

TÜV Rheinland
Technischer Überwachungs-Verein Rheinland

Certificate of Compliance

No. I-9663336-9603

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 Rd., Shin-Tien City, Taipei Hsien 231,
Taiwan, R.O.C.

has successfully demonstrated that its product

Digital I/O Cards
PCL-720, PCLD-885, PCLD-786, PCLD-7225, PCL-731, PCL-732, PCL-832

is in compliance with
prEN 50 082-2:1992, EN 55 022:1994 Class A, 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 9663336E01

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, 21.03.1996

Dipl.-Ing. K. Heinz
Certification Centre

Dipl.-Ing. U. Meyer
Testing Centre



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





Testreport No: P9663336E01

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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: Digital I/O Cards

Type Designation: PCL-720, PCLD-885, PCLD-786, PCLD-7225, PCL-731, PCL-732, PCL-832

Trade Mark: Advantech

Standard: prEN 50 082-2:1992 EN 55 022:1994 Class A
IEC 801-2:1984 EN 60 555-2:1987
IEC 801-3:1984 EN 60 555-3:1987/A1:1991
IEC 801-4:1988

Date of Receipt of Test Item: 16.11.1995

Date of Testing: 20.12.1995

Gesehen
den 21.03.1996
TÜV Rheinland Product Safety GmbH
Alwin Nijp

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

Der Sachverständige:
tested by

überprüft:
reviewed by

1. 03. 96 Alwin Nijp
Date, signature

TÜV Rheinland
Product Safety GmbH
P 9 6 6 3 3 3 6

12. 03. 96 Paul Lee
Date, signature

Other aspects: This equipment is tested against the requirements for apparatus intended to be used in the industrial environment. However, this equipment requires 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

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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 samples are Digital I/O- and Counter Cards with the model numbers **PCL-720**, **PCLD-885**, **PCLD-786**, **PCLD-7225**, **PCL-731**, **PCL-732**, **PCL-832** for general use in the Industrial Environment.

The PCLD-885 provides 16 SPST power relay channels with a maximum contact rating of AC 250V at 5A or DC 30V at 5A. This card can be driven directly by the digital output from PC-Lab Cards. The PCL-series is consisting of cards handling digital I/O channels and providing flexible timer/counter channels.

2.2. Rating and Physical Characteristics

| Model No. | Description of Card | Ratings | Protection Class |
|-----------|-------------------------------------|-------------------------------------------|------------------|
| PCL-720 | Digital I/O Counter Card | 5V / 500mA | III |
| PCLD-885 | 16-channel Power Relay Output Board | 12V / 22mA (each relay) | III |
| PCLD-786 | AC/DC Pow. SSR&RelayDriv. Board | not defined | III |
| PCLD-7225 | 24-channel Relay-output Board | 12V / 44mA 5V / <100mA (each relay) | III |
| PCL-731 | 48-bit Digital I/O Card | 5V / 800mA | III |
| PCL-732 | High-Speed DIO & Vector Inter. Card | 5V / 800mA | III |
| PCL-832 | 3-axis Servo-motor Control Card | 5V / 500mA 12V / 200mA | III |

2.3. Sources of Interference

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1. Switching frequency of Power Supply of the completely tested PC.
2. Pulses on clock or other lines of CPU card or peripheral cards

2.4. Noise Suppression Parts

None for the Digital IO Cards as the units under test

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

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3.1. Modes of Operation

The Digital I/O Cards were run in a configuration and set up as described in the next paragraph. A test program was run during all tests as described herein and which was set up by the customer

3.2. Additional Equipment

For Susceptibility Testing the Digital I/O Cards were set up with the following additional equipment:

“HP” PC, type Vectra VE4/66

“Packard Bell” Monitor, type 1402S for SBC-490

“HP” Keyboard, type C3757B#AB0, type C1405B for SBC-490

For Emission Testing the CPU Cards were set up with the “IBM” Monitor, type 8512-001, a “HP” Keyboard, type . C3757B#AB0 and a “HP”PC, type VE 4/66. Additionally, an Advantech D-type 37 pin connector wiring board, type PCLD-880, was used.

3.3. Test Setup

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

| | | |
|----------|--------------------------|--------------|
| PC | 1.5 m unshielded | power cord |
| Keyboard | 1.2 m shielded with core | signal cable |
| Monitor | 1.5 m shielded | signal cable |



3.4. List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

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For Emission Tests:

| Equipment | Manufacturer | Model No. | Cal. Date |
|--------------------------------------|-------------------|-----------|---------------|
| RF Test Receiver | Rohde and Schwarz | ESH3 | Oct. 26, 1995 |
| Line Impedance Stabilization Network | Rohde and Schwarz | ESH2-Z5 | N/A |
| | | KNW-407 | N/A |
| Shield Room | Riken | | N.C.R. |
| RF Test Receiver | Rohde and Schwarz | ESVP | Nov. 28, 1995 |
| Spectrum Analyzer | Hewlett-Packard | 8568B | Nov. 18, 1995 |
| Pre-amplifier | Hewlett-Packard | 8447D | Oct. 30, 1995 |
| Pre-selector | Hewlett-Packard | 85685A | Nov. 18, 1995 |
| Log Periodic Antenna | EMCO | 3146 | Apr. 17, 1995 |
| High Power Bicon. Ant. | EMCO | 3108 | Apr. 13, 1995 |
| Spectrum Monitor | Rohde and Schwarz | EZM | N.C.R. |

For ESD-, RS- and EFT/Burst Test:

| Kind of Equipment | Manufacturer | Type | Calibrat. Date |
|---------------------|--------------|---------------------|----------------|
| ESD Simulator | Keytek | 2000 (with DN1&DT1) | May 18, 1995 |
| Signal Source | Marconi | 2030 | Oct. 13, 1995 |
| Power Meter | Boonton | 9200B | Oct. 13, 1995 |
| Probe | Holaday | HI-4422 | Mar. 08, 1995 |
| Amplifier 1 | Kalmus | 225LCR | May 26, 1995 |
| Amplifier 2 | Kalmus | 7100LC | N.C.R. |
| Controller | HP | 23YLBFW | N.C.R. |
| GTEM Cell | Emco | 5317 | N.C.R. |
| Directional Coupler | AR | DC2500 | N.C.R. |
| Fiber Optics /RS232 | Holaday | HI-4413G | N.C.R. |
| EFT/Burst Gener. | KEYTEK | 801-4 | May 18, 1995 |

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' | | |

4. Test Results EMISSION

Result:

PASS

4.1. Continuous Interferences

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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
Operational mode: ON
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.



