FCC Test Report

Report No.: AGC01680151201FE03

FCC ID	:	2AC9LHB180B
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Keyboard
BRAND NAME	:	N/A
MODEL NAME	:	HB180B
CLIENT	:	Shenzhen Hastech industries Co., Ltd.
DATE OF ISSUE	:	Jan.05,2016
STANDARD(S) **TEST PROCEDURE(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	/	Jan.05,2016	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Hastech industries Co., Ltd.
Address	3rd, 4th floor G-A1 Bldg &1st, 2nd floor G-A2 Bldg, Democracy West Industry Park, Shajing Town, Bao'an District, Shenzhen, China.
Manufacturer	Shenzhen Hastech industries Co., Ltd.
Address	3rd, 4th floor G-A1 Bldg &1st, 2nd floor G-A2 Bldg, Democracy West Industry Park, Shajing Town, Bao'an District, Shenzhen, China.
Product Designation	Bluetooth Keyboard
Brand Name	N/A
Test Model	HB180B
Date of test	Dec.18,2015 to Dec.21,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service 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 (2009) 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 15.249.

Tested By	Time Huang(Huang Nanhui)	Jan.05,2016
Reviewed By	Forrest Lei(Lei Yonggang)	Jan.05,2016
Approved By	Solger Zhang(Zhang Hongyi) Authorized Officer	Jan.05,2016

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-2.36dBm(Max)
Bluetooth Version	V3.0
Modulation	GFSK
Number of channels	79
Hardware Version	V03
Software Version	N/A
Antenna Designation	PCB Antenna (Met 15.203 Antenna requirement)
Antenna Gain	0dBi
Power Supply	DC 3.7V by battery
Note: The USB port only used for charging and can't be used to transfer data with PC. The EUT is equipped with the Bluetooth Chip BCM20730 which complies with Bluetooth V 3.0, but for this device the functionality is limited to GFSK (1MBit/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 FREQUENCYS

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

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±3.18dB
2	All emissions,radiated	±3.91dB
3	Temperature	±0.5°C
4	Humidity	±2%

4. DESCRIPTION OF TEST MODES

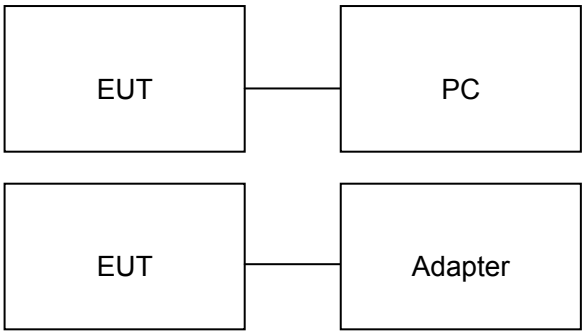
NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
10	BT Link with charging
11	BT Link without charging

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3.The EUT used fully-charged battery when tested.

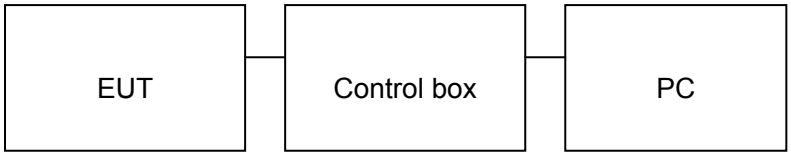
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Keyboard	N/A	HB180B	EUT
2	Control box	N/A	N/A	A.E
3	PC	SONY	E1412AYCW	A.E
4	USB Cable	N/A	0.4m, unshielded	A.E
5	AC adapter	GPE0538	1.1m,unshielded	A.E
6	Temporary Antenna Connector	T10	N/A	A.E

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
N/A	BANDWITH	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

7. ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

Radiated Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016
Spectrum analyzer	Agilent	E4407B	MY46185649	June 6, 2015	June 5, 2016
Radiation Cable 1	MXT	RS1	R005	June 6, 2015	June 5, 2016
Radiation Cable 2	MXT	RS1	R006	June 6, 2015	June 5, 2016

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Radiated Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 11, 2015	July 10, 2016
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 7, 2015	July 6, 2016
RF Cable	SCHWARZBECK	AK9515H	96220	July 8, 2015	July 7, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016
Radiation Cable 1	MXT	RS1	R005	June 6, 2015	June 5, 2016
Radiation Cable 2	MXT	RS1	R006	June 6, 2015	June 5, 2016

Conducted Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	- Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 6,2015	June 5,2016
Conduction Cable	MXT	SE1	S003	June 6,2015	June 5,2016

8. RADIATED EMISSION

8.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

8.2. 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 1.5MHz VBW and RBW for peak reading. Then 1.5MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

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.

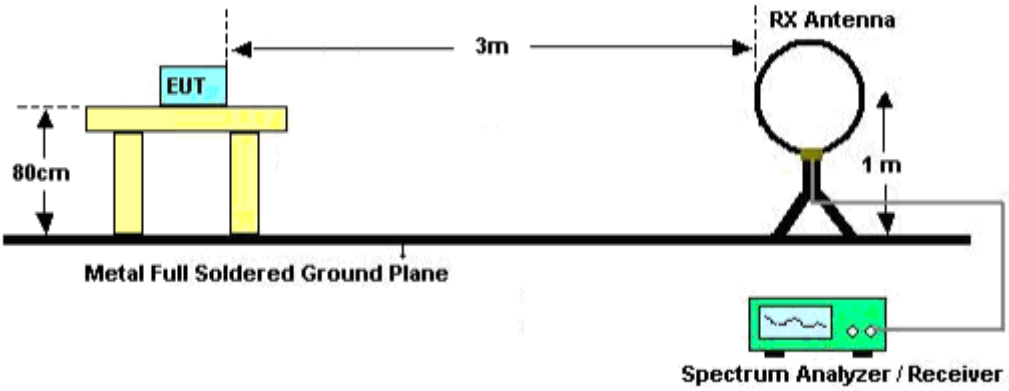
The following table is the setting of spectrum analyzer and receiver.

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 1.5MHz/1.5MHz for Peak, 1.5MHz/10Hz for Average

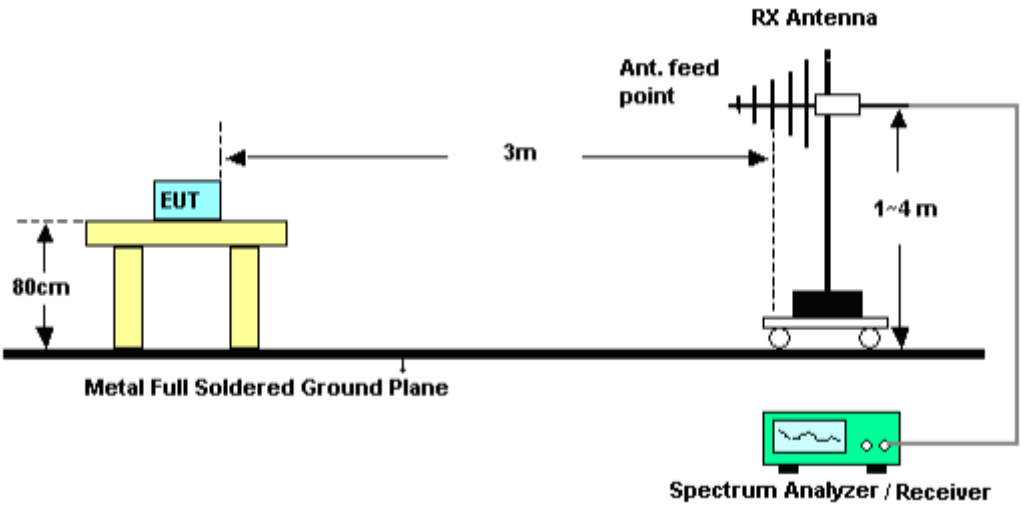
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3. TEST SETUP

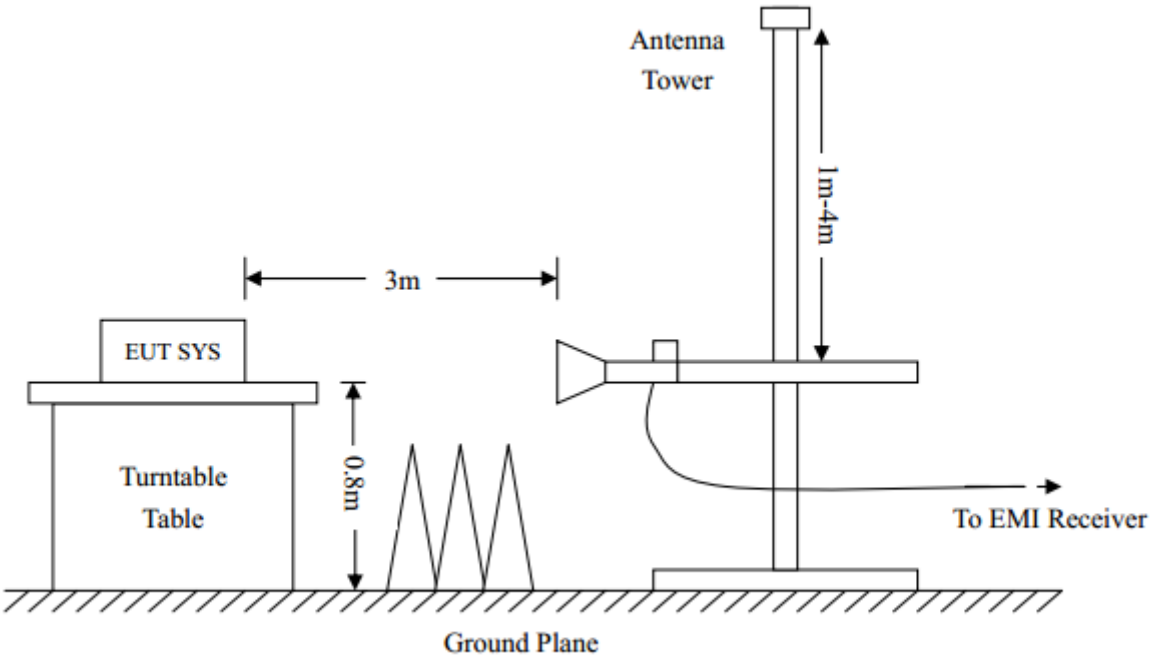
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



8.4. TEST RESULT

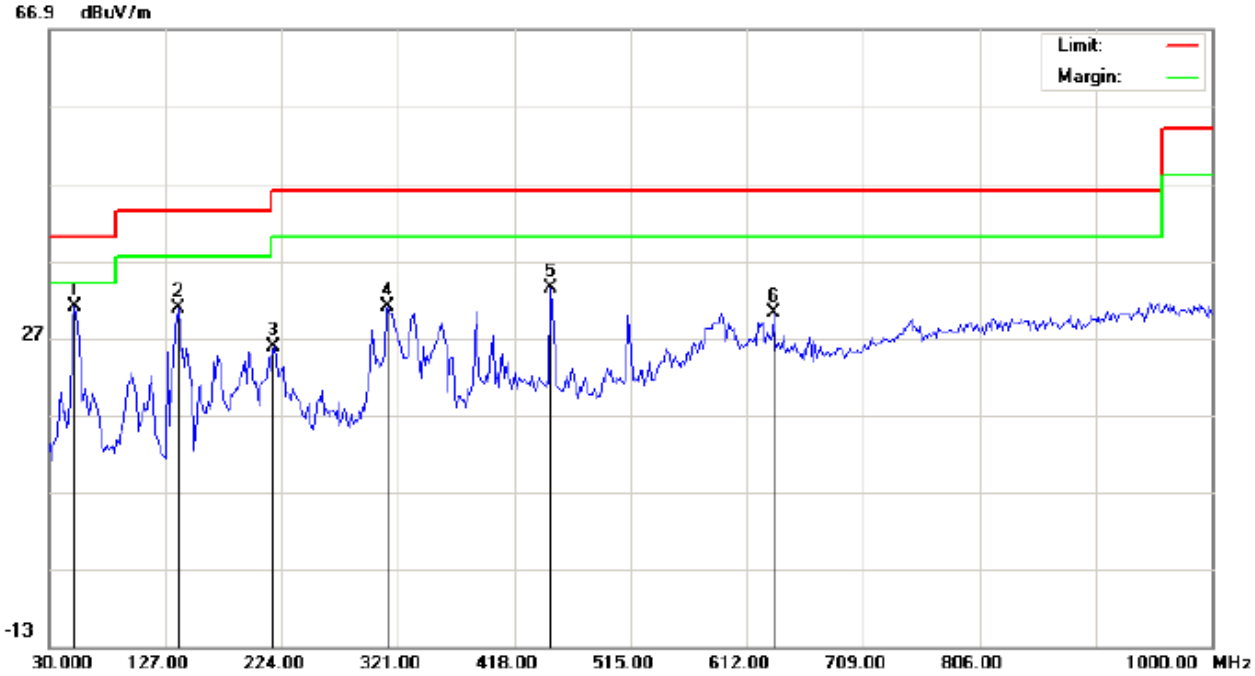
(Modulation:GFSK)

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Low Channel TX
Note:

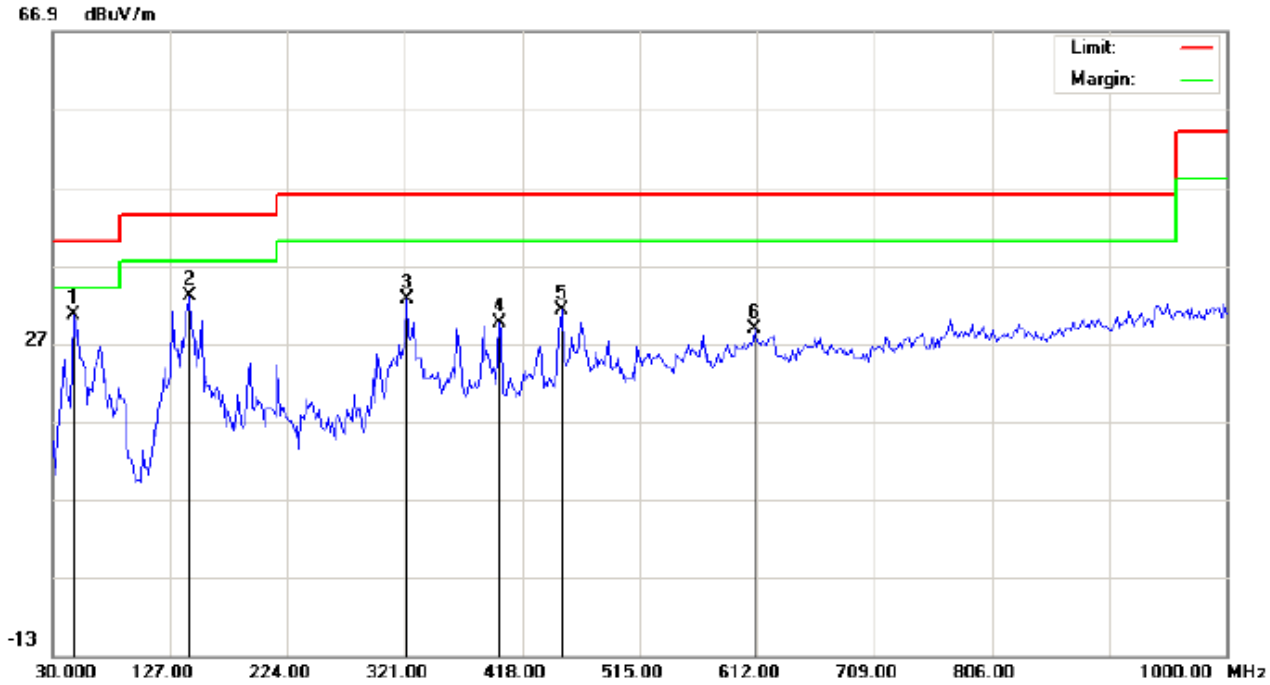
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

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	*	51.0167	20.90	10.15	31.05	40.00	-8.95	peak			
2		138.3165	16.37	14.41	30.78	43.50	-12.72	peak			
3		217.5332	15.61	10.21	25.82	46.00	-20.18	peak			
4		312.9166	14.64	16.27	30.91	46.00	-15.09	peak			
5		448.7167	12.85	20.55	33.40	46.00	-12.60	peak			
6		634.6332	6.47	23.81	30.28	46.00	-15.72	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Low Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

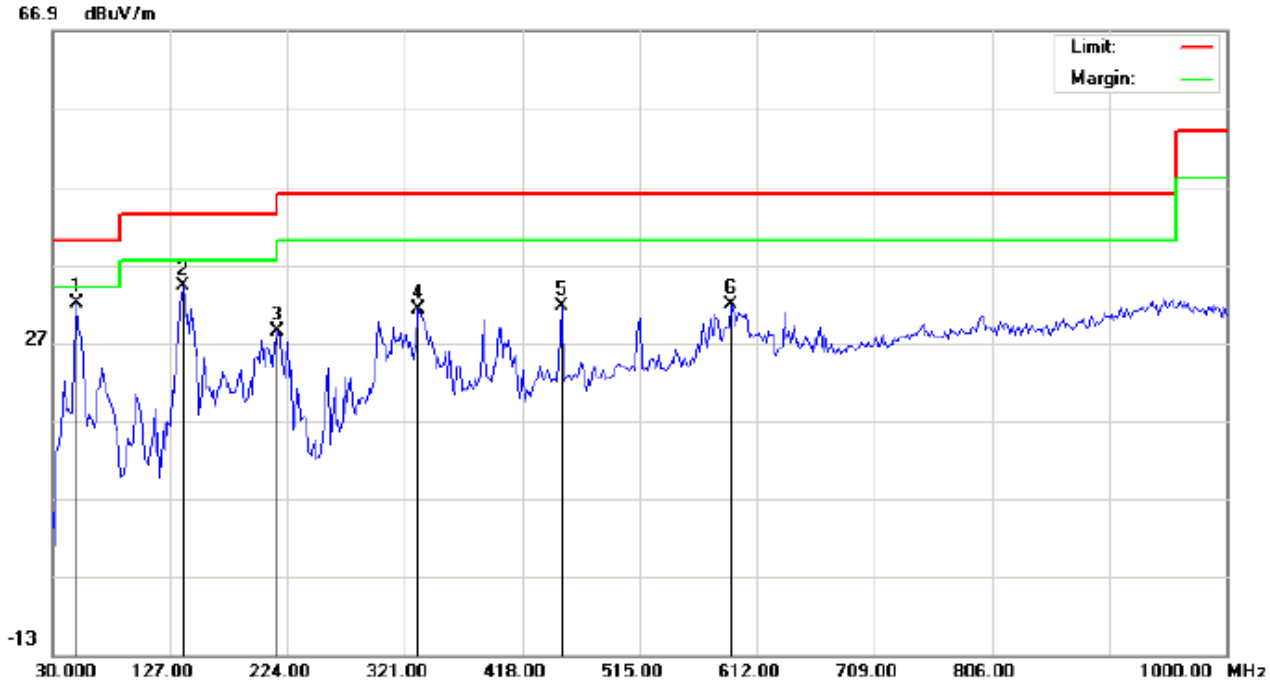
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	47.7832	22.22	8.39	30.61	40.00	-9.39	peak			
2		143.1667	17.81	15.22	33.03	43.50	-10.47	peak			
3		322.6167	15.62	16.92	32.54	46.00	-13.46	peak			
4		398.6000	10.55	19.06	29.61	46.00	-16.39	peak			
5		450.3333	10.64	20.59	31.23	46.00	-14.77	peak			
6		610.3832	5.85	22.96	28.81	46.00	-17.19	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 TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Middle Channel TX
Note:

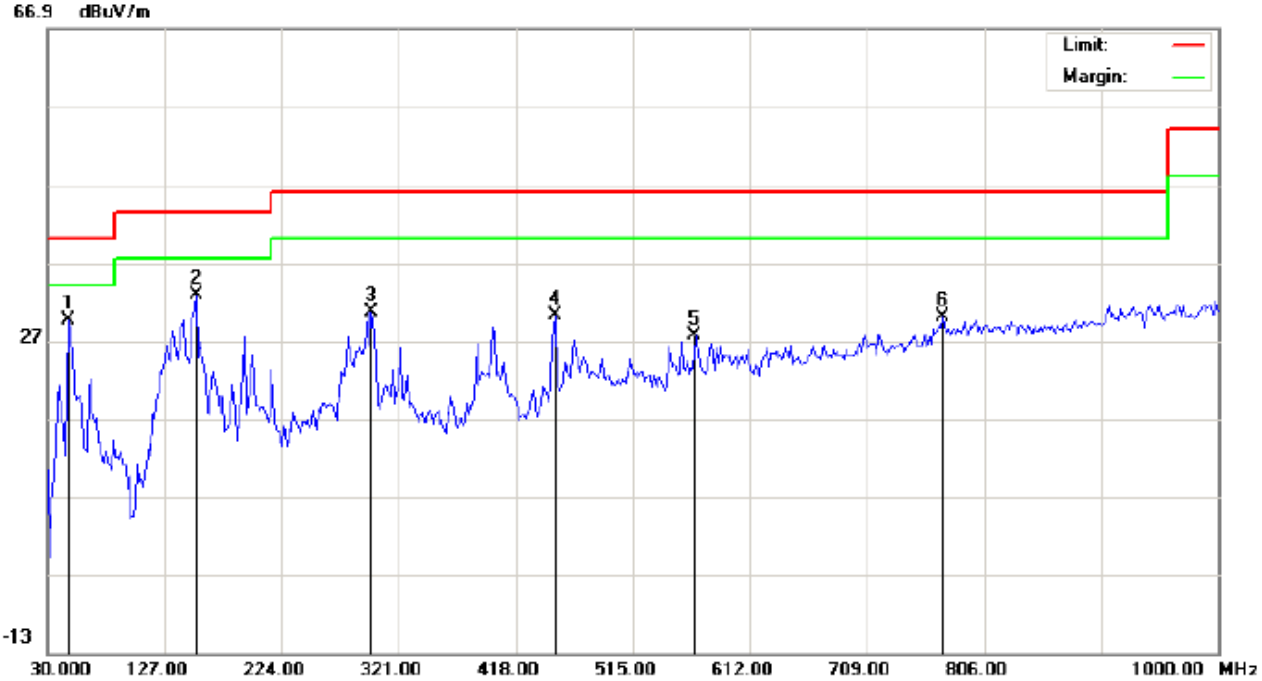
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

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	*	49.4000	20.80	11.28	32.08	40.00	-7.92	peak			
2		138.3165	19.87	14.41	34.28	43.50	-9.22	peak			
3		215.9167	18.08	10.38	28.46	43.50	-15.04	peak			
4		332.3167	13.57	17.56	31.13	46.00	-14.87	peak			
5		450.3333	11.00	20.59	31.59	46.00	-14.41	peak			
6		590.9832	8.22	23.50	31.72	46.00	-14.28	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Middle Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

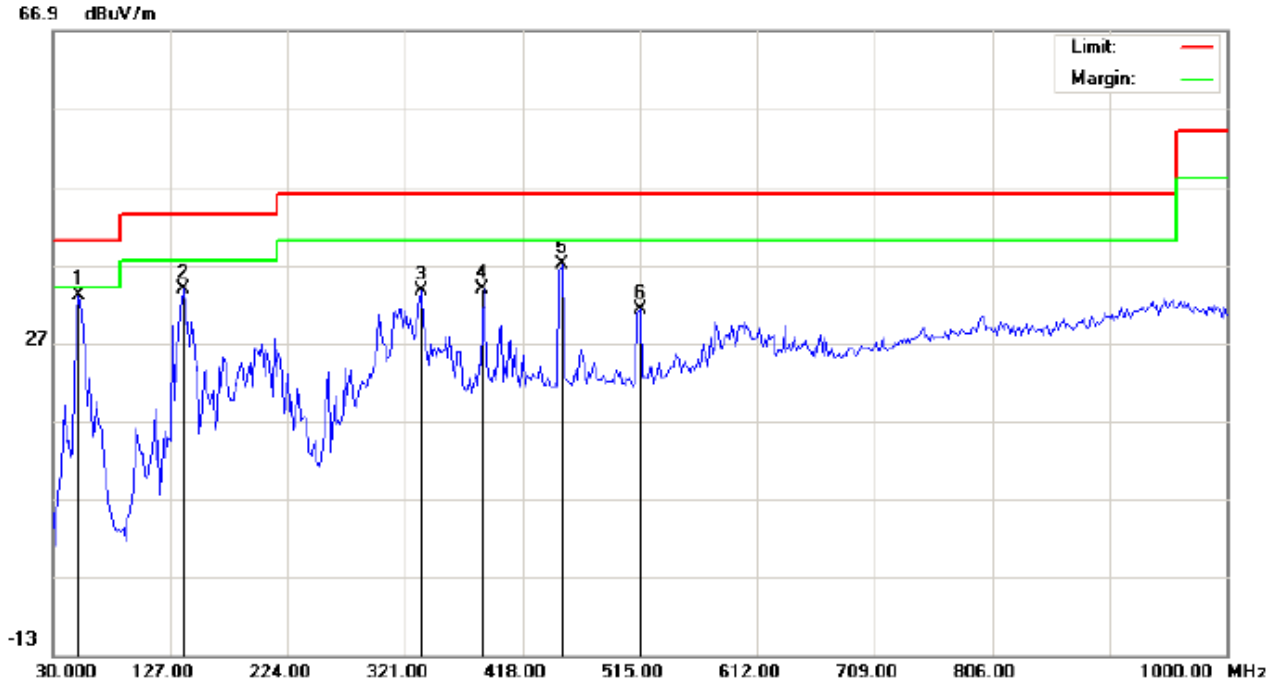
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	47.7832	21.22	8.39	29.61	40.00	-10.39	peak			
2		152.8667	17.51	15.28	32.79	43.50	-10.71	peak			
3		298.3667	15.34	15.36	30.70	46.00	-15.30	peak			
4		450.3333	9.64	20.59	30.23	46.00	-15.77	peak			
5		566.7332	4.99	22.56	27.55	46.00	-18.45	peak			
6		772.0500	3.03	26.93	29.96	46.00	-16.04	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 TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: High Channel TX
Note:

