FCC ID: HSUTRLC-786

EMC

TEST REPORT

REPORT NO. : F89062206
MODEL NO. : C-786, C-770
DATE OF TEST : June 22, 2000

PREPARED FOR: ROYAL INFORMATION ELECTRONICS CO., LTD.

ADDRESS : NO. 3, LANE 11, TZU-CHANG ST., TU-CHENG IND.
DISTRICT TAIPEI HSIEN, TAIWAN,R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION

NVLAP®
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. 3, 2000

Product	:	17" COLOR MONITOR
Trade Name	:	RIC
Model No.	:	C-786, C-770
Applicant	:	ROYAL INFORMATION ELECTRONICS CO., LTD.
Standard	:	FCC Part 15, Subpart B, Class B ANSI C63.4-1992

We hereby certify that one sample of the designation has been tested in our facility on June 22, 2000. 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 : Ken Liu , DATE: 8/3/2000
(Ken Liu)

CHECKED BY : , DATE: 8/3/2000
(Yemmy Soong)

APPROVED BY : Mike Su , DATE: 8/3/2000
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

Accredited Laboratory

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	17” COLOR MONITOR
Model No.	:	C-786, C-770
Power Supply Type	:	Switching
Power Cord	:	Nonshielded (1.8m)
Data Cable	:	Shielded (1.8m)

Note: The EUT is a 17” COLOR MONITOR with resolution up to 1280 x 1024.

The EUT has two model names, which differed in their highest horizontal/ vertical frequency as the following:

MODEL	BRAND	HIGHEST HORIZONTAL FREQ.
C-786	RIC	80.4 kHz
C-770	RIC	69 kHz

Both models were tested separately and their data are recorded in this report.

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-333T	FCC DoC Approved	Nonshielded Power (1.8m)
2	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded signal (1.4m)
3	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (1.2m) Nonshielded Power (1.9m)
4	MODEM	ACEEX	1414	IFAXDM1414	Shielded signal (1.2m) Nonshielded Power (1.9m)
5	MOUSE	LOGITECH	M-S43	DZL211106	Shielded signal (1.8m)
6	VGA CARD	GAINWARD	CD-GX2A44T	ICUVGA-GW710	NA

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 3 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	828109/007	July 6, 2001
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	July 9, 2001
EMCO-L.I.S.N.	3825/2	9204-1964	July 9, 2001
Shielded Room	Site 2	ADT-C02	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	3544A01042	April 6, 2001
HP Preamplifier	8447D	2944A08313	Sept. 19, 2000
HP Preamplifier	8347A	3307A01088	Aug. 30, 2000
HP Preamplifier	8449B	3008A01201	Dec. 14, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 2000
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 30, 2000
EMCO Double Ridged Guide Antenna	3115	9312-4192	March 29, 2001
CHASE BILOG Antenna	CBL6111A	1647	July 3, 2000
EMCO Turn Table	1016	1722	NA
EMCO Tower	1051	1825	NA
Open Field Test Site	Site 4	ADT-R04	June 9, 2001

Note: 1. The measurement uncertainty is less than +/- 3dB, 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

FREQUENCY (MHz)	Class A (at 10m)		Class B (at 3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
30 - 88	90	39.1	100	40.0
88 - 216	150	43.5	150	43.5
216 - 960	210	46.4	200	46.0
above 1000	300	49.5	500	54.0

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(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

FREQUENCY (MHz)	Class A		Class B	
	uV	dBuV	uV	dBuV
0.450 - 1.705	1000	60.0	250	48.0
1.705 - 30	3000	69.5	250	48.0

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(2) Emission level (dBuV) = 20 log Emission level (u V).
(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	:	0.45 - 30 MHz (Conducted Emission) 30 - 2000 MHz (Radiated Emission)
Input Voltage	:	120 Vac, 60 Hz
Temperature	:	26 degree C
Humidity	:	74 %
Atmospheric Pressure	:	995 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -4.6 dB at 22.511 MHz Minimum passing margin of radiated emission: -2.4 dB at 122.08 MHz

Note: The EUT were pre-tested under the following resolution & horizontal speed modes:

Model: C-786

- 1280x1024(80.4 kHz)
- 1024x768 (69.0 kHz)
- 640 x 480 (31.5 kHz)

Model: C-770

- 1280x1024(64.0 kHz)
- 1024x768 (69.0 kHz)
- 680 x 480 (31.5 kHz)

The worst emission levels were found under 1280 x 1024 (80.4 kHz) for model C-786 & 1280 x 1024 (64.0 kHz) for model C-770 and therefore test data of these two modes were recorded.

