FCC TEST REPORT

Report No: STS1503033F02

Issued for

Dongguan Haojianxuan Electronic Technology Co., Ltd.

4F, B Building, Jinxiongda Technical Industrial Park, Dalingshan, Dongguan, Guangdong, China.

Product Name:	Bluetooth keyboard
Brand Name:	N/A
Model No.:	HG190-1
FCC ID:	2AD35HG190-1
Test Standard:	FCC Part 15.247

Shenzhen STS Test Services Co., Ltd.
1/F, Building B, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China
TEL: +86-755 3688 6288FAX: +86-755 3688 6277E-mail:sts@stsapp.com

TEST RESULT CERTIFICATION

Applicant's name	Dongguan Haojianxuan Electronic Technology Co., Ltd.
Address	4F, B Building, Jinxiongda Technical Industrial Park, Dalingshan, Dongguan, Guangdong, China.
Manufacture's Name	Dongguan Haojianxuan Electronic Technology Co., Ltd.
Address	4F, B Building, Jinxiongda Technical Industrial Park, Dalingshan, Dongguan, Guangdong, China.

Product description

Product name	Bluetooth keyboard
Band name	N/A
Model and/or type reference	HG190-1
Ratings	DC 3.7V by Battery
Standards	FCC Part15.247
Test procedure	ANSI C63.4-2009

This device described above has been tested by STS, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document.

Date of Test	
Date (s) of performance of tests	Jan.12,2015 to Jan.13,2015
Date of Issue	Jan.14,2015
Test Result	**Pass**

Testing Engineer : (Tony Liu)

Technical Manager : (Vita Li)

Authorized Signatory : (Bovey Yang)

Table of Contents Page

Table of Contents Page

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(d)	Conducted Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

1.1 TEST FACILITY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China.

FCC Registration No.: 842334; IC Registration No.: 12108A-1

1.2 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	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.71dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth keyboard
Trade Name	N/A
Model Name	HG190-1
Channel List	Please refer to the Note 2.
Bluetooth	Frequency:2402 – 2480 MHz GFSK(1Mbps)
Battery	Rated Voltage: 3.7V Charge Limit: 4.2V
Hardware version number	N/A
Software versioningnumber	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	PCB Antenna	NA	0	BT Antenna

The EUT antenna is PCB Antenna. no antenna other than that furnished by the responsible party shall be used with the device.

2.1 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Low channel TX
Mode 2	Middle channel TX
Mode 3	High channel TX
Mode 4	Hopping on

For Conducted Emission	
Final Test Mode	Description
Mode 4	keeping TX

For Radiated Emission	
Final Test Mode	Description
Mode 1	Low channel TX
Mode 2	Middle channel TX
Mode 3	High channel TX
Mode 4	Hopping on

Note:

(1)The measurements are performed at the highest, middle, lowest available channels.

2.2 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

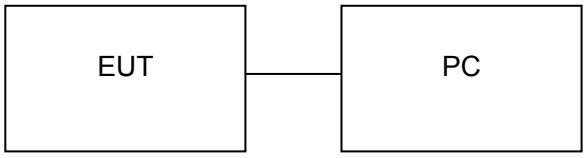
Test software Version	Test program: N/A		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF

2.3BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

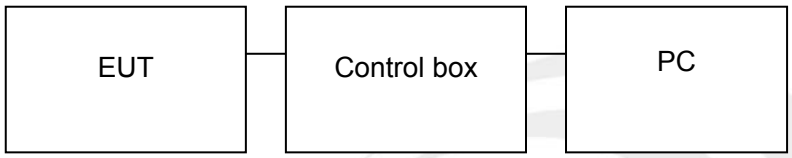
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Radiated Spurious EmissionTest

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



Conducted Emission Test

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	Bluetooth keyboard	N/A	HG190-1	N/A	EUT
2	Battery	N/A	N/A	N/A	Accessory
3	PC	Dell	INSPIRON	N/A	FCC DOC approval
4	Control box	N/A	N/A	N/A	A.E

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.
(4) N/A means not applicable.

2.5EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.06	2015.06.06
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07
Power Meter	Anritsu	ML2495A	1204003	2014.10.25	2015.10.24
Power Sensor	Anritsu	MA2411B	100309	2014.10.25	2015.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	102086	102086	2014.10.25	2015.10.24
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24
50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.06	2015.06.06
Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.06	2015.06.06
Absorbing clamp	R&S	MDS-21	100668	2014.10.27	2015.10.26

3.EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15.247&207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

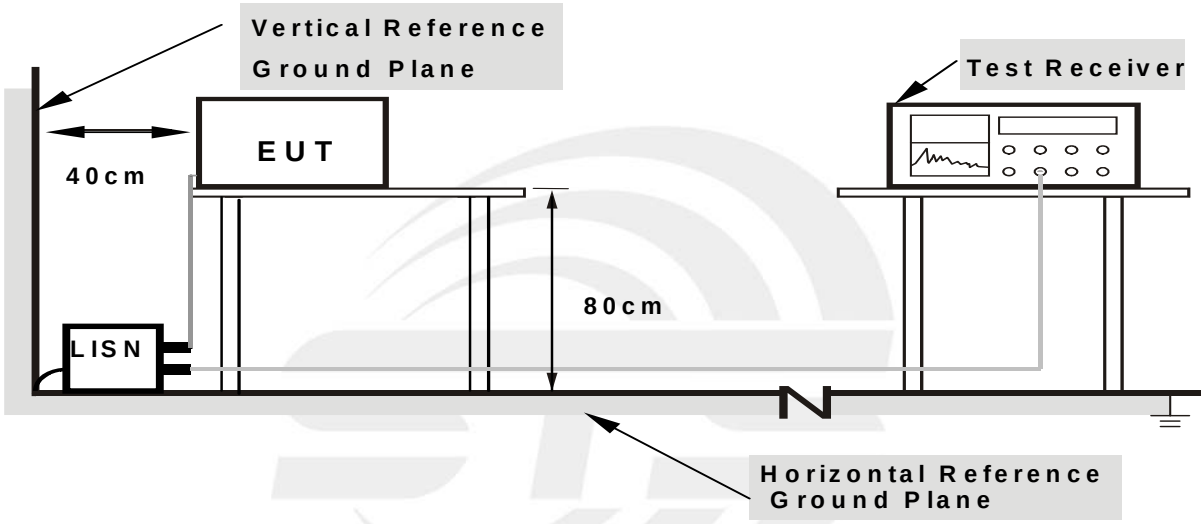
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



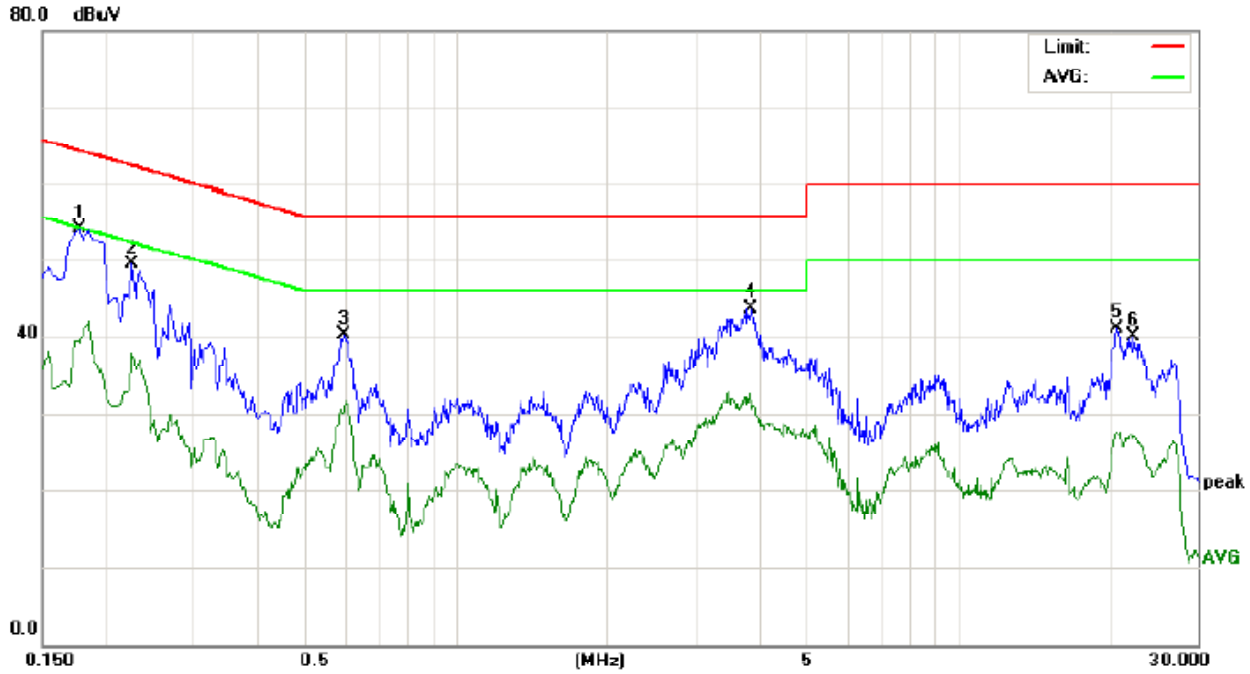
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5TEST RESULTS

EUT：	Bluetooth keyboard	Model Name. ：	HG190-1
Temperature：	23℃	Relative Humidity：	50%
Pressure：	1010hPa	Phase：	L
Test Voltage：	DC3.7V	Test Mode：	keeping TX



Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: keeping TX
Note:

Phase: L1
Power:

Temperature: 26
Humidity: 60 %

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	0.1780	44.19		29.17	10.19	54.38		39.36	64.57	54.57	-10.19	-15.21	P	
2	0.2260	39.20		27.72	10.24	49.44		37.96	62.59	52.59	-13.15	-14.63	P	
3	0.5980	30.01		20.49	10.31	40.32		30.80	56.00	46.00	-15.68	-15.20	P	
4	3.8620	33.18		21.25	10.45	43.63		31.70	56.00	46.00	-12.37	-14.30	P	
5	20.7300	30.95		17.54	10.12	41.07		27.66	60.00	50.00	-18.93	-22.34	P	
6	22.5220	29.94		16.89	10.11	40.05		27.00	60.00	50.00	-19.95	-23.00	P	

EUT：	Bluetooth keyboard	Model Name. ：	HG190-1
Temperature：	23 ℃	Relative Humidity：	50%
Pressure：	1010hPa	Phase：	N
Test Voltage：	DC3.7V	Test Mode：	keeping TX

Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: keeping TX
Note:

Phase: N
Power:

Temperature: 26
Humidity: 60 %

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	0.1860	44.46		31.39	10.20	54.66		41.59	64.21	54.21	-9.55	-12.62	P	
2	0.1980	43.49		23.11	10.21	53.70		33.32	63.69	53.69	-9.99	-20.37	P	
3	0.6020	30.07		21.55	10.31	40.38		31.86	56.00	46.00	-15.62	-14.14	P	
4	3.7140	33.60		20.91	10.48	44.08		31.39	56.00	46.00	-11.92	-14.61	P	
5	20.9540	28.46		16.99	10.13	38.59		27.12	60.00	50.00	-21.41	-22.88	P	
6	27.1060	27.71		17.10	10.12	37.83		27.22	60.00	50.00	-22.17	-22.78	P	

3.2 RADIATED EMISSION MEASUREMENT

3.2.1RADIATED EMISSION LIMITS

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15247&205(a), then the Part 15 247&209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (30MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic(Peak/AV)
RB / VB (emission in restricted band)	RBW 1MHz / VBW 1MHz Peak detector for Pk value RBW 1MHz / VBW 10Hz Peak detector for AV value

Receiver Parameter	**Setting**
Attenuation	Auto
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

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

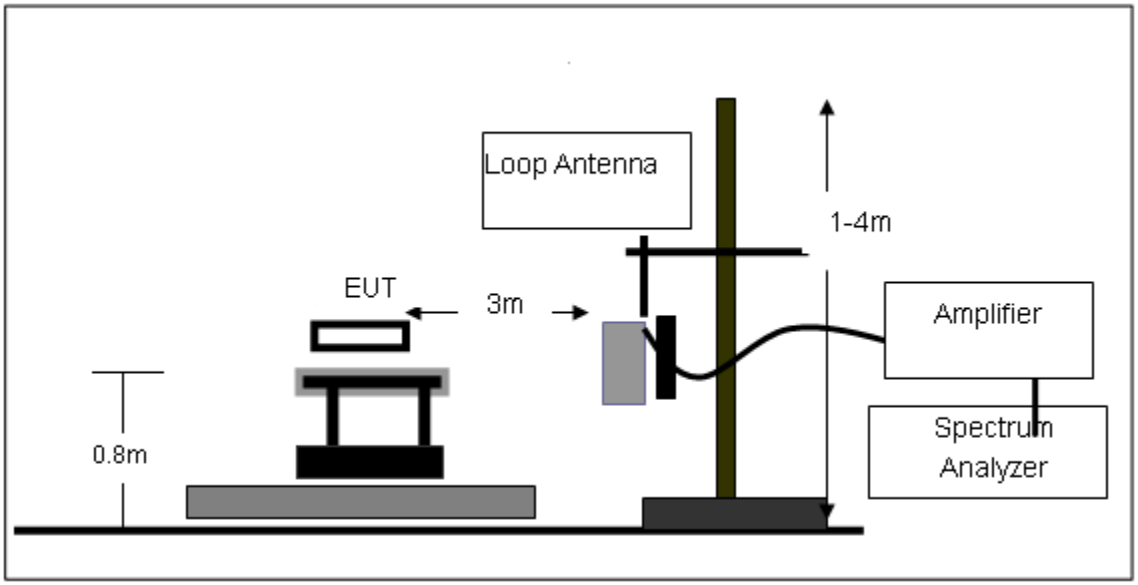
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

