

MEASUREMENT / TECHNICAL REPORT

Fujitsu Siemens Computers

Model: Personal Computer A4-D1170 (Scenic eD)

FCC ID: HSSSCENICeD01

Mar. 07, 2000

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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Engineer: _____
Heinz Zenkner
Fujitsu Siemens Computers
Personal Computer A4-D1170 (Scenic eD)
FCC Identifier:
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1 GENERAL INFORMATION

1.1 Product Description

The Fujitsu Siemens Computers Scenic eD is a compact desktop personal computer. The system board integrates the Pentium Processor, memory, and I/O-technologies. The main system unit is assembled with the Processor Intel Pentium III up to 733 MHz.

Description of the power supply:

- Power supply: Fortron, model FSP145-51N1

Features Overview:

CPU – Intel PGA370 Celeron

- 300 - 533 MHz Celeron with 66 MHz FSB
- 500 - 733 MHz PIII with 100MHz or 133 MHz FSB
- Onboard voltage regulator VRM 8.4

Main memory

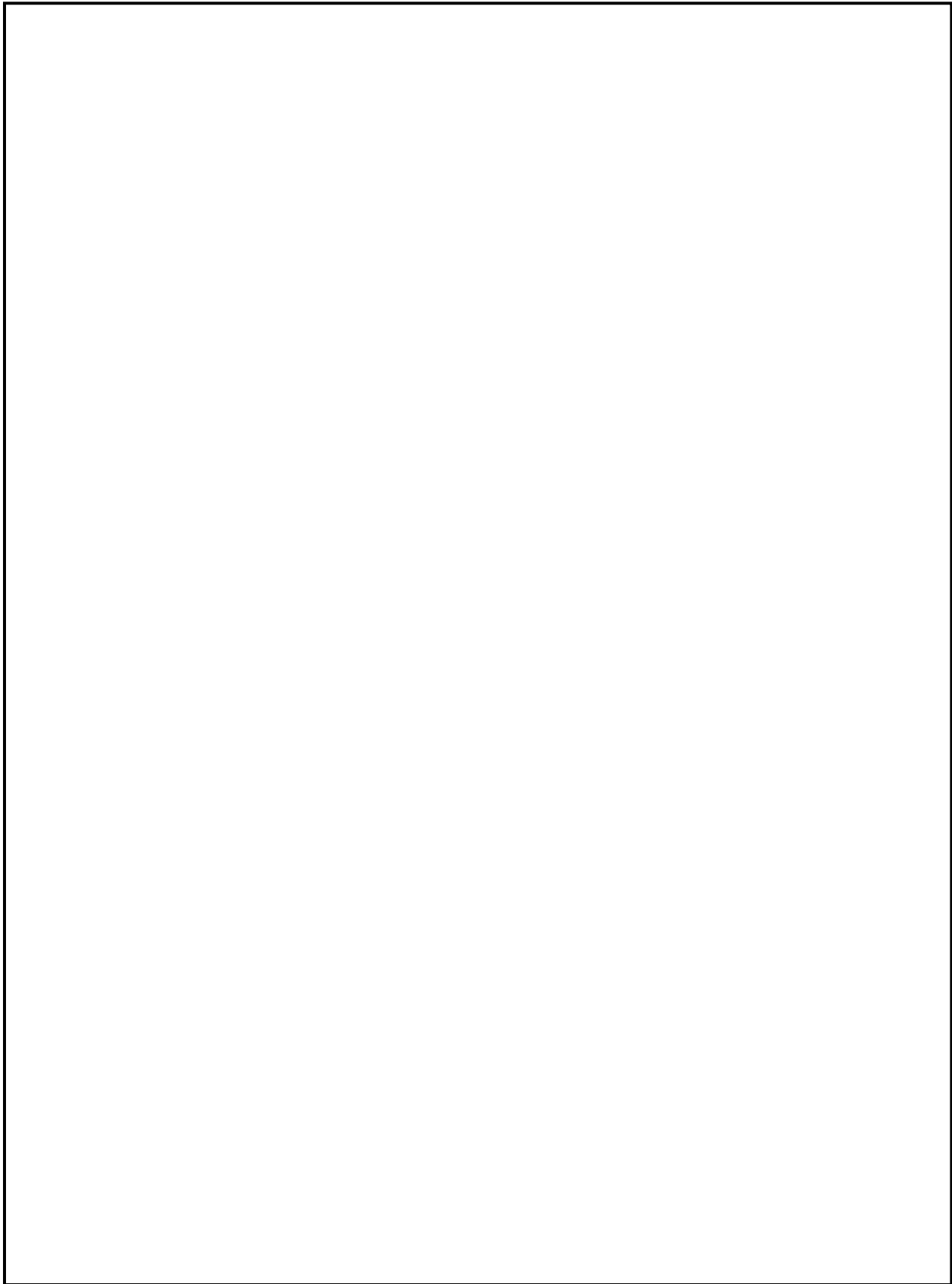
- Two 3,3 V DIMM sockets for 16 MByte up to 512 MByte, support only unbuffered SDRAM DIMMs with 100 MHz (PC100)

