



# EMC

## TEST REPORT

REPORT NO. : CE88070204

MODEL NO. : IPC-602XXX-YYYY

DATE OF TEST : July 05 ~ July 11, 1999

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

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

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## 1. CERTIFICATION

Issue date: July 19, 1999

Product	:	INDUSTRIAL COMPUTER	
Trade Name	:	ADVANTECH	
Model No.	:	IPC-602XXX-YYYY	
Applicant	:	ADVANTECH CO., LTD.	
Standard	:	EN 55022:1994+A1: 1995+A2: 1997, Class A EN 61000-3-2: 1995, Class A ( for mode 1 ) EN 61000-3-3: 1995 ( for mode 1 )	<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

We hereby certify that one sample (model: IPC-602P3-25X & IPC-602P3-26P & IPC-602P3-30D) of the designation has been tested in our facility from July 05 to July 11, 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 ) ( Bruce Lu )

TESTED BY : \_\_\_\_\_ , DATE: \_\_\_\_\_  
( Immunity ) ( S. S. Wang )

CHECKED BY : \_\_\_\_\_ , DATE: \_\_\_\_\_  
( Stacy Chang )

APPROVED BY : \_\_\_\_\_ , DATE: \_\_\_\_\_  
( Mike Su )

**ADVANCE DATA TECHNOLOGY CORPORATION**



Accredited Laboratory



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product	:	INDUSTRIAL COMPUTER
Model No.	:	IPC-602XXX-YYYY
Power Supply Type	:	Switching
		IPC-602P3-25X
		IPC-602P3-26P
		IPC-602P3-30D
Power Cord	:	Nonshielded ( 1.8m)

Note: The EUT, Industrial Computer, is a high-end desktop/rackmount fault-resilient IPC chassis.

The "XXX" in model: IPC-602XXX-YYYY represents different back planes and "YYYY" represents different switching power supply. They could be defined as A ~ Z, 0 ~ 9 or blank according to different client's requirement.

During the test, the manufacturer requested the following models were as representative models and their data are recorded in this report:

- MODE 1: Model: **IPC-602P3-25X**
- MODE 2: Model: **IPC-602P3-26P**
- MODE 3: Model: **IPC-602P3-30D**

The EUT was tested under the following configuration:

* HDD	:	QUANTUM, EX5100AT
* FDD	:	TEAC, FD-235HF
* CPU BOARD	:	ADVANTECH, PCA-6175
* CPU	:	Intel Pentium II 333 (66.6 MHz x 5)
* CD-ROM	:	BCT, BCD48S5B
* VGA CARD	:	PRIPLEX, C325bx

The video resolution of 1024 x 768 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 61000-3-2: 1995, Class A ( for mode 1 )

EN 61000-3-3: 1995 ( for mode 1 )

**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

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	730020U00100254	Shielded Signal (1.4m) Nonshielded Power (1.8m)
2.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110024	Shielded Signal (1.4m)
3.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110116	Shielded Signal (1.4m)
4.	MOUSE	LOGITECH	M-M30	LTR55500777	Shielded Signal (1.9m)
5.	MODEM	ACEEX	1414	980020538	Shielded Signal (1.4m) Nonshielded Power (1.5m)
6.	PRINTER	HP	2225C+	2936S56294	Shielded Signal (1.5m) Nonshielded Power (1.2m)
7.	ATX TYPE SPS (for mode 1 only)	DELTA	DPS-200PB-103A	NA	Nonshielded AC Power (1.8m)
8.	ATX TYPE SPS ( for mode 2 only )	SKYNET	ADT-925C	NA	Nonshielded AC Power (1.8m)
9.	DC 48V SPS ( for mode 3 only )	WIN-TACT	WT-310D	NA	Nonshielded AC Power (1.8m)
10.	DC POWER ( for mode 3 )	TOPWARD	6603A	667971	Nonshielded AC power ( 1.8m) Nonshielded DC power ( 0.5m)

### 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.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110024	Shielded Signal (1.4m)
3.	KEYBOARD	ACER	6311	K6355122516	Shielded Signal (1.5m)
4.	MOUSE	LOGITECH	M-M30	LTR53500777	Shielded Signal (1.5m)
5.	MODEM	GVC	F-1128V1R6	96-191-113004	Shielded Signal (1.25m) Nonshielded Power (1.5m)
6.	PRINTER	HP	C2145A	SG59N16035	Shielded Signal (1.5m) Nonshielded Power (1.8m)
7.	ATX TYPE SPS (for mode 1 only)	DELTA	DPS-200PB-103A	NA	Nonshielded AC Power (1.8m)
8.	ATX TYPE SPS ( for mode 2 only )	SKYNET	ADT-925C	NA	Nonshielded AC Power (1.8m)
9.	DC 48V SPS ( for mode 3 only )	WIN-TACT	WT-310D	NA	Nonshielded AC Power (1.8m)
10.	DC POWER ( for mode 3 )	TOPWARD	6603A	667971	Nonshielded AC power ( 1.8m) Nonshielded DC power ( 0.5m)

