
**Report on the
EMC Immunity
Testing of the
L440GX+ Server Board in the
AMC RPC-500 Rack Mount Chassis
Lab. Ref. PVCS1117**

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



EMC Immunity tests of
L440GX+ server board in AMC RPC-500
Lab. Ref. PVCS1117

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Lab. Ref. PVCS1117

Report Date
26 February 1999

<u>CONDUCTED TEST</u>	<u>TESTED BY & DATE of TESTS</u>		<u>SIGNATURE</u>
IEC 61000-4-2 1995-01 Immunity to ESD	Ann Nicholas	23/02/99	
IEC 61000-4-3 1995-01 Electromagnetic Field Immunity test	Ann Nicholas	25/02/99	
IEC 61000-4-4 1995-01 Fast Transients	Ann Nicholas	25/02/99	

APPROVED BY & DATE

SIGNATURE

Simon Lambden 26/02/99



EMC Immunity tests of
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Lab. Ref. PVCS1117

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1. INTRODUCTION

1.1. Introduction

This report presents the results of the EMC Immunity tests on the L440GX+ server board in the AMC RPC-500 Rack Mount Chassis - Lab. Ref. PVCS1117 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 (EUT), the test methods used, and any relevant modifications where appropriate.

1.2. Summary of Issues

A summary of Action Items for hardware related issues is 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 EUT designer.

Any recommendations in this report are based on observation and limited testing of the EUT in an “as purchased” condition. No attempt has been made to retest or fully validate these recommendations through modeling or modification of the existing EUT design.

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

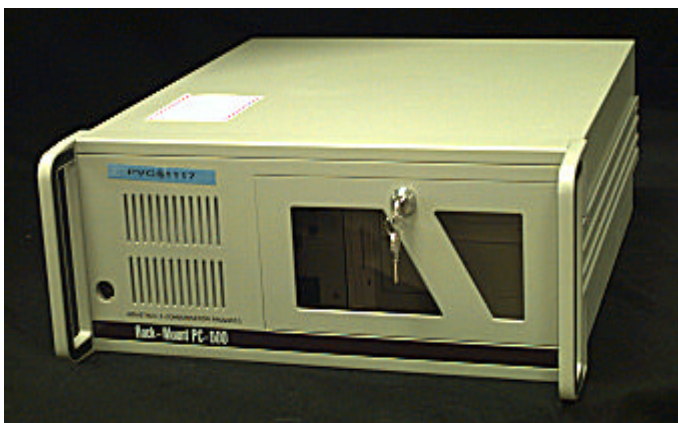


Figure 2-1 AMC RPC-500 Rack Mount Chassis

2.2. EUT Configuration.

Supplier	Description	Model/Part Number	Serial Number	Location
AMC	ATX Rack Mount Chassis	RPC-500	DOB0528009	N/A
Portwell*	ATX Power Supply	PW-300ATX	5388798	R/H back of chassis
Intel	L440GX Server board	PBA 721242-001	INLW90300235	N/A
Intel	Pentium® III Processor	80525PY500512 Q818ES	48479406-0384 A4	Slot 2
Intel	Pentium® III Processor	80525PY500512 Q818ES	48479406-0328 A4	Slot 1
Toshiba*	128MB 100MHz ECC DIMM	THMY721661EG-10	None	N/A
Sony*	Floppy Drive	MPF920-E	53172285	Top External 3.5" bay
Sony	32X IDE CDROM Drive	CDU701	5122189-10	Top 5.25" Bay
Seagate*	9GB Hard Drive	ST39173W	LM040217	Bottom 3.5" Bay

Table 2-1

NOTE: Four 128MB, 100MHz ECC DIMM were fitted.

2.3. EUT Deviations and Comments.

EUT tested with two 500MHz modules, Intel Pentium® III Processor with active heatsink and fan. The Intel Independent I/O shield was fitted in the chassis. Two Delta Electronics Inc fans (P/N AFB0812H and WFB1212H) fitted at the front of the chassis. BIOS version L440GX0.86B.0029.P01.9812180939.

