



FCC CERTIFICATION TEST REPORT

FOR

Applicant : Strategic Printing & Mfg Solutions, Inc
Address : 9673 SW Tualatin-Sherwood Rd. Tualatin, Oregon 97062
: USA
Equipment under Test : Wireless Keyboard
Model No : 510WL
FCC ID : PNJ510WL
Manufacturer : Dongguan Togran Electronic Technology Co, Ltd.
Address : 262 Shidan Rd., 3rd Industrial Area, Juzhou, Shijie,
: Dongguan, Guangdong

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City,
Guangdong Province, China, 523808

Tel: +86-0769-22891499 <http://www.dgddt.com>

Report No: DDT-F12070

Issued Date: 2012/08/24

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TEST REPORT DECLARE

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Equipment under Test : Wireless Keyboard

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FCC ID : PNJ510WL

Manufacturer : Dongguan Togran Electronic Technology Co, Ltd.

Address : 262 Shidan Rd., 3rd Industrial Area, Juzhou, Shijie, Dongguan, Guangdong

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C: 2010

Test procedure used: ANSI C63.10:2009

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-F12070		
Date of Test:	2012/08/23—2012/08/23	Date of Report:	2012/08/24
Approved & Authorized Signer :			
		Jamy Yu / Assistant Director	

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

1. Summary of test results

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission Test	FCC Part 15C: 15.207 ANSI C63.10 :2009	N/A
Radiated Emission Test	FCC Part 15C: 15.209 FCC Part 15C: 15.249 ANSI C63.10 :2009	PASS
Band Edge Compliance Test	FCC Part 15: 15.249 ANSI C63.10 :2009	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10 :2009	PASS
N/A is an abbreviation for Not Applicable.		

2. General test information

2.1. Description of EUT

EUT* Name	:	Wireless Keyboard
Model Number	:	510WL
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 3V from battery
FCC ID	:	PNJ510WL
FCC Operation frequency	:	2403MHz -2478MHz
Modulation	:	GFSK
Antenna Type	:	“F” Shape PCB antenna, Gain: 0dBi
Date of Receipt	:	2012/08/06
Sample Type	:	Series production

Note: EUT is the ab. of equipment under test.

2.2. Accessories of EUT

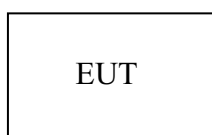
Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other
/	/	/	/

2.4. Block diagram of EUT configuration for test

TX Mode:



Note: For Tx Mode, A special test firmware was installed in the RF chip of EUT and which can exercise the EUT work in continues RF test mode at specified test channel as below:

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
Tx Mode	Low	2403
	Middle	2453
	High	2478

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25°C
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-22891499

FCC Registration Number: 270092

2.7. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.40dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	2.78 dB (Polarize: V)
	3.20 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	2.08dB(Polarize: V)
	2.56dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 20dB Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum analyzer	R&S	FSU	1166.1660.26	2011/11/23	1Y

