

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless optical mouse

Model No. : RF Lynx Mouse, Lynx MVII

FCC ID : F2Q96C96001M7

Filing Type : Certification

Applicant : **Itron Technology Inc.**
9F, #75, Sec, 1, Hsin Tai Wu Rd., Hsichih,
Taipei Hsien, Taiwan, R.O.C.

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SPORTON International Inc.

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

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History of this test report

Original Report Issue Date: May 26, 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 mouse
Model No. : RF Lynx Mouse, Lynx MVII
FCC ID : F2Q96C96001M7
Filing Type : Certification
Applicant : **Itron Technology Inc.**
9F, #75, Sec, 1, Hsin Tai Wu Rd., Hsichih,
Taipei Hsien, 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 May 05, 2003 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

Itron Technology Inc.
9F, #75, Sec, 1, Hsin Tai Wu Rd., Hsichih,
Taipei Hsien, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment : Wireless optical mouse
Model No. : RF Lynx Mouse, Lynx MVII
FCC ID : F2Q96C96001M7
Trade Name : Itron
Power Supply Type : From battery 3V
AC Power Input : N/A

1.4. Feature of Equipment under Test

Mouse				
Mode	Operation Voltage	Power Consumption		
		Max	Nom	Min
Working Mode	3V		40mA	
Non-Move Mode	3V		15mA	
Standby Mode (3 Sec)	3V		7mA	
Sleeping Mode 1 (8 min)	3V		0.1mA	
Operation voltage 3.5~1.6V				

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 ACEEX Modem, ViewSonic Monitor, Itron Receiver, Compaq PC, Compaq PS/2 Keyboard, Epson Printer and EUT for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 1000MHz.

2.2. Description of Test System

Support Unit 1. -- Modem (ACEEX)

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

Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID	: N/A
Model No.	: VCDTS21553-3P
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0050
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. -- Personal Computer (COMPAQ)

FCC ID : N/A
Model No. : D380MX
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0037
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- PS/2 Keyboard (COMPAQ)

FCC ID : N/A
Model No. : 6511-VA
Serial No. : SP0054
Data Cable : Shielded, 360 degree via metal backshells, 1.5m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 5. -- Printer (EPSON)

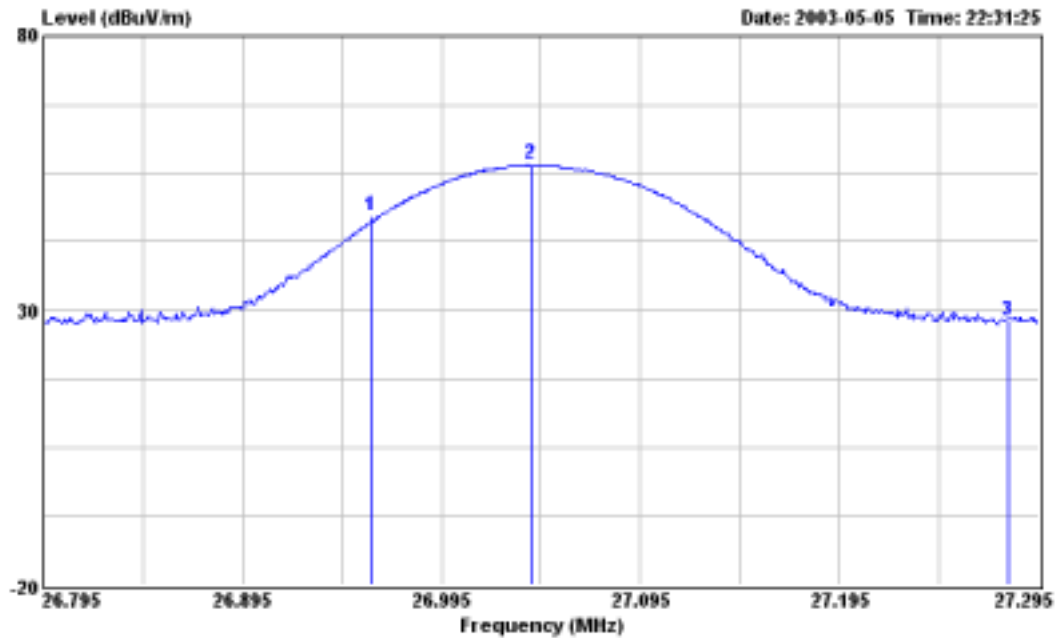
FCC ID : N/A
Model No. : STYLUS COLOR C61
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0048
Data Cable : Shielded, 1.7m

