



ADVANCE DATA TECHNOLOGY CORP.  
EMC & SAFETY TESTING LABORATORY

# Certificate of Compliance

We hereby certify that:

The product : CPU BOARD

Trade Name : ADVANTECH

Model No. : PCM-3345

Applicant : ADVANTECH CO., LTD.


one sample of the designation has been tested in our facility on Oct. 26 ~ Nov. 4, 1998. The test record, data evaluation and Equipment Under Test (EUT) configuration represented in our report no. **CE87102304**, are in compliance with the following standards:

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

EN 61000-4-2: 1995

EN 61000-4-3: 1997

EN 61000-4-4: 1995

  
Mike Su / Project Manager



Issue Date: Nov. 10, 1998



# EMC

## TEST REPORT

REPORT NO. : CE87102304  
MODEL NO. : PCM-3345  
DATE OF TEST : Oct. 26 ~ Nov. 4, 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  
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TAIPEI, TAIWAN, R.O.C.



Accredited Laboratory

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1.

## CERTIFICATION

Issue date: Nov. 6, 1998

Product : CPU BOARD  
Trade Name : ADVANTECH  
Model No. : PCM-3345  
Applicant : ADVANTECH CO., LTD.  
Standard : EN 55022:1994+A1: 1995+A2: 1997, EN 61000-4-2: 1995  
Class A EN 61000-4-3: 1997  
EN 61000-4-4: 1995

We hereby certify that one sample of the designation has been tested in our facility from Oct. 26 to Nov. 4, 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 : Ariel Hsieh, DATE: 11/6/98  
( Ariel Hsieh )

APPROVED BY : Mike Su, DATE: 11/6/98  
( Mike Su )

ADVANCE DATA TECHNOLOGY CORPORATION

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## **2. GENERAL INFORMATION**

### **2.1 GENERAL DESCRIPTION OF EUT**

Product	:	CPU BOARD
Model No.	:	PCM-3345
Power Supply	:	DC 5V (from PC)
Data Cable	:	N/A

Note: The EUT was tested with the following configuration:

- CHASSIS: ADVANTECH, model: IPC-610
- CPU: ST THOMSON DX-66
- HDD: MAXTOR, model: 7850AT
- FDD: TEAC, model: FD-235HF
- POWER SUPPLY: SKYNET, model: ADT 925C

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

ST THOMSON                      Speed: 66 MHz

The video resolution of 1024x768 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**

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 55 022:1994+A1: 1995+A2: 1997, Class A

EN 61000-4-2: 1995

EN 61000-4-3: 1997

EN 61000-4-4: 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	PD-959	730020u00100373	Shielded Signal (1.2m) Nonshielded Power (1.8m)
2	PRINTER	HP	2225C+	2949s638657	Shielded Signal (1.2m) Nonshielded Power (2.1m)
3	MODEM	ACEEX	1414	980020505	Shielded Signal (1.2m) Nonshielded Power (2.1m)
4	KEYBOARD	BTC	5140	765020078	Shielded Signal (1.5m)
5	MOUSE	DEXIN	A2R800A	80110028	Shielded Signal (1.5m)

### FOR IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ADI	937G	649015T00102093A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	PRINTER	HP	C2145A	SG5BN160GY	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3	MODEM	GVC	F-1128V1R6	96-191-113003	Shielded Signal (1.25m) Nonshielded Power (1.5m)
4	KEYBOARD	FOWRARDD	FDA-104GA	FDKB8110024	Shielded Signal (1.4m)
5	MOUSE	COMSYS	MOUSE 1300	507009797	Shielded Signal (1.4m)

## 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	April 29, 1999
HP Preamplifier	8447D	2944A08313	March 21, 1999
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 1, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BILOG Antenna	CBL6111A	1647	July 3, 1999
EMCO Turn Table	1016	1722	N/A
EMCO Tower	1051	1825	N/A
Open Field Test Site	Site 4	ADT-R04	June 19, 1999

- Note: 1. The measurement uncertainty is less than  $\pm 3$ dB, 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	828765/002	July 29, 1999
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	828075/003	July 27, 1999
EMCO-L.I.S.N.	3825/2	90031627	July 27, 1999
Shielded Room	Site 5	ADT-C05	N/A

- Note: 1. The measurement uncertainty is less than  $\pm 2.6$ dB, 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	9507277	April 15, 1999
KeyTek, EFT Generator	CE-40	9508d257	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. 12, 1998
EMCO BiconiLog Antenna	3141	1001	N/A
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1999

Note: 1. The calibration interval of the above test instruments is 12 months.

