



EMC

TEST REPORT

REPORT NO. : F88082304
MODEL NO. : 5141
DATE OF TEST : Aug. 24, 1999

PREPARED FOR: BEHAVIOR TECH COMPUTER CORP.

ADDRESS : 2F, NO.51, TUNG HSING. RD.,
TAIPEI, TAIWAN, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

11F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

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**1. CERTIFICATION**

Issue Date: Aug. 26, 1999

Product : KEYBOARD
Trade Name : BTC
Model No. : 5141
Applicant : BEHAVIOR TECH COMPUTER CORP.
Standard : FCC Part 15, Subpart B, Class B
CISPR 22: 1993+A1: 1995+A2: 1996, Class B
ANSI C63.4-1992

We hereby certify that one sample of the designation has been tested in our facility on Aug. 24, 1999. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards

TESTED BY : John Liao , DATE: 8/26/99
(John Liao)

CHECKED BY : Ariel Hsieh , DATE: 8/26/99
(Ariel Hsieh)

APPROVED BY : Mike Su , DATE: 8/26/99
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION**NVLAP[®]**

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	KEYBOARD
Model No.	:	5141
Power Supply	:	DC 5V (from PC)
Data Cable	:	Shielded (1.8 m)

Note: For more detailed features description, please refer to manufacturer's specification or User's Manual.



2.2 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 are used to form representative test configuration during the tests.

No	Product	Brand	Model No.	FCC ID	I/O Cable
1.	PERSONAL COMPUTER	NTI	PII-450T	FCC DoC Approved	Nonshielded Power (1.8m)
2.	MONITOR	ADI	PD-959	FCC DoC Approved	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3.	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (2.2m) Nonshielded Power (1.2m)
4.	MODEM	ACEEX	1414	IFAXDM1414	Shielded Signal (1.2m) Nonshielded Power (1.2m)
5.	MOUSE	DEXIN	A2P800A	NIYA2P800A	Shielded Signal (1.5m)

2.3 TEST METHODOLOGY AND CONFIGURATION

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 1992. Radiated testing was performed at an antenna to EUT distance of 10 m on an open area test site.

Please refer to the photos of test configuration in Item 5.



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828765/002	Aug. 2, 2000
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	828075/003	July 21, 2000
EMCO-L.I.S.N.	3825/2	90031627	July 21, 2000
Shielded Room	Site 5	ADT-C05	NA

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per 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.

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated until
HP Spectrum Analyzer	8590L	3544A00941	Dec. 06, 1999
HP Pre-Amplifier	8447D	2944A08312	Sept. 15, 1999
HP Preamplifier	8347A	3307A01088	Sept. 9, 1999
R&S Receiver	ESVS10	844594/010	Sept. 24, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 25, 1999
CHASE BILOG Antenna	CBL6111A	1500	Sept. 4, 1999
EMCO Double Ridged Guide Antenna	3115	9312-4192	April 5, 2000
EMCO Turn Table	1060-04	1196	NA
EMCO Tower	1051	1264	NA
Open Field Test Site	Site 1	ADT-R01	Aug. 28, 1999

Note: 1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per 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.



3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF CISPR 22

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

* Detector Function: Quasi-Peak

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.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

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

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

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz

(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. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Frequency Range : 0.15 - 30 MHz (Conducted Emission)
30 - 1000 MHz (Radiated Emission)

Input Voltage : 120 Vac, 60 Hz

Temperature : 33 °C

Humidity : 55 %

Atmospheric Pressure : 992 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -13.2 dB at 0.798 MHz Minimum passing margin of radiated emission: - 3.1 dB at 73.04 MHz

4.2 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. PC runs a test program to enable all functions.
3. PC reads and writes messages from FDD and HDD.
4. EUT sends "H" character to PC.
5. PC sends "H" messages to monitor and monitor displays "H" patterns on screen.
6. PC sends "H" messages to modem.
7. PC sends "H" messages to printer, and the printer prints them on paper.
8. Repeat steps 3-8.



