

MEASUREMENT / TECHNICAL REPORT

SIEMENS PC SYSTEME GmbH & Co. KG

Model: Personal Computer Scenic DT6

FCC ID: HSSSCENIC6201

Aug. 26, 1999

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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Engineer: _____

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Personal Computer Scenic DT6

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1 GENERAL INFORMATION

1.1 Product Description

The Siemens Computer Scenic DT6 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 Processor Intel Celeron 500 MHz.

With the first model (original grant, date: Feb. 25, 1999) two standard PSU`s (Astec, model AA20650 and Minebea, model SPW 1553) were equipped, now the PSU Minebea, model SPW 1553-1 has been added.

Description of the power supplies:

- Power supplies:

ASTEC, model	AA20650 S26113-E425-V30
Minebea, model	SPW1553 S26113-E425-V20
Minebea, model	SPW1553-1 S26113-E425-V20

Features Overview:

Chip Set

- Vendor: Intel
- Type: 82440BX
PAC 82443BX & PIIX4E 82371EB

Universal serial bus (USB) interface

- Support: 12 Mbits/s
Connector: Two external USB connectors

Serial port interface

- Connector: One external standard and one internal connector

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for chip card reader

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Main memory

- Support: The system needs at least one module and can manage at most two SDRAM modules.
- Size: From 16 Mbytes up to 512 Mbytes SDRAM
- Technology: 100 MHz unbuffered DIMM modules.

LAN - Ethernet controller

- Support: Wake on LAN by interesting packets, link status change and Magic-Packet™
InCom LAN boot and Intel LANdesk Service Agent (LSA)

The personal computer is assembled by Siemens PC Systeme GmbH & Co. KG,
Bürgermeister-Ulrich-Str. 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 620 (DT6)	HSSSCENIC6201	PC EUT	unshielded power cord [292]
2	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]
5	Microsoft Intelli mouse 1.1A	DOC: PN X03-29688	USB mouse	shielded mouse cable [197]
6	Hewlett Packard HP 2225C+ (3019S70991)	DSI6XU2225	Printer, parallel I/F	unshielded AC ca- ble [180], shielded centronics cable [190]

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Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
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]
	<u>Pos 1 contains:</u>			
a ₁	ASTECC (UK), AA20650 SNI: S26113-E425-V30	N/A	Power supply	
a ₂	Minebea SPW1553 SNI: S26113-E425-V20	N/A	Power supply	
a ₃	Minebea SPW1553-1 SNI: S26113-E425-V20	N/A	Power supply	
b	Siemens S26361-D1132-A10 WGS 02	N/A	System board	
c	Hyundai PC100-322-620	N/A	SDRAM	

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
d	Intel PGA 370 Celeron	N/A	Processor 500 MHz	
e	Matrox G100 AGP	DOC: G100A/4/OEM	Graphic controller board	
f	S26361-D960-V1	N/A	Cheap card reader	
g	Fujitsu MPC3064AT	N/A	Hard disk drive	
h	NEC CDR-1900A S26361-H375-V500	CJ6AT98-032	CD-ROM drive	
i	SONY MPF920-C	N/A	Floppy disk drive	

Remark: position 1a₁ / 1a₂ / 1a₃ 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 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 sub-mitted 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

see original grant, date: Feb. 25, 1999

2.2 Location of Label on EUT

see original grant, date: Feb. 25, 1999

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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). During radiated emission the monitor was powered via system unit, during conducted emission also the external monitor supply was tested.

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

66,6 MHz clock: Intel Celeron 500 MHz

The system is provided with three kinds of power supplies:

- ASTEC, AA20650 SNI: S26113-E425-V30
- Minebea, SPW1553 SNI: S26113-E425-V20
- Minebea, SPW1553-1 SNI: S26113-E425-V20

According both worst case results concerning the test report of the original grant (dated: Feb. 25, 1999) the following configuration has been tested:

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

Minebea PSU, model SPW1553-1:

Frequency range 30 MHz - 1 GHz:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz

Frequency range 1 GHz - 5 GHz:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz

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

Minebea PSU, model SPW1553-1:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz
monitor power via system unit

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3.2 Video mode Justification

The system was tested in video graphic modes 1024 x 768. The worst case combination according the test results of the original grant (date: Feb. 25, 1999) have been tested the configuration is:

The following data are applicable:

radiated emission:

Minebea PSU, model SPW1553-1:

Frequency range 30 MHz - 1 GHz:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz

Frequency range 1 GHz - 5 GHz:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz

conducted emission:

Minebea PSU, model SPW1553-1:

66,6 MHz clock / Celeron 500 MHz, video resolution 1024 x 768/100 Hz
monitor power via system unit

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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)
- 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
- LAN / Ethernet data communication

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.

