FCC TEST REPORT

CATEGORY	:	Portable
PRODUCT NAME	:	Labtec 2.4GHz Notebook Wireless Mouse
FCC ID.	:	O3L-PT-04-MN
FILING TYPE	:	Certification
BRAND NAME	:	Labtec, LOGITECH
MODEL NAME	:	M-RAW104
APPLICANT	:	**Paten Wireless Technology Inc** 8th F1, No. 407 Rueiguang Rd., Neihu, Taipei, 114, Taiwan, R.O.C.
MANUFACTURER	:	**Paten Wireless Technology Co., Ltd.** Da-Ning Industrial Zone, Humen, Dongguan, Guangdong, China
ISSUED BY	:	**SPORTON INTERNATIONAL INC.** 6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA, NVLAP or any agency of U.S. government.

The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.

Lab Code: 200079-0

Table of Contents

History of this test report

Original Report Issue Date: Dec. 17, 2004

Report No.: FR4N2413

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

with

47 CFR FCC Part 15 Subpart C (Section 15.249)

PRODUCT NAME	:	Labtec 2.4GHz Notebook Wireless Mouse
BRAND NAME	:	Labtec, LOGITECH
MODEL NAME	:	M-RAW104
APPLICANT	:	**Paten Wireless Technology Inc** 8th F1, No. 407 Rueiguang Rd., Neihu, Taipei, 114, Taiwan, R.O.C.
MANUFACTURER	:	**Paten Wireless Technology Co., Ltd.** Da-Ning Industrial Zone, Humen, Dongguan, Guangdong, China

I **HEREBY** CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 - 2003 and all test are performed according to 47 CFR FCC Part 15. Testing was carried out on Dec. 17, 2004 at SPORTON International Inc. LAB.

Dr. Alan Lane
Vice General Manager
Sporton International Inc.

1. General Description of Equipment under Test

1.1. Applicant

Paten Wireless Technology Inc
8th F1, No. 407 Rueiguang Rd., Neihu, Taipei, 114, Taiwan, R.O.C.

1.2. Manufacturer

Paten Wireless Technology Co., Ltd.
Da-Ning Industrial Zone, Humen, Dongguan, Guangdong, China

1.3. Basic Description of Equipment under Test

This product is a 2.4GHz wireless travel mouse. The radio technical data has been listed on section " Features of Equipment under Test ". The interface of the receiver is USB.

1.4. Features of Equipment under Test

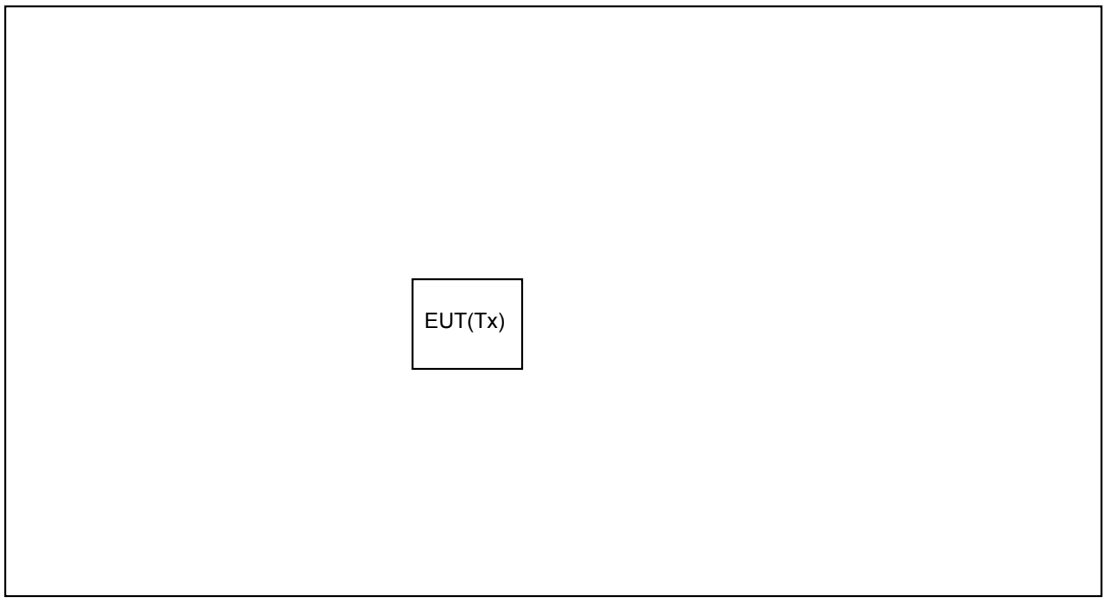
Items		Description
Type of Modulation	:	FSK
Number of Channels	:	8
Frequency Band	:	2403MHz ~ 2430MHz
Carrier Frequency	:	See section 1.5 for details
Channel Bandwidth	:	120kHz
Antenna Type	:	Printed Antenna
Testing Duty Cycle	:	100.00%
Power Rating (DC/AC, Voltage)	:	3 VDC (battery powered)
Temperature Range (Operating)	:	-10 ~ 40 ℃

