Kontron Embedded Modules GmbH
Brunnwiesenstr. 16
94469 Deggendorf - Germany
Tel.: +49 (0)991 37024-0
Fax.: +49 (0)991 37024-102
www.kontron.com

New Product Release

Orderer:	**Chris Spoon**
Manufacturer:	**INSIDE Technology**
Article Name:	**886LCD/ATX** **886LCD/ATXU**
Article Number:	**710010** **710020**
Lot Number:	**n. a.**
Sample Serial Number:	**0016A6, 001773** **2114**
PCB Rev:	**1.0**
BIOS Rev:	**6.00PG**

Kontron Embedded Modules internal testprocedure file:
F:\data\mqa\public\8ATX\8ATXHP10.doc

Responsible Test Engineer **Date: 10.02.2003**

Dallmeier Christian
Service Center Approval

1 Table of Content

2 General Informations

Copyright by Kontron Embedded Modules GmbH.

In this document Kontron Embedded Modules GmbH will also be referred to by the short form "Kontron".

The information in this document has been carefully checked and is believed to be accurate and reliable. However, no responsibility is assumed for inaccuracies. Furthermore, Kontron reserves the right to make changes to any portion of this specification to improve reliability, function or design. Kontron does not assume any liability for any product or circuit described herein.

2.1 Trademarks

AT and IBM are trademarks of International Business Machines
XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corporation.
Microsoft, Windows98 and Windows 2000 are registered trademarks of Microsoft Corporation.
Intel is a registered trademark of Intel Corporation.
All other products and trademarks mentioned in this manual are trademarks of their respective owners.

2.2 General

For the circuits, descriptions and tables indicated no responsibility is assumed as far as patents or other rights of third parties are concerned.
The information in this test report is confidential and may not be provided to anyone, except there is a expressed written authority by Kontron
The reproduction, transmission or use of this document or its contents is not permitted without expressed written authority.
Offenders will be liable for damages. All rights created by patent grant or registration of a utility model or design, are reserved.
(C) Kontron Embedded Modules GmbH 2002

3 Devices under Test

Box	form factor	CPU	Memory Module
#1	Full ATX	INTEL P4 2,4 GHz	TwinMOS 256MB DDR
#2	Ful ATX	INTEL P4 2,4 GHz	TwinMOS 256MB DDR
#3	Micro ATX	INTEL P4 2,4 GHz	APACER 512MB DDR

Back to Index

4 Temperature Margin Test

4.1 Used Hard- and Software

Hardware	Register
DUT#1	Box #3
DUT#2	Box #1
HDD IDE	EA0251
Keyboard	EA0111
Monitor	EA0249
Climatic Chamber	EA0022
Measuring Device	EA0157
Power Supply ATX	EA0235
microServer	
Active Loudspeaker	EA0175

Software
MS DOS 6.22
Windows 98
Amidiag 5.42

4.2 General Conditions

Time cycle from Power On to Power Off min. 3 minutes
Time cycle from Power Off to Power On min 1 minute

Test Preparation	• Connect LAN Interfaces of DUT to microSERVER • COM1-, COM2-, LPT1-Port Test with external loopback connectors. • Configure Batch Programs: **Win98.** Device under Test has to execute various tests of graphics, network, sound in Win98 **Amidiag.** Device under Test has to execute various tests of lpt, com, floppy, keyboard, mouse and usb controllers.
Test Flow	Between Power On and Power Off the controllers for graphics, network, sound, lpt, com, floppy, keyboard, mouse and usb are tested with appropriate test routines.

4.3 Temperature Profile

Step	Temp. [°C]	Time [min]	Remarks
1	55	15	Temp const 15 Min, boot
2	55		Run 25 Cycles WIN98
3	55		Run 25 Cycles AMIDIAG
4	40	30	Temp. Change 30 min.
5	40	15	Temp const 15 Min, boot
6	40		Run 25 Cycles WIN98
7	40		Run 25 Cycles AMIDIAG
8	20	30	Temp. Change
9	20	15	Temp const 15 Min, boot
10	20		Run 25 Cycles WIN98
11	20		Run 25 Cycles AMIDIAG
12	0	30	Temp. Change
13	0	15	Temp const 15 Min, boot
14	0		Run 25 Cycles WIN98
15	0		Run 25 Cycles AMIDIAG
16	-10	30	Temp. Change
17	-10	15	Temp const 15 Min, boot
18	-10		Run 25 Cycles WIN98

19	-10		Run 25 Cycles AMIDIAG
20	-20	30	Temp. Change
21	-20	15	Temp const 15 Min, boot
22	-20		Run 25 Cycles WIN98
23	-20		Run 25 Cycles AMIDIAG

Result:

X	**Test passed successfully** **Remark: Board of BOX3 shows boot problems when temperatures reach 0°C and below. See summary for further details.**	
	Test skipped because	
	Test failed because	

4.4 Supply Voltage Ripples

4.4.1 DC-DC Converter Overload

- Maximum Power Supply Current (CPU-Core): **65,4 A @ 3,06 Ghz**

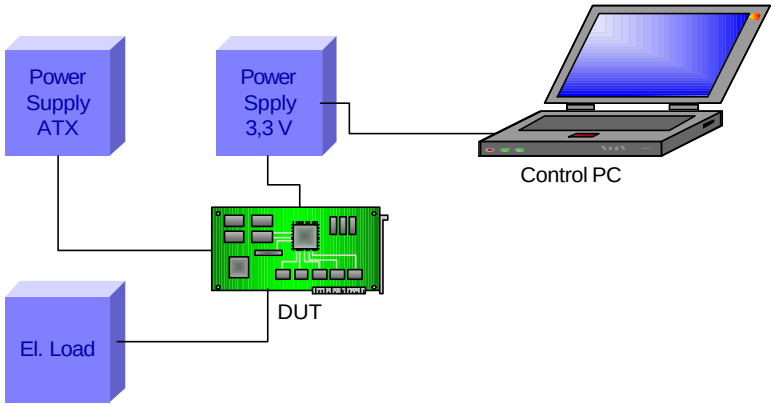
- from datasheet: **Intel ® Pentium ® 4 Processor with 512-KB L2 Cache on 0.13 Micron Process at 2 GHz – 3.06 GHz, with Support for Hyper-Threading Technology at 3.06 GHz Document Number: 298643-007**

- Minimum Power Reserve: 20% = **13,08 A @ 3,06 Ghz**

During the Tests Power On (Slow + Fast Ramp) and Power Supply Ripples a Electronic Load drawing the Minimum Power Reserve Current is connected between VCORE and GND. The Electronic Load is connected at Pin1 and 2 of capacitors **EC14 and EC21**

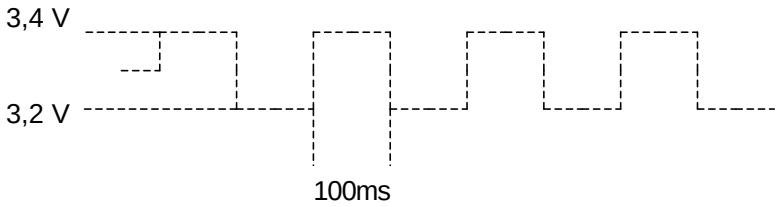
4.4.2 Test preparation

4.4.2.1 Ripples on 3,3 V

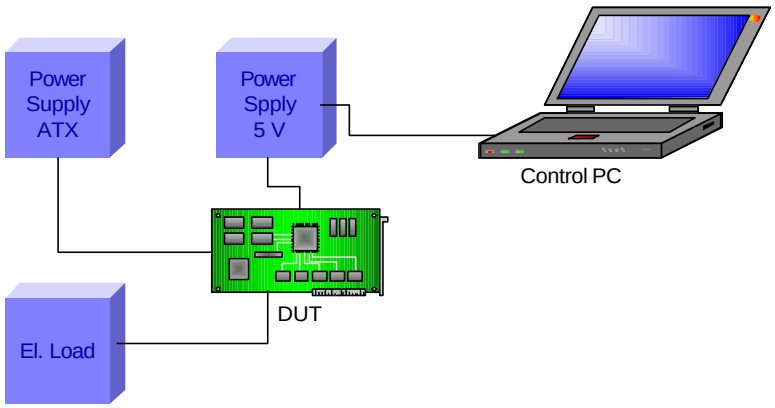


Back to Index

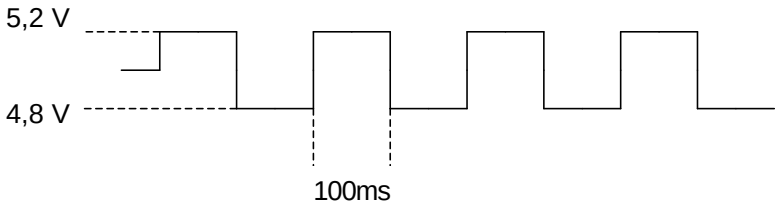
4.4.2.2 Test Flow

Preparation	Build up assembly to supply the DUT via the programable HP Power Supply E3632A with Electronic Load attached. ATX Power supplies 5V, 12V and Power Managment Signals, HP Power supplies 3,3V	
Flow	▸ Running rippfix.exe on the control pc will create the following output on the + output of the power supply:  ▸ Boot Win98 100 times.	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

4.4.2.3 Ripples on 5 V

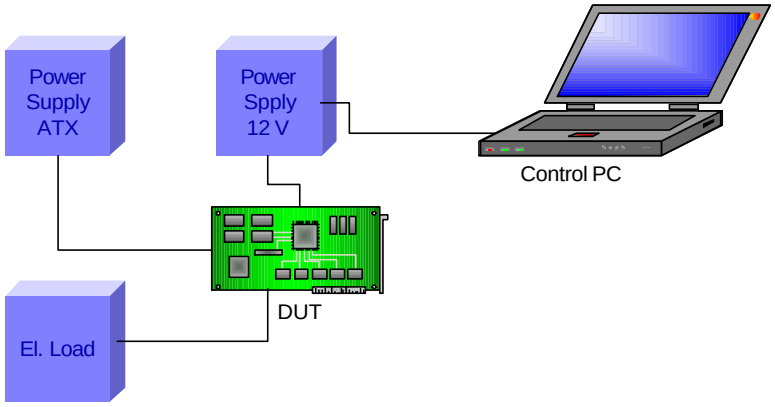


4.4.2.4 Test Flow

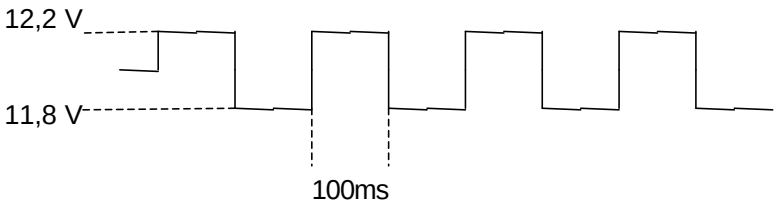
Preparation	Build up assembly to supply the DUT via the programable HP Power Supply E3632A with Electronic Load attached. ATX Power supplies 3,3V, 12V and Power Managment Signals, HP Power supplies 5V	
Flow	▸ Running rippfix.exe on the control pc will create the following output on the + output of the power supply:  ▸ Boot Win98 100 times.	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

4.4.2.5 Ripples on 12 V (CPU Supply Voltage)



4.4.2.6 Test Flow

Preparation	Build up assembly to supply the DUT via the programable HP Power Supply E3632A with Electronic Load attached. ATX Power supplies 3,3V, 5V and Power Managment Signals, HP Power supplies 12V	
Flow	▸ Running rippfix.exe on the control pc will create the following output on the + output of the power supply:  ▸ Boot Win98 100 times.	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

5 Power On Test

5.1 Used Hard- and Software

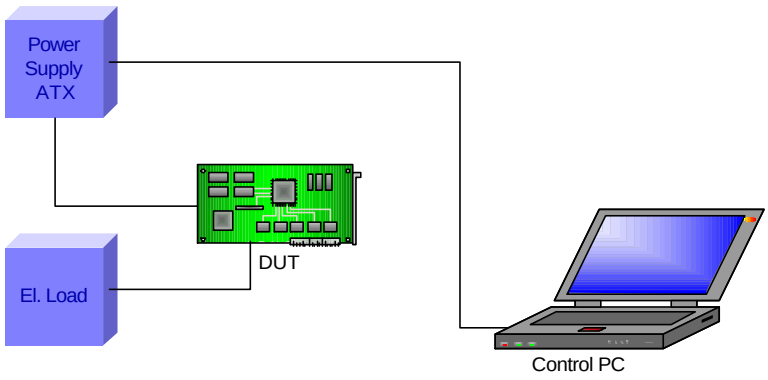
Hardware	Register
DUT	Box3
Monitor	EA0296
Keyboard	EA0254
ChipDisk	EA0120
El. Load	Höcherl & Hackl
Power Supply AT	EA0045
Oscilloscope	LeCroy

Software
MS-DOS 6.22
Kontron HP.EXE
Kontron counter.exe

5.2 General Conditions

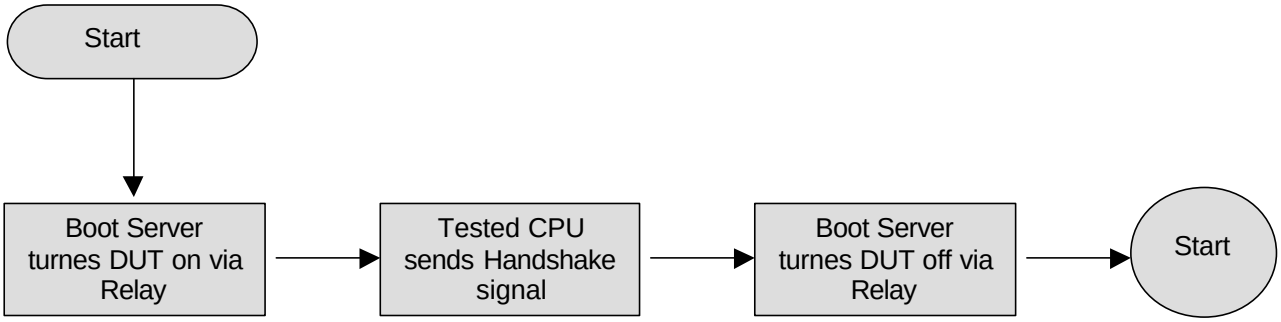
- 20% DCDC-Converter Overload as described above
- Ambient Temperature: 25°C
- CPU: Intel P4 2,4 Ghz/533 MHz
- Memory: 512 MB DDR
- Set BIOS Default Settings

5.2.1 Test preparation



Back to Index

5.3 Test Flow: 0V to 5 V (Fast Ramp)

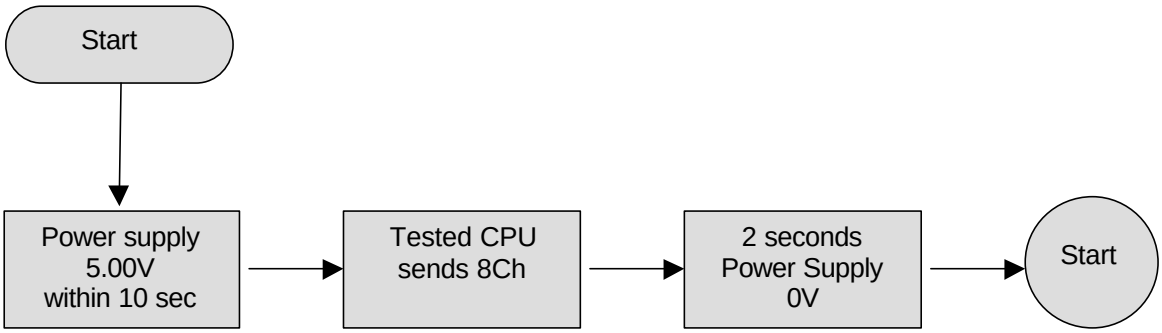


Number of cycles: **>500**
Result:

X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

5.4 Test Flow: 0V to 5 V (Slow Ramp)

Applying power with $\Delta U/\Delta t = 0.5\ V/s$



Number of cycles:
Result:

	Test passed successfully	
X	**Test skipped because**	**Not applicable (ATX Power On Behaviour)**
	Test failed because	

5.5 DC-DC Converter Quality

Preparation	▸ Build up Test assembly shown in 4.2.1 ▸ Dut has to be started with Power Button to generate a Fast Ramp ▸ Build up assembly of display test with simultan output to maximize load ▸ Prepare Measurement Points as described below ▸ Load Oscilloscope panels to execute dc-dc measurements	
Flow	VCC_{CORE} Fast Ramp	▸ Press Power Button to start DUT ▸ Measure V_{12V} (DC-DC Converter input) and Vcore
	FFT VCC_{CORE}	▸ Measure FFT of Vcore
Result	VCCCORE Fast Ramp FFT VCCCORE	See screendumps below

