

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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NIXDORF**

Engineer: *Robert Schaufler*
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Keyboard

FCC Identifier:
HSS01TASTK293

Date: May 7, 1998

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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	- Low-profile compact design, special ergonomic key design - adjustable keyboard slope
Technology	Key matrix on foil, single chip processor mounted on PC board

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

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

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

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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.

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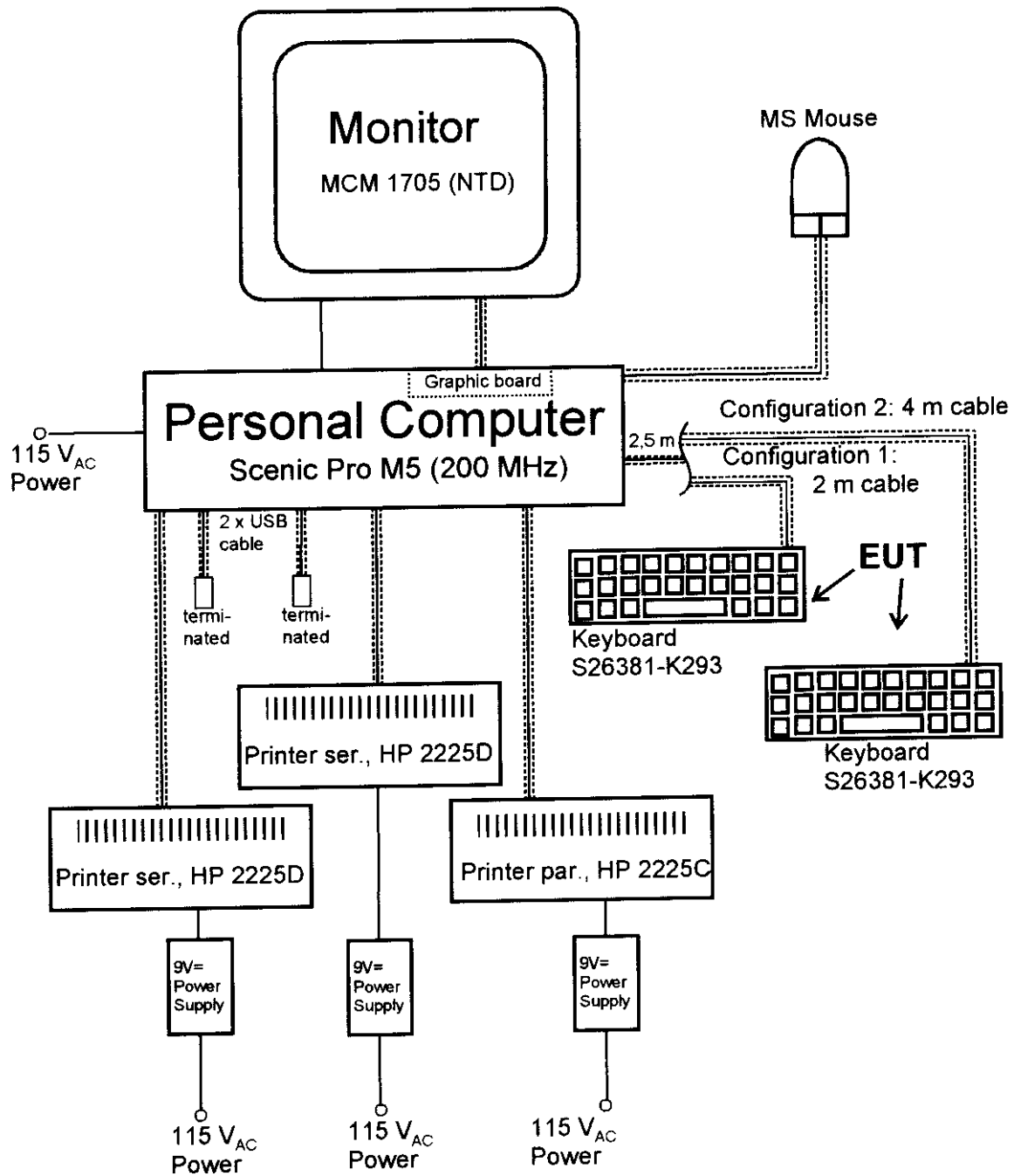
Siemens Nixdorf Informationssysteme AG
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FCC Identifier:
U20047A0TK002

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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 [MHz]	Measured [dB(μV)]	Kind of value	Limit [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 [MHz]	Measured [dB(μV)]	Kind of value	Limit [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 11, 1998