3.2. Block diagram of test setup



3.3. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

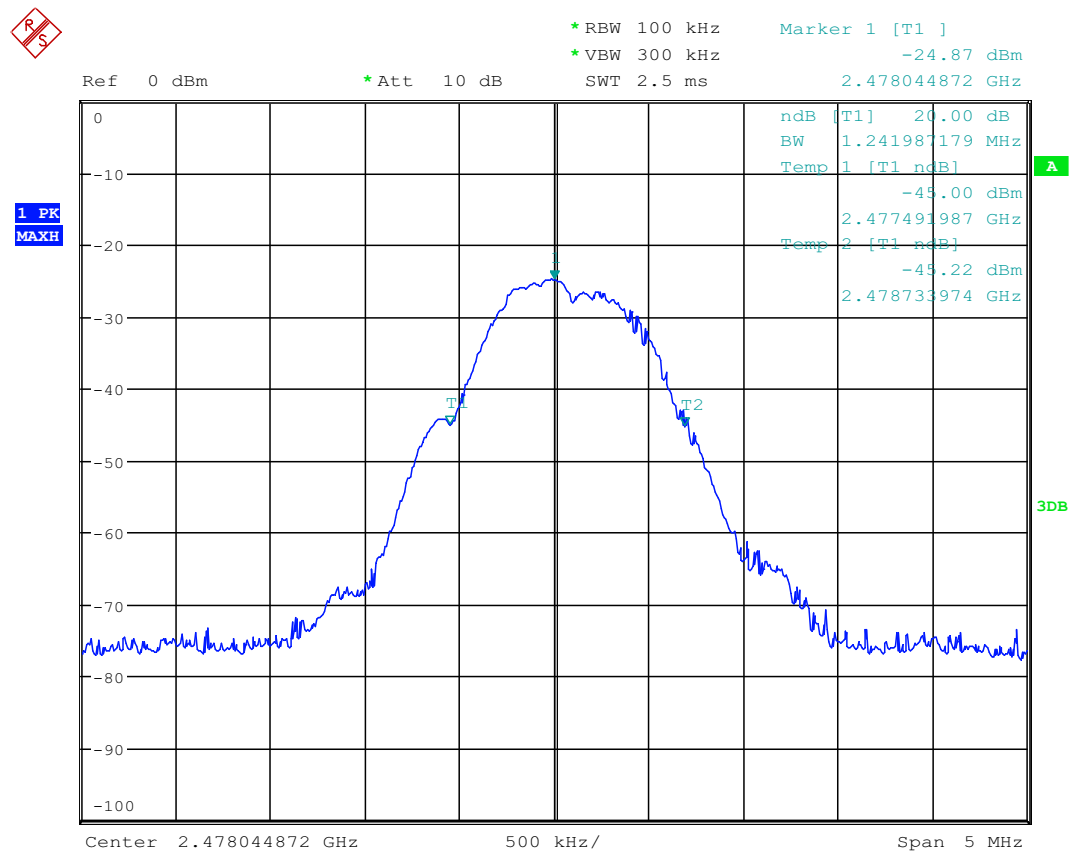
3.4. Test Procedure

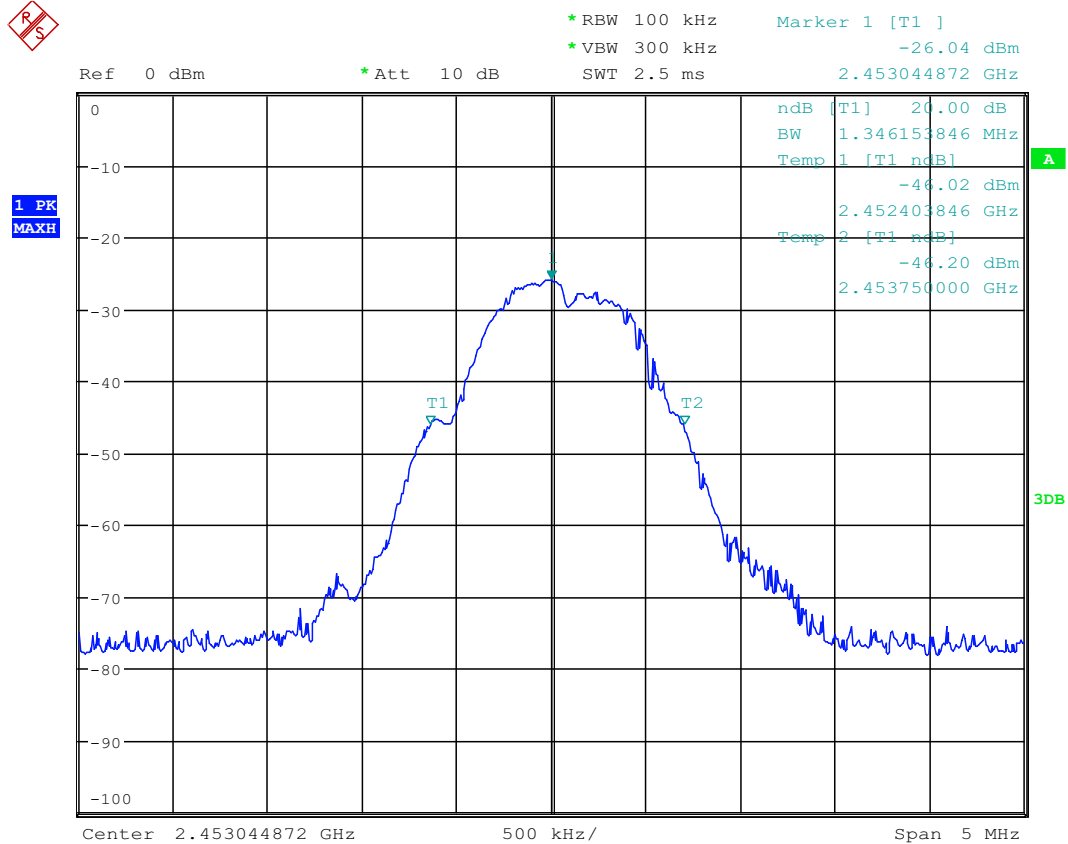
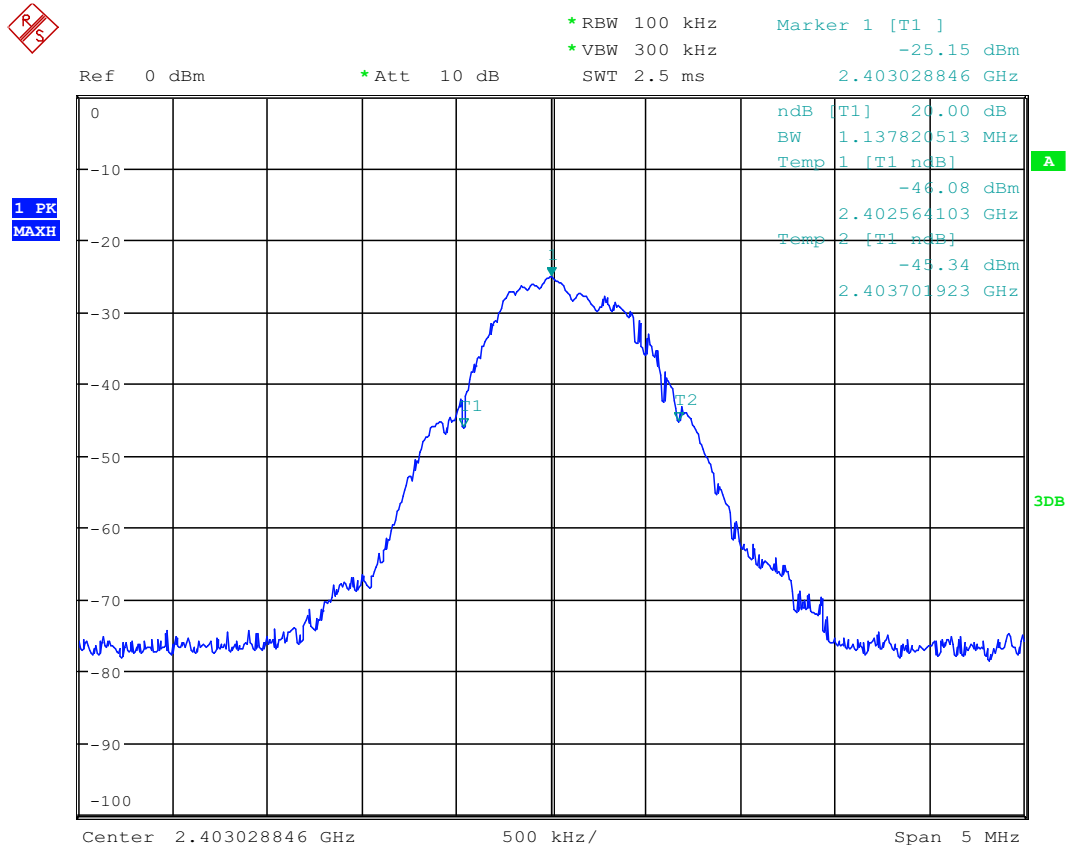
- (1) The EUT's RF signal was coupled to spectrum analyzer by a antenna connected to spectrum analyzer.
- (2) Configure EUT work in Tx mode as stated in clause 2.4.
- (3) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

3.5. Test Result

EUT: Wireless Keyboard M/N: 510WL					
Mode	Freq (MHz)	Result (MHz)	Limit (MHz)	Margin (MHz)	Conclusion
Tx Mode	2403	1.137	/	/	PASS
	2453	1.346	/	/	PASS
	2478	1.241	/	/	PASS
Test Date : 2012/05/13			Test Engineer : Damon_Hu		

3.6. Original test data





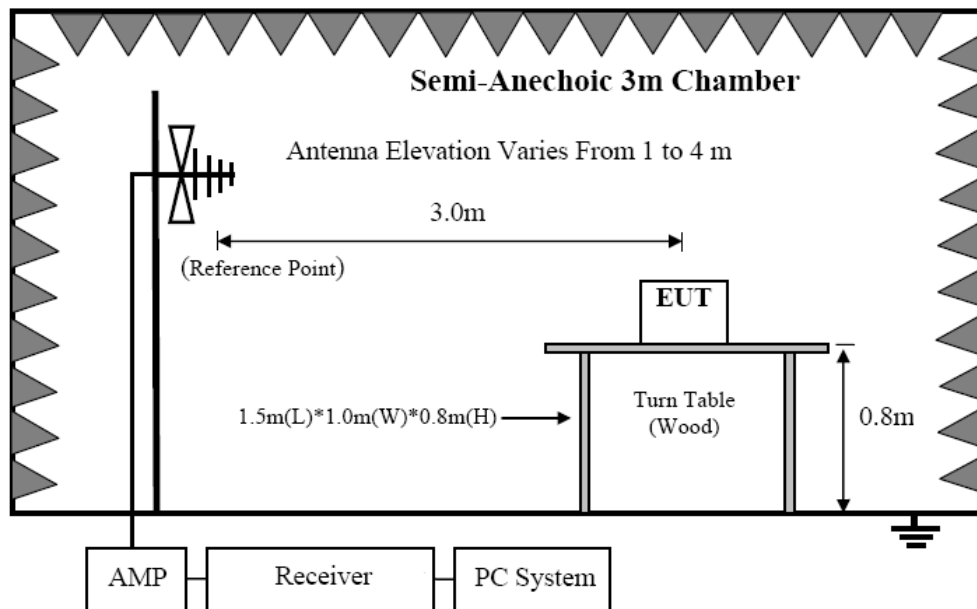
4. Radiated emission

4.1. Test equipment

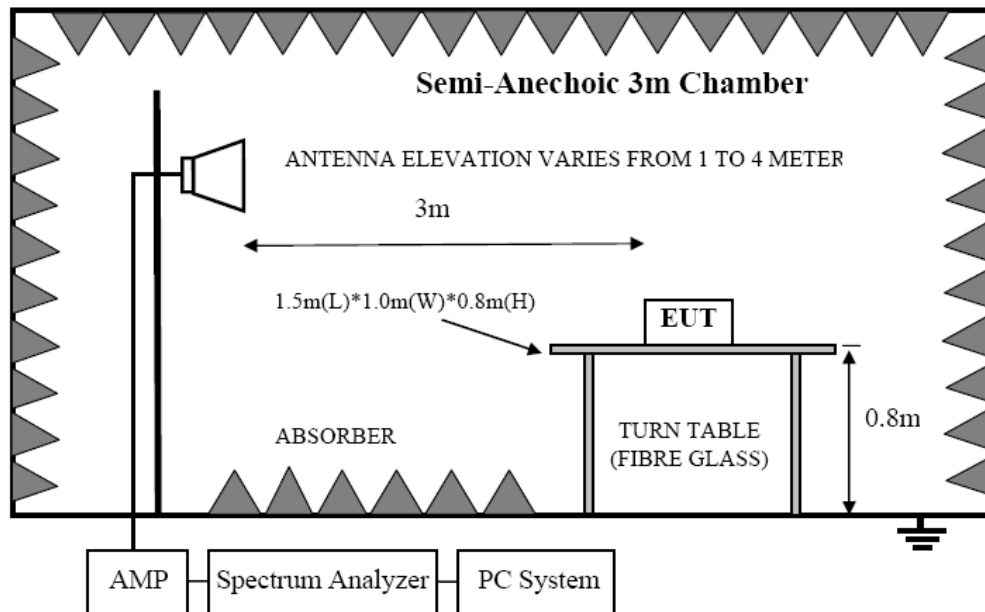
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2011/11/23	1Y
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2011/11/23	1Y
3	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2010/11/09	2 Y
4	Loop antenna	Chase	HLA6120	20129	2010/11/09	2 Y
5	Double Ridged Horn Antenna	R&S	HF907	100276	2011/01/16	2 Y
6	Pre-Amplifier	R&S	SCU-01	10049	2011/11/23	1Y
7	Pre-amplifier	A.H.	PAM0-0118	360	2011-12-20	1Y
8	RF Cable	R&S	R01	10403	2011/11/23	1Y
9	RF Cable	R&S	R02	10512	2011/11/23	1Y

4.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

4.3. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009-0.490	300	$2400/\text{F}(\text{KHz})$	$67.6-20\log(\text{F})$
0.490-1.705	30	$24000/\text{F}(\text{KHz})$	$87.6-20\log(\text{F})$
1.705-30.0	30	30	29.54
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	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of Fundamental emission for 2.4GHz-2.4835GHz	3	94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) 114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)	

Remark : (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$

(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.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 4.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2009 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.
- (8) For emissions below 1GHz, according explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in Tx 244MHz mode.