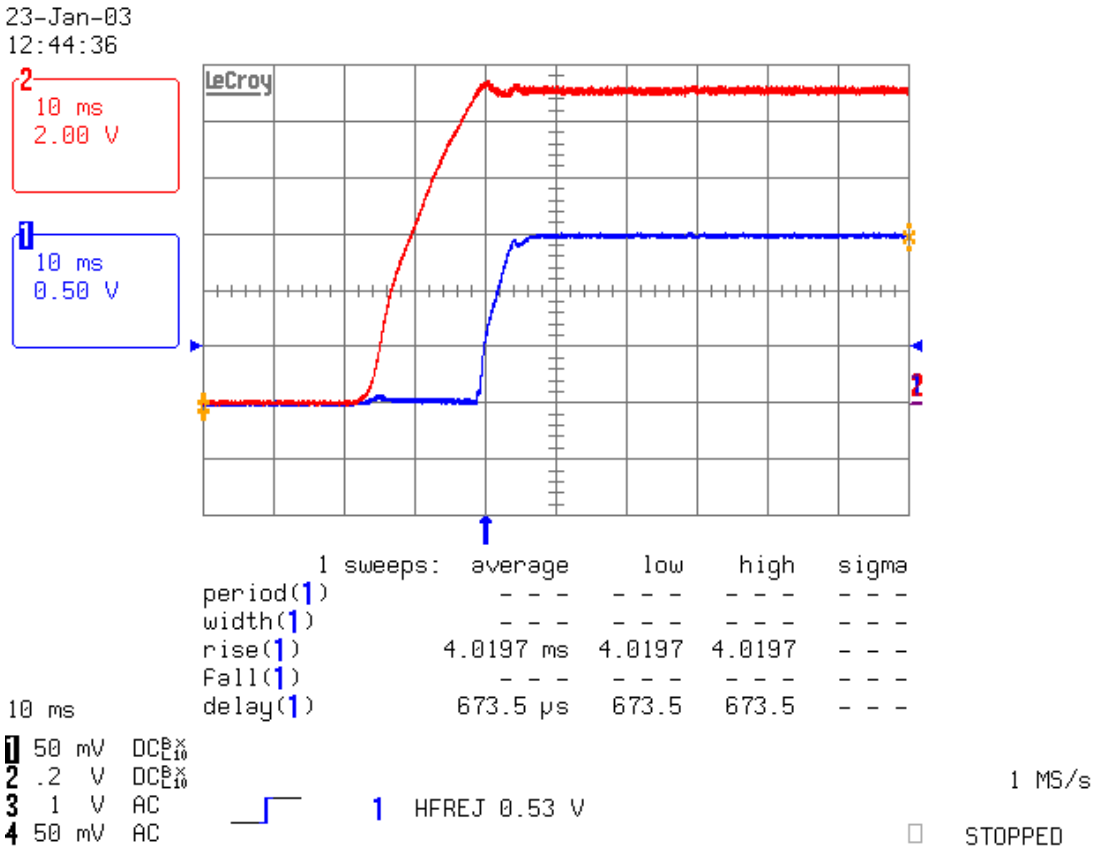
Back to Index

5.5.1 Measurement Points

To get most accurate results of the properties on the V_{CORE} – Plane and V_{3V}-Plane respectively a capacitor between V_{CORE} and GND is removed and the probe of the scope is attached to these free pads. The capacitor to remove should be as near as possible at the CPU and at the greatest 3.3V consumer (e.g. graphics controller) respectively. The removed capacitor is soldered on back of any near capacitor between V_{CORE} and GND.
Measurment point VCORE : Pin **1 of EC26**

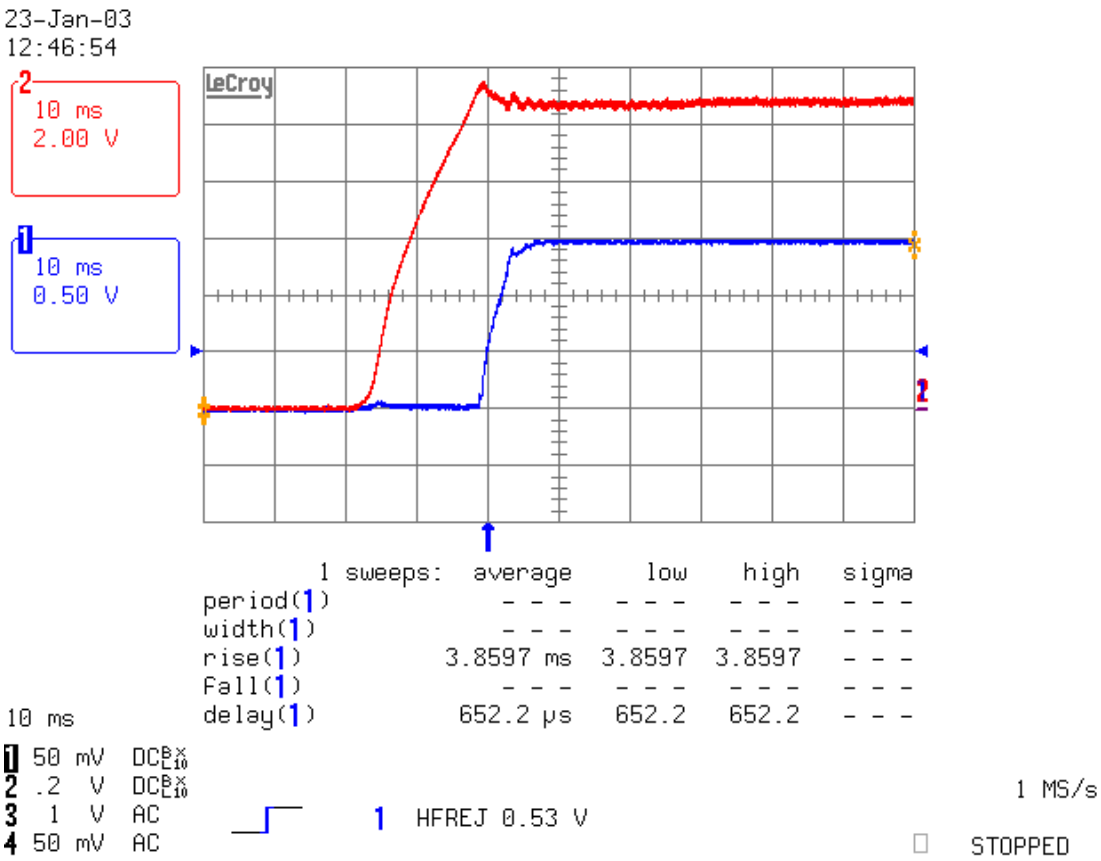
5.5.2 VCC_{CORE}

5.5.2.1 Fast Ramp without el. Load

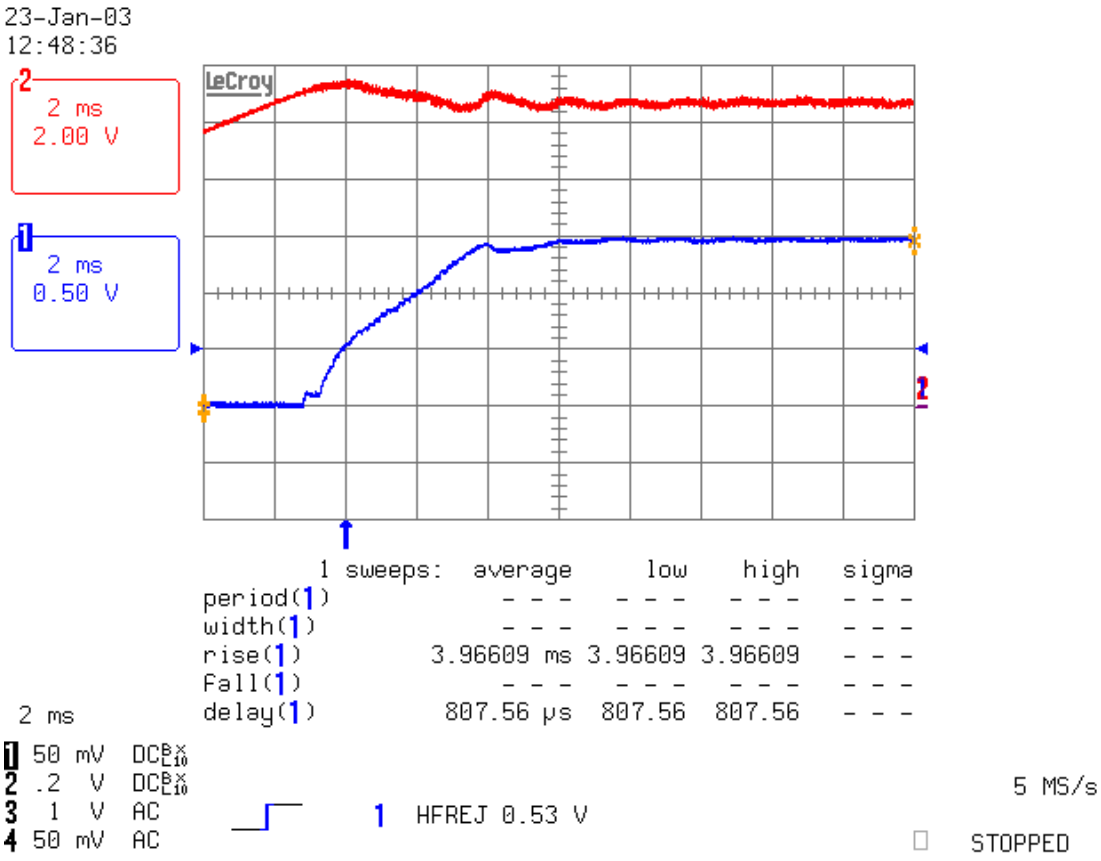


Back to Index

5.5.2.2 Fast Ramp with el. Load attached



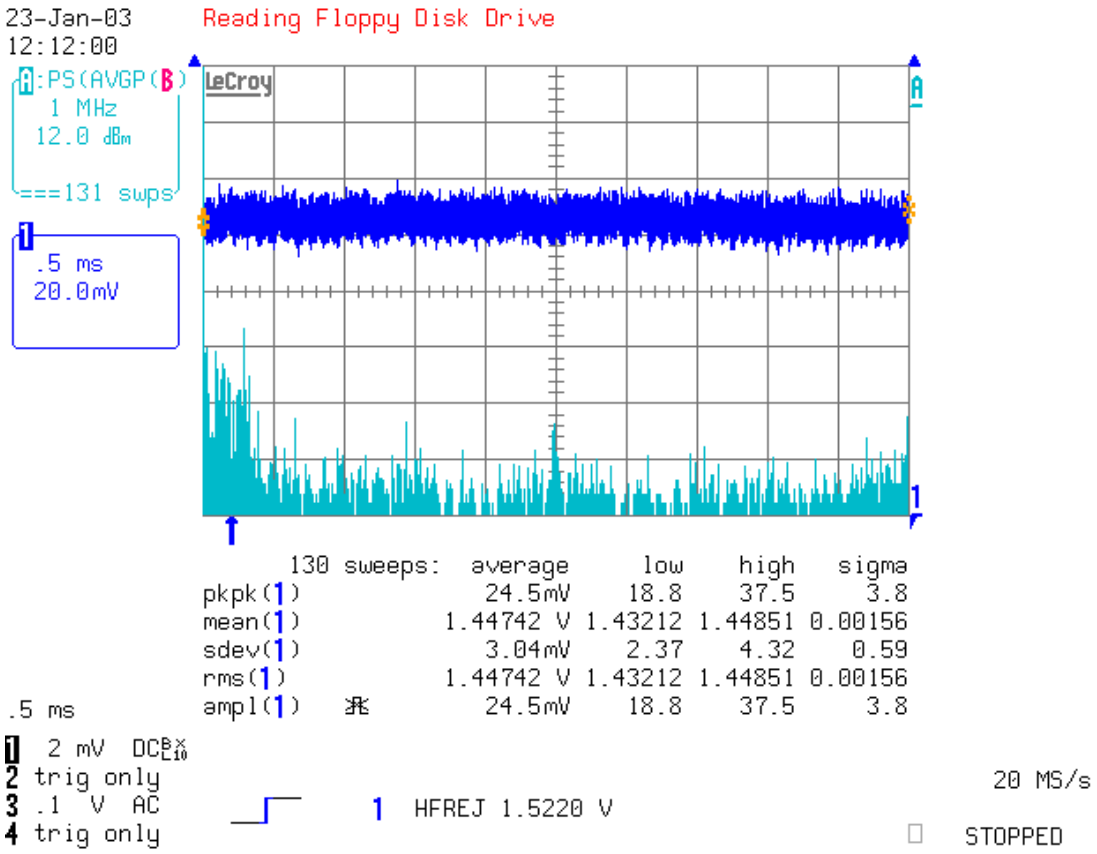
5.5.2.3 Fast Ramp with el. Load attached (Timebase expanded)



Back to Index

5.5.3 FFT

5.5.3.1 VCC_{Core}



5.6 DC-DC Converter Loop Compensation

5.6.1 3.3V

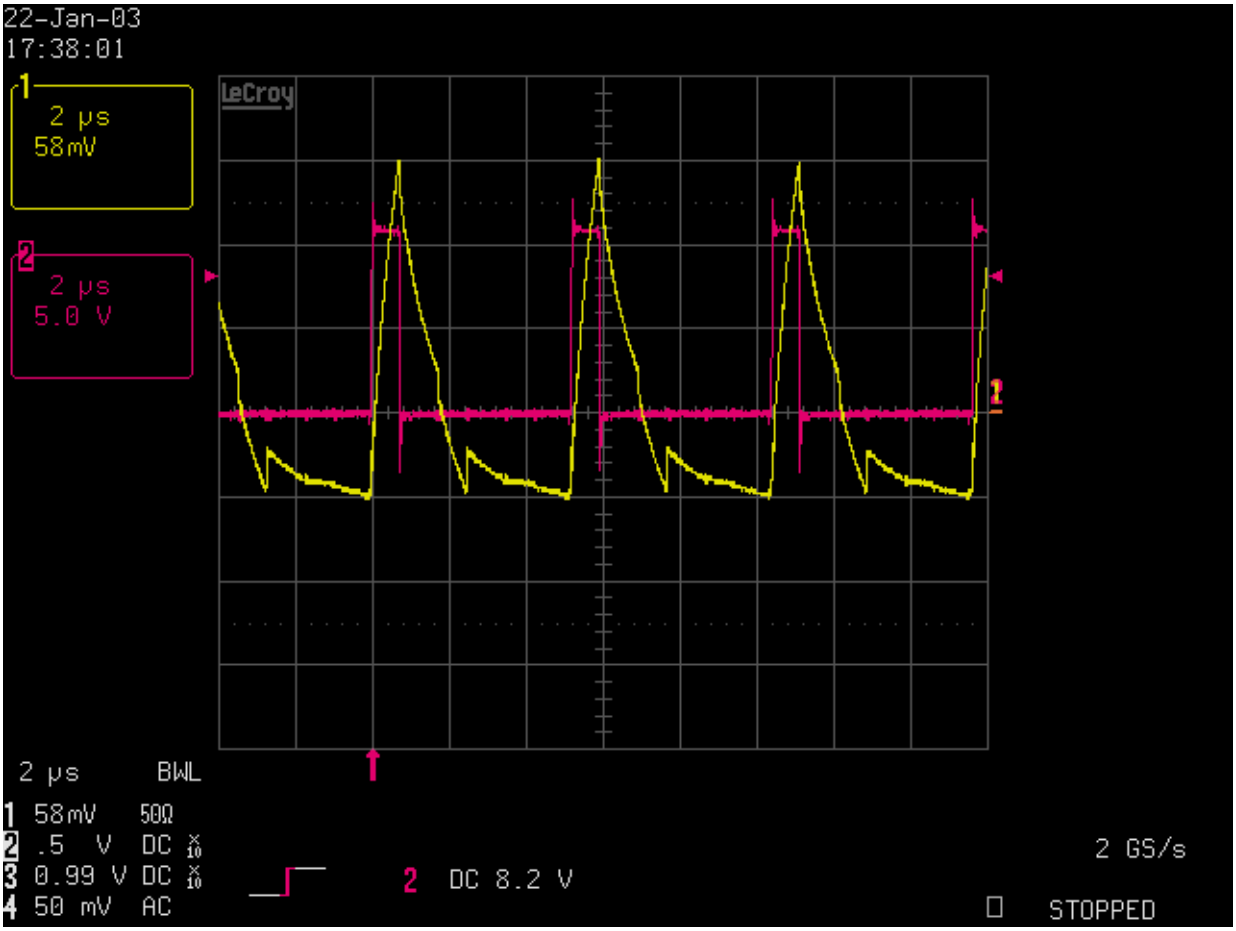
Preparation	▸ Disconnect Electronic Load ▸ Build up assembly of display test with simultan output to maximize load ▸ Unpick trace section between switching regulator and coil. ▸ Insert current measurement coil	
Flow	▸ Boot Win 2k and play starwars.mpg ▸ Measure Current through coil ▸ Measure Voltage of regulator output gates ▸ Insert scope screendump into test report	
Result		**Test passed successfully**
		Test failed because
	X	**Test skipped because 3.3 V are generated by ATX Power Supply**

5.6.2 V_{CORE}

Preparation	▸ Disconnect Electronic Load ▸ Unpick trace section between switching regulator and coil. ▸ Insert current measurement coil	
Flow	▸ Boot Win 2k and run cpustress.exe ▸ Measure Current through coil ▸ Measure Voltage of regulator output gates ▸ Insert scope screendump into test report	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

Screenshot



5.7 DC-DC Converter Stress Test

Preparation	▸ Disconnect Electronic Load	
Flow	▸ Boot Win2k ▸ Set board into standby mode ▸ Awake board via kbd hit ▸ Conduct 500 standby/awake cycles	
Result		**Test passed successfully**
		Test failed because
	X	**Test skipped because test software is not compatible.**

Back to Index

6 Function Test

6.1 Used Hard- and Software

Hardware	Register
DUT	BOX1
HDD IDE	EA0211
FDD	EA0278
Mouse PS/2	EA0202
Monitor	EA0221
Keyboard	EA0222
ChipDisk	EA0120

Software
Microsoft MS-DOS 6.22
Microsoft Windows 98
CHECK IT 4
AMIDIAG 5.42
Additional driver software depending on used controllers

6.2 Remark

For further function tests see Doc. **886LCD-ATXU_Testreport**.

