TÜV Rheinland

Technischer Überwachungs-Verein Rheinland

Certificate

of

Compliance

No. I-9567696-9512

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

Advantech Co., Ltd.
5Fl., No. 108-3, Ming-Chuan Rd., Shin-Tien City, Taipei Hsien 231,
Taiwan, R.O.C.

has successfully demonstrated that its product

Industrial PC
IPC-610 series

is in compliance with
prEN 50 082-2:1992, EN 55 022:1994, EN 60 555-2:1987, EN 60 555-3:1987/A1:1991
IEC 801-2:1984, IEC 801-3:1984, IEC 801-4:1988

as described in the Technical Report P 9567696E01
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, 08.12.1995

Dipl.-Ing. K. Heinz
Certification Centre

i.A.
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

TÜV Rheinland Product Safety

Am Grauen Stein

D-51105 Köln

TÜV Rheinland

Testreport No: P9567696E01

about

Electromagnetic Compatibility

Applicant:	**Advantech Co., Ltd. 5Fl., No. 108-3, Ming-Chuan Rd. Shin-Tien City, Taipei Hsien 231, Taiwan**
Kind of Equipment:	**Industrial PC**
Type Designation:	**IPC-610 series**
Trade Mark:	**Advantech**
Standard:	**prEN 50 082-2:1992**, **IEC 801-2:1984**, **IEC 801-3:1984**, **IEC 801-4:1988**, **EN 55 022:1994**, **EN 60 555-2:1987**, **EN 60 555-3:1987/A1:1991**
Date of Receipt of Test Item:	**19.06.1995**
Date of Testing:	**23.07.1995**

Gesehen
den 11.12. 19 95
TÜV Rheinland Product Safety GmbH

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

Der Sachverständige:
tested by

08.12.95
Date, signature

geprüft:
reviewed by

08.12.1995
Date, signature

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

Other aspects:

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.

Content

1. TEST SITE **3**

2. DESCRIPTION OF THE TESTED SAMPLES **3**

2.1. GENERAL DESCRIPTION OF EQUIPMENT 3

2.2. RATING AND PHYSICAL CHARACTERISTICS 3

2.3. SOURCES OF INTERFERENCE 3

2.4. NOISE SUPPRESSION PARTS 3

2.5. SUBMITTED DOCUMENTS 4

3. MEASUREMENT CONDITIONS **4**

3.1. MODES OF OPERATION 4

3.2. ADDITIONAL EQUIPMENT 4

3.3. TEST SETUP 4

3.4. LIST OF TEST AND MEASUREMENT INSTRUMENTS 5

3.5. ABBREVIATIONS 6

4. TEST RESULTS E M I S S I O N **7**

4.1. CONTINUOUS INTERFERENCES 7

4.1.1. Conducted Emission (AC Mains) 7

4.1.2. Radiated Emission 11

4.2. DISTURBANCES IN SUPPLY SYSTEMS 17

4.2.1. Harmonics 17

4.2.2. Voltage fluctuations 20

5. TEST RESULTS I M M U N I T Y **21**

5.1. ENCLOSURE PORT 21

5.1.1. Radio-frequency electromagnetic field 21

5.1.2. Electrostatic Discharge 23

5.2. INPUT AND OUTPUT AC POWER PORTS 24

5.2.1. Fast transients common mode 24

6. PHOTOGRAPHS OF THE TEST SET-UP **25**

7. LIST OF TABLES **29**

8. LIST OF FIGURES **29**

9. LIST OF PICTURES **30**

1. Test Site

Taiwan Tokin EMC Eng. Corp.
No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei Hsien, Taiwan, R.O.C.

All tests were conducted by a TÜV Rheinland appointed inspector.

2. Description of the tested samples

2.1. General Description of equipment

The tested sample is a Industrial PC for general use in Industrial Environment.

2.2. Rating and Physical Characteristics

Input Voltage:	AC 100-120V/200-240V
Frequency:	50/60Hz
Input Current:	8A/5.2A
Protection Class:	Class I

2.3. Sources of Interference

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

1. Switching frequencies in Power Supply.
2. Pulses on clock or other lines of CPU card or peripheral cards

2.4. Noise Suppression Parts

1. In switching power supply: X-cap 0.47μF Y-cap 4.7nF Common mode choke 0.65mH
2. Enclosure of computer

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

Independent modes of operation are:

Operating the PC for AT & PS2 modes.

For modes used at each individual test as described herein please refer to the dedicated test paragraphs of this report.

The equipment was tested with the following internal configuration:

SWPS: Seasonic SSH-350G

CPU card: Advantec PCA-6147

CPU: Intel 80486DX2-66; clock rate 33MHz

FDD: TEAC FD-235HF

HDD: Conner CFS425A

3.2. Additional Equipment

The equipment has been tested as an independent unit with additional accessories as described below.

3.3. Test Setup

The Industrial PC was tested with a "EFA" Monitor type XN-15 , a "Datacomp" Keyboard type DFK191F for AT mode , a "BTC" Keyboard type BTC-5139 for PS2 mode , a "Datatronics" Modem type AT-1200CK, a "Team" Modem type 1200AT.

3.4. List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For EMI conduction Test :

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Spectrum Monitor	Rohde & Schwarz	EZM	N/A	Jan. 1996
Test Receiver	Rohde & Schwarz	ESH3	N/A	Dec. 1995
A.M.N.	Rohde & Schwarz	ESH2-Z5	N/A	Jan. 1996
Plotter	HP	7550A	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A

For EMI radiated test : (No. 2 Open Test Site)

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Spectrum Analyzer	Anritsu	MS2601A	MT60755	N/A
Test Receiver	Rohde & Schwarz	ESVP	861190/011	May. 1996
Pre-Amplifier	HP	8447D	2727A06166	May. 1996
Computer	--	386AT	N/A	N/A
Printer	NEC	P5300	N/A	N/A
Broadband Antenna	Schwarzbeck	BBA 9106	N/A	Feb. 1996
Broadband Antenna	Schwarzbeck	UHALP9107	N/A	Feb. 1996
Dipole Antenna	Schwarzbeck	VHA 9103	N/A	Aug. 1996
Dipole Antenna	Schwarzbeck	UHA 9105	N/A	Aug. 1996

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

For EMS Test :

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
ESD Simulator	Keytek	ESD-1	N/A	Aug. 1996
EFT/B Noise Simulator	Keytek	E411	N/A	Jun. 1996
Signal Generator	Maconi	2031	N/A	Nov. 1995
Power Amplifier	A & R	100A100	N/A	Nov. 1995
Power Amplifier	A & R	25W1000M7	N/A	Nov. 1995
Fielded Strength Meter	A & R	FM2000	N/A	Nov. 1995
Fielded Strength Sensor	A & R	FP2000	N/A	Nov. 1995
Power Antenna	A & R	AT1080	N/A	Nov. 1995
Power Antenna	EMCO	3108	N/A	Dec. 1995

3.5. Abbreviations

PASS means 'complied with requirement'	**N/A** means 'not applicable'
FAIL means 'not complied'	**?** means 'open item'

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 2 (Class B)

Result:	PASS

Test Setup

Input Voltage: AC 230V, 50Hz
Operational mode: ON
Test Mode AT, PS2
Earthing: through power cord

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 2: Conducted Emission, AC Mains; 0.15 - 30MHz

