

**Report on the
EMC Immunity
Testing of the
STL2 Server Board in the
Enlight* EN-8950 ATX File Server
Lab. Ref. PVCS1400**

Tested to EN55024:1998

EN 61000-4-2 Electrostatic Discharge (ESD) Immunity Test
EN 61000-4-3 Radiated Radio-Frequency Electromagnetic Field Immunity Test
EN 61000-4-4 Electrical Fast Transient (EFT)/Burst Immunity Test
EN 61000-4-5 Surge Immunity Test
EN 61000-4-6 Immunity to Conducted Disturbances Induced by RF Fields
EN 61000-4-11 Voltage Dips and Interruptions



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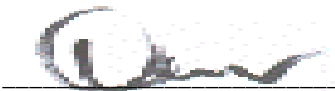




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EN 61000-4-2 Electrostatic Discharge (ESD) Immunity Test	Donna Fraser	23/10/00	
EN 61000-4-3 Radiated Radio-Frequency Electromagnetic Field Immunity Test	Donna Fraser	27/10/00	
EN 61000-4-4 Electrical Fast Transient (EFT)/Burst Immunity Test	Donna Fraser	23/10/00	
EN 61000-4-5 Surge Immunity Test	Donna Fraser	23/10/00	
EN 61000-4-6 Immunity to Conducted Disturbances Induced by RF Fields	Donna Fraser	23/10/00	
EN 61000-4-11 Voltage Dips and Interruptions	Donna Fraser	23/10/00	

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1. INTRODUCTION

1.1. Introduction

This report presents the results of the EMC Immunity tests on the STL2 Server Board in the Enlight EN - 8950 ATX File Server – Lab. Ref. PVCS1400 to the generic immunity standard EN55024:1998. This in turn entailed testing to the following:

- EN 61000-4-2 Electrostatic Discharge (ESD) Immunity Test
- EN 61000-4-3 Radiated Radio-Frequency Electromagnetic Field Immunity Test
- EN 61000-4-4 Electrical Fast Transient (EFT)/Burst Immunity Test
- EN 61000-4-5 Surge Immunity Test
- EN 61000-4-6 Immunity to Conducted Disturbances Induced by RF Fields
- EN 61000-4-11 Voltage Dips and Interruptions

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 Testing

Test	Result
EN 61000-4-2 Electrostatic Discharge (ESD) Immunity Test	Meets
EN 61000-4-3 Radiated Radio-Frequency Electromagnetic Field Immunity Test	Meets
EN 61000-4-4 Electrical Fast Transient (EFT)/Burst Immunity Test	Meets
EN 61000-4-5 Surge Immunity Test	Meets
EN 61000-4-6 Immunity to Conducted Disturbances Induced by RF Fields	Meets
EN 61000-4-11 Voltage Dips and Interruptions	Meets

Table 1-1

2. TEST METHODOLOGY

Environmental Phenomena	Basic Test Method	Performance Criteria	Test Specification
Electrostatic Discharge	EN 61000-4-2 1995	Performance Criteria B specified by EN 55024	EN 55024 1998
Radio Frequency Electromagnetic Field	EN 61000-4-3 1998	Performance Criteria A specified by EN 55024	EN 55024 1998
Electrical Fast Transients	EN 61000-4-4 1995	Performance Criteria B specified by EN 55024	EN 55024 1998
Surge	EN 61000-4-5 1995	Performance Criteria B specified by EN 55024	EN 55024 1998
Radio Frequency Common Mode	EN 61000-4-6 1997	Performance Criteria A specified by EN 55024	EN 55024 1998
Voltage Dips 30% Reduction	EN 61000-4-11 1994	Performance Criteria C specified by EN 55024	EN 55024 1998
Voltage Dips 100% Reduction	EN 61000-4-11 1994	Performance Criteria B specified by EN 55024	EN 55024 1998
Voltage Interruptions	EN 61000-4-11 1994	Performance Criteria C specified by EN 55024	EN 55024 1998

Table 2-1

2.1. Performance Criteria.

The following performance criteria specified under EN 55024:1998 were utilised to evaluate the performance of the EUT during test. The manufacturer may specify an alternative performance criterion, which would be referenced under section of this test report.

Performance Criteria A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specific by the manufacturer, then either of these may be derived from the product description and documentation and by what the user may reasonably expect from the equipment if used as intended.

Performance Criteria B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, not by what the user may reasonably expect from the equipment if used as intended.

Performance Criteria C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3. EQUIPMENT UNDER TEST (EUT)

3.1. EUT.



Figure 3-1 Enlight, EN8950 File Server Tower Chassis

3.2. EUT Configuration.

Supplier	Description	Model/Part Number	Serial Number	Location
Enlight	ATX File Server Chassis	EN-8950	C994101	N/A
Delta*	ATX Power Supply	RPS800	1000051	Top back of chassis
Intel	STL2 Server board	DG7ESZ	2AA1000192	N/A
VXI*	VRM	073-20770-01	None	VRM Socket
Intel	Pentium® III Processor	RB80526PZ001256	L026A588-0230	Primary CPU Socket
Intel	Pentium® III Processor	RB80526PZ001256	L026A588-0258	Secondary CPU Socket
NEC*	MB 133MHz ECC Reg. DIMM x4	PC133R-333-542-A1	None	DIMM 1 To 4
Sony*	Floppy Drive	MPF920-E	54316748	External floppy peripheral bay
Seagate*	18.5GB SCSI Hard Drive (Hot Swap)	ST318451LL	3CC008LP	1 st Hot Swap Bay
Seagate	18.5GB SCSI Hard Drive (Hot Swap)	ST318451LL	3CC007MA	2 nd Hot Swap Bay
Seagate	18.5GB SCSI Hard Drive (Hot Swap)	ST318451LL	3CC006MM	3 rd Hot Swap Bay
Sony	32X IDE CDROM Drive	CDU701	7004557	External top 5.25" peripheral bay
Intel	SRCU31 RAID Controller Card	PBA A2497-010	INGW03800076	PCI Slot 6

