



**Neutron Engineering Inc.**

# FCC/IC Radio Test Report

**FCC ID: PP23000PI**

**IC: 7497B-3000P**

This report concerns (check one):  Original Grant  Class II Change

**Issued Date** : Jan. 12, 2012  
**Project No.** : 1110C111B  
**Equipment** : Wireless Optical Mouse  
**Model Name** : 3000P; 3100P; 1090P  
**Applicant** : ShenZhen Rapoo Technology Co., Ltd.  
**Address** : Block A1,B1,B2,1st second stage, 1st Industrial Park,  
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Shenzhen, P.R.CHINA

**Tested by:**  
Neutron Engineering Inc. EMC Laboratory

**Date of Receipt:** Jan. 04, 2012

**Date of Test:**  
Jan. 04, 2012 ~ Jan. 11, 2012

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### **Declaration**

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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**Neutron's** laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



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## 1. CERTIFICATION

Equipment: Wireless Optical Mouse

Brand Name : RAPOO

Model Name. : 3000P; 3100P; 1090P

Applicant: ShenZhen Rapoo Technology Co., Ltd.

Date of Test: Jan. 04, 2012 ~ Jan. 11, 2012

Test Item: ENGINEERING SAMPLE

Standards: FCC Part15, Subpart C(15.249)/ ANSI C63.4 : 2003/ Canada RSS-210:2010

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FICP-1-1110C111B) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



**2. SUMMARY OF TEST RESULTS**

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249) ; Canada RSS-210:2010				
StandardSection		Test Item	Judgment	Remark
FCC	RSS-210			
15.207		Conducted Emission	N/A	Note(1)
15.209		Radiated Emission	PASS	
15.249	A2.9(a)	Radiated Spurious Emission	PASS	

NOTE:

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



**2.1 TEST FACILITY**

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792  
 Neutron's test firm number for FCC 319330

**2.2 MEASUREMENT UNCERTAINTY**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95 %**.

**A. Conducted Measurement :**

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

**B. Radiated Measurement :**

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
DG-CB03	CISPR	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	



**3. GENERAL INFORMATION**

**3.1 GENERAL DESCRIPTION OF EUT**

Equipment	Wireless Optical Mouse	
Brand Name	RAPOO	
Model Name.	3000P; 3100P; 1090P	
OEM Brand/Model Name	N/A	
Model Difference	Appearance and power source are differences, the PCB Layout and RF module are the same.	
Product Description	The EUT is a Wireless Optical Mouse.	
	Product Type	Low Power Communication Device
	Operation Frequency:	5727~5804 MHz
	Modulation Type:	GFSK
	Date rate:	1Mbps
	Number of Channel	16CH .Please see Note 2.
	Antenna Designation:	Chip antenna
	Antenna Gain(Peak)	1.4 dBi
	Output Power:	75.28 dBuV/m (AV Max.)
		Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.	
Power Source	DC Voltage supplied from 1090P: 1*AA battery only; 3000P/ 3100P: 2*AA battery parallel or 1*AA battery series.	
Power Rating	DC 1.5V	
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	Frequency (MHz)	Channel	Frequency (MHz)
<b>01</b>	<b>5727MHz</b>	<b>09</b>	<b>5771MHz</b>
02	5730MHz	10	5776MHz
03	5734MHz	11	5779MHz
04	5738MHz	12	5782MHz
05	5750MHz	13	5796MHz
06	5753MHz	14	5799MHz
07	5756MHz	15	5802MHz
08	5759MHz	<b>16</b>	<b>5804MHz</b>

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ACX	AT1005-T5R5LGA	Chip ANT	N/A	1.4



**3.2 DESCRIPTION OF TEST MODES**

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based 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	CH Lower – 5727MHz
Mode 2	CH Middle – 5771MHz
Mode 3	CH Highest -5804MHz

For Conducted Test	
Final Test Mode	Description
	" N/A" denotes test is not applicable in this Test Report

For Radiated Test	
Final Test Mode	Description
Mode 1	CH Lower – 5727MHz
Mode 2	CH Middle – 5771MHz
Mode 3	CH Highest -5804MHz

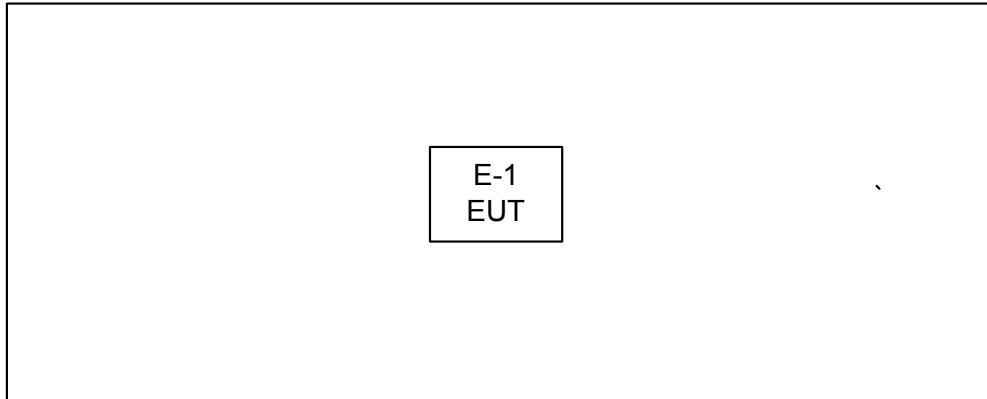
Note:

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



3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

**Radiatied:**





**3.4 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.	FCC ID/ IC ID	Series No.	Note
E-1	Wireless Optical Mouse	RAPOO	3000P	PP23000PI / 7497B-3000P	N/A	EUT

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 m in 『Length』 column.



**4. EMC EMISSION TEST**

**4.1 CONDUCTED EMISSION MEASUREMENT**

**4.1.1 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.

**4.1.2 MEASUREMENT INSTRUMENTS LIST**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2012
2	LISN	R&S	ENV216	100087	May.26.2012
3	Test Cable	N/A	C_17	N/A	Mar.30.2012
4	EMI TEST RECEIVER	R&S	ESCS30	826547/022	May.26.2012
5	50Ω Terminator	SHX	TF2-3G-A	08122902	May.26.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

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

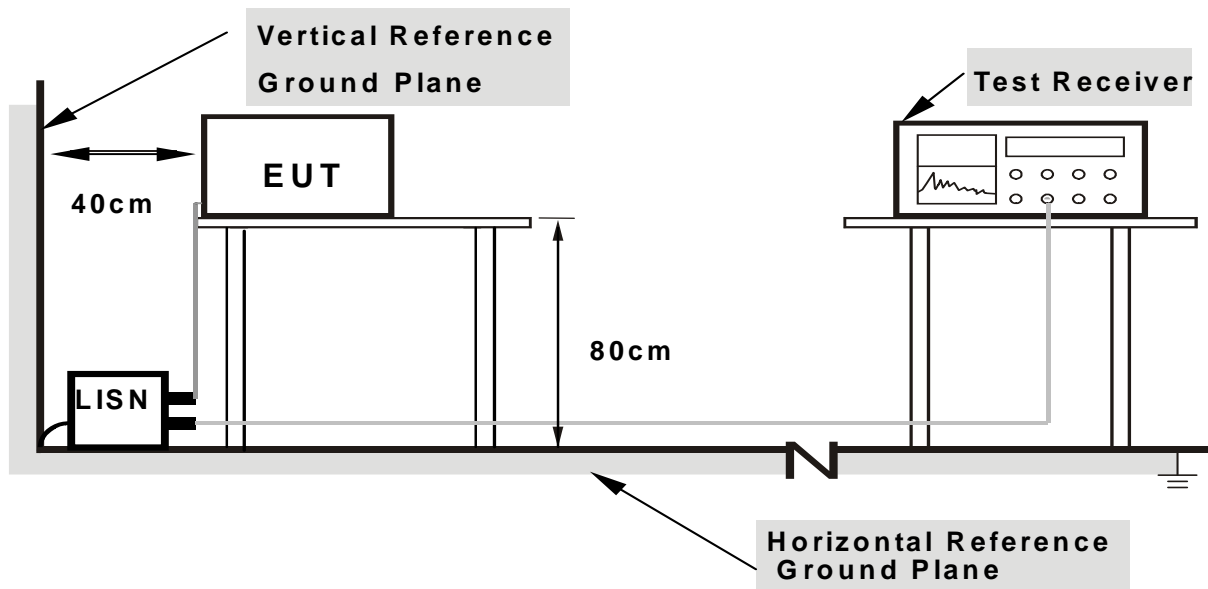
**4.1.3 TEST PROCEDURE**

- 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.

**4.1.4 DEVIATION FROM TEST STANDARD**

No deviation

**4.1.5 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**

**4.1.6 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.

The EUT was programmed to be in continuously transmitting mode.



4.1.7 TEST RESULTS

EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	--	Relative Humidity :	--
Pressure :	--	Test Power :	--
Test Mode :	" N/A" denotes test is not applicable in this Test Report		

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 『Note 』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a " \* " marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.



**4.2 RADIATED EMISSION MEASUREMENT**

**4.2.1 RADIATED EMISSION LIMITS ( FCC 15.209 )**

<b>Frequencies (MHz)</b>	<b>Field Strength (micorvolts/meter)</b>	<b>Measurement Distance (meters)</b>
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

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

**LIMITS OF RADIATED EMISSION MEASUREMENT ( FCC 15.209 )**

<b>FREQUENCY (MHz)</b>	<b>(dBuV/m) (at 1.5m)</b>	
	<b>PEAK</b>	<b>AVERAGE</b>
Above 1000	80	60

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).  
 The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
 Distance extrapolation factor = 20 log (3m/1.5m) dB ;  
 Limit line = specific limits (dBuV) + 6 dB

**FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)**

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





4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Jun .04.2012
2	Amplifier	HP	8447D	2944A09673	May.26.2012
3	Test Receiver	R&S	ESCI	100382	May.26.2012
4	Test Cable	N/A	C-01_CB03	N/A	Jul.01.2012
5	Antenna	ETS	3115	00075789	May.26.2012
6	Amplifier	Agilent	8449B	3008A02274	May.26.2012
7	Spectrum	Agilent	E4408B	US39240143	Nov.25.2012
8	Test Cable	HUBER+SUHNER	C-45	N/A	May.04.2012
9	Controller	CT	SC100	N/A	N/A
10	Active Loop Antenna	R&S	HFH2-Z2	830749/020	May.26.2012
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Aug.15.2012
12	Amplifier	EMC	EMC2654045	980039	Aug.12.2012

Remark: " N/A" denotes No Model Name. / Serial No. and No Calibration specified.

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, Average=PK-duty cycle

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



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DUTY CYCLE: TX 5727MHz (1Mbps)

