EMC

TEST REPORT

REPORT NO. : CE88030904
MODEL NO. : PCA-6275
DATE OF TEST : March 10 ~ 11, 1999

PREPARED FOR : ADVANTECH CO., LTD.

ADDRESS : FL. 4, NO. 108-3, MING-CHUAN ROAD,
SHING-TIEN CITY TAIPEI HSIEN, TAIWAN

PREPARED BY:

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

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1. CERTIFICATION

Issue date: March 12, 1999

Product	:	CPU BOARD	
Trade Name	:	ADVANTECH	
Model No.	:	PCA-6275	
Applicant	:	ADVANTECH CO., LTD.	
Standard	:	EN 55022: 1994+A1: 1995+A2: 1997, Class A	**EN 50082-2: 1995** EN 61000-4-2: 1995 EN 61000-4-3: 1997 EN 61000-4-4: 1995 EN 61000-4-6: 1996 EN 61000-4-8: 1994 ENV 50204: 1996

We hereby certify that one sample of the designation has been tested in our facility from March 10 to 11, 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.

TESTED BY (Emission) : _____ , DATE: _____
(Joey Chen)

TESTED BY (Immunity) : _____ , DATE: _____
(T. M. Yeung)

CHECKED BY : _____ , DATE: _____
(Yemmy Soong)

APPROVED BY : _____ , DATE: _____
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	PCA-6275
Power Supply	:	Switching, DC (from PC)
Data Cable	:	N/A

Note: The EUT, which is installed in the industrial PC, was tested with the following configuration:

ITEM	BRAND	MODEL	REMARK
CHASSIS	ADVANTECH	IPC-610	
CPU x2	INTEL PENTIUM II 350 MHz (frequency of clock generator: 100 MHz)		
HDD	MAXTOR	7345AT	
FDD	TEAC	FD-235HF	
BACKPLANE	ADVANTECH	PCA-6113	
VGA CARD	S3	TPO-64PC IS	ON BOARD
CPU BOARD	ADVANTECH	PCA-6275	ON BOARD
POWER SUPPLY	SEASONIC	SSH-250G	250W

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

2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

The EUT is a kind of Information Technology Equipment, which could be used in industrial area and according to the manufacturer' s specifications, it was tested according to the following standards:

EN 55022: 1994+A1: 1995+A2: 1997, Class A

EN 50082-2: 1995
EN 61000-4-2: 1995
EN 61000-4-3: 1997
EN 61000-4-4: 1995
EN 61000-4-6: 1996
EN 61000-4-8: 1994
ENV 50204: 1996

All tests are performed and recorded as per above standards.

2.3 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.

FOR EMISSION TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1.	COLOR MONITOR	ADI	PD-959	730020U00100295	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2.	PRINTER	HP	2225C+	3123S97230	Shielded Signal (1.2m) Nonshielded Power (1.2m)
3.	MODEM 2x	ACEEX	1414	980020508 980020503	Shielded Signal (1.2m) Nonshielded Power (1.2m)
4.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110111	Shielded Signal (1.4m)
5.	USB MOUSE	DEXIN	A2U800A	71001831	Shielded Signal (1.5m)
6.	USB KEYBOARD	BTC	7932	D7A140017	Nonshielded Signal (1.8m)

Note: Support unit 5 & 6 were connected to the USB ports of EUT.

FOR IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1.	COLOR MONITOR	ACER	7254e	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2.	PRINTER	HP	C2145A	SG5N1601K	Shielded Signal (14m) Nonshielded Power (1.8m)
3.	MODEM 2x	GVC	F-1128V1R6	96-191-113003 96-191-113004	Shielded Signal (1.5m) Nonshielded Power (1.2m)
4.	KEYBOARD	HP	C3758A	C3758-60223	Shielded Signal (1.8m)
5.	USB MOUSE	AGILER	2000	N/A	Shielded Signal (1.8m)
6.	USB KEYBOARD	BTC	7932	D7A140012	Nonshielded Signal (1.8m)

Note: Support unit 5 & 6 were connected to the USB ports of EUT.

2.4 TEST SETUP

Please refer to the photos of test configuration in Item 6.

