FCC RADIO TEST REPORT-BLE
FCC ID: 2ADCM-3DKBC

Product：	Wireless Keyboard and 3D Controller
Trade Name：	N/A
Model Name：	220-00069
Serial Model：	RT526, i526, K526, RT-KMW526, RT-526, Rii526
Report No.：	NTEK-2016NT01063782F

Prepared for

Osterhout Design Group

153 Townsend St., Ste. 570 San Francisco, California94107, United States

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

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Website:www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name ..... Osterhout Design Group

Address..... 153 Townsend St., Ste. 570 San Francisco, California94107, United States

Manufacture's Name .. ShenZhen Riitek Technology Co.,Ltd.

Address..... 401,4F, No.1 Building,Zhongkenuo Industry Park,Hezhou Development Zone,Xixiang Street,Baoan District,Shenzhen City, China

Product description

Product name..... Wireless Keyboard and 3D Controller

Model and/or type reference 220-00069

Serial Model RT526, i526, K526, RT-KMW526, RT-526, Rii526

Standards ..... FCC Part15.247: 01 Oct. 2015

Test procedure ..... ANSI C63.10-2013 and KDB 558074: June 5, 2014

This device described above has been tested by NTEK, 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.

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Date of Test .....:

Date (s) of performance of tests.....: 06 Jan. 2016 ~12 Jan. 2016

Date of Issue .....: 12 Jan. 2016

Test Result.....: **Pass**

Testing Engineer : Eileen Liu.

(Eileen Liu)

Technical Manager : Brown Lu

(Brown Lu)

Authorized Signatory : Sam. Chen

(Sam Chen)

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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)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this Test Report

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd
Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration No.:238937; IC Registration No.:9270A-1
CNAS Registration No.:L5516

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	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Wireless Keyboard and 3D Controller</td></tr>
<tr><td>Trade Name</td><td>N/A</td></tr>
<tr><td>Model Name</td><td>220-00069</td></tr>
<tr><td>Serial Model</td><td>RT526, i526, K526, RT-KMW526, RT-526, Rii526</td></tr>
<tr><td>Model Difference</td><td>These models are identical in circuitry and electrical, mechanical and physical construction, RF module; the only differences are the appearance color and model no.</td></tr>
<tr><td>Product Description</td><td>The EUT is a Wireless Keyboard and 3D Controller
<table>
<tr><td>Operation Frequency:</td><td>2402~2480MHz</td></tr>
<tr><td>Modulation Type:</td><td>GFSK</td></tr>
<tr><td>Number Of Channel</td><td>40CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
<tr><td>Antenna Gain (dBi)</td><td>1dBi</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Ratings</td><td>DC 3.7V</td></tr>
<tr><td>Adapter</td><td>N/A</td></tr>
<tr><td>Battery</td><td>DC 3.7V, 500mAh</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

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

2.

Channel	Frequency (MHz)
00	2402
01	2404
……	……
……	…….
…	…
……	……
38	2478
39	2480

3.

Table for Filed Antenna

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

2.2 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	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

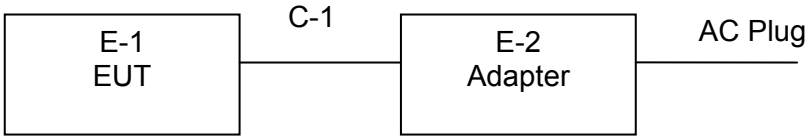
Note:

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

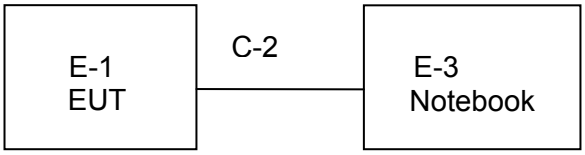
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test

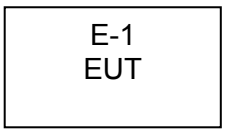
1)



2)



Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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	Brand	Model/Type No.	Series No.	Note
E-1	Wireless Keyboard and 3D Controller	N/A	220-00069	N/A	EUT
E-2	Adapter	N/A	DSA-20PFE-12 FUS 096200	N/A	Auxiliary Equipment
E-3	Notebook	Lenove	Thinkpad Edge E430	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	USB cable	NO	NO	1.2m	
C-2	USB cable	NO	NO	0.8m	

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.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2015.12.22	2016.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05	1 year
12	Test Cable	N/A	R-01	N/A	2015.07.06	2016.07.05	1 year
13	Test Cable	N/A	R-02	N/A	2015.07.06	2016.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2015.06.06	2016.06.05	1 year
2	LISN	R&S	ENV216	101313	2015.08.24	2016.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2015.08.24	2016.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2015.06.07	2016.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2015.06.08	2016.06.07	1 year
7	Test Cable	N/A	C01	N/A	2015.06.08	2016.06.07	1 year
8	Test Cable	N/A	C02	N/A	2015.06.08	2016.06.07	1 year
9	Test Cable	N/A	C03	N/A	2015.06.08	2016.06.07	1 year

1	Attenuation	MCE	24-10-34	BN9258	2015.06.08	2016.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	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

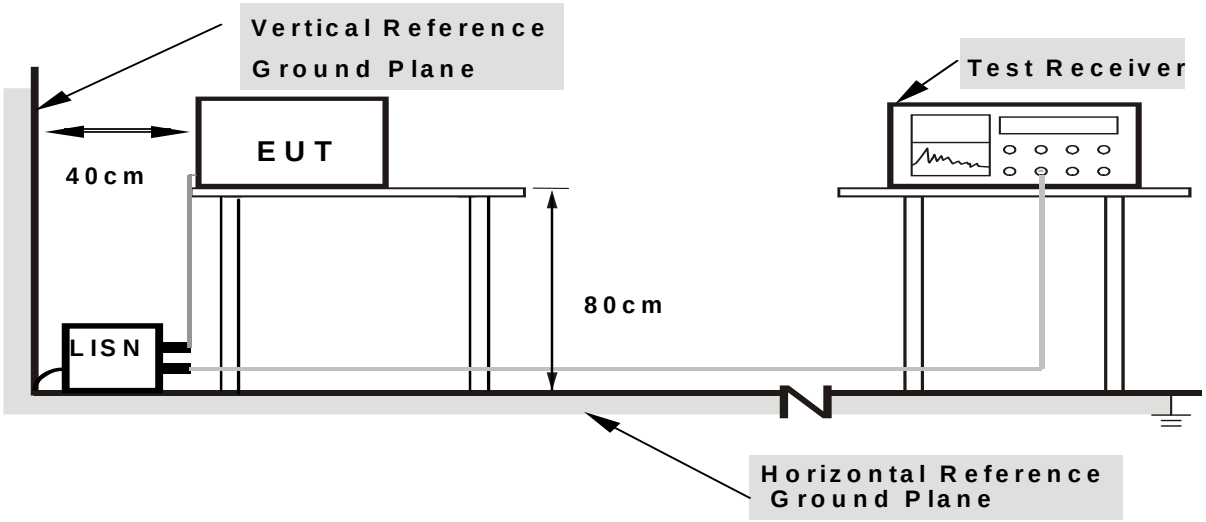
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 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 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 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

3.1.5 EUT OPERATING CONDITIONS

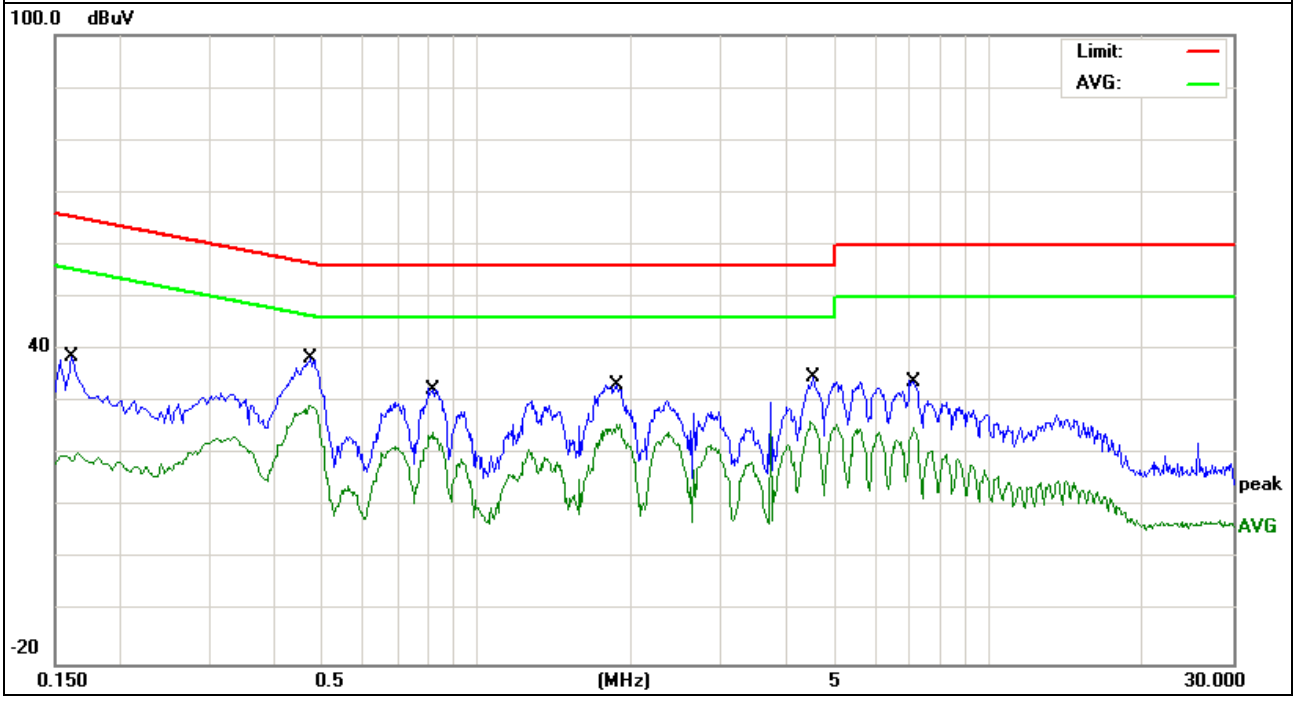
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form Adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1620	28.38	10.12	38.50	65.36	-26.86	QP
0.1620	10.22	10.12	20.34	55.36	-35.02	AVG
0.4699	28.58	9.87	38.45	56.52	-18.07	QP
0.4699	19.48	9.87	29.35	46.52	-17.17	AVG
0.8219	22.95	9.81	32.76	56.00	-23.24	QP
0.8219	14.34	9.81	24.15	46.00	-21.85	AVG
1.8859	23.56	9.74	33.30	56.00	-22.70	QP
1.8859	15.97	9.74	25.71	46.00	-20.29	AVG
4.4898	24.87	9.75	34.62	56.00	-21.38	QP
4.4898	16.53	9.75	26.28	46.00	-19.72	AVG
7.1299	24.37	9.77	34.14	60.00	-25.86	QP
7.1299	15.47	9.77	25.24	50.00	-24.76	AVG