Dwell time=ON/ON+OFF

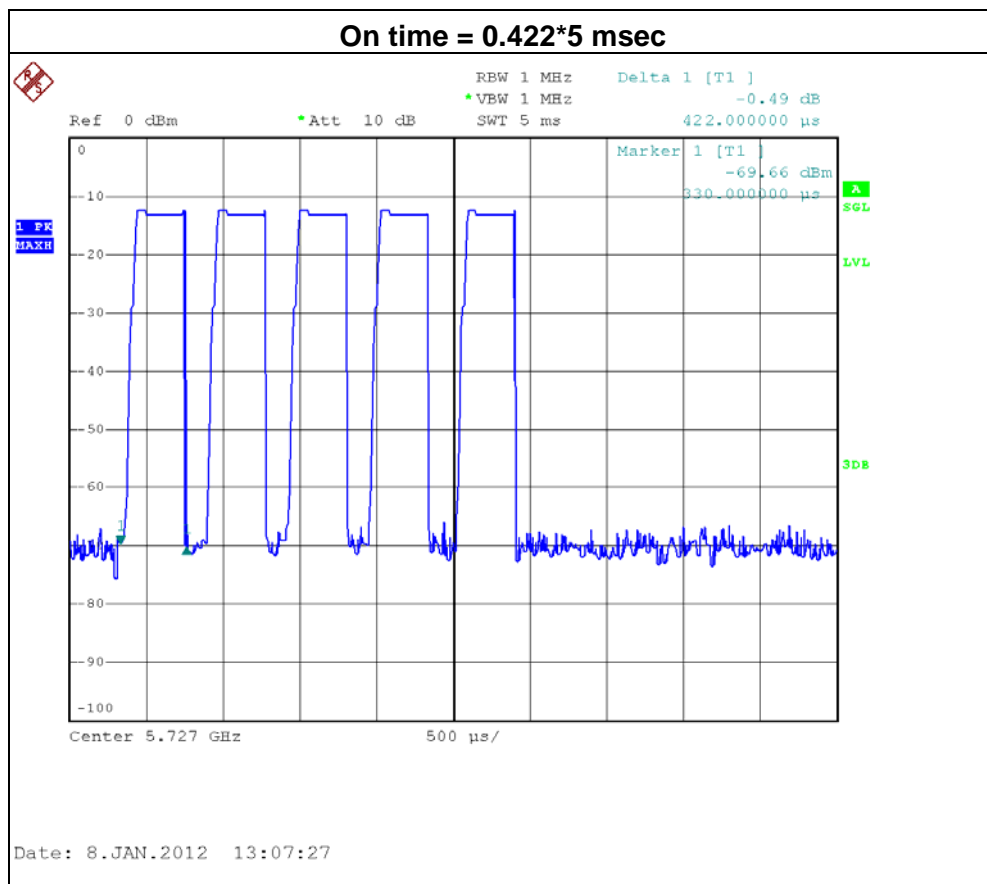
ON: 2.11msec

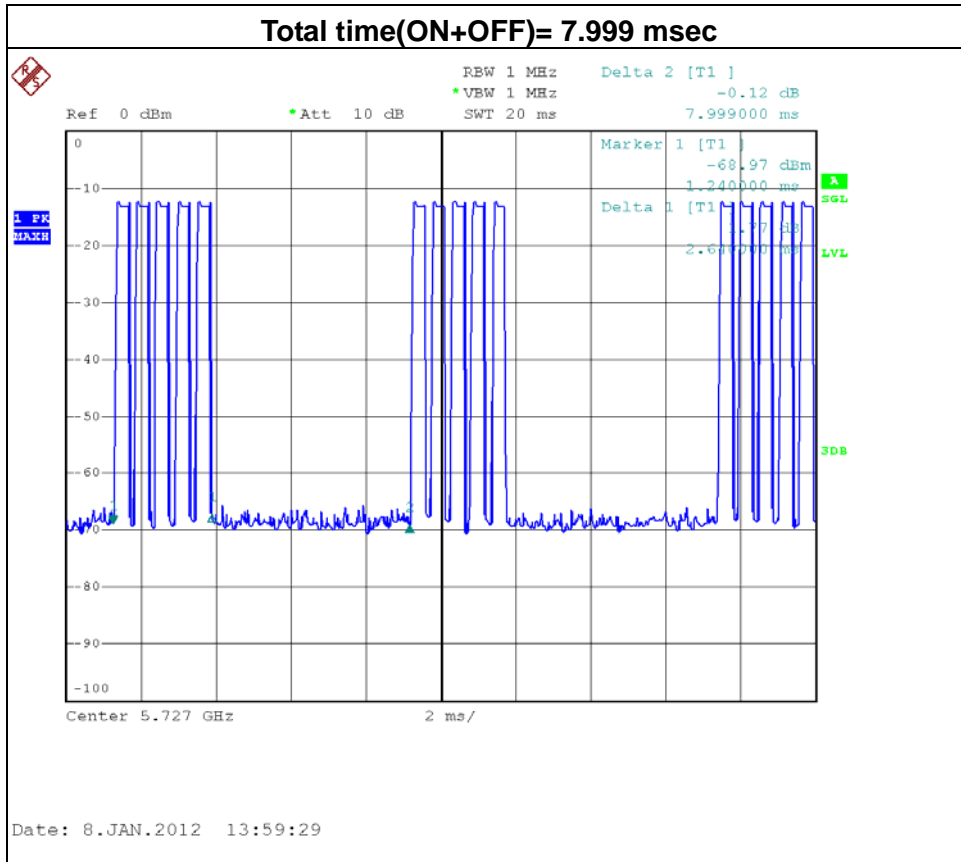
ON+OFF: (total time):7.999msec

Dwell time: 26.38%

AV=PK+20 log(Dwell time)

AV=PK-11.58







#### 4.2.3 TEST PROCEDURE

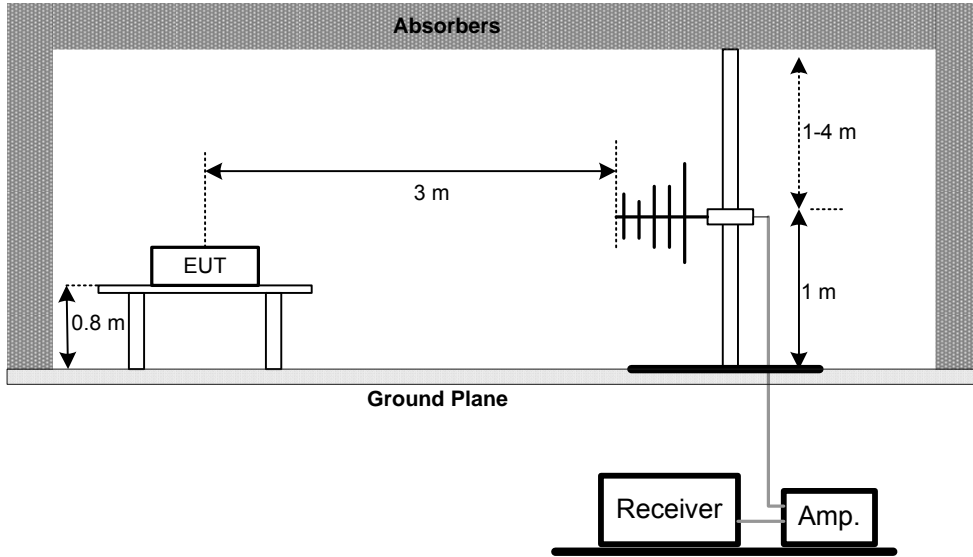
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter semi-anechoic chamber. The table was 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 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.

#### 4.2.4 DEVIATION FROM TEST STANDARD

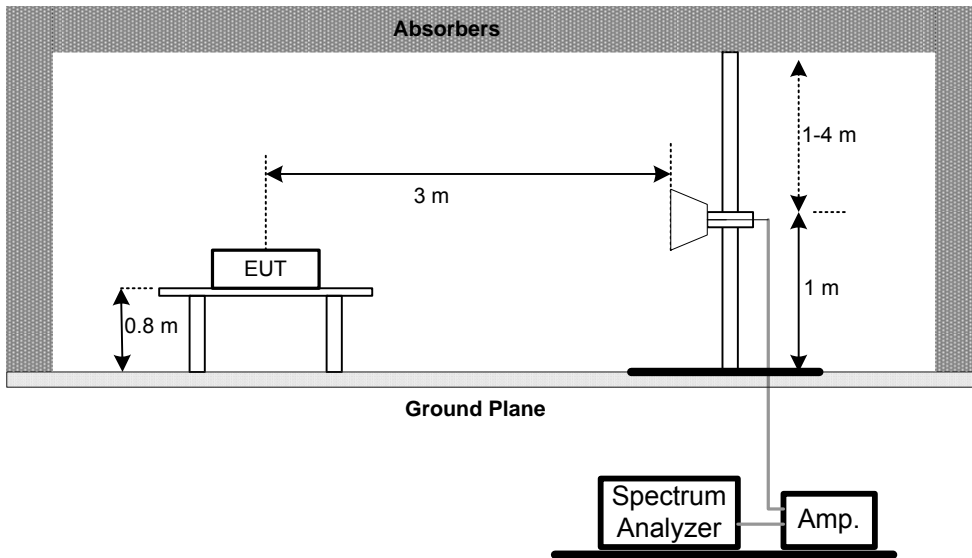
No deviation

**4.2.5 TEST SETUP**

**(A) Radiated Emission Test Set-Up Frequency Below 1 GHz**



**(B) Radiated Emission Test Set-Up Frequency Above 1 GHz**



**4.2.6 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



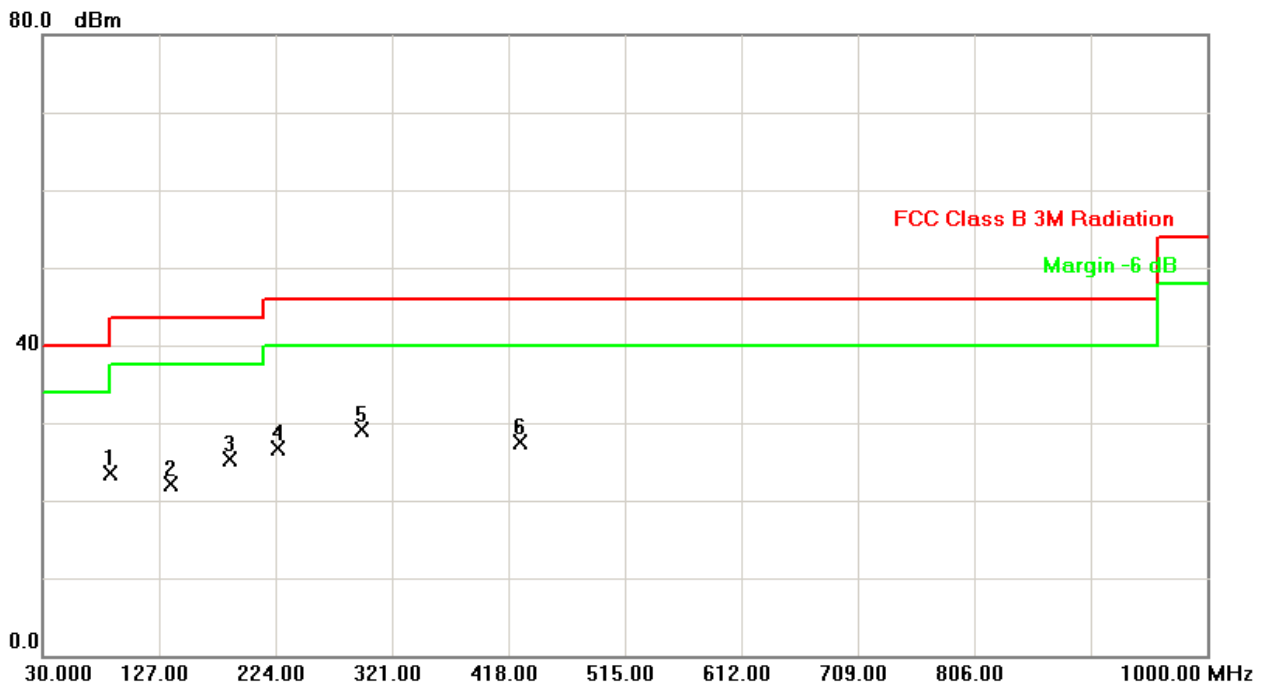
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHz)

EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX Mode 5727MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
86.51	V	42.54	-19.10	23.44	40.00	- 16.56	
136.81	V	39.94	-17.86	22.08	43.50	- 21.42	
186.48	V	42.12	-16.79	25.33	43.50	- 18.17	
226.58	V	42.48	-15.69	26.79	46.00	- 19.21	
296.31	V	41.21	-12.06	29.15	46.00	- 16.85	
427.46	V	36.02	-8.53	27.49	46.00	- 18.51	

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; " H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



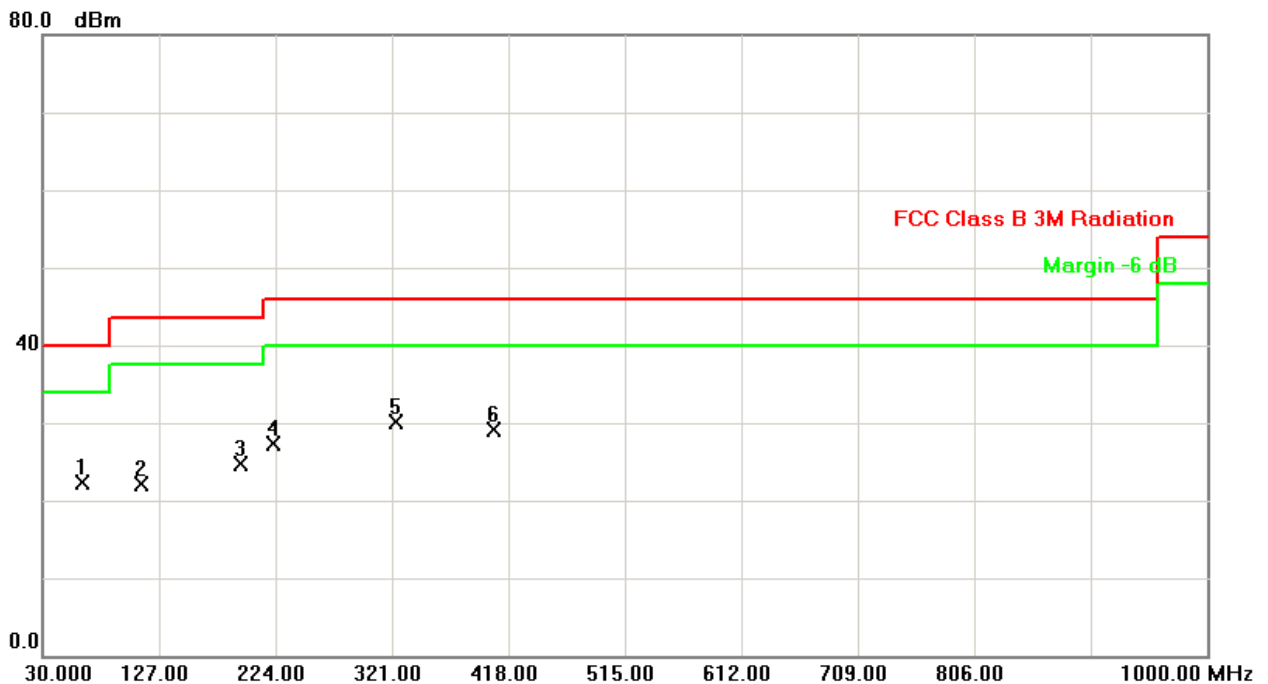


EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX Mode 5727MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
63.54	H	39.86	-17.56	22.30	40.00	- 17.70	
112.02	H	40.45	-18.34	22.11	43.50	- 21.39	
195.39	H	41.38	-16.65	24.73	43.50	- 18.77	
221.64	H	43.17	-15.82	27.35	46.00	- 18.65	
324.54	H	41.56	-11.47	30.09	46.00	- 15.91	
405.21	H	38.10	-8.93	29.17	46.00	- 16.83	