Support Unit 6. -- Receiver (Itron)

FCC ID : N/A
Model No. : RF Lynx Receiver
Serial No. : SP0019

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

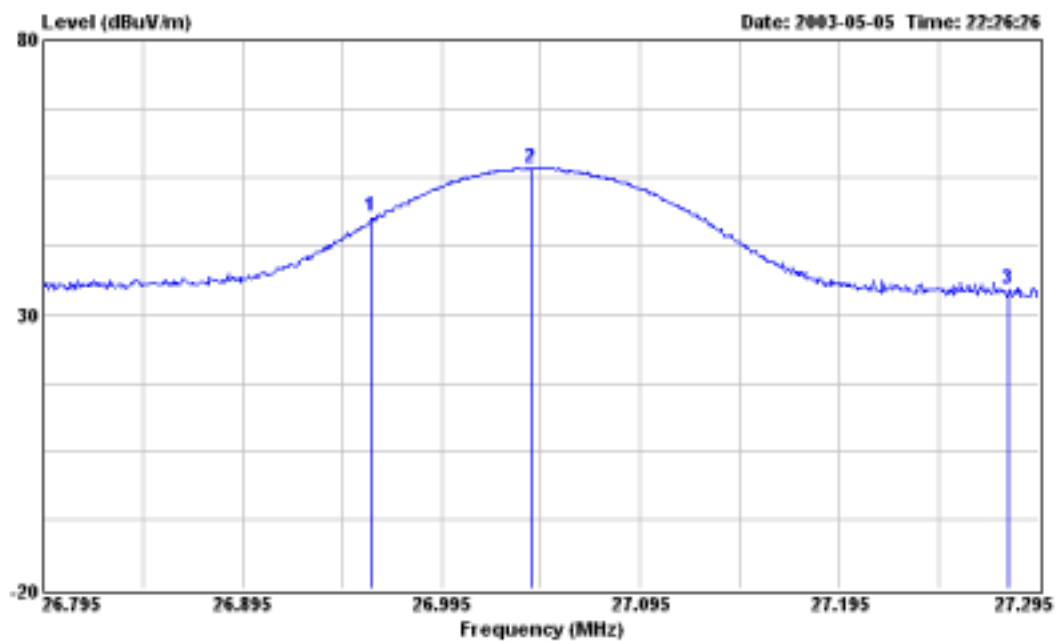
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Conformation of the fundamental frequency

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin
Polarity	Factor	Loss					
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
26.960	H	15.40	0.93	16.79	69.54	2999	33.12
27.040	H	15.40	0.93	26.16	69.54	2999	42.49
27.280	H	15.40	0.93	-2.15	69.54	2999	14.18

