

# MEASUREMENT / TECHNICAL REPORT

**SIEMENS NIXDORF AG**

**Model: Keyboard K293**

**FCC ID: HSS01TASTK293**

**May 7, 1998**

This report concerns: ☒ Original grant ☐ Class II change  
Equipment type: Keyboard

Request issue of grant: ☒ Immediately upon completion of review  
☐ Defer grant per 47 CFR 0.457(d)(1)(ii) until \_\_\_\_\_  
date \_\_\_\_\_. Company Name agrees to notify the  
Commission by \_\_\_\_\_ date \_\_\_\_\_ of the intended  
date of announcement of the product so that the  
grant can be issued on that date.

Measurement procedure  
used: ☒ ANSI C63.4-1992  
☐ FCC/OET MP-4(1987)  
☐ other \_\_\_\_\_

Limits on compliance with: CISPR 22

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**SIEMENS  
NIXDORF**

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Keyboard

FCC Identifier:  
HSS01TASTK293

Date: May 7, 1998

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Attachment A: User Manual

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# 1 GENERAL INFORMATION

## 1.1 Product Description

The Siemens Nixdorf keyboard K293 with the product number S26381-K293 is a MF-II-compatible keyboard for personal computers. The connection between the keyboard and the personal computer is done by a cable which has on one end a western plug connection and on the other end a PS/2-connection.

### *Functions and features:*

|                         |                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Industry standard       | MF-II-compatible                                                                                                                               |
| System compatibility    | AT, XT and PS/2 system, automatic AT/XT switch over                                                                                            |
| Keyboard to system unit | western plug to PS/2/DIN (200 / 400 cm variable length)                                                                                        |
| Design                  | <ul style="list-style-type: none"><li>- Low-profile compact design, special ergonomic key design</li><li>- adjustable keyboard slope</li></ul> |
| Technology              | Key matrix on foil, single chip processor mounted on PC board                                                                                  |

*Electrical:*

Power consumption < 50 mA at 5 V

*Temperature:*

Operating temperature 5° C to 40° C (as per IEC721)

*Dimensions at minimum adjustment angles and without palm rests:*

Dimensions (H x W x D) 36 mm x 463 mm x 164 mm

*Adjustment range:*

Keyboard slope: 6° and 12°

*Standards met:*

Product safety: EN 60950  
VDE 0805

Ergonomics: "Safety-tested" mark (ZH1/618)  
ISO 9241-4 / EN 29241-4  
ISO 9995, DIN 2137

Electromagnetic Compatibility: CE symbol to EC Guideline 89/336/EWG  
(EN 55022/B, EN 50082-1)

## 1.2 Related Submittal Grant

N/A

## 1.3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

| Pos | Model Number<br>(Serial Number)                     | FCC ID        | Description     | Cable<br>Description<br>(length in [cm])                        |
|-----|-----------------------------------------------------|---------------|-----------------|-----------------------------------------------------------------|
| 1   | Siemens Nixdorf<br>Scenic Pro M5<br>(200 MHz)       | HSSSCENICM502 | PC              | unshielded power<br>cord [292]                                  |
| 2   | Siemens Nixdorf<br>MCM 1705 NTD<br>S26361-K471-V150 | A3LCGH760     | Monitor         | unshielded power<br>cord [175]<br>shielded video<br>cable [186] |
| 3   | Siemens Nixdorf<br>S26381-K293                      | HSS01TASTK293 | Keyboard<br>EUT | shielded keyboard<br>cable [250]                                |
| 4   | Microsoft<br>MS 2.1A                                | C3KKMP3       | Mouse           | shielded mouse<br>cable [183]                                   |

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Keyboard

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| Pos | Model Number<br>(Serial Number)                                         | FCC ID     | Description              | Cable<br>Description<br>(length in [cm])                                    |
|-----|-------------------------------------------------------------------------|------------|--------------------------|-----------------------------------------------------------------------------|
| 5   | Hewlett Packard<br>HP 2225C+<br>(3019S70991)                            | DSI6XU2225 | Printer,<br>parallel I/F | unshielded power<br>cord [185], shielded centronics<br>parallel cable [190] |
| 6   | Hewlett Packard<br>HP 2225D+<br>(3012S70819)                            | DSI6XU2225 | Printer,<br>serial I/F   | unshielded power<br>cord [185], shielded serial cable<br>[190]              |
| 7   | Hewlett Packard<br>HP 2225D+<br>(2952S61299)                            | DSI6XU2225 | Printer,<br>serial I/F   | unshielded power<br>cord [185], shielded serial cable<br>[190]              |
| 8   | Siemens                                                                 | N/A        | USB cable                | shielded cable,<br>terminated [86]                                          |
| 9   | Siemens                                                                 | N/A        | USB cable                | shielded cable,<br>terminated [86]                                          |
|     | <b>Pos 1 contains:</b>                                                  |            |                          |                                                                             |
| a   | Minebea Electronics<br>(VK)<br>ME145S2CCCV00<br>SNI:<br>S26113-E406-V20 | N/A        | Power<br>supply          |                                                                             |
| b   | Siemens Nixdorf<br>S26361-D969-A11<br>GS 1                              | N/A        | System<br>board          |                                                                             |

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| Pos | Model Number<br>(Serial Number) | FCC ID    | Description                                  | Cable<br>Description<br>(length in [cm]) |
|-----|---------------------------------|-----------|----------------------------------------------|------------------------------------------|
| c   | Intel Pentium<br>200 MHz        | N/A       | Processor                                    |                                          |
| d   | Matrox<br>MAG-MIL/2/SI          | ID7057600 | Graphic<br>controller                        |                                          |
| e   | Matrox<br>MAG-<br>MIL/MOD6/OE   | N/A       | Storage<br>piggy to<br>Graphic<br>controller |                                          |

## 1.4 Test Methodology

Both, conducted and radiated tests were performed according to the procedures in ANSI C63.4-1992. Radiated testing was performed at an antenna to EUT distance of 10 meters. All radiated emission measurements were done in an anechoic chamber. Limits for radiated and conducted are in compliance with CISPR 22.

## 1.5 Test Facility

The anechoic chamber and conducted measurement facility used to collect the emission data is located at Siemens Nixdorf Informationssysteme AG, Buergermeister-Ulrich-Strasse 100, 86199 Augsburg, Germany.

This site has been fully described in a report dated January 24, 1997 submitted to your office, and accepted in a letter dated March 03, 1997 (31040/SIT).

## 1.6 Referenced Rules Sections

N/A

## 3 SYSTEM TEST CONFIGURATION

### 3.1 Justification

The system was configured for testing in a maximum fashion (as a customer can use it). Each type of external ports was connected with a peripheral unit (e.g. serial port connected to a serial printer, external keyboard port connected to a keyboard and so on). The EUT was configured with a cable of 2 m and 4 m length.