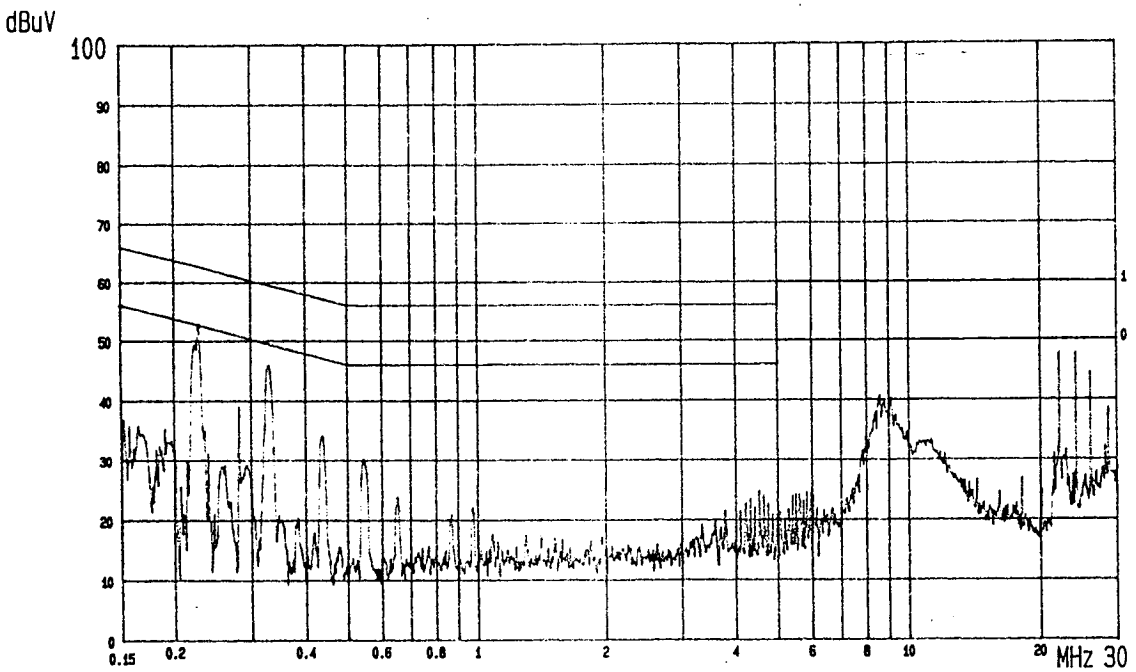
Settings

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

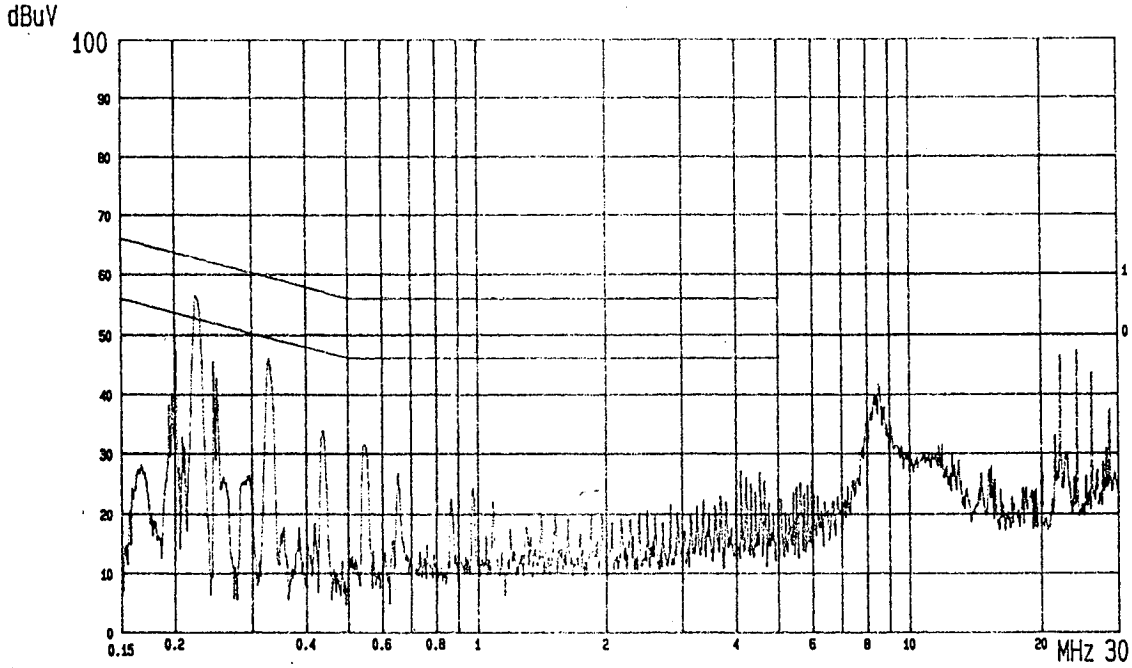
Freq.	N Level		L1 Level		Limit		Margin [dB (µV)]			
[MHz]	[dB (µV)]		[dB (µV)]		[dB (µV)]		N		L1	
For AT mode	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.215	54.2	45.1	53.3	40.4	62.9	52.9	8.7	7.8	9.6	12.5
0.322	42.6	40.8	42.4	41.1	59.5	49.5	16.9	8.7	17.1	8.4
0.435	34.2	30.2	32.1	31.1	57.1	47.1	22.9	16.9	25.0	16.0
8.490	37.2	36.1	38.7	37.3	60.0	50.0	22.8	13.9	21.3	12.7
22.140	44.8	43.7	44.1	43.7	60.0	50.0	15.2	6.3	15.9	6.3
24.040	40.7	38.2	38.2	36.3	60.0	50.0	19.3	11.8	21.8	13.7

Freq.	N Level		L1 Level		Limit		Margin [dB (µV)]			
[MHz]	[dB (µV)]		[dB (µV)]		[dB (µV)]		N		L1	
For PS2 mode	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.214	53.2	40.8	52.6	40.1	62.9	52.9	9.7	12.1	10.3	12.8
0.253	40.8	37.6	40.0	36.7	61.6	51.6	20.8	14.0	21.6	14.9
0.322	42.2	40.6	41.3	39.1	59.5	49.5	17.3	8.9	18.2	10.4
0.435	34.3	32.8	33.2	32.0	57.1	47.1	17.3	8.9	23.9	15.1
8.460	38.2	37.0	37.9	37.0	60.0	50.0	21.8	13	22.1	13.0
28.640	41.3	41.4	40.2	36.3	60.0	50.0	18.7	8.6	19.8	13.7

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

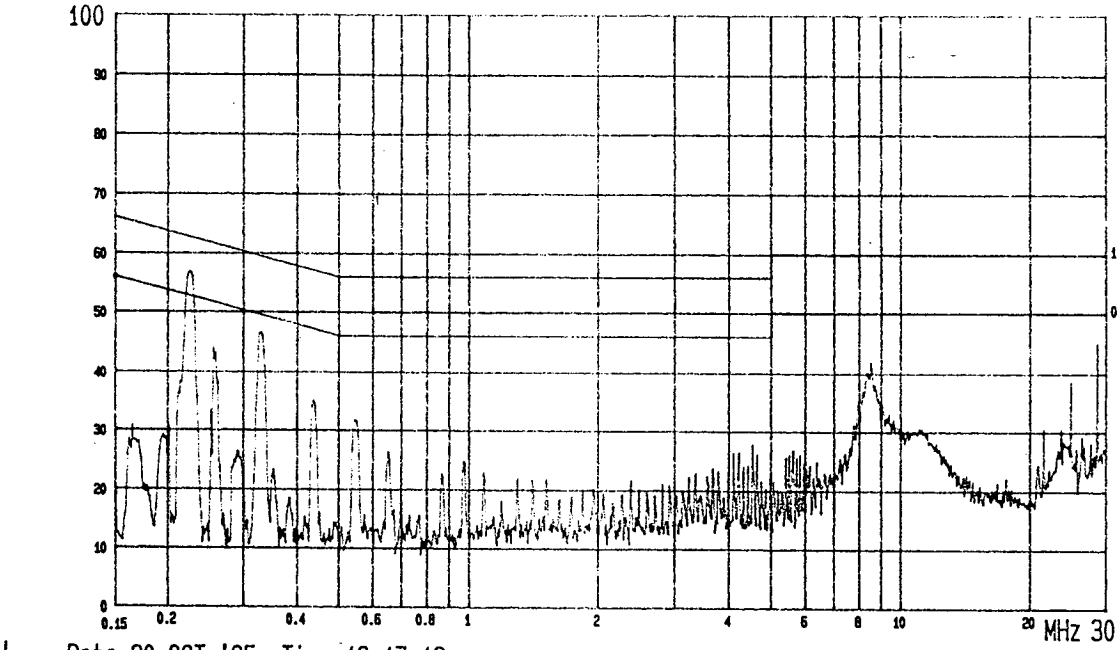


|--- Date 20.OCT '95 Time 12:28:06
ADVANTECH M/N: IPC-610 PAGE: 001.
LINE: N MEMO: (AT) K/B TAIWAN TOKIN EMC EMG.CORP.

