Report on the EMC Immunity Testing of the L440GX+ Server Board in the Ci Design* CiRS2100 Rack Mount chassis Lab. Ref. PVCS1346

Tested to EN50082-1:1992

IEC 61000-4-2 1995-01 Immunity to ESD
IEC 61000-4-3 1995-01 Electromagnetic Field Immunity test
IEC 61000-4-4 1995-01 Fast Transients

Certificate No FS 28707

In making any use of this test report you are expressly agreeing to the disclaimers and notices below:

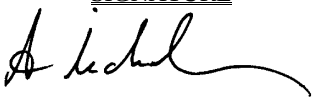
THIS TEST REPORT IS PROVIDED "AS IS" WITH NO WARRANTY WHATSOEVER, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO THOSE FOR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY, MERCHANTABILITY OR SATISFACTIRY QUALITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY WARRANTY OTHERWISE ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE.
INTEL ASSUMES NO RESPONSIBILITY FOR ANY ERRORS WHICH MAY APPEAR IN THIS DOCUMENT.
THIS INFORMATION IS FOR REFERENCE USE BY PC INTEGRATORS ONLY. PC INTEGRATORS ARE NOT AUTHORISED TO REFER TO INTEL'S TESTING OR REPORTING ACTIVITIES IN ADVERTISING OR ANY OTHER MANNER.

Information in this document is provided solely in connection with and to enable the use of Intel products. Intel assumes no liability whatsoever, including infringement of any patent or copyright, for sale and use of Intel products except as provided in Intel's Terms and Conditions of Sale for such products. Intel retain the right to make changes to its test specifications and Intel Products at any time, without notice nor does Intel make a commitment to update the information contained herein. The hardware vendor remains solely responsible for the design, sale and functionality of its product, including any liability arising from product infringement or product warranty. Intel accepts no liability for the quality of third party suppliers, and cannot guarantee that third party products are compatible with Intel products or that third party suppliers will not change parts so that they are no longer compliant.
No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by the sale of Intel products.
Intel products are not intended for use in medical, life saving, or life sustaining applications.

IN NO EVENT WILL INTEL BE LIABLE FOR ANY LOSS OF PROFITS, LOSS OF USE, BUSINESS INTERRUPTIONS, INCIDENTAL, INDIRECT, SPECULATIVE CONSEQUENTIAL OR SPECIAL DAMAGES, IRRESPECTIVE OF WHETHER INTEL HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.
IN NO EVENT WILL INTEL'S TOTAL LIABILITY TO BUYER UNDER THIS AGREEMENT EXCEED THE VALUE OF THE INTEL PRODUCT THAT CAUSES SUCH LOSS OR DAMAGE.
IN NO EVENT WILL INTEL BE LIABLE IN INDEMNITY.

THE LIMITATIONS AND DISCLAIMERS SET OUT IN THIS AGREEMENT WERE AN ESSENTIAL ELEMENT IN INTEL AGREEING TO SUPPLY THIS TEST REPORT FREE OF CHARGE.

CONDUCTED TEST	TESTED BY & DATE		SIGNATURE
IEC 61000-4-2 1995-01 Immunity to ESD	Donna Fraser	06/06/00	
IEC 61000-4-3 1995-01 Electromagnetic Field Immunity test	Donna Fraser	05/06/00	
IEC 61000-4-4 1995-01 Fast Transients	Donna Fraser	05/06/00	

APPROVED BY & DATE		SIGNATURE
Ann Nicholas	06/06/00	

CONTENTS

1. INTRODUCTION

1.1. Introduction

This report presents the results of the EMC Immunity tests on the L440GX+ Server Board in the Ci Design CiRS2100 Rack Mount chassis – Lab. Ref. PVCS1346 to the generic immunity standard EN50082-1:1992. This in turn entailed testing to the following:

- IEC 61000-4-2 1995-01 Immunity to ESD
- IEC 61000-4-3 1995-01 Electromagnetic Field Immunity test
- IEC 61000-4-4 1995-01 Fast Transients

The testing was carried out by INTEL CORPORATION (UK) LTD at their Engineering test facilities located at

Intel Corporation (UK) Ltd
Pipers Way
Swindon
Wiltshire
England
SN3 1RJ

This report also details the configuration of the equipment under test, the test methods used, and any relevant modifications where appropriate.

