

**TÜV Rheinland**

Technischer Überwachungs-Verein Rheinland

# Certificate of Compliance

No. I-9763097-9701

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

**CPU Card**  
**PCA-6144V**

is in compliance with  
EN 50 082-1:1992, EN 55 022:1994 Class A  
as described in the Technical Report P 9763097E01.

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, 24.01.1997

  
Dipl.-Ing. K. Heinz  
Certification Centre

  
Dipl.-Ing. R. Charton  
Testing Centre

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



**Testreport No: P9763097E01**

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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:**

CPU Card

**Type Designation:**

PCA-6144V

**Standard:**

EN 50 082-1:1992

EN 55 022:1994 Class A

IEC 801-2:1984

IEC 801-3:1984

IEC 801-4:1988

**Date of Receipt of Test Item:**

Oct.1996

**TÜV Rheinland**  
Product Safety GmbH

**Date of Testing:**

23.10.1996 / 08.11.1996

P 9 7 6 3 0 9 7

**Test result:** The above mentioned product has been tested and

**passed.**

**Der Sachverständige:**

tested by

**überprüft:**

reviewed by

**Gesehen**

71. 07.97

Date, signature

Gen. 24.01. 1997  
TÜV Rheinland Product Safety GmbH

20197  
Date, signature

**Other aspects:**

**This equipment is tested against the requirements for apparatus intended to be used in the industrial environment. However, this equipment might require a special permit by the competent authorities if used in residential or light industrial environment.**

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**

Electronics Testing Center, Taiwan

EMS Test Site:

No. 8 Lane 29, Wen-Ming Rd., Lo-Shan Tsun, Kuei-Shan Hsiang, Taoyuan, Taiwan, R.O.C.

EMI Test Site:

No. 34, Neighborhood 5, Ding Fu Tsuen, Linkou Hsiang, Taipei Hsien, 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 CPU Card for general use as an accessory to Industrial PC chassis in the Industrial Environment.

### **2.2. Rating and Physical Characteristics**

<b>Model No.</b>	<b>Input Voltage</b>	<b>Protection Class</b>
PCA-6144V	DC 5V @ 3.5A, DC $\pm$ 12V	Class III

### **2.3. Sources of Interference**

1. Switching frequency of Power Supply of IPC frame:  $\leq$  100 kHz
2. Pulses on clock or other lines of CPU card or peripheral cards:

### **2.4. Noise Suppression Parts**

Various SMD capacitors on CPU-Card.

## **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 CPU Card was run with a set up as described in paragraph 3.2 and 3.3.

The EUT was tested with the following configuration:

Model No.	<b>PCA-6144V</b>
Computer Chassis	IPC-610
Backplane	PCA-6114P3
Processor	Intel DX2-66
Display Card	Built-in Trident 9440
RAM	8 MB
Power Supply	250 W
FDD	1.44 MB
HDD	IDE HDD, SCSI HDD

A test program generating a complete line of continuously repeating "H" pattern was used. The program was executed as follows:

- a. Read and Write to the disk drives.
- b. Send "H" pattern to the video port device (Monitor)
- c. Send "H"-pattern to the COM port devices (Modem)
- d. Send test signal to the keyboard and mouse.
- e. Repeat the above steps

### **3.2. Additional Equipment**

For Susceptibility Testing the CPU Card was set up in a configuration as described in para.: 3.1 and with the following additional equipment:

“CTX” Monitor, type 1765S,  
“HP” Keyboard, type C1405B  
“Smart Link” Modem, type 2400U  
“Lemel” Mouse, type MUS1G  
“Panasonic” Printer, type KX-P1080i

For Emission Testing the CPU Cards were set up in a configuration as described in para.: 3.1 and with the additional equipment “Lemel” Mouse, type MUS0G, “HP” Printer, type 2225C+, an “NEC” Monitor

### **3.3. Test Setup**

The test setup was realized on a table of 40 cm height during all EMI tests. An unshielded power cable of about 2 m length was used. The following cable lengths were used:

PC	1.5 m unshielded	power cord
Mouse	1.5 m unshielded	signal cable
Modem	1.8 m shielded	signal cable
Printer	1.2 m shielded	signal cable
Keyboard	1.2 m shielded with core	signal cable
Monitor	1.5 m shielded with core	signal cable

### 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	Calibrated on
Test Receiver	Rohde & Schwarz	ESH3	880646/032	MAY 13, 1996
L.I.S.N.	Rohde & Schwarz	ESH2-Z5	881362/009	MAY 23, 1996
Spectrum Monitor	Rohde & Schwarz	EZM	861960/024	N/A
Shielded Room	Riken	N/A	N/A	N/A

For Radiated Emission:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated on
Test Receiver	Rohde & Schwarz	ESVP	861743/025	SEP. 23, 1996
Spectrum Analyzer	Hewlett-Packard	8568B	2521A00885	MAY 09, 1996
Biconical Antenna	EMCO	3108	9203-2454	APR. 13, 1996
Log Periodic Antenna	EMCO	3146	1711	APR. 17, 1996
Amplifier	Hewlett-Packard	8447D	2727A05401	OCT. 18, 1996
Quasi-Peak Adaptor	Hewlett-Packard	85650A	2648A00495	MAY 09, 1996
RF Preselector	Hewlett-Packard	85685A	2521A0885	MAY 09, 1996

For ESD:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated on
ESD Test System	KeyTek	Series 2000	9403372	MAY 18, 1996

**For Radiated Susceptibility:**

<b>Kind of Equipment</b>	<b>Manufacturer</b>	<b>Type</b>	<b>S/N</b>	<b>Calibrated on</b>
SIGNAL GENERATOR	MARCONI	2030	119665/069	OCT. 08, 1996
Power Amplifier (27~80MHz)	KALMUS	225LCR	052695-3	JUN. 17, 1996
Power Amplifier (80~1000MHz)	KALMUS	7100LC	052695-2	MAY 08, 1996
RF Voltmeter	BOONTON	9200B	326401AE	OCT. 09, 1996
RF Voltmeter	BOONTON	9200B	327001AE	OCT. 09, 1996
Isotropic Electric Field Probe	HOLADAY	HI-4422	89295	AUG. 29, 1996
Fiber Optic/RS-232 Interface	HOLADAY	HI-4413G	N/A	N/A
GTEM CELL	EMCO	5317	N/A	N/A
RF-Switch	COMTEST	RF-6	N/A	N/A
Controller	HP	Vectra VL2 4/33	3510F50465	N/A

**For EFT:**

<b>Kind of Equipment</b>	<b>Manufacturer</b>	<b>Type</b>	<b>S/N</b>	<b>Calibrated on</b>
EFT /BURST Generator	KeyTek	801-4	9110223	MAY 18, 1996

### 3.5. Abbreviations

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



## **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 - 30MHz  
Limits: Mains Terminal, table 1 (**Class A**)

**Result:**

**PASS**

#### **Test Setup**

Input Voltage: AC 230V, 50Hz into IPC  
Operational mode: ON  
Earthing: through power cord of IPC

If the result of the measurement with the Quasi Peak detector is below the Average limit the measurement with Average detector can be omitted.

Disturbances other than those mentioned are small or not detectable.