4.2 EUT OPERATION CONDITION

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

4.3 TEST DATA OF CONDUCTED EMISSION (A)

EUT: **17" COLOR MONITOR** MODEL: **C-786**

MODE: **1280 x 1024 (80.4 kHz)** dB Bandwidth: 10 kHz

PHASE: LINE (L)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.561	0.2	36.5	-	36.7	-	48.0	-	-11.3	-
0.801	0.2	28.9	-	29.1	-	48.0	-	-18.9	-
1.365	0.2	30.7	-	30.9	-	48.0	-	-17.1	-
4.326	0.4	33.3	-	33.7	-	48.0	-	-14.3	-
18.344	1.0	38.1	-	39.1	-	48.0	-	-8.9	-
22.511	1.2	42.2	-	43.4	-	48.0	-	-4.6	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": Not applicable.
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.

TEST DATA OF CONDUCTED EMISSION (A)

EUT: **17" COLOR MONITOR** MODEL: **C-786**

MODE: **1280 x 1024 (80.4 kHz)** 6 dB Bandwidth: 10 kHz

PHASE: NEUTRAL (N)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.561	0.2	38.7	-	38.9	-	48.0	-	-9.1	-
0.801	0.2	32.2	-	32.4	-	48.0	-	-15.6	-
1.365	0.2	32.1	-	32.3	-	48.0	-	-15.7	-
4.326	0.4	34.5	-	34.9	-	48.0	-	-13.1	-
18.344	0.9	38.2	-	39.1	-	48.0	-	-8.9	-
22.511	1.1	40.9	-	42.0	-	48.0	-	-6.0	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": Not applicable.
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.

4.4 TEST DATA OF CONDUCTED EMISSION (B)

EUT: **17" COLOR MONITOR** MODEL: **C-770**

MODE: **1280 x 1024 (64.0 kHz)** dB Bandwidth: 10 kHz

PHASE: LINE (L)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.483	0.2	37.2	-	37.4	-	48.0	-	-10.6	-
0.894	0.2	28.4	-	28.6	-	48.0	-	-19.4	-
2.550	0.2	29.6	-	29.8	-	48.0	-	-18.2	-
3.723	0.3	33.3	-	33.6	-	48.0	-	-14.4	-
18.611	1.0	35.7	-	36.7	-	48.0	-	-11.3	-
26.263	1.0	40.7	-	41.7	-	48.0	-	-6.3	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": Not applicable.
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.

TEST DATA OF CONDUCTED EMISSION (B)

EUT: **17" COLOR MONITOR** MODEL: **C-770**

MODE: **1280 x 1024 (64.0 kHz)** 6 dB Bandwidth: 10 kHz

PHASE: NEUTRAL (N)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.483	0.2	39.8	-	40.0	-	48.0	-	-8.0	-
0.894	0.2	27.5	-	27.7	-	48.0	-	-20.3	-
2.550	0.2	25.2	-	25.4	-	48.0	-	-22.6	-
3.723	0.3	32.1	-	32.4	-	48.0	-	-15.6	-
18.611	0.9	36.9	-	37.8	-	48.0	-	-10.2	-
26.263	0.9	38.2	-	39.1	-	48.0	-	-8.9	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": Not applicable.
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.

4.5 TEST DATA OF RADIATED EMISSION (A)

EUT: **17" COLOR MONITOR** MODEL: **C-786**

MODE: **1280 x 1024 (80.4 kHz)** ANT. POLARITY: Horizontal

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-2000 MHz MEASURED DISTANCE: 3 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
56.16	8.2	21.8	30.0	40.0	-10.0	282	177
82.17	9.6	16.9	26.5	40.0	-13.5	271	231
112.14	12.4	21.7	34.1	43.5	-9.4	316	280
134.65	13.7	12.2	25.9	43.5	-17.6	274	48
157.18	12.8	16.7	29.5	43.5	-14.0	299	337
168.34	12.3	26.7	39.0	43.5	-4.5	163	300
179.38	11.9	29.1	41.0	43.5	-2.5	193	279
190.86	11.5	29.0	40.5	43.5	-3.0	160	283
202.04	11.3	26.5	37.8	43.5	-5.7	172	276
212.99	12.1	27.6	39.7	43.5	-3.8	130	284
224.56	13.0	23.3	36.3	46.0	-9.7	140	85
269.15	15.6	27.6	43.2	46.0	-2.8	100	77
368.30	19.0	15.2	34.2	46.0	-11.8	217	31
527.50	24.2	11.6	35.8	46.0	-10.2	289	107