## 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	Dec. 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.

##### CURRENT HARMONICS, VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

Description & Manufacturer	Model no.	Serial No.	Calibrated Until
KeyTek, Power Arb Waveform Generator	EP72HF	9508346	Mar. 27, 2000
KIKUSUI AC SWITCHING POWER SUPPLY	PCR 4000L	9508355	Mar. 27, 2000

Note: 1. 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 14, 2000
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	NA
KALMUS Power Amplifier	757LC	091995-2	NA
HOLADAY Field Probe	HI-4422	89915	Oct. 27, 1999
EMCO BiconiLog Antenna	3141	1001	NA
FCC Coupling Decoupling Network	FCC-801-M3-25	48	NA
FCC Coupling Decoupling Network	FCC-801-M2-25	20	NA
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	NA
FCC Coupling Decoupling Network	FCC-801-M1-25	17	NA
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	NA
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 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.

#### 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.



## 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)  
Power System Voltage : 230 Vac, 50 Hz  
Temperature : 28 degree C  
Humidity : 64 %  
Atmospheric Pressure : 996 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -20.9 dB at 7.587 MHz Minimum passing margin of radiated emission: -2.1 dB at 461.15 MHz

### 4.2 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. Industrial PC (EUT) reads a test program to enable all functions.
3. Industrial PC (EUT) reads and writes messages from HDD and FDD.
4. Industrial PC (EUT) sends "H" messages to monitor and monitor displays "H" patterns on screen.
5. Industrial PC (EUT) sends "H" messages to modem.
6. Industrial PC (EUT) sends "H" messages to printer and the printer prints them on paper.
7. Repeat steps 2-7.



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

EUT: **INDUSTRIAL COMPUTER**

MODEL: **IPC-602P3-25X**

6 dB Bandwidth: 10 kHz

MODE: **1**

PHASE: LINE (L)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.219	0.2	51.7	-	51.9	-	79.0	66.0	-27.1	-
0.328	0.2	44.8	-	45.0	-	79.0	66.0	-34.0	-
0.658	0.2	36.1	-	36.3	-	73.0	60.0	-36.7	-
10.277	0.8	41.3	-	42.1	-	73.0	60.0	-30.9	-
14.592	1.0	38.6	-	39.6	-	73.0	60.0	-33.4	-
18.183	1.1	43.6	-	44.7	-	73.0	60.0	-28.3	-

- 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 levels of other frequencies were very low against the limit.
  5. Margin value = Emission level - Limit value
  6. Emission Level = Correction Factor + Reading Value.



## TEST DATA OF CONDUCTED EMISSION (A)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-25X

6 dB Bandwidth: 10 kHz

MODE: **1**

PHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.219	0.2	50.1	-	50.3	-	79.0	66.0	-28.7	-
0.328	0.2	42.5	-	42.7	-	79.0	66.0	-36.3	-
0.658	0.2	38.5	-	38.7	-	73.0	60.0	-34.3	-
10.277	0.6	42.0	-	42.6	-	73.0	60.0	-30.4	-
14.592	0.7	39.5	-	40.2	-	73.0	60.0	-32.8	-
18.183	0.8	43.9	-	44.7	-	73.0	60.0	-28.3	-

- 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 levels of other frequencies were very low against the limit.
  5. Margin value = Emission level - Limit value
  6. Emission Level = Correction Factor + Reading Value.



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

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-26P

6 dB Bandwidth: 10 kHz

MODE: 2

PHASE: LINE (L)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.187	0.2	45.8	-	46.0	-	79.0	66.0	-33.0	-
0.689	0.2	36.2	-	36.4	-	79.0	66.0	-42.6	-
1.376	0.3	37.6	-	37.9	-	73.0	60.0	-35.1	-
3.619	0.4	44.3	-	44.7	-	73.0	60.0	-28.3	-
7.587	0.7	51.4	-	52.1	-	73.0	60.0	-20.9	-
18.205	1.1	35.1	-	36.2	-	73.0	60.0	-36.8	-

- 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 levels of other frequencies were very low against the limit.
  5. Margin value = Emission level - Limit value
  6. Emission Level = Correction Factor + Reading Value.



## TEST DATA OF CONDUCTED EMISSION (B)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-26P

6 dB Bandwidth: 10 kHz

MODE: 2

PHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.187	0.2	46.0	-	46.2	-	79.0	66.0	-32.8	-
0.689	0.2	33.4	-	33.6	-	79.0	66.0	-45.4	-
1.376	0.3	37.7	-	38.0	-	73.0	60.0	-35.0	-
3.619	0.4	44.9	-	45.3	-	73.0	60.0	-27.7	-
7.587	0.5	51.5	-	52.0	-	73.0	60.0	-21.0	-
18.205	0.8	34.3	-	35.1	-	73.0	60.0	-37.9	-

- 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
  6. Emission Level = Correction Factor + Reading Value.