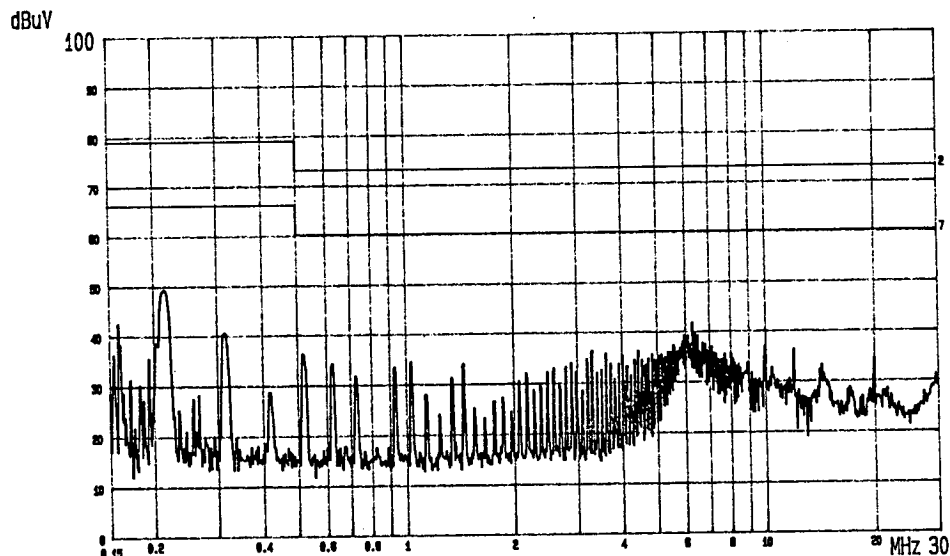
**Table 1: Conducted Emission, AC Mains; 0.15 - 30MHz**

**Settings**

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

Freq.	N Level		L1 Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		N		L1	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.204	44.9	----	43.0	----	79.0	66.0	34.1	N/A	36.0	N/A
0.309	35.3	----	32.7	----	79.0	66.0	43.7	N/A	46.3	N/A
3.296	30.7	----	32.7	----	79.0	66.0	48.3	N/A	46.3	N/A
6.285	36.0	----	39.0	----	73.0	60.0	37.0	N/A	34.0	N/A
9.998	31.6	----	34.4	----	73.0	60.0	41.4	N/A	38.6	N/A
14.319	24.2	----	34.5	----	73.0	60.0	48.8	N/A	38.5	N/A
20.001	33.2	----	34.3	----	73.0	60.0	39.8	N/A	38.7	N/A

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

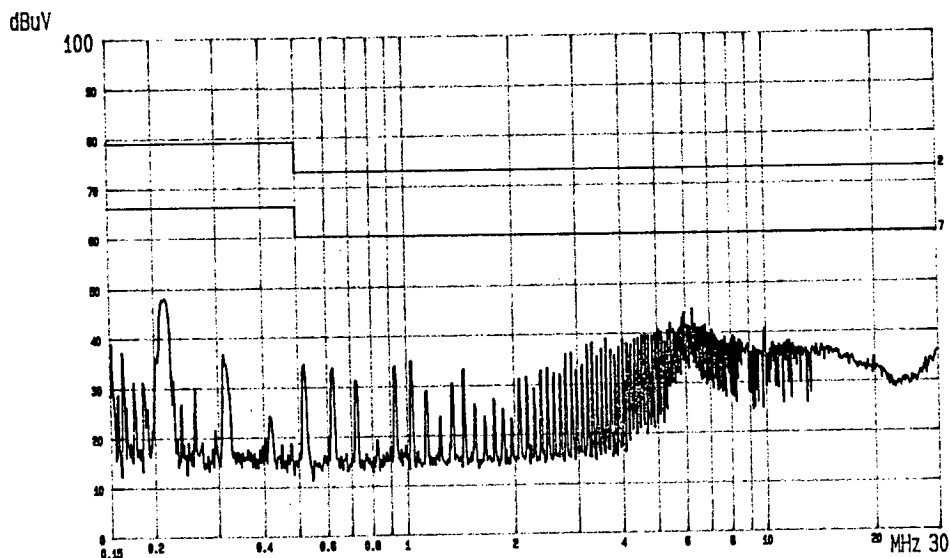


EN55022 CONDUCTED TEST  
MODEL NO: PCA-6144V

EUT: CPU CARD  
POWER: 230V/50Hz

LISN: N

2: GP., 7: AVG LIMIT  
ETC EMI LAB.



EN55022 CONDUCTED TEST  
MODEL NO: PCA-6144V

EUT: CPU CARD  
POWER: 230V/50Hz

LISN: L1

2: GP., 7: AVG LIMIT  
ETC EMI LAB.



#### 4.1.2. Radiated Emission

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

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230V, 50Hz into IPC  
Operational mode: ON  
Earthing: through power cord of IPC

Disturbances other than those mentioned are small or not detectable.

