EMC

TEST REPORT

REPORT NO. : CE88030401
MODEL NO. : PCM-4896
DATE OF TEST : March 04 ~ 08, 1999

PREPARED FOR: AAEON TECHNOLOGY INC.

ADDRESS : 1F, NO. 6, ALLEY 6, LANE 45, PAO-HSIN RD.,
HSIN-TIEN CITY, TAIPEI, TAIWAN, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION

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

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1. CERTIFICATION

Issue date: March 09, 1999

Product	:	CPU BOARD	
Trade Name	:	AAEON	
Model No.	:	PCM-4896	
Applicant	:	AAEON TECHNOLOGY INC.	
Standard	:	EN 55022:1994+A1:1995+A2:1997, Class A	**EN 50082-2:1995** EN 61000-4:2:1995 EN 61000-4-3:1996 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 04 to 08, 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) : Alan Chang (Alan Chang) , DATE: 03/09/99

TESTED BY (Immunity) : S. S. Wang (S. S. Wang) , DATE: 03/09/99

CHECKED BY : (Yemmy Soong) , DATE: 03/09/99

APPROVED BY : (Mike Su) , DATE: 3/9/99

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	PCM-4896
Power Supply Type	:	Switching, DC (from PC)
Data Cable	:	N/A

Note: During the test, the EUT was installed in a metal enclosure with a slot board to form an industrial PC. The Industrial PC includes the following:

* Chassis : AAEON, model: AIPC-110
* Switching power supply: EMACS, model: AX2-5250F
* FDD : MITSUMI, model: D353M3
* HDD : QUANTUM, 3.5 Series
* CPU : CYRIX MEDIA-GX 200 MHz

The EUT was tested under the CPU: 200 MHz, frequency of clock generator is 66.6 MHz and has a resolution up to 1024x768.

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 61000-4-3:1996
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	M500233452	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	PRINTER	HP	2225C+	2936S56294	Shielded Signal (1.4m) Nonshielded Power (1.2m)
3	MODEM x4	ACEEX	1414	IFAXDM1414	Shielded signal (1.2m) Nonshielded Power (1.2m)
4	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded Signal (1.4m)
5	MOUSE	DEXIN	A2P800A	NIYA2P800A	Shielded signal (1.5m)
6	USB KEYBOARD	BTC	7932	E5XKBUCP10410	Shielded Signal (1.5m)
7	USB MOUSE	DEXIN	A2U800A	NIYA2U800A	Shielded Signal (1.5m)
8	PC	IBM	6560-T7T	9983708	Nonshielded power (1.8m) Shielded Signal (1.8m)
9	MONITOR	ACER	7134T	M500233452	Shielded signal (1.3m) Nonshielded power (1.8m)
10	KEYBOARD	FORWARD	FDA-104GA	FDKB8110129	Nonshielded signal (1.4m)
11	MOUSE	DEXIN	A2P800A	80110021	Shielded signal (1.5m)
12	LAN CARD	INTEL	S82555	00A0C9A6CB525271	NA

Note: Support unit 1~7 acted as SERVER PC and communicated with support unit 8-12 which acted as HOST PC and systems of communication partner via a UTP cable (10m).

FOR IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ACER	7234e	9174302003	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	PRINTER	HP	C2145A	SG5BN160GY	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3	MODEM x4	GVC	F-1128V1R6 F-1128V1R6 F-1114V1R6	96-191-113003 96-191-113004 853E100	Shielded signal (1.25m) Nonshielded Power (1.5m)
		ACEEX	1414	980020528	
4	KEYBOARD	ACER	6311	K6355122516	Shielded Signal (1.8m)
5	MOUSE	COMPAQ	13H6690	23-D365100	Shielded signal (1.8m)
6	USB KEYBOARD	BTC	7932	D7A140018	Shielded Signal (1.8m)
7	USB MOUSE	DEXIN	A2U800A	71001830	Shielded Signal (1.5m)
8	PC	NTI	PII-233	P201097	Nonshielded power (1.8m) Shielded Signal (1.8m)
9	MONITOR	ADI	PV-448	604012V00100231A	Shielded signal (1.5m) Nonshielded power (1.8m)
10	KEYBOARD	HP	C3758A	K101088	Nonshielded signal (1.8m)
11	MOUSE	HP	M-S34	LZA72701223	Shielded signal (1.8m)
12	LAN CARD	3 COM	3C905B-TX	6NKD0BEFCB	NA