2.4. Support Equipment

2.4.1. Screened Chamber

Supplier	Description	Model/Part Number	Serial Number
Cherry	Keyboard	PS/2	00007
Logitec*	Mouse	PS/2	LTC60301831
NEC	Monitor	Multisync XV15	6Z00287EA
Intel Corporation	USB Camera	680942-002	None
Intel Corporation	Serial Emulator	C12573	None
Intel Corporation	Parallel Emulator	C12574	None

Table 2-2

2.4.2. Anechoic Chamber 3 metre

Supplier	Description	Model/Part Number	Serial Number
Cherry*	Keyboard	PS/2	G 027286 G21
Logitec	Mouse	PS/2	None
NEC*	Monitor	Multisync* E500	7Z05020EA
Intel Corporation	USB Camera	680942-002	None
Intel Corporation	Serial Emulator	C12573	None
Intel Corporation	Parallel Emulator	C12574	None

Table 2-3

2.5. Software

The program used to exercise the EUT was the EMC test software version 2.0 which was running under Microsoft Windows NT* 4.0 Server. Video resolution was set at 800x600.

The EMC test software version 2.0 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
Compliance Design Inc.	ESD Simulator, Contact & Air Discharge Guns	ESD 2000I	003063

Table 3-1

3.3. EUT

As specified in section 2

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, 6KV 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					
		✓ = Pass ✗ = Fail					
		+2KV	-2KV	+4KV	-4KV	+6KV	-6KV
1	Horizontal coupling plane	✓	✓	✓	✓	✓	✓
2	Vertical coupling plane	✓	✓	✓	✓	✓	✓
3	Chassis securing screws	✓	✓	✓	✓	✓	✓
4	PSU securing screws	✓	✓	✓	✓	✓	✓
5	Chassis screws	✓	✓	✓	✓	✓	✓
6	Serial connectors	✓	✓	✓	✓	✓	✓
7	Parallel connector	✓	✓	✓	✓	✓	✓
8	5.25" blanking plate	✓	✓	✓	✓	✓	✓
9	Video connector	✓	✓	✓	✓	✓	✓

Table 3-2

3.8.2. AIR DISCHARGE

TEST POINT		PERFORMANCE CRITERIA					
		✓ = Pass ✗ = Fail					
		+2KV	-2KV	+4KV	-4KV	+8KV	-8KV
1	Floppy drive	✓	✓	✓	✓	✓	✓
2	CDROM	✓	✓	✓	✓	✓	✓
3	Power LED	✓	✓	✓	✓	✓	✓
4	HDD LED	✓	✓	✓	✓	✓	✓
5	Power /Reset switches	✓	✓	✓	✓	✓	✓

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

Midi-Tower (3 meter Anechoic Chamber)

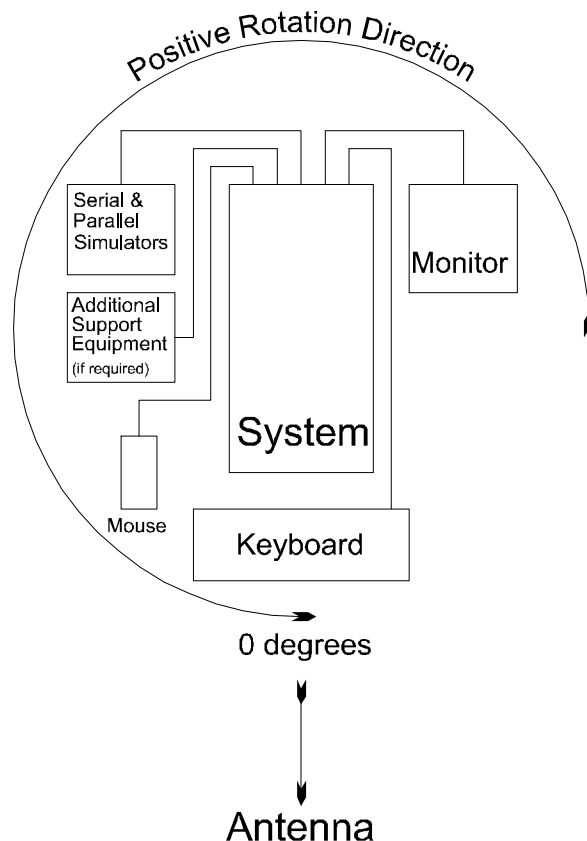


Figure 4-1

4.2. Test Equipment

Supplier	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	CBL6121A	1017

Table 4-1

**EMC Immunity tests of
L440GX+ server board in AMC RPC-500
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4.3. EUT

