



# EMC

## TEST REPORT

REPORT NO. : CE87041502  
MODEL NO. : PCM-4823, PCM-4825,  
PCM-4823L, PCM-4825L  
DATE OF TEST : Apr. 18 ~ May 12, 1998

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.

This test report consists of 38 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of our laboratory. It should not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. government. The test result in the report only applies to the tested sample.



## TABLE OF CONTENTS

1. CERTIFICATION .....	3
2. GENERAL INFORMATION .....	4
2.1 GENERAL DESCRIPTION OF EUT .....	4
2.2 GENERAL DESCRIPTION OF APPLIED STANDARD .....	4
2.3 DESCRIPTION OF SUPPORT UNITS .....	5
2.4 TEST SETUP .....	6
3. TEST INSTRUMENTS .....	7
3.1 TEST INSTRUMENTS (EMISSION) .....	7
3.2 TEST INSTRUMENTS (IMMUNITY) .....	8
4. TEST RESULTS (EMISSION) .....	9
4.1 RADIO DISTURBANCE .....	9
4.1.1 EUT OPERATION CONDITION .....	9
4.1.2 TEST DATA OF CONDUCTED EMISSION (A) .....	10
4.1.3 TEST DATA OF CONDUCTED EMISSION (B) .....	11
4.1.4 TEST DATA OF RADIATED EMISSION (A) .....	12
4.1.5 TEST DATA OF RADIATED EMISSION (B) .....	14
5. TEST RESULTS (IMMUNITY) .....	16
5.1 GENERAL DESCRIPTION .....	16
5.2 PERFORMANCE CRITERIA DESCRIPTION .....	16
5.3 EUT OPERATION CONDITION .....	16
5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD) .....	17
5.5 TEST RESULT OF RADIATED ELECTROMAGNETIC FIELDS (RS) .....	18
5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT (EFT) .....	19
5.7 TEST RESULT OF CONDUCTED RADIO FREQUENCY DISTURBANCES (CS) .....	20
5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD .....	21
5.9 TEST RESULT OF RADIO-FREQUENCY ELECTROMAGNETIC .....	22
6. PHOTOGRAPHS OF THE TEST CONFIGURATION .....	23
7. CONSTRUCTION PHOTOS OF EUT .....	34



1.

## CERTIFICATION

Issue date: May 22, 1998

Product : CPU BOARD  
Trade Name : ADVANTECH  
Model No. : PCM-4823, PCM-4825, PCM-4823L, PCM-4825L  
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 Apr. 18 ~ May 12, 1998. 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.

CHECKED BY: Sharon Hsiung, DATE: 5/22/98  
( Sharon Hsiung )

APPROVED BY: Mike Su, DATE: 5/22/98  
( Mike Su )

ADVANCE DATA TECHNOLOGY CORPORATION

NVLAP<sup>®</sup>

Accredited Laboratory



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product : CPU BOARD  
Model No. : PCM-4823, PCM-4825, PCM-4823L, PCM-4825L  
Power Supply Type : Switching

Note: The EUT was tested with the following configuration:

- CHASIS: ADVANTECH, model: IPC-610
- CPU: AMD, model: 5x86-133
- HDD: MAXTOR, model: 7345AT
- FDD: TEAC, model: FD-235HF
- POWER SUPPLY: SKYNET, model: ADT 930C

The EUT has four model names which are identical to each other in all aspects except for the following:

- Model: PCM-4823 (Full system with VGA and LAN function, but without Audio function)
- Model: PCM-4825 (Full system with VGA and Audio function, but without LAN function)
- Model: PCM-4823L (Without Audio function and VGA function)
- Model: PCM-4825L (Without Audio function and LAN function)

From the above models, model: PCM-4823 and PCM-4825 was chosen as representative models for the test and tested individually.

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

AMD 5X86-133                      Speed: 133 MHz

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

For more detailed features description, please refer to manufacturer's specification 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	<b>EN 50082-2:1995</b>
	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.

### EMISSION TEST FOR MODEL: PCM-4823

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ADI	937G	6490150T00102 093A	Shielded Signal (1.2m) Nonshielded Power (1.1m)
2	KEYBOARD	FORWARD	FDA-104GA	FDKB8110109	Shielded Signal (1.6m)
3	PRINTER	HP	2225C+	3208S05355	Shielded Signal (1.2m) Nonshielded Power (2.1m)
4	MODEM	TEAM TECH.	1200AT	AT120818	Shielded Signal (1.2m) Nonshielded Power (2.1m)
5	MODEM	DATATRONICS	1200CK	07-503003	Shielded Signal (1.2m) Nonshielded Power (2.1m)
6	MOUSE	LOGITECH	M-M30	LTR53500703	Shielded Signal (1.6m)
7	PC	ACER	PT75WB	TJ53521	Nonshielded Power (1.8m)
8	MONITOR	ACER	7134T	M500233452	Shielded Signal (1.4m) Nonshielded Power (1.5m)
9	HUB	ACCTON	EN2040	N/A	STP Cat. 5 cable to PC (2m) STP Cat. 5 cable to EUT (10m) Nonshielded Power (1.8m)
10	KEYBOARD	HP	C3757A	C3757-60223	Shielded Signal (1.2m)
11	MOUSE	HP	M-S34	LZA72033314	Shielded Signal (1.8m)
12	LAN CARD	ACCTON	142640-403	N/A	N/A
13	VGA CARD	GAINWARD	S3 TRIO32/64	GFB14962	N/A

Note: 1. The EUT system acted as Server PC and communicated with support units 7-13 which acted as HOST PC and systems of communication partner.

### FOR MODEL: PCM-4825

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ADI	937G	6490150T001020 93A	Shielded Signal (1.2m) Nonshielded Power (1.1m)
2	KEYBOARD	FORWARD	FDA-104GA	FDKB8110109	Shielded Signal (1.6m)
3	PRINTER	HP	2225C+	3208S05355	Shielded Signal (1.2m) Nonshielded Power (2.1m)
4	MODEM	TEAM TECH.	1200AT	AT120818	Shielded Signal (1.2m) Nonshielded Power (2.1m)
5	MODEM	DATATRONICS	1200CK	07-503003	Shielded Signal (1.2m) Nonshielded Power (2.1m)
6	MOUSE	LOGITECH	M-M30	LTR53500703	Shielded Signal (1.8m)
7	WALKMAN	PANASONIC	RQ-L309GT	C101013	Nonshielded Signal (1.1m)
8	MICROPHONE	L	UDM-535	M501010	N/A
9	EARPHONE	GAMMA	LH-115	H201004	Nonshielded Signal (1.2m)
10	SPEAKER	J-S	J-009	S501012	Nonshielded Power (1.1m)



## IMMUNITY TEST

### FOR MODEL: PCM-4823

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ACTION	MV-0951	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	KEYBOARD	ACER	6311	K6355122516	Shielded Signal (1.8m)
3	MOUSE	LOGITECH	M-M30	LTR53500777	Shielded Signal (1.8m)
4	PRINTER	HP	C2145A	SG5BN16035	Shielded Signal (2.0m) Nonshielded Power (1.8m)
5	MODEM	GVC	F-1128V1R6	50601531	Shielded Signal (1.2m) Nonshielded Power (2.0m)
6	MODEM	HAYES	5300AP	A1425300K045	Shielded Signal (1.2m) Nonshielded Power (1.7m)
7	PERSONAL COMPUTER	ACER	PT75WB	TJ53521	Nonshielded Power (1.8m)
8	COLOR MONITOR	ACTION	MV-0951	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
9	KEYBOARD	BTC	5140	765020079	Shielded Signal (1.8m)
10	MOUSE	HP	M-S34	LZA72556243	Shielded Signal (1.8m)
11	HUB	ACCTON	EN2040	N/A	Shielded Signal to PC (2m) Shielded Signal to EUT (10m) Nonshielded Power (1.8m)

Note: 1. The EUT system acted as Server PC and communicated with support units 7-11 which acted as HOST PC and systems of communication partner.

### FOR MODEL: PCM-4825

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ACTION	MV-0951	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	KEYBOARD	ACER	6311	K6355122516	Shielded Signal (1.8m)
3	MOUSE	LOGITECH	M-M30	LTR53500777	Shielded Signal (1.8m)
4	PRINTER	HP	C2145A	SG5BN16035	Shielded Signal (2.0m) Nonshielded Power (1.8m)
5	MODEM	GVC	F-1128V1R6	50601531	Shielded Signal (1.2m) Nonshielded Power (2.0m)
6	MODEM	HAYES	5300AP	A1425300K045	Shielded Signal (1.2m) Nonshielded Power (1.7m)
7	SPEAKER	HUNGTECH	ROBOTCOP	N/A	Nonshielded Signal (1.8m)
8	WALKMAN	PANASONIC	RQ-L307GT	C101001	Nonshielded Signal (1.5m)
9	EARPHONE	J-S	H-201	H201002	Nonshielded Signal (1.1m)
10	MICROPHONE	L	UDM-535	M501011	Nonshielded Signal (2.7m)

## 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	3544A01042	May 5, 1998
HP Preamplifier	8447D	2944A08313	Sept. 18, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 1998
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BiLOG Antenna	CBL6111A	1647	Aug. 2, 1998
EMCO Turn Table	1016	1722	N/A
EMCO Tower	1051	1263	N/A
Open Field Test Site	Site 4	ADT-R04	Aug. 1, 1998

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.

##### CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESH3	893495/006	July 23, 1998
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 24, 1998
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	Aug. 1, 1998
EMCO-L.I.S.N.	3825/2	9204-1964	July 22, 1998
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.



### 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 : 25 °C  
Humidity : 50 %  
Atmospheric Pressure : 1060 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -19.7 dB at 3.203 MHz
	Minimum passing margin of radiated emission: -2.3 dB at 200.24 MHz

#### 4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. Industrial PC (EUT) and communication PC run a test program to enable all functions.
3. Industrial PC (EUT) transmitted messages to and received messages from the communication PC via the STP Cat. 5 cable connected between EUT and communication PC.
4. Industrial PC (EUT) sent "H" messages to monitor and monitor displayed "H" patterns on screen.
5. Industrial PC (EUT) sent "H" messages to printer, then printer printed them on paper.
6. Repeat steps 3-6.



#### 4.1.2 TEST DATA OF CONDUCTED EMISSION (A)

EUT: CPU BOARD

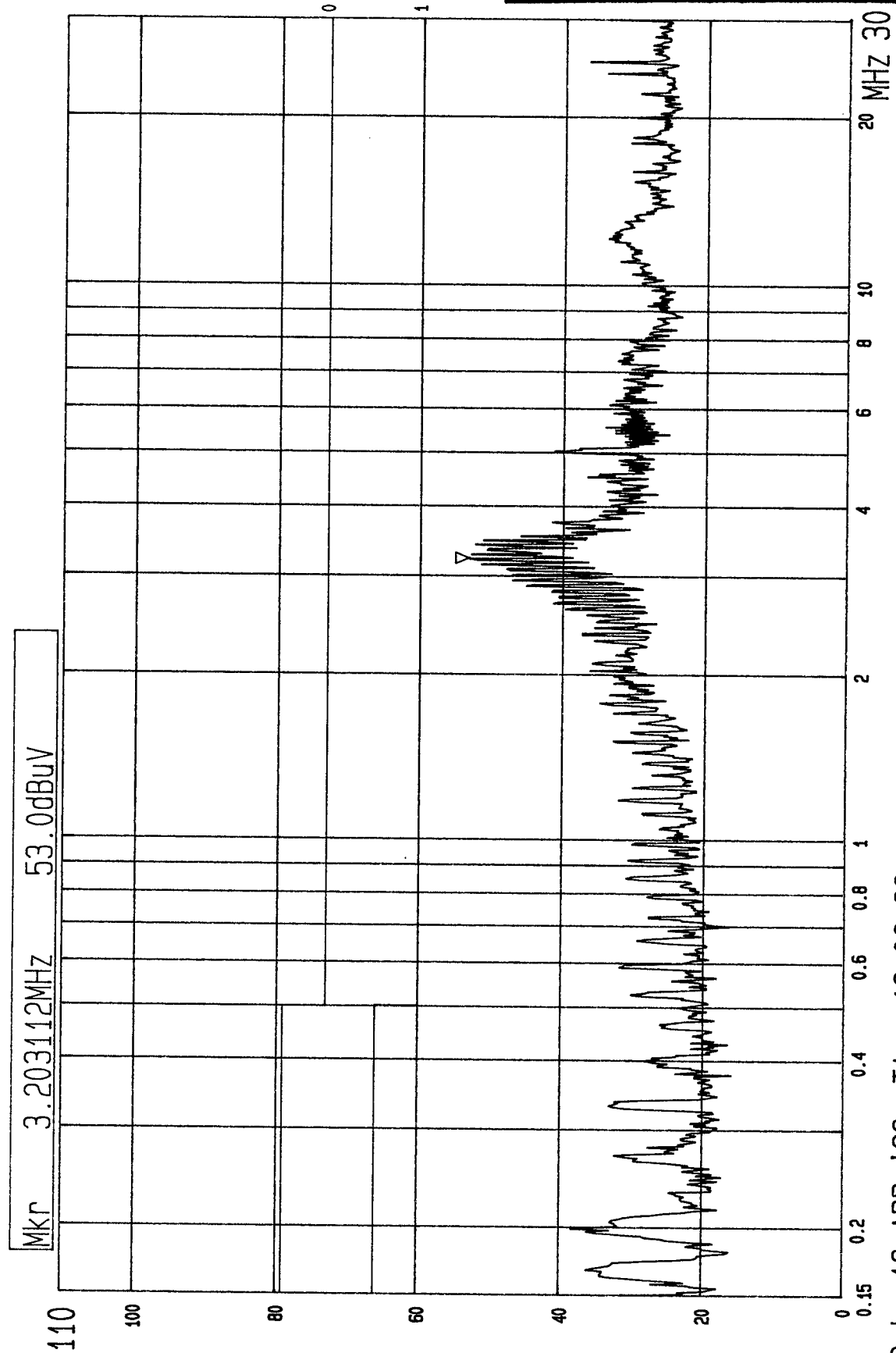
MODEL: PCM-4823

6 dB Band Width: 10 kHz

TEST PERSONNEL: Howard Chou

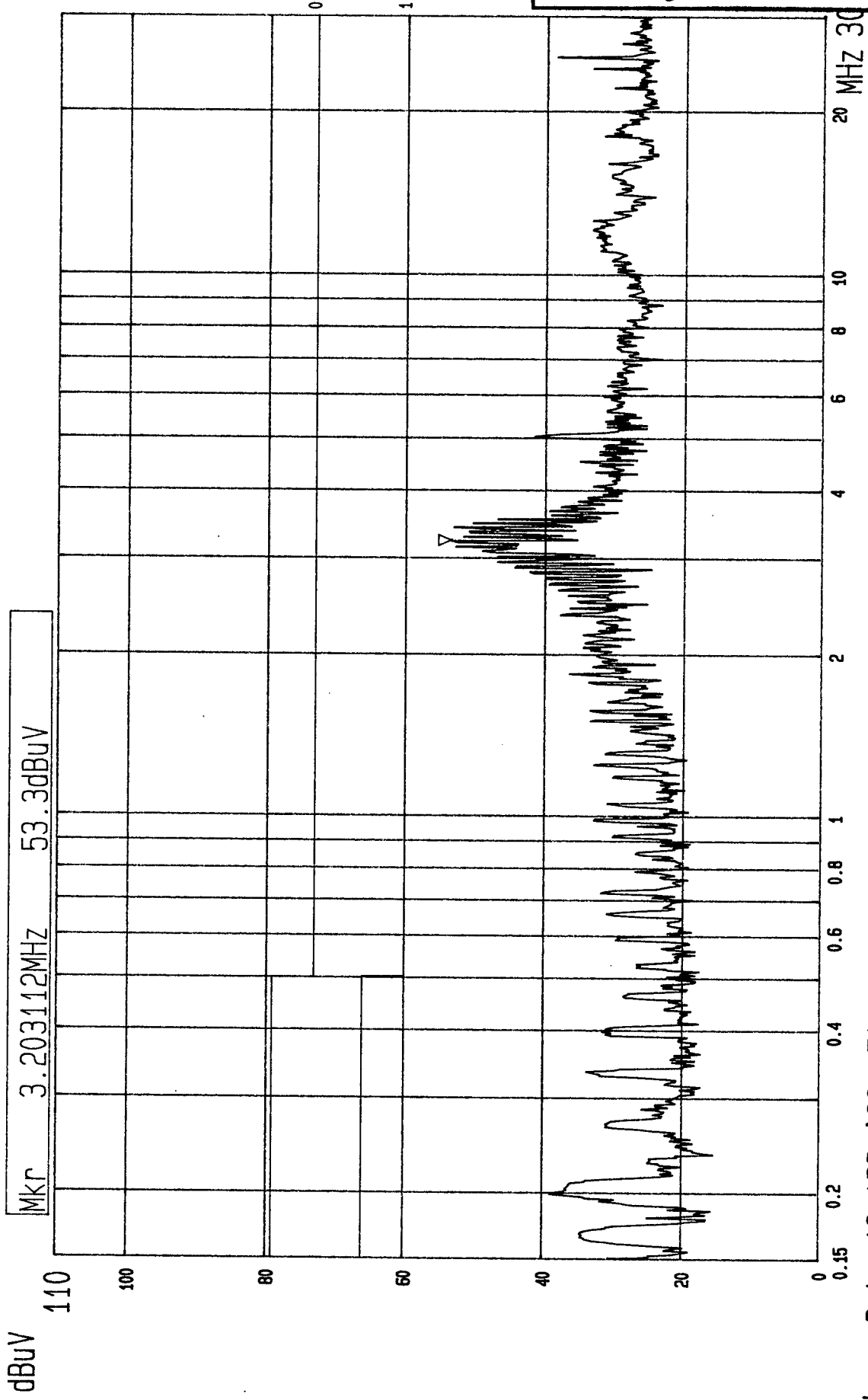
Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.166	36.00	-	34.10	-	79.00	66.00	-43.0	-	-44.9	-
0.197	38.20	-	38.10	-	79.00	66.00	-40.8	-	-40.9	-
0.587	31.60	-	31.00	-	73.00	60.00	-41.4	-	-42.0	-
3.203	53.00	-	53.30	-	73.00	60.00	-20.0	-	-19.7	-
5.101	41.20	-	41.50	-	73.00	60.00	-31.8	-	-31.5	-
12.260	33.20	-	33.00	-	73.00	60.00	-39.8	-	-40.0	-

- 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 level of other frequencies were very low against the limit.
  5. Margin value = Emission level - Limit value



