

**TÜV Rheinland**

Technischer Überwachungs-Verein Rheinland

# Certificate of Compliance

No. I-9664965-9612

Regarding the certification of products which are in the scope of the  
Council Directive 89/336/EEC  
the applicant

**Advantech Co., Ltd.**

**4Fl., No. 108-3, Ming-Chuan Road, Shin-Tien City, Taipei Hsien 231,  
Taiwan, R.O.C.**

has successfully demonstrated that its product

**Panel PC**

**PPC-100T, PPC-100M, PPC-100T+T/S, PPC-100M+T/S, OPT 112-100T, OPT 112-100M**

is in compliance with

EN 50 082-2:1992, EN 55 022:1994/A1:1995 Class A

EN 61 000-3-2:1995, EN 61 000-3-3:1995

as described in the Technical Report P 9664965E01

This Certificate is based on a single evaluation of one sample of the above mentioned product. It does not imply an assessment of the whole production and does not permit the use of a licenced test mark of TÜV Rheinland.

TÜV Rheinland Product Safety GmbH.

Taipei, 30.12.1996

Dipl.-Ing. K. Heinz  
Certification Centre

Saul Lu  
Testing Centre

CE The CE marking may only be used if all relevant and effective EC Directives are complied with. CE



**Testreport No: P9664965E01**

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about

**Electromagnetic Compatibility**

**Applicant:**

Advantech Co., Ltd.  
4Fl., No. 108-3, Ming-Chuan Rd.  
Shin-Tien City, Taipei Hsien 231, Taiwan

**Kind of Equipment:**

Panel PC

**Type Designation:**

PPC-100 x, OPT 112-100 x  
(for details regarding the suffix 'x' please refer to page 3)

**Trade Mark:**

Advantech

**Standard:**

EN 50 082-2:1992      EN 55 022:1994/A1:1995 Class A  
EN 61 000-3-2:1995  
EN 61 000-3-3:1995

**Date of Testing:**

03.12.1996 / 09.12.1996

**Test result:**

The above mentioned product has been tested and **passed.**

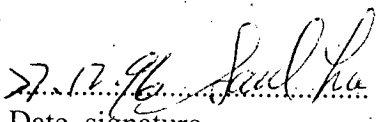
**Der Sachverständige:**


tested by

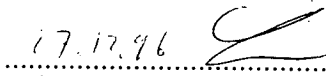
**Gesehen**

**überprüft:**

reviewed by

27.12.96   
Date, signature

den 30.12.1996  
TÜV Rheinland Product Safety GmbH  


17.12.96   
Date, signature

**TÜV Rheinland  
Product Safety GmbH**

**P 9 6 6 4 9 6 5**

This test report may be distributed only in its complete unabridged form. This report summarizes the results of a single investigation performed on the described test object. Unless validated by a EMC license bearing the same report number, this test report alone does not entitle the applicant the EMC-mark or any other test mark of approval on their products.

This report displays the emission and the immunity against disturbances of the tested product. If the tested product will be used with additional equipment other than those mentioned in this report or if the tested product will be used against the manufacturers description, the compliance with relevant standards for the system has to be ensured. Any mentioning of TÜV Rheinland or testing done by TÜV Rheinland in connection with distribution or use of the product described in this report must be approved by TÜV Rheinland in writing. A valid license is regarded as such an approval.

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## 1. Test Site

Advance Data Technology (ADT) Corporation

No. 47, 14 Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei, Taiwan, R.O.C.

All tests were conducted by a TÜV Rheinland appointed inspector.

## 2. Description of the Test Samples

### 2.1. General Description of Equipment

The test sample is a super slim 'Panel PC' with the model number **PPC-100T** for general use in the Heavy Industrial Environment. The EUT is containing a 'PCM-4865 Advantech' 486-all-in-one motherboard with a clock frequency of 100MHz. For configurations and components, respectively, please refer to the following paragraphs for details. The suffix 'x' as described on the cover page of this document can be 'T' for TFT-display, 'M' for Monochrome-display, 'T+T/S' for TFT-display and Analog resistive TouchScreen, 'M+T/S' for Monochrome-display and TouchScreen on the models PPC-100 series. But for Models **OPT 112-100** series, the suffix 'x' only denotes 'T' for TFT-display and 'M' for Monochrome-display.

### 2.2. Rating and Physical Characteristics

Input Voltage:	AC 115 / 230V
Frequency:	50 / 60Hz
Input Current:	1.0 / 0.6A
Protection Class:	Class I

### 2.3. Sources of Interference

1. Switching frequency of Power Supply: 35kHz.
2. Pulses on clock or other lines of peripheral cards (access. equipm. during testing).

**Gesehen**  
11.02. 1997  
TÜV Rheinland Product Safety GmbH

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## **2.4. Noise Suppression Parts**

1. Only within switching power supply, Skynet , model no. SNP-9551.
2. Enclosure.

## **2.5. Submitted Documents**

- 1) Information in the User / Installation Manual contains no information which are in the scope of this report.
- 2) Construction drawings
- 3) Photographic documentation

## **3. Measurement Conditions**

### **3.1. Modes of Operation**

The subject Panel PC was run in a configuration and set up as described in the next paragraph. A test program (set up by the manufacturer) was run during all tests to activate the printer, modem and HDD respectively.



