

FCC TEST REPORT

REPORT NO.: RF931012L03B

MODEL NO.: 5187URF2+

RECEIVED: July 27, 2005

TESTED: Aug. 31, 2005

ISSUED: Sep. 8, 2005

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 18 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.



Table of Contents

1	CERTIFICATION.....	3
2	SUMMARY OF TEST RESULTS.....	4
2.1	MEASUREMENT UNCERTAINTY	4
3	GENERAL INFORMATION	5
3.1	GENERAL DESCRIPTION OF EUT.....	5
3.1	DESCRIPTION OF TEST MODES.....	6
3.1.1	CONFIGURATION OF SYSTEM UNDER TEST	6
3.1.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	7
3.2	GENERAL DESCRIPTION OF APPLIED STANDARDS	8
3.3	DESCRIPTION OF SUPPORT UNITS.....	8
4	TEST PROCEDURE AND RESULT	9
4.1	CONDUCTED EMISSION MEASUREMENT	9
4.2	RADIATED EMISSION MEASUREMENT	9
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	9
4.2.2	TEST INSTRUMENT.....	10
4.2.3	TEST PROCEDURE	11
4.2.4	TEST SETUP	12
4.2.5	EUT OPERATING CONDITION.....	12
4.2.6	TEST RESULT	13
4.3	BAND EDGES MEASUREMENT	14
4.3.1	LIMITS OF BAND EDGES MEASUREMENT	14
4.3.2	TEST INSTRUMENTS	14
4.3.3	TEST PROCEDURE	14
4.3.4	DEVIATION FROM TEST STANDARD	14
4.3.5	EUT OPERATING CONDITION	15
4.3.6	TEST RESULTS.....	15
5	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	17
6	INFORMATION ON THE TESTING LABORATORIES	18

1 CERTIFICATION

PRODUCT: Wireless Mouse
BRAND NAME: HP, COMPAQ
MODEL NO: 5187URF2+
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Aug. 31, 2005
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 : Jessica Cheng , **DATE:** Sep. 8, 2005
(Jessica Cheng)

TECHNICAL
ACCEPTANCE : Ken Liu , **DATE:** Sep. 8, 2005
Responsible for RF (Ken Liu)

APPROVED BY : Cody Chang , **DATE:** Sep. 8, 2005
(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 -13.71dB at 323.53MHz
15.235(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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~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

PRODUCT	Wireless Mouse
MODEL NO.	5187URF2+
POWER SUPPLY	3.0Vdc from batteries
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	49.845MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Printed antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is the transmitter part of a Wireless Mouse.

2. The EUT has two brand names for one model no. as follows:

Brand	Model
HP	5187URF2+
COMPAQ	

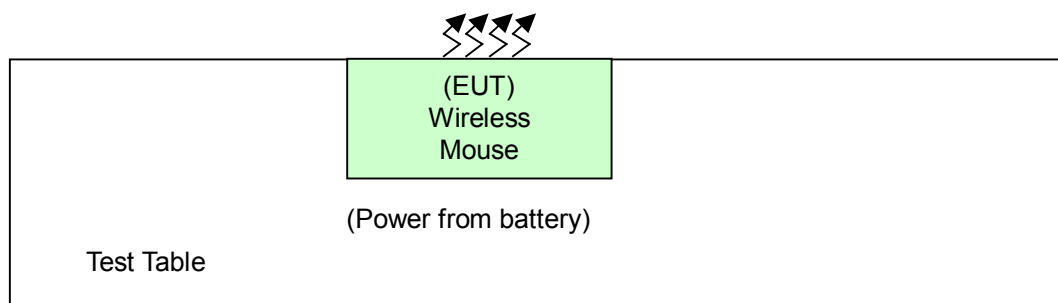
3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.1 DESCRIPTION OF TEST MODES

One channel was provided to this EUT

Channel	Frequency (MHz)
1	49.845MHz

3.1.1 CONFIGURATION OF SYSTEM UNDER TEST



3.1.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to		Description
	PLC	RE<1G	
1	Note	v	NA

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz

Note: No need to concern of Conducted Emission due to the EUT is powered by battery.

RADIATED EMISSION TEST (BELOW 1 GHZ):

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
Wireless Mouse	1	1	FSK

BANDEDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
Wireless Mouse	1	1	FSK

3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless 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.

3.3 DESCRIPTION OF SUPPORT UNITS

NA

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 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:

Other Frequencies (MHz)	Field Strength of Fundamental	
	uV/meter	dBuV/meter
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	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 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	Jan. 07, 2006
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 29, 2005
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 22, 2006
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2006
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170242	Jan. 23, 2006
Preamplifier Agilent	8447D	2944A10631	Nov. 17, 2005
Preamplifier Agilent	8449B	3008A01960	Nov. 14, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Jan. 26, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219275/4	Jan. 26, 2006
Software ADT.	ADT_Radiated_V5.1 4	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.

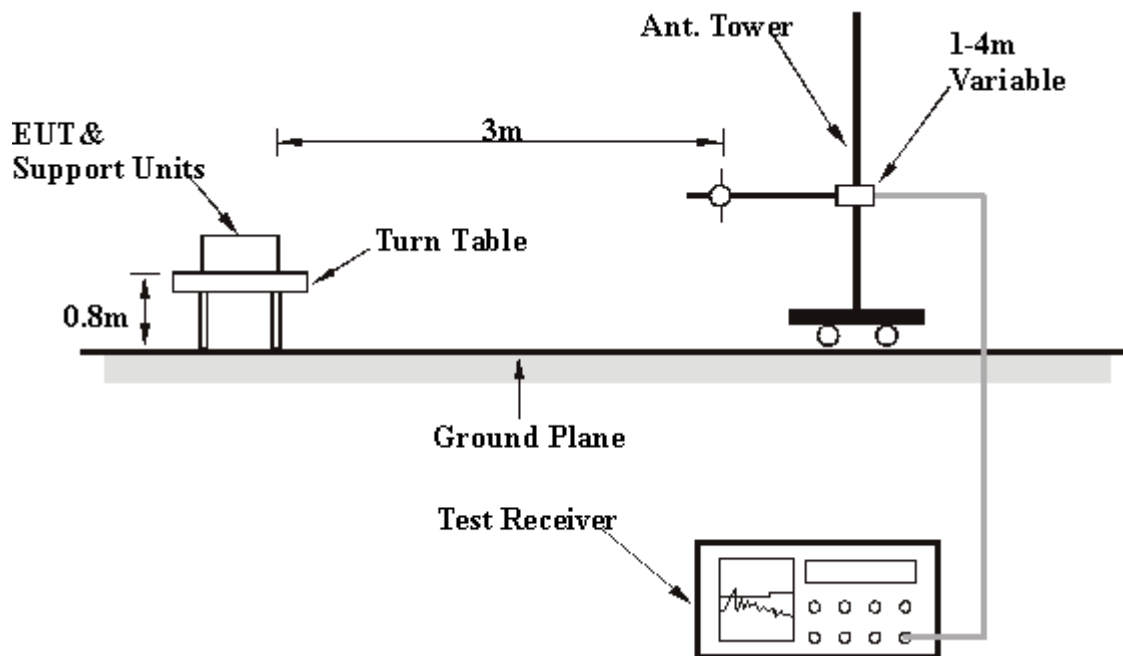
4.2.3 TEST PROCEDURE

- 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

NOTE:

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

EUT	Wireless Mouse	MEASUREMENT DETAIL	
INPUT POWER	3Vdc	MODEL	5187URF2+
ENVIRONMENTAL CONDITIONS	25deg. C, 64% RH, 989hPa	FREQUENCY RANGE	Below 1000MHz
TESTED BY	Brad Wu	DETECTOR FUNCTION	Peak / Quasi-Peak / Average

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	*49.845	57.25 PK	100.00	-42.75	1.50 H	130	42.56	14.69
2	*49.845	56.57 AV	80.00	-23.43	1.50 H	130	41.88	14.69
3	148.58	28.43 QP	43.50	-15.07	1.50 H	91	13.78	14.65
4	199.12	24.91 QP	43.50	-18.59	1.50 H	301	13.57	11.34
5	323.53	32.29 QP	46.00	-13.71	1.00 H	280	17.35	14.93
6	648.16	26.09 QP	46.00	-19.91	1.25 H	79	4.65	21.45
7	949.46	25.71 QP	46.00	-20.29	1.25 H	310	0.39	25.32

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	*49.845	43.21 PK	100.00	-56.79	1.00 V	94	28.52	14.69
2	*49.845	42.84 AV	80.00	-37.16	1.00 V	94	28.15	14.69
3	99.98	23.16 QP	43.50	-20.34	1.25 V	112	12.25	10.91
4	323.53	30.99 QP	46.00	-15.01	1.25 V	46	16.06	14.93
5	374.07	28.47 QP	46.00	-17.53	1.25 V	241	12.37	16.10
6	422.67	27.12 QP	46.00	-18.88	1.25 V	175	9.82	17.31
7	910.58	28.35 QP	46.00	-17.65	1.25 V	283	3.43	24.92

- 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
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Nov. 21, 2006

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 were measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

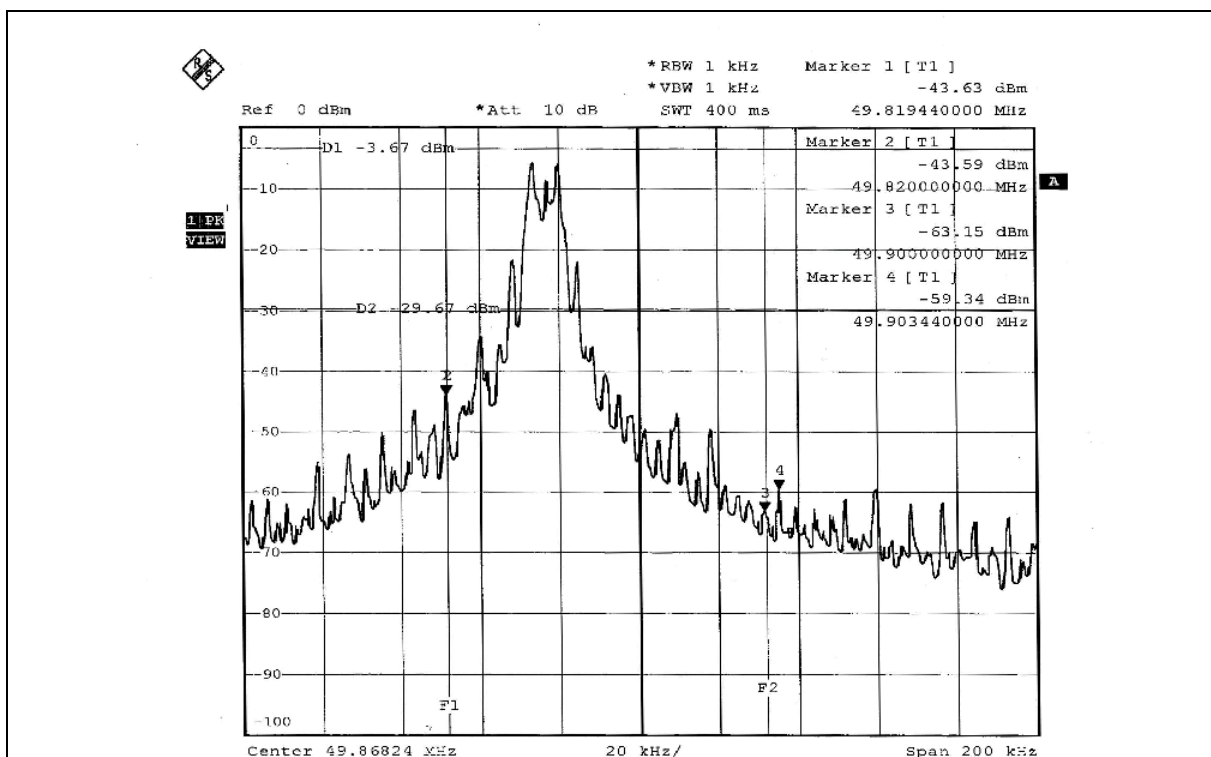
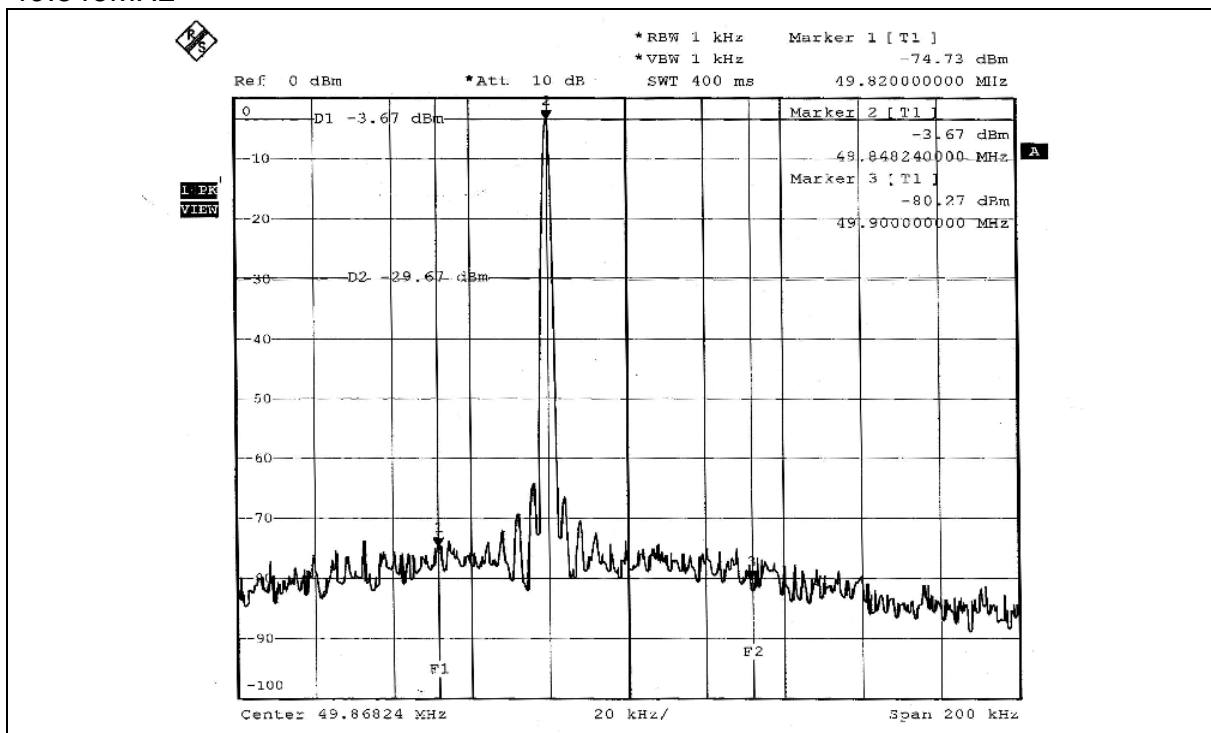
4.3.5 EUT OPERATING CONDITION

Same as Item 4.2.5

4.3.6 TEST RESULTS

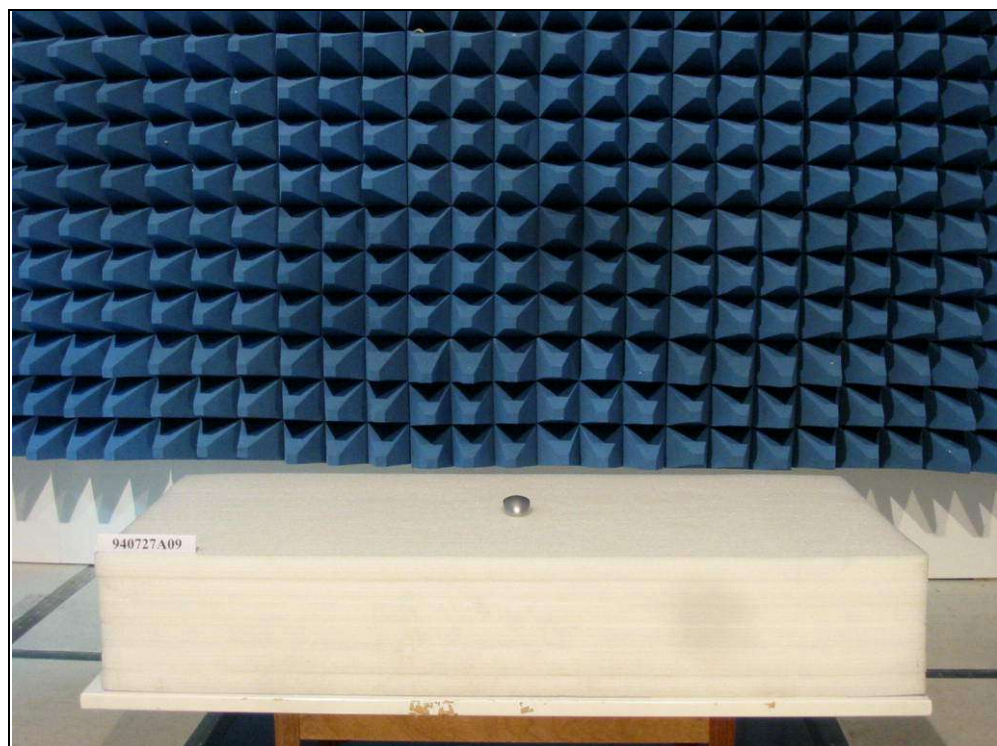
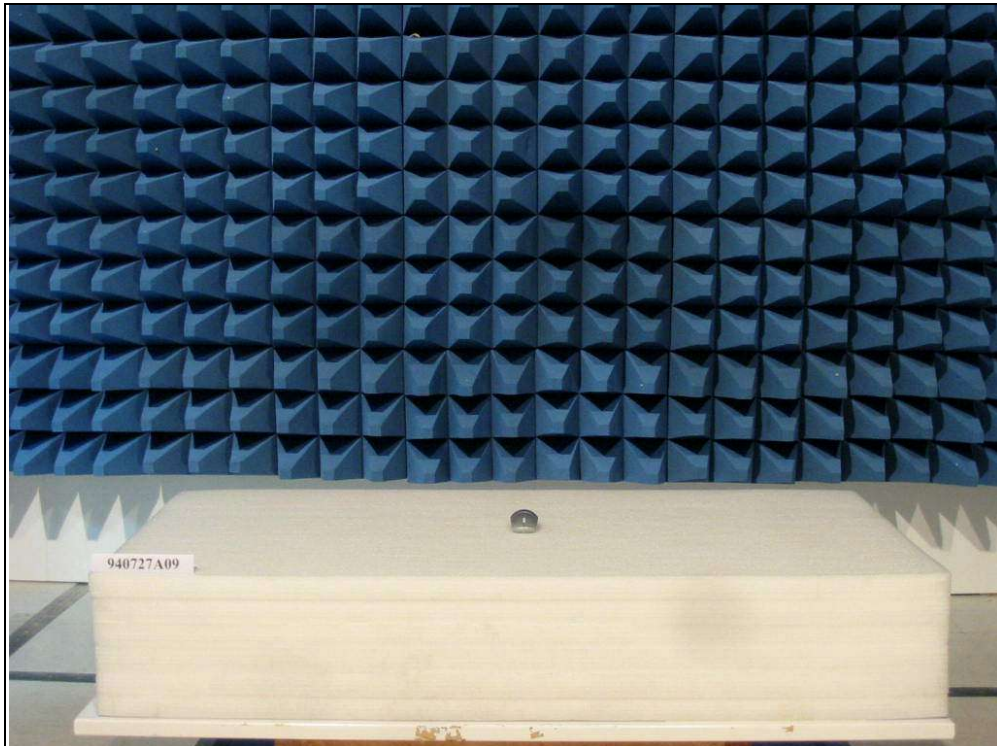
The spectrum plots are attached on the following pages. D1 line indicates the highest level, D2 line indicates the 26dB offset below D1. It shows compliance with the requirement in part 15.235(C).

49.845MHz



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

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

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

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