of the worst case was recorded in the report, if no other cases.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

## 5. SYSTEM TEST CONFIGURATION

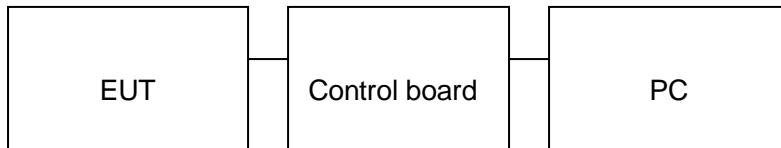
### 5.1. CONFIGURATION OF EUT SYSTEM

#### Configuration:

Configure 1 (Normal hopping)



Configure 1 (Control continuous TX)



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth keyboard	N/A	HB033	EUT
2	Battery	N/A	382035p	Accessory
3	PC	Dell	INSPIRON	A.E
4	Control Board	N/A	N/A	A.E
5	Table PC	N/A	N/A	A.E

### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Spurious Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant
§15.247	Frequency Separation	Compliant

## 6. TEST FACILITY

<b>Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China
<b>Description</b>	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2003.

## ALL TEST EQUIPMENT LIST

(For original test equipment list)

<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>S/N</b>	<b>Cal. Date</b>	<b>Cal. Due</b>
Power Probe	R&S	NRP-Z23	100323	07/18/2012	07/17/2013
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	07/18/2012	07/17/2013
Amplifier	EM	EM30180	0607030	02/28/2013	02/27/2014
Horn Antenna	EM	EM-AH-10180	67	04/21/2012	04/20/2014
Horn Antenna	A.H. Systems Inc.	SAS-574	--	06/08/2013	06/07/2014
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/18/2012	07/17/2013
Biological Antenna	A.H. Systems Inc.	SAS-521-4	26	06/08/2013	06/07/2014
Loop Antenna	Daze	ZN30900N	SEL0097	07/18/2012	07/17/2013
Isolation Transformer	LETEAC	LTBK	--	07/18/2012	07/17/2013

(For new test equipment list)

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Probe	R&S	NRP-Z23	100323	07/17/2013	07/16/2014
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	07/17/2013	07/16/2014
Amplifier	EM	EM30180	0607030	02/28/2013	02/27/2014
Horn Antenna	EM	EM-AH-10180	67	04/20/2013	04/19/2014
Horn Antenna	A.H. Systems Inc.	SAS-574	--	07/17/2013	07/16/2014
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/17/2013	07/16/2014
Biological Antenna	A.H. Systems Inc.	SAS-521-4	26	06/07/2013	06/06/2014
Loop Antenna	Daze	ZN30900N	SEL0097	07/17/2013	07/16/2014
Isolation Transformer	LETEAC	LTBK	--	07/17/2013	07/16/2014

## 7. RADIATED EMISSION

### 7.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

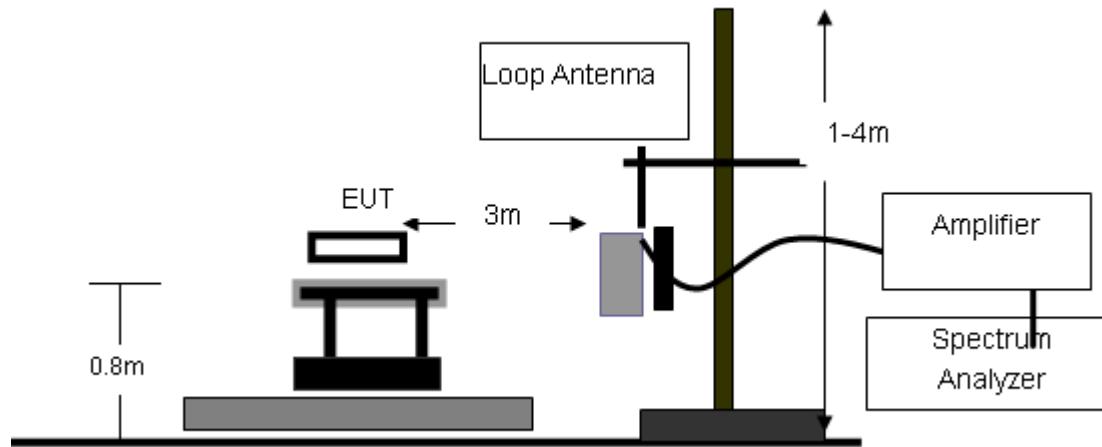
The following table is the setting of spectrum analyzer and receiver.

<b>Spectrum Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

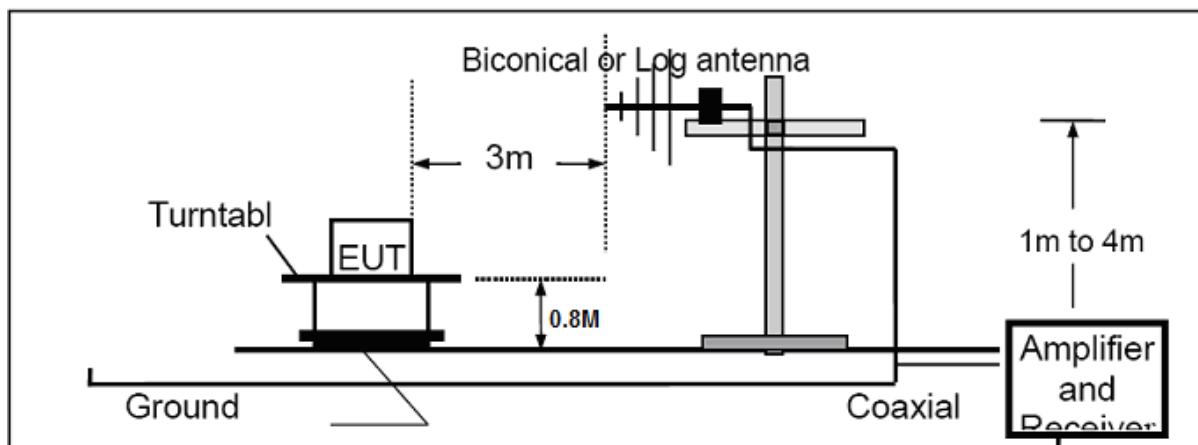
<b>Receiver Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