**Table 2: Radiated Emission, Mains; 30 - 1000MHz**

**Settings**

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

Frequency (MHz)	Result (dBuV/m)		Limit (dBuV/m)	Margin (dBuV/m)	
	Hor.	Ver.		Hor.	Ver.
	20.1	32.5	40.0	19.9	7.5
46.860	20.1	32.5	40.0	19.9	7.5
48.100	23.7	33.2	40.0	16.3	6.8
51.340	20.1	33.4	40.0	19.9	6.6
136.682	25.8	21.9	40.0	14.2	18.1
176.675	26.5	17.6	40.0	13.5	22.4
183.332	26.5	21.0	40.0	13.5	19.0
243.300	33.3	25.5	47.0	13.7	21.5
333.624	29.1	22.5	47.0	17.9	24.5

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

### **4.2.1. Harmonics**

Port: Mains  
Basic Standard: EN 61000-3-2  
Limits: clause 7.3

**Result:**

N/A

As there is no direct connection to mains this item is not applicable.

### **4.2.2. Voltage Fluctuations**

Port: Mains  
Basic Standard: EN 61000-3-3  
Limits: EN 61000-3-3, clause 5

**Result:**

N/A

As there is no direct connection to mains this item is not applicable.

## 5. Test Results IMMUNITY

**Result:**

**PASS**

### 5.1. Enclosure port

#### 5.1.1. Radio-Frequency Electromagnetic Field

Port:	Enclosure
Basic Standard:	IEC 801-3
Performance Criteria:	A
Test Specification:	EN 50 082-1
	Frequency. Range: 27 - 500MHz
	Field Strength 3V/m (unmodulated)
	(= level 2 of IEC 801-3)

**Result:**

**PASS**

#### Test Setup

Input Voltage:	AC 230V, 50Hz into IPC
Operational mode:	ON
Earthing:	through power cord of IPC
Temperature	15-20 °C
Relative Humidity	50-60 %

**Table 3: Radio-frequency electromagnetic field; 27 - 270MHz**

**Settings**

Frequency			Settings		
Start	Stop	Step Size	Field Strenght	Sweep mode	Meas. Time
27MHz	270MHz	73kHz	3V/m	auto	200ms

No abnormalities were observed during and directly after the test .

**Table 4: Radio-frequency electromagnetic field; 270 - 500MHz**

**Settings**

Frequency			Settings		
Start	Stop	Step Size	Field Strenght	Sweep mode	Meas. Time
270MHz	500MHz	728kHz	3V/m	auto	200ms

No abnormalities were observed during and directly after the test.



### 5.1.2. Electrostatic Discharge

Port: Enclosure  
 Basic Standard: IEC 801-2  
 Performance Criteria: B  
 Test Specification: EN 50 082-1  
 Voltage: 8kV (Air Discharge)  
 (= level 3 of IEC 801-2)

**Result:**

**PASS**

#### Test Setup

Input Voltage: AC 230V, 50Hz into IPC  
 Operational mode: ON  
 Earthing: through power cord of IPC  
  
 Temperature 15-20 °C  
 Relative Humidity 50-60 %

**Table 5: Electrostatic Discharge**

Testpoint	Polarity	Number of Discharges	Observation	Result
Housing of IPC	+	10	normal function	<b>PASS</b>
Connectors (backside)	+	10	normal function	<b>PASS</b>

No abnormalities were observed during and directly after the test.