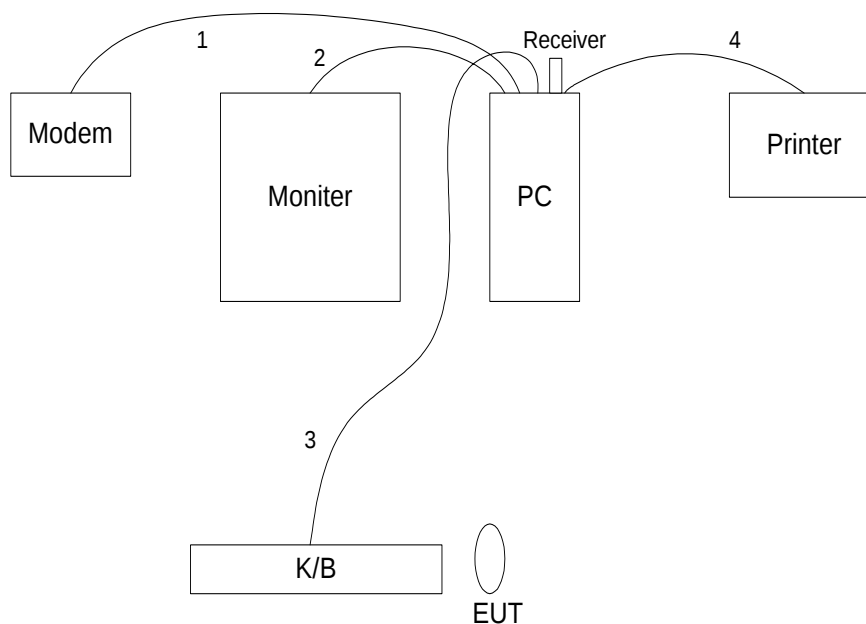
<VERTICAL>



Conformation of the fundamental frequency

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin
Polarity	Factor	Loss					
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m) (dB)
26.960	V	15.40	0.93	17.45	69.54	2999	33.78 48.87 -35.76
27.040	V	15.40	0.93	26.41	69.54	2999	42.74 137.09 -26.80
27.280	V	15.40	0.93	4.13	69.54	2999	20.46 10.54 -49.08

2.4. Connection Diagram of Test System



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

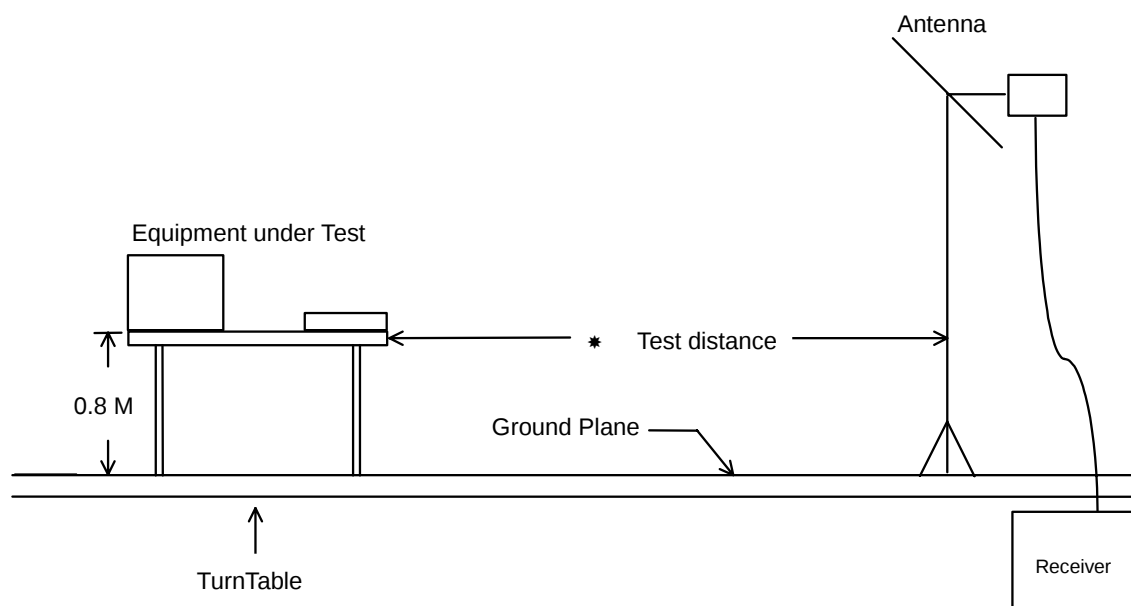
- Amplifier (HP 8447D)
 - RF Gain 30 dB
 - Signal Input 100 KHz to 1.3 GHz

- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 18 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 KHz to 40 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.