Printed Name: W. Richter

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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"

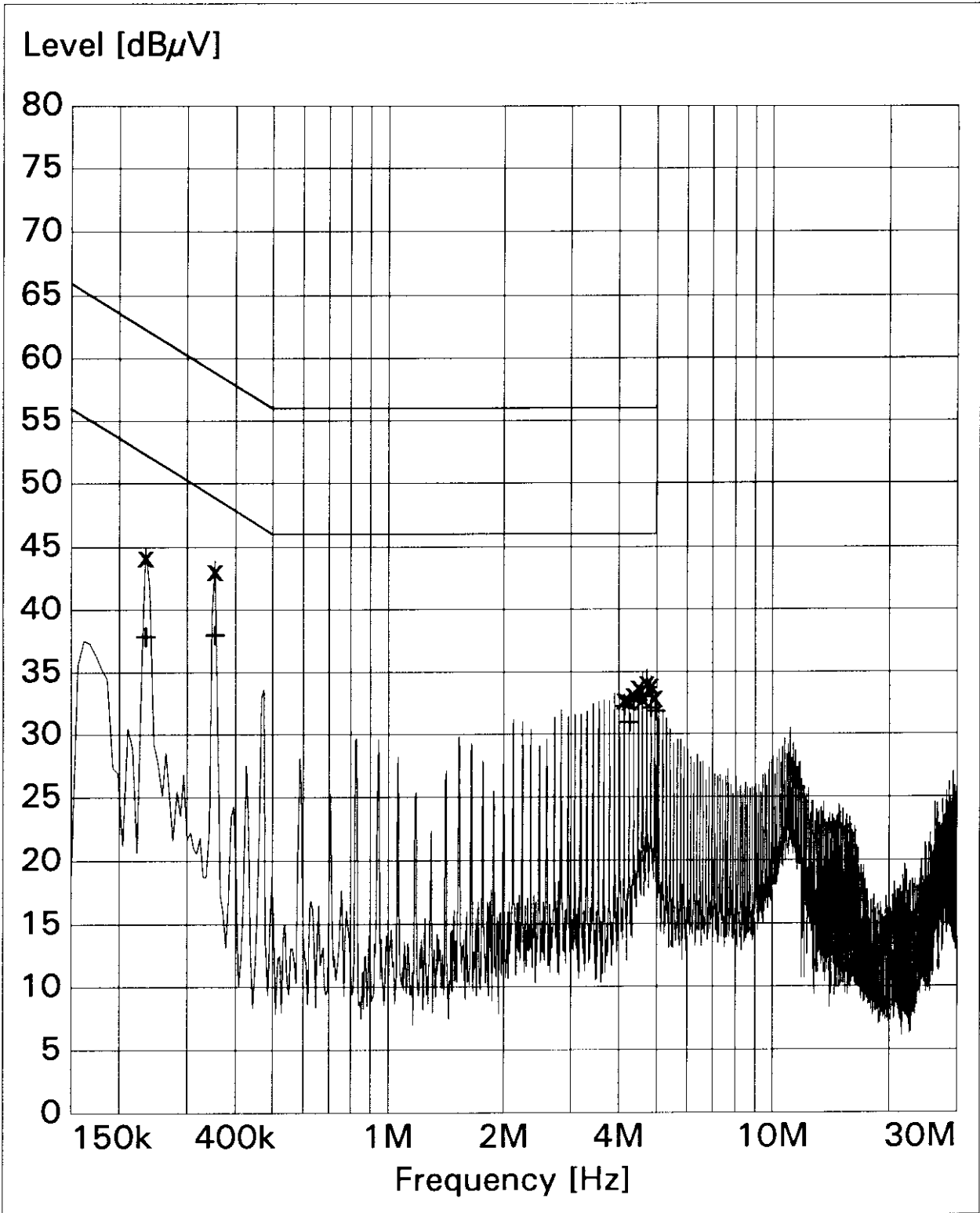
(continued)

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"