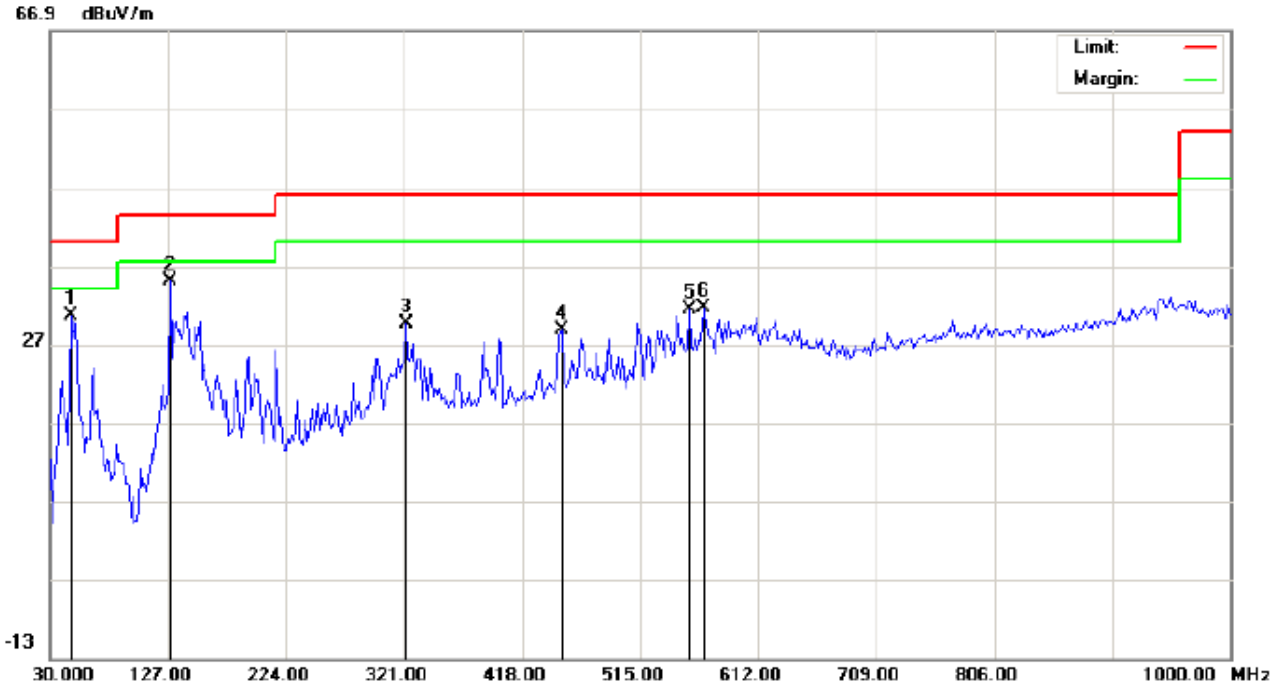
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

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	*	51.0167	22.90	10.15	33.05	40.00	-6.95	peak			
2		138.3167	19.37	14.41	33.78	43.50	-9.72	peak			
3		333.9333	15.97	17.67	33.64	46.00	-12.36	peak			
4		385.6666	14.85	18.98	33.83	46.00	-12.17	peak			
5		450.3333	16.50	20.59	37.09	46.00	-8.91	peak			
6		515.0000	9.74	21.54	31.28	46.00	-14.72	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.3
Humidity: 56.9 %

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		47.7833	22.22	8.39	30.61	40.00	-9.39	peak			
2	*	128.6167	24.52	10.45	34.97	43.50	-8.53	peak			
3		322.6167	12.62	16.92	29.54	46.00	-16.46	peak			
4		450.3333	8.14	20.59	28.73	46.00	-17.27	peak			
5		555.4167	8.80	22.51	31.31	46.00	-14.69	peak			
6		566.7333	8.99	22.56	31.55	46.00	-14.45	peak			

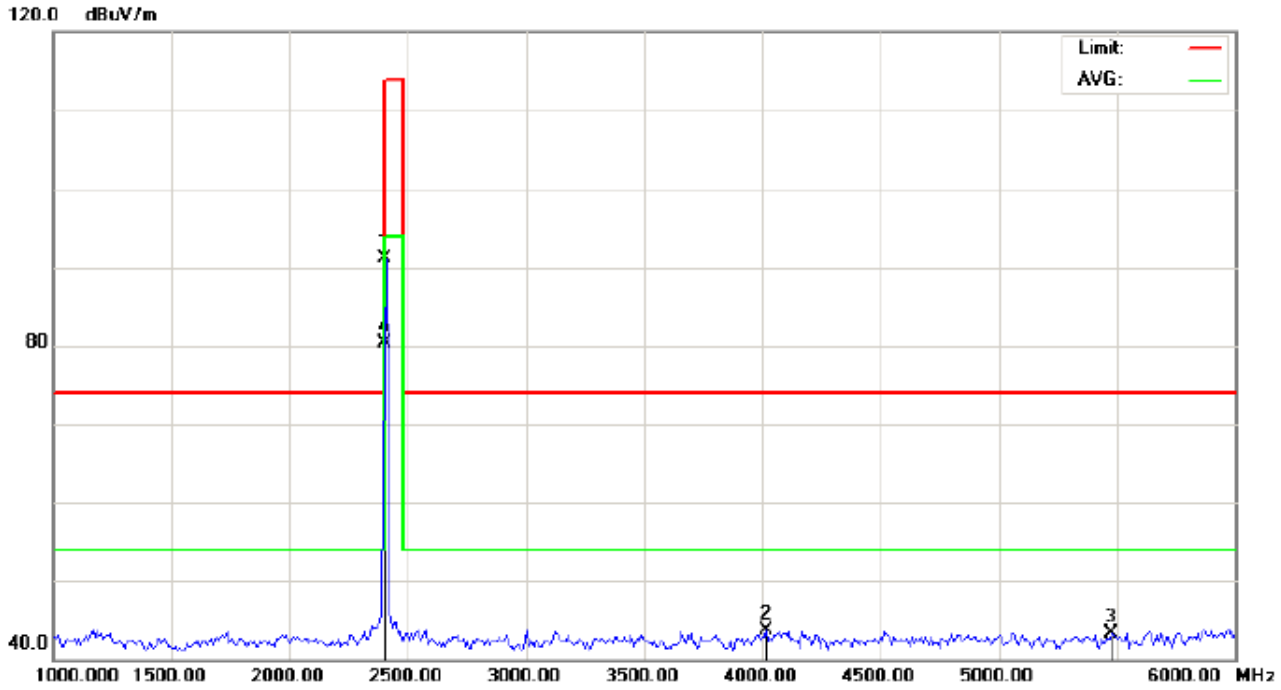
RESULT: PASS

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

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)-
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Low Channel TX
Note:

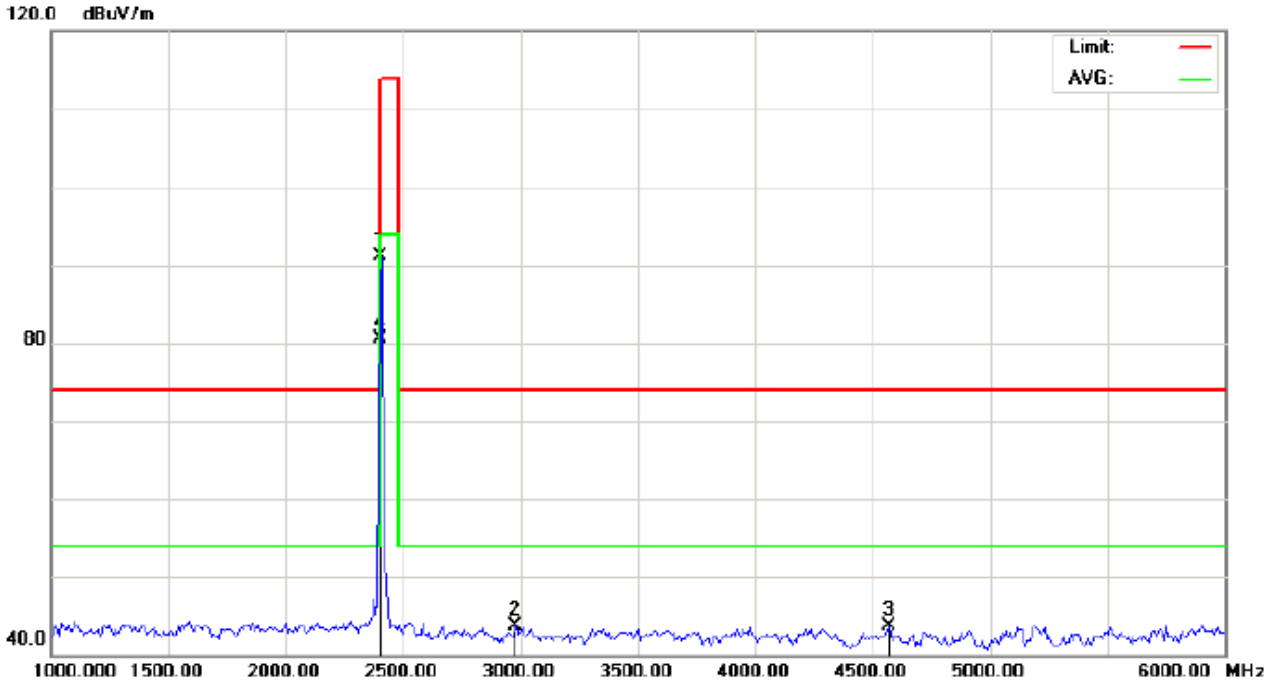
Polarization: *Horizontal*
Power:
Distance: 3m

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		2402.000	100.77	-9.68	91.09	114.00	-22.91	peak			
2		4016.667	48.53	-4.75	43.78	74.00	-30.22	peak			
3		5475.000	45.21	-1.81	43.40	74.00	-30.60	peak			
4	*	2402.000	89.93	-9.68	80.25	94.00	-13.75	AVG	100	105	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL- VERTICAL

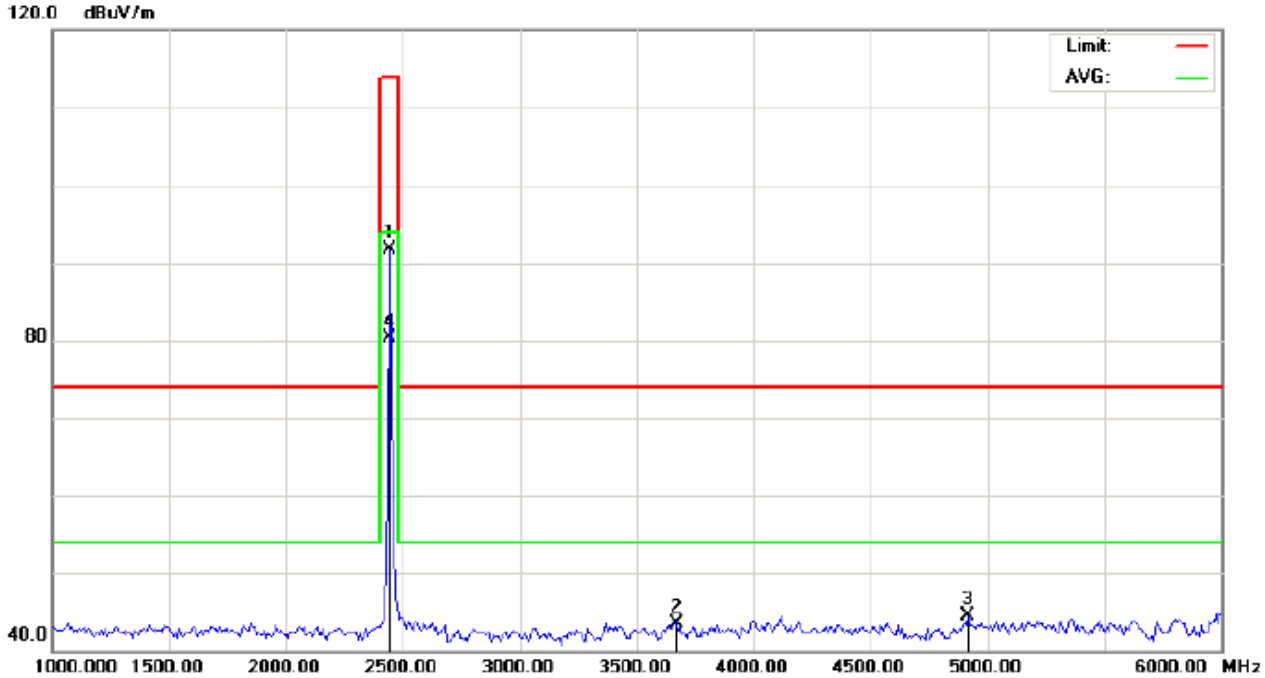


Site: site #1 | Polarization: *Vertical* | Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- | Power: | Humidity: 60 %
EUT: Bluetooth Keyboard | Distance: 3m
M/N: HB180B
Mode: Low Channel TX
Note:

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		2402.000	100.76	-9.68	91.08	114.00	-22.92	peak			
2		2975.000	52.08	-8.42	43.66	74.00	-30.34	peak			
3		4566.667	46.63	-2.94	43.69	74.00	-30.31	peak			
4	*	2402.000	90.10	-9.68	80.42	94.00	-13.58	AVG	100	231	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)-
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Middle Channel TX
Note:

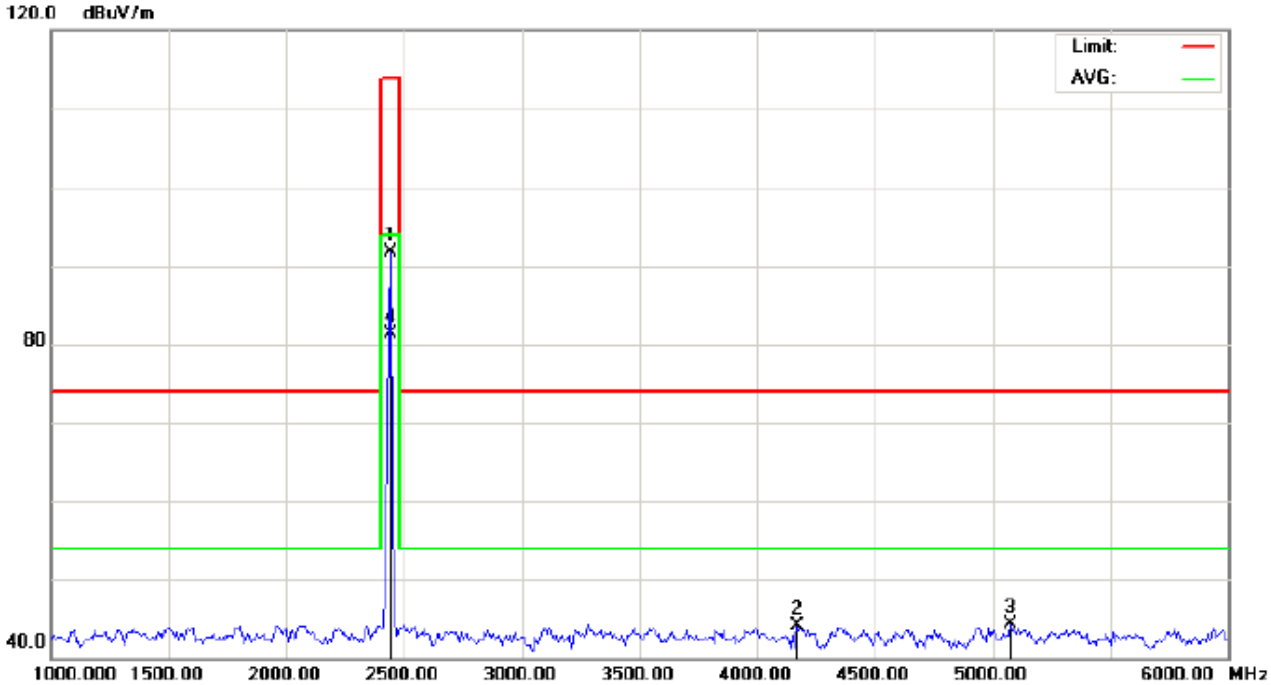
Polarization: *Horizontal*
Power:
Distance: 3m

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		2441.000	101.29	-9.63	91.66	114.00	-22.34	peak			
2		3666.667	50.38	-6.86	43.52	74.00	-30.48	peak			
3		4916.667	46.56	-2.02	44.54	74.00	-29.46	peak			
4	*	2441.000	89.89	-9.63	80.26	94.00	-13.74	AVG	100	102	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL- VERTICAL

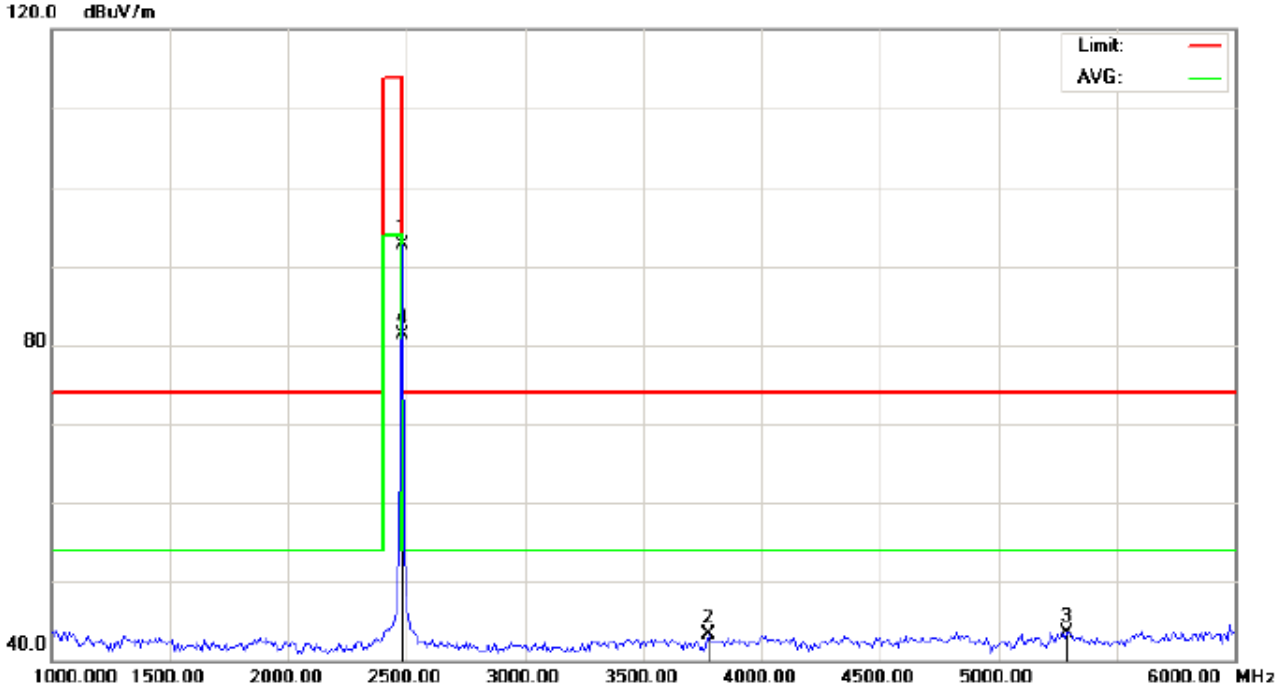


Site: site #1 Polarization: *Vertical* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Bluetooth Keyboard Distance: 3m
M/N: HB180B
Mode: Middle Channel TX
Note:

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		2441.000	101.25	-9.63	91.62	114.00	-22.38	peak			
2		4166.667	48.39	-4.24	44.15	74.00	-29.85	peak			
3		5075.000	46.04	-1.80	44.24	74.00	-29.76	peak			
4	*	2441.000	91.00	-9.63	81.37	94.00	-12.63	AVG	100	234	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)-
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: High Channel TX
Note:

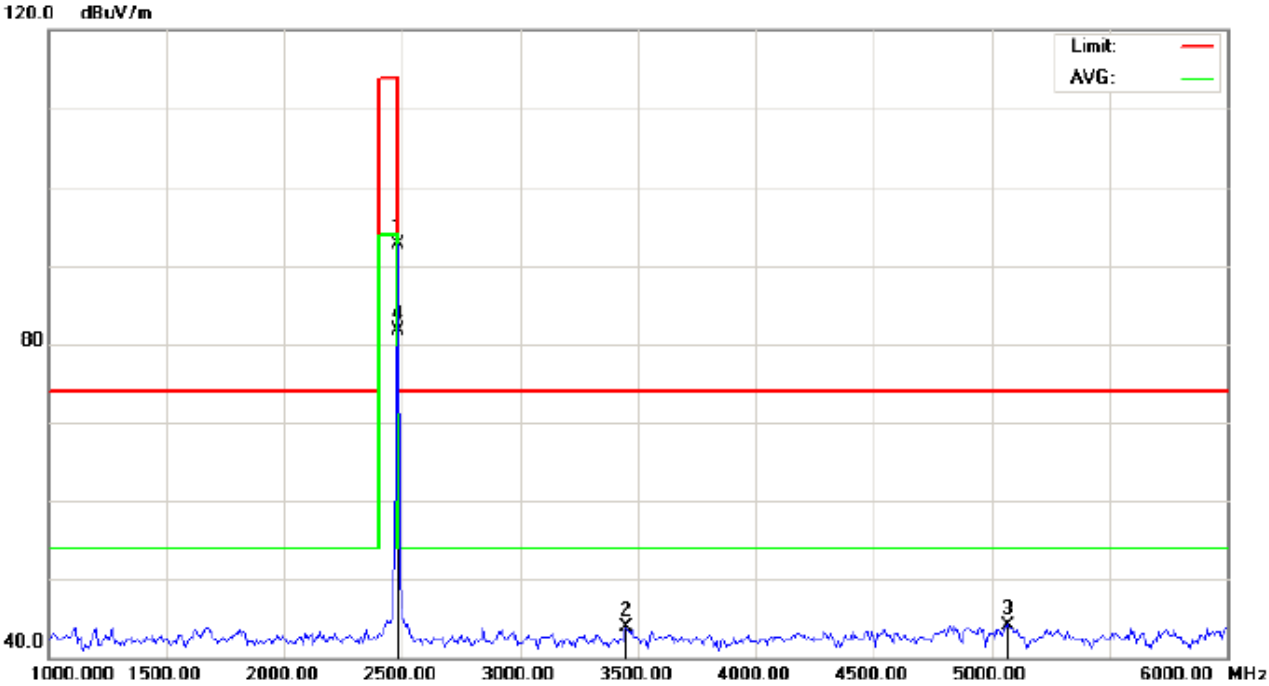
Polarization: ***Horizontal***
Power:
Distance: 3m

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		2480.000	102.24	-9.59	92.65	114.00	-21.35	peak			
2		3775.000	49.49	-6.20	43.29	74.00	-30.71	peak			
3		5291.667	45.40	-1.81	43.59	74.00	-30.41	peak			
4	*	2480.000	90.91	-9.59	81.32	94.00	-12.68	AVG	100	110	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL- 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: HB180B
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		2480.000	102.37	-9.59	92.78	114.00	-21.22	peak			
2		3450.000	51.94	-7.94	44.00	74.00	-30.00	peak			
3		5066.667	46.00	-1.80	44.20	74.00	-29.80	peak			
4	*	2480.000	91.26	-9.59	81.67	94.00	-12.33	AVG	100	237	

RESULT: PASS

Note: 6~25GHz 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.

Field strength of the fundamental signal

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	100.77	-9.68	91.09	114	-22.91	Horizontal
2402	100.76	-9.68	91.08	114	-22.92	Vertical
2441	101.29	-9.63	91.66	114	-22.34	Horizontal
2441	101.25	-9.63	91.62	114	-22.38	Vertical
2480	102.24	-9.59	92.65	114	-21.35	Horizontal
2480	102.37	-9.59	92.78	114	-21.22	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	89.93	-9.68	80.25	94	-13.75	Horizontal
2402	90.10	-9.68	80.42	94	-13.58	Vertical
2441	89.89	-9.63	80.26	94	-13.74	Horizontal
2441	91.00	-9.63	81.37	94	-12.63	Vertical
2480	90.91	-9.59	81.32	94	-12.68	Horizontal
2480	91.26	-9.59	81.67	94	-12.33	Vertical

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

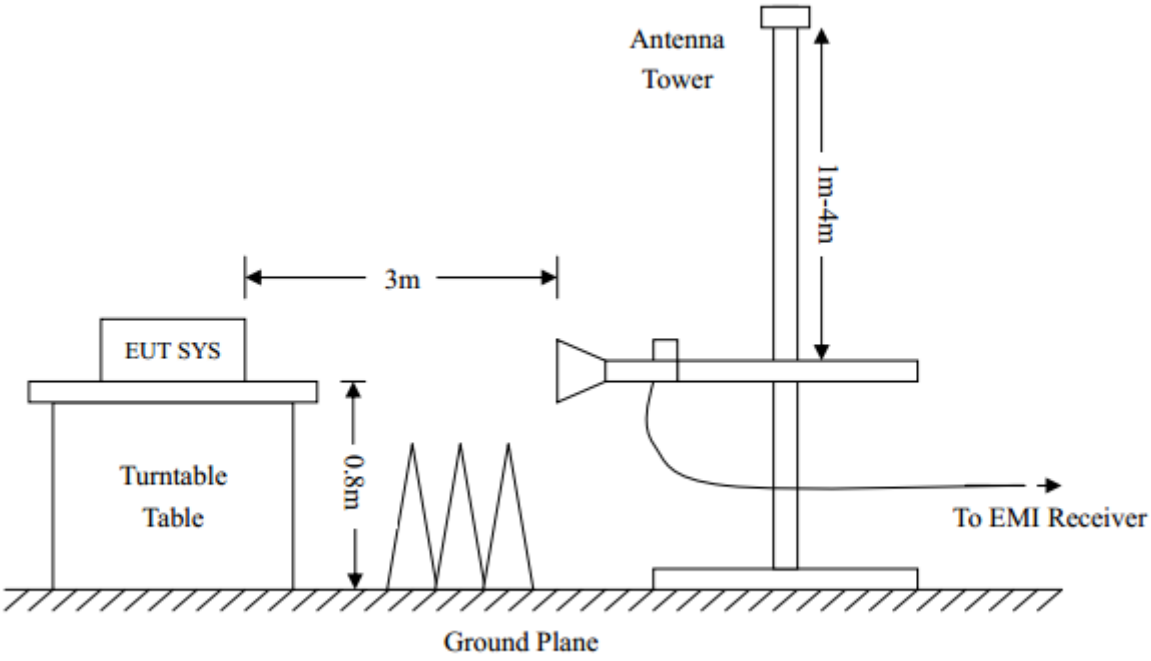
1The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