### 3.2. Additional Equipment

The Panel PC was tested together with the following additional equipment:

#### FOR EMISSION TEST

Product	Manufacturer	Model No.	Serial No.	I/O Cable
MONITOR	ACER	7134T	M5400233504	Shielded Signal Nonshielded Power
KEYBOARD	FORWARD	FDA-102A	4001381	Shielded Signal
PRINTER	HP	2225C	3123S97230	Shielded Signal Nonshielded Power
MODEM	DATATRONICS	1200CK	07-503066	Shielded signal Nonshielded Power
MOUSE	HP	M-S34	LCA5353210 0	Shielded Signal

#### FOR IMMUNITY TEST

Product	Manufacturer	Model No.	Serial No.	I/O Cable
MONITOR	ACTION	MV-0951	N/A	Shielded Signal Nonshielded Power
KEYBOARD	HP	C3757A	C3757-60223	Shielded Signal
PRINTER	HP	C2145A	SG59N1603S	N/A
MOUSE	IBM	96F9275	23-677904	Shielded Signal
MODEM	GVC	F-1128V+/R6	N/A	Shielded Signal

### 3.3. Test Setup

The test setup was realized on a table of 80 cm height during all tests as described herein. The power cord had a length of 1.8 m (nonshielded, detachable).

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### 3.4. List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For Conducted Emission:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
TEST RECEIVER	R & S	ESHS30	828765/002	JULY 22, 1997
ART. MAINS NETW.	R & S	ESH2-Z5	892107/003	JULY 25, 1997

For Radiated Emission:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
SPECTR. ANAL.	HP	8594A	3144A00308	AUG. 27, 1997
PREAMPLIFIER	HP	8447D	2944A08119	JULY 8, 1997
TEST RECEIVER	R & S	ESVP	893496/030	JULY 17, 1997
TUNABLE DIPOLE ANTENNA	SCHWARZBECK	VHA 9103 UHA 9105	E101051 E101055	NOV. 30, 1997
BILOG ANTENNA	CHASE	CBL6111A	1648	DEC. 25, 1996
TURN TABLE	EMCO	1060-04	1195	N/A
TOWER	EMCO	1051	1263	N/A

For Harmonics & Voltage Fluctuations:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
POWER ARB WAVEF. GENER.	KEYTEK	EP72HF	9508346	MAY 12, 1997
SWIT. POW. SUPPLY	KIKUSUI	PCR 4000L	9508355	MAY 12, 1997

For ESD:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
ESD TEST SYST.	KEYTEK	2000	9105240/41	AUG. 5, 1997
ESD SIMULATOR	KEYTEK	MZ-15/EC	92022232	JUNE 7, 1997

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*cont. table 1 "List of Test and Measurement Equipment"*

For Radiated/Conducted Susceptibility:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
SIGN. GENERATOR	R & S	SMY01	840490/009	OCT. 1, 1997
POWER AMPLIFIER	KALMUS	LA1000V	091995-1	N/A
POWER AMPLIFIER	KALMUS	757LC	091995-2	N/A
FIELD PROBE	HOLADAY	HI-4422	89915	SEPT. 12, 1997
BICON. ANTENNA	EMCO	3143	1116	N/A
ANECH. CHAMBER	COMTEST	CFAC	ADT-S01	AUG. 2, 1997

For EFT:

Kind of Equipment	Manufacturer	Type	S/N	Calibr. until
EFT GENERATOR	KEYTEK	CE-40	9508257	SEPT. 12, 1997

### 3.5. Abbreviations

PASS means 'complied with requirement'	N/A means 'not applicable'
FAIL means 'not complied'	? means 'open item'
N.C.R. means 'no calibration required'	

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## **4. Test Results EMISSION**

**Result:**

**PASS**

### **4.1. Continuous Interferences**

#### **4.1.1. Conducted Emission (AC Mains)**

Port: AC Mains  
Basic Standard: EN 55 022:1994, clause 5.1  
Frequency Range: 0.15 - 30 MHz  
Limits: Mains Terminal, table 1 (Class A)

**Result:**

**PASS**

#### **Test Setup**

Input Voltage: AC 230 V, 50 Hz  
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2  
Earthing: through power cord

Where the result of the measurement with the Quasi Peak detector was found to be below the limit for Average-measurements, the measurement with the Average detector was omitted.

Disturbances other than those mentioned are small or not detectable.

**Table 1: Conducted Emission, AC Mains; 0.15 - 30MHz**

**Settings**

Frequency			Settings		
Start	Stop	Step Size	IF Bandwidth	Detector	Meas. Time
0.15 MHz	30 MHz		10 kHz	QP	20 ms

