MEASUREMENT / TECHNICAL REPORT

SIEMENS NIXDORF AG

Model: Personal Computer Scenic Pro M7

FCC ID: HSSSCENICM701

August 6, 1998

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

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 resp. FCC class B

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Applicant for this device:

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1 GENERAL INFORMATION

1.1 Product Description

The Siemens Nixdorf Computer Scenic Pro M7 is a compact mini tower personal computer.
The system board integrates the Pentium Processor, memory, and I/O-technologies. In past the main system unit was assembled with Processors Intel Pentium II from 300 MHz up to 400 MHz, now the 450 MHz processor is added.

Description of the power supply:

- Power supply: ASTEC, model S26113-E413-V30

Features Overview:

- System board in ATX format
- Intel processor Pentium II, 100 MHz clock frequency, slot 1
- second level cache, synchronous up to 512 Kbytes
- main memory 16 to 384 MBytes (SDRAM)
- 2D/3D AGP Graphic Controller on board
- up to 4 MBit Flash-BIOS
- CMOS RAM 256 Byte

- Expansion slots (on board):

  5 x PCI
  2 x AT
  1 x AGP

The personal computer is assembled by Siemens Nixdorf Informationssysteme AG, Buergermeister-Ulrich-Str. 100, 86199 Augsburg.

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 M7 S26361-K510-V1**	HSSSCENICM701	PC **EUT**	unshielded power cord [292]
2a	Siemens Nixdorf MCM 2108 NTD S26361-K479-V150	M9U9703C97BMD	Monitor	unshielded power cord [175] shielded video cable [168]
2b	Siemens Nixdorf MCM 1703 NTD	A3KM053	Monitor	unshielded power cord [175] shielded video cable [168]
3	Siemens Nixdorf S26381-K210	HSS01TASTK210	Keyboard	shielded keyboard cable [143]
4	Microsoft MS 2.1A	C3KKMP3	Mouse	shielded mouse cable [183]

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 AC cable [180], shielded centronics 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 [192]
9	Siemens	N/A	USB cable	shielded cable, terminated [192]
	Pos 1 contains:			
a	ASTEC (UK), AA20050 SNI S26113-E413-V30	N/A	Power supply	
b	SNI S26361-D1064-A11	N/A	System board	
c	SNI S26361-D960-V1 GS 4	N/A	Chip card reader	

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
d	SECKMM966G512 BQN-G8	N/A	Video RAM	
e	SECKMM366S203 CT-GL (2x) SECKMM366S823 BT-GL (1x)	N/A	SDRAM	
f	Intel Pentium II 80523/PY400512 Q434ES	N/A	Processor module	
g	NEC CDR-1900A	A3DCDR-1900A	CD-ROM drive	
h	Quantum Fireball 2340 AT	N/A	Hard disk drive	
i	Mitsumi D359T5	N/A	Floppy disk drive	

Remark: positions 2a / 2b optional

1.4 Test Methodology

Both, conducted and radiated tests were performed according to the procedures in ANSI C63.4-1992. Radiated testing below 1 GHz was performed at an antenna to EUT distance of 10 meters above 1 GHz at an antenna to EUT distance of 3 meters. All radiated emission measurements were done in an anechoic chamber. Limits for radiated and conducted are in compliance with CISPR 22 resp. FCC class B.

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-Str. 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 system can be provided alternatively either with a chip card reader or with a second serial port. With respect to the worst case results established for the first report the combination with a second serial port has been measured. During radiated emission the monitor was powered via the system unit, during conducted emission also the external monitor supply was tested.
The clock frequency is 100 MHz, the system was tested with the highest possible processor:

100 MHz clock: Intel Pentium II 450 MHz

The system is provided with one kind of power supply:

- ASTEC AA20050 SNI: S26113-E413-V30

Referring to the worst case results measured for the first report, dated Apr. 29, 1998 the following radiated emission results are applicable:

ASTEC PSU:

Frequency range 30 MHz - 1 GHz:

100 MHz clock/Pentium II 450 MHz, video resolution 1280 x 1024/100 Hz

Frequency range 1 GHz - 3 GHz:

100 MHz clock/Pentium II 450 MHz, video resolution 1280 x 1024/100 Hz

Referring to conducted emission the following (worst case) results are applicable:

ASTEC PSU:

100 MHz clock/Pentium II 450 MHz, video resolution 1600 x 1200/85 Hz monitor power via system unit

3.2 Video mode Justification

The system was tested in video graphic modes 1024 x 768, 1280 x 1024 and 1600 x 1200. To get comparable results when measuring different video resolutions it is necessary to carry out the test with one monitor which is capable to drive all high resolutions. Such a high performance monitor has a special ferrite loaded video cable. To prove the compliance of the EUT without ferrite on the host side, we additionally tested the system with a representative standard 17" monitor provided with a cable without any ferrite in a video resolution which is usual for standard monitors (1024 x 768). The worst case combination (with clock frequency, video mode and power supply) of the system was used to collect the included data.