2Max hold the trace of the setp 1,and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

3Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1.5MHz / Sweep=AUTO

9.2 TEST SETUP

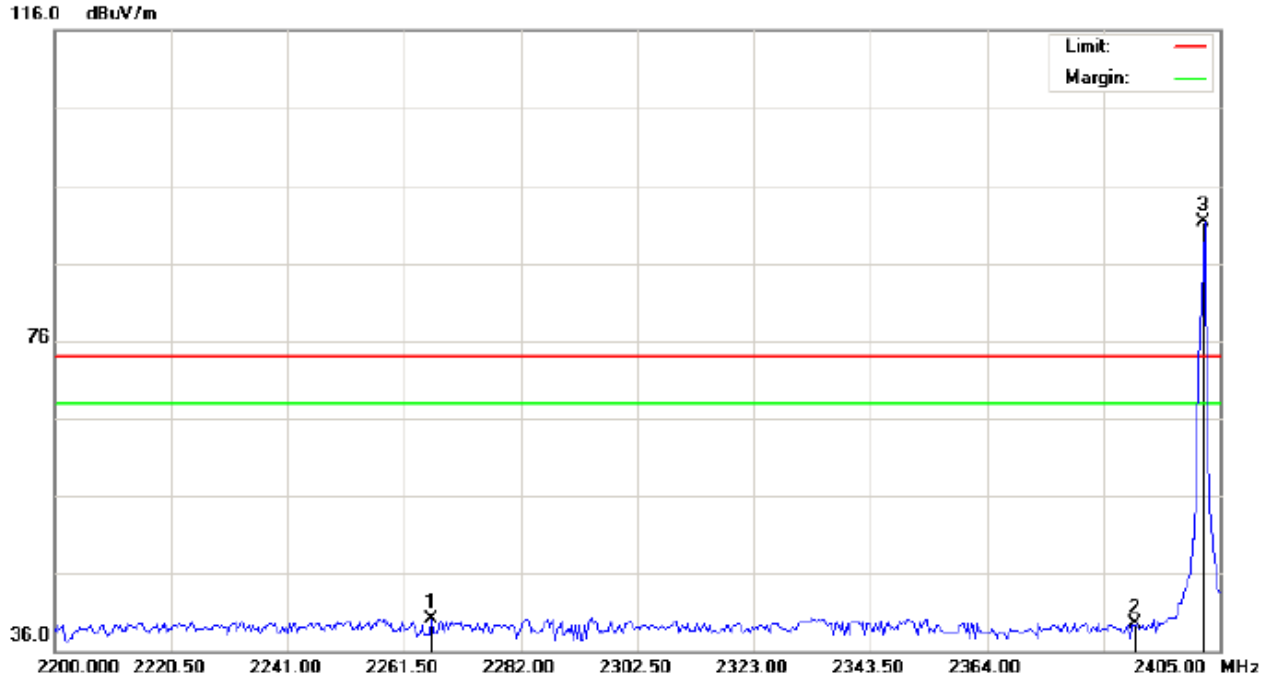
RADIATED EMISSION TEST SETUP



9.3 RADIATED TEST RESULT

(Modulation:GFSK)

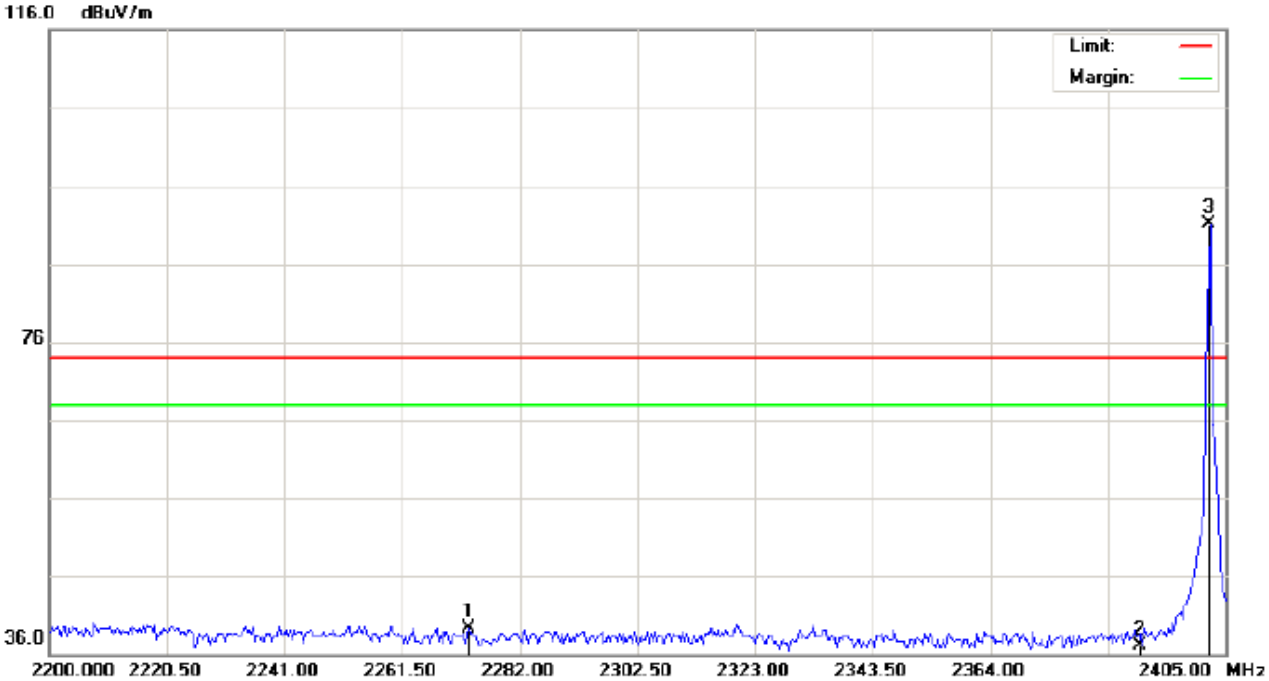
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



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: HB180B
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		2266.283	29.97	10.17	40.14	74.00	-33.86	peak			
2		2390.000	29.12	10.31	39.43	74.00	-34.57	peak			
3	*	2402.000	80.91	10.32	91.23	74.00	17.23	peak			

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



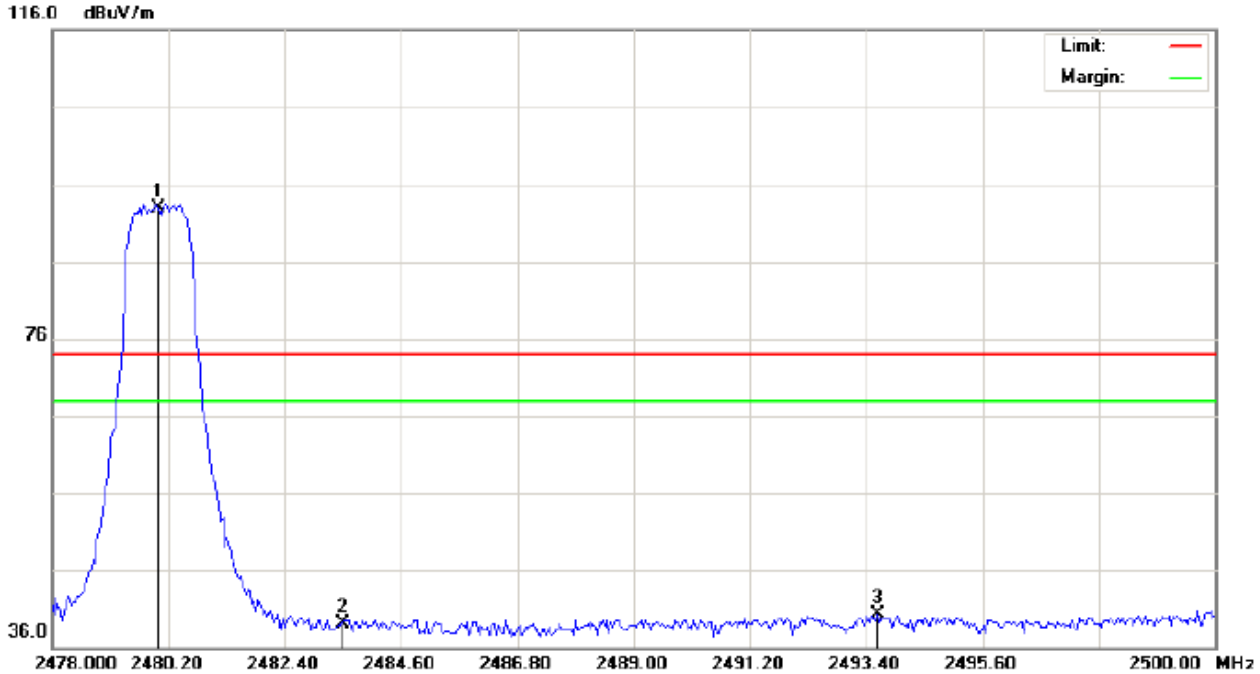
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: Low Channel TX
Note:

Polarization: *Vertical*
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		2273.117	29.12	10.18	39.30	74.00	-34.70	peak			
2		2390.000	26.85	10.31	37.16	74.00	-36.84	peak			
3	*	2402.000	80.76	10.32	91.08	74.00	17.08	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



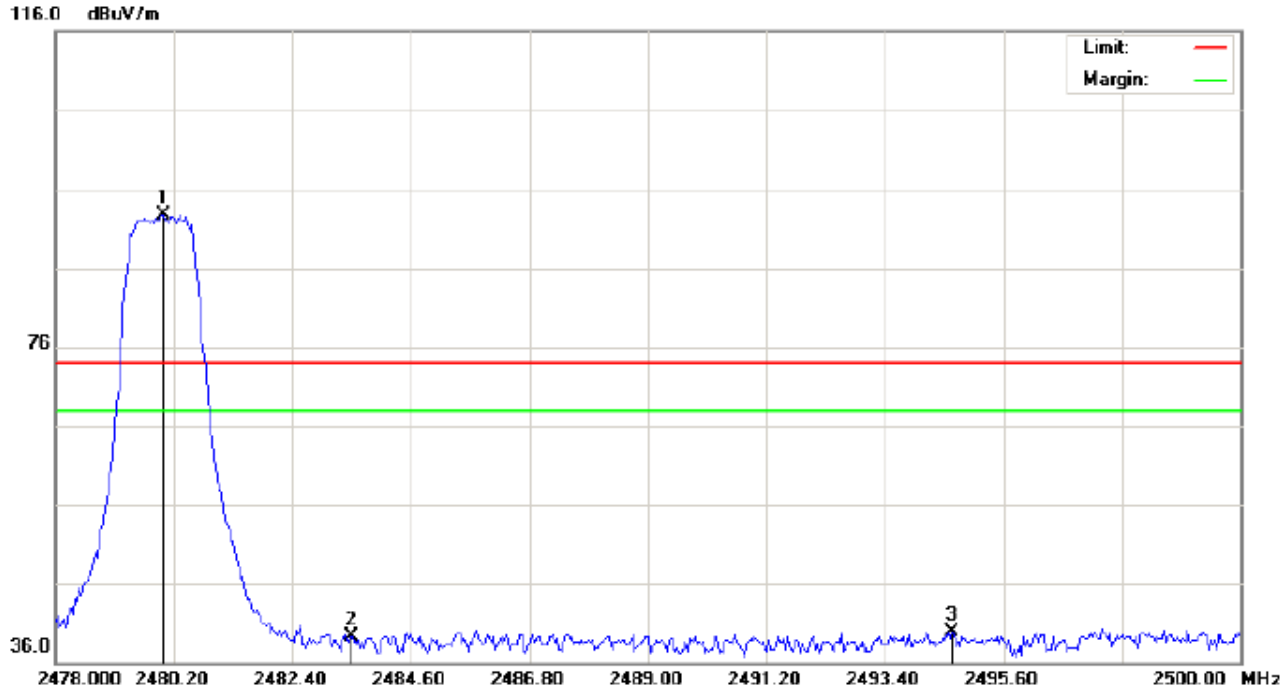
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: High Channel TX
Note:

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	*	2480.000	82.46	10.41	92.87	74.00	18.87	peak			
2		2483.500	28.75	10.41	39.16	74.00	-34.84	peak			
3		2493.620	29.87	10.42	40.29	74.00	-33.71	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-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: HB180B
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	*	2480.000	82.35	10.41	92.76	74.00	18.76	peak			
2		2483.500	28.87	10.41	39.28	74.00	-34.72	peak			
3		2494.647	29.43	10.42	39.85	74.00	-34.15	peak			

