

MEASUREMENT / TECHNICAL REPORT

SIEMENS AG

Model: Personal Computer Scenic Edition Mi7

FCC ID: HSSSCENICM702

December 09, 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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Main memory

- Two 3,3V DIMM sockets for 16MByte up to 512MByte
Support only unbuffered SDRAM

Security features

- Floppy write protection by BIOS and by switch
- System and BIOS Password
- Flash write protection against virus
- SPD EEPROM protection against virus

Support soft on/off power supplies

- Desk on/off software
- Power switch on/off

BIOS features

- Flash EPROM 2MBit
- System-BIOS
- USB legacy support

Environmental protection

- Battery on socket for recycling

Form factor and slots

- Micro ATX
- 1 AGP Slot
- 2 PCI slots
- 1 shared PCI-Bus / ISA-Bus slot

Compliant to

- ACPI, APM, AGP, BBS, DMI, OnNow, PC98, PCI

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 Edition Mi7	HSSSCENICM702	PC EUT	unshielded power cord [292]
2a	Siemens MCM 2108 NTD S26361-K479-V150	M9U9703C97BMD	Monitor	unshielded power cord [175] shielded video cable [168]
2b	Siemens MCM 1703 NTD	A3KM053	Monitor	unshielded power cord [175] shielded video cable [168]
2c	Siemens MCM 1705 NTD	A3LCGH760	Monitor	unshielded power cord [175] shielded video cable [168]
3	Siemens S26381-K210	HSS01TASTK210	Keyboard	shielded keyboard cable [143]
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)	894C2655X	Printer, parallel I/F	unshielded AC ca- ble [180], shielded centronics cable [190]
6	Hewlett Packard HP 2225D+ (3012S70819)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shiel- ded serial cable [190]
7	Hewlett Packard HP 2225D+ (2952S61299)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shiel- ded serial cable [190]
8	Siemens	N/A	USB cable	shielded cable, terminated [192]
	<u>Pos 1 contains:</u>			
a	ASTEC (UK), AA20710	N/A	Power supply	
b	Siemens S26361-D1115-F10 GS 2	N/A	System board	

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Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
c	Siemens S26361-S1783-V2	N/A	Slot with additional serial port	
d	NEC MC458C8645F-A10	N/A	SDRAM	
e	Intel Pentium II 80523PY450512PE SL2U7	N/A	Processor module	
f	NEC CDR-1900A S26361-H375-V500	A3DCDR-1900A	CD-ROM drive	
g	Fujitsu MPB3043AT 4,3 GB S26361-H369-V100	N/A	Hard disk drive	
h	SONY MPF920-C	N/A	Floppy disk drive	
i	Matrox G100A/4/OEM	DOC by 98/03/23	Graphic controller	

Remark: position 2a / 2b / 2c optional

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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 semi 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, 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: HSSSCENICM702

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

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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 system clock is 66,6 MHz, the clock frequency was tested with the highest possible processor:

100 MHz clock: Intel Pentium II (Deschutes) 450 MHz

The system is provided with one kind of power supply:

ASTEC, model AA20710

The power supply has been measured in each video resolution.

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

Frequency range 30 MHz - 1 GHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

Frequency range 1 GHz - 3 GHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

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

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

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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 21" monitor provided with a cable without any ferrite in a video resolution which is usual for standard monitors (1600 x 1200). 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:

Frequency range 30 MHz - 1 GHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

Frequency range 1 GHz - 3 GHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

conducted emission:

100 MHz clock/ Intel Pentium II 450 MHz, video resolution 1024 x 768/100 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

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

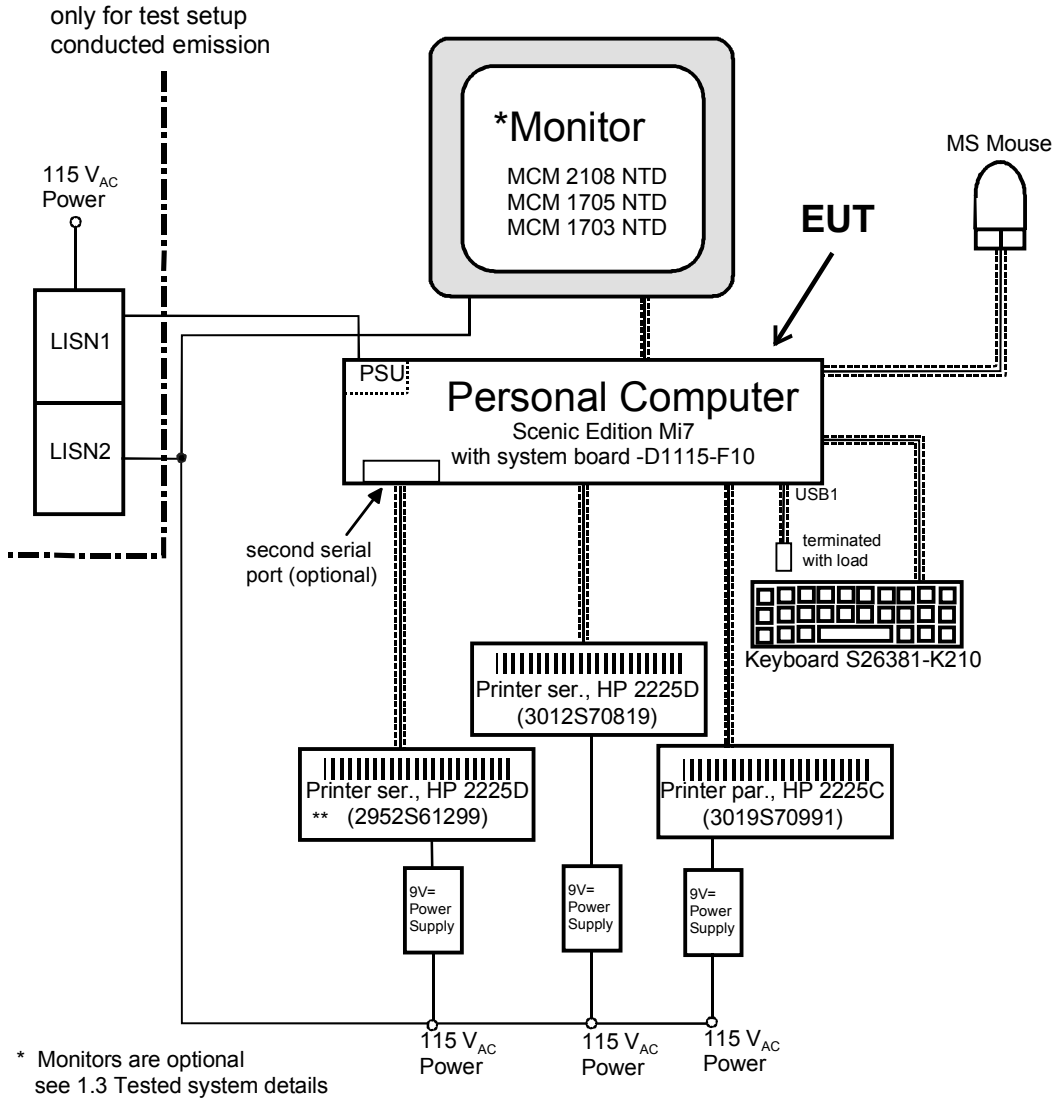
Applicant Signature _____ Date _____

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, Ser. 2, 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.