Two configurations were measured:

- 1) Keyboard K293 connected to system unit via 2 m cable
- 2) Keyboard K293 connected to system unit via 4 m cable

Both measurement results are applicable.

### 3.2 Video mode Justification

The system was tested in video graphic mode 1024 x 768/85 Hz, because this is the most commonly used resolution and reflects the worst case.

### 3.3 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The used sequence is:

- scrolling "H" with applicable video mode (see 3.2)
- internal Floppy drive writes to the HD and reads back
- internal CD-ROM writes to the HD
- "H's" are sent to the printer ports
- data is sent to USB ports

### 3.4 Special Accessories

As shown in Figure 3.1, all interface cables used for compliance testing are shielded like normally supplied by the manufacturer. All cable connectors feature integral metal hoods for shielding.

## 3.5 Equipment Modifications

To achieve compliance to Class B levels, the following modifications were made during compliance testing:

**no modifications**

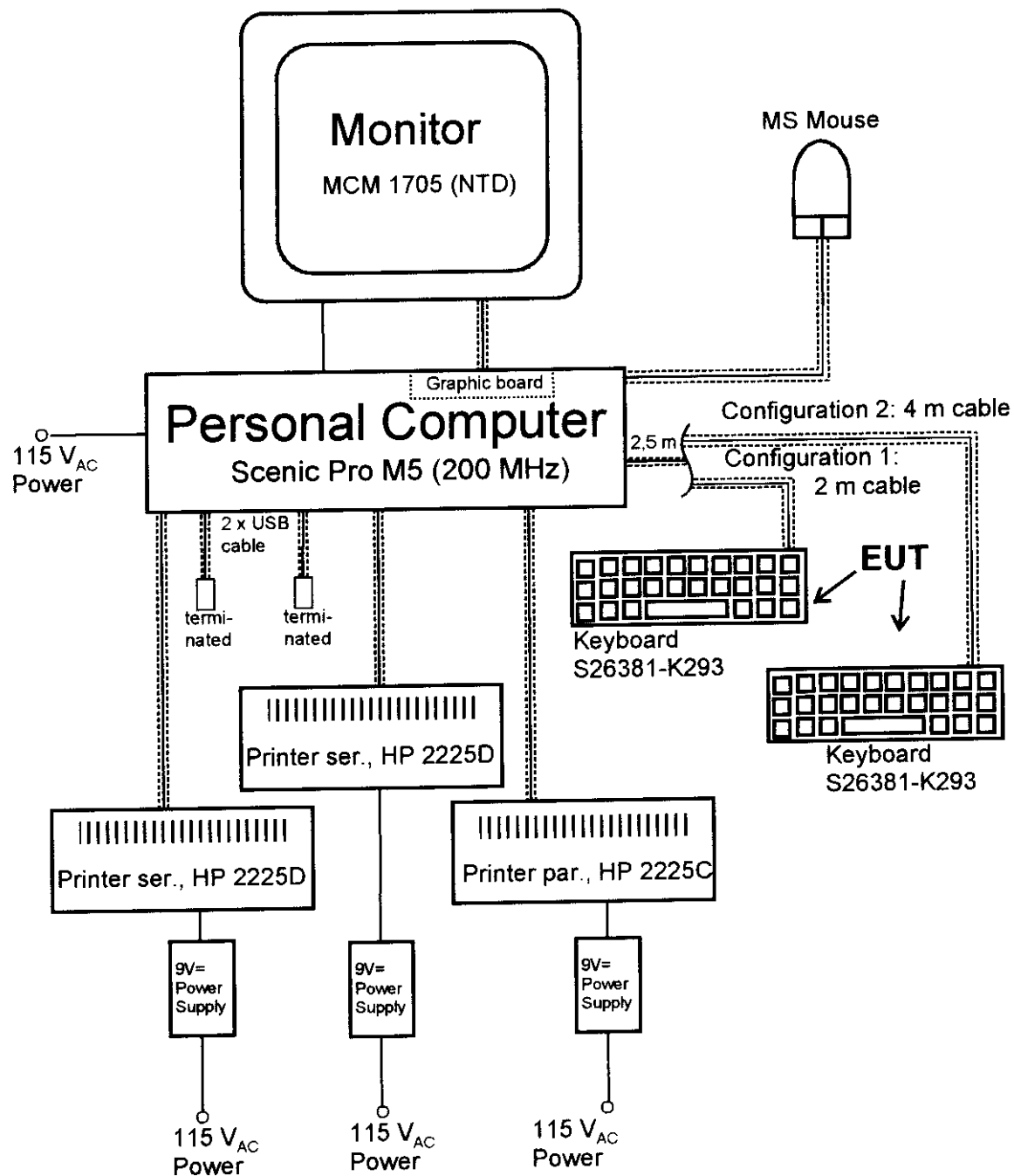
Applicant Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed/Printed Name \_\_\_\_\_ Position \_\_\_\_\_

## 3.6 Configuration of Tested System

All necessary tests were carried out like figure 3.1. The system was used according to paragraph 1.1. During test for conducted emission the EUT was connected to a LISN. All peripherals were supplied by a second LISN. The equipment was configured according to ANSI C63.4-1992 Fig 11.

Figure 3.1 Configuration of Tested System



## 4.2 Clockfrequency of EUT

Ceramic resonator frequency: 4.0 MHz  $\pm 1 \%$

The external clock frequency is divided by 2 in the keyboard controller.

## 4.3 Theory of Operation

The keyboard works exactly like a traditional keyboard.

The control of all keyboard functions is done by a micro controller MOTO-ROLA MC68HC05B4. The external frequency is 4 MHz, the internal is 2 MHz.

The controller scans a matrix of 18 x 8 (144 keys). The matrix is scanned all time by the controller with a high level pulse. The input is an A/D-converter part of the controller which analysis, if a key is pressed or released.

The communication to the system is realised by two lines, a clock- and a data line. It is a synchronous data transmission.

## 6 CONDUCTED EMISSION DATA

### 6.1 Test Procedure

The initial step in collecting conducted emission data is a Rohde & Schwarz Test Receiver (ESHS10). During first scan all data in peak mode is measured, then all significant peaks are explored either in quasi-peak mode or in average mode. In case of low noise (no peak value reaches the quasi peak limit), only average checks are done.