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

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Settings

P 9 6 6 3 3 3 6

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

Model No. PCL-732

| Freq. (MHz) | Meter Reading (dBuV) | | | | Factor (dB) | Limit (dBuV) | | Result (dBuV) | | | |
|----------------|-------------------------|------|------------|------|----------------|-----------------|------------|------------------|------|------------|------|
| | Q.P. Value | | AVE. Value | | | Q.P. Value | AVE. Value | Q.P. Value | | AVE. Value | |
| | N | L1 | N | L1 | | | | N | L1 | N | L1 |
| 0.183 | 39.4 | 43.6 | ---- | ---- | 0.0 | 79.0 | 66.0 | 39.4 | 43.6 | ---- | ---- |
| 0.206 | 36.8 | 41.6 | ---- | ---- | 0.0 | 79.0 | 66.0 | 36.8 | 41.6 | ---- | ---- |
| 0.272 | 40.2 | 42.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 40.2 | 42.8 | ---- | ---- |
| 0.941 | 32.8 | 31.4 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.8 | 31.4 | ---- | ---- |
| 11.975 | 32.6 | 32.6 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.6 | 32.6 | ---- | ---- |
| 15.979 | 32.4 | 32.2 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.4 | 32.2 | ---- | ---- |

Model No. PCL-731

| Freq. (MHz) | Meter Reading (dBuV) | | | | Factor (dB) | Limit (dBuV) | | Result (dBuV) | | | |
|----------------|-------------------------|------|------------|------|----------------|-----------------|------------|------------------|------|------------|------|
| | Q.P. Value | | AVE. Value | | | Q.P. Value | AVE. Value | Q.P. Value | | AVE. Value | |
| | N | L1 | N | L1 | | | | N | L1 | N | L1 |
| 0.183 | 40.6 | 43.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 40.6 | 43.8 | ---- | ---- |
| 0.270 | 40.4 | 42.2 | ---- | ---- | 0.0 | 79.0 | 66.0 | 40.4 | 42.2 | ---- | ---- |
| 0.941 | 33.4 | 42.6 | ---- | ---- | 0.0 | 73.0 | 60.0 | 33.4 | 42.6 | ---- | ---- |
| 1.676 | 32.6 | 33.0 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.6 | 33.0 | ---- | ---- |
| 11.975 | 32.4 | 31.8 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.4 | 31.8 | ---- | ---- |
| 15.979 | 32.6 | 32.4 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.6 | 32.4 | ---- | ---- |

Model No. PCLD-885, PCLD-786

| Freq. (MHz) | Meter Reading (dBuV) | | | | Factor (dB) | Limit (dBuV) | | Result (dBuV) | | | |
|----------------|-------------------------|------|------------|------|----------------|-----------------|------------|------------------|------|------------|------|
| | Q.P. Value | | AVE. Value | | | Q.P. Value | AVE. Value | Q.P. Value | | AVE. Value | |
| | N | L1 | N | L1 | | | | N | L1 | N | L1 |
| 0.185 | 39.6 | 43.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 39.6 | 43.8 | ---- | ---- |
| 0.207 | 36.4 | 41.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 36.4 | 41.8 | ---- | ---- |
| 0.270 | 40.0 | 42.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 40.0 | 42.8 | ---- | ---- |
| 3.397 | 38.2 | 37.8 | ---- | ---- | 0.0 | 73.0 | 60.0 | 38.2 | 37.8 | ---- | ---- |
| 6.926 | 33.2 | 34.2 | ---- | ---- | 0.0 | 73.0 | 60.0 | 33.2 | 34.2 | ---- | ---- |
| 11.975 | 32.6 | 33.2 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.6 | 33.2 | ---- | ---- |



Model No. PCLD-7225

| Freq. (MHz) | Meter Reading (dBuV) | | | | Factor (dB) | Limit (dBuV) | | Result (dBuV) | | | |
|----------------|-------------------------|------|------------|------|----------------|-----------------|---------------|------------------|------|------------|------|
| | Q.P. Value | | AVE. Value | | | Q.P. Value | AVE. Value | Q.P. Value | | AVE. Value | |
| | N | L1 | N | L1 | | | | N | L1 | N | L1 |
| 0.183 | 39.8 | 43.6 | ---- | ---- | 0.0 | 79.0 | 66.0 | 39.8 | 43.6 | ---- | ---- |
| 0.211 | 37.0 | 42.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 37.0 | 42.8 | ---- | ---- |
| 0.272 | 39.8 | 42.4 | ---- | ---- | 0.0 | 79.0 | 66.0 | 39.8 | 42.4 | ---- | ---- |
| 3.478 | 38.2 | 39.8 | ---- | ---- | 0.0 | 73.0 | 60.0 | 38.2 | 39.8 | ---- | ---- |
| 6.805 | 33.6 | 36.2 | ---- | ---- | 0.0 | 73.0 | 60.0 | 33.6 | 36.2 | ---- | ---- |
| 11.975 | 32.6 | 32.4 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.6 | 32.4 | ---- | ---- |

Model No. PCL-832

| Freq. (MHz) | Meter Reading (dBuV) | | | | Factor (dB) | Limit (dBuV) | | Result (dBuV) | | | |
|----------------|-------------------------|------|------------|------|----------------|-----------------|---------------|------------------|------|------------|------|
| | Q.P. Value | | AVE. Value | | | Q.P. Value | AVE. Value | Q.P. Value | | AVE. Value | |
| | N | L1 | N | L1 | | | | N | L1 | N | L1 |
| 0.178 | 37.8 | 42.2 | ---- | ---- | 0.0 | 79.0 | 66.0 | 37.8 | 42.2 | ---- | ---- |
| 0.207 | 39.2 | 42.8 | ---- | ---- | 0.0 | 79.0 | 66.0 | 39.2 | 42.8 | ---- | ---- |
| 0.272 | 42.0 | 42.0 | ---- | ---- | 0.0 | 79.0 | 66.0 | 42.0 | 42.0 | ---- | ---- |
| 1.600 | 33.0 | 35.2 | ---- | ---- | 0.0 | 73.0 | 60.0 | 33.0 | 35.2 | ---- | ---- |
| 11.975 | 32.2 | 32.8 | ---- | ---- | 0.0 | 73.0 | 60.0 | 32.2 | 32.8 | ---- | ---- |
| 15.979 | 33.0 | 31.4 | ---- | ---- | 0.0 | 73.0 | 60.0 | 33.0 | 31.4 | ---- | ---- |