1.5. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency
01	2403 MHz	05	2419 MHz
02	2407 MHz	06	2422 MHz
03	2411 MHz	07	2426 MHz
04	2415 MHz	08	2430 MHz

2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System



2.2. The Test Mode Description

Spurious emission below 1GHz is independent of channel selection, so only channel 08 was tested.
AC conduction emission is independent of channel selection, so only channel 08 was tested.

2.3. Description of Test Supporting Units

The EUT was tested alone.

3. General Information of Test

3.1. Test Facility

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.

: TEL 886-3-327-3456

: FAX 886-3-318-0055

Test Site No : 03CH03-HY / TH01-HY

3.2. Test Conditions

Normal Voltage	: 3.0VDC (battery powered)
Extreme Voltages	: 2.7VDC and 3.3VDC (battery powered)
Normal Temperature	: 20℃
Extreme Temperature	: -10 ℃ and 40 ℃

3.3. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.

ANSI C63.4-2003

47 CFR Part 15 Subpart C (Section 15.249)

3.4. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

3.5. Frequency Range Investigated

Radiated emission test: from 30 MHz to 10th carrier harmonic

3.6. Test Distance

The test distance of radiated emission (30MHz~1GHz) test from antenna to EUT is 3 M.
The test distance of radiated emission (1GHz~10th carrier harmonic) test from antenna to EUT is 1 M.

3.7. Test Software

There is no test software for testing. The channel selection is controlled by the hardware key.

4. List of Measurements

4.1. Summary of the Test Results

Applied Standard: 47 CFR Part 15 and Part 2

Paragraph	FCC Rule	Description of Test	Result
5.1	15.249	Maximum Carrier Field Strength	Pass
5.2	15.209/15.249	Spurious Radiated Emission	Pass
5.3	15.203	Antenna Requirement	Pass

5. Test Result

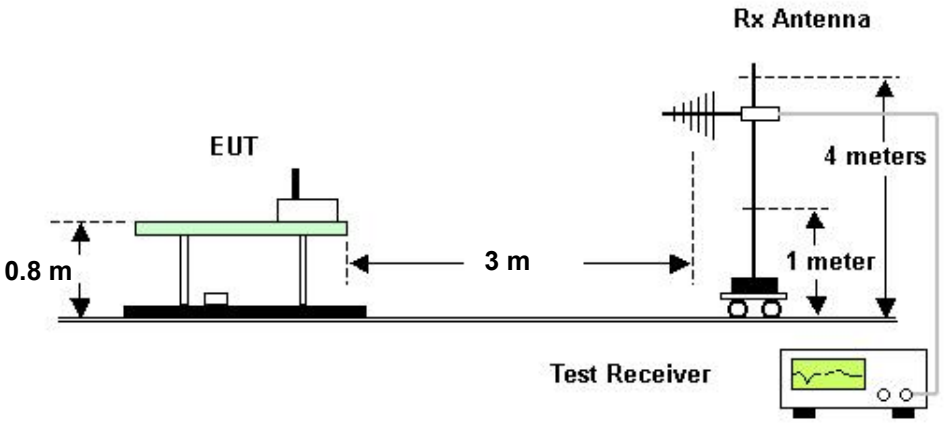
5.1. Test of Maximum Carrier Field Strength

5.1.1. Measuring Instruments

Item 6~17 of the table is on section 6.