### 6.2 Measured Data

The conducted emission was measured the following way:

1. Peak noise on L
2. Peak noise on N

During the emission measurement the printers and the monitor are supplied with power via a second LISN. Two configurations were measured:

Configuration a: Keyboard K293 with 2 m cable

Configuration b: Keyboard K293 with 4 m cable

Judgement: Passed by

|         | Frequency<br>[MHz] | Measured<br>[dB(μV)] | Kind of<br>value | Limit<br>[dB(μV)] | Configuration |
|---------|--------------------|----------------------|------------------|-------------------|---------------|
| neutral | 0.354              | 37.90                | AV               | 49                | b             |
| phase   | 4.710              | 33.70                | AV               | 46                | a             |
| phase   | 4.836              | 33.30                | AV               | 46                | b             |

|       | Frequency<br>[MHz] | Measured<br>[dB(μV)] | Kind of<br>value | Limit<br>[dB(μV)] | Configuration |
|-------|--------------------|----------------------|------------------|-------------------|---------------|
| phase | 4.602              | 33.20                | AV               | 49                | b             |
| phase | 4.482              | 33.20                | AV               | 46                | b             |
| phase | 4.590              | 33.00                | AV               | 49                | a             |

AV: average

QP: quasi peak

Test Personnel:

Tester Signature: W. Richter Date: May 14, 1998

Printed Name: W. Richter

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Keyboard

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# Measurement Protocols

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| <b>Configuration a:</b><br>Keyboard K293 with 2 m cable | 26 - 28 |
| <b>Configuration b:</b><br>Keyboard K293 with 4 m cable | 29 - 31 |

conducted noise according to:

EN55022/B

EUT: Keyboard : KBPC P2 (S26381-K293)  
Manufacturer: SNI  
Operating Condition: scr."H" 1024 x 768, 100Hz ,Keyboard+HD-Test  
Test Site: EMC CENTER Augsburg ; SK2  
Operator: W. Richter  
Comment : meas. point: N, L1 of PC  
Comment: Keyboard cable length: 2m  
Start of Test: 31.03.1998 / 10:54:23

**SCAN TABLE: "Volt\_015-30av"**

Unit: dBµV

Detector: Mode:

Curve 1: MaxPeak MaxHold  
Curve 2: Average MaxHold

Subrange 1:

Start Frequency: 150.0 kHz Step Size: 6.0 kHz  
Stop Frequency: 30.0 MHz  
Measure Time: 10.0 ms  
IF Bandwidth: 10 kHz

Receiver: ESH3 Transducer: ESH3-Z5  
Signal Path: None System Transducer: None  
Meas. Mode: Lin Add. Transd. 1: ESH3-Z2  
Tracking Gen.: Off Add. Transd. 2: None  
Input: -- Add. Transd. 3: None

Preamplifier: -- Demodulation: A3  
RF Att.: 0 dB Volume: --  
Ref. Level: -- Squelch: --  
Min. RF Att.: -- Option: None  
IF Att.: LowDistortion  
Autorange: On

Curve 1: On Repetition: 0  
Curve 2: On Stop Mark: Off  
Stop Message: Off  
Stop Message:

**MEASUREMENT RESULT: "Quasi Peak"**

31.03.1998 11:24

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 0.234000  | 44.10 | 62    | 18.2   |        | N    | GND |
| 0.354000  | 43.00 | 59    | 15.9   |        | N    | GND |
| 4.122000  | 32.70 | 56    | 23.3   |        | L1   | GND |

**MEASUREMENT RESULT: "Quasi Peak"**

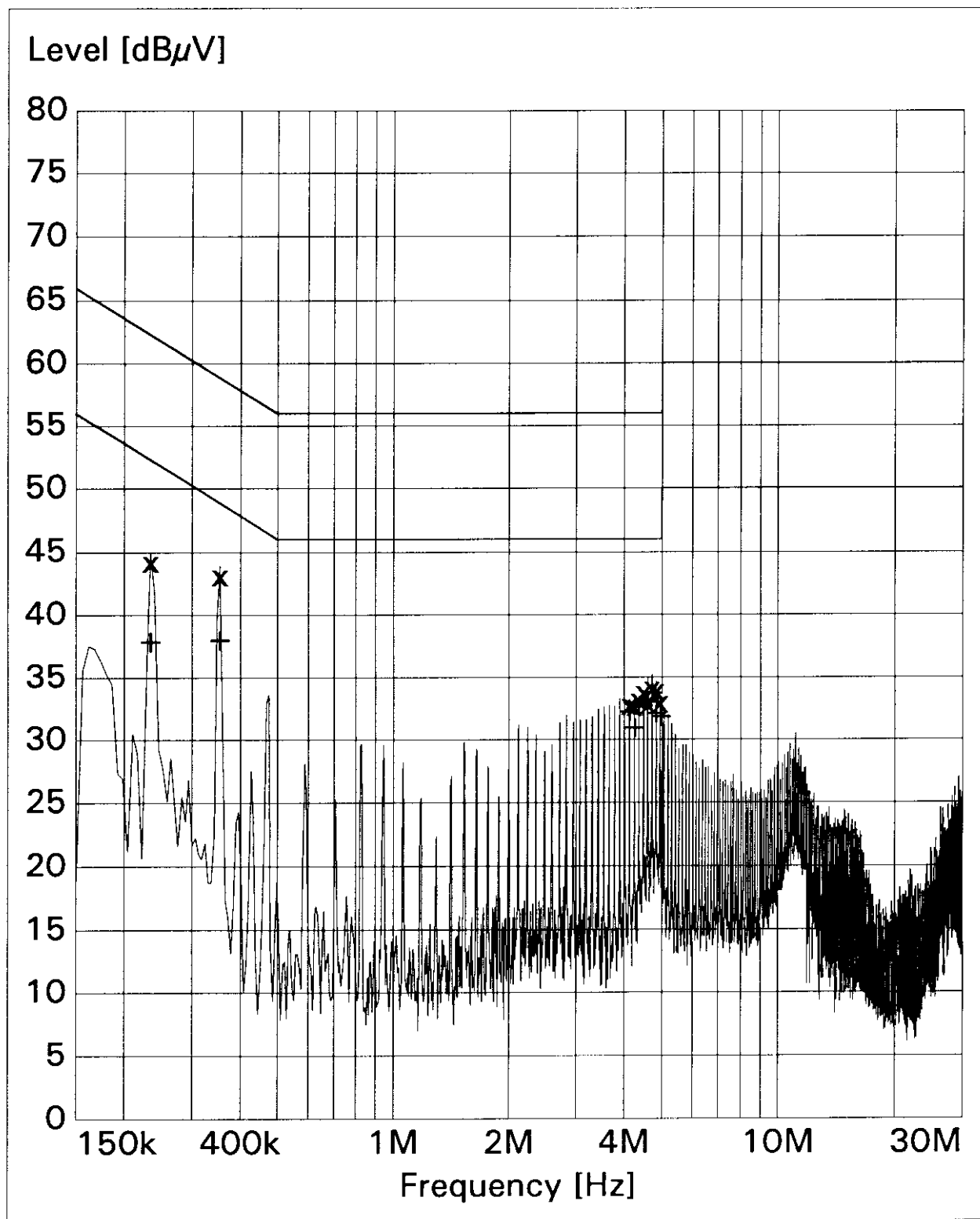
(continued)