---- Date 18.APR.'98 Time 12:02:32  
EN 55022 CLASS A CONDUCTION TEST  
MODEL: PCM-4823

(PEAK VALUE)  
ADT CORP.  
LISN: L



--- Date 18.APR.'98 Time 12:04:50  
EN 55022 CLASS A CONDUCTION TEST (PEAK VALUE)  
MODEL: PCM-4823  
ADT CORP.  
LISN: N



#### 4.1.3 TEST DATA OF CONDUCTED EMISSION (B)

EUT: CPU BOARD

MODEL: PCM-4825

6 dB Band Width: 10 kHz

TEST PERSONNEL: James D. Chen

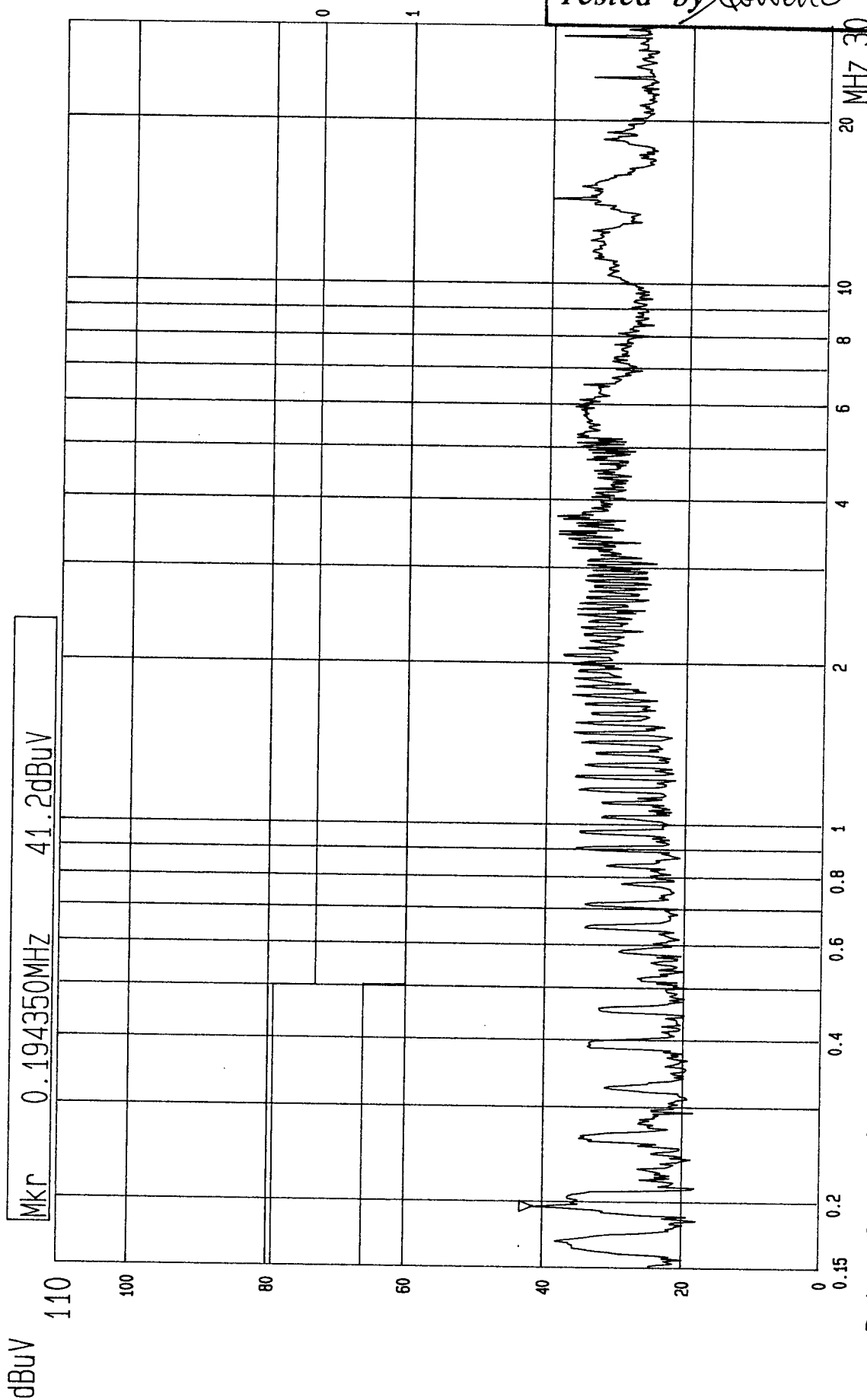
Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.167	37.90	-	36.50	-	79.00	66.00	-41.1	-	-42.5	-
0.195	41.20	-	38.20	-	79.00	66.00	-37.8	-	-40.8	-
0.649	34.10	-	35.70	-	73.00	60.00	-38.9	-	-37.3	-
1.736	36.30	-	39.60	-	73.00	60.00	-36.7	-	-33.4	-
14.288	40.00	-	39.00	-	73.00	60.00	-33.0	-	-34.0	-
21.072	34.10	-	46.20	-	73.00	60.00	-38.9	-	-26.8	-

- 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

Report No. CE87041502

Page 11-1

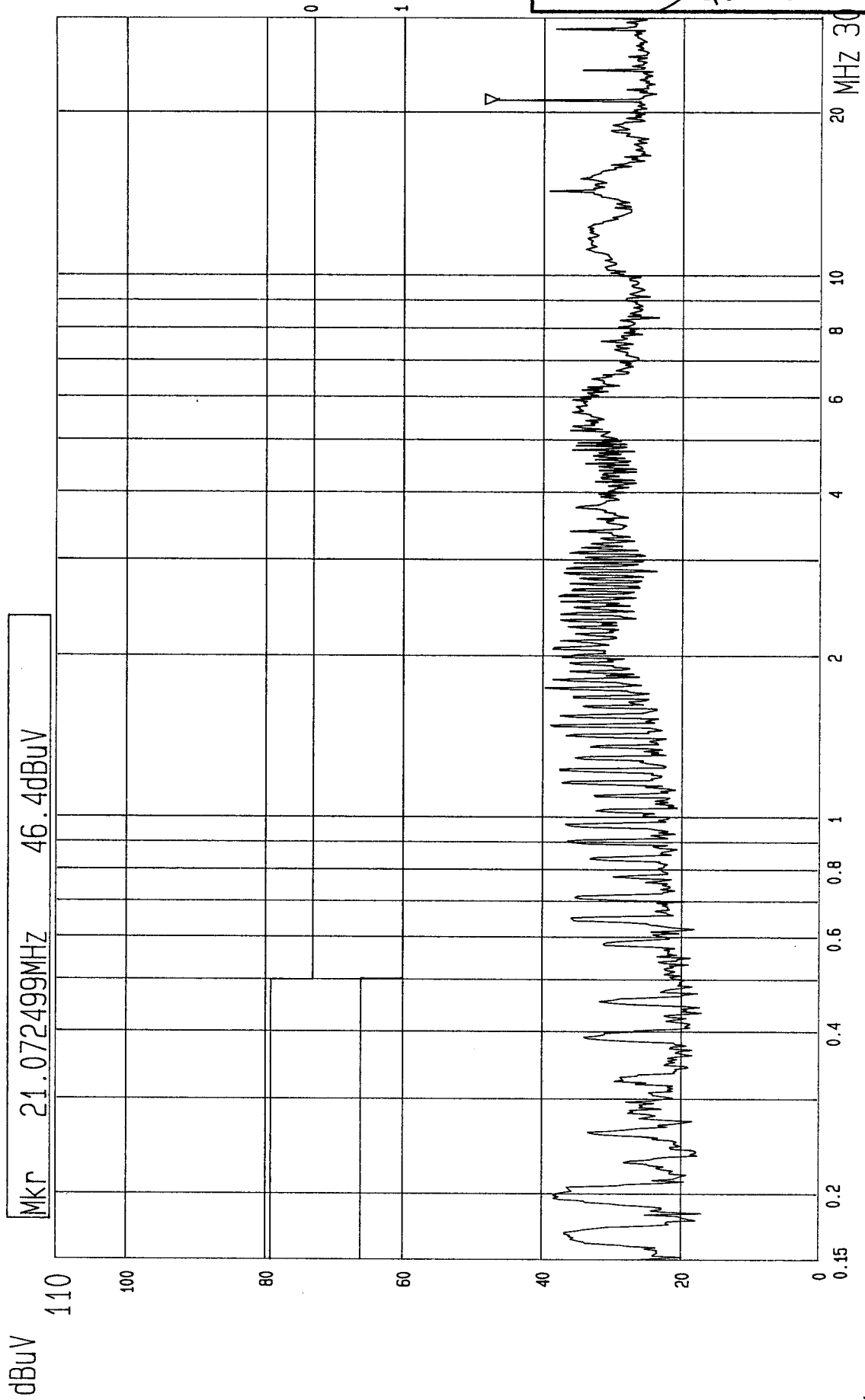
Tested by *Howard May*



---- Date 18.APR.'98 Time 11:18:41  
EN 55022 CLASS A CONDUCTION TEST  
MODEL: PCM-4825

(PEAK VALUE)

ADT CORP.  
LISN: L



--- Date 18.APR.'98 Time 11:15:47  
EN 55022 CLASS A CONDUCTION TEST (PEAK VALUE)  
MODEL: PCM-4825  
ADT CORP.  
LISN: N