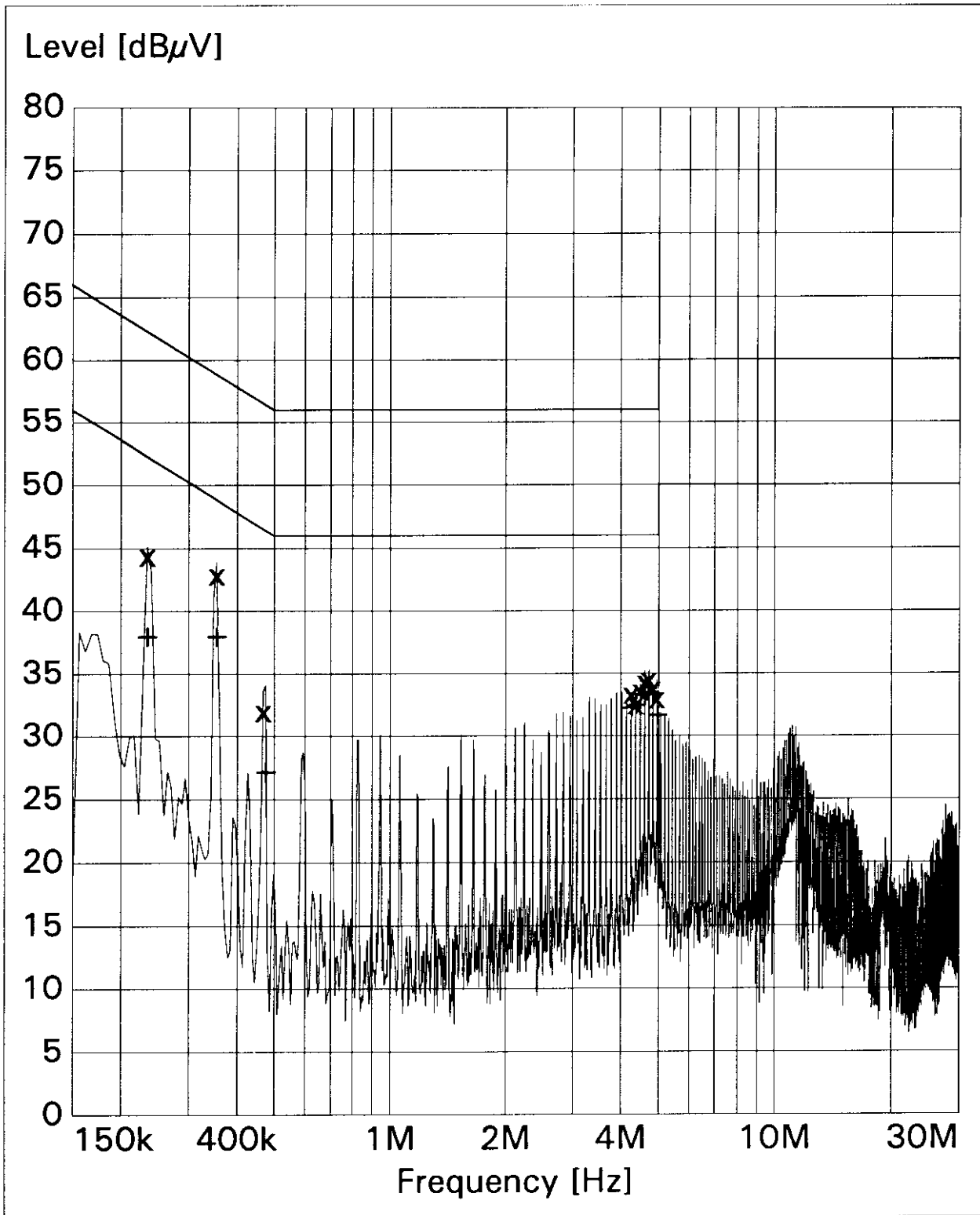
(continued)

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/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESH3 Rohde & Schwarz	873676/014	March 97	12 months
LISN	NSLK 8126 Schwarzbeck	KWA20870662	March 97	12 months
LISN	ESH2-Z5 Schwarzbeck	846695/027	March 97	12 months
Pulse limiter	ESH3-Z2 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 [MHz]	Level* [dB(μV/m)]	10 Meter Limit [dB(μV/m)]	Exceeding [dB]	Ant Pol	Height in [m]	Angle 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 [MHz]	Level* [dB(μV/m)]	10 Meter Limit [dB(μV/m)]	Exceeding [dB]	Ant Pol	Height in [m]	Angle 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

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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 μ 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 MHz	Level dB μ V/m	ANT POL	HEIGHT in [m]	ANGLE 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 MHz	Level dB μ V/m	LIMIT dB μ V/m	EXCEEDING dB	ANT POL	HEIGHT in [m]	ANGLE 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

Level [dB μ V/m]