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 4.242000  | 32.60 | 56    | 23.4   |        | L1   | GND |
| 4.356000  | 33.10 | 56    | 22.9   |        | L1   | GND |
| 4.476000  | 33.70 | 56    | 22.3   |        | L1   | GND |
| 4.596000  | 32.80 | 56    | 23.2   |        | L1   | GND |
| 4.710000  | 34.00 | 56    | 22.0   |        | L1   | GND |
| 4.830000  | 33.80 | 56    | 22.2   |        | L1   | GND |
| 4.944000  | 32.90 | 56    | 23.1   |        | L1   | GND |

**MEASUREMENT RESULT: "Average"**

31.03.1998 11:24

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 0.234000  | 37.80 | 52    | 14.5   |        | N    | GND |
| 0.354000  | 37.90 | 49    | 11.0   |        | N    | GND |
| 4.122000  | 32.20 | 46    | 13.8   |        | L1   | GND |
| 4.242000  | 30.90 | 46    | 15.1   |        | L1   | GND |
| 4.356000  | 32.60 | 46    | 13.4   |        | L1   | GND |
| 4.476000  | 32.70 | 46    | 13.3   |        | L1   | GND |
| 4.590000  | 33.00 | 46    | 13.0   |        | L1   | GND |
| 4.710000  | 33.70 | 46    | 12.3   |        | L1   | GND |
| 4.830000  | 32.10 | 46    | 13.9   |        | L1   | GND |
| 4.944000  | 31.80 | 46    | 14.2   |        | L1   | GND |



x x MES Quasi Peak  
 + MES Average  
 — MES Preview Peak  
 — LIM EN 55022/B V QP  
 — LIM EN 55022/B V AV

conducted noise according to:

**EN55022/B**

EUT: Keyboard : KBPC P2 (S26381-K293)  
Manufacturer: SNI  
Operating Condition: scr."H" 1024 x 768, 100Hz ,Keyboard+HD-Test  
Test Site: EMC CENTER Augsburg ; SK2  
Operator: W. Richter  
Comment : meas. point: N, L1 of PC  
Comment: Keyboard cable length: 4m  
Start of Test: 31.03.1998 / 10:21:31

**SCAN TABLE: "Volt\_015-30av"**

Unit: dBµV

Detector: Mode:

Curve 1: MaxPeak MaxHold  
Curve 2: Average MaxHold

Subrange 1:

Start Frequency: 150.0 kHz Step Size: 6.0 kHz  
Stop Frequency: 30.0 MHz  
Measure Time: 10.0 ms  
IF Bandwidth: 10 kHz

Receiver: ESH3 Transducer: ESH3-Z5  
Signal Path: None System Transducer: None  
Meas. Mode: Lin Add. Transd. 1: ESH3-Z2  
Tracking Gen.: Off Add. Transd. 2: None  
Input: -- Add. Transd. 3: None

Preamplifier: -- Demodulation: A3  
RF Att.: 0 dB Volume: --  
Ref. Level: -- Squelch: --  
Min. RF Att.: -- Option: None  
IF Att.: LowDistortion  
Autorange: On

Curve 1: On Repetition: 0  
Curve 2: On Stop Mark: Off  
Stop Message: Off  
Stop Message:

**MEASUREMENT RESULT: "Quasi Peak"**

31.03.1998 10:50

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 0.234000  | 44.30 | 62    | 18.0   |        | N    | GND |
| 0.354000  | 42.80 | 59    | 16.1   |        | N    | GND |
| 0.468000  | 31.90 | 57    | 24.6   |        | N    | GND |

**MEASUREMENT RESULT: "Quasi Peak"**

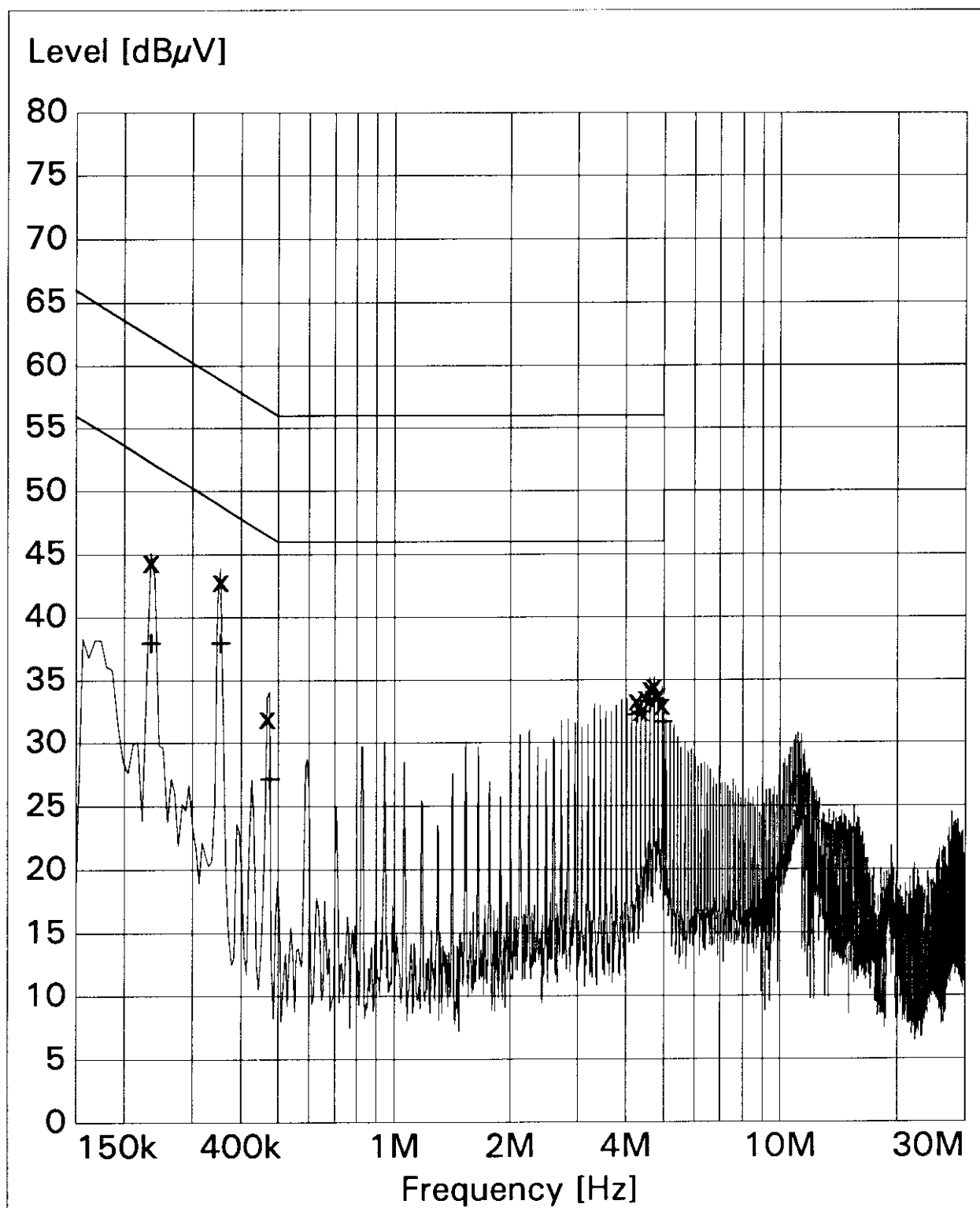
(continued)