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4.2 Clock frequencies of EUT

Clock synthesizer	14,318 MHz
Front side bus	100,0 MHz
Memory	66,6 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	48,0 MHz

4.3 Theory of Operation

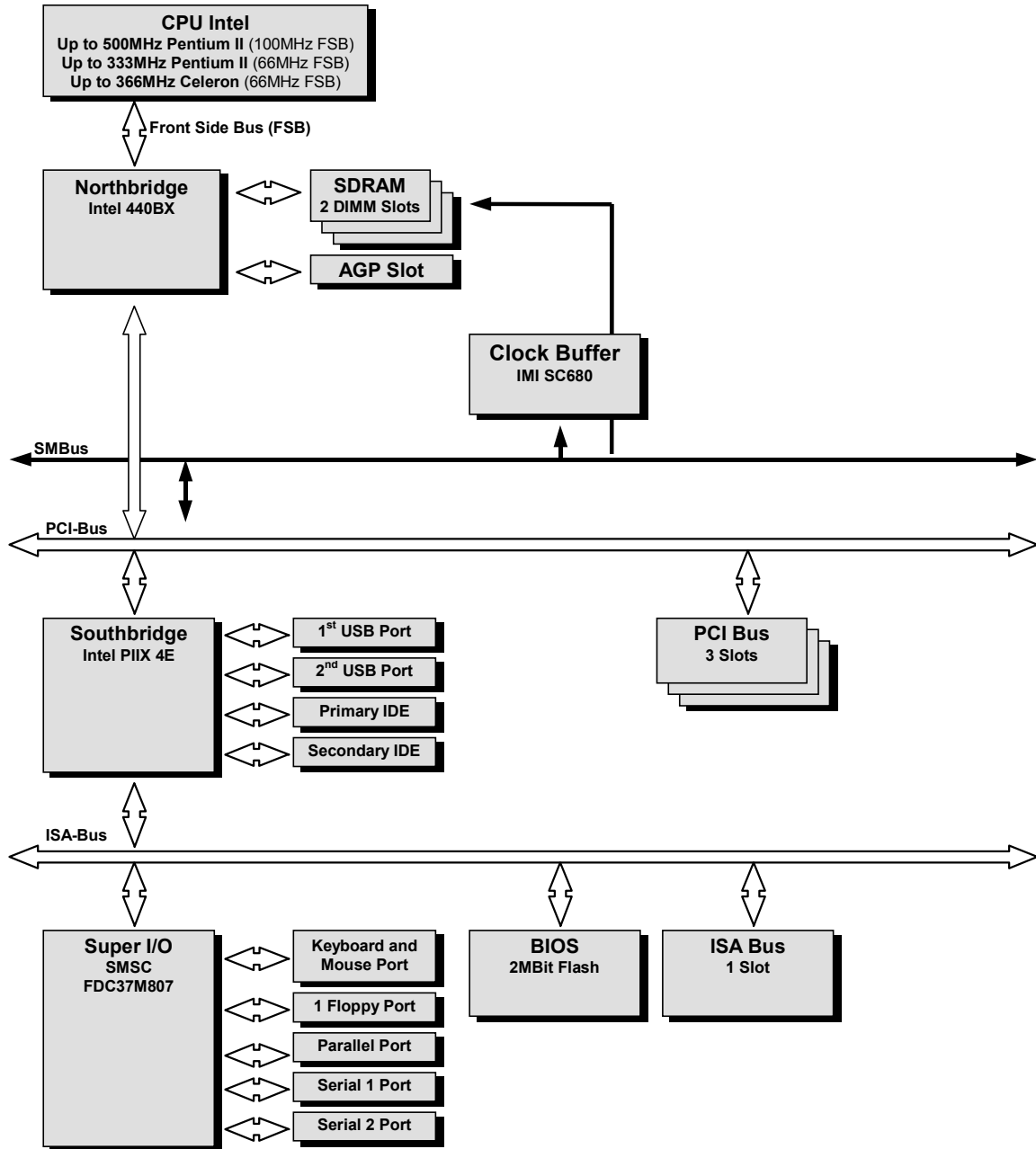
The compact tower PC works exactly as a traditional PC.

The processors run internally between 233 and 500 MHz, the type is selected by switches, the system clock is 66,6 MHz or 100 MHz and is multiplied by the processors internally by 3,5, 4,0, 4,5, 5,0 or 5,5 (only with 66,6 MHz clock).

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

Figure 4.1 Block Diagram of the EUT



5 CONDUCTED AND RADIATED MEASUREMENT PHOTOS

5.1 Test setup, conducted emission, front side view

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5.2 Test setup, conducted emission, rear side view

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5.3 Test setup, radiated emission, front side view

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5.4 Test setup, radiated emission, rear side view

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6 CONDUCTED EMISSION DATA

6.1 Test Procedure

The initial step in collecting conducted emission data is a Rohde & Schwarz Test Receiver (ESH3). 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 worst case results of the corresponding configuration (video resolution, supply modus) is given next:

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μ V)]	Kind of value	Limit [dB(μ V)]
phase	3.660000	36.20	AV	46
phase	3.668000	35.10	AV	46
phase	3.162000	34.30	AV	46

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
phase	3.066000	36.10	AV	46
phase	3.660000	40.20	QP	56
phase	3.558000	37.80	QP	56
phase	3.066000	38.60	QP	56
phase	2.670000	39.80	QP	56

AV: average
QP: quasi peak

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: R. Schaufler

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100 MHz clock/Intel Pentium II 450 MHz
video resolution 1024 x 768/100 Hz