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

2. The calibration schedule of probe is arranged to be finished before  
Nov. 20, 1998





#### 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 : 26 °C  
Humidity : 59 %  
Atmospheric Pressure : 1005 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -34.0 dB at 24.164 MHz Minimum passing margin of radiated emission: -2.2 dB at 144.02 MHz

##### 4.1.1 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.



#### 4.1.2 TEST DATA OF CONDUCTED EMISSION

EUT: CPU BOARD

MODEL: PCM-3345

6 dB Bandwidth: 10 kHz

TEST PERSONNEL: Johnny Liu

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
0.154	45.00	-	43.00	-	79.00	66.00	-39.5	-	-38.6	-
0.193	39.50	-	40.40	-	79.00	66.00	-39.5	-	-41.2	-
1.801	33.50	-	31.80	-	73.00	66.00	-35.8	-	-39.5	-
3.906	37.20	-	33.50	-	73.00	60.00	-36.6	-	-37.0	-
11.687	36.40	-	36.00	-	73.00	60.00	-36.4	-	-34.6	-
24.164	36.60	-	38.40	-	73.00	60.00	-34.0	-	-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

ADT CO. Shielded Room 5  
EN 55022 CLASS A

26. Oct 98 14:16

EUT: PCM-3345  
Op Cond: FULL SYSTEM  
Test Spec: LISN : L

Report No. CE 8702304

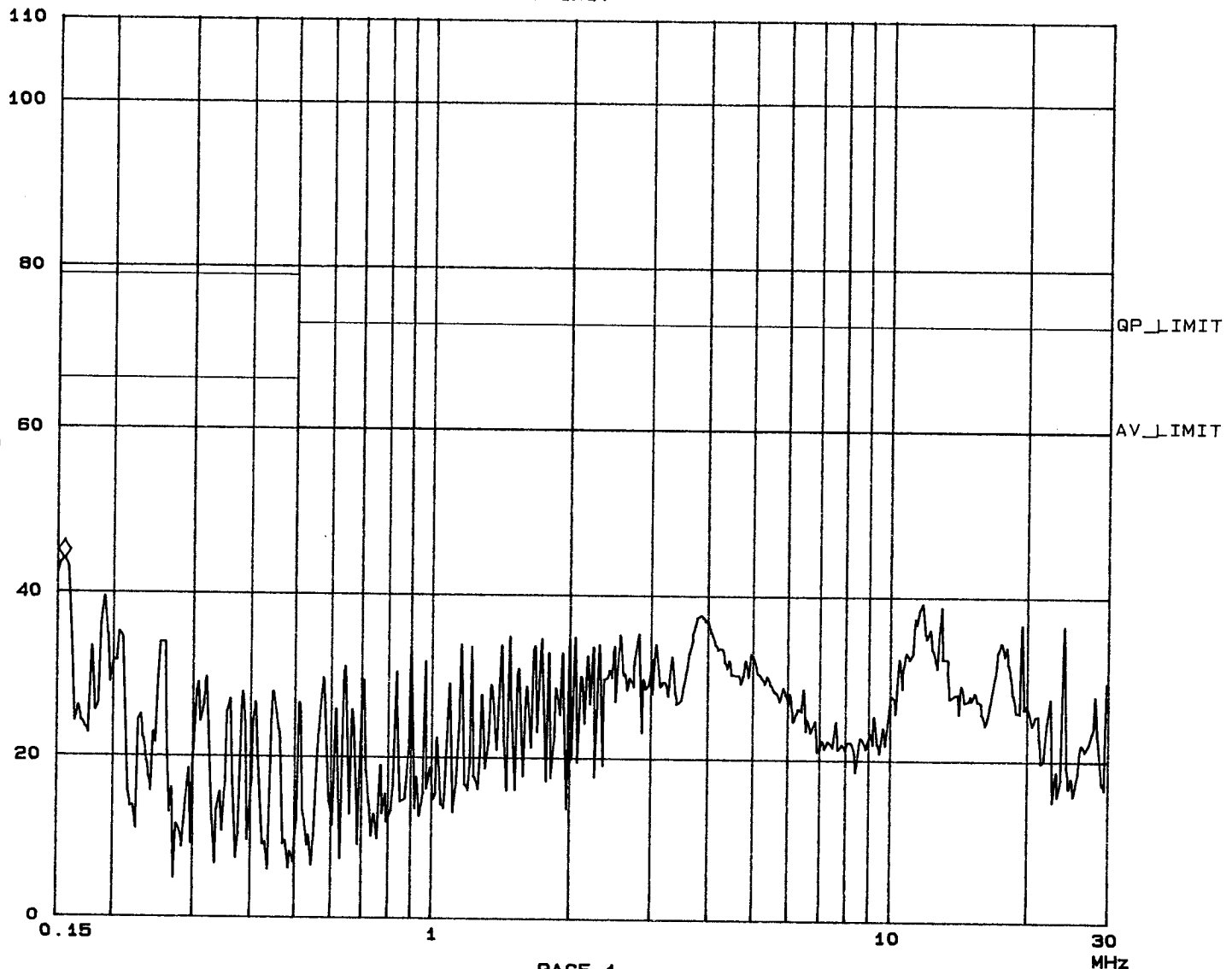
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Tested by Johnny-Liu

