
FCC Test Report

Report No.: AGC06300160401FE03

FCC ID : 2AH35K20

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : K20 Multimedia Backlit Bluetooth Keyboard

BRAND NAME : Airfox

MODEL NAME : K20, AFA-K20

CLIENT : Airfox Technology Trade Co., Limited

DATE OF ISSUE : Apr.21,2016

STANDARD(S) : FCC Part 15 Rules

TEST PROCEDURE(S)

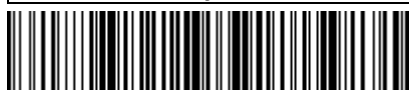
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.21,2016	Valid	Original Report

TABLE OF CONTENTS

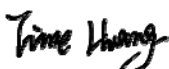
1. VERIFICATION OF CONFORMITY	4
2. GENERAL INFORMATION	5
2.1. PRODUCT DESCRIPTION.....	5
2.2. TABLE OF CARRIER FREQUENCYS.....	5
3. MEASUREMENT UNCERTAINTY.....	6
4. DESCRIPTION OF TEST MODES.....	6
5. SYSTEM TEST CONFIGURATION	7
5.1. CONFIGURATION OF EUT SYSTEM	7
5.2. EQUIPMENT USED IN EUT SYSTEM	7
5.3. SUMMARY OF TEST RESULTS	7
6. TEST FACILITY	8
7 TEST METHODOLOGY.....	8
8. ALL TEST EQUIPMENT LIST	8
9. RADIATED EMISSION	10
9.1TEST LIMIT.....	10
9.2. MEASUREMENT PROCEDURE	11
9.3. TEST SETUP	13
9.4. TEST RESULT	15
10. BAND EDGE EMISSION	28
10.1. MEASUREMENT PROCEDURE	28
10.2 TEST SETUP	28
10.3 RADIATED TEST RESULT	29
11. 20DB BANDWIDTH.....	33
11.1. MEASUREMENT PROCEDURE	33
11.2. TEST SET-UP	33
11.3. LIMITS AND MEASUREMENT RESULTS	33
12. FCC LINE CONDUCTED EMISSION TEST	36
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST	36
12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	36
12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	37
12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	37
12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	37
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	40
APPENDIX B: PHOTOGRAPHS OF EUT	42

1. VERIFICATION OF CONFORMITY

Applicant	Airfox Technology Trade Co., Limited
Address	N0.14, Unit3, Building 48 115 Geological Team Neighborhood QingZhen City, GuiZhou, China
Manufacturer	Airfox Technology Trade Co., Limited
Address	N0.14, Unit3, Building 48 115 Geological Team Neighborhood QingZhen City, GuiZhou, China
Product Designation	K20 Multimedia Backlit Bluetooth Keyboard
Brand Name	Airfox
Test Model	K20
Series Model	AFA-K20
Difference description	All the same except the model name.
Date of test	Apr.11,2016 to Apr.13,2016
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, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249.

Tested By 
Time Huang(Huang Nanhui) Apr.21,2016

Reviewed By 
Forrest Lei(Lei Yonggang) Apr.21,2016

Approved By 
Solger Zhang(Zhang Hongyi)
Authorized Officer Apr.21,2016

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	-2.0dBm(Max)
Bluetooth Version	V3.0
Modulation	GFSK
Number of channels	79
Hardware Version	HB086-A VER:02
Software Version	N/A
Antenna Designation	PCB Antenna
Antenna Gain	0dBi
Power Supply	Normal Voltage: DC 3.7V
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 V3.0 But for this device the functionality is limited to GFSK(1MBit/s) by the firmware End-User is not able to change the setting and enable any additional functionality by himself.	

2.2. TABLE OF CARRIER FREQUENCIES

BR channel List

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 $y \pm U$, where expanded 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	$\pm 3.18\text{dB}$
2	All emissions, radiated	$\pm 3.91\text{dB}$
3	Temperature	$\pm 0.5^\circ\text{C}$
4	Humidity	$\pm 2\%$

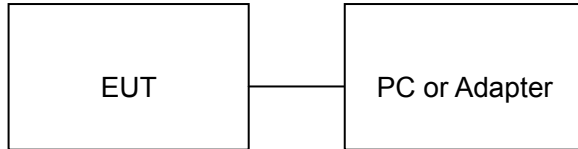
4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	BT Link with charging
Note: 1. 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. 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.	

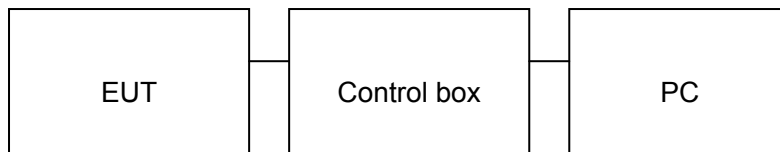
5. SYSTEM TEST CONFIGURATION

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	K20 Multimedia Backlit Bluetooth Keyboard	N/A	K20	EUT
2	PC	SONY	E1412AYCW	A.E
3	Control box	N/A	N/A	A.E
4	Adapter	ETPCA-050100U3W	N/A	A.E
5	Temporary antenna connector	N/A	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
§15.215	BANDWIDTH	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 C63.10:2013.

7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013

8. 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

9. RADIATED EMISSION

9.1 TEST 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(μ V)/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(μ V)/m (Peak) 54.0 dB(μ V)/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.

9.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 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 RBW for peak reading. Then 1MHz 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.

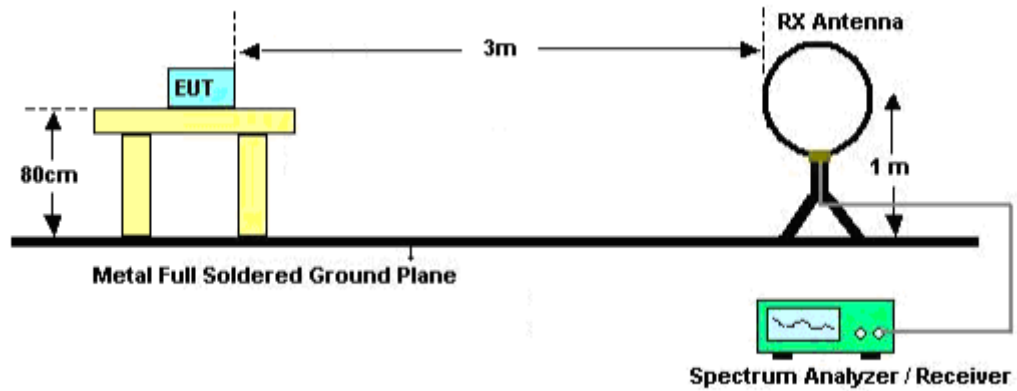
The following table is the setting of spectrum analyzer and receiver.

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 1MHz/3MHz for Peak, 1MHz/10Hz for Average

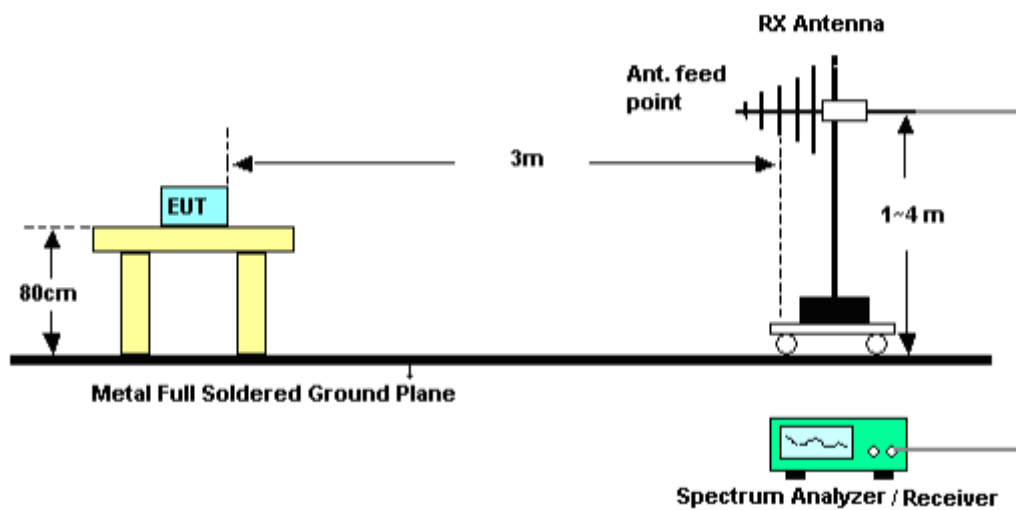
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

9.3. TEST SETUP

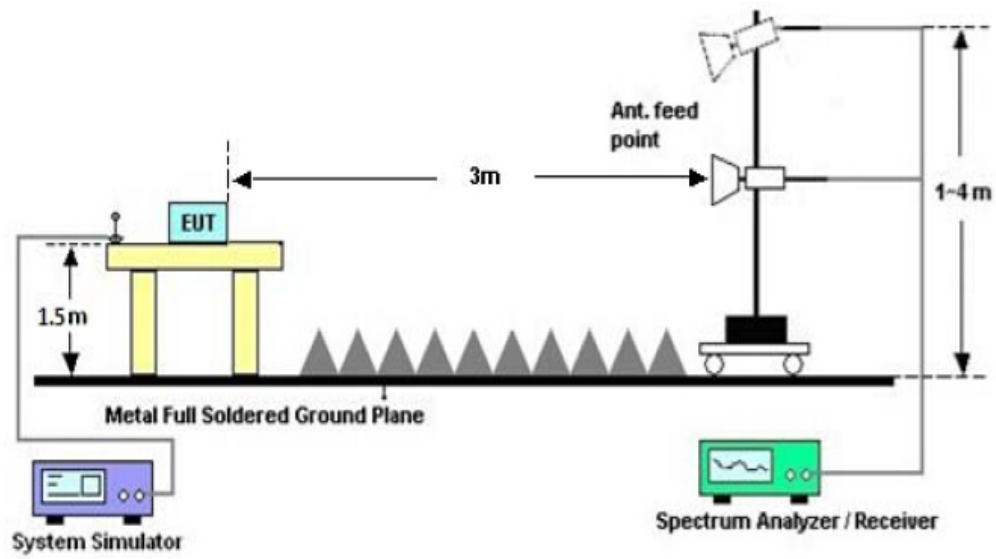
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