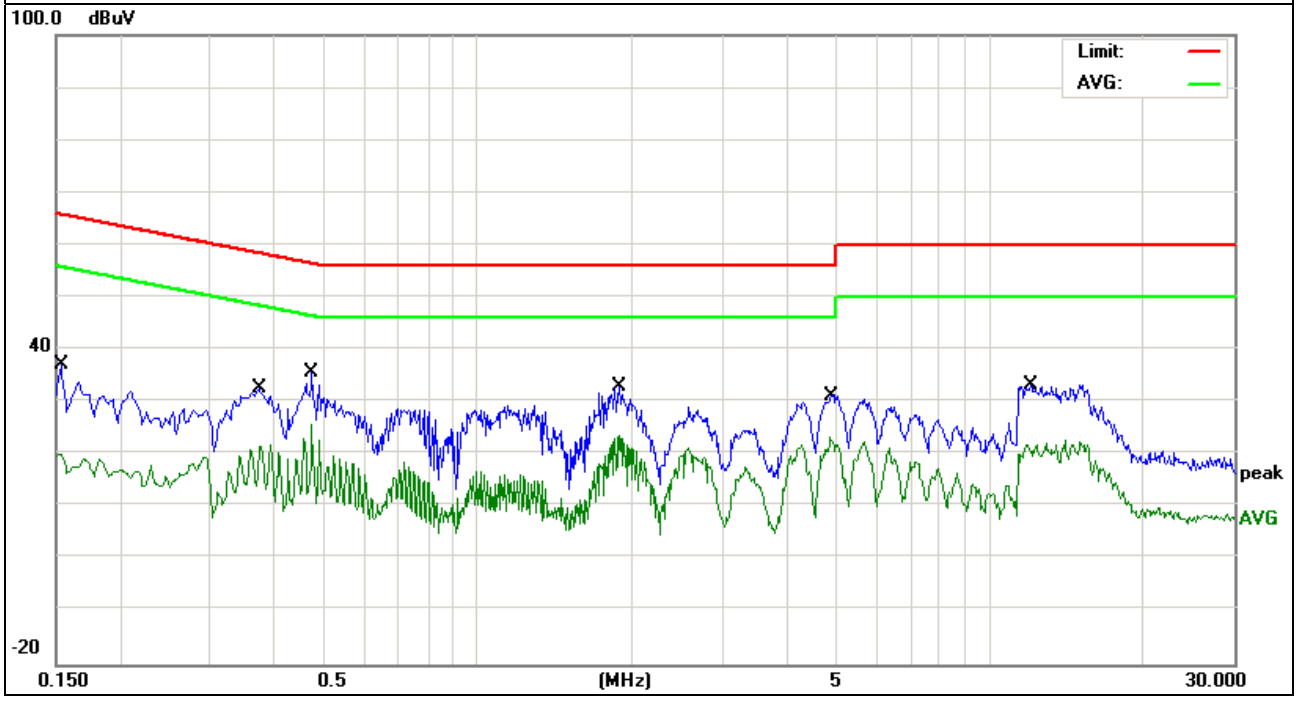
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form Adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1539	27.00	10.08	37.08	65.78	-28.70	QP
0.1539	10.08	10.08	20.16	55.78	-35.62	AVG
0.3738	22.48	10.07	32.55	58.41	-25.86	QP
0.3738	11.84	10.07	21.91	48.41	-26.50	AVG
0.4738	25.68	9.88	35.56	56.45	-20.89	QP
0.4738	15.91	9.88	25.79	46.45	-20.66	AVG
1.8898	23.26	9.76	33.02	56.00	-22.98	QP
1.8898	13.84	9.76	23.60	46.00	-22.40	AVG
4.8939	21.61	9.73	31.34	56.00	-24.66	QP
4.8939	13.65	9.73	23.38	46.00	-22.62	AVG
11.9977	23.36	9.78	33.14	60.00	-26.86	QP
11.9977	12.04	9.78	21.82	50.00	-28.18	AVG

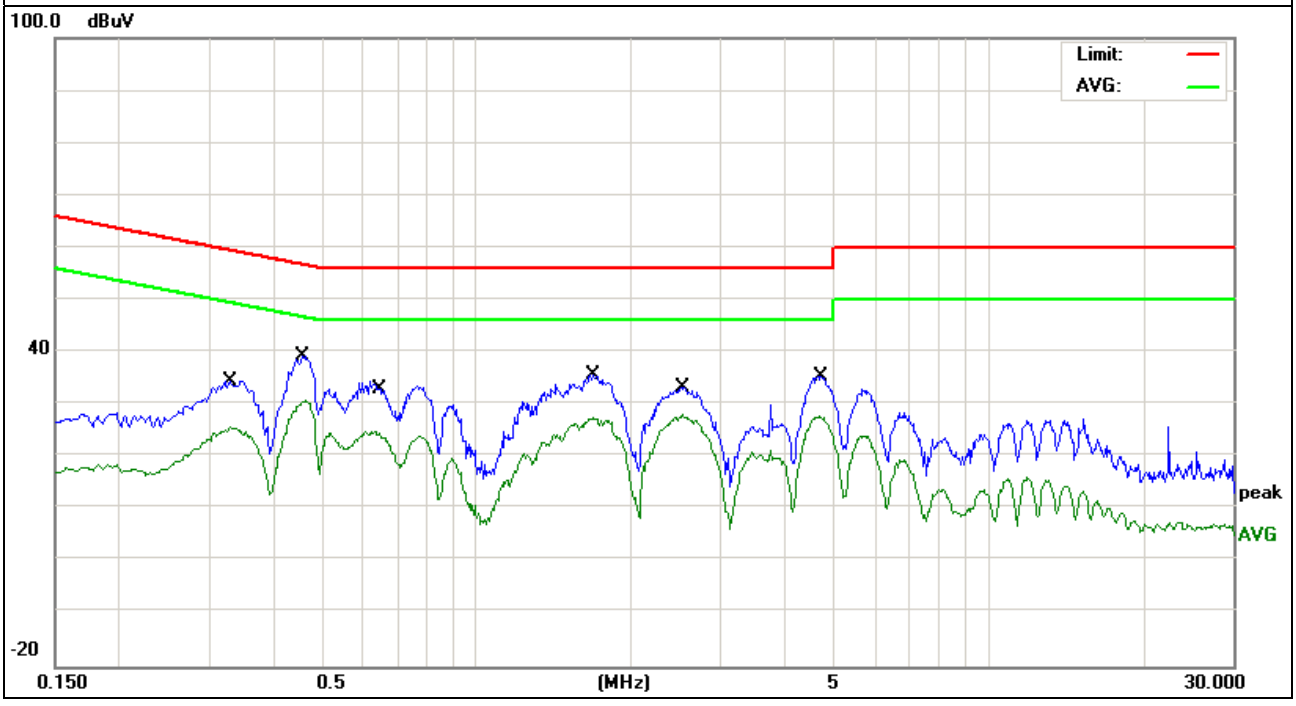
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form Adapter AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3300	24.45	10.11	34.56	59.45	-24.89	QP
0.3300	15.55	10.11	25.66	49.45	-23.79	AVG
0.4620	29.34	9.89	39.23	56.66	-17.43	QP
0.4620	21.00	9.89	30.89	46.66	-15.77	AVG
0.6460	23.80	9.79	33.59	56.00	-22.41	QP
0.6460	14.70	9.79	24.49	46.00	-21.51	AVG
1.6819	25.92	9.77	35.69	56.00	-20.31	QP
1.6819	17.82	9.77	27.59	46.00	-18.41	AVG
2.5219	23.64	9.74	33.38	56.00	-22.62	QP
2.5219	18.28	9.74	28.02	46.00	-17.98	AVG
4.6738	25.58	9.75	35.33	56.00	-20.67	QP
4.6738	18.02	9.75	27.77	46.00	-18.23	AVG

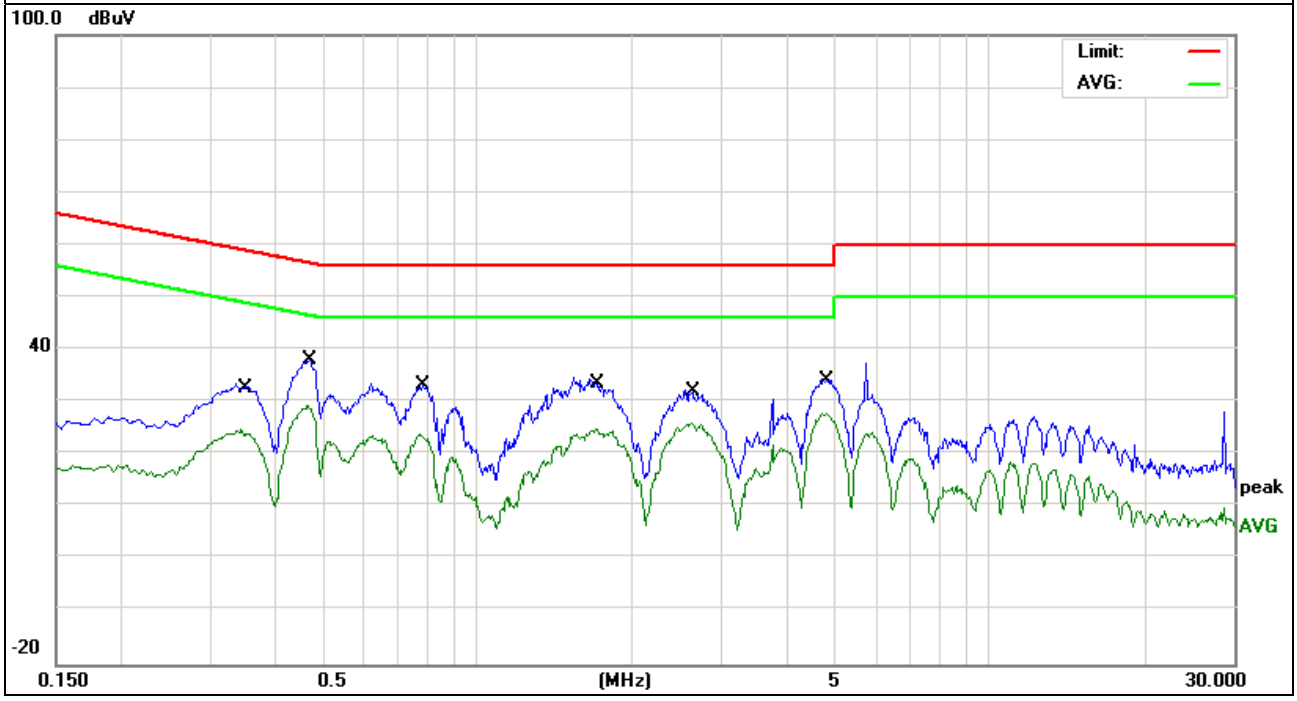
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form Adapter AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3459	23.36	10.09	33.45	59.06	-25.61	QP
0.3459	14.66	10.09	24.75	49.06	-24.31	AVG
0.4660	28.15	9.90	38.05	56.58	-18.53	QP
0.4660	19.58	9.90	29.48	46.58	-17.10	AVG
0.7740	23.56	9.82	33.38	56.00	-22.62	QP
0.7740	14.02	9.82	23.84	46.00	-22.16	AVG
1.7099	24.96	9.78	34.74	56.00	-21.26	QP
1.7099	14.98	9.78	24.76	46.00	-21.24	AVG
2.6179	22.58	9.74	32.32	56.00	-23.68	QP
2.6179	16.35	9.74	26.09	46.00	-19.91	AVG
4.8178	24.75	9.73	34.48	56.00	-21.52	QP
4.8178	18.24	9.73	27.97	46.00	-18.03	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