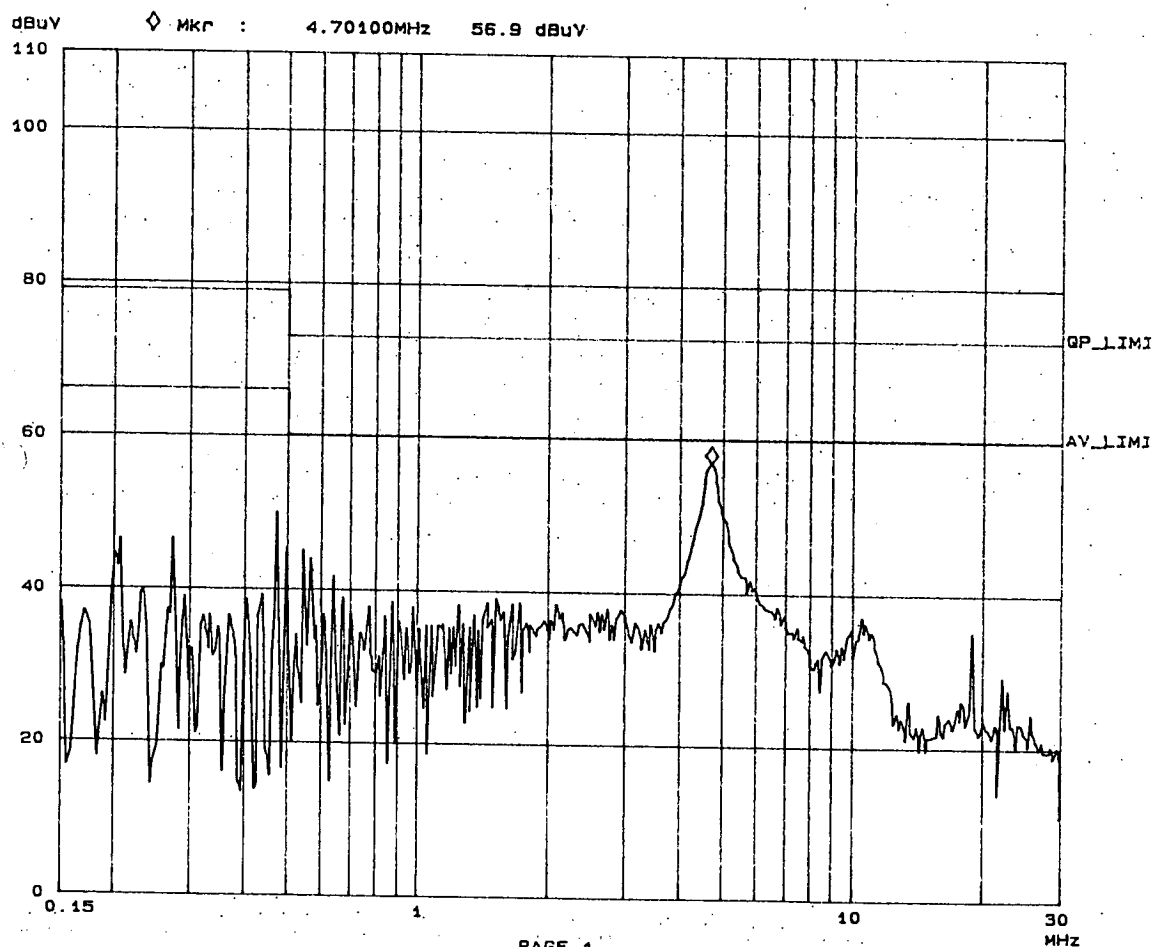
**Table 2: Conducted Emission, AC Mains; 150 kHz - 30 MHz**

Freq.	L1 Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L1		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.204	51.7	0.0	50.3	0.0	79.0	69.0	27.3	0.0	28.7	0.0
0.234	50.4	0.0	50.2	0.0	79.0	69.0	28.6	0.0	28.8	0.0
0.302	47.8	0.0	47.8	0.0	79.0	69.0	31.2	0.0	31.2	0.0
0.506	49.0	0.0	49.5	0.0	73.0	63.0	24.0	0.0	23.5	0.0
4.701	56.5	0.0	57.2	0.0	73.0	63.0	16.5	0.0	15.8	0.0
10.817	35.6	0.0	33.1	0.0	73.0	63.0	37.4	0.0	39.9	0.0

Figure 1: Conducted Emission, AC Mains (L1); 0.15 - 30 MHz

ADT CO.SITE-2  
EN55022 CLASS A

EUT: PPC-100T  
Op Cond: FULL SYSTEM  
Operator: TOMMY  
Test Spec: LISN : L1  
Comment: 230V AC/50Hz