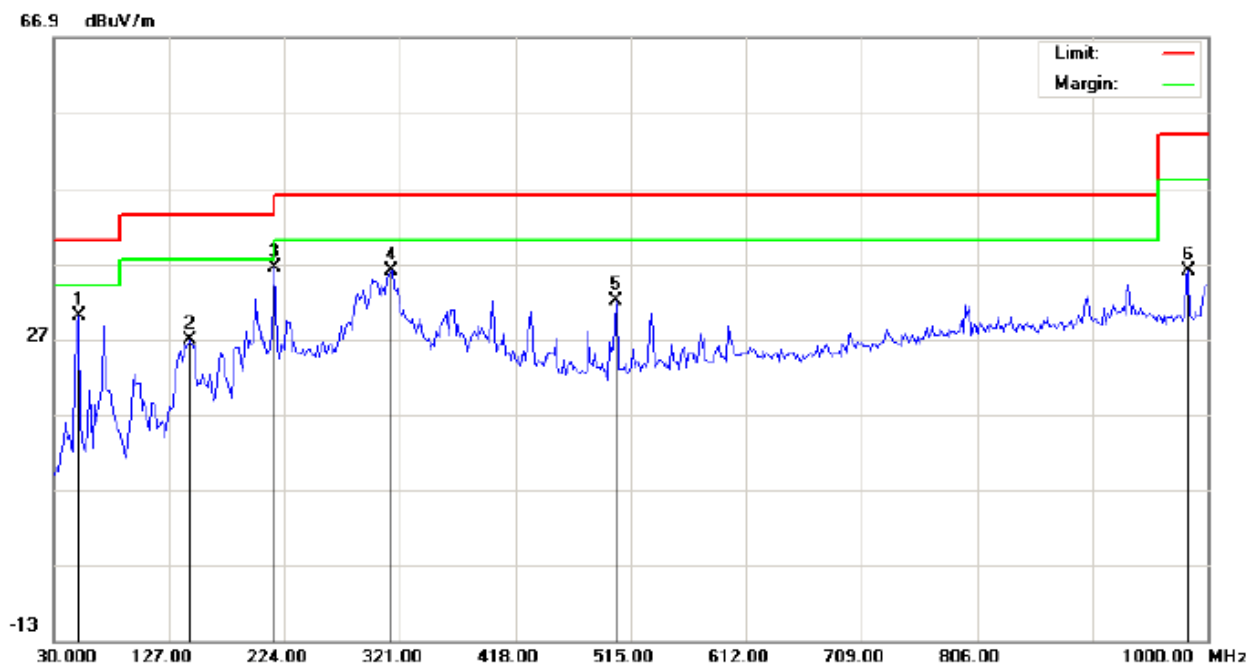
9.4. TEST RESULT

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

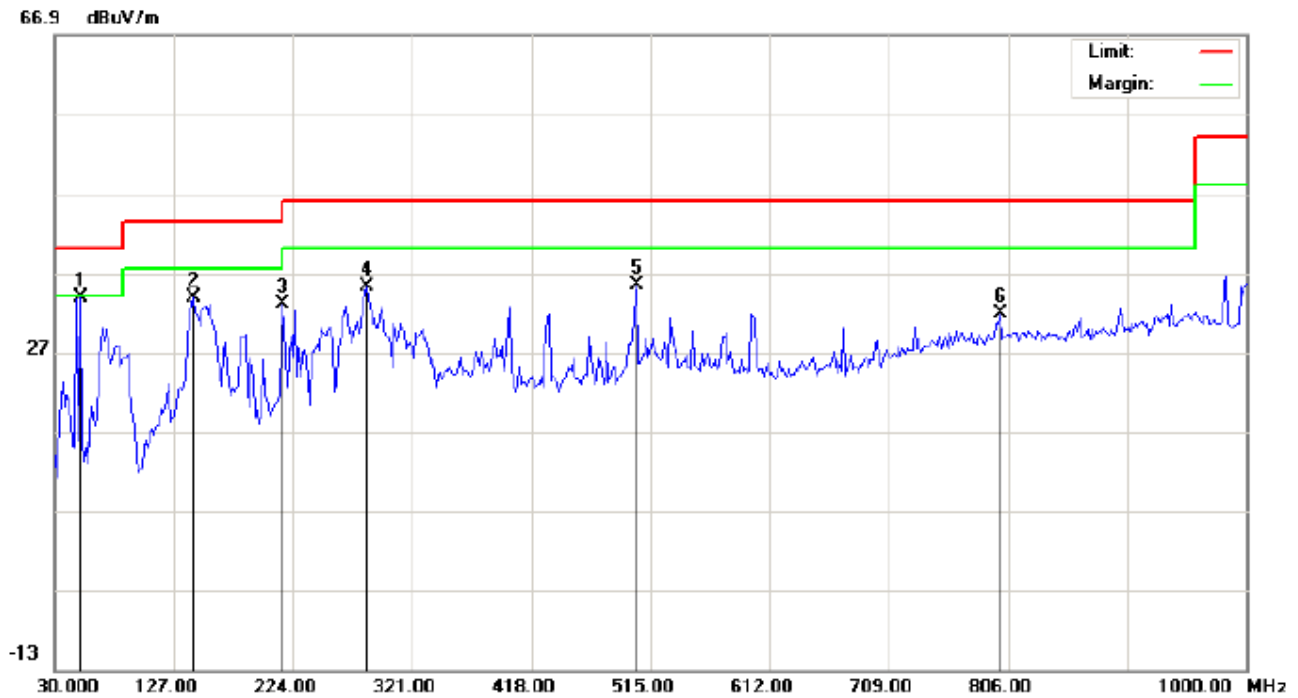


Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 22.3
Limit: FCC Class B 3M Radiation	Power:	Humidity: 52.3 %
EUT: K20 Multimedia Backlit Bluetooth Keyboard	Distance:	
M/N:K20		
Mode:Low Channel TX		
Note:		

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		51.0167	19.88	10.15	30.03	40.00	-9.97	peak			
2		144.7832	12.70	14.04	26.74	43.50	-16.76	peak			
3	*	215.9166	26.04	10.38	36.42	43.50	-7.08	peak			
4		314.5332	19.57	16.38	35.95	46.00	-10.05	peak			
5		502.0667	10.89	21.19	32.08	46.00	-13.92	peak			
6		983.8333	6.34	29.68	36.02	54.00	-17.98	peak			

RESULT: PASS

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



Site: site #1

Polarization: **Vertical**

Temperature: 22.3

Limit: FCC Class B 3M Radiation

Power:

Humidity: 52.3 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

Mode:Low Channel TX

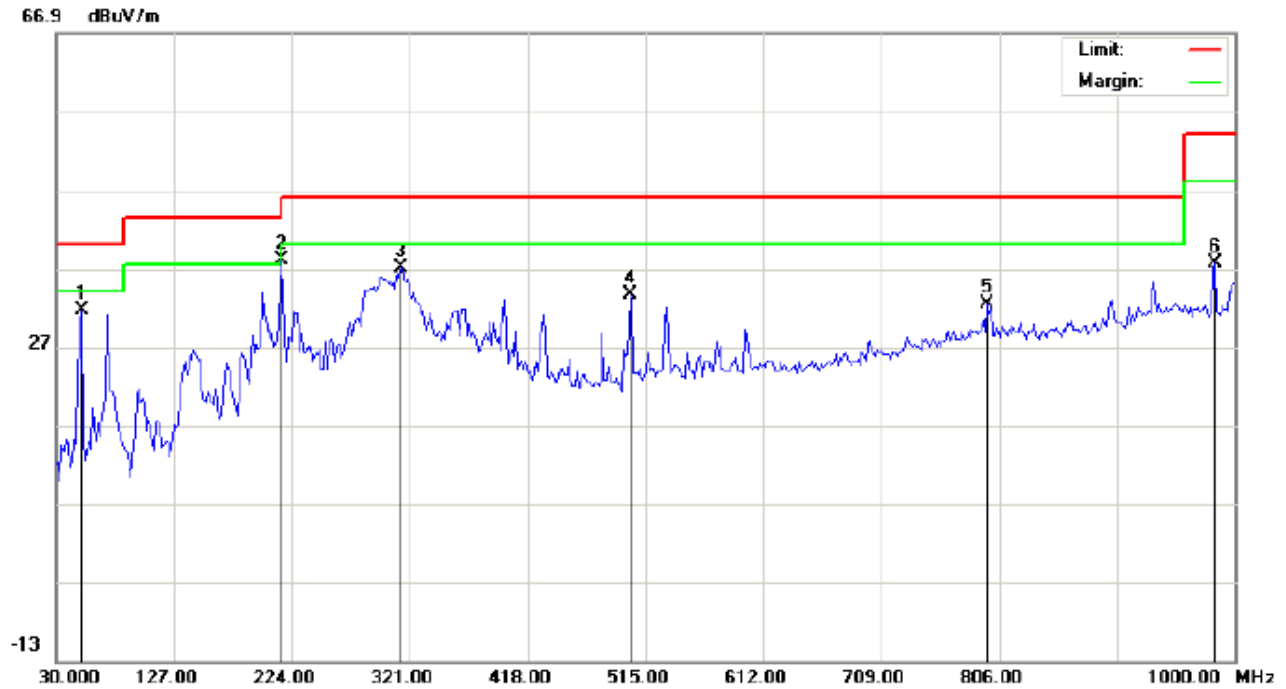
Note:

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	*	51.0167	25.50	8.23	33.73	40.00	-6.27	peak			
2		143.1665	18.56	15.22	33.78	43.50	-9.72	peak			
3		215.9166	22.53	10.56	33.09	43.50	-10.41	peak			
4		283.8167	20.29	14.92	35.21	46.00	-10.79	peak			
5		503.6832	14.17	21.23	35.40	46.00	-10.60	peak			
6		799.5333	4.54	27.31	31.85	46.00	-14.15	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

Polarization: *Horizontal*

Temperature: 22.3

Limit: FCC Class B 3M Radiation

Power:

Humidity: 52.3 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

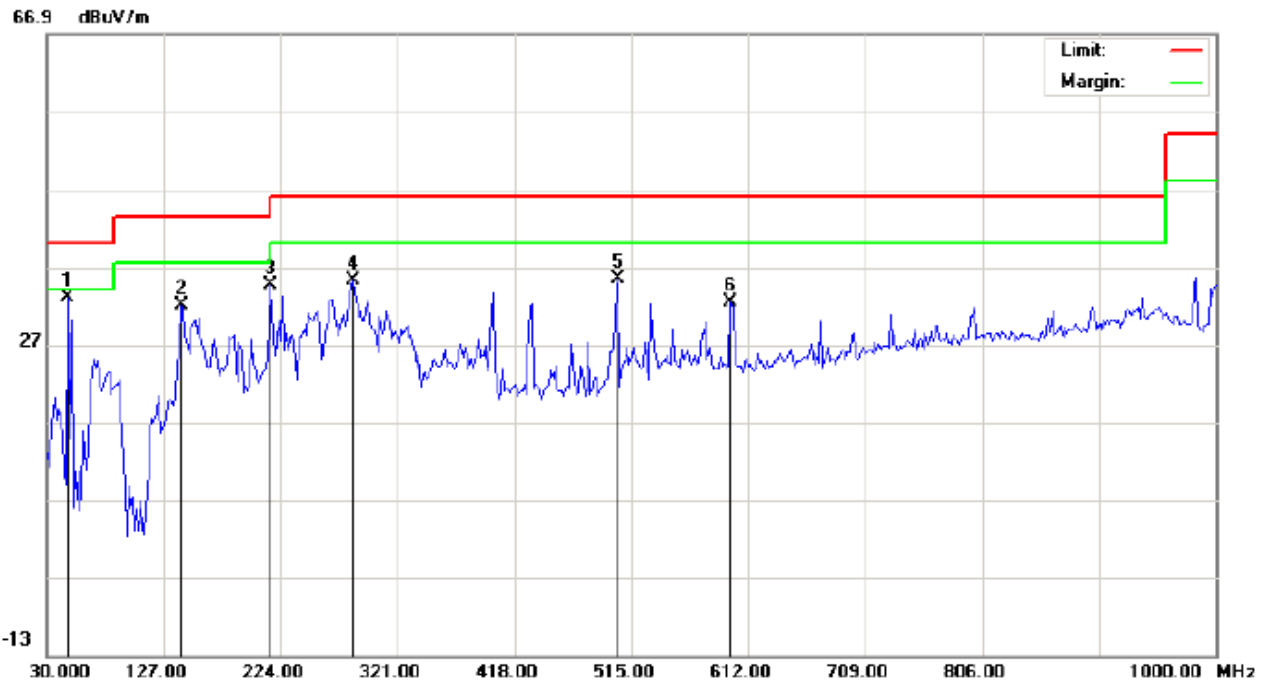
Mode:Middle Channel TX

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		51.0167	21.38	10.15	31.53	40.00	-8.47	peak			
2	*	215.9166	27.54	10.38	37.92	43.50	-5.58	peak			
3		314.5332	20.57	16.38	36.95	46.00	-9.05	peak			
4		502.0667	12.39	21.19	33.58	46.00	-12.42	peak			
5		796.2999	5.14	27.27	32.41	46.00	-13.59	peak			
6		983.8333	7.84	29.68	37.52	54.00	-16.48	peak			

RESULT: PASS

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



Site: site #1

Polarization: **Vertical**

Temperature: 22.3

Limit: FCC Class B 3M Radiation

Power:

Humidity: 52.3 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

Mode:Middle Channel TX

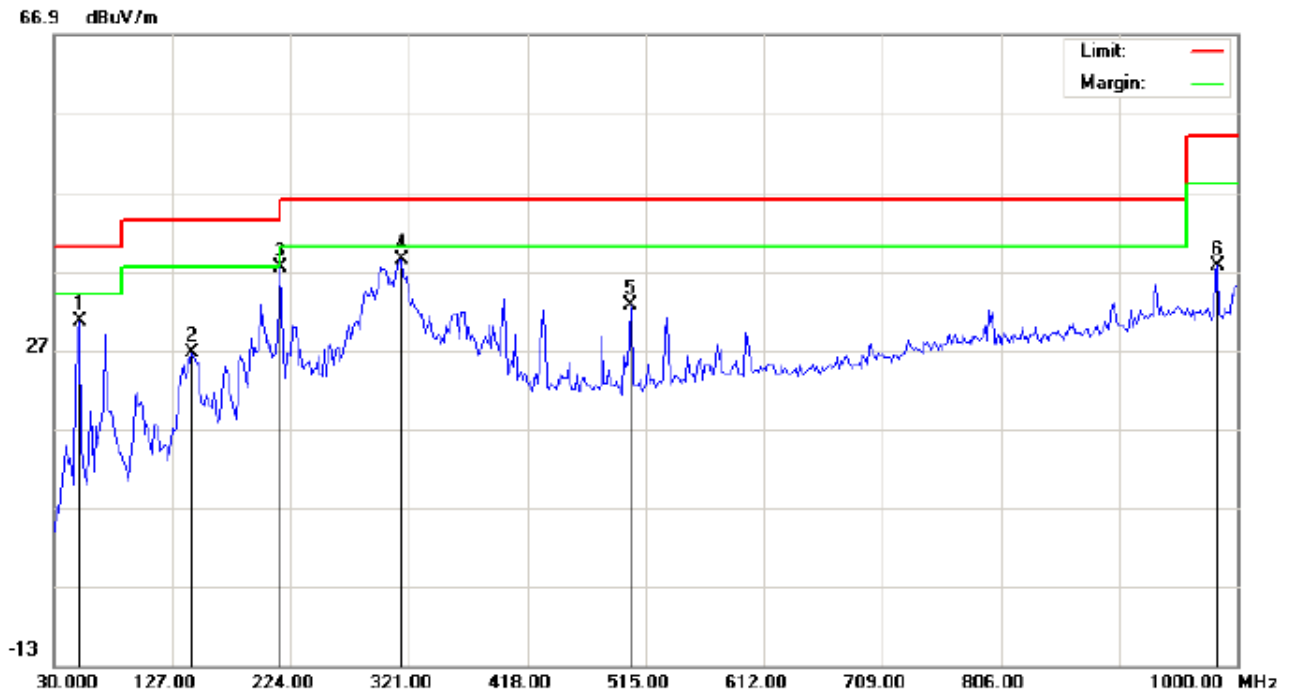
Note:

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	*	47.7832	24.64	8.39	33.03	40.00	-6.97	peak			
2		141.5500	16.84	15.21	32.05	43.50	-11.45	peak			
3		215.9166	24.03	10.56	34.59	43.50	-8.91	peak			
4		283.8167	20.29	14.92	35.21	46.00	-10.79	peak			
5		503.6832	14.17	21.23	35.40	46.00	-10.60	peak			
6		597.4500	9.66	22.72	32.38	46.00	-13.62	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

Polarization: *Horizontal*

Temperature: 22.3

Limit: FCC Class B 3M Radiation

Power:

Humidity: 52.3 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

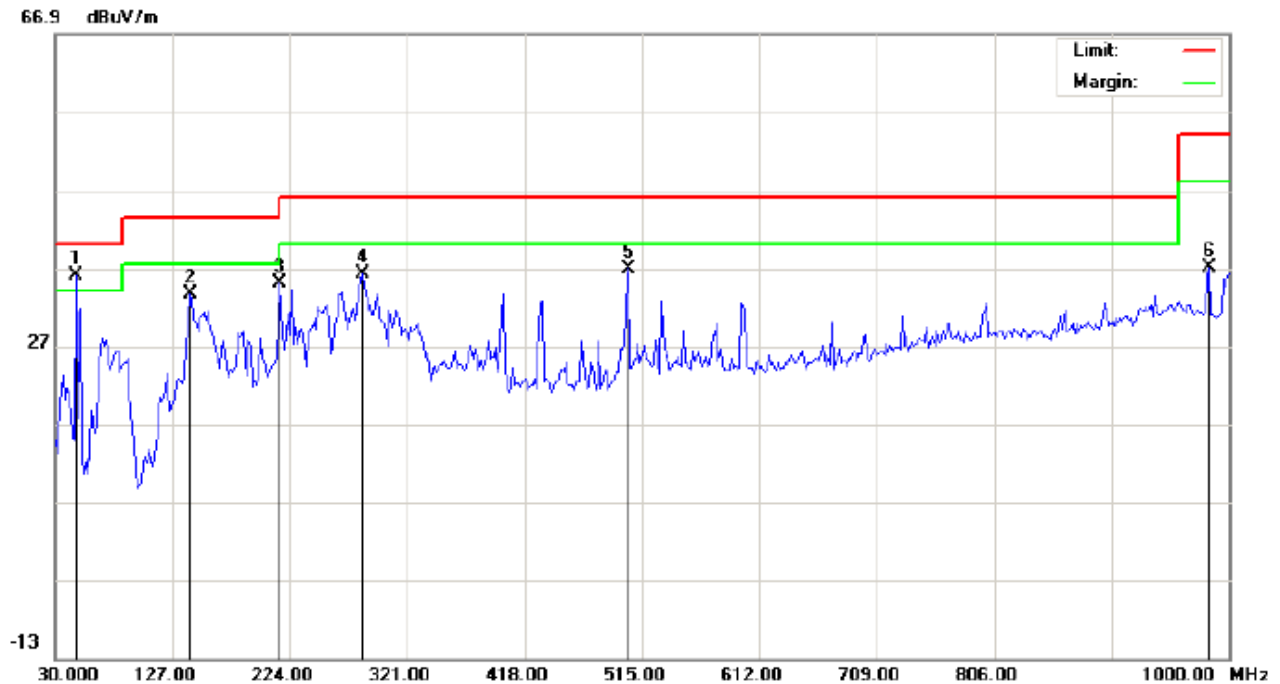
Mode:High Channel TX

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		51.0167	20.38	10.15	30.53	40.00	-9.47	peak			
2		143.1667	12.24	14.43	26.67	43.50	-16.83	peak			
3	*	215.9167	27.04	10.38	37.42	43.50	-6.08	peak			
4		314.5333	22.07	16.38	38.45	46.00	-7.55	peak			
5		502.0667	11.39	21.19	32.58	46.00	-13.42	peak			
6		983.8333	7.84	29.68	37.52	54.00	-16.48	peak			

RESULT: PASS

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



Site: site #1

Polarization: *Vertical*

Temperature: 22.3

Limit: FCC Class B 3M Radiation

Power:

Humidity: 52.3 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

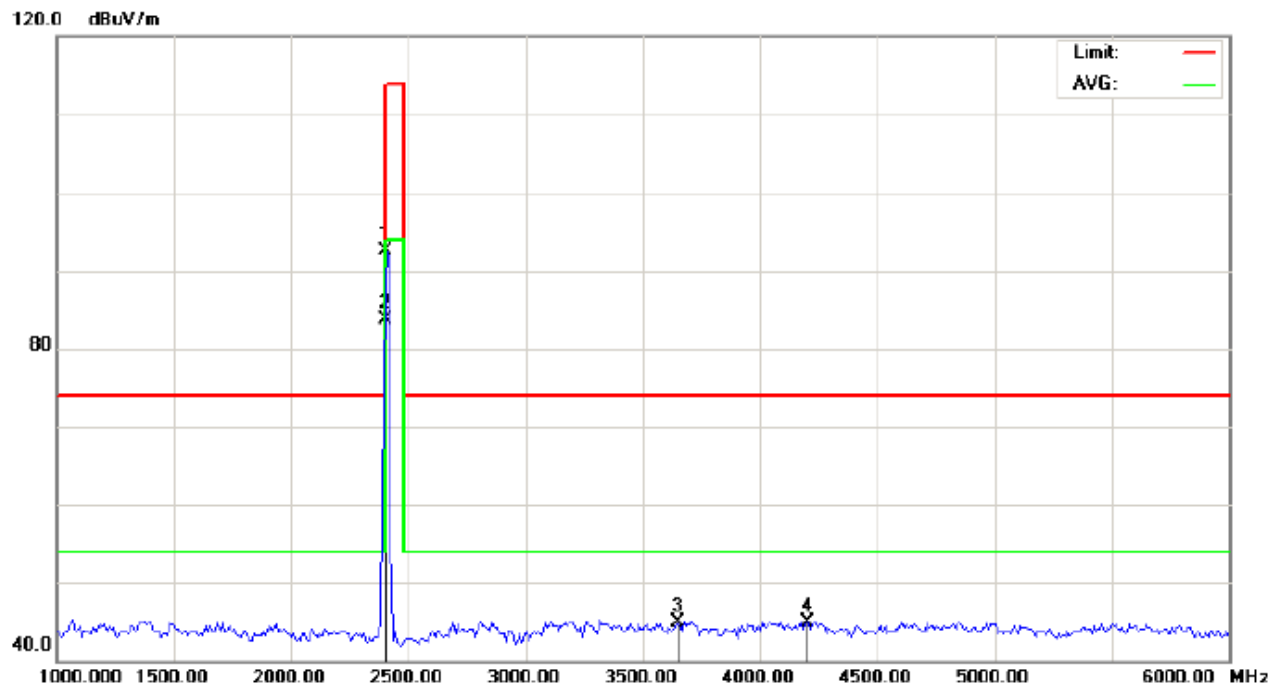
Mode:High Channel TX

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	*	47.7833	27.64	8.39	36.03	40.00	-3.97	peak			
2		141.5500	18.34	15.21	33.55	43.50	-9.95	peak			
3		215.9167	24.53	10.56	35.09	43.50	-8.41	peak			
4		283.8167	21.29	14.92	36.21	46.00	-9.79	peak			
5		503.6833	15.67	21.23	36.90	46.00	-9.10	peak			
6		983.8333	7.38	29.68	37.06	54.00	-16.94	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

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

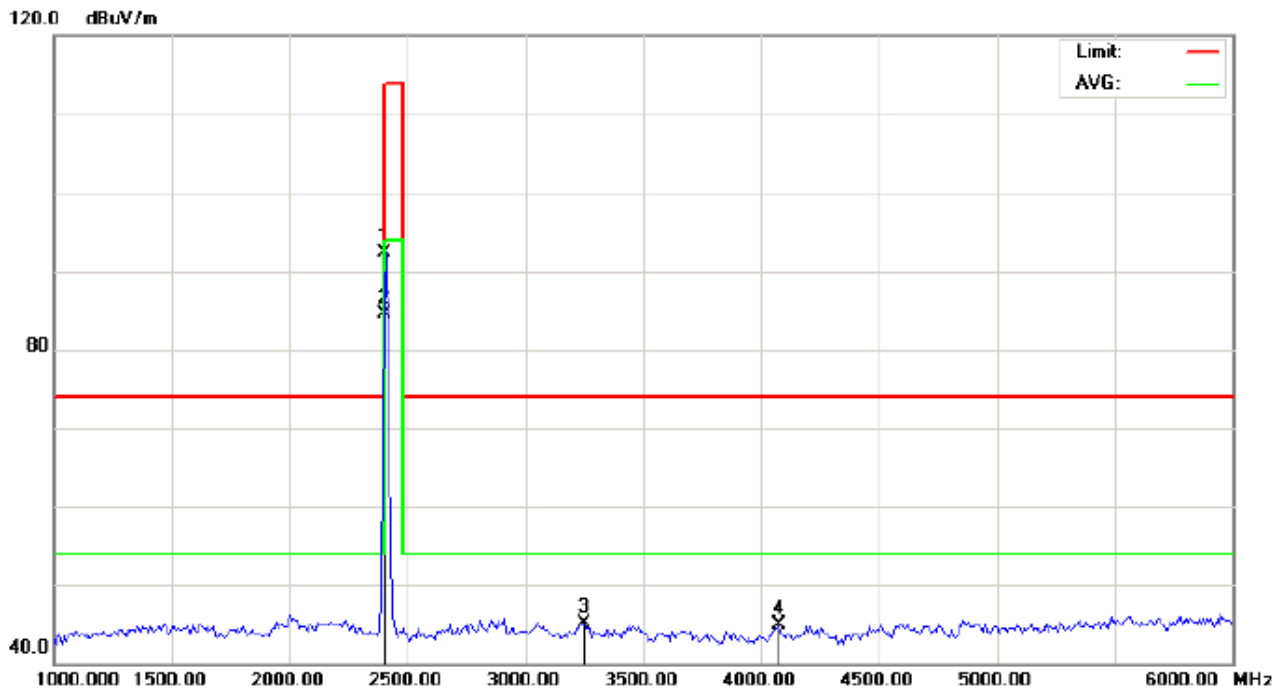
Mode: Low Channel TX

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	102.23	-9.68	92.55	114.00	-21.45	peak			
2	*	2402.000	93.44	-9.68	83.76	94.00	-10.24	AVG	100	312	
3		3650.000	51.86	-6.97	44.89	74.00	-29.11	peak			
4		4200.000	49.10	-4.13	44.97	74.00	-29.03	peak			

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: K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

