



EMC

TEST REPORT

REPORT NO. : CE86110605
MODEL NO. : PCM-5862
DATE OF TEST : Nov. 10 ~ Dec. 20, 1997

PREPARED FOR : ADVANTECH CO., LTD.

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

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

12F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

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1.

CERTIFICATION

Issue date: Dec. 29, 1997

Product : CPU BOARD
Trade Name : ADVANTECH
Model No. : PCM-5862
Applicant : ADVANTECH CO., LTD.
Standard : EN 55022:1994, 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 61000-4-8:1993

ENV 50204:1995

We hereby certify that one sample of the designation has been tested in our facility from Nov. 10 ~ Dec. 20, 1997. 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.

PREPARED BY: Sharon Hsiung
(Sharon Hsiung)

DATE: 12/29/97

CHECKED BY: Paul Yang
(Paul Yang)

DATE: 12/29/97

APPROVED BY: Harris W. Lai
(Harris W. Lai)

DATE: 12/29/97

ADVANCE DATA TECHNOLOGY CORPORATION

NVLAP®

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product : CPU BOARD
Model No. : PCM-5862
Power Supply Type : Switching

Note: The EUT was tested with the following configuration:

- CHASIS: ADVANTECH, model: IPC-610
- CPU: AMD, AMD K6-Pr200
- HDD: MAXTOR, model: 7131AT, 130MB
- FDD: TEAC, model: FD-235HF
- POWER SUPPLY: SKYNET, model: ADT-930C
- VGA CARD: C&T, model: Chips 65550

The EUT was tested with the following kind of processing speed of CPU:

AMD K6-Pr200 Speed: 200 MHz (the frequency of clock
generator is 66.6 MHz)

The video resolution of 1024x768 was used during the test.

For more detailed features description, please refer to ATTACHMENT 1 -
TECHNICAL DESCRIPTION OF EUT and 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, Class A	EN50 082-2:1995
	EN 61000-4-2:1995
	EN 61000-4-3:1996
	EN 61000-4-4:1995
	EN 61000-4-6:1996
	EN 61000-4-8:1993
	ENV 50204:1995

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	937G	649015T00102095A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	USB KEYBOARD	BTC	7932	N/A	Shielded Signal (1.5m)
3	KEYBOARD	BTC	5140	765020079	Shielded Signal (1.8m)
4	PRINTER	HP	2225C+	3208S05355	Shielded Signal (1.2m) Nonshielded Power (1.9m)
5	MODEM	DATATRONICS	1200CK	07-503069	Shielded Signal (1.2m) Nonshielded Power (1.9m)
6	MODEM	DATATRONICS	1200CK	07-503066	Shielded Signal (1.2m) Nonshielded Power (1.9m)
7	MOUSE	COMPAQ	M-S28-6MD	LCA53206262	Shielded Signal (1.8m)
8	WALKMAN	PANASONIC	RQ-LS307	N/A	Nonshielded Signal (1.5m)
9	MICROPHONE	CAROL	MUD-329	N/A	Nonshielded Signal (2.5m)
10	SPEAKER	J-S	J-003	N/A	Nonshielded Signal (1.2m)
11	SPEAKER	AUDIO-TECHNICA	AT-SP25	96-M-15406-T	Nonshielded Signal (1.2m) Nonshielded Power (1.9m)

Note: 1. An USB cable (1.2m) was connected to the USB port of PC to form an open loop cable.

2. Two RS-232 cables (1.2m) were connected to the COM ports of PC to form two open loop cables.

FOR IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ACER	7156i	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	KEYBOARD	HP	C3758A	C3758-60223	Shielded Signal (1.8m)
3	KEYBOARD	BTC	7932	D7A140017	Shielded Signal (1.8m)
4	MOUSE	FORWARD	FDM-411	N/A	Shielded Signal (1.8m)
5	PRINTER	HP	C2145A	SG5BN160GY	Shielded Signal (2.0m) Nonshielded Power (1.8m)
6	MODEM	GVC	F-1128V1R6	50601531	Shielded Signal (1.2m) Nonshielded Power (2.0m)
7	MODEM	HAYES	5300AP	A1425300K045	Shielded Signal (1.2m) Nonshielded Power (1.7m)
8	WALKMAN	PANASONIC	RQ-LS307	N/A	Nonshielded Signal (1.5m)
9	SPEAKER	HUNGTECH	ROBOTCOP	N/A	Shielded Signal (1.2m) Nonshielded Power (1.2m)
10	MICROPHONE	L	UDM-535	N/A	Nonshielded Signal (2.7m)

Note: 1. An USB cable (1.2m) was connected to the USB port of PC to form an open loop cable.

2. Two RS-232 cables (1.2m) were connected to the COM ports of PC to form two open loop cables.

2.4 TEST SETUP

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



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated until
HP Spectrum Analyzer	8590L	3544A00941	Dec. 14, 1998
HP Pre-Amplifier	8447D	2944A08312	Sept. 16, 1998
R&S Receiver	ESVS10	844591/010	Sept. 23, 1998
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BiLOG Antenna	CBL6111A	1500	Sept. 12, 1998
EMCO Turn Table	1060-04	1196	N/A
EMCO Tower	1051	1264	N/A
Open Field Test Site	Site 1	ADT-R01	Sept. 5, 1998

Note: 1. The measurement uncertainty is less than +/- 4dB, 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.