6.3 Properties of Used Connectors

- Loopback COM: 3m ribbon cable with 2200pF between Transmit Data line and GND line
- Loopback LPT: 5m ribbon cable with loopback

6.4 Diagnosis Programs

6.4.1 CMOS Settings

Feature	**Setting**
Set Optimized Settings.	

6.4.2 Check It 4

Test Flow	Run 3 cycles of ▸ „Systemplatinen“ Test ▸ COM1-, COM2-, LPT1-Port Test with external loopback connectors.	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

6.4.3 AMIDIAG

Test Flow	Run 3 cycles of ▸ All tests in the System tab (Processor, DMA Controller, Interrupt Controller, Timer, RTC, CMOS Validity, PCI(if applicable), Plug-n-play(if applicable), MMX(if applicable)) ▸ PC speaker Test ▸ COM1-, COM2-, LPT1-Port Test with external loopback connectors.	
Result	**X**	**Test passed successfully** Remark: *RTC Periodic Interrupt not coming.* This is a known behaviour of the Test software with comparatively fast processors and not seen as a problem.
		Test failed because
		Test skipped because

6.5 Filetransfer over COM

Test Preparation	Connect Dut and Approval Server via Zero Modem cable
Test Flow	▸ Start Windows Hyperterminal on DUT and Approval Server with settings 115,2k;8;1;no parity ▸ Transmit Test.txt (1MB) from and to Approval Server and note needed time ▸ Repeat Test with COM1-, COM2-Port

Port	Size of Testfile / Time in sec (from Approval Server)	Size of Testfile / Time in sec (to EVAL-Server)
COM1	**1024KB / 91sec**	**1024KB / 91sec**
COM2	**1024KB / 91sec**	**1024KB / 91sec**

X	**Test passed successfully**	
	Test skipped because	

6.6 FDD Test

Test Flow	▸ Boot MS-DOS 6.22 ▸ Run CheckIt Floppy Test ▸ Format Floppy disk with option /s ▸ Boot from Floppy Disk Drive	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

6.7 Network EEPROM Test

- Verify that MAC adress is correctly programmed
- Assure that the MAC adress matches the various company codes as in the following list, where x is a hexadecimal digit:
  - Kontron Embbedded: E04Bxxxxxx
  - Adastra : 200Cxxxxxx
  - Inside Technologies: E0F4xxxxxx
  - Kontron Elektronik: 0060xxxxxx
  - Pep: 8082xxxxxx

Result:

Read out MAC Adress		**00-09-1E-00-16-A6**
X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

Back to Index

7 Bios Features Test

7.1 ACPI Power Saving Modes

Test Preparation	Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Test Flow		
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

7.2 USB Legacy/ Boot Support

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	**X**	**Test passed successfully** **Remark: No Legacy Boot Support**
		Test failed because
		Test skipped because

7.3 Wake on LAN

Test Flow	Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

7.4 BIOS Power Saving settings

Test Flow	Test proper function of BIOS Power Saving settings and measure current consumption Test video off / hdd off modes Run APM Test of AMIdiag	
Available Modes	**Standby**	**789 mA on 12V cord** (defined as S1 State in BIOS description)
	Suspend	**788 mA on 12V cord** (defined as S3 State in BIOS description)
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

7.5 CPU clock throttling / CPU clock/thermal control

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

7.6 Boot Test

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

7.7 Flashing BIOS

Test Flow	▸	Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

8 Operating Systems Test

8.1 Used Hard- and Software

Hardware	Register
DUT	Box #3
HDD IDE	EA0271
CD ROM IDE	EA0164
FDD	EA0257
FDD USB	EA0203
Mouse PS/2	EA0202
Mouse serial	EA0226
Mouse USB	EA0261
Printer	EA0124
Monitor	EA0221
Keyboard	EA0222

Software
Microsoft Windows 98
Microsoft Windows 2000
Additional driver software depending on used controllers

8.2 Windows 98

Install Medium:	**IDE HDD 3½" on Primary Master**				
	Preparation:	fdisk format	File System:	FAT	**32**
			Size:	**4000**	MB
Additional BIOS Settings:	Menu				Setting
	Load Optimized Defaults				
	Advanced BIOS Features			**First Boot Device** **Second Boot Device** **Third Boot Device**	**Floppy** **CDROM** **HDD-0**
Install Procedure:	**Boot from Win98 CD-ROM on Primary Slave**				
Installation length approx.	**12**	min			

Driver	Manufacturer	Driver Version	Driver Date
Graphics	INTEL	4.13.01.3317	n. a.
ChipSet	INTEL	4.10.1012	n. a.
USB	INTEL		12-11-2001
Sound	Avance Logic, Inc.	5.10.3960	8-15-2002
LAN	Realtek	4.10.2222	8-23-2001

Verification of Functionality

X	**Mouse PS/2**		X	**Mouse Serial COM1-2**		X	**Printer Testpage**
X	**Sound**	Verifying sound functionality by connecting Active Loudspeakers and playing jump.wav with windows media player.					
X	**Network**	Verifying ethernet functionality by connecting to Kontron Embedded Network					
X	**USB (6 channels)**	▸ Checking USB functionality by connecting USB-Mouse and running usbview.exe; ▸ Connect USB FDD and copy files from USB FDD to HDD and FDD					
		Used Batch File:	*md f:\test* *copy c:\windows\media*.* f:\test* *fc f:\test*.* c:\windows\media*.** *deltree /y f:\test*				

Result:

X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

8.2.1 Power Management Test

Test Flow	▸ Press <Ctrl> + <Alt> + <Del> two times
	▸ <Start> → Shutdown
	▸ <Start> → Shutdown to MS DOS mode
	▸ <Start> → Restart
	▸ Set Power Management Modes:
	  ▸ Switch off monitor after 2 min
	  ▸ Switch off harddisk after 5 min

Result:

X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

Back to Index

8.3 Windows 2000

Install Medium:	**IDE HDD 3½" on Secondary Master**				
	Preparation: fdisk format	File System:	FAT	**32**	
		Size:	**4000**	MB	
Additional BIOS Settings:	Menu				Setting
	Load Optimized Defaults				
	Advanced BIOS Features		**First Boot Device**		**Floppy**
			Second Boot Device		**CDROM**
			Third Boot Device		**HDD-0**
Install Procedure:	• **Boot from Win2000 CD-ROM on Primary Master** • **Change Filesystem into NTFS during Installation**				
Installation length approx.		**33**	min		

Driver	Manufacturer	Driver Version	Driver Date
Graphics	INTEL	6.13.01.3317	25.10.2002
ChipSet	INTEL	4.10.1012	n. a.
USB	INTEL	5.1.3538.1	
Sound	Avance Logic, Inc.	5.10.0.3960	n. a.
LAN	Realtek	5.366.818.1999	19.10.1999

Verification of Functionality

X	**Mouse PS/2**		**X**	**Mouse Serial COM1-2**		**X**	**Printer Testpage**
X	**Sound**	Verifying sound functionality by connecting Active Loudspeakers and playing jump.wav with windows media player.					
X	**Network**	Verifying ethernet functionality by connecting to Kontron Embedded Network					
X	**USB**	▸ Checking USB functionality by connecting USB-Mouse and running usbview.exe; ▸ Connect USB FDD and copy files from USB FDD to HDD and FDD					
		Used Batch File:	*md b:\test* *copy c:\winnt\media\B*.* b:\test* *fc c:\winnt\media\B*.* b:\test*.**				

Result:

X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

Back to Index

9 Hardware Compatibility Test

9.1 Used Hard- and Software

Hardware	Register
DUT	BOX1
HDD IDE	EA0251
Monitor	EA0221
Keyboard	EA0222

Software
Microsoft Windows 98
Additional driver software depending on used controllers

9.2 PCI Voltage Level

Test Flow	▸ Measure V_{3V} on PCI BUS with oscilloscope ▸ 3V level signals have to exceed 3,25V	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

9.3 PCI Slot

Test Flow	Installation of several PCI cards (SCSI-, Modem-, LAN-, Sound) Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

9.4 Mouse

Additional Used Hardware		
Interface	**Device**	**Register**
PS/2	Microsoft	EA0095
Serial		EA0226
USB	Qtronix	EA0215

Additional CMOS Settings	
Menu	**Setting**
Load Optimized Settings	

Test Flow		Ensure proper mouse function.	
Result	PS/2	**X**	**Test passed successfully**
			Test failed because
			Test skipped because
	Serial	**X**	**Test passed successfully**
			Test failed because
			Test skipped because
	USB Connect-disconnect-connect in Win98	**X**	**Test passed successfully**
			Test failed because
			Test skipped because

Back to Index

9.5 Keyboard

Additional Used Hardware		
Interface	Device	Register
DIN	Cherry	EA0063
USB	Cherry	EA0254

Additional CMOS Settings		
Menu		**Setting**
Load Optimized Settings		
Integrated Peripherals	USB Keyboard Support	Enabled

Test Flow			Ensure proper keyboard function.
Result	PS/2	X	**Test passed successfully**
			Test failed because
			Test skipped because
	DIN	X	**Test passed successfully**
			Test failed because
			Test skipped because
	USB Connect-disconnect-connect in MS-DOS	X	**Test passed successfully**
			Test failed because
			Test skipped because

9.6 Zip Drives

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.7 USB

Additional Used Hardware	
Device	**Register**
Electronic Load	EL7000
Kontron USB Docking Station USB1	EA0260

9.7.1 USB Current Load

Test Preparation		Connect Electronic Load to Powerline of USB connector(s)	
Test Flow		Increase current load, until Fuse triggers Fuse trigger threshold must be in the range between 550mA and 700mA Notify Voltage Level on USB Power Line when drawing 550mA Voltage Level @550mA must be exceeding 4,75V	
Voltage Level @	**1100mA**	USB Stack1 (includes USB3, USB4)	4722 mV Remark: 4753 mV @ 1000 mA
	1100mA	USB Stack2 (includes USB1, USB2)	**4810 mV**
	1100mA	USB Stack3 (additional USB)	**4791 mV**
Fuse Trigger Threshold		**2100mA** @ all USB Stacks	
Result	X	**Test passed successfully**	
		Test failed because	
		Test skipped because	

Back to Index

9.7.2 USB Docking Station USB1

Test Preparation	▸ Connect USB Docking Station USB1 ▸ Attach IDE HDD to USB1	
Test Flow	▸ Boot Win2k ▸ Load corresponding drivers ▸ Copy 10MB Testfile from USB HDD to IDE HDD and note passing time ▸ Performance must exceed 1Mbyte/s	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.8 Hard Disk Drives

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.9 CPUs

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.10 DRAM Modules

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.11 Power Supplies

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

9.12 AGP Graphics Adapter

Test Flow	▸ Tested by Kontron DK. Testreport: **886LCD-ATXu_TestReport**	
Result	X	**Test passed successfully**
		Test failed because
		Test skipped because

Back to Index

10 Performance Test

10.1 Used Hard- and Software

Hardware	Register
DUT	Box 1
DIE HDD	EA0271
DIE CD ROM	EA0164
IDE HDD Seagate 10GB ST310211A	EA0146
Keyboard	EA0222
Monitor	EA0221
Mouse PS/2	EA0138

Software
MS-DOS 6.22
Windows 98
Winbench 99
PC LABS

10.2 Dos Benchmark PCLabs

<table>
<tr><td>Preparation</td><td colspan="4">▸ Use chipDISK 92MB
▸ Use Optimized Settings + USB enabled
▸ Start MS-DOS Benchmark PC LABS</td></tr>
<tr><td rowspan="8">Flow</td><td colspan="4">Conduct all tests of the Performance, Compatibility and Quality menues and run Tests with following Settings</td></tr>
<tr><td rowspan="7">Take following settings to climatic Chamber and Power Supply</td><td>Climatic Conditions</td><td>Supply Voltage</td><td>Result</td></tr>
<tr><td>Room Temperature</td><td>Nominal Voltage</td><td rowspan="5">See following table</td></tr>
<tr><td rowspan="2">Room Temperature</td><td>10,8 V</td></tr>
<tr><td>13,2 V</td></tr>
<tr><td>-30°C</td><td rowspan="2">Nominal Voltage</td></tr>
<tr><td>+60°C</td></tr>
</table>

10.2.1 Results

PC LABS Results			Nominal Voltage at Room Temp.	Nominal Voltage +10%	Nomial Voltage -10%	Nominal Voltage at +60°C	Nominal Voltage at -30°C
SYS	1	CPU	80486	80486	80486	80486	80486
SYS	2	CPU Speed	N/A	N/A	N/A	N/A	N/A
PROCSR	0	Processor Performance Tests					
PROCSR	1	Instruction Mix - 8088	0.02	0.02	0.01	0.02	0.01
PROCSR	2	Instruction Mix - 80286	0.01	0.01	0.02	0.01	0.01
PROCSR	3	Instruction Mix - 80386	0.01	0.01	0.01	0.01	0.02
PROCSR	4	Instruction Mix - 80486	0.02	0.01	0.01	0.01	0.01
PROCSR	5	128K NOP Loop	0.01	0.01	0.01	N/A	0.01
PROCSR	6	Do-nothing Loop	N/A	N/A	0.01	N/A	N/A
PROCSR	7	Integer Add	N/A	N/A	N/A	N/A	N/A
PROCSR	8	Integer Multiply	0.01	0.01	N/A	N/A	N/A
PROCSR	9	String Sort and Move	0.02	0.01	0.01	0.01	0.01
PROCSR	10	Prime Number Sieve	0.01	N/A	N/A	N/A	N/A
PROCSR	11	Floating Point Mix	0.06	N/A	0.05	N/A	N/A
COPROC	0	Coprocessor Performance Tests					

COPROC	1	Math Coprocessor Type	80486	80486	80486	80486	80486
COPROC	2	Math Coprocessor Mix	N/A	N/A	N/A	N/A	N/A
VIDEO	0	Video Performance Tests					
VIDEO	1	Direct Screen Access	0.28	0.22	0.22	0.22	0.22
VIDEO	2	Direct Screen Access	0.11	0.11	0.11	0.16	0.17
VIDEO	3	Direct Screen Access	0.44	0.44	0.43	0.39	0.39
MEMORY	0	Memory Performance Tests					
MEMORY	1	Conventional (Avg.)	N/A	N/A	0.03	N/A	N/A
MEMORY	2	Conventional Read	N/A	N/A	N/A	N/A	N/A
MEMORY	3	Conventional Write	N/A	N/A	0.05	N/A	N/A

10.3 Windows Benchmark Winbench99

Preparation	For comparison purposes always use ▸ 64MB SDRAM modul >> **256MB modul used !** ▸ IDE HDD Seagate 10GB ST310211A >> **Seagate ST32001A !**
	Test 1: Use BIOS ***Fail Safe*** Settings
	Test 2: Use BIOS ***Optimized*** Settings
Flow	▸ Start Win98 and Winbench 99 ▸ Conduct following Tests in Winbench 99 Test Suite Selection 1. CPUmark32 2. DirectDraw Tests 3. FPU WinMark 4. Processor Tests
Result	See following table

