

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA,
PT-2003-MC

FCC ID : O3L-PT-02-MV

Filing Type : Certification

Applicant : **Paten Wireless Technology Inc.**
4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114,
Taiwan, R.O.C.

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SPORTON International Inc.

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History of this test report

Original Report Issue Date: Feb. 28, 2003

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA,
PT-2003-MC

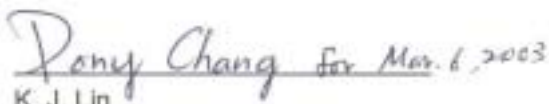
FCC ID : O3L-PT-02-MV

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Applicant : **Paten Wireless Technology Inc.**
4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114,
Taiwan, R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed** both radiated and conducted emission limits. Testing was carried out on Dec. 28, 2002 at **SPORTON International Inc. LAB.**


K. J. Lin
Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

Paten Wireless Technology Inc.

4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114, Taiwan, R.O.C.

1.2. Manufacturer

WEI FU MOLD PLASTIC & METAL FACTORY

Da-Ning Industrial Zone, Humen, Dongguan, Guangdong, CHINA

1.3. Basic Description of Equipment under Test

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA, PT-2003-MC

(Difference of these models are only the external appearance)

FCC ID : O3L-PT-02-MV

Trade Name : Paten

Power Supply Type : From Battery (3V)

AC Power Cord : N/A

1.4. Feature of Equipment under Test

Mouse		
ITEM	SPEC	REMARK
Channel	1	
User ID:	256 Sets	
Cordless Technology	Radio Frequency	
Modulation	FSK (Frequency Shift Key)	
Transfer Rate	10000 bps	
Carry Frequency	27.045MHZ	
Input Power	3.0VDC (2*AAA)	
Rated Output Power Level	42 mA	Maximum(dark surface)
RF Power	500 uV/M	Minimum
Buttons	2 Buttons, Scroll Button	3-Button Type
Encoder Technology	Opto-Mechanical	
Resolution	800 DPI	
Frames Speed	1500 Frames/sec	Maximum
Display LED	1 LED	Green-Normal,
Link Switch	1 Rubber Switch	
Effective Distance	1M	
Battery Life	3 Months	Non-working
Dimension	99.5(L)*63.8(W)*36.5(H) mm	
Weight	90g	Including Batteries

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included HP PC, LOGITECH PS/2 Keyboard, HP Printer, ACEEX Modem, VIEWSONIC Monitor, Paten Wireless Mouse Receiver and EUT for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 1000MHz.

2.2. Description of Test System

Support Unit 1. -- Personal Computer (HP)

FCC ID	: N/A
Model No.	: VECTRA VL420 DT
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0040
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- PS/2 Keyboard (LOGITECH)

FCC ID	: N/A
Model No.	: Y-SJ17
Serial No.	: SP0054
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- Printer (HP)

FCC ID	: B94C2642X
Model No.	: DJ 400
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0014
Data Cable	: Shielded, 360 degree via metal backshells, 1.35m

Support Unit 4. -- Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 360 degree via metal backshells, 1.15m

Support Unit 5. -- Monitor (VIEWSONIC)

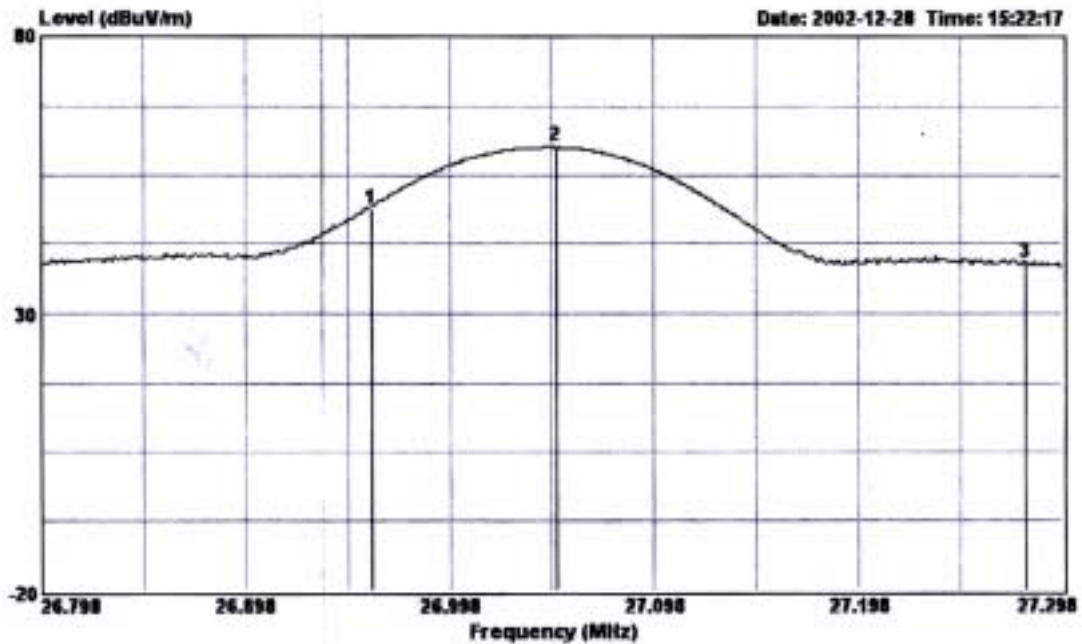
FCC ID	: N/A
Model No.	: VCDTS21553-3P
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0013
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 6. -- Wireless Mouse Receiver (Paten)

FCC ID	: N/A
Model No.	: PT-2002-RSUK
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.3. Band edge compliance plot per 15.227(b).

