

MEASUREMENT / TECHNICAL REPORT

SIEMENS AG

Model: Personal Computer Scenic Mobile 750

FCC ID: HSSMOB75001

March 01, 1999

This report concerns: Original grant ☐ Class II change
Equipment type: Personal Computer (Notebook)

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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1. GENERAL INFORMATION

1.1 Product Description

The Siemens Computer Scenic Mobile 750 is a notebook. The system board integrates the Pentium Processor, memory and I/O-technologies. The system can be assembled with Intel Processors Pentium II up to 366 MHz.

Description of the power supply:

AC/DC- adapter: Astec, model AA20590
S26113-E429-V30

Features Overview:

Cache: 16 Kbyte integrated in processor
512 Kbyte synchronous Second Level Cache

Main memory: 32 - 128 Mbyte EDO RAM or SD RAM
2 slots for 16, 32, 64 Mbyte modules
JEDEC 144 pin SO DIMM (may not be mixed)

System ROM (flash EPROM): 512 Kbyte for system and video BIOS

Disk drives: Floppy disk drive for 3 ½ inch floppy disks
Hard disk drive 2.5 inch, 12.7 mm height
CD ROM drive twenty speed or more
DVD drive
ZIP-drive (IOME6A)

Display: Backlit liquid-crystal transmissive display (LCD)

Display diagonal: 33.8 cm (13.3 inch) XGA
LCD TFT/ADS 30.7 cm (12.1 inch) XGA overhead display
33.0 cm (13.0 inch) XGA ADS

Resolution/colors: LCD TFT 13.3 1024 x 768 x 256 colors (18 bit)

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Screen controller:	ATI-3D Rage LT Pro 4 Mbyte
Video memory (EDO-RAM):	4 Mbyte
supported resolutions on external display	640 x 480 / 16.7 million colors and 85 Hz 800 x 600 / 16.7 million colors and 85 Hz 1024 x 768 / 65.536 colors and 75 Hz
 <i>Audio:</i>	
Compatibility:	Soundchip ESS1869 Soundblaster Pro, Ad lib, MS sound system
A/D and D/A conversion:	16 bit, stereo
 <i>Input devices:</i>	
Keyboard:	86 keys
Touchpad (Length, Width)	64 x 48 mm
 <i>Slots:</i>	
PC card (CardBus/PCMCIA):	PCMCIA 2 x type II or 1 x type III PC card TI 1250, Zoomed-Video-Port
 <i>Ports:</i>	
PS/2 mouse port/keyboard port:	6-pin mini DIN female connector
Port for MobiDock/QuickPort:	240-pin female connector
Parallel port:	25-pin female connector, bi-directional EPP/ECP capable
Port for external monitor:	15-pin female connector
Serial port:	9-pin male connector, 16550 compatible
Microphone:	jack connector
Audio input:	jack connector
Audio output:	jack connector
Infrared interface (Fast IrDA):	
USB (Universal Serial Bus):	
TV out	Hosiden

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

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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 Scenic Mobile 750	HSSMOB75001	Notebook EUT	
2	Siemens MCM 1705 NTD	A3LCGH760	Monitor	unshielded power cord [175] shielded video cable [172]
3	Microsoft MS 2.1A	C3KKMP3	Mouse	shielded mouse cable [183]
4	Hewlett Packard HP 2225D+ (3012S70819)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shiel- ded serial cable [190]
5	Siemens AA20590 S26113-E429-V30	N/A	AC- / DC- Adapter (inter/extern use)	unshielded AC cable [178] shielded DC cable [149]

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Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
6	Escom	N/A	Microphone	shielded cable [142]
7	Power beat P10	N/A	Loud-speakers	shielded cable [166 + 124]
8	Siemens	N/A	USB cable	shielded cable, terminated [86]
9	Siemens FA 288 G6		Cam Corder	shielded S-VHS cable (159)
10	Siemens LEA S26391-F213-V800	H/A	extern/intern FD-drive	shielded with ferrit core (60)
11	3 Com 3C575-TX	DF63C575	Fast Ether Link Card Bus PC Card	shielded cable (>150)
	<u>Pos 1 contains:</u>			
a1	TX34D61VC1HAD	N/A	LCD-Display 13.3"	
a2	S26391-F212-V300	N/A	Overhead LCD- Display	
a3	S26391-F212-V301		FAN unit overheaddisplay	Shielded cable with ferrite core (140)
b	Sanyo I1020E002	N/A	Inverter board	
c	Fujitsu MHD2032AT	N/A	Hard disk	
d	Synaptics TM41PUC220-2	N/A	Touch pad	

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Pos	Model Number /Part Number	FCC ID	Description	Cable Description (length in [cm])
e	3RE4U27001610	N/A	Keyboard US	
f	Intel MMO-Modul PMF36602002QS	N/A	CPU	
g	upper connection board 3RE4B13003021A	N/A	Board	
h	SEC Memory module	N/A	RAM	
i	3RE4J19003920	N/A	PCMCIA-bay	
j	3RE4B13503681B	N/A	main board	
k	3RE4B13503682B	N/A	audioboard	
l	S26391-F192-V110	N/A	Battery	
m	UJDA510L	N/A	DVD	
n	CDR-U240-Z	N/A	CD-ROM 24speed	

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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 emission are in compliance with CISPR 22 resp FCC class B.

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the emission data is located at Siemens 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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2. PRODUCT LABELING

2.1 FCC ID Label

FCC ID: HSSMOB75001

This device complies with part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing-Equipment Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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2.2 Location of Label on EUT

see attached file "label on eut.jpg"

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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 notebook can be equipped either with an internal AC/DC-adapter or with an accumulator. Both combinations were tested (see figure 3.1). The system clock is 66,66 MHz, the clock frequency was tested with the corresponding worst case processor:

66,66 MHz clock: Pentium II 366 MHz

12.2 inch Overhead display:

Instead of the standard TFT-LCD-display an overhead TFT display can be used. This overhead-display can be mounted either directly to the notebook or via an extension cable.

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

a) External AC/DC-adapter, internal accumulator,13.3" TFT LCD:

Frequency range 30 MHz - 1 GHz:

66,66 MHz clock/Pentium II 366 MHz, video resolution 1024 x 768

Frequency range 1 GHz - 3 GHz:

66,66 MHz clock/Pentium II 366 MHz, video resolution 1024 x 768

b) External AC/DC-adapter, internal accumulator,12.2" overhead display:

Frequency range 30 MHz - 1 GHz:

66,66 MHz clock/Pentium II 366 MHz, video resolution 1024 x 768

Referring to conducted emission the following (worst case) result is applicable:

a) External AC/DC-adapter, internal accumulator,13.3" TFT LCD:

66,66 MHz clock/Pentium II 366 MHz, video resolution 1024 x 768

b) External AC/DC-adapter, internal accumulator,12.2" overhead display:

66,66 MHz clock/Pentium II 366 MHz, video resolution 1024 x 768

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3.2 Video mode Justification

The system was tested in video graphic mode 1024 x 768. This displays the worst case resolution.

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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)
- external Floppy drive writes to the HD and reads back
- internal DVD-drive or CD-ROM writes to the HD
- "H`s" are sent to the printer port
- data is sent to USB port
- signals to video and audio periphery
- accumulator is charged (if applicable)
- LAN communication via PCMCIA

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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Figure 3.1 Configuration a) System with 13.3" LCD-display

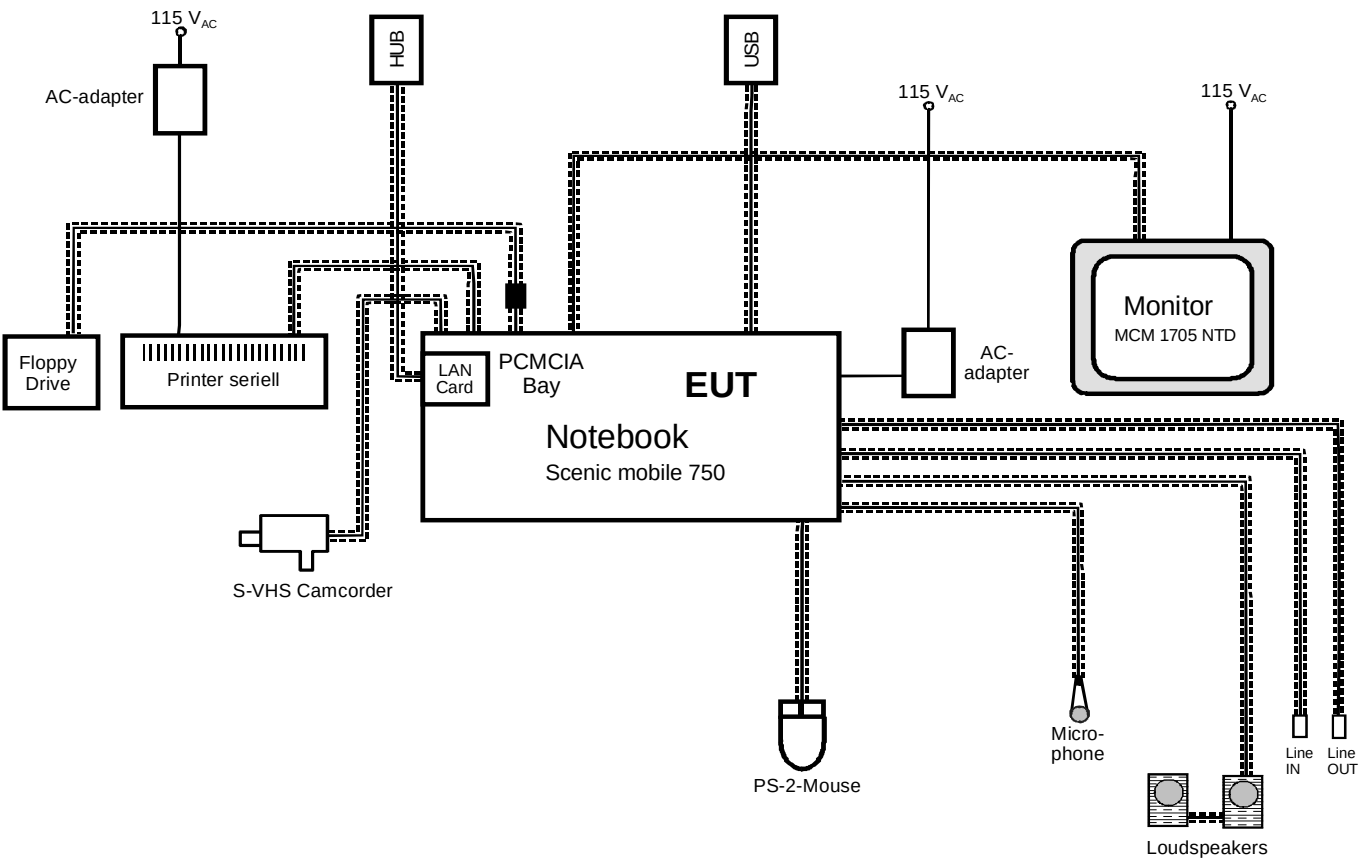
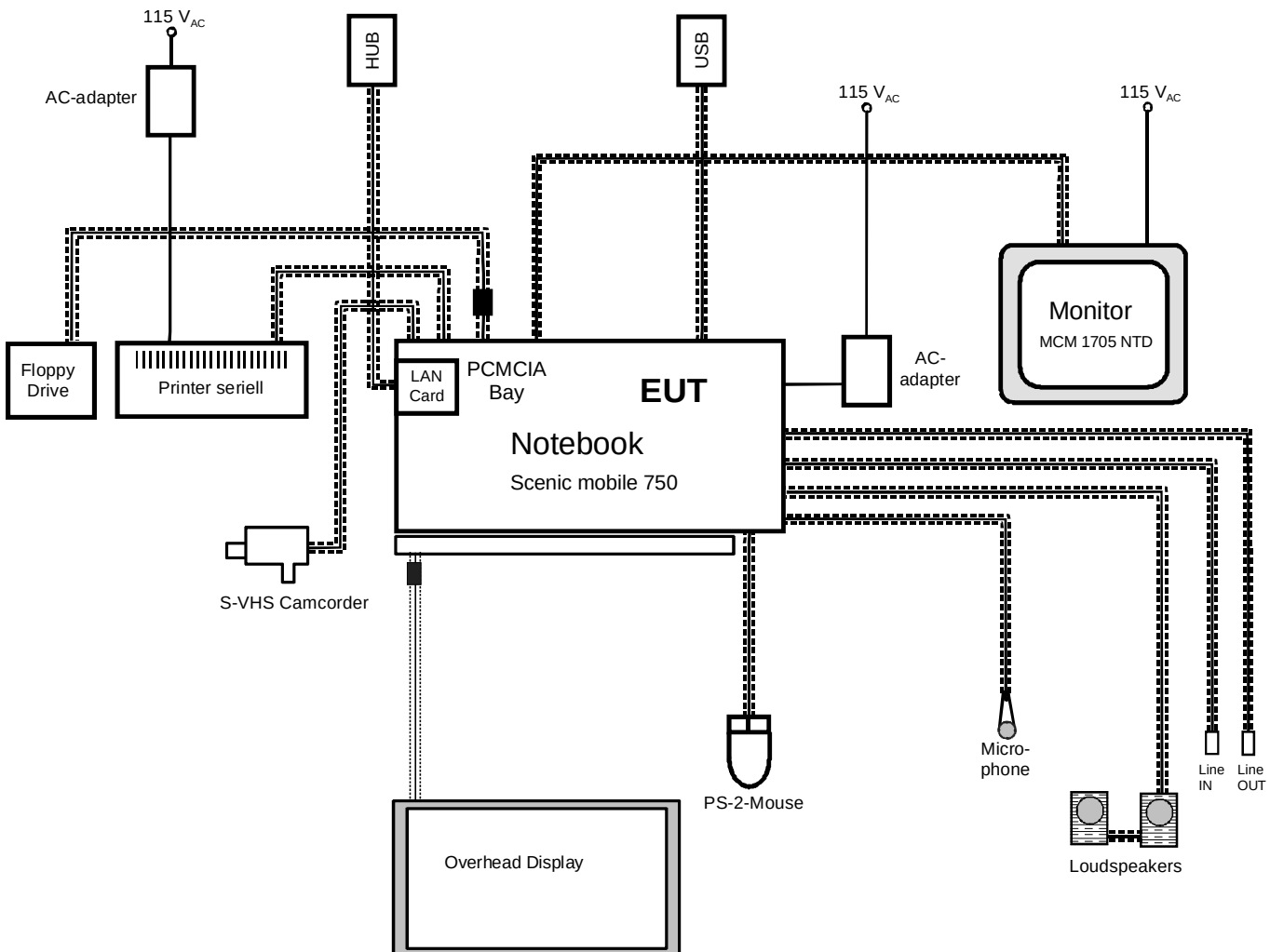


Figure 3.2 Configuration b) System with Overhead display



4. BLOCK DIAGRAM OF EUT

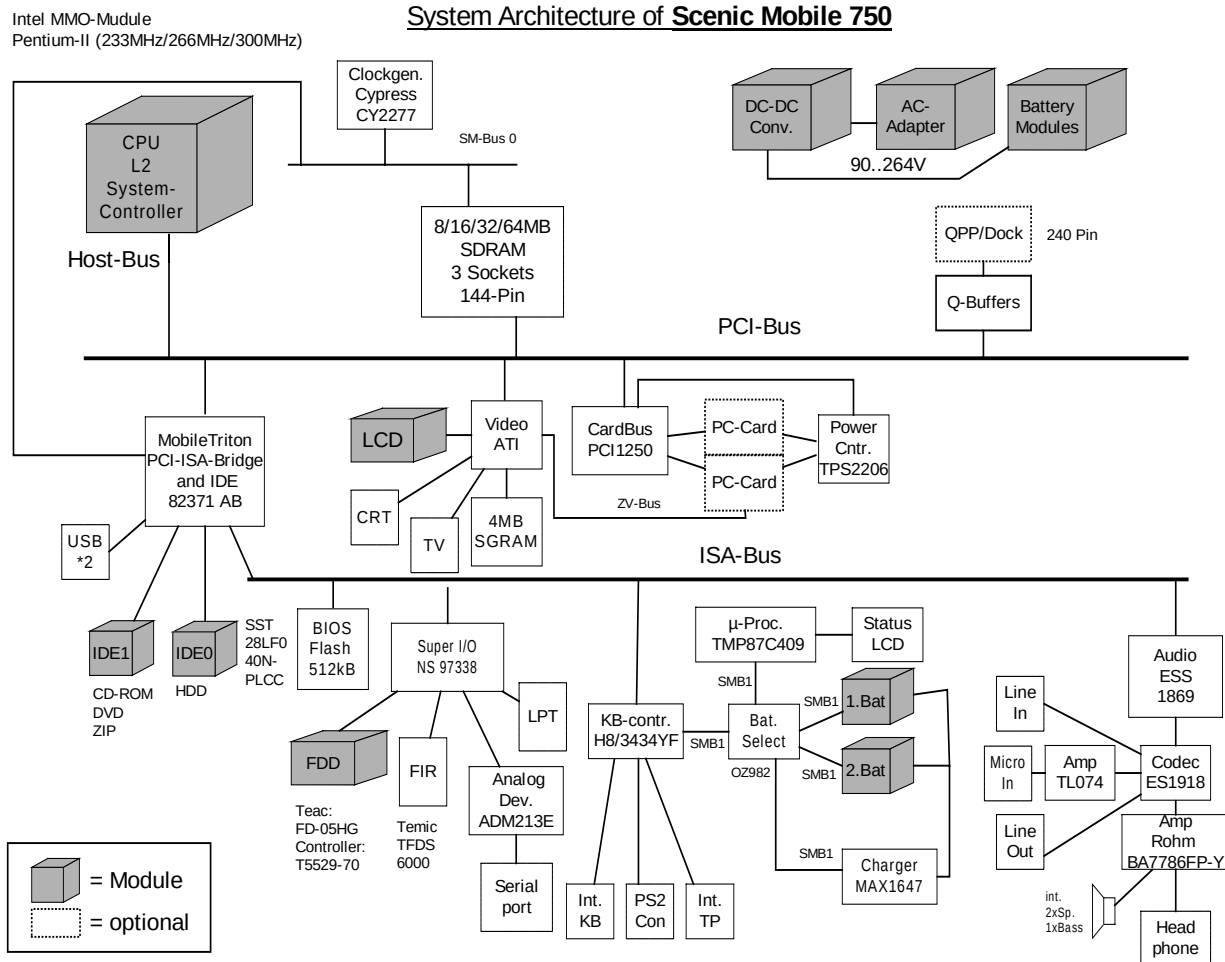


Fig 4.1 Blockdiagram

4.1 Block Diagram Description

The major parts of the system are

- MMO module (CPU)
- Clock
- Video
- Extension
- internal periphery
- Audio
- external periphery
- LCD-Display

4.2 Clock frequencies of EUT

Clock synthesizer	14,318 MHz
Memory	66,66 MHz
PCI-bus	33,33 MHz
PIIX4	33,33 MHz / 48 MHz
I/O controller	14,3 MHz
USB	48 MHz
VGA controller	14,3 MHz
Real time clock	32,768 kHz
Docking clock	33,3 MHz
ISA-Bus	14,3 MHz

4.3 Theory of Operation

The notebook works exactly like a traditional PC.

The processor runs internally with 233; 266; 300; 333 or 366 MHz, the system clock is in each case the same - 66,66 MHz - and is internally multiplied by the processor.

The highest possible frequencies and the corresponding processors are:

System clock	Processor	factor
66,66 MHz	233 MHz	3,5
66,66 MHz	266 MHz	4,0
66,66 MHz	300 MHz	4,5
66,66 MHz	333 MHz	5,0
66,66 MHz	366 MHz	5,5

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5. CONDUCTED EMISSION DATA

5.1 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.

5.2 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 printer and the monitor are supplied with power via a second LISN.

The worst case results of the corresponding is given next:

a) External AC/DC-adapter, internal accumulator, 13.3" TFT LCD

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
neutral	0,168000	49.80	QP	65.0
neutral	23.820000	36.40	QP	60.0
neutral	0.162000	36.00	AV	55.3
neutral	1.026000	21.30	AV	46.0
phase	1.800000	23.20	AV	46.0
neutral	3.354000	24.80	AV	46.0
neutral	4.998000	25.60	AV	46.0
neutral	6.204000	26.50	AV	50.0
phase	22.980000	31.00	AV	50.0

b) External AC/DC-adapter, internal accumulator, 12.2" overhead display:

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
neutral	0,168000	51.70	QP	65.00
neutral	0.252000	41.50	QP	61.60
neutral	0.156000	36.70	AV	55.60
phase	0.168000	34.80	AV	55.00
neutral	0.252000	30.50	AV	51.60
neutral	0.312000	35.10	AV	49.90
neutral	0.378000	29.50	AV	48.30
neutral	0.438000	29.00	AV	47.00
phase	0.498000	24.40	AV	46.00

AV: average

QP: quasi peak

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Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: R. Schaufler

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Measurement Protocols

See attached file "measurement protocols.pdf"

5.3 Referenced Rules Sections

N/A

5.4 Test Instrumentation Used, Conducted Measurement

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESHS10 Rohde&Schwarz	842884/011	May 98	12 months
LISN	ESH2-Z5 Rohde/Schwarz	871884/004	May 98	12 months
LISN	NSLK8126 Rohde&Schwarz	8126160	May 98	12 months
Pulse limiter	ESH3-Z2 Rohde&Schwarz	60813	May 98	12 months

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6. RADIATED EMISSION DATA

6.1 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 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.
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 prescan 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.

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6.2 Measured Data

The EUT was measured with the Processor Pentium II 366 MHz in video mode 1024 x 768 in two different configurations:

Part 1: frequency range 30 MHz - 1000 MHz:

a) External AC/DC-adapter, internal accumulator, 13.3" TFT LCD

Judgement: Passed by

Frequency MHz	Level * dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth [deg]	Polarization
30.780000	28.50	17.9	30.0	1.4	160.0	29.00	vertical
133.320000	26.70	12.6	30.0	3.2	160.0	0.00	vertical
174.780000	24.80	11.1	30.0	5.1	280.0	90.00	horizontal
185.670000	25.90	10.8	30.0	4.0	400.0	90.00	horizontal
199.950000	28.50	10.8	30.0	1.4	100.0	119.00	vertical
216.210000	24.50	11.8	30.0	5.4	100.0	119.00	vertical
733.110000	33.70	22.4	37.0	3.2	220.0	180.00	vertical

b) External AC/DC-adapter, internal accumulator, 12.2" overhead display:

Judgement: Passed by

Frequency MHz	Level * dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth [deg]	Polarization
31.47	27.1	17.6	30.0	2.8	100	300	Vertical
100.02	23.6	12.0	30.0	6.3	160	59	Vertical
130.32	23.6	12.7	30.0	6.3	100	29	Vertical
142.92	25.3	12.3	30.0	4.6	100	29	Vertical
456.03	31.5	19.0	37.0	5.4	220	0	Horizontal
521.13	31.2	20.4	37.0	5.7	160	150	Horizontal
733.08	34.5	22.4	37.0	2.4	280	180	Vertical

all levels are quasi-peak levels

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Part 2: frequency range 1 GHz - 3 GHz:

Judgement: Passed by

Frequency MHz	Level * dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth [deg]	Polarization
1166.200000	21.00	8.2	53.9	32.8	100.0	119.00	vertical
1367.800000	30.80	9.2	53.9	23.0	100.0	300.00	horizontal
1466.200000	23.50	9.1	53.9	30.3	180.0	119.00	horizontal
1593.100000	22.50	10.0	53.9	31.3	280.0	239.00	vertical
1621.900000	22.80	10.1	53.9	31.0	100.0	59.00	horizontal
1716.100000	23.90	11.1	53.9	29.9	120.0	0.00	horizontal
1766.200000	24.40	11.1	53.9	29.4	220.0	0.00	vertical
1832.800000	37.80	10.5	53.9	16.0	100.0	0.00	vertical
1932.700000	23.30	10.9	53.9	30.5	160.0	0.00	vertical

all levels are average levels

*The correction factor is considered automatically by the test receiver.
A table of correction factors is listed in paragraph 6.6.

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Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Bosse

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: H. Zenkner

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Heuser

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Measurement Protocols

See file "measurement protocols.pdf"

6.3 Referenced Rules Sections

N/A

6.4 Test Instrumentation used, Radiated Measurement

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESMI Rohde&Schwarz	840607/006	Aug 98	12 months
Antenna	CBL 6112 Chase	0003	May 98	12 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	May 98	12 months

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6.5 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 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 dB μ V/m)/20] =

103,5 μ V/m

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6.6 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

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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

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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

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7.CONDUCTED AND RADIATED MEASUREMENT PHOTOS

- 7.1. Test setup, conducted emission, front side view
- 7.2. Test setup, conducted emission, rear side view
- 7.3. Test setup, radiated emission, front side view
- 7.4. Test setup, radiated emission, rear side view

8. EXTERNAL PHOTOS OF EUT

- 8.1. Front side of EUT
- 8.2. Rear side of EUT
- 8.3. Notebook with overheaddisplay

9. INTERNAL PHOTOS OF EUT

- 9.1. Base unit keyboard removed
- 9.2. Base unit top cover removed
- 9.3. Base unit view to systemboard
- 9.4. Systemboard bottom side view
- 9.5. Systemboard top side view
- 9.6. Memory pcb top side view
- 9.7. Memory pcb bottom side view
- 9.8. Upper connection board top side view
- 9.9. Upper connection board bottom side view
- 9.10. MMO module top side view
- 9.11. MMO module bottom side view
- 9.12. PCMCIA top side view
- 9.13. PCMCIA bottom side view
- 9.14. Audio pcb top side view
- 9.15. Audio pcb bottom side view
- 9.16. keyboard top side view
- 9.17. keyboard bottom side view
- 9.18. touch pad dissassembled
- 9.19. DVD drive
- 9.20. HD drive

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- 9.21. FLOPPY drive
- 9.22. CDROM drive
- 9.23. LCD XGA front side view
- 9.24. LCD XGA without cover front side view
- 9.25. LCD XGA without cover back side view
- 9.26. LCD HV-converter bottom side view
- 9.27. LCD HV-converter top side view
- 9.28. Overhead display fan unit
- 9.29. Overhead display opened
- 9.30. Overhead display top cover removed
- 9.31. Overhead display HV converter pcb bottom side
- 9.32. Overhead display HV converter pcb top side
- 9.33. AC DC adapter
- 9.34. AC DC adapter cover removed
- 9.35. AC DC adapter component side
- 9.36. AC DC adapter soldering side
- 9.37. AC DC adapter soldering side w shield.

10. USER MANUAL (see attached file "user manual")
for FCC statement refer to user manual page 5

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