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	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB

dBuV      ◇ Mkr : 156.00    kHz    43.9 dBuV



ADT CO. Shielded Room 5  
EN 55022 CLASS A

26. Oct 98 14:08

EUT: PCM-3345  
Op Cond: FULL SYSTEM  
Test Spec: LISN : N

Report No. CE 87102704

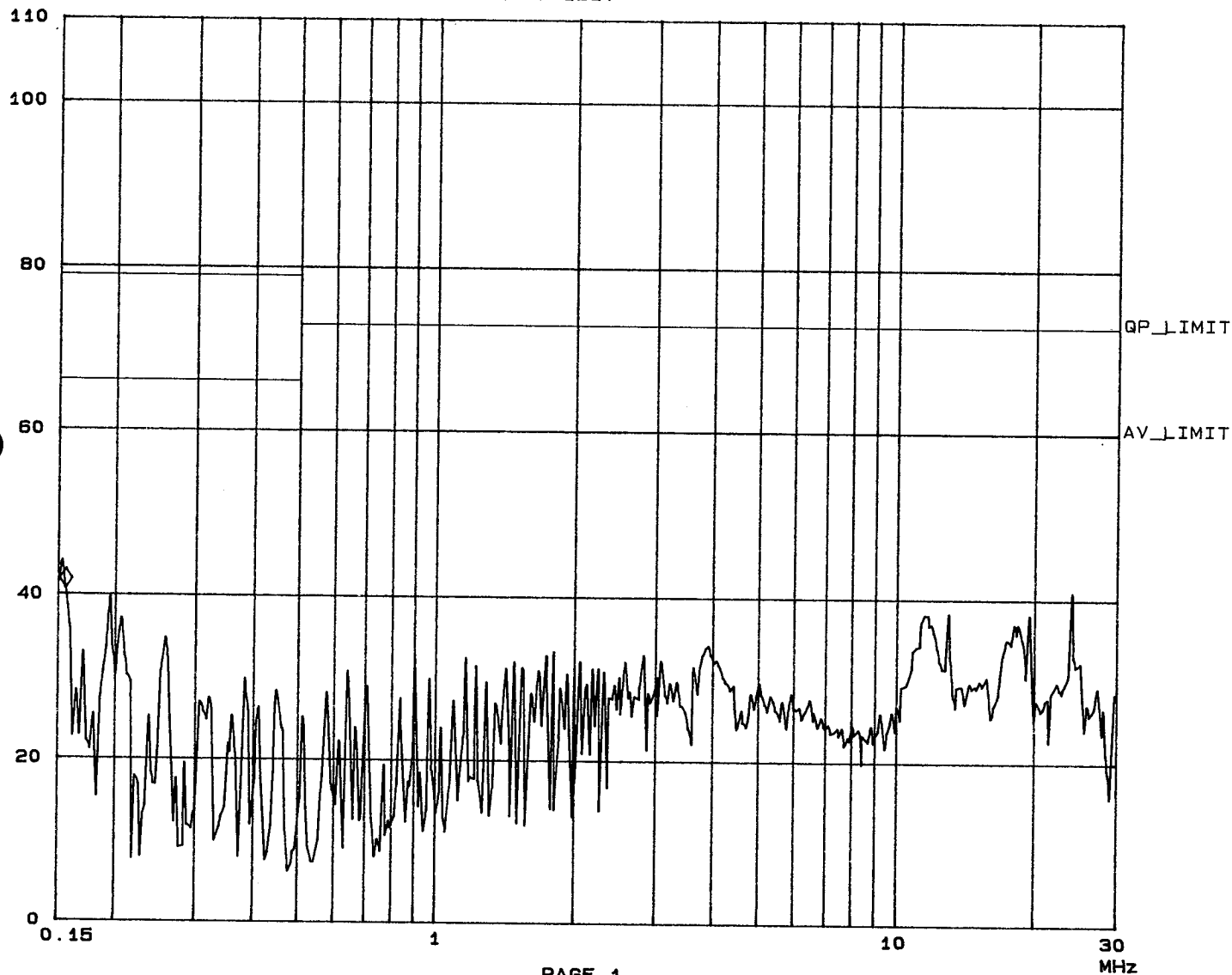
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Tested by Johnny Liu