<HORIZONTAL>



<VERTICAL>



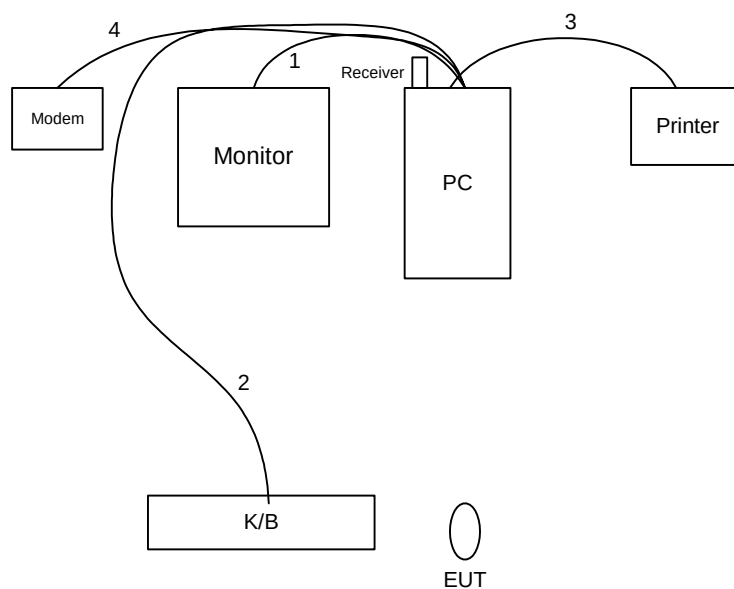
Mark 1: 26.96MHz

Mark 3: 27.28MHz

RBW:120KHz,VBW:300KHz

Conformation of the fundamental frequency

2.4. Connection Diagram of Test System



1. The I/O cable is connected from PC to the support unit 2.
2. The I/O cable is connected from PC to the support unit 3.
3. The I/O cable is connected from PC to the support unit 4.
4. The I/O cable is connected from PC to the support unit 5.

3. General Information of Test

3.1. Test Facility

Test Site Location : No. 52, Hwa Ya 1St Road, Hwa Ya Technology Park,
Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
TEL : 886-3-3273456
FAX : 886-3-3180055
Test Site No. : 03CH03-HY

3.2. Test Voltage

DC 3V

3.3. Standard for Methods of Measurement

ANSI C63.4-1992

3.4. Frequency Range Investigated

FCC Part 15, Subpart C

3.5. Frequency Range Investigated

a. Radiation: from 30 MHz to 1000 MHz

3.6. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

4. Test of Conducted Powerline

The power supply of the EUT is from Battery.

So Conducted Powerline test is not applicable to this equipment.

5. Test of Radiated Emission

Radiated emissions from 30 MHz to 1 GHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 5.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

5.1. Major Measuring Instruments

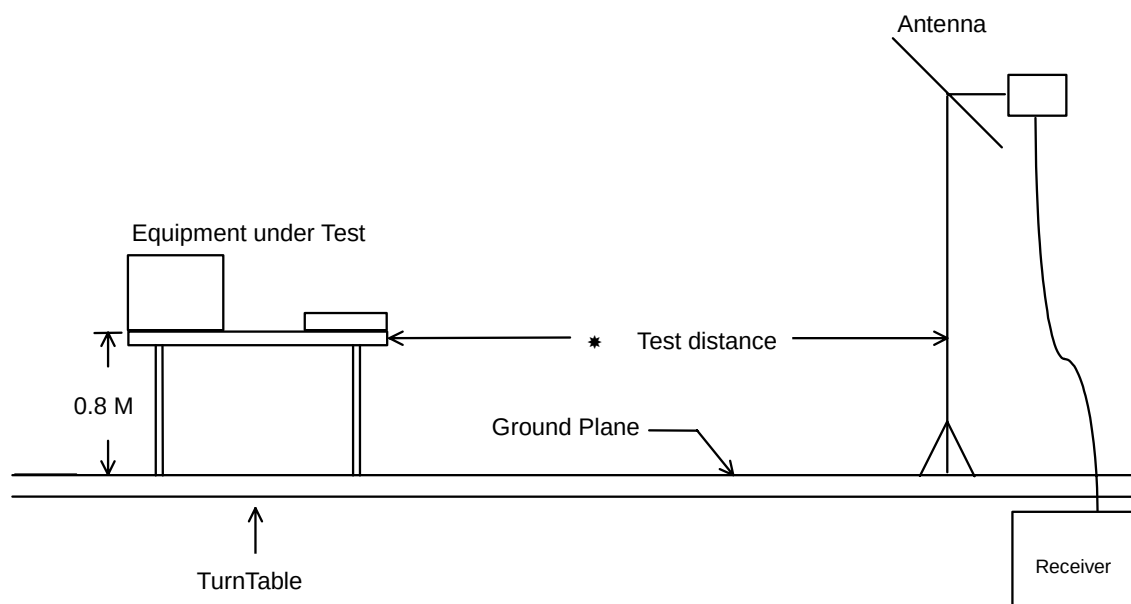
- Amplifier (HP 8447D)
 - RF Gain 30 dB
 - Signal Input 100 KHz to 1.3 GHz