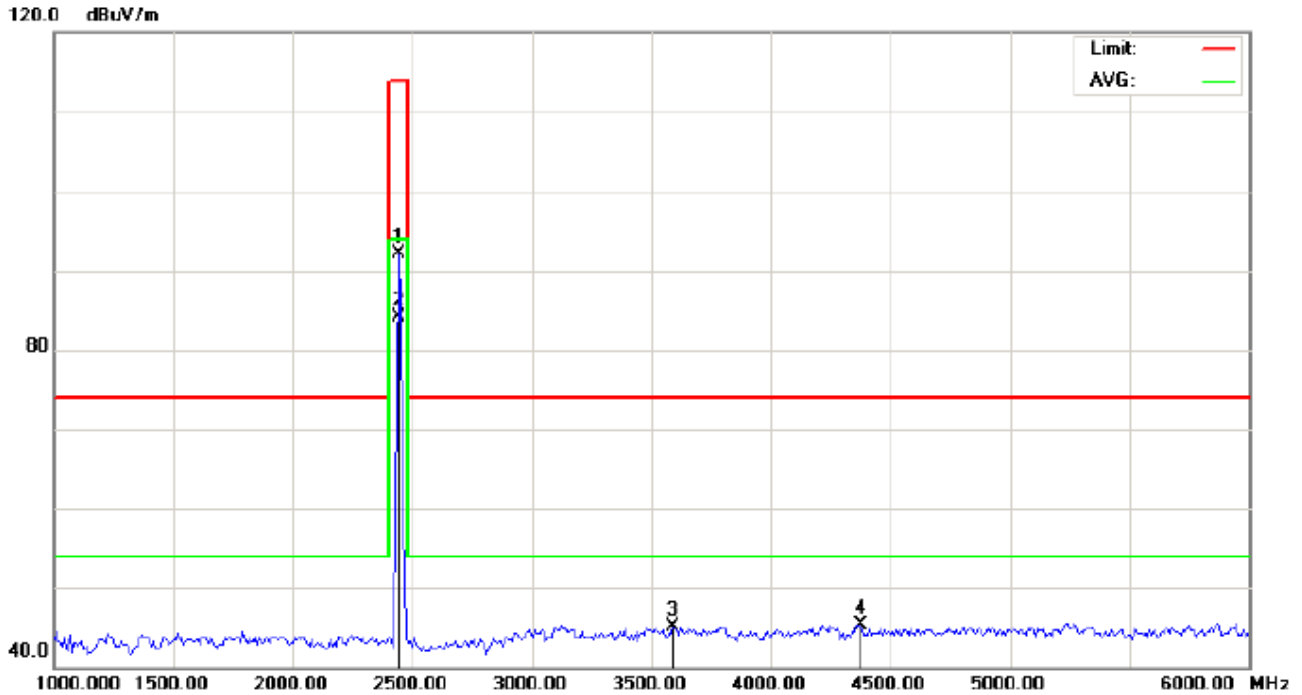
Mode: Low Channel TX

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	102.00	-9.68	92.32	114.00	-21.68	peak			
2	*	2402.000	94.15	-9.68	84.47	94.00	-9.53	AVG	100	125	
3		3250.000	53.20	-8.12	45.08	74.00	-28.92	peak			
4		4075.000	49.41	-4.55	44.86	74.00	-29.14	peak			

RESULT: PASS

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



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

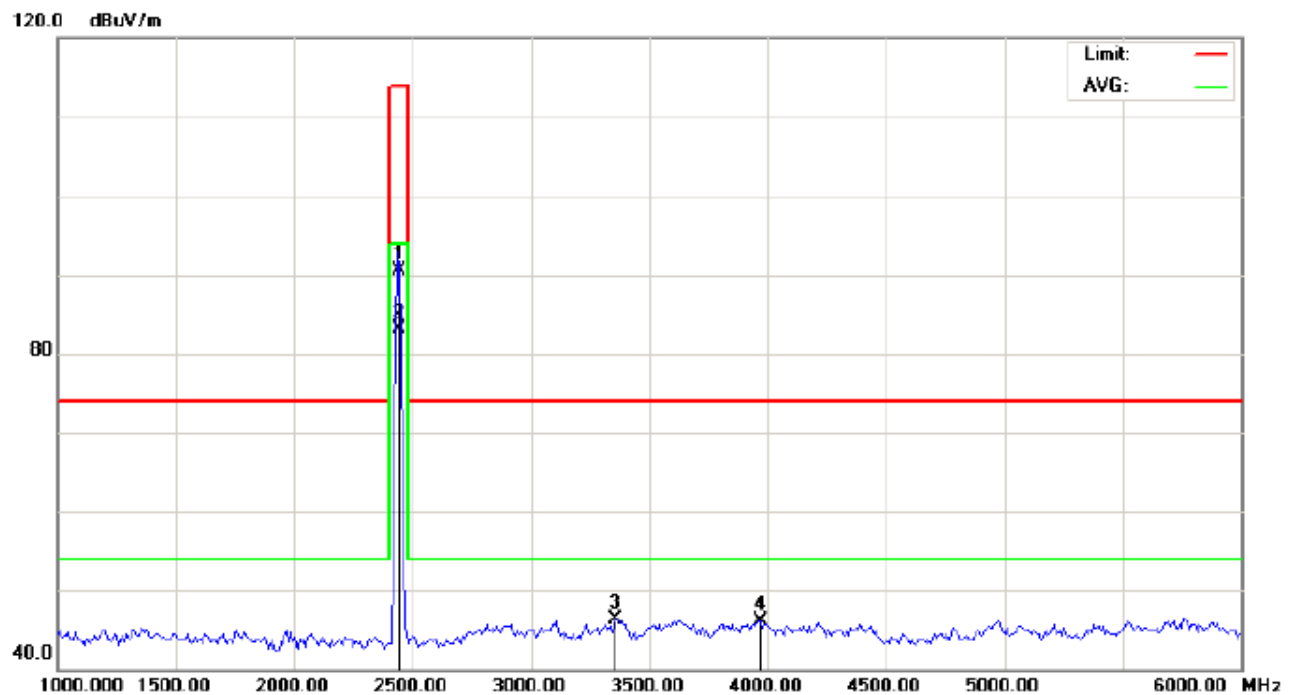
Mode: Middle Channel TX

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	101.79	-9.63	92.16	114.00	-21.84	peak			
2	*	2441.000	93.71	-9.63	84.08	94.00	-9.92	AVG	100	271	
3		3591.667	52.42	-7.33	45.09	74.00	-28.91	peak			
4		4375.000	48.93	-3.53	45.40	74.00	-28.60	peak			

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: K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

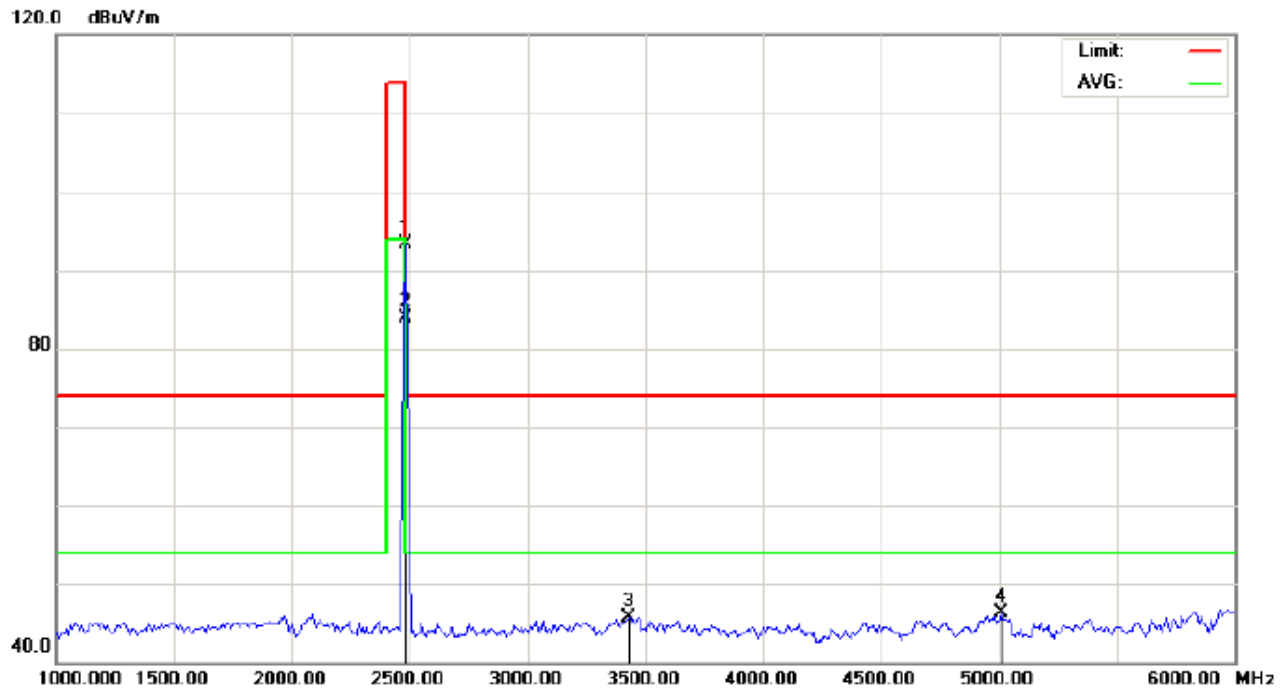
Mode: Middle Channel TX

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	100.23	-9.63	90.60	114.00	-23.40	peak			
2	*	2441.000	92.75	-9.63	83.12	94.00	-10.88	AVG	100	56	
3		3358.333	54.36	-8.02	46.34	74.00	-27.66	peak			
4		3966.667	51.04	-5.02	46.02	74.00	-27.98	peak			

RESULT: PASS

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



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT:K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

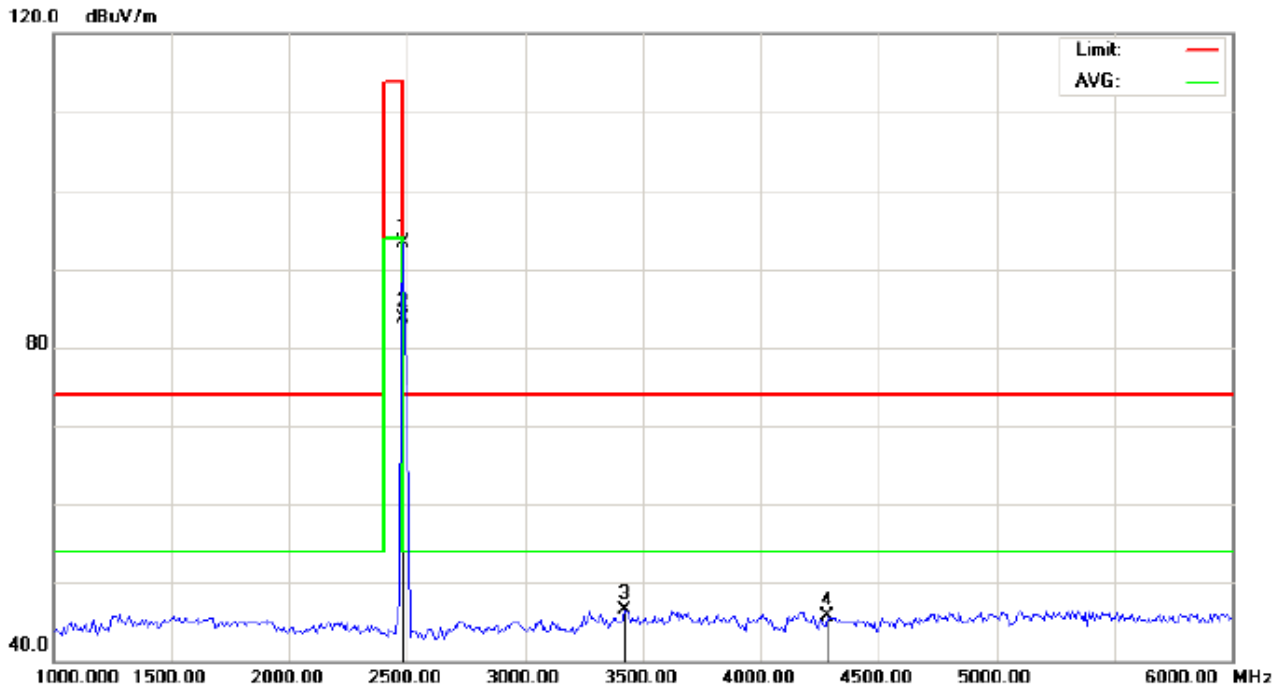
Mode: High Channel TX

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	102.87	-9.59	93.28	114.00	-20.72	peak			
2	*	2480.000	93.53	-9.59	83.94	94.00	-10.06	AVG	100	132	
3		3433.333	53.58	-7.95	45.63	74.00	-28.37	peak			
4		5008.333	48.14	-1.80	46.34	74.00	-27.66	peak			

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: K20 Multimedia Backlit Bluetooth Keyboard

Distance: 3m

M/N:K20

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	102.91	-9.59	93.32	114.00	-20.68	peak			
2	*	2480.000	93.38	-9.59	83.79	94.00	-10.21	AVG	100	31	
3		3425.000	54.50	-7.96	46.54	74.00	-27.46	peak			
4		4283.333	49.56	-3.85	45.71	74.00	-28.29	peak			

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(GFSK):

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	102.23	-9.68	92.55	114.00	-21.45	Horizontal
2402	102.00	-9.68	92.32	114.00	-21.68	Vertical
2441	101.79	-9.63	92.16	114.00	-21.84	Horizontal
2441	100.23	-9.63	90.60	114.00	-23.40	Vertical
2480	102.87	-9.59	93.28	114.00	-20.72	Horizontal
2480	102.91	-9.59	93.32	114.00	-20.68	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	93.44	-9.68	83.76	94.00	-10.24	Horizontal
2402	94.15	-9.68	84.47	94.00	-9.53	Vertical
2441	93.71	-9.63	84.08	94.00	-9.92	Horizontal
2441	92.75	-9.63	83.12	94.00	-10.88	Vertical
2480	102.87	-9.59	83.94	94.00	-0.72	Horizontal
2480	93.38	-9.59	83.79	94.00	-10.21	Vertical

10. BAND EDGE EMISSION

10.1. 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.