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	Aug. 4, 1998
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 22, 1998
EMCO L.I.S.N.	3825/2	9504-2359	Aug. 1, 1998
Shielded Room	Site 3	ADT-C03	N/A

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. 10, 1998
KeyTek, ESD Simulator	MZ-15/EC	92022232	June 12, 1998
KeyTek, EFT Generator	CE-40	9508257	Sept. 9, 1998
KeyTek, Capacitive Clamp	CE-40-CCL	9508259	Sept. 9, 1998
ROHDE & SCHWARZ Signal Generator	SMY01	840490/009	Sept. 29, 1998
KALMUS Power Amplifier	LA1000V	091995-1	N/A
KALMUS Power Amplifier	757LC	091995-2	N/A
HOLADAY Field Probe	HI-4422	89915	Oct. 12, 1998
EMCO BiconiLog Antenna	3141	1001	N/A
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1998

Note: The calibration interval of the above test instruments is 12 months.

And the calibrations are traceable to NML/ROC and NIST/USA.



4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Product Family Standard : EN 55 022, Class A
Frequency Range : 0.15 - 30 MHz (Conducted Emission)
30 - 1000 MHz (Radiated Emission)
Input Voltage : 230 Vac, 50 Hz
Temperature : 23 °C
Humidity : 55 %
Atmospheric Pressure : 1060 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -26.9 dB at 0.684 MHz
	Minimum passing margin of radiated emission: -3.6 dB at 219.04 MHz

4.1.1 EUT OPERATION CONDITION

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



4.1.2 TEST DATA OF CONDUCTED EMISSION

EUT: CPU BOARD

MODEL: PCM-5862

6 dB Band Width: 10 kHz

TEST PERSONNEL: James S. Chan

Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.195	44.20	-	44.30	-	79.00	66.00	-34.8	-	-34.7	-
0.390	32.60	-	33.10	-	79.00	66.00	-46.4	-	-45.9	-
0.684	46.00	-	46.10	-	73.00	60.00	-27.0	-	-26.9	-
3.519	44.00	-	44.30	-	73.00	60.00	-29.0	-	-28.7	-
5.830	29.10	-	29.30	-	73.00	60.00	-43.9	-	-43.7	-
19.515	34.20	-	33.60	-	73.00	60.00	-38.8	-	-39.4	-

- 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

ADT CO.SITE-3
EN55022 CLASS A

10. Nov 97 18:04

EUT: PCM 5882
Operator: BERNIE
Test Spec: LIAISON
Comment: 230V AC/50Hz
1024X768 50HZ 48KHZ

File No. CE86110605

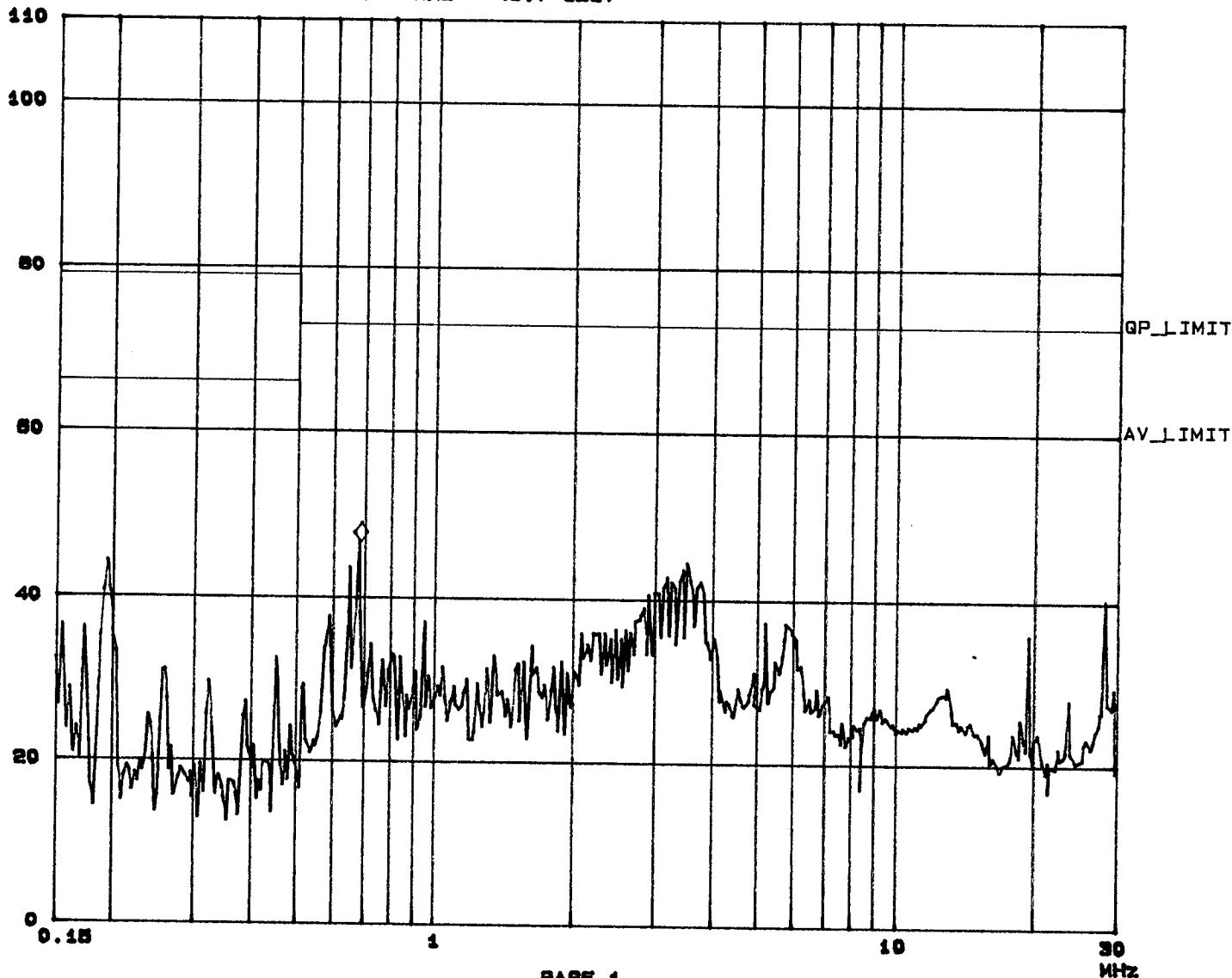
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Tested by *James Chan*