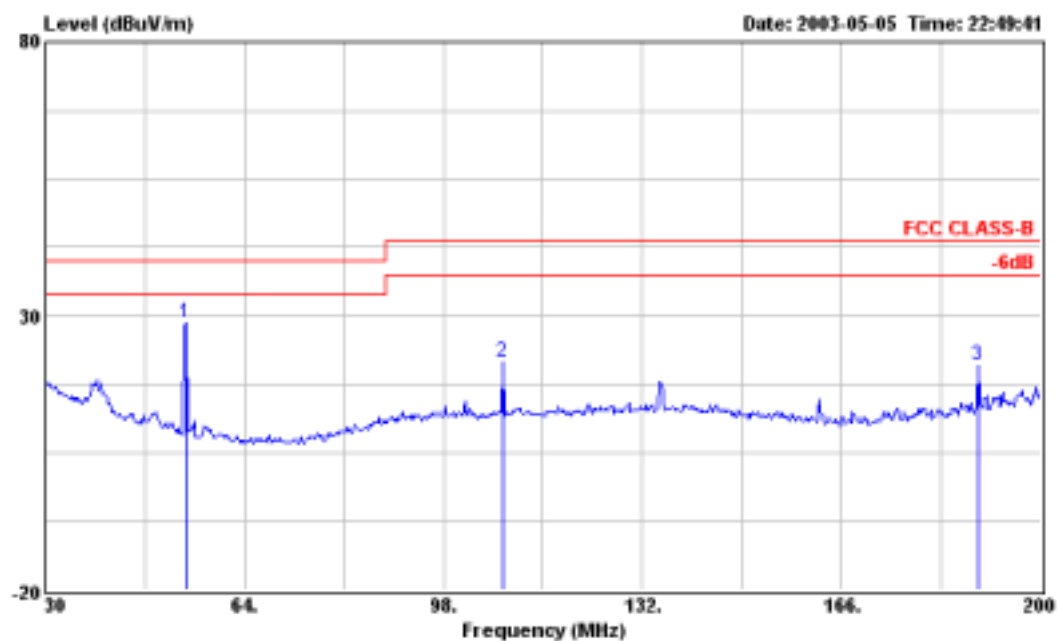
5.3. Typical Test Setup Layout of Radiated Emission



5.4. Test Result of Radiated Emission

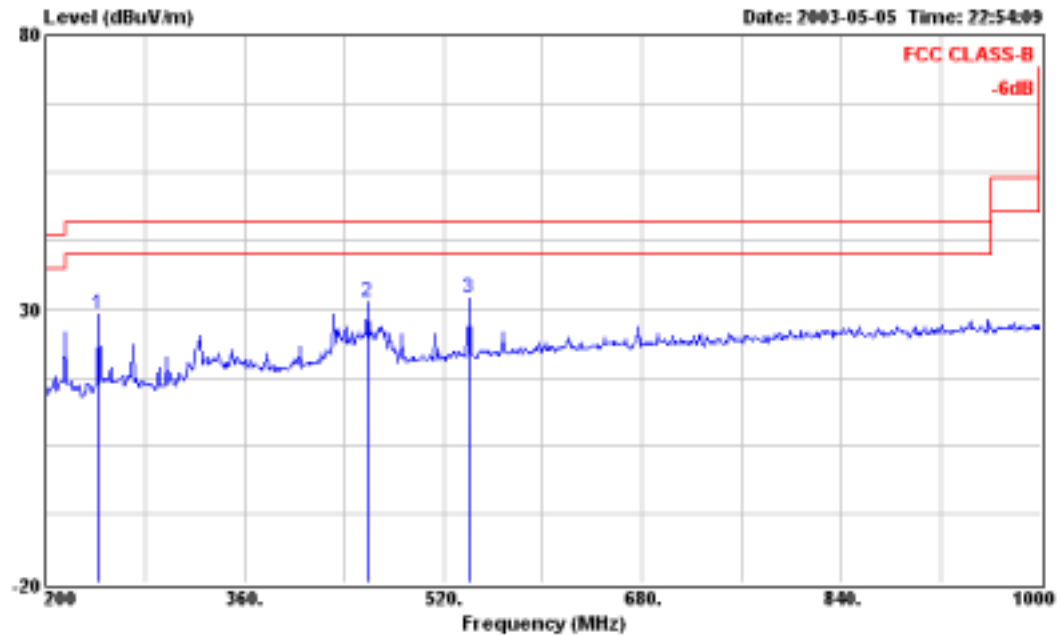
- Test Distance: 3 M
- Temperature: 27°C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following test record