Notes : 1) Place of Measurement : ETC's Shielded Room, 40 cm table height

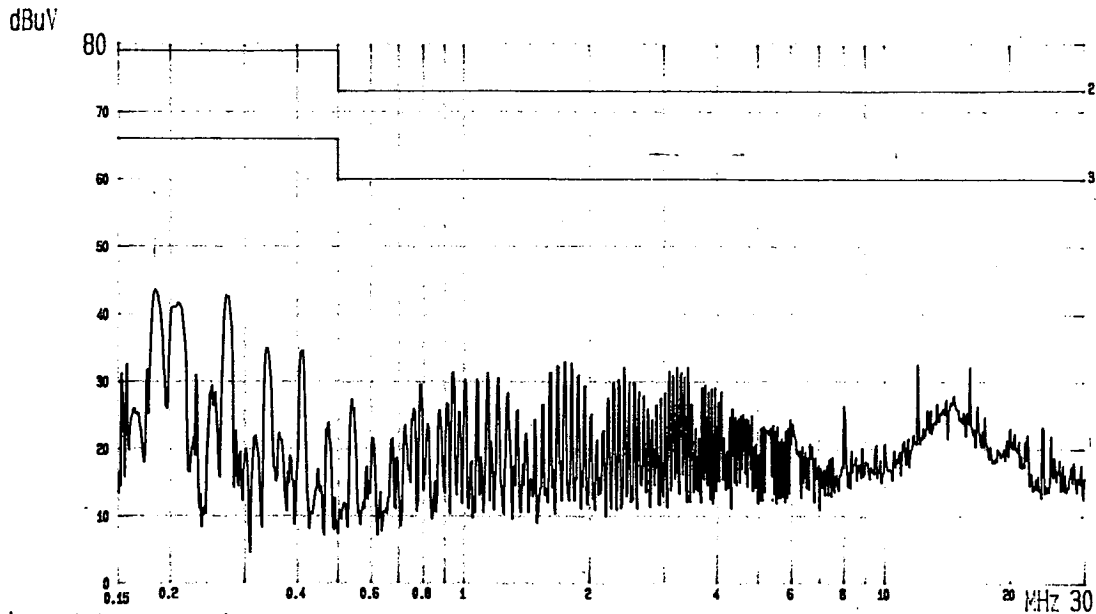
2) N : One end & Ground,
L1 : The other end & Ground

3) Calculation: Meter Reading + Factor = Result

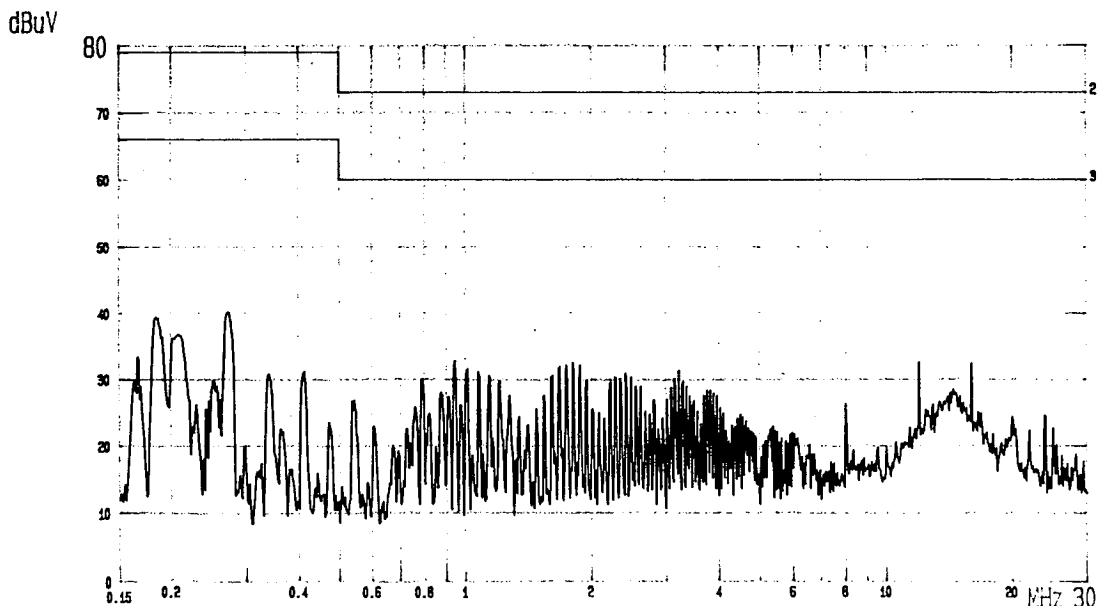
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Figure 1: Conducted Emission, AC Mains; 0.15 - 30MHz (PCL-732)

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--- Date 13.DEC.'95 Time 18:00:10
 EN55022 CONDUCTION TEST EUT: CARD 2: QP 3: AVG CLASS A LIMIT
 MODEL: PCL-732+PCLD-880 POWER: 230V/50Hz LISN: L1 ETC EMI LAB.



--- Date 13.DEC.'95 Time 17:56:04
 EN55022 CONDUCTION TEST EUT: CARD 2: QP 3: AVG CLASS A LIMIT
 MODEL: PCL-732+PCLD-880 POWER: 230V/50Hz LISN: N ETC EMI LAB.

Figure 2: Conducted Emission, AC Mains; 0.15 - 30MHz (PCL-731)

