

FCC Part 15 Subpart C
EMI TEST REPORT
of

E.U.T. : Cordless Mouse

FCC ID. : O3LPT-2000-6789

MODEL : PT-2000

Working Frequency : 26.96 ~ 27.28 MHz

for

APPLICANT : Paten Technology Corporation

ADDRESS : 3FL. NO.2, LANE 497, CHUNG CHENG ROAD,
HSIN TIEN, TAIPEI HSIEN, TAIWAN, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN

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Report Number : ET89S-05-024-01

TEST REPORT CERTIFICATION

Applicant : Paten Technology Corporation
7F. NO.48, Lane 10, Jihu Road, Neihu, Taipei, Taiwan, R.O.C.

Manufacturer : Paten Technology Corporation
7F. NO.48, Lane 10, Jihu Road, Neihu, Taipei, Taiwan, R.O.C.

Description of EUT :

a) Type of EUT : Cordless Mouse
b) Trade Name : Paten
c) Model No. : PT-2000
d) FCC ID : O3LPT-2000-6789
e) Working Frequency : 26.96 ~ 27.28 MHz
f) Power Supply : DC 3V Battery

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (1999)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note : 1. The results of the testing report relate only to the items tested.
2. The testing report shall not be reproduced except in full, without the written approval of ETC.

Test Date : May 10, 2000

Test Engineer : Rick Hu

Approve & Authorized
Signer :

Win-Po Tsai

Win-Po Tsai, Supervisor, NVLAP Signatory
EMC Dept. of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: Cordless Mouse
b) Trade Name	: Paten
c) Model No.	: PT-2000
d) FCC ID	: O3LPT-2000-6789
e) Working Frequency	: 26.96 ~ 27.28 MHz
f) Power Supply	: DC 3V Battery

1.2 Characteristics of Device:

The EUT is the most recently launched cordless wheel mouse, which supports as many as 13 sets of wireless channels, its wheel button can control the horizontal scroll and the vertical scroll, in addition it can act as a third set of buttons or functions such as zooming.

1.3 Test Methodology

Radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4. The Cordless Mouse (Transmitter) under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.

The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the Cordless Mouse (Transmitter) under test.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3360-4400	Above 38.6
13.36-13.41			

Remark “**” : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency (MHz)	Emission (μ V)	Emission (dB μ V)
0.45 - 30.0	250	48.0

(2) Radiated Emission Limits:

According to 15.227

- (a) The field strength of any emission within this band shall not exceed 10,000 $\mu\text{V}/\text{m}$ at 3 meter. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in 15.35 for limiting peak emission apply.

Fundamental Frequency (MHz)	Field Strength of Fundamental	
	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$
26.96 ~ 27.28	10000	80

- (b) Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, as following table:

Other Frequencies (MHz)	Field Strength of Fundamental	
	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. SYSTEM TEST CONFIGURATION

3.1 EUT configuration and operating

The system was configured for testing in a typical fashion, as a customer would normally use it. Measurement was performed under the condition that :

Plugged the PS/2 connector of the Fantasy Mouse(Receiver) to the PS/2 socket of the personal computer. The LED showed in hexadecimal 0-F indicating the current channel used to the user.

3.2 Devices for Tested System

Description	Model	Manufacturer	Cable
Cordless Mouse *	PT-2000	Paten Technology Corporation.	None
PC	APTIVA	IBM	1.5m unshielded power cable
Keyboard	KB 9910	IBM	1.5m unshielded cable
Monitor	P750	NEC	1.5m unshielded power cable 1.8m unshielded VGA cable with 2 cores
Modem	1414	Aceex	1.2m unshielded power cable 1.5m unshielded RS232 cable
Printer	DeskJet 690C	HP	1.5m unshielded power cable 1.2m unshielded printer cable
Fantasy Mouse (Receiver)	PT-2000	Paten Technology Corporation.	1.45m unshielded mouse cable

“*” -- Equipment Under Test

3.3 Deviation Statement

(If any deviation from additions to or exclusions from test method must be stated)