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 (A)

EUT: **17" COLOR MONITOR** MODEL: **C-786**

MODE: **1280 x 1024 (80.4 kHz)** ANT. POLARITY: Vertical

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-2000 MHz MEASURED DISTANCE: 3 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
70.30	6.9	20.3	27.2	40.0	-12.8	213	146
78.55	9.1	19.6	28.7	40.0	-11.3	167	233
86.35	9.9	22.2	32.1	40.0	-7.9	122	187
104.61	11.8	26.0	37.8	43.5	-5.7	195	20
109.86	12.2	24.3	36.5	43.5	-7.0	101	75
133.90	13.7	15.7	29.4	43.5	-14.1	100	57
134.65	13.7	17.9	31.6	43.5	-11.9	100	66
145.80	13.5	14.8	28.3	43.5	-15.2	100	295
157.14	12.8	18.2	31.0	43.5	-12.5	100	7
168.36	12.3	21.1	33.4	43.5	-10.1	100	1
179.36	11.9	27.6	39.5	43.5	-4.0	100	203
190.89	11.5	24.1	35.6	43.5	-7.9	100	256
213.01	12.1	17.5	29.6	43.5	-13.9	100	109
224.57	13.0	16.2	29.2	46.0	-16.8	100	194
246.63	14.8	15.9	30.7	46.0	-15.3	100	46
269.38	15.6	15.4	31.0	46.0	-15.0	100	78
531.00	24.4	10.2	34.6	46.0	-11.4	243	275

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

4.6 TEST DATA OF RADIATED EMISSION (B)

EUT: **17" COLOR MONITOR** MODEL: **C-770**

MODE: **1280 x 1024 (64.0 kHz)** ANT. POLARITY: Horizontal

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-2000 MHz MEASURED DISTANCE: 3 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
80.85	9.5	23.2	32.7	40.0	-7.3	202	289
110.80	12.3	22.0	34.3	43.5	-9.2	318	200
119.10	12.9	21.8	34.7	43.5	-8.8	287	191
158.29	12.7	12.6	25.3	43.5	-18.2	326	324
166.13	12.4	17.1	29.5	43.5	-14.0	286	33
174.00	12.1	14.4	26.5	43.5	-17.0	223	299
213.50	12.2	15.0	27.2	43.5	-16.3	197	2
336.08	17.8	13.1	30.9	46.0	-15.1	100	95
480.10	22.1	9.0	31.1	46.0	-14.9	100	293

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 (B)

EUT: **17" COLOR MONITOR** MODEL: **C-770**

MODE: **1280 x 1024 (64.0 kHz)** ANT. POLARITY: Vertical

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-2000 MHz MEASURED DISTANCE: 3 M