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P 9 6 6 3 3 3 6

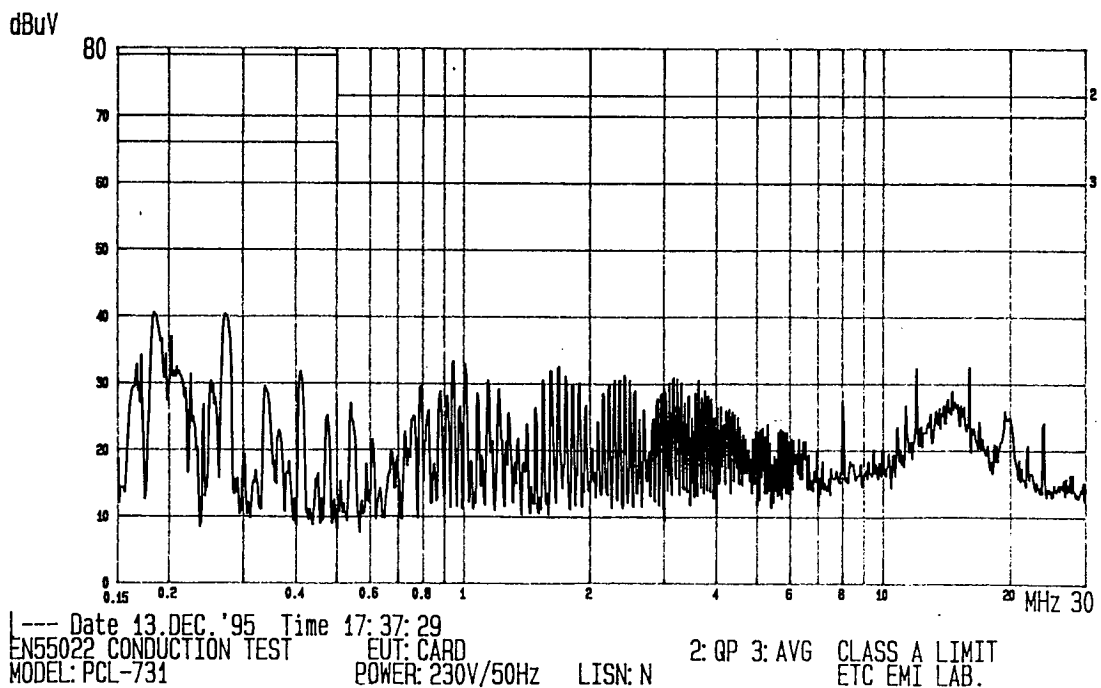
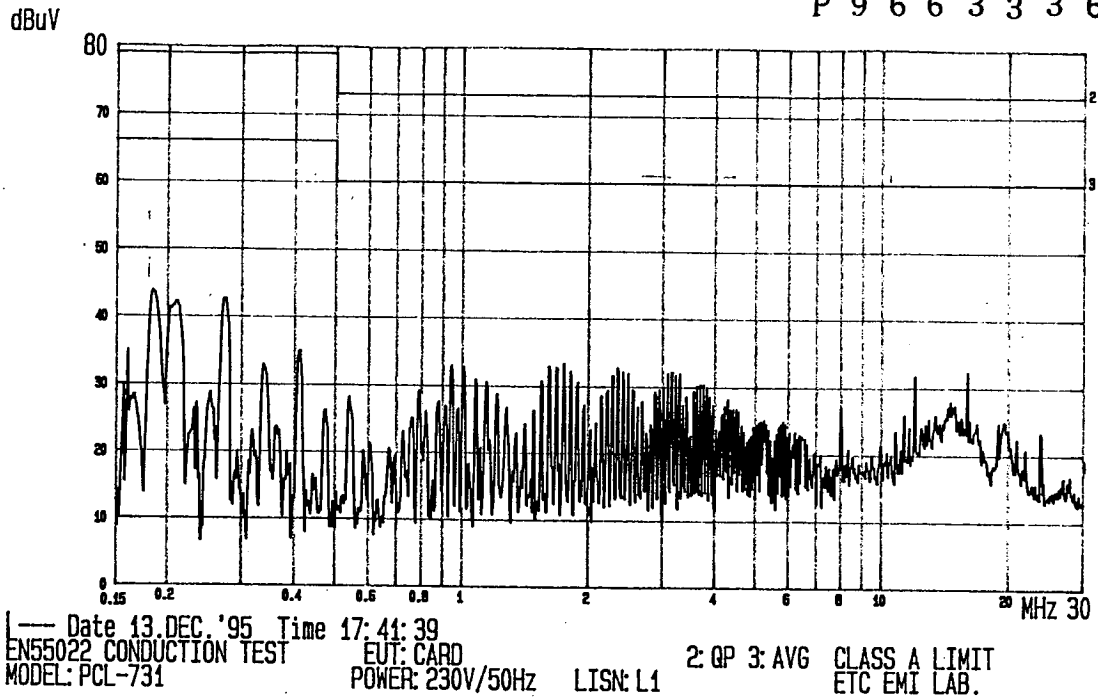
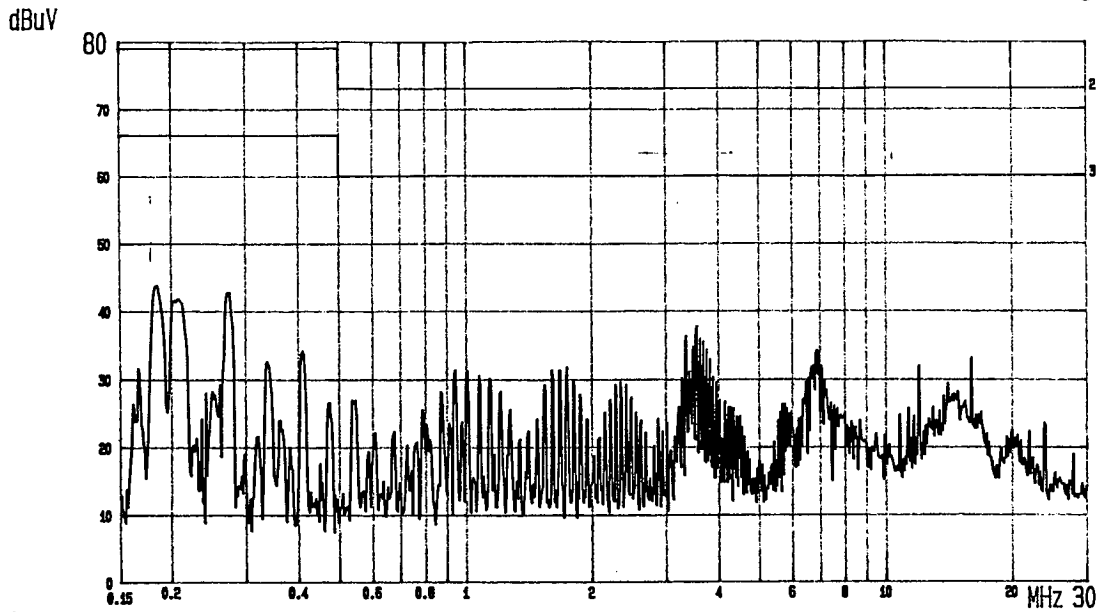
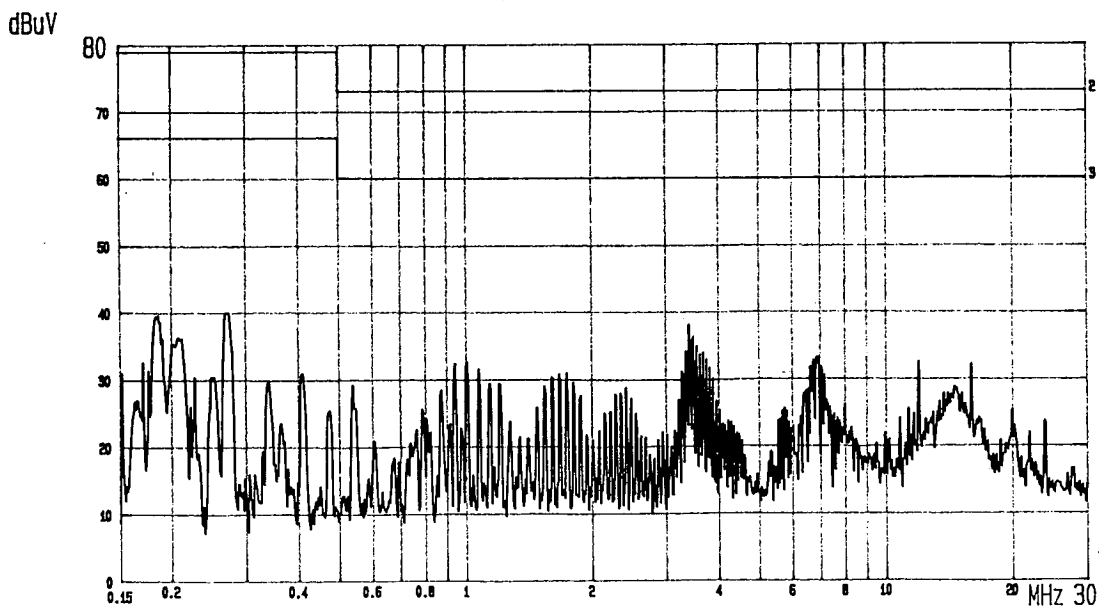


Figure 3: Conducted Emission, AC Mains; 0.15 - 30MHz (PCLD-885, PCLD-786)

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Product Safety GmbH
P 9 6 6 3 3 3 6



--- Date 13.DEC.'95 Time 19:23:31
 EN55022 CONDUCTION TEST EUT: CARD 2: QP 3: AVG CLASS A LIMIT
 MODEL: PCL-720+PCLD-885+PCLD-786 POWER: 230V/50Hz LISN: L1 ETC EMI LAB.