4.3 TEST DATA OF CONDUCTED EMISSION

EUT: **KEYBOARD**MODEL: **5141**6 dB Bandwidth: 10 kHz

PHASE: LINE (L)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.150	0.2	49.0	-	49.2	-	66.0	56.0	-16.8	-
0.798	0.2	41.8	-	42.0	-	56.0	46.0	-14.0	-
4.186	0.5	33.7	-	34.2	-	56.0	46.0	-21.8	-
11.361	0.8	43.2	-	44.0	-	60.0	50.0	-16.0	-
13.300	1.0	43.1	-	44.1	-	60.0	50.0	-15.9	-
20.414	1.3	32.3	-	33.6	-	60.0	50.0	-26.4	-

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

ADT CO. Shielded Room 5
CISPR 22 CLASS B

24. Aug 99 13:50

EUT: MODEL: 5141
Test Spec: LISN: L
Comment: 120V AC / 60Hz
FULL SYSTEM

Report No. J8808304

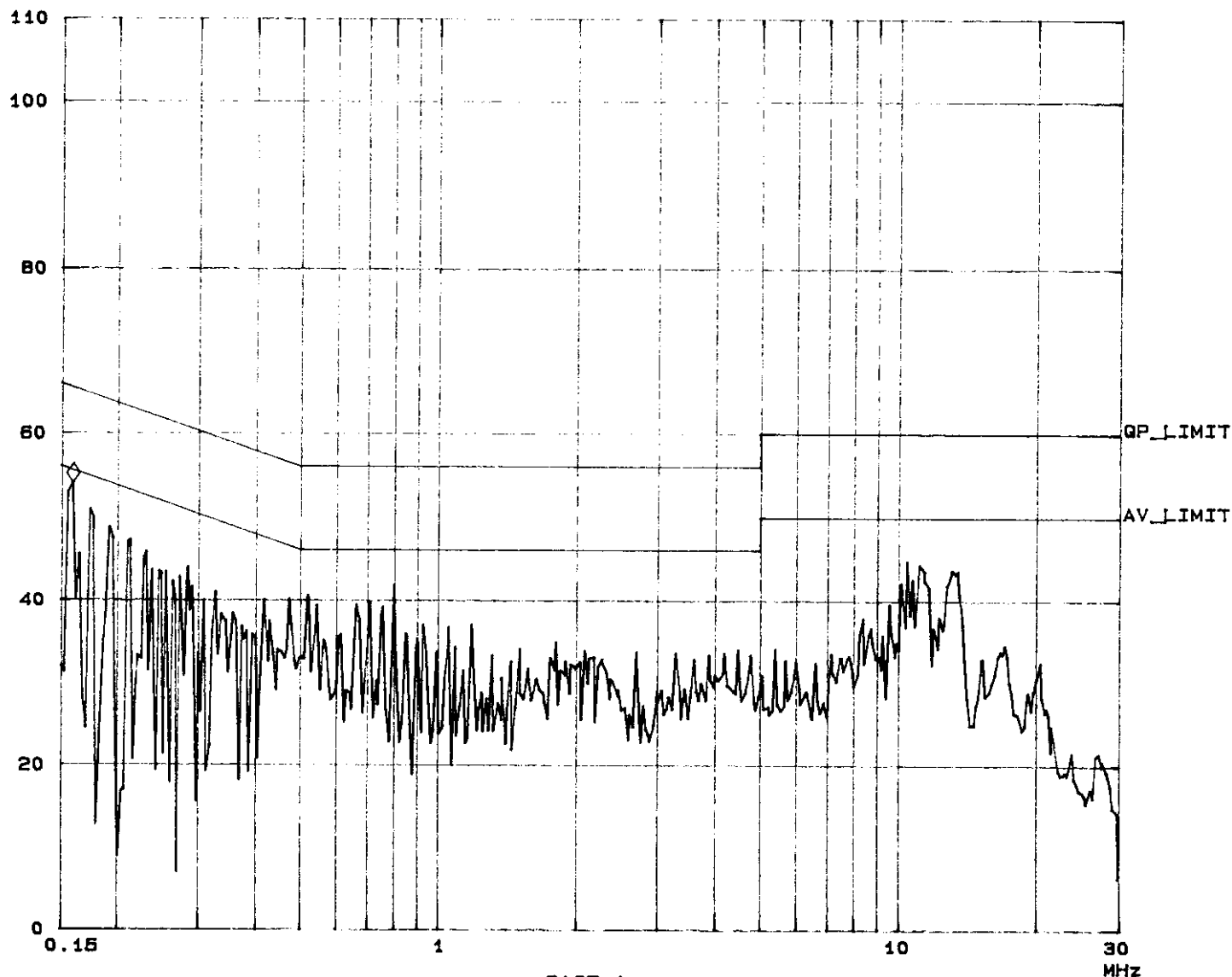
Page 9-1

Tested by John Liao

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	3k	10k	PK	1ms	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	1ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	1ms	10dBLN	OFF	60dB