- Spectrum Analyzer (R&S FSP)
 - Attenuation 10 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 120 KHz
 - Signal Input 9 KHz to 7 GHz

5.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

5.3. Typical Test Setup Layout of Radiated Emission



5.4. Test Result of Radiated Emission

- Test Distance: 3 M
- Temperature: 20.3°C
- Relative Humidity: 58 %
- Test Date: Dec. 28, 2002
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

■ The test was passed at the minimum margin that marked under gray area in the following table, and its antenna height is 1 m, turn table degree is 50°

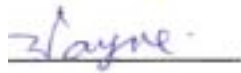
- Spurious Emissions:

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m) (uV/m)		Margin (dB)	Detect Mode
53.490	H	6.75	1.28	6.99	40.00	100	15.02	5.64	-24.98	Peak
243.570	H	11.28	2.64	3.98	46.00	200	17.90	7.85	-28.10	Peak
297.570	H	12.92	2.90	8.70	46.00	200	24.52	16.83	-21.48	Peak
377.700	H	14.75	3.30	10.74	46.00	200	28.79	27.51	-17.21	Peak
433.000	H	16.28	3.54	9.66	46.00	200	29.48	29.79	-16.52	Peak
458.900	H	16.58	3.51	11.45	46.00	200	31.54	37.76	-14.46	Peak
53.490	V	6.75	1.28	6.38	40.00	100	14.41	5.25	-25.59	Peak
200.100	V	8.11	2.40	11.83	43.50	150	22.34	13.09	-21.16	Peak
377.700	V	14.75	3.30	3.78	46.00	200	21.83	12.35	-24.17	Peak
433.000	V	16.28	3.54	3.81	46.00	200	23.63	15.19	-22.37	Peak
458.90	V	16.58	3.51	5.74	46.00	200	25.83	19.57	-20.17	Peak

- Field strength of fundamental and harmonics:

Frequency	Antenna	Cable	Reading	Limits			Emission Level		Margin	Detect
	Polarity	Factor	Loss							
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
27.050	H	15.40	0.93	29.75	80.00	10000	46.08	201.37	-33.92	Peak
27.050	V	15.40	0.93	29.59	80.00	10000	45.92	197.70	-34.08	Peak

Test Engineer :



Wayne Hsu

6. EMI Suppression Component List

No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	18.10	0.90
35	16.00	0.90
40	13.19	1.09
45	10.57	1.10
50	8.00	1.21
55	6.30	1.30
60	5.30	1.30
65	4.95	1.40
70	5.19	1.40
75	6.05	1.49
80	6.86	1.50
85	7.94	1.60
90	8.60	1.60
95	9.70	1.60
100	10.26	1.69
110	11.19	1.70
120	11.60	1.81
130	11.42	1.90
140	10.92	1.99
150	10.20	2.00
160	9.20	2.11
170	9.00	2.20
180	8.60	2.29
190	8.70	2.30
200	8.10	2.40
220	8.86	2.51
240	10.70	2.60
260	13.10	2.71
280	12.50	2.80
300	13.00	2.90
320	13.51	3.00
340	13.90	3.10
360	14.43	3.30
380	14.79	3.30
400	15.80	3.40
450	16.37	3.59
500	17.40	3.80
550	18.57	3.90
600	18.50	4.20
650	18.93	4.40
700	19.03	4.40
750	19.84	4.71
800	19.82	4.90
850	20.30	5.00
900	20.32	5.11
950	20.82	5.60
1000	21.20	5.50

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum analyzer	R&S	FSP40	100004/040	9KHZ~40GHz	Aug. 07, 2002	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Aug. 12, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 09, 2002	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Half-wave dipole antenna	R&S	HZ12 HZ13	83924403 83924503	30MHz - 1GHz	Sep. 23, 2002	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty $U_e(y)$	normal	±2.7
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±5.4

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2$ for 10m test distance

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	0.2
combined standard uncertainty $U_e(y)$	normal	±1.66
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±3.32

$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$