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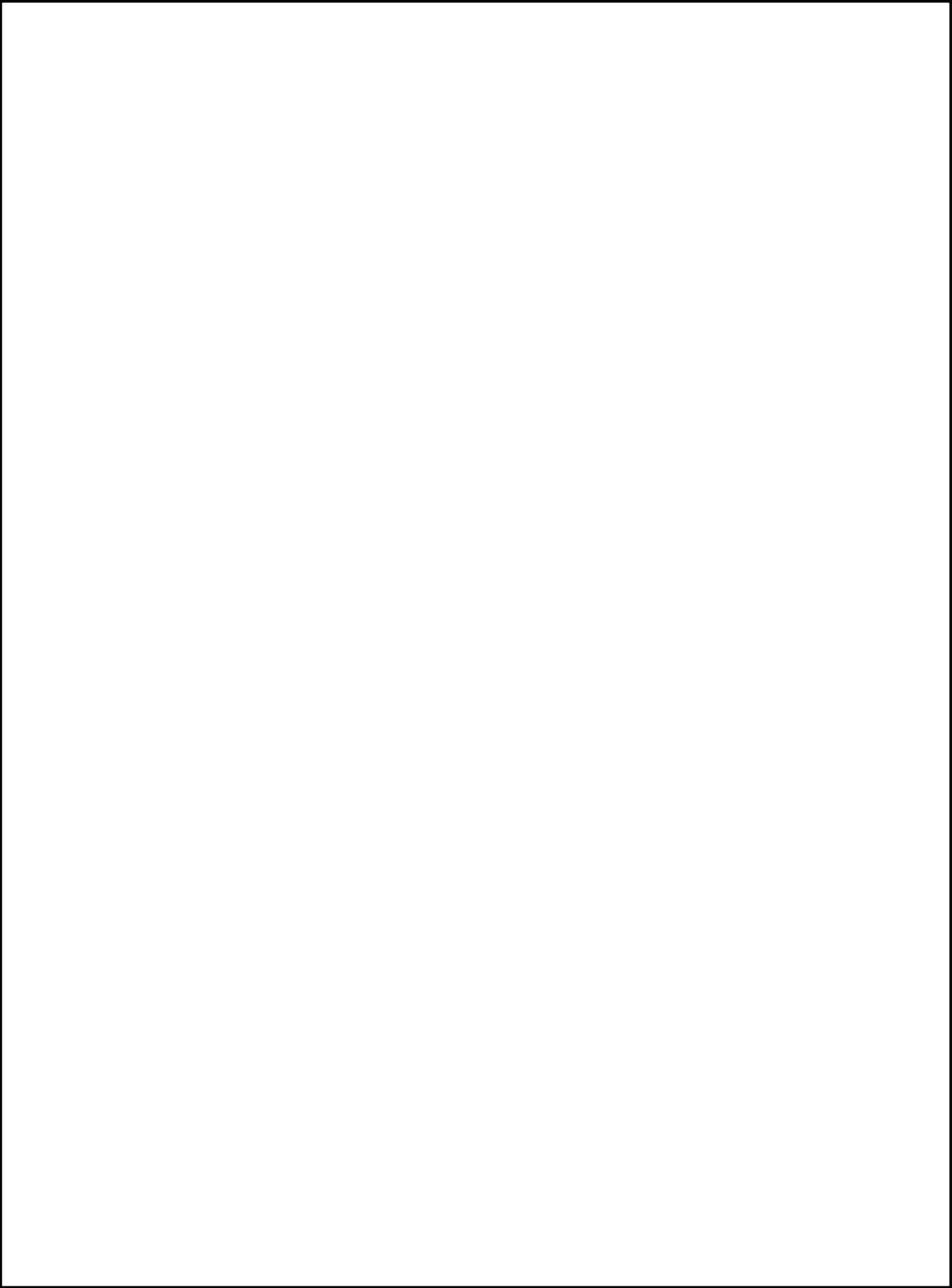
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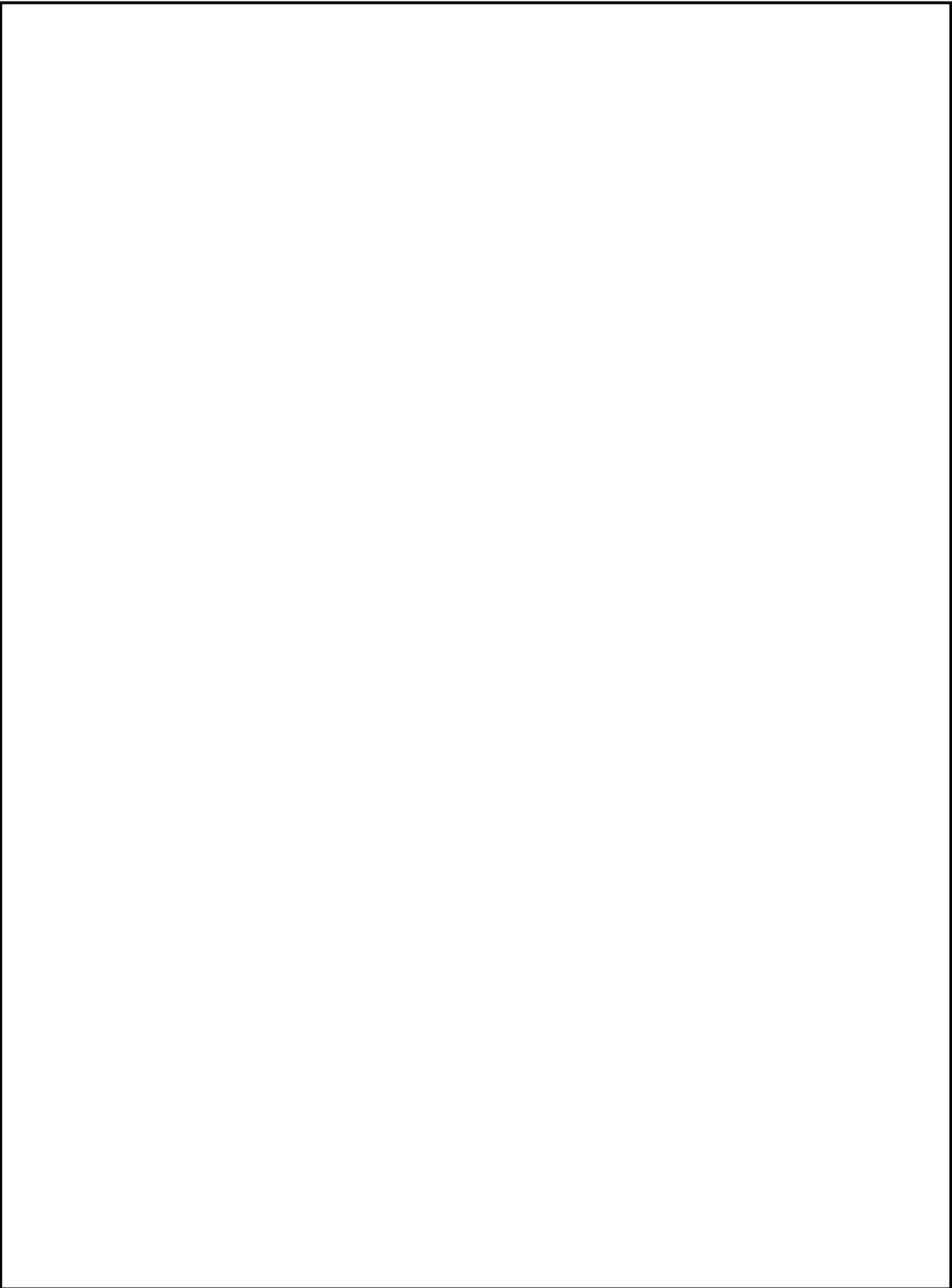
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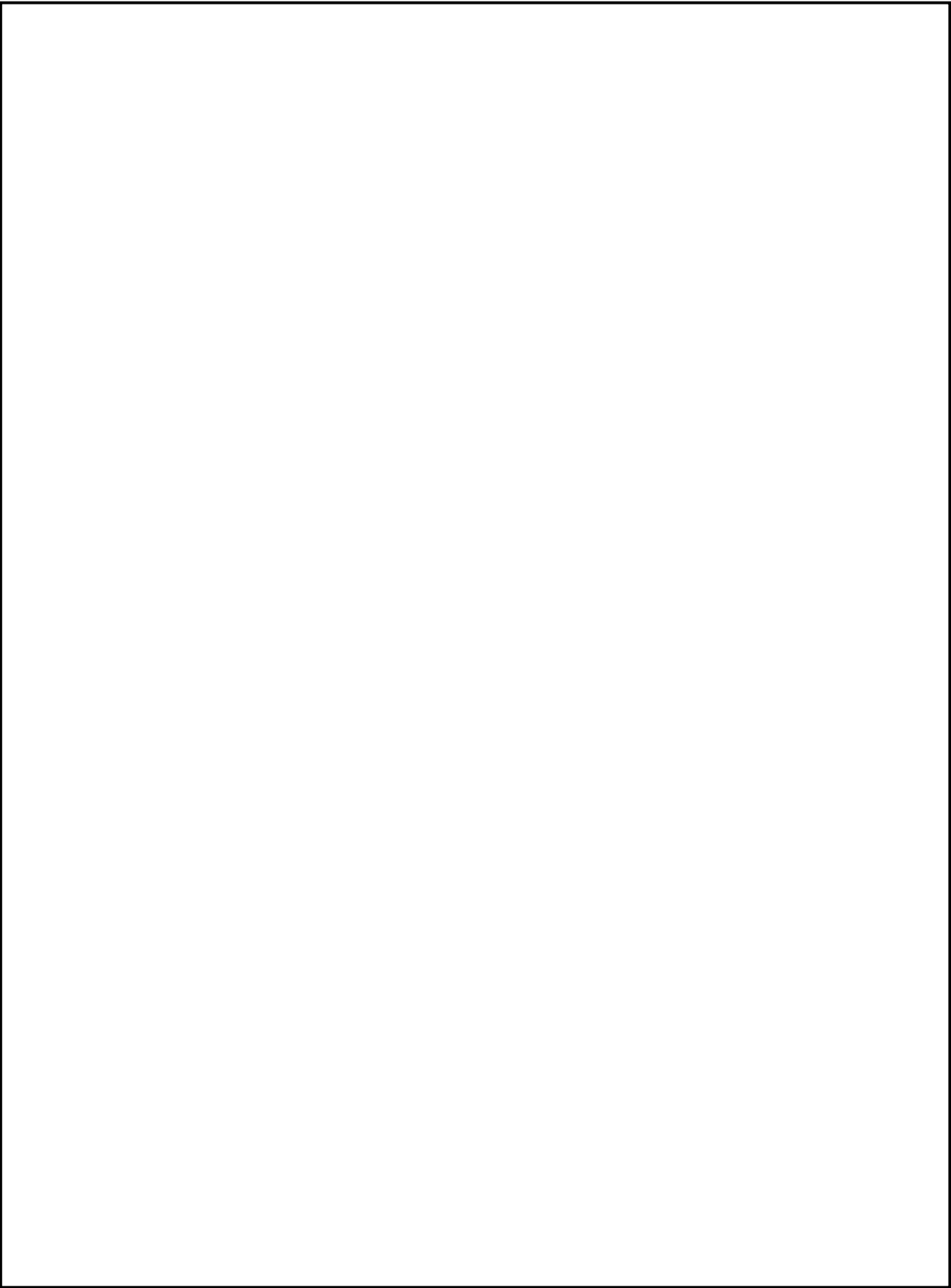
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6.3 Referenced Rules Sections