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	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB

dBuV      ◇ Mkr : 156.00    kHz    40.7 dBuV





### 4.1.3 TEST DATA OF RADIATED EMISSION

EUT: CPU BOARD

MODEL: PCM-3345

ANTENNA: CHASE BILOG CBL 6111A

POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Johnny Liu

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
67.50	8.1	13.4	21.5	40.0	-18.5
108.03	12.6	18.9	31.5	40.0	-8.5
117.00	13.8	19.6	33.4	40.0	-6.6
130.51	14.3	19.8	34.1	40.0	-5.9
139.50	14.4	19.3	33.7	40.0	-6.3
143.99	13.9	20.1	34.0	40.0	-6.0
153.03	12.8	20.6	33.4	40.0	-6.6
162.04	12.0	23.9	35.9	40.0	-4.1
184.55	11.6	24.7	36.3	40.0	-3.7
216.01	12.6	20.5	33.1	40.0	-6.9
261.00	16.1	7.3	23.4	47.0	-23.6
360.20	18.5	13.4	31.9	47.0	-15.1

- 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-3345

ANTENNA: CHASE BILOG CBL 6111A

POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Johnny Liu

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
45.51	12.0	20.5	32.5	40.0	-7.5
58.51	7.9	20.4	28.3	40.0	-11.7
66.61	7.9	16.6	24.5	40.0	-15.5
108.00	11.3	19.2	30.5	40.0	-9.5
130.51	14.5	19.4	33.9	40.0	-6.1
144.02	14.9	22.9	37.8	40.0	-2.2
157.51	13.1	17.9	31.0	40.0	-9.0
184.52	11.6	21.0	32.6	40.0	-7.4
216.11	12.7	16.3	29.0	40.0	-11.0
256.50	15.0	10.3	25.3	47.0	-21.7
274.53	14.8	9.3	24.1	47.0	-22.9
360.20	20.4	18.2	38.6	47.0	-8.4

- 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**

Basic Standard	:	EN 61000-4-2	(Electrostatic Discharge Test, ESD)
		EN 61000-4-3	(Radio-Frequency Electromagnetic Field Susceptibility Test, RS)
		EN 61000-4-4	(Electrical Fast Transient/Burst Test,
Input Voltage	:	230 Vac, 50 Hz	(to PC)
Temperature	:	23 °C	
Humidity	:	56 %	
Atmospheric Pressure	:	1002 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  
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-3345

### OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1~ 5	N/A	Note 1
4	+/-	2, 3	Note 1	N/A

#### Description of test point:

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

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 : 3 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 Chuang*

Test Result		Remarks
Criterion A	PASS	Model: PCM-3345

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 - 1 kV (to PC)  
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-3345