10.3.1 Results

	Test1 BIOS FailSafe Settings used		**Test2 BIOS Optimized Settings used**
Version	2000 Build 21		2000 Build 21
CPU Name	Intel(R) Pentium(R) 4 CPU 2.40GHz		Intel(R) Pentium(R) 4 CPU 2.40GHz
CPU Family	15		15
CPU Model	2		2
CPU Stepping	4		4
CPU Features	0x3FEBF9FF		0x3FEBF9FF
CPU Clock Speed	2400		2400
CPU L1 Cache (KB)	20		20
CPU L2 Cache (KB)	512		512
CPU Supports MMX	Yes		Yes
CPU Floating Point	Yes		Yes
System Name (Make/Model)	Unknown		Unknown
System BIOS Information	Phoenix		Phoenix
System BIOS Version	Phoenix - AwardBIOS v6.00PG		Phoenix - AwardBIOS v6.00PG
System Bus Type	Unknown		Unknown
System RAM (MB)	248		248
Display Adapter Name (Make/Model)	Intel(R) 82845G Graphics Controller		Intel(R) 82845G Graphics Controller
Display Adapter Chip	Unknown		Unknown
Display Adapter DAC	Unknown		Unknown

Display Adapter Driver File(s) \tFile\tVersion\tDescription\tSize\tDate\tTime\n	Unknown		Unknown
Display Adapter Memory (KB)	Unknown		Unknown
Display Adapter BIOS Information	Unknown		Unknown
Display Color Reproduction	Unknown		Unknown
Display Cursor Type	Unknown		Unknown
Display Mode	1024 x 768 32 bits/pixel		1024 x 768 32 bits/pixel
Display Orientation	Landscape		Landscape
Display Refresh Rate (Hz)	Unknown		Unknown
Display Refresh Mode	Unknown		Unknown
Disk Name (Make/Model)	GENERIC IDE DISK TYPE00		GENERIC IDE DISK TYPE00
Disk Controller (Make/Model)	Intel(R) 82801DB Ultra ATA Storage Controller - 24CB		Intel(R) 82801DB Ultra ATA Storage Controller - 24CB
Disk Controller RAM (KB)	Unknown		Unknown
Disk Windows Cache Type	System Cache: write caching enabled		System Cache: write caching enabled
Disk Windows Cache RAM (KB)	All Available RAM		All Available RAM
Disk Settings Synchronous buffer commits disabled	No		No
Disk Settings Write-behind caching for all drives disabled	No		No
Disk Settings 32 bit protect-mode disk drivers disabled	No		No
Disk Settings Long name preservation for old programs disabled	No		No
Disk Settings New file sharing and locking semantics disabled	No		No
Disk Settings Protect-mode hard disk interrupt handling disabled	No		No
APM Battery Life	Unknown		Unknown
APM BIOS Information	Unknown		Unknown
APM Enabled	Yes		Yes
APM AC Power	Yes		Yes
CD-ROM Name (Make/Model)	ASUS CD-S500/A		ASUS CD-S500/A
CD-ROM Controller (Make/Model)	Unknown		Unknown
CD-ROM Controller RAM (KB)	Unknown		Unknown
CD-ROM Windows Cache Type	CDFS Cache		CDFS Cache
CD-ROM Windows Cache RAM (KB)	1238 KB		1238 KB
Sound Adapter Name (Make/Model)	Gameport Joystick		Gameport Joystick
Sound Adapter Driver	Unknown		Unknown
Windows Computer Name	886LCD_ATX		886LCD_ATX
Windows Version	Windows 98 Second Edition, Build 2222 A		Windows 98 Second Edition, Build 2222 A
Display Adapter Driver Acceleration	0x 0		0x 0
Display Refresh Pattern	Unknown		Unknown
Disk Settings Read Ahead Threshold	65536		65536
Disk Settings Path Cache	Default		Default
Disk Settings Name Cache	Default		Default
Disk Settings CDFS Prefetch	228		228
Disk Settings CDFS Prefetch Tail	128		128
CPU Active Processors	1		1
CPU Clock Speed (Unrounded)	2393157886		2393095887

CPU Supports 3DNow!	No		No
Display Devices	Unknown		Unknown
CPU Supports Streaming SIMD	Yes		Yes
CPU L3 Cache (KB)	0		0
QueryPerformanceFrequency	1193180		1193180
WEIGHTED SUITE	**SCORE**	**UNITS**	**SCORE**
CPUmark32	4610		4580
FPU WinMark	8360		8360
TEST			
DirectDraw/Animate Screen Size, 640x480:Pixels Drawn	821	Million Pixels/Sec	818
DirectDraw/Animate Screen Size, 800x600:Pixels Drawn	725	Million Pixels/Sec	720
DirectDraw/Animate Screen Size, 1024x768:Pixels Drawn	796	Million Pixels/Sec	788
DirectDraw/Animate Screen Size, 1152x864:Pixels Drawn	758	Million Pixels/Sec	752
DirectDraw/Animate Screen Size, 1280x1024:Pixels Drawn	762	Million Pixels/Sec	763
DirectDraw/Animate Screen Size, 1600x1200:Pixels Drawn	689	Million Pixels/Sec	No Result
DirectDraw/Animate Color Depth, 8 bit:Pixels Drawn	820	Million Pixels/Sec	818
DirectDraw/Animate Color Depth, 16 bit:Pixels Drawn	349	Million Pixels/Sec	346
DirectDraw/Animate Color Depth, 24 bit:Pixels Drawn	No Result	Million Pixels/Sec	No Result
DirectDraw/Animate Color Depth, 32 bit:Pixels Drawn	199	Million Pixels/Sec	194
DirectDraw/Animate BltFast:Pixels Drawn	820	Million Pixels/Sec	818
DirectDraw/Animate Blt:Pixels Drawn	820	Million Pixels/Sec	817
DirectDraw/Animate Solid:Pixels Drawn	638	Million Pixels/Sec	636
DirectDraw/Animate Transparent:Pixels Drawn	786	Million Pixels/Sec	782
DirectDraw/Animate Full Screen:Pixels Drawn	185	Million Pixels/Sec	175
DirectDraw/Animate Windowed:Pixels Drawn	174	Million Pixels/Sec	164
DirectDraw/Animate Clipped:Pixels Drawn	183	Million Pixels/Sec	173
DirectDraw/Animate Memory, Source in video, Work area in video:Pixels Drawn	820	Million Pixels/Sec	818
DirectDraw/Animate Memory, Source in system, Work area in video:Pixels Drawn	510	Million Pixels/Sec	510
DirectDraw/Animate Memory, Source in video, Work area in system:Pixels Drawn	15,6	Million Pixels/Sec	15. Jul
DirectDraw/Animate Memory, Source in system, Work area in system:Pixels Drawn	1220	Million Pixels/Sec	1220
DirectDraw/Animate BLT size, 256 pixels:Pixels Drawn	217	Million Pixels/Sec	225

DirectDraw/Animate BLT size, 1024 pixels:Pixels Drawn	583	Million Pixels/Sec	581
DirectDraw/Animate BLT size, 4096 pixels:Pixels Drawn	820	Million Pixels/Sec	818
DirectDraw/Animate Stretch, Solid, 2.0x, 8 bit:Pixels Drawn	36,9	Million Pixels/Sec	37
DirectDraw/Animate Stretch, Solid, 1.7x, 8 bit:Pixels Drawn	6,95	Million Pixels/Sec	Jun 95
DirectDraw/Animate Stretch, Transparent, 1.7x, 8 bit:Pixels Drawn	6,98	Million Pixels/Sec	Jun 98
DirectDraw/Animate Stretch, Solid, 1.7x, 16 bit:Pixels Drawn	179	Million Pixels/Sec	178
DirectDraw/Animate Stretch, Solid, 1.7x, 24 bit:Pixels Drawn	No Result	Million Pixels/Sec	No Result
DirectDraw/Animate Stretch, Solid, 1.7x, 32 bit:Pixels Drawn	89,7	Million Pixels/Sec	88
DirectDraw/Fill Color Depth, 8 bit color:Pixels Drawn	1430	Million Pixels/Sec	1430
DirectDraw/Fill Color Depth, 16 bit color:Pixels Drawn	680	Million Pixels/Sec	672
DirectDraw/Fill Color Depth, 24 bit color:Pixels Drawn	No Result	Million Pixels/Sec	No Result
DirectDraw/Fill Color Depth, 32 bit color:Pixels Drawn	344	Million Pixels/Sec	336

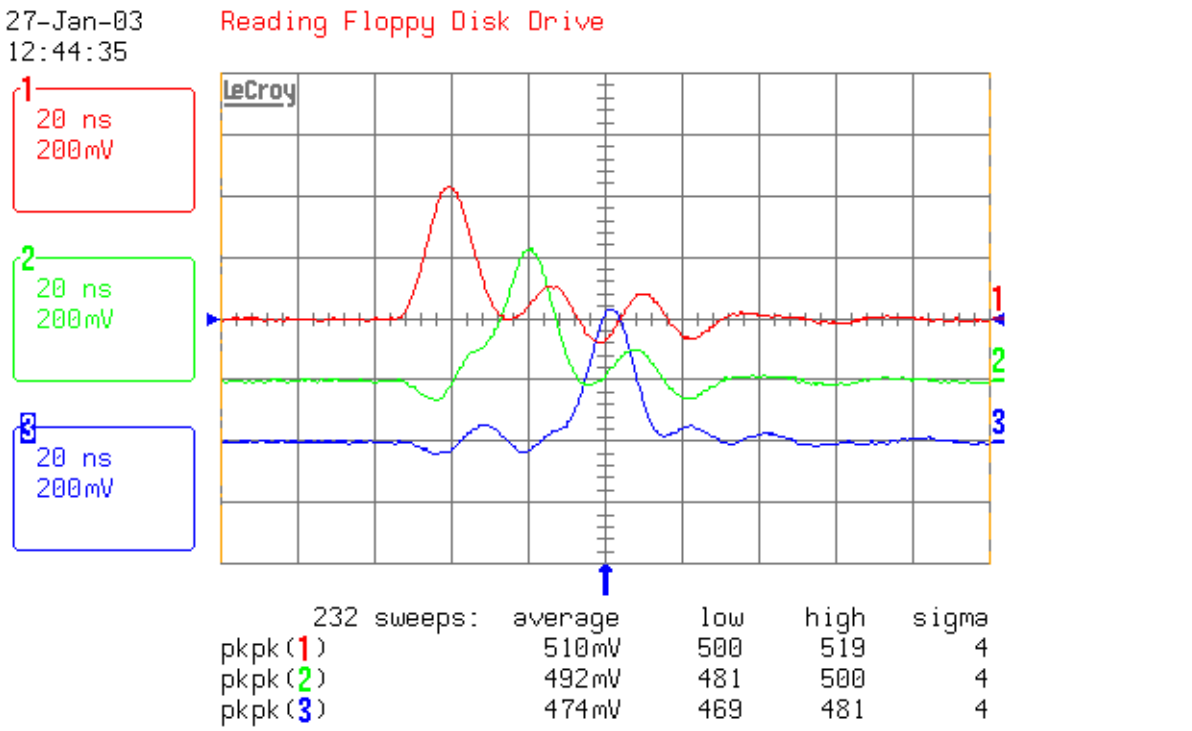
10.4 Graphics Performance

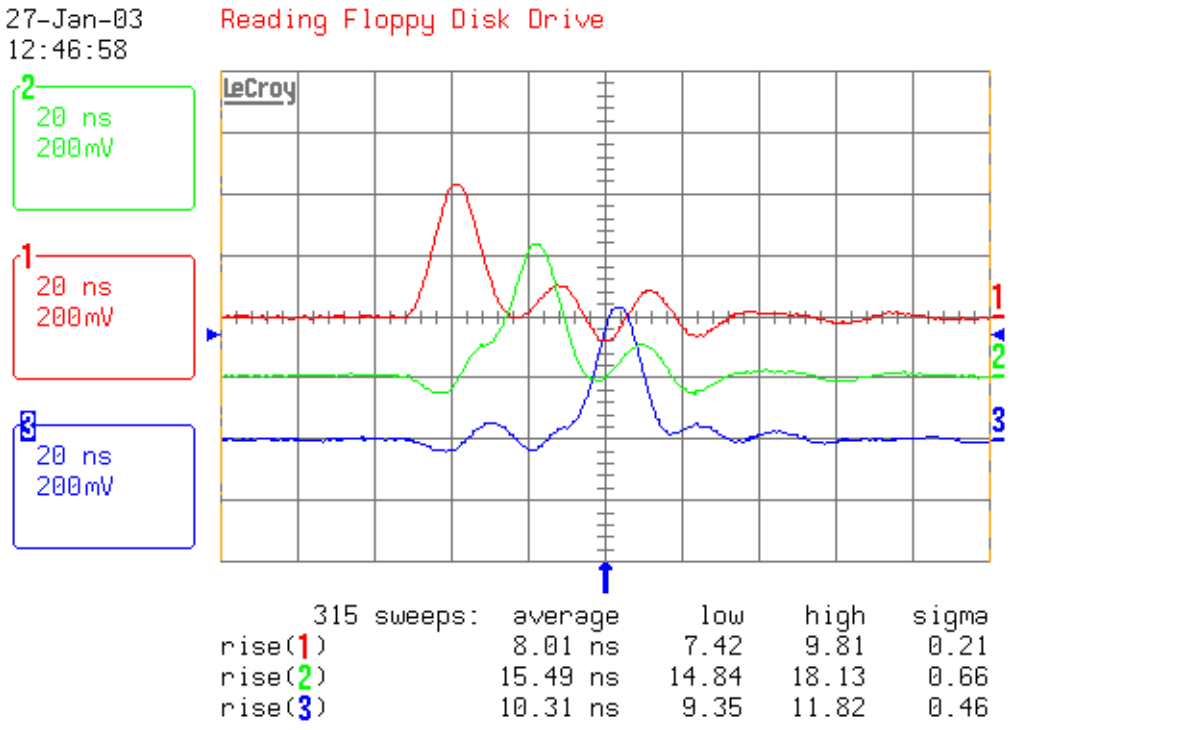
10.4.1 Signal Measurements

Test Flow	▸ Attach Monitor Samtron 75E ▸ Set resolution to 1024x768 and Color depth to 32 bit ▸ Start Kontron graphics testtool rgbspots.exe ▸ Measure voltage level and signal rise time on RGB lines with oscilloscope		
Result	Voltage Level R / G / B	in mV	**510 / 492 / 474**
	Signal Rise Time R / G / B	in ns	**8,01 / 15,49 / 10,31**

Back to Index

Screenshots





Back to Index

10.4.2 DOS

Test Flow	▸ Run testscreen.exe ▸ Run all tests in the Graphics Tab of AMIDiag Video Memory Test Attribute Test Page Selection Test Color Test Text Mode Test Graphics Mode Test VESA Video Modes Test AGP Test	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

10.4.3 Winbench Graphic Marks

Test Flow	▸ Set Display mode: ▸ Resolution : max : 1024x786 ▸ Color depth : max: True Color (32-Bit) ▸ Run Winbench Business Graphics Mark Winbench High-End Graphics Mark	
Result	Business Graphics Mark	**161**
	High-End Graphics	**1250**

10.4.4 Resolution / Color Depth

Test Flow	▸ Set the three highest resolutions and three highest color depths / resolution: 800 x 600 1024 x 768 } 32-bit, 16-bit, 256 color 1280 x 1024 ▸ Play starwars.avi	
Result	**X**	**Test passed successfully**
		Test failed because
		Test skipped because

10.5 HDD Performance

Test Preparation	▸ Always use HDD Seagate ST310211A, 10GB, Ultra ATA/100 for comparison purposes ▸ Verify with “ct Ampel“	
Additional CMOS Settings		
Menu		**Setting**
Load optimized Settings		
Test Flow	▸ Run H2Bench ▸ Run Business Disk Winmark ▸ Run Highend Disk Winmark	
Result	H2Bench	see result list below
	Business Disk Winmark	**3450**
	Highend Disk Winmark	**12800**

Back to Index

Result H2Bench:

Platte: Seagate
BIOS: Award
CPU: INTEL P4 2.4 GHz
Board: ATX
Adapter: none

Kapazit„t: CHS=(1024/255/63), 16450560 Sektoren = 8033 MByte

Interface-Transferrate mit Blockgr”áe 128 Sektoren bei 0.0% der Kapazit„t:
Sequentielle Leserate Medium (ungebremst): 5142 KByte/s
Sequentielle Leserate Read-Ahead (Verz”gerung: 13.69 ms): 4991 KByte/s
Wiederholtes sequentielles Lesen ("Coretest"): 5370 KByte/s

