

# FCC TEST REPORT

**REPORT NO.:** F900720A09

**MODEL NO.:** M860, M850

**RECEIVED:** July 20, 2001

**TESTED:** July 24, 2001

**APPLICANT:** BEHAVIOR TECH COMPUTER CORP.

**ADDRESS:** 2F, 51 TUNG HSING RD., TAIPEI,  
TAIWAN, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** 47 14th Lin, Chiapau Tsun, Linko, Taipei,  
Taiwan, R.O.C.

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0528



Lab Code: 200102-0



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## 1 CERTIFICATION

**PRODUCT:** MOUSE  
**BRAND NAME:** BTC  
**MODEL NO:** M860, M850  
**TEST ITEM:** ENGINEERING SAMPLE  
**APPLICANT:** BEHAVIOR TECH COMPUTER CORP.  
**STANDARDS:** FCC Part 15, Subpart B, Class B  
CISPR 22: 1997, Class B  
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on July 24, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

**TESTED BY:** \_\_\_\_\_, **DATE:** \_\_\_\_\_  
( Jone Lin )

**CHECKED BY:** \_\_\_\_\_, **DATE:** \_\_\_\_\_  
( Kathy Tseng )

**APPROVED BY:** \_\_\_\_\_, **DATE:** \_\_\_\_\_  
( Jonson Lee, Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Remarks
FCC Part 15, Subpart B, Class B / CISPR 22: 1997, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -11.68 dB at 0.154 MHz
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is -6.2 dB at 33.20 MHz

**NOTE:** For conducted emission test, the test limit used is according to FCC Part 15.107. In this part, conducted emission test for telecom port is not mentioned and therefore this item is not tested.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	MOUSE
<b>MODEL NO.</b>	M860, M850
<b>POWER SUPPLY</b>	DC 5V From PC
<b>DATA CABLE</b>	1.4m Nonshielded wire.

**NOTE:** The EUT is a PS/2 Optical Mouse.

The EUT has two model names, which are identical to each other including the outlook except for their function key as the following:

- 1.Model: M860 – with 5 function keys
- 2.Model: M850 – with 3 function keys (there are 5 function keys in its surface but only 3 keys can work)

During the test, the model: M860 was chosen as a representative model and its data was recorded in this report.

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



### 3.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Personal Computer	COMPAQ	EXM/P733/15C/9 /64V TAI	7045FR4Z0022	FCC DoC APPROVED
2	21" COLOR MONITOR	HP	D2846A	JP90512318	FCC DoC APPROVED
3	PRINTER	HP	2225C+	2930S52725	DSI6XU2225
4	MODEM	ACEEX	1414	980020526	IFAXDM1414
5	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110129	F4ZDA-104G

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core.
3	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.

**NOTE:** All power cords of the above support units are non shielded (1.8m).

## 4 EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

- NOTES:** (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS30	838251/021	Jan. 17, 2002
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	835239/001	May 20, 2002
ROHDE & SCHWARZ 4-wire ISN	ENY41	935154/007	May 13, 2002
ROHDE & SCHWARZ 2-wire ISN	ENY22	833823/026	May 9, 2002
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	May 20, 2002
Software	Cond-V2J	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	June 10, 2002
JYEBAO Terminator (For ROHDE & SCHWARZ LISN)	BNC 3950-0000	E1-01-379	June 13, 2002
Shielded Room	Site 9	ADT-C09	NA
VCCI Site Registration No.	Site 9	C-1312	NA