The following data is applicable:

radiated emission:

ASTEC PSU:

Frequency range 30 MHz - 1 GHz:

100 MHz clock/Pentium II 450 MHz, video resolution 1280 x 1024/100 Hz

Frequency range 1 GHz - 3 GHz:

100 MHz clock/Pentium II 450 MHz, video resolution 1280 x 1024/100 Hz

conducted emission:

ASTEC PSU:

100 MHz clock/Pentium II 450 MHz, video resolution 1600 x 1200/85 Hz

monitor power via system unit

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

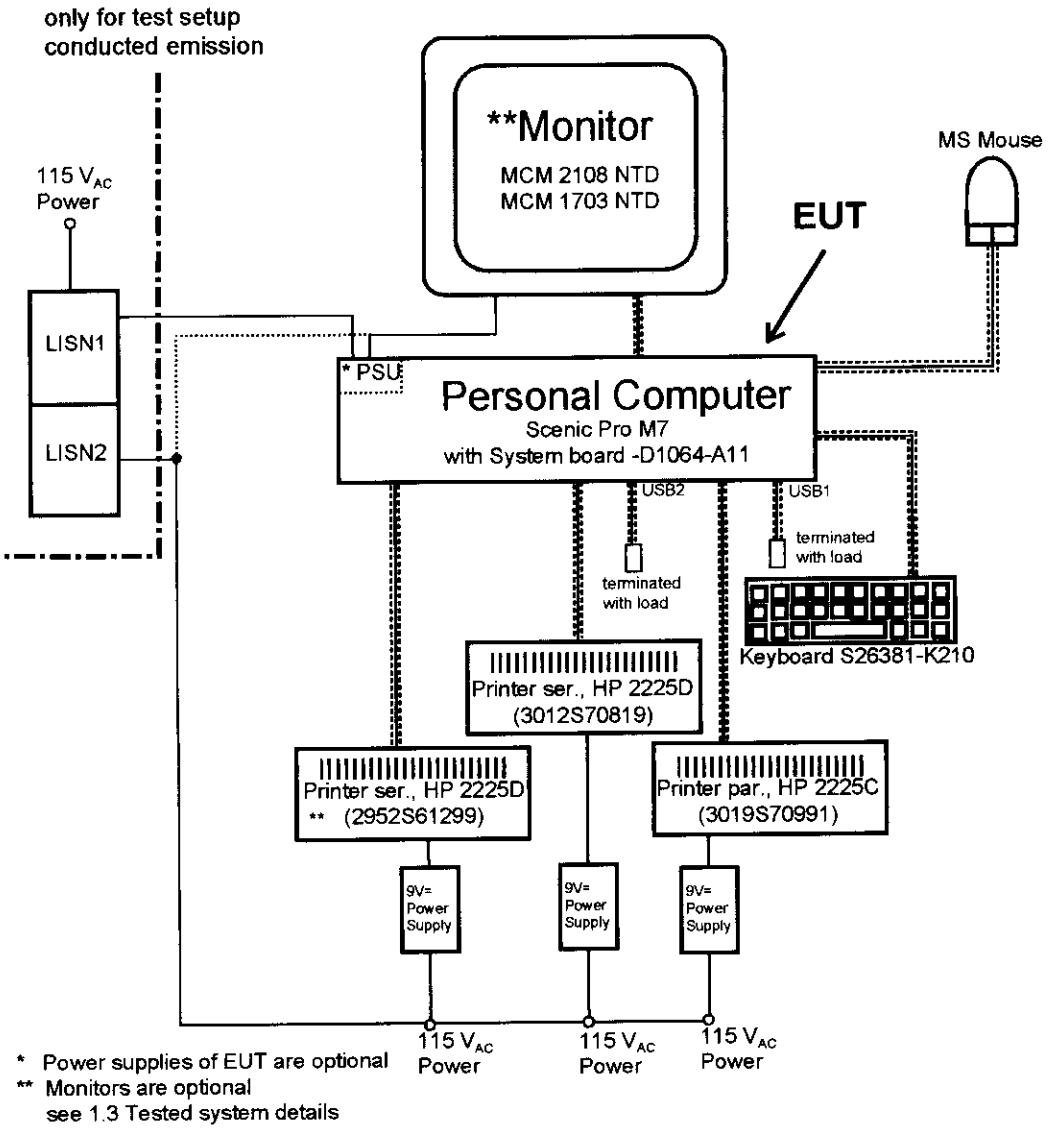
Applicant Signature _____Date_____

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



* Power supplies of EUT are optional
** Monitors are optional
see 1.3 Tested system details

4 BLOCK DIAGRAM OF EUT

see fig 4.1 page 20

4.1 Block Diagram Description (see fig. 4.1)

The major parts of the system are (fig 4.1).

- System board
- Power supply
- Floppy disk drive
- Hard disk drive
- CD-ROM drive
- Chip card reader
- Peripheral connector area (Keyboard, Mouse, Ser. 1, Ser. 2, Video, Parallel Port and USB)

The detailed diagram of the system board is shown in fig 4.1

The personal computer works exactly like a traditional PC.