4.5. Test result

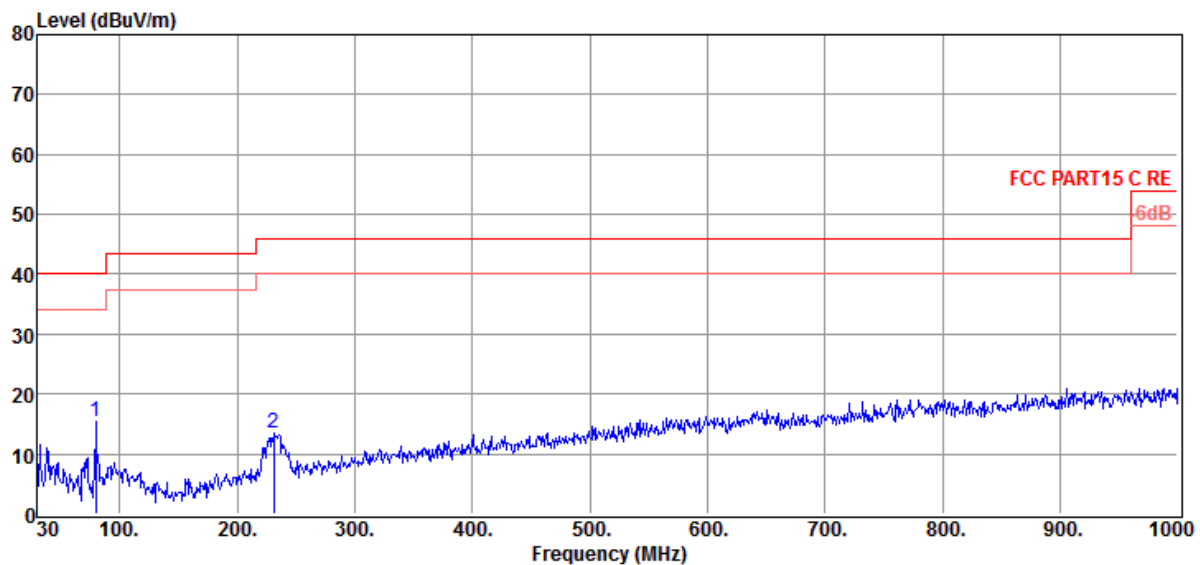
PASS. (See below detailed test result)

All the emissions except fundamental emission from 9 KHz to 25GHz were comply with 15.209 limit.

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : VULB 9163/3m/HORIZONTAL

Data : 17



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	79.47	49.71	8.54	43.79	1.05	15.51	40.00	-24.49	Peak	HORIZONTAL
2	230.79	43.54	11.73	43.69	1.84	13.42	46.00	-32.58	Peak	HORIZONTAL

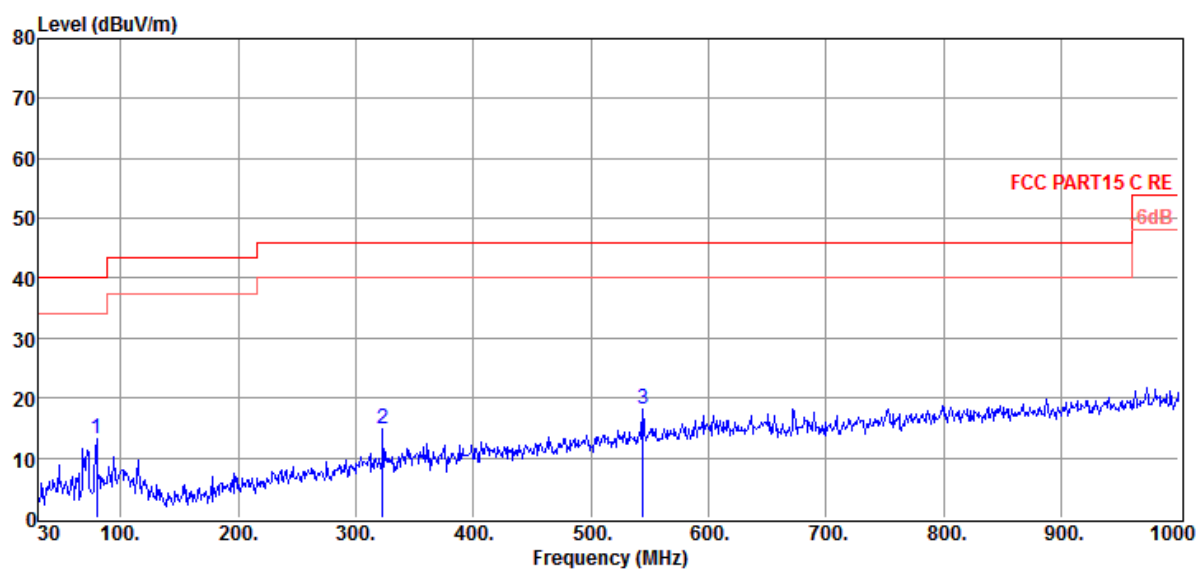
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with QP limit, QP Result is deemed to comply with QP limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : VULB 9163/3m/VERTICAL

Data : 18



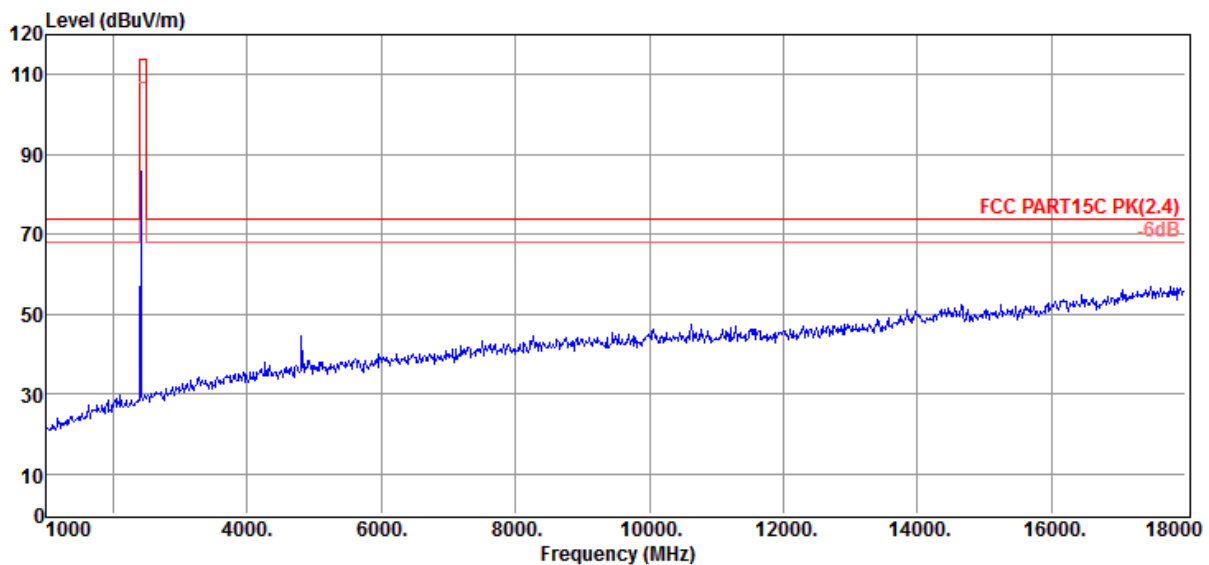
Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	79.47	47.45	8.54	43.79	1.05	13.25	40.00	-26.75	Peak	VERTICAL
2	322.94	42.71	13.49	43.66	2.25	14.79	46.00	-31.21	Peak	VERTICAL
3	544.10	40.67	17.44	43.09	3.08	18.10	46.00	-27.90	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor
 2. If Peak Result comply with QP limit, QP Result is deemed to comply with QP limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : Tx
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : VULB 9163/3m/HORIZONTAL