--- Date 13.DEC.'95 Time 19:19:15
 EN55022 CONDUCTION TEST EUT: CARD 2: QP 3: AVG CLASS A LIMIT
 MODEL: PCL-720+PCLD-885+PCLD-786 POWER: 230V/50Hz LISN: N ETC EMI LAB.

Figure 4: Conducted Emission, AC Mains; 0.15 - 30MHz (PCLD-7225)

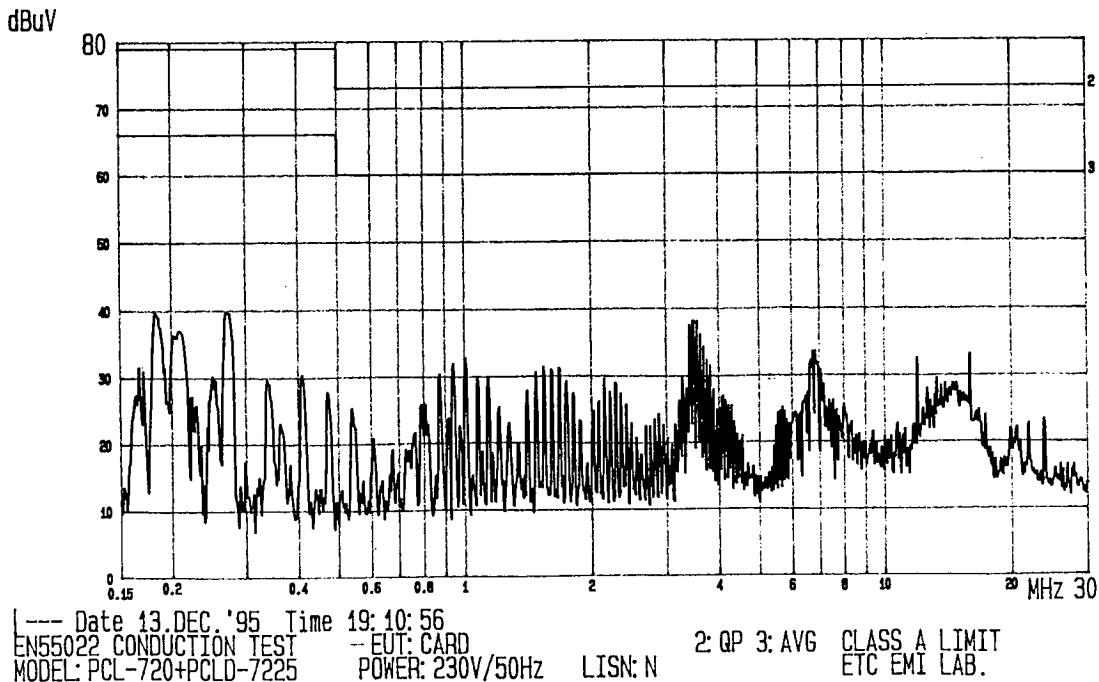
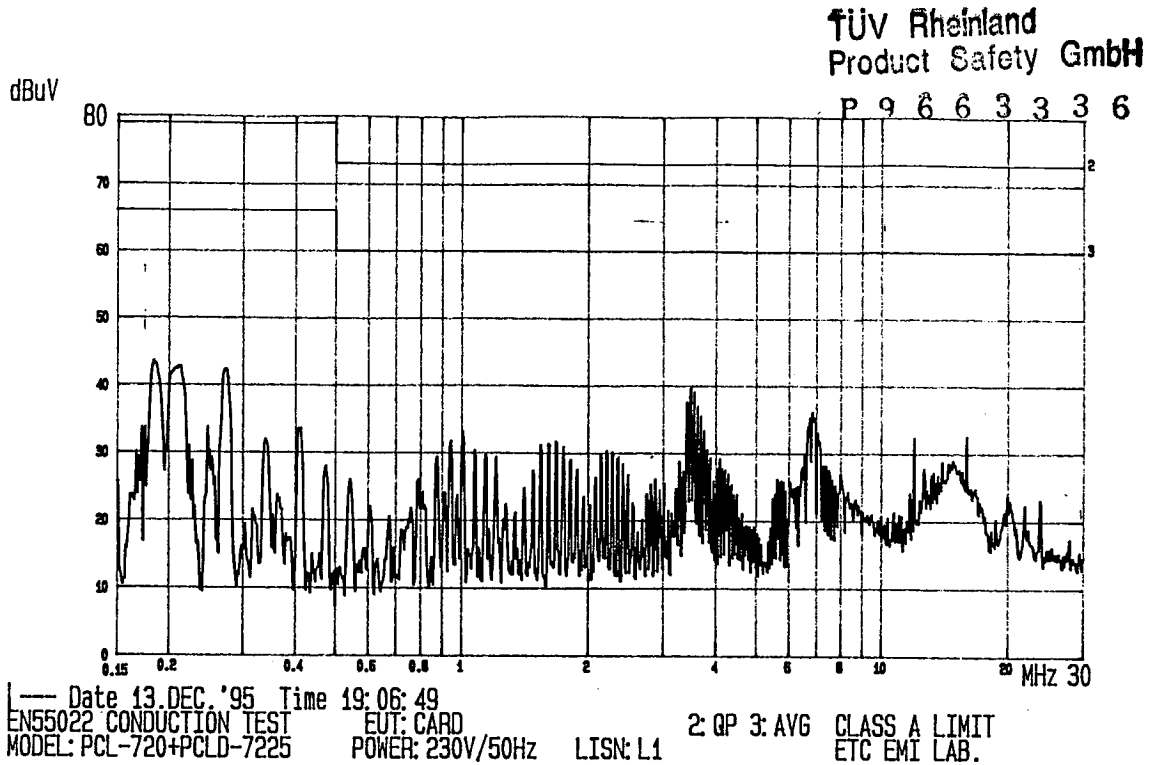
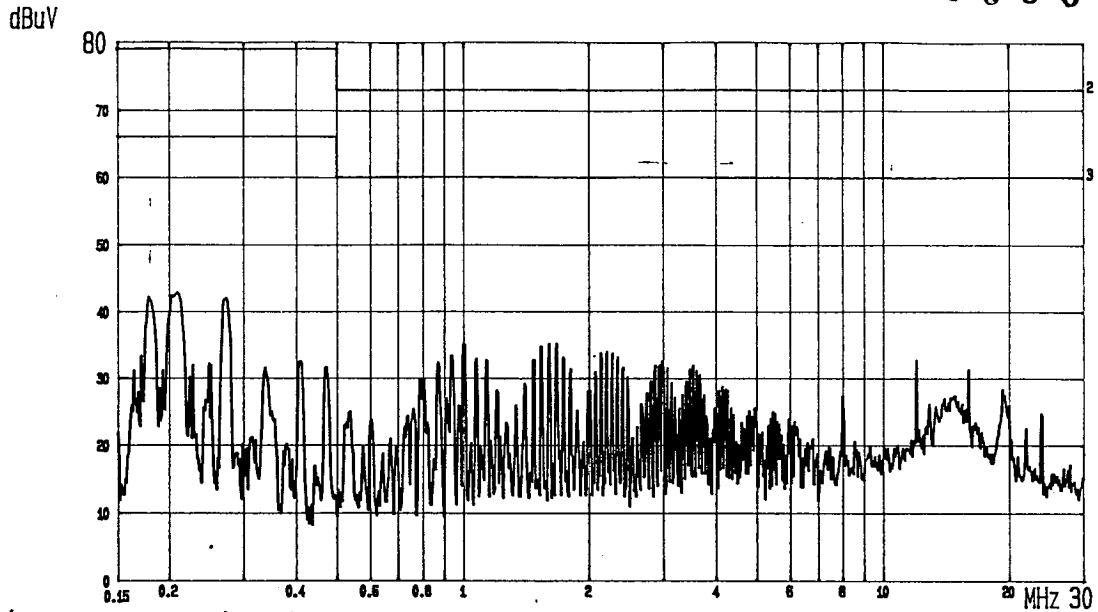
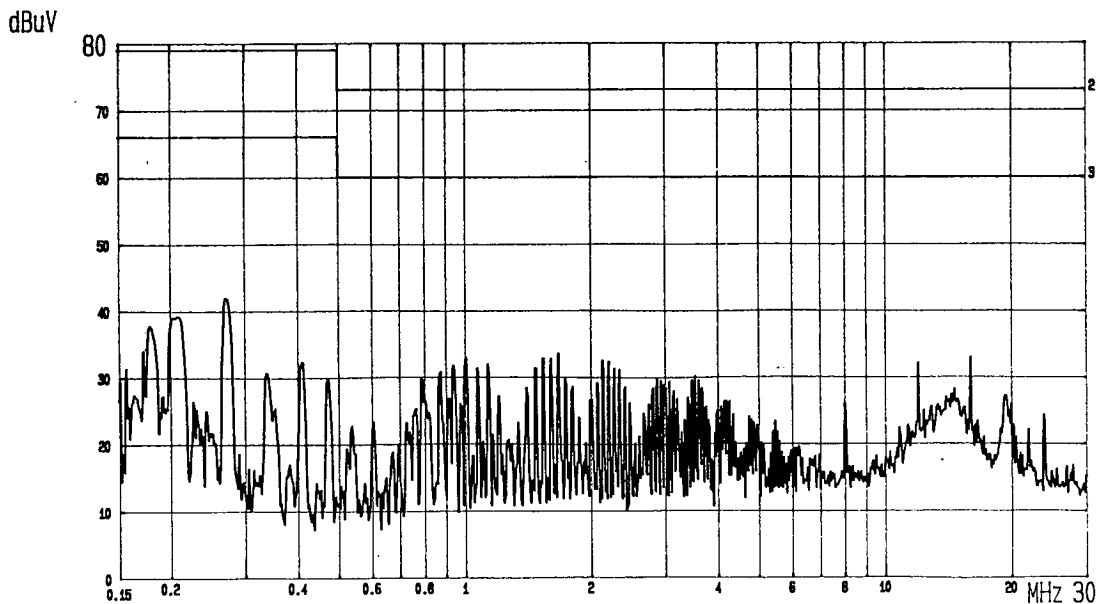