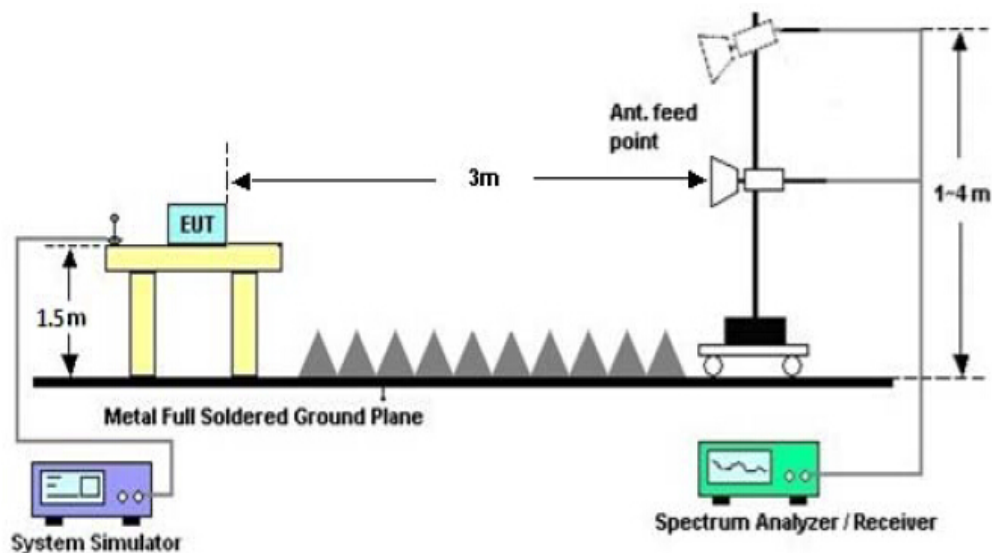
2Max hold the trace of the setp 1,and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

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

(b) AVERAGE: RBW=1.5MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

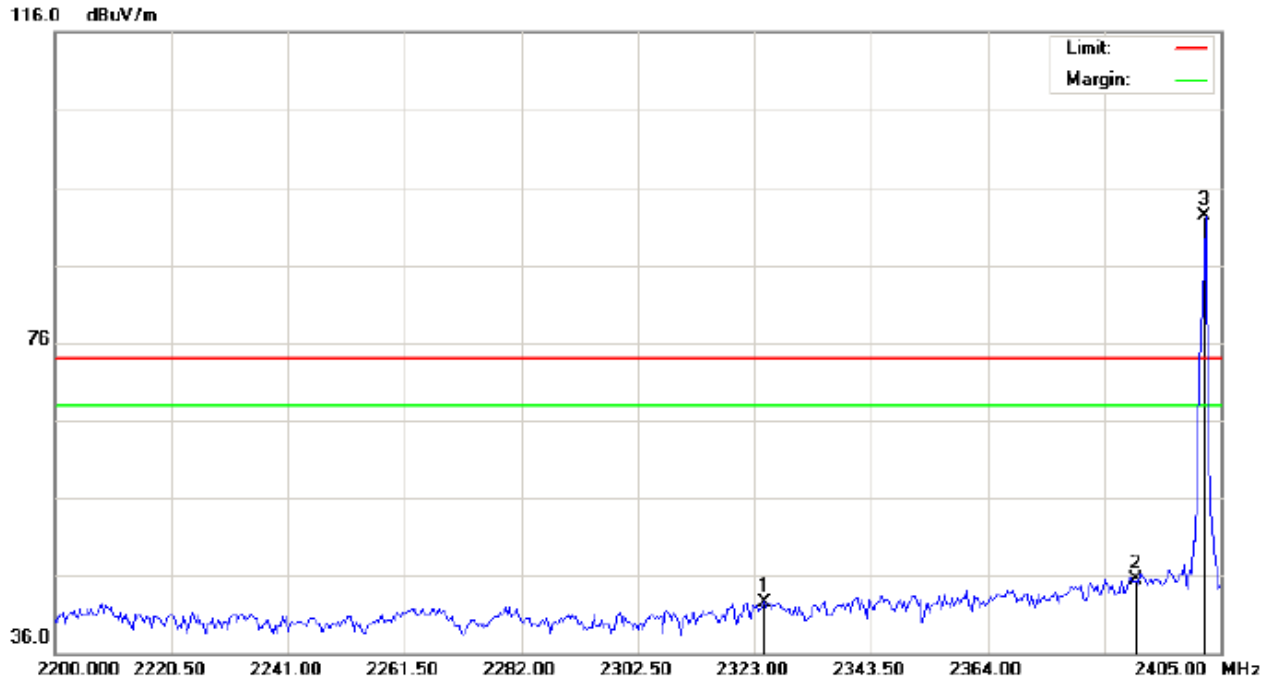
10.2 TEST SETUP

RADIATED EMISSION TEST SETUP



10.3 RADIATED TEST RESULT

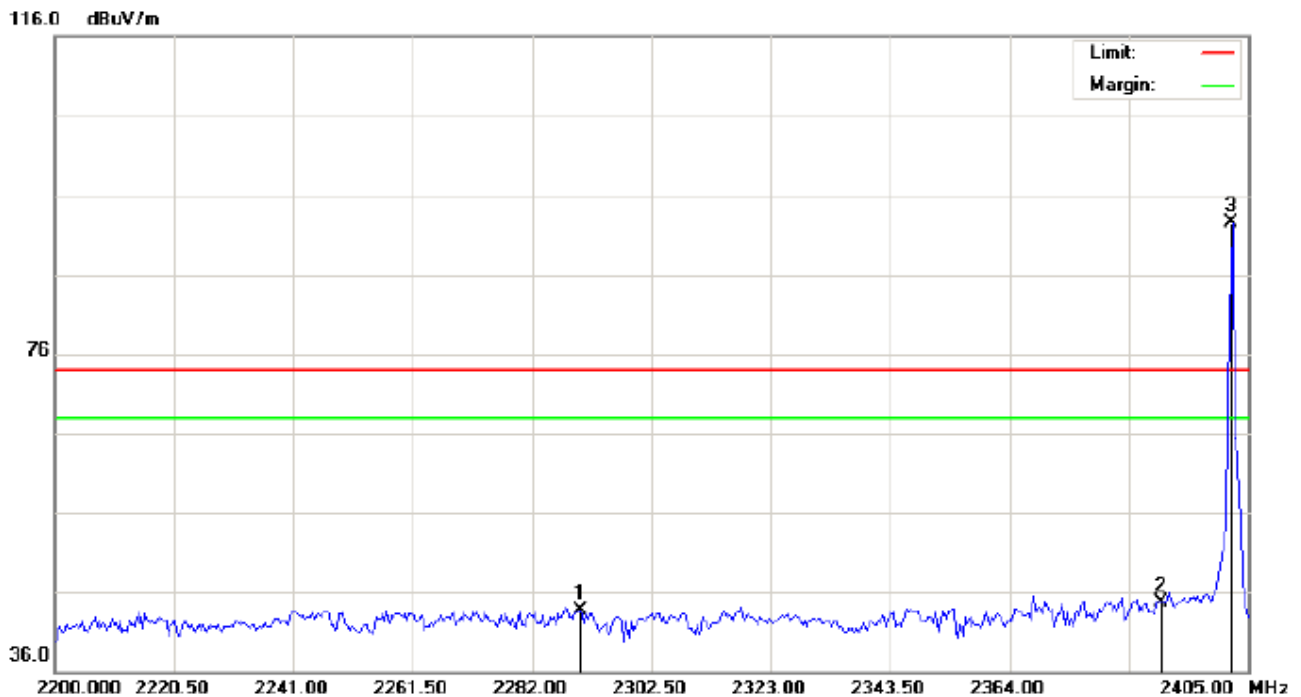
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: K20 Multimedia Backlit Bluetooth Keyboard Distance:
M/N:K20
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		2324.708	32.36	10.24	42.60	74.00	-31.40	peak			
2		2390.000	35.12	10.31	45.43	74.00	-28.57	peak			
3	*	2402.000	81.91	10.32	92.23	74.00	18.23	peak			

TEST PLOT OF BAND EDGE FOR LOW CHANNEL –Vertical



Site: site #1

Polarization: *Vertical*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

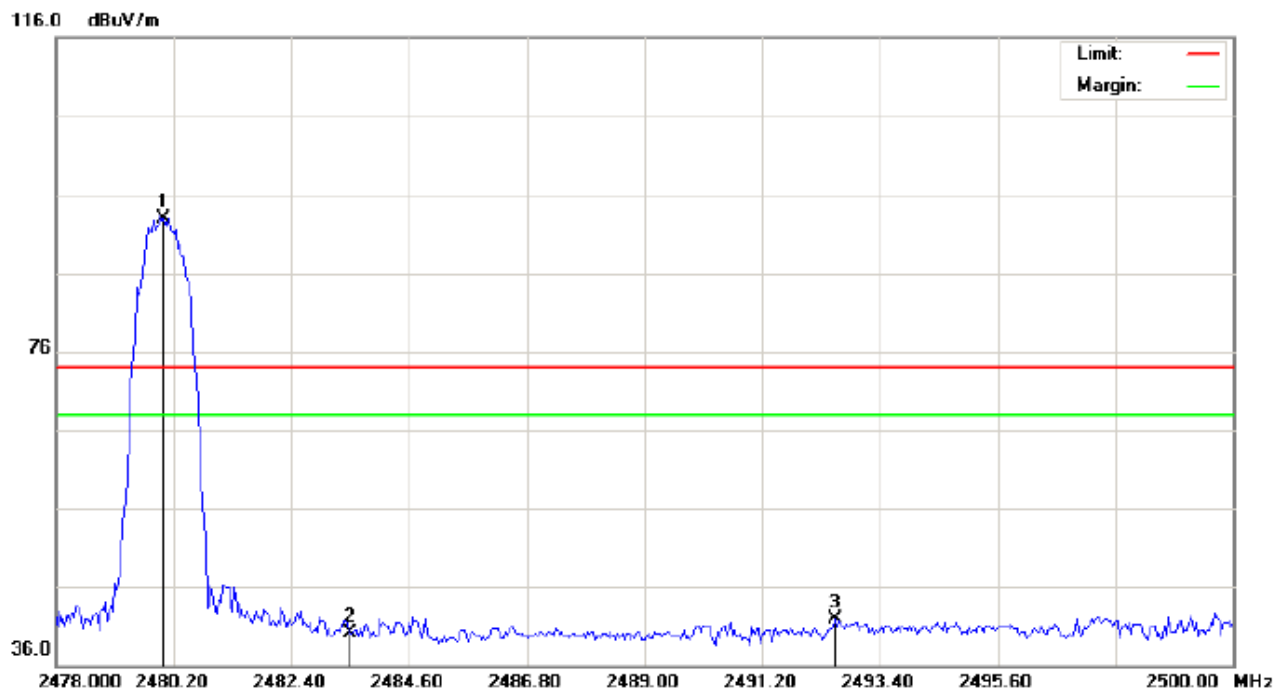
M/N:K20

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		2290.200	33.47	10.20	43.67	74.00	-30.33	peak			
2		2390.000	34.35	10.31	44.66	74.00	-29.34	peak			
3	*	2402.000	82.26	10.32	92.58	74.00	18.58	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