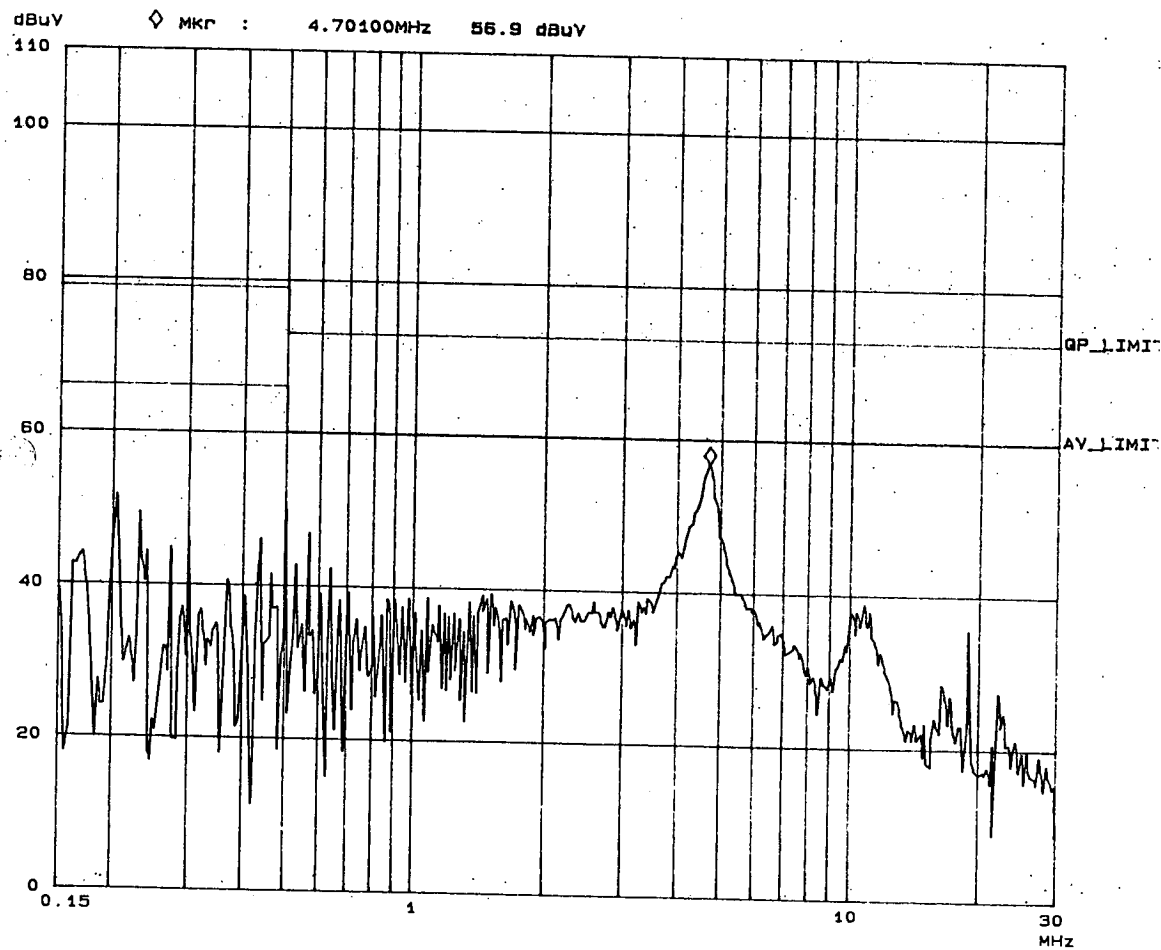


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Figure 2: Conducted Emission, AC Mains (N); 0.15 - 30 MHz

ADT CO.SITE-2  
EN55022 CLASS A

EUT: PPC-100T  
Op Cond: FULL SYSTEM  
Operator: TOMMY  
Test Spec: LISN : N  
Comment: 230V AC/50Hz



#### **4.1.2. Radiated Emission**

Port: Enclosure  
Basic Standard: EN 55 022:1994, clause 6  
Frequency Range: 30 - 1000 MHz  
Limits: clause 6, table 3, **(class A)**

**Result:**

**PASS**

#### **Test Setup**

Input Voltage: AC 230 V ,50 Hz  
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2

Earthing: through power

QP-Measurements were carried out at frequencies where the highest levels for Peak-Measurements were monitored. It was found, that this levels are well below the limit for QP-measurements and it is considered that the levels at all other frequencies are also below this limit.



Table 3: Radiated Emission, 30 - 1000 MHz

Settings

Frequency			Settings		
Start	Stop	Step Size	IF Bandwidth	Detector	Meas. Time
30 MHz	1 GHz		120 kHz	QP	20 ms

Frequency (MHz)	Result (dBuV/m)		Limit (dBuV/m)	Margin (dBuV/m)	
	Hor.	Ver.		Hor.	Ver.
116.43	25.9	0	40.0	-14.1	0
133.64	24.1	0	40.0	-15.9	0
200.45	24.3	0	40.0	-15.7	0
201.39	22.4	0	40.0	-17.6	0
226.55	25.4	0	40.0	-14.6	0
276.90	29.8	0	47.0	-17.2	0
377.59	33.7	0	47.0	-13.3	0
427.95	37.4	0	47.0	-9.6	0
116.44	0	26.1	40.0	0	-13.9
141.59	0	22.5	40.0	0	-17.5
176.20	0	23.6	40.0	0	-16.4
182.50	0	23.2	40.0	0	-16.8
191.90	0	29.4	40.0	0	-10.6
200.12	0	33.6	40.0	0	-6.4
226.54	0	30.9	40.0	0	-9.1
277.16	0	36.9	47.0	0	-10.1
400.91	0	33.3	47.0	0	-13.7
503.34	0	32.6	47.0	0	-14.4

**Figure 3: Radiated Emission, 30 - 1000 MHz (horiz. pol.)**

Model:PPC-100T

Mode:

EMI Type:EN55022 Class A

Freq. Range:30-1000 MHz

Antenna:CHASE Bi\_Log

Test Date:05 DEC 1996

Remark:FULL SYSTEM

Distance:10 M

Detector:CISPR,QUASI\_Peak

Ant. Polarization:HORIZONTAL

Tested By : \_\_\_\_\_

Report No. : EC96205

No.	Freq.(MHz)	Emission(dBuV)
1	116.4	25.9
3	200.5	24.3
5	226.6	25.4
7	377.6	33.7

No.	Freq.(MHz)	Emission(dBuV)
2	133.6	24.1
4	201.4	22.4
6	276.9	29.8
8	428.0	37.4