- NOTE:** 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



### **4.1.3 TEST PROCEDURE**

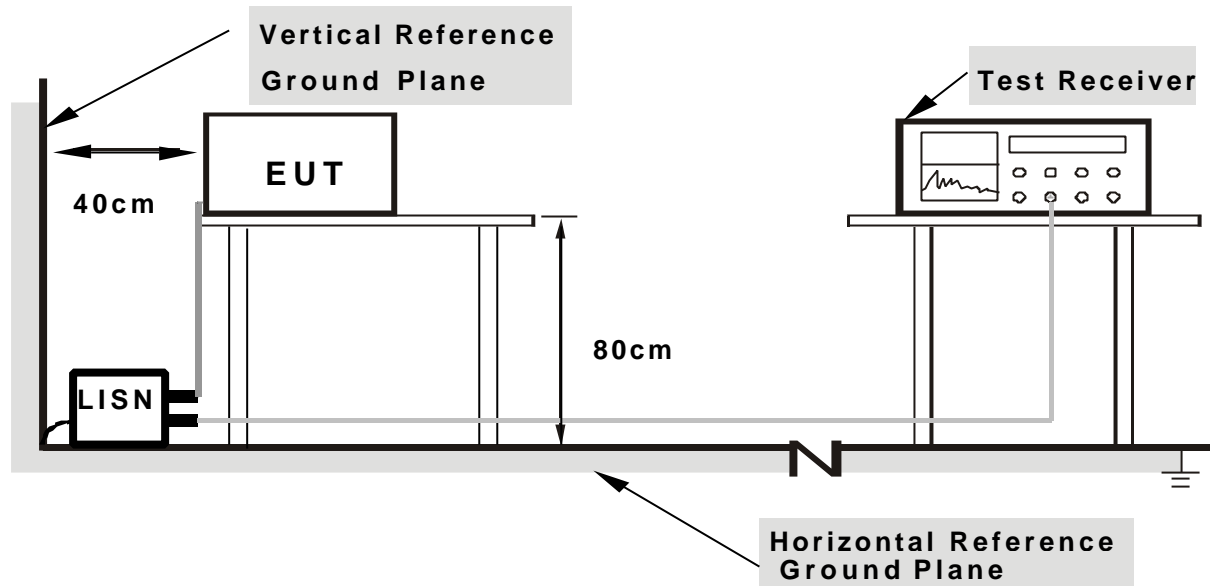
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported.

### **4.1.4 DEVIATION FROM TEST STANDARD**

No deviation



#### 4.1.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.**

**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



#### **4.1.6 EUT OPERATING CONDITIONS**

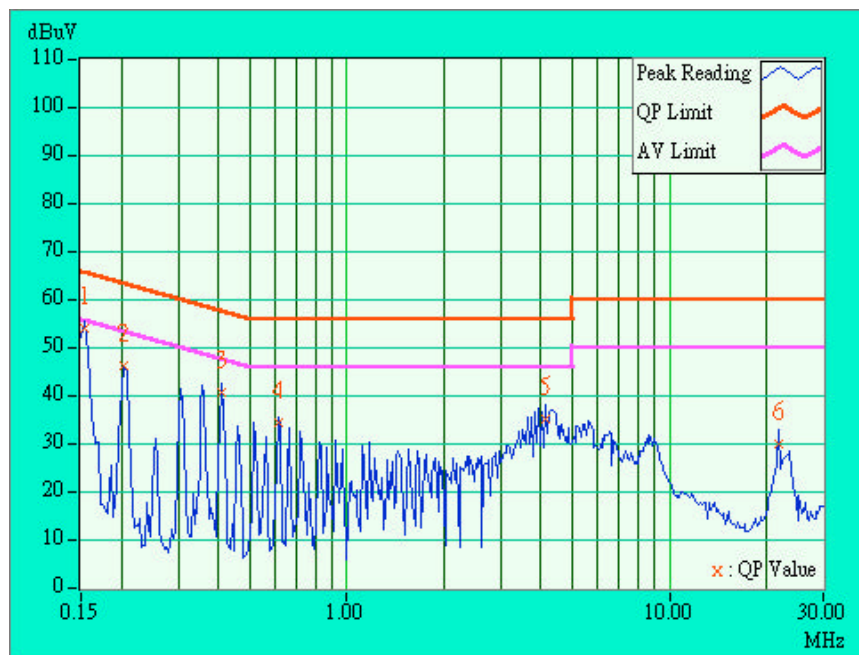
- a. Turned on the power of all equipment.
- b. PC read a test program to enable all functions.
- c. PC read and wrote messages from FDD and HDD.
- d. PC sent "H" messages to monitor and monitor displayed "H" patterns on screen.
- e. PC sent "H" messages to modem.
- f. PC sent "H" messages to printer, and the printer printed them on paper.
- g. Steps c-g were repeated.

