



FCC Test Report

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

Report Version	Revise Time	Issued Date	Valid Version	Notes
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.

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1. VERIFICATION OF CONFORMITY

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

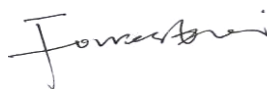
Prepared By



Water Zuo

Nov.09, 2013

Checked By



Forrest Lei

Nov.09, 2013

Authorized By



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

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	0.85dBm(Max)
Bluetooth Version	V 3.0
Modulation	GFSK
Number of channels	79
Antenna Designation	Integrated Antenna
Antenna Gain	0dBi
Power Supply	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 multislotted 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 sent on the same frequency, it is sent 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 24 MSB's of the 48 BD_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 synchronization 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 cases it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With these input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the 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 transmissions 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

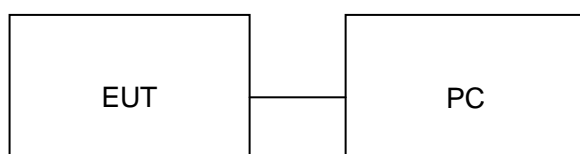
TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	Low channel TX	
2	Middle channel TX	
3	High channel TX	
4	Normal Hopping	V
<p>Note:</p> <ol style="list-style-type: none">1. V means EMI worst mode.2. All the test modes can be supply by Built-in Li-ion battery and adapter, only the result of 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

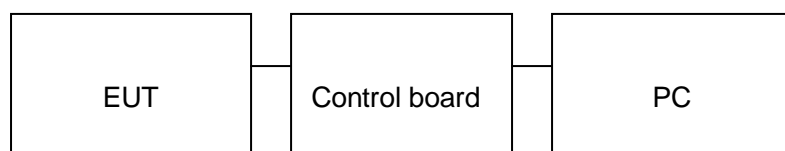
5.1. CONFIGURATION OF EUT SYSTEM

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

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Description	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)

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
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.

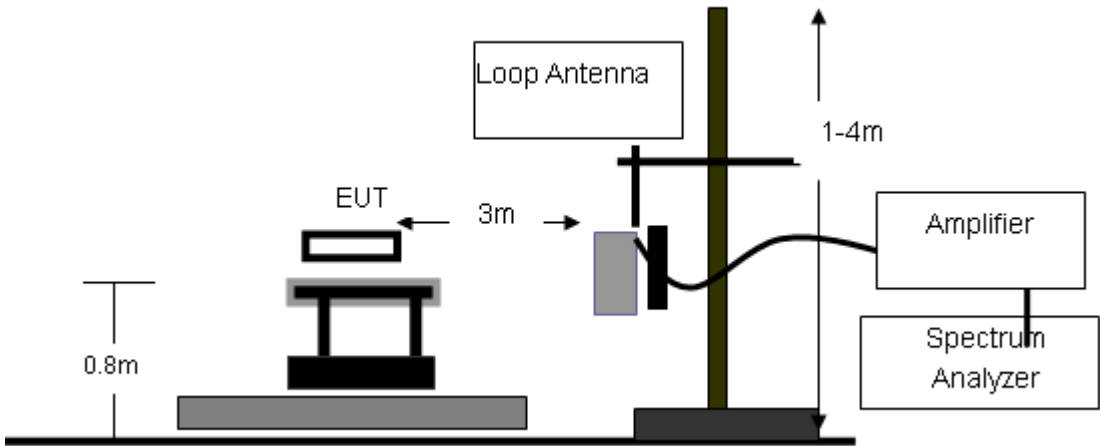
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
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

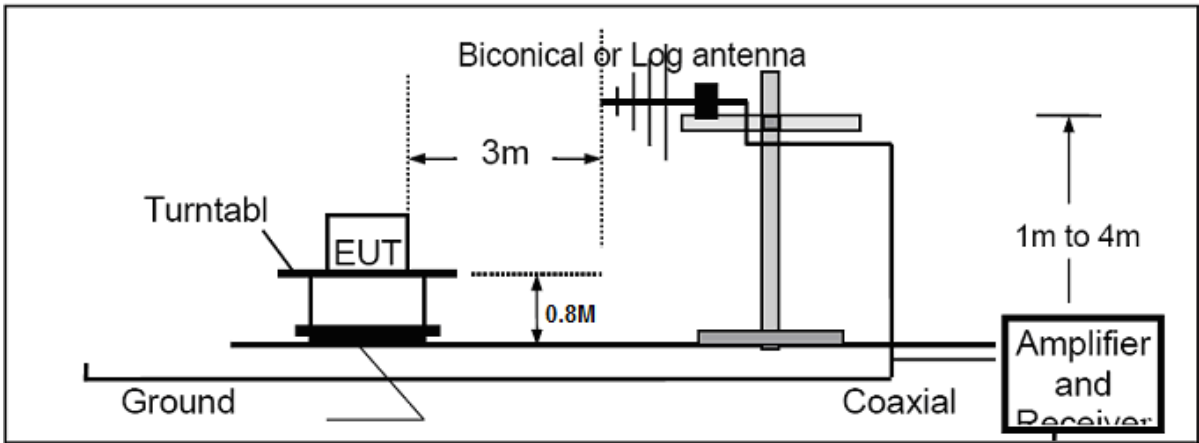
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