dBuV ◇ Mkr : 159.00 kHz 54.1 dBuV





TEST DATA OF CONDUCTED EMISSION

EUT: **KEYBOARD**MODEL: **5141**6 dB Bandwidth: 10 kHzPHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.150	0.2	49.2	-	49.4	-	66.0	56.0	-16.6	-
0.798	0.2	42.6	-	42.8	-	56.0	46.0	-13.2	-
4.186	0.4	32.5	-	32.9	-	56.0	46.0	-23.1	-
11.361	0.7	42.4	-	43.1	-	60.0	50.0	-16.9	-
13.300	0.7	42.7	-	43.4	-	60.0	50.0	-16.6	-
20.414	1.1	31.9	-	33.0	-	60.0	50.0	-27.0	-

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

ADT CO. Shielded Room 5
CISPR 22 CLASS B

24. Aug 99 14:06

EUT: MODEL: 5141
Test Spec: LISN: N
Comment: 120V AC / 60Hz
FULL SYSTEM

Report No. J8808204

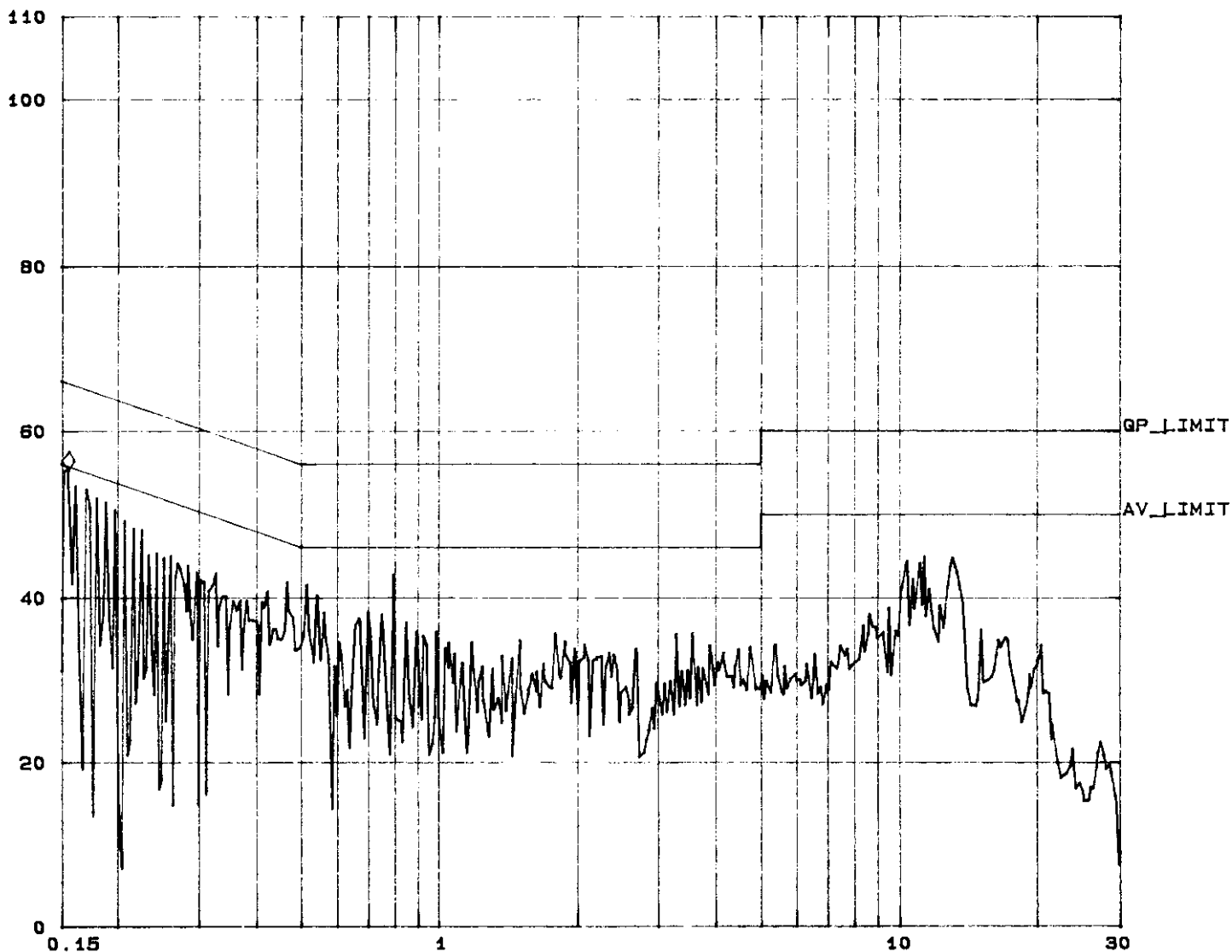
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Tested by John Liao