#### 4.1.7 TEST RESULTS

EUT	MOUSE	MODEL	M860
		6dB BANDWIDTH	10 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	28 deg. C, 70 % RH, 1005 hPa	TESTED BY: Jone Lin	

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.10	54.01	-	54.11	-	65.79	55.79	-11.68	-
2	0.205	0.10	46.16	-	46.26	-	63.42	53.42	-17.16	-
3	0.412	0.10	40.79	-	40.89	-	57.61	47.61	-16.72	-
4	0.617	0.14	34.37	-	34.51	-	56.00	46.00	-21.49	-
5	4.138	0.31	35.21	-	35.52	-	56.00	46.00	-20.48	-
6	21.853	0.94	29.86	-	30.80	-	60.00	50.00	-29.20	-

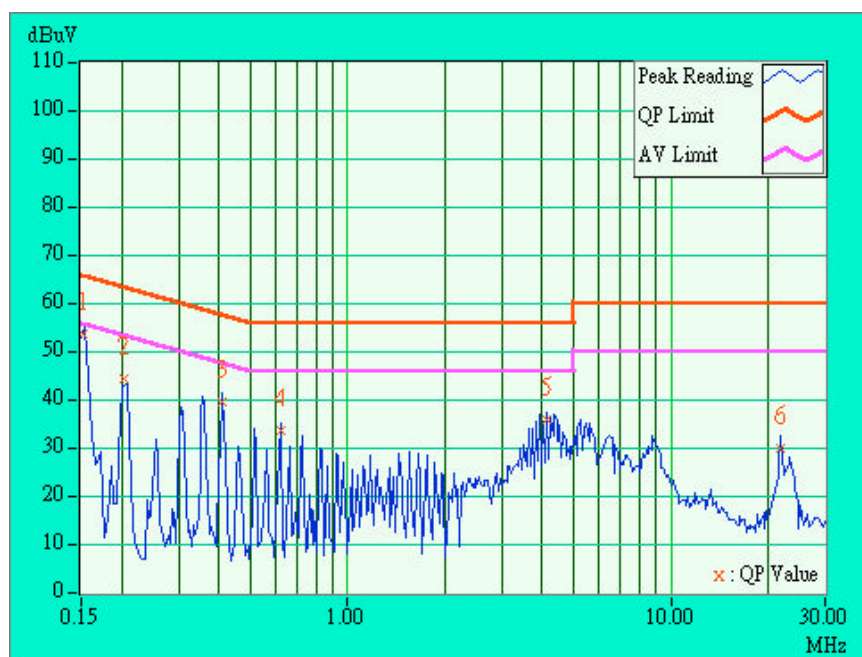
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	MOUSE	<b>MODEL</b>	M860
		<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	28 deg. C, 70 % RH, 1005 hPa	<b>TESTED BY:</b> Jone Lin	

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.153	0.10	53.85	-	53.95	-	65.86	55.86	-11.91	-
2	0.205	0.10	44.49	-	44.59	-	63.41	53.41	-18.82	-
3	0.412	0.10	39.77	-	39.87	-	57.61	47.61	-17.74	-
4	0.619	0.14	33.68	-	33.82	-	56.00	46.00	-22.18	-
5	4.136	0.30	36.06	-	36.36	-	56.00	46.00	-19.64	-
6	21.853	0.74	30.13	-	30.87	-	60.00	50.00	-29.13	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	40	30
230 – 1000	47	37

### LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

**Note:** (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8591E	3230A00704	Nov. 02, 2001
CHASE Preamplifier	PA9231A	3230	Nov.12, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Oct. 30, 2001
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112B	2695	Feb. 19, 2002
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 15, 2002
* CHANCE Turn Table	CM-TT15	CM-T009	NA
* CHANCE Tower	CM-AT40	CM-A009	NA
* Software	AS61D3	NA	NA
* ANRITSU RF Switches	MP59B	M63079	Feb. 19, 2002
* TIMES RF cable	LMR-600	CABLE-ST9-01	May 28, 2002
Open Field Test Site	Site 9	ADT-R09	Dec. 15, 2001
VCCI Site Registration No.	Site 9	R-1248	NA

**NOTE:** 1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.

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

3. "\*" = These equipment are used for the final measurement.