1.2. Summary of Issues

A summary of Action Items for hardware related issues are given below.

An Action Item (AI) means that the particular test is not meeting the relevant specification and could prevent correct operation of the named EUT.

Other items in this report may be marked as FYI. These are recommendations or observations that may be of interest to the system designer.

1.2.1. Action Items

- None.

1.2.2. FYI Items

- From the results in this report it can be seen that the EUT passed EN50082-1 (1992).

2. EQUIPMENT UNDER TEST (EUT)

2.1. EUT.

Figure 2-1 Ci Design CiRS2100 Rack Mount chassis

2.2. EUT Configuration.

Supplier	Description	Model/Part Number	Serial Number	Location
Ci Design	2U Rack Mount Chassis	Ci Rack Server 2U	None	N/A
Ci Design	ATX Server Power Supply	CA-300WATX	01181	R/H side of chassis
Intel	L440GX Server board	AA 721242-011	IWLW1004539	N/A
Intel	Pentium® III Processor	80526PY850256	90098026-0017	Primary Slot
Intel	Pentium® III Processor	80526PY850256	90098026-0347	Secondary Slot
Toshiba*	128MB 100MHz ECC DIMM x4	THMY721661EG-10	None	DIMM 1 To 4
Sony*	Floppy Drive	MPF920-E	54316748	Top 3.5” peripheral bay
Quantum*	18GB Hard Drive	Atlas 10K	111917440911	Top L/H side HDD peripheral bay
Quantum	18GB Hard Drive	Atlas 10K	111917342957	Bottom L/H side HDD peripheral bay
Quantum	18GB Hard Drive	Atlas 10K	111917440737	Top R/H side HDD peripheral bay
Sony	32X IDE CDROM Drive	CDU701	7004556	Bottom 5.25” peripheral Bay
Intel	Server RAID Card	A00773-002	018542-44907	PCI Slot 6 mounted on riser card

Table 2-1

2.3. Support Equipment

2.3.1. Anechoic Chamber 3 meter

Supplier	Description	Model/Part Number
Cherry*	Keyboard	PS/2
Logitech*	Mouse	PS/2
NEC*	Monitor	Multisync* XV15
Intel Corporation	Serial Emulator	C12573
Intel Corporation	Parallel Emulator	C12574
Intel Corporation	USB Camera	680942-002

Table 2-2

2.3.2. Screened Chamber

Supplier	Description	Model/Part Number
Cherry	Keyboard	PS/2
Logitech	Mouse	PS/2
NEC	Monitor	Multisync XV15
Intel Corporation	Serial Emulator	C12573
Intel Corporation	Parallel Emulator	C12574
Intel Corporation	USB Camera	680942-002

Table 2-3

2.4. EUT Deviations and Comments

EUT tested with two 850MHz modules, Intel Pentium® III Processors with active heatsink and fan.
Four Sunon* 12v 3" Fans (KD1208PTB2-6 were positioned in the middle of chassis.
The Intel Independent I/O shield was fitted in the chassis.
BIOS version L440GX0.86B.0115.P12.

2.5. Software

The program used to exercise the EUT was the EMC test software version 2.2 which was running under Microsoft* Windows NT* 4.0 Server. Video resolution was set at 800x600.

The EMC test software version 2.2 is designed to exercise the various EUT components in a manner similar to typical use. The software was installed on the hard disk drive and starts automatically on EUT power up. Once started the software exercises each of the following EUT components:

CDROM drive - reads data from the CD-ROM. The directory tree is scanned and data is read until a given number of bytes (1.5M) have been read.
Hard disk drive - writes, read and verifies 64K bytes of data on each drive.
Floppy drive - writes, read and verifies one sector for each working drive.
Keyboard - performs a keyboard confidence test.
Monitor - either inverts the colour of every pixel on the screen or continually outputs 'H' characters.
Mouse uses the driver to do a mouse confidence test.
Parallel port - either 256 (with loopback connector) or 54 (without) characters (A-z, a-z) are written (and with loopback connector, also read back).
Serial port - the line is configured, if a loopback connector is present a non-blocking read is issued, (baudrate/20, max 6000) characters (streams of 0-9) are written, and the same number of characters must be read back (only if a loopback connector is present).
USB - Reads device descriptor from each device attached. On subsequent reads it verifies that the data is correct.
Network - Writes a file to a specified directory then reads it back.