#### 4.5 TEST DATA OF CONDUCTED EMISSION (C)

EUT: **INDUSTRIAL COMPUTER**

MODEL: **IPC-602P3-30D**

6 dB Bandwidth: 10 kHz

MODE: **3**

PHASE: LINE (L)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.354	0.2	39.9	-	40.1	-	79.0	66.0	-38.9	-
1.323	0.3	33.3	-	33.6	-	79.0	66.0	-45.4	-
3.151	0.4	23.7	-	24.1	-	73.0	60.0	-48.9	-
6.884	0.7	40.7	-	41.4	-	73.0	60.0	-31.6	-
12.024	0.9	39.8	-	40.7	-	73.0	60.0	-32.3	-
20.226	1.2	36.7	-	37.9	-	73.0	60.0	-35.1	-

- 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
  6. Emission Level = Correction Factor + Reading Value.



## TEST DATA OF CONDUCTED EMISSION ( C )

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-30D

6 dB Bandwidth: 10 kHz

MODE: 3

PHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.354	0.2	39.5	-	39.7	-	79.0	66.0	-39.3	-
1.323	0.3	32.8	-	33.1	-	79.0	66.0	-45.9	-
3.151	0.4	20.8	-	21.2	-	73.0	60.0	-51.8	-
6.884	0.5	42.7	-	43.2	-	73.0	60.0	-29.8	-
12.024	0.7	38.3	-	39.0	-	73.0	60.0	-34.0	-
20.226	0.8	39.2	-	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
  6. Emission Level = Correction Factor + Reading Value.





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

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-25X

ANT. POLARITY: Horizontal

MODE: 1

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
78.21	7.9	16.3	24.2	40.0	-15.8	400	295
84.73	8.5	18.8	27.3	40.0	-12.7	400	96
162.93	11.4	12.1	23.5	40.0	-16.5	400	100
167.06	11.5	25.8	37.3	40.0	-2.7	400	234
200.46	12.5	24.4	36.9	40.0	-3.1	400	133
267.29	15.0	21.3	36.3	47.0	-10.7	324	208
461.15	21.3	23.6	44.9	47.0	-2.1	237	275
527.03	23.3	15.9	39.2	47.0	-7.8	192	216
801.81	29.6	6.6	36.2	47.0	-10.8	100	195

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB)  
+ Reading value (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 (A)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-25X

ANT. POLARITY: Vertical

MODE: 1

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
45.96	11.9	17.5	29.4	40.0	-10.6	100	21
78.21	7.9	26.9	34.8	40.0	-5.2	176	142
84.72	8.2	23.2	31.4	40.0	-8.6	155	318
167.07	11.3	20.6	31.9	40.0	-8.1	100	6
200.47	12.2	25.3	37.5	40.0	-2.5	100	261
267.63	15.5	22.0	37.5	47.0	-9.5	100	311
461.16	21.7	19.7	41.4	47.0	-5.6	100	213
527.03	22.8	19.0	41.8	47.0	-5.2	100	183
801.81	29.3	5.3	34.6	47.0	-12.4	400	225

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB)  
+ Reading value (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



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

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-26P

ANT. POLARITY: Horizontal

MODE: 2

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
78.22	7.9	17.1	25.0	40.0	-15.0	400	303
84.73	8.5	15.7	24.2	40.0	-15.8	400	93
167.06	11.5	21.8	33.3	40.0	-6.7	400	212
200.46	12.5	22.2	34.7	40.0	-5.3	400	344
263.53	15.0	25.3	40.3	47.0	-6.7	367	254
267.29	15.0	23.0	38.0	47.0	-9.0	360	257
461.17	21.3	21.7	43.0	47.0	-4.0	262	72
501.14	22.9	9.1	32.0	47.0	-15.0	234	207
527.04	23.3	18.0	41.3	47.0	-5.7	215	55
534.55	23.4	18.9	42.3	47.0	-4.7	195	47
601.37	24.4	8.5	32.9	47.0	-14.1	188	17
801.82	29.6	6.2	35.8	47.0	-11.2	100	7

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (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 (B)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-26P

ANT. POLARITY: Vertical

MODE: 2

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
43.68	13.3	17.5	30.8	40.0	-9.2	100	261
78.22	7.9	27.7	35.6	40.0	-4.4	169	312
84.73	8.2	23.3	31.5	40.0	-8.5	182	303
167.06	11.3	21.0	32.3	40.0	-7.7	100	231
197.65	12.1	17.1	29.2	40.0	-10.8	100	0
200.43	12.2	25.6	37.8	40.0	-2.2	100	311
228.09	13.7	8.9	22.6	40.0	-17.4	100	193
263.53	15.3	26.3	41.6	47.0	-5.4	100	127
267.29	15.5	28.5	44.0	47.0	-3.0	100	323
329.41	17.1	19.8	36.9	47.0	-10.1	100	121
461.17	21.7	20.6	42.3	47.0	-4.7	100	42
534.55	22.7	17.1	39.8	47.0	-7.2	293	311
701.60	25.7	6.5	32.2	47.0	-14.8	233	245
801.82	29.3	7.3	36.6	47.0	-10.4	157	238

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (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