**Remark :**

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



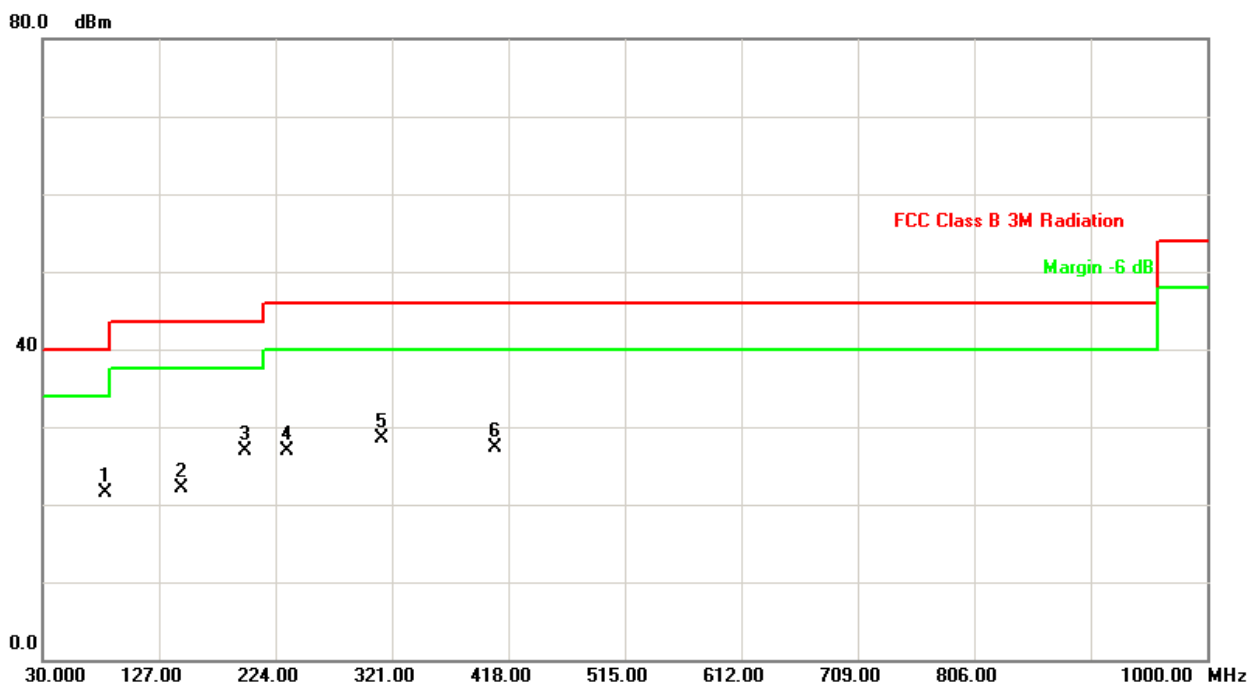


EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	RX Mode		

Freq. (MHz)	Ant. HV	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
82.74	V	40.50	-19.09	21.41	40.00	- 18.59	
145.78	V	39.71	-17.63	22.08	43.50	- 21.42	
198.66	V	43.45	-16.58	26.87	43.50	- 16.63	
233.56	V	42.34	-15.45	26.89	46.00	- 19.11	
312.55	V	40.31	-11.76	28.55	46.00	- 17.45	
407.22	V	36.18	-8.89	27.29	46.00	- 18.71	

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.





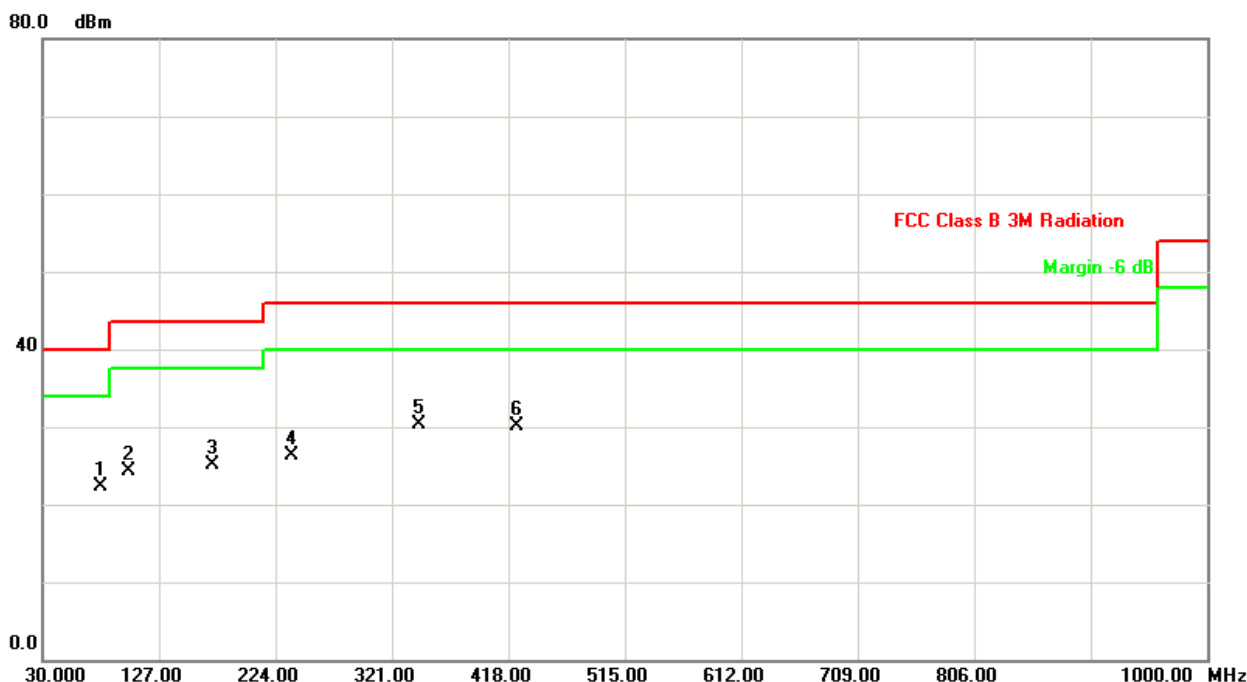


EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	RX Mode		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
78.92	H	41.31	-19.01	22.30	40.00	- 17.70	
102.33	H	42.70	-18.40	24.30	43.50	- 19.20	
171.39	H	42.33	-17.24	25.09	43.50	- 18.41	
237.33	H	41.64	-15.29	26.35	46.00	- 19.65	
344.26	H	41.27	-10.98	30.29	46.00	- 15.71	
425.33	H	38.74	-8.57	30.17	46.00	- 15.83	

**Remark :**

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.





4.2.8 TEST RESULTS (ABOVE 1000 MHz)

EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5727MHz		

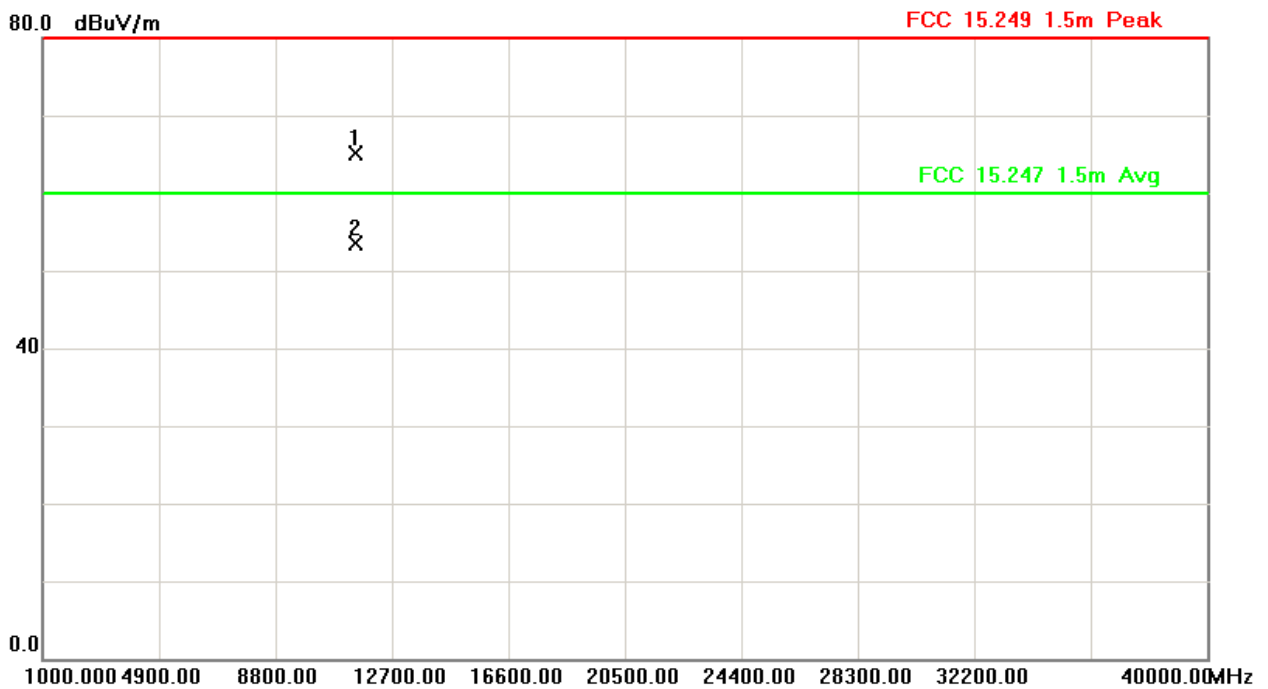
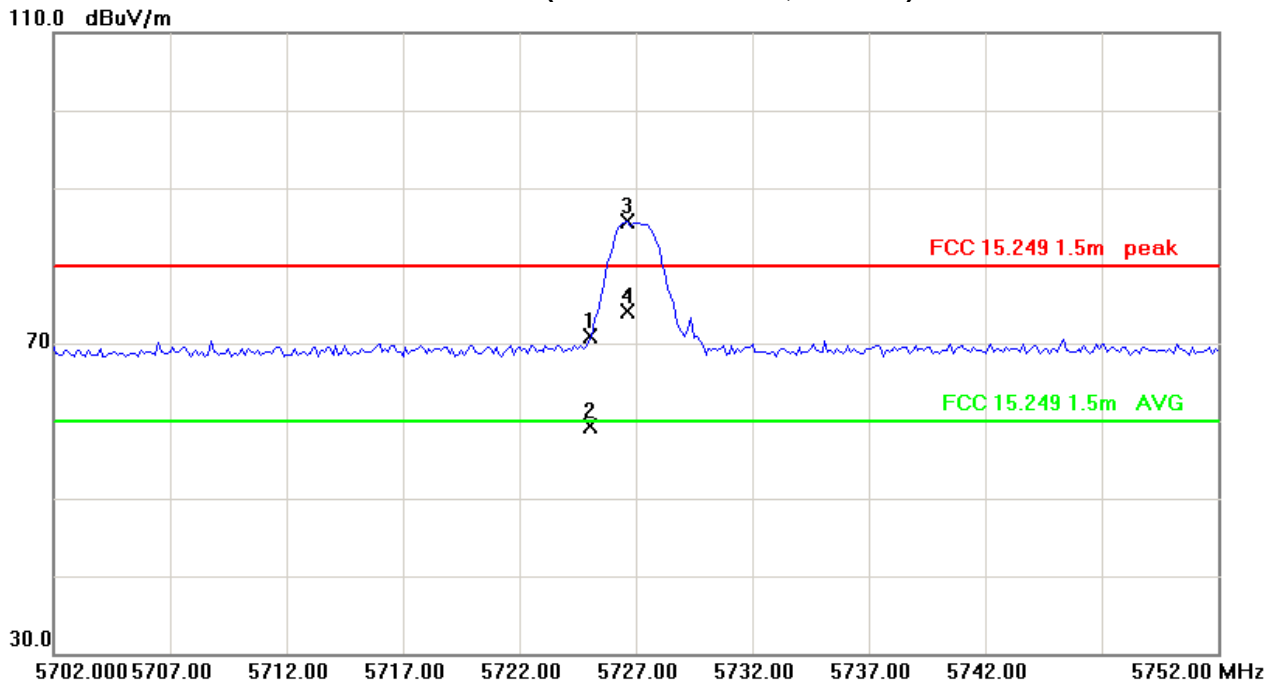
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
5725.00	V	29.98	18.40	40.90	70.88	59.30	80.00	60.00	X/E
<b>5726.63</b>	<b>V</b>	<b>44.72</b>	<b>33.14</b>	<b>40.90</b>	<b>85.62</b>	<b>74.04</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11454.12	V	51.87	40.29	13.25	65.12	53.54	80.00	60.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
Distance extrapolation factor = 20 log (3m/1.5m) dB ;  
Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle) › Final AV=PK-11.58



Orthogonal Axis : X  
TX 5727MHz (Above 1000 MHz, Vertical)





EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5727MHz		

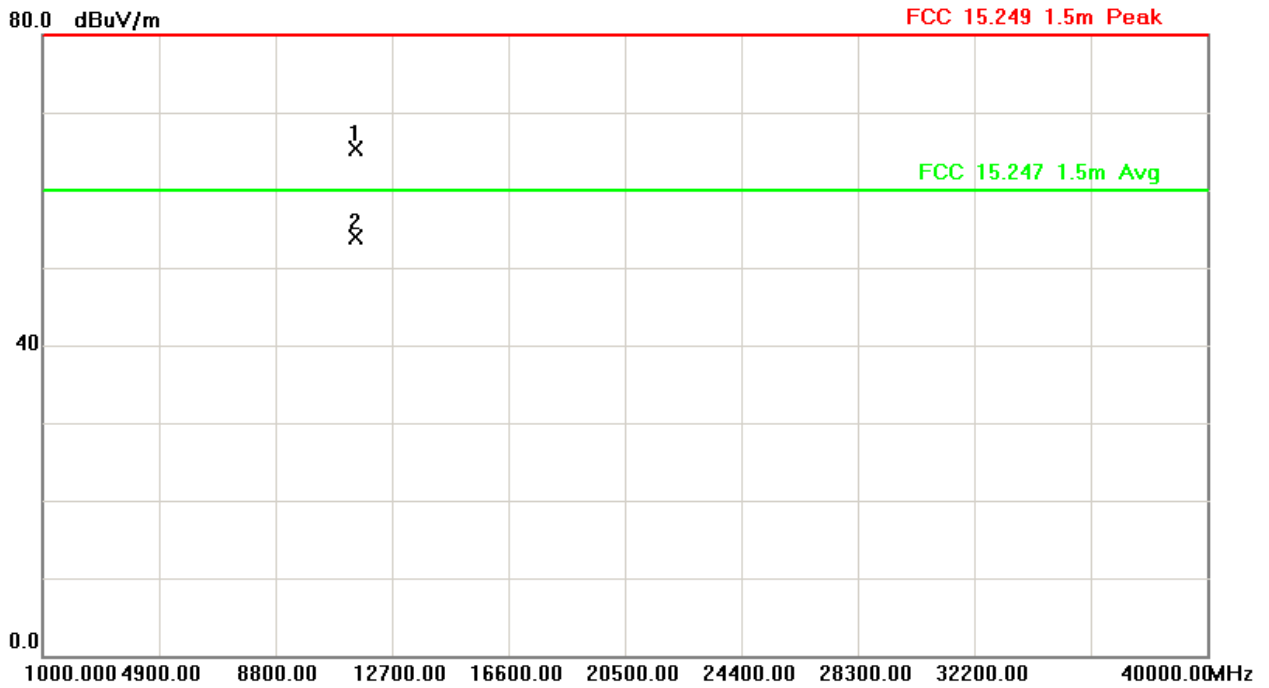
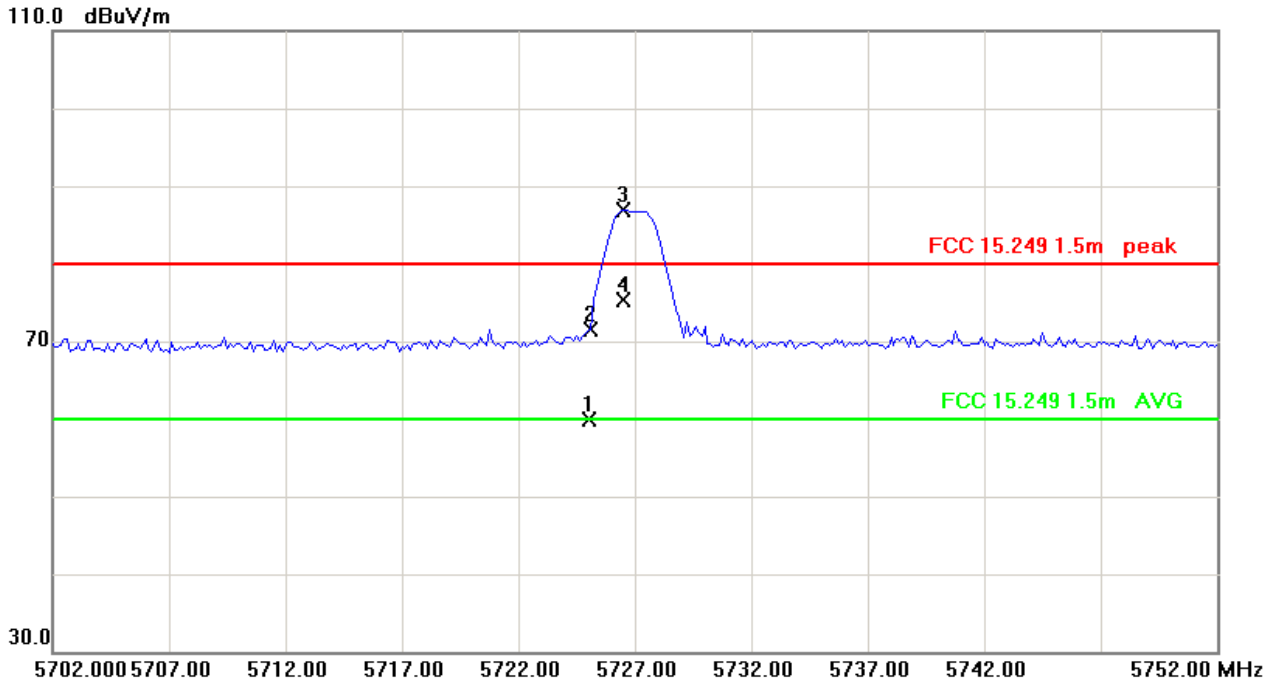
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
5725.00	H	30.58	19.00	40.90	71.48	59.90	80.00	60.00	X/E
<b>5726.50</b>	<b>H</b>	<b>45.96</b>	<b>34.38</b>	<b>40.90</b>	<b>86.86</b>	<b>75.28</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11453.92	H	52.15	40.57	13.25	65.40	53.82	80.00	60.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
Distance extrapolation factor = 20 log (3m/1.5m) dB ;  
Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle) → Final AV=PK-11.58



Orthogonal Axis : X  
TX 5727MHz (Above 1000 MHz, Horizontal)





EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5771MHz		

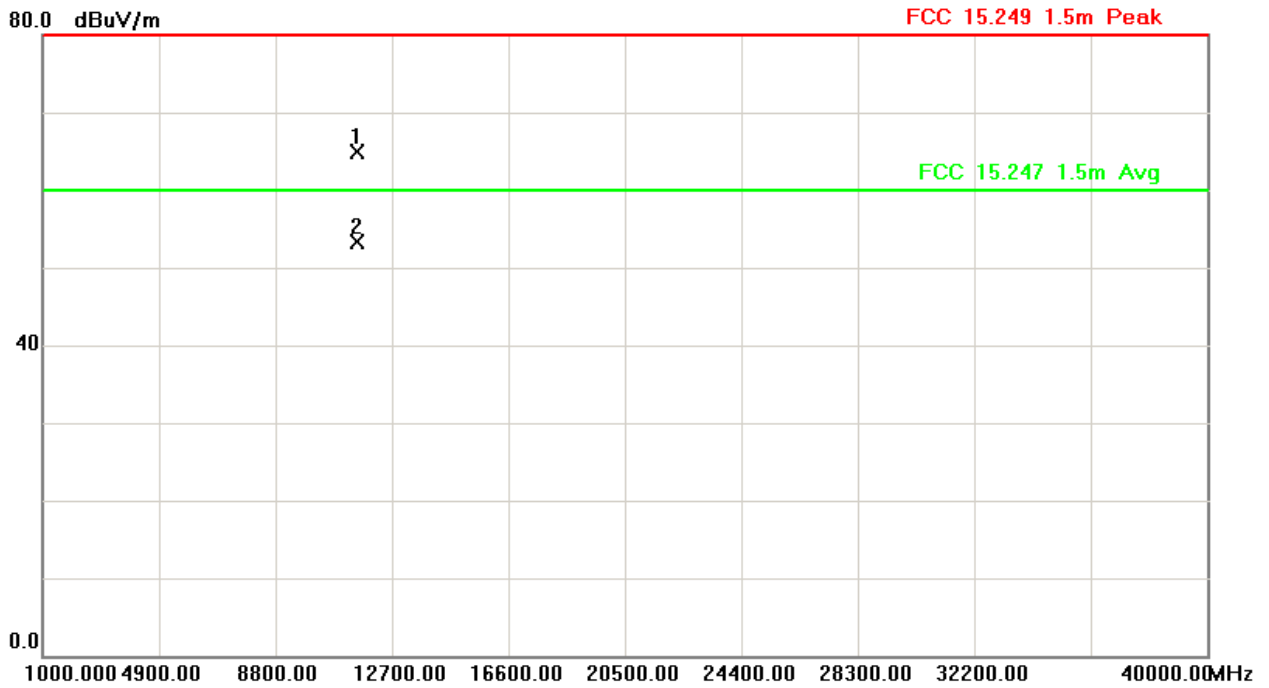
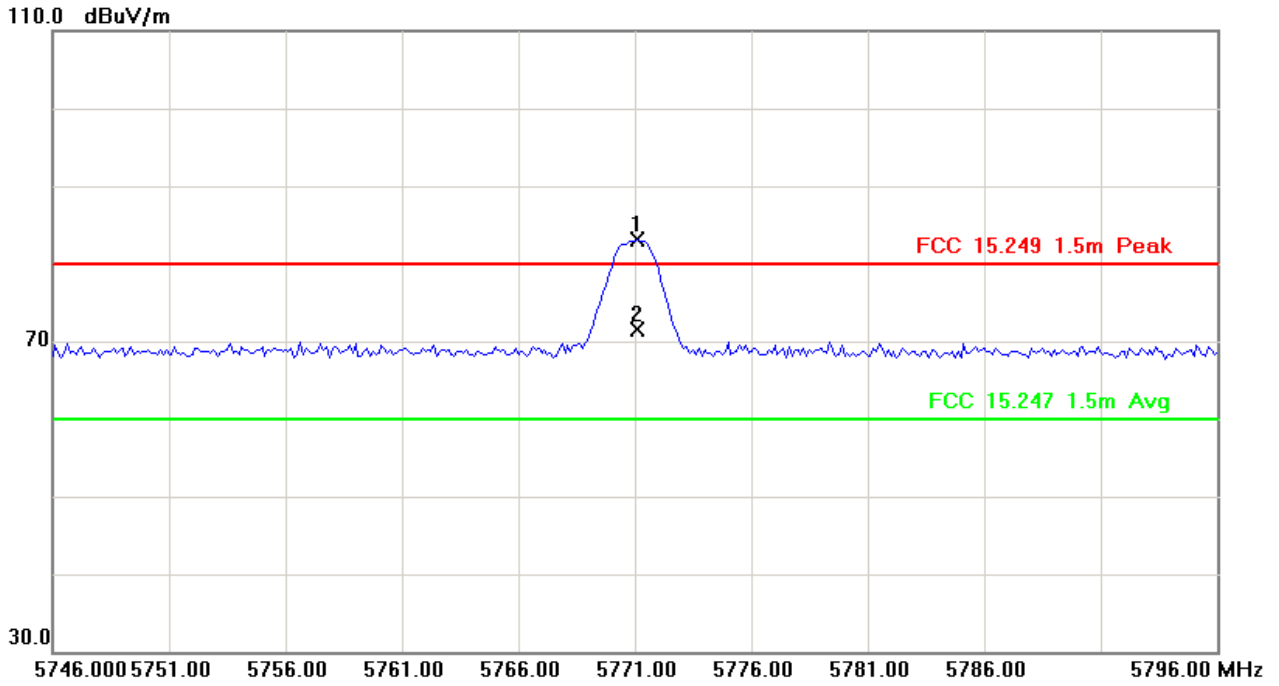
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>5771.13</b>	<b>V</b>	<b>42.02</b>	<b>30.44</b>	<b>41.07</b>	<b>83.09</b>	<b>71.51</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11541.02	V	51.57	39.99	13.33	64.90	53.32	80.00	60.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
Distance extrapolation factor =  $20 \log(3m/1.5m)$  dB ;  
Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
Average = Peak value +  $20\log(\text{Duty cycle})$  → Final AV=PK-11.58



Orthogonal Axis : X  
TX 5771 MHz (Above 1000 MHz, Vertical)





EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5771MHz		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>5770.88</b>	<b>H</b>	<b>43.26</b>	<b>31.68</b>	<b>41.07</b>	<b>84.33</b>	<b>72.75</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11541.13	H	53.89	42.31	13.33	67.22	55.64	80.00	60.00	X/H