4.2 Clock frequencies of EUT

Clock synthesizer	14,318 MHz
Memory	100 MHz
PCI-bus	33,3 MHz
PIIX4 to IDE and USB	33,3 MHz
ISA Bus	8,2 MHz
I/O controller	33,3 MHz
USB	48 MHz

4.3 Theory of Operation

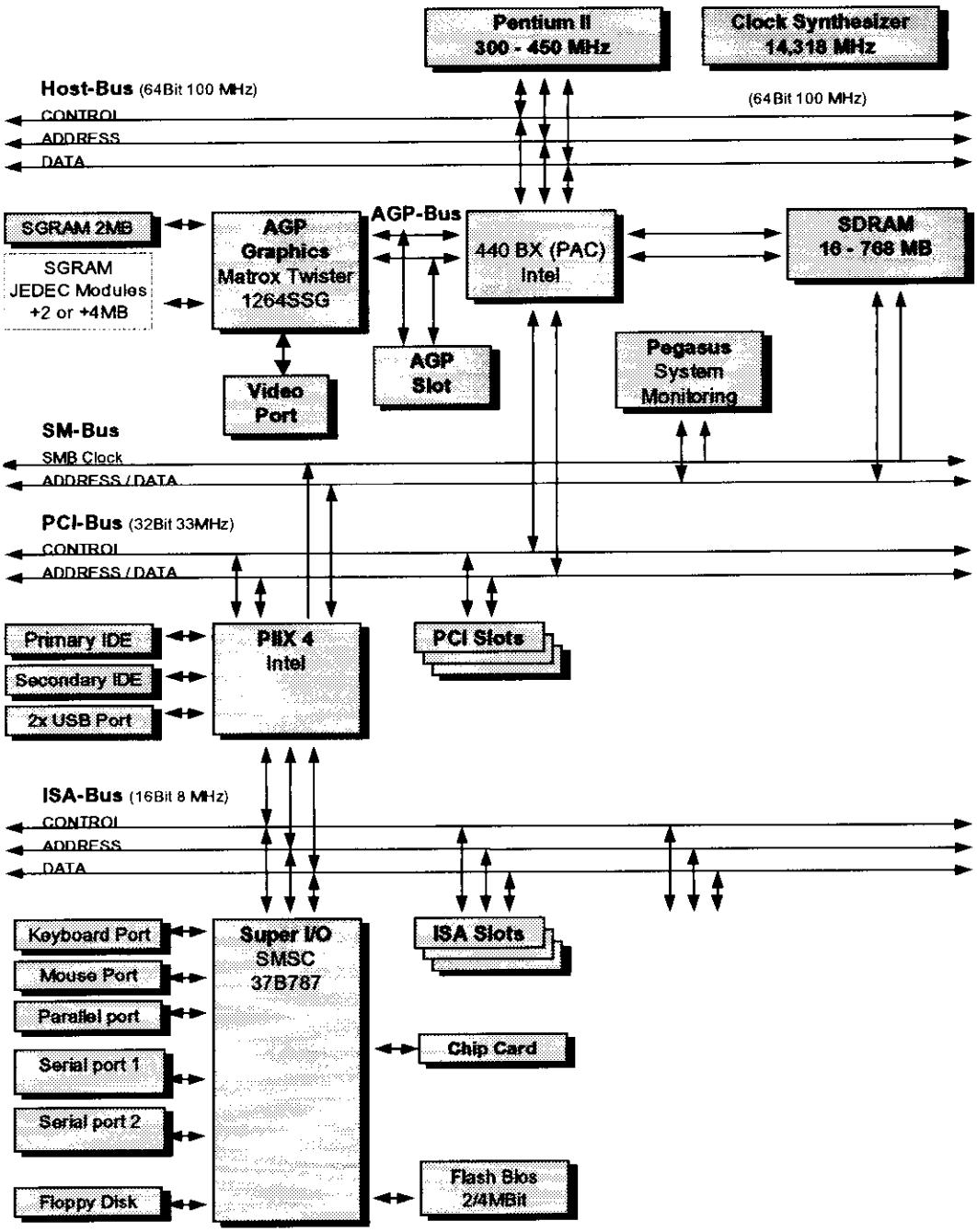
The compact mini tower PC works exactly as a traditional PC.

The processors run internally between 300 and 450 MHz, the type is selected by switches, the system clock is in each case the same - 100 MHz and is multiplied by the processors internally.

The highest possible frequencies and the corresponding processors are:

System clock	Processor	factor
100 MHz	300 MHz	3,0
100 MHz	350 MHz	3,5
100 MHz	400 MHz	4,0
100 MHz	450 MHz	4,5

Figure 4.1 Block Diagram of the EUT



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 are supplied with power via a second LISN, the monitor was either powered via the system unit or separately.