Figure 5: Conducted Emission, AC Mains; 0.15 - 30MHz (PCL-832)

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--- Date 13.DEC.'95 Time 18:26:15
 EN55022 CONDUCTION TEST EUT: CARD 2: GP 3: AVG CLASS A LIMIT
 MODEL: PCL-832+PCLD-880 POWER: 230V/50Hz LISN: L1 ETC EMI LAB.



--- Date 13.DEC.'95 Time 18:30:22
 EN55022 CONDUCTION TEST EUT: CARD 2: GP 3: AVG CLASS A LIMIT
 MODEL: PCL-832+PCLD-880 POWER: 230V/50Hz LISN: N 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)

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Result:

PASS

Test Setup

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

Disturbances other than those mentioned are small or not detectable.

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

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Settings

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

Model No. PCL-732

| Emission Frequency (MHz) | Meter Reading (dBuV) | | Corr'd Factor (dB) | Result (dBuV/m) | | Limit (dBuV/m) | Margin (dB) |
|--------------------------|----------------------|-------|--------------------|-----------------|-------|----------------|-------------|
| | Hor. | Vert. | | Hor. | Vert. | | |
| 68.4 | 43.4 | 47.9 | -15.3 | 28.1 | 32.6 | 40.0 | -7.4 |
| 84.6 | 43.3 | 46.4 | -16.0 | 27.3 | 30.4 | 40.0 | -9.6 |
| 109.4 | 29.2 | 42.6 | -9.9 | 19.3 | 32.7 | 40.0 | -7.3 |
| 124.0 | 41.9 | 44.7 | -10.3 | 31.6 | 34.4 | 40.0 | -5.6 |
| 143.6 | 32.8 | 44.6 | -10.5 | 22.3 | 34.1 | 40.0 | -5.9 |
| 191.8 | 35.2 | 37.9 | -5.0 | 30.2 | 32.9 | 40.0 | -7.1 |

Model No. PCL-731

| Emission Frequency (MHz) | Meter Reading (dBuV) | | Corr'd Factor (dB) | Result (dBuV/m) | | Limit (dBuV/m) | Margin (dB) |
|--------------------------|----------------------|-------|--------------------|-----------------|-------|----------------|-------------|
| | Hor. | Vert. | | Hor. | Vert. | | |
| 73.0 | 47.7 | 49.1 | -16.9 | 30.8 | 32.2 | 40.0 | -7.8 |
| 85.8 | 46.6 | 49.9 | -15.8 | 30.8 | 34.1 | 40.0 | -5.9 |
| 90.2 | 45.2 | 47.0 | -13.7 | 31.5 | 33.3 | 40.0 | -6.7 |
| 127.8 | 40.1 | 44.5 | -11.4 | 28.7 | 33.1 | 40.0 | -6.9 |
| 139.0 | 45.6 | 45.8 | -10.6 | 35.0 | 35.2 | 47.0 | -4.8 |
| 158.9 | 39.6 | 41.1 | -7.8 | 31.8 | 33.3 | 47.0 | -6.7 |