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3.5 Equipment Modifications

To achieve compliance to Class B levels, the following modifications were made during compliance testing:

no modifications

Applicant Signature _____ Date _____

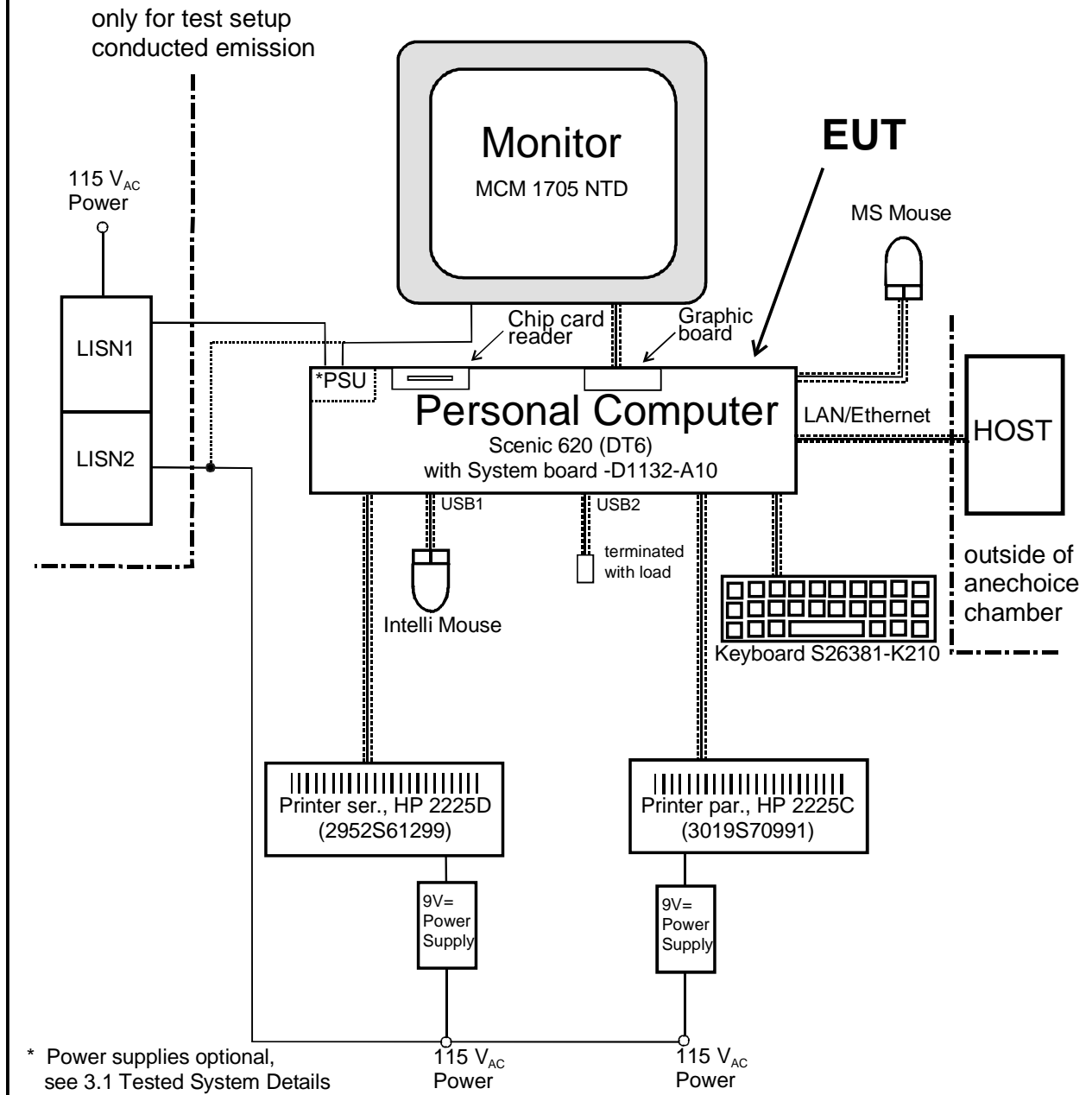
Typed/Printed Name _____ Position _____

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 of Tested System



* Power supplies optional, see 3.1 Tested System Details

4 BLOCK DIAGRAM OF EUT

see fig 4.1 page 19

