

# FCC TEST REPORT

**REPORT NO.:** RF931012L03A

**MODEL NO.:** 5187URF+

**RECEIVED:** Oct. 12, 2004

**TESTED:** Oct. 13 ~ Oct. 14, 2004

**APPLICANT:** BEHAVIOR TECH COMPUTER CORP.

**ADDRESS:** 2F, 51, Tung Hsing Rd., Taipei, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou  
Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen,  
Kwei Shan Hsiang, Taoyuan Hsien 333,  
Taiwan, R.O.C.

This test report consists of 17 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, A2LA or any government agencies. The test results in the report only apply to the tested sample.



No. 2177-01



0528  
ILAC MRA

## Table of Contents

1	CERTIFICATION.....	3
2	SUMMARY OF TEST RESULTS .....	4
3	GENERAL INFORMATION .....	5
3.1	GENERAL DESCRIPTION OF EUT .....	5
3.1	DESCRIPTION OF TEST MODES .....	6
3.2	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	6
3.3	DESCRIPTION OF SUPPORT UNITS .....	6
3.4	CONFIGURATION OF SYSTEM UNDER TEST .....	6
4	TEST PROCEDURE AND RESULT.....	7
4.1	CONDUCTED EMISSION MEASUREMENT.....	7
4.2	RADIATED EMISSION MEASUREMENT.....	7
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT .....	7
4.2.2	TEST INSTRUMENT .....	8
4.2.3	TEST PROCEDURE.....	9
4.2.4	TEST SETUP.....	10
4.2.5	EUT OPERATING CONDITION.....	10
4.2.6	TEST RESULT.....	11
4.3	BAND EDGES MEASUREMENT .....	12
4.3.1	LIMITS OF BAND EDGES MEASUREMENT .....	12
4.3.2	TEST INSTRUMENTS.....	12
4.3.3	TEST PROCEDURE.....	12
4.3.4	DEVIATION FROM TEST STANDARD.....	12
4.3.5	EUT OPERATING CONDITION.....	13
4.3.6	TEST RESULTS .....	13
5	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	16
6	INFORMATION ON THE TESTING LABORATORIES.....	17

## 1 CERTIFICATION

**PRODUCT :** Wireless Optical Mouse  
**BRAND NAME :** HP (refer to page 5 for other brand)  
**MODEL NO :** 5187URF+  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Oct. 13 ~ Oct. 14, 2004  
**APPLICANT :** BEHAVIOR TECH COMPUTER CORP.  
**STANDARDS :** FCC Part 15, Subpart C (Section 15.235),  
ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Andrea Hsia , **DATE:** Oct. 19, 2004  
( Andrea Hsia )

**TECHNICAL**  
**ACCEPTANCE :** Gary Chang , **DATE:** Oct. 19, 2004  
Responsible for RF ( Gary Chang )

**APPROVED BY :** Cody Chang , **DATE:** Oct. 19, 2004  
( Cody Chang, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.207	Conducted Emission Test	N/A	Power supply is 3Vdc from batteries
15.235 15.209	Radiated Emission Test	PASS	Minimum passing margin is -8.24dB at 797.84MHz
15.235(a) (b)	Band Edges Test	PASS	Meet the requirement of limit

### 2.1 MEASUREMENT UNCERTAINTY

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

Measurement	Frequency	Uncertainty
Conducted emissions	9k~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.65 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless Optical Mouse
<b>MODEL NO.</b>	5187URF+
<b>POWER SUPPLY</b>	3Vdc from batteries
<b>MODULATION TYPE</b>	FSK
<b>CARRIER FREQUENCY OF EACH CHANNEL</b>	49.845MHz
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	Integral antenna
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. The EUT is a Wireless Optical Mouse.
2. The models as below are identical to each other except for their brands due to marketing requirement.

<b>Brand</b>	<b>Model</b>
HP	5187URF+
Compaq	5187URF+

3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.1 DESCRIPTION OF TEST MODES

One channel was provided to this EUT.