## 5.2. Input and Output AC Power Ports

### 5.2.1. Fast Transients Common Mode

Port: Mains Plug of IPC  
 Basic Standard: IEC 801-4  
 Performance B  
 Criteria:  
 Test Specification: EN 50 082-1  
     Peak Voltage: 1kV (= level 3 of IEC 801-4)  
      $T_r/T_n$  5/50ns  
     Burst Duration: 15ms  
     Rep. frequency 5kHz

<b>Result:</b>	<b>PASS</b>
----------------	-------------

#### Test Setup

Input Voltage: AC 230V, 50Hz into IPC  
 Operational mode: ON  
 Earthing: through power cord of IPC

Temperature 15-20 °C  
 Relative Humidity 50-60 %

Coupling: Coupling Network

**Table 6: Fast transients common mode (Input and output AC power ports)**

Testpoint	Polarity	Observation	Result
L	+/-	normal function	PASS
N	+/-	normal function	PASS
PE	+/-	normal function	PASS

### 5.3. Ports for Signal Lines

#### 5.3.1. Fast Transients Common Mode

Port: Signal Lines

Basic Standard: IEC 801-4

Performance B

Criteria:

Test Specification: EN 50 082-1

Peak Voltage: 0.5kV (= level 2 of IEC 801-4)

$T_r/T_n$  5/50ns

Burst Duration: 15ms

Rep. frequency: 5kHz

Coupling: Capacitive Clamp

**Result:**

**PASS**

#### Test Setup

Operational mode: ON

Earthing: through power cord of IPC

Temperature 15-20 °C

Relative Humidity 50-60 %

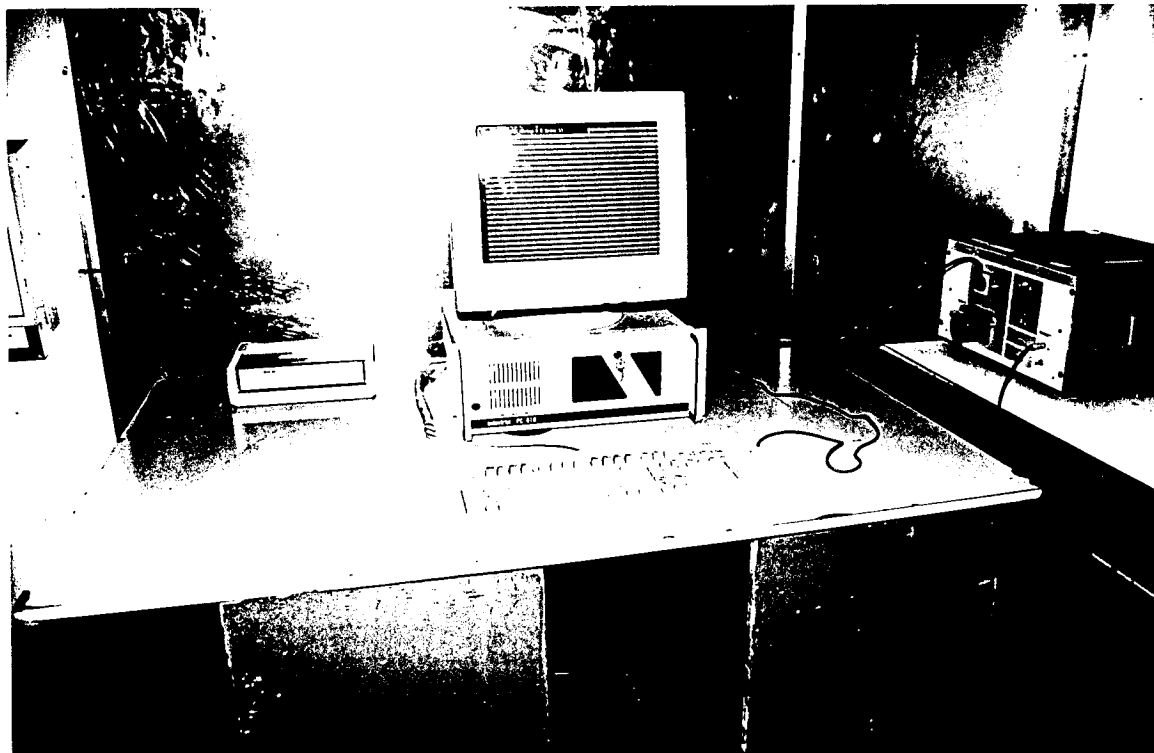
Coupling: Coupling Clamp

**Table 7: Fast transients common mode (Signal and Control Lines)**

Testpoint	Polarity	Observation	Result
Signal Lines	+/-	normal function	<b>PASS</b>