#### 4.1.4 TEST DATA OF RADIATED EMISSION (A)

EUT: CPU BOARD

MODEL: PCM-4823

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 Choy

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.19	16.4	9.1	25.5	40.0	-14.5
82.00	9.0	21.3	30.3	40.0	-9.7
120.12	14.6	20.8	35.4	40.0	-4.6
200.24	11.6	26.1	37.7	40.0	-2.3
229.09	13.1	13.7	26.8	40.0	-13.2
264.30	14.9	18.8	33.7	47.0	-13.3
936.75	26.5	3.9	30.4	47.0	-16.6

- 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 (A)

EUT: CPU BOARD

MODEL: PCM-4823

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)
35.55	18.6	15.8	34.4	40.0	-5.6
38.25	16.7	18.9	35.6	40.0	-4.4
77.00	7.9	22.7	30.6	40.0	-9.4
82.00	8.0	26.8	34.8	40.0	-5.2
139.94	12.8	22.3	35.1	40.0	-4.9
229.11	13.8	14.5	28.3	40.0	-11.7
266.90	15.8	19.1	34.9	47.0	-12.1
452.81	20.3	12.7	33.0	47.0	-14.0
935.67	27.6	15.0	42.6	47.0	-4.4

- 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



#### 4.1.5 TEST DATA OF RADIATED EMISSION (B)

EUT: CPU BOARD

MODEL: PCM-4825

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: Edward Chay

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
42.90	14.4	14.3	28.7	40.0	-11.3
75.53	8.2	20.1	28.3	40.0	-11.7
80.20	8.8	25.6	34.4	40.0	-5.6
113.28	13.6	23.7	37.3	40.0	-2.7
151.05	12.6	11.9	24.5	40.0	-15.5
200.50	11.6	20.0	31.6	40.0	-8.4
208.95	12.0	9.6	21.6	40.0	-18.4
302.10	15.9	15.3	31.2	47.0	-15.8

- 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



## TEST DATA OF RADIATED EMISSION (B)

EUT: CPU BOARD

MODEL: PCM-4825

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: Sawar Chay

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.00	18.2	18.6	36.8	40.0	-3.2
42.82	13.7	23.5	37.2	40.0	-2.8
60.15	6.7	26.8	33.5	40.0	-6.5
80.25	7.8	23.9	31.7	40.0	-8.3
113.31	10.4	26.4	36.8	40.0	-3.2
200.46	11.2	22.4	33.6	40.0	-6.4
208.96	12.0	17.0	29.0	40.0	-11.0
302.05	15.1	17.3	32.4	47.0	-14.6

- 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



## **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	:	22 °C	
Humidity	:	54 %	
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 :

*Dennis Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

## OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1 ~ 7	N/A	Note 1
4	+/-	2, 4	Note 1	N/A

### Description of test point:

1. All screws
2. Metal case
3. All openings
4. All I/O ports
5. All LEDs
6. FDD
7. All switches

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 :

*Dennis Chung*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

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 : *Dennis Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

### OBSERVATION DESCRIPTION (MODEL: PCM-4823)

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

### OBSERVATION DESCRIPTION (MODEL: PCM-4825)

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 : *Dennis Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

## 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 : *Dennis Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

## 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 : *Dennis Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-4823
Criterion A	PASS	Model: PCM-4825

Note: Four sides of PC system are verified separately.

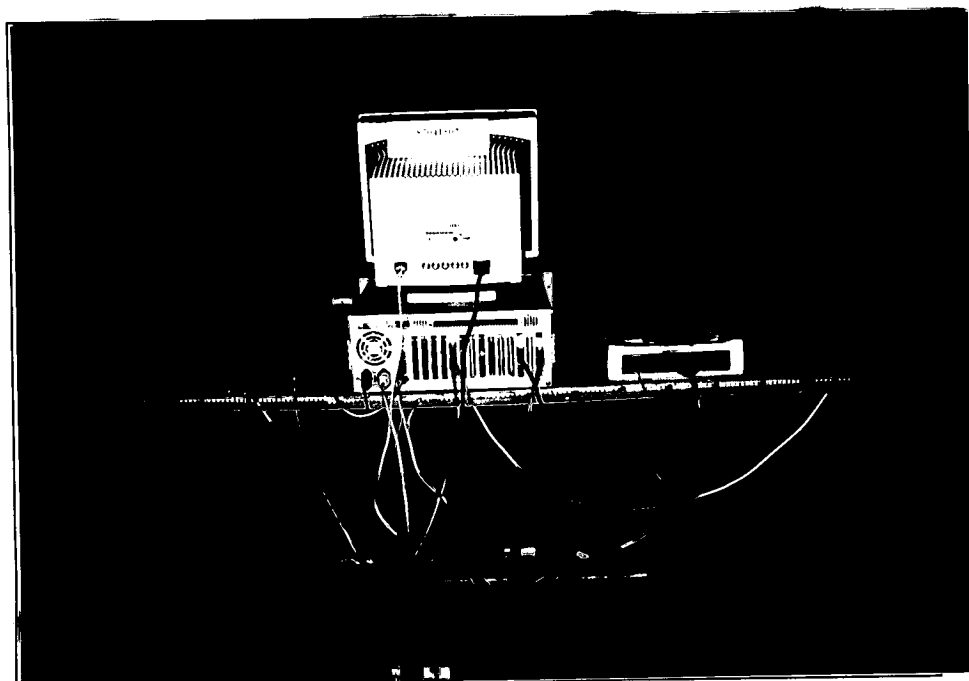
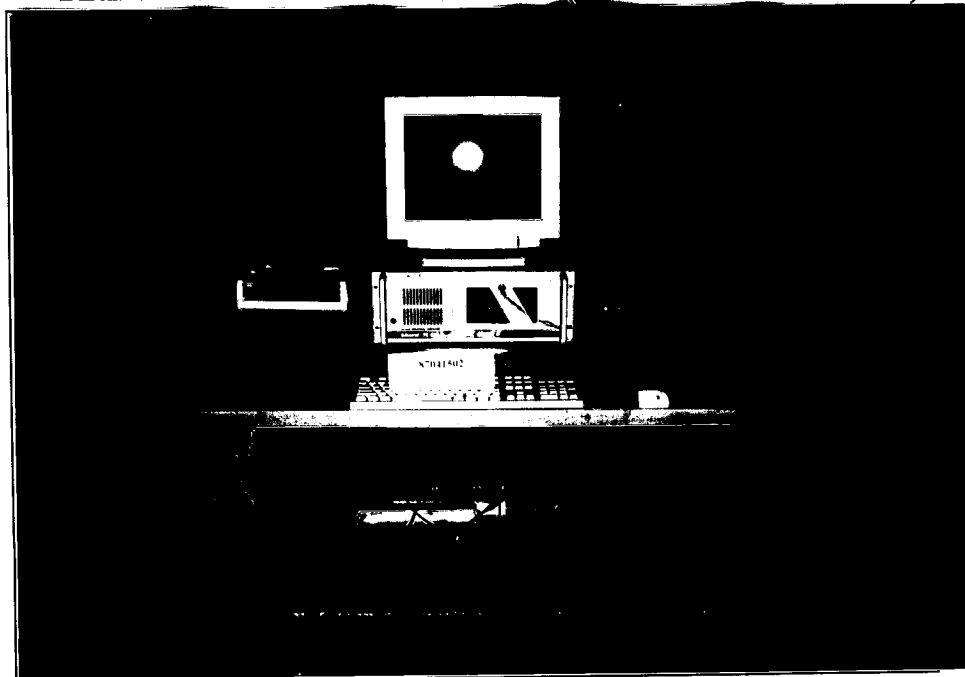
## OBSERVATION DESCRIPTION