Model No. PCLD-885, PCLD-786

| Emission Frequency (MHz) | Meter Reading (dBuV) | | Corr'd Factor (dB) | Result (dBuV/m) | | Limit (dBuV/m) | Margin (dB) |
|--------------------------|----------------------|-------|--------------------|-----------------|-------|----------------|-------------|
| | Hor. | Vert. | | Hor. | Vert. | | |
| 56.4 | 41.2 | 48.0 | -13.3 | 27.9 | 34.7 | 40.0 | -5.3 |
| 75.1 | 48.8 | 51.3 | -17.2 | 31.6 | 34.1 | 40.0 | -5.9 |
| 85.6 | 42.9 | 49.9 | -15.8 | 27.1 | 34.1 | 40.0 | -5.9 |
| 150.2 | 41.5 | 45.4 | -10.0 | 31.5 | 35.4 | 40.0 | -4.6 |
| 177.8 | 37.9 | 41.3 | -6.0 | 31.9 | 35.3 | 40.0 | -4.7 |
| 191.7 | 37.1 | 41.9 | -5.0 | 32.1 | 36.9 | 40.0 | -3.1 |

Model No. PCLD-7225

| Emission Frequency (MHz) | Meter Reading (dBuV) | | Corr'd Factor (dB) | Result (dBuV/m) | | Limit (dBuV/m) | Margin (dB) |
|--------------------------|----------------------|-------|--------------------|-----------------|-------|----------------|-------------|
| | Hor. | Vert. | | Hor. | Vert. | | |
| 53.0 | 37.1 | 44.6 | -12.8 | 24.3 | 31.8 | 40.0 | -8.2 |
| 76.6 | 44.7 | 47.0 | -17.4 | 27.3 | 29.6 | 40.0 | -10.4 |
| 79.7 | 41.7 | 48.3 | -16.8 | 24.9 | 31.5 | 40.0 | -8.5 |
| 83.5 | 50.2 | 46.3 | -16.5 | 33.7 | 29.8 | 40.0 | -6.3 |
| 135.8 | 33.9 | 34.6 | -10.5 | 23.4 | 24.1 | 40.0 | -15.9 |
| 159.7 | 29.9 | 29.6 | -7.2 | 22.7 | 22.4 | 40.0 | -17.3 |

Model No. PCL-832

| Emission Frequency (MHz) | Meter Reading (dBuV) | | Corr'd Factor (dB) | Result (dBuV/m) | | Limit (dBuV/m) | Margin (dB) |
|--------------------------|----------------------|-------|--------------------|-----------------|-------|----------------|-------------|
| | Hor. | Vert. | | Hor. | Vert. | | |
| 48.0 | 41.0 | 46.8 | -12.6 | 28.4 | 34.2 | 40.0 | -5.8 |
| 66.8 | 48.6 | 46.6 | -13.9 | 34.7 | 32.7 | 40.0 | -5.3 |
| 74.4 | 51.6 | 50.3 | -17.2 | 34.4 | 33.1 | 40.0 | -5.6 |
| 119.54 | 42.5 | 28.0 | -9.1 | 33.4 | 18.9 | 40.0 | -6.6 |
| 177.68 | 34.7 | 28.4 | -6.0 | 28.7 | 22.4 | 40.0 | -11.3 |
| 184.52 | 31.6 | 26.7 | -5.2 | 26.4 | 21.5 | 40.0 | -13.6 |

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- Notes :
- 1) Place of Measurement : ETC's Measuring Site
 - 2) Distance of Measurement : 10 m (30-1000MHz)
 - 3) Height of table on which the EUT was placed : 0.8m
 - 4) Height of Receiving Antenna : (30 - 1000MHz) 1 - 4 m
 - 5) Calculation: Meter Reading + Factor = Result

4.2. Disturbances in Supply Systems

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4.2.1. Harmonics

P 9 6 6 3 3 3 6

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

Result:

N/A

The harmonics on AC Mains in the frequency from 0 to 2kHz were not measured because the EUT as a Digital I/O Card for an industrial PC is not in the scope of EN 60 555-2.

4.2.2. Voltage Fluctuations

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

Result:

N/A

The voltage fluctuations on AC Mains were not measured because the EUT as a Digital I/O Card for an industrial PC is not in the scope of EN 60 555-3.

5. Test Results IMMUNITY

Result:

PASS

5.1. Enclosure port

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5.1.1. Radio-Frequency Electromagnetic Field

P 9 6 6 3 3 3 6

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
Earthing: through power cord

Temperature 26 °C
Relative Humidity 55 %

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

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Settings

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

No abnormalities were observed during and directly after the test and when investigating all models as described on page 3 of this document.

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

Settings

| Frequency | | | Settings | | |
|-----------|--------|-----------|----------------|------------|------------|
| Start | Stop | Step Size | Field Strength | Sweep mode | Meas. Time |
| 270MHz | 500MHz | 728kHz | 10V/m | auto | 200ms |

No abnormalities were observed during and directly after the test and when investigating all models as described on page 3 of this document.

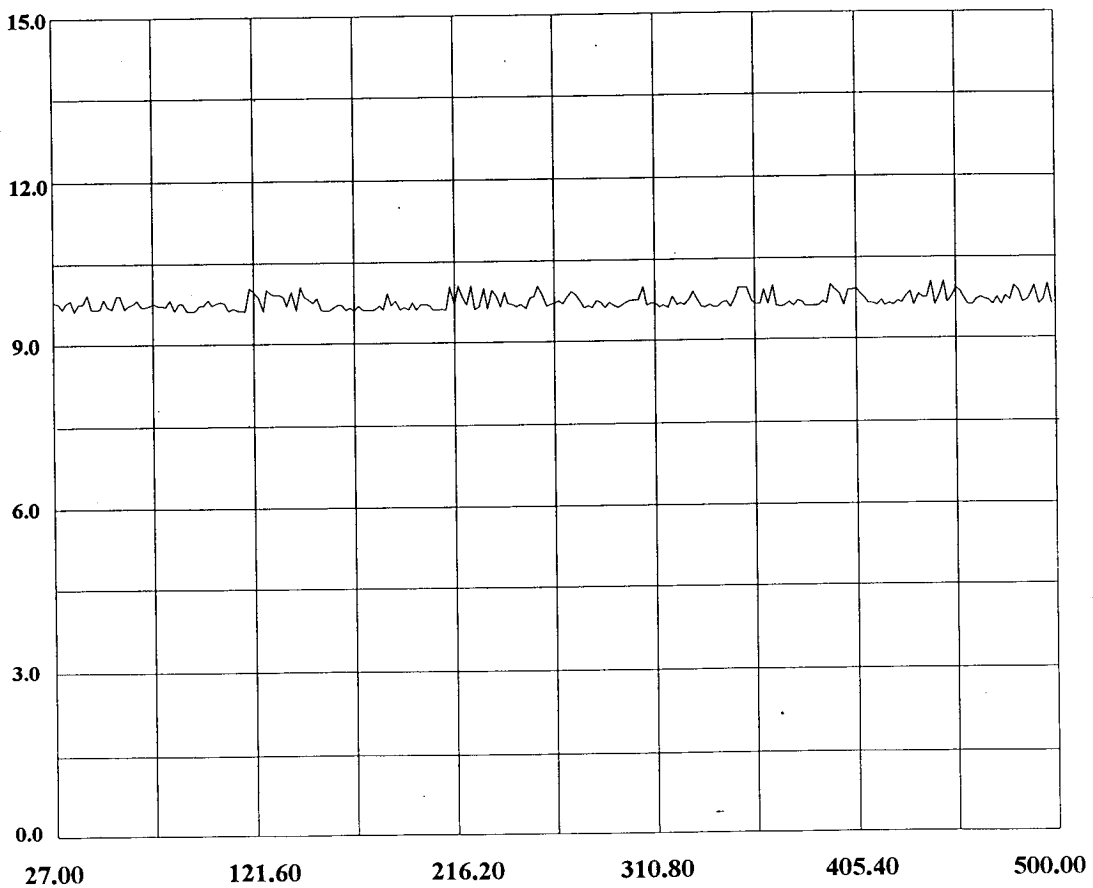
Figure 6: Radiated Susceptibility, Field Calibration