Data : 1



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

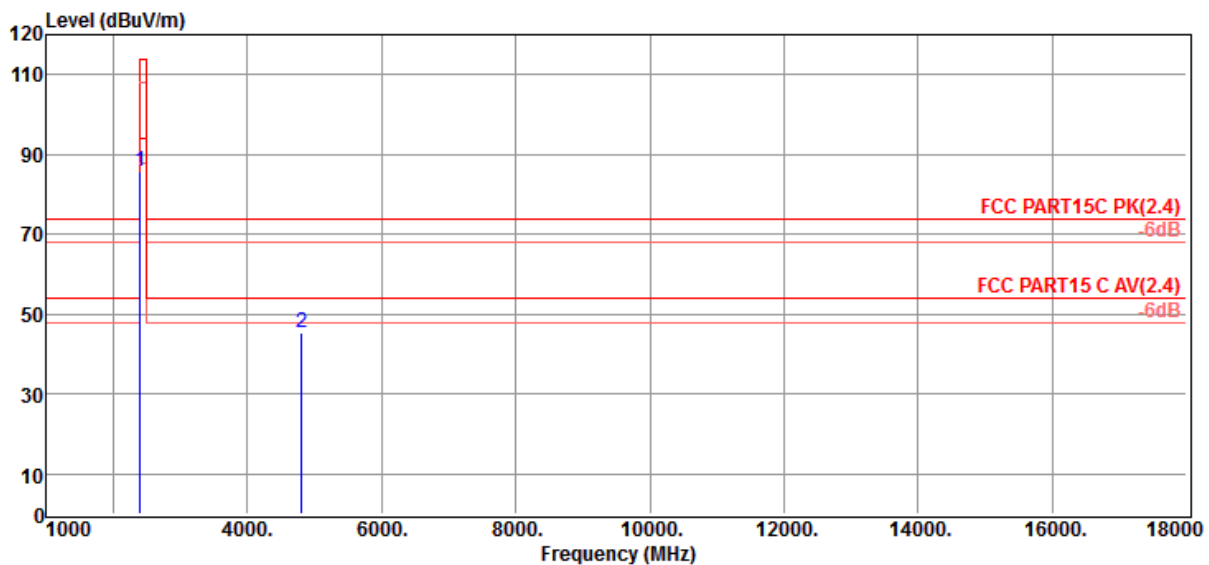
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3V	Test Mode : TX 2403MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/VERTICAL

Data : 2



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2403.00	93.70	28.93	43.49	6.47	85.61	114.00	-28.39	Peak	VERTICAL
2	4806.00	46.24	34.01	44.06	9.32	45.51	74.00	-28.49	Peak	VERTICAL

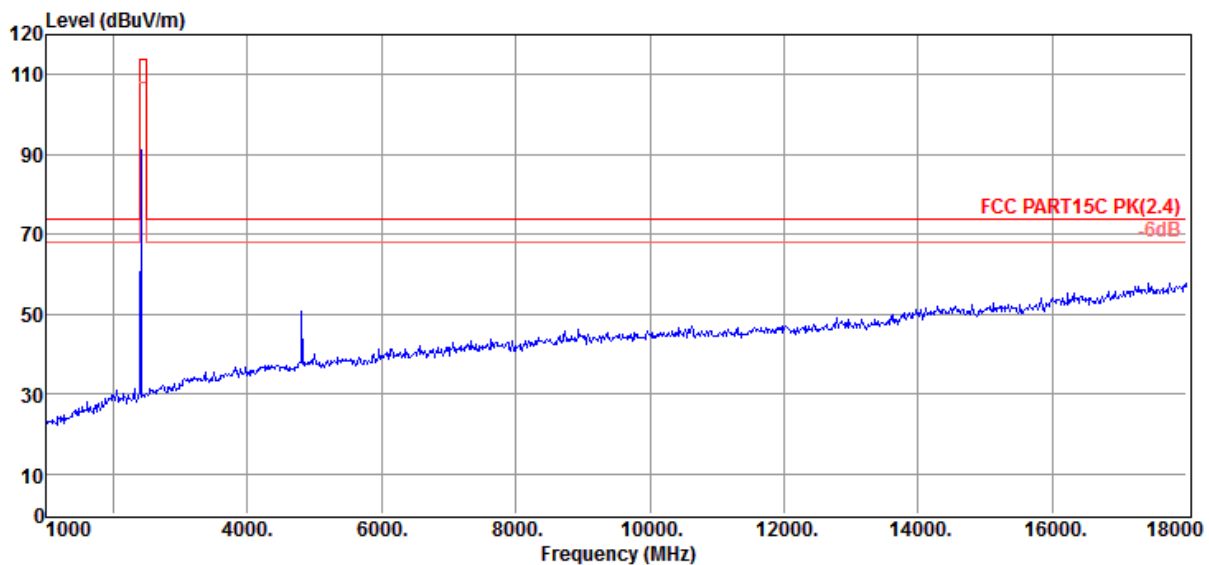
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3V	Test Mode : TX 2403MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 3



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

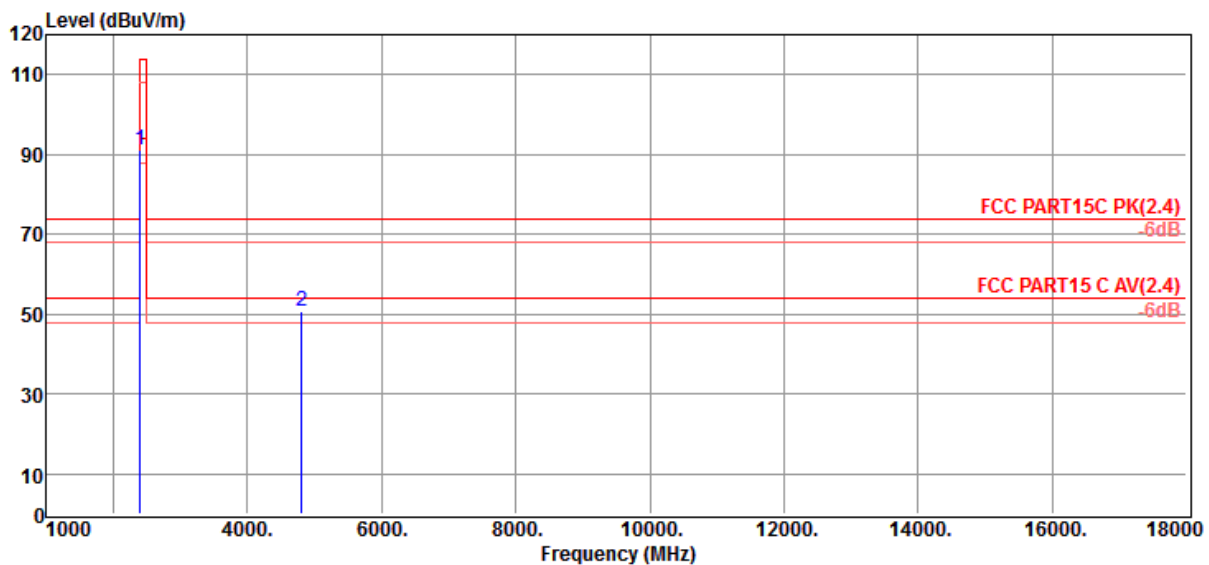
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2403MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/HORIZONTAL

Data : 4



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2403.00	99.36	28.93	43.49	6.47	91.27	114.00	-22.73	Peak	HORIZONTAL
2	4806.00	51.29	34.01	44.06	9.32	50.56	74.00	-23.44	Peak	HORIZONTAL