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpAmp
150k	450k	3k	10k	PK	1ms	10dB	BLN OFF	60dB
450k	5M	3k	10k	PK	1ms	10dB	BLN OFF	60dB
5M	30M	3k	10k	PK	1ms	10dB	BLN OFF	60dB

dBuV ◇ Mkr : 156.00 kHz 55.4 dBuV





4.4 TEST DATA OF RADIATED EMISSION

EUT: **KEYBOARD**MODEL: **5141**

ANT. POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
55.88	8.1	9.9	18.0	30.0	-12.0	400	246
60.19	7.0	10.2	17.2	30.0	-12.8	400	238
64.46	7.0	14.4	21.4	30.0	-8.6	400	245
68.75	6.9	17.0	23.9	30.0	-6.1	400	261
73.04	7.3	19.6	26.9	30.0	-3.1	400	240
85.96	9.0	9.3	18.3	30.0	-11.7	400	248
120.01	14.3	5.6	19.9	30.0	-10.1	400	220
167.09	11.2	5.9	17.1	30.0	-12.9	400	219
200.50	11.1	8.1	19.2	30.0	-10.8	400	259

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



TEST DATA OF RADIATED EMISSION

EUT: **KEYBOARD**MODEL: **5141**

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 M

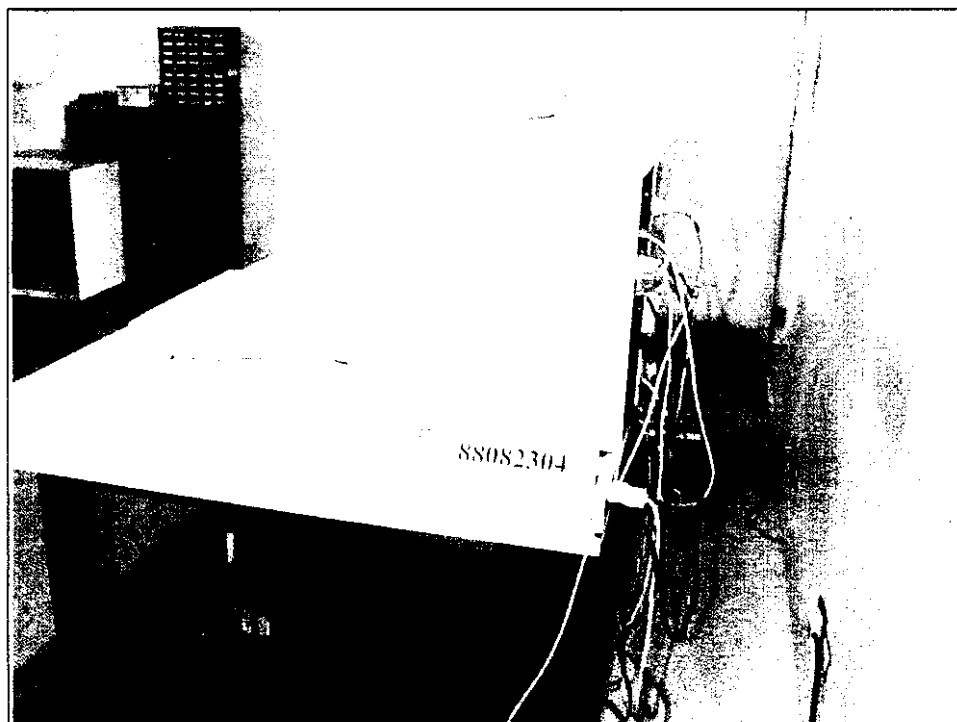
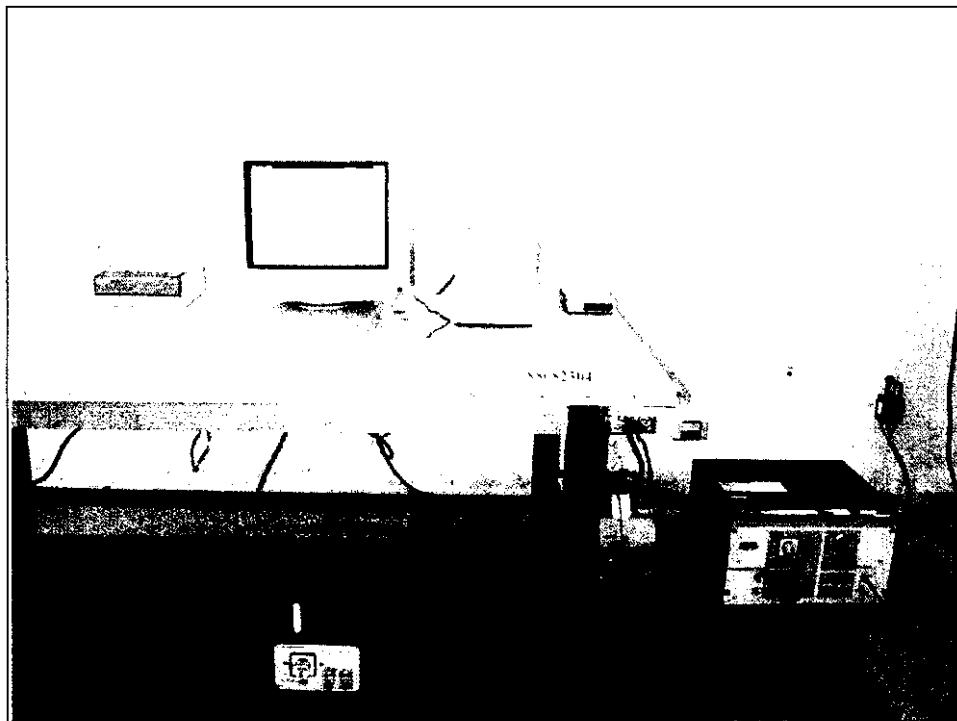
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
30.10	20.2	2.8	23.0	30.0	-7.0	100	275
55.90	8.0	13.6	21.6	30.0	-8.4	100	360
60.20	7.0	13.2	20.2	30.0	-9.8	100	228
64.45	7.0	10.8	17.8	30.0	-12.2	100	212
73.13	7.2	19.3	26.5	30.0	-3.5	155	279
77.41	7.3	12.9	20.2	30.0	-9.8	177	340
86.02	8.1	13.4	21.5	30.0	-8.5	100	231
201.69	11.8	8.7	20.5	30.0	-9.5	100	347
403.18	18.4	3.5	21.9	37.0	-15.1	101	360