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 4.248000  | 33.20 | 56    | 22.8   |        | L1   | GND |
| 4.368000  | 32.40 | 56    | 23.6   |        | L1   | GND |
| 4.482000  | 33.50 | 56    | 22.5   |        | L1   | GND |
| 4.602000  | 34.20 | 56    | 21.8   |        | L1   | GND |
| 4.716000  | 34.40 | 56    | 21.6   |        | L1   | GND |
| 4.836000  | 33.70 | 56    | 22.3   |        | L1   | GND |
| 4.956000  | 32.90 | 56    | 23.1   |        | L1   | GND |

**MEASUREMENT RESULT: "Average"**

31.03.1998 10:50

| Frequency | Level | Limit | Margin | Exceed | Line | PE  |
|-----------|-------|-------|--------|--------|------|-----|
| MHz       | dBµV  | dBµV  | dB     | Mark   |      |     |
| 0.234000  | 37.90 | 52    | 14.4   |        | N    | GND |
| 0.354000  | 37.90 | 49    | 11.0   |        | N    | GND |
| 0.474000  | 27.10 | 46    | 19.3   |        | L1   | GND |
| 4.248000  | 32.20 | 46    | 13.8   |        | L1   | GND |
| 4.362000  | 32.40 | 46    | 13.6   |        | L1   | GND |
| 4.482000  | 33.20 | 46    | 12.8   |        | L1   | GND |
| 4.602000  | 33.20 | 46    | 12.8   |        | L1   | GND |
| 4.716000  | 33.40 | 46    | 12.6   |        | L1   | GND |
| 4.836000  | 33.30 | 46    | 12.7   |        | L1   | GND |
| 4.956000  | 31.60 | 46    | 14.4   |        | L1   | GND |



|     |     |                 |
|-----|-----|-----------------|
| x x | MES | Quasi Peak      |
| +   | MES | Average         |
| —   | MES | Preview Peak    |
| —   | LIM | EN 55022/B V QP |
| —   | LIM | EN 55022/B V AV |

## 6.3 Referenced Rules Sections

N/A

## 6.4 Test Instrumentation Used, Conducted Measurement

| Type             | Manufacturer/<br>Model No. | Serial No.  | Last Cal. | Cal. Interval |
|------------------|----------------------------|-------------|-----------|---------------|
| Receiver         | ESH3<br>Rohde & Schwarz    | 873676/014  | March 97  | 12 months     |
| LISN             | NSLK 8126<br>Schwarzbeck   | KWA20870662 | March 97  | 12 months     |
| LISN             | ESH2-Z5<br>Schwarzbeck     | 846695/027  | March 97  | 12 months     |
| Pulse<br>limiter | ESH3-Z2<br>Rohde & Schwarz | 60813       | March 97  | 12 months     |

## 7 RADIATED EMISSION DATA

### 7.1 Test Procedure

The radiated emission was measured between 30 MHz and 1000 MHz. The bandwidth of the EMI-receiver was set to 120 kHz and the detector was set to peak. During prescan all data in peak mode are accumulated automatically. At final measurement the detector was set to CISPR quasi peak and values above the acceptance line were verified automatically.

The test was performed in a semi anechoic chamber in a distance of 10 meters between antenna and EUT. During tests the EUT was turned 360° the receiving antenna was moved from 1 to 4 meters and the antenna polarisation was changed from horizontal to vertical for finding the maximum levels of emission.

For the whole range one antenna was used:

30 MHz to 1000 MHz:                      Bilog antenna

After automatic tests during manual verification the cables and the equipment were placed and moved within the range of position in order to find the maximum of emission.

For further data see enclosed test results.

## 7.2 Measured Data

The EUT was measured with the Pentium 200 MHz in video mode 1024 x 768.

### Configuration a:

Keyboard K293 with 2 m cable

Judgement: Passed by

| Frequency<br>[MHz] | Level*<br>[dB(μV/m)] | 10 Meter<br>Limit<br>[dB(μV/m)] | Exceeding<br>[dB] | Ant<br>Pol | Height<br>in [m] | Angle<br>in deg |
|--------------------|----------------------|---------------------------------|-------------------|------------|------------------|-----------------|
| 31.53000           | 17.66                | 30.000                          | -12.3000          | ver        | 3.4000           | 120.00          |
| 193.20000          | 21.08                | 30.000                          | -8.9000           | ver        | 1.6000           | 150.00          |
| 199.35000          | 18.44                | 30.000                          | -11.5600          | hor        | 4.000            | 120.00          |
| 927.36000          | 32.62                | 37.000                          | -4.3000           | ver        | 1.6000           | 150.00          |
| 967.08000          | 30.83                | 37.000                          | -6.1000           | ver        | 1.6000           | 270.00          |

all levels are quasi-peak levels

### Configuration b:

Keyboard K293 with 4 m cable

Judgement: Passed by

| Frequency<br>[MHz] | Level*<br>[dB(μV/m)] | 10 Meter<br>Limit<br>[dB(μV/m)] | Exceeding<br>[dB] | Ant<br>Pol | Height<br>in [m] | Angle<br>in deg |
|--------------------|----------------------|---------------------------------|-------------------|------------|------------------|-----------------|
| 135.21000          | 17.71                | 30.000                          | -12.3000          | ver        | 1.0000           | 210.00          |
| 148.74000          | 15.07                | 30.000                          | -10.9000          | ver        | 1.0000           | 180.00          |
| 193.80000          | 21.16                | 30.000                          | -8.8000           | ver        | 1.0000           | 210.00          |
| 222.18000          | 18.43                | 30.000                          | -11.6000          | ver        | 1.0000           | 330.00          |
| 869.40000          | 32.90                | 37.000                          | -4.1000           | ver        | 3.4000           | 210.00          |

all levels are quasi-peak levels

\*The correction factor is considered automatically by the test receiver.  
A table of correction factors is listed in paragraph 7.4.