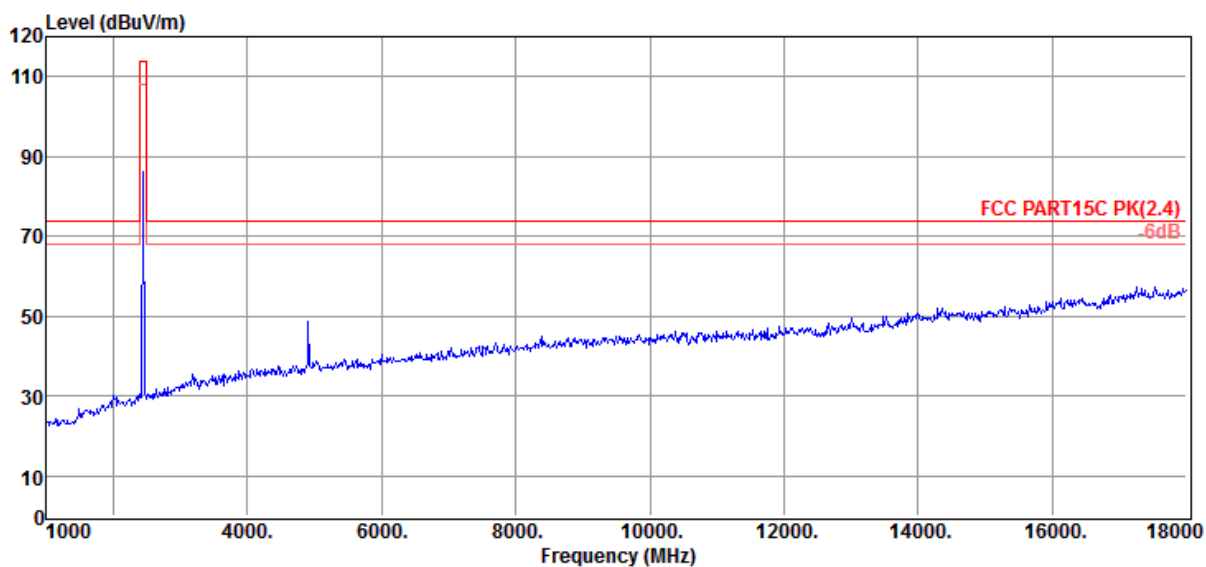
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2453MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/VERTICAL

Data : 5



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

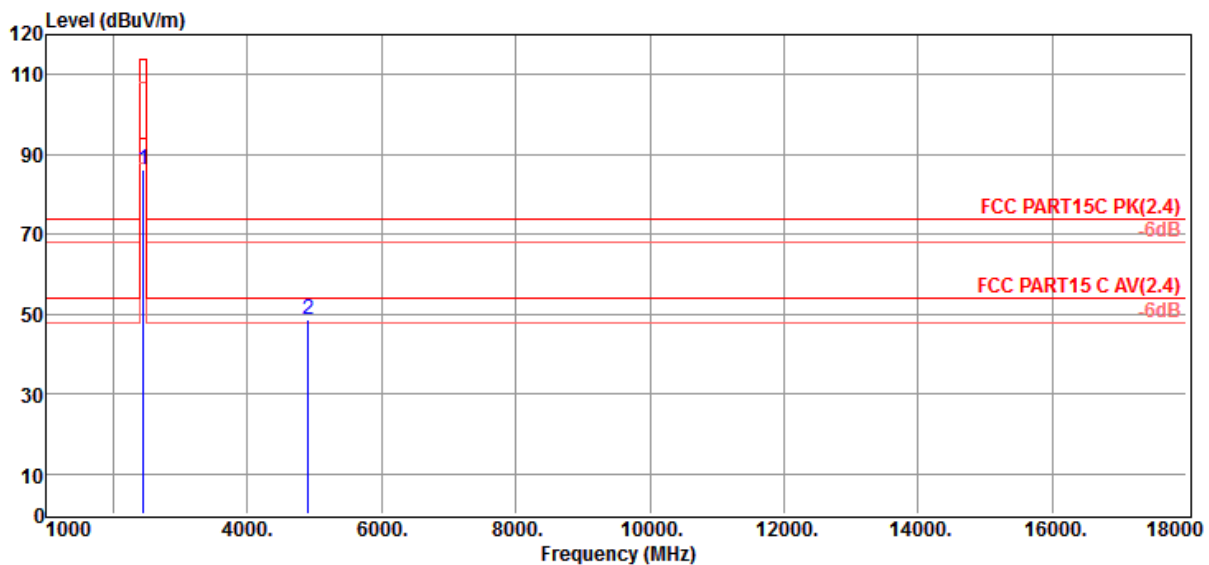
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2453MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/VERTICAL

Data : 6



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2453.00	94.19	29.08	43.49	6.53	86.31	114.00	-27.69	Peak	VERTICAL
2	4906.00	49.06	34.35	44.03	9.44	48.82	74.00	-25.18	Peak	VERTICAL

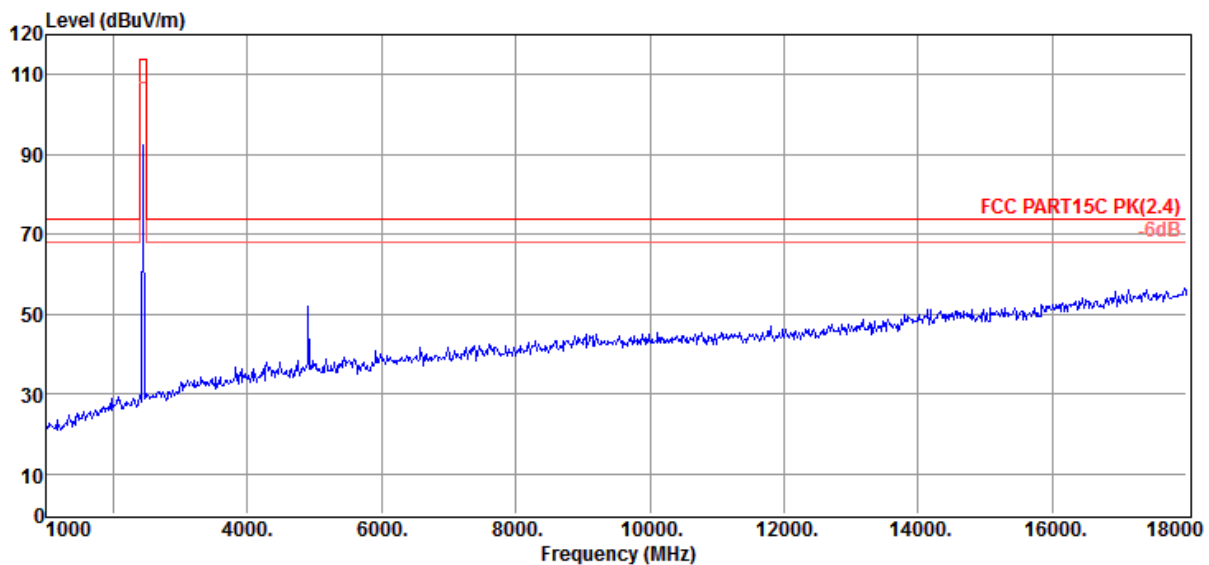
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3V	Test Mode : TX 2453MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 7



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

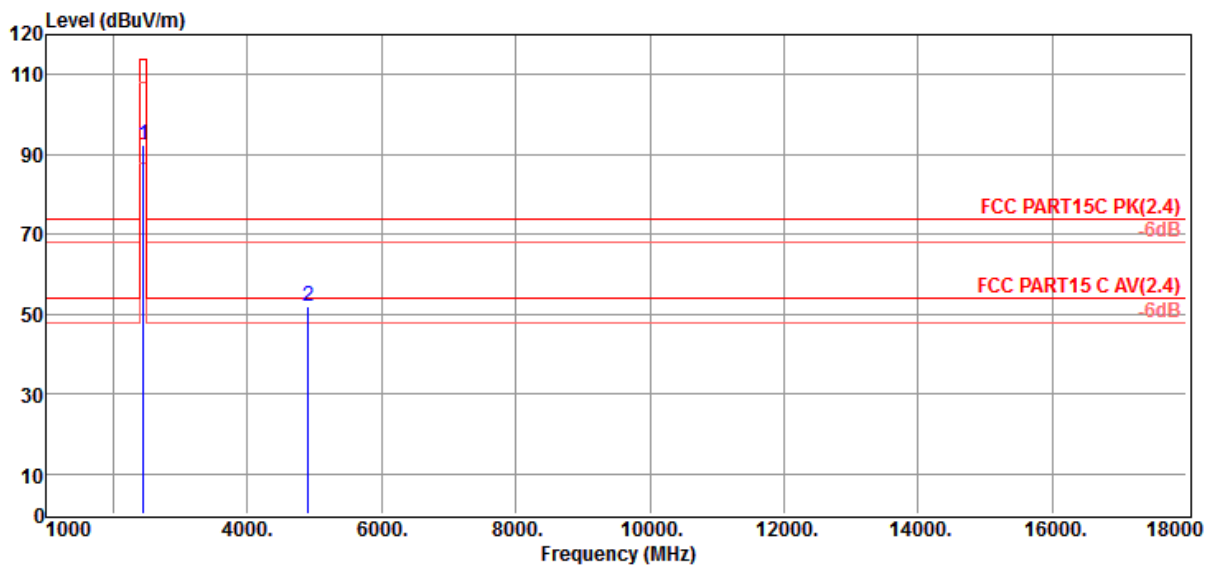
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2453MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/HORIZONTAL