## 7.2. TEST SETUP

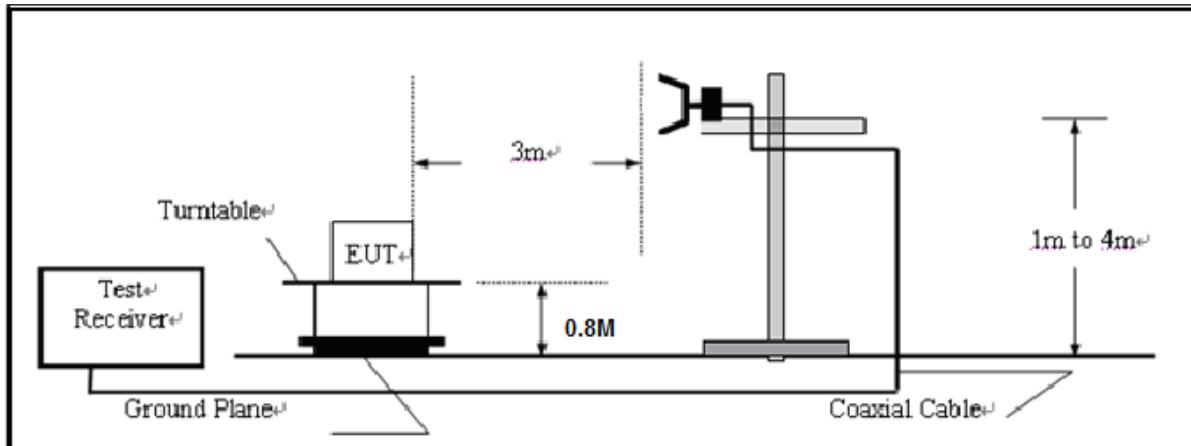
### RADIATED EMISSION TEST SETUP BELOW 30MHz



### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz

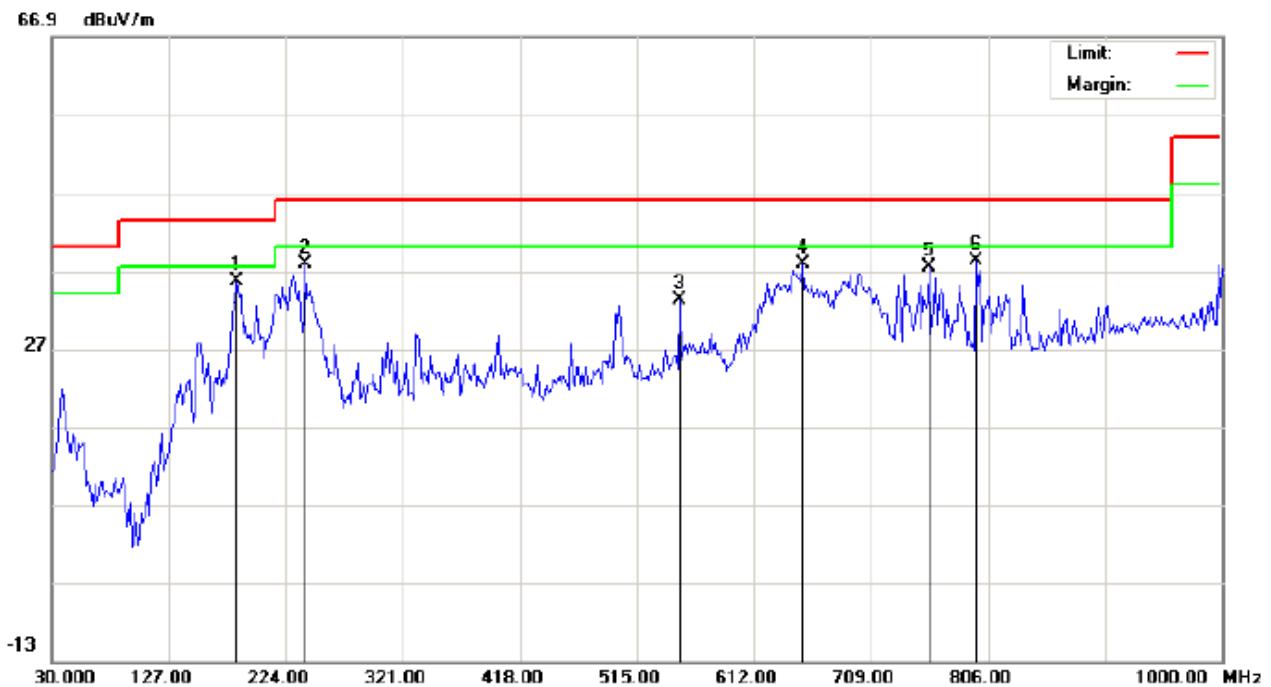


### 7.3. TEST RESULT

#### RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

#### RADIATED EMISSION BELOW 1GHZ-Horizontal



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT:Bluetooth keyboard

Distance:

M/N:HB033

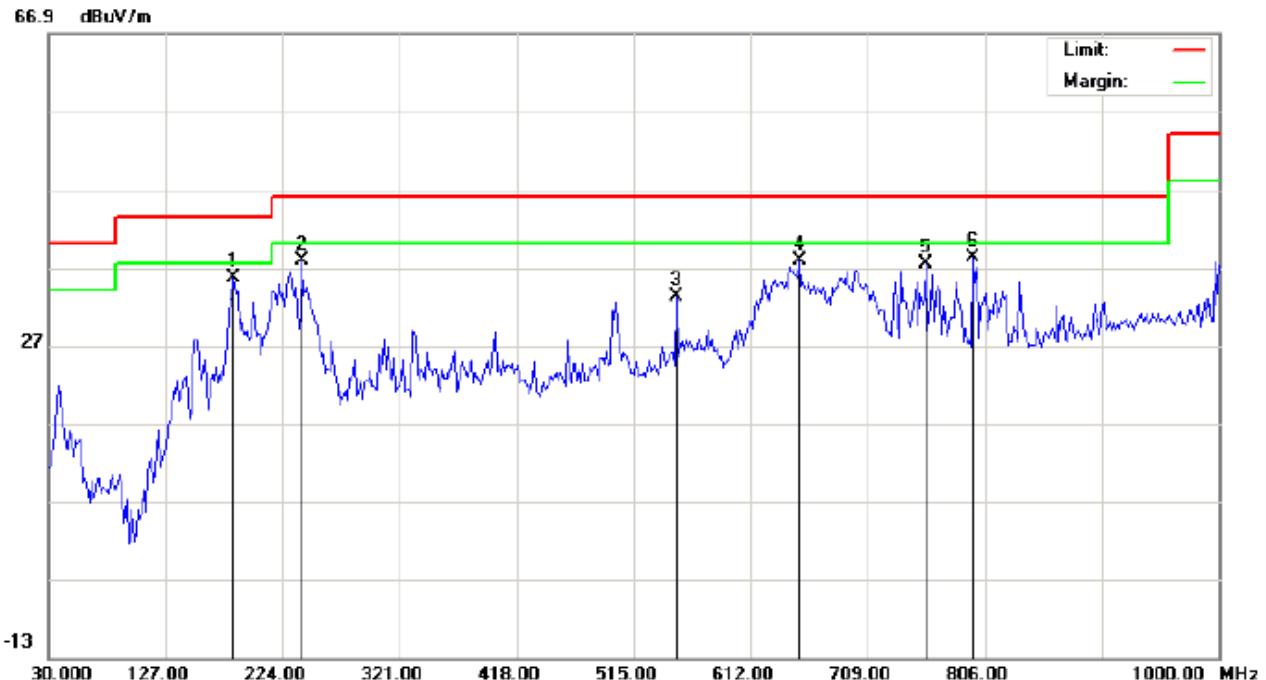
Mode: Normal Hopping

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		183.5833	22.36	13.16	35.52	43.50	-7.98	peak			
2		240.1667	24.91	12.94	37.85	46.00	-8.15	peak			
3		550.5667	10.65	22.48	33.13	46.00	-12.87	peak			
4		652.4167	13.83	23.91	37.74	46.00	-8.26	peak			
5		757.5000	10.63	26.73	37.36	46.00	-8.64	peak			
6	*	796.3000	11.00	27.27	38.27	46.00	-7.73	peak			

**RESULT: PASS**

RADIATED EMISSION BELOW 1GHZ-Vertical



Site: site #1 Polarization: *Vertical* Temperature: 26  
 Limit: FCC Class B 3M Radiation Power: Humidity: 60 %  
 EUT:Bluetooth keyboard Distance:  
 M/N:HB033  
 Mode: Normal Hopping  
 Note:

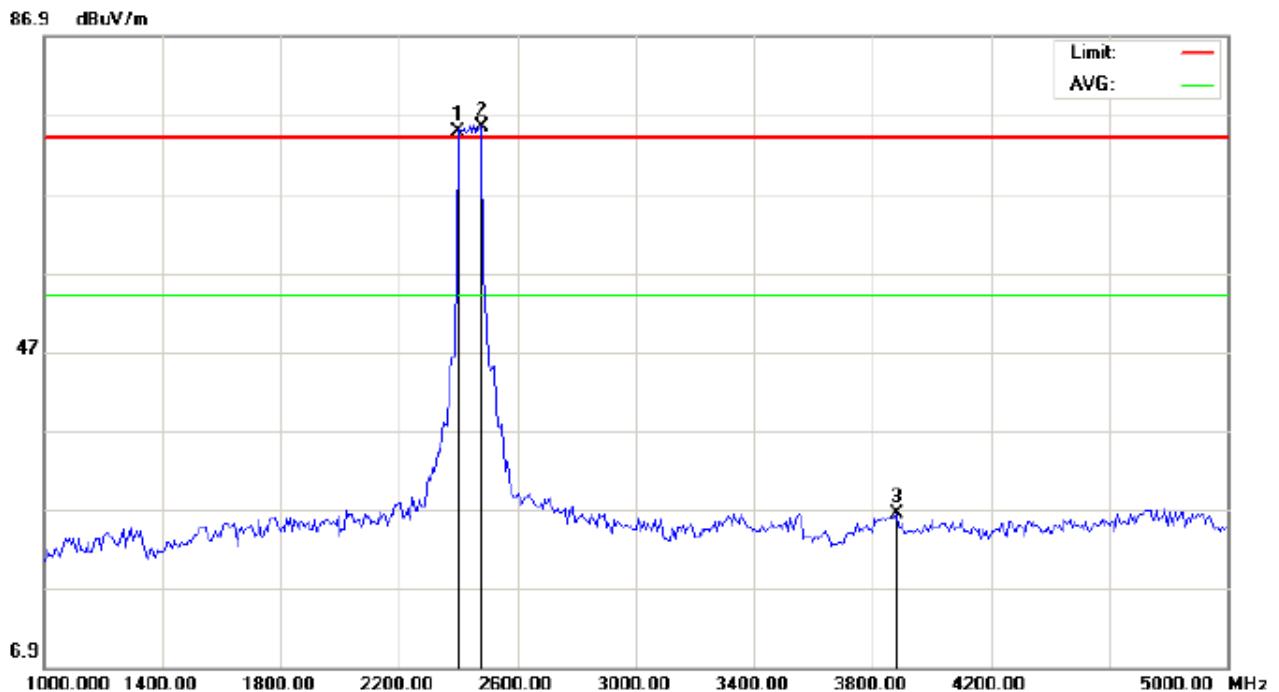
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
1		183.5833	22.36	13.16	35.52	43.50	-7.98	peak			
2		240.1667	24.91	12.94	37.85	46.00	-8.15	peak			
3		550.5667	10.65	22.48	33.13	46.00	-12.87	peak			
4		652.4167	13.83	23.91	37.74	46.00	-8.26	peak			
5		757.5000	10.63	26.73	37.36	46.00	-8.64	peak			
6	*	796.3000	11.00	27.27	38.27	46.00	-7.73	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

## RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics) -Horizontal

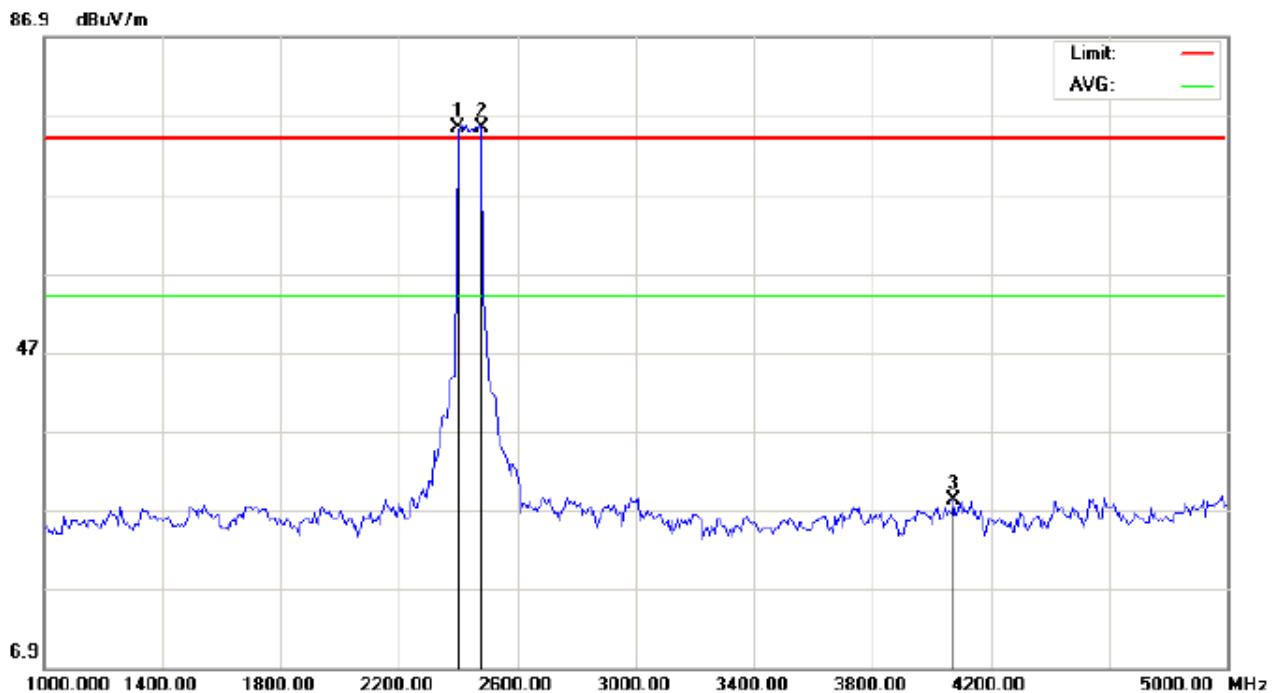


Site: site #1 Polarization: *Horizontal* Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT:Bluetooth keyboard Distance: 3m  
M/N:HB033  
Mode: Normal Hopping  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2402.000	83.21	-8.39	74.82	74.00	0.82	peak			
2	*	2480.000	83.39	-8.08	75.31	74.00	1.31	peak			
3		3880.000	33.62	-7.24	26.38	74.00	-47.62	peak			

## RESULT: PASS

## RADIATED EMISSION ABOVE 1GHZ (1-10<sup>th</sup> Harmonics) -Vertical



Site: site #1 Polarization: *Vertical* Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT:Bluetooth keyboard Distance: 3m  
M/N:HB033  
Mode: Normal Hopping  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2402.000	83.71	-8.39	75.32	74.00	1.32	peak			
2	X	2480.000	83.39	-8.08	75.31	74.00	1.31	peak			
3		4073.333	34.85	-6.73	28.12	74.00	-45.88	peak			

## RESULT: PASS

**Note:** 5~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor+ Cable loss-Amplifier gain, Margin=Measurement-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