#### 4.8 TEST DATA OF RADIATED EMISSION (C)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-30D

ANT. POLARITY: Horizontal

MODE: 3

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
44.58	13.7	10.3	24.0	40.0	-16.0	400	271
78.20	7.9	20.8	28.7	40.0	-11.3	400	110
84.72	8.5	17.9	26.4	40.0	-13.6	400	137
167.05	11.5	17.5	29.0	40.0	-11.0	373	240
200.46	12.5	19.6	32.1	40.0	-7.9	343	261
267.27	15.0	22.3	37.3	47.0	-9.7	331	160
334.09	17.0	19.2	36.2	47.0	-10.8	260	236
467.72	21.5	18.7	40.2	47.0	-6.8	198	305
668.17	25.5	12.8	38.3	47.0	-8.7	112	304
801.80	29.6	7.6	37.2	47.0	-9.8	110	310

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (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 (C)

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-30D

ANT. POLARITY: Vertical

MODE: 3

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
45.75	12.2	18.2	30.4	40.0	-9.6	150	243
74.40	7.4	23.8	31.2	40.0	-8.8	192	243
78.20	7.9	26.5	34.4	40.0	-5.6	175	306
84.72	8.2	27.3	35.5	40.0	-4.5	183	350
131.76	13.5	19.5	33.0	40.0	-7.0	100	114
167.05	11.3	18.7	30.0	40.0	-10.0	100	81
200.46	12.2	23.2	35.4	40.0	-4.6	100	269
267.27	15.5	16.3	31.8	47.0	-15.2	100	112
334.09	17.4	19.4	36.8	47.0	-10.2	100	312
467.71	21.9	14.3	36.2	47.0	-10.8	381	174
601.35	23.4	10.6	34.0	47.0	-13.0	300	219
801.79	29.3	5.7	35.0	47.0	-12.0	222	345

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (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



## 4.9 DISTURBANCE IN SUPPLY SYSTEM

Product Family Standard: EN 61000-3-2: 1995, Class A ( for mode 1 )  
Input Voltage : 230Vac, 50Hz  
Temperature : 27 degree C  
Humidity : 60 %  
Atmospheric Pressure : 1004 mbar

TEST RESULT	Remarks
PASS	MODE 1

### 4.9.1 EUT OPERATION CONDITION

Same as 4.2



#### 4.9.2 MEASUREMENT DATA OF HARMONICS TEST

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-25X

MODE: 1

Fundamental Voltage : 229.831 Vrms

Power consumption : 53.003 W

Amperes : 0.460 Arms

Frequency : 50 Hz

Harm. Order	Reading Data (A)	Limit (A)
1	-	-
3	0.21	2.30
5	0.19	1.14
7	0.17	0.77
9	0.14	0.40
11	0.11	0.33
13	0.08	0.21
15	0.06	0.15
17	0.03	0.13
19	0.02	0.12
21	0.01	0.11
23	0.01	0.10
25	0.01	0.09
27	0.01	0.08
29	0.01	0.08
31	0.01	0.07
33	0.00	0.07
35	0.00	0.06
37	0.00	0.06
39	0.00	0.06

Harm. Order	Reading Data (A)	Limit (A)
2	0.00	1.08
4	0.00	0.43
6	0.00	0.30
8	0.00	0.23
10	0.00	0.18
12	0.00	0.15
14	0.00	0.13
16	0.00	0.11
18	0.00	0.10
20	0.00	0.09
22	0.00	0.08
24	0.00	0.08
26	0.00	0.07
28	0.00	0.07
30	0.00	0.06
32	0.00	0.06
34	0.00	0.05
36	0.00	0.05
38	0.00	0.05
40	0.00	0.05

Note: Steady state values on AC mains are recorded in the table.





## 4.10 VOLTAGE FLUCTUATIONS AND FLICKER

Basic Standard : EN 61000-3-3 ( for mode 1 )  
Input Voltage : 230Vac, 50Hz  
Temperature : 27 degree C  
Humidity : 60 %  
Atmospheric Pressure : 1004 mbar

TEST RESULT	Remarks
PASS	The measured reading is too low against the limit

### 4.10.1 EUT OPERATION CONDITION

Same as 4.2



#### 4.10.2 TEST DATA OF VOLTAGE FLUCTUATIONS AND FLICKER

EUT: INDUSTRIAL COMPUTER

MODEL: IPC-602P3-25X

MODE: 1

Input Voltage : 229.831 Vrms

Input Amperes : 0.460 Arms

Power Factor : 0.501

Power Frequency: 50 Hz

Observation period (Tp): 2 hour

Test Parameter	Measurement Value	Limitation	Remark
Pst	0.09	1.0	pass
Plt	0.039	0.65	pass
Tdt (ms)	0	200	pass
dmax (%)	0	4%	pass
dc (%)	0	3%	pass

- Note:
- (1) Plt means long-term flicker indicator
  - (2) Pst means short-term flicker indicator
  - (3) dc means relative steady-state voltage change
  - (4) dmax means maximum relative voltage change
  - (5) Tdt means maximum time that dt exceeds 3 %



## 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)
Power System Voltage	:	230 Vac, 50 Hz
Temperature	:	27 degree C
Humidity	:	60 %
Atmospheric Pressure	:	1006 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.