Chips on board

- Intel 810e Chip Set
- Analog Devices AD 1881 Audio Codec
- Intel 82559 LAN Controller
- National PC87363 Super I/O

2D/3D Graphics

- 24 Bit 230 MHz RAMDAC
- optional Display Cache
- Dynamic Video Memory (DVM)



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AC'97

- Host based Audio with AC'97
- Mono Micro In, Stereo Line In, Stereo CD IN, Stereo Aux In, Game/MIDI Port
- Stereo Line Out (max. 2x0,5 W / 8 Ω)
- Sound via internal system speaker

Communication

- 2 USB ports with 12 MBits/s
- 2 External PS2 ports
- 1 External parallel port
- 1 External serial (COM1) port
- 1 Internal connector for chipcard reader or external serial (COM2) port via wire

LAN – Ethernet Controller

- Intel 82559 with 10/100 MBit/s
- WOL by interesting packets, link status change and Magic-Packet™
- InCom LAN boot and Intel LANdesk Service Agent (LSA) support
- Alert on LAN (AOL)

Storage Devices

- 2 IDE ports for up to 4 IDE devices Support enhanced busmaster ATA66
- One internal Floppy port for two Floppy and one Floppy-Tape drive Support up to 2,88 MByte Floppy

Form factor, slots compatible list

- Micro ATX
- 4 PCI slots
- Compatible to ACPI, APM, AGP, BBS, DMI, IAPC, OnNow, PC99, PCI, WfM

The personal computer is assembled by Siemens PC Systeme GmbH & Co. KG, 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	Fujitsu Siemens Computers A4-D1170 (Scenic eD)	HSSSCENICeD01	Personal Computer EUT	unshielded power cord [292]
2	Fujitsu Siemens Computers MCM 17P1 YEDA220350	A3LCSE783	Monitor	unshielded power cord [175] shielded video cable [168]
3	Microsoft Mouse 2.1 A 0010114-5	C3KKMP1	Mouse	shielded mouse cable [197]
4	Logitech M-UB48 LZA83300052	DOC: m/n:IM1	USB-Mouse	shielded mouse cable [197]

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
5	Fujitsu Siemens Computers S26381-K252-V120 OG6A1NKFGP	HSS01TASTK252	Keyboard	shielded keyboard cable [143]
6	Cherry MY3000USB4A 000468K37	DOC	USB- Keyboard	shielded keyboard cable [143]
7	Hewlett Packard HP 2225C+ (2910S40941)	DSI6XU2225	Printer, parallel I/F	unshielded AC ca- ble [180], shielded centronics cable [190]
8	Hewlett Packard HP 2225D+ (22952S61229)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shiel- ded serial cable [190]
8	Labtec AM-32	N/A	Microphone	shielded cable [142]
9	Boeder LT-100	N/A	Headphone	shielded cable [142]
10	Microsoft Side Winder 3D Pro 00877178	C3KMJ1	Joystick	shielded cable
11	Bay Networks HUB 100BaseT	N/A	HUB	