Data : 8



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2453.00	100.17	29.08	43.49	6.53	92.29	114.00	-21.71	Peak	HORIZONTAL
2	4906.00	52.07	34.35	44.03	9.44	51.83	74.00	-22.17	Peak	HORIZONTAL

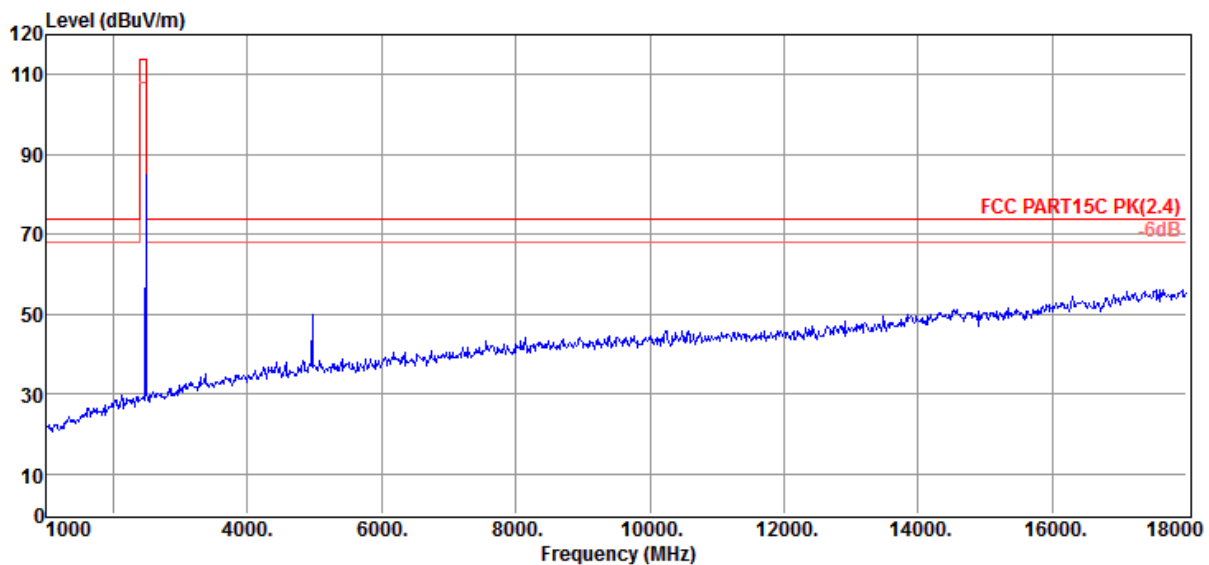
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2478MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/VERTICAL

Data : 9



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

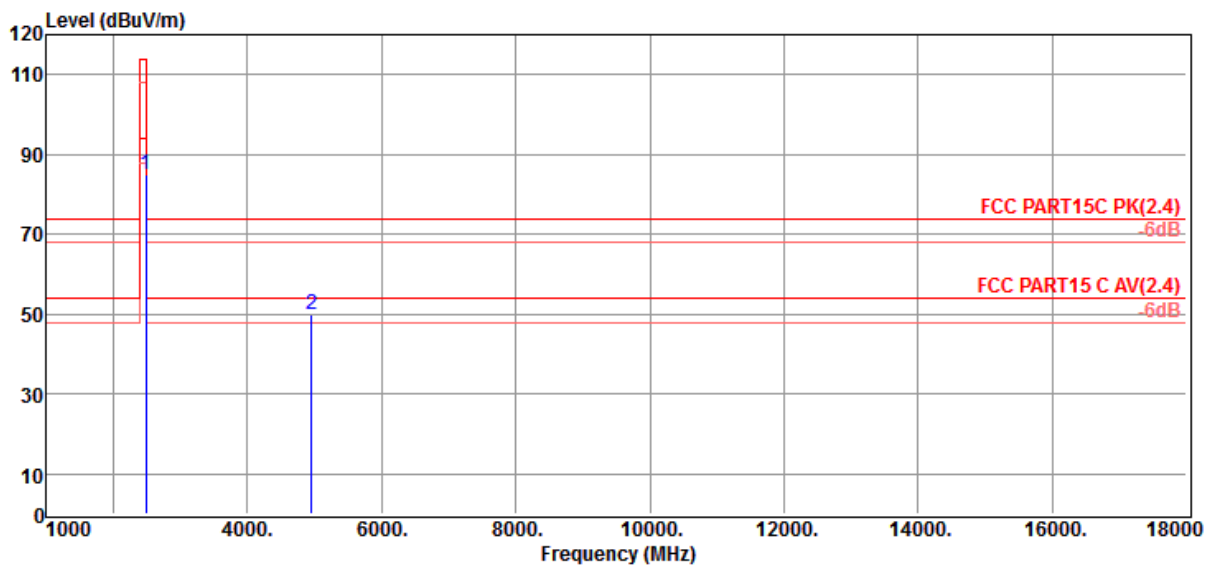
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3V **Test Mode** : TX 2478MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/VERTICAL

Data : 10



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2478.00	92.67	29.18	43.49	6.57	84.93	114.00	-29.07	Peak	VERTICAL
2	4956.00	50.14	34.34	44.02	9.47	49.93	74.00	-24.07	Peak	VERTICAL

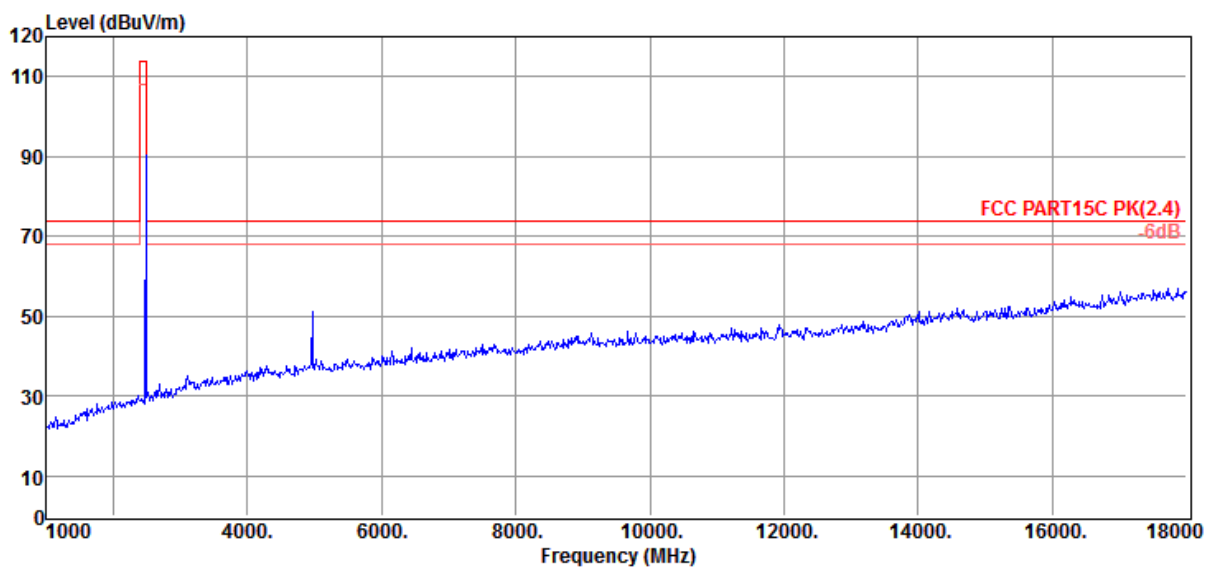
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3V	Test Mode : TX 2478MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 11



Item	Freq	Read Level	Antenna Factor	PRM Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)		