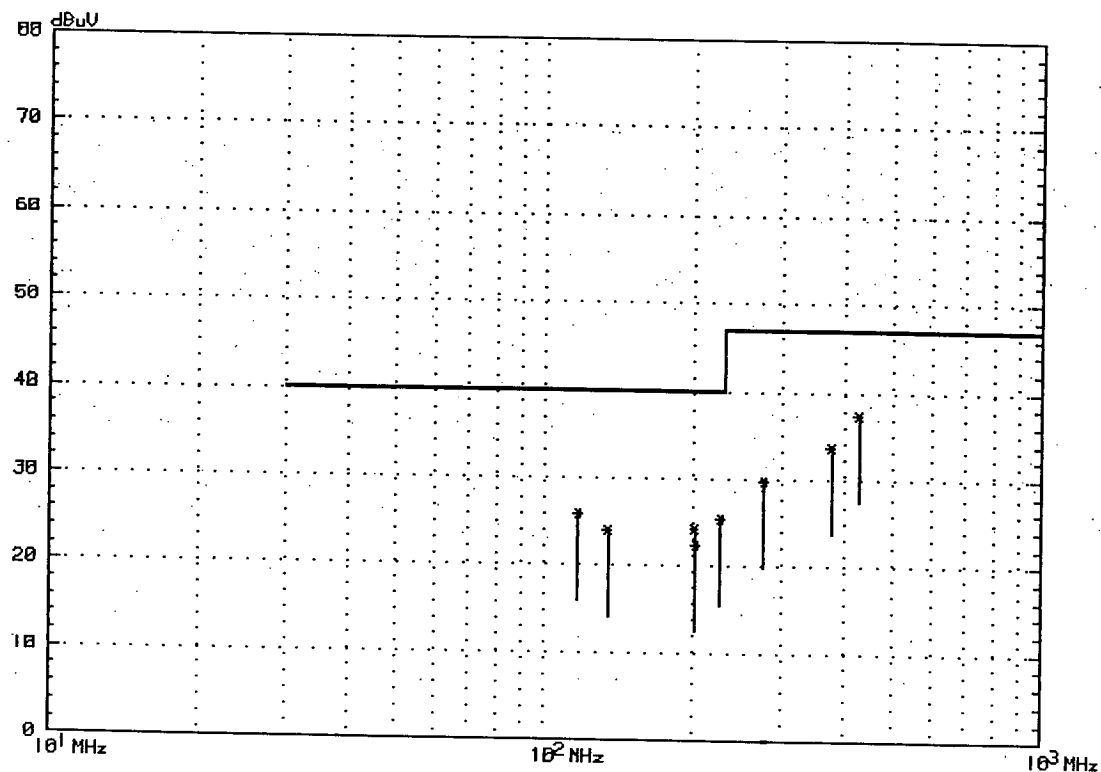




Figure 4: Radiated Emission, 30 - 1000 MHz (vert. pol.)

Model:PPC-100T

Mode:

EMI Type:EN55022 Class A

Freq. Range:30-1000 MHz

Antenna:CHASE Bi\_Log

Test Date:05 DEC 1996

Remark:FULL SYSTEM

Distance:10 M

Detector:CISPR,QUASI\_Peak

Ant. Polarization:VERTICAL

Tested By : \_\_\_\_\_

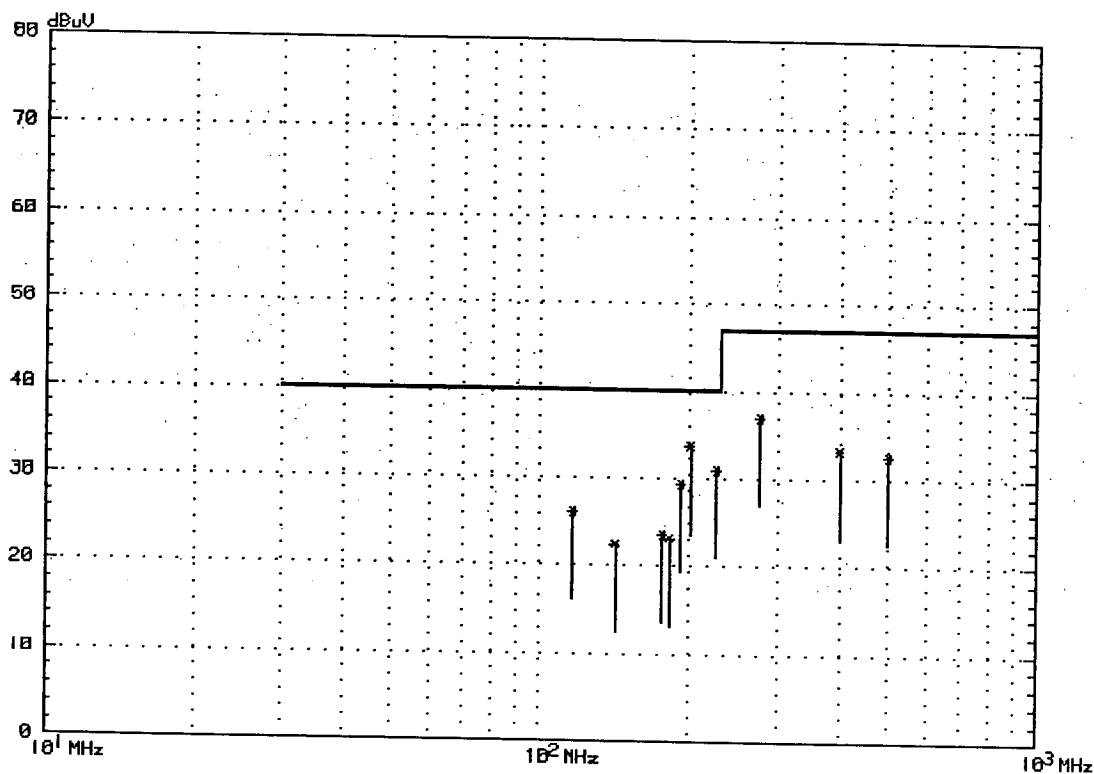
Report No. : EC96205

No. Freq.(MHz) Emission(dBuV)

1	116.4	26.1
3	176.2	23.6
5	191.9	29.4
7	226.5	30.9
9	400.9	33.3

No. Freq.(MHz) Emission(dBuV)

2	141.6	22.5
4	182.5	23.2
6	200.1	33.6
8	277.2	36.9
10	503.3	32.6





## **4.2. Disturbances in Supply Systems**

### **4.2.1. Harmonics**

Port: Mains  
Basic Standard: EN 61 000-3-2  
Limits: EN 61 000-3-2, clause 7

**Result:**

N/A

The equipment as described was found to be 'class D'-equipment. Since the input power was measured to be below 75 W, this item is not applicable to the Panel PC.