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
12			Line IN	shielded cable, terminated [192]
	<u>Pos 1 contains:</u>			
a	Fortron (145 W) FSP145-51N1	N/A	Power supply	N/A
b	Quantum Fireball Itc08 (8,4 GB) S26361-H496-V100	N/A	Hard disk drive	N/A
c	LITE-ON LTN-403 (40x) S26361-H451-V500	DOC	CD-ROM drive	N/A
d	Mitsumi D359M3-LB S26361-H315-V500	N/A	Floppy disk drive	N/A
e	Fujitsu Siemens Computers S26361-D1170-A11	N/A	System board GS01 (WGS2)	N/A
f	Intel Pentium III, CuMine 733 MHz FSB: 133 MHz	N/A	Processor module	N/A
g	Pabst 412 FM (4000 U/min)	N/A	Fan for CPU	N/A

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
h	Siemens SIE0864100G07MV- TW-83808D PC100-222-620- 9951	N/A	DIMM 2x 64 MB	N/A
i	Intel 810E 2D/3D	N/A	Graphic (onboard)	N/A
k	Analog Devices AD1881 (Audio Codec AC`97)	N/A	Audio (onboard)	N/A

Remark:

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 PC Systeme GmbH & Co. KG, 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). The update description has been sent to FCC in February 2000 (Registration No. 90935).

1.6 Referenced Rules Sections

N/A

2 PRODUCT LABELING

2.1 FCC ID Label: see attached file

2.2 Location of Label on EUT: see attached file

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). During conducted and radiated emission the monitor was powered externally.

The system clock is 133 MHz, the clock frequency was tested with the corresponding worst case processor:

133 MHz clock: Intel Pentium III 733 MHz

The system is provided with one kind of power supply:

– Fortron, FSP145-51N1

The power supply has been measured with the highest possible video resolution (worst case with this low performance graphic controller).

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

Frequency range 30 MHz - 1 GHz:

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz

Frequency range 1 GHz - 5 GHz:

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz

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

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz
monitor power externally

3.2 Video mode Justification

The system was tested in video graphic mode 1024 x 768, 85 Hz (worst case of the low performance graphic controller).

The following data are applicable:

radiated emission:

Frequency range 30 MHz - 1 GHz:

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz

Frequency range 1 GHz - 5 GHz:

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz

conducted emission:

133 MHz clock/Pentium III 733 MHz, video resolution 1024 x 768/85 Hz
monitor power externally

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

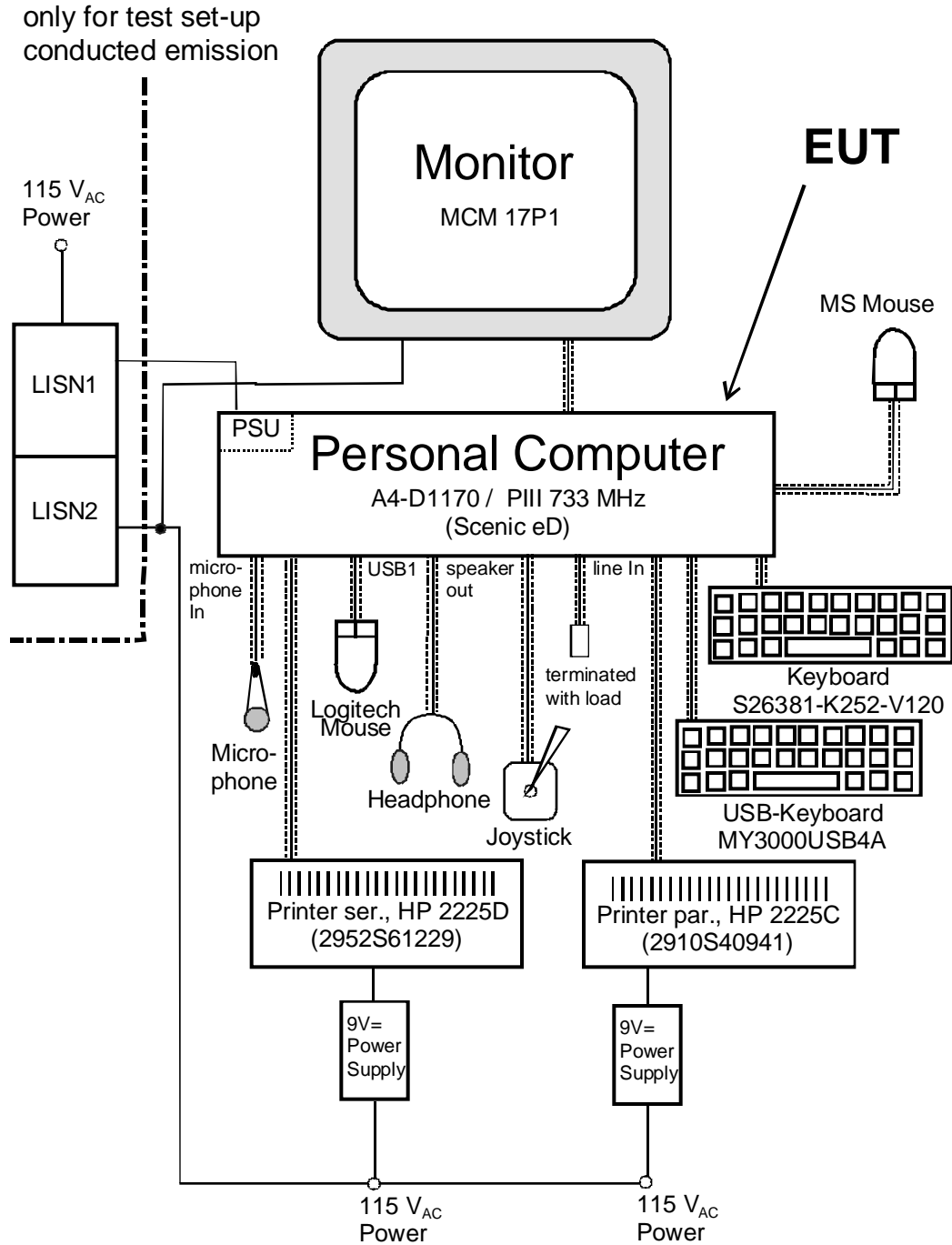
Applicant Signature _____ Date _____

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 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
- Peripheral connector area (keyboard, mouse, ser. 1, parallel port
USB and audio)

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

VGA controller	48 MHz
Clock synthesizer	14.318 MHz
Front side bus	66.6/100/133 MHz
Memory	100 MHz
PCI-bus	33.3 MHz
PIIX4 to IDE and USB	33.3 MHz
I/O controller	48 MHz
USB	48 MHz
Display cache	133 MHz
Audio controller	24.576 MHz