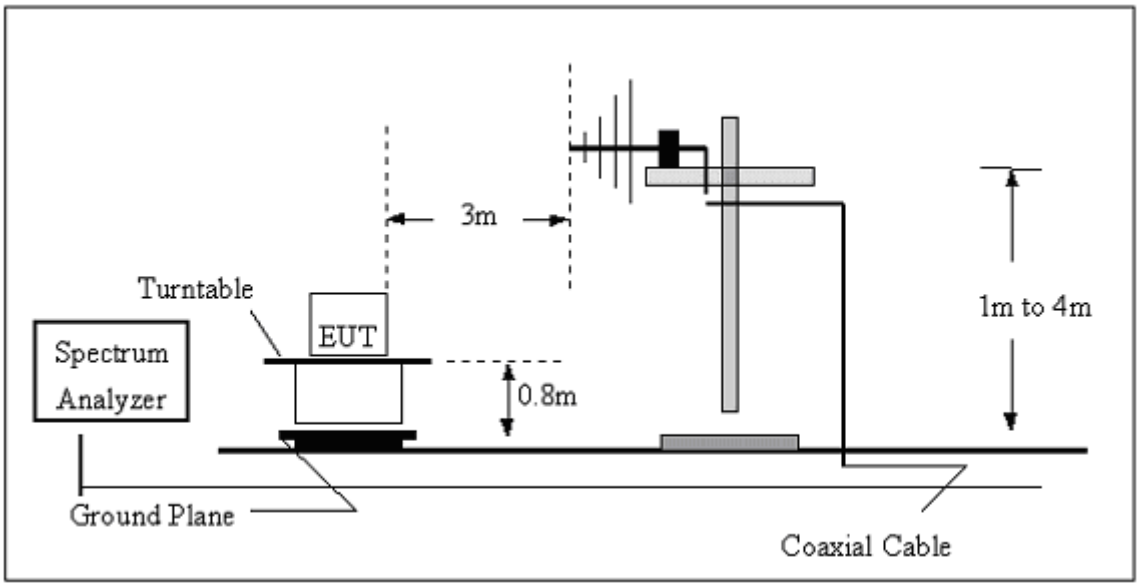
No deviation

3.2.4 TESTSETUP

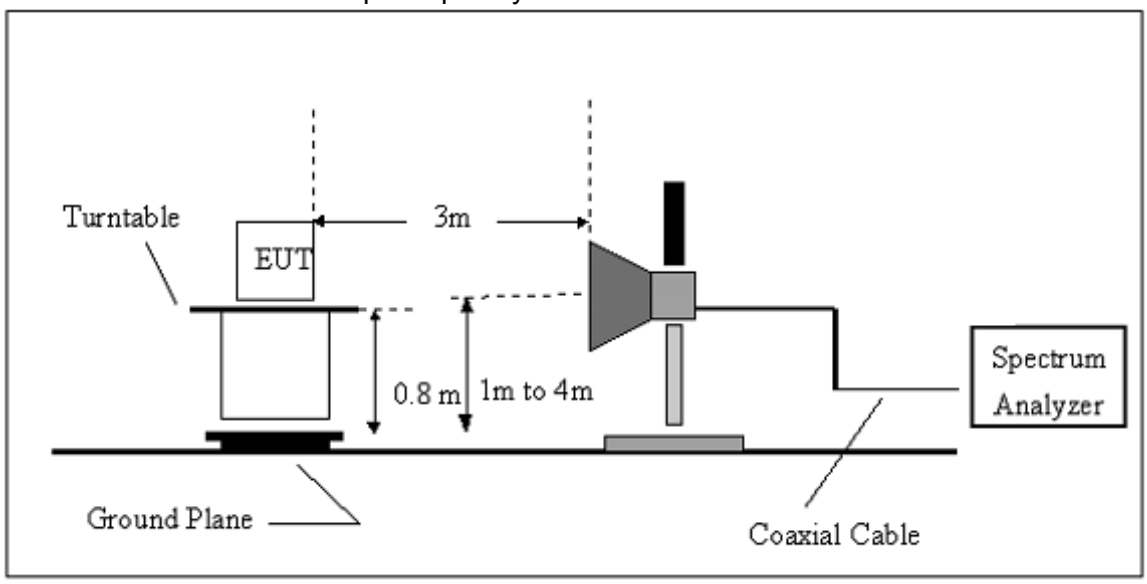
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS

Below 30 MHz

EUT：	Bluetooth keyboard	Model Name. ：	HG190-1
Temperature：	23 ℃	Relative Humidity：	50%
Pressure：	1010hPa	Polarization：	---
Test Voltage：	DC 3.7V		
Test Mode ：	TX Mode		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

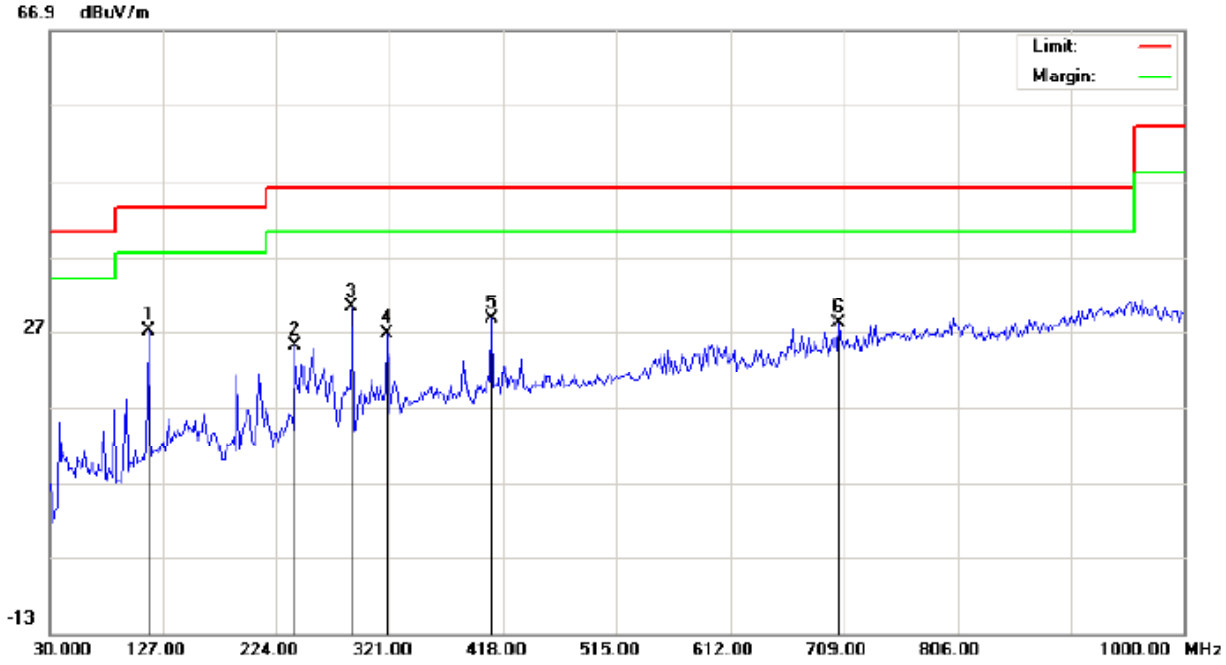
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1000 MHz

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



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Low Channel TX
Note:

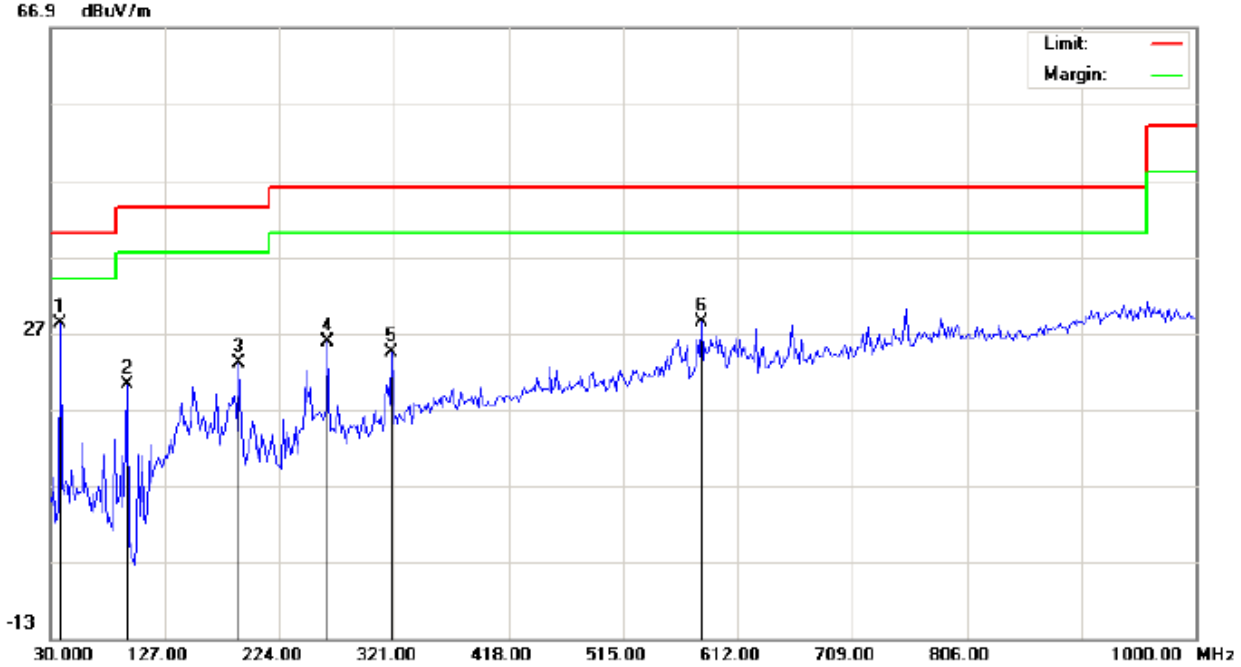
Polarization: *Horizontal*
Power:
Distance: 3m

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		114.0667	15.52	11.45	26.97	43.50	-16.53	peak			
2		240.1667	11.41	13.53	24.94	46.00	-21.06	peak			
3	*	288.6666	15.19	15.07	30.26	46.00	-15.74	peak			
4		319.3833	10.00	16.70	26.70	46.00	-19.30	peak			
5		408.3000	9.19	19.32	28.51	46.00	-17.49	peak			
6		704.1500	2.77	25.31	28.08	46.00	-17.92	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: HG190-1
Mode: Low Channel TX
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

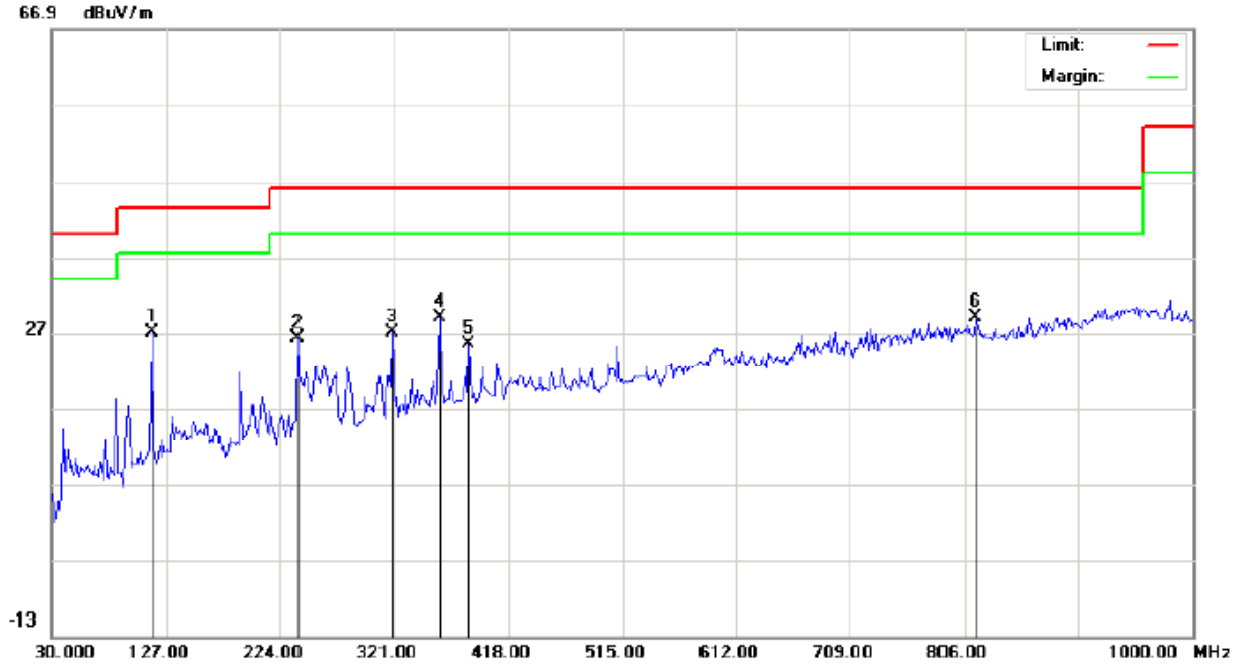
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	38.0833	21.86	6.39	28.25	40.00	-11.75	peak			
2		94.6667	18.80	1.42	20.22	43.50	-23.28	peak			
3		190.0500	11.45	11.52	22.97	43.50	-20.53	peak			
4		264.4166	11.39	14.34	25.73	46.00	-20.27	peak			
5		319.3833	7.62	16.70	24.32	46.00	-21.68	peak			
6		581.2833	5.85	22.64	28.49	46.00	-17.51	peak			

RESULT: PASS

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

2. The “Factor”valuecan 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: HG190-1
Mode: Middle Channel TX
Note:

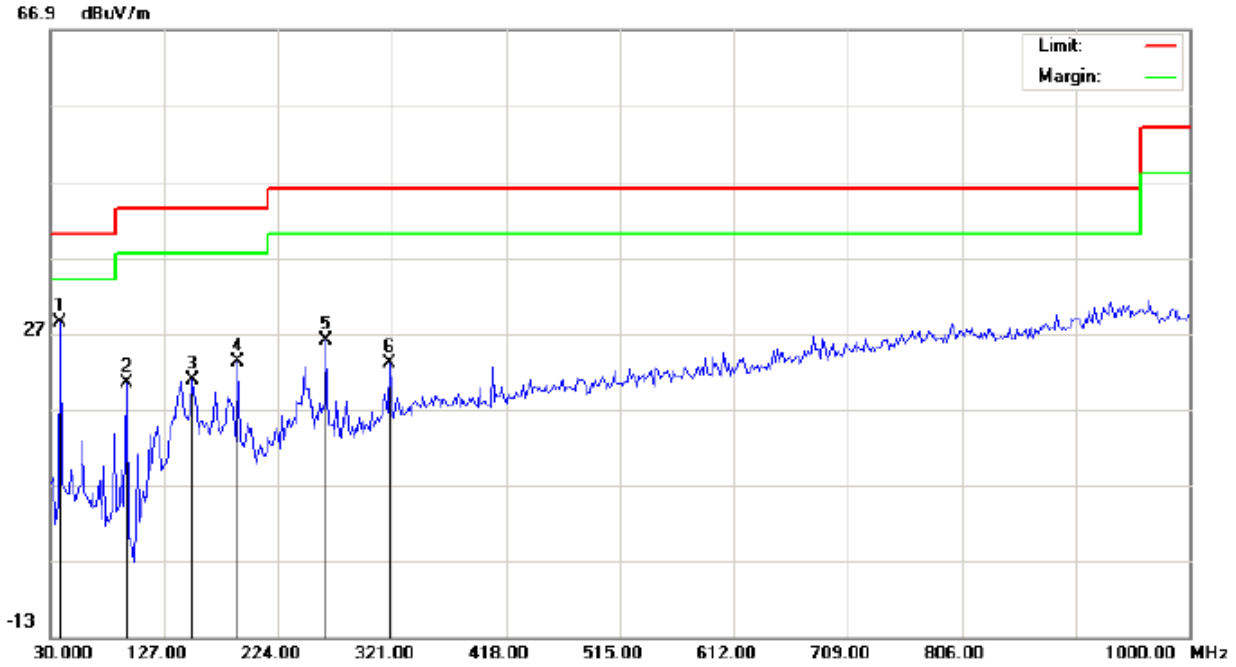
Polarization: *Horizontal*
Power:
Distance: 3m