Dauertransferrate (Blockgr”áe: 128 Sektoren):
Lesen: Mittel 5064.4, Min 4859.7, Max 5187.4 [KByte/s]

Zugriffszeit Lesen: Mittel 17.8, Min 3.2, Max 37.6 [ms]
Zugriffszeit Lesen (<504 MByte): Mittel 9.7, Min 1.7, Max 36.7 [ms]

Hdbench bei 0.0% der Kapazit„t:
Gewichteter Mittelwert 3280.6, Min 919.3, Max 5085.0 [KByte/s] [NUR LESEN]

Detailergebnisse:

Nr.	Bl. File sz. [KB]	File size [KB]	WLin [KB/s]	RLin [KB/s]	WRan [KB/s]	RRan [KB/s]	WLin Again [KB/s]	RLin Again [KB/s]	WRan Again [KB/s]	RRan Again [KB/s]
1	0.5	50	-------	1091.7	-------	2303.3	-------	2314.5	-------	2321.7
2	1.0	100	-------	3199.7	-------	3222.6	-------	3217.8	-------	3249.4
3	2.0	200	-------	3552.9	-------	1250.1	-------	3600.6	-------	1384.7
4	4.0	400	-------	3610.6	-------	935.2	-------	3604.7	-------	919.3
5	8.0	800	-------	4256.7	-------	1313.4	-------	4324.8	-------	1263.3
6	16.0	1600	-------	4369.4	-------	1637.3	-------	4143.0	-------	1636.5
7	24.0	2400	-------	3672.2	-------	2161.9	-------	3544.2	-------	2160.3
8	32.0	3200	-------	4727.5	-------	2483.2	-------	4645.7	-------	2483.0
9	40.0	4000	-------	3842.1	-------	2811.7	-------	4052.6	-------	2880.3
10	48.0	4800	-------	4234.2	-------	3088.6	-------	4066.4	-------	3086.1
11	56.0	5600	-------	4694.1	-------	3199.5	-------	4667.1	-------	3190.3
12	62.0	6200	-------	4995.5	-------	3474.6	-------	4963.6	-------	3466.2
13	63.0	6300	-------	5085.0	-------	3531.5	-------	5063.5	-------	3544.1
14	63.5	6350	-------	5014.5	-------	3550.1	-------	5058.1	-------	3550.1
Maximum			-------	5085.0	-------	3550.1	-------	5063.5	-------	3550.1
Mittel			-------	4024.7	-------	2497.4	-------	4090.5	-------	2509.7

Max 5085.0 [KB/s], Min 919.3 [KB/s], gewichtetes Mittel 3280.6 [KB/s]

Timeraufl”sung: 0.838 æs, 1.193 MHz
Timerstatistik: 5241 Aufrufe, min 1744.08 æs, mittel 329914.31 æs, max 1788683.54 æs
Testbeginn: 29.01.03 01:34:41
Testversion: $Id: h2bench.c,v 2.26 1999/01/20 13:29:41 hwb Exp $
Kommandozeile: A:\H2BENCH.EXE -a -w h2bench 0

Back to Index

10.6 Network Performance

10.6.1 General Conditions

- 50m 100BaseT cable
- Crossed 100BaseT Ethernet patch cable

Additional CMOS Settings	
Menu	**Setting**
Set Optimized Settings	

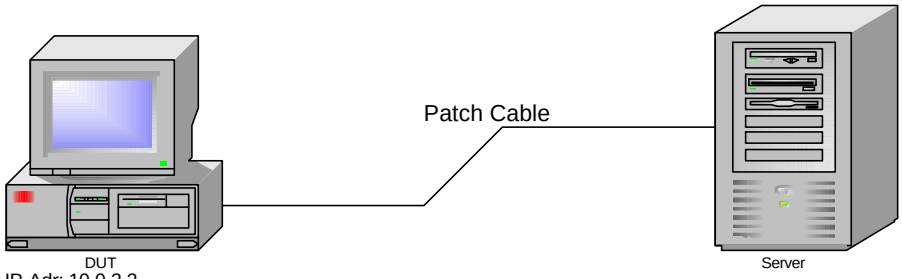
Additional used Hardware	
Device	**Register Code**
Approval Server	
Oscilloscope LT374; differential probe	
10BaseT Hub	EA0276
Ethernet measurement adapter 10BaseT	EA0239

Additional used Software
Windows 98
Netio.exe

10.6.2 Patch Cable Test

10.6.2.1 Patch Cable Test Preparation

Connect DUT and Eval_Server via a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: Auto
- Connection Type: Auto

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100 Mbps
- Connection Type: Half Duplex

10.6.2.2 Patch Cable Test Flow

1. Search the network and assure to have access to the Eval_Server by copying the directory <\software> from the Server to the DUT.
2. Run netio.exe in Server mode (netio.exe –s) on the Eval_Server. Run netio.exe in Client mode (netio.exe –t 10.0.3.1) on the DUT and evaluate the benchmark results at various packet sizes. Insert the results in tables as shown in the following.

Back to Index

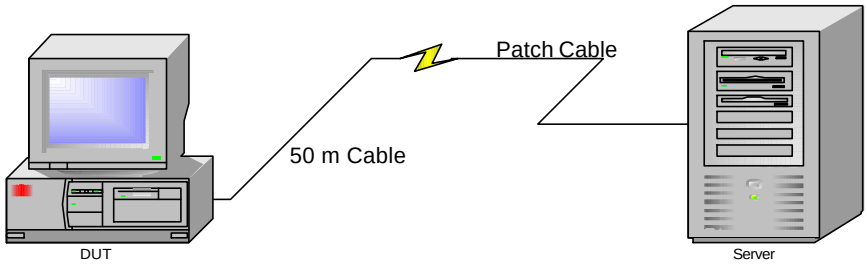
10.6.2.3 Patch Cable Test Result

TCP/IP connection established.		NetBIOS connection established.	
1k packets:	9897 k/sec	1k packets:	4589 k/sec
2k packets:	8734 k/sec	2k packets:	6971 k/sec
4k packets:	10219 k/sec	4k packets:	8474 k/sec
8k packets:	9833 k/sec	8k packets:	3396 k/sec
16k packets:	3372 k/sec	16k packets:	3582 k/sec
32k packets:	163 k/sec	32k packets:	9023 k/sec

10.6.3 Long Distance Cable Test

10.6.3.1 Long Distance Cable Test Preparation

Connect DUT and Eval_Server via a 100BaseT Ethernet cable with a length of 50m and a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Full Duplex

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Full Duplex

10.6.3.2 Long Distance Cable Test Flow

Repeat steps 1 and 2 of the Patch Cable Test.

10.6.3.3 Long Distance Cable Test Result

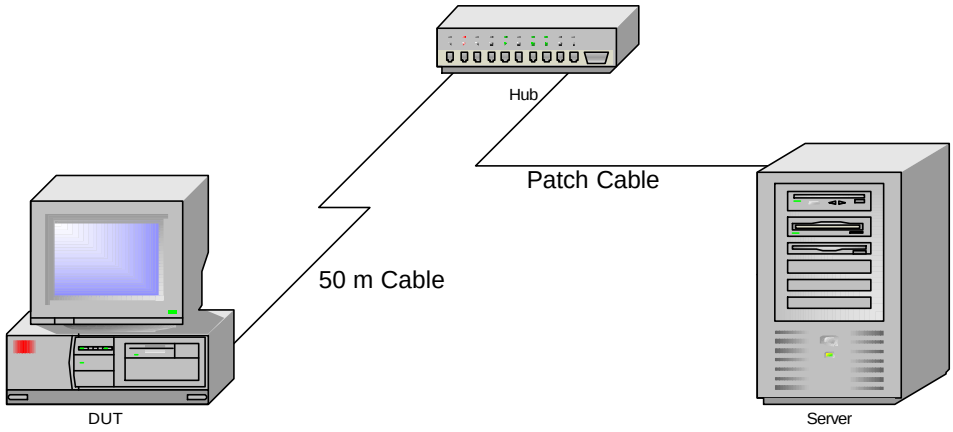
TCP/IP connection established.		NetBIOS connection established.	
1k packets:	10466 k/sec	1k packets:	5335 k/sec
2k packets:	8298 k/sec	2k packets:	5898 k/sec
4k packets:	9195 k/sec	4k packets:	7618 k/sec
8k packets:	11317 k/sec	8k packets:	7972 k/sec
16k packets:	10304 k/sec	16k packets:	9145 k/sec
32k packets:	160 k/sec	32k packets:	10695 k/sec

Back to Index

10.6.4 Hub Test

10.6.4.1 Hub Test Preparation

Connect DUT and Eval_Server via a hub, 50m 100BaseT cable and a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: Auto
- Connection Type: Auto

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Half Duplex

10.6.4.2 Hub Test Flow

Repeat steps 1 and 2 of the patch cable test.

10.6.4.3 Result Hub Test

TCP/IP connection established.		NetBIOS connection established.	
1k packets:	5719 k/sec	1k packets:	3183 k/sec
2k packets:	7566 k/sec	2k packets:	4727 k/sec
4k packets:	8479 k/sec	4k packets:	6646 k/sec
8k packets:	8305 k/sec	8k packets:	4522 k/sec
16k packets:	6209 k/sec	16k packets:	4764 k/sec
32k packets:	167 k/sec	32k packets:	8047 k/sec

10.7 Sound Test

Additional used Hardware	
Device	**Register Code**
Sound Connector Terminations	Line Out: 40 kOhm Headphone: 92Ohm Speaker: 8 Ohm
Active Loudspeaker	EA0175
Oszilloscope Waverunner2 LT374	LeCroy
Function Generator HM 8130	Hameg

Additional used Software
Windows 98
Audiotester V1.4

The sound measurements, as described below, do not put a claim to be exact professional audio measurements. The values listed in the report are only clues to prequantify sound behaviour. So do not compare these values to measurments with high quality audio measurments equipment. The mentioned measurements are rather for comparison purposes with other Kontron Embedded Boards in order to find out whether there is something wrong with sound input / output in general.

Back to Index

10.7.1 General Settings

General Driver Settings
System Control → Multimedia → Audio Quality
Hardware Acceleration: max
Sample Converting Quality: max

10.7.2 Sound Test subjective (Mic In)

Record voice via microphone and playback sampled recordings. Set Mic In / Master Volume at Win98 Mixer to ≈70% (→ -3dB).

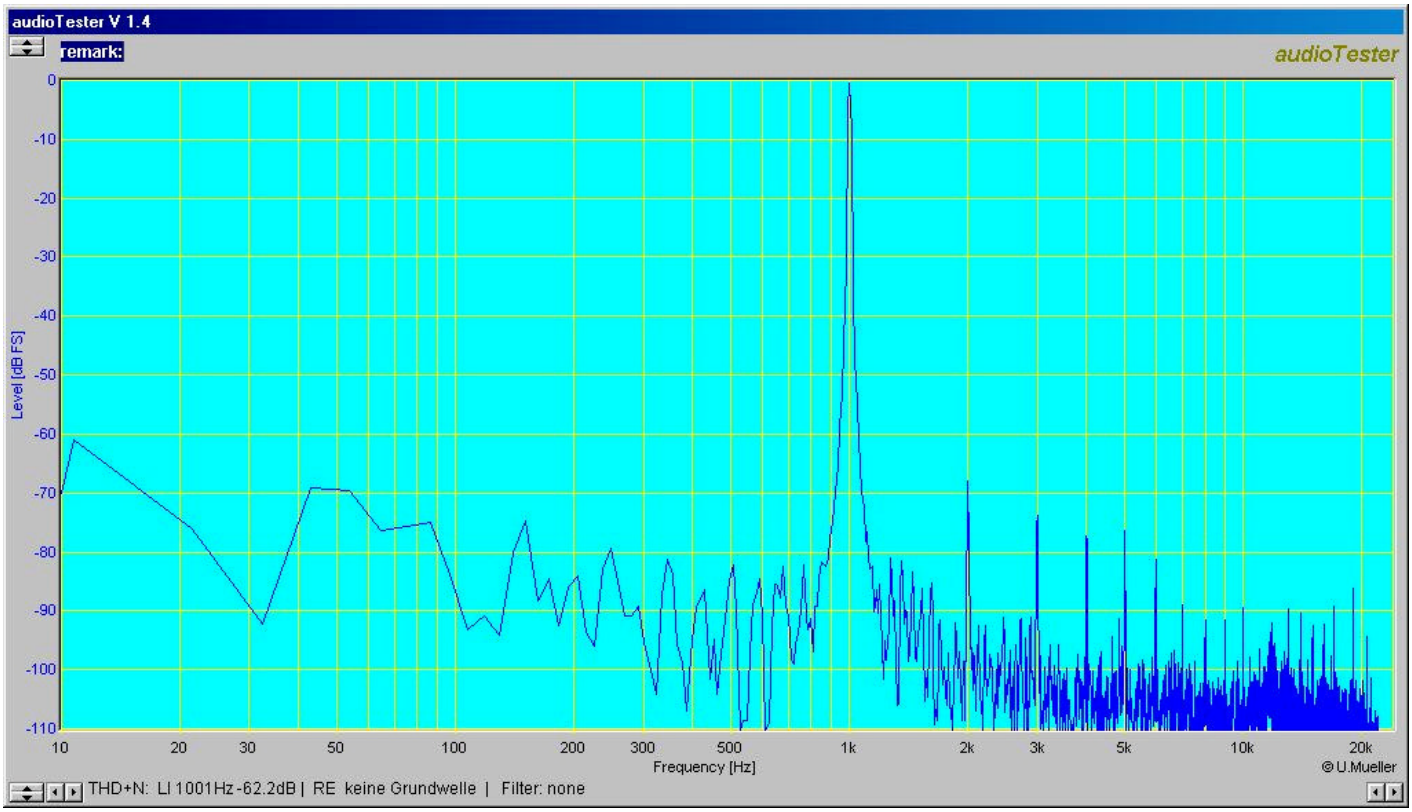
Result:

X	**Test passed successfully**	
	Test skipped because	
	Test failed because	

10.7.3 Sound Input (Line In)

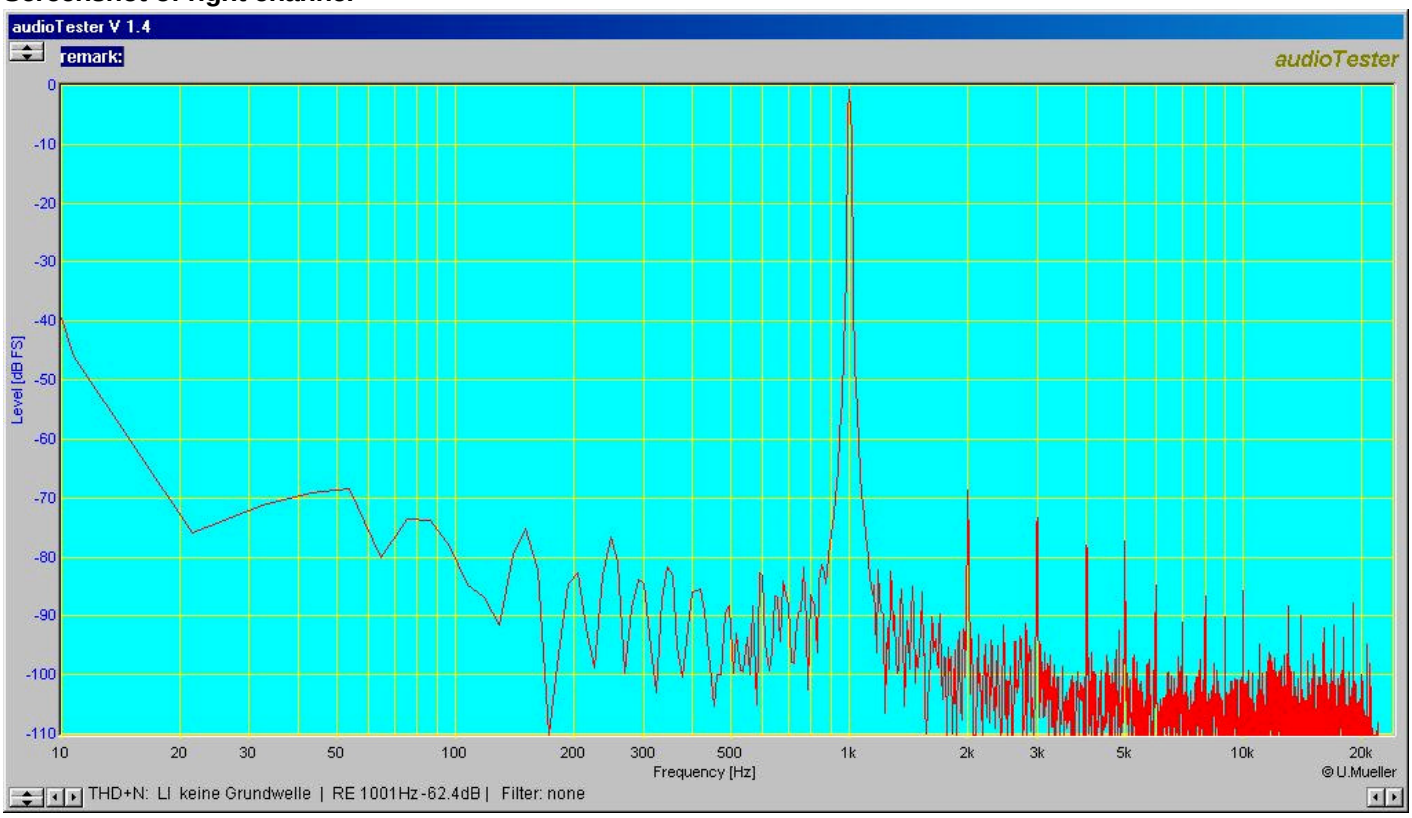
Test Preparation	▸ Set Line In Volume at WIN98 Mixer to 100%, all other inputs are disabled ▸ Connect LINE input via adapter with Function Generator with following Settings: Sine Frequ.: 1 kHz; Amplitude: set amplitude as high as possible so that just no clipping appears (no red beams may appear in volume control) Adjusted Amplitude: **84,6 mV_{RMS}**
Test Flow	▸ Start AudioTester V1.4 and set recording amplitude to –3dBFS. ▸ Set von Hann Filter ▸ Record sound input ▸ Start FFT Analysis and insert screenshot into the test report. ▸ Measure THD+N with Audio Tester