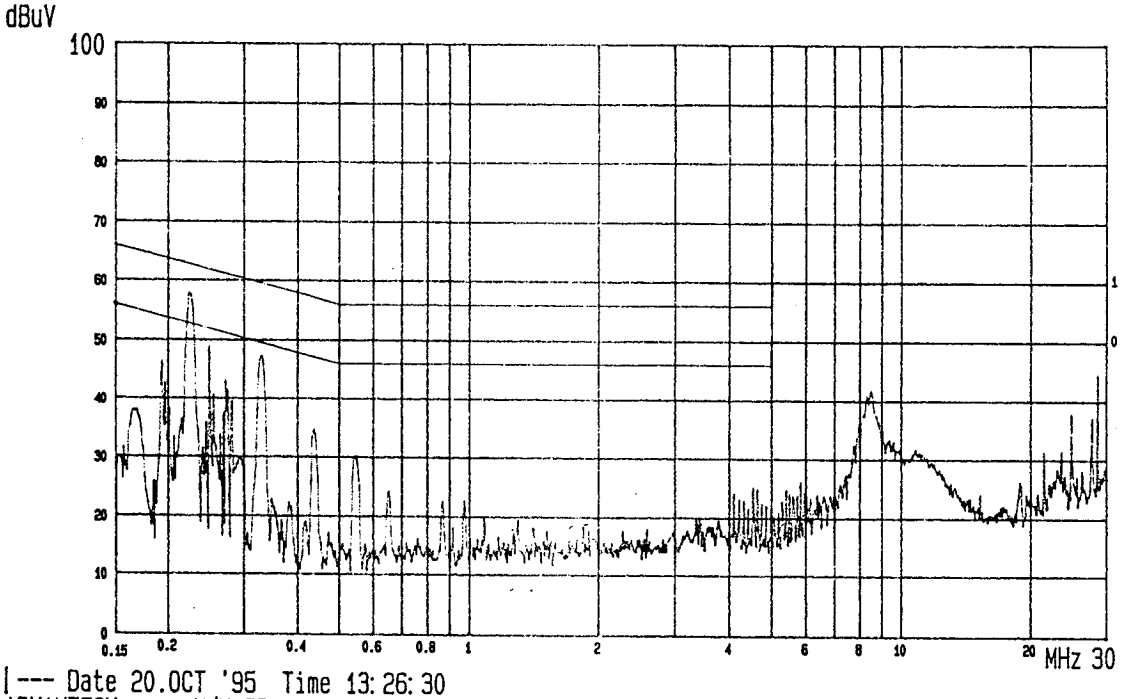


|--- Date 20.OCT '95 Time 13:06:10
ADVANTECH M/N: IPC-610 PAGE: 002.
LINE: L1 MEMO: (AT) K/B TAIWAN TOKIN EMC EMG.CORP.

Figure 2: Conducted Emission, AC Mains; 0.15 - 30MHz (PS2 mode)



|--- Date 20.OCT '95 Time 13:17:13
ADVANTECH M/N: IPC-610 PAGE: 003.
LINE: L1 MEMO: (PS 2) K/B TAIWAN TOKIN EMC EMG.CORP.



|--- Date 20.OCT '95 Time 13:26:30
ADVANTECH M/N: IPC-610 PAGE: 004.
LINE: N MEMO: (PS 2) K/B TAIWAN TOKIN EMC EMG.CORP.

4.1.2. Radiated Emission

Port:	Enclosure
Basic Standard:	EN 55 022:1994, clause 6
Frequency Range:	30 - 1000MHz
Limits:	clause 6, table 4, (class B)

Result:	**PASS**

Test Setup

Input Voltage:	AC 230V, 50Hz
Operational mode:	ON
Test Mode	AT, PS2
Earthing:	through power cord

If the result of the measurement with the Quasi Peak detector is below the Average limit the measurement with Average detector has been omitted.
Disturbances other than those mentioned are small or not detectable.

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

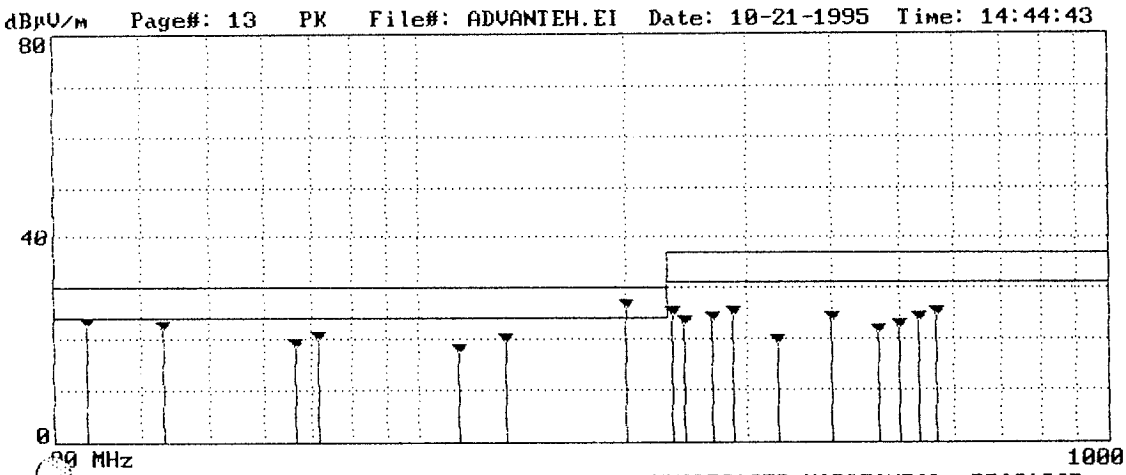
Table 3: Radiated Emission, Mains; 30 - 1000MHz

Settings

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

Freq. [MHz]	Level [dB (µV/m)]	Limit [dB (µV/m)]	Margin [dB (µV/m)]
-	-	-	-

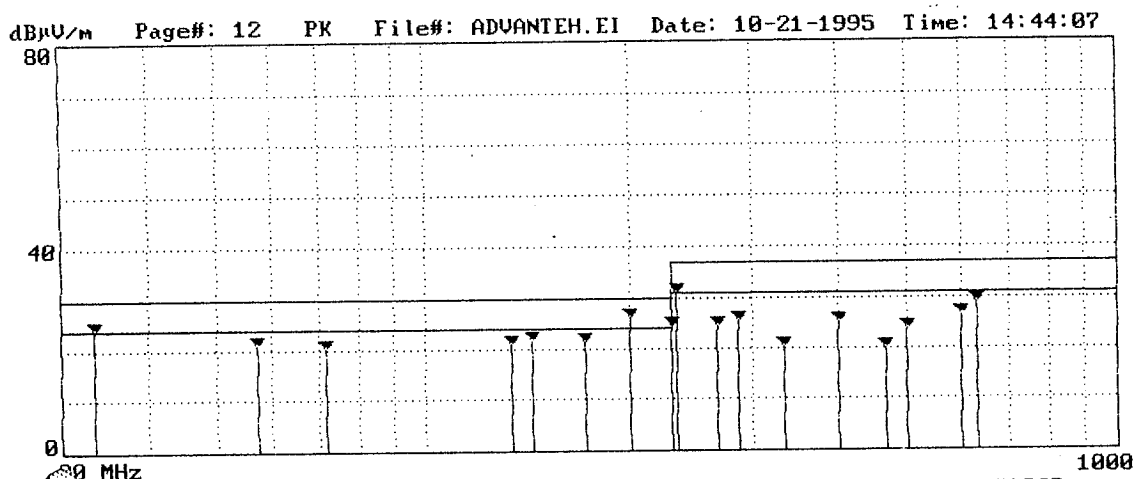
Figure 3: Radiated Emission, Mains; 30 - 1000MHz (AT mode, horizontal)