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	*	114.0667	15.64	11.45	27.09	43.50	-16.41	peak			
2		238.5500	12.82	13.46	26.28	46.00	-19.72	peak			
3		319.3833	10.39	16.70	27.09	46.00	-18.91	peak			
4		359.8000	10.16	18.80	28.96	46.00	-17.04	peak			
5		384.0500	6.49	18.96	25.45	46.00	-20.55	peak			
6		815.7000	1.63	27.32	28.95	46.00	-17.05	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: HG190-1
Mode: Middle Channel TX
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

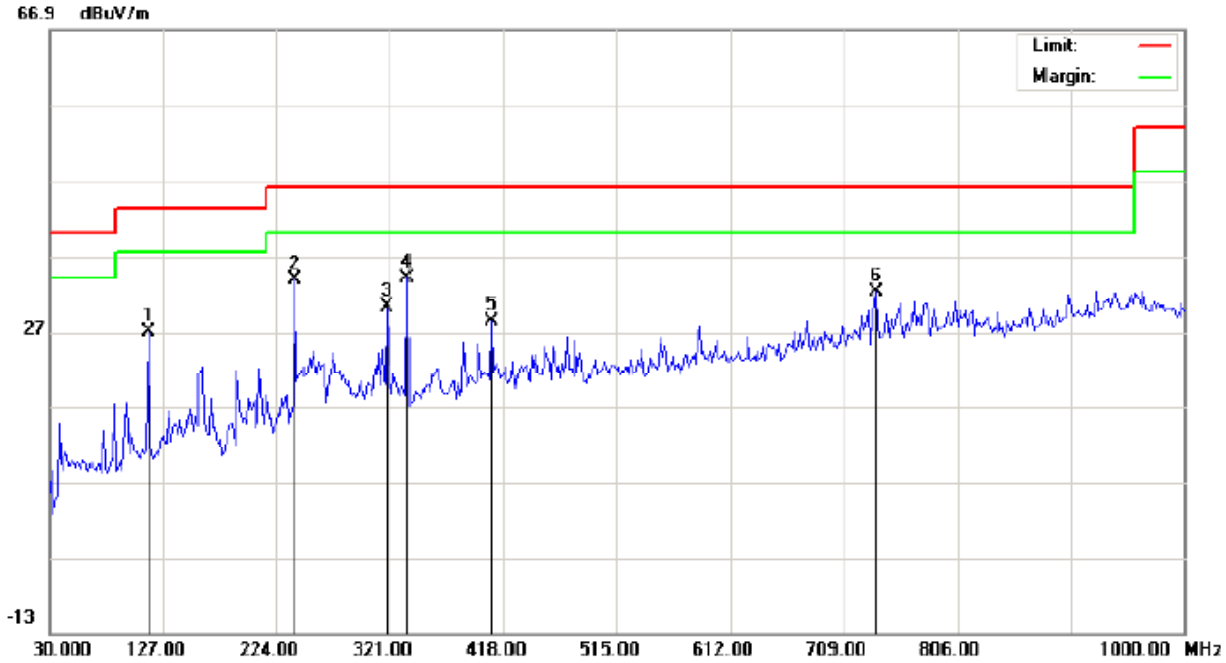
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	38.0833	22.05	6.39	28.44	40.00	-11.56	peak			
2		94.6667	18.97	1.42	20.39	43.50	-23.11	peak			
3		151.2500	5.54	15.27	20.81	43.50	-22.69	peak			
4		190.0500	11.66	11.52	23.18	43.50	-20.32	peak			
5		264.4166	11.58	14.34	25.92	46.00	-20.08	peak			
6		319.3833	6.21	16.70	22.91	46.00	-23.09	peak			

RESULT: PASS

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

2. The “Factor”valuecan 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: HG190-1
Mode: High Channel TX
Note:

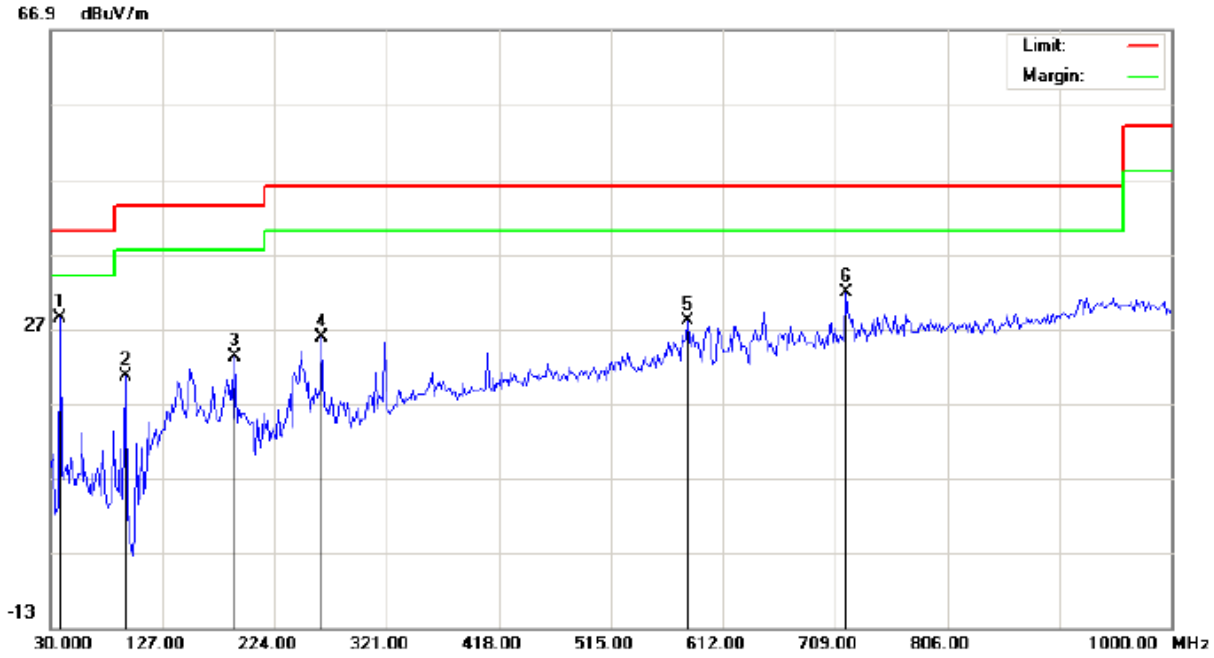
Polarization: *Horizontal*
Power:
Distance: 3m

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		114.0667	15.61	11.45	27.06	43.50	-16.44	peak			
2		240.1667	20.22	13.53	33.75	46.00	-12.25	peak			
3		319.3833	13.54	16.70	30.24	46.00	-15.76	peak			
4	*	335.5500	16.32	17.78	34.10	46.00	-11.90	peak			
5		408.3000	9.03	19.32	28.35	46.00	-17.65	peak			
6		736.4833	5.93	26.24	32.17	46.00	-13.83	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: HG190-1
Mode: High Channel TX
Note:

Polarization: *Vertical*
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	*	38.0833	22.00	6.39	28.39	40.00	-11.61	peak			
2		94.6667	19.21	1.42	20.63	43.50	-22.87	peak			
3		190.0500	11.76	11.52	23.28	43.50	-20.22	peak			
4		264.4166	11.55	14.34	25.89	46.00	-20.11	peak			
5		581.2833	5.34	22.64	27.98	46.00	-18.02	peak			
6		718.7000	6.17	25.73	31.90	46.00	-14.10	peak			

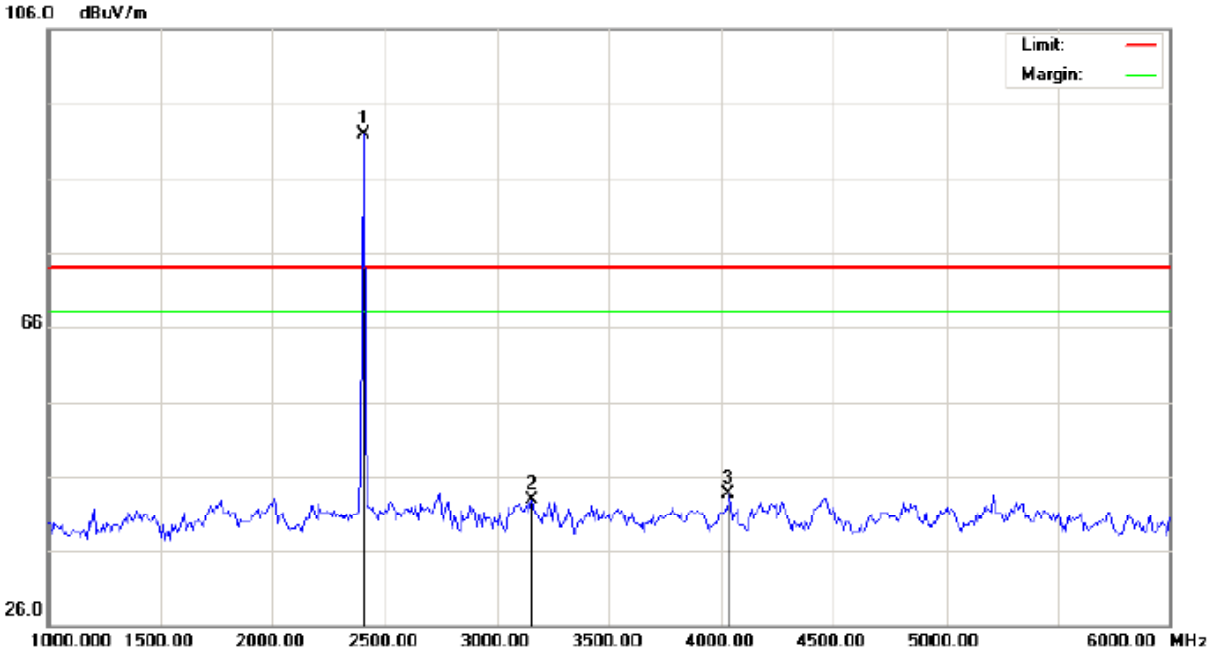
RESULT: PASS

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

2. The “Factor”valuecan be calculated automatically by software of measurement system.

Above 1000 MHz

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-LOW CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Low Channel TX
Note:

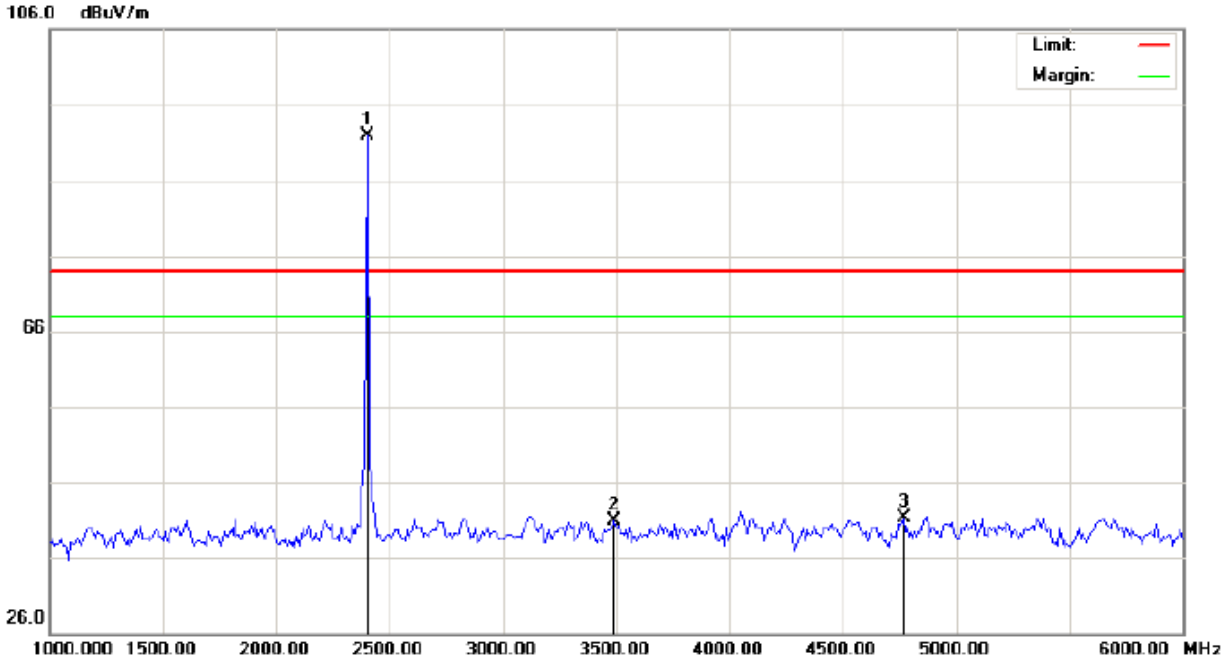
Polarization: *Horizontal*
Power:
Distance:

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	*	2402.000	81.61	10.32	91.93	74.00	17.93	peak			
2		3158.333	31.19	11.79	42.98	74.00	-31.02	peak			
3		4033.333	28.99	14.64	43.63	74.00	-30.37	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-LOW CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Low Channel TX
Note:

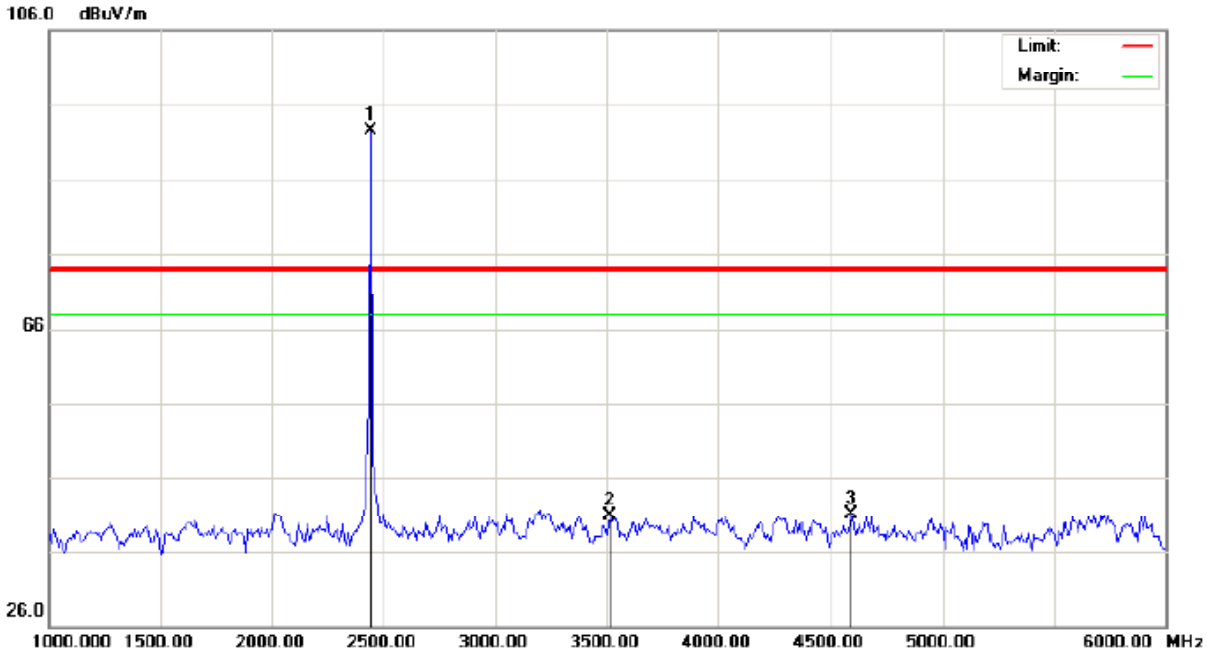
Polarization: *Vertical*
Power:
Distance:

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	*	2402.000	81.67	10.32	91.99	74.00	17.99	peak			
2		3491.667	28.85	12.10	40.95	74.00	-33.05	peak			
3		4766.667	33.70	7.59	41.29	74.00	-32.71	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Middle Channel TX
Note:

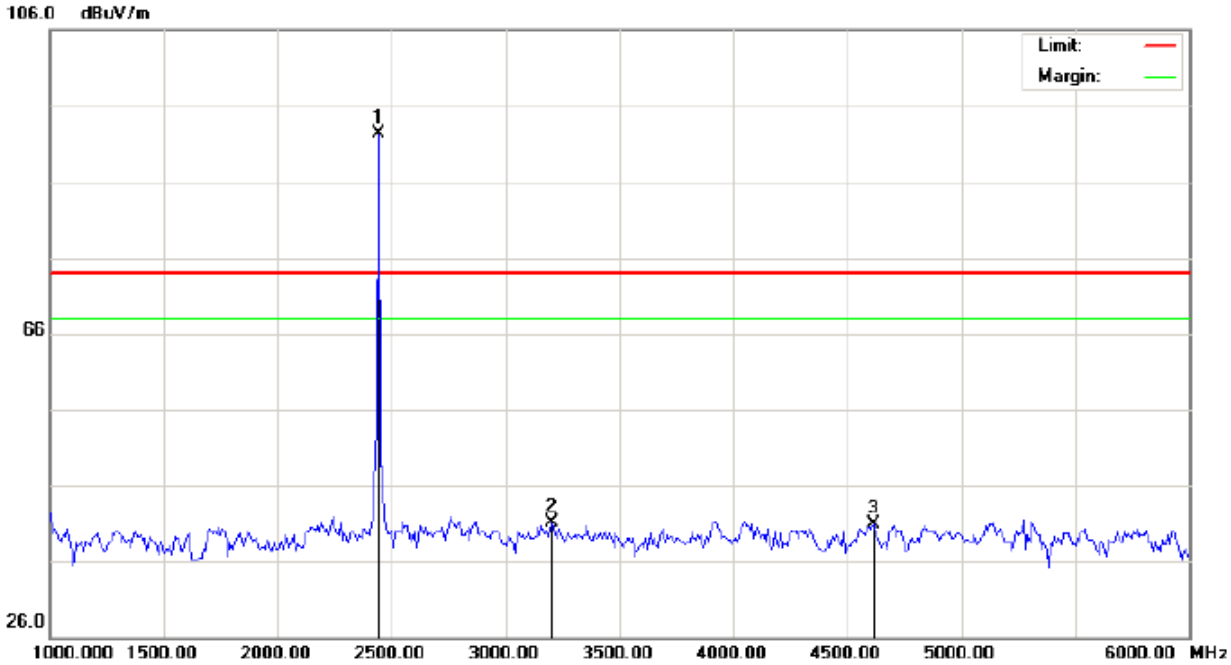
Polarization: *Horizontal*
Power:
Distance:

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	*	2441.000	82.23	10.36	92.59	74.00	18.59	peak			
2		3516.667	28.63	12.21	40.84	74.00	-33.16	peak			
3		4591.667	34.01	7.13	41.14	74.00	-32.86	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)- MIDDLE CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Middle Channel TX
Note:

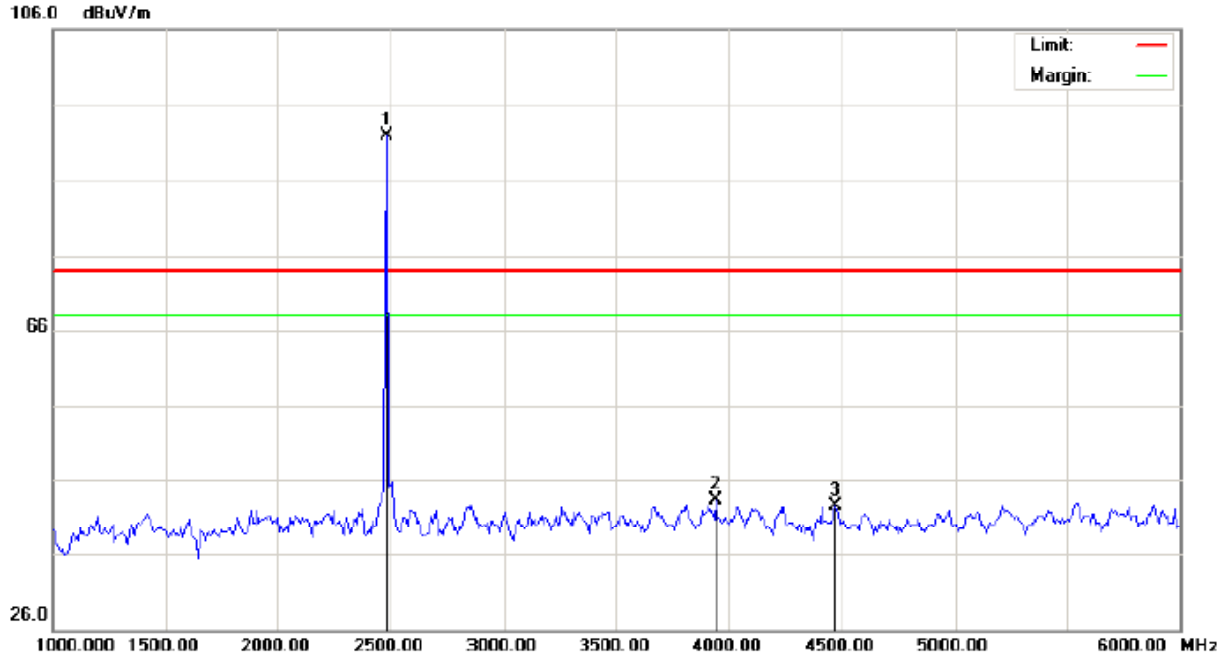
Polarization: *Vertical*
Power:
Distance:

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	*	2441.000	81.89	10.36	92.25	74.00	18.25	peak			
2		3200.000	29.22	11.83	41.05	74.00	-32.95	peak			
3		4616.667	33.67	7.20	40.87	74.00	-33.13	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: High Channel TX
Note:

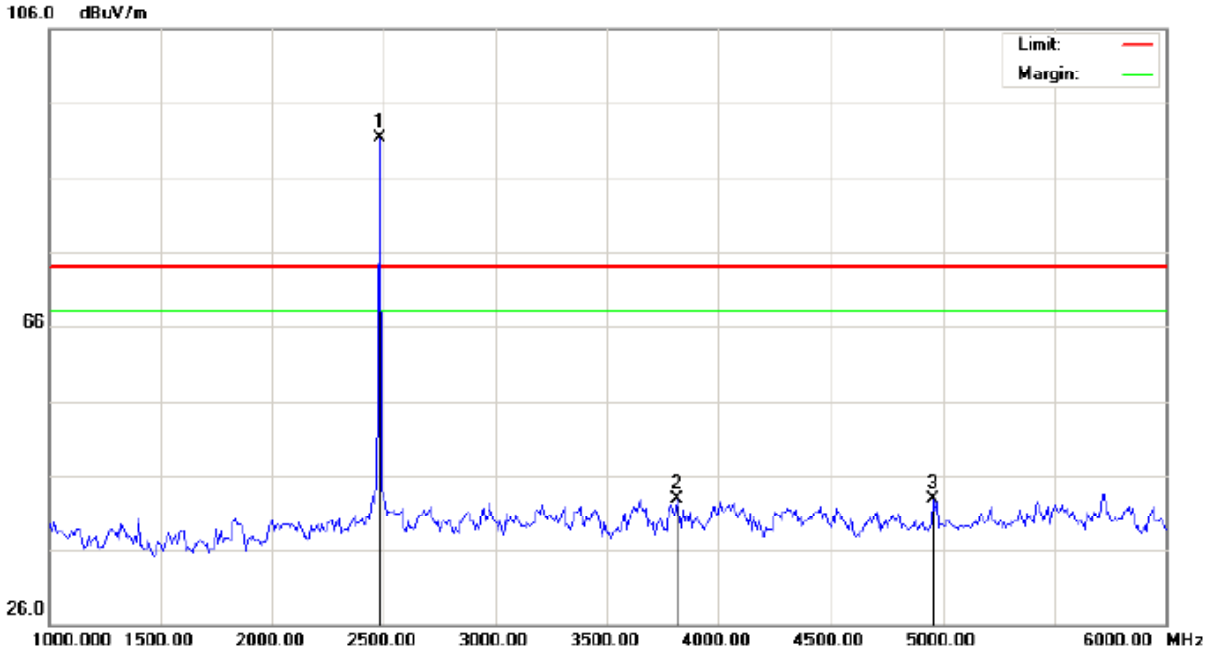
Polarization: *Horizontal*
Power:
Distance:

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	81.43	10.41	91.84	74.00	17.84	peak			
2		3941.667	28.44	14.83	43.27	74.00	-30.73	peak			
3		4466.667	35.16	7.44	42.60	74.00	-31.40	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-HIGH CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: High 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	*	2480.000	80.97	10.41	91.38	74.00	17.38	peak			
2		3816.667	28.81	14.06	42.87	74.00	-31.13	peak			
3		4958.333	34.75	8.09	42.84	74.00	-31.16	peak			

RESULT: PASS

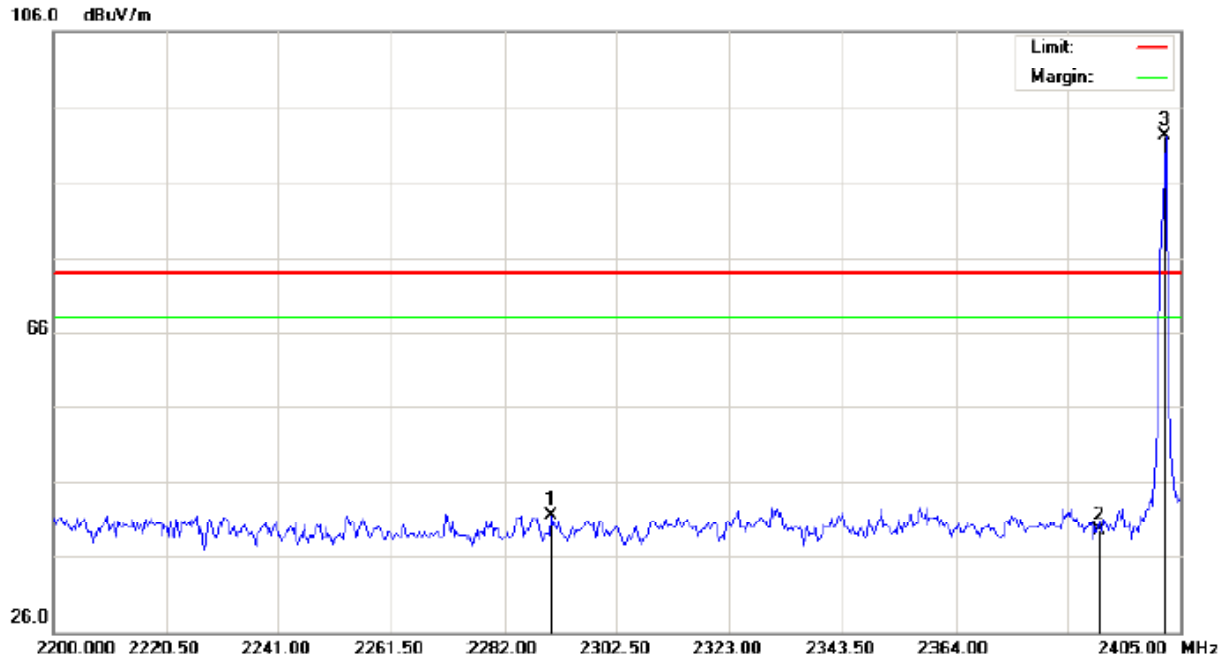
Note: 6~25GHz at least have 20dB margin. No recording in the test report.