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	3k	10K	PK	0.05ms	10dB	OFF	50dB
450k	5M	3k	10K	PK	0.05ms	10dB	OFF	50dB
5M	30M	3k	10K	PK	0.05ms	10dB	OFF	50dB

dBuV ◇ Mkr : 884.00 kHz 48.7 dBuV



ADT CO.SITE-3
EN55022 CLASS A

10. Nov 87 10:15

EUT: PDM_5002
Operator: SERVICE
Test Spec: L100 N
Comments: 230V AC/50Hz
1024X768 80HZ 40KHZ

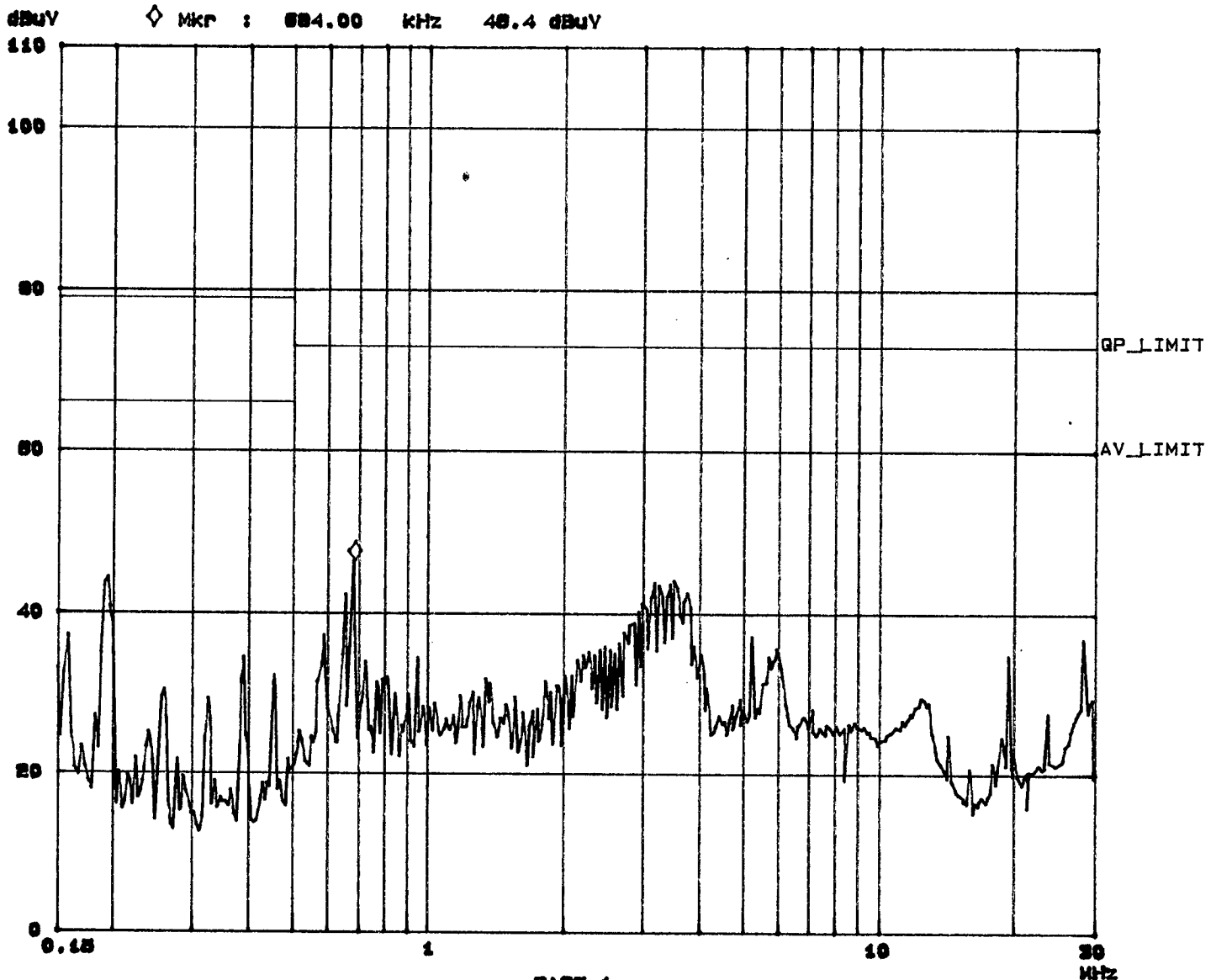
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Tested by *Howard Chou*