Page#: 13 File#: ADVANTEH.EI 10-21-1995 14:44:43
CISPR CLASS-B 10m, UHALP9107B HORIZONTAL, BBA9106B
SITE2, R&S ESVP

Freq	Level	Over Limit	Limit Line	Reading Level	Probe Factor	Cable Loss	Preamp Factor
MHz	dB	dB	dB	dB	dB	dB	dB
33.397	22.41	-7.59	30.00	-0.90	22.19	1.13	0.00
42.974	21.70	-8.30	30.00	-0.80	21.29	1.21	0.00
66.728	18.20	-11.80	30.00	3.50	13.27	1.42	0.00
71.613	19.76	-10.24	30.00	5.40	12.90	1.47	0.00
114.566	17.24	-12.76	30.00	-3.40	18.80	1.84	0.00
133.387	19.26	-10.74	30.00	-3.30	20.56	2.00	0.00
200.013	25.99	-4.01	30.00	0.30	23.10	2.59	0.00
233.344	24.45	-12.55	37.00	-1.80	23.36	2.89	0.00
243.433	22.87	-14.13	37.00	-3.70	23.60	2.97	0.00
266.674	23.60	-13.40	37.00	-3.50	23.93	3.17	0.00
286.385	24.54	-12.46	37.00	-3.70	24.90	3.34	0.00
333.343	18.93	-18.07	37.00	-1.30	16.48	3.75	0.00
399.991	23.53	-13.47	37.00	1.10	18.09	4.34	0.00
466.678	20.99	-16.01	37.00	-2.70	18.77	4.93	0.00
499.997	21.90	-15.10	37.00	-2.80	19.49	5.21	0.00
533.326	23.48	-13.52	37.00	-2.30	20.27	5.51	0.00
566.659	24.42	-12.58	37.00	-2.30	20.92	5.80	0.00

Figure 4: Radiated Emission, Mains; 30 - 1000MHz (AT mode, vertical)



Limit : CISPR CLASS-B 10m
EUT : PC M/N:IPC-610
Margin: 6dB Graph: 0 Trace: 12, 0, 0, 0, 0
Memo : AT
SITE2, R&S ESVP

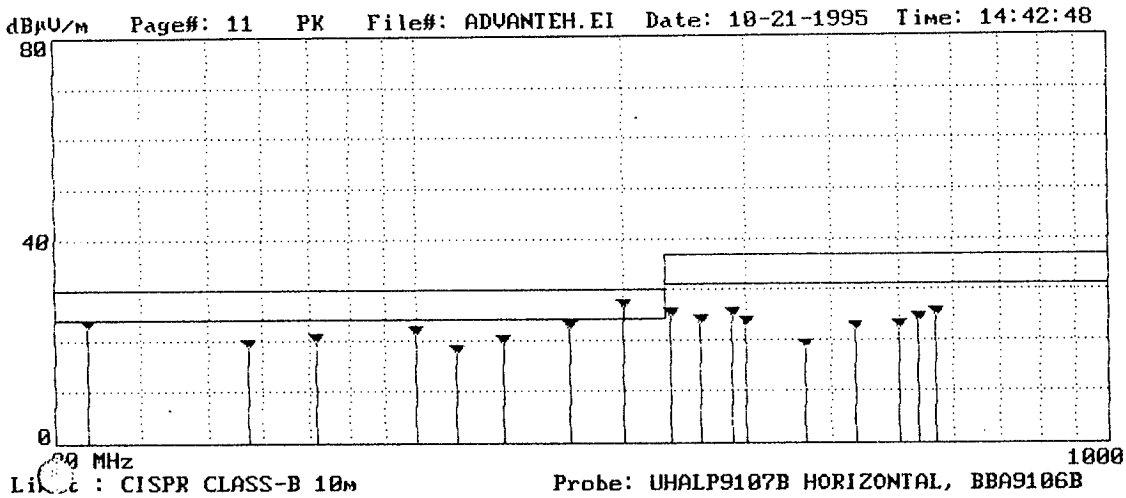
Probe: UHALP9107B VERTICAL, BBA9106B
Power: 230Vac,50Hz

TAIWAN TOKIN EMC ENG. CORP.

Page#: 12 File#: ADVANTEH.EI 10-21-1995 14:44:07
CISPR CLASS-B 10m, UHALP9107B VERTICAL, BBA9106B
SITE2, R&S ESVP

	Freq	Level	Over Limit	Limit Line	Reading Level	Probe Factor	Cable Loss	Preamp Factor
	MHz	dB	dB	dB	dB	dB	dB	dB
!	33.384	24.31	-5.69	30.00	2.70	20.48	1.13	0.00
	57.287	21.20	-8.80	30.00	3.40	16.47	1.34	0.00
	71.612	20.34	-9.66	30.00	3.90	14.97	1.47	0.00
	133.385	20.90	-9.10	30.00	-3.40	22.30	2.00	0.00
	143.199	21.62	-8.38	30.00	-2.90	22.42	2.09	0.00
	171.832	21.45	-8.55	30.00	-3.80	22.91	2.34	0.00
!	200.025	26.27	-3.73	30.00	-0.40	24.08	2.59	0.00
!	229.102	24.50	-5.50	30.00	-3.60	25.26	2.84	0.00
	233.340	30.97	-6.03	37.00	3.10	24.98	2.89	0.00
	266.670	24.59	-12.41	37.00	-3.50	24.91	3.17	0.00
	286.377	25.59	-11.41	37.00	-3.50	25.75	3.34	0.00
	333.018	20.50	-16.50	37.00	0.60	16.15	3.75	0.00
	399.991	25.23	-11.77	37.00	2.40	18.49	4.34	0.00
	466.655	20.03	-16.97	37.00	-3.50	18.60	4.93	0.00
	499.985	23.81	-13.19	37.00	-0.70	19.29	5.21	0.00
	599.971	26.38	-10.62	37.00	-1.70	21.99	6.09	0.00
	633.283	28.99	-8.01	37.00	0.10	22.50	6.39	0.00

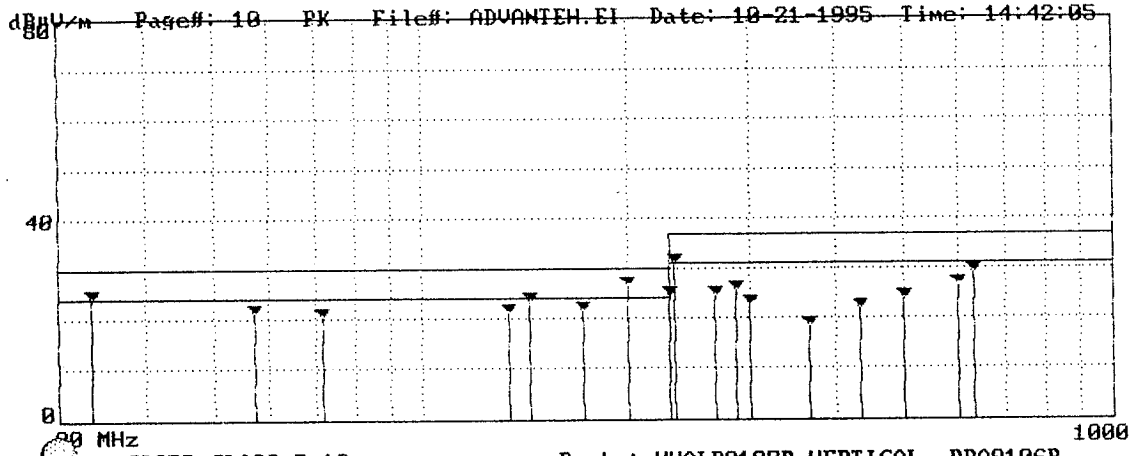
Figure 5: Radiated Emission, Mains; 30 - 1000MHz (PS2 mode, horizontal)