3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESH3	893495/006	July 15, 1999
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 16, 1999
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	July 14, 1999
EMCO-L.I.S.N.	3825/2	9204-1964	July 14, 1999
Shielded Room	Site 2	ADT-C02	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA' s 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	3544A01176	April 28, 1999
HP Preamplifier	8447D	2944A08485	May 1, 1999
HP Preamplifier	8347A	3307A01088	Sept. 9, 1999
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 27, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 25, 1999
CHASE BILOG Antenna	CBL6112A	2221	Aug. 10, 1999
EMCO Turn Table	1060	1115	N/A
SHOSHIN Tower	AP-4701	A6Y005	N/A
Open Field Test Site	Site 5	ADT-R05	Aug. 9, 1999

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA' s 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 TEST INSTRUMENTS (IMMUNITY)

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
KeyTek, ESD Test System	2000	9105240/41	Aug. 9, 1999
KeyTek, ESD Simulator	MZ-15/EC	92022232	April 15, 1999
KeyTek, EFT Generator	CE-40	9508257	Sept. 8, 1999
KeyTek, Capacitive Clamp	CE-40-CCL	9508259	Sept. 8, 1999
ROHDE & SCHWARZ Signal Generator	SMY01	840490/009	Sept. 30, 1999
KALMUS Power Amplifier	LA1000V	091995-1	N/A
KALMUS Power Amplifier	757LC	091995-2	N/A
HOLADAY Field Probe	HI-4422	89915	Oct. 27, 1999
EMCO BiconiLog Antenna	3141	1001	N/A
FCC Coupling Decoupling Network	FCC-801-MODE:3-25	48	N/A
FCC Coupling Decoupling Network	FCC-801-MODE:2-25	20	N/A
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	N/A
FCC Coupling Decoupling Network	FCC-801-MODE:1-25	17	N/A
BOONTON RF Voltage Meter	9200B	331801AE	Dec. 17, 1999
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1999
HAEFELY Magnetic Field Tester	MAG 100.1	083794-06	N/A
COMBINOVA Magnetic Field Meter	MFM10	224	Aug. 26, 1999

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

3.3 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF EN 55022

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

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 EN 55022

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

Product Family Standard	:	EN 55022+A1: 1995+A2: 1997, Class A
Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	230 Vac, 50 Hz (to PC)
Temperature	:	20 degree C
Humidity	:	85 %
Atmospheric Pressure	:	1003 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -14.2 dB at 6.644 MHz Minimum passing margin of radiated emission: -2.2 dB at 100.25 MHz

4.2 EUT OPERATION CONDITION

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

4.3 TEST DATA OF CONDUCTED EMISSION

EUT: **CPU BOARD** MODEL: **PCA-6275**

6 dB Bandwidth: 10 kHz

Freq.	L Level		N Level		Limit		Margin [dB (mV)]			
[MHz]	[dB (mV)]		[dB (mV)]		[dB (mV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.157	64.8	-	62.1	-	79.0	66.0	-28.8	-	-29.1	-
0.344	50.2	-	49.9	-	79.0	66.0	-25.6	-	-25.5	-
0.691	47.4	-	47.5	-	73.0	60.0	-22.9	-	-22.5	-
0.865	50.1	-	50.5	-	73.0	60.0	-24.9	-	-25.0	-
3.646	48.1	-	48.0	-	73.0	60.0	-24.4	-	-23.8	-
6.644	48.6	-	49.2	-	73.0	60.0	-14.2	-	-16.9	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value 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

4.4 TEST DATA OF RADIATED EMISSION

EUT: **CPU BOARD** MODEL: **PCA-6275**

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/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
75.19	8.2	24.5	32.7	40.0	-7.3
100.24	12.3	24.3	36.6	40.0	-3.4
167.06	11.9	14.7	26.6	40.0	-13.4
233.89	14.2	25.3	39.5	47.0	-7.5
267.28	16.6	19.9	36.5	47.0	-10.5
300.70	16.3	26.5	42.8	47.0	-4.2
501.15	22.1	18.3	40.4	47.0	-6.6

REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB/m) +Meter Reading (dBuV).
2. Correction Factor (dB/m) = Ant. Factor (dB/m)+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: **CPU BOARD** MODEL: **PCA-6275**