The worst case result of the corresponding configuration (video resolution, supply modus, configuration with second serial printer) is given next:

100 MHz clock/Pentium II 450 MHz, video resolution 1600 x 1200/85 Hz, monitor power via system unit, two serial printers configured

Judgement: Passed by

Line	Frequency [MHz]	Measured Level [dB(µV)]	Kind of value	Limit [dB(µV)]
neutral	0.468000	28.50	AV	47
neutral	0.540000	28.20	AV	46
phase	0.804000	26.80	AV	46
neutral	2.418000	26.20	AV	46
neutral	4.032000	24.70	AV	46

AV: average
QP: quasi peak

Test Personnel:

Tester Signature: A. Siebenhütter Date: Aug. 7 1998

Printed Name: A. Siebenhütter

Measurement Protocols

	Page No
ASTEC PSU: 100 MHz clock/Pentium II 450 MHz video resolution 1600 x 1200/85 Hz monitor power via system unit, two serial printers configured	28 - 30

Conducted noise according to:

EN55022/B

EUT:	Scenic Pro M7/PII/450, D1064-A11
Manufacturer:	SNI
Operating Condition:	Scroll H 1600x1200/85 Hz, HD/CD test
Test Site:	EMC Center Augsburg; SK1
Operator:	A. Siebenhütter
Comment:	Full configured, monitor MCM2108
Comment:	PSU from CPU
Start of Test:	27.07.1998 / 09:49:36

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"

27.07.1998 10:24

Frequency	Level	Limit	Margin	Exceed Mark	Line	PE
MHz	dBµV	dBµV	dB			
0.474000	31.20	56	25.2		N	GND
0.540000	33.90	56	22.1		L1	GND
0.810000	30.30	56	25.7		L1	GND

MEASUREMENT RESULT: "Quasi Peak"

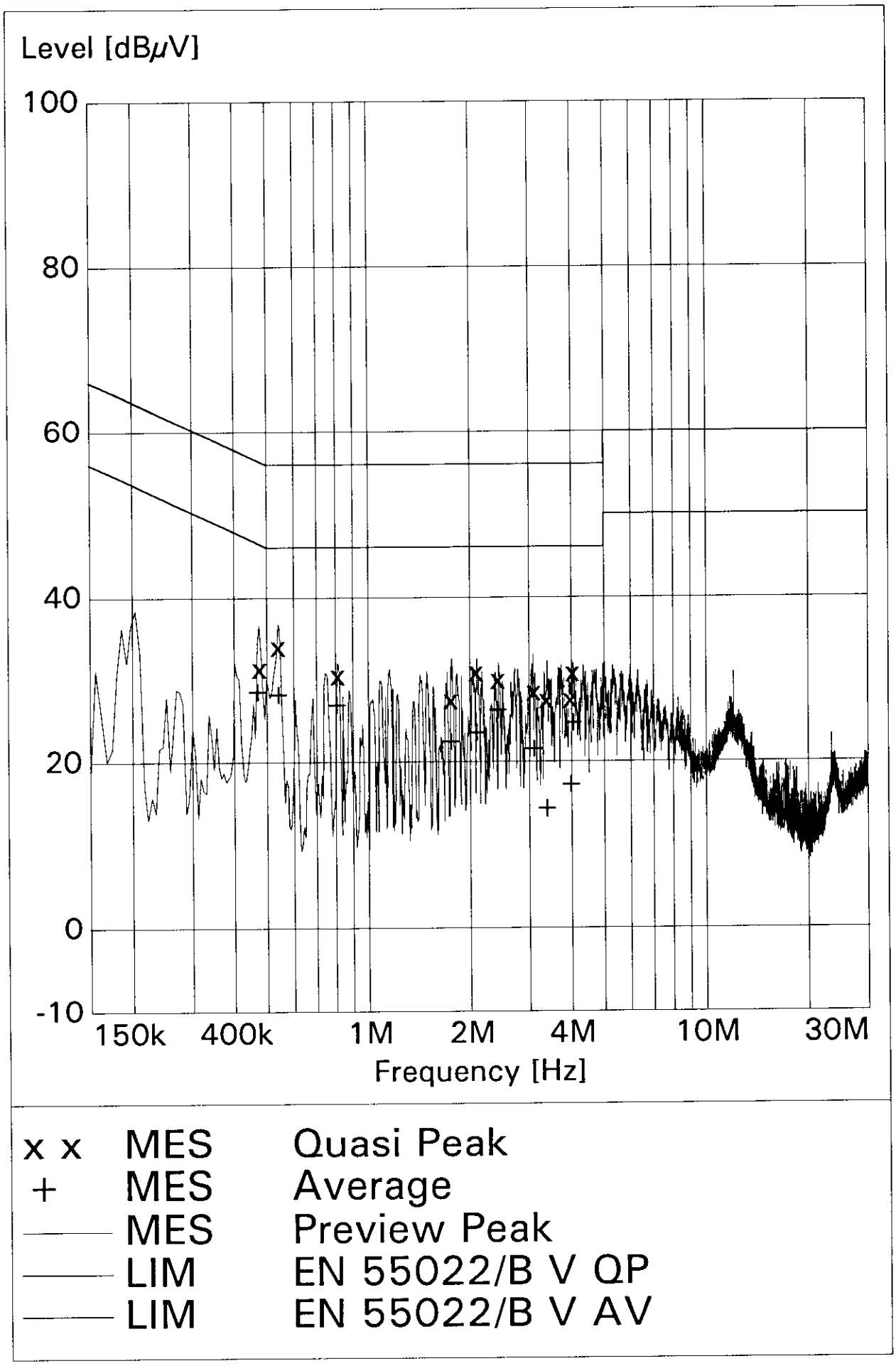
(continued)