Page#: 11 File#: ADVANTEH.EI 10-21-1995 14:42:48
CISPR CLASS-B 10m, UHALP9107B HORIZONTAL, BBA9106B
SITE2, R&S ESVP

Freq	Level	Over Limit	Limit Line	Reading Level	Probe Factor	Cable Loss	Preamp Factor
MHz	dB	dB	dB	dB	dB	dB	dB
33.397	22.41	-7.59	30.00	-0.90	22.19	1.13	0.00
57.291	18.72	-11.28	30.00	1.80	15.58	1.34	0.00
71.613	19.76	-10.24	30.00	5.40	12.90	1.47	0.00
100.242	21.16	-8.84	30.00	3.00	16.45	1.71	0.00
114.566	17.24	-12.76	30.00	-3.40	18.80	1.84	0.00
133.387	19.26	-10.74	30.00	-3.30	20.56	2.00	0.00
166.718	22.14	-7.86	30.00	-2.50	22.34	2.30	0.00
200.014	26.19	-3.81	30.00	0.50	23.10	2.59	0.00
233.344	24.45	-12.55	37.00	-1.80	23.36	2.89	0.00
257.753	23.10	-13.90	37.00	-3.80	23.80	3.10	0.00
286.385	24.54	-12.46	37.00	-3.70	24.90	3.34	0.00
300.012	22.66	-14.34	37.00	2.60	16.60	3.46	0.00
366.660	18.22	-18.78	37.00	-3.40	17.57	4.05	0.00
433.341	21.64	-15.36	37.00	-1.20	18.22	4.63	0.00
499.997	21.90	-15.10	37.00	-2.80	19.49	5.21	0.00
533.326	23.48	-13.52	37.00	-2.30	20.27	5.51	0.00
566.659	24.42	-12.58	37.00	-2.30	20.92	5.80	0.00

Figure 6: Radiated Emission, Mains; 30 - 1000MHz (PS2 mode, vertical)



Limit : CISPR CLASS-B 10m Probe: UHALP9107B VERTICAL, BBA9106B
EUT : PC M/N:IPC-610 Power: 230Vac,50Hz
Margin: 6dB Graph: 0 Trace: 10, 0, 0, 0, 0
Memo : PS2
SITE2, R&S ESVP TAIWAN TOKIN EMC ENG. CORP.

Page#: 10 File#: ADVANTEH.EI 10-21-1995 14:42:05
CISPR CLASS-B 10m, UHALP9107B VERTICAL, BBA9106B
SITE2, R&S ESVP

	Freq	Level	Over Limit	Limit Line	Reading Level	Probe Factor	Cable Loss	Preamp Factor
	MHz	dB	dB	dB	dB	dB	dB	dB
!	33.384	24.31	-5.69	30.00	2.70	20.48	1.13	0.00
	57.287	21.20	-8.80	30.00	3.40	16.47	1.34	0.00
	71.612	20.34	-9.66	30.00	3.90	14.97	1.47	0.00
	133.385	20.90	-9.10	30.00	-3.40	22.30	2.00	0.00
	143.211	23.62	-6.38	30.00	-0.90	22.42	2.09	0.00
	171.832	21.45	-8.55	30.00	-3.80	22.91	2.34	0.00
!	200.050	26.67	-3.33	30.00	-0.00	24.08	2.59	0.00
!	229.102	24.50	-5.50	30.00	-3.60	25.26	2.84	0.00
	233.340	30.97	-6.03	37.00	3.10	24.98	2.89	0.00
	266.670	24.59	-12.41	37.00	-3.50	24.91	3.17	0.00
	286.377	25.59	-11.41	37.00	-3.50	25.75	3.34	0.00
	300.006	22.76	-14.24	37.00	3.30	16.00	3.46	0.00
	366.023	18.34	-18.66	37.00	-3.30	17.60	4.04	0.00
	433.320	21.75	-15.25	37.00	-0.60	17.72	4.63	0.00
	499.985	23.81	-13.19	37.00	-0.70	19.29	5.21	0.00
	599.971	26.38	-10.62	37.00	-1.70	21.99	6.09	0.00
	633.283	28.99	-8.01	37.00	0.10	22.50	6.39	0.00

4.2. Disturbances in supply systems

4.2.1. Harmonics

Port:	Mains
Basic Standard:	EN 60 555-2
Limits:	EN 60 555-2, clause 4.1

Result:	**PASS**

Test Setup

Input Voltage:	AC 230V, 50Hz
Operational mode:	ON

The harmonics on AC Mains in the frequency from 0 to 2kHz were measured and found to be within the limits of EN 60 555-2.

Table 4: Harmonics

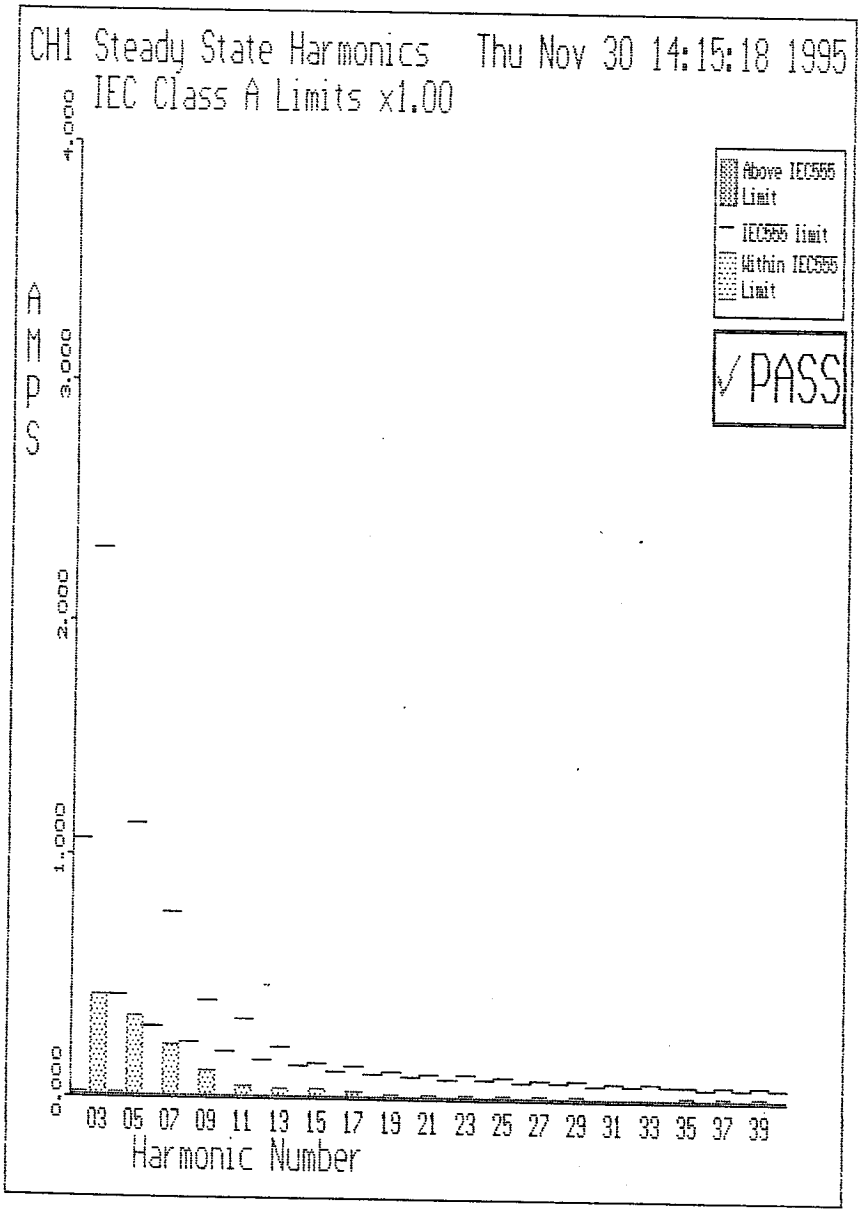
CH1 Steady State Harmonics Test. Thu Nov 30 14:15:18 1995

Volts 231.300003V
Amps 0.779100A
Watts 110.959999W
Power Factor 0.619600
Limits multiplied by 1.00