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



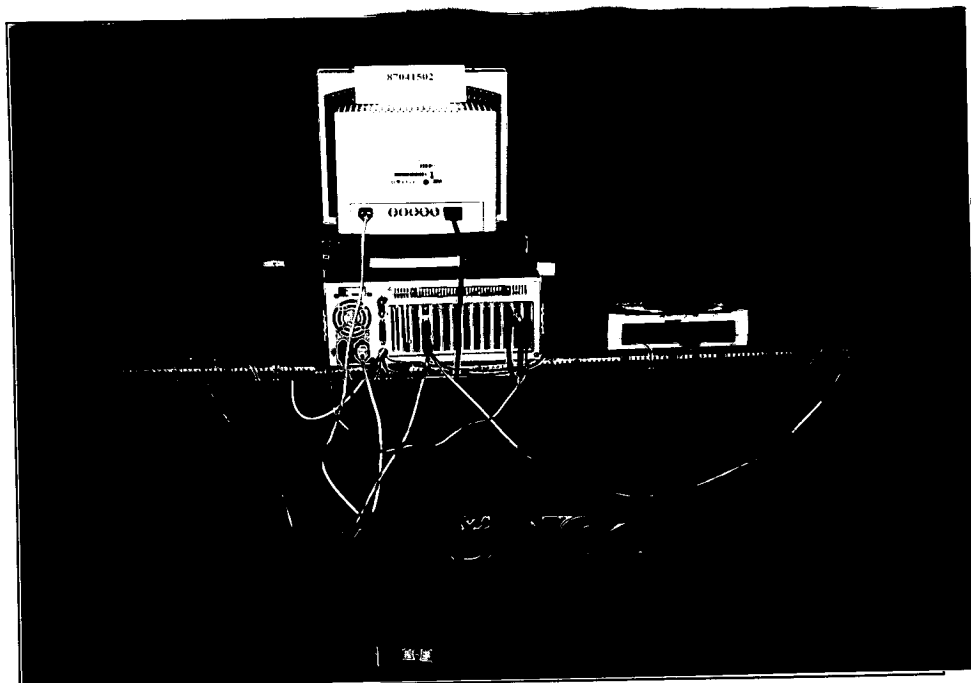
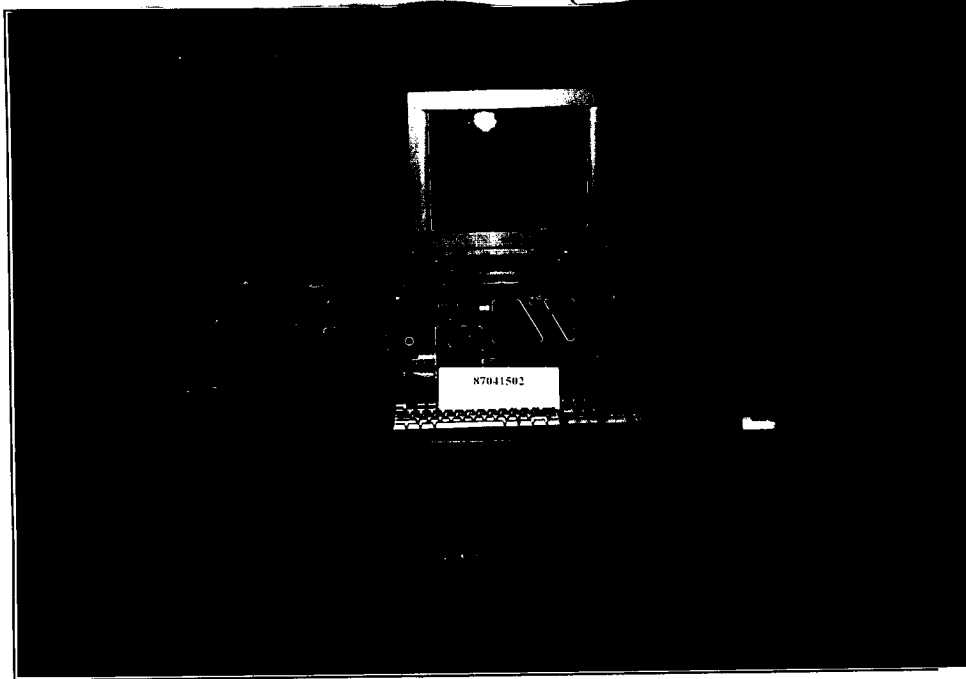
## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