## **8. BAND EDGE EMISSION**

### **8.1. MEASUREMENT PROCEDURE**

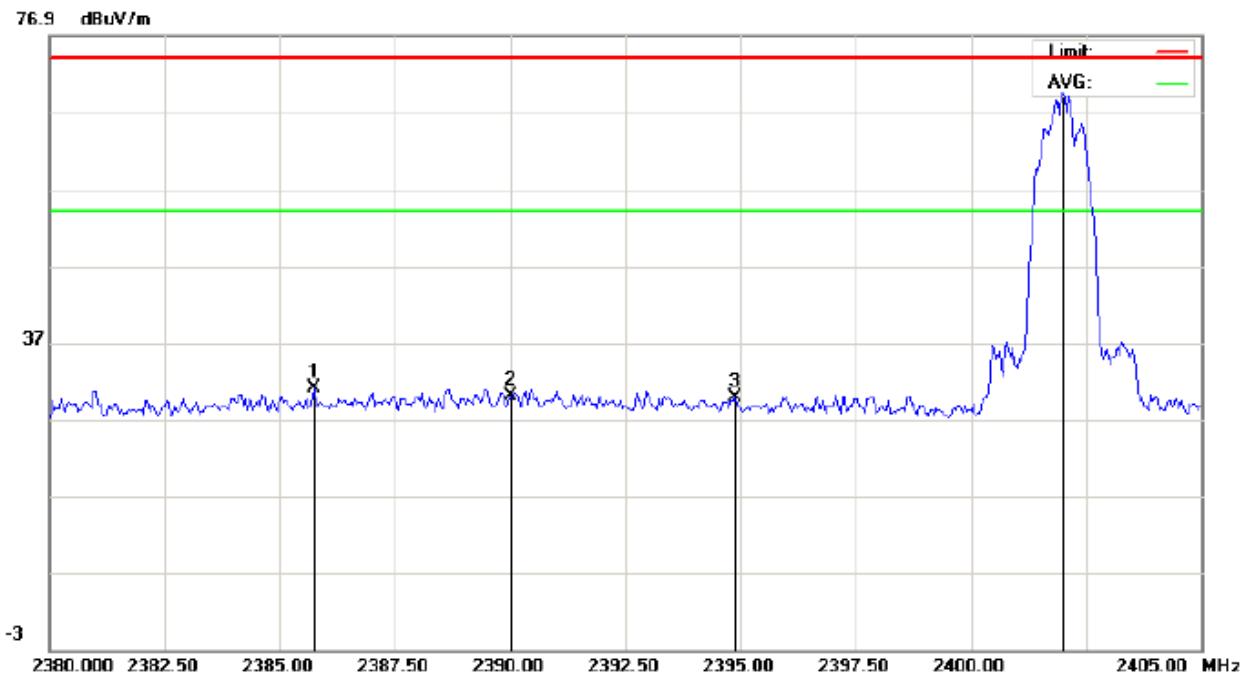
1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency = Operation Frequency,  $RBW \geq 1\% \text{span}$ ,  $VBW \geq RBW$
3. The band edges was measured and recorded.

### **8.2. TEST SET-UP**

Radiated same as 7.2

### 8.3. TEST RESULT

TEST PLOT OF BAND EDGE FOR LOW CHANNEL (3Mbps)-Horizontal

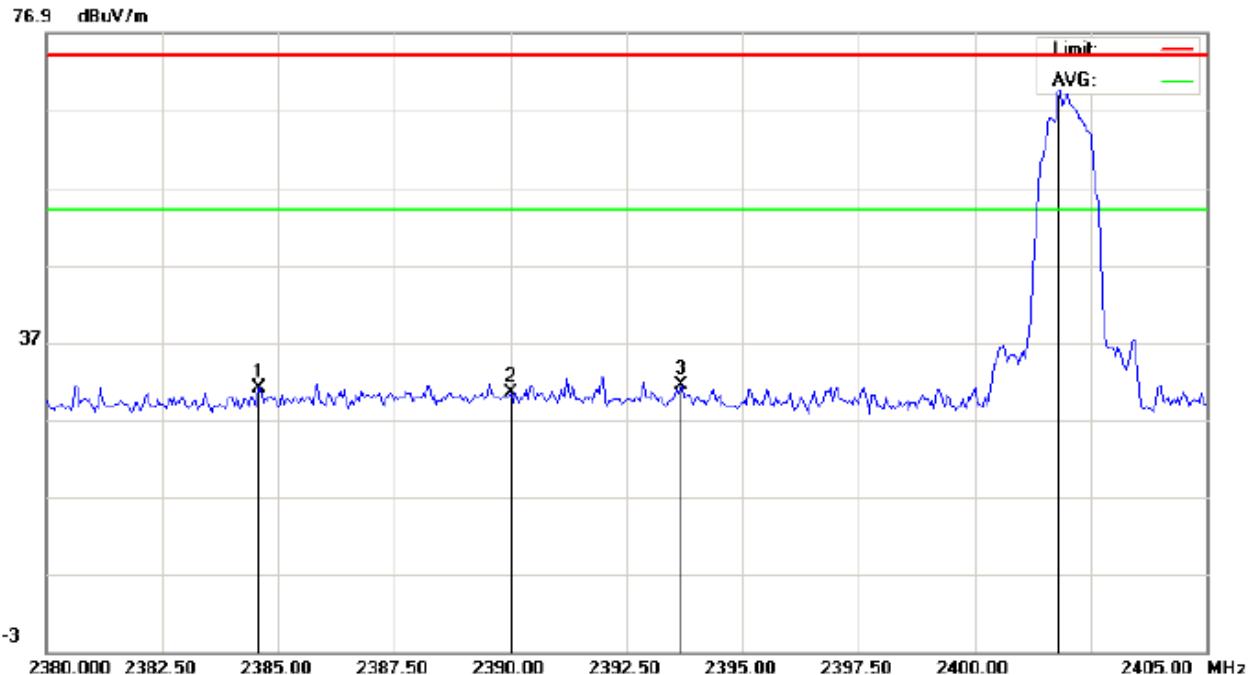


Site: site #1  
 Polarization: *Horizontal* Temperature: 26  
 Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
 EUT: Bluetooth keyboard Distance:  
 M/N: HB033  
 Mode: Low channel TX  
 Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2385.750	40.73	-9.70	31.03	74.00	-42.97	peak			
2		2390.000	39.72	-9.69	30.03	74.00	-43.97	peak			
3		2394.875	39.48	-9.69	29.79	74.00	-44.21	peak			
4	*	2402.000	79.12	-9.68	69.44	74.00	-4.56	peak			

RESULT: PASS

TEST PLOT OF BAND EDGE FOR LOW CHANNEL (3Mbps)-Vertical

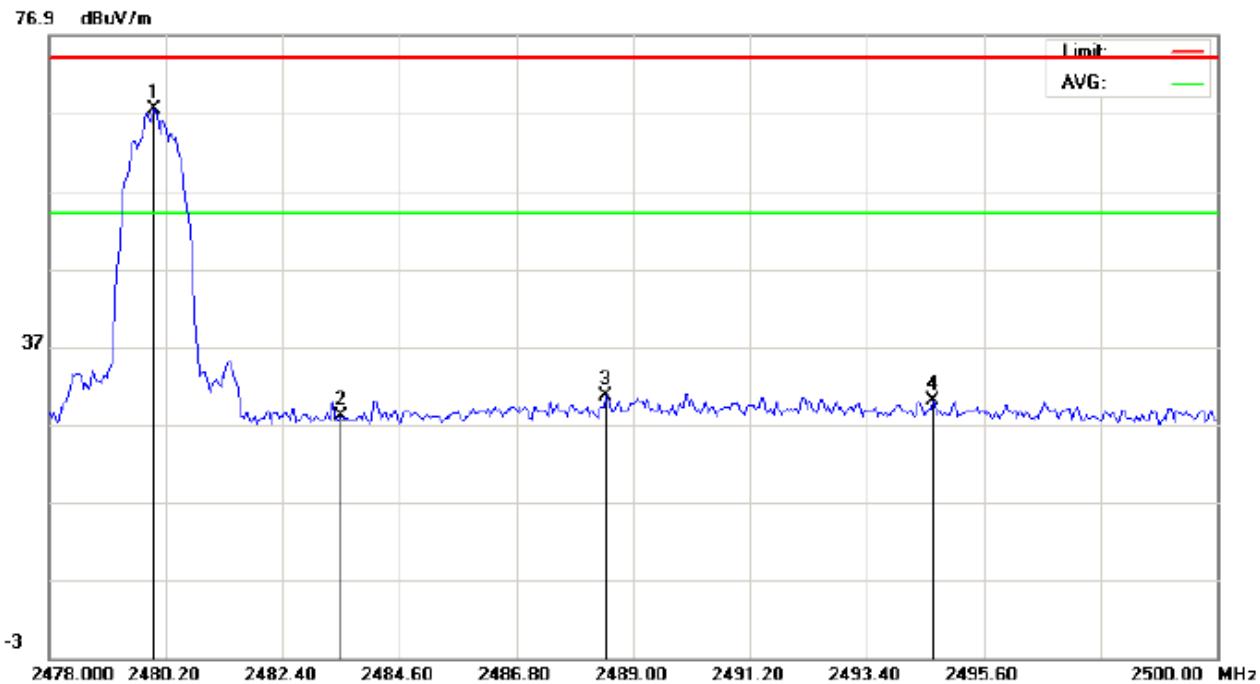


Site: site #1 Polarization: **Vertical** Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT: Bluetooth keyboard Distance:  
M/N: HB033  
Mode: Low channel TX  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2384.583	40.77	-9.70	31.07	74.00	-42.93	peak			
2		2390.000	40.13	-9.69	30.44	74.00	-43.56	peak			
3		2393.667	41.12	-9.69	31.43	74.00	-42.57	peak			
4	*	2401.833	79.23	-9.68	69.55	74.00	-4.45	peak			

**RESULT: PASS**

## TEST PLOT OF BAND EDGE FOR HIGH CHANNEL (3Mbps)-Horizontal

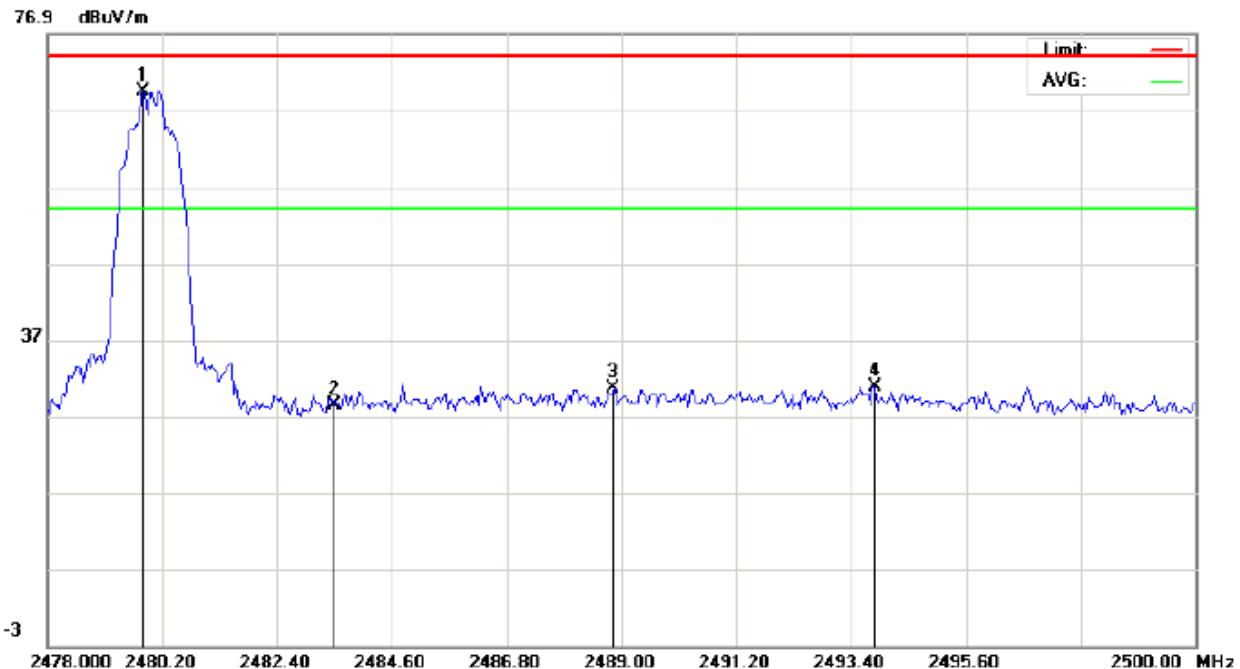


Site: site #1 Polarization: *Horizontal* Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT: Bluetooth keyboard Distance:  
M/N: HB033  
Mode: High channel TX  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2479.980	77.04	-9.59	67.45	74.00	-6.55	peak			
2		2483.500	37.60	-9.59	28.01	74.00	-45.99	peak			
3		2488.487	40.10	-9.58	30.52	74.00	-43.48	peak			
4		2494.647	39.59	-9.58	30.01	74.00	-43.99	peak			

## RESULT: PASS

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL (3Mbps)-Vertical

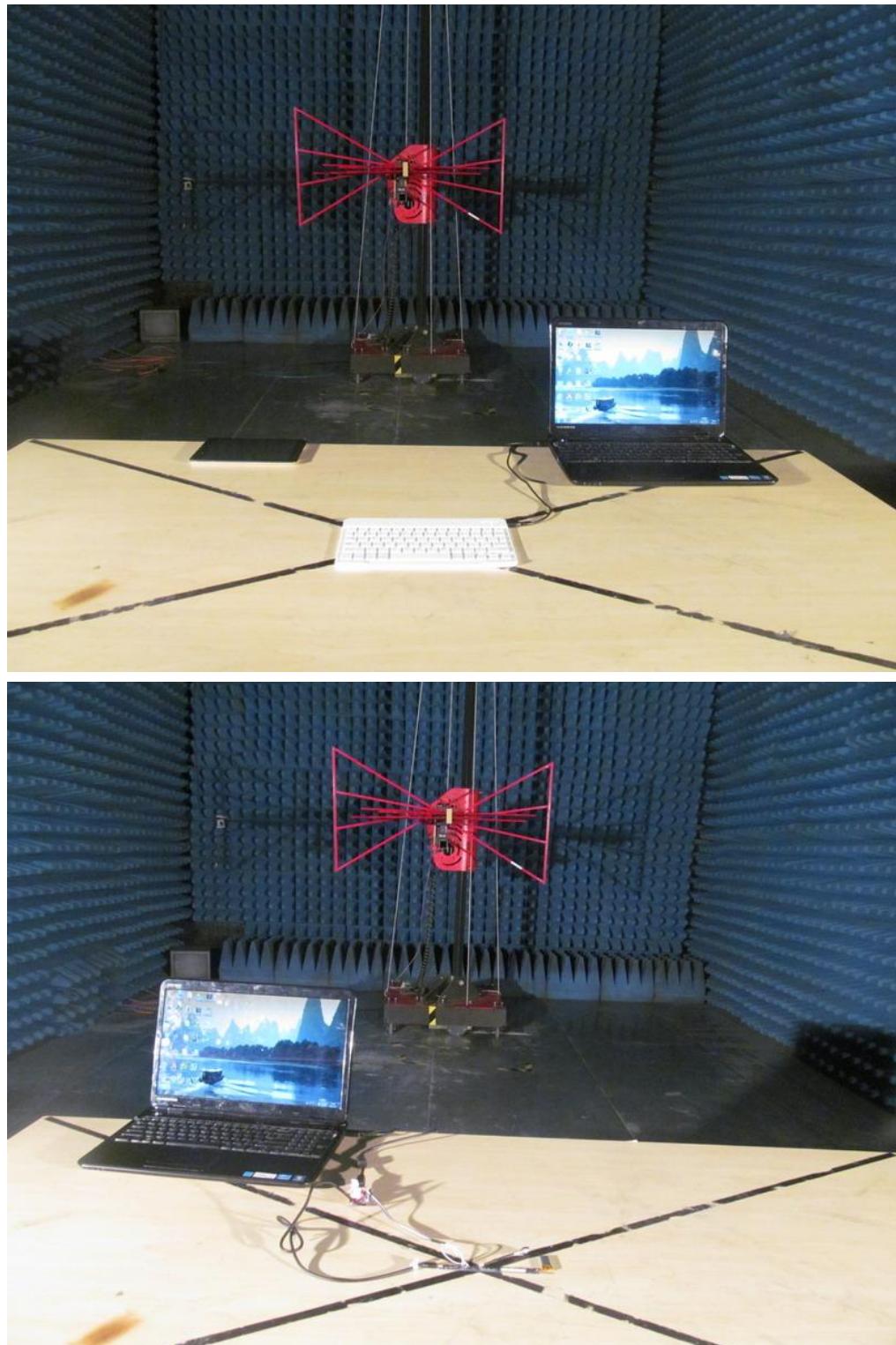


Site: site #1 Polarization: **Vertical** Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT: Bluetooth keyboard Distance:  
M/N: HB033  
Mode: High channel TX  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2479.833	79.07	-9.59	69.48	74.00	-4.52	peak			
2		2483.500	37.94	-9.59	28.35	74.00	-45.65	peak			
3		2488.853	40.26	-9.58	30.68	74.00	-43.32	peak			
4		2493.840	40.46	-9.58	30.88	74.00	-43.12	peak			

**RESULT: PASS**

**APPENDIX A: PHOTOGRAPHS OF TEST SETUP**  
**FCC RADIATED EMISSION TEST SETUP**

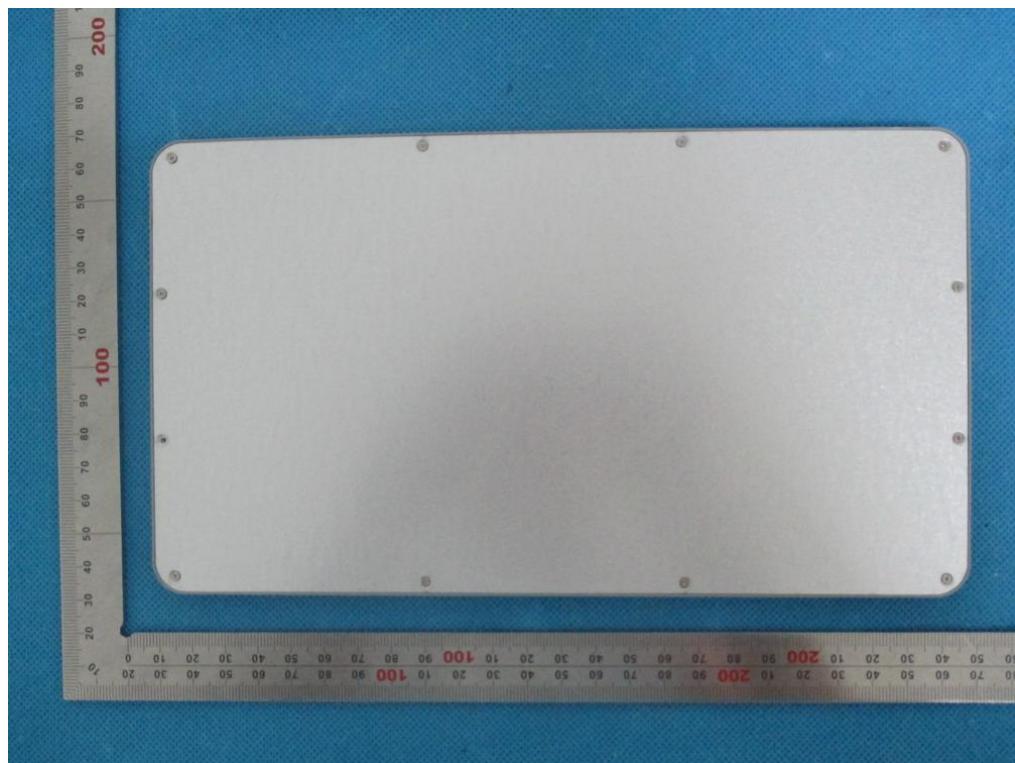


## APPENDIX B: PHOTOGRAPHS OF EUT

### TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



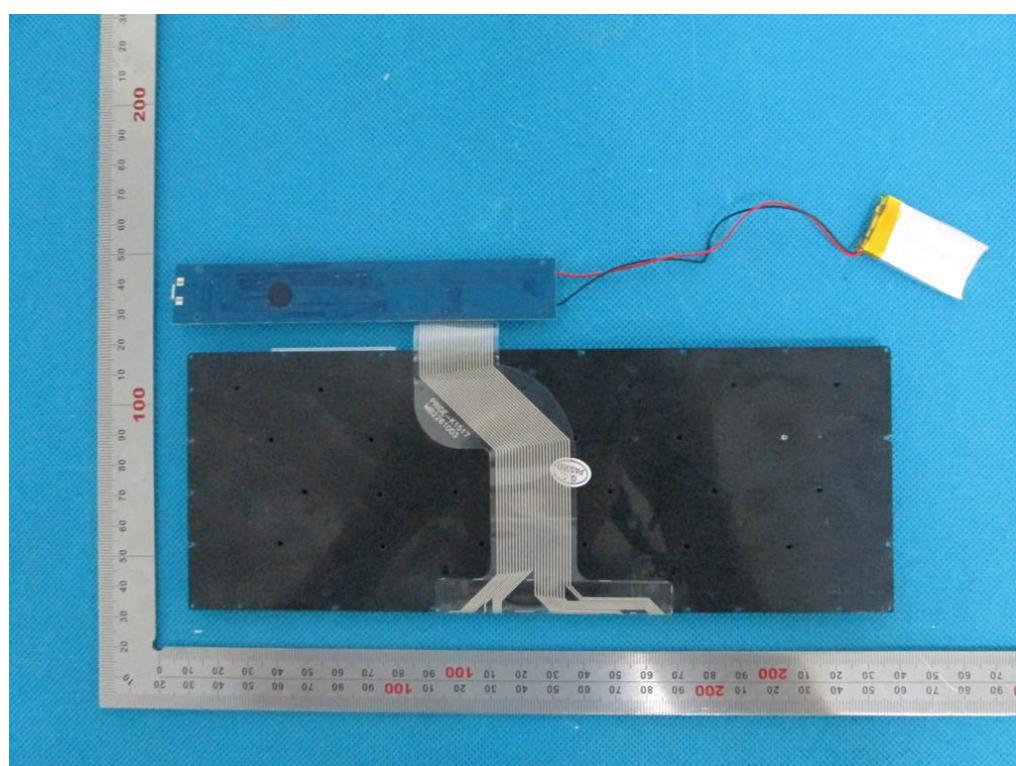
RIGHT VIEW OF EUT



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----