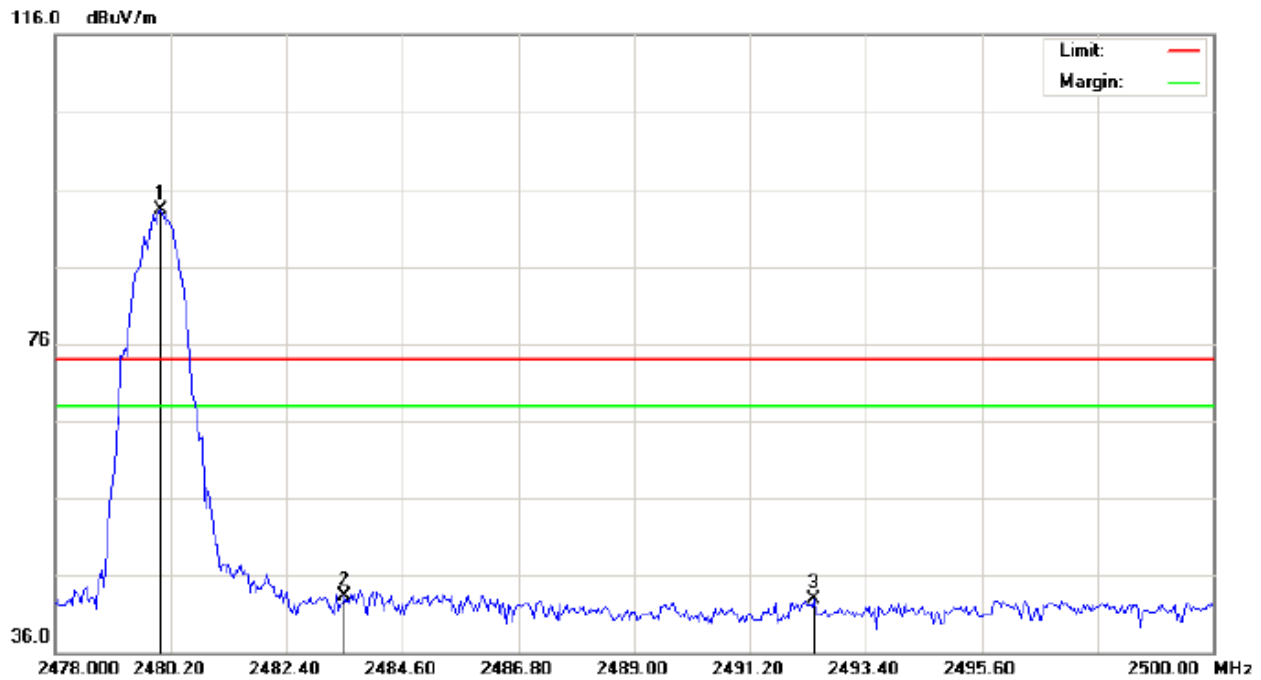
M/N:K20

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	82.46	10.41	92.87	74.00	18.87	peak			
2		2483.500	29.75	10.41	40.16	74.00	-33.84	peak			
3		2492.557	31.55	10.42	41.97	74.00	-32.03	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: K20 Multimedia Backlit Bluetooth Keyboard

Distance:

M/N:K20

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	82.85	10.41	93.26	74.00	19.26	peak			
2		2483.500	32.87	10.41	43.28	74.00	-30.72	peak			
3		2492.410	32.41	10.42	42.83	74.00	-31.17	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.

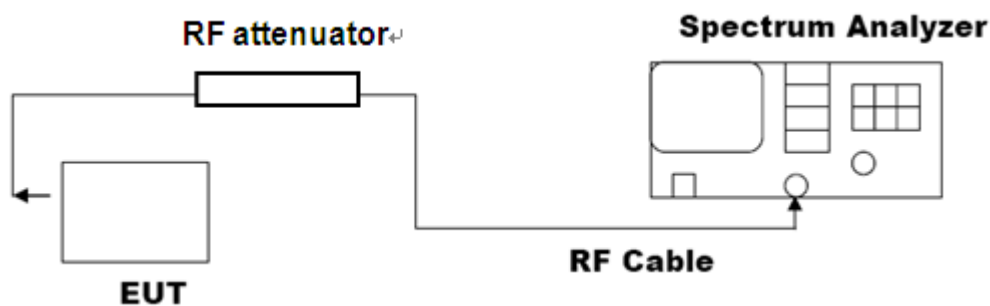
11. 20DB BANDWIDTH

11.1. 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 hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

11.2. TEST SET-UP

(BLOCK DIAGRAM OF CONFIGURATION)

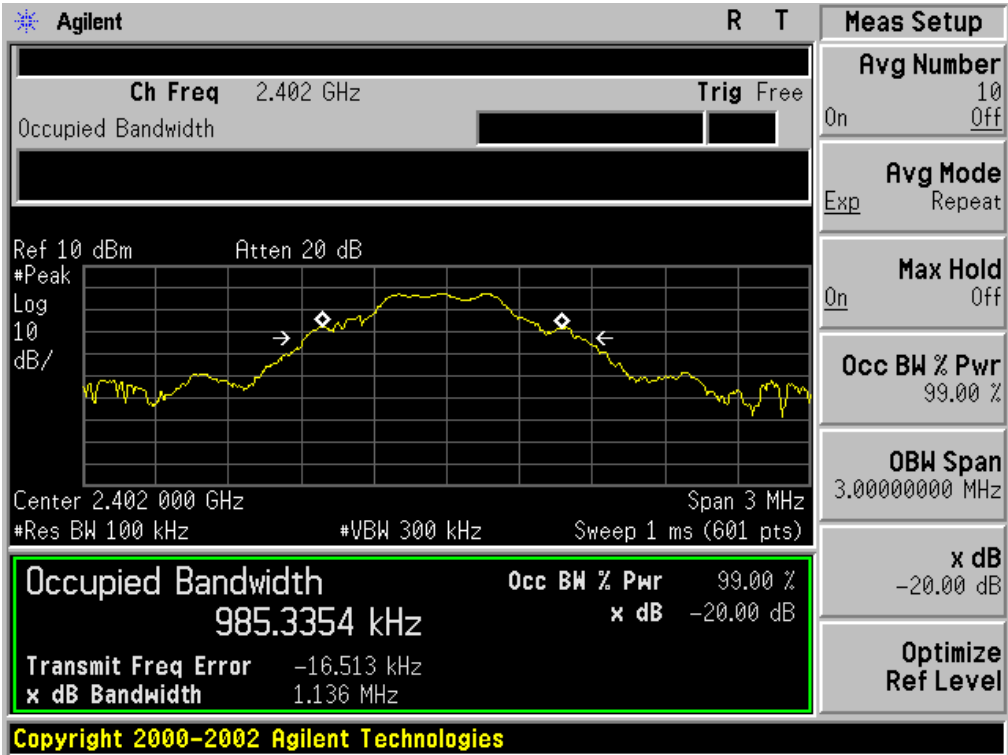


Note: The EUT has been used temporary antenna connector for testing.

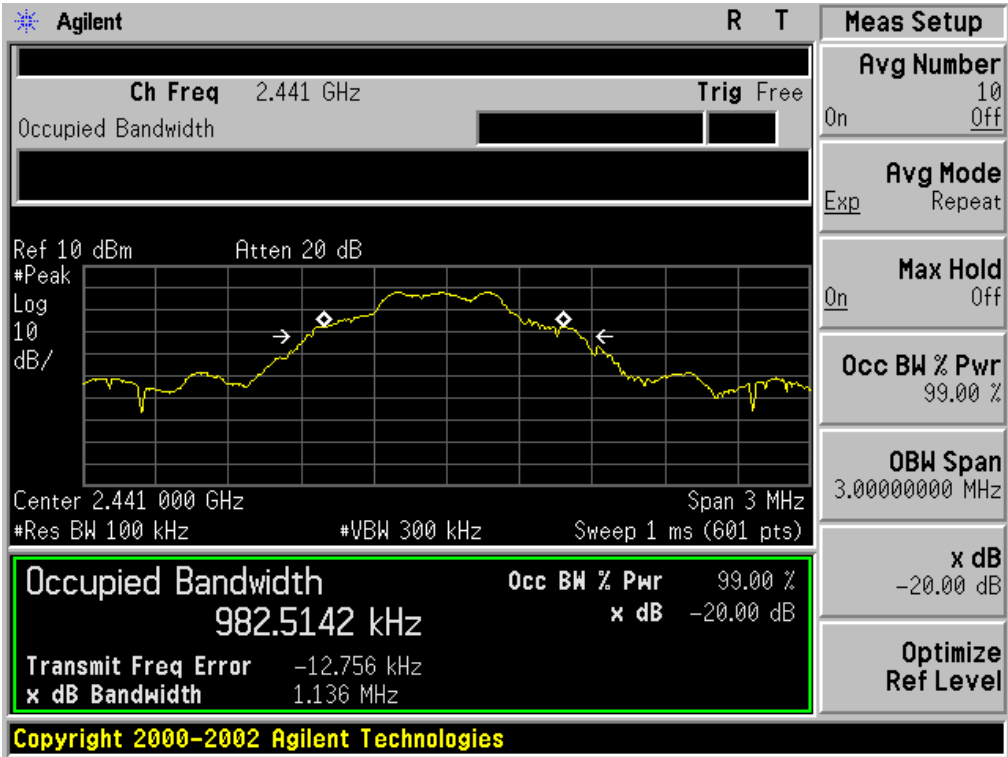
11.3. LIMITS AND MEASUREMENT RESULTS

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

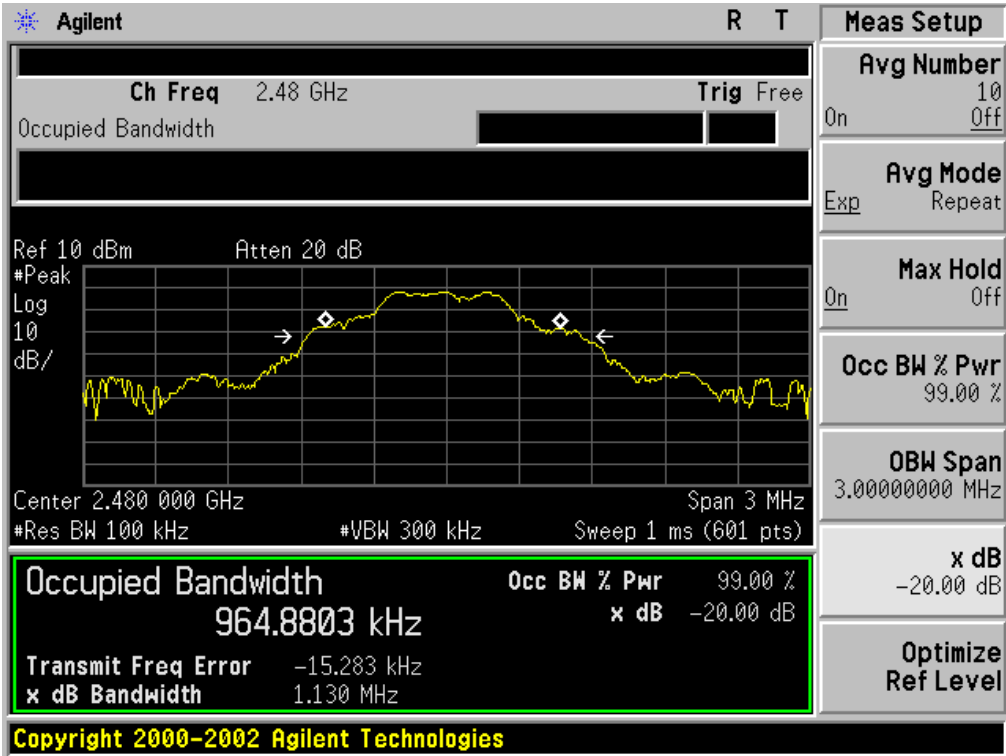
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