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, Parallel Port, LAN and USB)

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

The personal computer works exactly like a traditional P.C..

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4.2 Clockfrequencies of EUT

Clock synthesizer	14,318 MHz
Front side bus	66,6 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	14,3 MHz
USB	48 MHz
AGP bus	66,6 MHz

4.3 Theory of Operation

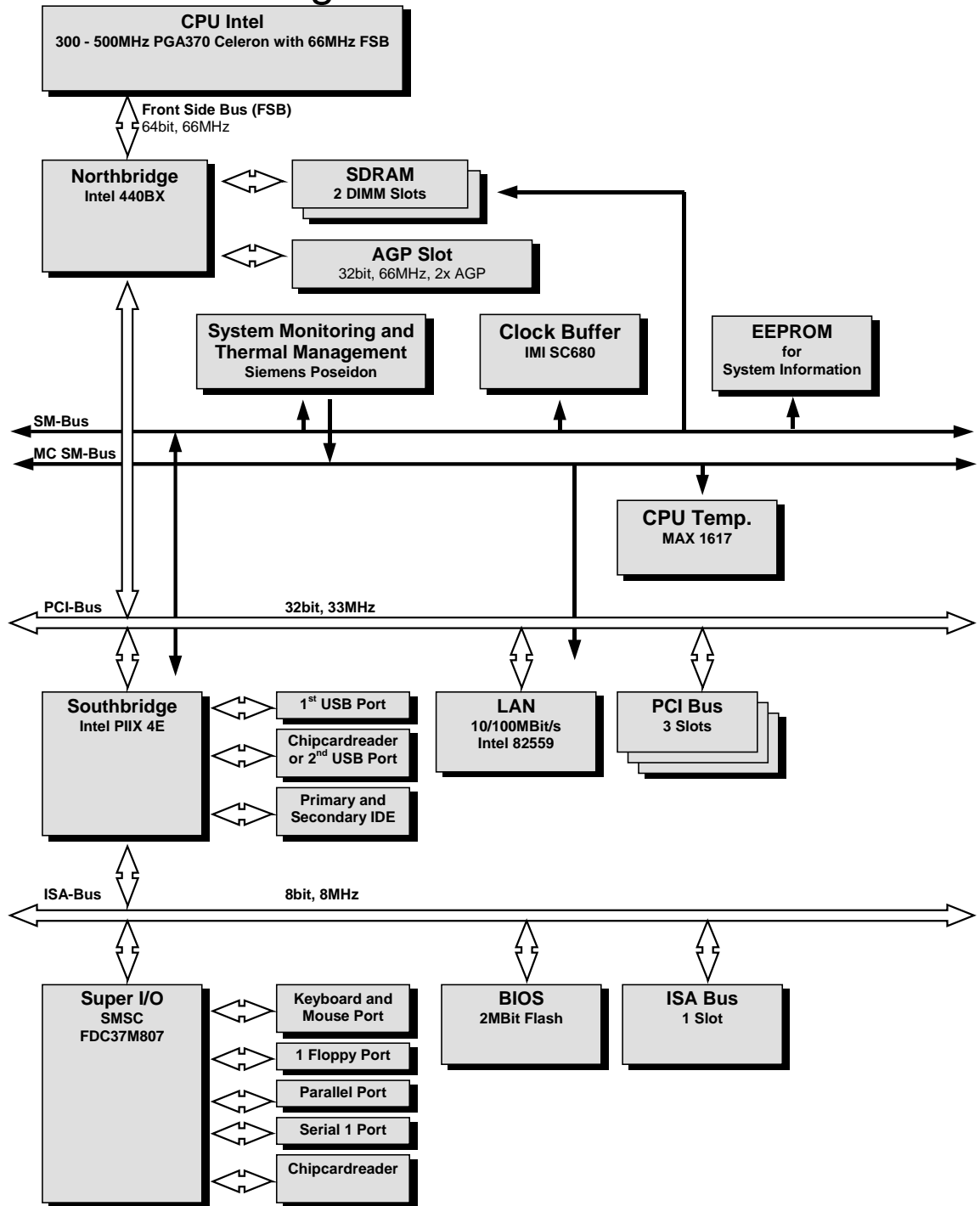
The compact desktop PC works exactly as a traditional PC.