3. IEC 61000-4-2 1995-01 Immunity to ESD

3.1. Test Setup

The EUT was placed on a horizontal metal coupling plane separated by a mylar sheet on top of a fixed wooden table. A vertical metal coupling plane, attached to a 10cm block of wood, was then positioned against the EUT such that the wood was between the EUT and the coupling plane.

3.2. Test Equipment

Supplier	Description	Model/Part Number	Serial Number
EM Test	ESD Simulator, Contact & Air Discharge Guns	ESD 30	0496-47

Table 3-1

3.3. EUT

See section 2.1

3.4. Support Equipment Deviations

None.

3.5. Test Method

The EUT was placed on a ground plane as described in section 7.1 of the above specification and static electricity discharges were applied as per the specification. The severity used was level 3, 4KV contact and 8KV air discharge.

3.6. EUT pass/fail Criteria

Loss or corruption of data during the test (i.e. HDD, FDD, CDROM, Serial and Parallel EMC tests) constitutes a failure. Failure of Mouse or Keyboard during test only constitutes a failure if the Mouse or Keyboard fails to operate after the tests are completed.

3.7. Monitoring of EUT

The EUT was visually observed to see if any part of the EUT stopped operating.

3.8. Test Results

3.8.1. CONTACT DISCHARGE

TEST POINT		PERFORMANCE CRITERIA			
		+2KV	-2KV	+4KV	-4KV
1	Horizontal coupling plane	Pass	Pass	Pass	Pass
2	Vertical coupling plane	Pass	Pass	Pass	Pass
3	Chassis securing screws	Pass	Pass	Pass	Pass
4	Power Supply securing screws	Pass	Pass	Pass	Pass
5	Fan securing screws	Pass	Pass	Pass	Pass
6	Serial connectors	Pass	Pass	Pass	Pass
7	Parallel connector	Pass	Pass	Pass	Pass
8	Video connector	Pass	Pass	Pass	Pass

Table 3-2

3.8.2. AIR DISCHARGE

TEST POINT		PERFORMANCE CRITERIA					
		+2KV	-2KV	+4KV	-4KV	+8KV	-8KV
1	Top of chassis	Pass	Pass	Pass	Pass	Pass	Pass
2	Side panel	Pass	Pass	Pass	Pass	Pass	Pass
3	Floppy drive	Pass	Pass	Pass	Pass	Pass	Pass
4	CD ROM	Pass	Pass	Pass	Pass	Pass	Pass
5	Power/reset buttons	Pass	Pass	Pass	Pass	Pass	Pass

Table 3-3

Compliant to performance criteria for this test.