## 4.2.3 TEST PROCEDURE

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

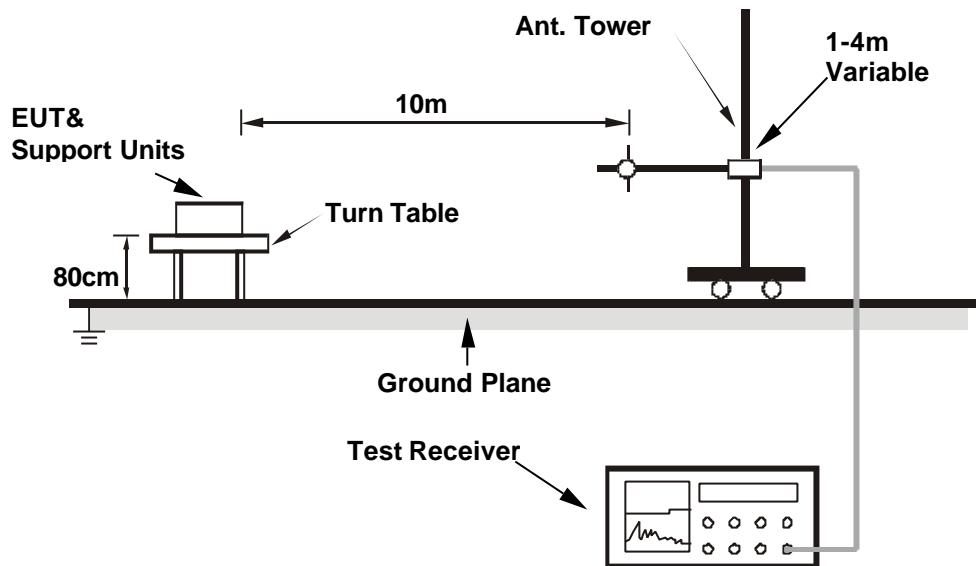
**NOTE:**

- 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.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.
- 3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference antenna.

#### **4.2.4 DEVIATION FROM TEST STANDARD**

No deviation

## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6



## 4.2.7 TEST RESULTS

<b>EUT</b>	MOUSE	<b>MODEL</b>	M860
		<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Quasi-Peak, 120kHz
<b>ENVIRONMENTAL CONDITIONS</b>	29 deg. C, 70 % RH, 1005 hPa	<b>TESTED BY:</b> Jone Lin	

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	58.77	21.6 QP	30.00	-8.40	4.00H	166	16.14	4.82	0.64	0.00	-5.46
2	78.56	23.6 QP	30.00	-6.40	4.00H	252	16.95	5.90	0.74	0.00	-6.65
3	110.65	19.5 QP	30.00	-10.50	4.00H	78	7.77	10.82	0.91	0.00	-11.73
4	132.61	20.8 QP	30.00	-9.20	4.00H	63	8.75	11.03	1.02	0.00	-12.05
5	205.18	18.9 QP	30.00	-11.10	4.00H	289	8.82	8.72	1.36	0.00	-10.08
6	366.50	27.4 QP	37.00	-9.60	4.00H	64	10.85	14.47	2.08	0.00	-16.55
7	599.60	27.8 QP	37.00	-9.20	1.07H	5	6.68	18.09	3.03	0.00	-21.12