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

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

BAND EDGE TEST

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Horizontal



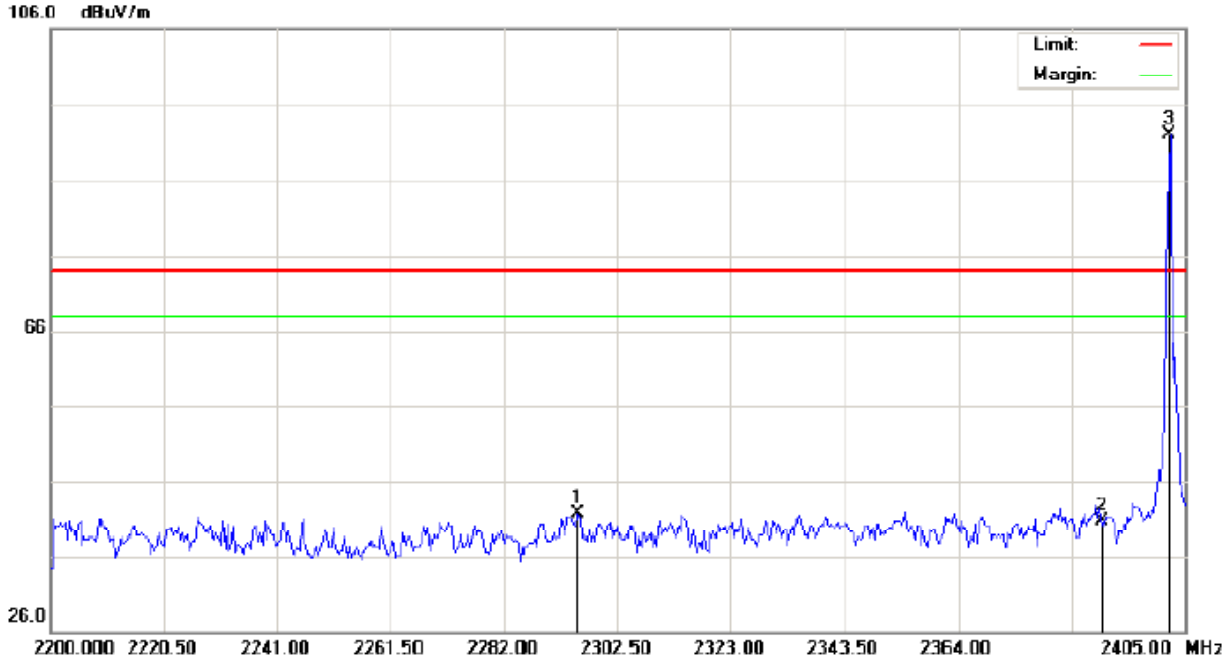
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Low Channel TX
Note:

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		2290.542	31.38	10.20	41.58	74.00	-32.42	peak			
2		2390.000	29.12	10.31	39.43	74.00	-34.57	peak			
3	*	2402.000	81.91	10.32	92.23	74.00	18.23	peak			

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



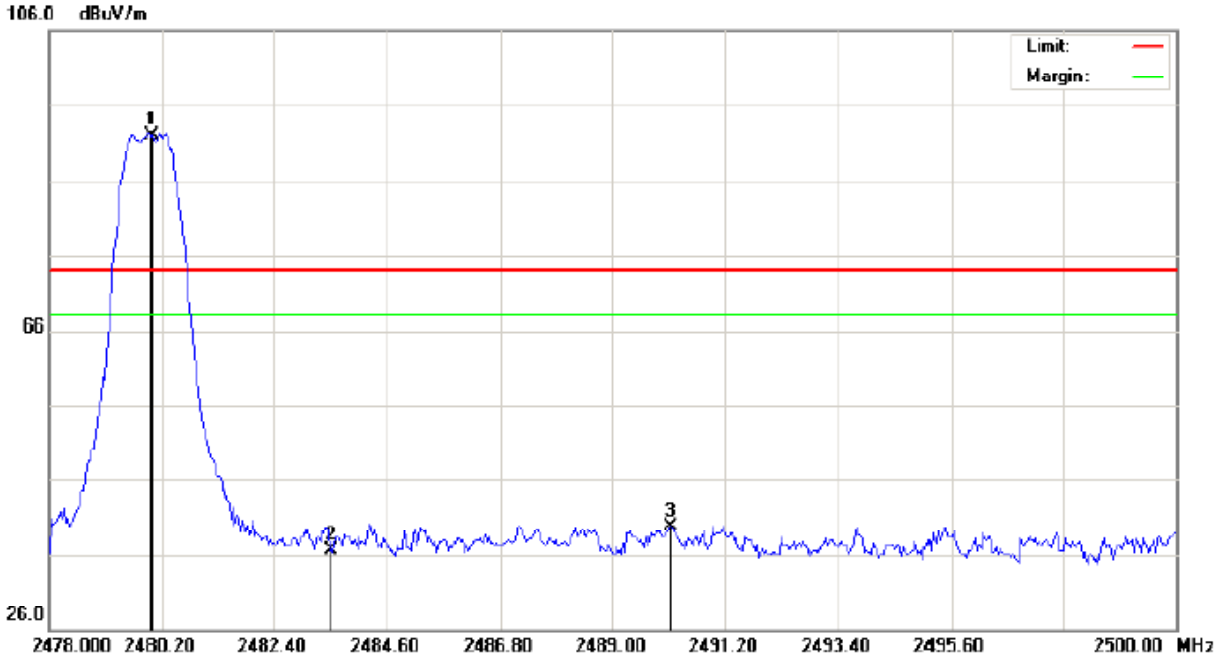
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: Low Channel TX
Note:

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		2295.325	31.50	10.20	41.70	74.00	-32.30	peak			
2		2390.000	30.35	10.31	40.66	74.00	-33.34	peak			
3	*	2402.000	81.76	10.32	92.08	74.00	18.08	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



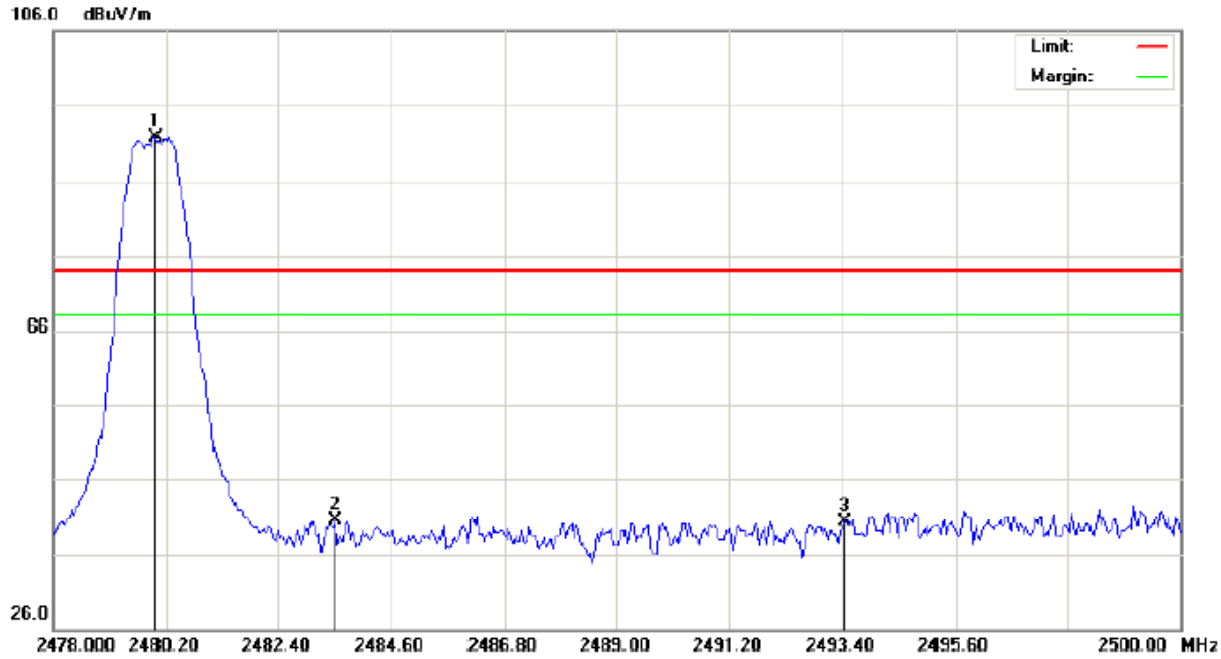
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: High Channel TX
Note:

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	81.46	10.41	91.87	74.00	17.87	peak			
2		2483.500	26.25	10.41	36.66	74.00	-37.34	peak			
3		2490.137	29.49	10.42	39.91	74.00	-34.09	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Vertical



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Bluetooth Keyboard
M/N: HG190-1
Mode: High 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	*	2480.000	81.35	10.41	91.76	74.00	17.76	peak			
2		2483.500	30.37	10.41	40.78	74.00	-33.22	peak			
3		2493.437	30.08	10.42	40.50	74.00	-33.50	peak			

RESULT: PASS

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

2. The “Factor”valuecan be calculated automatically by software of measurement system.

4. CONDUCTED SPURIOUS EMISSIONS

4.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

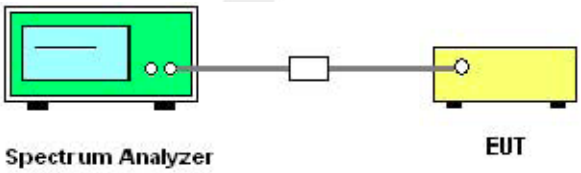
4.2TEST PROCEDURE

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/100 KHz
Trace-Mode:	Max hold

.

4.3 TEST SETUP



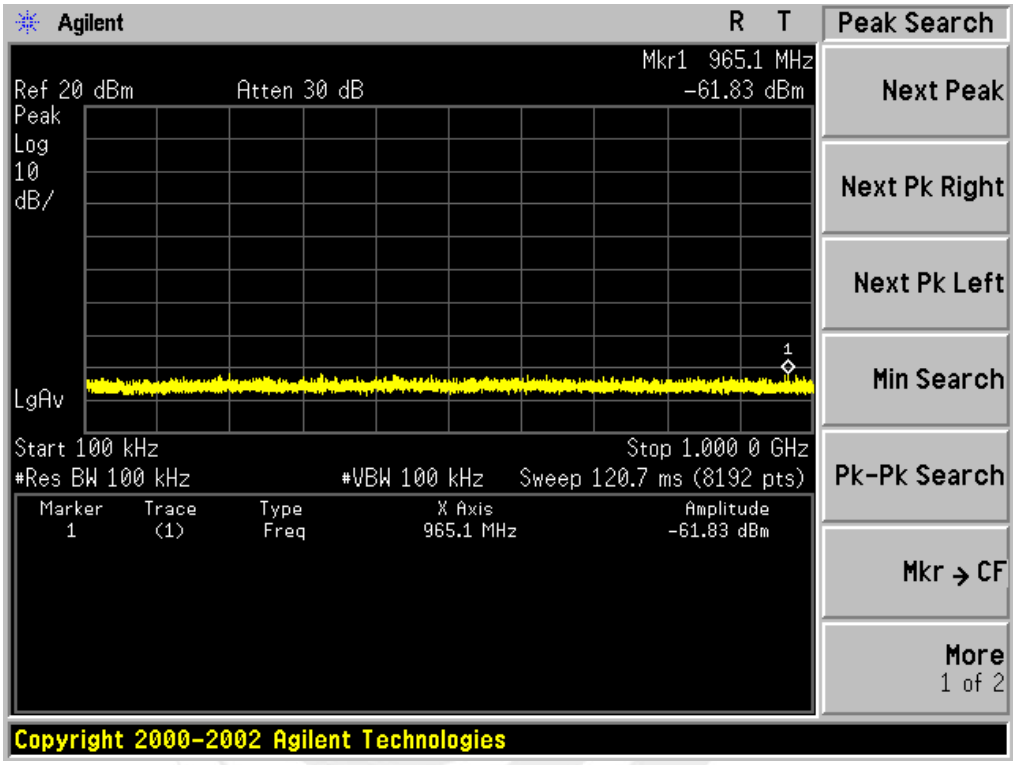
The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

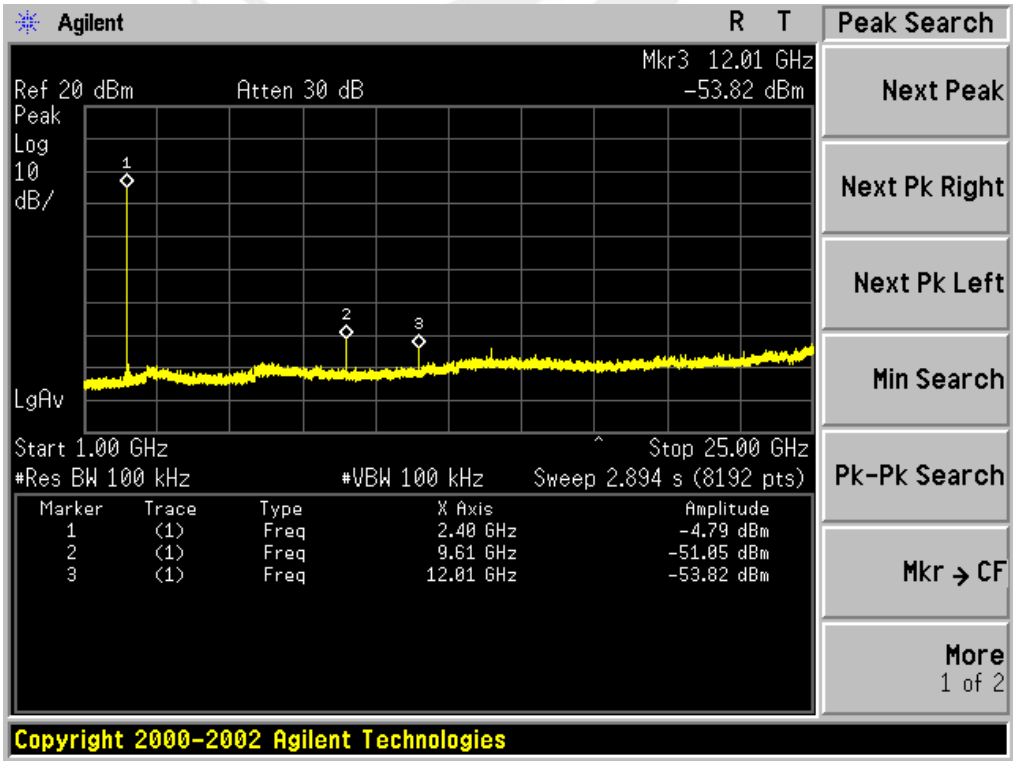
4.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