HNumber	IEC Limit (class A)	Magnitude	PASS FAIL
2	1.080A	0.018935A	PASS
3	2.300A	0.430200A	PASS
4	0.430A	0.014500A	PASS
5	1.140A	0.335400A	PASS
6	0.300A	0.009804A	PASS
7	0.770A	0.218300A	PASS
8	0.230A	0.006521A	PASS
9	0.400A	0.116940A	PASS
10	0.184A	0.005357A	PASS
11	0.330A	0.048810A	PASS
12	0.153A	0.002769A	PASS
13	0.210A	0.039880A	PASS
14	0.131A	0.001847A	PASS
15	0.150A	0.039560A	PASS
16	0.115A	0.001856A	PASS
17	0.132A	0.025860A	PASS
18	0.102A	0.003424A	PASS
19	0.118A	0.016773A	PASS
20	0.092A	0.003463A	PASS
21	0.107A	0.017329A	PASS
22	0.084A	0.002208A	PASS
23	0.098A	0.017968A	PASS
24	0.077A	0.002306A	PASS
25	0.090A	0.014806A	PASS
26	0.071A	0.002359A	PASS
27	0.083A	0.011789A	PASS
28	0.066A	0.002039A	PASS
29	0.078A	0.012471A	PASS
30	0.061A	0.002350A	PASS
31	0.073A	0.010515A	PASS
32	0.058A	0.004371A	PASS
33	0.068A	0.010444A	PASS
34	0.054A	0.005643A	PASS
35	0.064A	0.011692A	PASS
36	0.051A	0.004259A	PASS
37	0.061A	0.014438A	PASS
38	0.048A	0.003827A	PASS
39	0.058A	0.015939A	PASS
40	0.046A	0.004166A	PASS

Passed Steady State Harmonics test

Figure 7: Harmonics



4.2.2. Voltage fluctuations

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

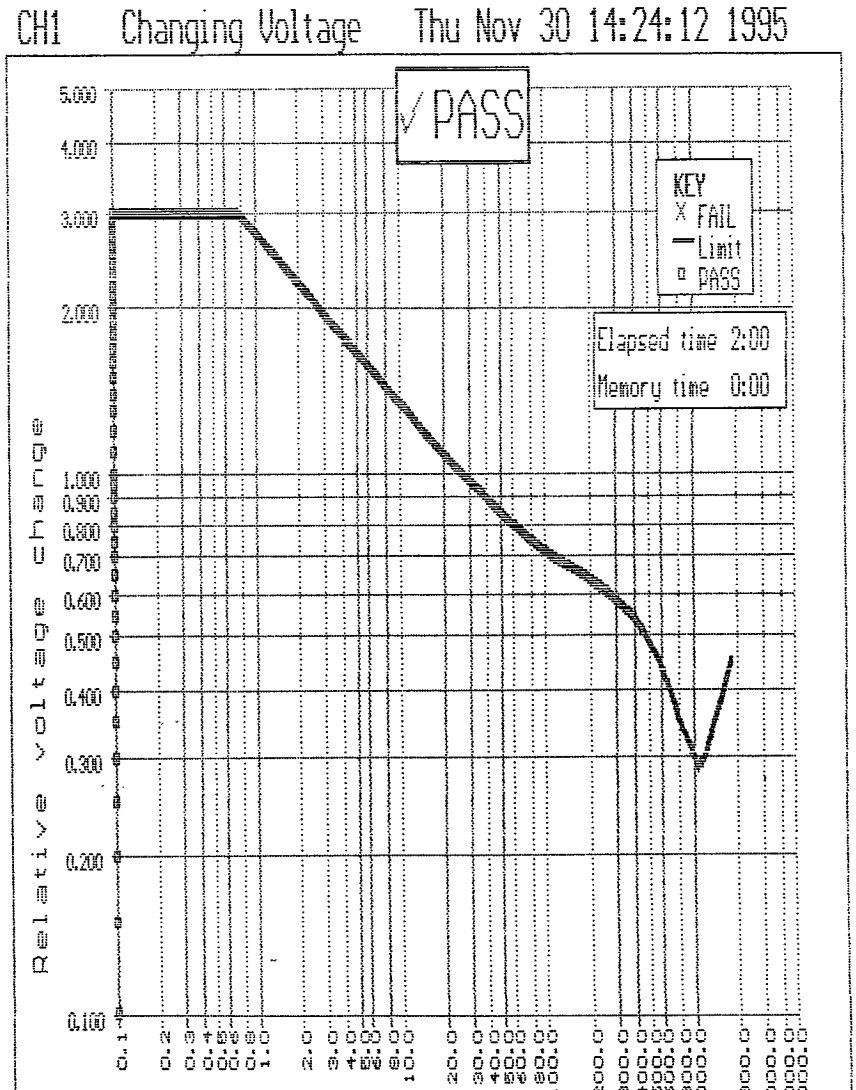
Port: Mains
Basic Standard: EN 60 555-3
Limits: EN 60 555-3, clause 6.2

Result:	PASS

Test Setup

Input Voltage: AC 230V, 50Hz
Operational mode: ON

Table 5: Voltage fluctuations



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:	prEN 50 082-2	
	Frequency. Range:	27 - 500MHz
	Field Strength	10V/m (unmodulated)
		(= level 3 of IEC 801-3)

Result:	PASS

Test Setup

Input Voltage:	AC 230V, 50Hz
Operational mode:	ON
Test Mode	AT, PS2
Earthing:	through power cord
Temperature	25°C
Relative Humidity	60%

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

Table 6: Radio-frequency electromagnetic field; 27 - 270MHz

Settings

Frequency			**Settings**		
Start	Stop	Step Size	Field Strenght	Sweep mode	Meas. Time
27MHz	270MHz	73kHz	10V/m	auto	200ms

No abnormalities were observed.

Table 7: Radio-frequency electromagnetic field; 270 - 500MHz

Settings

Frequency			**Settings**		
Start	Stop	Step Size	Field Strenght	Sweep mode	Meas. Time
270MHz	500MHz	73kHz	10V/m	auto	200ms

No abnormalities were observed.

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

5.1.2. Electrostatic Discharge

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

Result:	PASS

Test Setup

Input Voltage: AC 230V, 50Hz
Operational mode: ON
Test Mode AT, PS2

Earthing: through power cord

Temperature 25°C
Relative Humidity 60%

Table 8: Electrostatic Discharge

Testpoint	Polarity	Number of Discharges	Observation	Result
reset button	+	10	normal function	PASS
keyboard lock button	+	10	normal function	PASS
ventilation front grill	+	10	normal function	PASS
keyboard connector	+	10	normal function	PASS

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

5.2. Input and output AC power ports

5.2.1. Fast transients common mode

Port:	Mains Plug	
Basic Standard:	IEC 801-4	
Performance Criteria:	B	
Test Specification:	prEN 50 082-2	
	Peak Voltage:	2kV (= level 3 of IEC 801-4)
	T_r/T_n	5/50ns
	Rep. frequency	5kHz

Result:	PASS

Test Setup

Input Voltage:	AC 230V, 50Hz
Operational mode:	ON
Test Mode	AT, PS2
Earthing:	through power cord
Temperature	25°C
Relative Humidity	60%
Coupling:	Coupling Network