As specified in section 2

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 ✓ = Pass ✗ = Fail	
0°	Vertical		✓
0°	Horizontal		✓
90°	Vertical		✓
90°	Horizontal		✓
180°	Vertical		✓
180°	Horizontal		✓
270°	Vertical		✓
270°	Horizontal		✓

Table 4-2

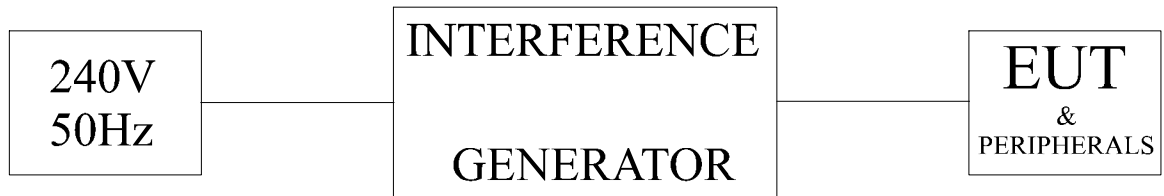
Compliant to performance criteria for this test.

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

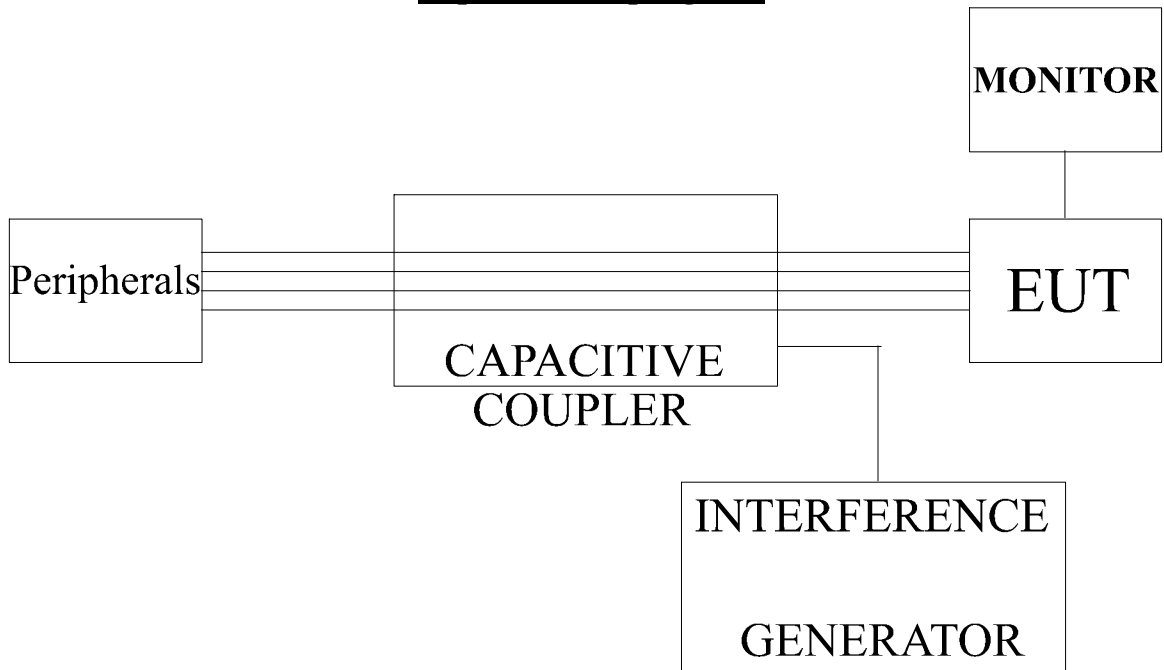
5.1. Test Setup

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

As specified in section 2

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	
		✓ = Pass	✗ = Fail
LIVE	±1	✓	
NEUTRAL	±1	✓	
EARTH	±1	✓	
LIVE + NEUTRAL	±1	✓	

Table 5-2

5.8.2. I/O CABLES (as per list)

TEST POINT	LEVEL (V)	PERFORMANCE CRITERIA	
		✓ = Pass	✗ = Fail
CAPACITIVE COUPLER	±500	✓	

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 AMC RPC-500 Rack Mount Chassis were:

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

Table 6-1

The EUT therefore passes EN50082-1:1992.

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