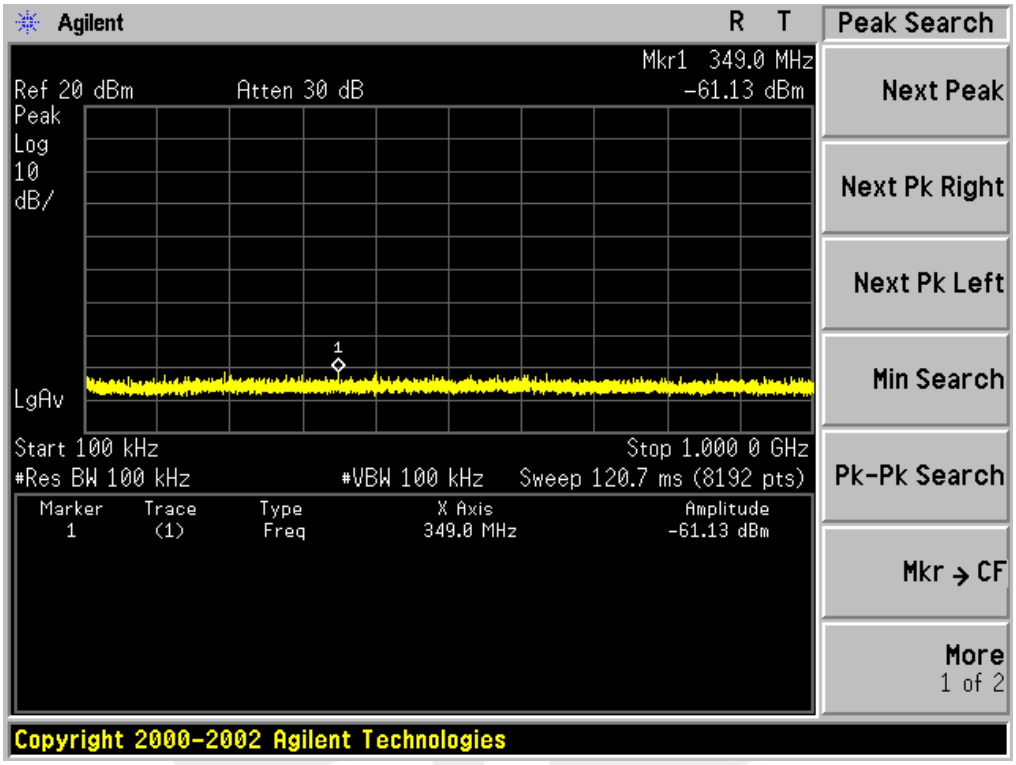
4.5 TEST RESULTS

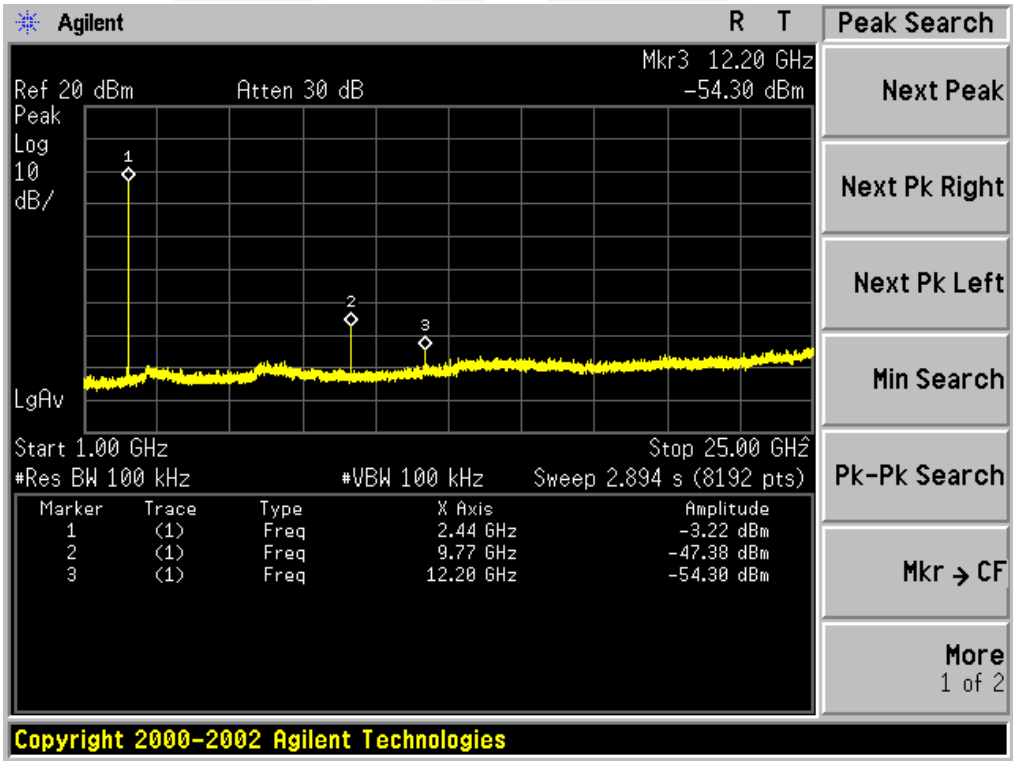
EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	Low Channel(GFSK)		



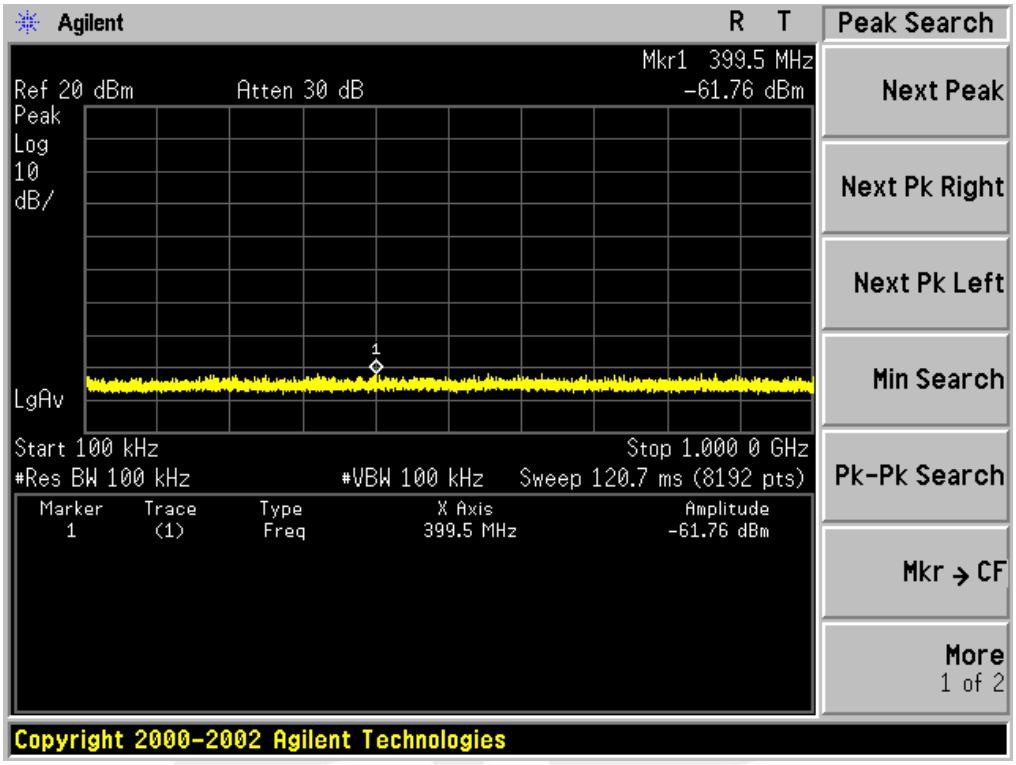


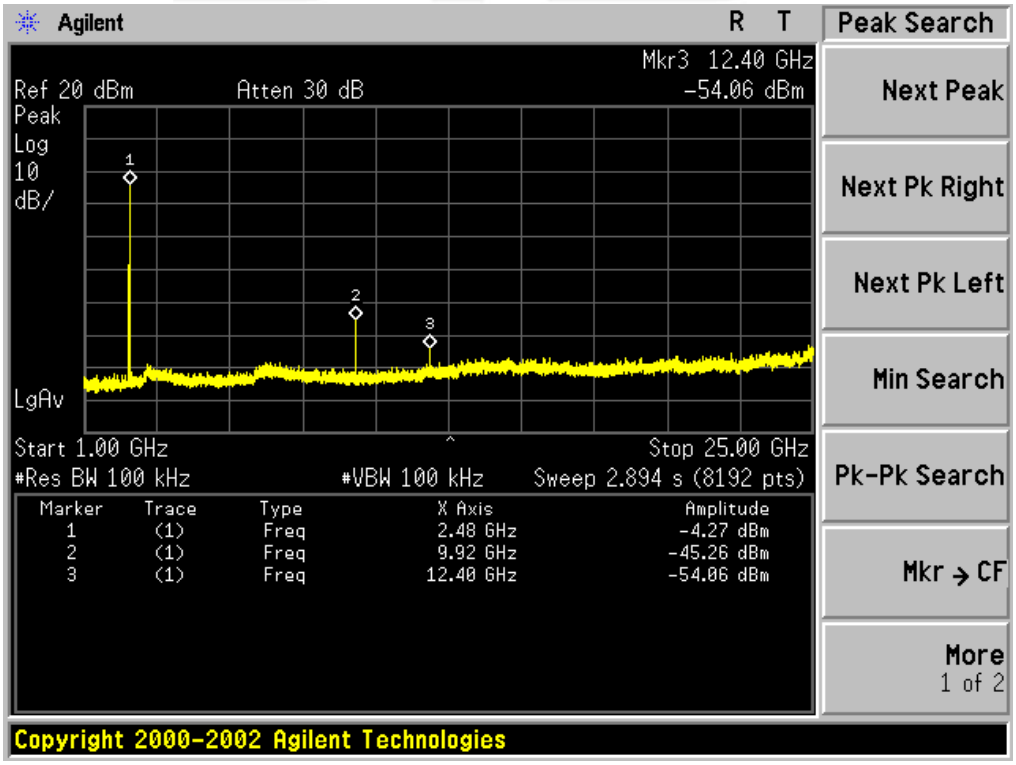
EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	Middle(GFSK)		





EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	High(GFSK)		

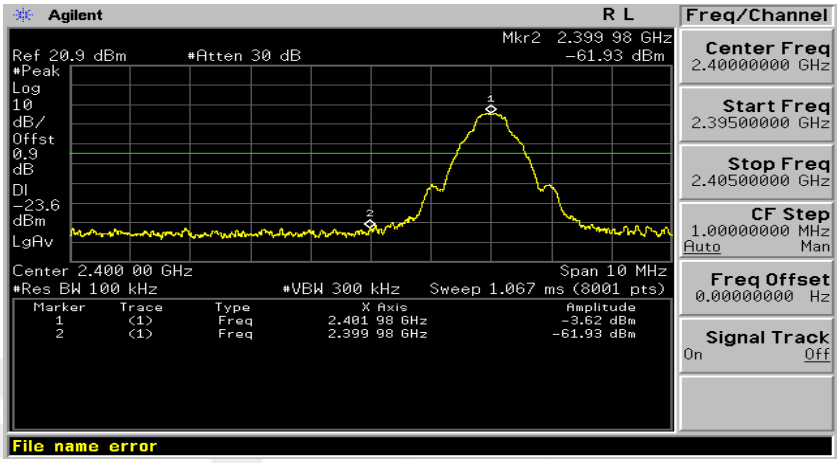
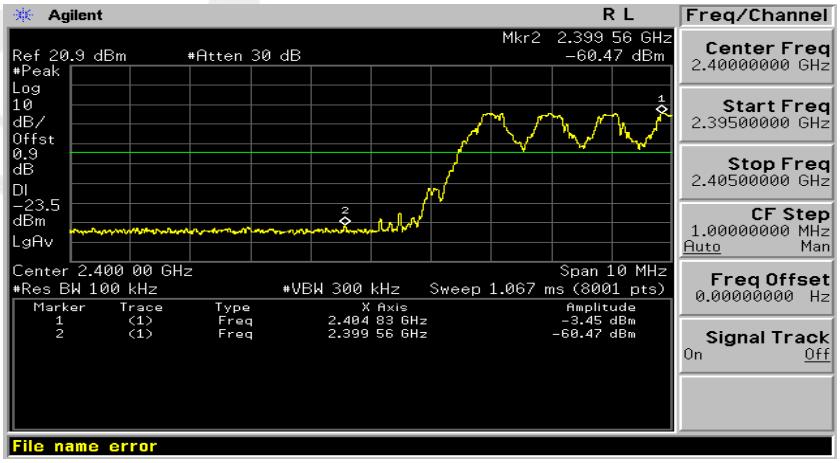
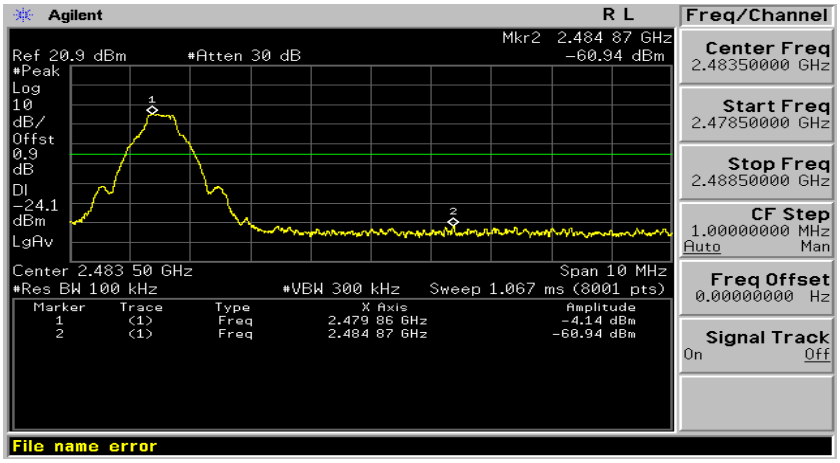