7.2. TEST SETUP

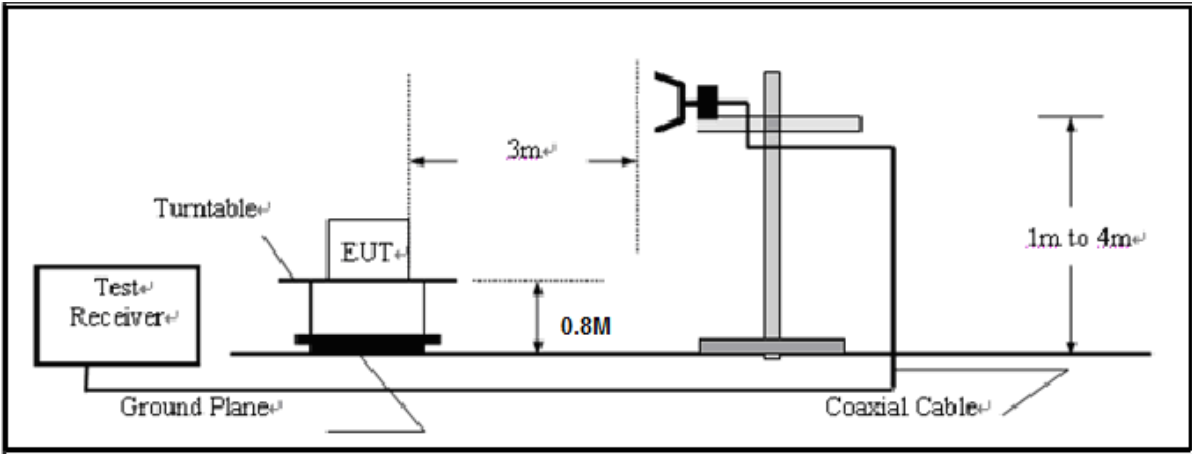
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz

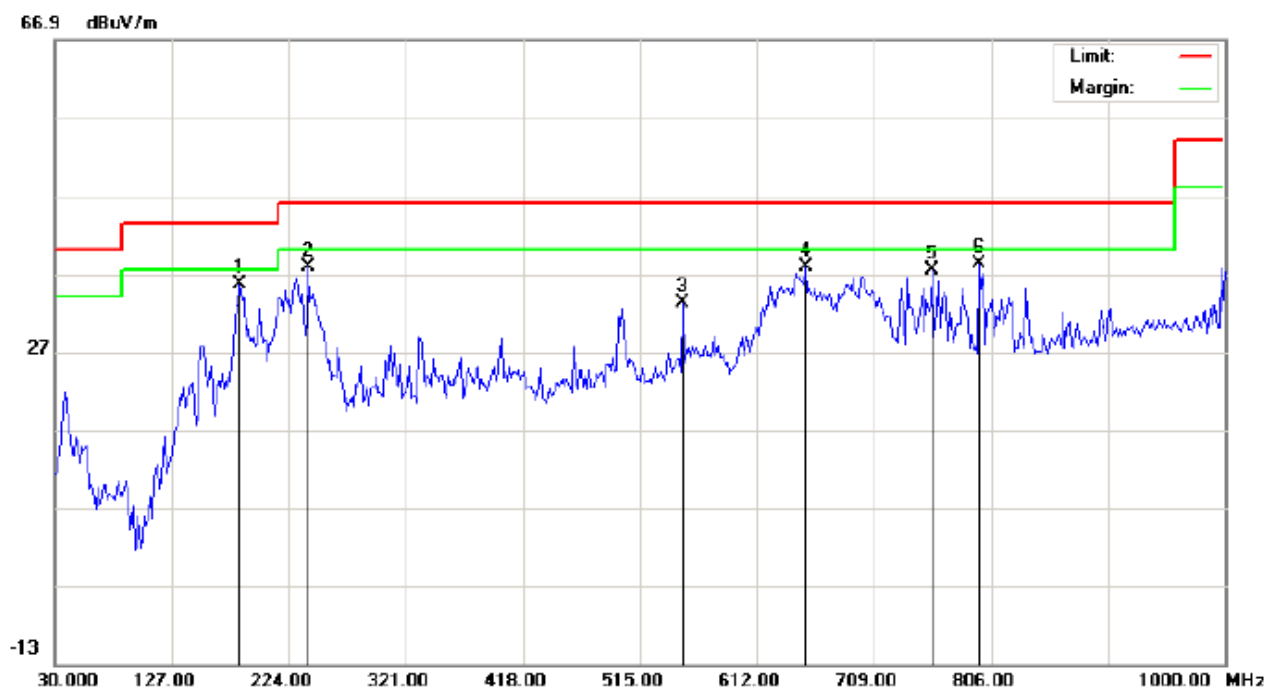


7.3. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION BELOW 1GHZ-Horizontal



Site: site #1
Limit: FCC Class B 3M Radiation
EUT:Bluetooth keyboard
M/N:HB033
Mode: Normal Hopping
Note:

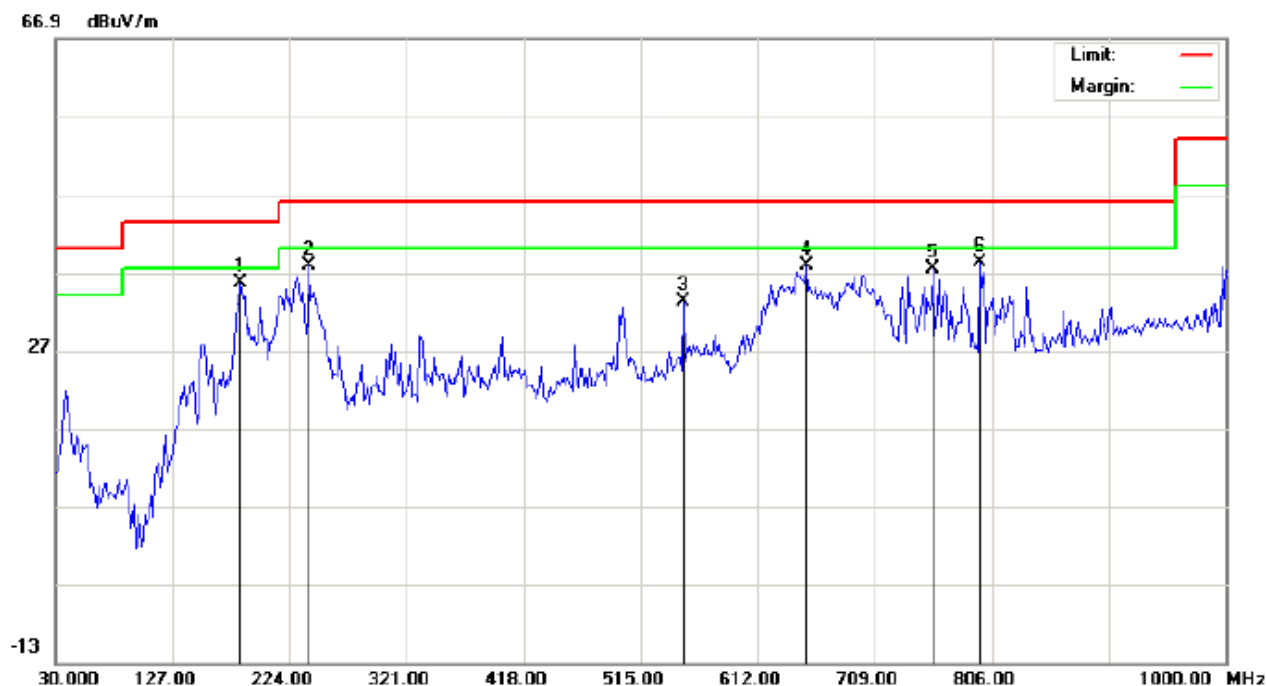
Polarization: **Horizontal**
Power:
Distance:

Temperature: 26
Humidity: 60 %

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:

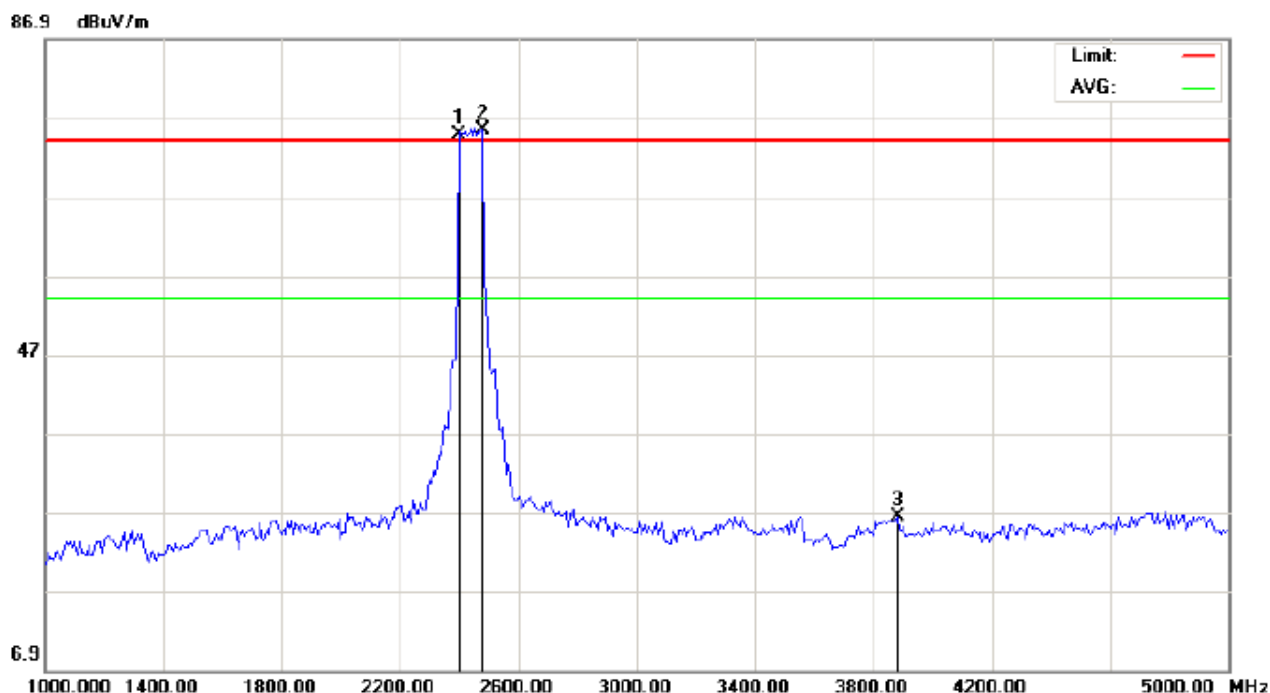
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		183.5833	22.36	13.16	35.52	43.50	-7.98	peak			
2		240.1667	24.91	12.94	37.85	46.00	-8.15	peak			
3		550.5667	10.65	22.48	33.13	46.00	-12.87	peak			
4		652.4167	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

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 (1-10th Harmonics) -Horizontal