### OBSERVATION DESCRIPTION

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

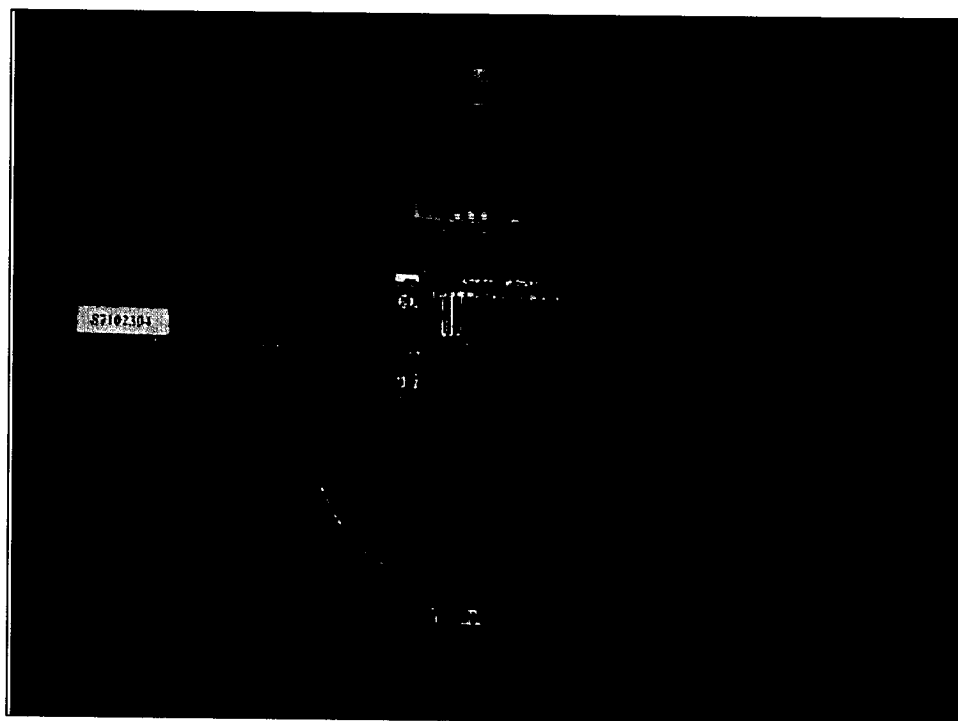
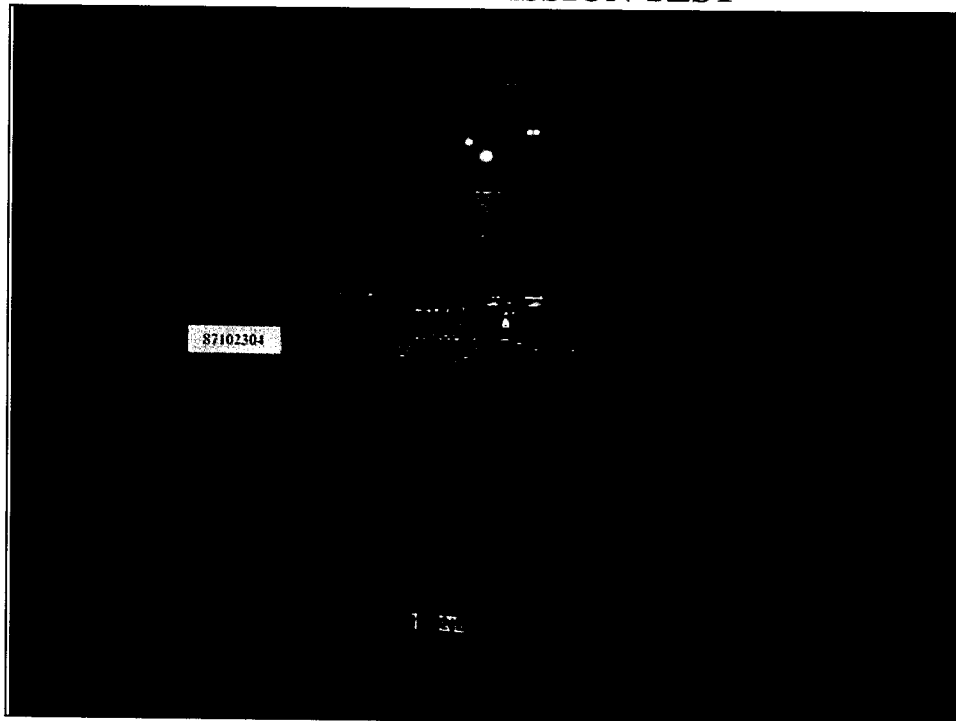
### Description of test result:

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



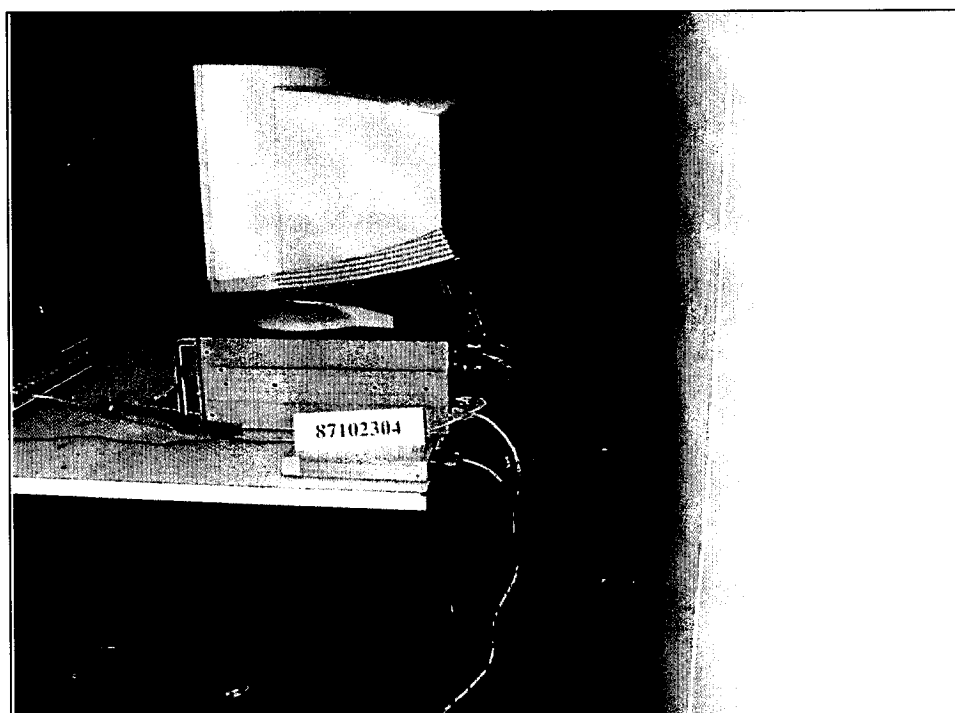
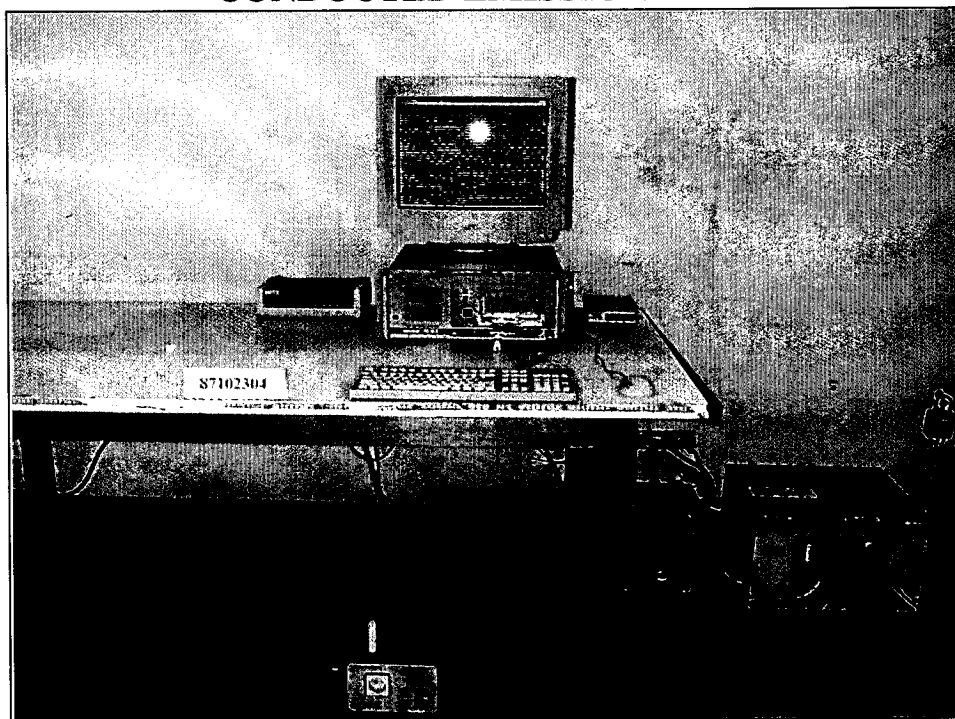
## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