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
66.05	7.4	16.8	24.2	40.0	-15.8
78.08	8.3	25.7	34.0	40.0	-6.0
100.25	11.2	26.6	37.8	40.0	-2.2
108.60	12.8	18.5	31.3	40.0	-8.7
167.06	12.0	18.7	30.7	40.0	-9.3
200.47	13.0	19.7	32.7	40.0	-7.3
267.28	16.7	24.9	41.6	47.0	-5.4
400.93	20.0	19.6	39.6	47.0	-7.4
501.15	22.1	20.0	42.1	47.0	-4.9
601.38	24.3	13.2	37.5	47.0	-9.5
701.61	25.9	13.3	39.2	47.0	-7.8
902.07	28.1	9.5	37.6	47.0	-9.4

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

5. TEST RESULTS (IMMUNITY)

5.1 GENERAL DESCRIPTION

Generic Standard	:	EN 50082-2: 1995	
Basic Standard and Performance Criteria	:	EN 61000-4-2	(Electrostatic Discharge, ESD, 8kV air discharge, 4kV Contact discharge, Performance Criterion B)
		EN 61000-4-3	(Radio-Frequency Electromagnetic Field Susceptibility Test, RS, 80-1000 MHz, 10V/m, 80% AM (1kHz), Performance Criterion A)
		EN 61000-4-4	(Electrical Fast Transient/Burst, EFT, Power line: 2kV, Signal line: 1kV, Performance Criterion B)
		EN 61000-4-6	(Conducted Radio Frequency Disturbances Test, CS, 0.15-80 MHz, 10V/m, 80% AM, 1kHz, Performance Criterion A)
		EN 61000-4-8	(Power Frequency Magnetic Field Test, 50 Hz, 30A/m, Performance Criterion A)
		ENV 50204	(Radio-Frequency Electromagnetic Field, Pulse modulated, 900+/-5 MHz, 10V/m, 50 % duty cycle, Rep. Frequency 200 Hz, Performance Criterion A)
Input Voltage	:	230 Vac, 50 Hz (to PC)	
Temperature	:	25 degree C	
Humidity	:	58 %	
Atmospheric Pressure	:	1004 mbar	

5.2 PERFORMANCE CRITERIA DESCRIPTION

Criterion A -	The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion B -	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion C -	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5.3 EUT OPERATION CONDITION

Industrial PC runs a test program to access FDD/HDD/MODEM/PRINTER sequentially and shows the result on monitor screen.

5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

Basic Standard	:	EN 61000-4-2
Discharge Impedance	:	330 ohm / 150 pF
Discharge Voltage	:	Air Discharge - 8 kV (Direct) Contact Discharge - 4 kV (Direct/Indirect)
Polarity	:	Positive/Negative
Number of Discharge	:	Minimum 10 times at each test point
Discharge Mode	:	Single Discharge
Discharge Period	:	1-second minimum

Test Result		**Remarks**
Criterion A	**PASS**	Model: PCA-6275

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1 ~ 4	N/A	Note 1
4	+/-	3, 4	Note 1	N/A

Description of test point:

1. FDD
2. Power switch
3. Metal case
4. I/O ports

Indirect Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1 ~ 4	Note 1	Note 1

Description of test point:

1. Front side
2. Rear side
3. Right side
4. Left side

Description of test result:

Note 1: There was no change compared with initial operation during the test.

5.5 TEST RESULT OF RADIATED ELECTROMAGNETIC FIELDS (RS)

Basic Standard	:	EN 61000-4-3
Frequency range	:	80 MHz - 1000 MHz
Field strength	:	10 V/m
Modulation	:	1kHz Sine Wave, 80%, AM Modulation
Frequency step	:	1 % of fundamental
Polarity of Antenna	:	Horizontal and Vertical
Test distance	:	3 m

Test Result		Remarks
Criterion A	**PASS**	Model: PCA-6275

Note: Four sides of EUT are verified separately.

OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT (EFT)

Basic Standard	:	EN 61000-4-4
Test Voltage	:	Power Line - 2 kV (to PC)
		Signal/Control Line - NA
Polarity	:	Positive/Negative
Impulse Frequency	:	5 kHz
Tr / Tn	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	Not less than 1 min.

Test Result		**Remarks**
Criterion A	**PASS**	Model: PCA-6275

OBSERVATION DESCRIPTION

Test Point	Polarity	Test Level (kV)	Result
L1	+/-	2	Note 1
L2	+/-	2	Note 1
GND	+/-	2	Note 1

Description of test result:

Note 1: There was no change compared to initial operation during the test.