Screenshot of left channel



Back to Index

Screenshot of right channel



Result:

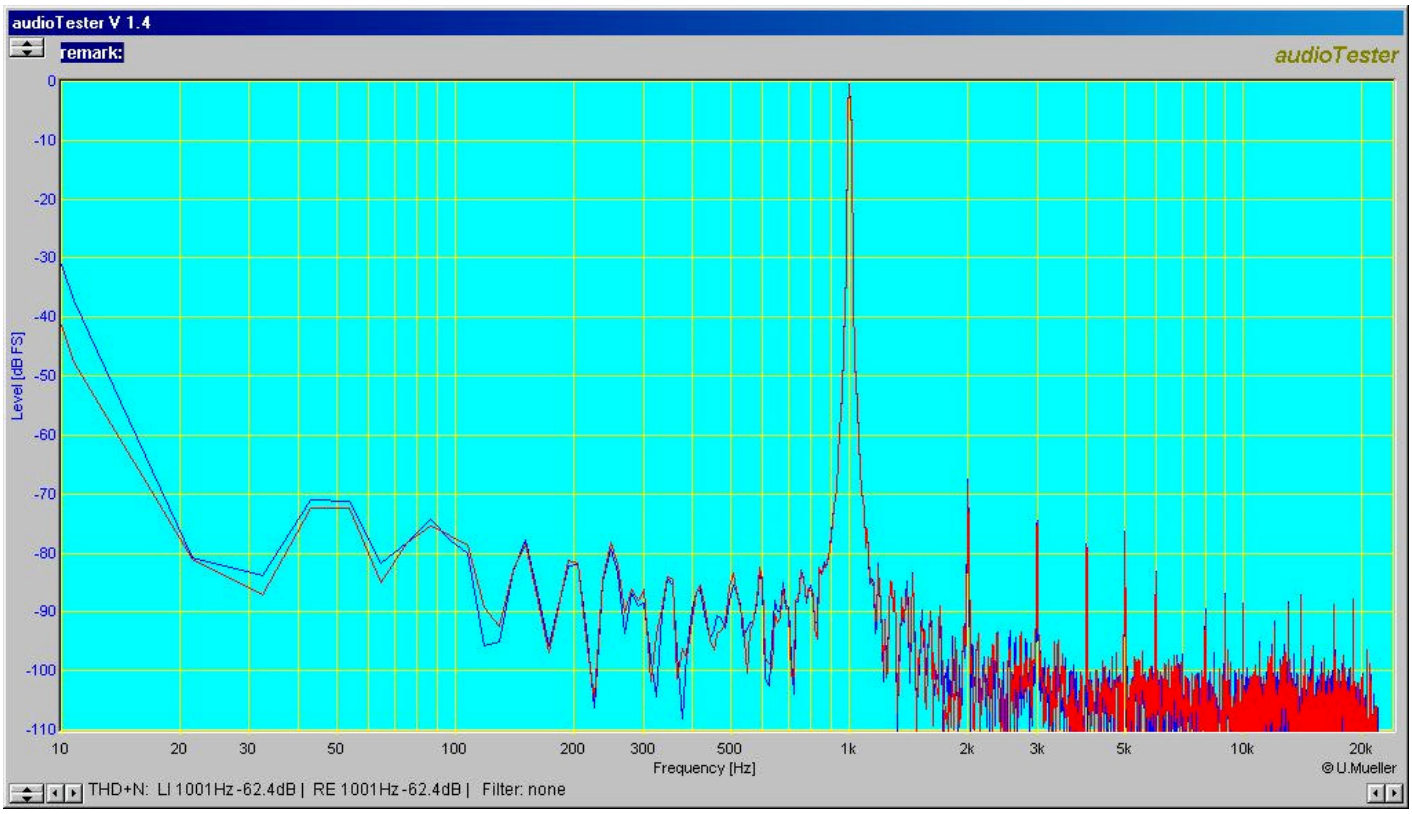
X	**Test passed successfully**	
	THD+N with Audio Tester (Line In Left Channel)	**- 62,2 dB**
	THD+N with Audio Tester (Line In Right Channel)	**- 62,4 dB**
	Test skipped because	
	Test failed because	

10.7.4 Sound Input (MIC In)

Test Preparation	▸ Set Mic In Volume at WIN98 Mixer to 100%, all other inputs are disabled. ▸ Connect MIC input via adapter with Function Generator with following Settings: Sine Frequ.: 1 kHz; Amplitude: set amplitude as high as possible so that just no clipping appears (no red beams may appear in volume control) Adjusted Amplitude: **95,1 mV_{RMS}**
Test Flow	▸ Start AudioTester V1.4 and set recording amplitude to –3dBFS. ▸ Set von Hann Filter ▸ Record sound input ▸ Start FFT Analysis and insert screenshot into the test report. ▸ Measure THD+N with Audio Tester

Back to Index

Screenshot MIC In



Result:

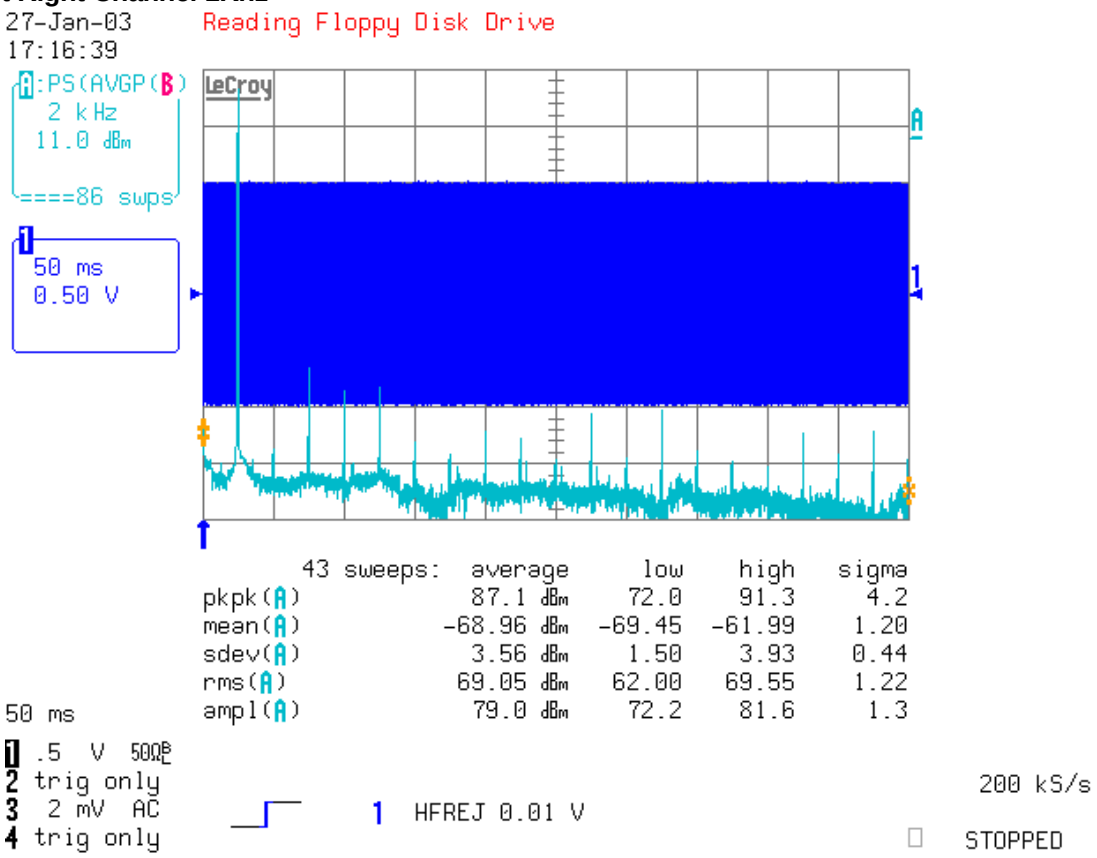
X	**Test passed successfully**	
	THD+N with Audio Tester (Mic In)	**- 62,4 dB**
	Test skipped because	
	Test failed because	

10.7.5 Sound output (Line Out)

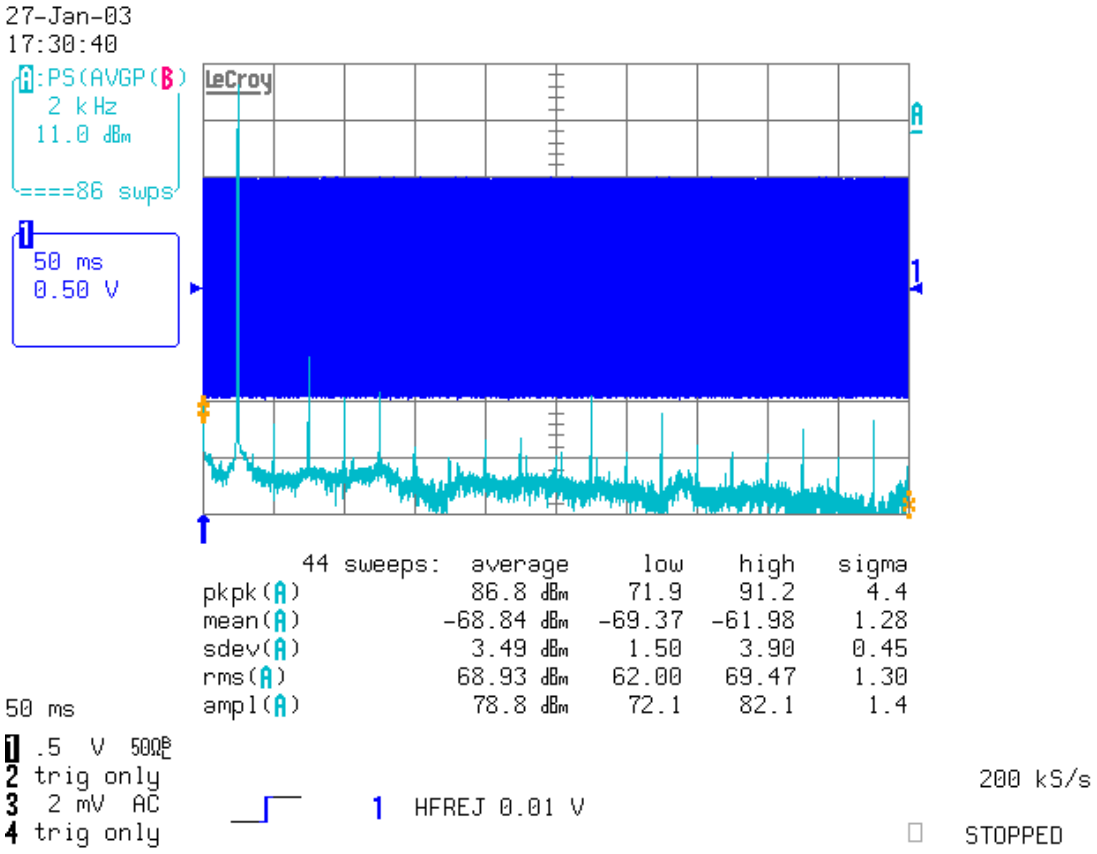
Test Preparation	▸ Start sinusgen.exe with following Settings: Frequ.: 1 kHz Outp. Amplitude: 0 dB ▸ Connect Line Out (left and right channel) via termination adapter to oscilloscope ▸ Set Master Volume at WIN98 Mixer to –3dBFS (=70% of max Amplitude at 0dB) ▸ Prepare Oscilloscope
Test Flow	▸ Start FFT analysis with von Hann filter and show results in magnitude mode; insert screenshot into the test report ▸ Measure V_{RMS} of 0dBFS on both channels ▸ Repeat measurements with following settings of sinusgen.exe Frequ.: 10 kHz Outp. Vol. (sinusgen.exe): 0 dB