4. IEC 61000-4-3 1995-01 Electromagnetic Field Immunity test

4.1. Test Setup

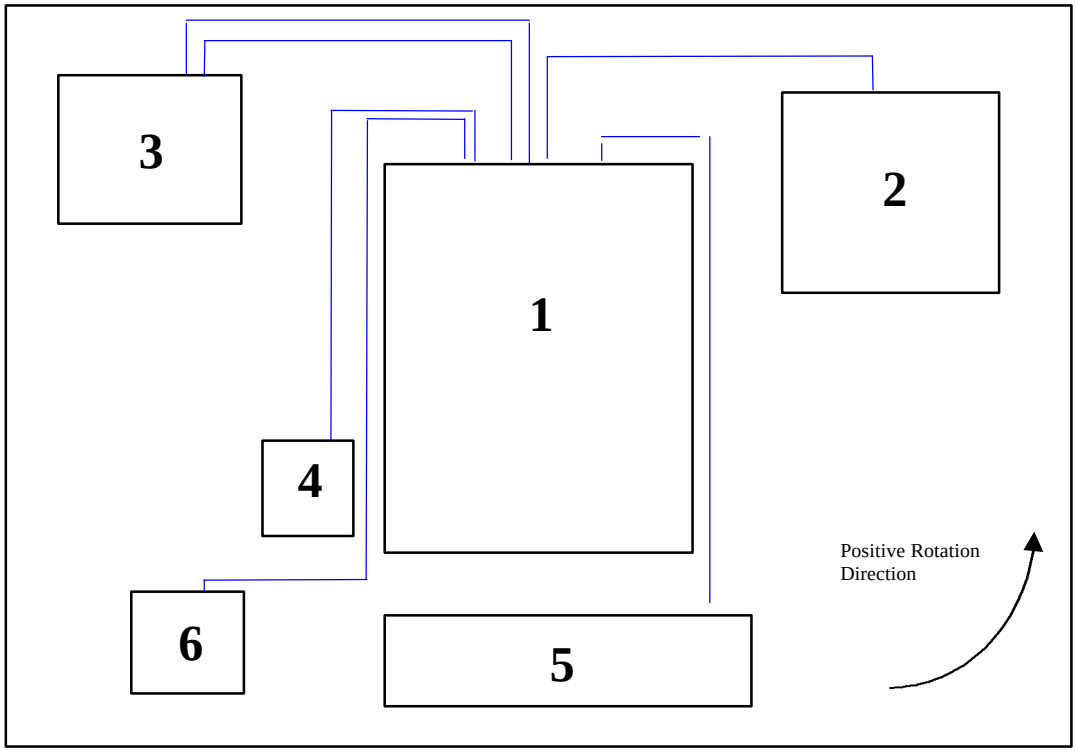


Figure 4-1 Generic test set-up

1. Equipment Under Test
2. Monitor
3. Peripheral Emulators (Parallel & Serial)
4. USB Camera
5. Keyboard
6. Mouse

4.2. Test Equipment

Reference	Description	Model/Part Number	Serial Number
Marconi Instruments	Power Sensor	6912	1245
Marconi Instruments	Power Meter	6960B	237009/010
Marconi Instruments	Signal Generator	2023	12158/078
Amplifier Research	Amplifier	100W 1000M1	17521
Amplifier Research	Power Coupler	DC1680	17389
Chase	Bi-Log Antenna	CBL6112B	2556

Table 4-1

4.3. EUT

See section 2.1

4.4. Support Equipment Deviations

None.

4.5. Test Method

The EUT was tested with each of its four sides coincident with the calibration plane, as per the specification. The test field strength used was 5.5V/m (2.5V/m above the requirements of level 2). Dwell time at each frequency in the selected range was 3 seconds.

4.6. EUT pass/fail Criteria

Loss or corruption of data during the test (i.e. HDD, FDD, CDROM, Serial and Parallel EMC tests) constitutes a failure.

4.7. Monitoring of EUT

The EUT was visually observed to see if any part of the EUT stopped operating.

4.8. Test Results

4·5V/m 80% AM 1KHZ FREQUENCY	LEVEL	PERFORMANCE CRITERIA
0°	Vertical	Pass
0°	Horizontal	Pass
90°	Vertical	Pass
90°	Horizontal	Pass
180°	Vertical	Pass
180°	Horizontal	Pass
270°	Vertical	Pass
270°	Horizontal	Pass

Table 4-2

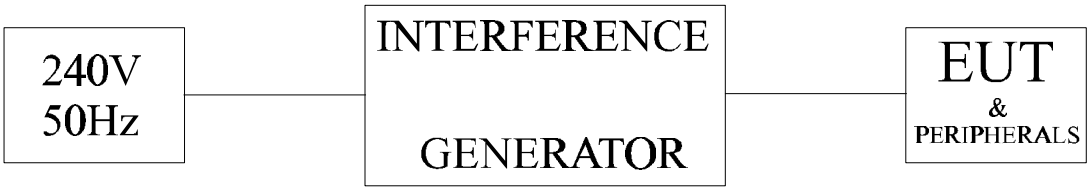
Compliant to performance criteria for this test.

5. IEC 61000-4-4 1995-01 Fast Transients

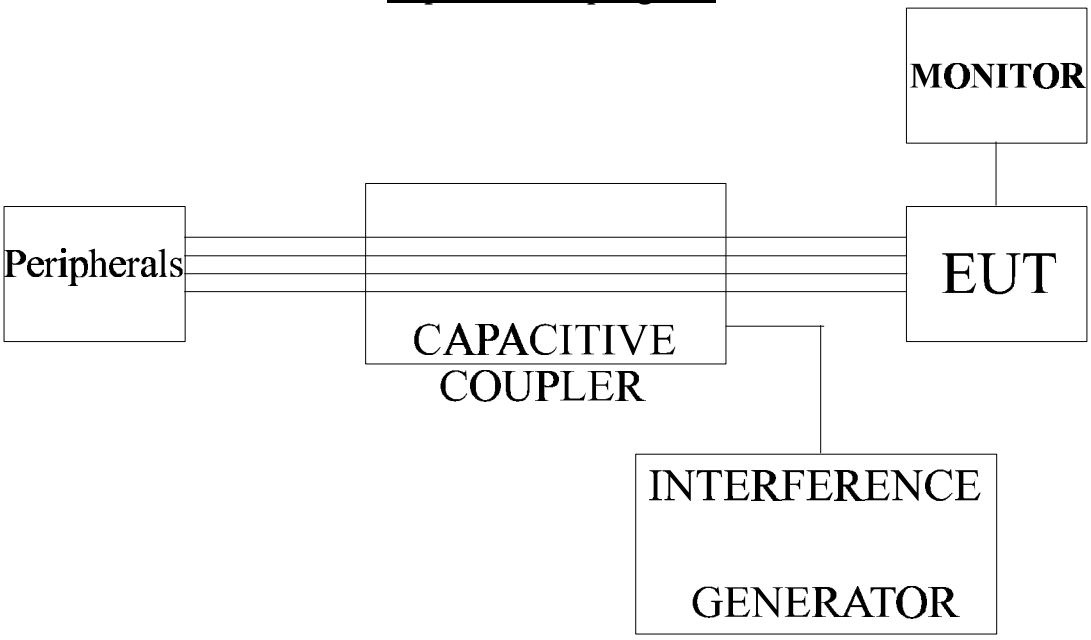
5.1. Test Setup

The EUT was placed on top of a fixed wooden table as shown in the following two diagrams.

Fast Transient Test



Capacitive Coupling Test



5.2. Test Equipment

Supplier	Description	Model/Part Number	Serial Number
EM Test	Interference Generator (Burst Generator)	EFT 500	0196-22
HFK	Capacitive Coupler	None	0196-24

Table 5-1

5.3. EUT

See section 2.1.

5.4. Support Equipment Deviations

None.

5.5. Test Method

As per the specification.

5.6. EUT pass/fail Criteria

Loss or corruption of data during the test (i.e. HDD, FDD, CDROM, Serial and Parallel EMC tests) constitutes a failure. Failure of Mouse or Keyboard during test only constitutes a failure if the Mouse or Keyboard fails to operate after the tests are completed.

5.7. Monitoring of EUT

The EUT was visually observed to see if any part of the EUT stopped operating.

5.8. Test Results

5.8.1. AC POWERLINE

TEST POINT	LEVEL (kV)	PERFORMANCE CRITERIA
LIVE	±1	Pass
NEUTRAL	±1	Pass
EARTH	±1	Pass
LIVE + NEUTRAL	±1	Pass

Table 5-2

5.8.2. I/O CABLES (as per list)

TEST POINT	LEVEL (V)	PERFORMANCE CRITERIA
CAPACITIVE COUPLER	±500	Pass

Table 5-3 Keyboard, Mouse, COM1, COM2, Parallel.

Compliant to performance criteria for this test.

6. CONCLUSIONS

The compliance levels achieved by the L440GX+ Server Board in the Ci Design, CiRS2100 Rack Mount chassis were:

TEST	PERFORMANCE CRITERIA
Immunity to ESD	Pass
Field Uniformity	Pass
Fast Transients, AC Powerline	Pass
Fast Transients, I/O Cables	Pass

Table 6-1

The EUT therefore passes EN50082-1:1992.

Parts	61000-4-2
	61000-4-3
	61000-4-4