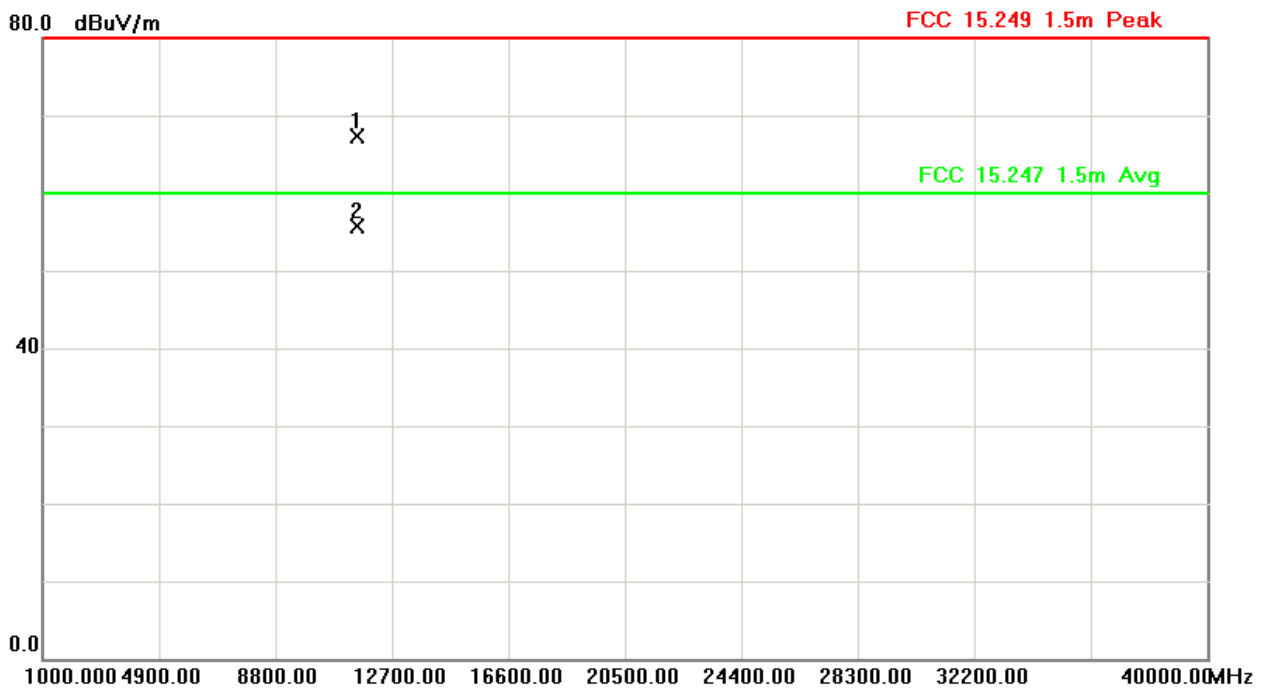
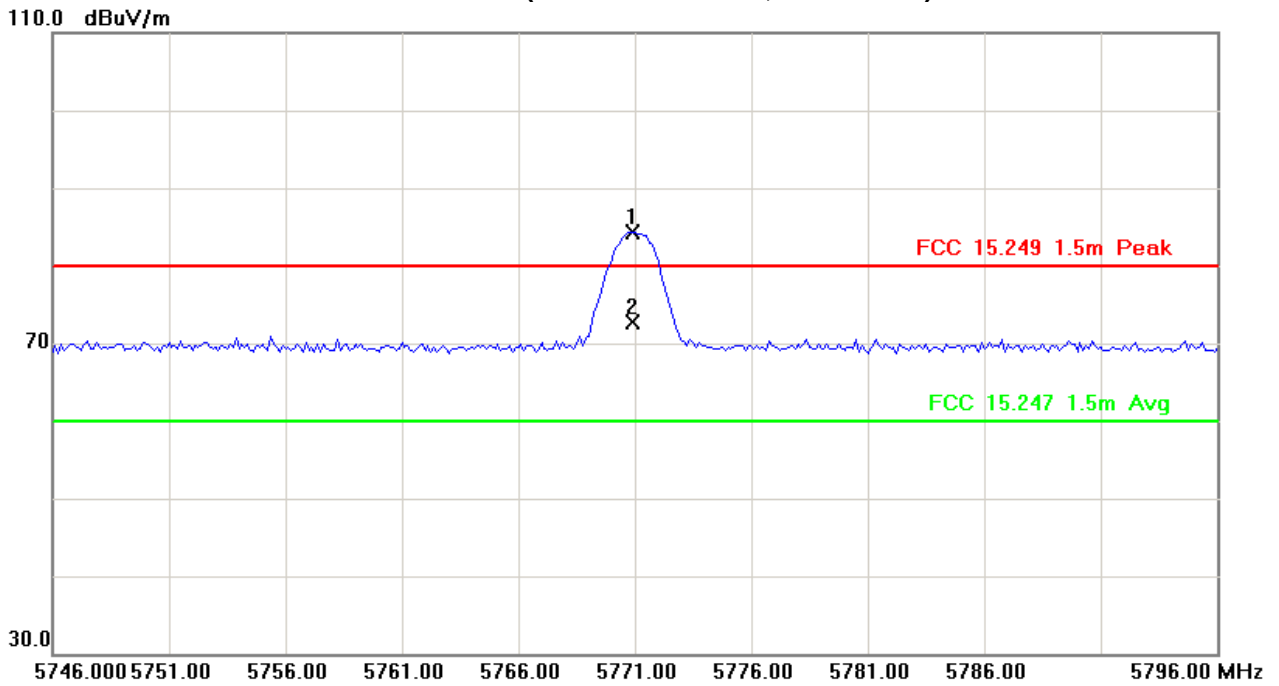
Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
Distance extrapolation factor =  $20 \log(3m/1.5m)$  dB ;  
Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
Average = Peak value +  $20 \log(\text{Duty cycle})$  , Final AV=PK-11.58





Orthogonal Axis : X  
TX 5771MHz (Above 1000 MHz, Horizontal)





EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5804MHz		

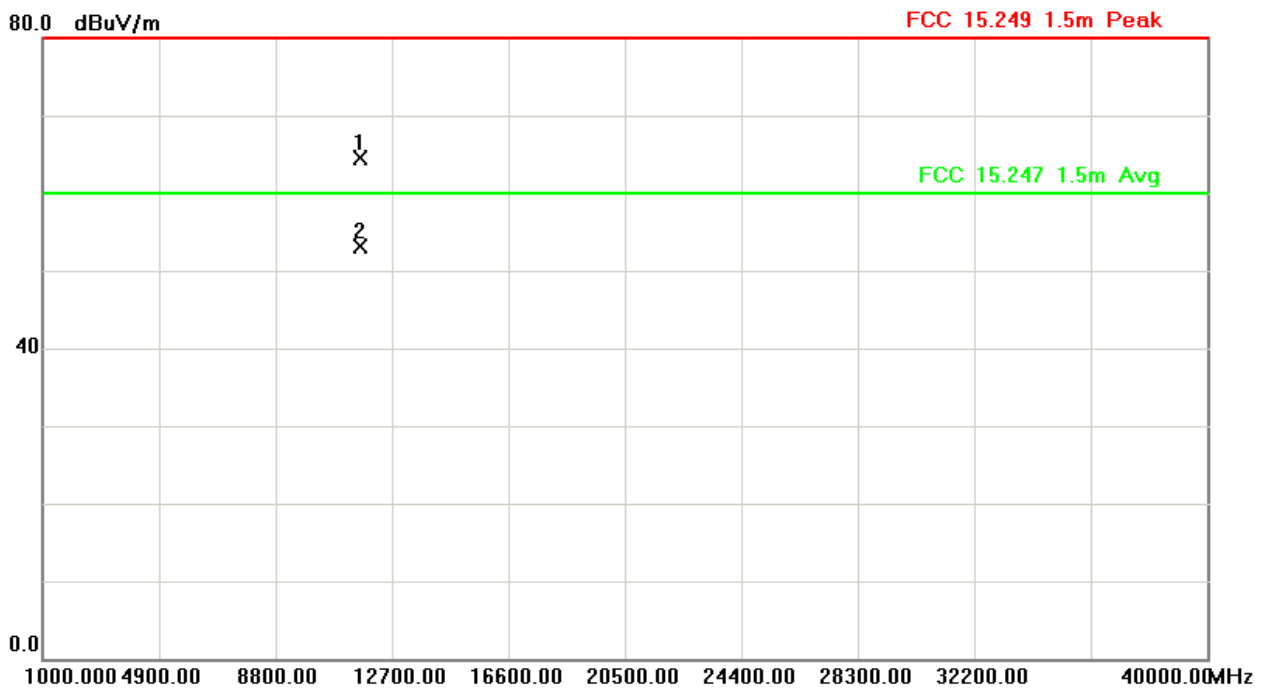
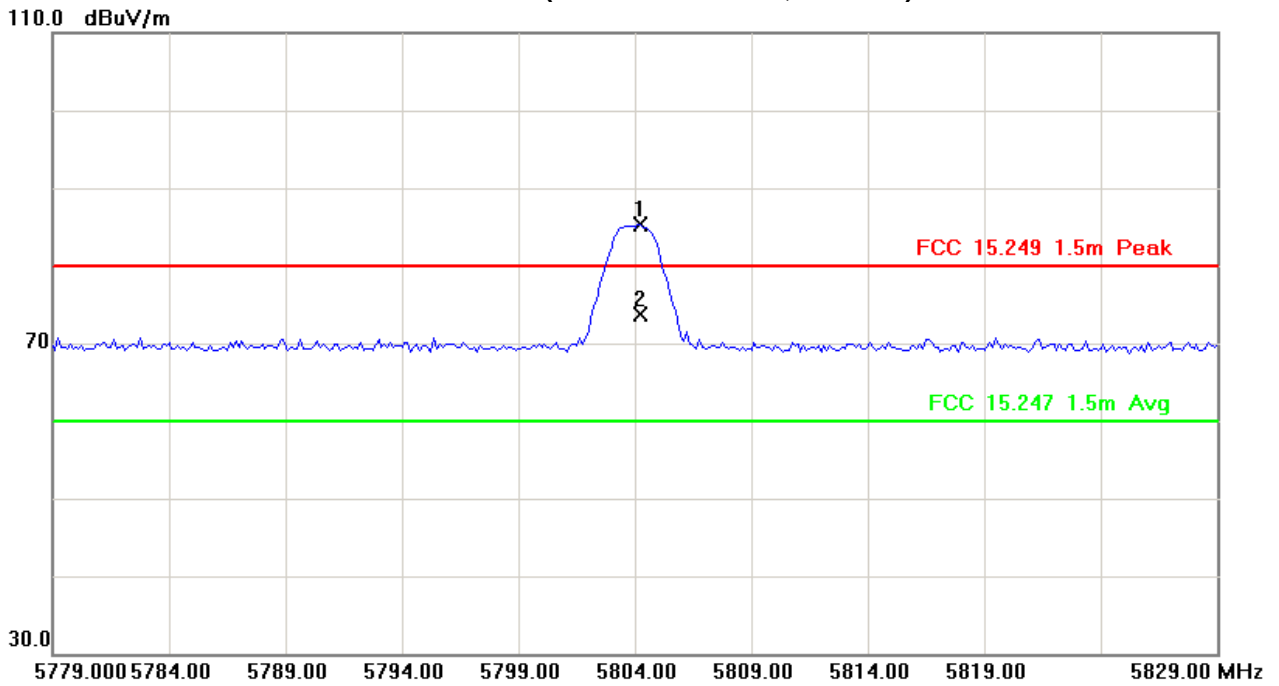
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>5804.25</b>	<b>V</b>	<b>44.13</b>	<b>32.55</b>	<b>41.20</b>	<b>85.33</b>	<b>73.75</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11608.11	V	51.20	39.62	13.39	64.59	53.01	80.00	60.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
Distance extrapolation factor =  $20 \log(3m/1.5m)$  dB ;  
Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
Average = Peak value +  $20\log(\text{Duty cycle})$  → Final AV=PK-11.58



Orthogonal Axis : X  
TX 5804MHz (Above 1000 MHz, Vertical)





EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX 5804MHz		

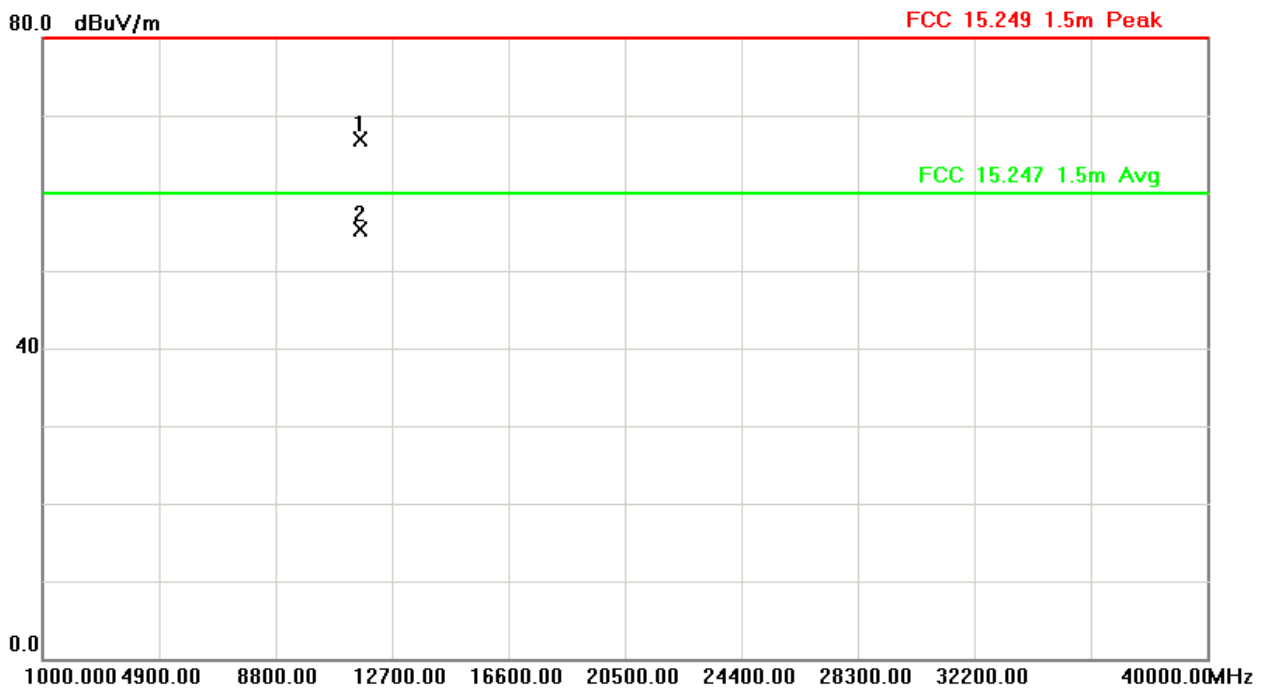
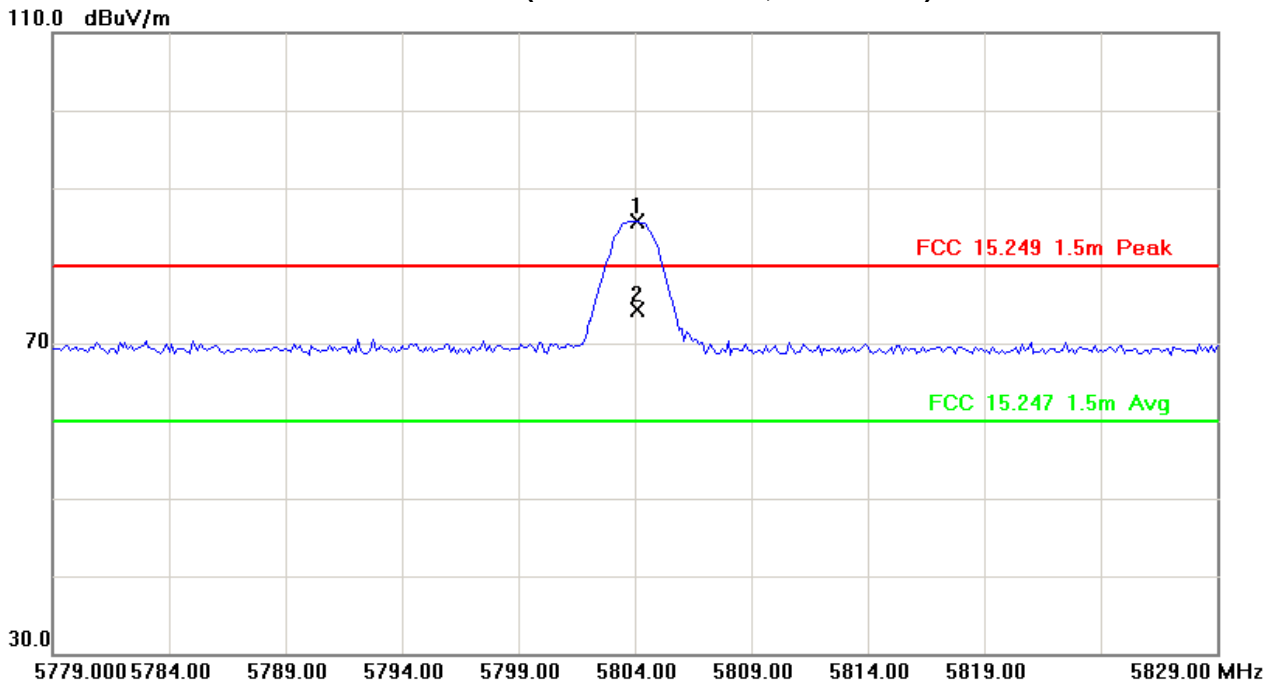
Freq. (MHz)	Ant. Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>5804.13</b>	<b>H</b>	<b>44.60</b>	<b>33.02</b>	<b>41.20</b>	<b>85.80</b>	<b>74.22</b>	<b>120.00</b>	<b>100.00</b>	<b>X/F</b>
11608.21	H	53.57	41.99	13.39	66.96	55.38	80.00	60.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
 "X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (8) The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade form 3m to 1.5m  
 Distance extrapolation factor =  $20 \log (3m/1.5m)$  dB ;  
 Limit line = specific limits (dBuV) + 6 dB
- (9) The average value of fundamental frequency is:  
 Average = Peak value +  $20 \log(\text{Duty cycle})$  , Final AV=PK-11.58