60

50

40

30

20

10

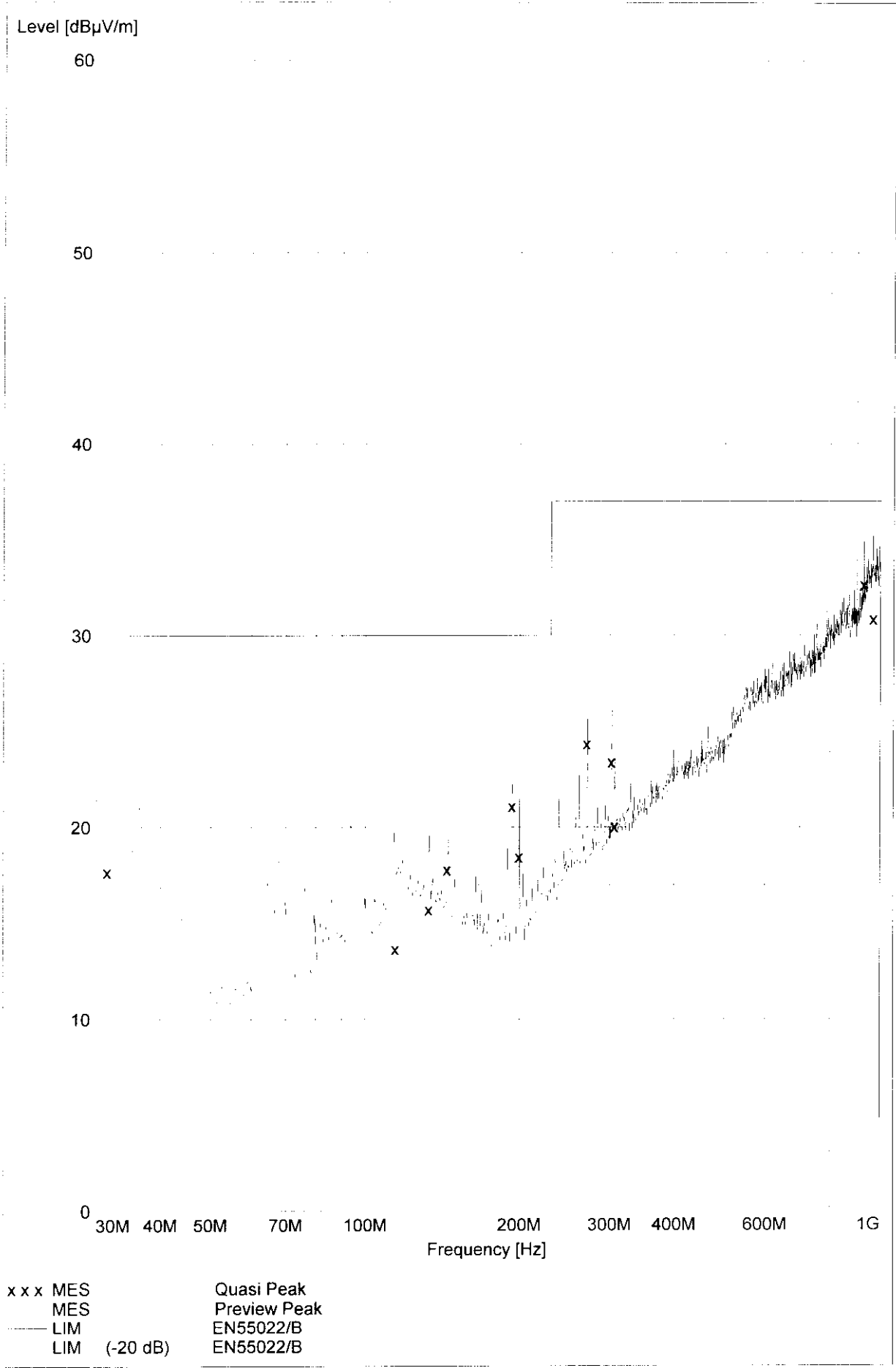
0

30M 40M 50M 70M 100M 200M 300M 400M 600M 1G

Frequency [Hz]

x x x MES
MES
- - - LIM
LIM (-20 dB)

Quasi Peak
Preview Peak
EN55022/B
EN55022/B



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: dBµV/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