Test Personnel:

Tester Signature: W. Richter Date: May 4, 1998

Printed Name: W. Richter

**SIEMENS**  
**NIXDORF**

Siemens Nixdorf Informationssysteme AG  
Keyboard

FCC Identifier:  
HSS01TASTK293

Date: May 7, 1998

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# Measurement Protocols

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| <b>Configuration a:</b><br>Keyboard K293 with 2 m cable | 37 - 39 |
| <b>Configuration b:</b><br>Keyboard K293 with 4 m cable | 40 - 42 |

## Radiation Test according to:

**EN 55022/B**

EUT: Keyboard : KBPC P2 (S26381-K293)  
Manufacturer: SNI  
Operating Condition: scr. "H" 1024 \* 768, 100Hz, Keyboard+HD-Test  
Test Site: EMC Center Augsburg  
Operator: W.Richter  
Job No: SCT8E008  
Comment : full conf. with Scenic Pro M5  
Comment: Keyboard cable length : 2m

## SCAN TABLE: "10m/30-1000"

Unit: dB $\mu$ V/m

Detector: Mode:

Curve 1: MaxPeak ClearWrite  
Curve 2: QuasiPeak ClearWrite

Subrange 1:

Start Frequency: 30.0 MHz Step Size: 30.0 kHz  
Stop Frequency: 1.0 GHz  
Measure Time: 0.01 s  
IF Bandwidth: 120 kHz

Receiver: ESMI Probe Transducer: CBL6111 cal. 4/95  
Signal Path: 2DC-CP1X1 System Transducer: RFin2-CP1/X1  
Scan Mode: Lin Add. Transd. 1: cable30-1000  
Tracking Gen.: Off Add. Transd. 2: NONE  
Input: 2DC Add. Transd. 3: NONE

Preamplifier: 10 dB Demodulation: AM  
RF Att.: 0 dB Volume: 70.0 %  
Ref. Level: -60 dBm Squelch: --  
Min. RF Att.: 0 dB Option: None  
IF Att.: --  
Autorange: On

Curve 1: On Repetition: 1  
Curve 2: On Stop Mark: Off  
Stop Message: Off  
Text: 1

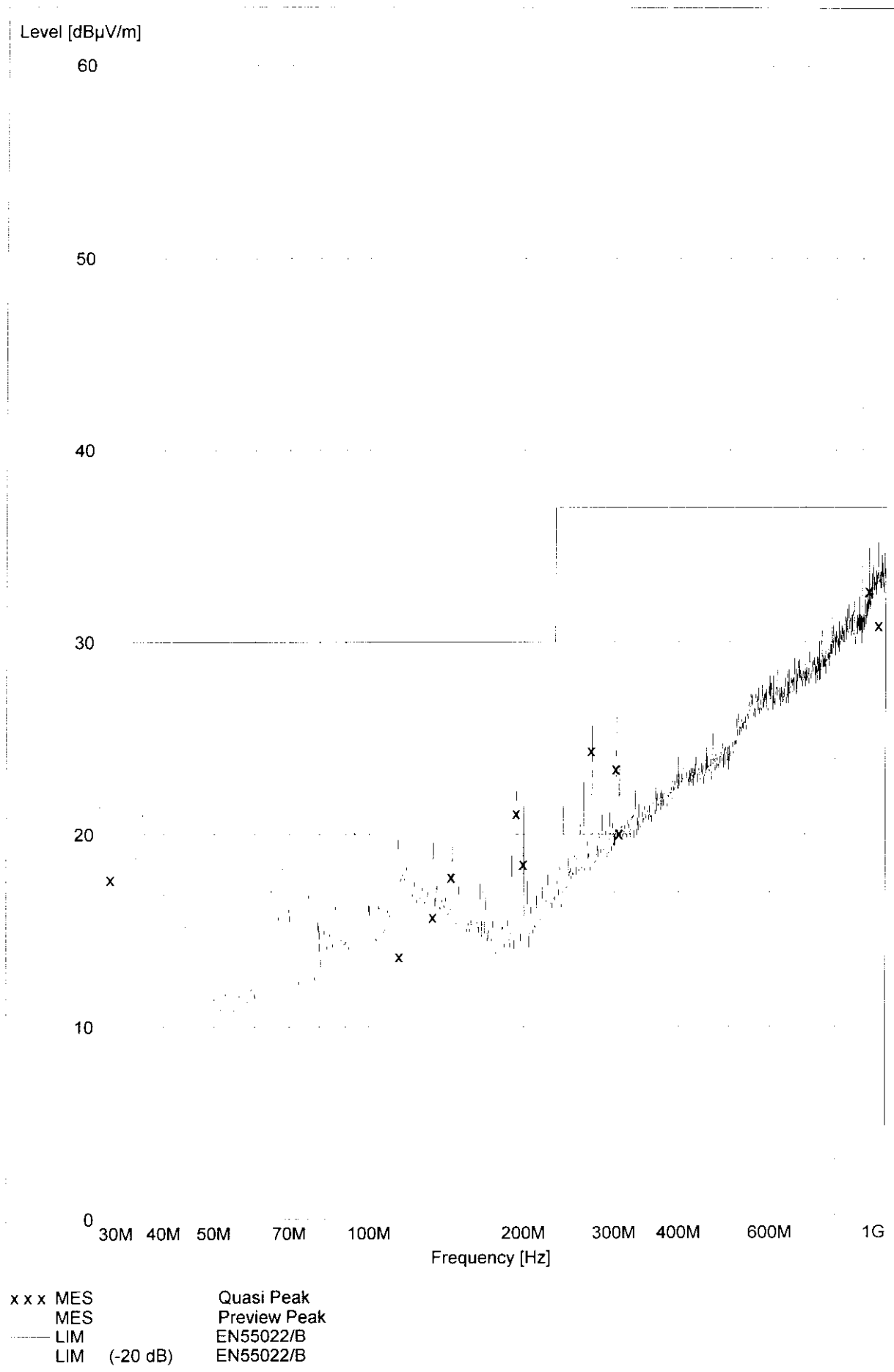
## MEASUREMENT RESULT: "Peak"

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | ANT<br>POL | HEIGHT<br>in [m] | ANGLE<br>in deg |
|------------------|-----------------------|------------|------------------|-----------------|
| 30.00000         | 21.49                 | VER        | 3.4000           | 120.00          |
| 114.06666        | 19.74                 | VER        | 1.0000           | 30.000          |

|           |       |     |        |        |
|-----------|-------|-----|--------|--------|
| 133.46666 | 19.58 | VER | 3.4000 | 210.00 |
| 145.32222 | 19.52 | VER | 1.0000 | 270.00 |
| 193.82222 | 22.27 | VER | 1.6000 | 150.00 |
| 200.28888 | 21.50 | HOR | 4.0000 | 120.00 |
| 271.42222 | 25.65 | VER | 1.0000 | 240.00 |
| 302.67777 | 26.12 | HOR | 3.4000 | 240.00 |
| 306.98888 | 23.59 | VER | 1.0000 | 30.000 |
| 927.78888 | 34.86 | VER | 1.6000 | 150.00 |
| 967.66666 | 35.17 | VER | 1.6000 | 270.00 |