### RADIATED EMISSION TEST



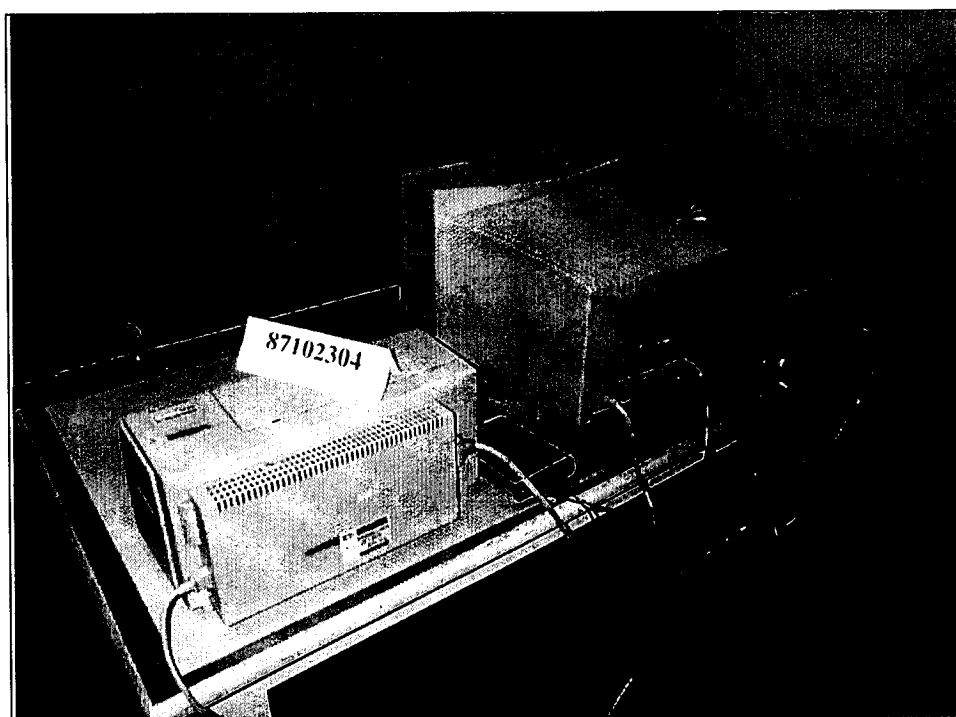
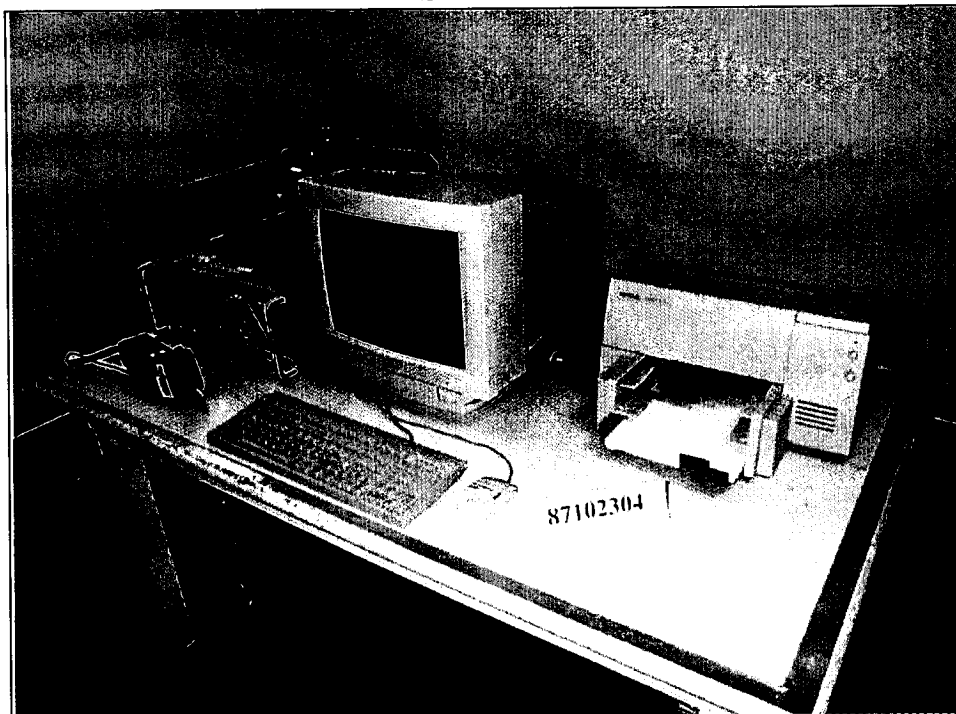