Frequency	Level	Limit	Margin	Exceed Mark	Line	PE
MHz	dBµV	dBµV	dB			
1.758000	27.30	56	28.7		N	GND
2.088000	30.70	56	25.3		N	GND
2.424000	29.80	56	26.2		N	GND
3.096000	28.30	56	27.7		N	GND
3.372000	27.30	56	28.7		N	GND
3.978000	27.40	56	28.6		N	GND
4.032000	30.60	56	25.4		N	GND

MEASUREMENT RESULT: "Average"

27.07.1998 10:24

Frequency	Level	Limit	Margin	Exceed Mark	Line	PE
MHz	dBµV	dBµV	dB			
0.468000	28.50	47	18.0		N	GND
0.540000	28.20	46	17.8		N	GND
0.804000	26.80	46	19.2		L1	GND
1.752000	22.40	46	23.6		N	GND
2.088000	23.50	46	22.5		N	GND
2.418000	26.20	46	19.8		N	GND
3.090000	21.50	46	24.5		L1	GND
3.372000	14.30	46	31.7		L1	GND
3.978000	17.20	46	28.8		N	GND
4.032000	24.70	46	21.3		N	GND


Level [dBµV]
100
80
60
40
20
0
-10
150k
400k
1M
2M
4M
10M
30M
Frequency [Hz]
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	879676/014	May 98	12 months
LISN	NSLK 8126 Schwarzbeck	KWA20870662	May 98	12 months
LISN	ESH3-Z5 Rohde&Schwarz	831.5518.52	May 98	12 months
Pulse limiter	ESH3-Z2 Rohde&Schwarz	357.8810.52	May 98	12 months

7 RADIATED EMISSION DATA

7.1 Test Procedure

The radiated emission was measured in two parts:

1. in the frequency range from 30 MHz to 1000 MHz. The bandwidth of the EMI-receiver was set to 120 kHz and the detector was set to peak. During pre-scan 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.

2. in the frequency range from 1000 MHz to 3000 MHz. The bandwidth of the EMI-receiver was set to 1 MHz and the detector was set to peak. During pre-scan all data in peak mode are accumulated automatically. At final measurement the detector was set to average and values above the acceptance line were verified automatically.

Both tests were performed in a semi anechoic chamber, measurements below 1000 MHz in a distance of 10 meters between antenna and EUT, above 1 GHz with a distance of 3 meters between antenna and EUT. During tests the EUT was turned 360° and the actual used 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 each range one antenna for the whole span was used

1.	30 MHz to 1000 MHz:	log.-per antenna
2.	1000 MHz to 3000 MHz:	rigid tensor 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 Processor Pentium II 450 MHz in video modes 1024 x 768, 1280 x 1024, and 1600 x 1200.
The test results below reflect the worst case with:

ASTEC PSU:
100 MHz clock/Pentium II 450 MHz, video resolution: 1280 x 1024/100 Hz, two serial printers configured.

Part 1: frequency range 30 MHz - 1000 MHz:

Judgement: Passed by

Frequency [MHz]	Level* [dB(µV/m)]	Limit [dB(µV/m)]	Exceeding [dB]	Ant Pol	Height in [m]	Angle in deg
94.50000	25.76	30.000	-4.242546	ver	1.0000	180.00
108.00000	25.98	30.000	-4.016910	ver	1.6000	120.00
700.20000	34.89	37.000	-2.110929	hor	1.0000	90.000
700.26000	34.76	37.000	-2.240489	hor	1.0000	90.000
998.40000	31.72	37.000	-5.276940	hor	4.0000	330.00

all levels are quasi-peak levels

Part 2: frequency range 1 GHz - 3 GHz:

System with chip card reader

Judgement: Passed by

Frequency [MHz]	Level* [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1400.200000	24.81	54.0	29.2		100.0	0.00	hor
1734.100000	24.62	54.0	29.4		150.0	0.00	hor
2014.000000	23.40	54.0	30.6		150.0	135.00	ver
2986.300000	26.40	54.0	27.6		250.0	135.00	ver
3000.000000	26.57	54.0	27.4		250.0	135.00	ver

all levels are average 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: M. Borrmann Date: June 28, 1998