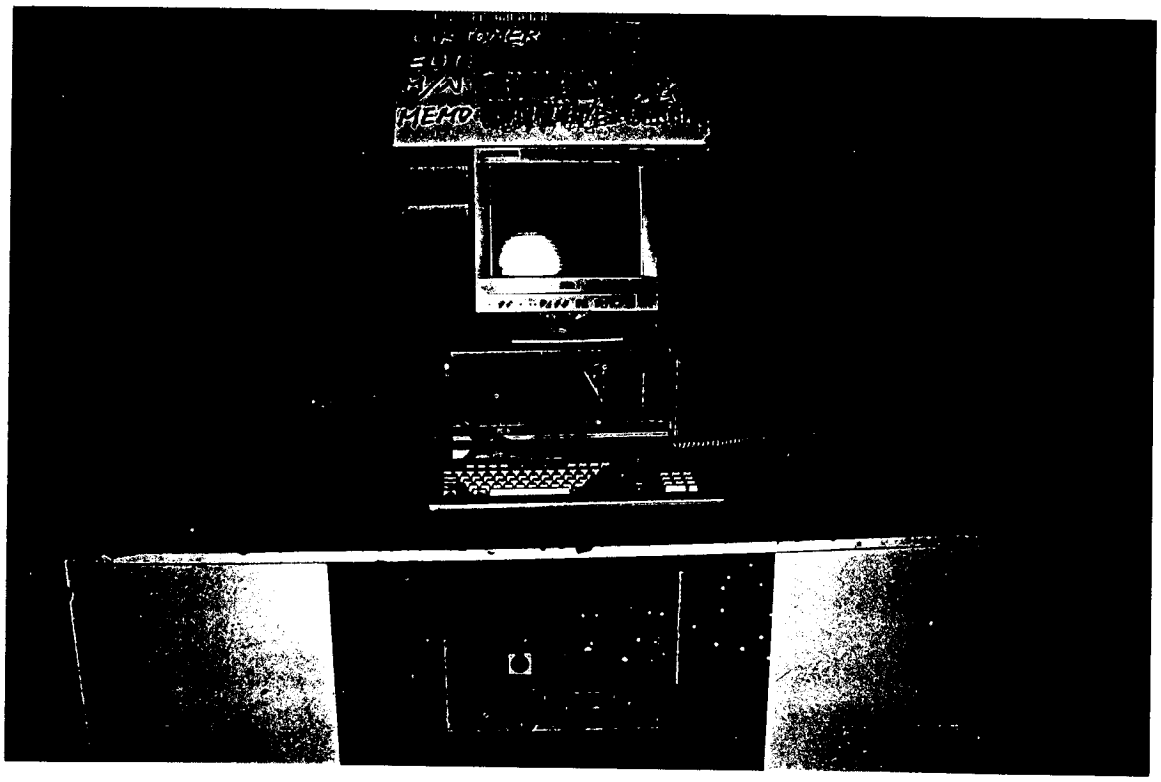
Table 9: Fast transients common mode (Input and output AC power ports)

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

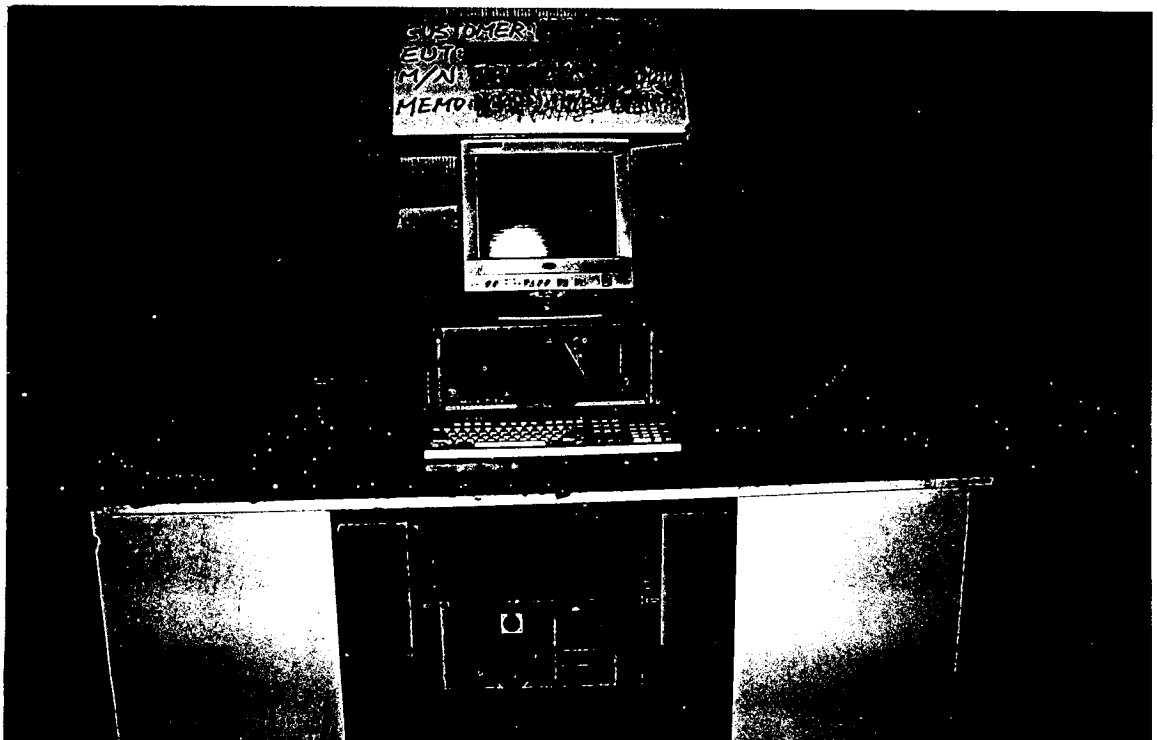
6. Photographs of the Test Set-up

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

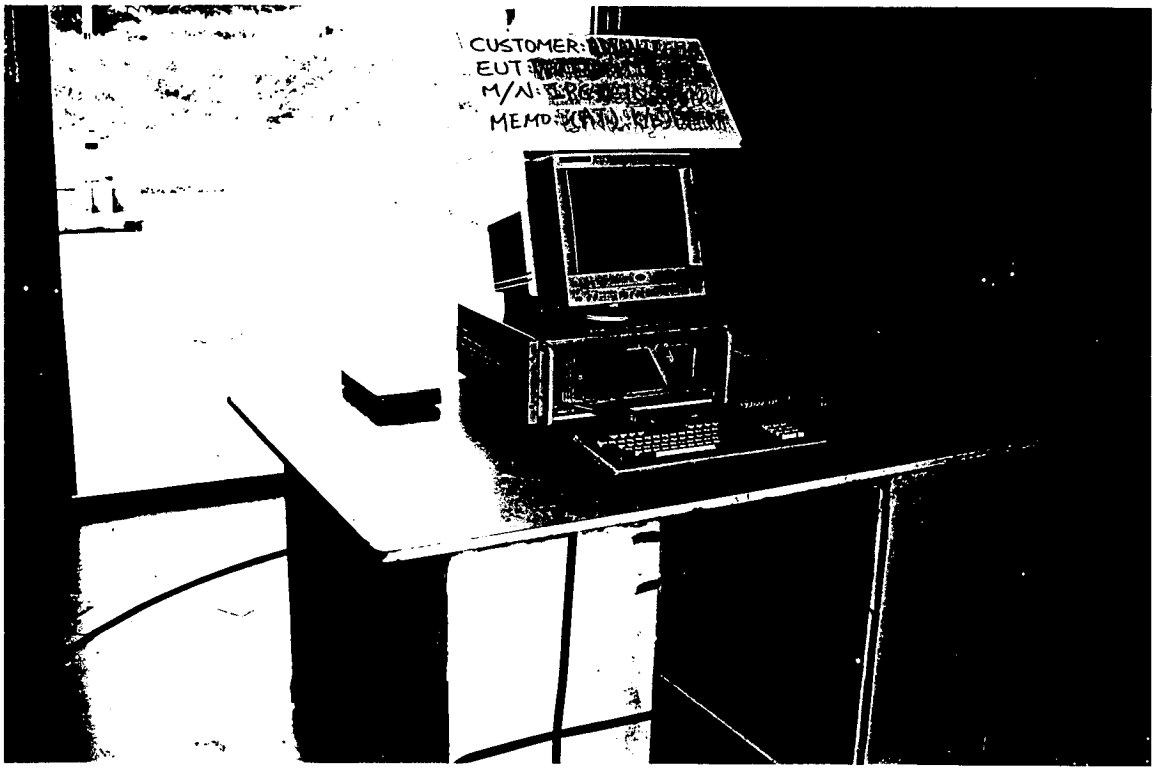
Picture 1: Conductive Emission (AT mode)