## CONDUCTED EMISSION TEST



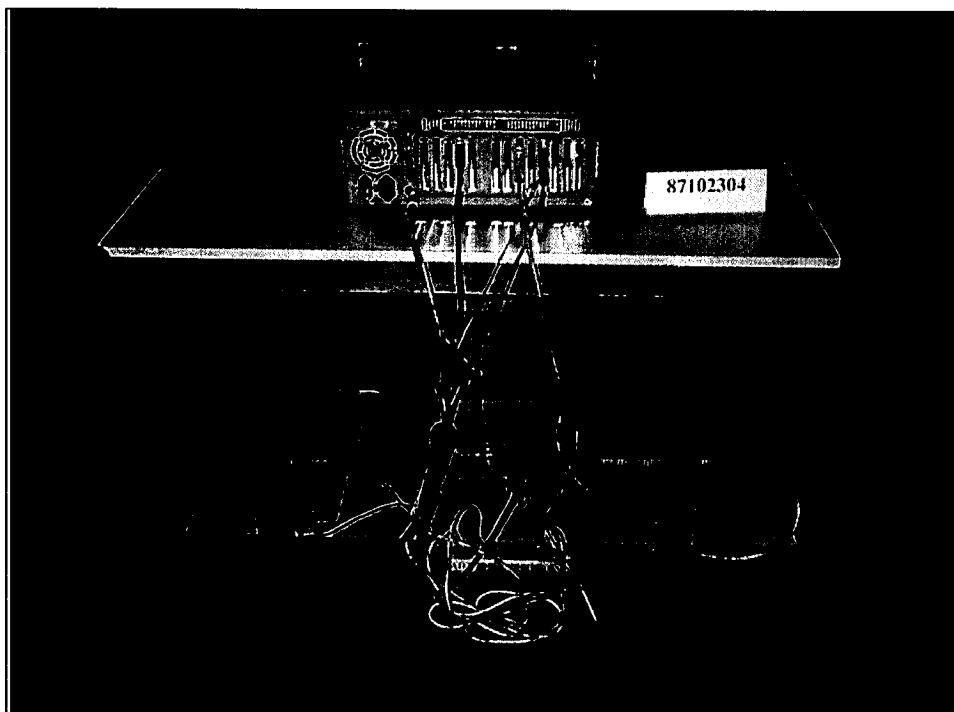
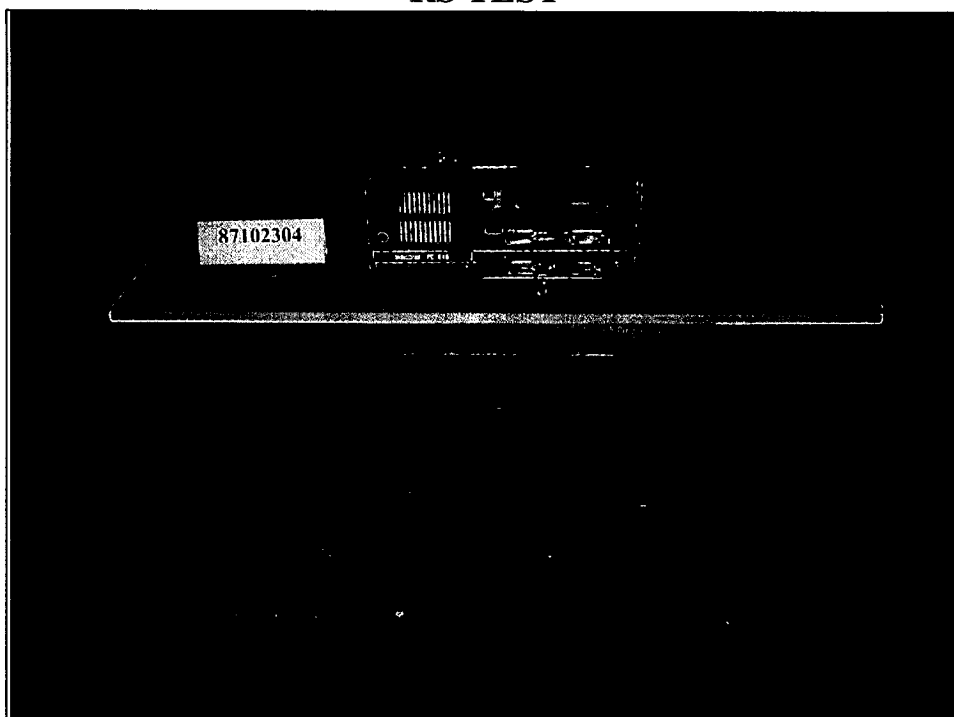


## ESD TEST





## RS TEST





## EFT TEST