4.3 Theory of Operation

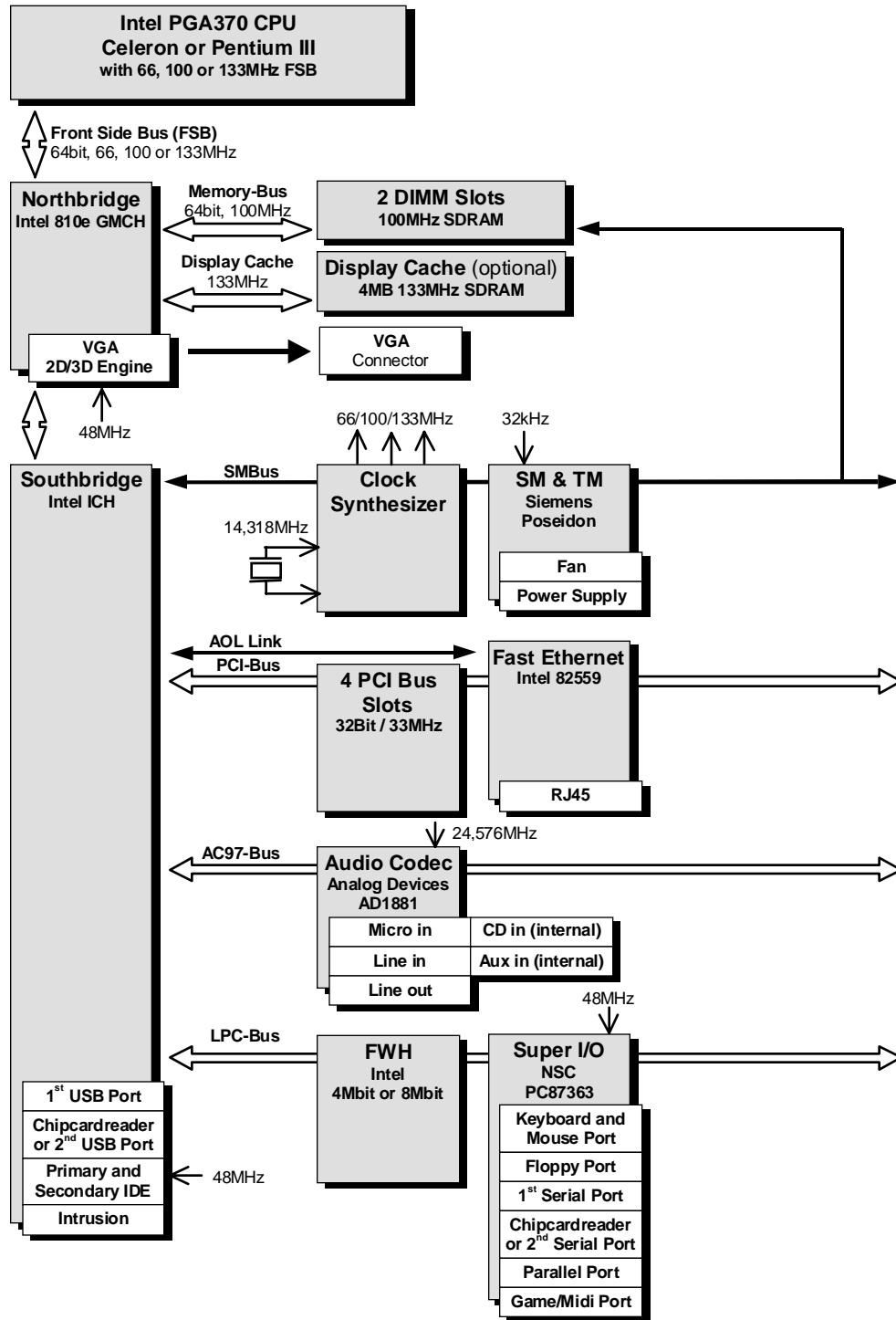
The compact desktop PC works exactly as a traditional PC.

The processors run internally between 233 and 733 MHz, the system clock is 66.6 MHz, 100 MHz or 133 MHz and is multiplied by the processors 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
100 MHz	350 MHz	3.5
100 MHz	400 MHz	4.0
100 MHz	450 MHz	4.5
100 MHz	500 MHz	5.0
100 MHz	550 MHz	5.5
100 MHz	600 MHz	6.0
133 MHz	667 MHz	5.0
133 MHz	733 MHz	5.5

4.1 Block Diagram of the EUT



5 CONDUCTED EMISSION DATA

5.1 Test Procedure

The initial step in collecting conducted emission data is a Rohde & Schwarz Test Receiver (ESH3/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 are supplied with power via a second LISN, the monitor was powered separately.