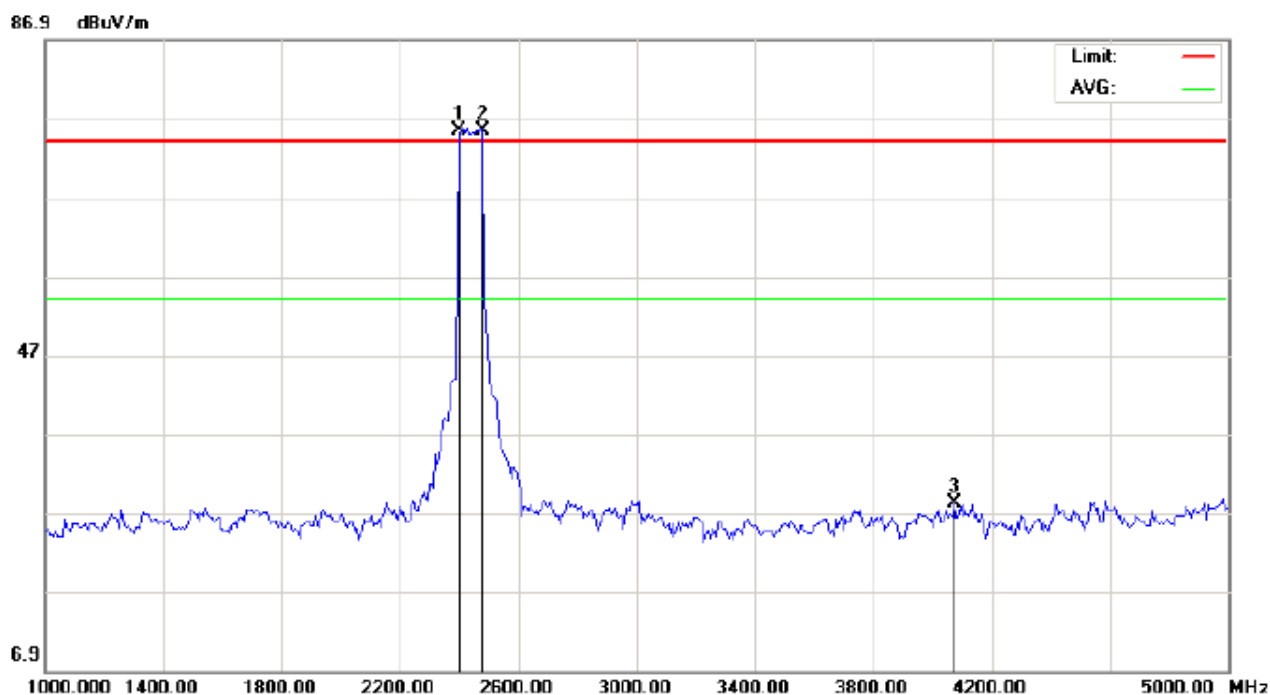


Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT:Bluetooth keyboard Distance: 3m
M/N:HB033
Mode: Normal Hopping
Note:

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 (1-10th 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

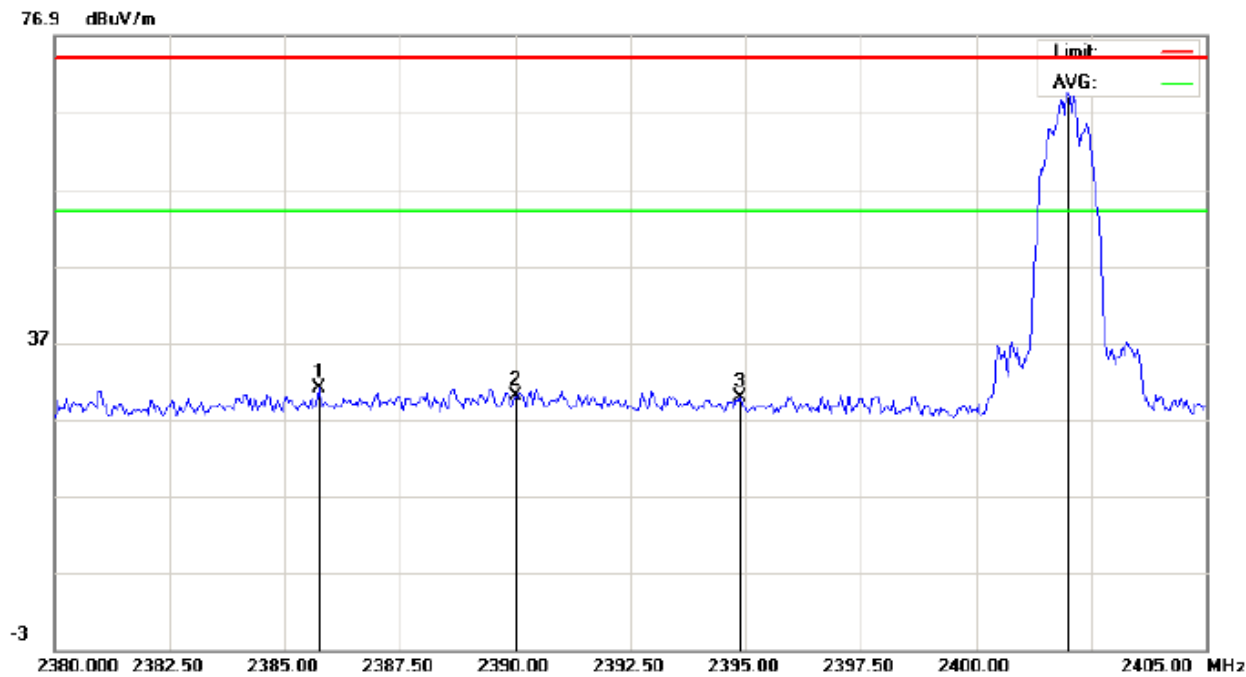
1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency = Operation Frequency, $RBW \geq 1\% \text{span}$, $VBW \geq RBW$
3. The band edges was measured and recorded.