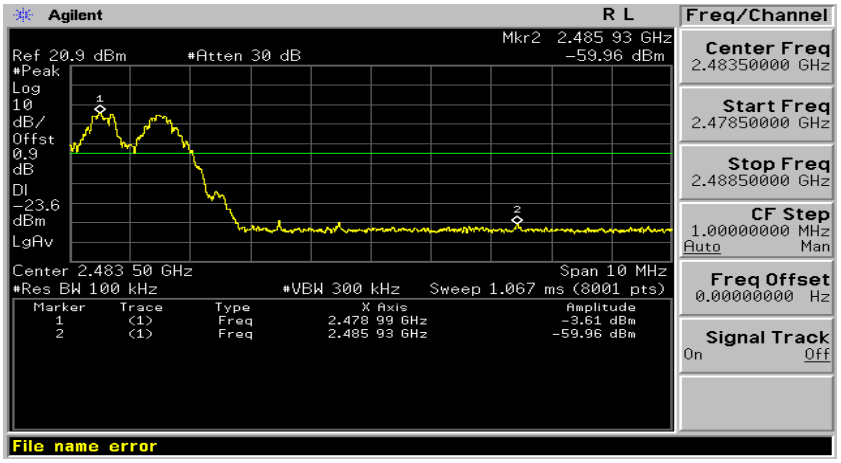


CONDUCTED TEST RESULT FOR BANDEDGE

Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBm]	Verdict
GFSK	LCH	2402	Off	-61.93	PASS
			On	-60.47	PASS
GFSK	HCH	2480	Off	-60.94	PASS
			On	-59.96	PASS

Test Graph

Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	
GFSK/HCH/No Hop	

GFSK/HCH/Hop	

Agilent
R L
Freq/Channel
Mkr2 2.485 93 GHz
Ref 20.9 dBm
#Atten 30 dB
-59.96 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-23.6
dBm
LgAv
Center Freq
2.48350000 GHz
Start Freq
2.47850000 GHz
Stop Freq
2.48850000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 2.483 50 GHz
Span 10 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1.067 ms (8001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.478 99 GHz -3.61 dBm
2 (1) Freq 2.485 93 GHz -59.96 dBm
File name error

5. NUMBER OF HOPPING CHANNEL

5.1APPLIED PROCEDURES / LIMIT

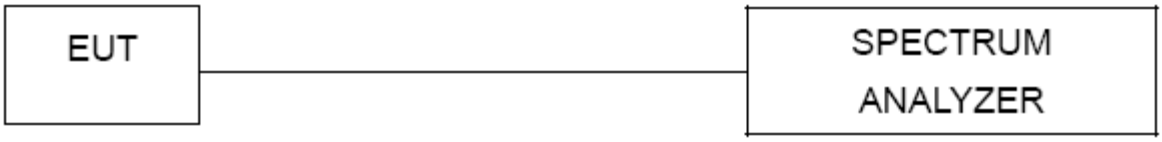
FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100K, VBW=300K, Sweep time = Auto.

5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

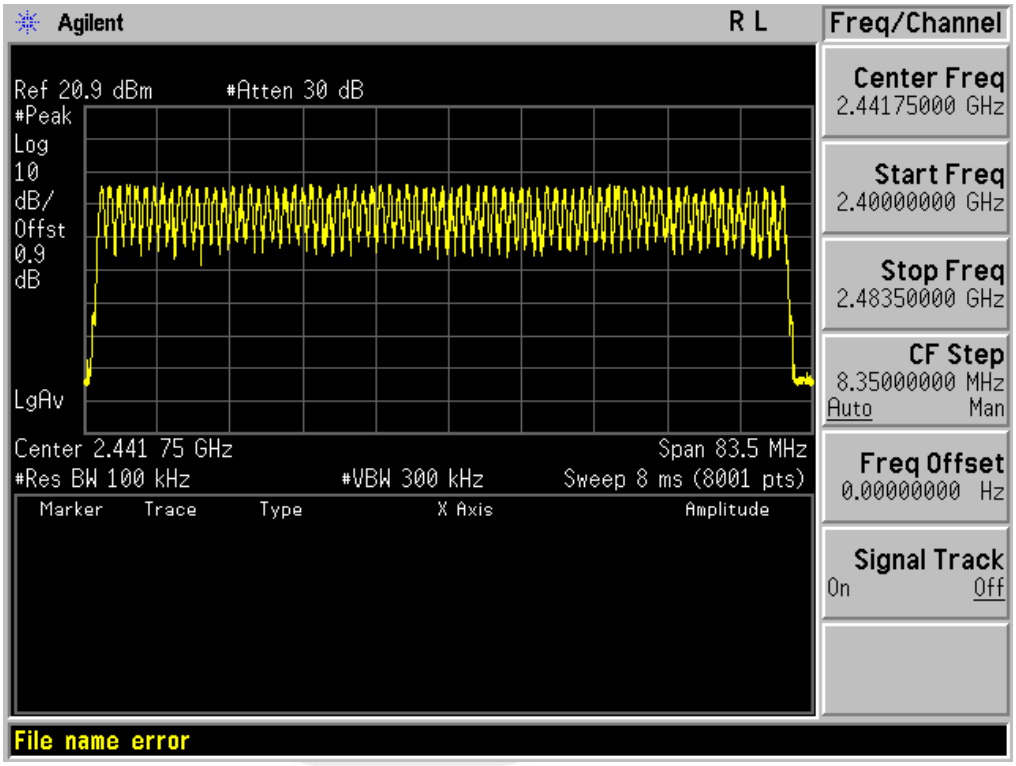
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.5TEST RESULTS

EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage：	DC 3.7V
Test Mode ：	Hopping Mode		

Number of Hopping Channel	79

Hopping channel



6. AVERAGE TIME OF OCCUPANCY

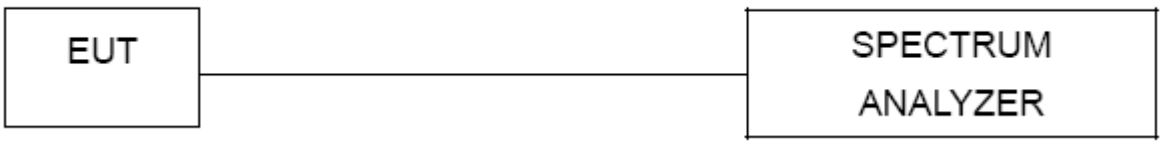
6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

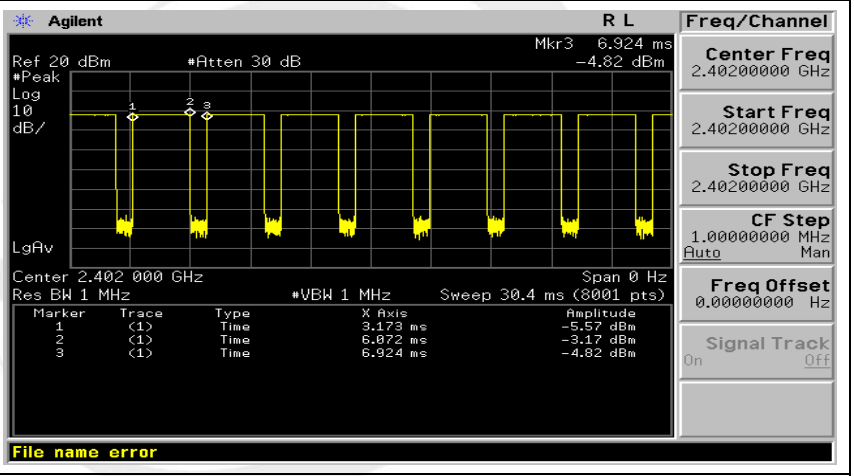
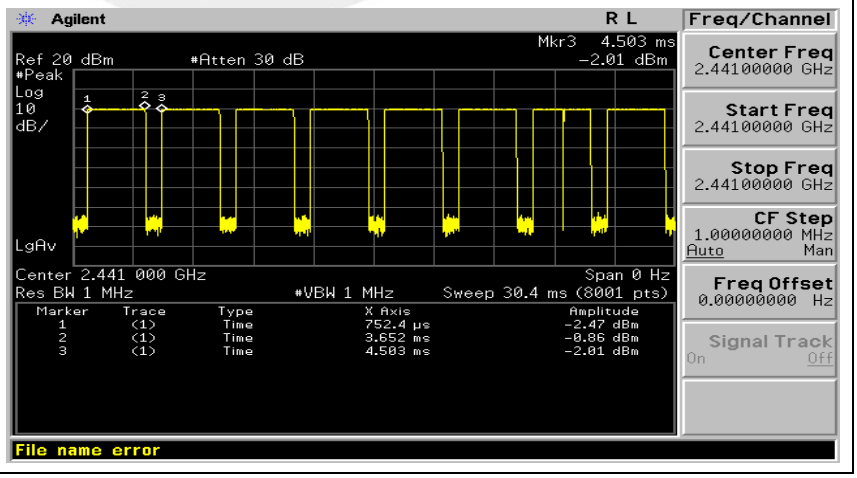
6.5TEST RESULTS

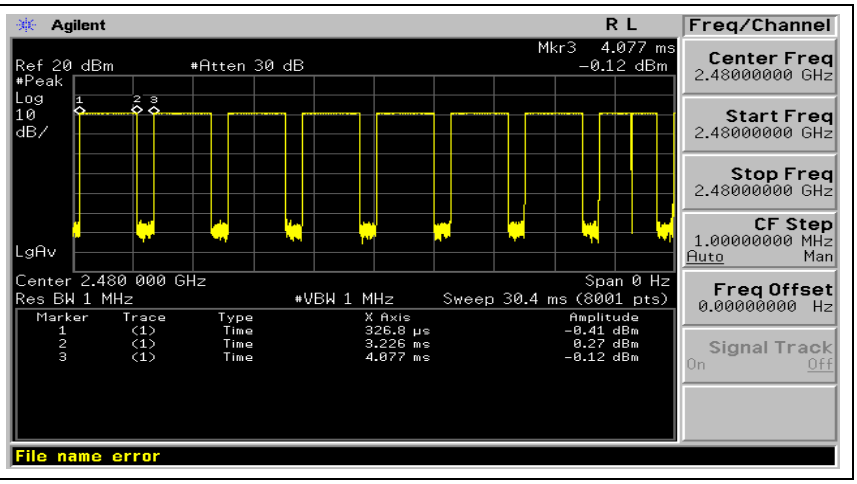
EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	GFSK(1Mbps)DH5		

Note:All modes were tested,only the worst case record in the report.

Mode	Channel.	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Verdict	Limit (ms)
GFSK	LCH	2.899	106.67	310.193	PASS	400
GFSK	MCH	2.899	106.67	310.193	PASS	400
GFSK	HCH	2.899	106.67	310.193	PASS	400

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	

Agilent
R L
Freq/Channel
Mkr3 4.077 ms
Ref 20 dBm
#Atten 30 dB
-0.12 dBm
#Peak
Log
10
dB/
LgAv
Center Freq
2.48000000 GHz
Start Freq
2.48000000 GHz
Stop Freq
2.48000000 GHz
CF Step
1.00000000 MHz
Auto
Man
Center 2.480 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 30.4 ms (8001 pts)
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Marker Trace Type X Axis Amplitude
1 (1) Time 326.8 µs -0.41 dBm
2 (1) Time 3.226 ms 0.27 dBm
3 (1) Time 4.077 ms -0.12 dBm
File name error

7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

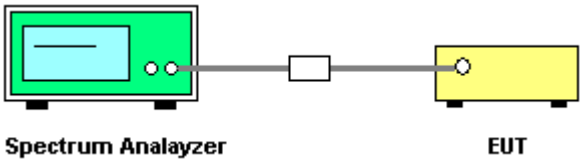
Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 30 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 30 kHz and the video bandwidth of 30 kHz were utilised for channel separation measurement.

7.3 TEST SETUP



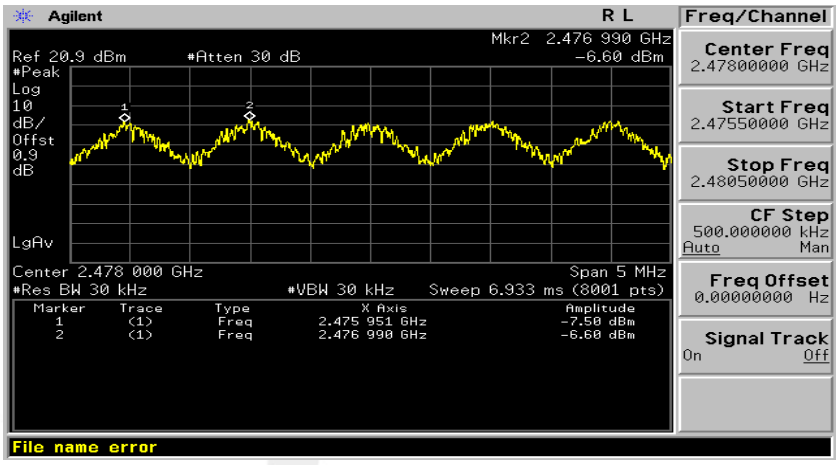
7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.5TEST RESULTS

EUT：	Bluetooth keyboard	Model Name ：	HG190-1
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	CH00 (GFSK(1Mbps) Mode)		

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
GFSK	Hop	1.039	PASS

Graphs	
GFSK/Hop	

NOTE:

1. Separation Limits: >=20 dB bandwidth.

8. BANDWIDTH TEST

8.1APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C

Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

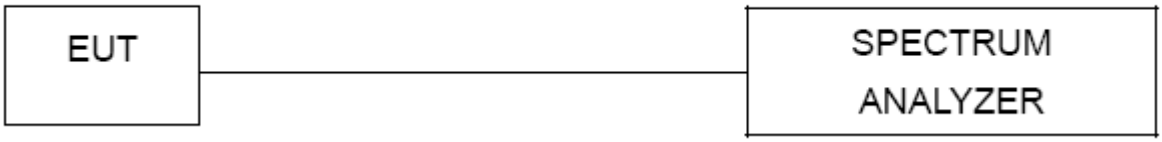
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. Spectrum Setting : RBW= 30KHz, VBW ≥ RBW, Sweep time = Auto.