## **MEASUREMENT RESULT: "Quasi Peak"**

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | LIMIT<br>dB $\mu$ V/m | EXCEEDING<br>dB | ANT<br>POL | HEIGHT<br>in [m] | ANGLE<br>in deg |
|------------------|-----------------------|-----------------------|-----------------|------------|------------------|-----------------|
| 31.53000         | 17.66                 | 30.000                | -12.34382       | VER        | 3.4000           | 120.00          |
| 114.39000        | 13.64                 | 30.000                | -16.36291       | VER        | 1.0000           | 30.000          |
| 132.96000        | 15.71                 | 30.000                | -14.28843       | VER        | 3.4000           | 210.00          |
| 144.24000        | 17.79                 | 30.000                | -12.21228       | VER        | 1.0000           | 270.00          |
| 193.20000        | 21.08                 | 30.000                | -8.917049       | VER        | 1.6000           | 150.00          |
| 199.35000        | 18.44                 | 30.000                | -11.56108       | HOR        | 4.0000           | 120.00          |
| 270.48000        | 24.34                 | 37.000                | -12.65889       | VER        | 1.0000           | 240.00          |
| 302.01000        | 23.39                 | 37.000                | -13.60801       | HOR        | 3.4000           | 240.00          |
| 306.48000        | 20.03                 | 37.000                | -16.97251       | VER        | 1.0000           | 30.000          |
| 927.36000        | 32.62                 | 37.000                | -4.378010       | VER        | 1.6000           | 150.00          |
| 967.08000        | 30.83                 | 37.000                | -6.174050       | VER        | 1.6000           | 270.00          |



## Radiation Test according to:

**EN 55022/B**

EUT: Keyboard : KBPC P2 (S26381-K293)  
Manufacturer: SNI  
Operating Condition: scr. "H" 1024 \* 768, 100Hz, Keyboard+HD-Test  
Test Site: EMC Center Augsburg  
Operator: W.Richter  
Job No: SCT8E008  
Comment : full conf. with Scenic Pro M5  
Comment: Keyboard cable length : 4m

## SCAN TABLE: "10m/30-1000"

Unit: dB $\mu$ V/m

Detector: Mode:

Curve 1: MaxPeak ClearWrite  
Curve 2: QuasiPeak ClearWrite

Subrange 1:

Start Frequency: 30.0 MHz Step Size: 30.0 kHz  
Stop Frequency: 1.0 GHz  
Measure Time: 0.01 s  
IF Bandwidth: 120 kHz

Receiver: ESMI Probe Transducer: CBL6111 cal. 4/95  
Signal Path: 2DC-CP1X1 System Transducer: RFin2-CP1/X1  
Scan Mode: Lin Add. Transd. 1: cable30-1000  
Tracking Gen.: Off Add. Transd. 2: NONE  
Input: 2DC Add. Transd. 3: NONE

Preamplifier: 10 dB Demodulation: AM  
RF Att.: 0 dB Volume: 70.0 %  
Ref. Level: -60 dBm Squelch: --  
Min. RF Att.: 0 dB Option: None  
IF Att.: --  
Autorange: On

Curve 1: On Repetition: 1  
Curve 2: On Stop Mark: Off  
Stop Message: Off  
Text: 1

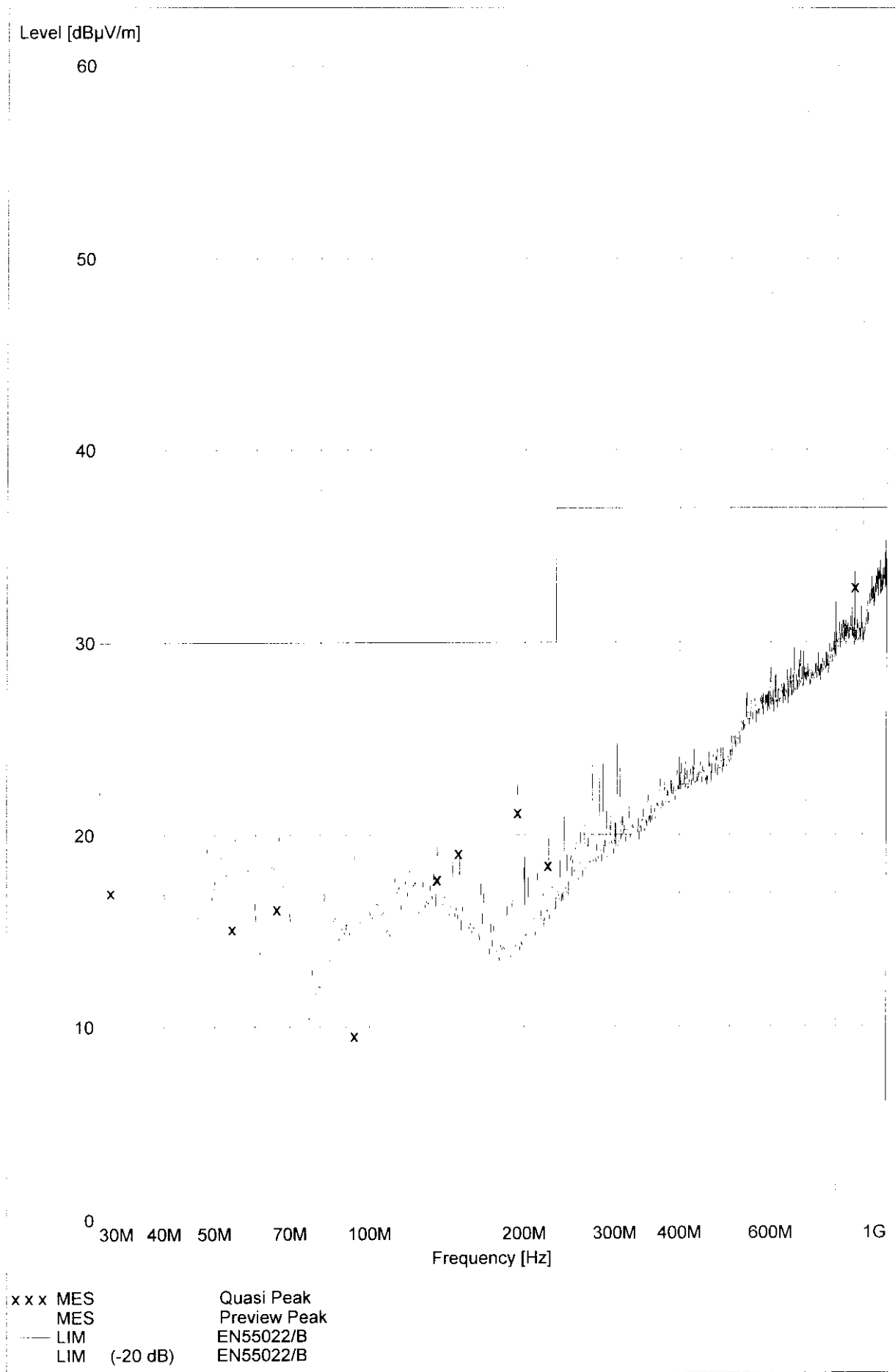
## MEASUREMENT RESULT: "Peak"