N/A

6.4 Test Instrumentation Used, Conducted Measurement

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESHS Rohde&Schwarz	879676/014	May 98	12 months
LISN	NSLK 8126 Schwarzbeck	8126160	May 98	12 months
LISN	ESH2-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 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: Bilog 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.

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7.2 Measured Data

The EUT was measured with the Processor Pentium II 450 MHz Processor in video modes 1024 x 768, 1280 x 1024 and 1600 x 1200. The test results below reflect the worst case with:

Part 1: frequency range 30 MHz - 1000 MHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

Judgement: Passed by

Frequency [MHz]	Level* [dB(μ V/m)]	10 Meter Limit [dB(μ V/m)]	Exceeding [dB]	Ant Pol	Height in [m]	Angle in deg
500.19000	26.08	37.000	-10.91921	hor	2.2000	30.000
300.06000	26.35	37.000	-10.65036	ver	1.0000	0.0000
99.99000	22.90	30.000	-7.099297	ver	1.6000	270.00
96.00000	19.54	30.000	-10.45749	ver	2.8000	90.000
83.52000	25.80	30.000	-4.203102	ver	4.0000	300.00

all levels are quasi-peak levels

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Part 2: frequency range 1 GHz - 3 GHz:

100 MHz clock/Intel Pentium II 450 MHz, video resolution 1024 x 768/100 Hz

Judgement: Passed by

Frequency [MHz]	Level* [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Azimuth [deg]	Ant Pol
2086.00000	40.60	53.9	12.1	100.0	210.00	hor
1802.20000	43.40	53.9	10.4	100.0	330.00	ver
1735.60000	40.20	53.9	11.4	100.0	0.00	ver
1594.00000	36.40	53.9	10.0	100.0	330.00	ver
1566.70000	36.20	53.9	17.6	160.0	119.00	ver
1344.70000	37.90	53.9	9.2	160.0	29.00	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

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Frequency range 30 MHz - 1 GHz:
100 MHz clock/Intel Pentium II 450 MHz,
video resolution 1024 x 768/100 Hz

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Frequency range 1 GHz - 3 GHz:
100 MHz clock/Intel Pentium II 450 MHz,
video resolution 1024 x 768/100 Hz