Printed Name: M. Borrmann

Tester Signature: H. Zenkner Date: June 28, 1998

Printed Name: H. Zenkner

Measurement Protocols

	Page No
ASTEC PSU: Frequency range 30 MHz - 1 GHz: 100 MHz clock/Pentium II 450 MHz video resolution 1280 x 1024/100 Hz	36 - 38
Frequency range 1 GHz - 3 GHz: 100 MHz clock/Pentium II 450 MHz video resolution 1280 x 1024/100 Hz	39 - 41

Radiation Test according to:

EN 55022/B

EUT:	Scenic Pro M7/PII 450MHz; D1064-A11
Manufacturer:	SNI
Operating Condition:	scr. "H" 1280 * 1024,100Hz, HD/CD-Test
Test Site:	EMC Center Augsburg
Operator:	M. Borrmann
Job No:	PDP8E063
Comment :	full configuration with MCM2108
Comment:	

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

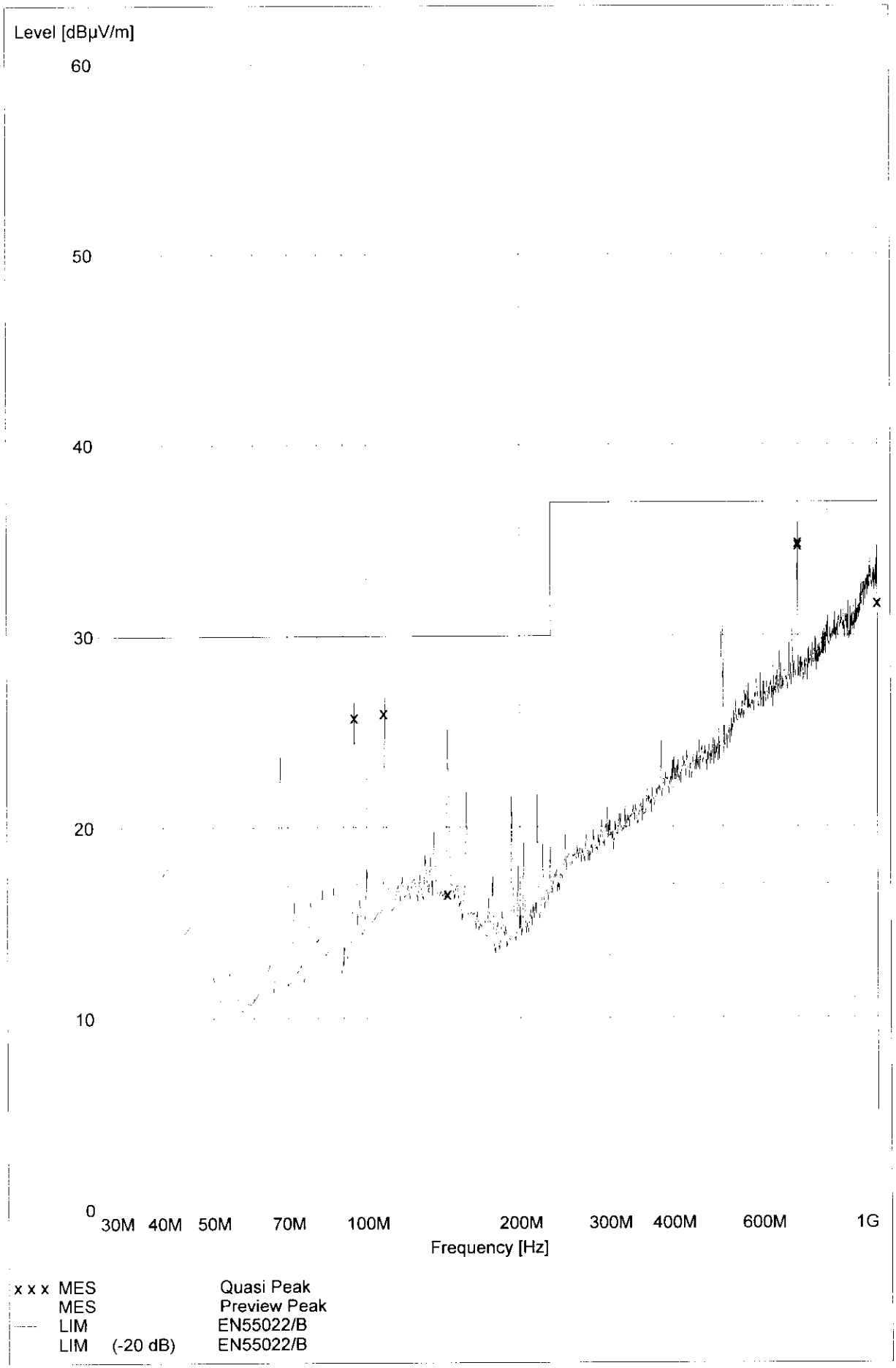
MEASUREMENT RESULT: "Peak"

Frequency MHz	Level dBµV/m	ANT POL	HEIGHT in [m]	ANGLE in deg
94.66666	26.52	VER	1.0000	180.00
108.67777	26.85	VER	1.6000	120.00