### **4.2.2. Voltage Fluctuations**

Port: Mains  
Basic Standard: EN 61 000-3-3  
Limits: EN 61 000-3-3, clause 5

**Result:**

PASS

#### **Test Setup**

Input Voltage: AC 230 V, 50 Hz  
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2  
Earthing: through power

**Table 4: Voltage Fluctuation and Flicker**

Input Voltage : 230.60 Vrms      Input Amperes: 0.253 Arms  
 Power Factor : 0.494      Power Frequency: 50 Hz  
 Observation period (Tp): 2 hour

Test Parameter	Measurement Value	Limitation	Remark
Pst	0.141	1.0	pass
Plt	0.099	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

**Result:**

**PASS**

### 5.1. Enclosure Port

#### 5.1.1. Radio-Frequency Electromagnetic Field

Port:	Enclosure		
Basic Standard:		ENV 50 140	ENV 50 204
Performance Criteria:	A		
Test Specification:	EN 50 082-2		
	Frequency Range:	80 - 1000 MHz	900 ± 5 MHz
	Field Strength:	10 V/m (unmodulated) (= level 3 of ENV 50 140)	10 V/m (unmodulated)
	Modulation:	1 kHz AM 80%	200 Hz Pulse 50 % duty cycle

**Result:**

**PASS**

#### Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power
Temperature:	23 °C
Humidity:	51 %RH

**Table 5: Radio-Frequency Electromagnetic Field**

**Test Result**

A. Frequency range : 80 MHz - 1 GHz

Severity level (V/m)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
10	A	A	<b>PASS</b>

No degradation in performance was monitored during and directly after application of the H.F. electromagnetic interference field.

B. Frequency : 900 MHz +/- 5 MHz

Severity level (V/m)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
10	A	A	<b>PASS</b>

No degradation in performance was monitored during and directly after application of the H.F. electromagnetic interference field.

### 5.1.2. Power Frequency Magnetic Field Immunity

Port: Enclosure  
Basic Standard: EN 61 000-4-8  
Performance Criteria: A

Test Specification: EN 50 082-2  
Frequency: 50 Hz  
Magnetic Field Strength 30 A/m Level 4

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230 V, 50 Hz  
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2  
Earthing: through power  
Temperature: 23 °C  
Humidity: 51 %RH

Severity level (Arms/m) , 50 Hz	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
30	A and B, respectively *)	A	<b>PASS</b>

\*) Display interference is allowed to be criterion B above 3 A/m

No degradation in performance was monitored during and directly after application of the magnetic field.

### 5.1.3. Electrostatic Discharge

Port: Enclosure  
 Basic Standard: EN 61 000-4-2  
 Performance Criteria: B  
 Test Specification: EN 50 082-2  
 Voltage: 8 kV (Air Discharge)  
 (= level 3 of EN 61 000-4-2)  
 4 kV (Contact Discharge)  
 (= level 2 of EN 61 000-4-2)

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230 V, 50 Hz  
 Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2  
 Earthing: through power  
 Temperature: 21 °C  
 Humidity: 51 %RH

**Table 6: Electrostatic Discharge**

Severity level	EN 50 082-2 requirement			Performance criteria			Test results
	Air discharge	Contact discharge	HCP/VCP discharge	Air discharge	Contact discharge	HCP/VCP discharge	
4 KV	NR	B	B	NR	A	A	<b>PASS</b>
8 KV	B	NR	NR	A	NR	A	<b>PASS</b>

**Note:**

- 1) NR means there is no requirement.
- 2) Test Points: Air Discharge for non-conducted parts  
 Contact Discharge for conducted parts

No degradation in performance was monitored during and directly after application of the electrostatic discharges.

## 5.2. Input and Output AC Power / Signal and Control Ports

### 5.2.1. Conducted Disturbances

Port: AC mains input  
 Basic Standard: ENV 50 141  
 Performance Criteria: A  
 Test Specification: EN 50 082-2  
 Frequency Range: 0.15 - 80 MHz  
 Voltage Level: 10 Vrms (unmodulated)  
 Modulation: AM 80 %, 1 kHz sine wave  
 (= level 3 of ENV 50 141)

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230 V, 50 Hz  
 Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2  
 Earthing: through power  
 Temperature: 23 °C  
 Humidity: 51 %RH

#### Test Result:

Severity Level (Vrms)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test Results
10	A	A	<b>PASS</b>

No degradation in performance was monitored during and directly after application of the injected interferences.