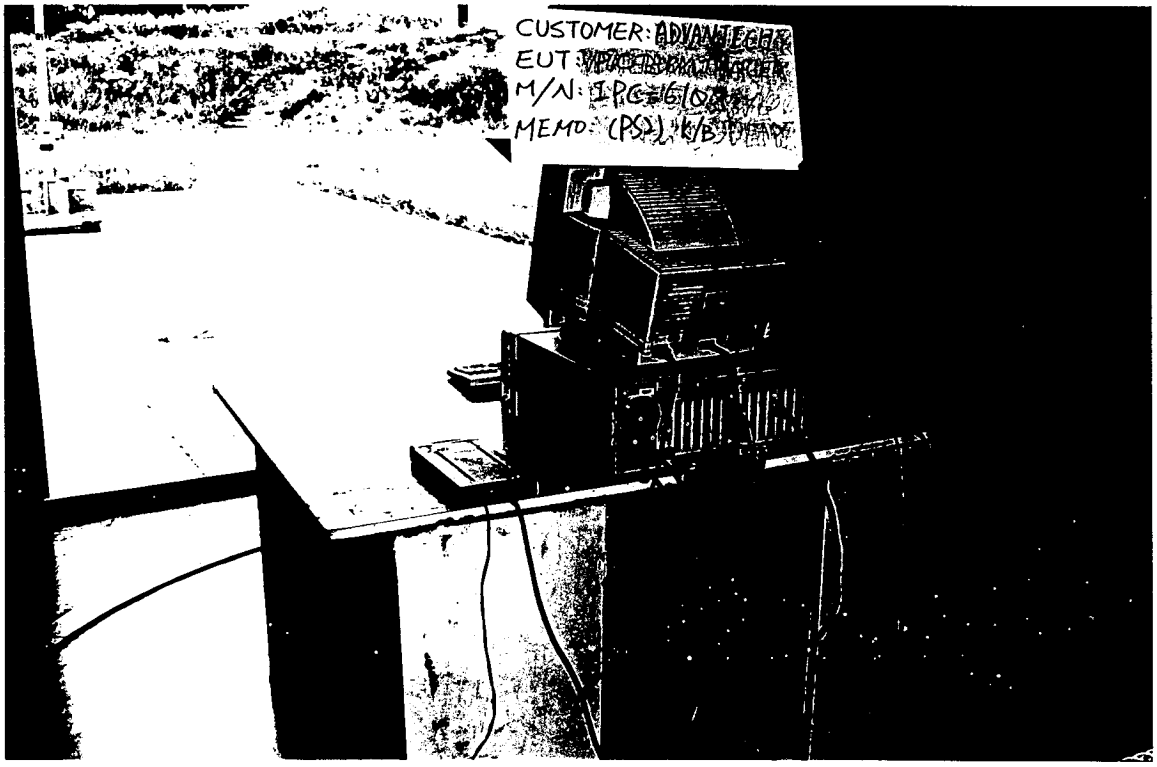
Picture 2: Conductive Emission (PS2 mode)



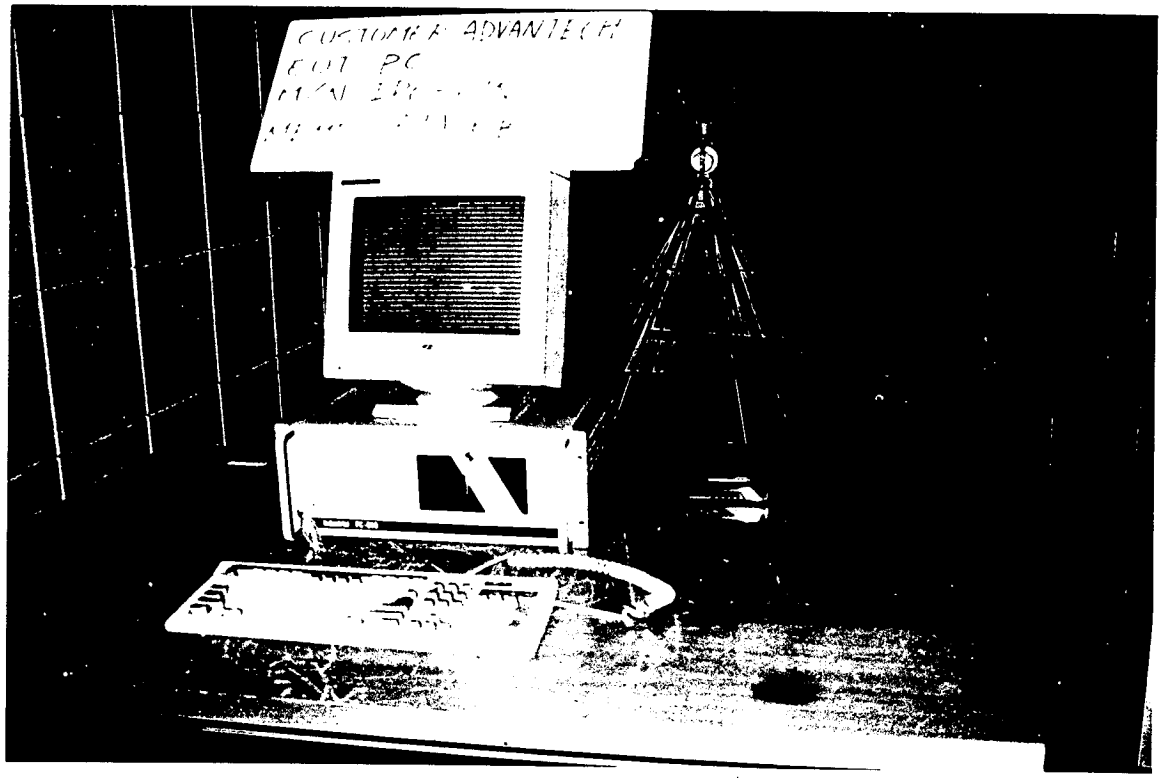
Picture 3: Radiated Emission (AT mode)



Picture 4: Radiated Emission (PS2 mode)



Picture 5: Radiated Susceptibility, Frequency Range 27MHz to 500Mhz



Picture 6: Electrostatic Discharge

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6

Picture 7: Fast Transients on AC Mains

7. List of Tables

TABLE 1: LIST OF TEST AND MEASUREMENT EQUIPMENT 5

TABLE 2: CONDUCTED EMISSION, AC MAINS; 0.15 - 30MHZ 8

TABLE 3: RADIATED EMISSION, MAINS; 30 - 1000MHZ 12

TABLE 4: HARMONICS 18

TABLE 5: VOLTAGE FLUCTUATIONS 20

TABLE 6: RADIO-FREQUENCY ELECTROMAGNETIC FIELD; 27 - 270MHZ 22

TABLE 7: RADIO-FREQUENCY ELECTROMAGNETIC FIELD; 270 - 500MHZ 22

TABLE 8: ELECTROSTATIC DISCHARGE 23

TABLE 9: FAST TRANSIENTS COMMON MODE (INPUT AND OUTPUT AC POWER PORTS) 24

8. List of Figures

FIGURE 1: CONDUCTED EMISSION, AC MAINS; 0.15 - 30MHZ (AT MODE) 9

FIGURE 2: CONDUCTED EMISSION, AC MAINS; 0.15 - 30MHZ (PS2 MODE) 10

FIGURE 3: RADIATED EMISSION, MAINS; 30 - 1000MHZ (AT MODE, HORIZONTAL 13

FIGURE 4: RADIATED EMISSION, MAINS; 30 - 1000MHZ (AT MODE, VERTICAL 14

FIGURE 5: RADIATED EMISSION, MAINS; 30 - 1000MHZ (PS2 MODE, HORIZONTAL 15

FIGURE 6: RADIATED EMISSION, MAINS; 30 - 1000MHZ (PS2 MODE, VERTICAL 16

FIGURE 7: HARMONICS 19

9. List of Pictures

PICTURE 1: CONDUCTIVE EMISSION (AT MODE) 25

PICTURE 2: CONDUCTIVE EMISSION (PS2 MODE) 25

PICTURE 3: RADIATED EMISSION (AT MODE) 26

PICTURE 4: RADIATED EMISSION (PS2 MODE) 26

PICTURE 5: RADIATED SUSCEPTIBILITY, FREQUENCY RANGE 27MHZ TO 500MHZ 27

PICTURE 6: ELECTROSTATIC DISCHARGE 27

PICTURE 7: FAST TRANSIENTS ON AC MAINS 28

Gesehen
den 11.12. 19 95
TÜV Rheinland Product Safety GmbH

TÜV Rheinland
Product Safety GmbH
P 9 5 6 7 6 9 6