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RADIATED SUSCEPTIBILITY TEST GRAPH

Title : Calibration
Date : DEC, 6, 1995

Field (V/M)



Frequency (MHz)

5.1.2. Electrostatic Discharge

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P 9 6 6 3 3 3 6

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
 Earthing: through power cord

 Temperature 26 °C
 Relative Humidity 55 %

Table 5: Electrostatic Discharge

| Testpoint | Polarity | Number of Discharges | Observation | Result |
|-----------------------|----------|----------------------|-----------------|-------------|
| Housing | + | 10 | normal function | PASS |
| Connectors (backside) | + | 10 | normal function | PASS |

The data displayed on the monitor screen, for M/N PCL-720, PCLD-885 and PCLD-786, changed to "0" during the test but recovered directly after the test. All other models as described on page 3 of this document did not show any degradation in performance during and after the test.

5.2. Input and Output AC Power Ports

5.2.1. Fast Transients Common Mode

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Port: Mains Plug
 Basic Standard: IEC 801-4
 Performance: B
 Criteria:
 Test Specification: prEN 50 082-2
 Peak Voltage: 2kV (= level 3 of IEC 801-4)
 T_r/T_n : 5/50ns
 Burst Duration: 15ms
 Rep. frequency: 5kHz

Result:

PASS

Test Setup

Input Voltage: AC 230V, 50Hz
 Operational mode: ON
 Earthing: through power cord
 Temperature: 27 °C
 Relative Humidity: 56 %
 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 |

The disturbance was shown on the monitor screen in form of a visual noise during the test but recovered itself directly after the test.



5.3. Ports for Signal Lines

5.3.1. Fast Transients Common Mode

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| | |
|---------------------|------------------------------|
| Port: | Signal Lines |
| Basic Standard: | IEC 801-4 |
| Performance | B |
| Criteria: | |
| Test Specification: | prEN 50 082-2 |
| Peak Voltage: | 1kV (= level 2 of IEC 801-4) |
| T_r/T_n | 5/50ns |
| Burst Duration: | 15ms |
| Rep. frequency: | 5kHz |
| Coupling: | Capacitive Clamp |

Result:

N/A

This test is not applicable to the signal lines since the interconnection cables and signal cables, respectively, have a length less than 3 m.

6. Photographs of the Test Set-up

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Picture 1: Conducted Emission



Picture 2: Radiated Emission

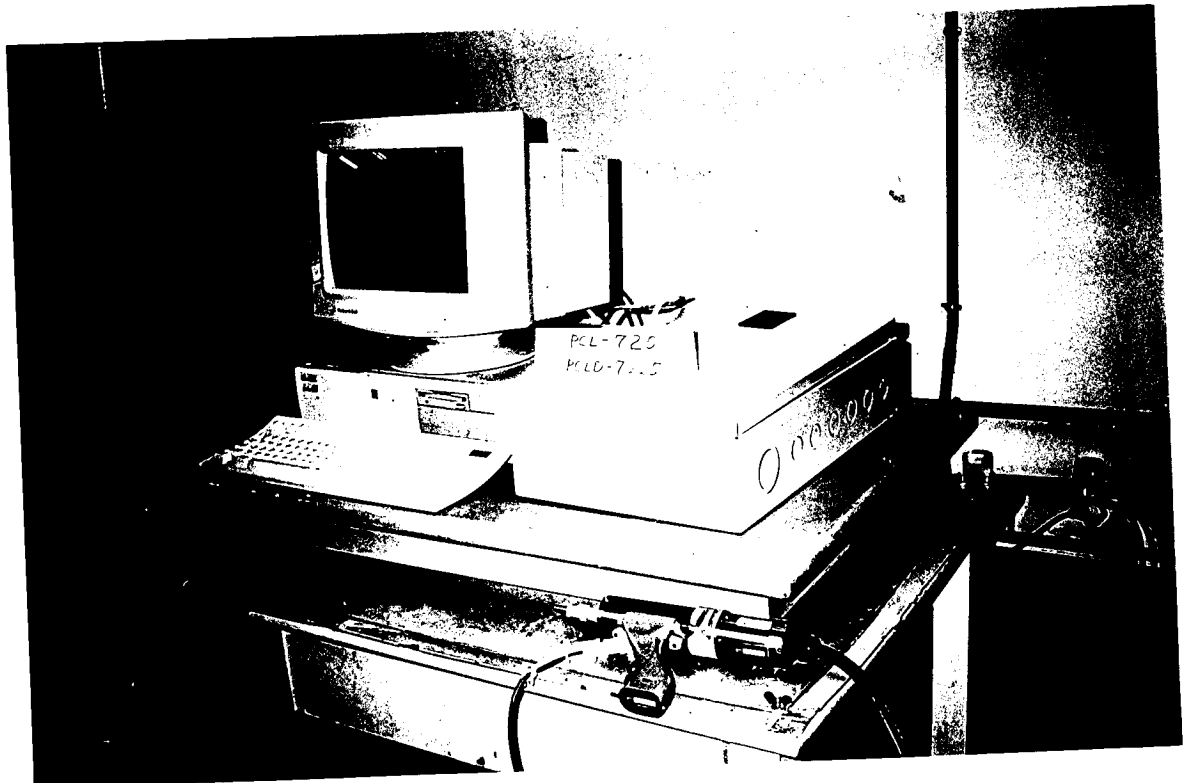


Picture 3: Radiated Susceptibility, Frequency Range 27MHz to 500Mhz



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Picture 4: Electrostatic Discharge



Picture 5: Fast Transients on AC Mains



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7. List of Tables

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