N/A

3.4 Modification Record

N/A

4. RADIATED EMISSION MEASUREMENT

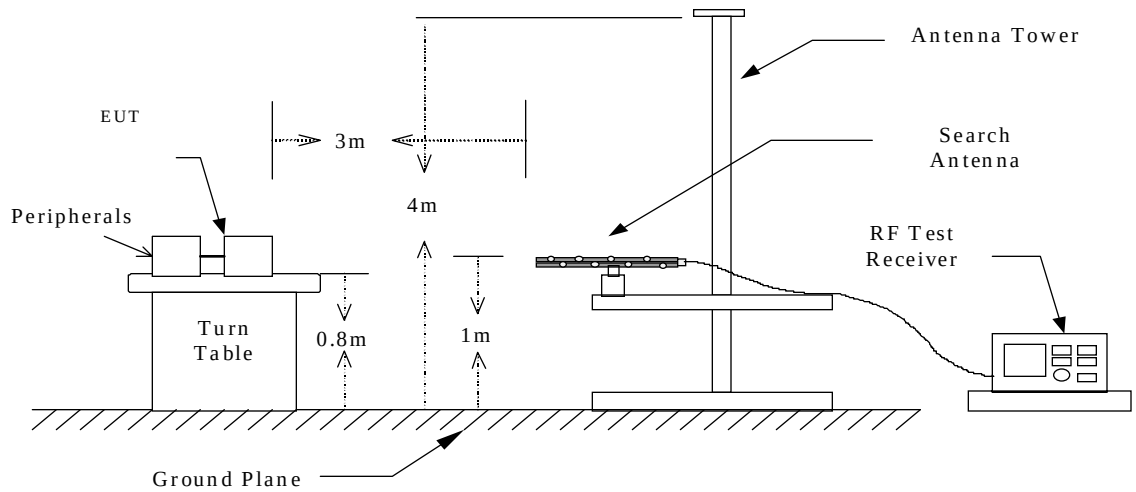
4.1 Applicable Standard

The radiated emission shall comply with FCC part 15, section 15.227.

4.2 Measurement Procedure

1. Setup the configuration per figure 1 for radiated emission. Turn on EUT and make sure that it is in normal function.
2. A pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured.
3. Set the spectrum analyzer on a 100 kHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies that need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worse case and record the result.

Figure 1 : Radiatd emission configuration



4.3 Test Data

Temperature : 23 °
 Humidity : 55 %
 Operated mode : Transmitting
 Test Date : May 10, 2000

a) Fundamental frequency

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Peak AVG		Margin (dB)	Table Degree (Deg.)	Ant. High (m)
26.973	H	41.4	13.9	55.3	100.0	80.0	-24.7	340	3.5
26.973	V	42.6	13.9	56.5	100.0	80.0	-23.5	340	1.0

b) Other Frequencies

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) QP	Correct Factor (dB)	Result @3m (dBuV/m) QP	Limit @3m (dBuV/m) QP	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
53.946	H/V	---	7.8	---	40.0	---	---	---
80.919	H/V	---	10.1	---	40.0	---	---	---
107.892	H/V	---	9.1	---	43.5	---	---	---
134.865	H/V	---	10.6	---	43.5	---	---	---
161.838	H/V	---	11.6	---	43.5	---	---	---
188.811	H/V	---	12.3	---	43.5	---	---	---
215.784	H/V	---	13.4	---	43.5	---	---	---
242.757	H/V	---	14.5	---	46.0	---	---	---
269.730	H/V	---	15.6	---	46.0	---	---	---

Note :

1. "----" means the noise is too low to be measured.

2. If the measured frequencies fall in the restricted frequency band, the limit employed is 15.209 general requirement when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function, no duty factor applied.

4.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$RESULT = READING + CORR. FACTOR$$

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

Assume a receiver reading of 22.5 dB•V is obtained. The Antenna Factor of 14.5 and a Cable Factor of 1.5 is added . The total of field strength is 38.5 dB•V/m.

$$\begin{aligned} RESULT &= 22.5 + 14.5 + 1.5 = 38.5 \text{ dB} \cdot \text{V/m} \\ \text{Level in } \cdot \text{V/m} &= \text{Common Antilogarithm}[(38.5 \text{ dB} \cdot \text{V/m})/20] \\ &= 84.14 \cdot \text{V/m} \end{aligned}$$

4.5 Radiated Test Equipment

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Hewlett-Packard	8546A	3411A00192	Nov. 04, 2000
BiconiLog Antenna	SCHWARZBECK	9160	3059	Oct. 29, 2000

Note: The standards used to perform this calibration are traceable to NML/ROC, NIST/USA and NPL.

4.6 Measuring Instrument Setup

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	Auto

4.7 Radiated Measurement Photos

Please see Test Setup Photos files : RE01.jpg and RE02.jpg

5. CONDUCTED EMISSION MEASUREMENT

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.