RESULT: PASS

Note: The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

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

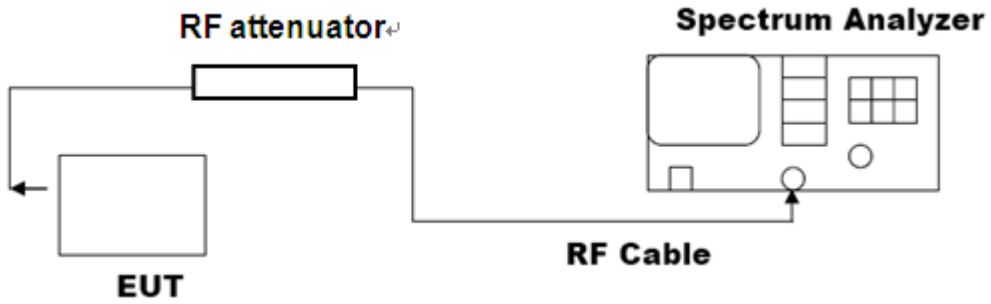
10. 20DB BANDWIDTH

10.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

10.2. TEST SET-UP

(BLOCK DIAGRAM OF CONFIGURATION)

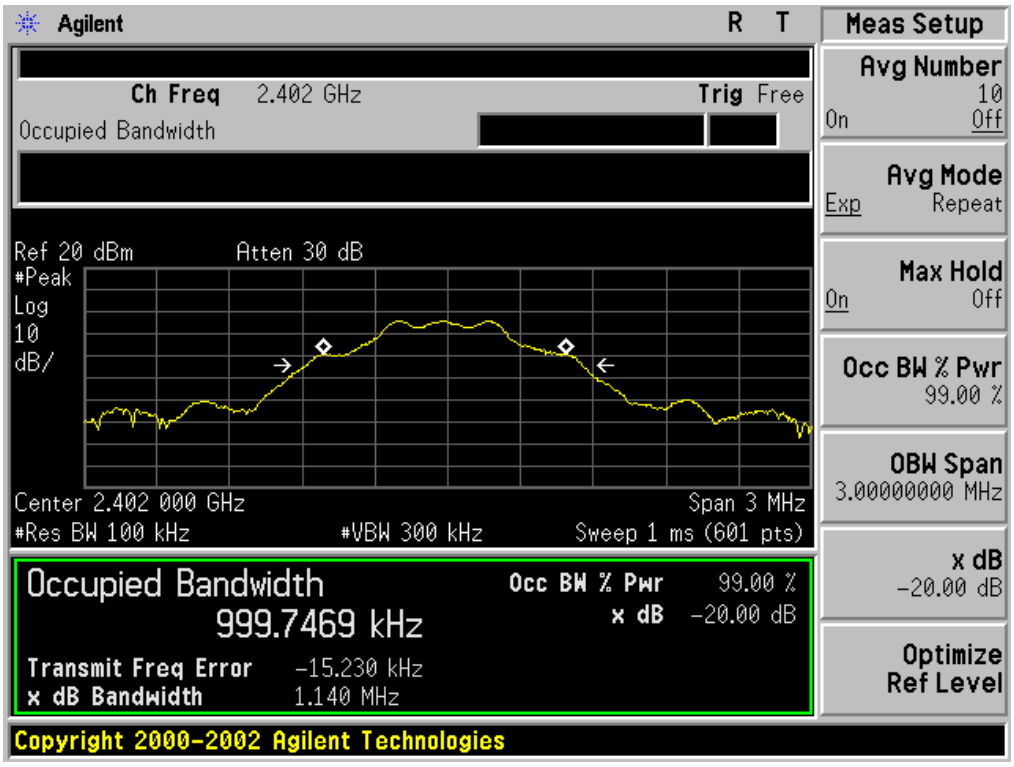


Note: The EUT has been used temporary antenna connector for testing.

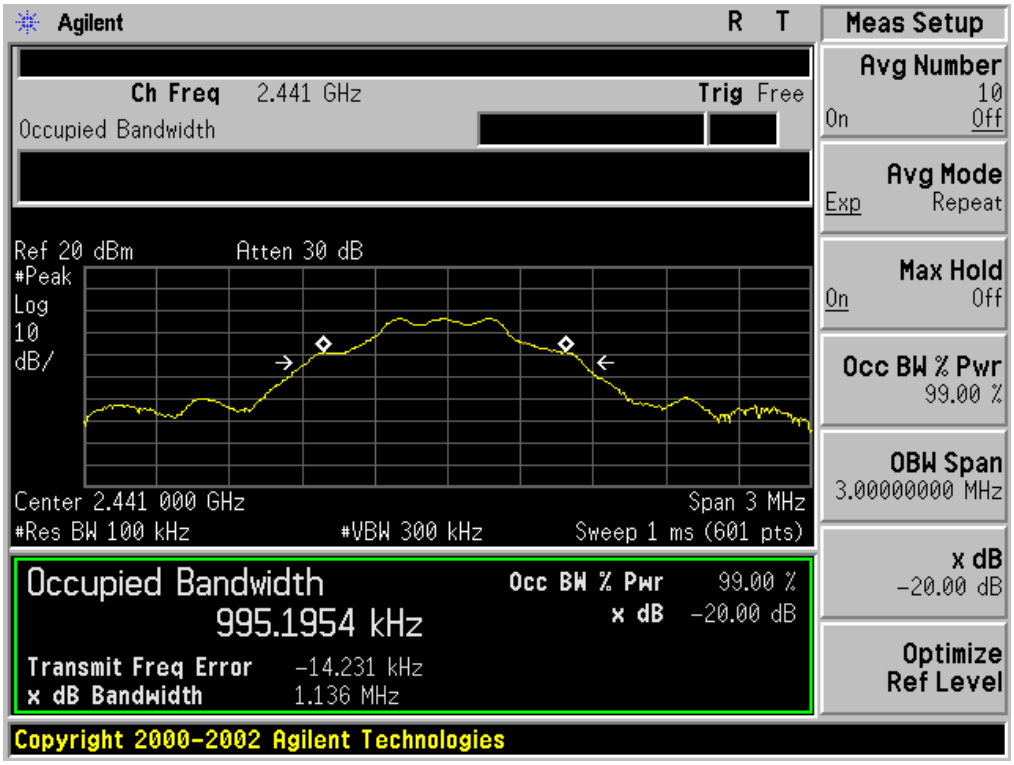
10.3. LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.140	PASS
	Middle Channel	1.136	PASS
	High Channel	1.130	PASS

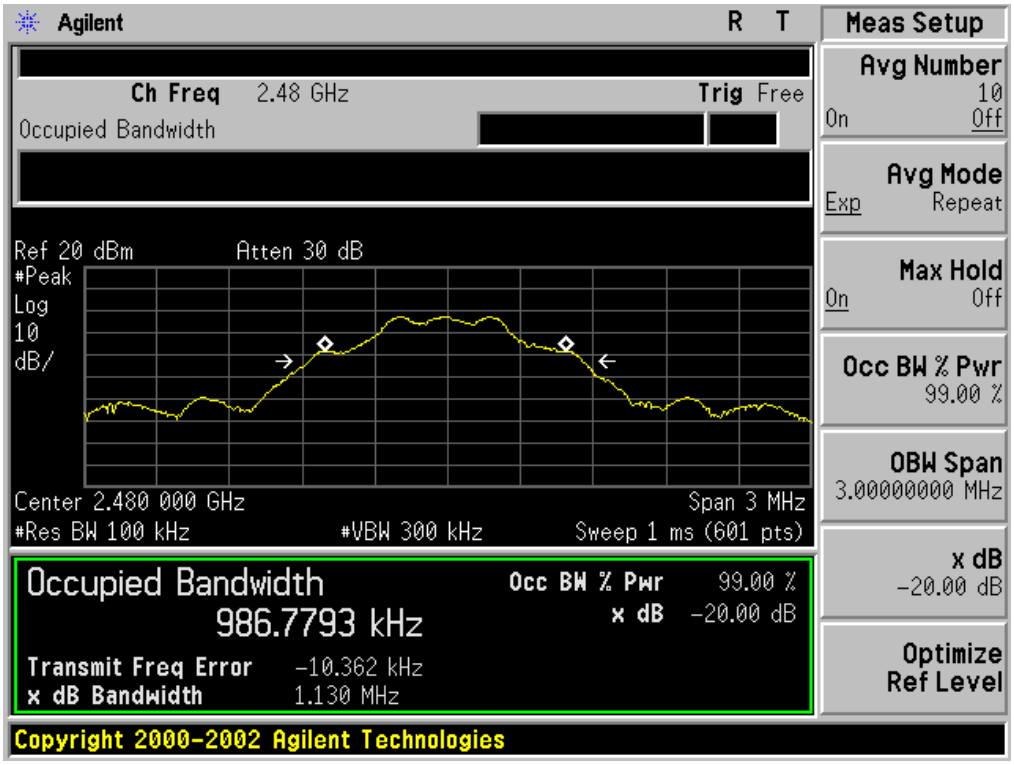
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



11. FCC LINE CONDUCTED EMISSION TEST

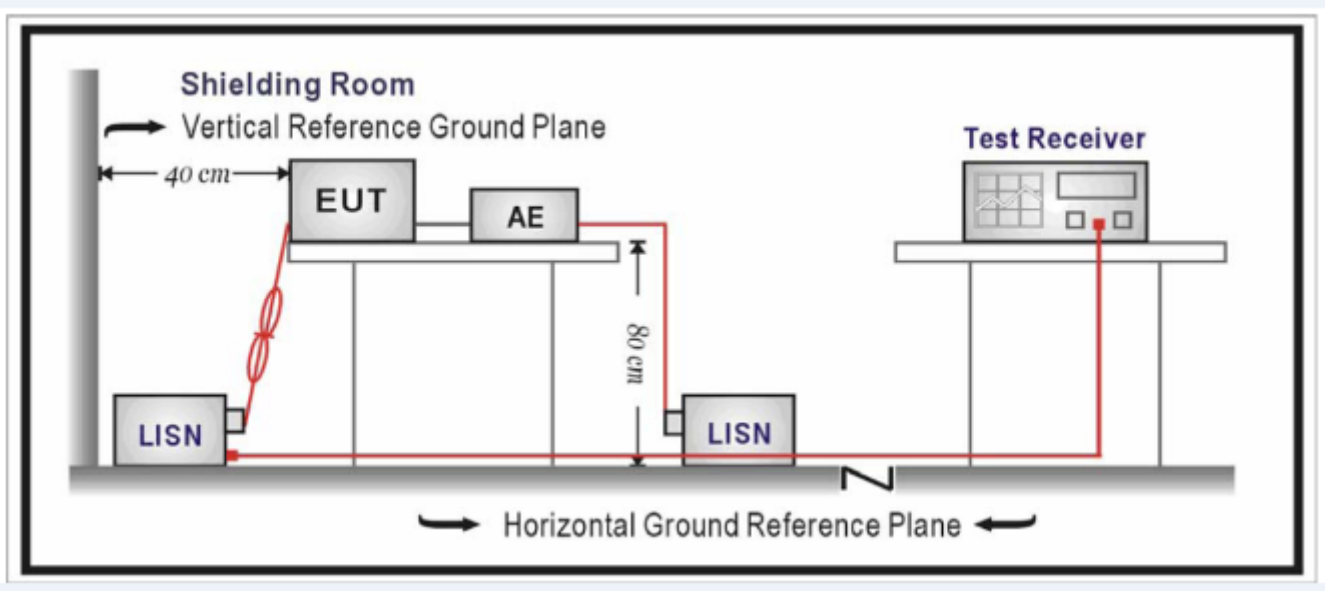
11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

11.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



11.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC or by adapter which received 120V/60Hzpower by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

11.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

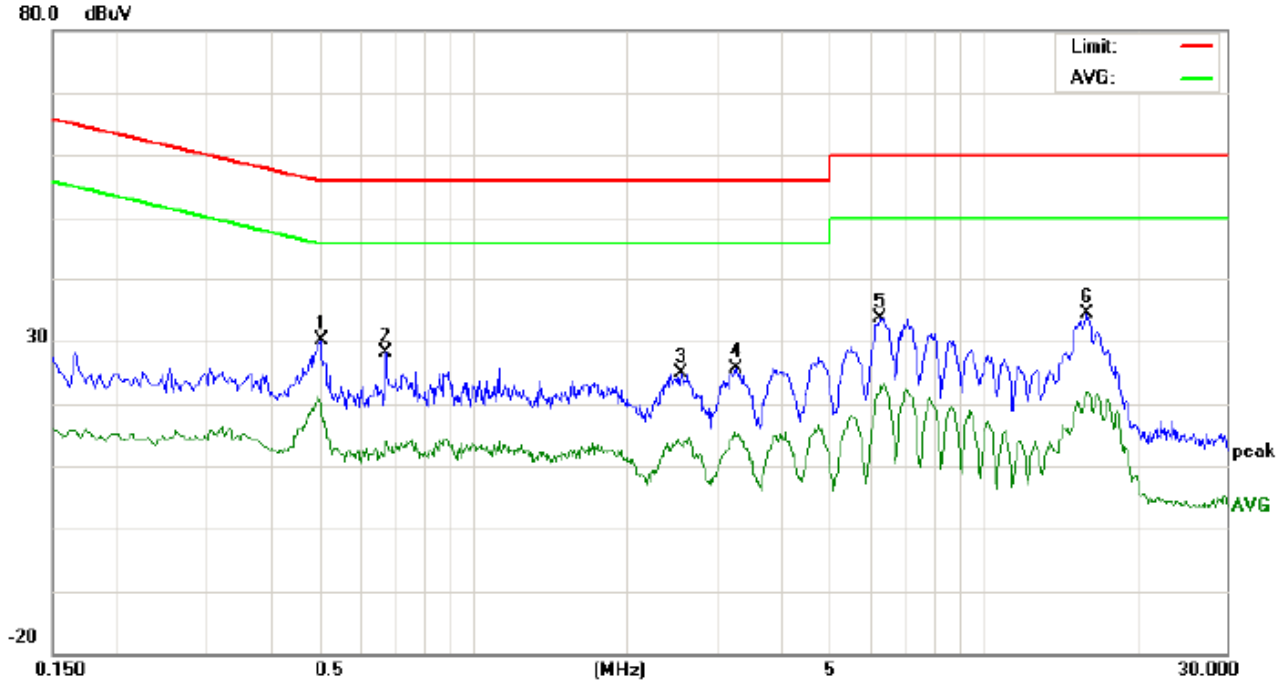
- EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.