### RADIATED EMISSION TEST (MODEL: PCM-4823)





# RADIATED EMISSION TEST (MODEL: PCM-4825)

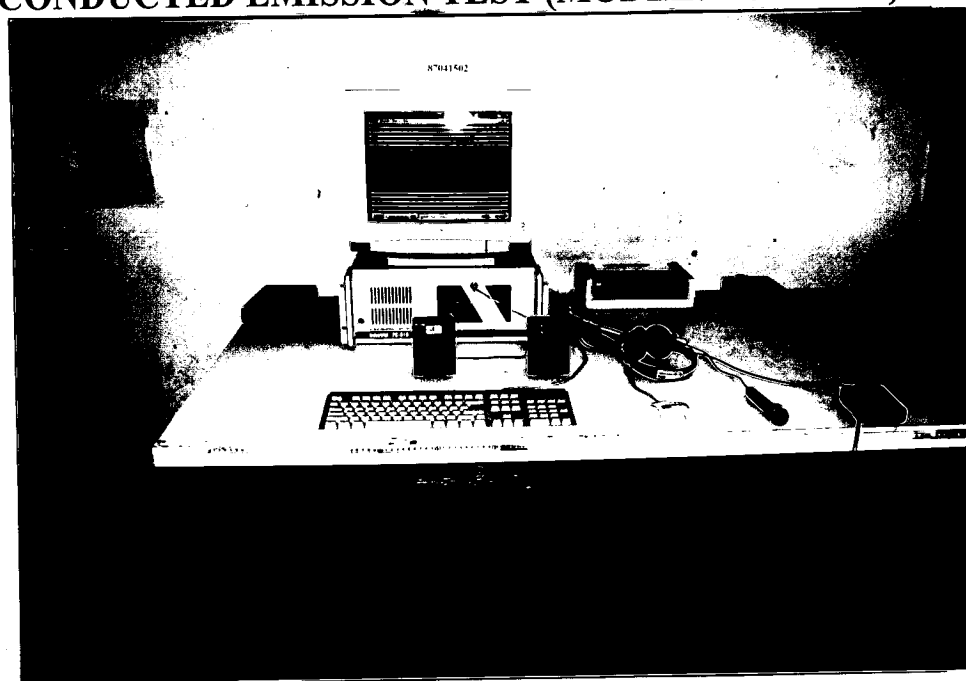




### CONDUCTED EMISSION TEST (MODEL: PCM-4823)

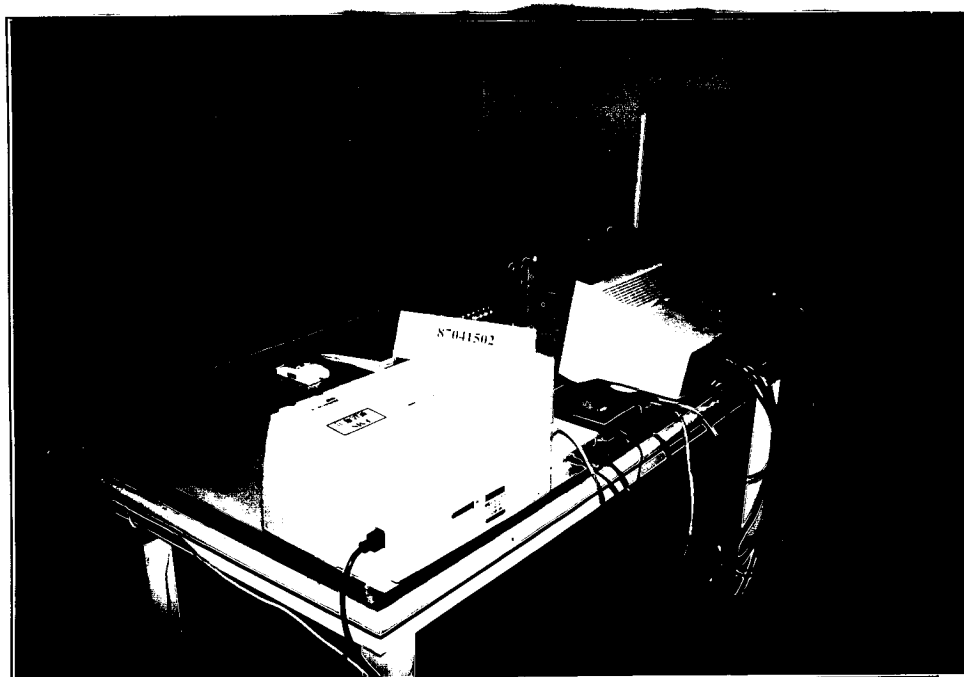


### CONDUCTED EMISSION TEST (MODEL: PCM-4825)



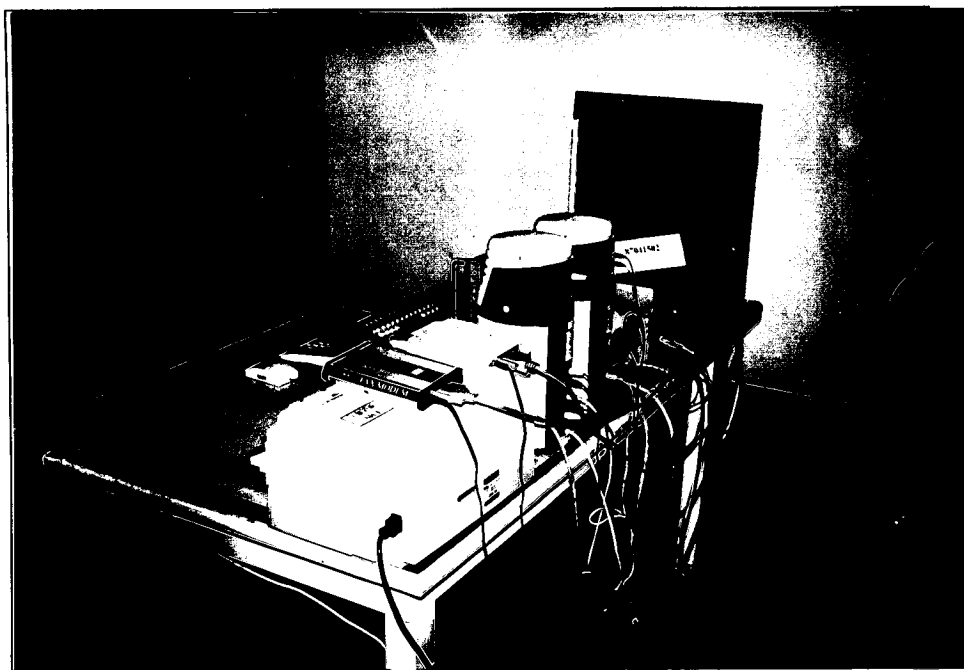


# ESD TEST (MODEL: PCM-4823)



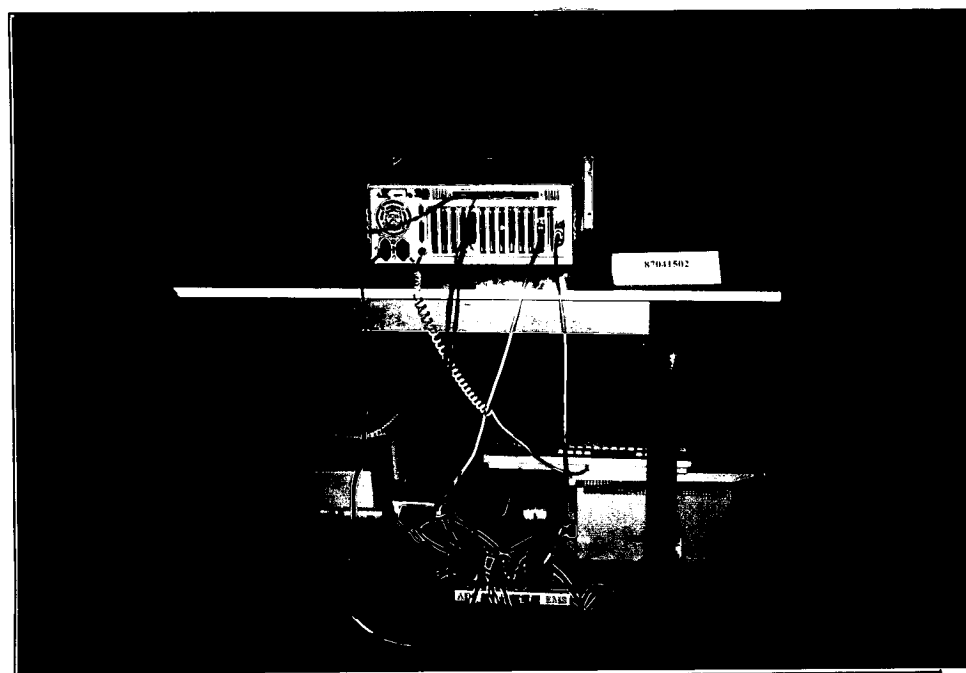
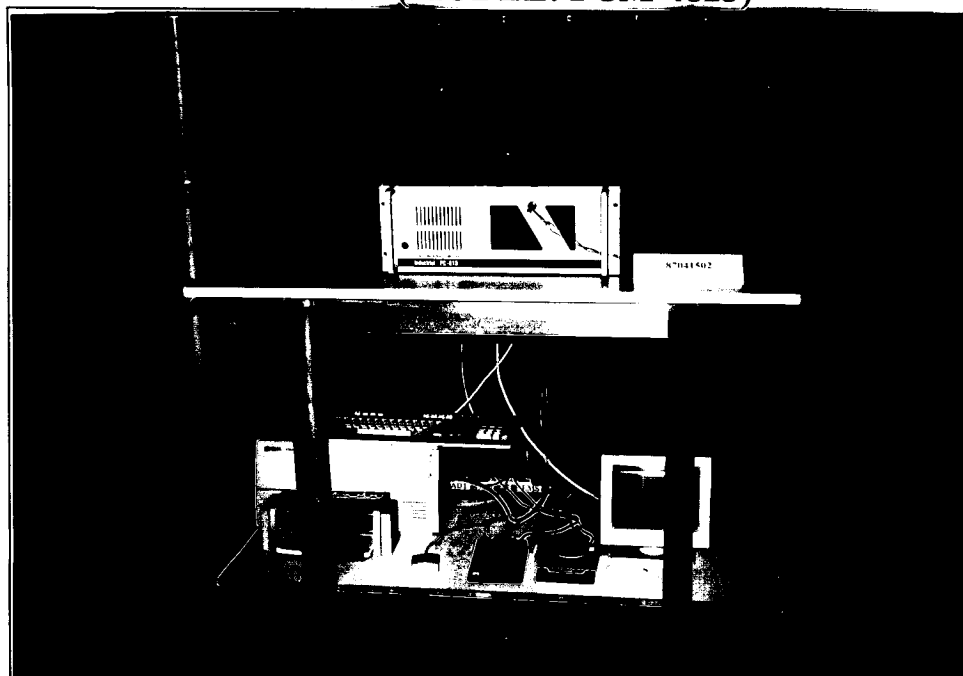


# **ESD TEST (MODEL: PCM-4825)**





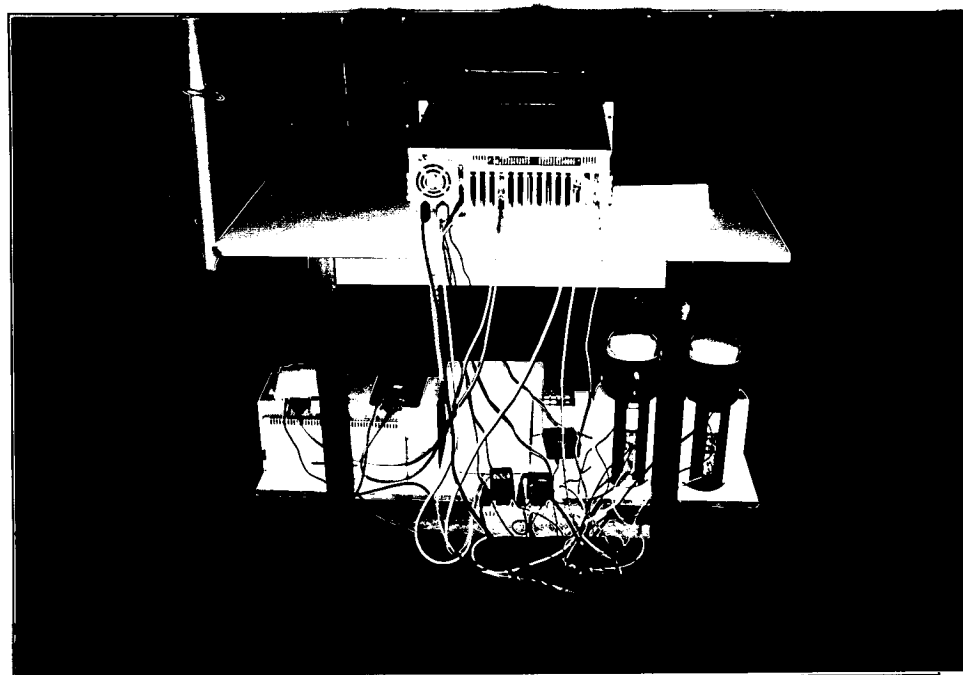
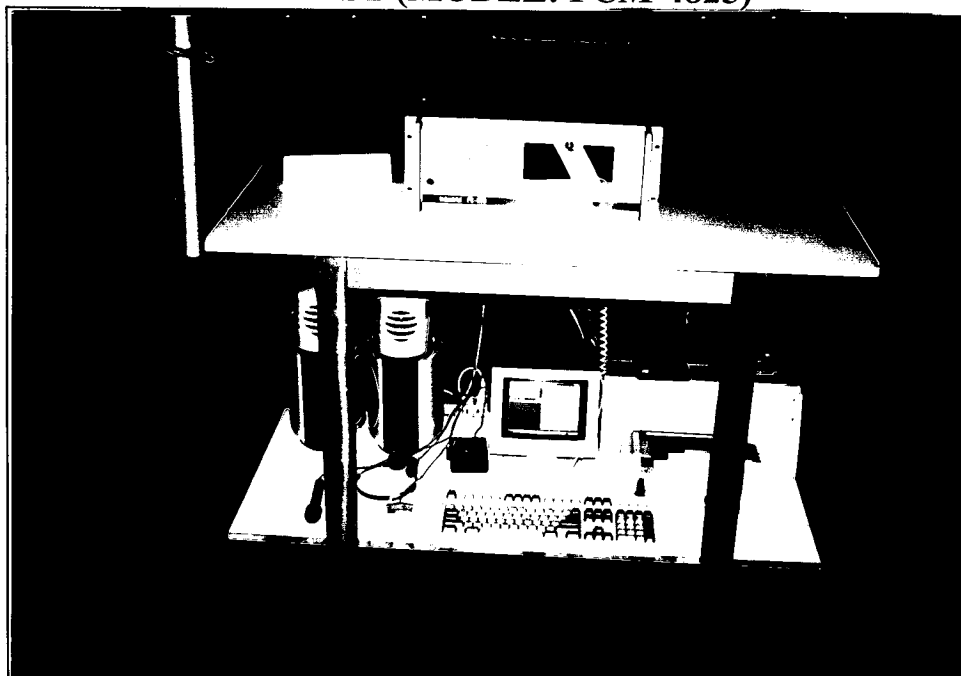
# RS TEST (MODEL: PCM-4823)