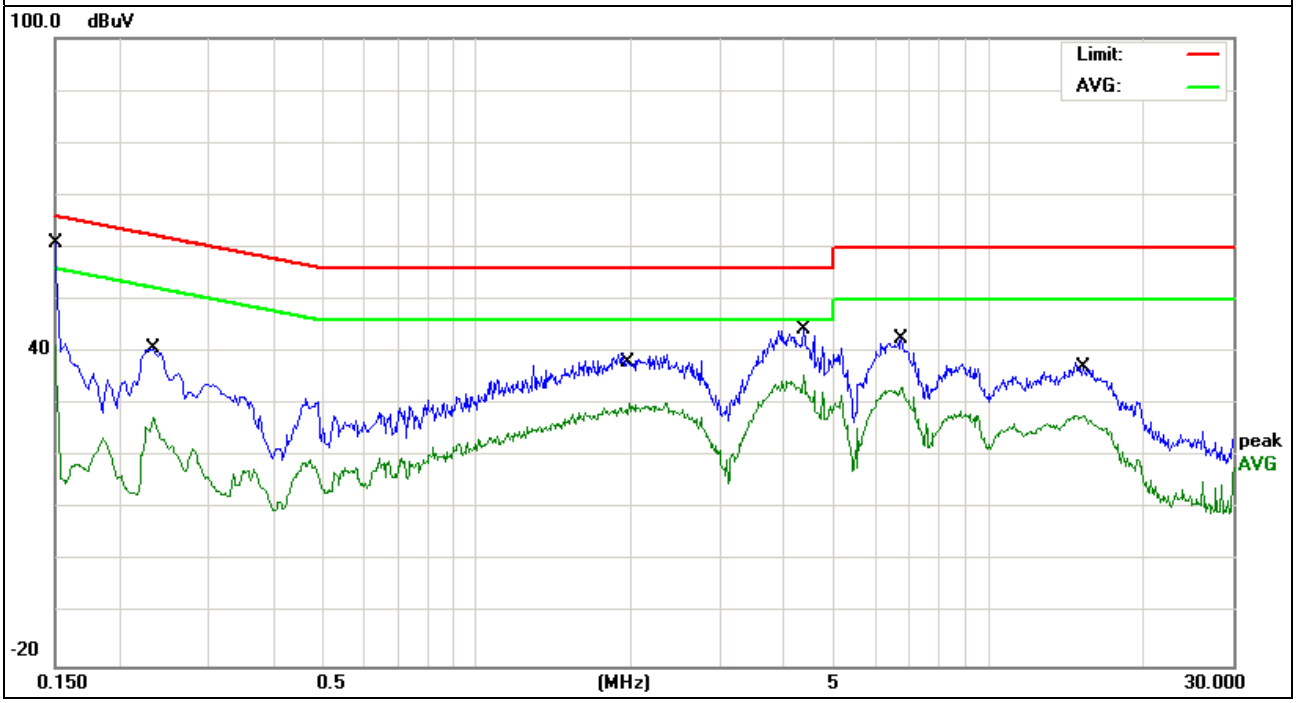


Note: pre-test all of charging mode, this mode is worst case, only provide the worst case in report.

EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form PC AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1500	50.75	10.12	60.87	65.99	-5.12	QP
0.1500	31.26	10.12	41.38	55.99	-14.61	AVG
0.2340	30.47	10.13	40.60	62.30	-21.70	QP
0.2340	17.33	10.13	27.46	52.30	-24.84	AVG
1.9859	30.16	9.73	39.89	56.00	-16.11	QP
1.9859	20.42	9.73	30.15	46.00	-15.85	AVG
4.3459	34.61	9.75	44.36	56.00	-11.64	QP
4.3459	25.91	9.75	35.66	46.00	-10.34	AVG
6.7698	32.76	9.77	42.53	60.00	-17.47	QP
6.7698	23.36	9.77	33.13	50.00	-16.87	AVG
15.3939	28.09	9.87	37.96	60.00	-22.04	QP
15.3939	18.12	9.87	27.99	50.00	-22.01	AVG

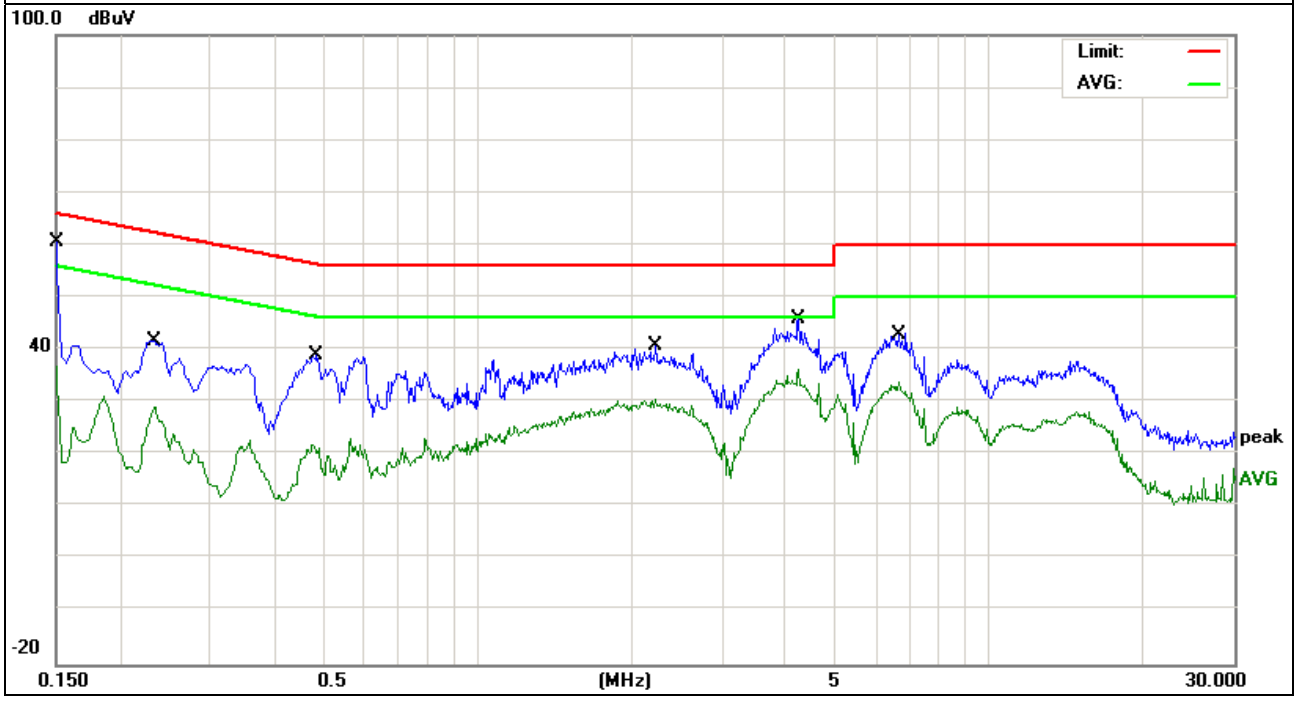
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form PC AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1500	50.47	10.08	60.55	65.99	-5.44	QP
0.1500	26.67	10.08	36.75	55.99	-19.24	AVG
0.2340	31.61	10.06	41.67	62.30	-20.63	QP
0.2340	19.05	10.06	29.11	52.30	-23.19	AVG
0.4859	29.05	9.85	38.90	56.24	-17.34	QP
0.4859	12.10	9.85	21.95	46.24	-24.29	AVG
2.2259	30.87	9.75	40.62	56.00	-15.38	QP
2.2259	20.80	9.75	30.55	46.00	-15.45	AVG
4.2259	36.02	9.72	45.74	56.00	-10.26	QP
4.2259	26.62	9.72	36.34	46.00	-9.66	AVG
6.6498	33.31	9.74	43.05	60.00	-16.95	QP
6.6498	24.05	9.74	33.79	50.00	-16.21	AVG