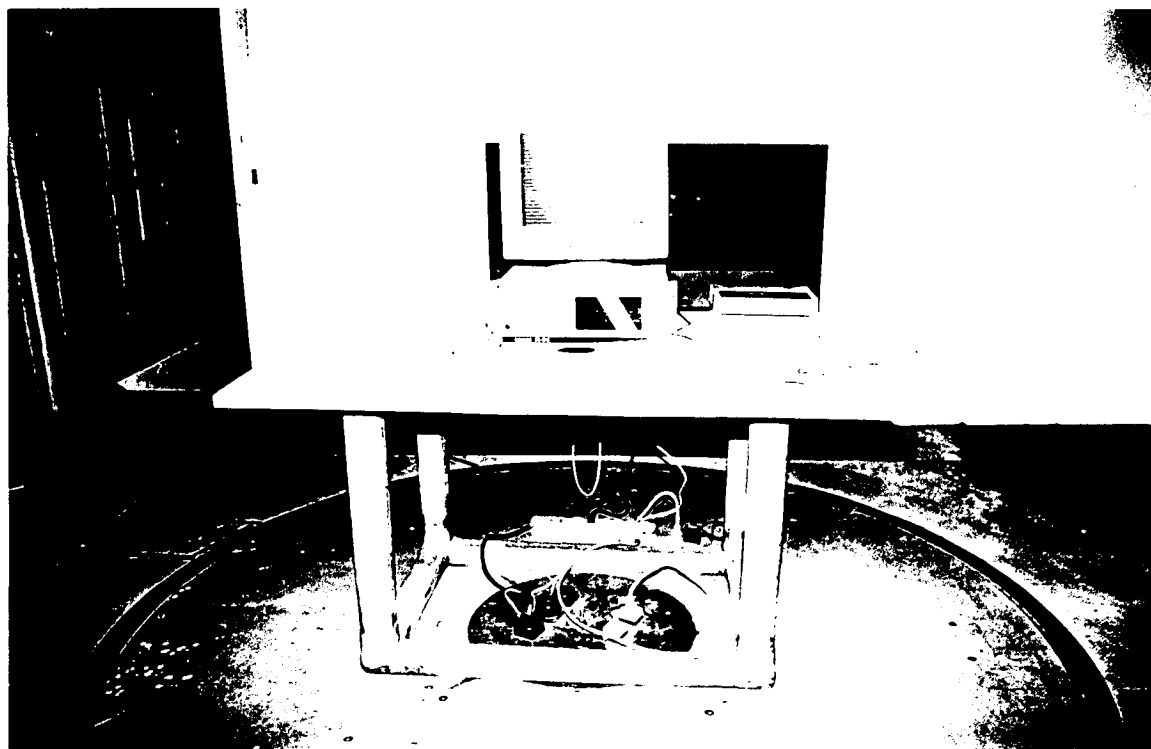
## 6. Photographs of the Test Set-up

Picture 1: Conducted Emission

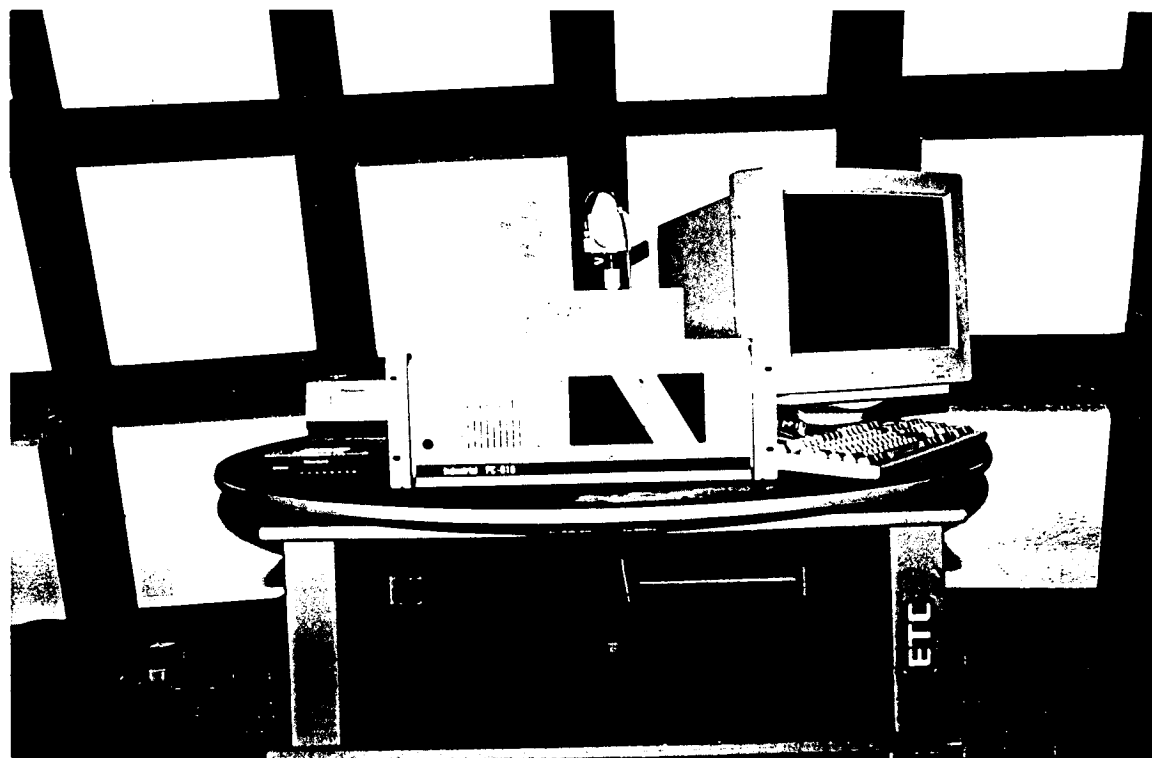


Picture 2: Radiated Emission