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	33.20	23.8 QP	30.00	-6.20	1.00V	55	6.94	16.42	0.44	0.00	-16.86
2	40.09	20.6 QP	30.00	-9.40	1.00V	116	7.70	12.35	0.55	0.00	-12.90
3	48.05	23.0 QP	30.00	-7.00	1.43V	292	13.94	8.47	0.58	0.00	-9.06
4	77.97	22.4 QP	30.00	-7.60	1.82V	54	15.75	5.90	0.74	0.00	-6.66
5	110.68	20.4 QP	30.00	-9.60	1.00V	348	8.67	10.82	0.91	0.00	-11.73
6	132.59	21.6 QP	30.00	-8.40	1.00V	200	9.55	11.03	1.02	0.00	-12.05
7	169.59	22.4 QP	30.00	-7.60	1.00V	192	12.73	8.44	1.20	0.00	-9.64
8	213.80	20.8 QP	30.00	-9.20	1.00V	195	10.02	9.36	1.42	0.00	-10.78
9	299.70	25.0 QP	37.00	-12.00	1.00V	111	10.51	12.60	1.89	0.00	-14.49
10	566.61	27.1 QP	37.00	-9.90	2.34V	275	5.86	18.34	2.91	0.00	-21.24

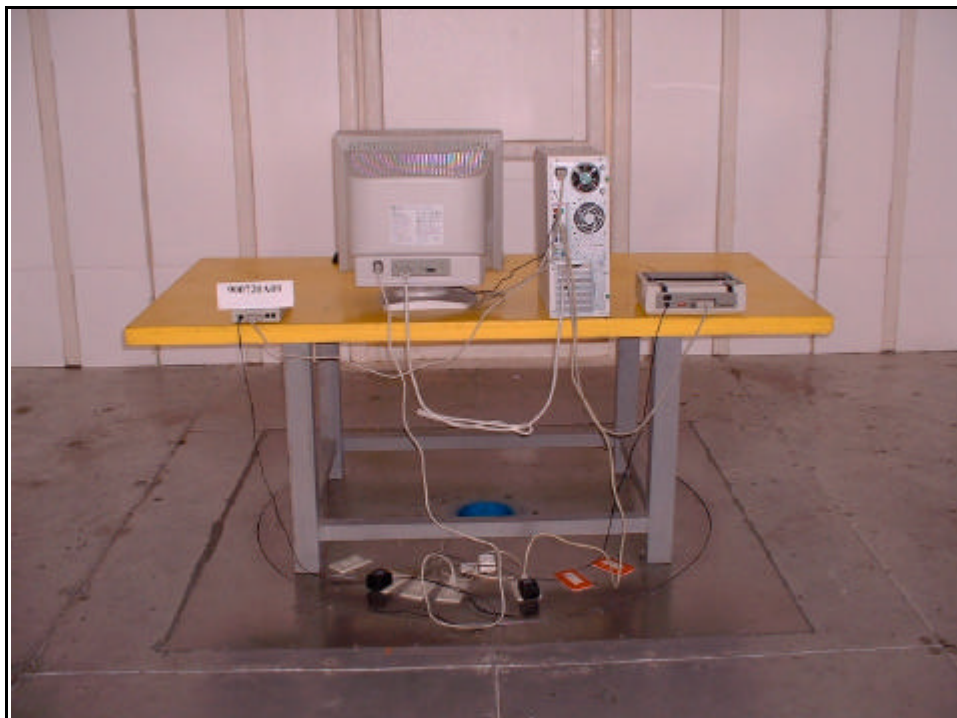
- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
  2. Correction Factor(dB/m) = Pre-Amplifier Gain (dB) - Antenna Factor (dB/m) - Cable Factor (dB)
  3. Pre-Amplifier Gain (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
  4. The other emission levels were very low against the limit.
  5. Margin value = Emission level – Limit value.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



## RADIATED EMISSION TEST





## 6 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC 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
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO, DNV
<b>Canada</b>	INDUSTRY CANADA
<b>R.O.C.</b>	CNLA, BSMI

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:

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**Lin Kou Safety Lab:**

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Fax: 886-2-26093184

**Lin Kou RF & Telecom Lab.**

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**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.