## 5.4 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 Result		Remarks
Criterion A	PASS	MODE 1 & 2 & 3

### OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1 ~ 10	NA	Note 1
4	+/-	4 ~ 9	Note 1	N/A

#### Description of test point: (Pls. refer to ESD test photo)

1. Switch
2. Floppy
3. Push button
4. Screws
5. Metal case
6. VGA port
7. Parallel port
8. Serial port
9. PS2 port
10. Junction of case

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. Left side
2. Right side
3. Front 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 Result		Remarks
Criterion A	PASS	MODE 1 & 2 & 3

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 A	PASS	MODE 1 & 2 & 3

### OBSERVATION DESCRIPTION ( for mode 1 & 2 )

Test Point	Polarity	Test Level (kV)	Result
L1	+ / -	2	Note 1
L2	+ / -	2	Note 1
GND	+ / -	2	Note 1

### OBSERVATION DESCRIPTION ( for mode 3 )

Test Point	Polarity	Test Level (kV)	Result
L1	+ / -	2	Note 1
L2	+ / -	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 : AC power, L1/L2/GND ( Nonshielded )- for mode 1 & 2  
DC power, Anode and Cathode ( Nonshielded )- for mode 3  
Coupling device : CDN-M3 (3 wires)

Test Result		Remarks
Criterion A	PASS	MODE 1 & 2 & 3

### 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	MODE 1 & 2 & 3

### 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	MODE 1 & 2 & 3

Note: Four sides of EUT are verified separately.

### OBSERVATION DESCRIPTION

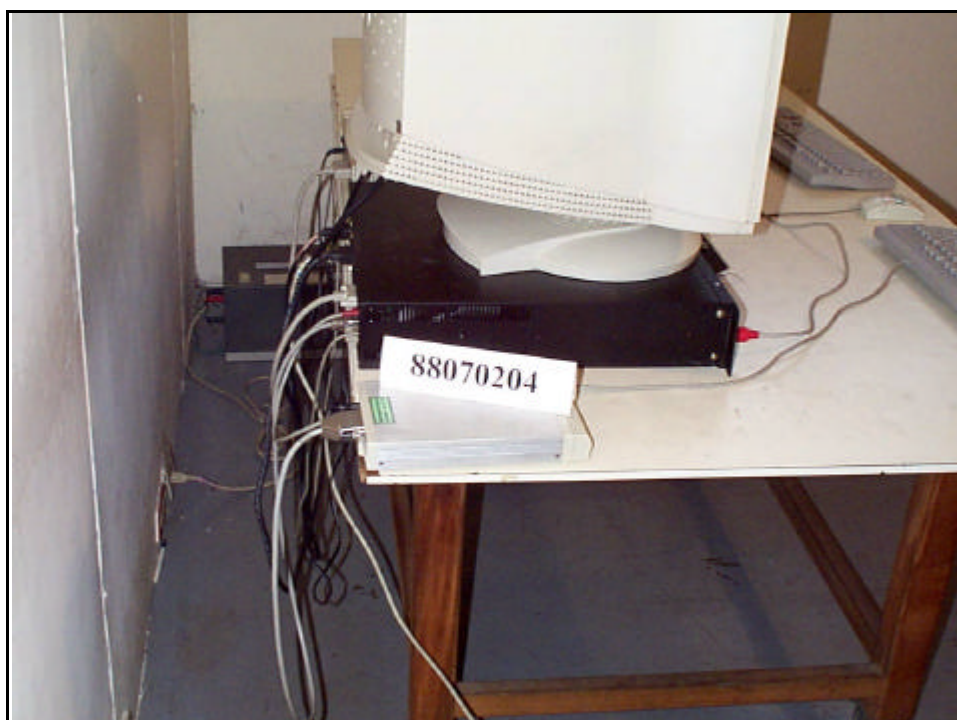
There was no change compared with initial operation during the test.

## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST (MODE 1)