Orthogonal Axis : X  
TX 5804MHz (Above 1000 MHz, Horizontal)



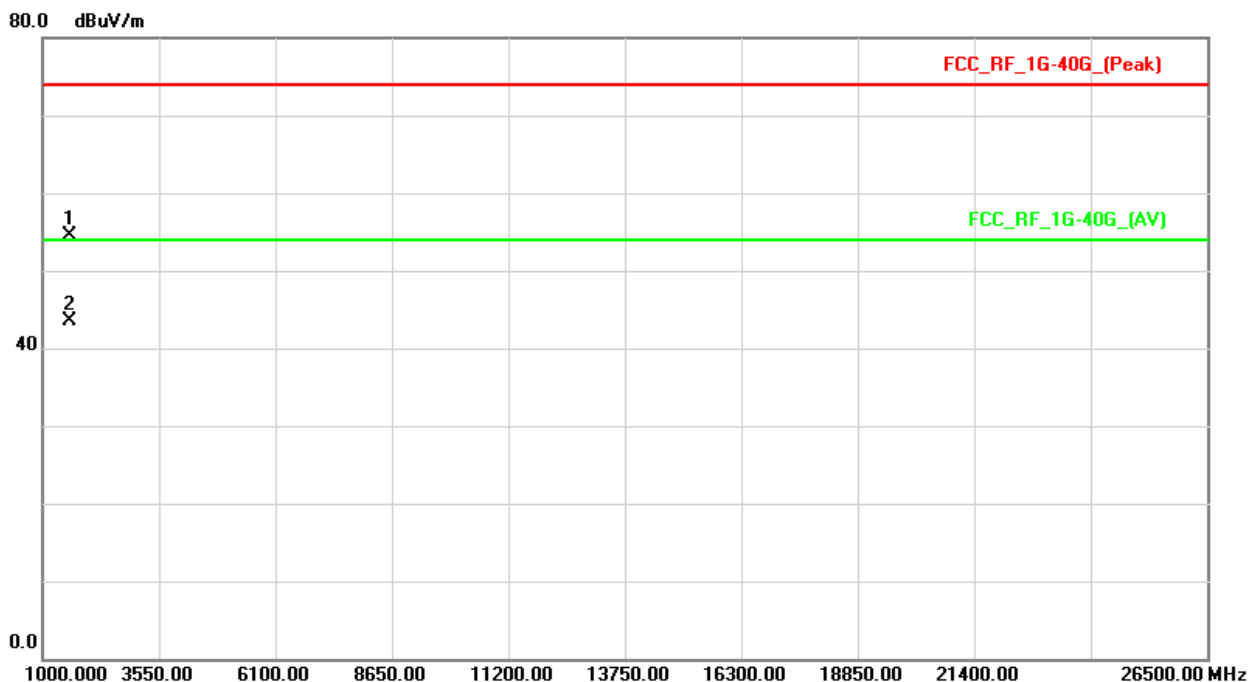


EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	RX Mode		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
3533.11	V	58.22	45.14	1.87	60.09	47.01	74.00	54.00	X/E

**Remark :**

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 1000MHz to 6000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle) ◦ Final AV=PK-11.58



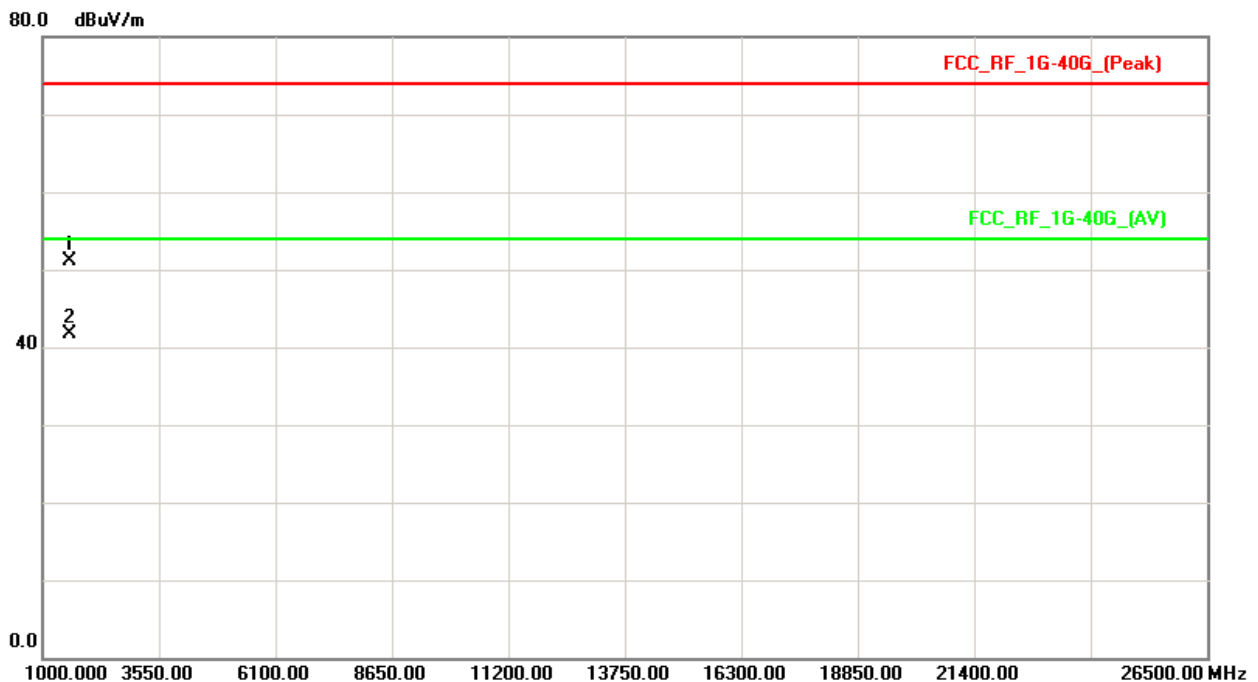


EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	RX Mode		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2328.15	H	59.56	44.56	-1.39	58.17	43.17	74.00	54.00	X/E

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 1000MHz to 6000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
 "X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) The average value of fundamental frequency is:  
 Average = Peak value + 20log(Duty cycle) ◦ Final AV=PK-11.58





4.2.9 TEST RESULTS (5725 – 5875 MHz)

EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	20°C	Relative Humidity :	58 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH 5727MHz/5771MHz/5804MHz		

Freq. (MHz)	Ant.Pol. (HV)	Reading		Ant./CL/ CF(dB)	Actual FS		Limit3m		NOTE
		(dBuV)	(dBuV)		(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
5726.63	V	44.72	33.14	40.90	85.62	74.04	120.00	100.00	CH01
5726.50	H	45.96	34.38	40.90	86.86	75.28	120.00	100.00	CH01
5771.13	V	42.02	30.44	41.07	83.09	71.51	120.00	100.00	CH09
5770.88	H	43.26	31.68	41.07	84.33	72.75	120.00	100.00	CH09
5804.25	V	44.13	32.55	41.20	85.33	73.75	120.00	100.00	CH16
5404.13	H	44.60	33.02	41.20	85.80	74.22	120.00	100.00	CH16

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (3) Data of measurement within this frequency range shown “ \* ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) EUT Orthogonal Axis :  
 “X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- (5) The average value of fundamental frequency is:  
 Average = Peak value + 20log(Duty cycle) → Final AV=PK-11.58





## 5. BANDWIDTH TEST

### 5.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

### 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= 100KHz, VBW=100KHz, Sweep time = 20 ms.

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

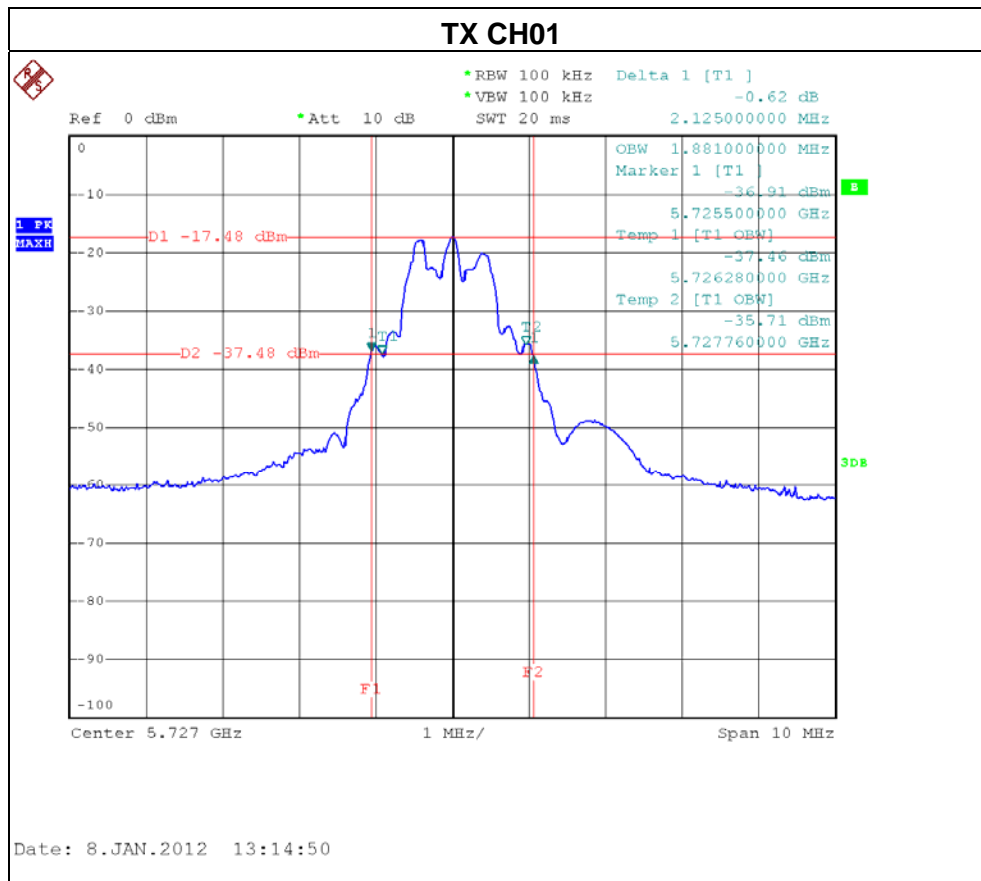
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