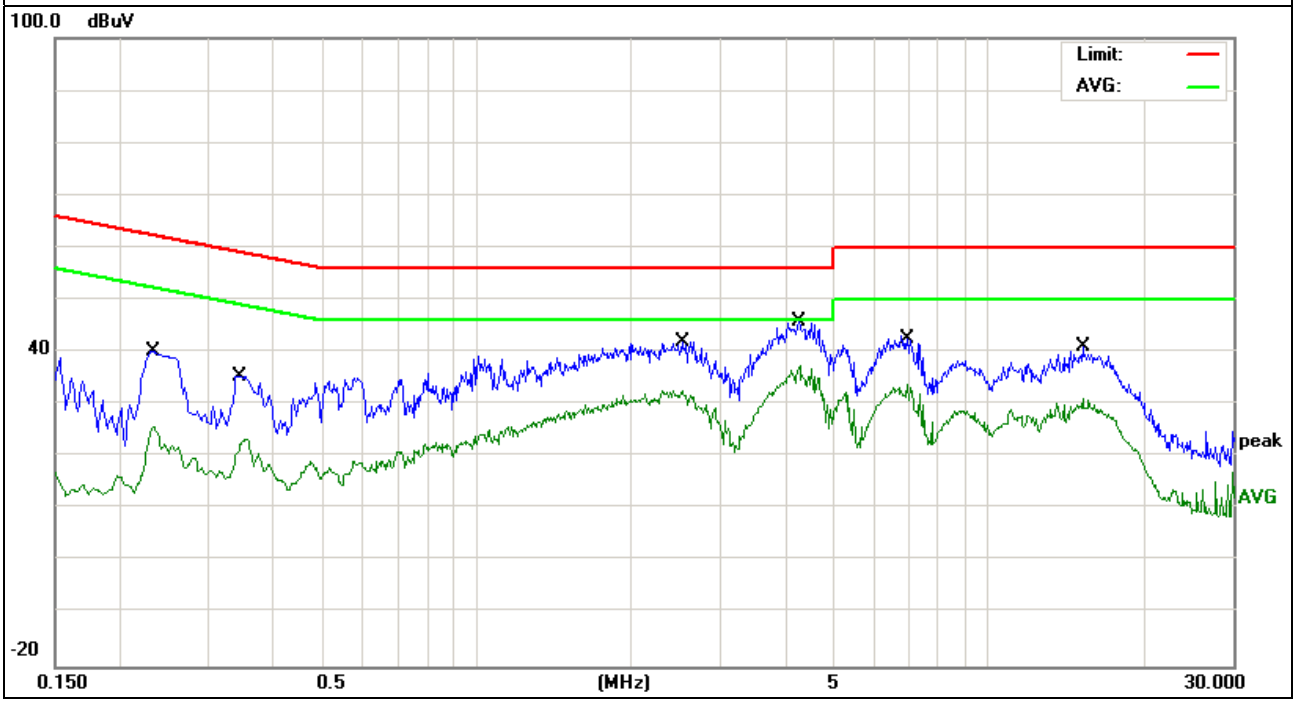
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form PC AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2340	30.15	10.13	40.28	62.30	-22.02	QP
0.2340	15.67	10.13	25.80	52.30	-26.50	AVG
0.3459	25.35	10.09	35.44	59.06	-23.62	QP
0.3459	13.35	10.09	23.44	49.06	-25.62	AVG
2.5178	32.35	9.74	42.09	56.00	-13.91	QP
2.5178	22.95	9.74	32.69	46.00	-13.31	AVG
4.2698	36.24	9.75	45.99	56.00	-10.01	QP
4.2698	27.56	9.75	37.31	46.00	-8.69	AVG
6.9378	33.33	9.77	43.10	60.00	-16.90	QP
6.9378	24.00	9.77	33.77	50.00	-16.23	AVG
15.2779	31.18	9.86	41.04	60.00	-18.96	QP
15.2779	21.15	9.86	31.01	50.00	-18.99	AVG

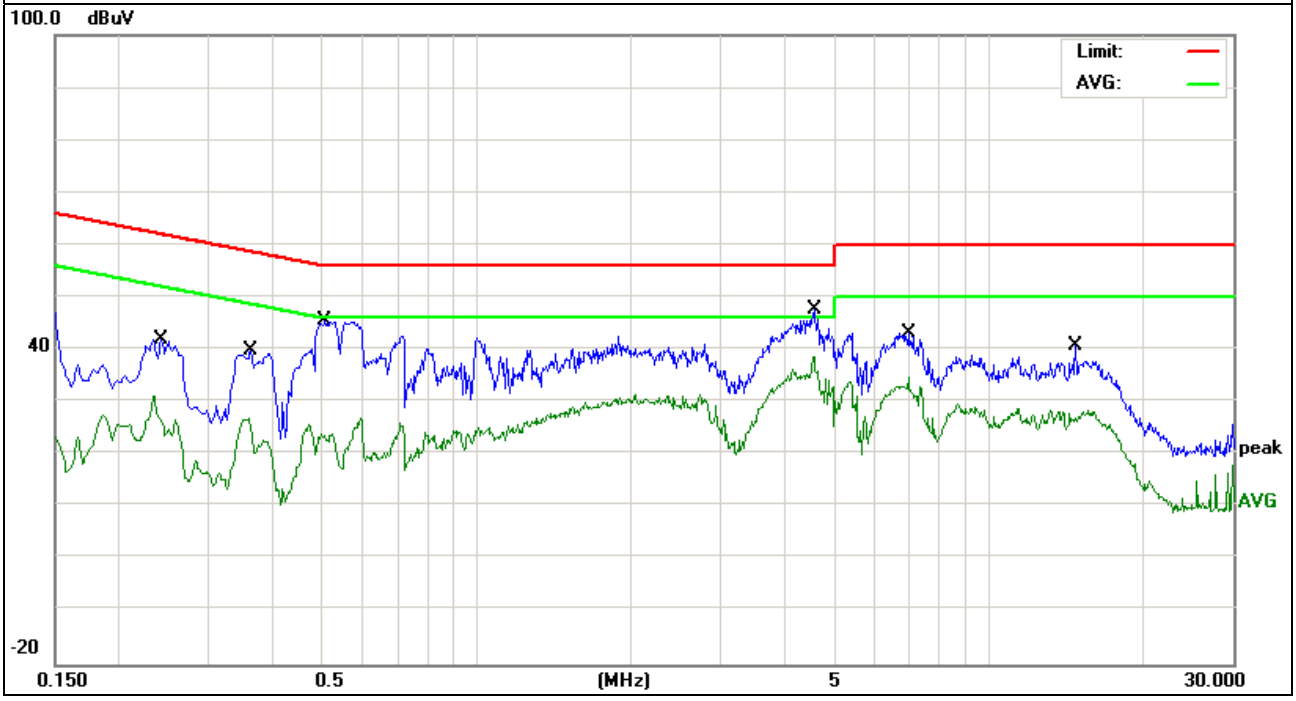
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form PC AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2419	31.93	10.07	42.00	62.03	-20.03	QP
0.2419	21.06	10.07	31.13	52.03	-20.90	AVG
0.3619	29.75	10.08	39.83	58.68	-18.85	QP
0.3619	16.87	10.08	26.95	48.68	-21.73	AVG
0.5060	35.64	9.82	45.46	56.00	-10.54	QP
0.5060	17.09	9.82	26.91	46.00	-19.09	AVG
4.5579	38.08	9.72	47.80	56.00	-8.20	QP
4.5579	29.05	9.72	38.77	46.00	-7.23	AVG
6.9659	33.55	9.74	43.29	60.00	-16.71	QP
6.9659	25.11	9.74	34.85	50.00	-15.15	AVG
14.8018	30.85	9.80	40.65	60.00	-19.35	QP
14.8018	18.51	9.80	28.31	50.00	-21.69	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Note: pre-test all of charging mode, this mode is worst case, only provide the worst case in report.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

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 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. 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 for below 1GHz and 1.5m for above 1GHz; 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 Quasi Peak 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 EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(Z orientation).

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

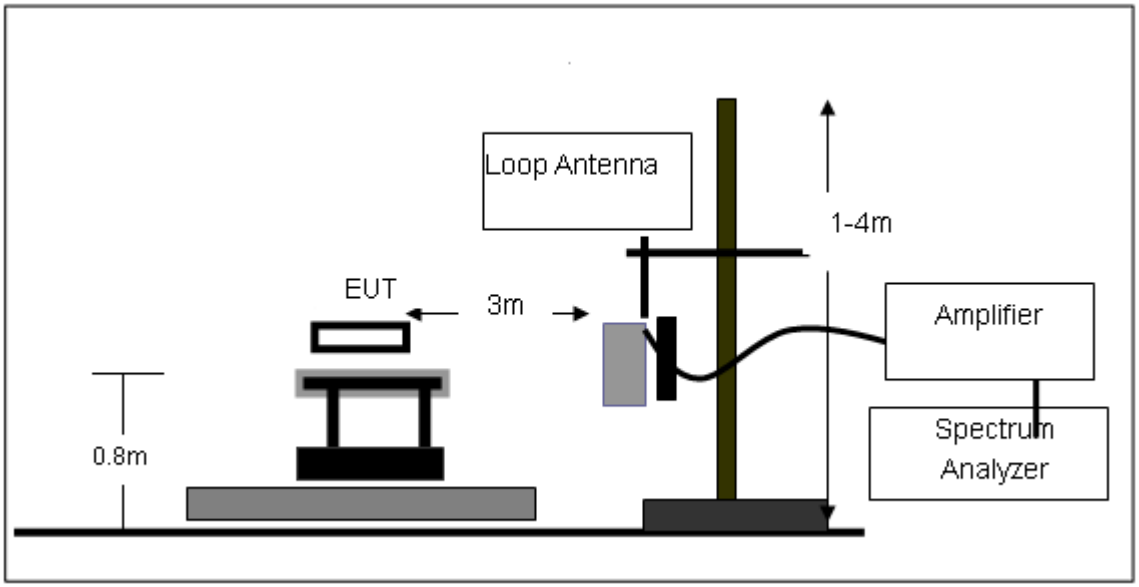
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

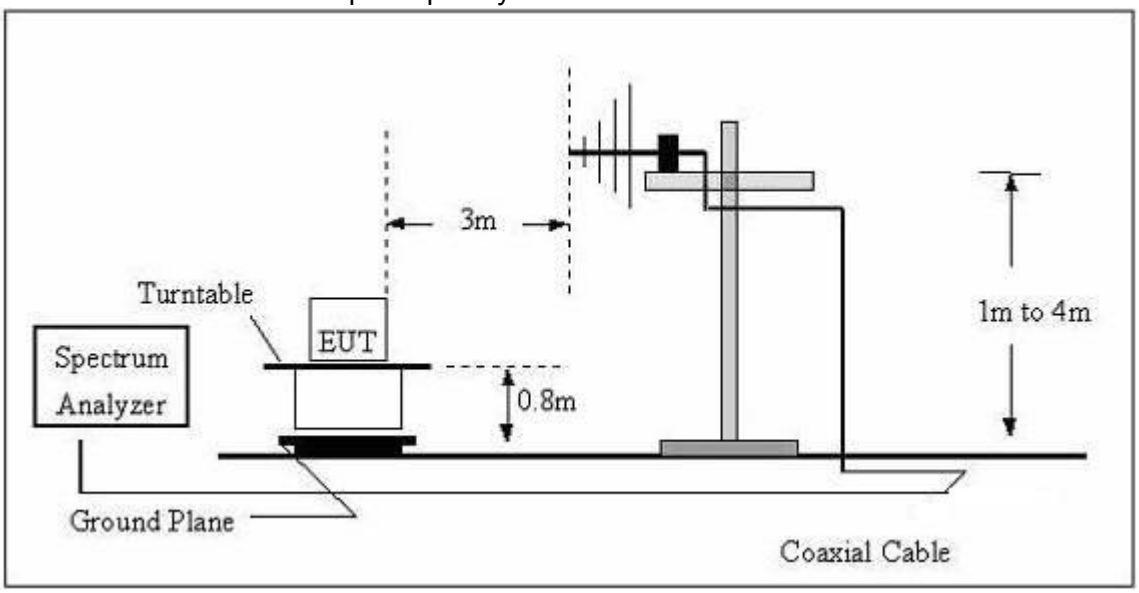
No deviation

3.2.4 TEST SETUP

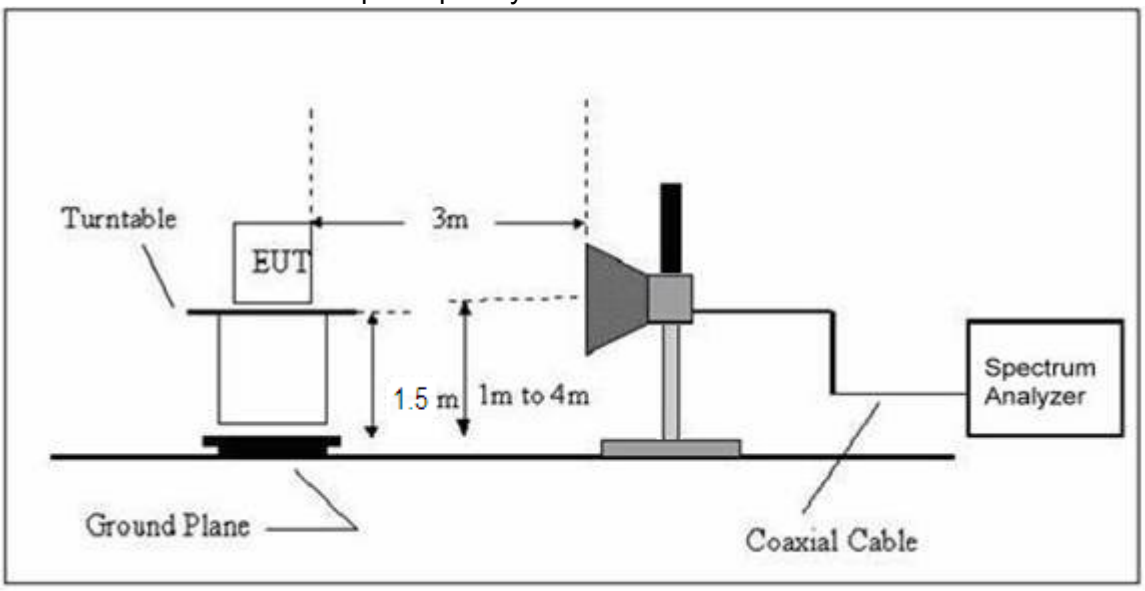
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT 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 (BETWEEN 9KHZ – 30 MHZ)

EUT：	Wireless Keyboard and 3D Controller	Model Name. ：	220-00069
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX	Polarization :	--

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

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.

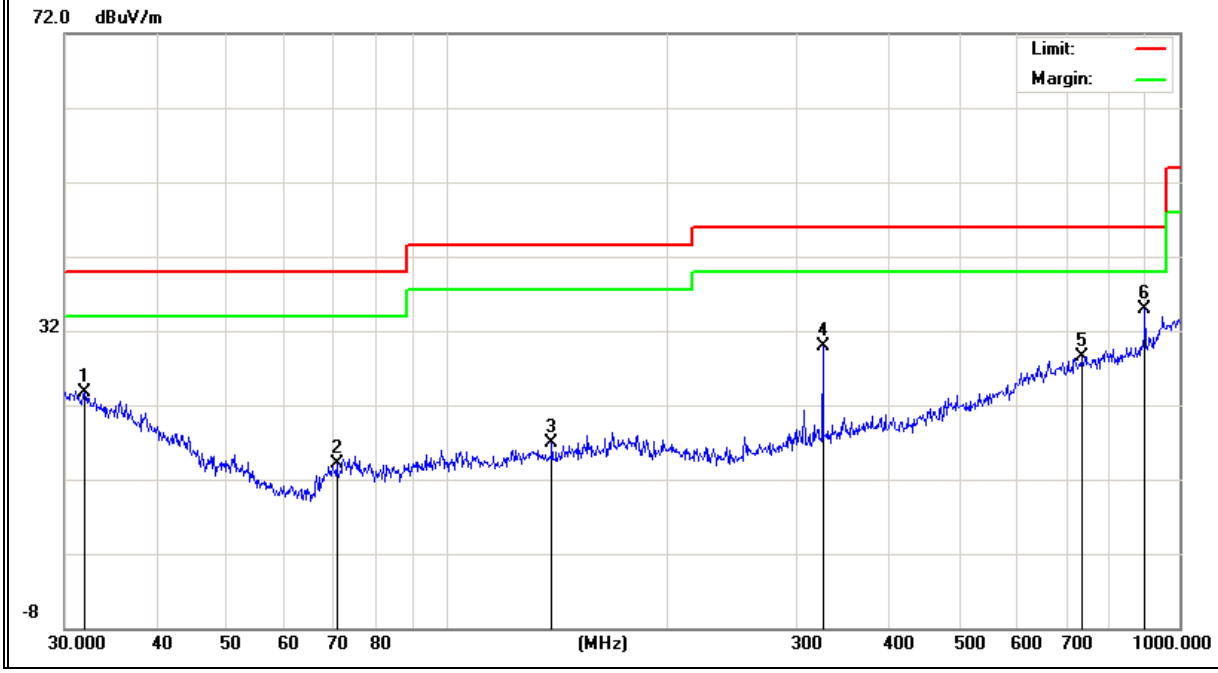
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	31.9543	4.87	18.87	23.74	40.00	-16.26	QP
V	70.5836	4.90	9.13	14.03	40.00	-25.97	QP
V	138.8735	5.90	11.00	16.90	43.50	-26.60	QP
V	325.5957	16.37	13.46	29.83	46.00	-16.17	QP
V	737.0714	6.52	21.93	28.45	46.00	-17.55	QP
V	896.9963	10.78	24.06	34.84	46.00	-11.16	QP

Remark:

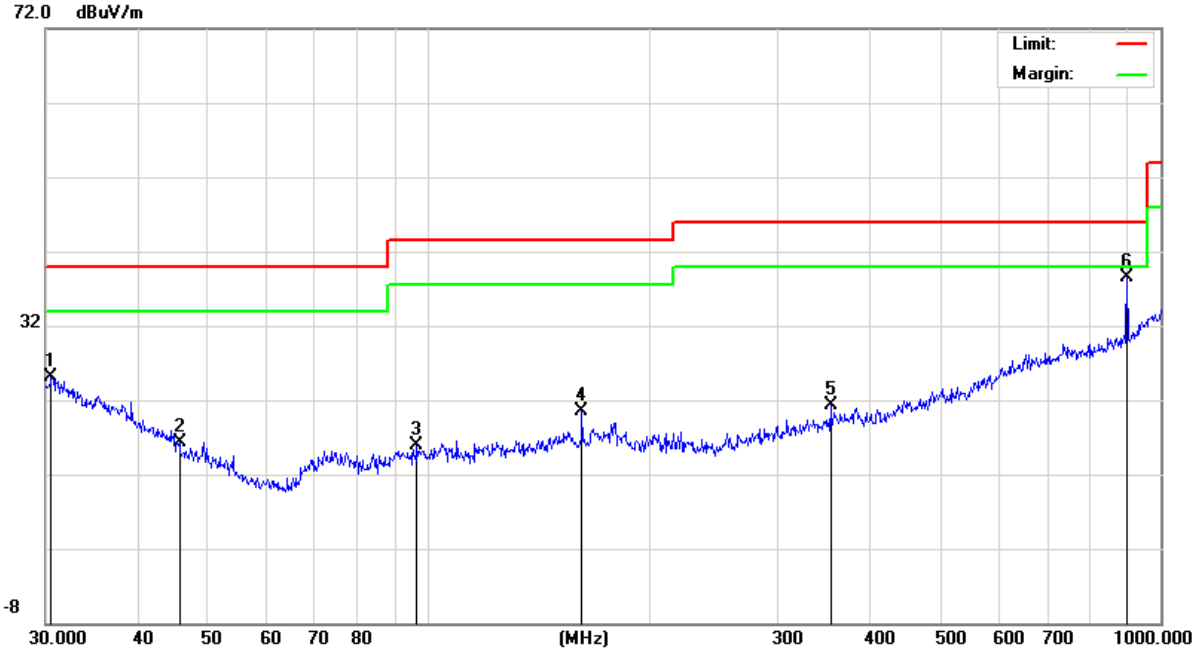
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	30.5304	5.63	19.38	25.01	40.00	-14.99	QP
H	45.6948	5.47	10.92	16.39	40.00	-23.61	QP
H	96.4361	5.66	10.22	15.88	43.50	-27.62	QP
H	162.0414	8.99	11.56	20.55	43.50	-22.95	QP
H	354.1831	7.14	14.21	21.35	46.00	-24.65	QP
H	900.1471	14.36	24.09	38.45	46.00	-7.55	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX		

The Testing have been conformed to 10*2480MHz=24800MHz, and the worst result was report as below:

Frequency (MHz)	Reading (dBμV)	Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark	Polar (H/V)
Low Channel (2402 MHz)-Above 1G							
4804.115	59.82	-3.64	56.18	74.00	-17.82	Pk	Vertical
4804.115	40.11	-3.64	36.47	54.00	-17.53	AV	Vertical
7206.103	61.28	-0.95	60.33	74.00	-13.67	Pk	Vertical
7206.103	39.67	-0.95	38.72	54.00	-15.28	AV	Vertical
4804.229	62.25	-3.64	58.61	74.00	-15.39	Pk	Horizontal
4804.229	38.76	-3.64	35.12	54.00	-18.88	AV	Horizontal
7206.247	59.52	-0.95	58.57	74.00	-15.43	Pk	Horizontal
7206.247	38.69	-0.95	37.74	54.00	-16.26	AV	Horizontal
Mid Channel (2440 MHz)-Above 1G							
4880.156	53.17	-3.68	49.49	74.00	-24.51	Pk	Vertical
4880.156	46.58	-3.68	42.90	54.00	-11.10	AV	Vertical
7320.193	62.29	-0.82	61.47	74.00	-12.53	Pk	Vertical
7320.193	42.87	-0.82	42.05	54.00	-11.95	AV	Vertical
4880.334	63.69	-3.68	60.01	74.00	-13.99	Pk	Horizontal
4880.334	41.15	-3.68	37.47	54.00	-16.53	AV	Horizontal
7320.292	61.09	-0.82	60.27	74.00	-13.73	Pk	Horizontal
7320.292	44.64	-0.82	43.82	54.00	-10.18	AV	Horizontal
High Channel (2480MHz)- Above 1G							
4960.299	62.97	-3.59	59.38	74.00	-14.62	Pk	Vertical
4960.299	42.46	-3.59	38.87	54.00	-15.13	AV	Vertical
7440.158	59.53	-0.68	58.85	74.00	-15.15	Pk	Vertical
7440.158	43.62	-0.68	42.94	54.00	-11.06	AV	Vertical
4960.391	59.85	-3.59	56.26	74.00	-17.74	Pk	Horizontal
4960.391	41.71	-3.59	38.12	54.00	-15.88	AV	Horizontal
7440.259	60.02	-0.68	59.34	74.00	-14.66	Pk	Horizontal
7440.259	40.13	-0.68	39.45	54.00	-14.55	AV	Horizontal
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit							

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

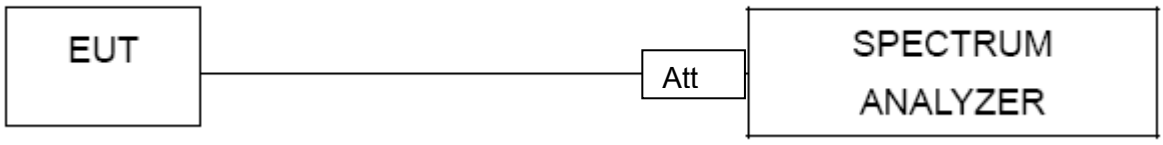
4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. 3 kHz ≤Set the RBW≤100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

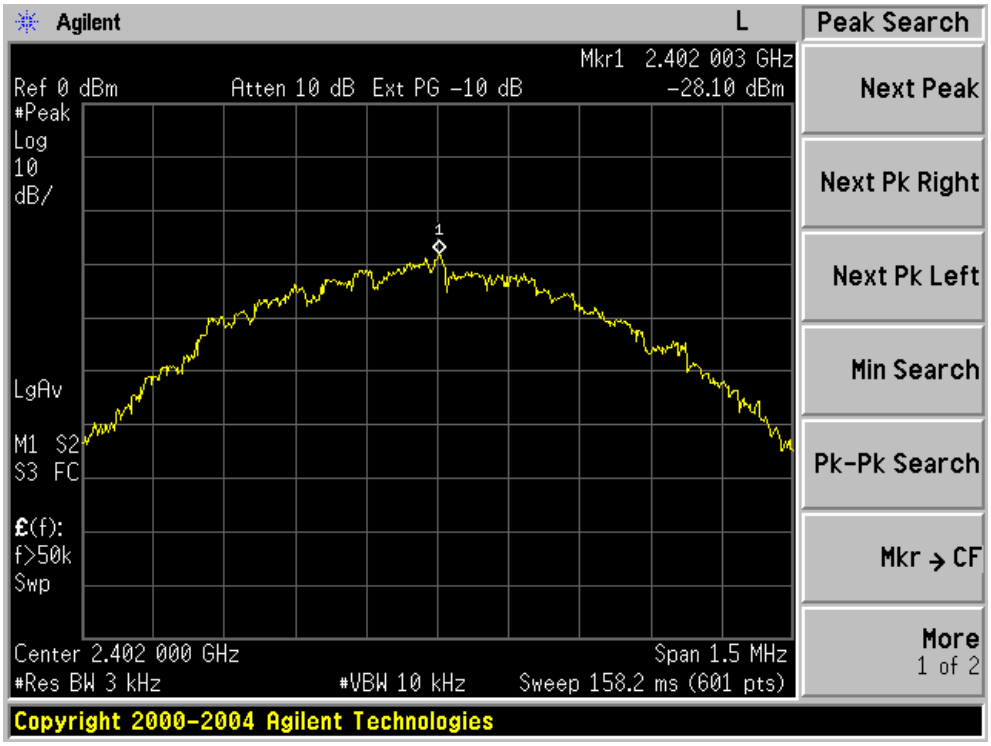
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

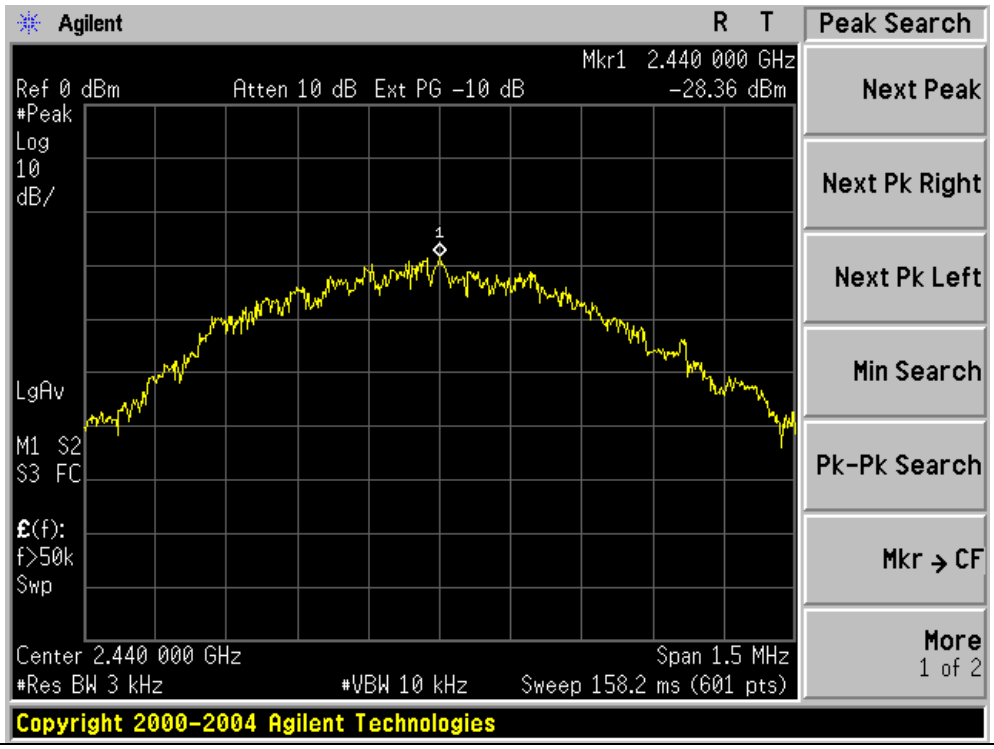
EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

Frequency	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2402 MHz	-28.10	8	PASS
2440 MHz	-28.36	8	PASS
2480 MHz	-28.00	8	PASS

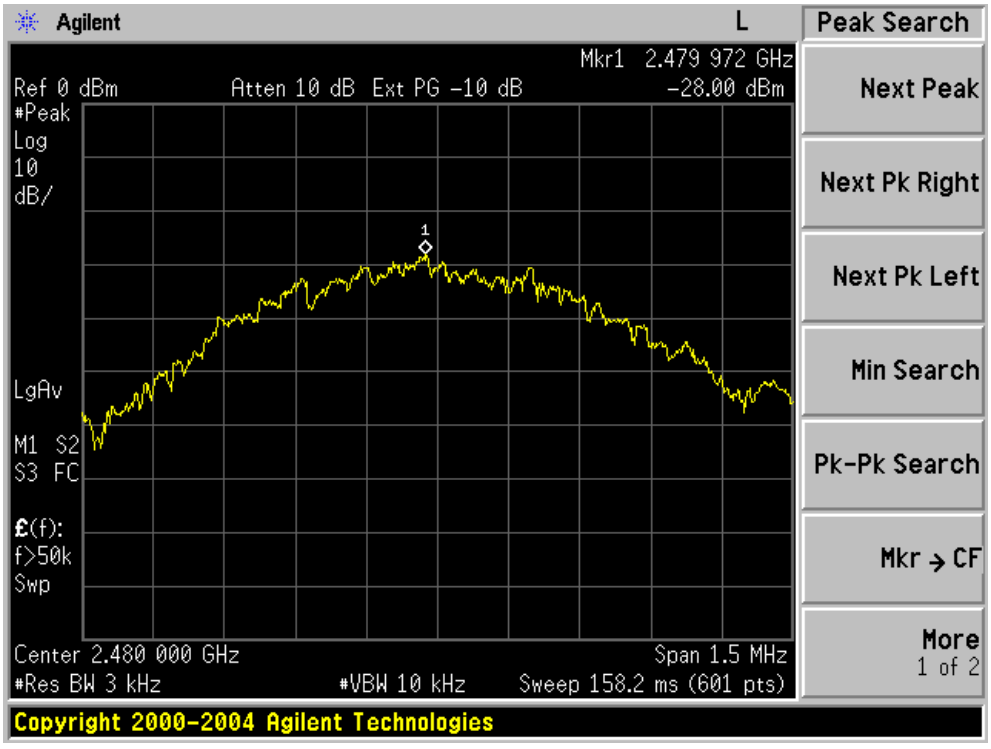
TX CH00



TX CH19



TX CH39



5. BANDWIDTH TEST

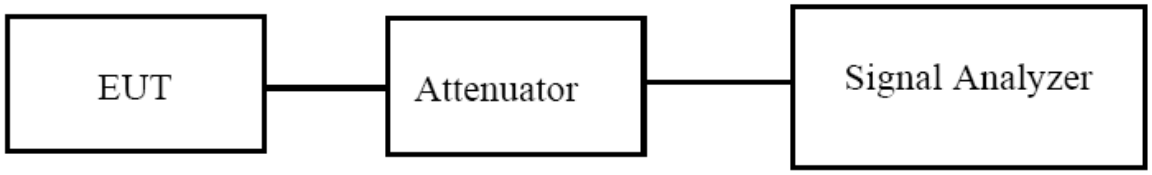
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



5.1.2 EUT OPERATION CONDITIONS

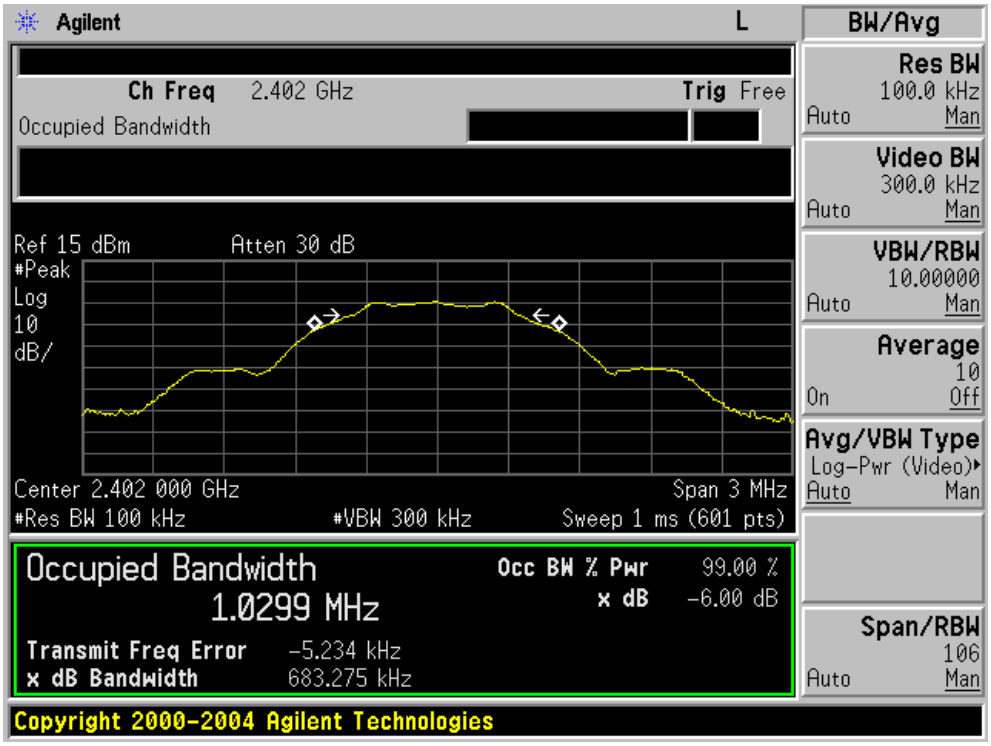
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.3 TEST RESULTS

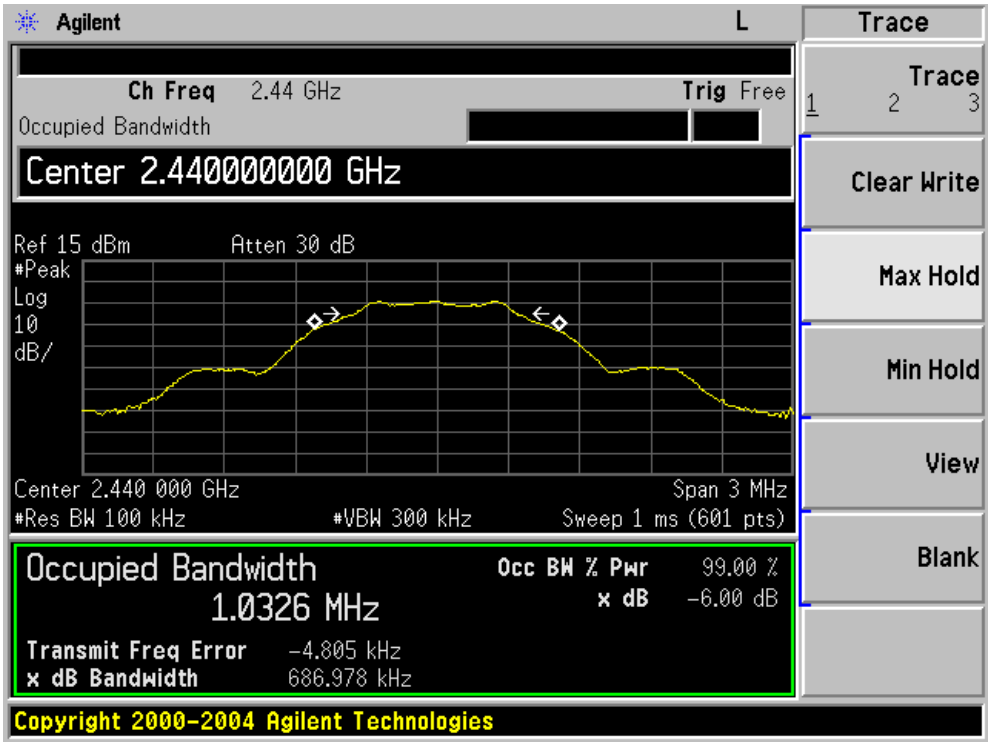
EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2402	683.275	500	Pass
Middle	2440	686.978	500	Pass
High	2480	693.005	500	Pass

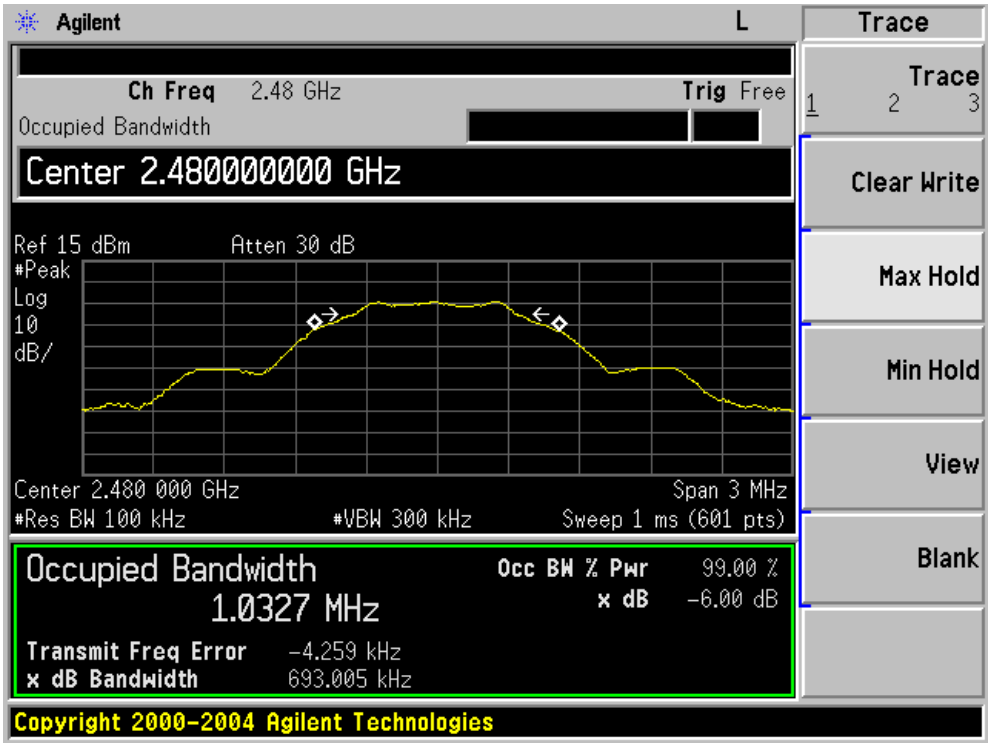
TX CH 00



TX CH 19



TX CH 39



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

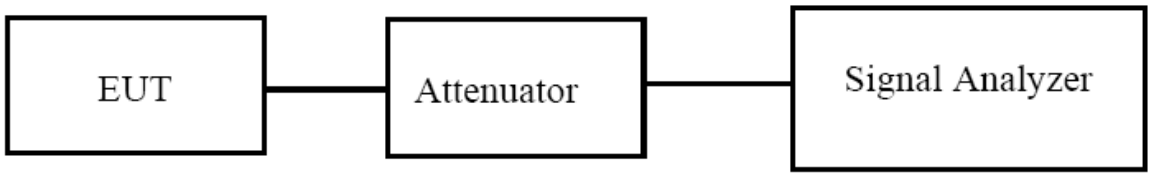
6.1.1 TEST PROCEDURE

a. The EUT was connected to the Signal Analyzer by RF cable and Attenuator.
b. Set the RBW ≧DTS bandwidth
c. Set VBW =3*RBW
d. Set the span ≧3*RBW
e. Set Sweep time = auto couple
f. Set Detector = peak
g. Set to the maximum power setting and enable the EUT transmit continuously.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



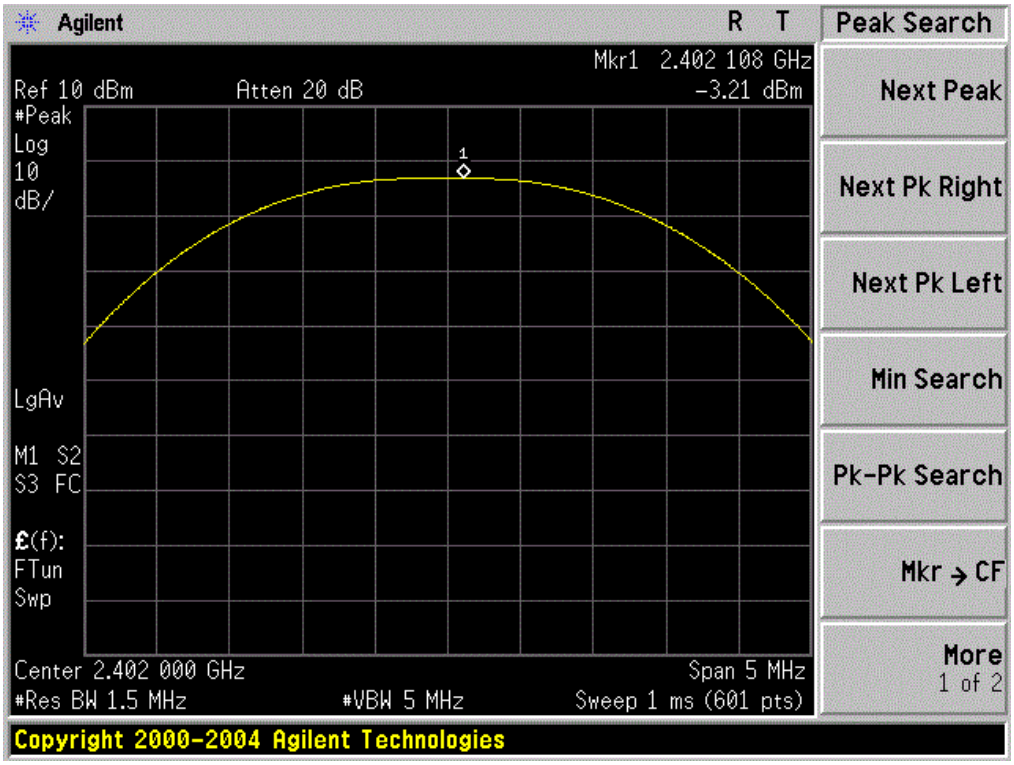
6.1.4 EUT OPERATION CONDITIONS

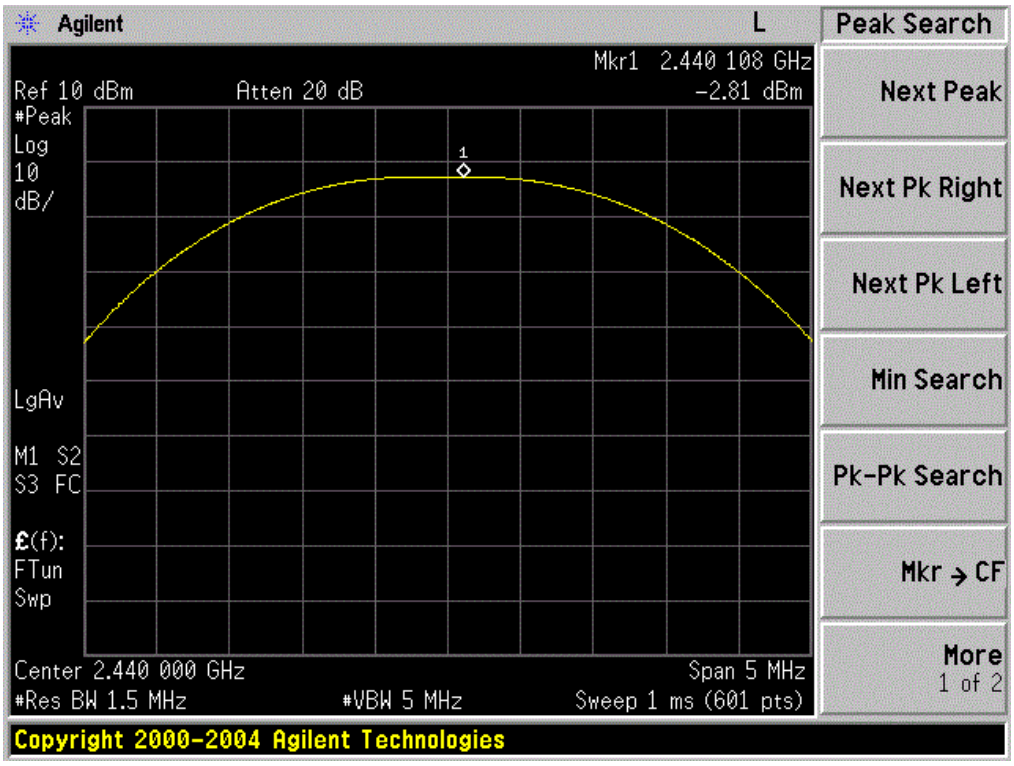
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode		

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	(dBm)
CH01	2402	-3.21	30
CH20	2440	-2.81	30
CH39	2480	-3.30	30




Agilent
L
Peak Search
Mkr1 2.440 108 GHz
Ref 10 dBm
Atten 20 dB
-2.81 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
LgAv
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Center 2.440 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
#VBW 5 MHz
Sweep 1 ms (601 pts)
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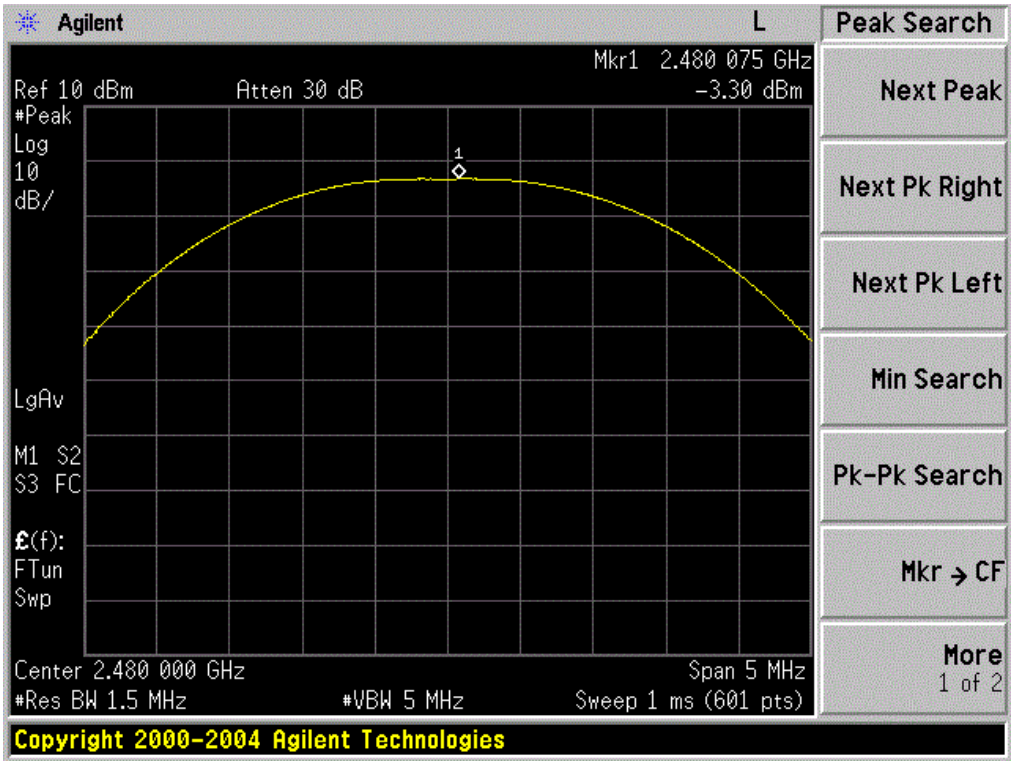
Agilent
L
Peak Search
Mkr1 2.480 075 GHz
Ref 10 dBm
Atten 30 dB
-3.30 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
LgAv
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Center 2.480 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
#VBW 5 MHz
Sweep 1 ms (601 pts)
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7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

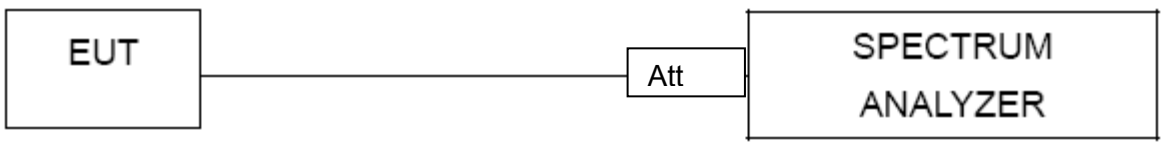
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 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.

7.4 TEST RESULTS

EUT：	Wireless Keyboard and 3D Controller	Model Name ：	220-00069
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V

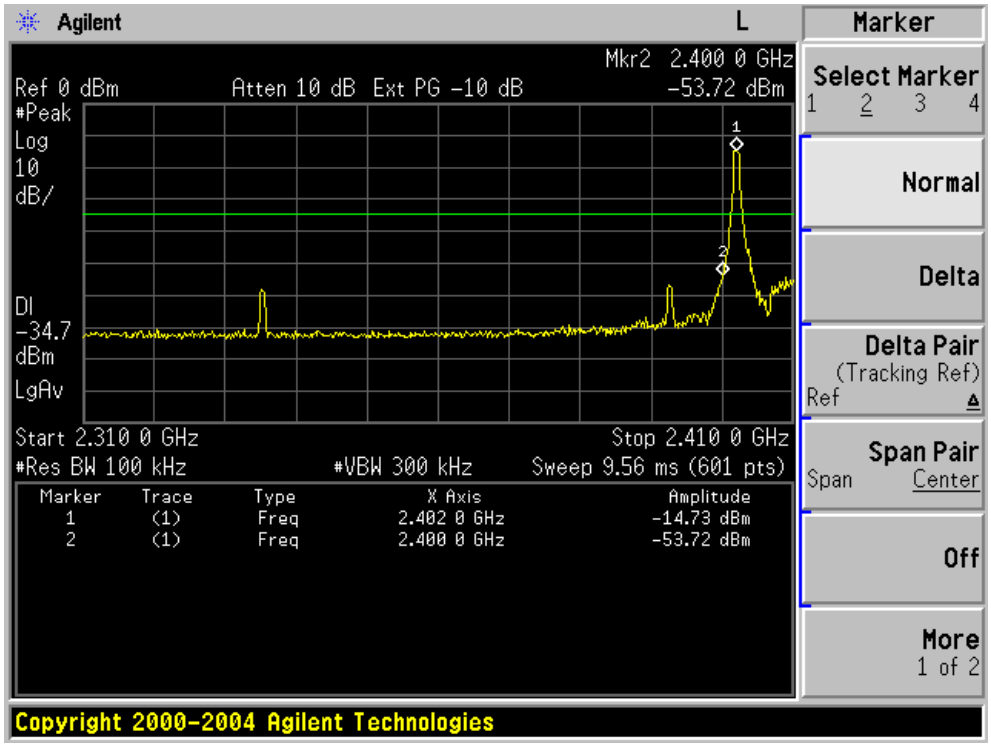
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
Left-band	38.99	20	Pass
Right-band	46.08	20	Pass

Radiated band edge:

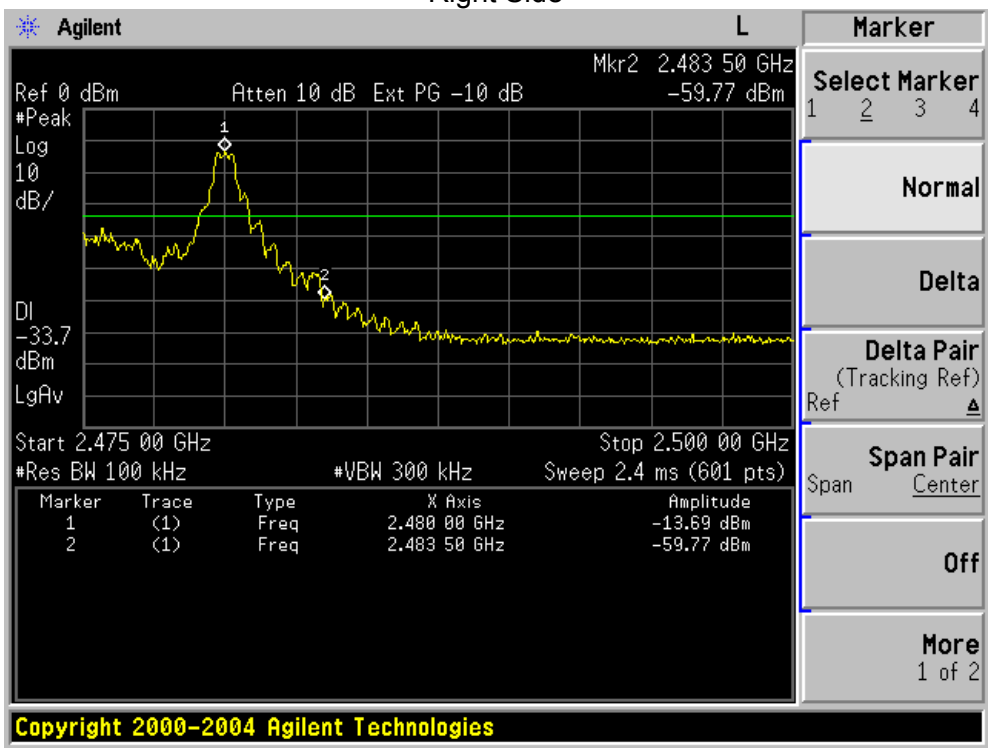
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
2390	58.96	-13.06	45.9	74	-28.10	peak	Vertical
2390	59.21	-13.06	46.15	74	-27.85	peak	Horizontal
2483.5	59.74	-12.78	46.96	74	-27.04	peak	Vertical
2483.5	60.33	-12.78	47.55	74	-26.45	peak	Horizontal

Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average not record.

Left Side



Right Side



8. ANTENNA REQUIREMENT

8.1 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.

8.2 EUT ANTENNA

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