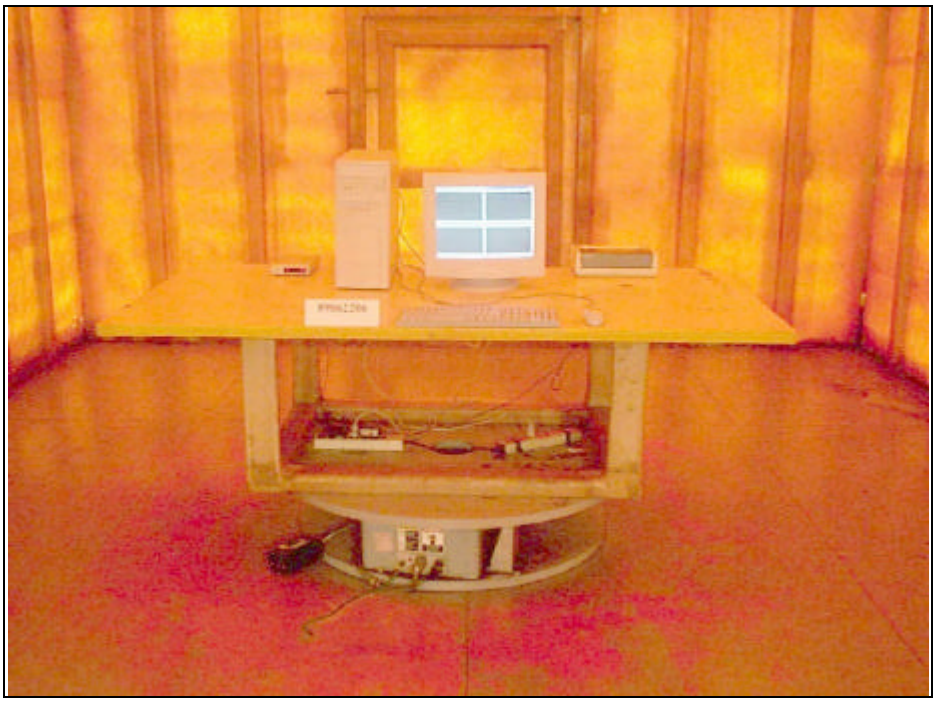
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
78.08	8.9	23.2	32.1	40.0	-7.9	171	279
106.06	11.9	27.1	39.0	43.5	-4.5	114	276
116.08	12.7	26.6	39.3	43.5	-4.2	100	237
122.08	13.1	28.0	41.1	43.5	-2.4	100	284
150.26	13.2	16.7	29.9	43.5	-13.6	100	318
158.22	12.7	17.9	30.6	43.5	-12.9	150	0
165.95	12.4	24.1	36.5	43.5	-7.0	104	358
173.96	12.1	16.8	28.9	43.5	-14.6	100	358
213.43	12.2	13.5	25.7	43.5	-17.8	313	7
291.53	16.3	22.7	39.0	46.0	-7.0	203	322
386.09	19.7	22.2	41.9	46.0	-4.1	191	251
482.24	22.2	19.9	42.1	46.0	-3.9	151	326
577.64	24.9	13.5	38.4	46.0	-7.6	100	351
673.37	26.1	11.0	37.1	46.0	-8.9	212	84

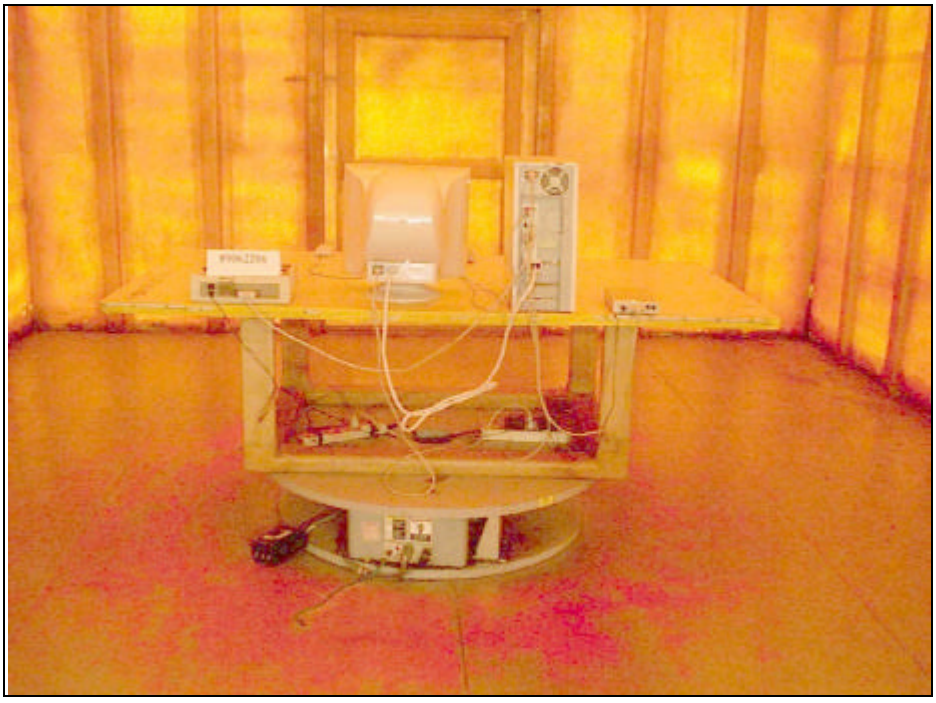
REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

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., are 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:

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Hsin Chu EMC Lab:
Tel: 886-35-935343
Fax: 886-35-935342

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