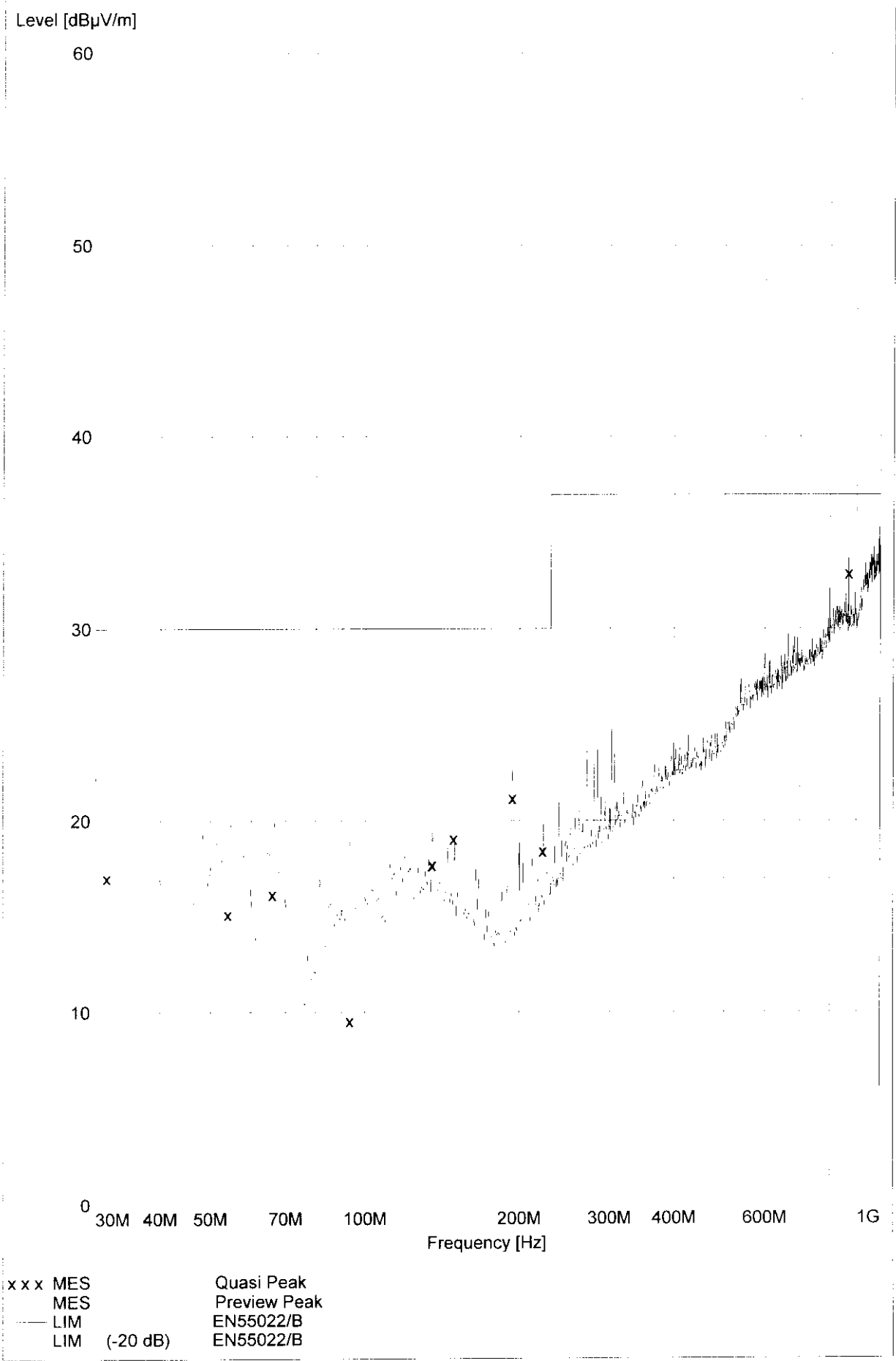
MEASUREMENT RESULT: "Peak"

Frequency MHz	Level dBµV/m	ANT POL	HEIGHT in [m]	ANGLE 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 MHz	Level dB μ V/m	LIMIT dB μ V/m	EXCEEDING dB	ANT POL	HEIGHT in [m]	ANGLE 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/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESMI Rohde & Schwarz	840607/006	Jan. 97	12 months
Antenna	CBL 6111 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 μ 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 μ V/m.

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

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

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

103,5 μ V/m

7.6 Table of Correction Factors

Frequency range: 30 MHz to 1000 MHz

Frequency [MHz]	Correction Bilog Antenna with Pre-amplifier [dB]	Correction Cable [dB]	Correction Antenna + Cable [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 [MHz]	Correction Bilog Antenna with Pre- amplifier [dB]	Correction Cable [dB]	Correction Antenna + Cable [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