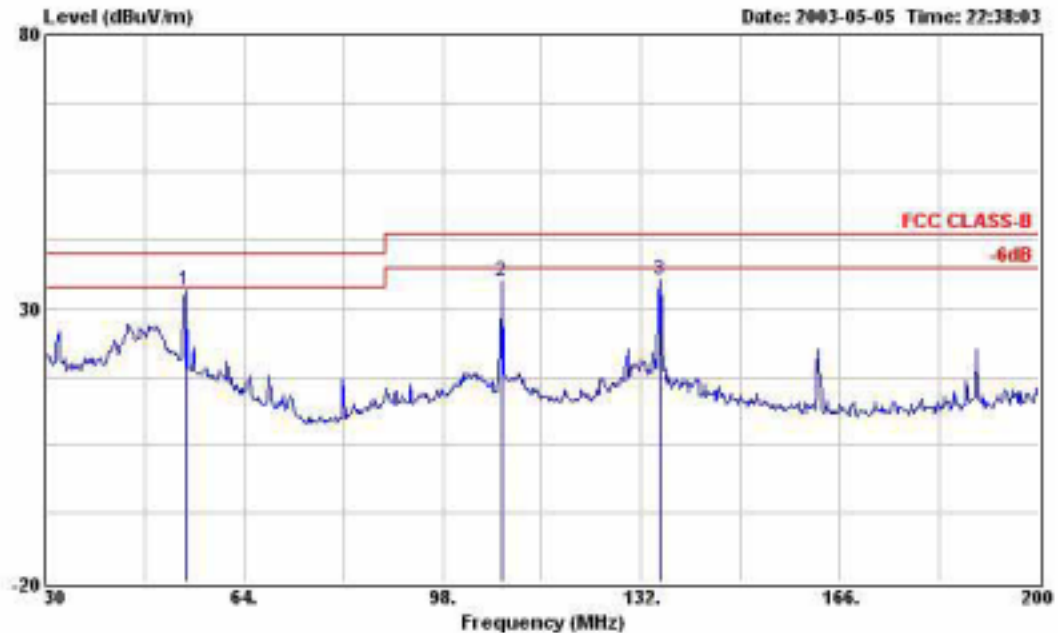
Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : RF Mouse
 Power : DC 3V
 MODEL : Lynx MV11,Wireless Lynx Mouse
 NEMO : TX Mouse

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	54.140	28.76	-11.24	40.00	48.55	5.93	1.37	27.09	Peak	---	---
2	108.030	21.70	-21.80	43.50	37.08	9.60	1.99	26.97	Peak	---	---
3	189.460	21.05	-22.45	43.50	37.60	7.42	2.67	26.64	Peak	---	---



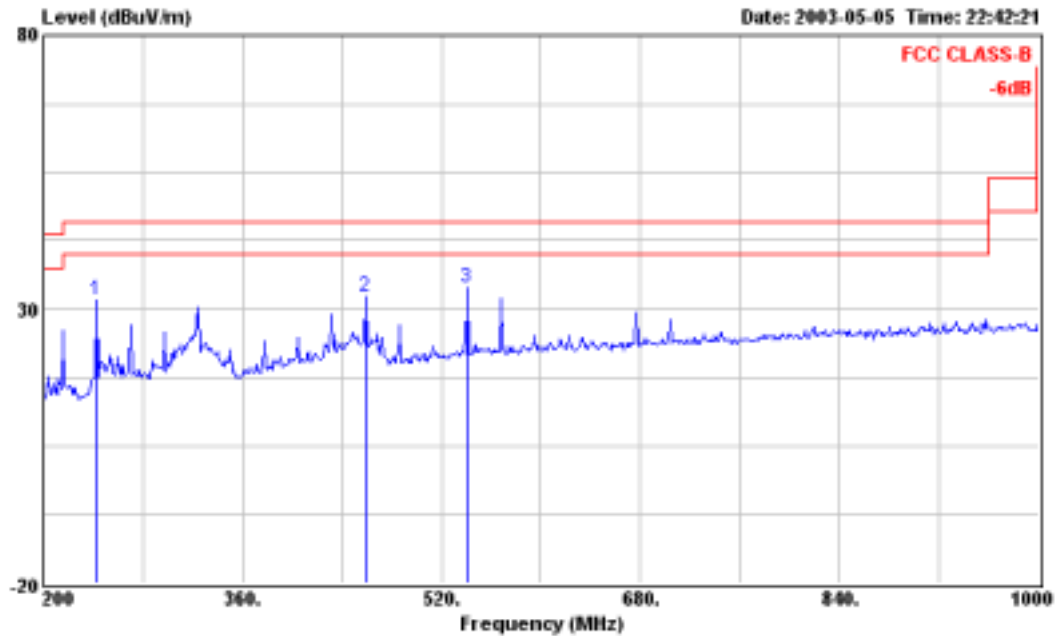
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : RF Mouse
 Power : DC 3V
 MODEL : Lynx MV11, Wireless Lynx Mouse
 MEMO : TX Mouse