The worst case results of the corresponding configuration (video resolution 1024 x 768/85 Hz, monitor power externally), is given next:

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
neutral	0.264	48.00	QP	61.0
neutral	0.414	40.40	QP	58.0
neutral	0.492	39.00	QP	56.0
neutral	0.264	44.90	AV	51.0

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μ V)]	Kind of value	Limit [dB(μ V)]
neutral	0.414	38.20	AV	48.0
neutral	0.492	35.80	AV	46.0

AV: average

QP: quasi peak

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Rothtauscher

Measurement Protocols: see attached file



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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 99	12 months
Receiver	ESH3 Rohde&Schwarz	879599/019	May 99	12 months
LISN	ESH2-Z5 Rohde&Schwarz	871884/004	May 99	12 months
LISN	ESH3-Z5 Rohde&Schwarz	883650/027	May 99	12 months
Pulse limiter	ESH3-Z2 Rohde&Schwarz	---	May 99	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 III 733 MHz in video mode 1024 x 768, 85 Hz. The test results below reflect the worst case with:

133 MHz clock/Intel Pentium III 733 MHz,
video resolution 1024 x 768/85 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
113.40000	27.30	30.000	-2.7	ver	1.00	119.000
144.03000	28.10	30.000	-1.9	ver	1.00	210.000
165.72000	28.70	30.000	-1.3	hor	4.00	59.000
231.99000	34.20	37.000	-2.8	hor	4.00	270.000
299.82000	35.80	37.000	-1.2	ver	1.00	29.000
932.79000	34.10	37.000	-2.9	ver	2.00	180.000

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
1192.90000	29.70	53.9	24.2		160.00	150.00	hor
1396.30000	31.60	53.9	22.3		120.00	59.00	hor

Frequency [MHz]	Level* [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1732.30000	29.30	53.9	24.6		180.00	270.00	ver
2931.70000	29.70	53.9	24.2		120.00	180.00	hor
4129.90000	31.90	53.9	22.0		220.00	270.00	hor
4976.80000	33.90	53.9	20.0		160.00	300.00	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: H. Zenkner

Tester Signature: _____ Date: _____

Printed Name: M. Heuser



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Measurement Protocols: see attached file



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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 99	15 months
Antenna	CBL 6111 Chase	1345	May 99	12 months
Antenna	CBL 6112 Chase	2041	Aug 99	15 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	Dec 99	15 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:

$$\mathbf{FS = RA + AF + CF}$$

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

6.6 Table of Correction Factors

Frequency range: 30 MHz to 1000 MHz (Antenna CBL6112)

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
30,0	17,80	0,65	18,45
35,0	15,10	0,67	15,77
40,0	12,40	0,68	13,08
45,0	9,80	0,73	10,53
50,0	7,70	0,74	8,44
55,0	6,20	0,82	7,02
60,0	5,10	0,84	5,94
70,0	5,00	0,90	5,90
80,0	6,60	0,95	7,55
90,0	8,50	0,99	9,49
100,0	10,30	1,10	11,40
120,0	11,40	1,14	12,54
140,0	10,40	1,27	11,67
160,0	9,40	1,35	10,75
180,0	8,50	1,45	9,95
200,0	9,10	1,51	10,61
250,0	11,80	1,71	13,51
300,0	13,00	1,84	14,84
350,0	14,10	2,00	16,10
400,0	16,00	2,18	18,18
450,0	16,30	2,35	18,65
500,0	17,10	2,43	19,53
550,0	18,80	2,62	21,41
600,0	18,60	2,73	21,33

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
650,0	19,00	2,88	21,88
700,0	19,10	2,91	22,01
750,0	19,80	3,01	22,81
800,0	19,80	3,21	23,01
850,0	20,40	3,32	23,72
900,0	20,50	3,40	23,90
950,0	20,80	3,49	24,29
1000,0	21,10	3,69	24,79

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 set-up, conducted emission, front side view

7.2 Test set-up, conducted emission, rear side view

7.3 Test set-up, radiated emission, front side view

7.4 Test set-up, radiated emission, rear side view

8 External Photos of EUT

8.1 Front side of EUT

8.2 Rear side of EUT

9 Internal Photos of EUT: see attached files

- 9.1 Inside view of EUT
- 9.2 Hard disk drive, top side view
- 9.3 CD-ROM drive, top side view
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10 User Manual

For FCC statement please refer to user manual page 5.



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