5.7 TEST RESULT OF CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

Basic Standard	:	EN 61000-4-6
Frequency range	:	0.15 MHz - 80 MHz
Field strength	:	10 V/m
Modulation	:	1kHz Sine Wave, 80%, AM Modulation
Frequency step	:	1 % of fundamental
Coupled cable	:	Power Mains, Unshielded
Coupling device	:	CDN-M3 (3 wires),

Test Result		Remarks
Criterion A	**PASS**	MODEL: PCA-6275

OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.

5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD

Basic Standard	:	EN 61000-4-8
Frequency range	:	50 Hz
Field strength	:	30 A/m
Observation Time	:	1 minute
Inductance coil	:	Rectangular type, 1mx1m

Test Result		Remarks
Criterion A	**PASS**	MODEL: PCA-6275

OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.

5.9 TEST RESULT OF RADIO-FREQUENCY ELECTROMAGNETIC FIELD, PULSE MODULATED

Basic Standard	:	ENV 50204
Frequency range	:	900 +/- 5 MHz
Field strength	:	10 V/m
Modulation	:	200Hz, Square Wave, 50% Duty Cycle
Dewell Time	:	30 second
Polarity of Antenna	:	Horizontal and Vertical
Test distance	:	3 m

Test Result		Remarks
Criterion A	**PASS**	MODEL: PCA-6275

Note: Four sides of EUT are verified separately.