Back to Index

Screenshot Right Channel 1Khz

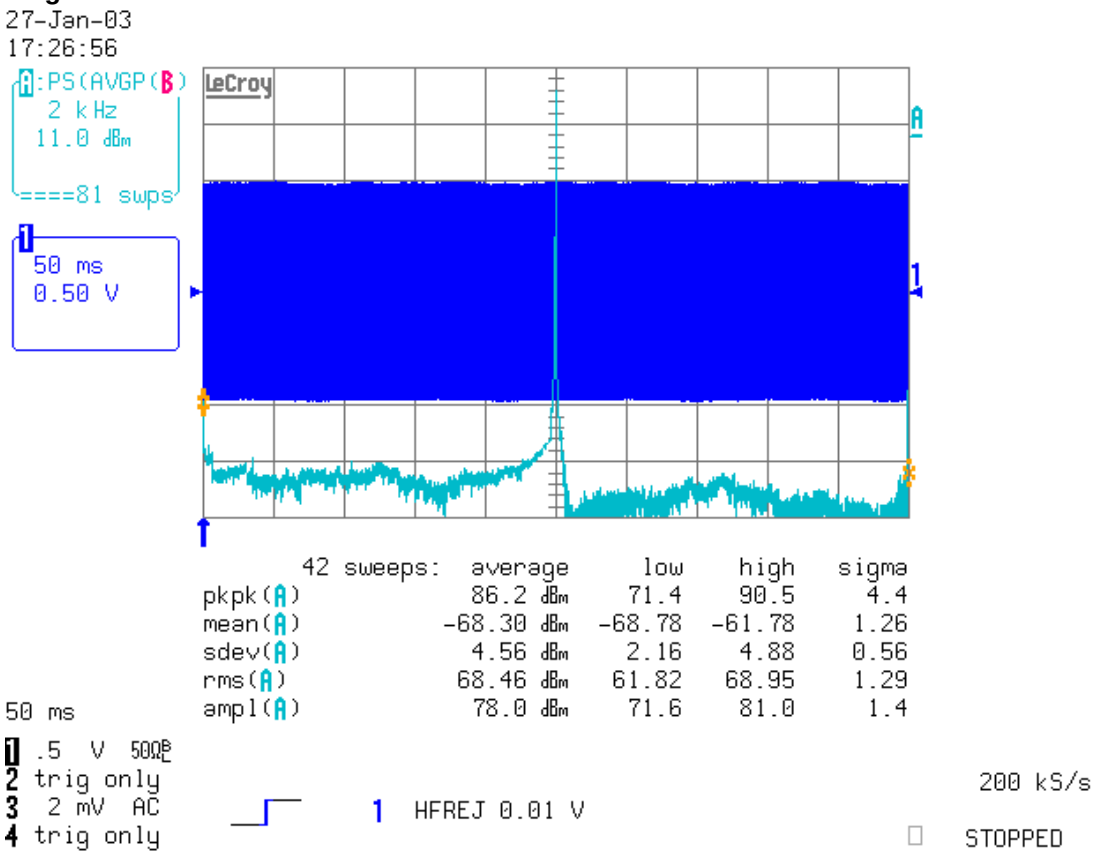


Screenshot Left Channel 1Khz

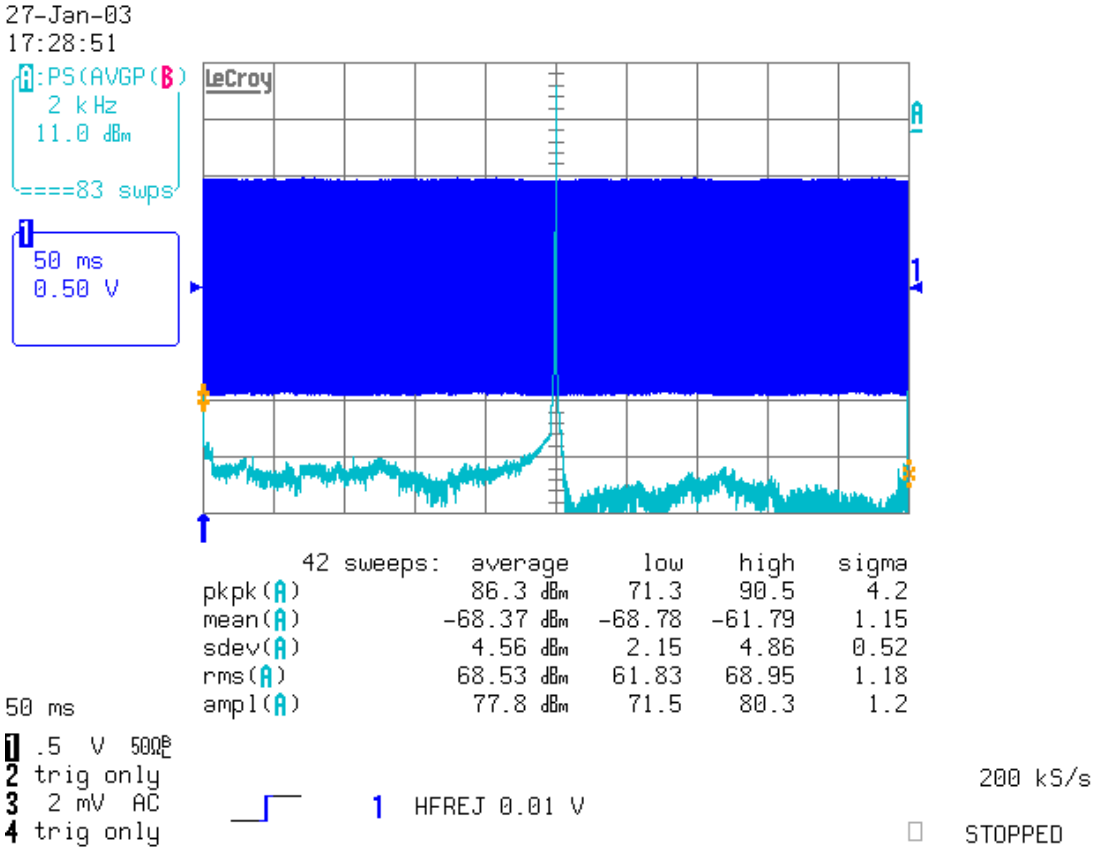


Back to Index

Screenshot Right Channel 10Khz



Screenshot Left Channel 10Khz



Result:

X	**Test passed successfully**
	Test skipped because
	Test failed because

Back to Index

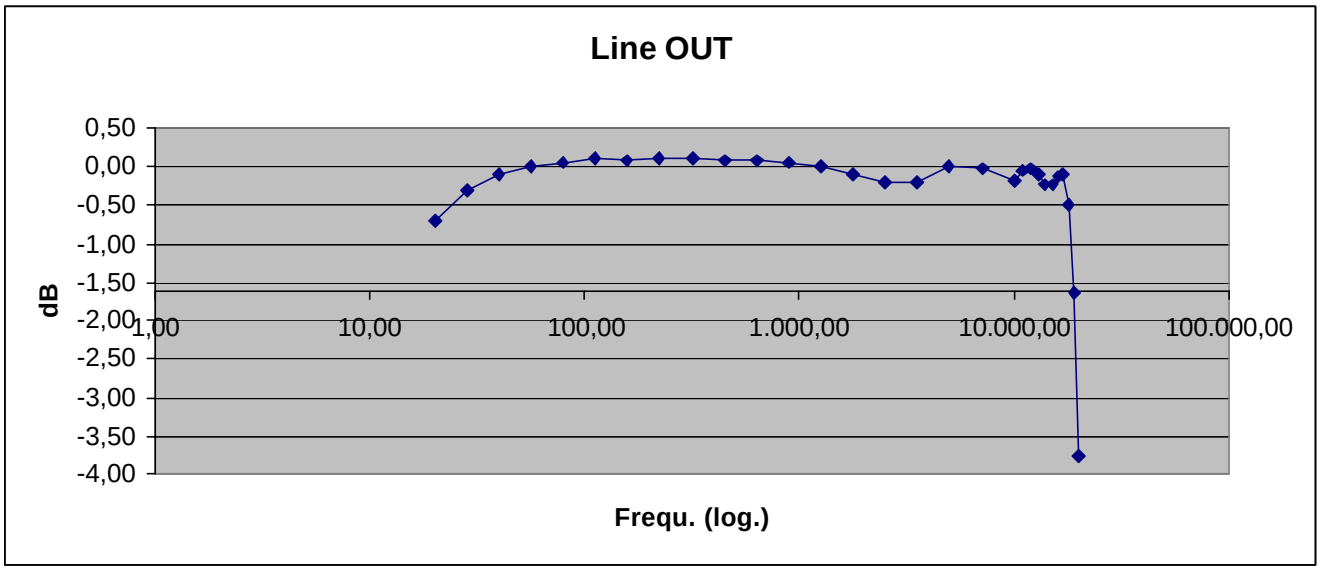
10.7.6 Frequency Response Record and Playback Path

10.7.6.1 Playback Path

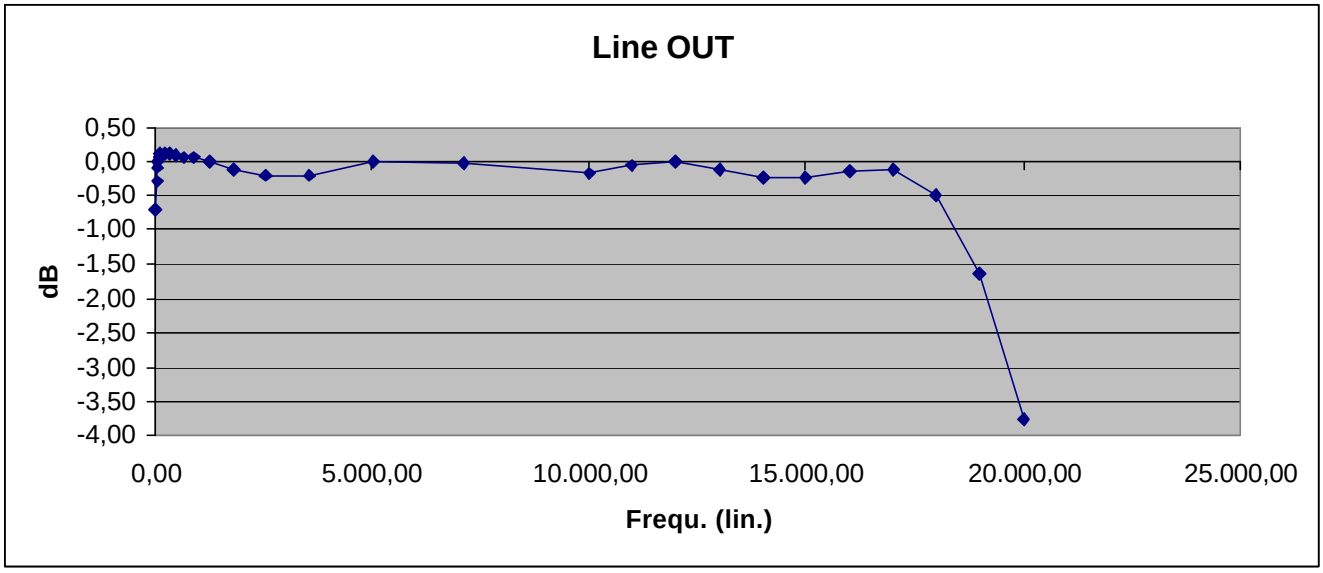
Test Preparation	▸ Connect Line In with Function Generator ▸ Connect Line Out via termination adapter with Oscilloscope ▸ Set Master Volume at WIN98 Mixer to 0dB (=100%) ▸ Prepare Oscilloscope
Test Flow	▸ Generate 1kHz Sine with Function Generator, adjust amplitude to -20dB to minimize distortion;Use that measured level as 0dB reference; Sweep frequencies from 20Hz...20kHz
Result	see tables and diagrams below

Results Line Out						
Freq [Hz]	**RMS Voltage Level [mV]**	**Level [dB]** relative to 1kHz *		**Freq [Hz]**	**RMS Voltage Level [mV]**	**Level [dB]** relative to 1kHz *
20,00	756	-0,69		3.556,60	800	-0,19
28,30	790	-0,30		5.023,80	818	0,00
39,90	809	-0,10		7.096,30	815	-0,03
56,40	818	0,00		10.000,00	801	-0,18
79,60	824	0,06		11.000,00	813	-0,05
112,50	828	0,11		12.000,00	817	-0,01
158,90	827	0,10		13.000,00	808	-0,11
224,40	828	0,11		14.000,00	796	-0,24
317,00	828	0,11		15.000,00	796	-0,24
447,70	827	0,10		16.000,00	806	-0,13
632,50	825	0,07		17.000,00	808	-0,11
893,40	823	0,05		18.000,00	773	-0,49
1.261,90	818	0,00		19.000,00	678	-1,63
1.782,50	808	-0,11		20.000,00	530	-3,77
2.517,90	800	-0,19				

- Formula: 20 log (Level[mV] / Level@1kHz[mV])



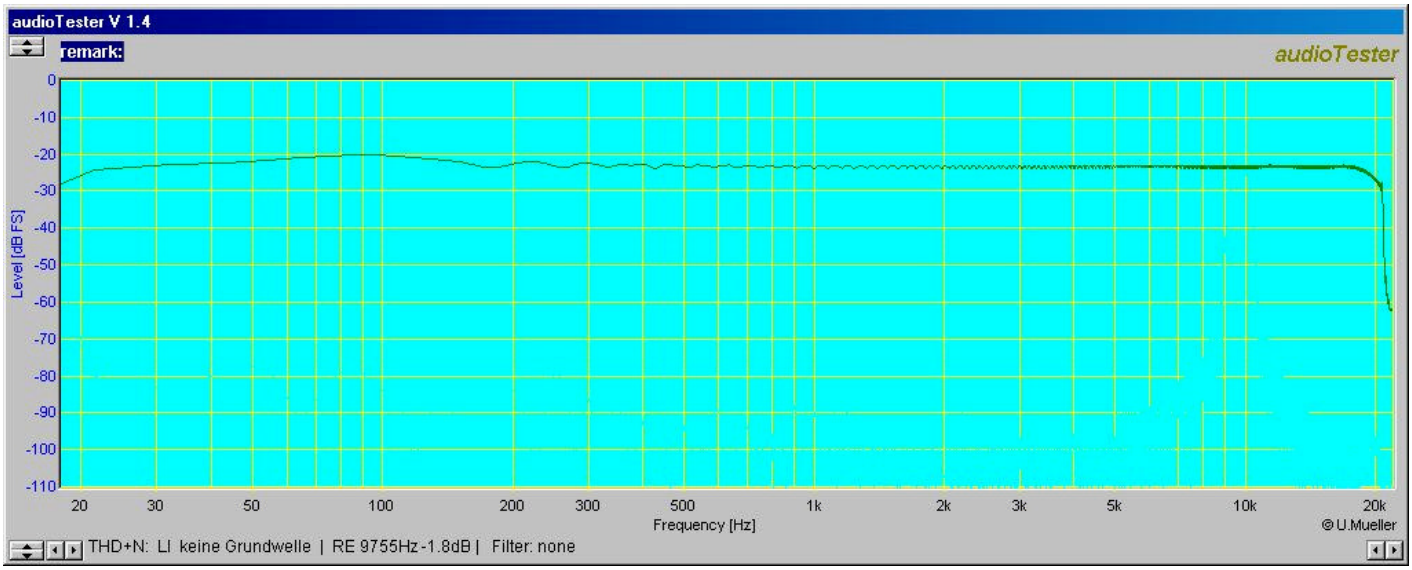
Back to Index



10.7.6.2 Record Path

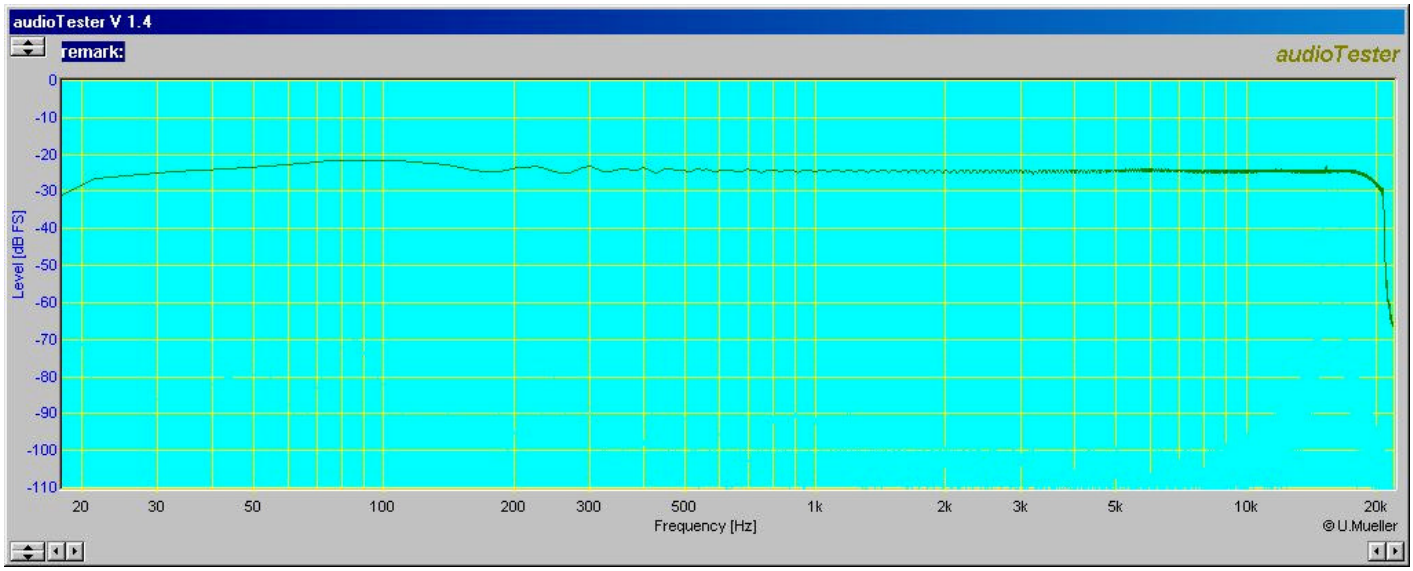
Test Preparation	▸ Connect Line IN and Mic IN via termination adapter with Function Generator ▸ Set Master Volume at WIN98 Mixer to 0dB (=100%) ▸ Start Audio Tester 1.4
Test Flow	▸ Generate a Sine with Function Generator, swept frequencies from 20Hz...20kHz adjust ▸ Amplitude -20dB to minimize distortion
Result	see tables and diagrams below

Screenshot Line IN



Back to Index

Screenshot Mic IN



Back to Index

11 Surface Temperature Test

11.1 Used Hard- and Software

Hardware	Register
DUT	Box #3
HDD IDE #1	EA0146
CD ROM IDE #1	EA0310
CD ROM IDE #2	EA0206
Power Supply ATX	EA0285
Monitor	EA0221
Keyboard	EA0222
Thermometer	EA0130

Software
Windows 98
Winbench 99

11.2 General Conditions

Room Temperature	24°C
Draught	None
CPU	Intel Pentium4 2,4 GHz
Memory	512MB

11.3 Test Procedure

Preparation	Build up following Test assembly. ▸ HDD IDE (Master) and CD-ROM IDE #1 (Slave) mounted at IDE Port 0 ▸ CD-ROM IDE #2 (Master) mounted on IDE Port 1 ▸ Connect LAN Interface to KEM Network ▸ Connect Audio output of CD-ROM #2 with Line Input of DUT ▸ Connect Active Loudspeakers to DUT
Flow	1. Run wrver.bat ▸ Explanation of driveletters: C:\HDD IDE Z:\Network Drive ▸ wrver.bat: *md c:\test* *copy z:*.* c:\test* *fc z:*.* c:\test*.** *deltree /y e:\test* *wrver.bat* 2. Insert Audio CD into CD-ROM Drive #2 and play it 3. Run Benchmark Program WinBench 99 All Tests, All Winmarks 4. Copy a test Folder located on EVAL_Server to DUT 5. Measure Surface Temperature of components exceeding 35°C with a digital thermometer after 1 hour running.
Result	See following table

Back to Index

11.4 Result

List all components exceeding 35°C

Component	Measurement point	Manufacturer specification [°C]	Remark Surface, Ambient, Junction...	Surface Temp [°C]	D_T [°C]	$T_{room\ max}$
U13 MOSFET Driver	Case Surface	85	Ambient operating Temperature	**43**	***42***	66
U11 MOSFET Driver	Case Surface	85	Ambient operating Temperature	**41**	***44***	68
U8 MOSFET Driver	Case Surface	85	Ambient operating Temperature	**42**	***43***	67
U10 Core Voltage Reg.	Case Surface	70	Ambient operating Temperature	**41**	***29***	53
Q6 MOSFET	Case Surface	175	Junction Temperature	**38**	***See Datasheet***	
Q9 MOSFET	Case Surface	175	Junction Temperature	**43**	***See Datasheet***	
Q5 MOSFET	Case Surface	175	Junction Temperature	**44**	***See Datasheet***	
Q8 MOSFET	Case Surface	175	Junction Temperature	**45**	***See Datasheet***	
Q4 MOSFET	Case Surface	175	Junction Temperature	**44**	***See Datasheet***	
Q7 MOSFET	Case Surface	175	Junction Temperature	**42**	***See Datasheet***	
U9 RS232 Driver	Case Surface	70	Ambient operation Temperature	***48***	***22***	46
U7 RS232 Driver	Case Surface	70	Ambient operation Temperature	**45**	***25***	49
U12 Clock Generator	Case Surface	70	Ambient operation Temperature	**40**	***30***	54
U16 Northbridge	Case Surface	92	Case Temperature	**43**	***49***	73
Q28 MOSFET	Case Surface	n. a.		**37**	n. a.	
Q27 MOSFET	Case Surface	n. a.		**37**	n. a.	