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | ANT<br>POL | HEIGHT<br>in [m] | ANGLE<br>in deg |
|------------------|-----------------------|------------|------------------|-----------------|
| 30.00000         | 22.28                 | VER        | 3.4000           | 150.00          |
| 54.78888         | 19.83                 | VER        | 3.4000           | 330.00          |

|           |       |     |        |        |
|-----------|-------|-----|--------|--------|
| 66.64444  | 19.94 | VER | 3.4000 | 150.00 |
| 93.58888  | 19.19 | VER | 1.0000 | 90.000 |
| 135.62222 | 19.52 | VER | 1.0000 | 210.00 |
| 149.63333 | 19.18 | VER | 1.0000 | 180.00 |
| 193.82222 | 22.60 | VER | 1.0000 | 210.00 |
| 222.92222 | 19.82 | VER | 1.0000 | 330.00 |
| 869.58888 | 33.73 | VER | 3.4000 | 210.00 |

# **MEASUREMENT RESULT: "Quasi Peak"**

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | LIMIT<br>dB $\mu$ V/m | EXCEEDING<br>dB | ANT<br>POL | HEIGHT<br>in [m] | ANGLE<br>in deg |
|------------------|-----------------------|-----------------------|-----------------|------------|------------------|-----------------|
| 31.53000         | 17.03                 | 30.000                | -12.97382       | VER        | 3.4000           | 150.00          |
| 54.09000         | 15.11                 | 30.000                | -14.88958       | VER        | 3.4000           | 330.00          |
| 65.97000         | 16.16                 | 30.000                | -13.83708       | VER        | 3.4000           | 150.00          |
| 93.36000         | 9.53                  | 30.000                | -20.46681       | VER        | 1.0000           | 90.000          |
| 135.21000        | 17.71                 | 30.000                | -12.29124       | VER        | 1.0000           | 210.00          |
| 148.74000        | 19.07                 | 30.000                | -10.93114       | VER        | 1.0000           | 180.00          |
| 193.80000        | 21.16                 | 30.000                | -8.839462       | VER        | 1.0000           | 210.00          |
| 222.18000        | 18.43                 | 30.000                | -11.56871       | VER        | 1.0000           | 330.00          |
| 869.40000        | 32.90                 | 37.000                | -4.102809       | VER        | 3.4000           | 210.00          |



## 7.3 Referenced Rules Sections

N/A

## 7.4 Test Instrumentation Used, Radiated Measurement

| Type     | Manufacturer/<br>Model No. | Serial No. | Last Cal. | Cal. Interval |
|----------|----------------------------|------------|-----------|---------------|
| Receiver | ESMI<br>Rohde & Schwarz    | 840607/006 | Jan. 97   | 12 months     |
| Antenna  | CBL 6111<br>Chase          | 1345       | March 97  | 12 months     |

## 7.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor automatically to the measured value. The display of the Receiver shows the corrected value. The complete table of correction factors is given on next page. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 28,5 dB $\mu$ V is obtained. The Antenna Factor of 10,5 and a Cable Factor of 1,3 is added, giving a field strength of 40,3 dB $\mu$ V/m.

$$FS = 28,5 + 10,5 + 1,3 = 40,3 \text{ dB}\mu\text{V/m}$$

The 40,3 dB $\mu$ V/m value can be mathematically converted to its corresponding level in  $\mu$ V/m.

Level in  $\mu$ V/m =  
Common Antilogarithm  $[(40,3 \text{ dB}\mu\text{V/m})/20] =$

**103,5  $\mu$ V/m**

## 7.6 Table of Correction Factors

Frequency range: 30 MHz to 1000 MHz

| Frequency<br>[MHz] | Correction<br>Bilog<br>Antenna<br>with Pre-<br>amplifier<br>[dB] | Correction<br>Cable<br>[dB] | Correction<br>Antenna +<br>Cable<br>[dB] |
|--------------------|------------------------------------------------------------------|-----------------------------|------------------------------------------|
| 30,0               | 17,90                                                            | 0,65                        | 28,55                                    |
| 35,0               | 15,20                                                            | 0,67                        | 15,87                                    |
| 40,0               | 12,80                                                            | 0,68                        | 13,48                                    |
| 45,0               | 10,00                                                            | 0,73                        | 10,73                                    |
| 50,0               | 8,20                                                             | 0,74                        | 8,94                                     |
| 55,0               | 6,90                                                             | 0,82                        | 7,72                                     |
| 60,0               | 6,50                                                             | 0,84                        | 7,34                                     |
| 70,0               | 6,40                                                             | 0,90                        | 7,30                                     |
| 80,0               | 7,20                                                             | 0,95                        | 8,15                                     |
| 90,0               | 9,30                                                             | 0,99                        | 10,29                                    |
| 100,0              | 11,10                                                            | 1,10                        | 12,20                                    |
| 120,0              | 12,10                                                            | 1,14                        | 13,24                                    |
| 140,0              | 11,30                                                            | 1,27                        | 12,57                                    |
| 160,0              | 10,60                                                            | 1,35                        | 11,95                                    |
| 180,0              | 9,60                                                             | 1,45                        | 11,05                                    |
| 200,0              | 9,50                                                             | 1,51                        | 11,01                                    |
| 250,0              | 12,40                                                            | 1,71                        | 14,11                                    |
| 300,0              | 13,80                                                            | 1,84                        | 15,64                                    |
| 350,0              | 15,00                                                            | 2,00                        | 17,00                                    |
| 400,0              | 16,40                                                            | 2,18                        | 18,58                                    |

| Frequency<br>[MHz] | Correction<br>Bilog<br>Antenna<br>with Pre-<br>amplifier<br>[dB] | Correction<br>Cable<br>[dB] | Correction<br>Antenna +<br>Cable<br>[dB] |
|--------------------|------------------------------------------------------------------|-----------------------------|------------------------------------------|
| 450,0              | 16,90                                                            | 2,35                        | 19,25                                    |
| 500,0              | 17,40                                                            | 2,43                        | 19,83                                    |
| 550,0              | 19,00                                                            | 2,62                        | 21,62                                    |
| 600,0              | 18,70                                                            | 2,73                        | 21,43                                    |
| 650,0              | 19,70                                                            | 2,88                        | 22,58                                    |
| 700,0              | 19,00                                                            | 2,91                        | 21,91                                    |
| 750,0              | 20,00                                                            | 3,01                        | 23,01                                    |
| 800,0              | 19,90                                                            | 3,21                        | 23,11                                    |
| 850,0              | 22,90                                                            | 3,32                        | 26,22                                    |
| 900,0              | 20,70                                                            | 3,40                        | 24,10                                    |
| 950,0              | 21,00                                                            | 3,49                        | 24,49                                    |
| 1000,0             | 25,00                                                            | 3,69                        | 28,69                                    |