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



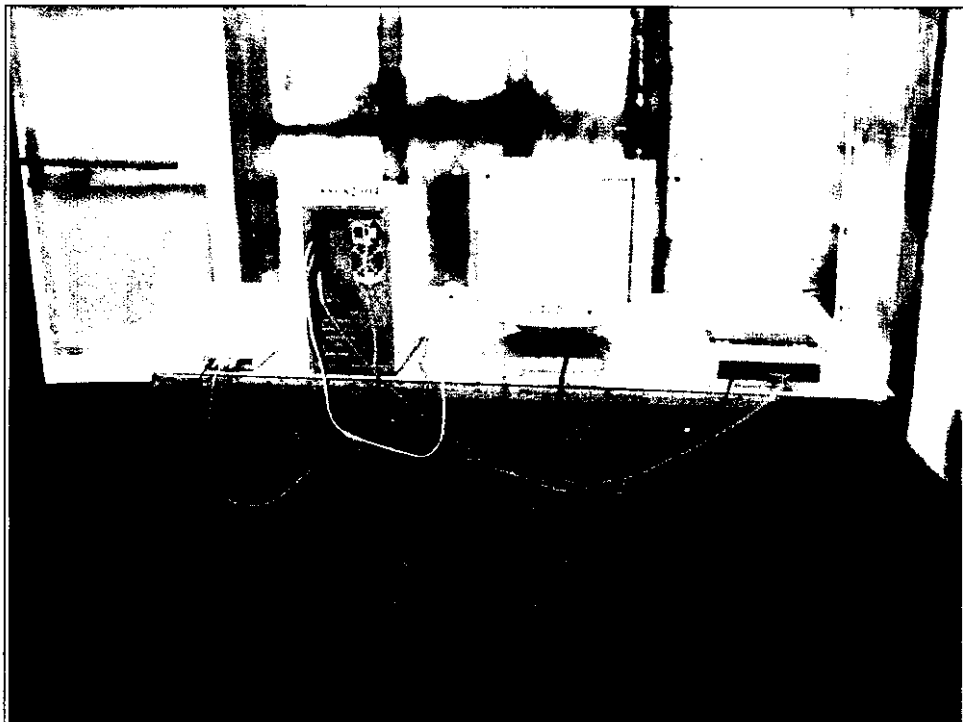
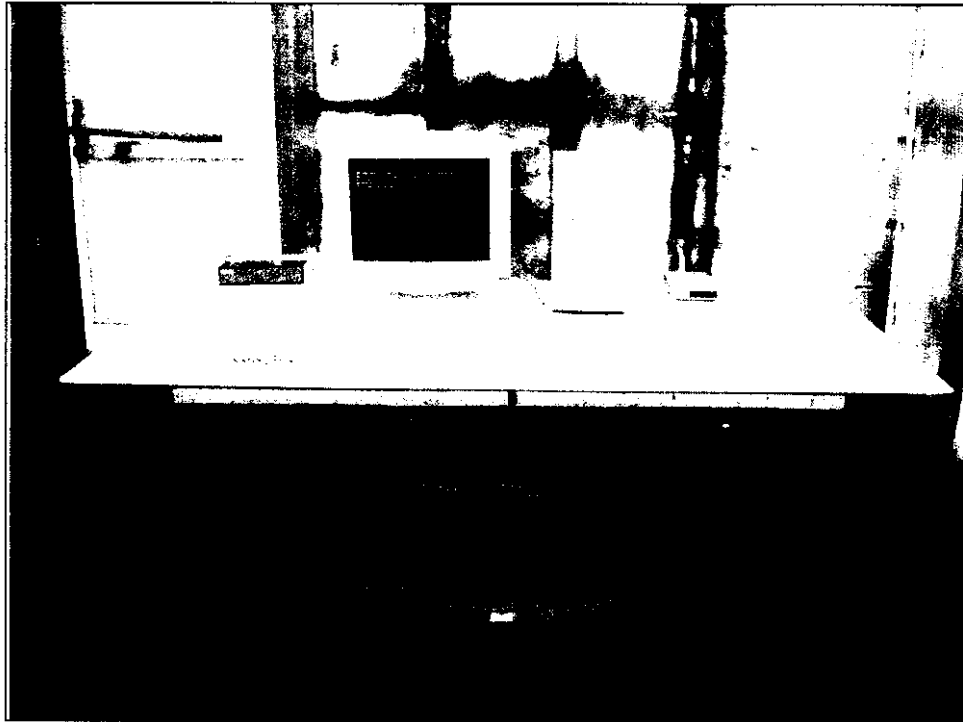
5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN

CONDUCTED EMISSION TEST





RADIATED EMISSION TEST





6. APPENDIX - INFORMATION OF THE TESTING LABORATORY

Information of the testing laboratory

We, ADT Corp., is founded in 1988, to provide our best service in EMC and Safety consultation. Our laboratory is accredited by the following approval agencies according to ISO/IEC Guide 25 or EN 45001:

- | | |
|---------------|--------------------------------------|
| ● USA | FCC, UL, NVLAP |
| ● Germany | TUV Rheinland
TUV Product Service |
| ● Japan | VCCI |
| ● New Zealand | RFS |
| ● Norway | NEMKO, DNV |
| ● U.K. | INCHCAPE |
| ● R.O.C. | BSMI |

Enclosed please find some certificates of our laboratory obtained from approval agencies. If you have any comments, please feel free to contact us with the following:

Lin Kou EMC Lab.:

Tel: 886-2-26032180

Fax: 886-2-26022943

Hsin Chu EMC Lab:

Tel: 886-35-935343

Fax: 886-35-935342

Lin Kou Safety Lab.:

Tel: 886-2-26093195

Fax: 886-2-26093184

Design Center:

Tel: 886-2-26093195

Fax: 886-2-26093184

E-mail: service@mail.adt.com.tw<http://www.adt.com.tw>