



EMC

TEST REPORT

REPORT NO. : CE88033108

MODEL NO. : PCA-6176 series

DATE OF TEST : Apr. 3 ~ Apr. 15, 1999

PREPARED FOR : ADVANTECH CO., LTD.

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PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

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1.

CERTIFICATION

Issue date: Apr. 23, 1999
Reference No.: 88033105

Product : CPU BOARD
Trade Name : ADVANTECH
Model No. : PCA-6176 series
Applicant : ADVANTECH CO., LTD.
Standard : EN 55022: 1994+A1: 1995+A2: 1997, **EN 50082-2: 1995**
Class A 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: 1995

We hereby certify that one sample of the designation has been tested in our facility from Apr. 3 to Apr. 15, 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 : _____ , DATE: _____
(Emission) (Chris Yang)

TESTED BY : _____ , DATE: _____
(Immunity) (Dennis Chuang)

CHECKED BY : _____ , DATE: _____
(Ariel Hsieh)

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-6176 series
Power Supply Type : Switching (from PC)
Power Cord : NA

Note: The EUT is a CPU board, which is installed in an industrial computer.

The EUT was tested under the following configuration:

ITEM	BRAND	MODEL	REMARK
INDUSTRIAL PC	ADVANTECH	IPC-623MB-300	-
CPU	INTEL	Pentium II 450	450 MHz
BACKPLANE	ADVANTECH	PCA-6114P4	-
VGA CARD	-	-	ON BOARD (1600x1200)
SPS	SKYNET	ADT-930C	300W
FDD	NEC	FD1231H	-
HDD	NEC	DSE1340A	1.2G
CD-ROM	ACER	ACER 24X	24X

The video resolution of 1600 x 1200 was used during the test.

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

2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

According to the manufacturer's request, the EUT was tested with the requirements of 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: 1995

All tests are performed and recorded as per above standards.



2.3 DESCRIPTION OF SUPPORT UNITS

The EUT was installed into a system and tested 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	HP	D2846	JP74912250	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2.	MODEM	ACEEX	1414	980020507	Shielded Signal (1.2m) Nonshielded Power (1.2m)
3.	PRINTER	HP	2225C+	3208S5355	Shielded Signal (1.2m) Nonshielded Power (1.2m)
4.	USB KEYBOARD	BTC	7932	174250046	Shielded Signal (1.7m)
5.	USB MOUSE	DEXIN	A2U800A	71001820	Shielded Signal (1.5m)
6.	PS2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110116	Shielded Signal (1.4m)
7.	RS232 MOUSE	LOGITECH	M-M30	LTR53500777	Shielded Signal (1.9m)
8.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110162	Shielded Signal (1.4m)

Note: Support units 4 & 5 were connected to the USB ports of PC system.

FOR IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1.	COLOR MONITOR	HP	D2846	JP74912250	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2.	MODEM	GVC	F-1128V1R6	96-191-113003	Shielded Signal (1.25m) Nonshielded Power (1.5m)
3.	PRINTER	HP	C2145A	SG59N16035	Shielded Signal (2.0m) Nonshielded Power (1.8m)
4.	USB KEYBOARD	BTC	7932	D7A140018	Shielded Signal (1.8m)
5.	USB MOUSE	DEXIN	A2U800A	71001824	Shielded Signal (1.5m)
6.	PS2 KEYBOARD	HP	C3758A	K101088	Shielded Signal (1.8m)
7.	RS232 MOUSE	DEXIN	A2R800A	80110026	Shielded Signal (1.5m)
8.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110162	Shielded Signal (1.4m)

Note: Support units 4 & 5 were connected to the USB ports of PC system.

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	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	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 5, 2000
CHANCE Turn Table	U200	9701	NA
CHANCE Tower	AT-100	CM-A003	NA
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 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 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-M3-25	48	N/A
FCC Coupling Decoupling Network	FCC-801-M2-25	20	N/A
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	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 Magnetic Field Tester	MAG 100.1	083794-06	N/A
COMBINOVA Magnetic Field Meter	MFM10	224	Aug. 26, 1999

Note: 1. The calibration schedule of ESD Simulator is arranged to be finished before Apr. 30, 1999

2. 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)	Class B (at 10m)
	dBuV/m	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: 1994+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
Temperature : 21 degree C
Humidity : 73 %
Atmospheric Pressure : 1000 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -20.5 dB at 7.577 MHz Minimum passing margin of radiated emission: -3.3 dB at 171.85 MHz

4.2 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. Industrial PC reads a test program to enable all functions.
3. Industrial PC reads and writes messages from HDD and FDD.
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-6176 series

6 dB Band Width: 10 kHz

PHASE: LINE (L)

Freq.	Meter Reading [dB (uV)]					Limit		Margin	
[MHz]	Corr.	Reading Data		Total		[dB (uV)]		[dB (uV)]	
	Factor	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.195	0.2	43.0	-	43.2	-	79.0	66.0	-35.8	-
0.261	0.2	32.8	-	33.0	-	79.0	66.0	-46.0	-
1.347	0.3	38.4	-	38.7	-	73.0	60.0	-34.3	-
3.549	0.5	44.3	-	44.8	-	73.0	60.0	-28.2	-
7.577	0.7	51.8	-	52.5	-	73.0	60.0	-20.5	-
19.868	1.2	38.8	-	40.0	-	73.0	60.0	-33.0	-