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	GrRge
150k	450k	3k	10k	PK	0.05ms	10dB LN	OFF	80dB
450k	5M	3k	10k	PK	0.05ms	10dB LN	OFF	80dB
5M	30M	3k	10k	PK	0.05ms	10dB LN	OFF	80dB





4.1.3 TEST DATA OF RADIATED EMISSION

EUT: CPU BOARD

MODEL: PCM-5862

ANTENNA: CHASE BILOG CBL6111A

POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Howard Chau

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
57.30	8.7	24.5	33.2	40.0	-6.8
66.85	8.0	23.9	31.9	40.0	-8.1
133.67	14.7	18.5	33.2	40.0	-6.8
144.24	14.2	16.9	31.1	40.0	-8.9
200.50	12.7	21.0	33.7	40.0	-6.3
206.46	13.2	22.1	35.3	40.0	-4.7
214.07	14.0	21.7	35.7	40.0	-4.3
216.03	14.2	19.3	33.5	40.0	-6.5
217.61	14.3	20.7	35.0	40.0	-5.0
219.04	14.4	22.0	36.4	40.0	-3.6
367.55	20.0	20.4	40.4	47.0	-6.6
467.80	23.5	16.8	40.3	47.0	-6.7

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-5862

ANTENNA: CHASE BILOG CBL6111A

POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Howard Chou

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
33.42	17.8	16.6	34.4	40.0	-5.6
42.80	14.1	19.3	33.4	40.0	-6.6
52.52	9.8	24.7	34.5	40.0	-5.5
66.86	7.6	25.9	33.5	40.0	-6.5
133.67	16.6	15.3	31.9	40.0	-8.1
144.24	16.4	16.0	32.4	40.0	-7.6
200.49	13.8	18.4	32.2	40.0	-7.8
226.59	15.2	17.0	32.2	40.0	-7.8
233.93	15.6	19.8	35.4	47.0	-11.6
334.15	18.9	16.7	35.6	47.0	-11.4
400.97	22.4	15.5	37.9	47.0	-9.1
576.90	26.3	3.9	30.2	47.0	-16.8

- 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

Basic Standard	:	EN 61000-4-2	(Electrostatic Discharge Test, ESD)
	:	EN 61000-4-3	(Radiated Radio-Frequency Disturbance Test, RS)
	:	EN 61000-4-4	(Electrical Fast Transient/Burst Test, EFT)
	:	EN 61000-4-6	(Conducted Radio Frequency Disturbances Test, CS)
	:	EN 61000-4-8	(Power Frequency Magnetic Field Test)
	:	ENV 50204	(Radio-Frequency Electromagnetic Field, Pulse modulated)
Generic Standard	:	EN 50 082-2	
Input Voltage	:	230 Vac, 50 Hz	
Temperature	:	20 °C	
Humidity	:	58 %	
Atmospheric Pressure	:	1060 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 4.1.1.



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 Personnel :

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

OBSERVATION DESCRIPTION

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

Description of test point:

1. Metal case
2. FDD
3. Power switch
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. Left side
3. Right 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 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 Personnel :

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

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 - N/A
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 Personnel : Tim Henry

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

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 with 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 Personnel : Tim Jelena

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

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 : 50 A/m
Observation Time : 1 minute
Inductance coil : Rectangular type, 1mx1m
Test Personnel : *Tom Gervy*

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

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 Personnel : 

Test Result		Remarks
Criterion A	PASS	Model: PCM-5862

Note: Four sides of PC system are verified separately.