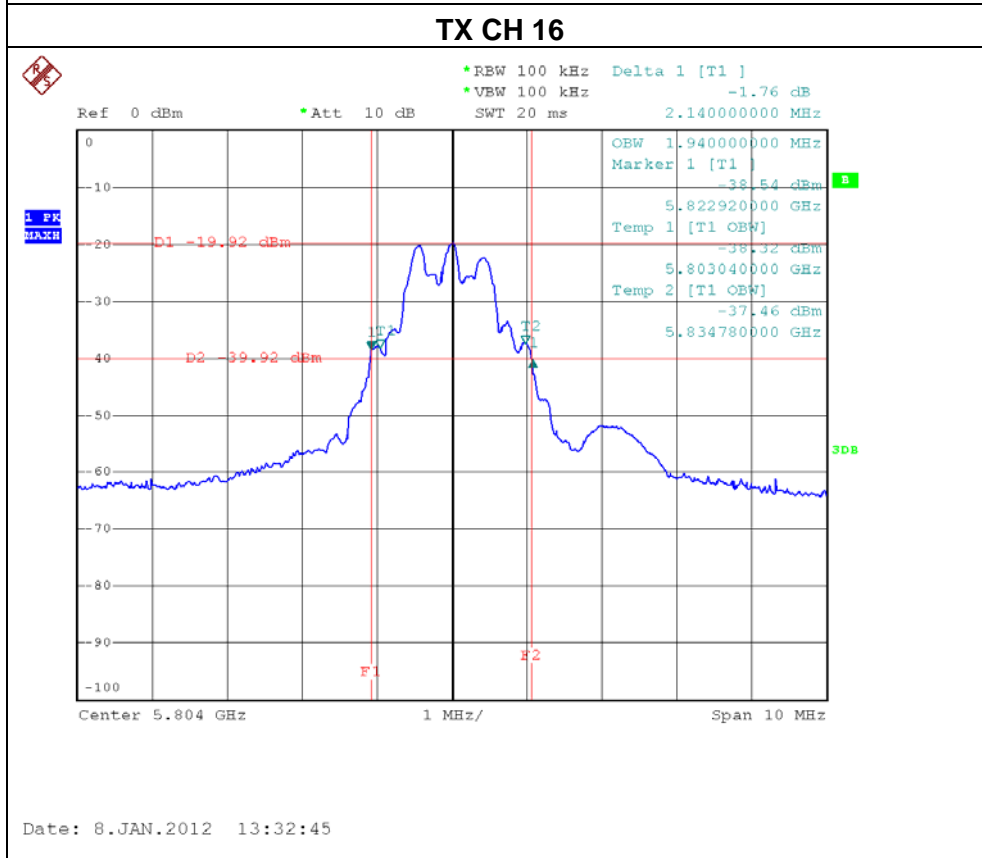
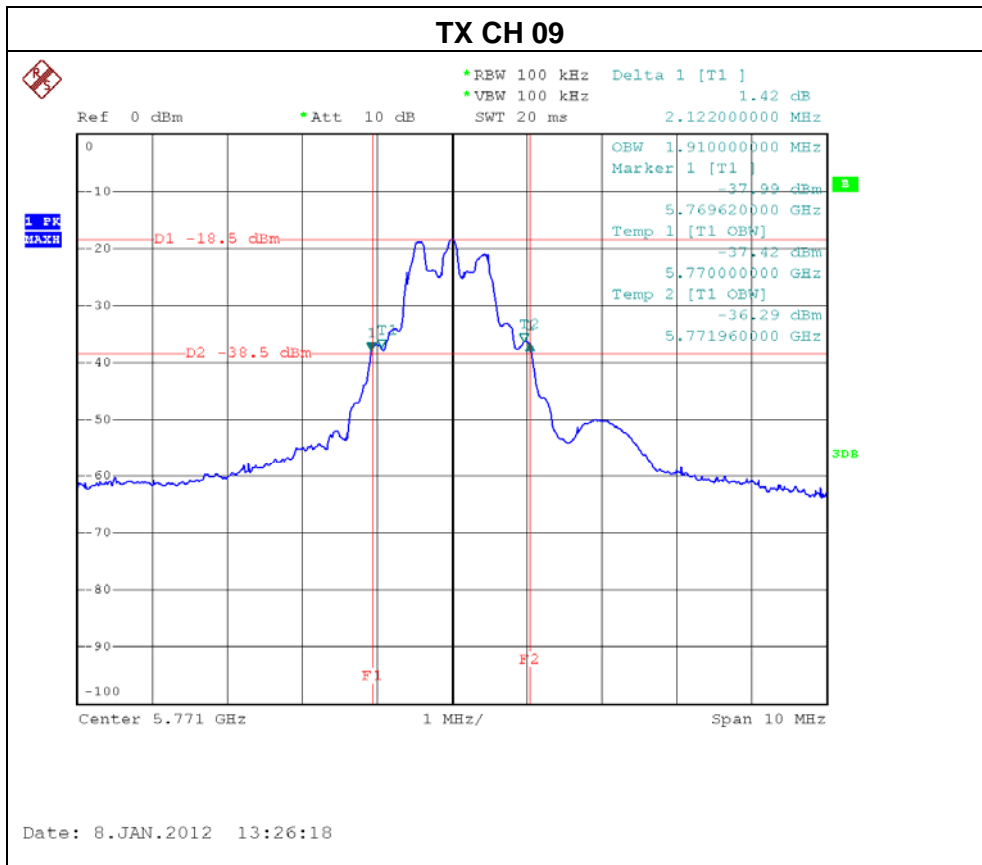


**5.6 TEST RESULTS**

EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	25 °C	Relative Humidity :	55 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH 01/09/16		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% occupied Bandwidth(MHz)
CH01	5727	2.125	1.881
CH 09	5771	2.122	1.910
CH16	5804	2.140	1.940







**6. ANTENNA CONDUCTED SPURIOUS EMISSION**

**6.1 APPLIED PROCEDURES / LIMIT**

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

**6.1.1 MEASUREMENT INSTRUMENTS LIST**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

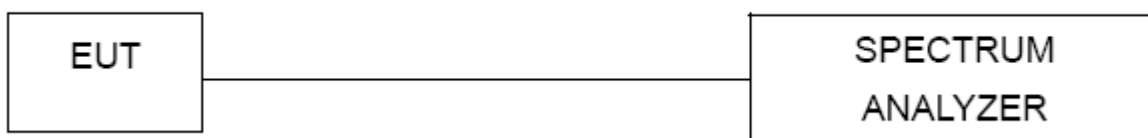
**6.1.2 TEST PROCEDURE**

- 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= 100KHz, VBW=100KHz, Sweep time = 20 ms.

**6.1.3 DEVIATION FROM STANDARD**

No deviation.

**6.1.4 TEST SETUP**



**6.1.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



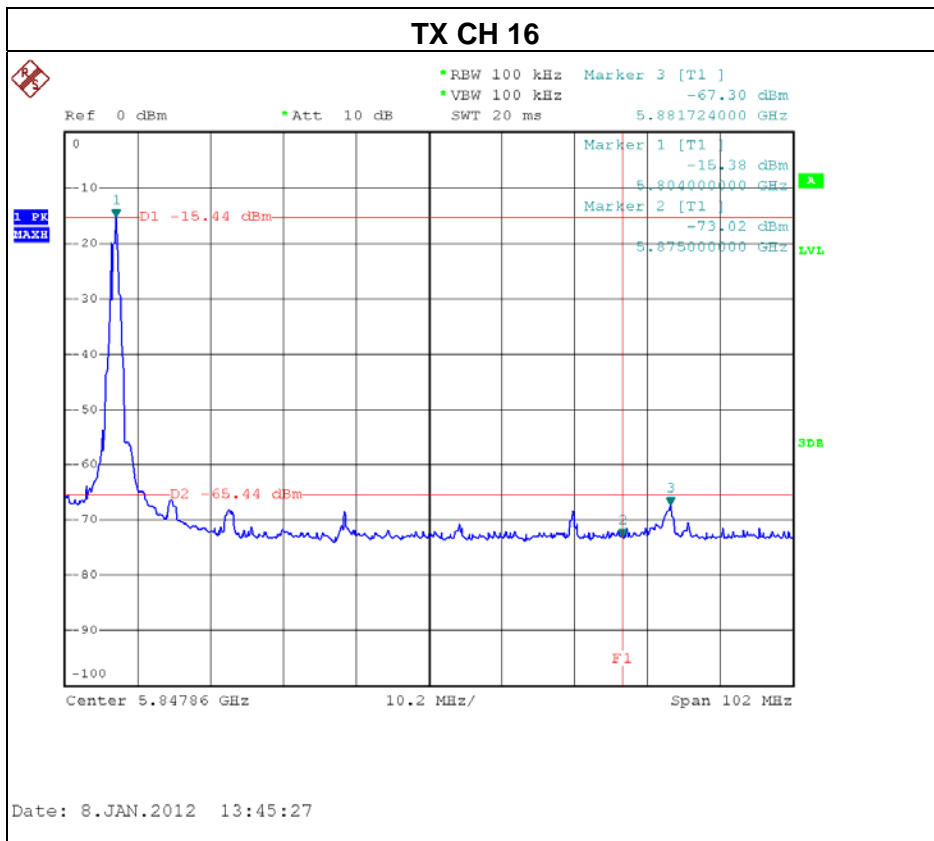
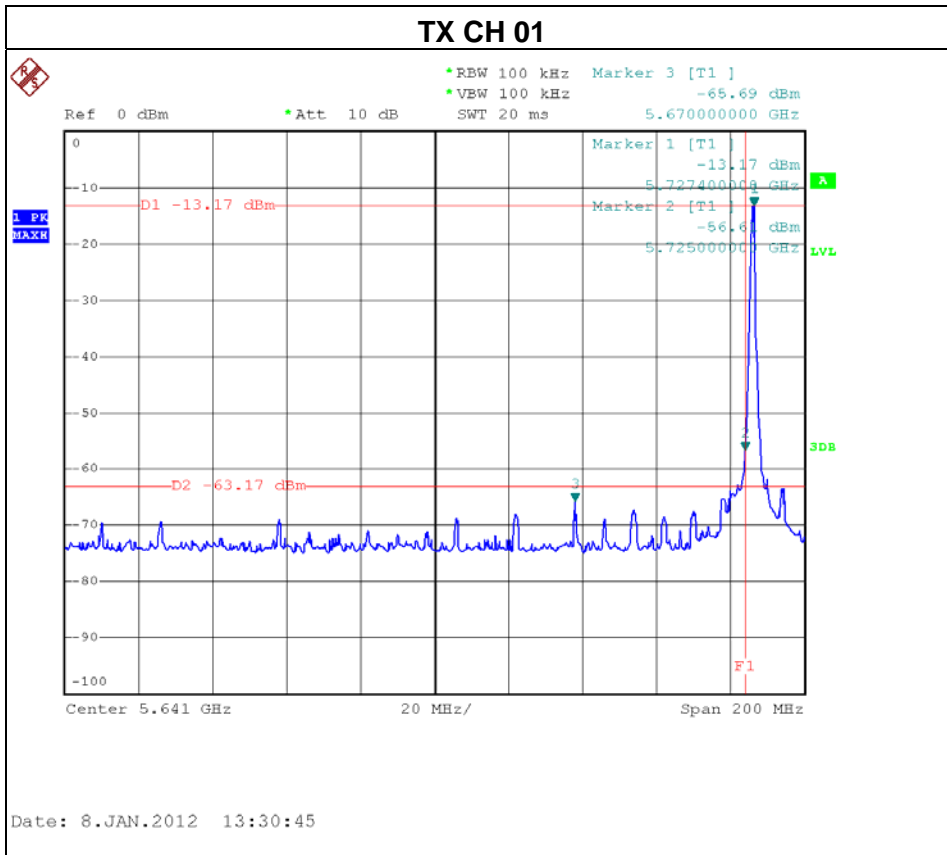
6.1.6 TEST RESULTS