5.1.2. Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The turn table was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For carrier field strength emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For carrier field strength emission, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. Test Setup Layout



5.1.3. Test Result

- Temperature: 23°C
- Relative Humidity: 52%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Sam Lee

Channel	Frequency	Level	Over Limit	Limit Line	Read Level	Detector
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	
01	2403 MHz	71.94	-22.06	94.00	41.90	Average
01	2403 MHz	72.71	-41.29	114.00	42.67	Peak
05	2419 MHz	73.99	-20.01	94.00	43.89	Average
05	2419 MHz	74.92	-39.08	114.00	44.82	Peak
08	2430 MHz	74.63	-19.37	94.00	44.50	Average
08	2430 MHz	75.27	-38.73	114.00	45.14	Peak

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.2. Test of Spurious Radiated Emission

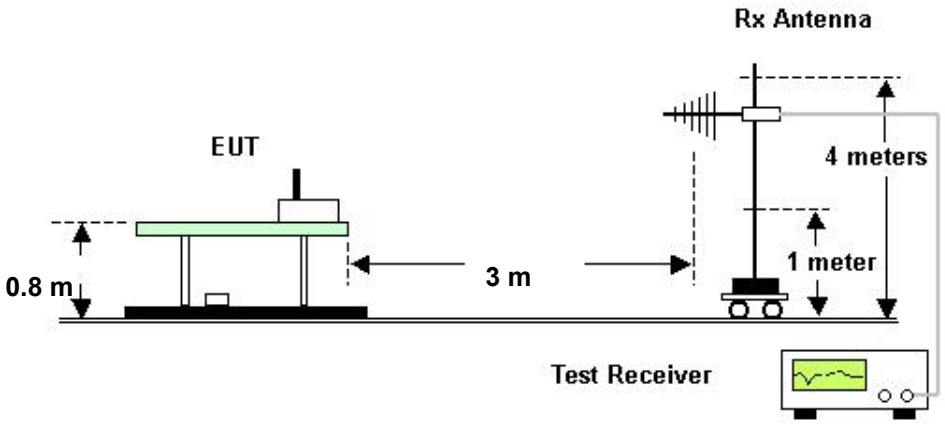
5.2.1. Measuring Instruments

Please reference item 6~17 in chapter 6 for the instruments used for testing.

5.2.2. Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. If the emission level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz and average method for above the 1GHz. the reported.
11. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB higher than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.2.3. Test Setup Layout



5.2.4. Test Results for CH 08 / 2430 MHz (for emission below 1GHz)

- Temperature: 23°C
- Relative Humidity: 52%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A)Polarization: Horizontal

	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	67.230	18.13	-21.87	40.00	34.22	9.99	1.38	27.46	Peak	---	---
2	139.140	15.21	-28.29	43.50	27.72	12.58	2.03	27.12	Peak	---	---
3	191.670	18.14	-25.36	43.50	27.55	15.13	2.48	27.02	Peak	---	---
1	317.600	19.50	-26.50	46.00	28.69	14.34	3.18	26.71	Peak	---	---
2	596.000	24.34	-21.66	46.00	28.16	20.22	4.35	28.39	Peak	---	---
3	960.000	33.30	-12.70	46.00	31.93	23.02	5.67	27.32	Peak	---	---

(B)Polarization: Vertical

	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	69.100	25.55	-14.45	40.00	41.73	9.86	1.41	27.45	Peak	---	---
2	105.140	18.76	-24.74	43.50	34.38	9.74	1.83	27.19	Peak	---	---
3	199.150	28.30	-15.20	43.50	37.00	15.73	2.57	27.00	Peak	---	---
1	451.200	19.95	-26.05	46.00	27.74	16.39	3.72	27.90	Peak	---	---
2	756.000	27.05	-18.95	46.00	28.71	21.37	4.84	27.87	Peak	---	---
3	960.000	34.37	-11.63	46.00	33.00	23.02	5.67	27.32	Peak	---	---

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.2.5. Test Results for CH 01 / 2403 MHz (for emission above 1GHz)

- Temperature: 23°C
- Relative Humidity: 52%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal

	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	1916.000	38.17	-35.83	74.00	49.13	27.02	1.58	39.56	Peak	---	---
2	4808.000	54.46	-19.54	74.00	59.24	32.96	2.40	40.14	Peak	---	---
3	4808.000	53.46	-0.54	54.00	58.24	32.96	2.40	40.14	Average	---	---
4	7208.000	54.01	-19.99	74.00	55.00	35.77	2.72	39.48	Peak	---	---
5	7208.000	51.27	-2.73	54.00	52.26	35.77	2.72	39.48	Average	---	---