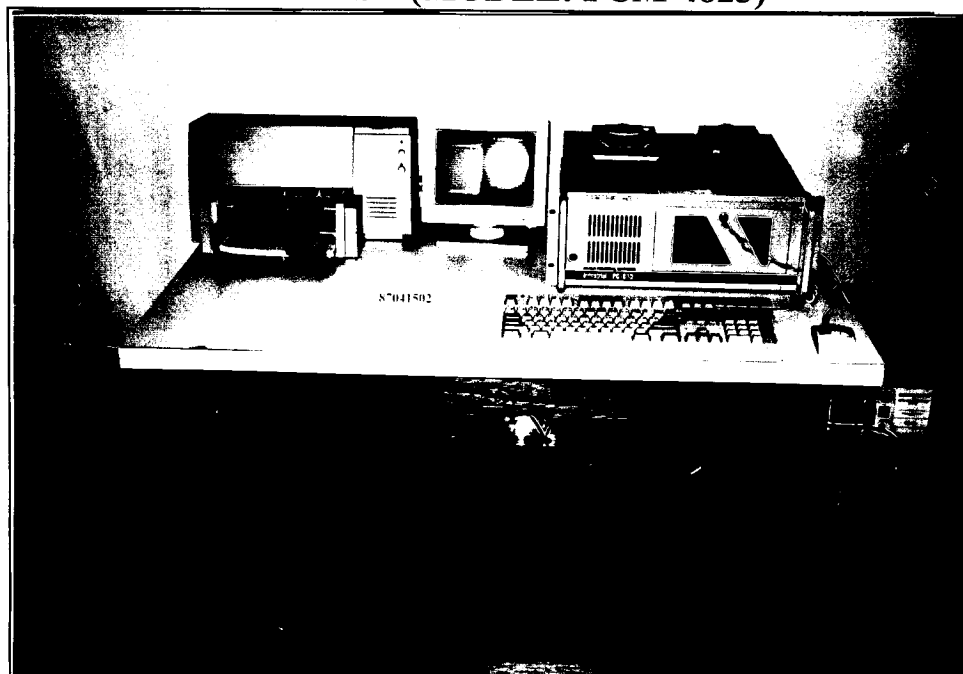


# RS TEST (MODEL: PCM-4825)

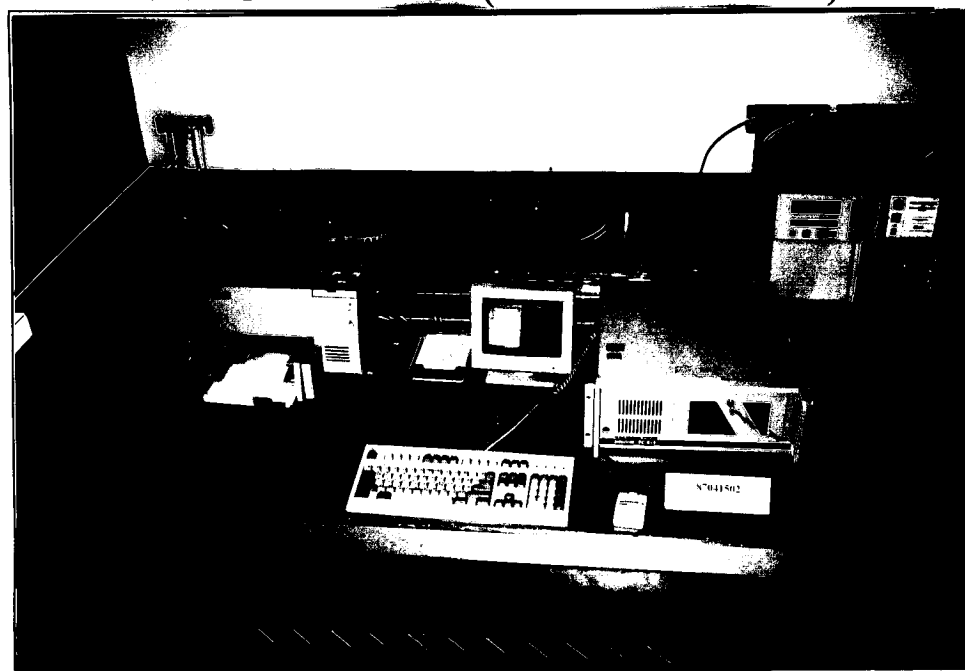




### EFT TEST (MODEL: PCM-4823)

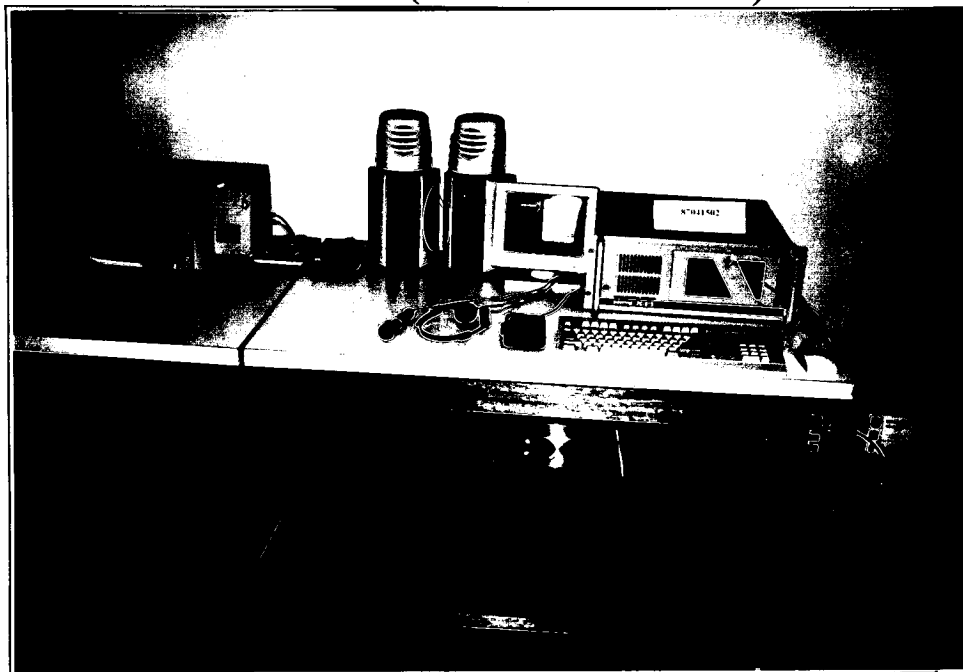


### EFT CLAMP TEST (MODEL: PCM-4823)





# EFT TEST (MODEL: PCM-4825)

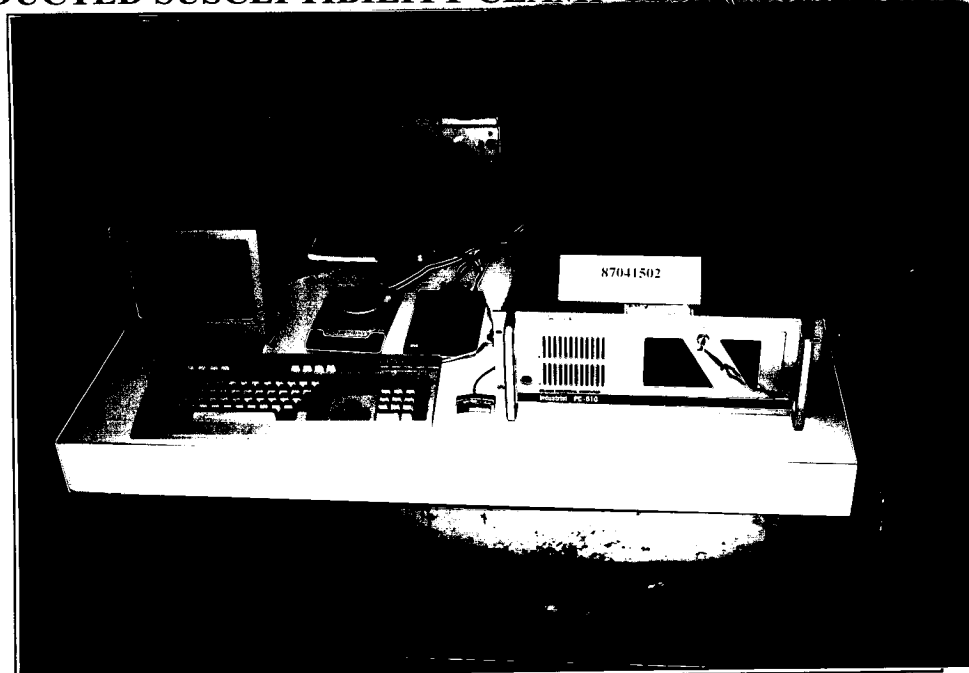




# **CONDUCTED SUSCEPTIBILITY TEST (MODEL: PCM-4823)**

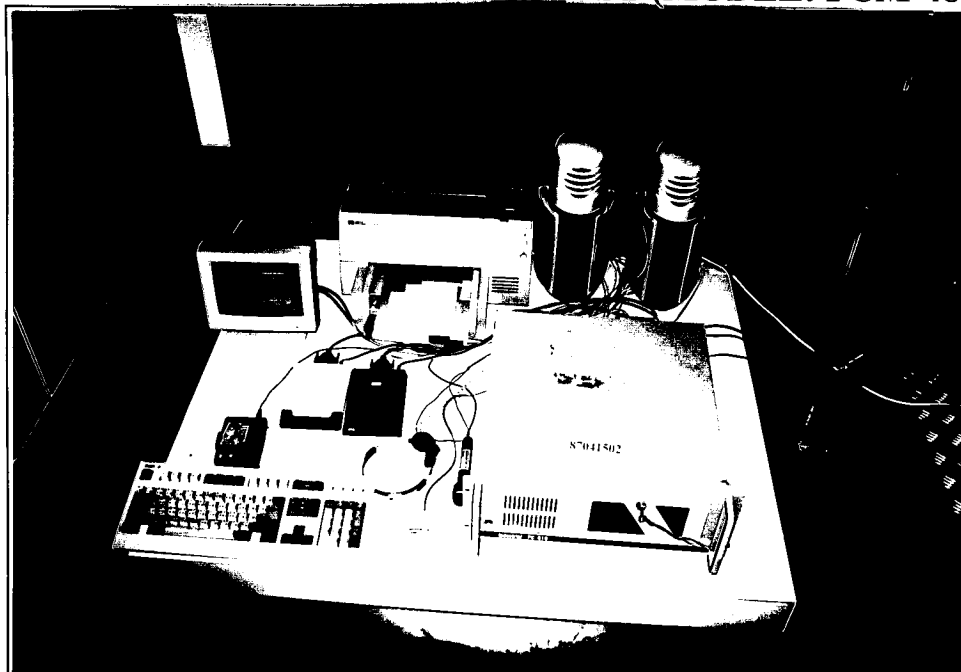