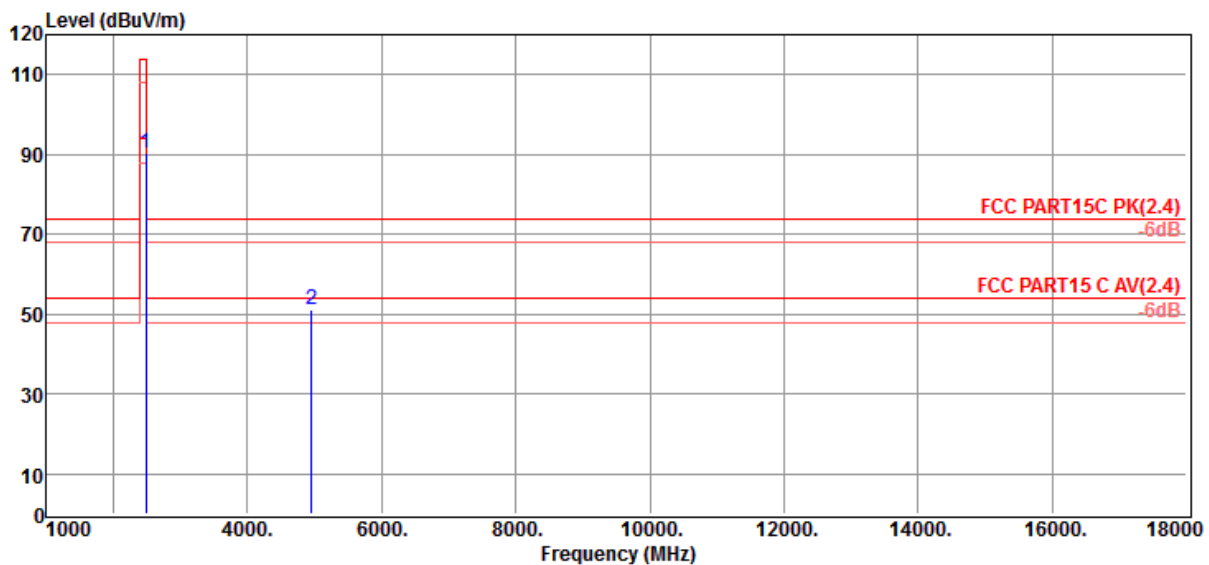
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3V	Test Mode : TX 2478MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 12



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2478.00	98.12	29.18	43.49	6.57	90.38	114.00	-23.62	Peak	HORIZONTAL
2	4956.00	51.15	34.34	44.02	9.47	50.94	74.00	-23.06	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

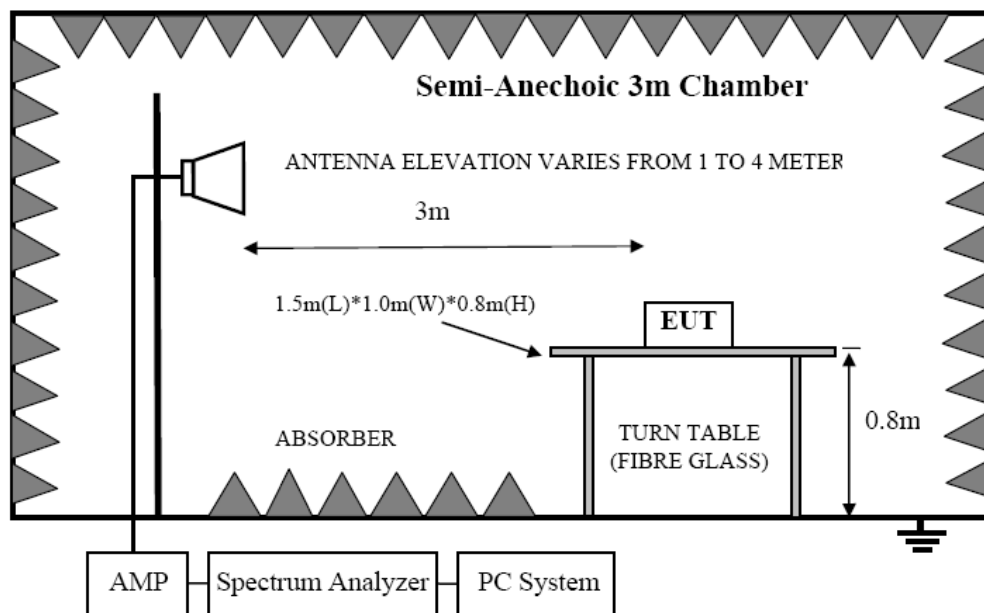
2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

5. Band Edge Compliance

5.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2011/11/23	1Y
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2011/11/23	1Y
3	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2010/11/09	2 Y
4	Double Ridged Horn Antenna	R&S	HF907	100276	2011/01/16	2 Y
5	Pre-Amplifier	R&S	SCU-01	10049	2011/11/23	1Y
6	Pre-amplifier	A.H.	PAM0-0118	360	2011-12-20	1Y
7	RF Cable	R&S	R01	10403	2011/11/23	1Y
8	RF Cable	R&S	R02	10512	2011/11/23	1Y
9	Test software	R&S	EMC32	/	/	/

5.2. Block diagram of test setup



5.3. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.4. Test Procedure

Same with clause 8.4 except change investigated frequency range from 2310MHz to 2415MHz and 2475MHz to 2500MHz.

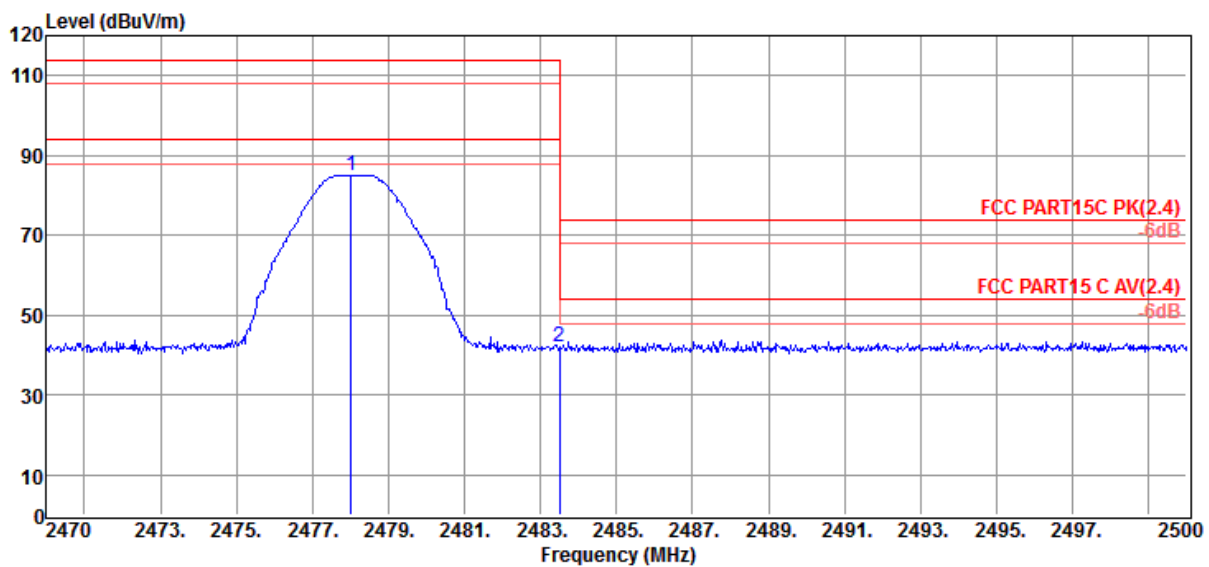
5.5. Test result

PASS. (See below detailed test result)

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6	
Test Date	: 08-23-2012	Tested By	: Damon_Hu
EUT	: Wireless Keyboard	Model Number	: 510WL
Power Supply	: DC 3V	Test Mode	: Tx 2478MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance	: HF907 SN100276/3m/VERTICAL

Data : 13



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2478.01	92.80	29.18	43.49	6.57	85.06	114.00	-28.94	Peak	VERTICAL
2	2483.50	49.63	29.18	43.50	6.57	41.88	74.00	-32.12	Peak	VERTICAL