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
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth keyboard
M/N: HB033
Mode: Low channel TX
Note:

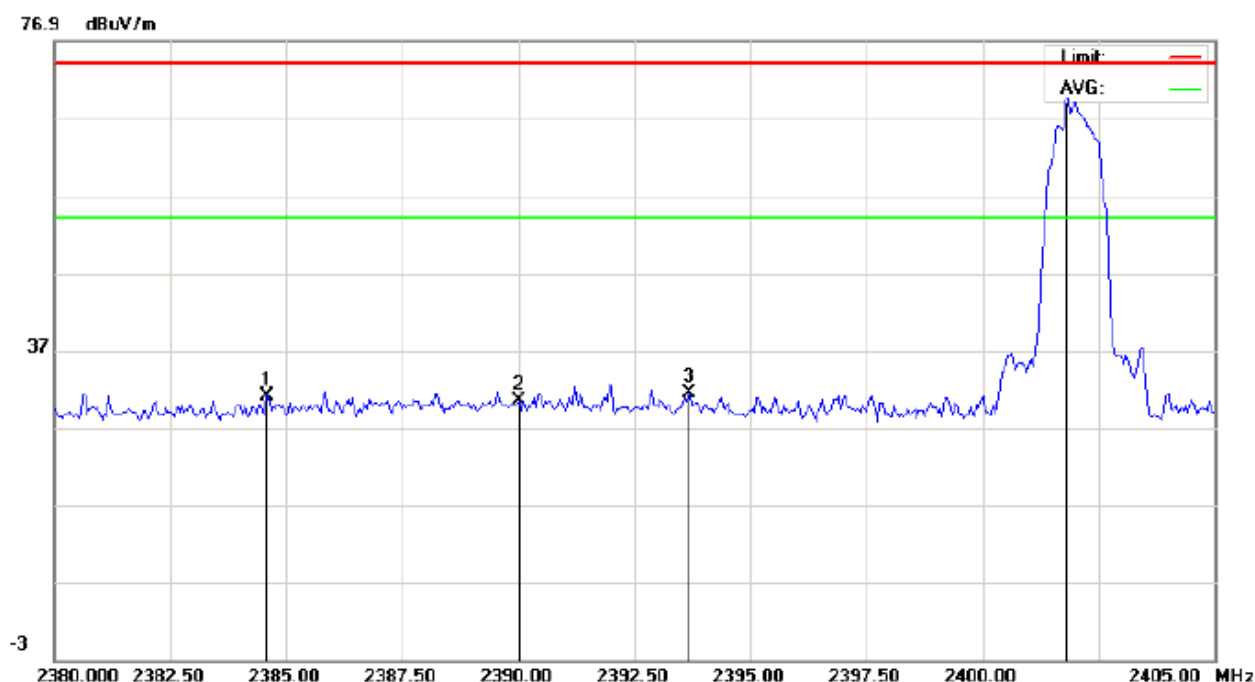
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

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

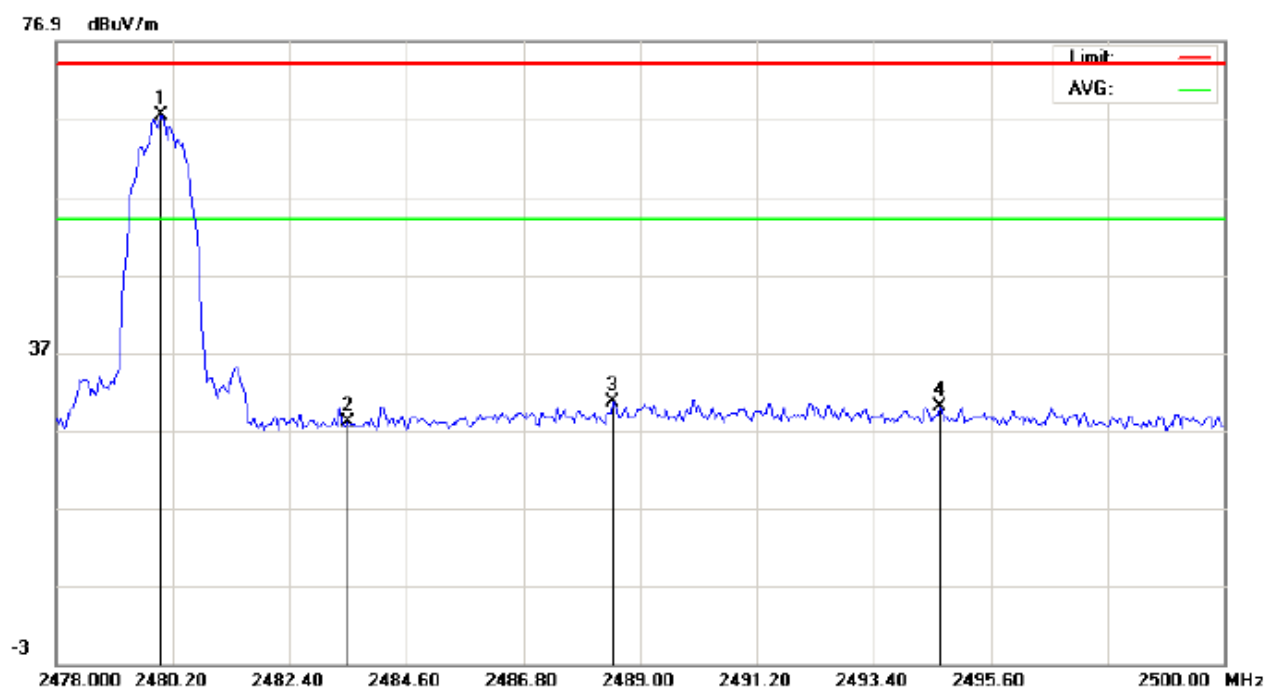


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Bluetooth keyboard Distance:
M/N: HB033
Mode: Low channel TX
Note:

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

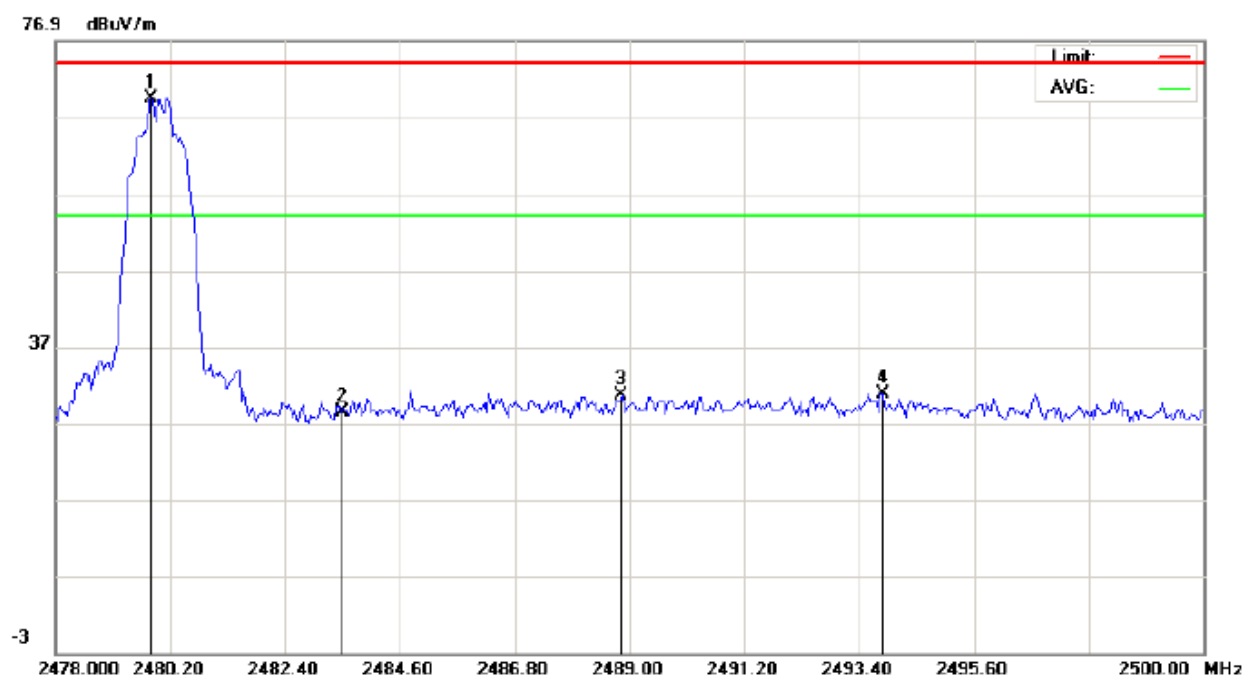


Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Bluetooth keyboard Distance:
M/N: HB033
Mode: High channel TX
Note:

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



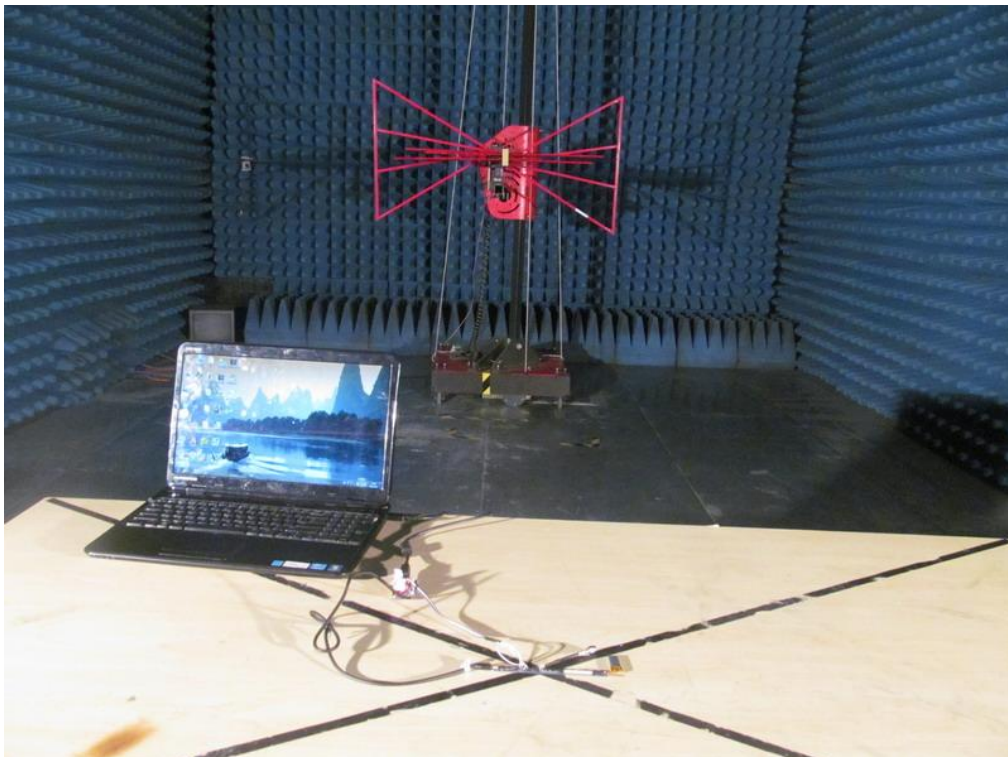
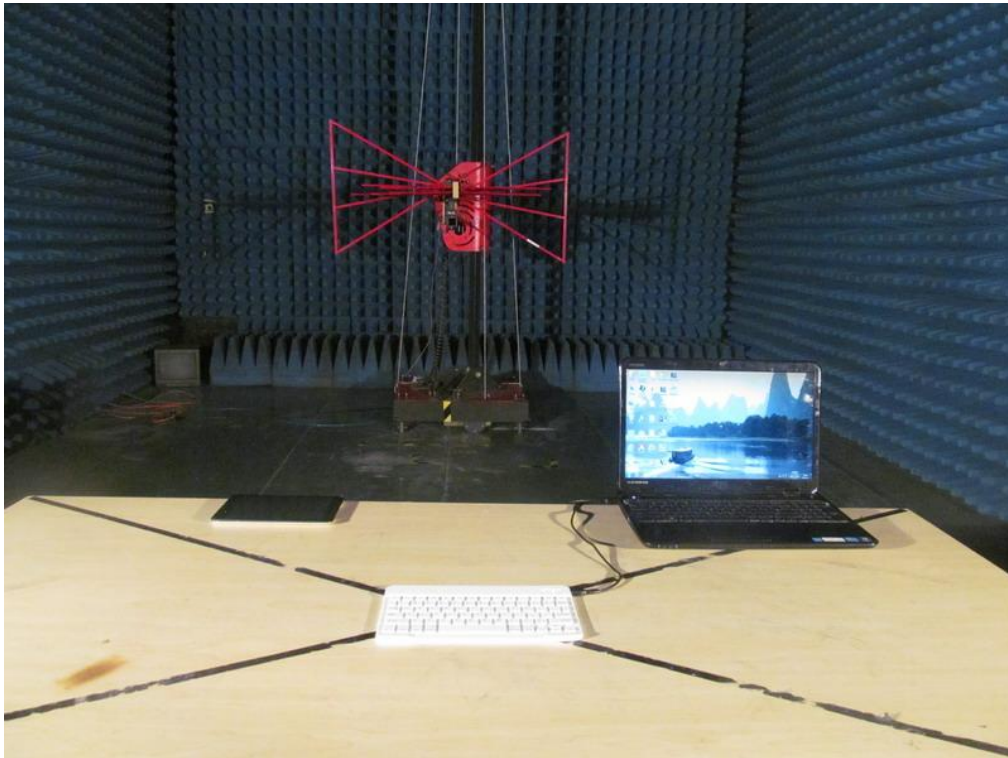
Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Bluetooth keyboard Distance:
M/N: HB033
Mode: High channel TX
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	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

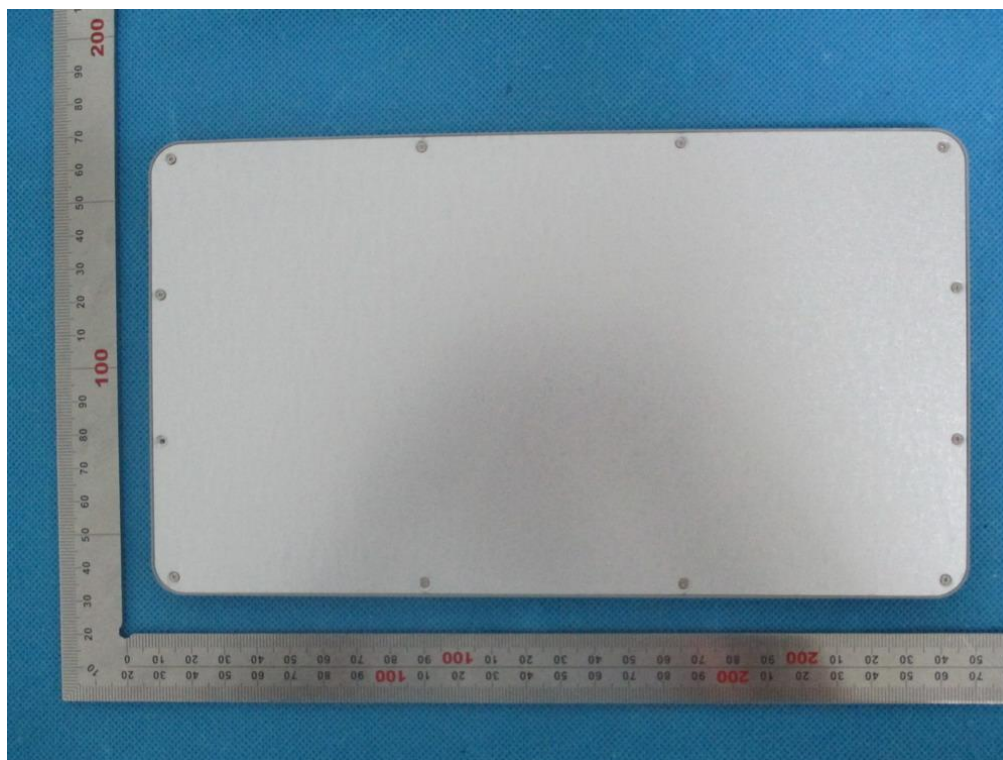


APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



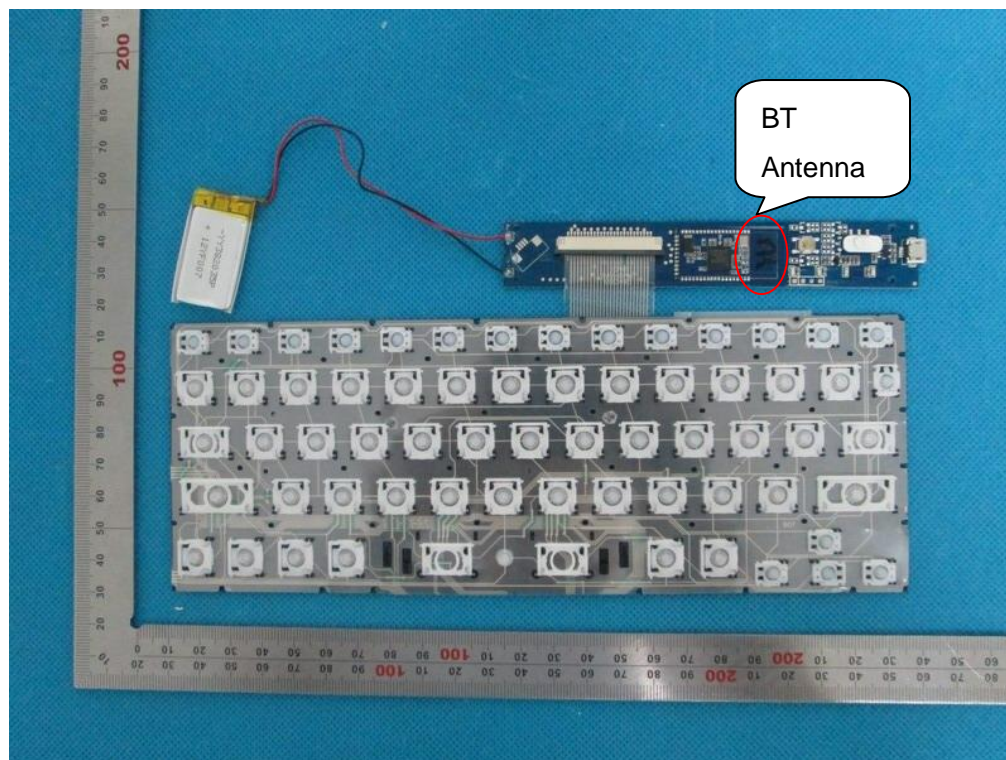
LEFT VIEW OF EUT



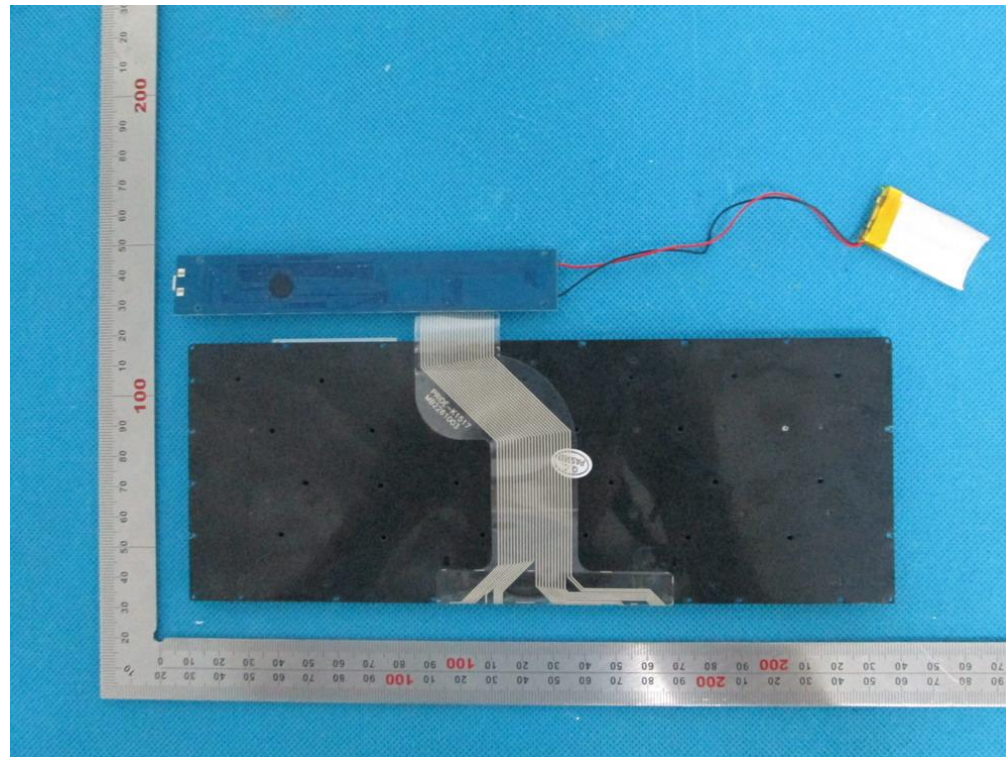
RIGHT VIEW OF EUT



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----