(B) Polarization: Vertical

	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	1548.000	36.00	-38.00	74.00	48.42	25.33	1.47	39.22	Peak	---	---
2	4808.000	51.59	-22.41	74.00	56.37	32.96	2.40	40.14	Peak	---	---
3	4808.000	50.73	-3.27	54.00	55.51	32.96	2.40	40.14	Average	---	---
4	7208.000	55.30	-18.70	74.00	56.29	35.77	2.72	39.48	Peak	---	---
5	7208.000	52.49	-1.51	54.00	53.48	35.77	2.72	39.48	Average	---	---

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.2.6. Test Results for CH 05 / 2419 MHz (for emission above 1GHz)

- Temperature: 23°C
- Relative Humidity: 52%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal

	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	1632.000	36.93	-37.07	74.00	48.95	25.76	1.53	39.31	Peak	---	---
2	4840.000	54.67	-19.33	74.00	59.32	33.02	2.47	40.14	Peak	---	---
3	4840.000	52.83	-1.17	54.00	57.48	33.02	2.47	40.14	Average	---	---
4	7256.000	54.66	-19.34	74.00	55.18	35.88	3.07	39.47	Peak	---	---
5	7256.000	52.05	-1.95	54.00	52.57	35.88	3.07	39.47	Average	---	---

(B) Polarization: Vertical

	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	1296.000	35.35	-38.65	74.00	48.43	24.75	1.37	39.20	Peak	---	---
2	4840.000	51.09	-22.91	74.00	55.74	33.02	2.47	40.14	Peak	---	---
3	4840.000	49.62	-4.38	54.00	54.27	33.02	2.47	40.14	Average	---	---
4	7256.000	56.51	-17.49	74.00	57.03	35.88	3.07	39.47	Peak	---	---
5	7256.000	53.76	-0.24	54.00	54.28	35.88	3.07	39.47	Average	---	---

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.2.7. Test Results for CH 08 / 2430 MHz (for emission above 1GHz)

- Temperature: 23°C
- Relative Humidity: 52%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal

	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	2052.000	38.35	-35.65	74.00	48.81	27.53	1.65	39.64	Peak	---	---
2	4864.000	54.54	-19.46	74.00	59.08	33.05	2.55	40.14	Peak	---	---
3	4864.000	53.41	-0.59	54.00	57.95	33.05	2.55	40.14	Average	---	---
4	7288.000	54.43	-19.57	74.00	54.73	35.98	3.18	39.46	Peak	---	---
5	7288.000	53.49	-0.51	54.00	53.79	35.98	3.18	39.46	Average	---	---

(B) Polarization: Vertical

	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	2532.000	38.70	-35.30	74.00	47.80	28.61	1.86	39.57	Peak	---	---
2	4864.000	51.42	-22.58	74.00	55.96	33.05	2.55	40.14	Peak	---	---
3	4864.000	49.50	-4.50	54.00	54.04	33.05	2.55	40.14	Average	---	---
4	7288.000	55.64	-18.36	74.00	55.94	35.98	3.18	39.46	Peak	---	---
5	7288.000	52.26	-1.74	54.00	52.56	35.98	3.18	39.46	Average	---	---

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.2.8. Photographs of Radiated Emission Test Configuration

FRONT VIEW

REAR VIEW

5.3. Antenna Requirements

5.3.1. Standard Applicable

47 CFR Part15 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.

5.3.2. Antenna Connected Construction

There is no antenna connector for printed antenna.

6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100174	9 KHz – 2.75 GHz	Feb. 16, 2004	Conduction (CO04-HY)
2	LISN	MessTec	NNB-2/16Z	2001/004	9 KHz – 30 MHz	Jun. 09, 2004	Conduction (CO04-HY)
3	LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9 KHz – 30 MHz	Apr. 27, 2004	Conduction (CO04-HY)
4	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
5	RF Cable-CON	UTIFLEX	3102-26886-4	CB044	9KHz~30MHz	Apr. 21, 2004	Conduction (CO04-HY)
6	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
7	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 22, 2004	Radiation (03CH03-HY)
8	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 04, 2004	Radiation (03CH03-HY)
9	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
10	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
11	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 02, 2004	Radiation (03CH03-HY)
12	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
13	Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 11, 2004	Radiation (03CH03-HY)
14	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
15	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
16	Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
17	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 04, 2004	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
18	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 02, 2004	Conducted (TH01-HY)
19	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
20	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
22	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
23	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 05, 2004	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Sep. 30, 2004	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
26	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)