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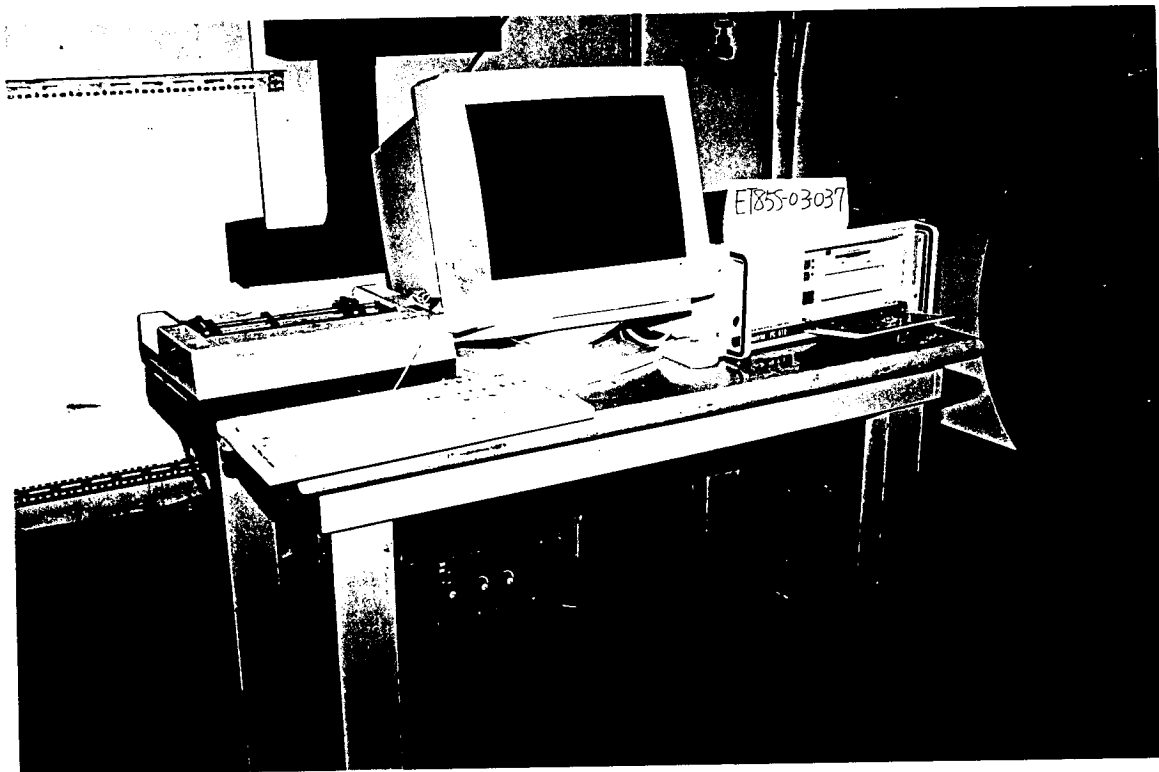
Picture 3: Radiated Susceptibility, Frequency Range 27MHz to 500Mhz