8.3 TEST SETUP



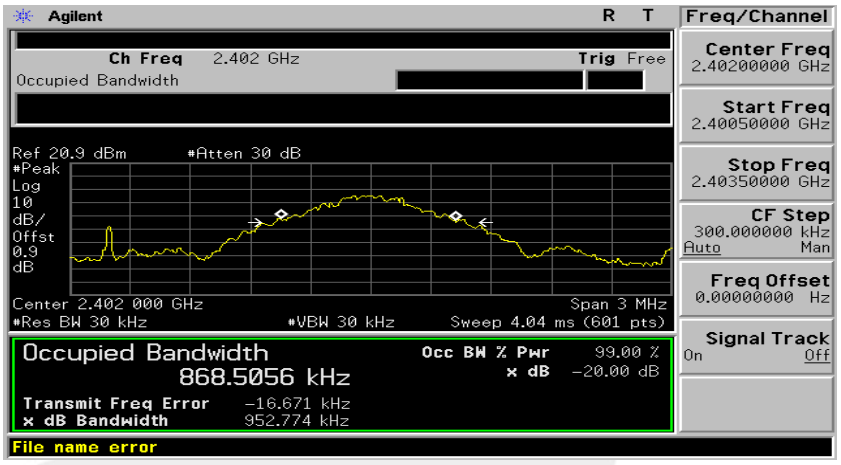
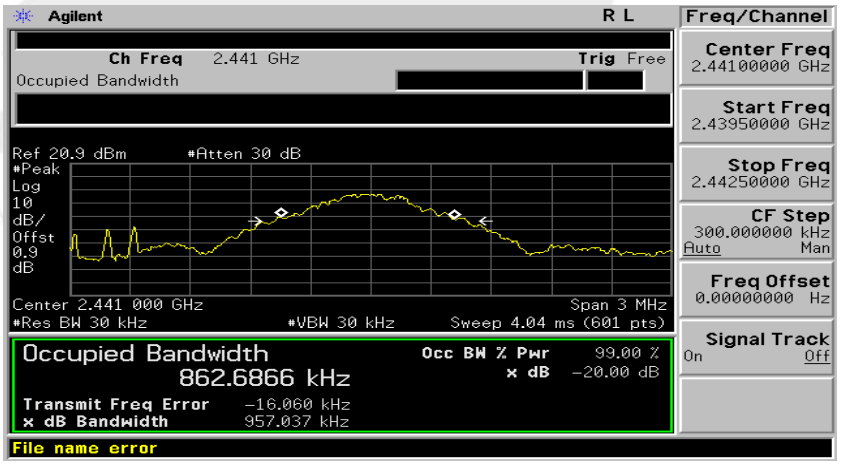
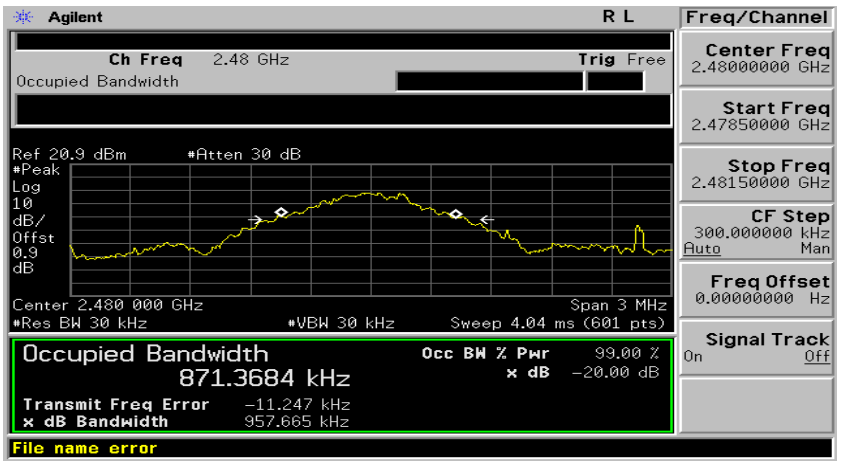
8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5TEST RESULTS

Mode	Channel.	20DbBW [MHz]	99% BW [MHz]	Verdict
GFSK	LCH	0.9528	0.8685	PASS
GFSK	MCH	0.9570	0.8627	PASS
GFSK	HCH	0.9577	0.8714	PASS

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	
GFSK/HCH	

9. OUTPUT POWER TEST

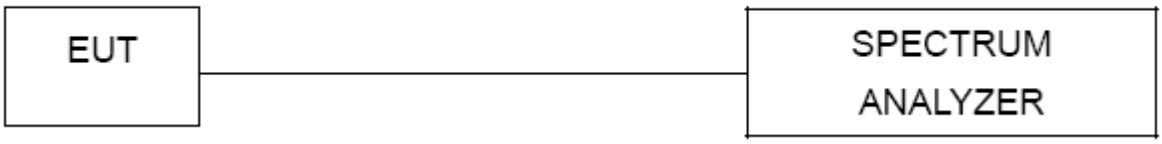
9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (b)(i)	Peak Output Power	1 W or 0.125W Or if channel separation > 2/3 bandwidthprovidedthesystem soperatewith an output power no greater than125 mW(20.96dBm)	2400-2483.5	PASS

9.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting :GFSK(1Mbps):RBW= 1.5MHz, VBW= 1.5MHz, Sweep time = Auto.
c. Spectrum Setting :π/4-DQPSK(2Mbps):RBW= 1.5MHz, VBW= 1.5MHz, Sweep time = Auto.
d. Spectrum Setting :8-DPSK(3Mbps):RBW= 1.5MHz, VBW= 1.5MHz, Sweep time = Auto.

9.3 TEST SETUP



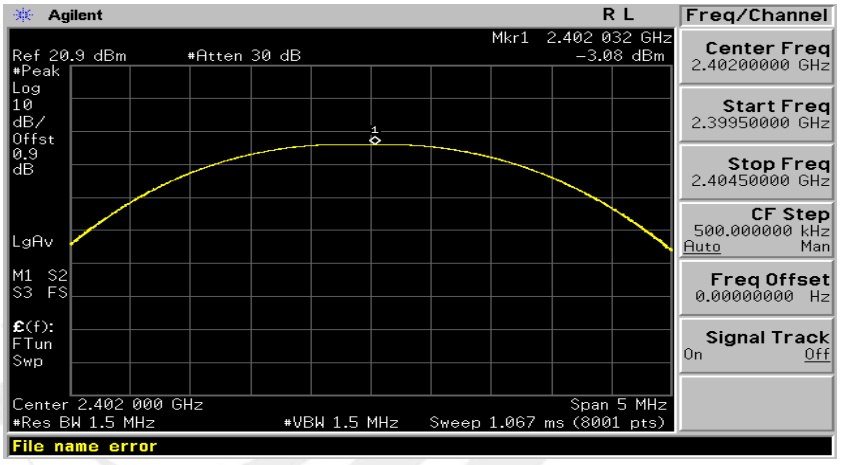
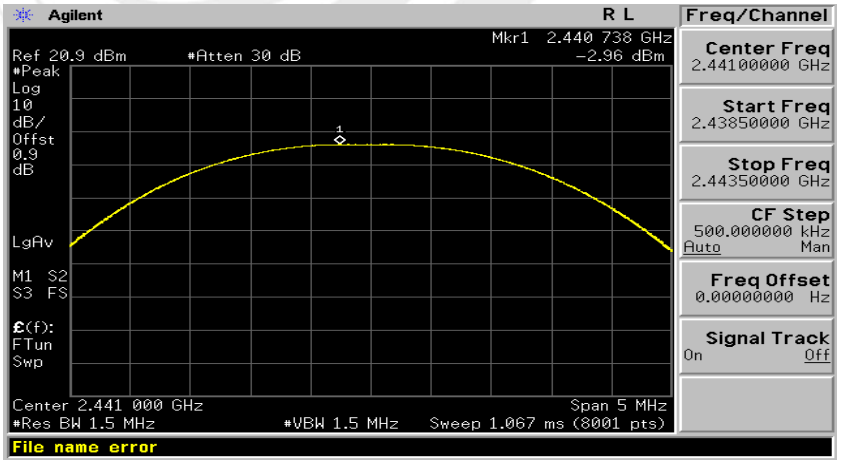
9.4 EUT OPERATION CONDITIONS

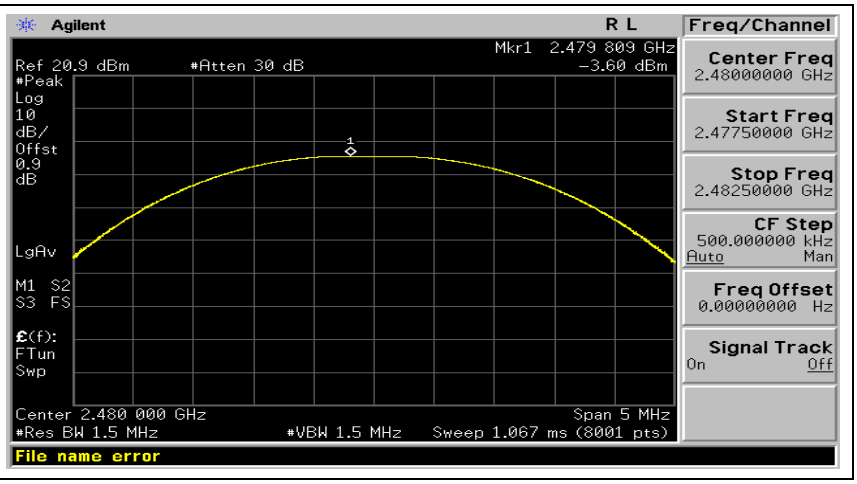
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.5TEST RESULTS

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	-3.08	30	Pass
2.441	-2.96	30	Pass
2.480	-3.60	30	Pass

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	

Agilent
R L
Freq/Channel
Mkr1 2.479 809 GHz
Ref 20.9 dBm
#Atten 30 dB
-3.60 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center Freq
2.48000000 GHz
Start Freq
2.47750000 GHz
Stop Freq
2.48250000 GHz
CF Step
500.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
#VBW 1.5 MHz
Sweep 1.067 ms (8001 pts)
File name error

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

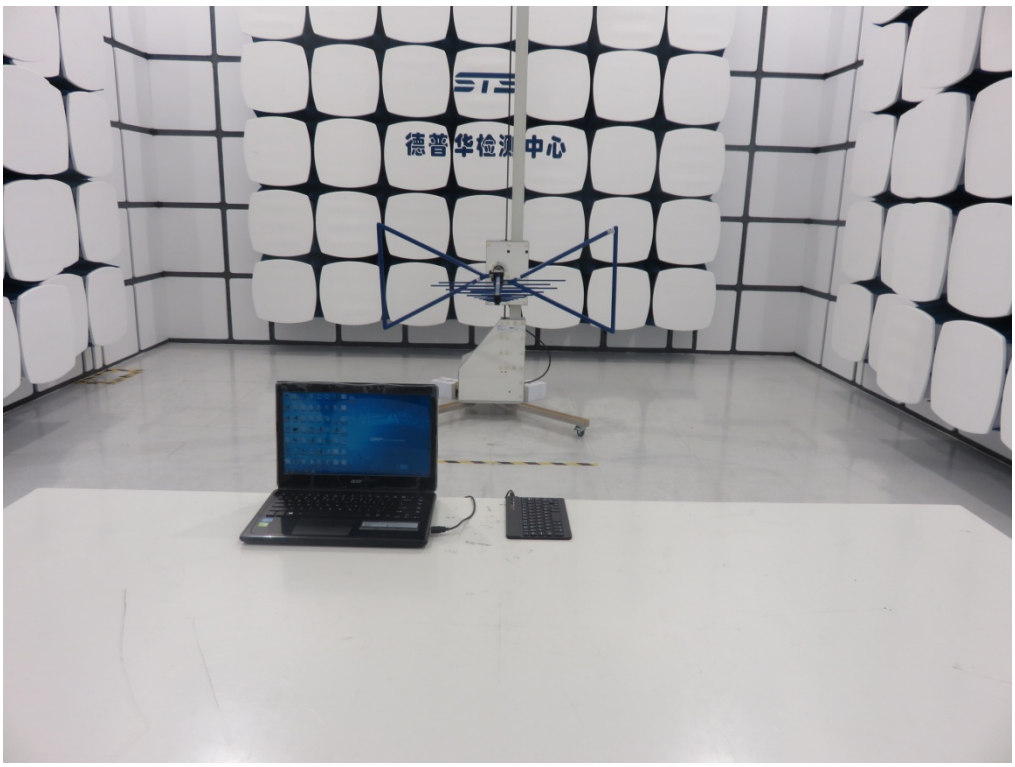
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

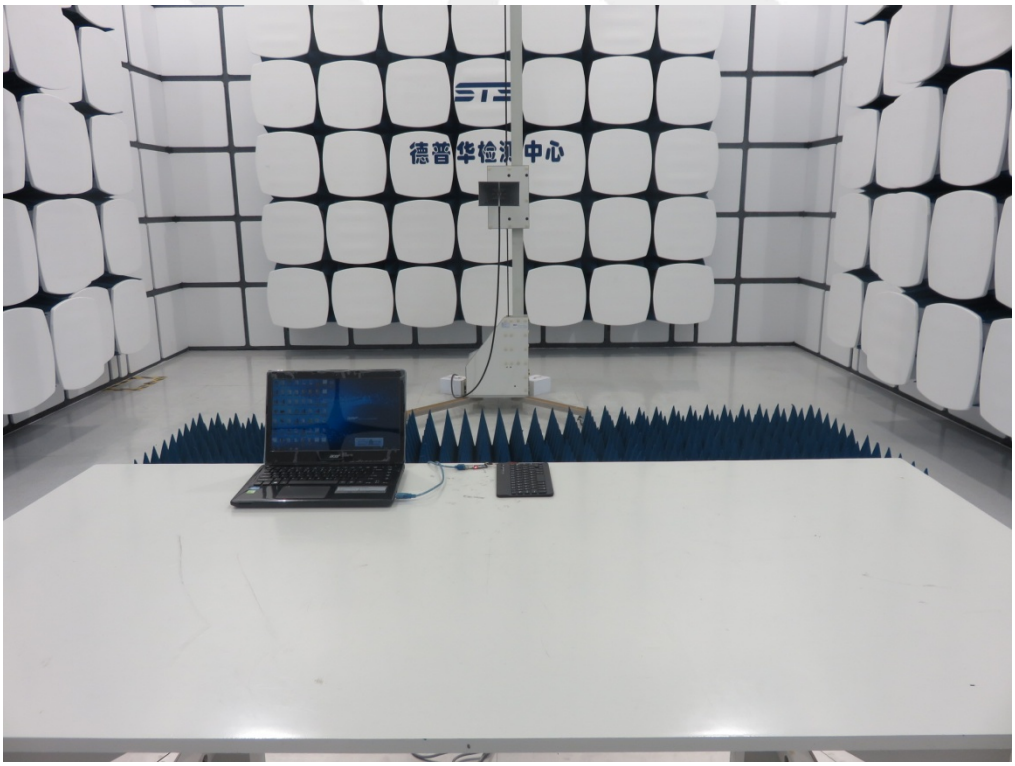
10.2 EUT ANTENNA

The EUT antenna is permanent attached antenna. It comply with the standard requirement.

APPENDIX-PHOTOS OF TEST SETUP

Radiated Measurement Photos





Conducted Measurement Photos