144.24444	25.09	HOR	4.0000	30.000
699.30000	33.78	HOR	1.0000	90.000
701.45555	35.94	HOR	1.0000	90.000
998.92222	34.68	HOR	4.0000	330.00

MEASUREMENT RESULT: "Quasi Peak"

Frequency MHz	Level dBµV/m	LIMIT dBµV/m	EXCEEDING dB	ANT POL	HEIGHT in [m]	ANGLE in deg
94.50000	25.76	30.000	-4.242546	VER	1.0000	180.00
108.00000	25.98	30.000	-4.016910	VER	1.6000	120.00
144.03000	16.51	30.000	-13.49398	HOR	4.0000	30.000
700.20000	34.89	37.000	-2.110929	HOR	1.0000	90.000
700.26000	34.76	37.000	-2.240489	HOR	1.0000	90.000
998.40000	31.72	37.000	-5.276940	HOR	4.0000	330.00


Level [dBµV/m]
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
x x x MES
Quasi Peak
MES
Preview Peak
LIM
EN55022/B
LIM (-20 dB)
EN55022/B

Fieldstrength according to :

FCC class B

EUT:	Scenic Pro M7 with D1064 /PII/ 450MHz
Manufacturer:	SNI
Operating Condition:	scr. "H" , 1280 * 1024/ 100Hz and periph. test
Test Site:	EMC Center Augsburg
Operator:	H. Zenkner
Job No:	PDO8E063
Comment :	fully configured, MCM2108
Start of Test:	28.07.1998 / 08:16:43

SCAN TABLE: "3m/1-3GHz"

Unit: dBµV/m

	Detector:	Mode:
Curve 1:	Average	MaxHold

Subrange 1:

Start Frequency:	1.0 GHz	Step Size:	300.0 kHz
Stop Frequency:	3.0 GHz		
Measure Time:	10.0 ms		
IF Bandwidth:	1 MHz		
Receiver:	ESXI	Transducer:	Tensor 4105 h
Signal Path:	2DC-CP7X1	System Transducer:	RFin2-CP7/X1
Meas. Mode:	Lin	Add. Transd. 1:	Rosenberger 8m
Tracking Gen.:	Off	Add. Transd. 2:	None
Input:	2DC	Add. Transd. 3:	None
Preamplifier:	10 dB	Demodulation:	AM
RF Att.:	Coupled	Volume:	75 %
Ref. Level:	-40.0 dBm	Squelch:	--
Min. RF Att.:	0 dB	Option:	None
IF Att.:	--		
Autorange:	On		
Curve 1:	On	Repetition:	0
		Stop Mark:	Off
		Stop Message:	Off
		Stop Message:	

MEASUREMENT RESULT: "Final_Average"

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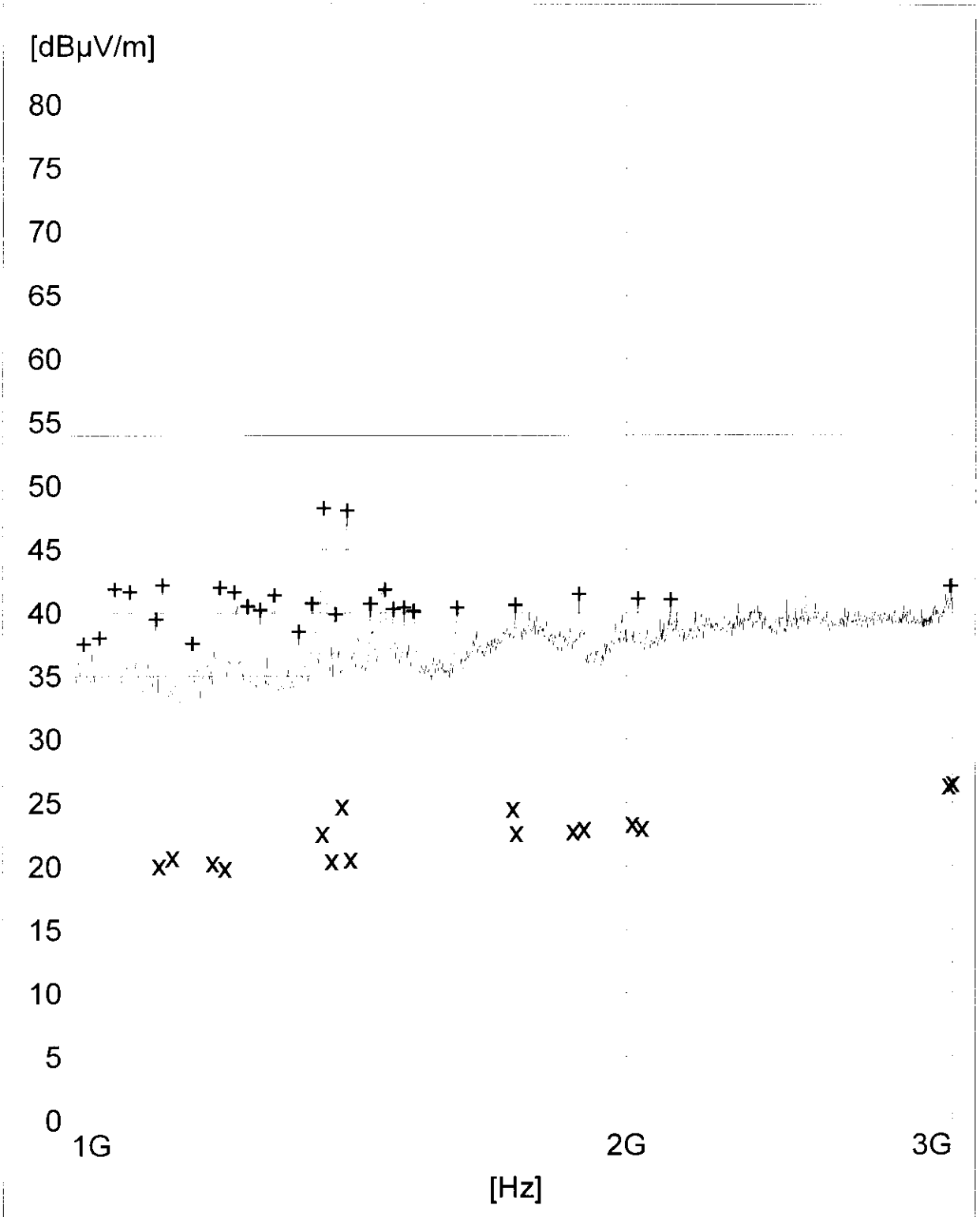
Frequency	Level	Limit	Margin	Exceed Mark	Height	Azimuth	Polarisation
MHz	dBµV/m	dBµV/m	dB		cm	deg	
1114.900000	20.16	54.0	33.8		100.0	180.00	HORIZONTAL
1133.500000	20.81	54.0	33.2		100.0	180.00	HORIZONTAL
1191.400000	20.35	54.0	33.7		100.0	135.00	HORIZONTAL
1210.000000	19.94	54.0	34.1		100.0	135.00	HORIZONTAL
1366.300000	22.67	54.0	31.3		150.0	0.00	HORIZONTAL
1381.900000	20.51	54.0	33.5		150.0	0.00	HORIZONTAL
1400.200000	24.81	54.0	29.2		100.0	0.00	HORIZONTAL
1414.900000	20.64	54.0	33.4		100.0	0.00	HORIZONTAL
1734.100000	24.62	54.0	29.4		150.0	0.00	HORIZONTAL
1741.600000	22.68	54.0	31.3		150.0	0.00	HORIZONTAL
1870.000000	22.82	54.0	31.2		150.0	135.00	HORIZONTAL
1895.800000	23.00	54.0	31.0		150.0	135.00	HORIZONTAL
2014.000000	23.40	54.0	30.6		150.0	135.00	VERTICAL
2038.900000	23.06	54.0	30.9		150.0	135.00	VERTICAL
2986.300000	26.40	54.0	27.6		250.0	135.00	VERTICAL
3000.000000	26.57	54.0	27.4		250.0	135.00	VERTICAL


[dBµV/m]
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1G
2G
3G
[Hz]
x x x MES Final_Average
MES Preview Peak
+ + + MES Peak
LIM FCC/B 1-3GHz
LIM FCC/B 1-3GHz

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	18 months
Antenna	CBL 6111 Chase	1345	May 98	12 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	May 98	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 (incl. Preamplifier factor)

CF = Cable Attenuation Factor

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

FS = 28,5 + 10,5 + 1.3 = 40,3 dBµV/m

The 40,3 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m =
Common Antilogarithm [(40,3 dBµV/m)/20] =

103,5 µV/m

7.6 Table of Correction Factors

Frequency range: 30 MHz to 1000 MHz

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
30,0	17,90	0,65	18,55
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
450,0	16,90	2,35	19,25
500,0	17,40	2,43	19,83

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
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

Frequency range: 1 GHz to 3 GHz

Frequency [GHz]	Correction Tensor Antenna with Pre-amplifier [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
1,0	5,70	1,62	7,32
1,1	4,80	1,68	6,48
1,2	5,10	1,75	6,85
1,3	5,00	1,80	6,80
1,4	5,10	1,96	7,06
1,5	5,90	2,00	7,90
1,6	5,60	2,15	7,75
1,7	6,70	2,30	9,00
1,8	6,60	2,32	8,92
1,9	5,90	2,35	8,25
2,0	7,20	2,44	9,64
2,1	7,30	2,62	9,92
2,2	7,40	2,75	10,15
2,3	8,40	2,70	11,10
2,4	8,00	2,69	10,69
2,5	9,30	2,65	11,95
2,6	8,70	2,75	11,45
2,7	8,70	2,92	11,62
2,8	9,00	2,98	11,98
2,9	8,60	3,10	11,70
3,0	9,50	3,12	12,62