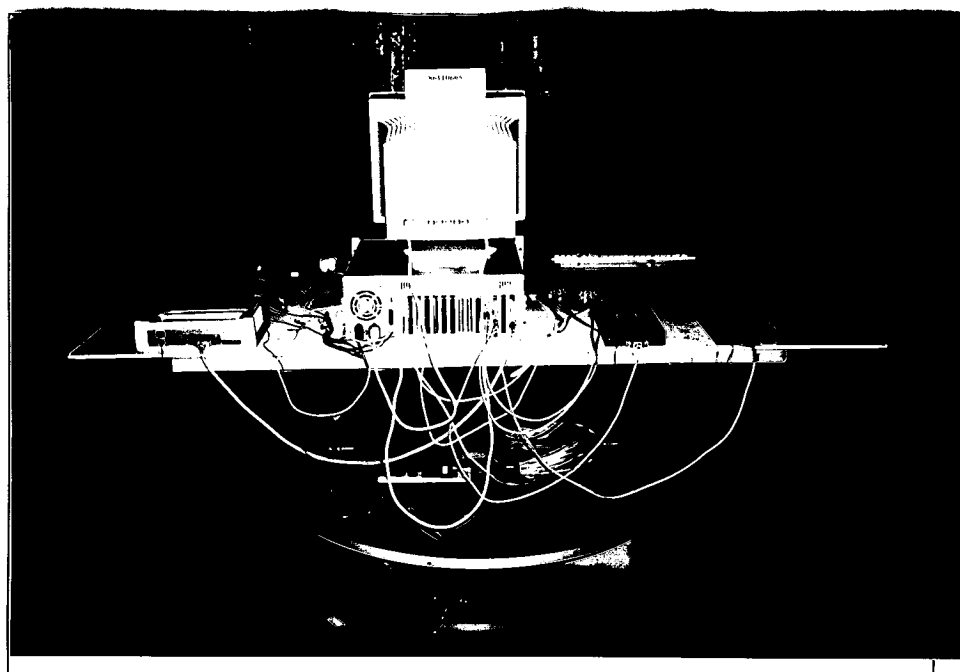
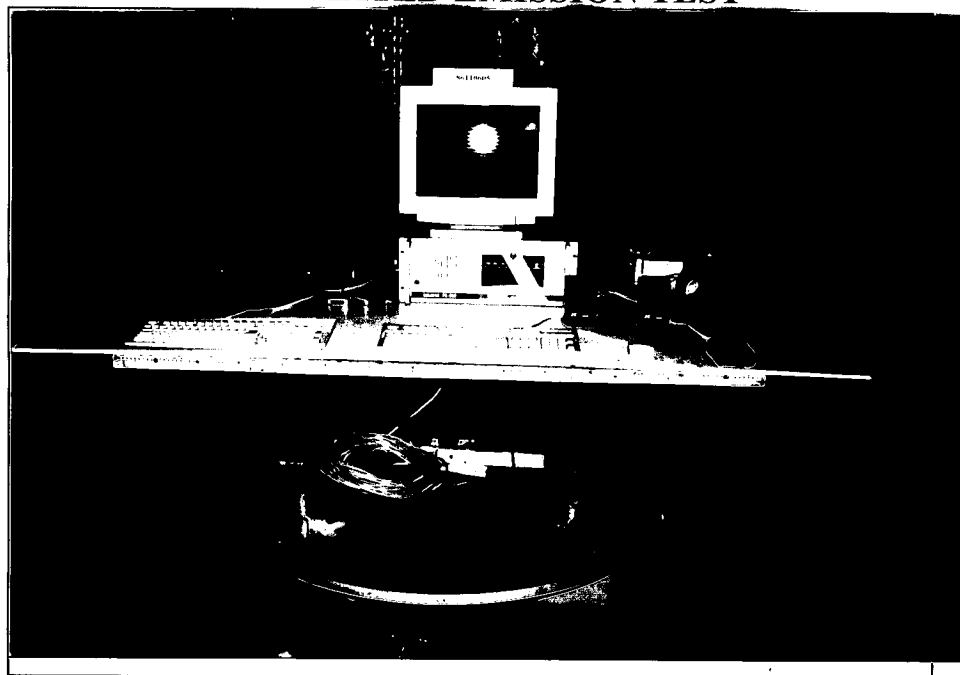
OBSERVATION DESCRIPTION

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



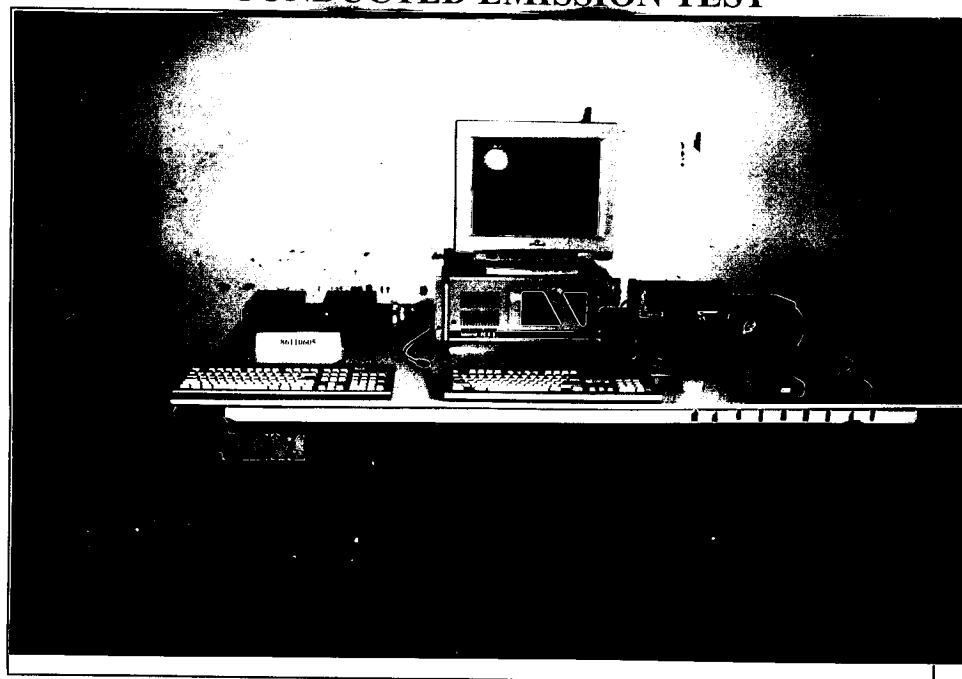
6. PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST



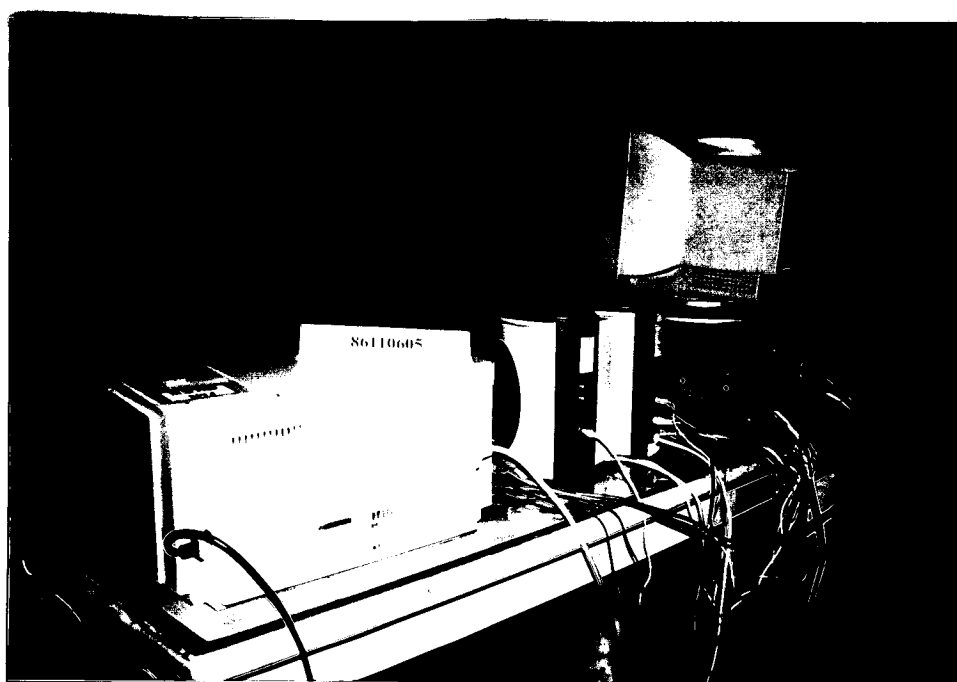


CONDUCTED EMISSION TEST



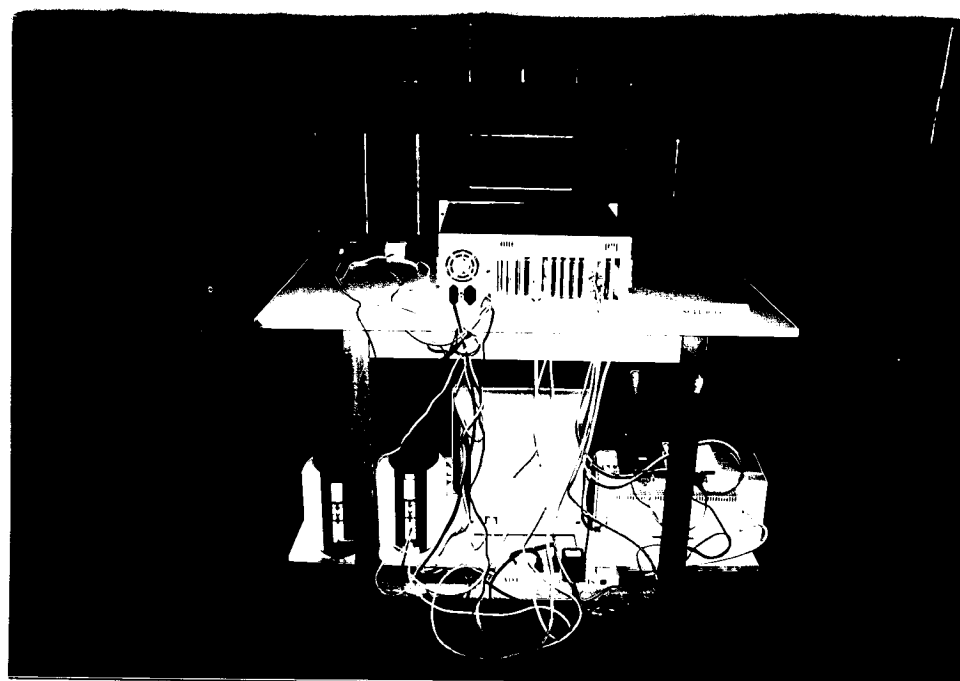


ESD TEST





RS TEST





EFT TEST

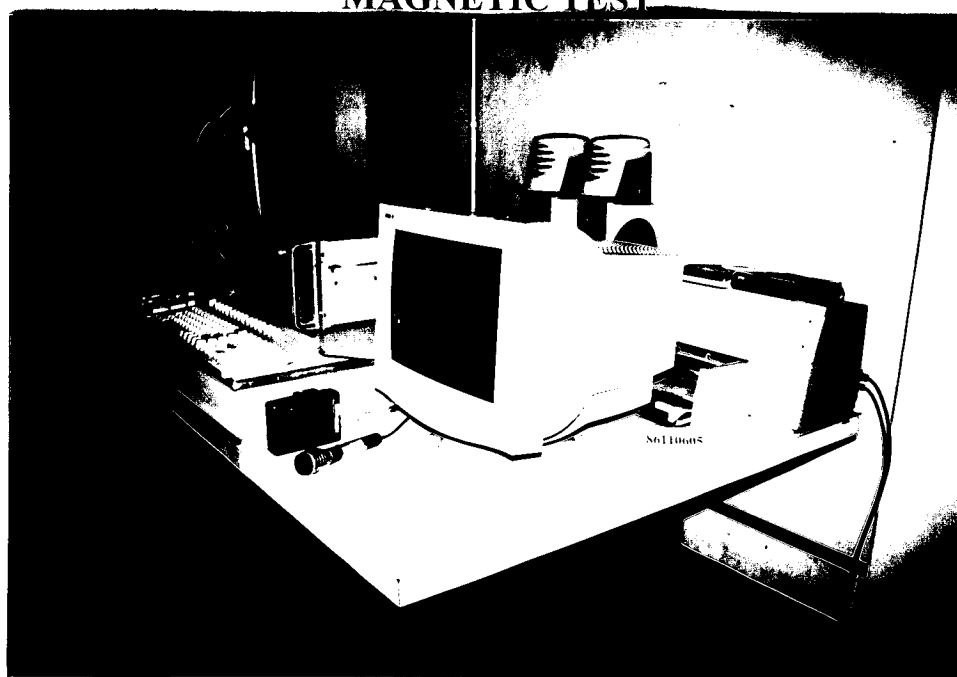




CONDUCTED SUSCEPTIBILITY TEST

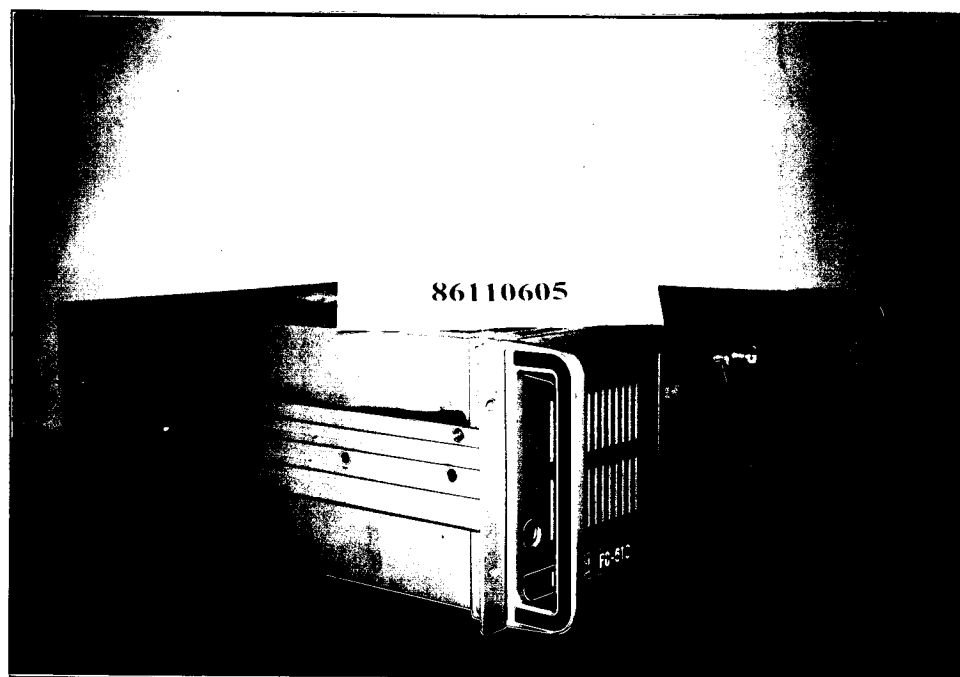


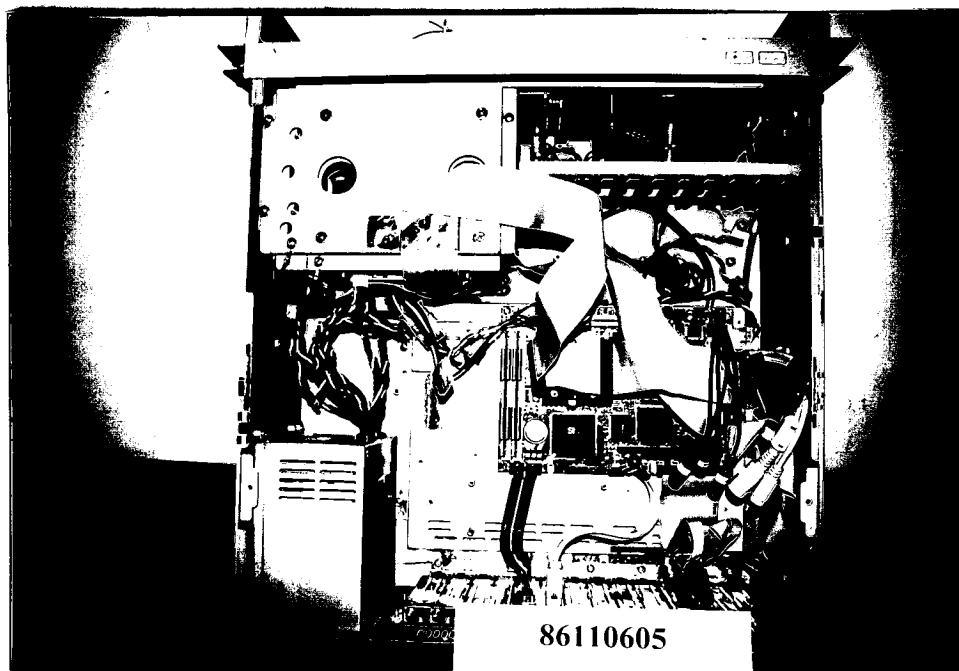
MAGNETIC TEST

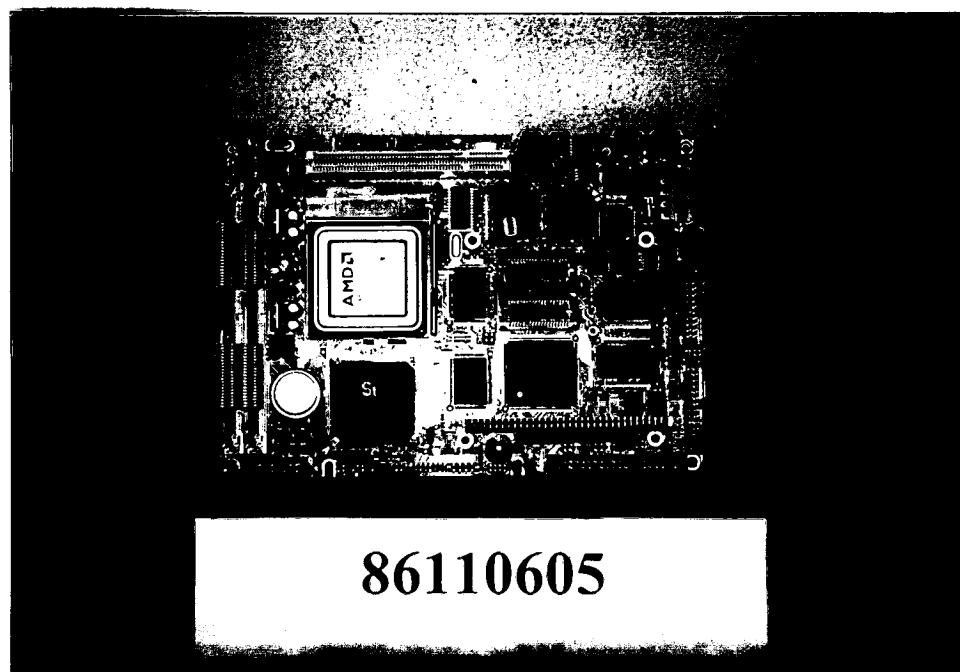




7.CONSTRUCTION PHOTOS OF EUT









8. ATTACHMENT I - TECHNICAL DESCRIPTION OF EUT

Specifications:

* CPU	Intel Pentium® 75-200MHz, P55C AMD K6 Cyrix 6x86
* BIOS	Flash BIOS, supports Plug & Play, APM
* Second level cache	256/512KB PB-SRAM on board
* DRAM	Two 72-pin SIMM sockets, support 8 MB to 64 MB, accept 4/8/16/32MB EDO/FP DRAM
* Green function	Supports 360K/1.2M/720K/1.44MB FDD 2 devices.
* IDE interface	One Enhanced IDE interface, supports 2 IDE devices
* Floppy disk interface	Supports 360K/1.2M/720K/1.44MB FDD 2 devices
* Parallel ports	One parallel port, supports EPP/ECP parallel mode
* Serial ports	4 serial ports COM1, 3, 4: RS-232; COM2: RS232/422/485
* VGA controller	PCI SVGA supporting CRT and LCD display. LCD display up to 1024x768. Support 2MB display memory, with 1MB on board
* Ethernet Interface	PCI Ethernet controller, NE-2000 compatible. Support 10Mbps
* Audio Interface	16-bit audio controller. Sound Blaster Pro compatible.
* Watchdog timer	63 levels timer interval, setup by software, jumperless selection, generates system reset or IRQ15 or IRQ11.
* Keyboard/Mouse	10-pin header connector for keyboard and PS/2 mouse.