## CONDUCTED EMISSION TEST (MODE 2)

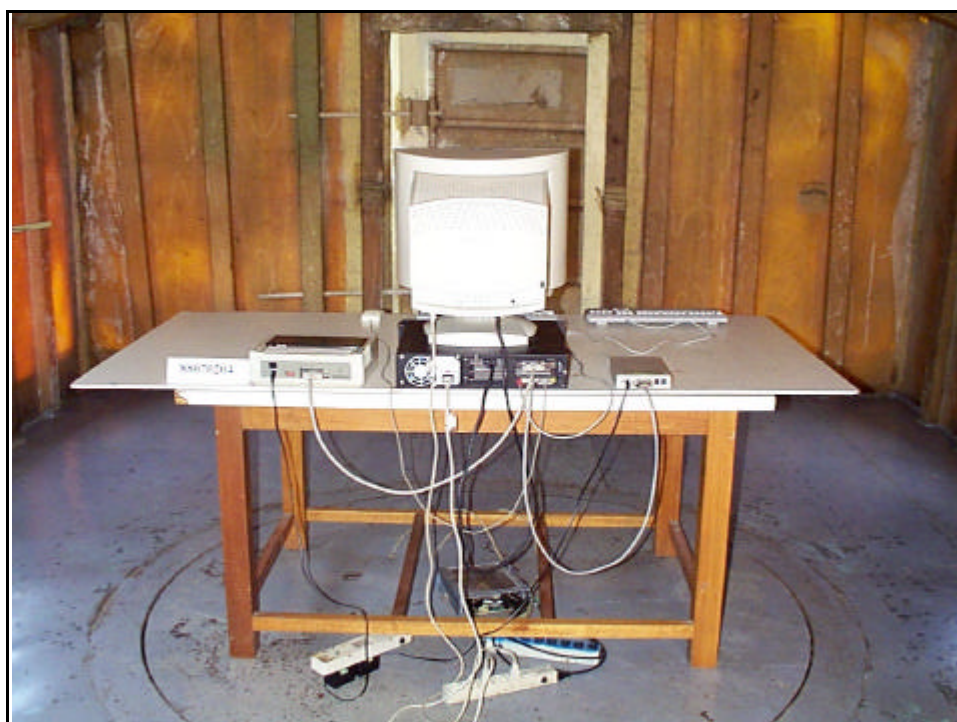


### CONDUCTED EMISSION TEST (MODE 3)

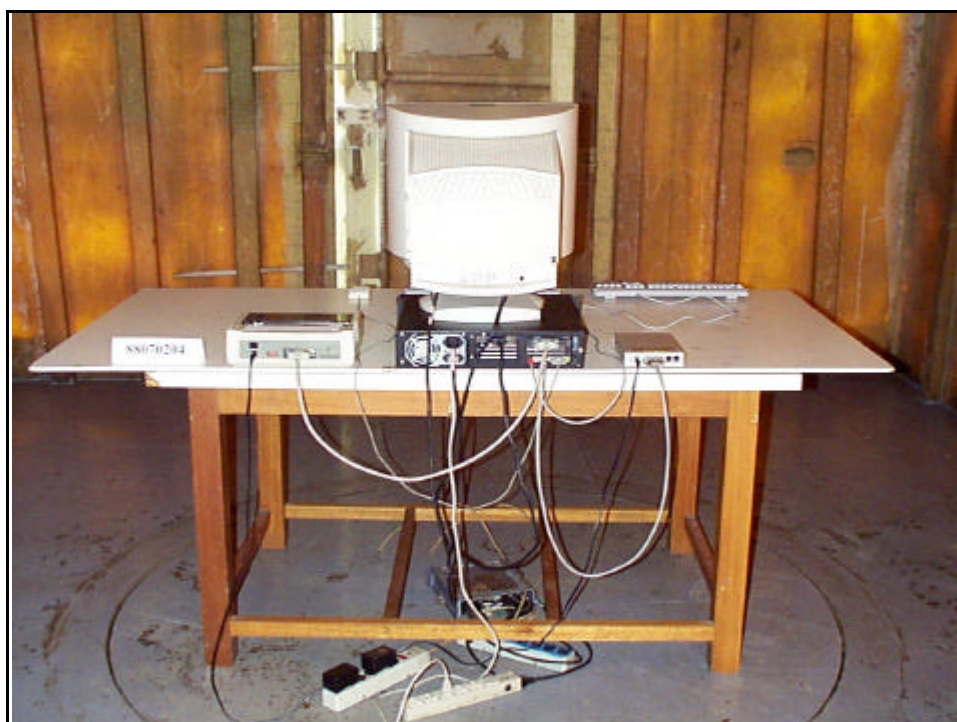




## **RADIATED EMISSION TEST (MODE 1)**

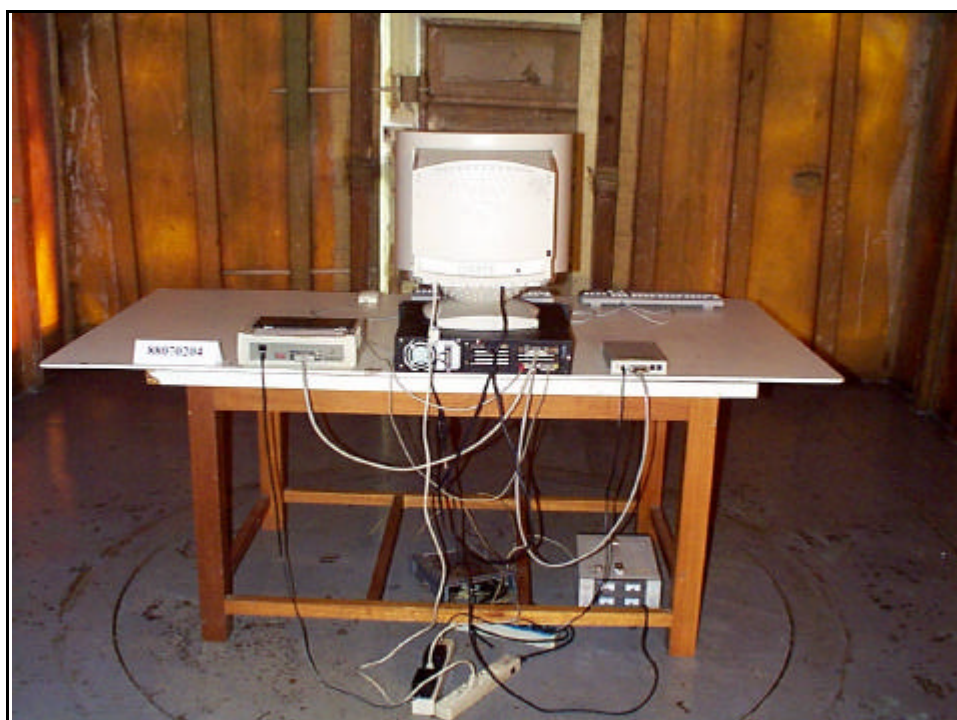


## **RADIATED EMISSION TEST (MODE 2)**





### **RADIATED EMISSION TEST (MODE 3)**



**HARMONICS EMISSION TEST &  
VOLTAGE FLUCTUATIONS AND FLICKER TEST  