Note: Support unit 1~7 acted as SERVER PC and communicated with support unit 8-12 which acted as HOST PC and systems of communication partner via a UTP cable (10m).

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	ESHS30	828109/007	July 22, 1999
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 20, 1999
EMCO L.I.S.N.	3825/2	9504-2359	July 20, 1999
Shielded Room	Site 3	ADT-C03	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	8594E	3520A01861	Feb. 08, 2000
HP Preamplifier	8447D	2944A08118	June 28, 1999
HP Preamplifier	8347A	3307A01088	Sept. 9, 1999
ROHDE & SCHWARZ TEST RECEIVER	ESVS 10	840241/010	Sept. 10, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 25, 1999
CHASE BILOG Antenna	CBL6111A	1079	July 17, 1999
EMCO Double Ridged Guide Antenna	3115	9312-4192	April 3, 1999
CHANCE Turn Table	U200	9701	N/A
CHANCE Tower	AT-100	CM-A003	N/A
Open Field Test Site	Site 3	ADT-R03	July 16, 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. 9, 1999
KeyTek, Control Center	E103	9508347	N/A
KeyTek, Surge Combination Wave	E501A	9508349	Sept. 3, 1999
KeyTek, Surge Coupler/Decoupler	E551	9508350	Sept. 3, 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-M3-25	48	N/A
FCC Coupling Decoupling Network	FCC-801-M2-25	20	N/A
FCC Coupling Decoupling Network	FCC-801-M1-25	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 Mains Interference Simulator	PLINE 1610	083690-17	July 6, 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 B
Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	230 Vac, 50 Hz (to PC)
Temperature	:	25 degree
Humidity	:	58 %
Atmospheric Pressure	:	1000 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -16.4 dB at 0.199 MHz Minimum passing margin of radiated emission: -4.9 dB at 38.98 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 and receives messages to and from WORKSTATION PC via a UTP cable.
5. Industrial PC sends "H" messages to monitor and monitor display "H" patterns on screen.
6. Industrial PC sends "H" messages to modem.
7. Industrial PC sends "H" messages to printer, and the printer prints them on paper.
8. Repeat steps 2-8.

4.3 TEST DATA OF CONDUCTED EMISSION

EUT: **CPU BOARD** MODEL: **PCM-4896**

6 dB Band Width: 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
0.199	62.4	-	62.6	-	79.0	66.0	-16.6	-	-16.4	-
0.299	55.1	-	55.3	-	79.0	66.0	-23.9	-	-23.7	-
0.495	53.2	-	53.4	-	79.0	66.0	-25.8	-	-25.6	-
0.896	43.7	-	43.6	-	73.0	60.0	-29.3	-	-29.4	-
5.051	49.3	-	49.0	-	73.0	60.0	-23.7	-	-24.0	-
20.203	42.1	-	42.7	-	73.0	60.0	-30.9	-	-30.3	-

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 level 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: **PCM-4896**

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)
45.48	13.3	16.9	30.2	40.0	-9.8
150.05	12.6	16.5	29.1	40.0	-10.9
168.03	11.5	15.8	27.3	40.0	-12.7
175.04	11.6	15.6	27.2	40.0	-12.8
178.99	11.7	19.8	31.5	40.0	-8.5
199.99	12.5	16.3	28.8	40.0	-11.2
215.99	13.2	19.7	32.9	40.0	-7.1
229.09	13.9	18.1	32.0	40.0	-8.0
343.65	17.5	23.0	40.5	47.0	-6.5
447.48	20.8	13.7	34.5	47.0	-12.5