Channel	Frequency
1	49.845MHz

### 3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Optical Mouse. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.235)**  
**ANSI C63.4-2003**

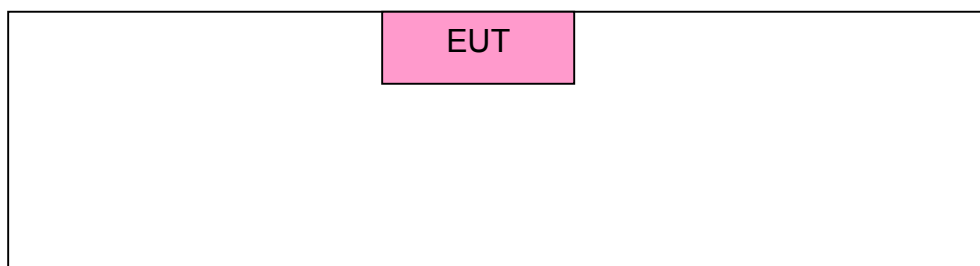
All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 3.3 DESCRIPTION OF SUPPORT UNITS

NA

### 3.4 CONFIGURATION OF SYSTEM UNDER TEST



## 4 TEST PROCEDURE AND RESULT

### 4.1 CONDUCTED EMISSION MEASUREMENT

NA

### 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.235(a) the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
49.82 - 49.90	100	80

According to 15.235 (b) the field strength of and emissions appearing between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26dB below the level of the unmodulated carrier or to the general limits in 15.209, whichever permits the higher emission levels.

The field strength of and emissions removed by more than 10kHz from the band edges shall not exceed the general radiated emission limits in 15.209. as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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 20dB under any condition of modulation.

## 4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Feb. 09, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 15, 2004
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170242	Feb. 23, 2005
Preamplifier Agilent	8447D	2944A10631	Jan. 15, 2005
Preamplifier Agilent	8449B	3008A01960	Jan. 22, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Mar. 04, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219275/4	Mar. 04, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 3.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The IC Site Registration No. is IC4924-4.



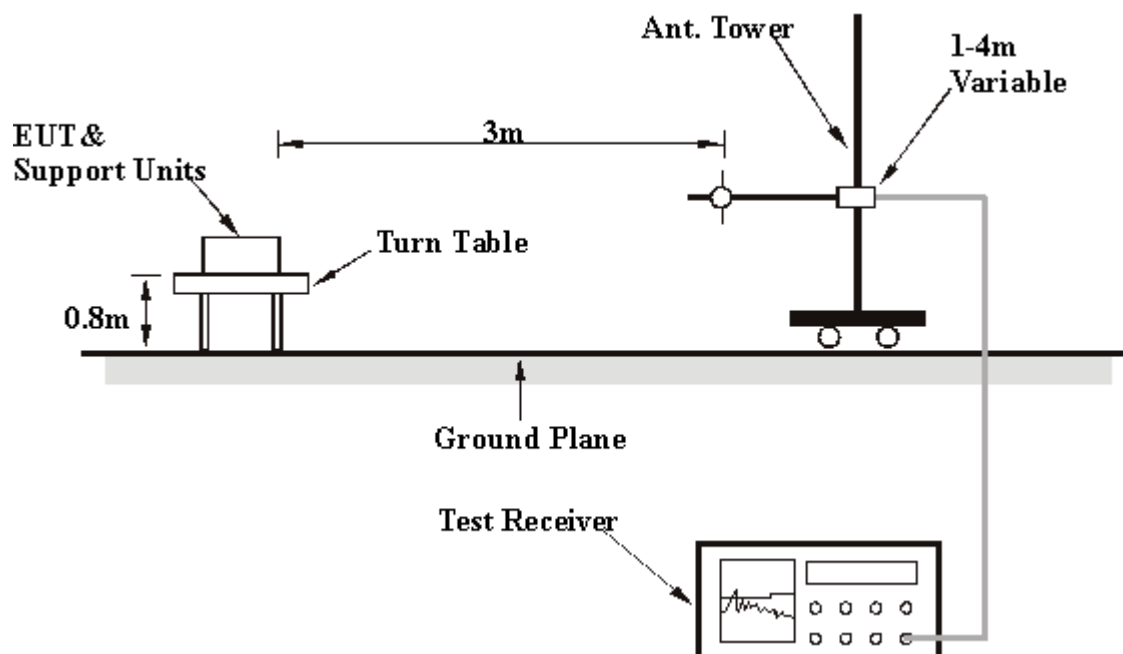
#### 4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

#### 4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item in this test report - Photographs of the Test Configuration.

#### 4.2.5 EUT OPERATING CONDITION

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

## 4.2.6 TEST RESULT

<b>EUT</b>	Wireless Optical Mouse	<b>MODEL</b>	5187URF+
<b>INPUT POWER</b>	3Vdc	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 52 % RH, 991 hPa	<b>DETECTOR FUNCTION</b>	Peak / Quasi-Peak / Average
<b>TESTED BY</b>	Rush Kao		

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*49.84	55.26 PK	100.00	-44.74	1.75 H	340	40.57	14.69
2	*49.84	54.12 AV	80.00	-4.68	1.75 H	340	39.43	14.69
3	98.04	28.87 AV	43.50	-14.63	2.00 H	334	18.12	10.75
4	148.58	28.76 AV	43.50	-14.74	1.25 H	337	14.10	14.65
5	698.70	35.63 AV	46.00	-10.37	1.25 H	55	13.63	22.00
6	747.29	34.62 AV	46.00	-11.38	1.00 H	25	11.44	23.17
7	<b>797.84</b>	<b>37.76 AV</b>	<b>46.00</b>	<b>-8.24</b>	<b>2.00 H</b>	<b>73</b>	<b>14.31</b>	<b>23.45</b>
8	848.38	35.47 AV	46.00	-10.53	1.75 H	67	11.58	23.90

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*49.84	44.85 PK	100.00	-55.15	2.50 V	289	14.69	30.16
2	*49.84	43.10 AV	80.00	-36.90	2.50 V	289	12.94	30.16
3	422.67	32.16 AV	46.00	-13.84	1.25 V	205	14.86	17.31
4	698.70	32.41 AV	46.00	-13.59	1.25 V	343	10.41	22.00
5	797.84	34.50 AV	46.00	-11.50	1.75 V	334	11.05	23.45
6	848.38	32.44 AV	46.00	-13.56	1.75 V	304	8.55	23.90
7	922.24	31.32 AV	46.00	-14.68	1.50 V	295	6.28	25.04

**REMARKS:** 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)  
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level – Limit value.  
 5. "\*" = Fundamental frequency.

## 4.3 BAND EDGES MEASUREMENT

### 4.3.1 LIMITS OF BAND EDGES MEASUREMENT

The field strength of any emissions appearing between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26dB below the level of the unmodulated carrier or to the general limits in 15.209, whichever permits the higher emissions levels.

### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 1kHz with suitable frequency span including 10kHz bandwidth from band edge. The band edges was measured and recorded.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

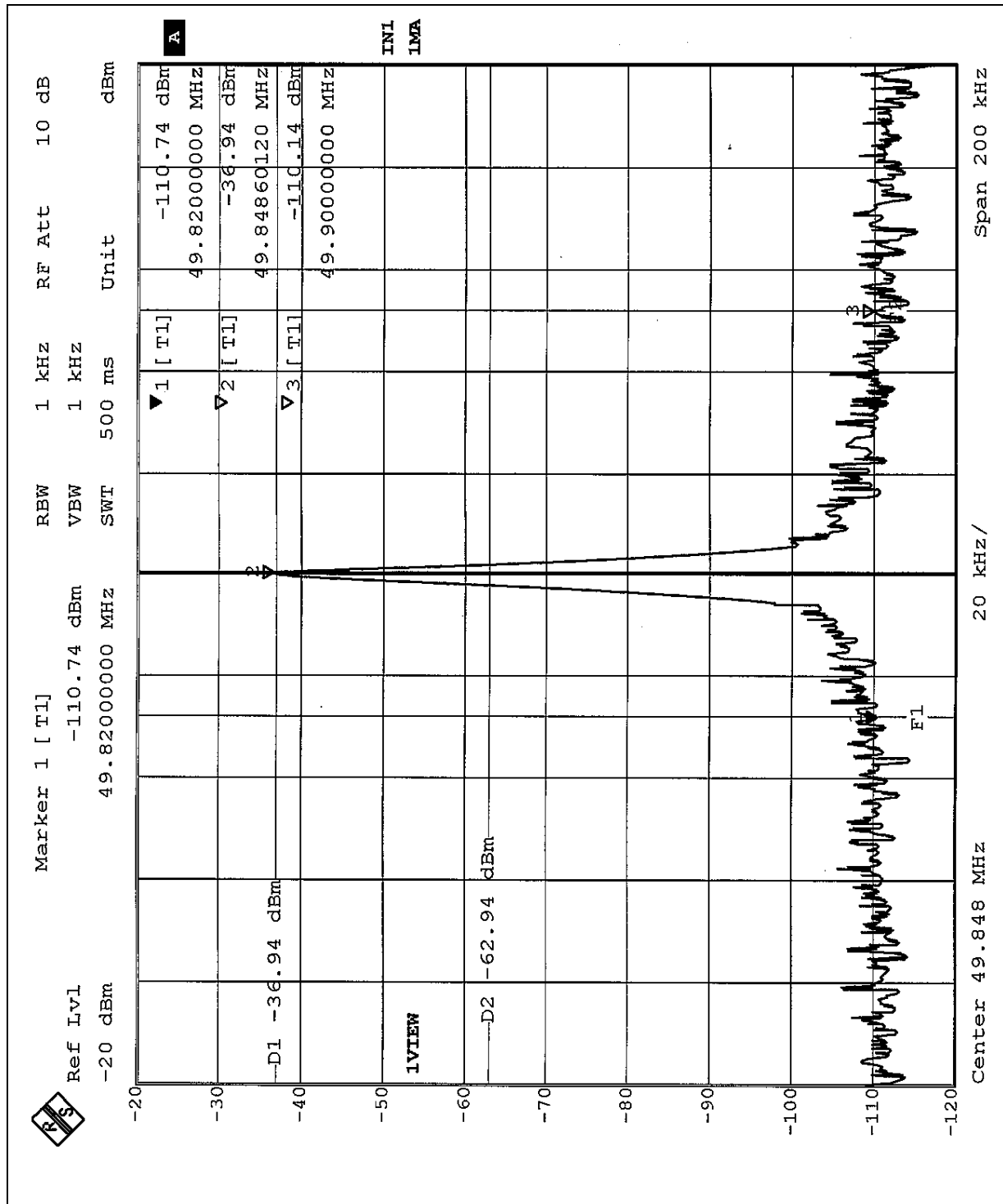


#### 4.3.5 EUT OPERATING CONDITION

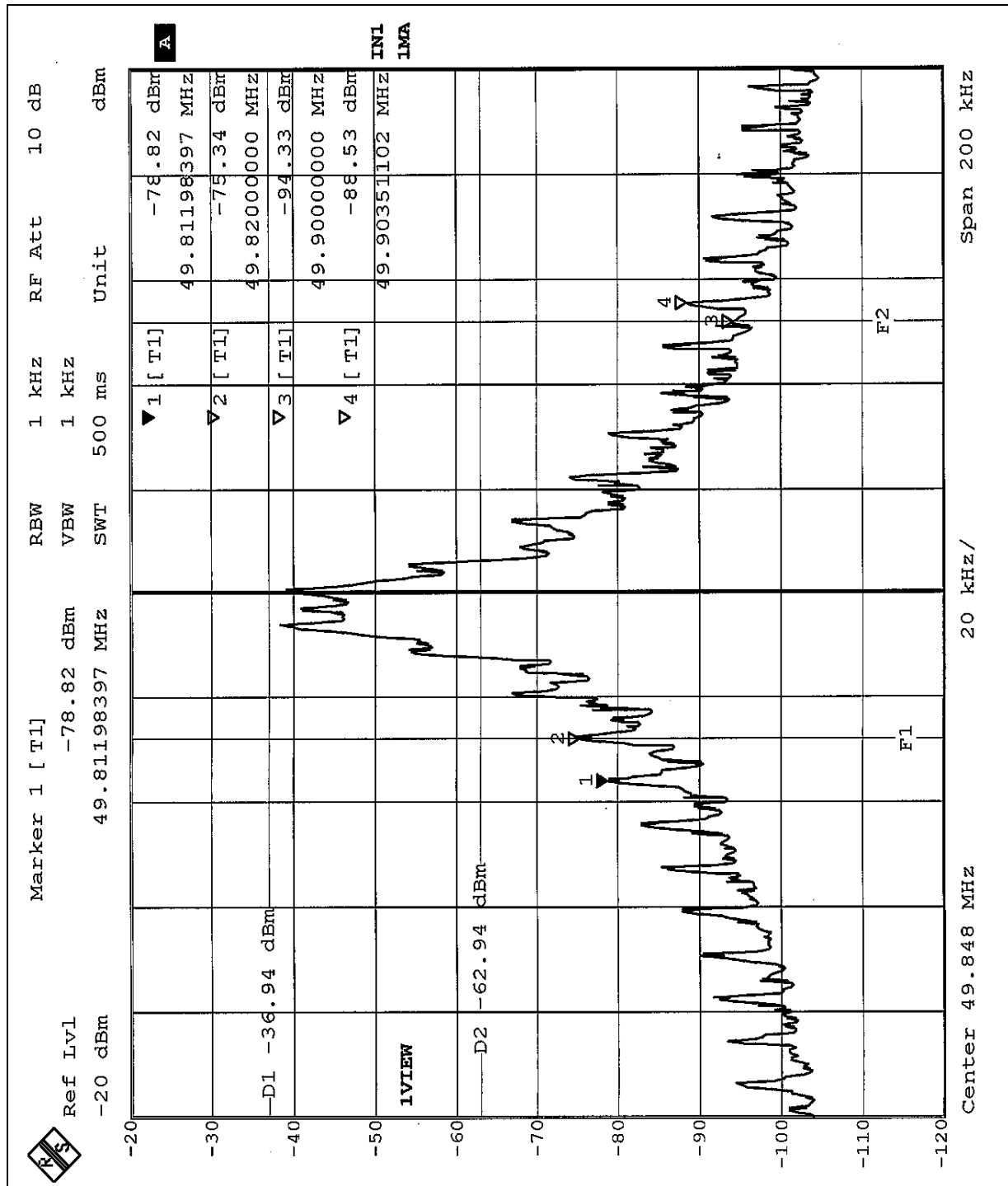
Same as Item 4.2.5

#### 4.3.6 TEST RESULTS

The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 26dB offset below D2. It shows compliance with the requirement in part 15.235(b).

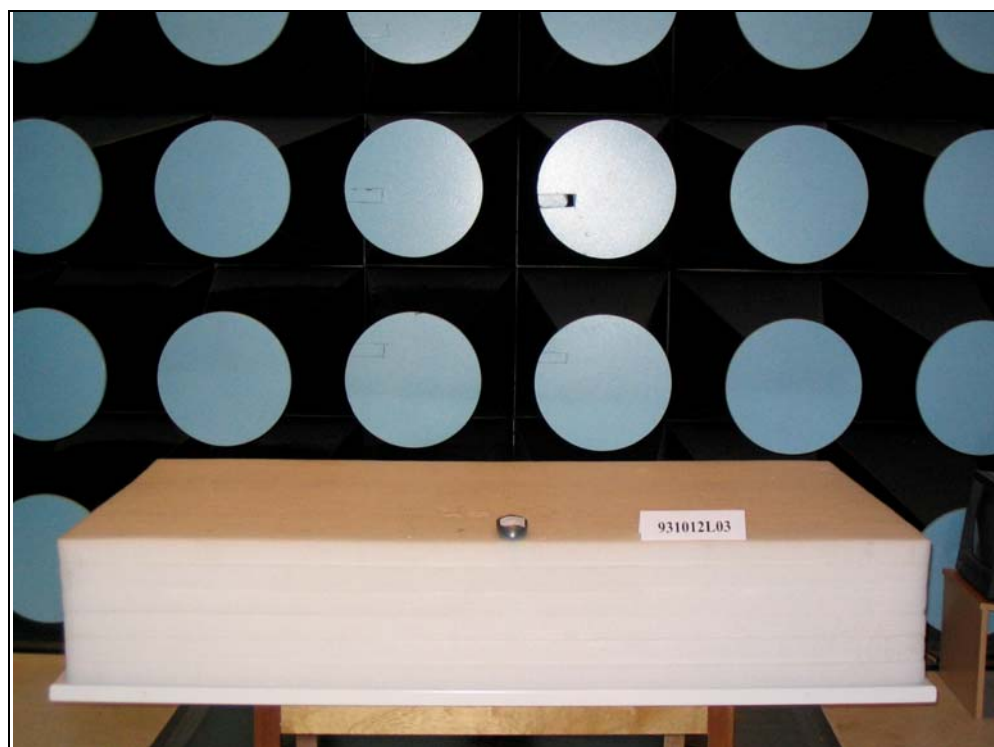
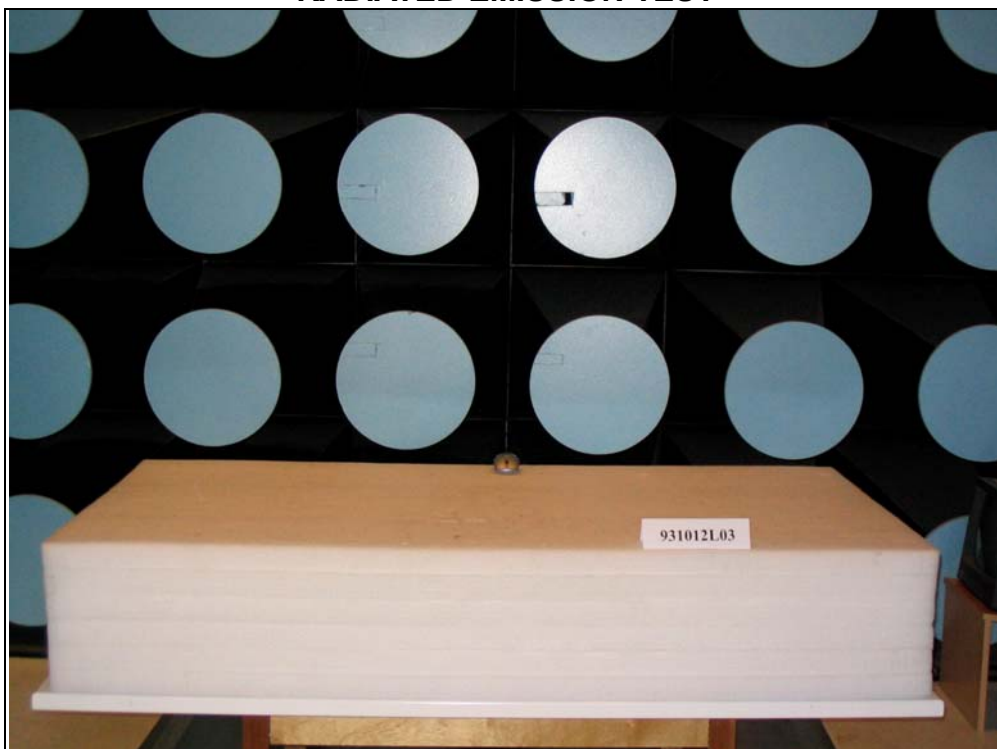
**49.848MHz**

## 49.848MHz



## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

### RADIATED EMISSION TEST





## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP, UL , A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA , CSA
<b>R.O.C.</b>	CNLA, BSMI, DGT
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB , GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety/Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Linko RF Lab.**

Tel: 886-3-3270910

Fax: 886-3-3270892

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.

Report Format Version 1.5