( for mode 1 )**





## ESD TEST (MODE 1)





## MODE 2





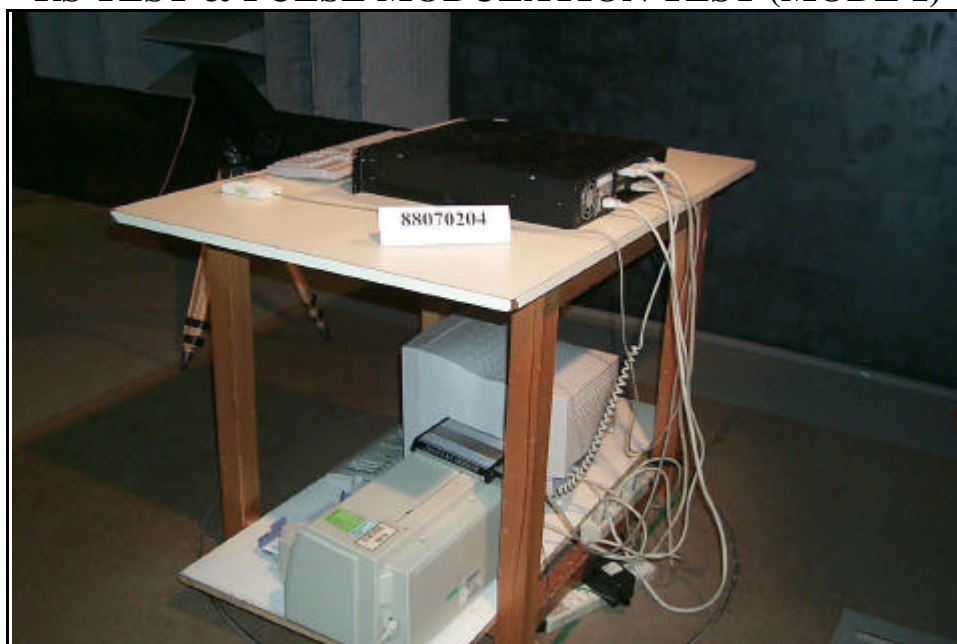
### MODE 3



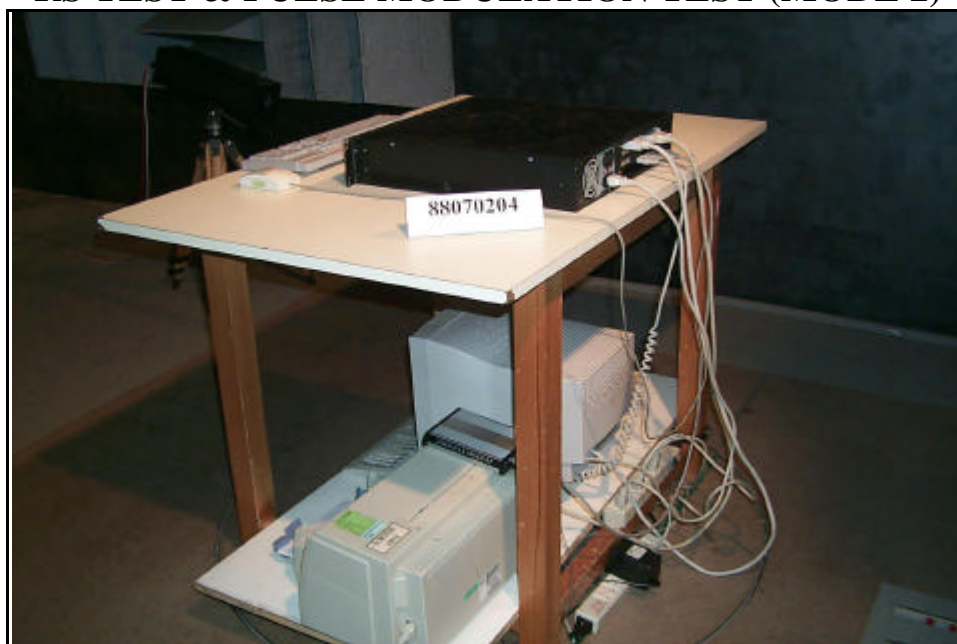




## RS TEST & PULSE MODULATION TEST (MODE 1)



## RS TEST & PULSE MODULATION TEST (MODE 2)





## RS TEST & PULSE MODULATION TEST (MODE 3)



### **EFT TEST (MODE 1 & 2 )**



### **(MODE 3)**



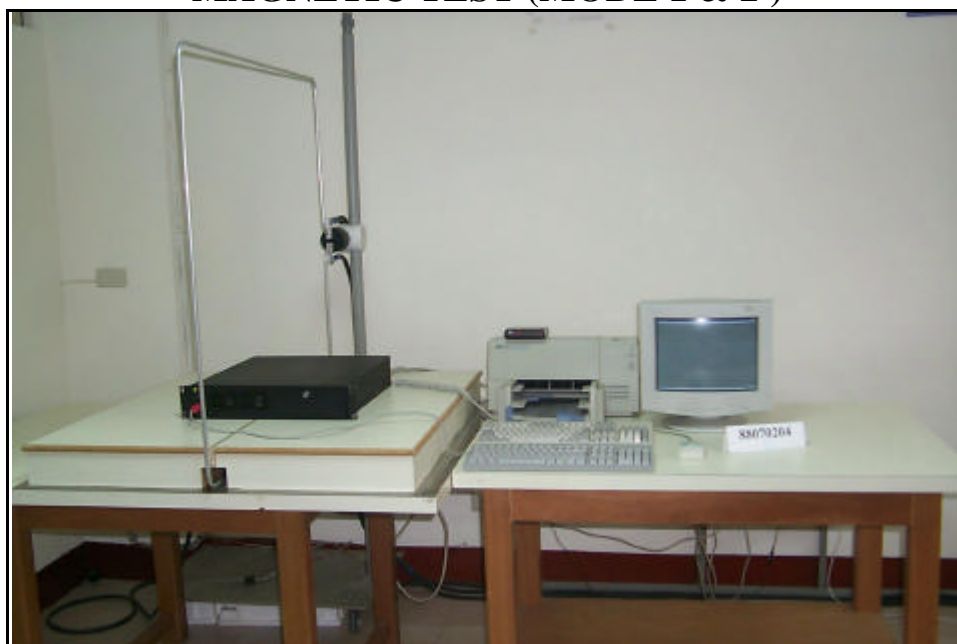