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: **PCM-4896**

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)
38.98	14.7	20.4	35.1	40.0	-4.9
45.49	12.5	16.7	29.2	40.0	-10.8
52.05	7.6	27.0	34.6	40.0	-5.4
77.95	7.9	23.2	31.1	40.0	-8.9
149.98	12.3	16.4	28.7	40.0	-11.3
168.03	11.4	19.2	30.6	40.0	-9.4
184.25	11.8	18.4	30.2	40.0	-9.8
186.13	11.8	16.3	28.1	40.0	-11.9
343.64	18.0	22.4	40.4	47.0	-6.6
447.30	21.2	10.5	31.7	47.0	-15.3

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 power of Industrial PC)	
Temperature	:	24 degree	
Humidity	:	58 %	
Atmospheric Pressure	:	998 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 show the result on monitor screen.

5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

Basic Standard	:	EN 61000-4-2
Generic Standard	:	EN 50082-2
Discharge Impedance	:	330 ohm / 150 pF
Discharge Voltage (Direct/Indirect)	:	Air Discharge - 8 kV (Direct) Contact Discharge - 4 kV (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: PCM-4896

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1 ~ 5	NA	Note 1
4	+/-	1, 4, 5	Note 1	NA

Description of test point:

1. Metal case
2. Junction of case
3. Push button
4. In/Out Port
5. Screws

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. Right side
3. Left side
4. Rear side

Description of test result:

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

5.5 TEST RESULT OF RADIATED RADIO FREQUENCY DISTURBANCES (RS)

Basic Standard	:	EN 61000-4-3
Generic Standard	:	EN 50082-2
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: PCM-4896

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/BURST (EFT/BURST)

Basic Standard	:	EN 61000-4-4
Generic Standard	:	EN 50082-2
Test Voltage	:	Power Line - 2 kV (to power of Industrial PC) Signal/Control Line – 1kV
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: PCM-4896

OBSERVATION DESCRIPTION

Test Point	Polarity	Test Level (kV)	Result
L1	+/-	2	Note 1
L2	+/-	2	Note 1
GND	+/-	2	Note 1
Signal / Control Line	+/-	1	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
Generic Standard	:	EN 50082-2
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: PCM-4896

OBSERVATION DESCRIPTION

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

5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD

Basic Standard	:	EN 61000-4-8
Generic Standard	:	EN 50082-2
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: PCM-4896

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
Generic Standard	:	EN 50082-2
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: PCM-4896

Note: Four sides of EUT are verified separately.