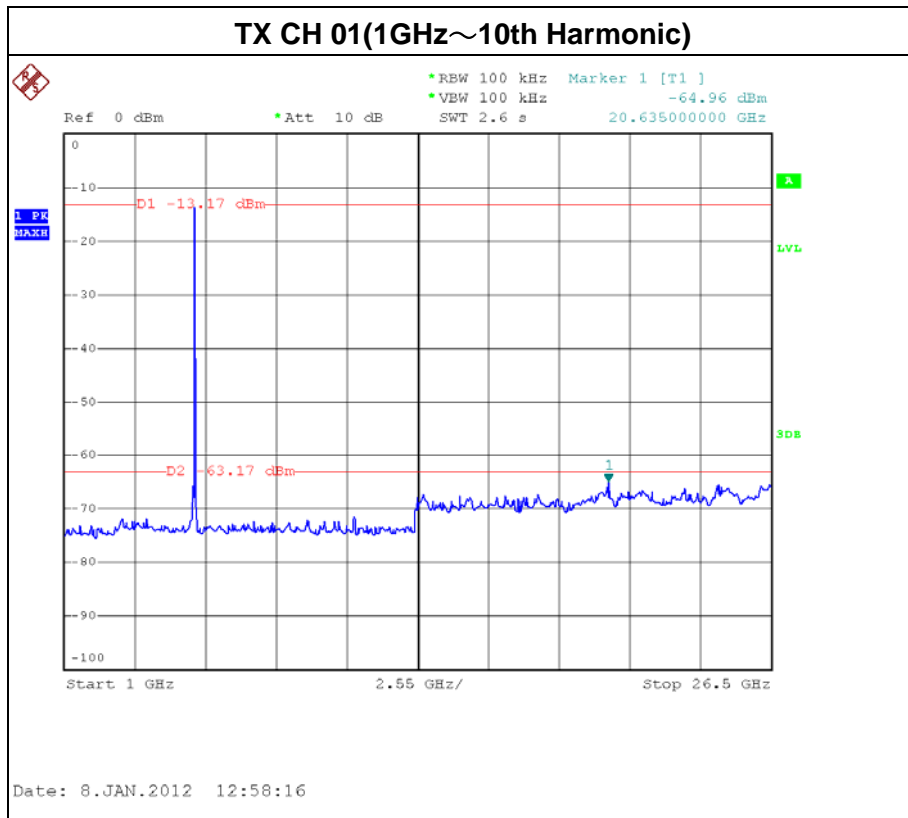
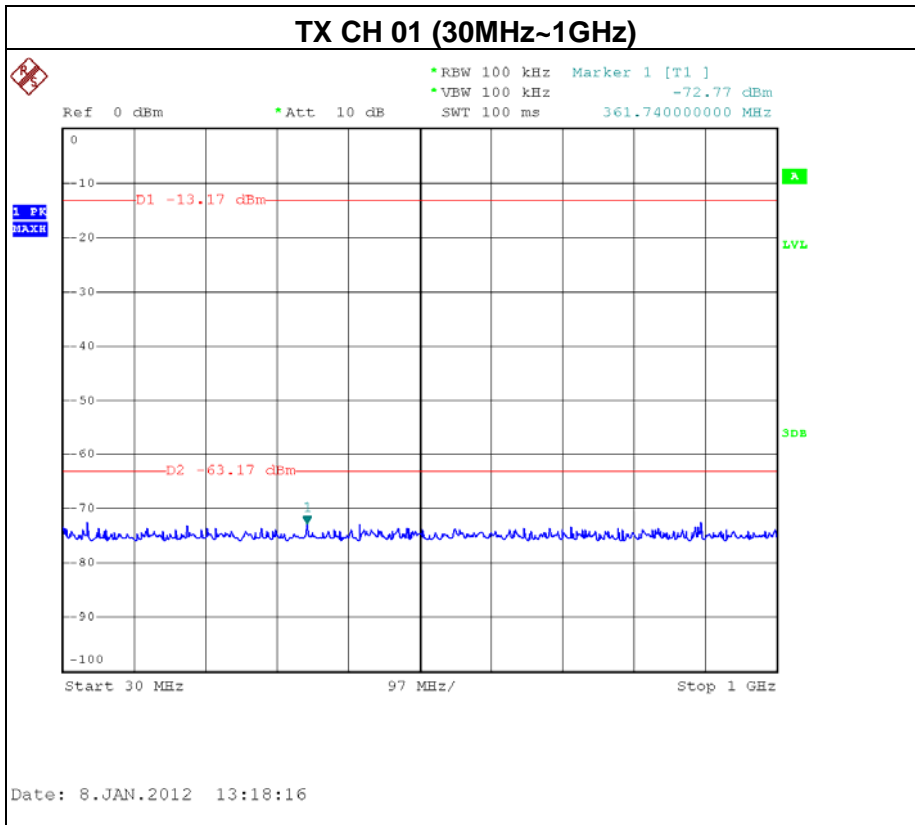
EUT :	Wireless Optical Mouse	Model Name. :	3000P
Temperature :	25 °C	Relative Humidity :	55 %
Pressure :	1009 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH01, CH09, CH16		

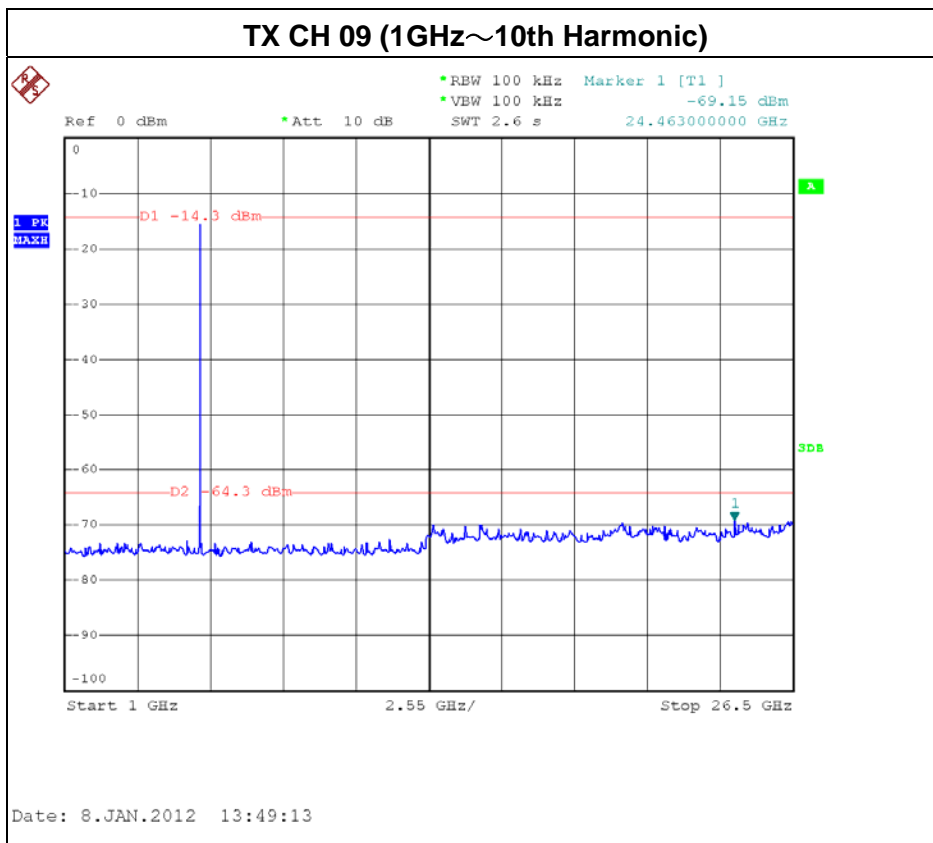
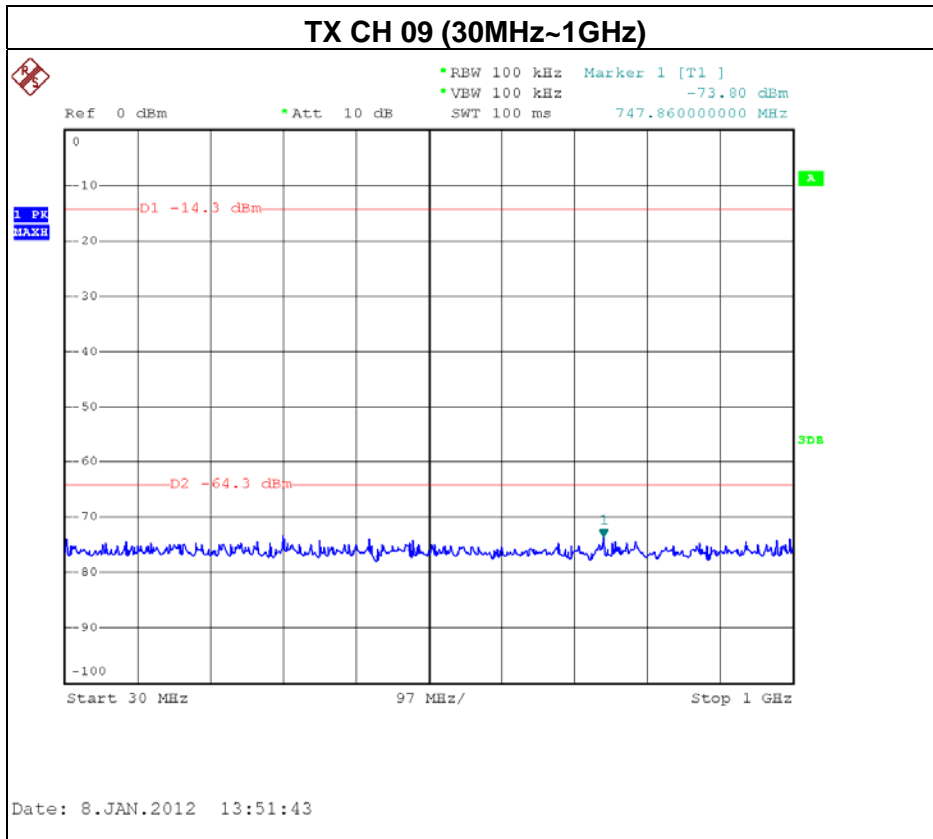
Channel of Worst Data: CH16			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
5725.00	-56.61	5881.121	-77.30
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 50dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.			

Band-edge test results –apply marker delta method

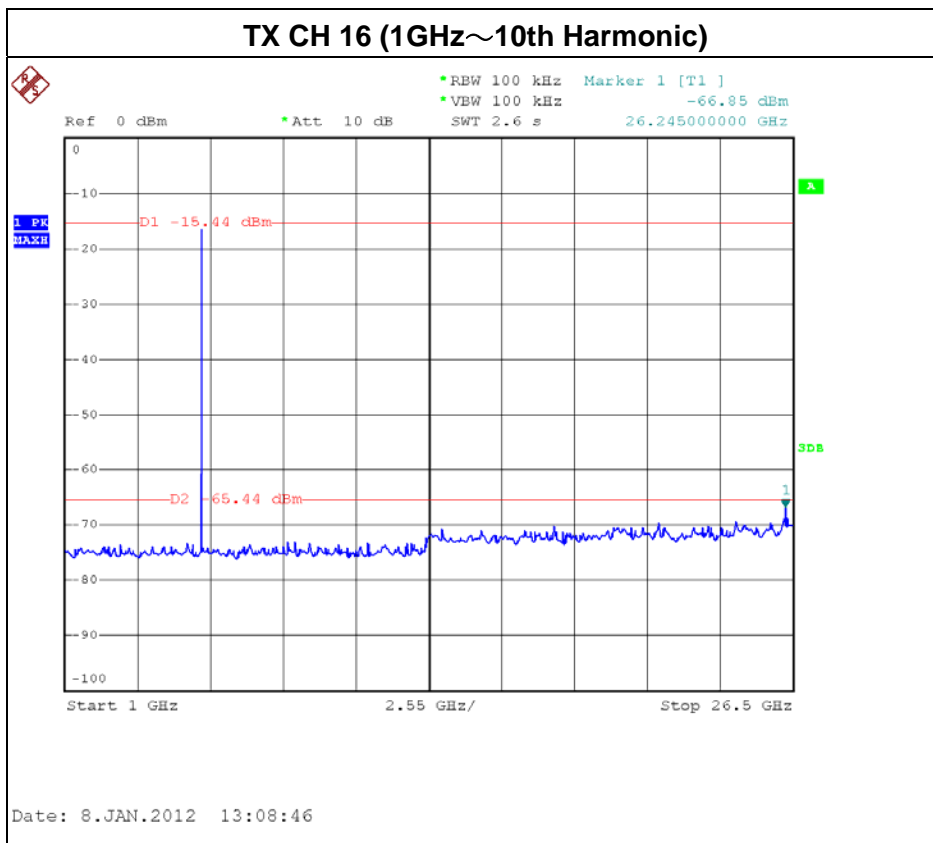
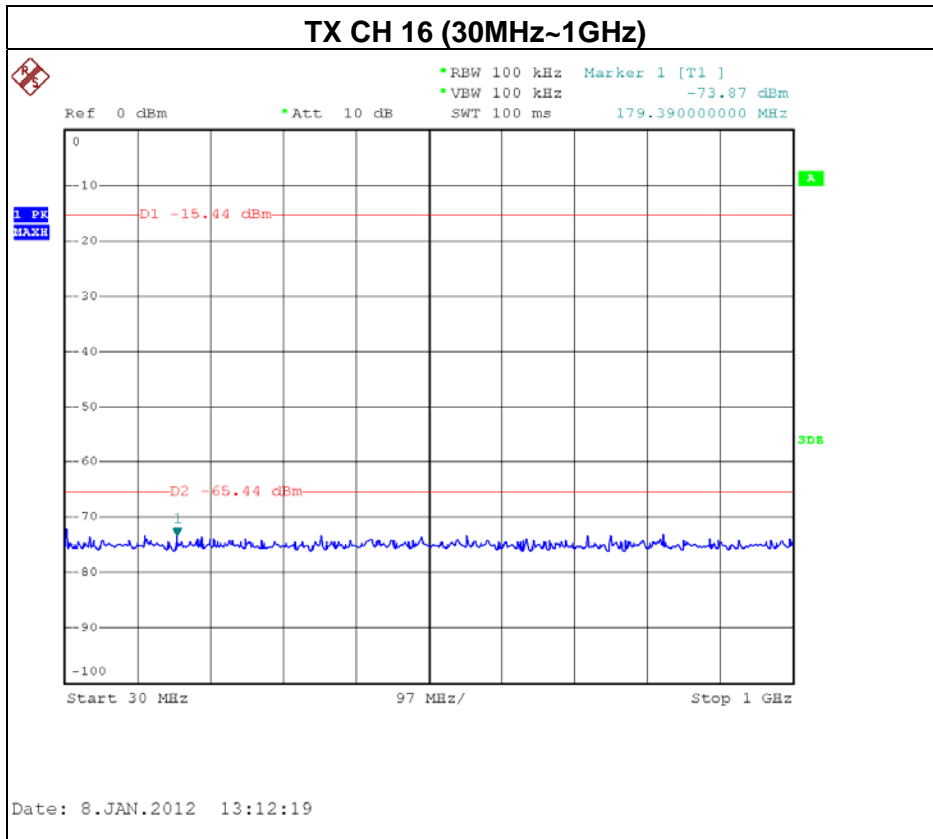
CH01	
Peak fundamental frequency measured	86.86dBuV/m
Delta	56.61dBm-13.17dBm=43.44dB
Peak field strength at 2400.0MHz	86.86dBuV/m-43.44dB=43.42dBuV/m
Result	PASS < Limits 74 dBuV/m













**7. EUT TEST PHOTO**

**Radiated Measurement Photos**