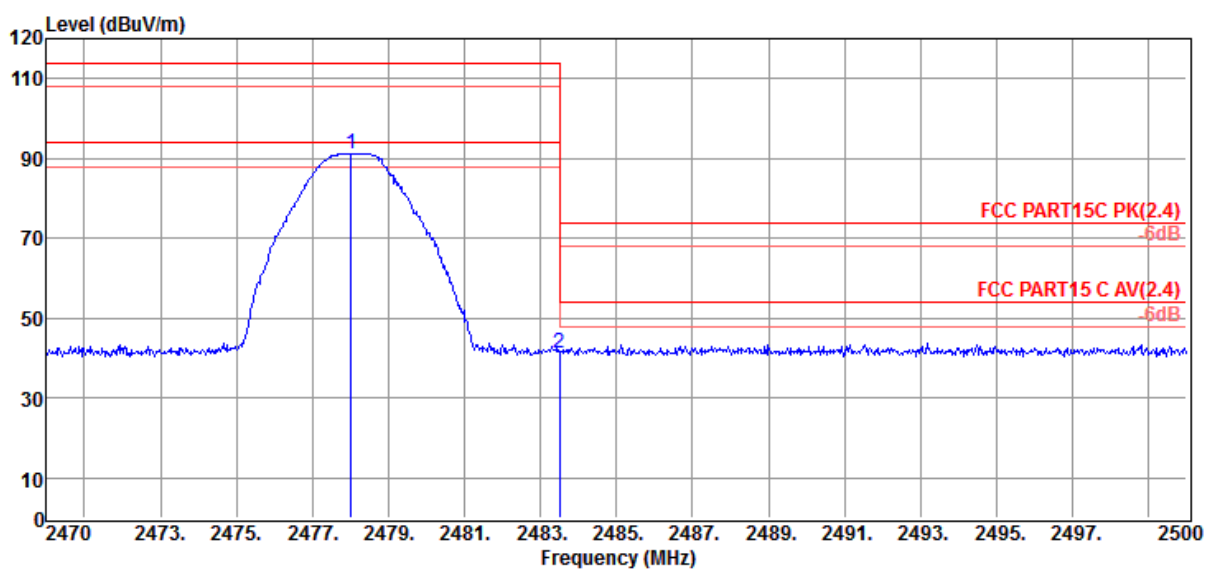
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3.7V	Test Mode : Tx 2478MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 14



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2478.01	98.79	29.18	43.49	6.57	91.05	114.00	-22.95	Peak	HORIZONTAL
2	2483.50	48.97	29.18	43.50	6.57	41.22	74.00	-32.78	Peak	HORIZONTAL

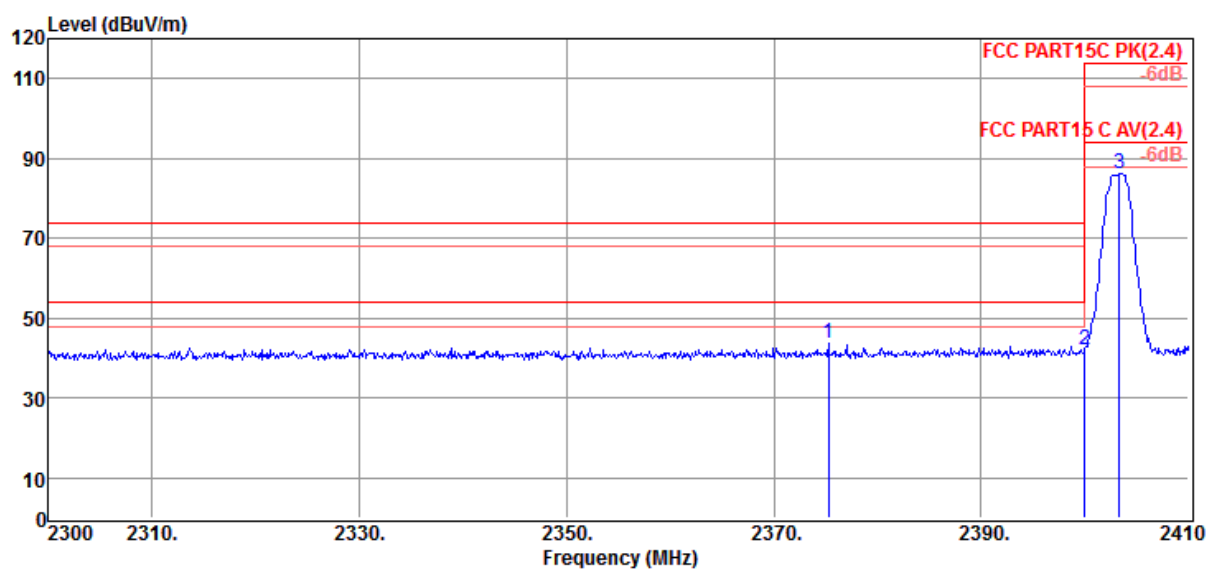
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site : DDT 3m Chamber **E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6**
Test Date : 08-23-2012 **Tested By** : Damon_Hu
EUT : Wireless Keyboard **Model Number** : 510WL
Power Supply : DC 3.7V **Test Mode** : Tx 2403MHz
Condition : Temp:24.5°C,Humi:55% **Antenna/Distance** : HF907 SN100276/3m/VERTICAL

Data : 15



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2375.24	52.00	28.70	43.48	6.45	43.67	74.00	-30.33	Peak	VERTICAL
2	2399.99	50.12	28.93	43.49	6.47	42.03	74.00	-31.97	Peak	VERTICAL
3	2403.29	94.08	28.93	43.49	6.49	86.01	114.00	-27.99	Peak	VERTICAL

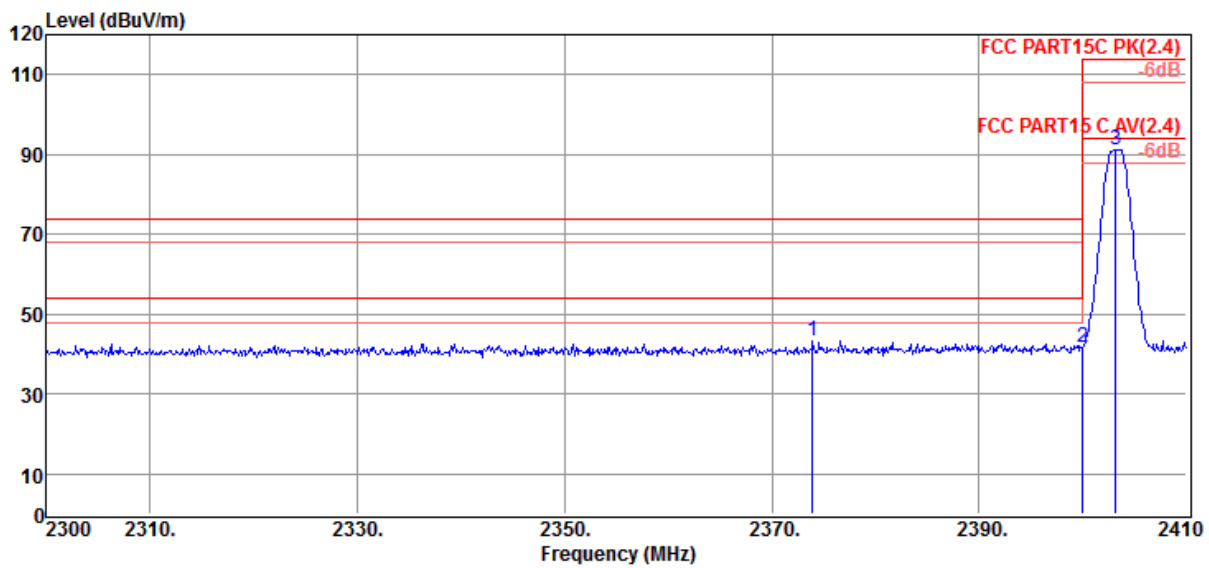
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2012 Test Data\ 05-15 Wireless Keyboard.EM6
Test Date	: 08-23-2012	Tested By : Damon_Hu
EUT	: Wireless Keyboard	Model Number : 510WL
Power Supply	: DC 3.7V	Test Mode : Tx 2403MHz
Condition	: Temp:24.5°C,Humi:55%	Antenna/Distance : HF907 SN100276/3m/HORIZONTAL

Data : 16



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2373.92	51.47	28.70	43.48	6.45	43.14	74.00	-30.86	Peak	HORIZONTAL
2	2399.99	49.74	28.93	43.49	6.47	41.65	74.00	-32.35	Peak	HORIZONTAL
3	2403.18	99.09	28.93	43.49	6.49	91.02	114.00	-22.98	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor

2. If Peak Result comply with AV limit, AV Result is deemed to comply with AV limit

6. Antenna Requirements

6.1. Limit

For intentional device, according to FCC 47 CFR Section 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.

6.2. Result

The antennas used for this product is integral “F” Shape PCB antenna, Gain: 0dBi and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi.