MEASUREMENT / TECHNICAL REPORT

SIEMENS AG

Model: Personal Computer Scenic Mobile 750 AGP

FCC ID: HSSMOB75001

June 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

Application for Certification prepared by:
Guenther Roesch
Siemens AG
Buergermeister-Ulrich-Str. 100
86199 Augsburg
Germany
Tel.: +49 821 804-2821
Fax: +49 821 804 2675

Applicant for this device:

Siemens AG
Buergermeister-Ulrich-Str. 100
86199 Augsburg
Germany
Tel.: +49 821 804-0

Table of Contents

1 GENERAL INFORMATION

1.1 Product Description

The Siemens Computer Scenic Mobile 750 AGP is a notebook with an anhanced video graphic. The system board integrates the Pentium Processor, memory, and I/O-technologies. The system can be assembled with Processor Intel Pentium II up to 400 MHz.

Additionally a 14,1" Display and a dual drive have been added to the configuration.

Description of the power supply:

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

Features Overview:

Cache:	16 Kbyte integrated in processor up to 512 Kbyte synchronous Second Level Cache
Main memory:	64 - 256 Mbyte EDO RAM or SD RAM 2 slots for 64, 128 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:	13.3 inch XGA
LCD TFT/ADS	12.1 inch XGA overhead display 14.1 inch) XGA
Resolution/colors:LCD TFT 14.1	1024 x 768 x 256 colors (18 bit)
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

Audio:

Compatibility:	Soundchip ESS1940 Soundblaster Pro, Ad lib, MS sound system
A/D and D/A conversion:	16 bit, stereo

Input devices:

Keyboard:	86 keys
Touchpad (Length, Width)	64 x 48 mm

Slots:

PC card (CardBus/PCMCIA):	PCMCIA 2 x type II or 1 x type III PC card TI 1251, Zoomed-Video-Port

Ports:

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, Bürgermeister-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 Scenic Mobile 750 AGP	HSSMOB75001	Notebook (400 MHz) **EUT**	unshielded power cord [292]
2	Siemens MCM 1705 NTD	A3LCGH760	Monitor	unshielded power cord [175] shielded video cable [168]
3	Microsoft MS 2.1A	C3KKMP3	Mouse	shielded mouse cable [183]
4	Microsoft Intelli Mouse 1.1A	DOC: m/n:IM1	USB-Mouse	shielded mouse cable [183]
5	Siemens S26381-K240-V120	HSS01TASTK240	Keyboard	shielded keyboard cable [143]
6	Hewlett Packard HP 2225C+ (3011S70627)	DSI6XU2225	Printer, parallel I/F	unshielded AC cable [180], shielded centronics cable [190]

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
7	Hewlett Packard HP 2225D+ (2952S61229)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shielded serial cable [190]
8	Escom	N/A	Microphone	shielded cable [142]
9	Chairman Power beat P10	N/A	Loud-speakers	shielded cable [166 + 124]
10	Siemens FA 288 G6		Camcorder	shielded cable [159]
11	3 COM Fast Ether Link 3C575-TX	DF63C575	LAN PC card	shielded cable [> 150]
12			Line IN	shielded cable, terminated [192]
	Pos 1 contains:			
a_1	NEC MOB750 S26391-F212-V400	N/A	LCD-Display TFT 14.1“	N/A
a_2	TX34D61VC1HAD	N/A	LCD-Display TFT 13.3“	N/A
a_3	S26391-F212-V300	N/A	Overhead LCD-Display	N/A

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
a_4	S26391-F212-V301	N/A	FAN unit overhead-Display	shielded cable with ferrite core
b	Siemens AA20590 S26113-E429-V30	N/A	AC- / DC-Adapter	unshielded AC cable [152] shielded DC cable [149]
c	FDD + CD MOV75A S26361-F213-V210	N/A	Dual drive	N/A
d	Sanyo I1020E002	N/A	Inverter board	N/A
e	Siemens CDR-U2240-Z	N/A	CD-ROM drive 24speed	N/A
f	Siemens LEA S26391-F213-V800	N/A	Floppy disk drive extern/intern	N/A
g	Fujitsu MHD22032AT	N/A	Hard disk drive	N/A
h	Siemens 3RE4B13503990B	N/A	System board	N/A
i	Intel MMO PMK40002001QS	N/A	Processor module (400 MHz)	N/A
k	SEC Memory module	N/A	RAM	N/A

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
l	Synaptics TM41PUC220-2	N/A	Touch pad	N/A
m	Siemens 3RE4B13003021A	N/A	Upper connection board	N/A
n	3RE4J19003920	N/A	PCMCIA bay	N/A
o	3RE4B13503682B	N/A	Audio board	N/A
p	S26391-F192-V110	N/A	Accu pack	N/A
q	UJDA510L	N/A	DVD	N/A

Remark: position a_1 / a_2 / a_3 / a_4 / c / e / f / p / q 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 emission 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 AG, Bürgermeister 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

2 PRODUCT LABELING

see original grant, date: March 01, 1999

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. In relation to original grant the worst case combination with the external AC- / DC-adapter was included.

The system clock is 66,6 MHz, the clock frequency was tested with the corresponding worst case processor:

66,6 MHz clock: Intel Pentium II 400 MHz

A new 14,1" Display and a dual drive (FDD/CD) have been added to the configuration.

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

External AC- / DC–adapter, 14.1" TFT Display
Frequency range 30 MHz - 1 GHz:
66,6 MHz clock/Intel Pentium II 400 MHz,
video resolution 1024 x 768/60 Hz

Frequency range 1 GHz - 5 GHz:
66,6 MHz clock/Intel Pentium II 366 MHz,
video resolution 1024 x 768/60 Hz

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

External AC- / DC–adapter, 14.1” TFT Display
66,6 MHz clock/Intel Pentium II 400 MHz,
video resolution 1024 x 768/60 Hz

3.2 Video mode Justification

The system was tested in video graphic mode 1024 x 768, 60 Hz. The configuration is AC- / DC-adapter, 14.1 TFT-Display

The following data are applicable:

radiated emission:

Frequency range 30 MHz - 1 GHz:
66,6 MHz clock/Intel Pentium II 400 MHz,
video resolution 1024 x 768/60 Hz

Frequency range 1 GHz - 5 GHz:
66,6 MHz clock/Intel Pentium II 400 MHz,
video resolution 1024 x 768/60 Hz

conducted emission:

66,6 MHz clock/Intel Pentium II 400 MHz,
video resolution 1024 x 768/60 Hz

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
- signal to video and audio periphery
- 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

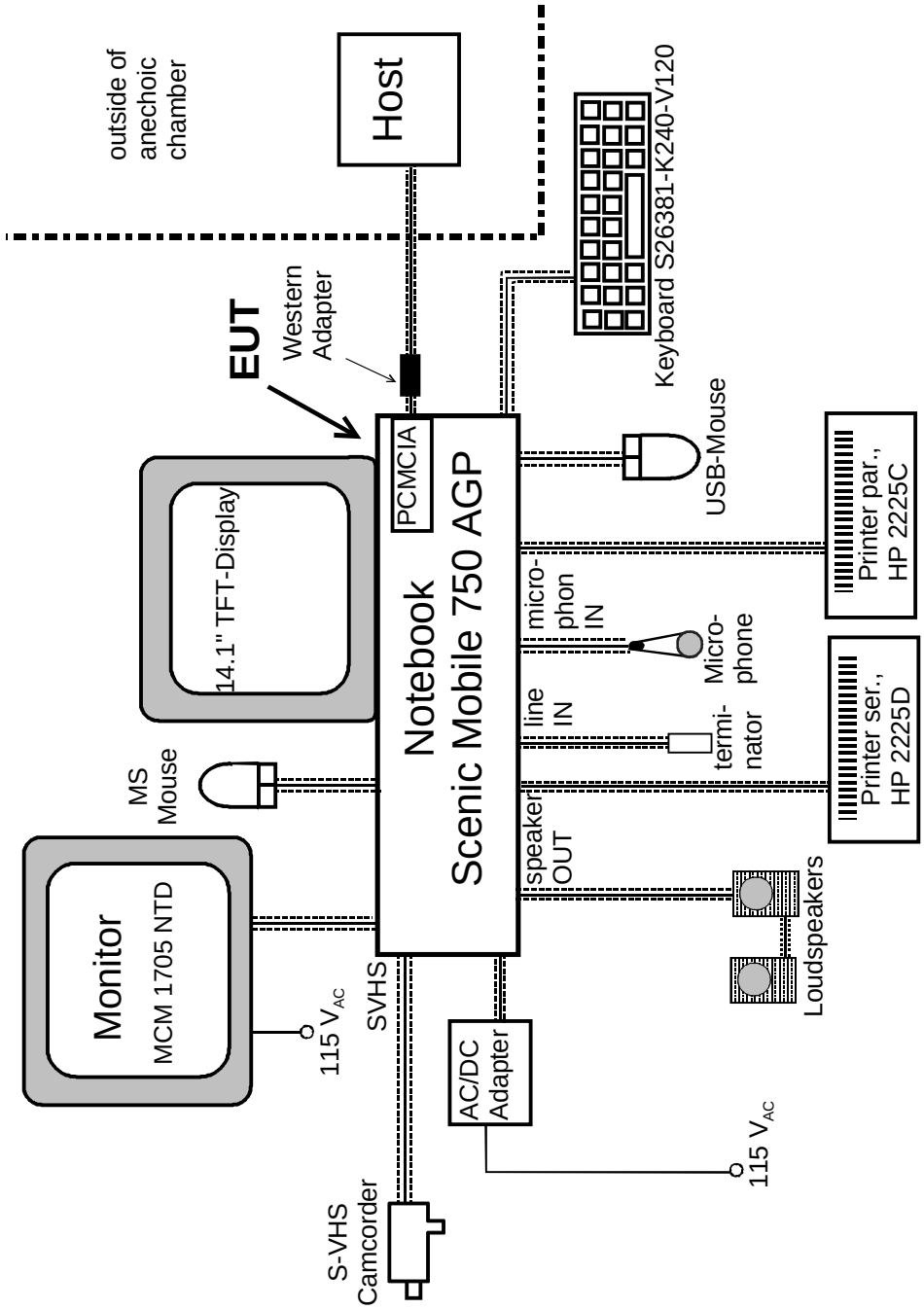
Applicant Signature _____ Date _____

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.

Figure 3.1 Configuration of Tested System



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
- processor module
- LCD-Display
- Peripheral connector area (keyboard, mouse, serial, parallel, video, USB, SVHS, microphone, speakers, line out and PCMCIA)

The detailed diagram of the system board is shown in fig 4.1
The personal computer works exactly like a traditional P.C..

4.2 Clockfrequencies of EUT

Clock synthesizer	14,318 MHz
Memory	66,6 MHz
PCI-bus	33,3 MHz
PIIX4	33,3 MHz / 48 MHz
ISA Bus	14,3 MHz
I/O controller	14,3 MHz
USB	48,0 MHz
VGA controller	14,3 MHz
Real time clock	32,768 MHz
Docking clock	33,3 MHz

4.3 Theory of Operation

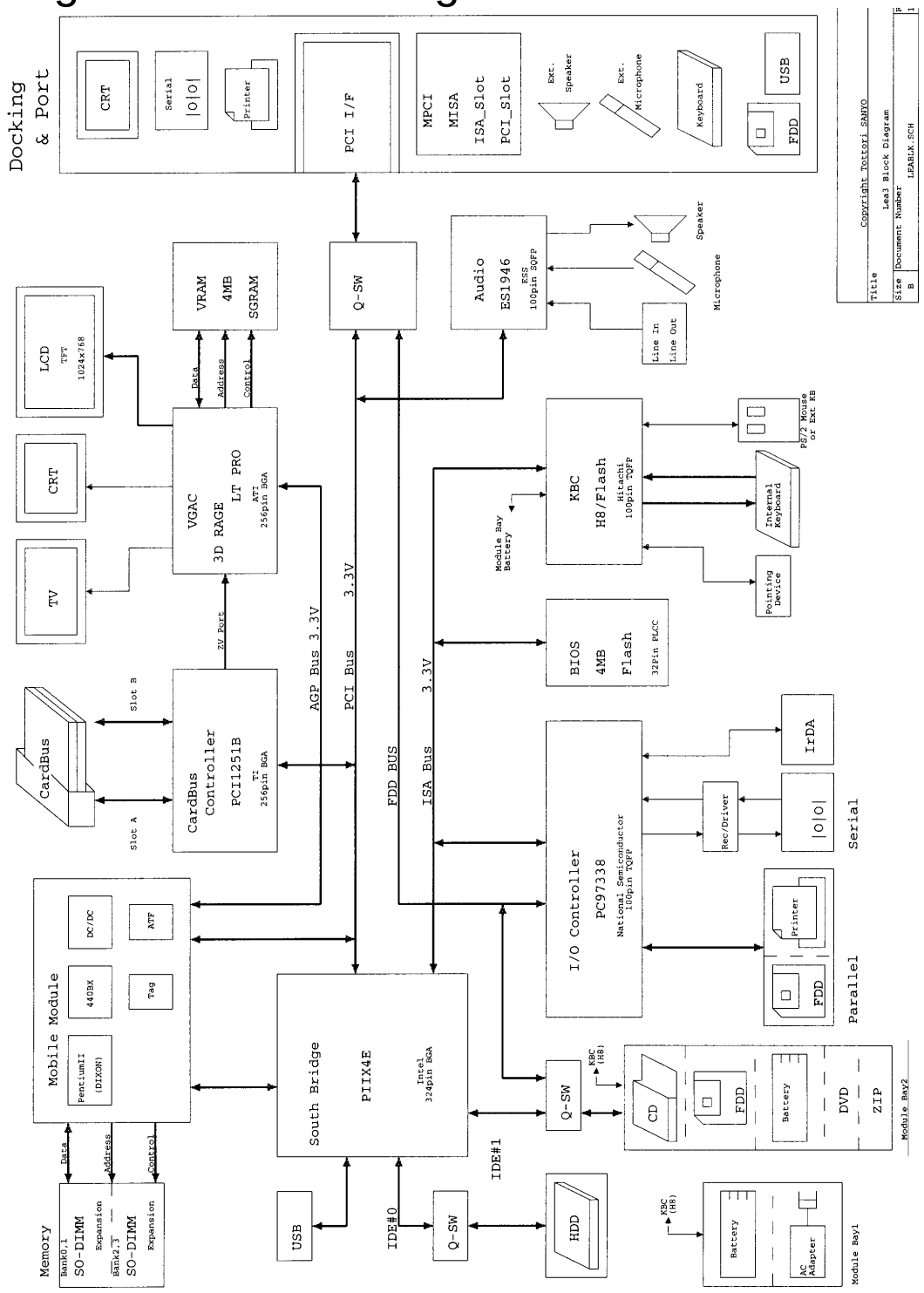
The notebook works exactly like a traditional PC.

The processors runs internally with 233, 266, 300, 333, 366 or 400 MHz, the system clock is in each case the same - 66,6 MHz and is multiplied by the processor internally by 3,5, 4,0, 4,5, 5,0, 5,5 or 6,0.

The highest possible frequencies and the corresponding processors are:

System clock	Processor	factor
66,6 MHz	233 MHz	3,5
66,6 MHz	266 MHz	4,0
66,6 MHz	300 MHz	4,5
66,6 MHz	333 MHz	5,0
66,6 MHz	366 MHz	5,5
66,6 MHz	400 MHz	6,0

Figure 4.1 Block Diagram of the EUT



S	**Siemens AG** **Personal Computer Scenic Mobile 750 AGP** FCC Identifier: **HSSMOB75001**	Date: **June 01, 1999** Page: **20/38**

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

The worst case results of the measurement is given next:

Configuration with external AC- / DC-adapter, 14.1" TFT-Display

Judgement: Passed by

	Frequency [MHz]	Measured [dB(µV)]	Kind of value	Limit [dB(µV)]
phase	0,180	52,30	QP	64,4
phase	0,270	44,20	QP	61,1
phase	0,312	42,10	QP	59,9
neutral	4,806	38,30	QP	56,0

Judgement: Passed by

	Frequency [MHz]	Measured [dB(µV)]	Kind of value	Limit [dB(µV)]
neutral	3,720	31,50	AV	46,0
neutral	4,716	32,40	AV	46,0
neutral	4,806	31,70	AV	46,0
neutral	5,262	35,20	AV	50,0

AV: average
QP: quasi peak

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Heuser

Measurement Protocols: see attached file

Scenic Mobile 750 AGP, AC- / DC-adapter, 14.1” TFT-Display
video resolution 1024 x 768/60 Hz
66,6 MHz clock/Intel Pentium II 400 MHz

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	ESH3 Rohde&Schwarz	871650/030	May 98	12 months
LISN	NSLK 8126 Schwarzbeck	8126160	May 98	12 months
LISN	ESH3-Z5 Rohde&Schwarz	871884/004	May 98	12 months
Pulse limiter	ESH3-Z2 Rohde&Schwarz	357.8810.52	May 98	12 months

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 5000 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 5000 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.

6.2 Measured Data

The EUT was measured with the Processor Intel Pentium II 400 MHz in video mode 1024 x 768, 60 Hz with AC- / DC-adapter and 14.1" TFT-Display (worst case). The test results below reflect the worst case with:

AC- / DC-adapter, 14.1" TFT-Display:
66,6 MHz clock/Intel Pentium II 400 MHz, video resolution 1024 x 768 / 60 Hz

Part 1: frequency range 30 MHz - 1000 MHz:

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
30.90000	25.00	30.000	-5.0	ver	1.0000	0.000
125.01000	27.50	30.000	-2.5	ver	1.0000	29.000
130.29000	28.10	30.000	-1.9	ver	1.0000	180.000
195.48000	26.80	30.000	-3.2	ver	1.0000	59.000
208.47000	26.30	30.000	-3.7	ver	1.0000	119.000
214.98000	27.90	30.000	-2.1	ver	1.6000	90.000

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.

Part 2: frequency range 1 GHz - 5 GHz:

Judgement: Passed by

Frequency [MHz]	Level* [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1716.10000	19.30	53.9	34.6		220.0	150.00	ver
1765.00000	20.20	53.9	33.7		140.0	150.00	hor
2617.90000	19.90	53.9	34.0		140.0	300.00	hor
3404.20000	21.10	53.9	32.8		300.0	119.00	hor
4031.50000	25.00	53.9	28.9		140.0	119.00	ver
4974.10000	29.20	53.9	24.7		180.0	239.00	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: _____ Date: _____

Printed Name: R. Schaufler

Measurement Protocols: see attached files

Frequency range 30 MHz - 1 GHz:
Scenic Mobile 750 AGP, AC- / DC-adapter, 14.1” TFT-Display
video resolution 1024 x 768/60 Hz
66,6 MHz clock/Intel Pentium II 400 MHz

Frequency range 1 GHz - 5 GHz:
Scenic Mobile 750 AGP, AC- / DC-adapter, 14.1” TFT-Display
video resolution 1024 x 768/60 Hz
66,6 MHz clock/Intel Pentium II 400 MHz

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	May 98	15 months
Antenna	CBL 6112 Chase	0003	May 98	12 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	May 98	12 months

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 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

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

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 5 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
3,1	9,20	2,37	11,57
3,2	8,60	2,40	11,00

Frequency [GHz]	Correction Tensor Antenna with Pre-amplifier [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
3,3	8,70	2,42	11,12
3,4	9,70	2,43	12,13
3,5	9,70	2,46	12,16
3,6	10,40	2,43	12,83
3,7	10,80	2,45	13,25
3,8	11,50	2,47	13,97
3,9	11,90	2,49	14,39
4,0	10,90	2,46	13,36
4,1	10,10	2,48	12,58
4,2	8,80	2,49	11,29
4,3	8,70	2,51	11,21
4,4	8,50	2,53	11,03
4,5	8,70	2,54	11,24
4,6	9,50	2,57	12,07
4,7	10,10	2,57	12,67
4,8	11,10	2,59	13,69
4,9	11,50	2,60	14,10
5,0	11,60	2,62	14,22

7 Conducted And Radiated Emission Measurement Photos: see attached files

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:

see original grant, date: March 01, 1999

9 Internal Photos of EUT: see attached files

9.1 System board, front side view, part one
9.2 System board, front side view, part two
9.3 System board, rear side view, part one
9.4 System board, rear side view, part two
9.5 DC converter board (of display) front side
9.6 DC converter board (of display) rear side

10 User Manual:

see original grant, date: March 01, 1999