### 5.2.2. Fast Transients Common Mode

Port: AC supply terminals Signal and control lines

Basic Standard: EN 61 000-4-4

Performance B

Criteria:

Test Specification: EN 50 082-2 Power Lines Control Lines

Peak Voltage: 2 kV 2 kV

(= level 3) (= level 4)

$T_r/T_n$  5/50 ns

Rep. frequency 5 kHz

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230 V, 50 Hz

Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2

Earthing: through power

Temperature: 23 °C

Humidity: 51 %RH

**Table 7: Fast Transients Common Mode**

Severity level	EN 50 082-2 requirement		Performance Verification (Criteria)		Test Results
Coupling mode	AC line	I/O line	AC line	I/O line	
1 kV clamp	NR	NR*	NR	NR*	<b>PASS</b>
2 kV direct	B	NR	A	NR	<b>PASS</b>

Remark: NR means there is no requirement

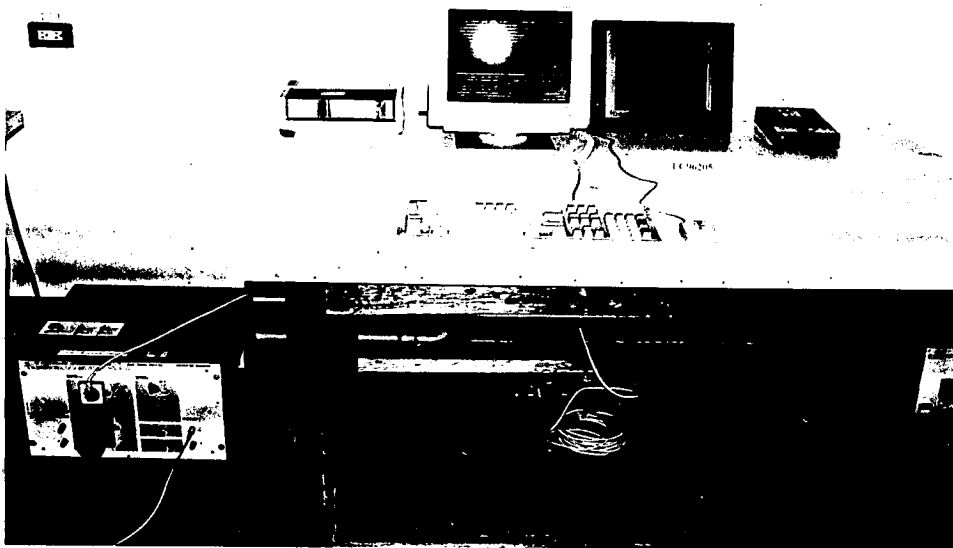
NR\* means there was no requirement as in the configuration submitted for testing there were no signal lines longer than 3 m

No degradation in performance was monitored during and directly after application of the electrical fast transients.



## 6. Photographs of the Test Set-up

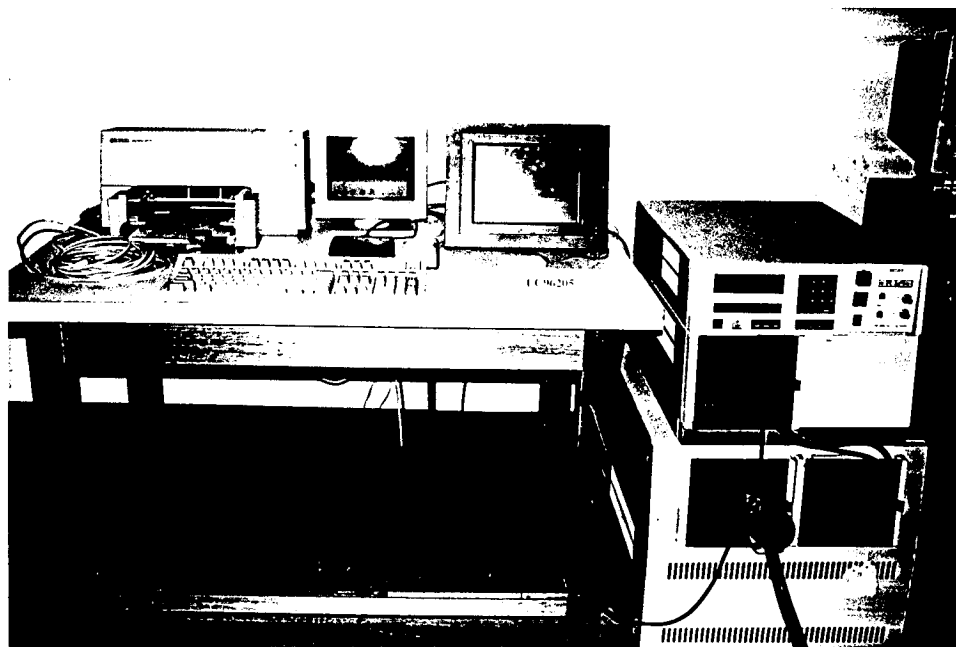
Picture 1: Conducted Emission



Picture 2: Radiated Emission



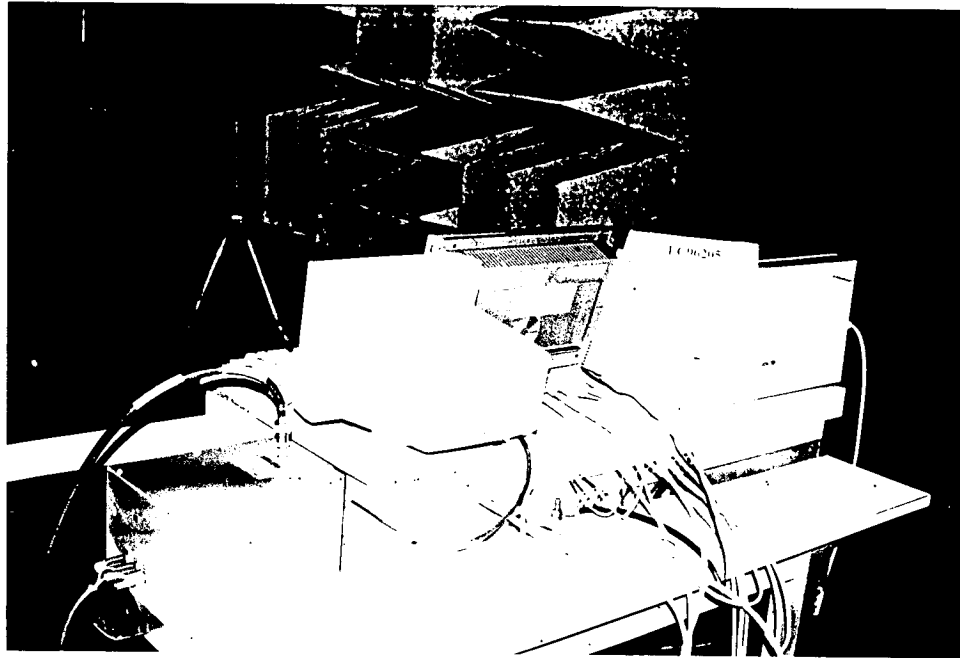
**Picture 3: Voltage Fluctuations & Flicker**