The processors run internally between 300 and 500 MHz, the system clock is 66,6 MHz and is multiplied by the processors internally by 4,5, 5,0, 5,5 6,0, 6,5 or 7,5 (only with 66,6 MHz clock).

The highest possible frequencies and the corresponding processors are:

System clock	Processor	factor
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
66,6 MHz	433 MHz	6,5
66,6 MHz	500 MHz	7,5

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). 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 both, via the system unit or separately.

The worst case results of the measurement is given next:

Minebea PSU, model SPW1553-1

video resolution 1024 x 768/100 Hz, monitor power via system unit

Judgement: Passed by

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
neutral	0,228	46,0	QP	62,5
neutral	0,726	40,4	QP	56,0
neutral	0,828	40,6	QP	56,0

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Judgement: Passed by

	Frequency [MHz]	Measured [dB(μV)]	Kind of value	Limit [dB(μV)]
neutral	0,228	44,0	AV	52,5
neutral	0,516	37,5	AV	46,0
neutral	0,624	37,1	AV	46,0
neutral	0,726	38,1	AV	46,0
phase	0,828	38,4	AV	46,0
phase	0,936	37,6	AV	46,0
neutral	1,038	36,4	AV	46,0

AV: average

QP: quasi peak

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Bosse

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Measurement Protocols: see attached file

Minebea PSU, model SPW1553-1:
66,6 MHz clock / Intel Celeron 500 MHz
video resolution 1024 x 768/100 Hz

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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

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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 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.

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6.2 Measured Data

The EUT was measured with the Processor Intel Celeron 500 MHz in video mode 1024 x 768. The test results below reflect the worst case with:

Minebea PSU, model SPW1553-1:
66,6 MHz clock / Intel Celeron 500 MHz,
video resolution 1024 x 768/100 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
96.69000	23.10	30.000	-6.9	ver	1.600	239.000
145.02000	22.00	30.000	-8.0	ver	1.000	180.000
178.02000	19.10	30.000	-10.9	hor	4.000	29.000
336.03000	25.80	37.000	-11.2	hor	2.200	59.000
539.28000	25.90	37.000	-11.1	ver	2.200	180.000
897.54000	30.70	37.000	-6.3	ver	3.400	210.000

all levels are quasi-peak levels

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
1068.40000	30.00	53.9	23.9		180.0	0.00	hor
1267.00000	29.00	53.9	24.9		100.0	29.00	ver

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Frequency [MHz]	Level* [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1311.10000	30.20	53.9	23.7		100.0	29.00	ver
1489.90000	30.40	53.9	23.5		180.0	0.00	hor
4005.10000	30.90	53.9	23.0		100.0	29.00	hor
4966.60000	33.10	53.9	20.8		140.0	0.00	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: M. Heuser

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: H. Zenkner

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Measurement Protocols: see attached files

Minebea PSU, model SPW1553-1:

Frequency range 30 MHz - 1 GHz:

66,6 MHz clock / Intel Celeron 500 MHz

video resolution 1024 x 768/100 Hz

Frequency range 1 GHz - 5 GHz:

66,6 MHz clock / Intel Celeron 500 MHz

video resolution 1024 x 768/100 Hz

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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	May 98	15 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	May 98	15 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:

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

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

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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

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

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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

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8 External Photos of EUT

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9 Internal Photos of EUT: see attached files

9.1 Power supply Minebea (SPW1553-1), closed case, top side view

9.2 Power supply Minebea (SPW1553-1), opened case, inside view

9.3 Power supply Minebea (SPW1553-1), rear side view

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10 User Manual

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