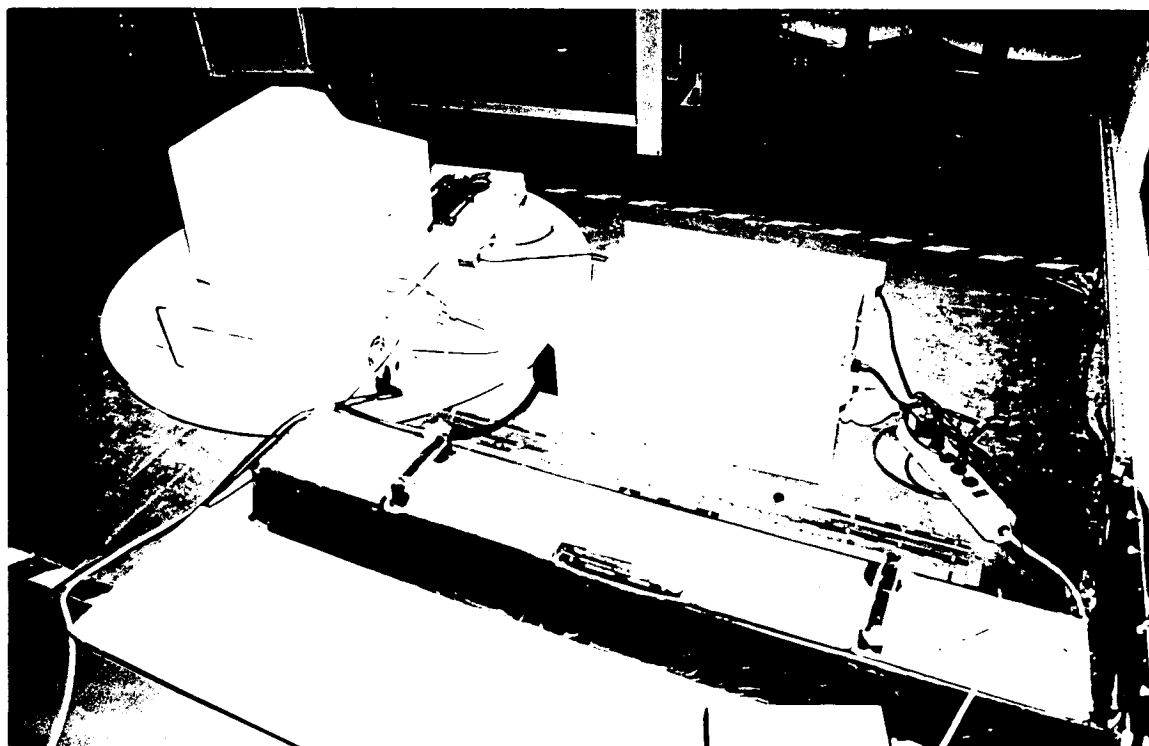
Picture 4: Electrostatic Discharge



Picture 5: Fast Transients on AC Mains



Picture 6: Fast Transients on Signal and Control Lines



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**Gesehen**

den 24.01.19  
TÜV Rheinland Product Safety GmbH