**Picture 4: Radiated Susceptibility, Frequency Range 80 MHz to 1000 MHz**



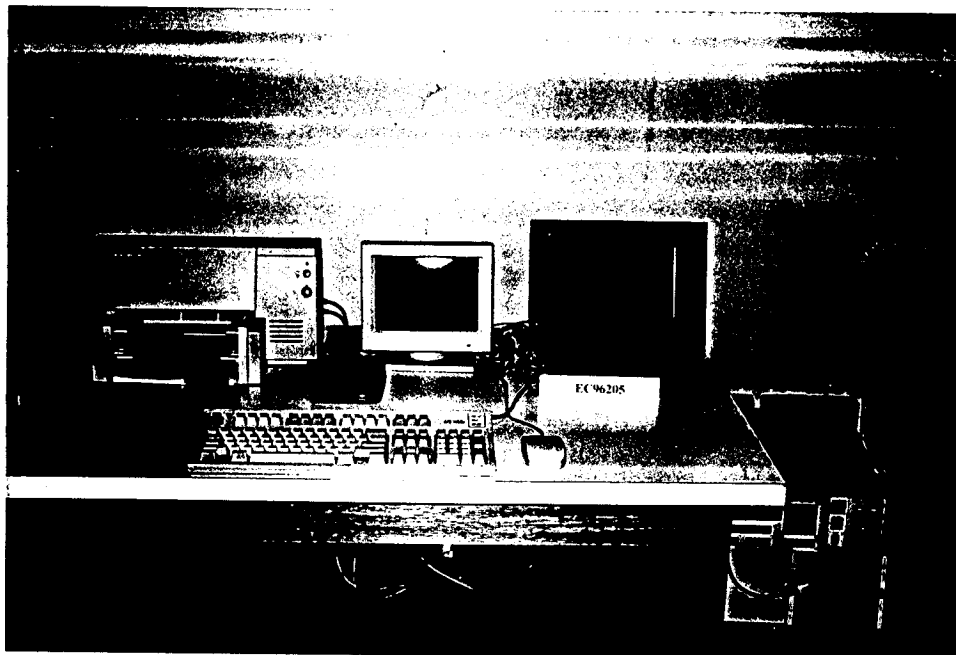
Picture 5: R.F. Conducted Susceptibility



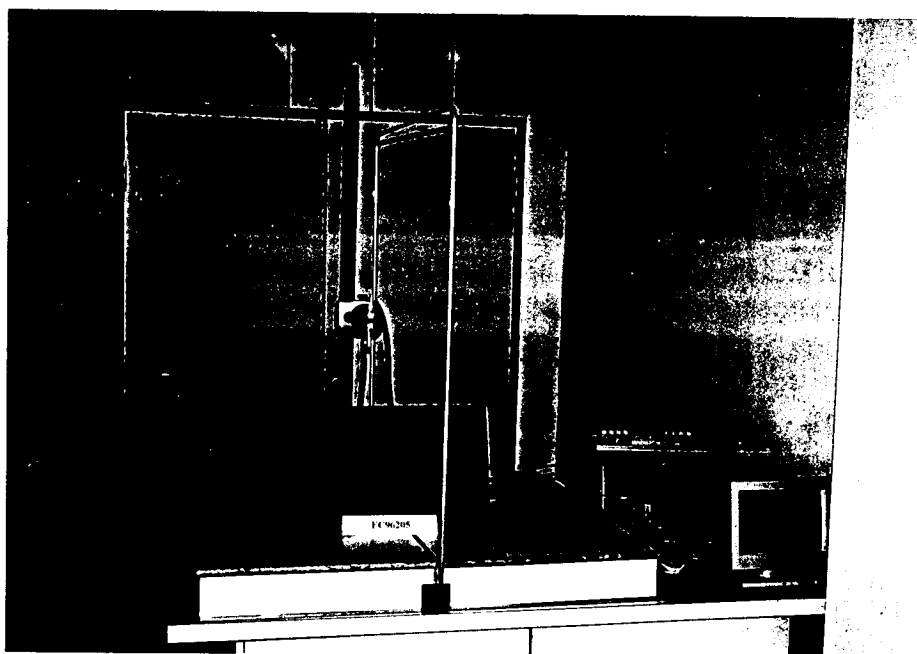
Picture 6: Electrostatic Discharge



Picture 7: Fast Transients on AC Mains



Picture 8: Magnetic Field Susceptibility



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**Gesehen**

den 20.12. 1996  
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