12. FCC LINE CONDUCTED EMISSION TEST

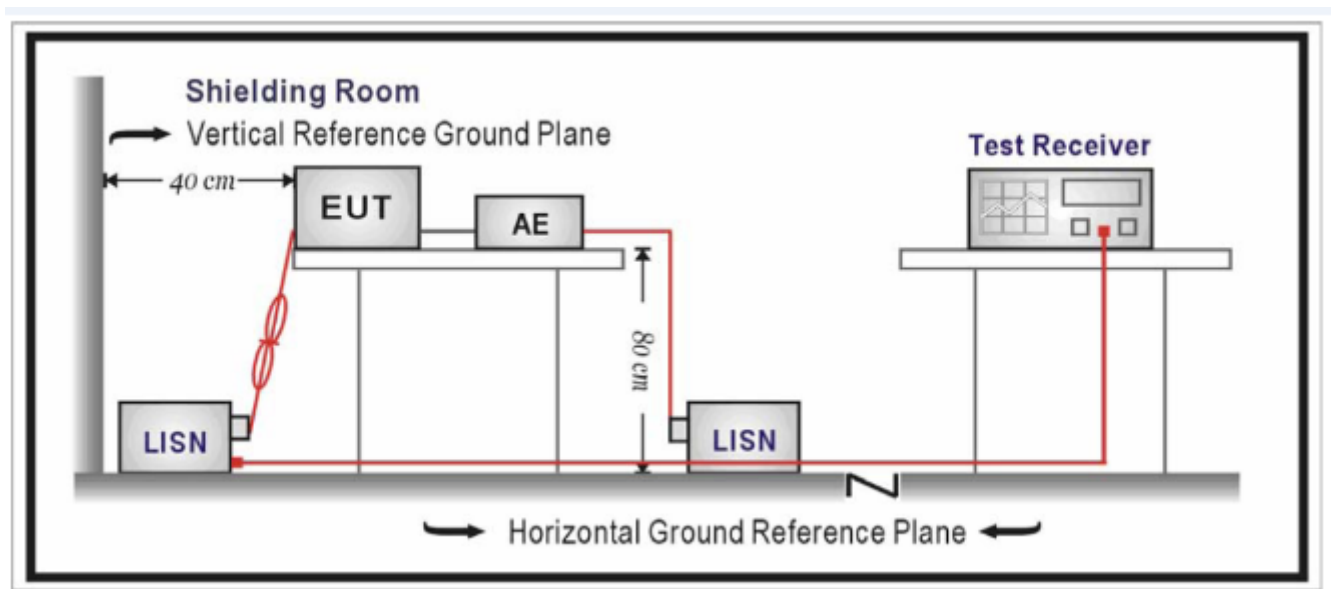
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



12.3. 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 (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 C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC or Adapter
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.

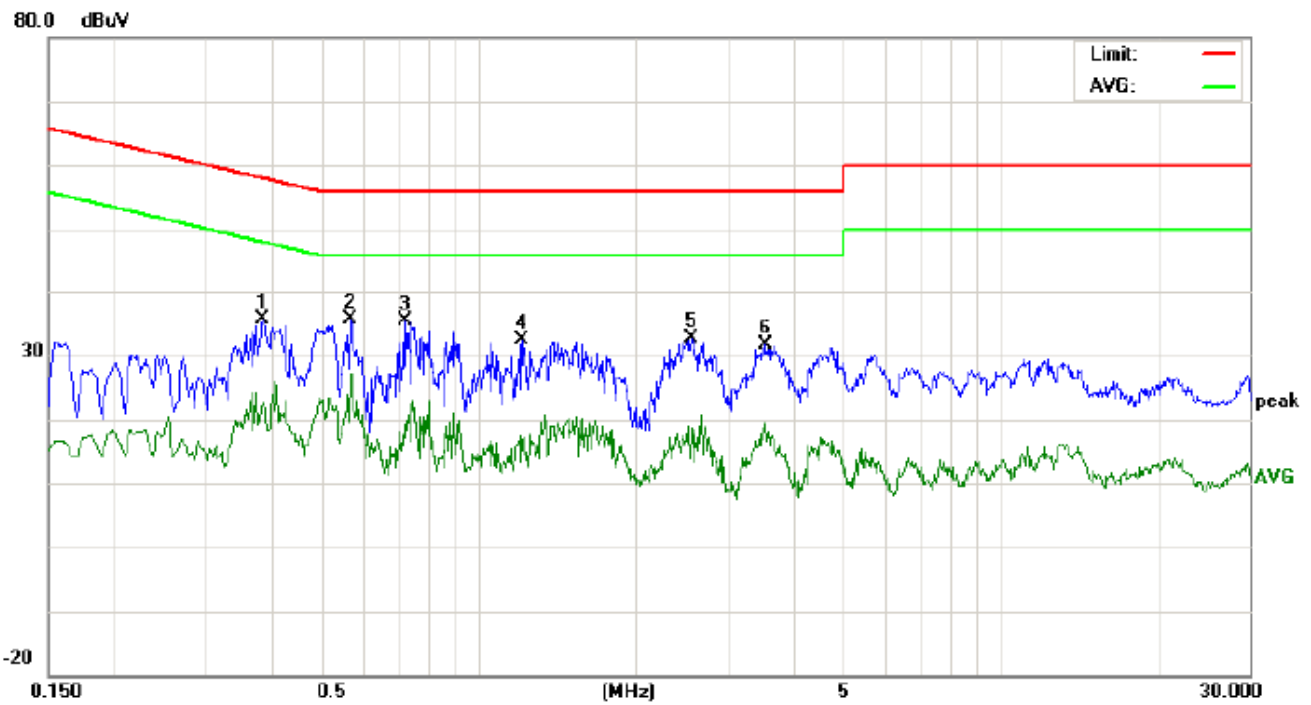
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. 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.

12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Note: The below data was tested by adapter (worst case)



Site: Conduction

Phase: **L1**

Temperature: 22.5

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 54.5 %

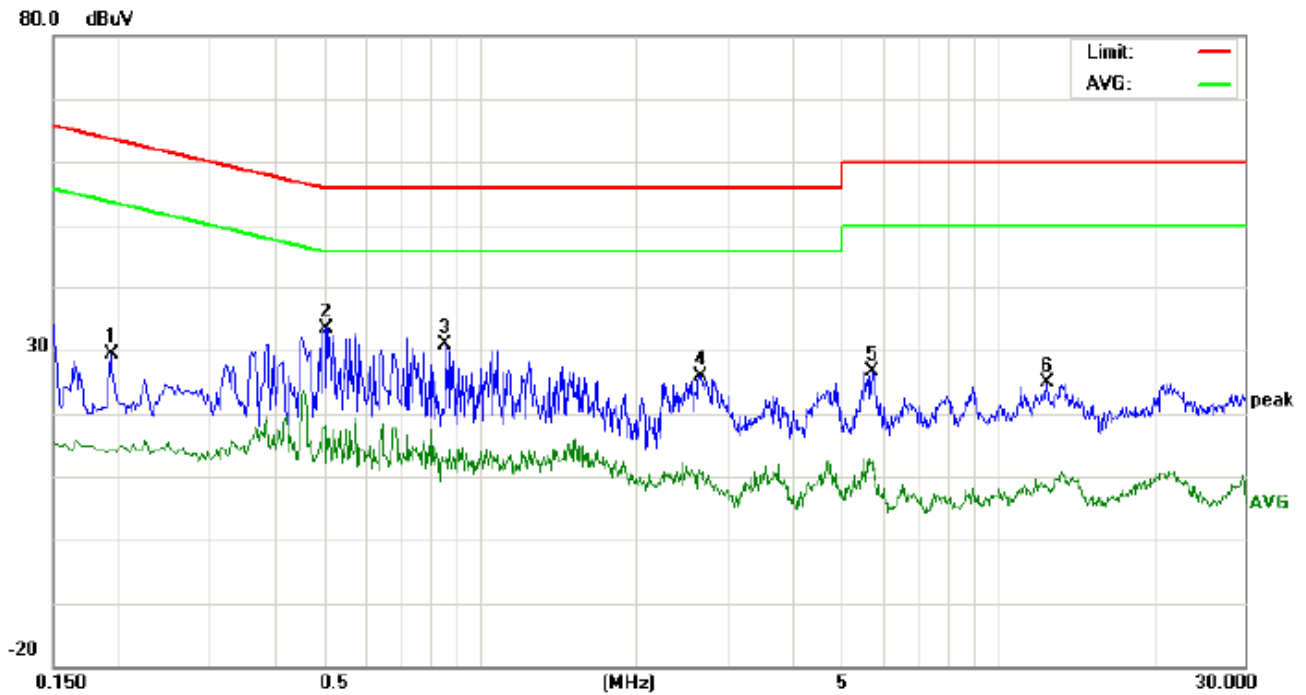
EUT: K20 Multimedia Backlit Bluetooth Keyboard

M/N:K20

Mode:BT Link with charging

Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.3860	25.36		12.26	10.32	35.68		22.58	58.15	48.15	-22.47	-25.57	P	
2	0.5699	25.33		16.73	10.34	35.67		27.07	56.00	46.00	-20.33	-18.93	P	
3	0.7219	25.11		8.78	10.33	35.44		19.11	56.00	46.00	-20.56	-26.89	P	
4	1.2099	22.11		6.26	10.37	32.48		16.63	56.00	46.00	-23.52	-29.37	P	
5	2.5539	22.08		8.11	10.44	32.52		18.55	56.00	46.00	-23.48	-27.45	P	
6	3.5419	21.10		8.93	10.50	31.60		19.43	56.00	46.00	-24.40	-26.57	P	



Site: Conduction Phase: **N** Temperature: 22.5
Limit: FCC Class B Conduction(QP) Power: Humidity: 54.5 %
EUT: K20 Multimedia Backlit Bluetooth Keyboard
M/N:K20
Mode:BT Link with charging
Note:

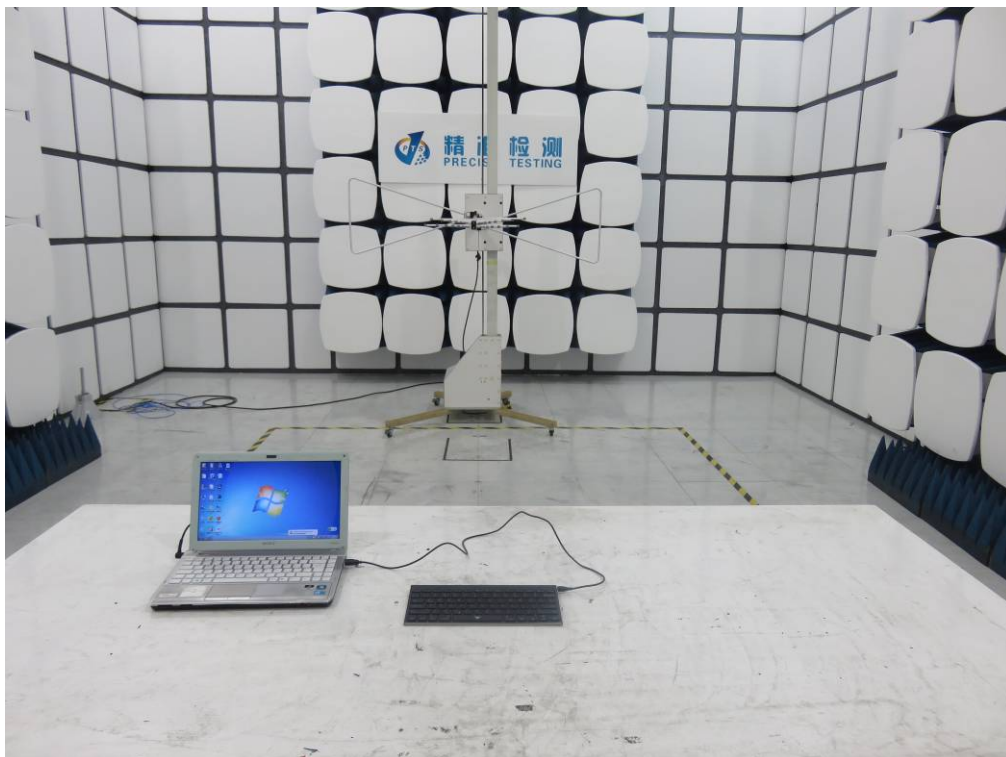
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1940	19.05		3.86	10.21	29.26		14.07	63.86	53.86	-34.60	-39.79	P	
2	0.5020	22.97		7.64	10.40	33.37		18.04	56.00	46.00	-22.63	-27.96	P	
3	0.8579	20.52		2.82	10.36	30.88		13.18	56.00	46.00	-25.12	-32.82	P	
4	2.6659	15.32		0.02	10.47	25.79		10.49	56.00	46.00	-30.21	-35.51	P	
5	5.7378	16.41		1.99	10.26	26.67		12.25	60.00	50.00	-33.33	-37.75	P	
6	12.4539	14.84		-1.86	10.14	24.98		8.28	60.00	50.00	-35.02	-41.72	P	