# **CONDUCTED SUSCEPTIBILITY CLAMP TEST (MODEL: PCM-4823)**





# **CONDUCTED SUSCEPTIBILITY TEST (MODEL: PCM-4825)**

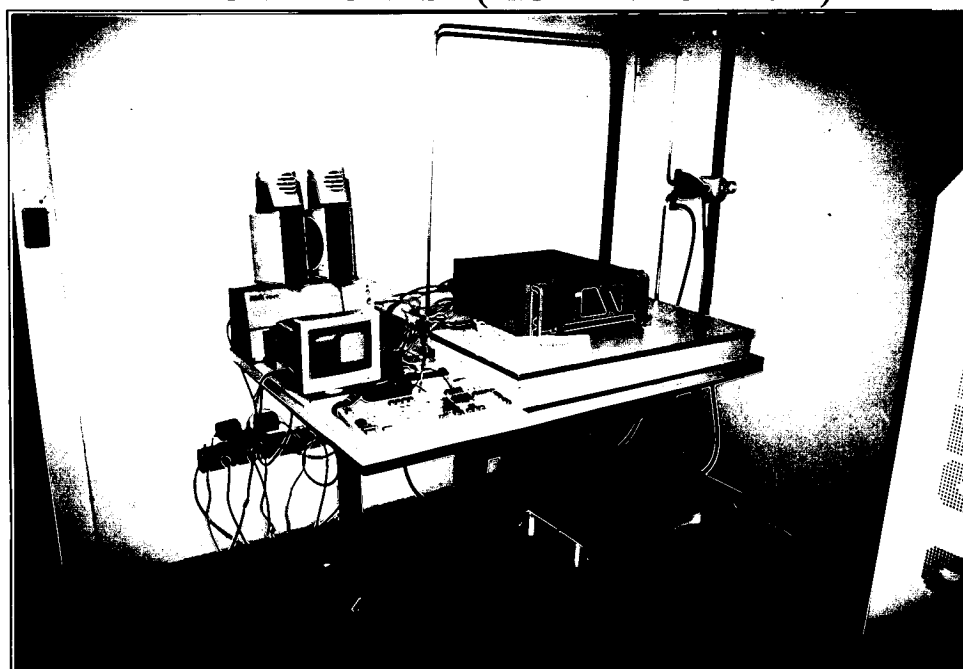




**MAGNETIC TEST (MODEL: PCM-4823)**



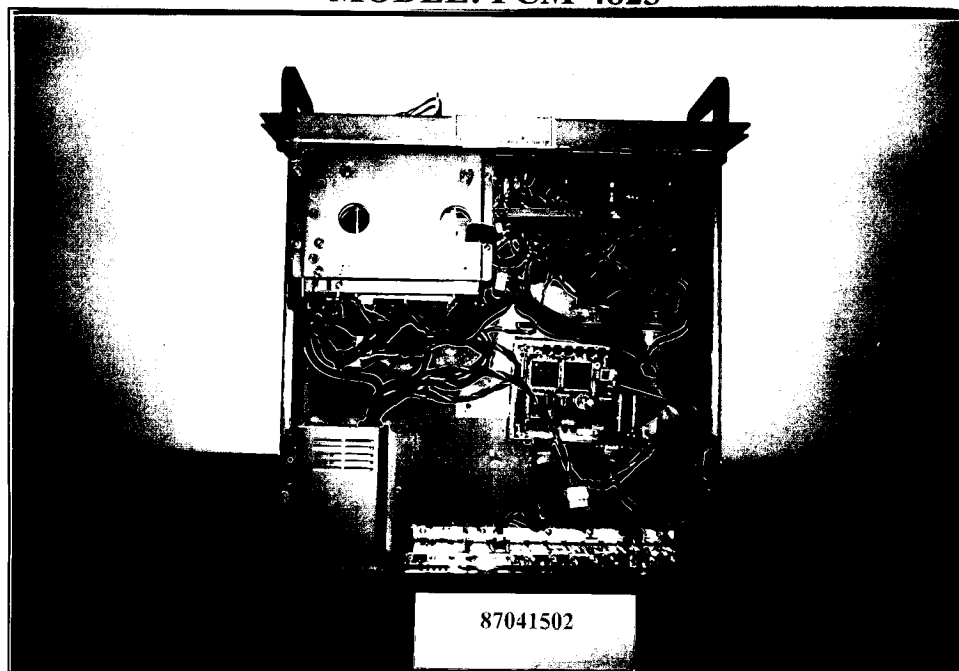
**MAGNETIC TEST (MODEL: PCM-4825)**

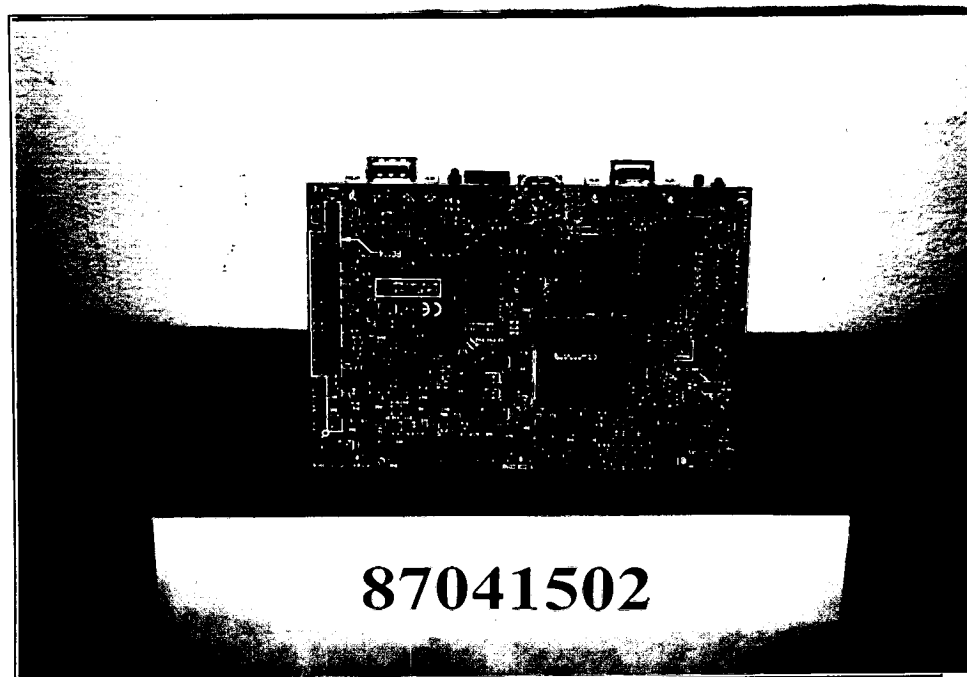
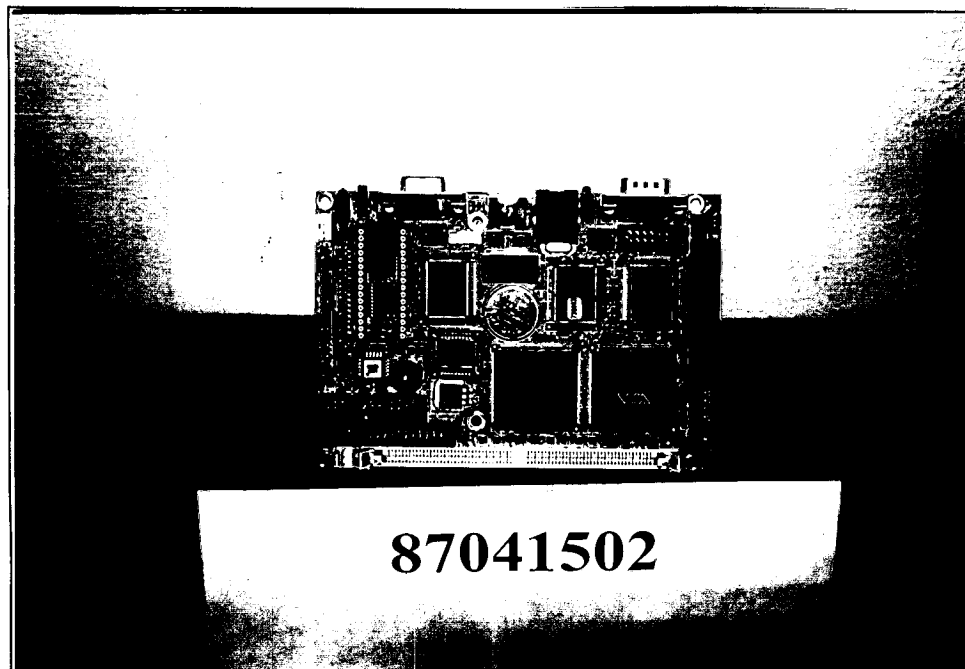




## 7. CONSTRUCTION PHOTOS OF EUT

**MODEL: PCM-4823**









MODEL: PCM-4825