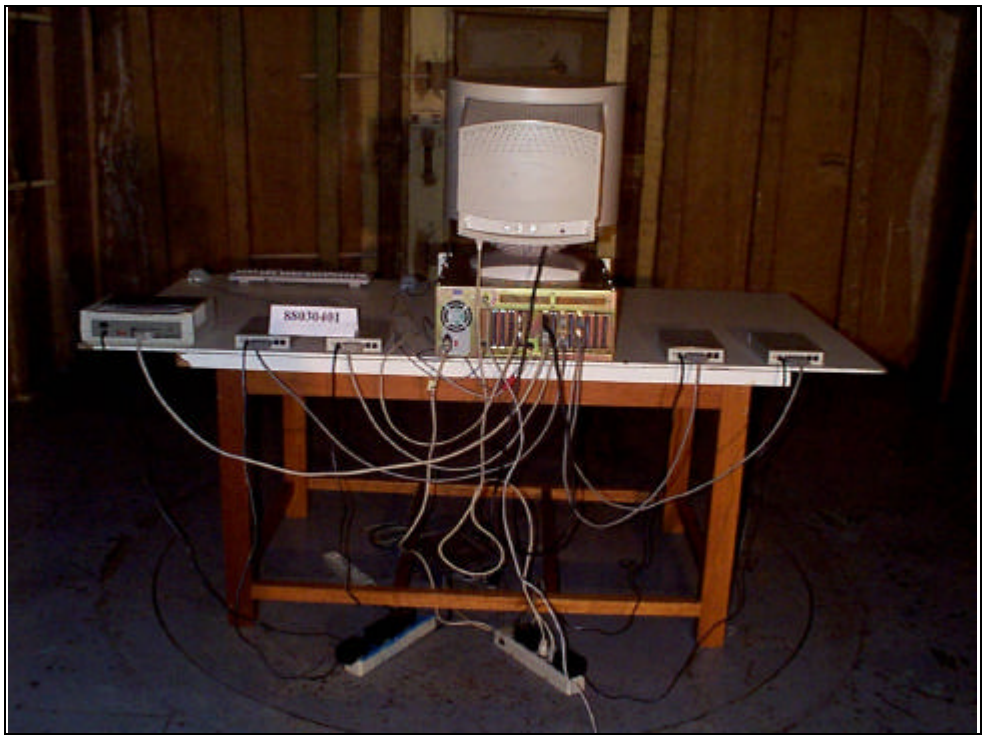
OBSERVATION DESCRIPTION

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

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

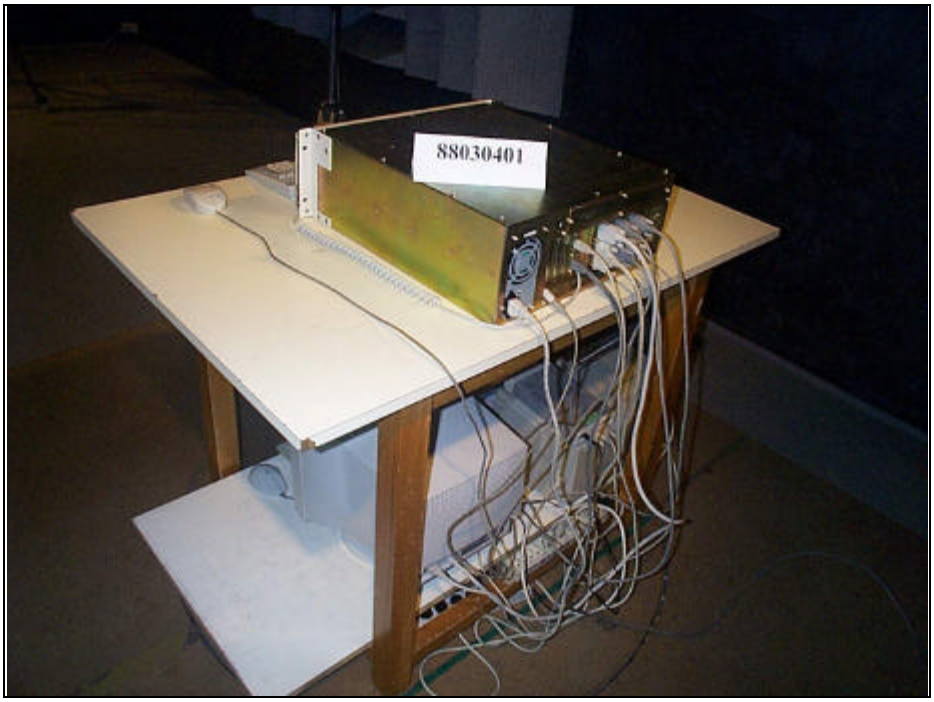
CONDUCTED EMISSION TEST

RADIATED EMISSION TEST



ESD TEST

RS TEST (AM MODULATION AND PULSE MODULATION)



EFT TEST

EFT CLAMP TEST

CONDUCTED SUSCEPTIBILITY TEST

CONDUCTED SUSCEPTIBILITY CLAMP TEST

MAGNETIC TEST

7. 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
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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