## CONDUCTED SUSCEPTIBILITY TEST (MODE 1 & 2 )



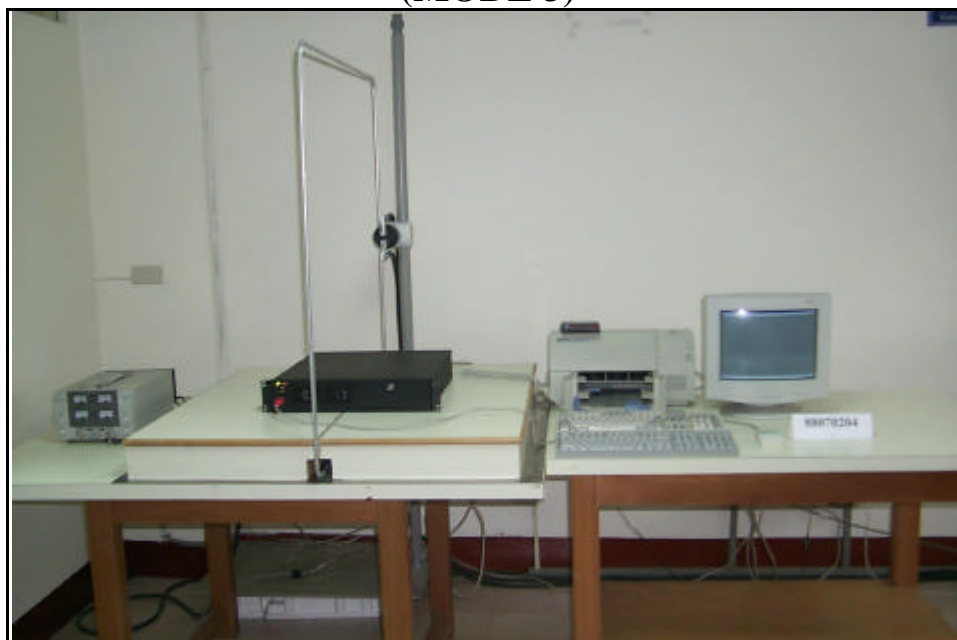
## (MODE 3)



## **MAGNETIC TEST (MODE 1 & 2 )**



## **(MODE 3)**







## 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<br>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:

**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](mailto:service@mail.adt.com.tw)  
<http://www.adt.com.tw>