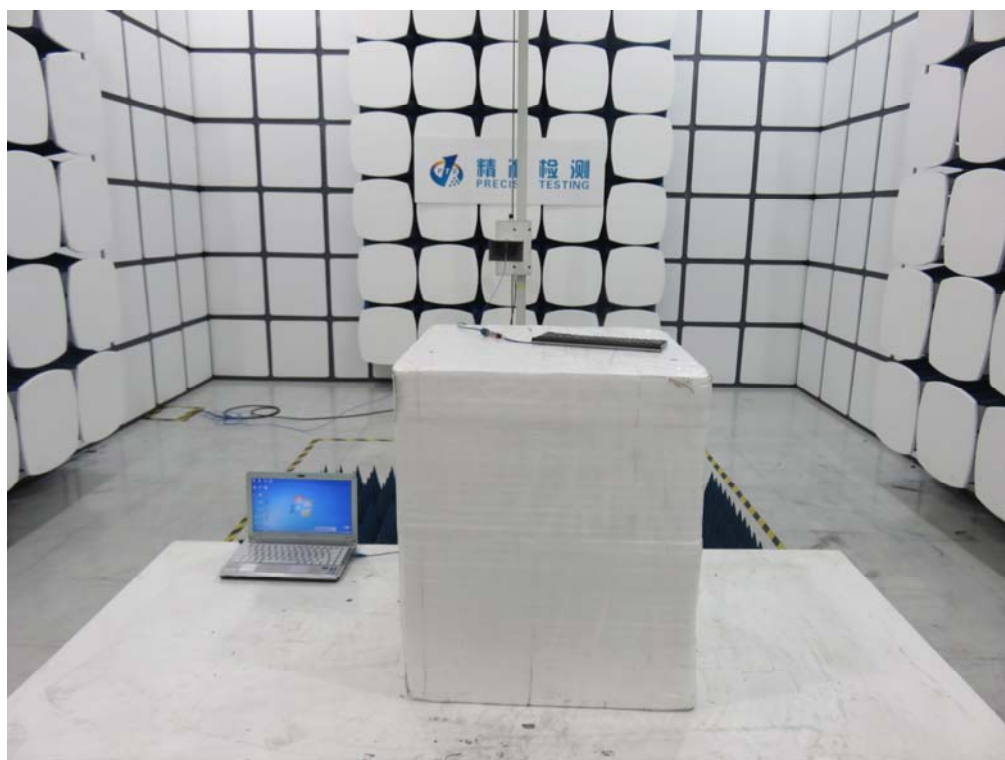
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION 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



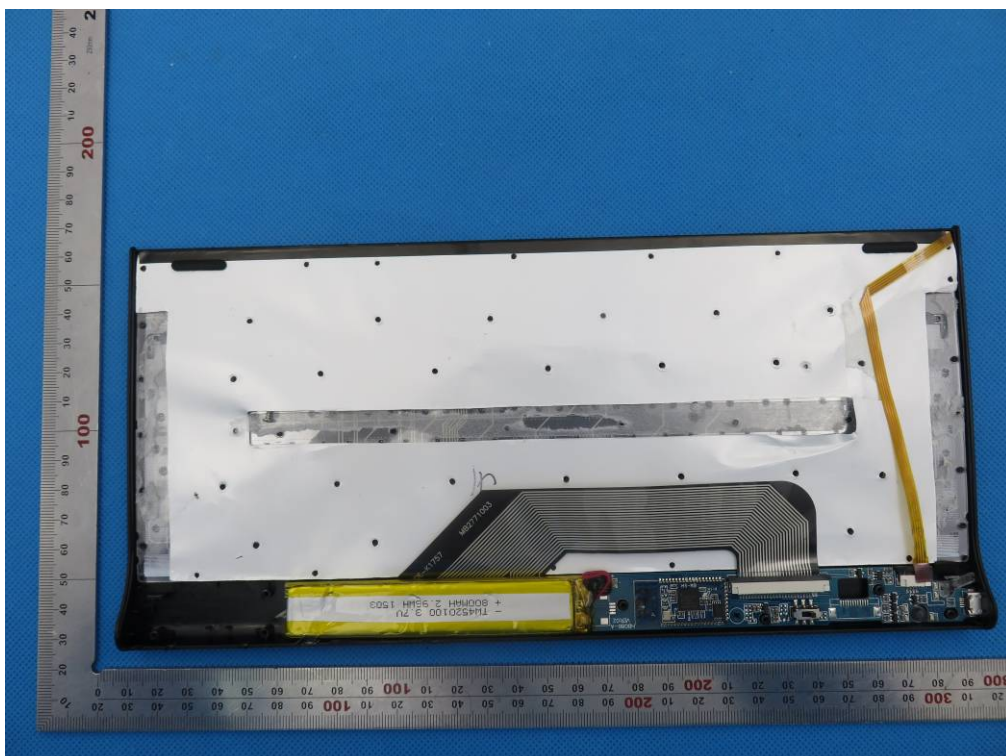
RIGHT VIEW OF EUT



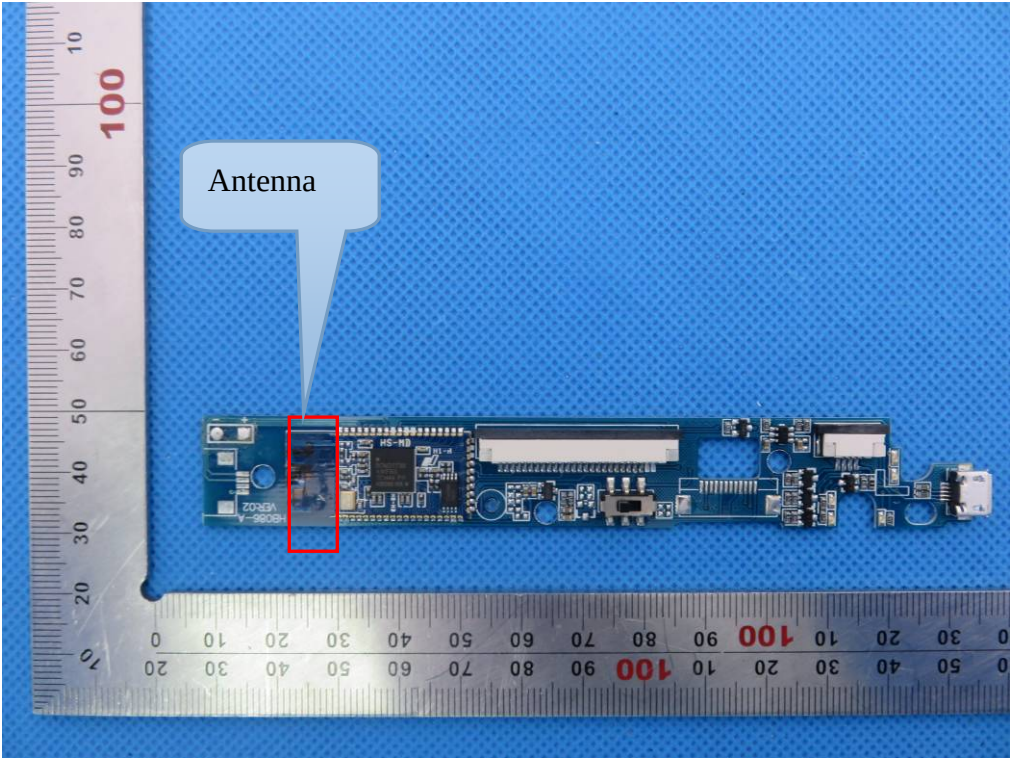
VIEW OF EUT (PORT)



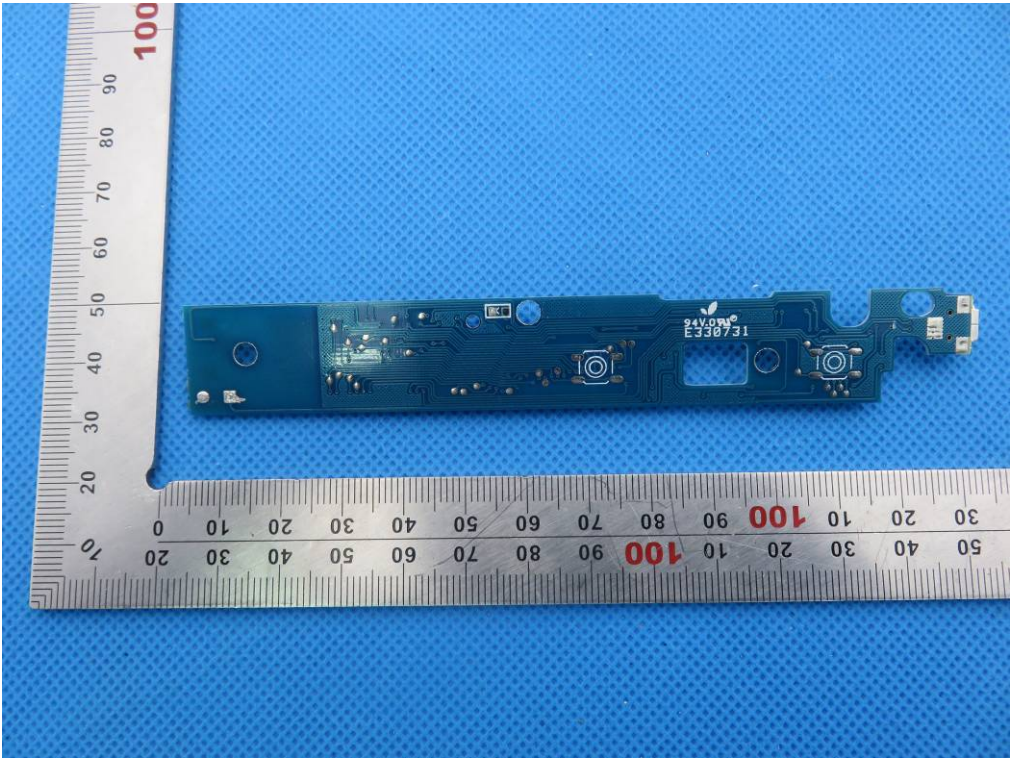
OPEN VIEW OF EUT



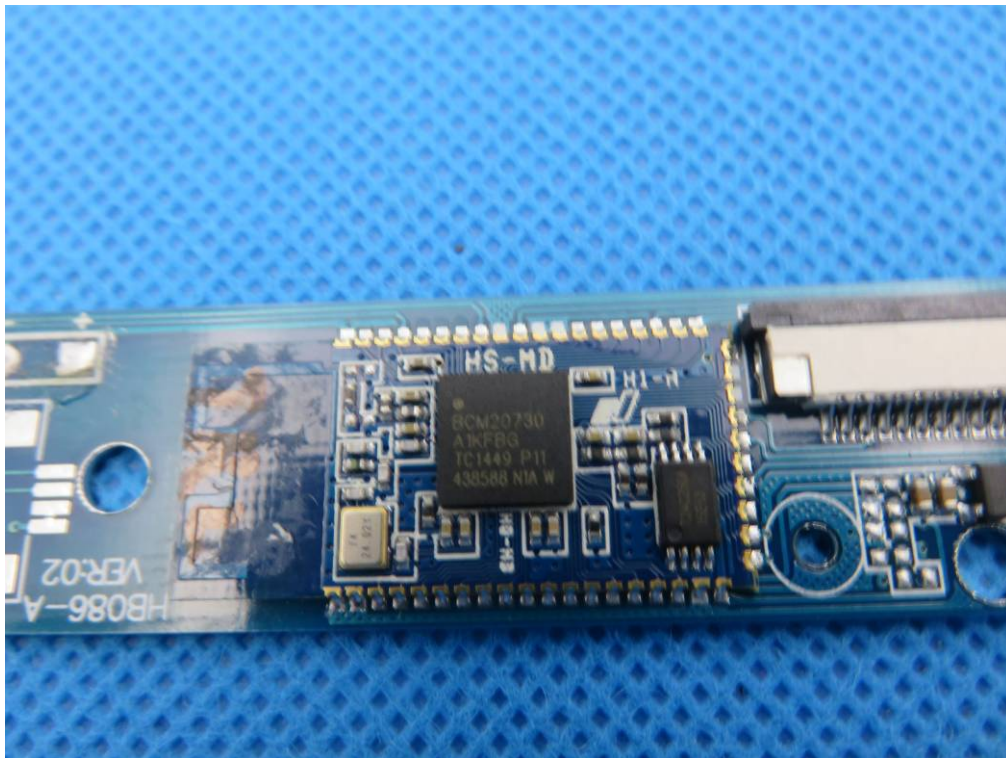
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----