- 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



TEST DATA OF CONDUCTED EMISSION

EUT: CPU BOARD

MODEL: PCA-6176 series

6 dB Band Width: 10 kHz

PHASE: NEUTRAL (N)

Freq.	Meter Reading [dB (uV)]					Limit		Margin	
[MHz]	Corr.	Reading Data		Total		[dB (uV)]		[dB (uV)]	
	Factor	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.195	0.2	43.8	-	44.0	-	79.0	66.0	-35.0	-
0.261	0.2	34.7	-	34.9	-	79.0	66.0	-44.1	-
1.347	0.3	37.9	-	38.2	-	73.0	60.0	-34.8	-
3.549	0.4	45.1	-	45.5	-	73.0	60.0	-27.5	-
7.577	0.5	51.3	-	51.8	-	73.0	60.0	-21.2	-
19.868	0.8	36.2	-	37.0	-	73.0	60.0	-36.0	-

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-6176 series

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 Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
146.10	13.1	13.8	26.9	40.0	-13.1
171.85	11.6	25.1	36.7	40.0	-3.3
197.15	12.4	13.1	25.5	40.0	-14.5
206.38	12.8	18.8	31.6	40.0	-8.4
223.10	13.6	15.5	29.1	40.0	-10.9
240.33	14.4	17.3	31.7	47.0	-15.3

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

MODEL: **PCA-6176 series**

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)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
146.10	12.7	14.8	27.5	40.0	-12.5
171.85	11.5	24.7	36.2	40.0	-3.8
197.25	12.1	17.7	29.8	40.0	-10.2
200.53	12.2	19.0	31.2	40.0	-8.8
206.08	12.5	19.0	31.5	40.0	-8.5
240.33	14.4	17.3	31.7	47.0	-15.3

REMARKS:

1. Emission level (dBuV/m) = Correction Factor (dB/m) + Meter Reading (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. TEST RESULTS (IMMUNITY)

5.1 GENERAL DESCRIPTION

Generic Standard	:	EN 50082-2: 1995	
Basic Standard	:	EN 61000-4-2	(Electrostatic Discharge, ESD, 8kV air discharge, 4kV Contact discharge, Performance Criterion B)
Specification and Performance Criteria		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	
Temperature	:	21 degree C	
Humidity	:	53 %	
Atmospheric Pressure	:	1000 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

Same as item 4.2.



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-6176 series

Note: Four sides of EUT are verified separately.

Description of test result:

There was 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
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 B	PASS	Model: PCA-6176 series

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: Mouse and keyboard loose their functions during the test and recoverable only after they are reconnected to PC.



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-6176 series

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 : 50Hz
Field strength : 30 A/m
Observation Time : 1 minute
Inductance coil : Rectangular type, 1mx1m

Test Result		Remarks
Criterion A	PASS	Model: PCA-6176 series

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
Dwell Time : 30 second
Polarity of Antenna : Horizontal and Vertical
Test distance : 3 m

Test Result		Remarks
Criterion A	PASS	Model: PCA-6176 series

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 & PULSE MODULATION TEST



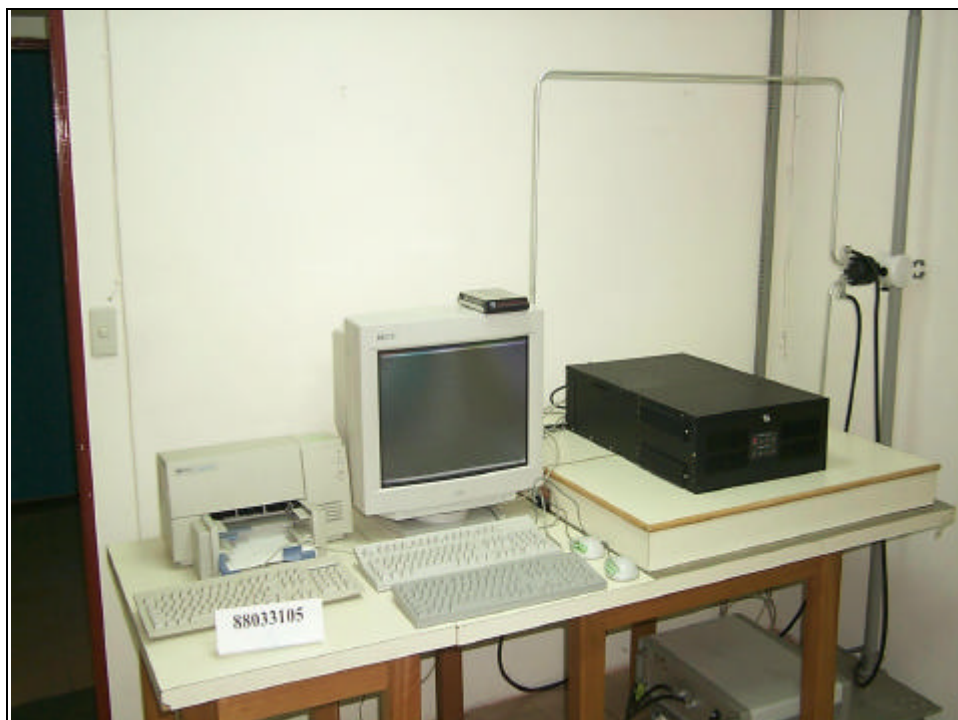
EFT TEST



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:

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