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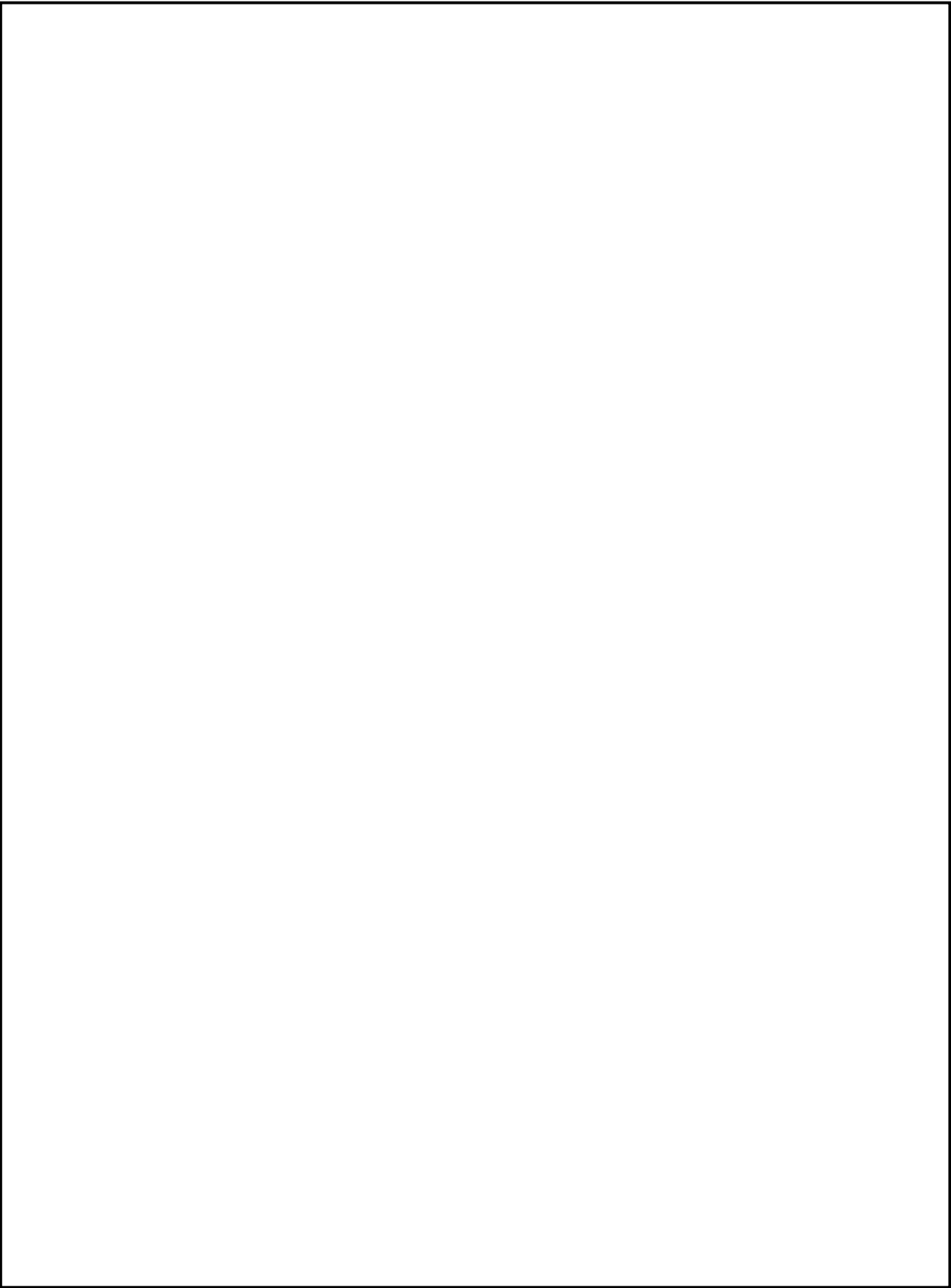
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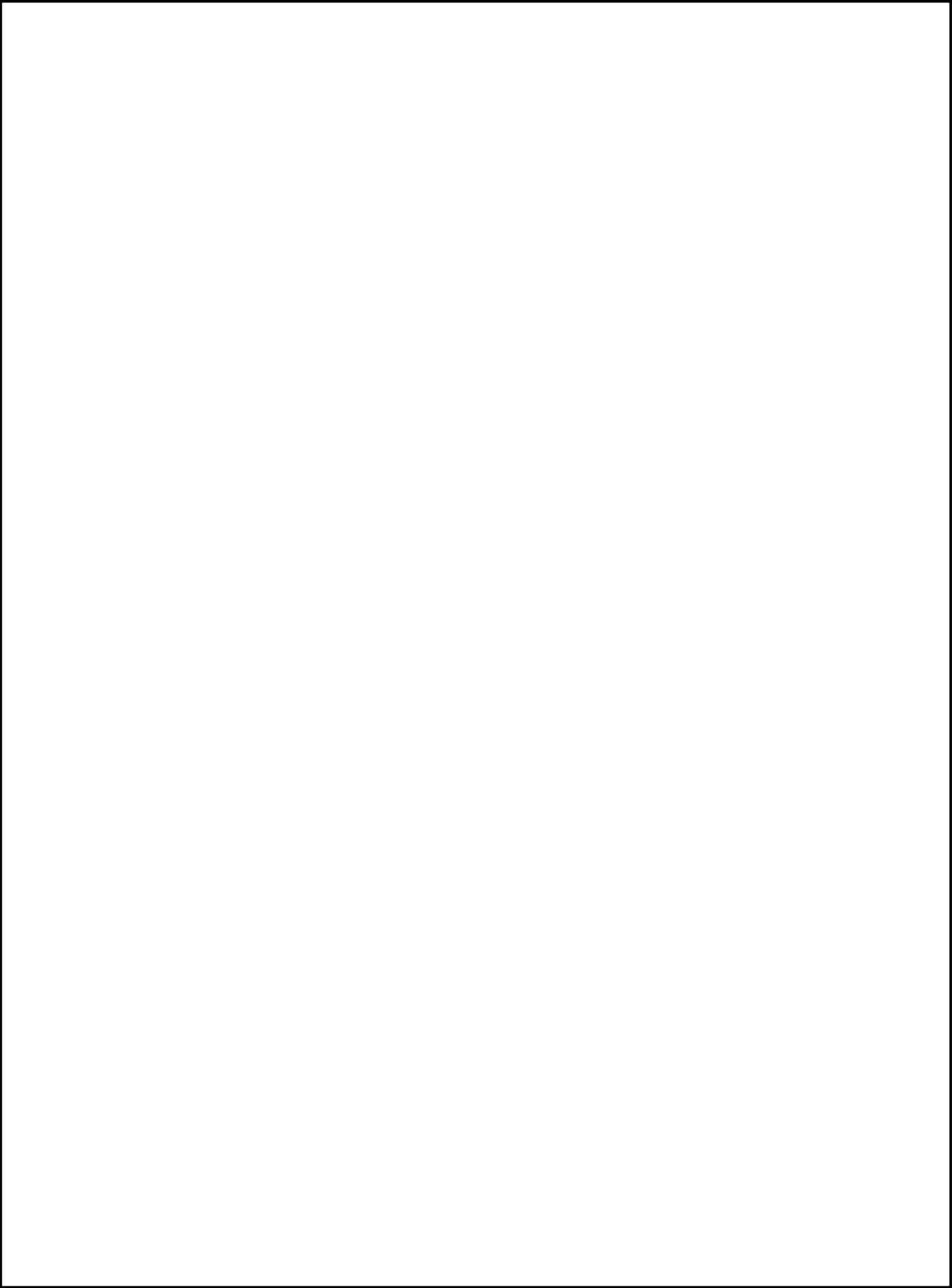
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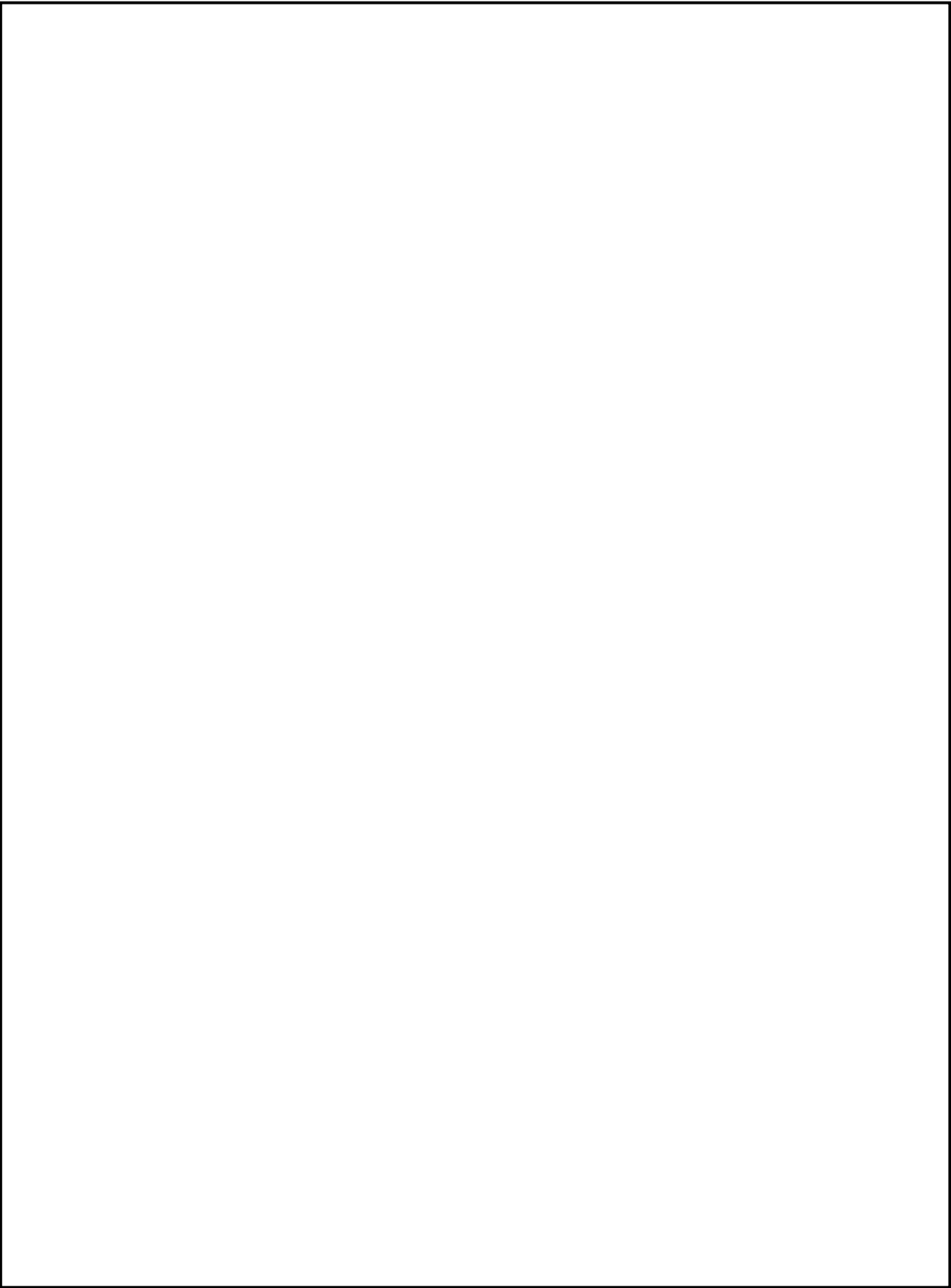
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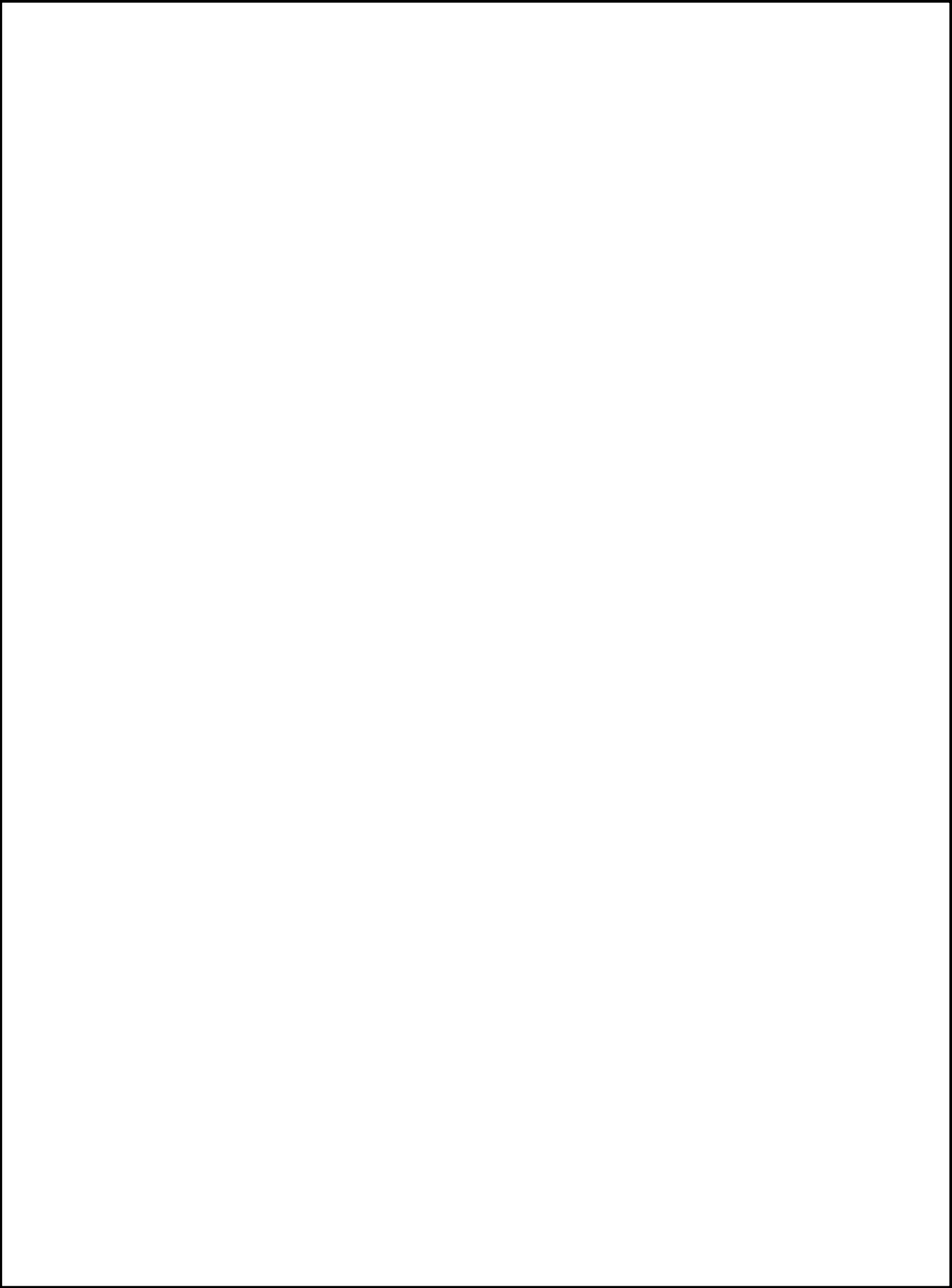
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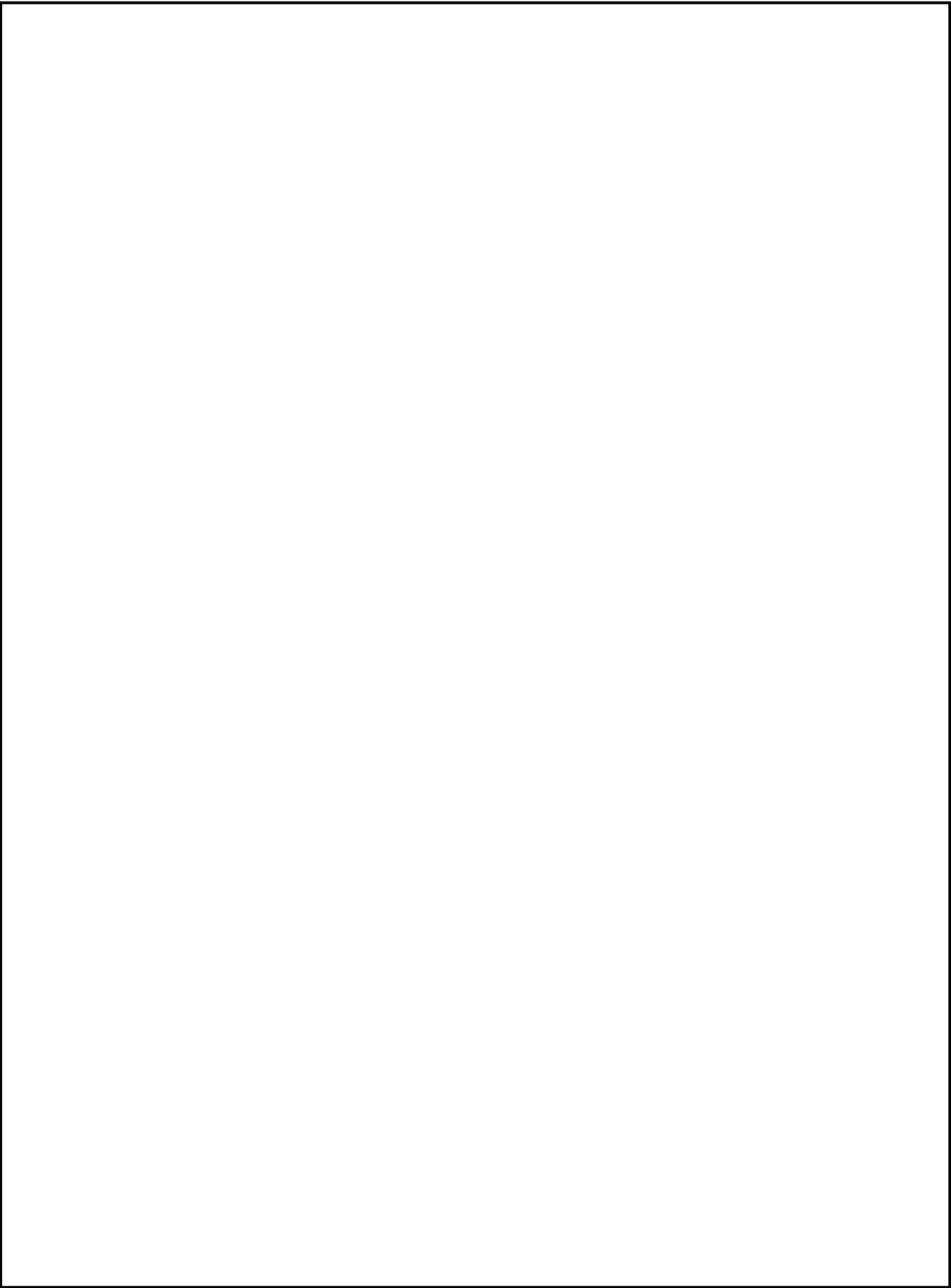
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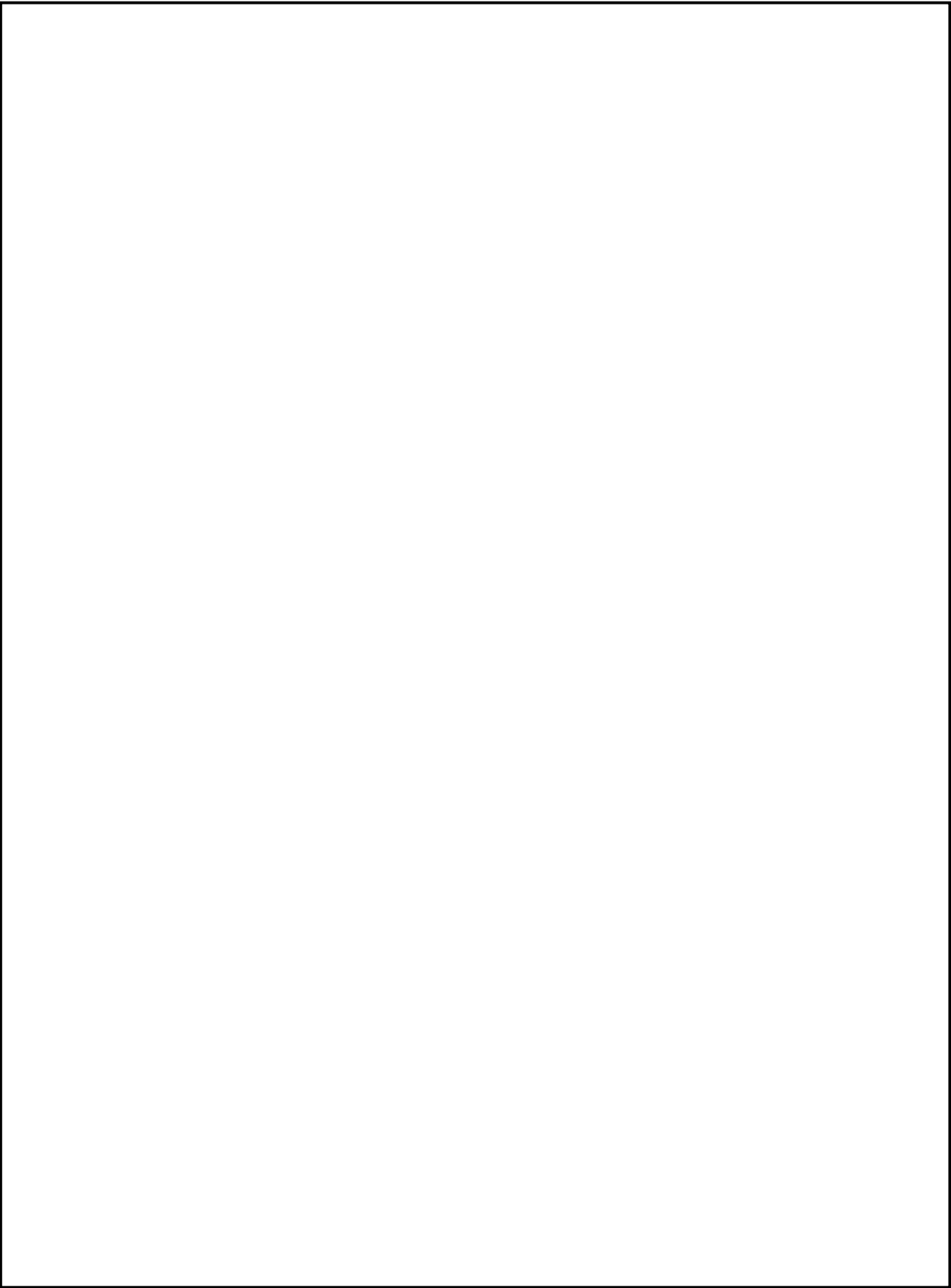
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7.3 Referenced Rules Sections

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	15 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:

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

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

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

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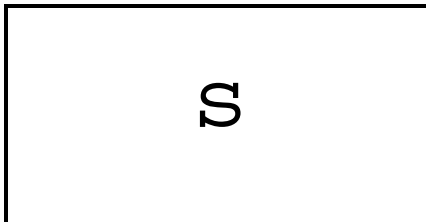
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Frequency range: 1 GHz to 3 GHz

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
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

8 PHOTOS OF TESTED EUT

8.1 Front side of EUT



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8.2 Rear side of EUT

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8.3 Opened case, inside view of EUT

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8.4 System board, front side view, part one

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8.5 System board, front side view, part two



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8.6 System board, rear side view, part one



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8.7 System board, rear side view, part two



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8.8 SDRAM module, front side view

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8.9 SDRAM module, rear side view



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8.10 Additional slot with serial interface

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8.11 Power supply ASTEC, closed case, top side view

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8.12 Power supply ASTEC, opened case, inside view

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8.13 Power supply ASTEC, regulator board, front side view

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8.14 Power supply ASTEC, regulator board, rear side view

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8.15 Primary board, front side view

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8.16 Primary board, rear side view

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Attachment: User Manual

For FCC statement please refer to user manual page 6.

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