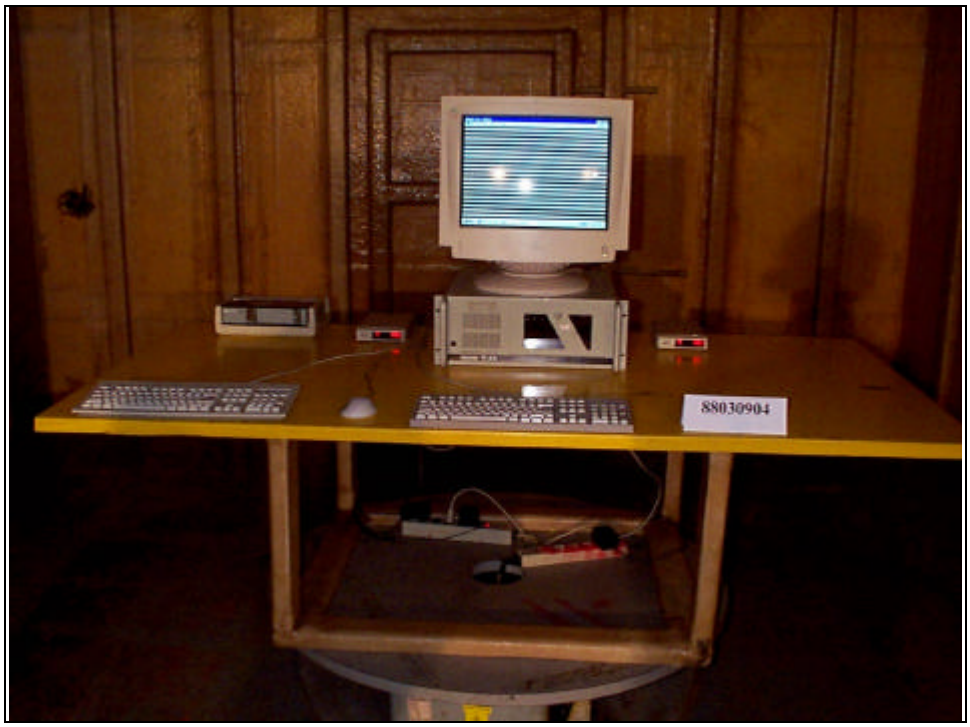
OBSERVATION DESCRIPTION

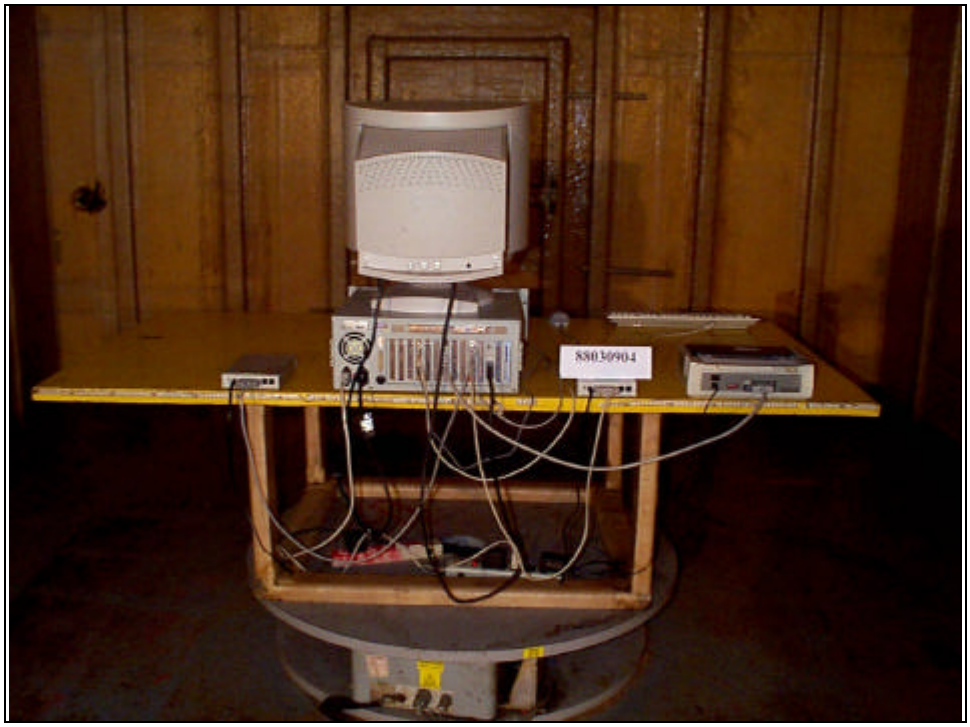
There was no change compared with initial operation during the test.