Maximum Measured Surface Temperature: 48 °C

$\Delta_T = T_{spec} - T_{sur}$ T_{spec} => manufacturer specified surface/ambient Temperature
T_{sur} => measured case surface temperature

$T_{roommax} = T_{room} + \Delta_T$ T_{room} => actual room temperature
$T_{roommax}$ => maximum rated room temperature

Maximum Room Ambient Temperature Rating: 46 °C

Please be aware, that this calculation is without processor. However the processor will probably be the most temperature critical component of an application. PGA478 P4 processors max. case temperatures range from 75°C down to 68°C.

Back to Index

11.5 Manual Specifications

The manual specifications define the maximum operating temperature as the maximum measurable temperature on any spot on the module´s surface.

Operating Temperature according to Manual	0°C - 50°C
Storage Temperature according to Manual	-10°C – 85°C

Back to Index

12 Max Temperature Test

12.1 Used Hard- and Software

Hardware	Register
DUT	BOX 2
ChipDisk	EA0120
Keyboard	EA0111
Monitor	EA0249
Climatic Chamber	EA022
Measuring Device	EA0157
Power Supply ATX	EA0235

Software
MS-DOS 6.22
Checkit4

12.2 Temperature Tests at -40°C and +60°C

12.2.1 Startup / Function Test

Preparation	▸ Nominal Power Supply Voltage: 5.000V ▸ Stay at specified temperature: 30 min ▸ Time between Power off and on : 1min			
Flow	▸ Boot MS-DOS 20 times (Power on / Power off) ▸ Run CHECKIT4 tests with loopback connectors: <Systemplatine> <Serielle Schnittstelle> <Paralelle Schnittstelle>			
	at –40°C		at +60°C	
Result	**X**	Test passed successfully	**X**	Test passed successfully
		Test failed because		Test failed because
		Test skipped because		Test skipped because

Back to Index

13 Maximum Current Test

13.1 Used Hard- and Software

Hardware	Register
DUT	BOX 3
CompactFlash	SanDisk
Keyboard	EA0290
Monitor	EA0221
Climatic Chamber	EA0241
Ppower Supply ATX	EA0286
Power Supply HP	EA0145
Measuring Device	EA0158
Measuring Device	PPC ETX
Measuring Device	PPC ETX
Measuring Device	EA0157
HDD IDE	EA0251
Power Supply	EA0020

Software
MS-DOS 6.22
Memtest.exe
Windows 98
Winbench99

13.2 General Conditions

Nominal CPU Clock: **2,4 Ghz**
Memory: **512 MB**

No keyboard
No floppy disk drive
No other external devices

13.3 Power Consumption DOS

13.3.1 Remark

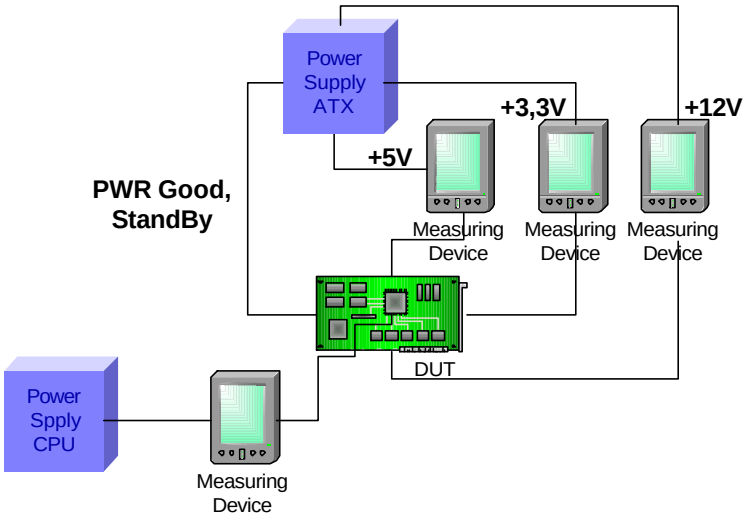
Power Consumption of a board is measured in three ways. The first method is on DOS prompt without the DOS TSR power.exe, during the second power.exe is running in background. The third measurement is during memtest.exe a DOS based memory test tool.
Using BIOS internal routines for Power Management is equivalent to using power.exe, because this TSR uses BIOS APM functions.
Settings:

- Set Power Management to enabled
- Set Standby Time to 1 min
- Set Suspend Time to 1 min

MS DOS Tool *Power.exe* does not significantly reduce Power Consumption and is for that reason not used.

Back to Index

13.3.2 Test Preparation



13.3.3 Result

Conditions			Result		
APM	**Temperature**	**Supply Voltage**	**Current [A]**	**Power [W]**	**Total [W]**
Power Management ***Max Saving*** enabled.	Room Temp	CPU	1,17	14,04	25,411
		3,3 V	2,37	7,821	
		+ 5 V	0,11	0,55	
		+ 12 V	0,25	3	
		CPU -10%	1,23	13,284	24,705
		3,3 V	2,37	7,821	
		+ 5 V	0,12	0,6	
		+ 12 V	0,25	3	
		CPU +10%	1,11	14,652	26,143
		3,3 V	2,37	7,821	
		+ 5 V	0,11	0,55	
		+ 12 V	0,26	3,12	
Without Power Management.		CPU	2,74	32,88	44,251
		3,3 V	2,37	7,821	
		+ 5 V	0,11	0,55	
		+ 12 V	0,25	3	
		CPU -10%	3,03	32,724	44,095
		3,3 V	2,37	7,821	
		+ 5 V	0,11	0,55	
		+ 12 V	0,25	3	
		CPU +10%	2,59	34,188	45,679
		3,3 V	2,37	7,821	
		+ 5 V	0,11	0,55	
		+ 12 V	0,26	3,12	
Memtest		CPU	3,62	43,44	58,161
		3,3 V	3,37	11,121	
		+ 5 V	0,12	0,6	
		+ 12 V	0,25	3	
		CPU -10%	3,81	41,148	55,886
		3,3 V	3,36	11,088	
		+ 5 V	0,13	0,65	
		+ 12 V	0,25	3	
		CPU +10%	3,37	44,484	59,359
		3,3 V	3,35	11,055	
		+ 5 V	0,14	0,7	
		+ 12 V	0,26	3,12	

Back to Index

13.4 Power Consumption Winbench99

Conditions	Temperature: Room Voltage: Nominal			
Flow	Start Winbench99 with selected test suite of Performance Test (+graphics benchmarks) Measure max current during benchmark is running			
Result	Current	**Supply Voltage**	**Current in A**	**Power Consumption in W**
		CPU	4,31	51,72
		3,3 V	3,21	10,593
		+ 5 V	0,15	0,75
		+ 12 V	0,45	5,4
	Power Consumption total	**68,46 W**		

Back to Index

14 Power Supply and Wires

14.1 General Definitions

The Power Supply test specifies the requirements that the power supply should fullfill at least.
To calculate these values it is neccessary to determine the current consumption of the assembly first.

Supply voltage:		**Nominal**
Measured current consumption I_{meas} :	CPU	**4,31 A**
	3,3 V	**3,21 A**
	+ 5 V	**0,15 A**
	+ 12 V	**0,45 A**

14.2 Result

		Formula	Result
Minimum cross cut section of Power supply cords		radius assumed to be r = 0,5mm	
Maximal length of power supply cords	CPU	$l = \frac{\Delta U * g * A}{2 * I}$ whereby ΔU = permitted voltage drop (3% of V_{CPU}) l : length of power cords I : I_{meas} * 2 γ : electr. Conductivity of the material γ_{copper} => 57m/Ω*mm^2 A: cord cross section (= Π*r^2 = 0.785 mm^2)	$l = \frac{0,36*57*0,785}{2*8,62}$ **l_{max} = 0,93 m**
	$V_{3,3}$	see CPU formula	$l = \frac{0,099*57*0,785}{2*6,42}$ **l_{max} = 0,34 m**
	V_5	see CPU formula	$l = \frac{0,15*57*0,785}{2*0,3}$ **l_{max} = 11,19 m**
	V_{12}	see CPU formula	$l = \frac{0,36*57*0,785}{2*0,9}$ **l_{max} = 8,95 m**
Minimal output of power supply		$P_{power\ supply} = V * I_{meas} * 2$ Whereby V_{cc}: nominal supply voltage I_{meas}: measured current consumption	**$P_{power\ supply}$ = 136,92 W**

Back to Index

15 Real Time Clock Test

15.1 Used Hard- and Software

Hardware	Register
DUT	Box1
HDD IDE	EA0146
Keyboard	EA0111
Monitor	EA0249
ChipDisk	EA0120
Climatic Chamber	EA0241
Ppower Supply ATX	EA0235
Power Supply HP	EA0030
Measuring device	EA0157

Software
MS-DOS 6.22
Checkit 3
AMIDIAG 5.42
AtomTime.exe

15.2 Test with CheckIt & Amidiag

<table>
<tr><td rowspan="11">Preparation

Flow</td><td colspan="5">Build up Test assembly and boot MS-DOS 6.22</td></tr>
<tr><td>Testsoftware</td><td colspan="3">Conditions</td><td>Result</td></tr>
<tr><td rowspan="4">Checkit:
Run 5 cycles of
→ Tests → “Systemplatine“</td><td>-30°C</td><td colspan="2">Nom</td><td>OK</td></tr>
<tr><td rowspan="2">Nom</td><td>3,14 V</td><td rowspan="2">3,3 V Supply
+/- 5%</td><td>OK</td></tr>
<tr><td>3,63 V</td><td>OK</td></tr>
<tr><td>+60°C</td><td colspan="2">Nom</td><td>OK</td></tr>
<tr><td rowspan="5">Amidiag:
Run 5 cycles of
→ System → Real Time Clock Test</td><td>-30°C</td><td colspan="2">Nom</td><td rowspan="5">RTC Periodic Interrupt not coming. This is a known behaviour of the Test software with comparatively fast processors and not seen as a problem.</td></tr>
<tr><td rowspan="2">Nom</td><td>3,14 V</td><td rowspan="2">3,3 V Supply
+/- 5%</td></tr>
<tr><td>3,63 V</td></tr>
<tr><td rowspan="2">+60°C</td><td colspan="2" rowspan="2">Nom</td></tr>
<tr></tr>
</table>

15.3 15h Tests

15.3.1 General Annotations

The CMOS Real Time Clock is powered by onboard or external battery and therefore runs also, when the board is not connected to the power supply. During Bootup the BIOS reads out CMOS Date and Time and sets the System (DOS) Time to the values of the CMOS RTC. Calling time operations under OSs will always return System Time.

Back to Index

15.3.2 15h CMOS Clock Test

Preparation	▸ Assure that there is a battery to supply the CMOS RTC of the DUT ▸ Install AtomTime (connects to an exact atomic clock via internet and calculates the divergence to System Time) ▸ Call up AtomTime and set System Time to Atomic Time	
Flow	▸ Shut down the DUT and wait for 15 hours ▸ Start DUT, run AtomTime and calculate divergence ▸ Assure that the local system time is not set to the server time at logon.	
Result	Local PC Difference:	**Clocks match**
	X	Test passed successfully
		Test failed because
		Test skipped because

15.3.3 15h System Clock Test

Preparation	▸ Install AtomTime (connects to an exact atomic clock via internet and calculates the divergence to System Time) ▸ Run AtomTime and set System Time to Atomic Time	
Flow	▸ Wait for 15 hours ▸ Run AtomTime and calculate divergence	
Result	Local PC Difference:	**5 sec. ahead**
	X	Test passed successfully
		Test failed because
		Test skipped because

15.4 Battery

If the DUT is supplied with an external battery, measure current consumption.
Nominal Battery Voltage : 3,0 V

15.4.1 Power supply off

Measured Battery Voltage [V]	Current [µA]	Power Consumption [µW]
3,0	12,4	36,95

15.4.2 Power supply on

Measured Battery Voltage [V]	Current [µA]	Power Consumption [µW]
3,0	-6,94	20,82

15.4.3 Voltage on battery socket

Preparation	▸ Take battery out of socket ▸ Turn on power supply	
Flow	▸ Measure voltage over battery connection pads and assure that no voltage from the board is fed back to the battery	
Result	Measured voltage:	**3,24 V**

Back to Index

16 Mechanical and Hardware Requirements

16.1 USB Protection

	Assure that a resettable overcurrent limiting mechanism like PTC or solid state switch is used to protect the USB powerline; a coil is not sufficient for this purpose	
Result	**X**	Test passed successfully
		Test failed because
		Test skipped because

16.2 Comparison To Form Factor Spec

	Assure that the dimensions of DUT matches the corresponding form factor specs such as PC104 / ETX / DIMM / PICMG / Half Size /	
Result	**X**	Test passed successfully, exceptions are described in the manual
		Test failed because
		Test skipped because board does not correspond to any form factor.

16.3 Fixing Holes

	Assure that there are fixing holes with the specified correct diameter for ▸ the board itself ▸ the chipdisk, flash disk ▸ extension modules	
Result	**X**	Test passed successfully
		Test failed because
		Test skipped because

16.4 Battery Circuit Protection

	According to EN60950 batteries have to be protected twice against charging. This double protection can consist out of a) Diode and a resistor b) 2 x Diode	
Result	**X**	Test passed successfully
		Test failed because
		Test skipped because

16.5 Memory, Chipdisk, Fan,...

	Assure that memory, chipdisk, display adapter, compact flash, pcmcia card, cooler and fan can be equipped at the same time without mechanical restrictions for any component	
Result	**X**	Test passed successfully
		Test failed because
		Test skipped because

Back to Index

17 Mean Time between Failures (MTbF)

The mean time between failures (MTBF) prediction is calculated using component and subassembly random failure rates. The calculation is based on the Bellcore Reliability Prediction Procedure, TR-NWT-000332, Issue 4, September 1991. The MTBF data is calculated from predicted data at 55 ºC.
The 886LCD-ATXU board MTBF is **111,732 hours**.

18 Product Safety Test

18.1 General Definitions

The Product safety test assures that the tested device complies with the european standard EN 60950.
The conformity with EN 60950 is mandatory for electronical devices used in the information technology. It states, that the device fullfills the Low Voltage Directive and at least flammability class 94V-0. The certificate is written out by the following institution:

Result:

Back to Index

19 Summary Of Test Results 886LCD/ATX

Chapter	Description	Seriousness	Status
	Remark: *RTC Periodic Interrupt not coming.* This is a known behaviour of the Test software with comparatively fast processors and not seen as a problem.	info	reported

20 Revision History

Date: 10.02.2003 A0 Document created

Back to Index