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	243.200	29.14	-16.86	46.00	41.58	11.05	3.11	26.60	Peak	---	---
2	458.400	31.17	-14.83	46.00	38.82	15.44	4.40	27.49	Peak	---	---
3	540.800	31.97	-14.03	46.00	38.41	16.41	4.97	27.82	Peak	---	---



Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : RF Mouse
 Power : DC 3V
 MODEL : Lynx HV11, Wireless Lynx Mouse
 MEMO : TX Mouse

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	Remark	Pos	Pos
										cm	deg
1	54.140	33.21	-6.79	40.00	53.00	5.93	1.37	27.09	Peak	100	79
2	108.030	34.79	-8.71	43.50	50.17	9.60	1.99	26.97	Peak	---	---
3	135.230	35.21	-8.29	43.50	49.47	10.40	2.20	26.86	Peak	---	---



Site : 03CH03-HY
 Condition : 3a 03CH03-MAT VERTICAL
 EUT : RF Mouse
 Power : DC 3V
 MODEL : Lynx MV11,Wireless Lynx Mouse
 MEMO : TX Mouse

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	243.200	31.64	-14.36	46.00	44.08	11.05	3.11	26.60	Peak	---	---
2	458.400	32.21	-13.79	46.00	39.86	15.44	4.40	27.49	Peak	---	---
3	540.800	33.90	-12.10	46.00	40.34	16.41	4.97	27.82	Peak	---	---

Test Engineer :

Murray Lu

6. EMI Suppression Component List

No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.00
35	13.63	1.08
40	11.11	1.18
45	10.59	1.24
50	6.47	1.30
55	5.83	1.38
60	5.18	1.44
65	4.81	1.52
70	4.43	1.59
75	5.10	1.68
80	5.91	1.75
85	7.33	1.77
90	8.74	1.83
95	9.05	1.85
100	9.36	1.90
110	9.65	2.01
120	9.97	2.06
130	10.51	2.16
140	10.32	2.24
150	9.42	2.34
160	8.09	2.42
170	7.43	2.56
180	7.60	2.62
190	7.43	2.67
200	7.26	2.76
220	9.11	2.92
240	10.88	3.09
260	11.75	3.23
280	11.55	3.38
300	11.36	3.51
320	12.03	3.63
340	12.69	3.73
360	13.33	4.03
380	14.00	4.00
400	14.63	4.09
450	15.33	4.31
500	16.03	4.64
550	16.65	5.09
600	17.29	5.49
650	17.64	5.82
700	18.00	5.94
750	18.39	6.16
800	18.79	6.58
850	19.10	6.72
900	19.42	6.81
950	19.58	7.10
1000	19.75	7.41

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 22, 2002	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004/040	9KHZ~40GHz	Aug. 07, 2002	Radiation (03CH03-HY)
Receiver	SCHAFFNER	SCR 3501	417	9 KHz ~1GHz	Feb. 20, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz ~ 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz ~2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Jan. 02, 2003	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)

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

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