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

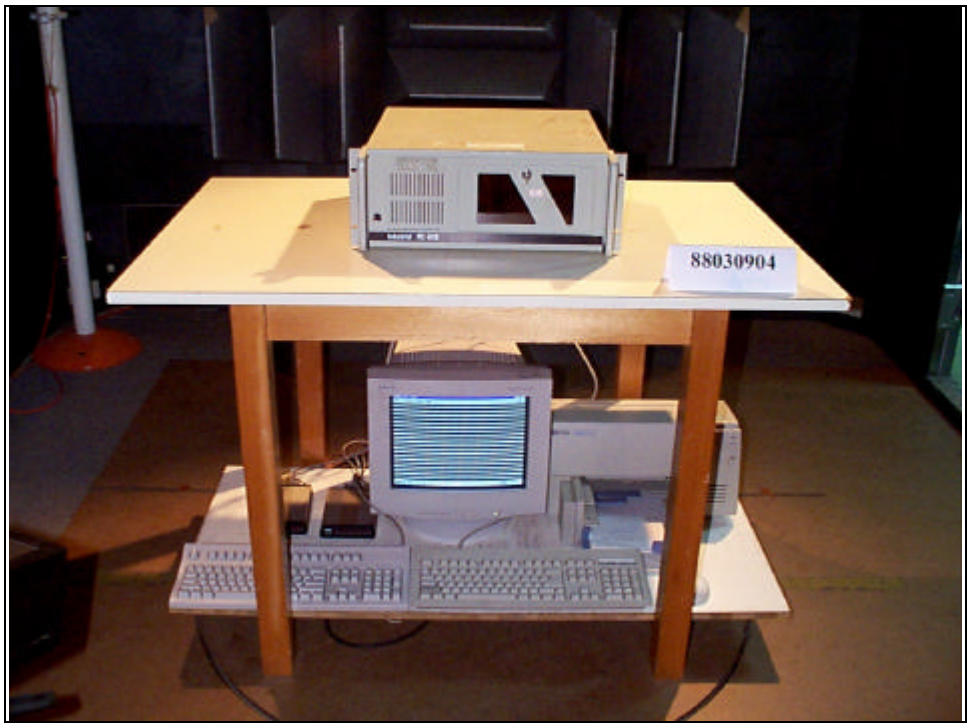
RADIATED EMISSION TEST

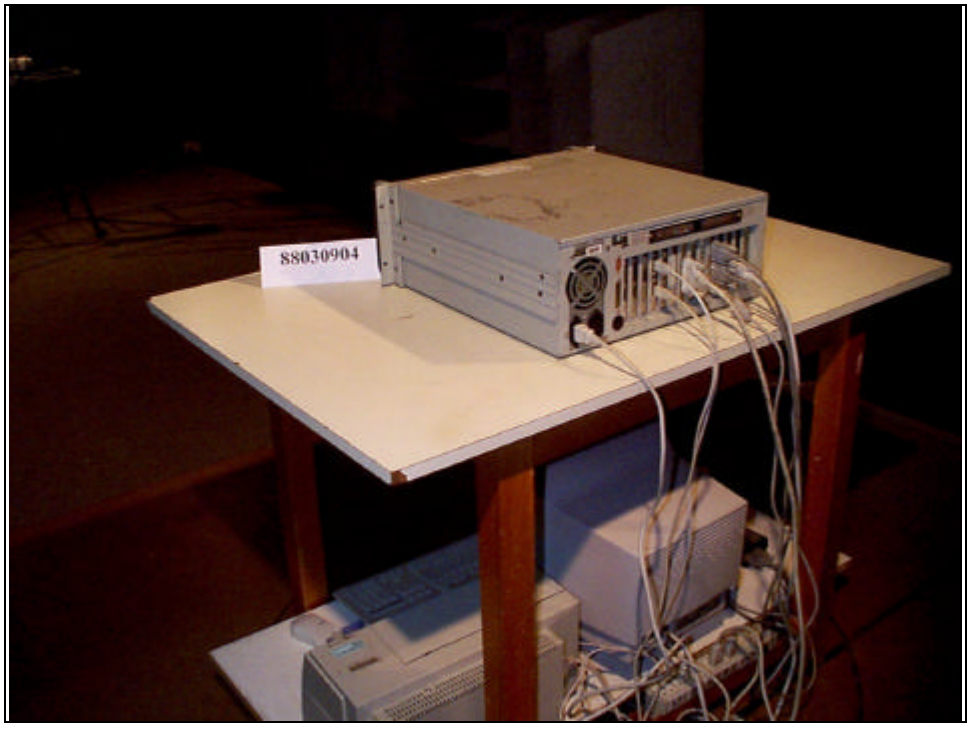




ESD TEST

RS TEST

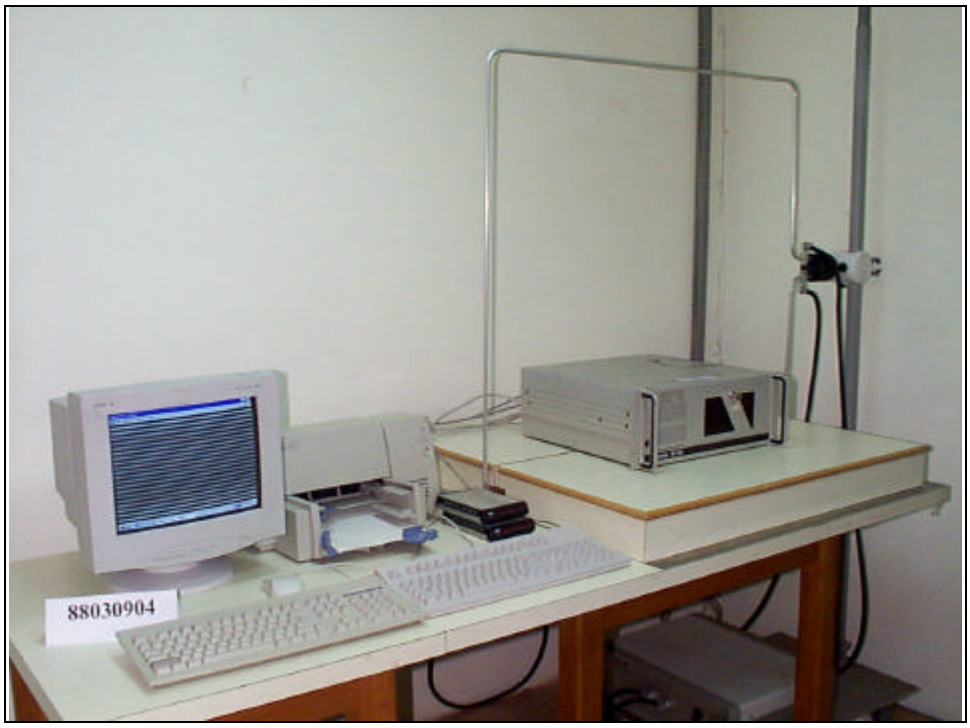




EFT TEST

CONDUCTED SUSCEPTIBILITY TEST

MAGNETIC TEST



7. 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, SGS
• 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.:
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