2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

11.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

By Adapter(Worst case)

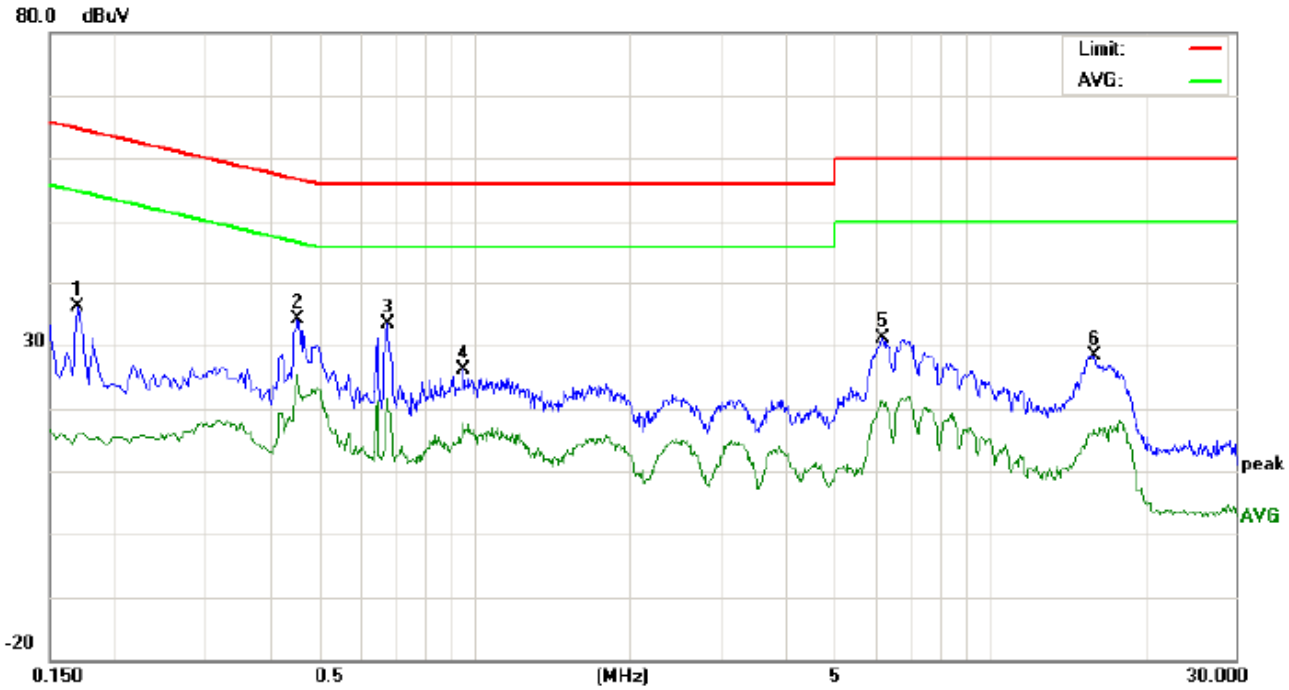
Line Conducted Emission Test Line 1-L



Site: Conduction
Phase: L1
Temperature: 22.7
Limit: FCC Class B Conduction(QP)
Power:
Humidity: 53.9 %
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: BT Link with charging
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.5020	19.66		9.45	10.40	30.06		19.85	56.00	46.00	-25.94	-26.15	P	
2	0.6740	17.83		3.63	10.34	28.17		13.97	56.00	46.00	-27.83	-32.03	P	
3	2.5540	14.48		3.05	10.44	24.92		13.49	56.00	46.00	-31.08	-32.51	P	
4	3.2820	15.13		4.43	10.53	25.66		14.96	56.00	46.00	-30.34	-31.04	P	
5	6.3060	23.40		12.55	10.29	33.69		22.84	60.00	50.00	-26.31	-27.16	P	
6	15.9980	24.18		11.85	10.11	34.29		21.96	60.00	50.00	-25.71	-28.04	P	

Line Conducted Emission Test Line 2-N

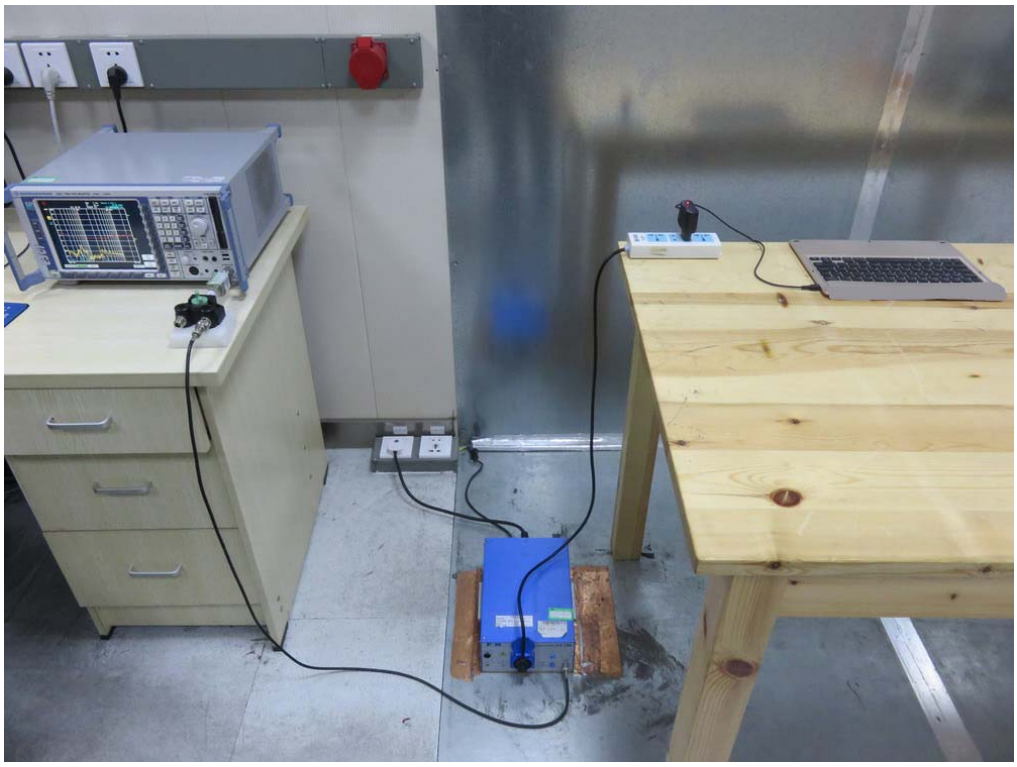


Site: Conduction | Phase: *N* | Temperature: 22.7
Limit: FCC Class B Conduction(QP) | Power: | Humidity: 53.9 %
EUT: Bluetooth Keyboard
M/N: HB180B
Mode: BT Link with charging
Note:

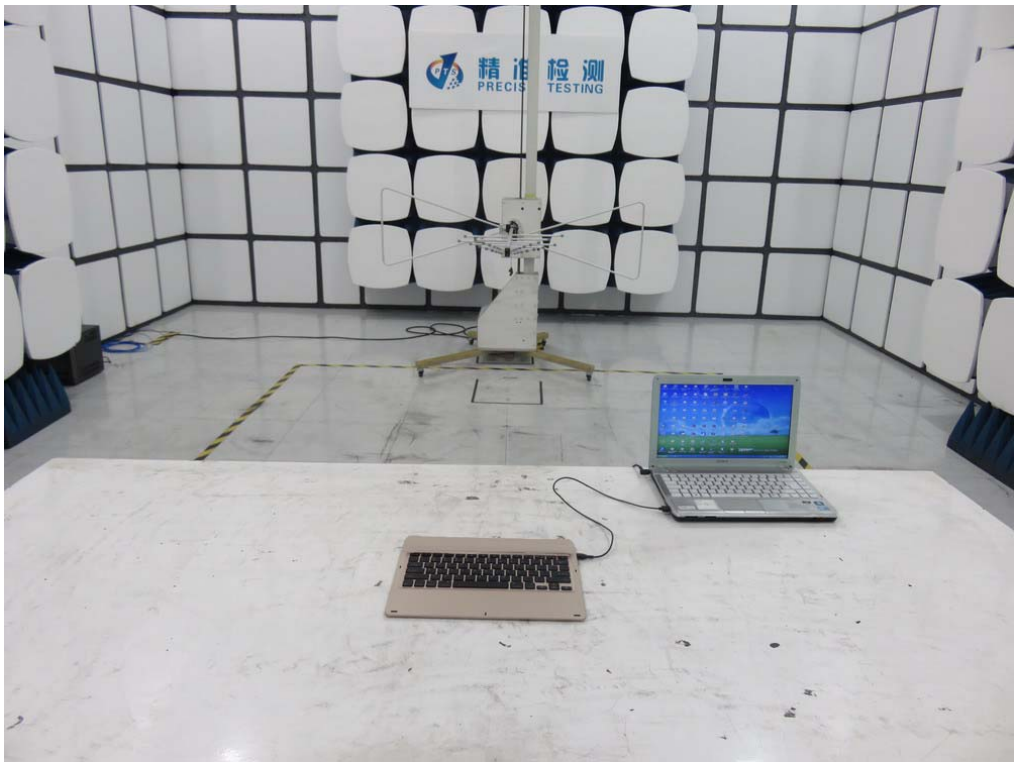
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1700	25.94		5.71	10.18	36.12		15.89	64.96	54.96	-28.84	-39.07	P	
2	0.4540	23.77		14.90	10.37	34.14		25.27	56.80	46.80	-22.66	-21.53	P	
3	0.6780	22.93		11.17	10.34	33.27		21.51	56.00	46.00	-22.73	-24.49	P	
4	0.9540	15.62		7.16	10.39	26.01		17.55	56.00	46.00	-29.99	-28.45	P	
5	6.2019	20.89		10.76	10.29	31.18		21.05	60.00	50.00	-28.82	-28.95	P	
6	15.8859	18.24		5.71	10.11	28.35		15.82	60.00	50.00	-31.65	-34.18	P	

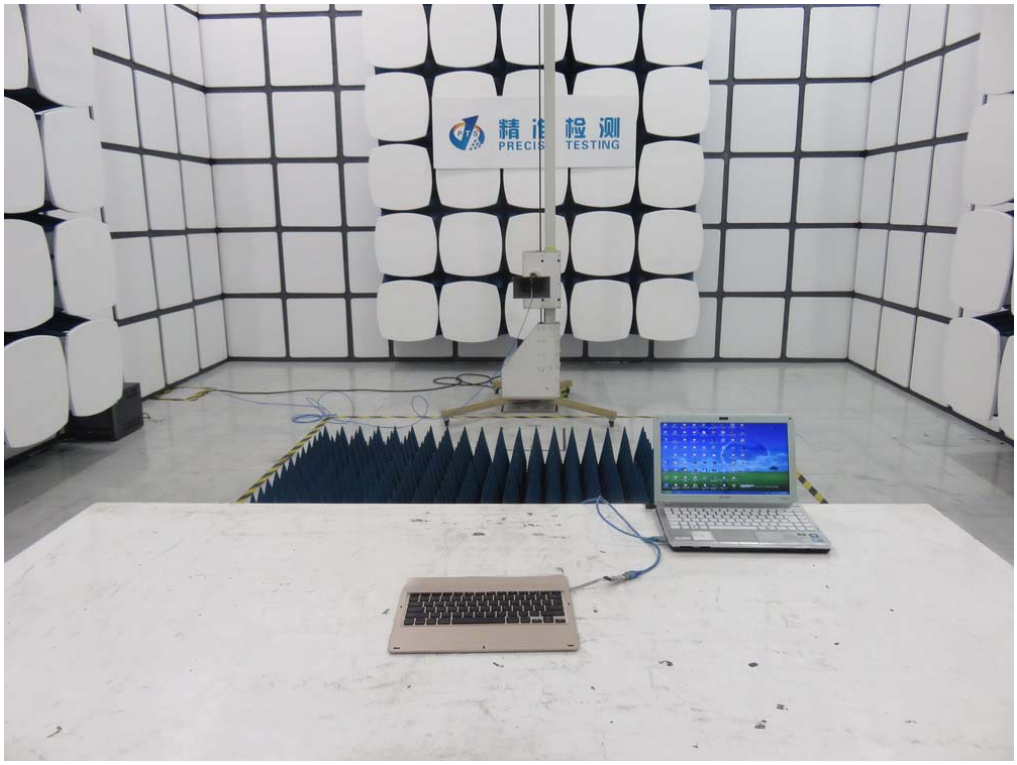
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP




精诚检测
PRECISION TESTING

APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

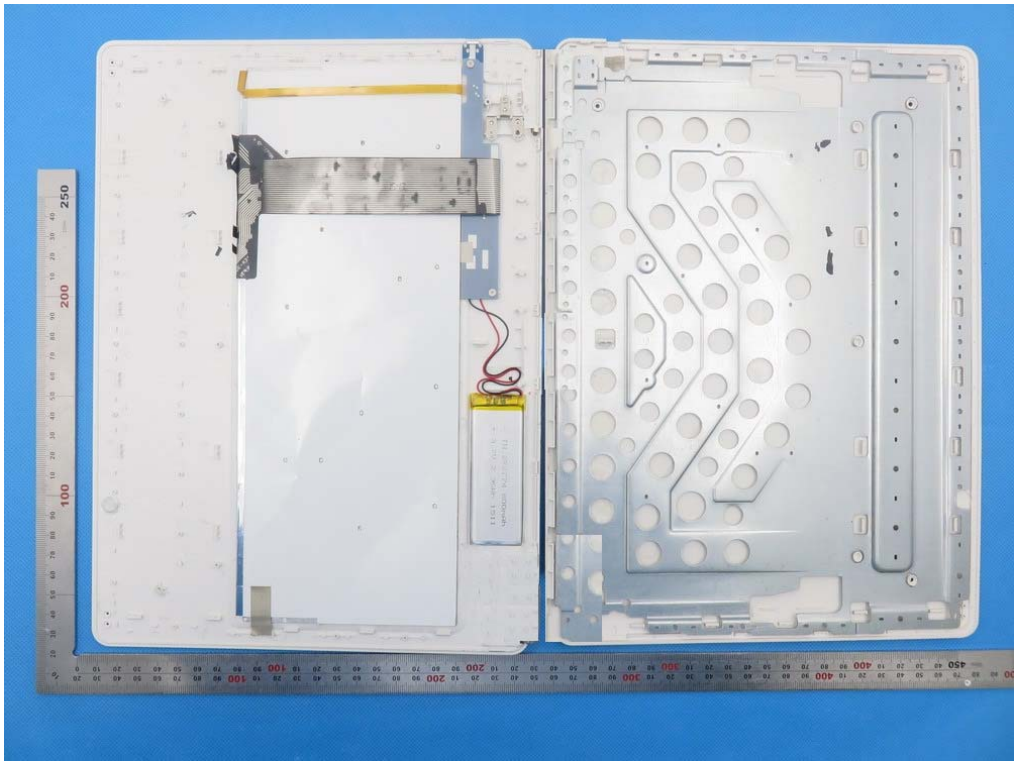
BACK VIEW OF EUT

LEFT VIEW OF EUT

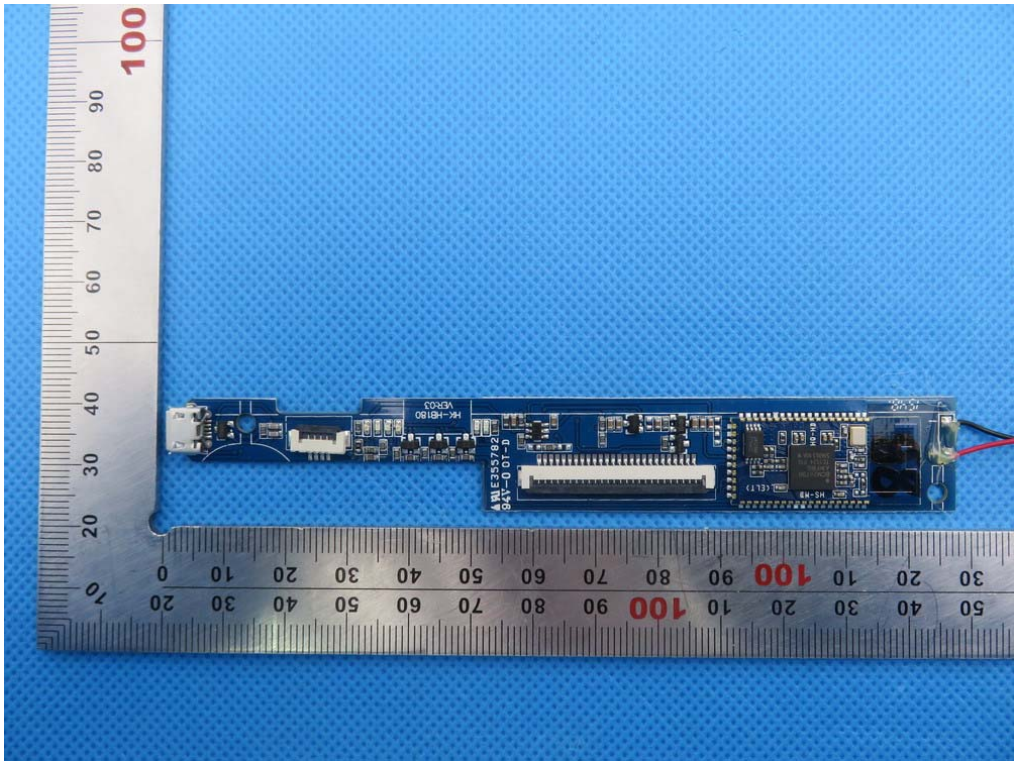
RIGHT VIEW OF EUT

VIEW OF EUT (PORT)

OPEN VIEW OF EUT

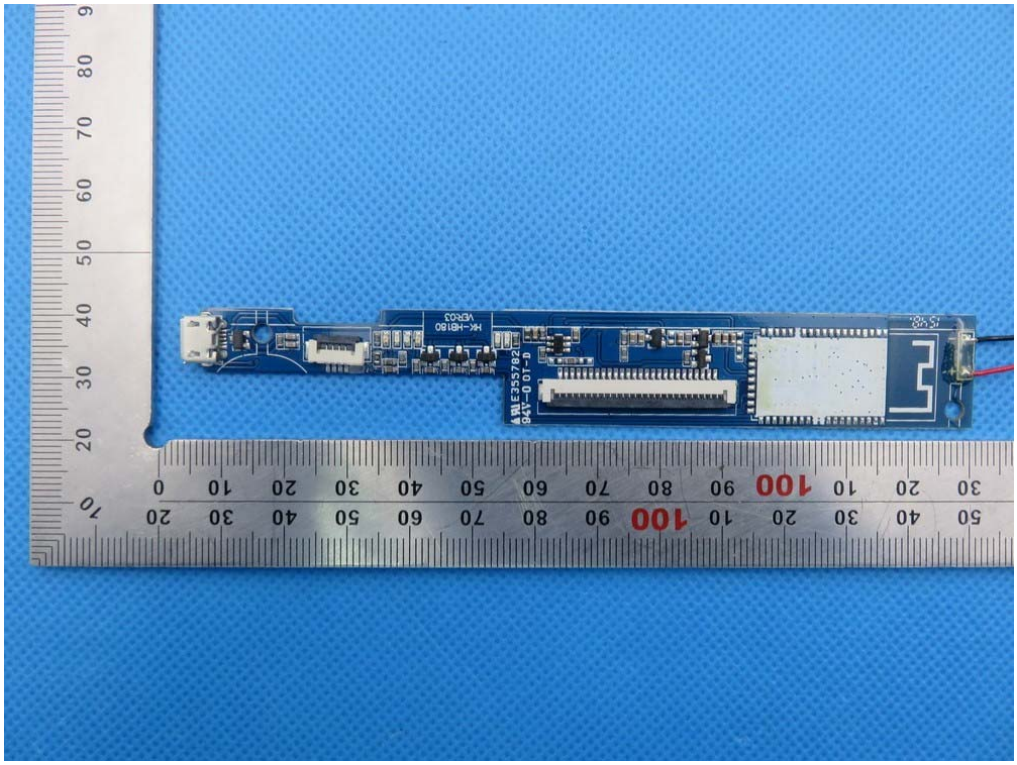


INTERNAL VIEW OF EUT-1

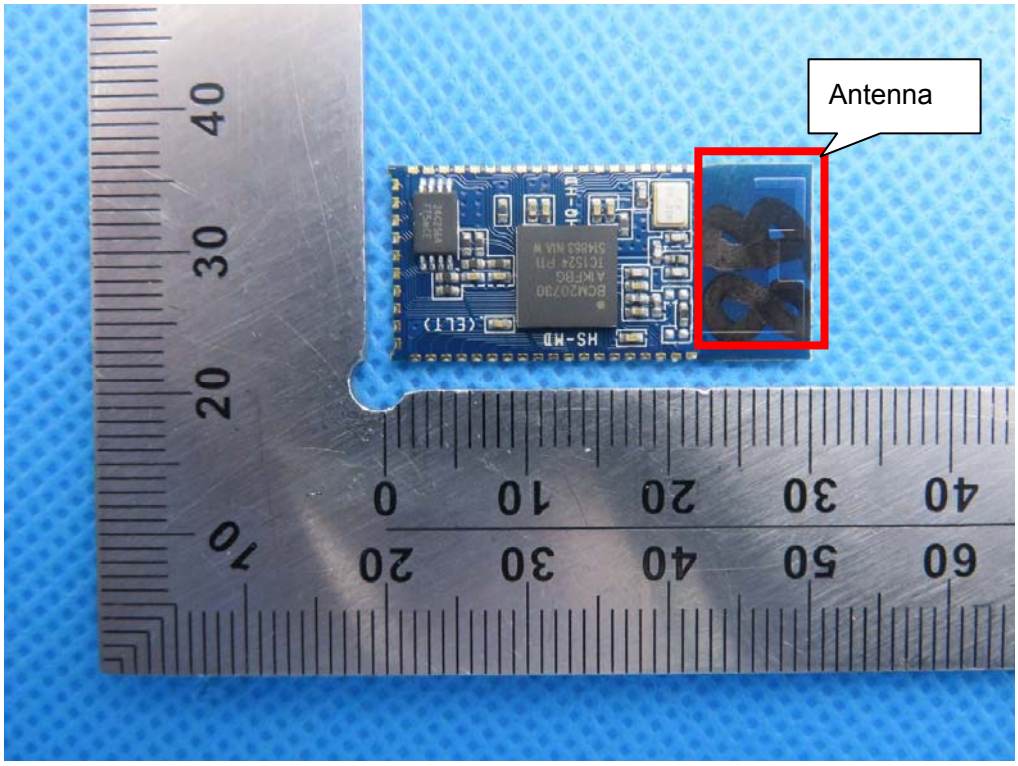


INTERNAL VIEW OF EUT-2

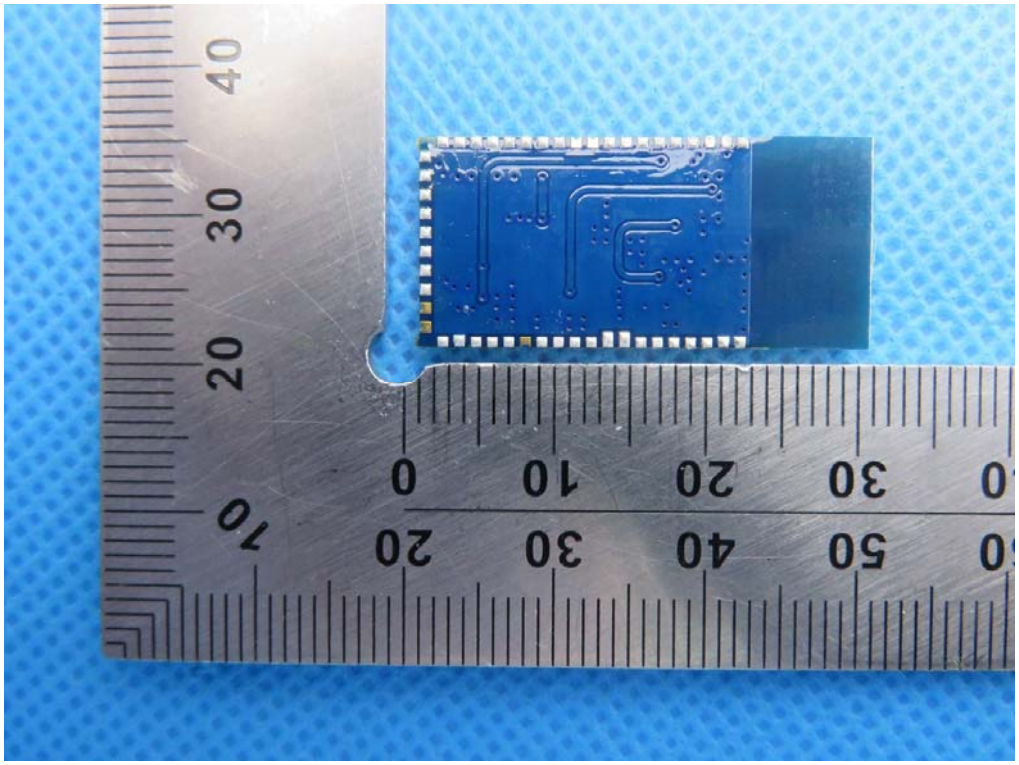
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



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