Table 3-1

3.3. Support Equipment

3.3.1. Anechoic Chamber 3 meter

Supplier	Description	Model/Part Number	Cable description
Cherry*	PS/2 Keyboard	MY 3000	2M shielded
Logitech*	PS/2 Mouse	MS-35	2M unshielded
NEC	Monitor	Multisync* E500	2M shielded
Intel Corporation	Serial Emulator	C12573	2.5M shielded
Intel Corporation	Parallel Emulator	C12574	1.5M shielded
Intel Corporation	USB Camera	680942-002	2M unshielded

Table 3-2

3.3.2. Screened Chamber 1

Supplier	Description	Model/Part Number	Cable description
Cherry	PS/2 Keyboard	MY 3000	2M shielded
Logitech	PS/2 Mouse	MS-35	2M unshielded
NEC	Monitor	Multisync XV15+	2M shielded
Intel Corporation	Serial Emulator	C12573	2.5M shielded
Intel Corporation	Parallel Emulator	C12574	1.5M shielded
Intel Corporation	USB Camera	680942-002	2M unshielded

Table 3-3

3.3.3. Screened Chamber 2

Supplier	Description	Model/Part Number	Cable description
Cherry	PS/2 Keyboard	MY 3000	2M shielded
Logitech	PS/2 Mouse	MS-35	2M unshielded
NEC	Monitor	Multisync E500	2M shielded
Intel Corporation	Serial Emulator	C12573	2.5M shielded
Intel Corporation	Parallel Emulator	C12574	1.5M shielded
Intel Corporation	USB Camera	680942-002	2M unshielded

Table 3-4

3.4. EUT Deviations and Comments

EUT tested with two 1GHz module, Intel Pentium® III Processor with active heatsink and fan.

The Intel Independent I/O shield was fitted in the chassis.

Three Suncon* 12v 3" fans (KD208PTB2) fitted. Two positioned back middle of chassis and one positioned in hard drive bay.

BIOS version STL20.86B.0015.P01.

3.5. 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.

4. EN 61000-4-2 Electrostatic Discharge (ESD) Immunity Test

4.1. 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.

4.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
EM Test	ESD Simulator, Contact & Air Discharge Guns	ESD 30	0496-47	13 th Nov. 2000

Table 4-1

4.3. EUT

See section 3.1

4.4. Support Equipment Deviations

None.

4.5. 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.

4.6. EUT pass/fail Criteria

See section 2.1

4.7. Monitoring of EUT

As per performance criteria B.

4.8. Test Results

4.8.1. 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	PSU top left screw	Pass	Pass	Pass	Pass
5	PSU bottom left screw	Pass	Pass	Pass	Pass
6	PSU bottom right screw	Pass	Pass	Pass	Pass
7	PSU switch selector screw	Pass	Pass	Pass	Pass
8	Top serial connector	Pass	Pass	Pass	Pass
9	Bottom serial connector	Pass	Pass	Pass	Pass
10	Parallel connector	Pass	Pass	Pass	Pass
11	Video connector	Pass	Pass	Pass	Pass

Table 4-2

4.8.2. 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 LED	Pass	Pass	Pass	Pass	Pass	Pass

Table 4-3

Compliant to performance criteria for this test.

5. EN 61000-4-3 Radiated Radio-Frequency Electromagnetic Field Immunity Test

5.1. Test Setup



Figure 5-1 Generic test set-up

See section 3.3 for details of support equipment.

5.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
Marconi Instruments	Power Sensor	6912	1245	10 th Mar. 2002
Marconi Instruments	Power Meter	6960B	237009/010	15 th May 2002
Marconi Instruments	Signal Generator	2023	12158/078	4 th May 2002
Amplifier Research	Amplifier	100W 1000M1	17521	NCR
Amplifier Research	Power Coupler	DC1680	17389	5 th Nov. 2001
Chase	Bi-Log Antenna	CBL6121A	1017	13 th Jul. 2001

Table 5-1

5.3. EUT

See section 3.1

5.4. Support Equipment Deviations

None.

5.5. 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.

5.6. EUT pass/fail Criteria

See section 2.1.

5.7. Monitoring of EUT

As per performance criteria A.

5.8. Test Results

Environmental Status

23.5°C Temperature, 44% Humidity and 1019mB Barometric Pressure

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 5-2

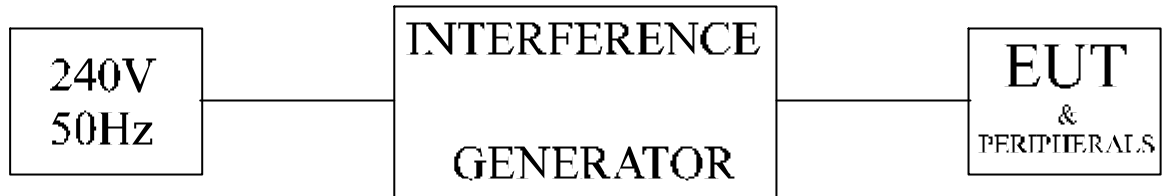
Compliant to performance criteria for this test.

6. EN 61000-4-4 Electrical Fast Transient (EFT)/Burst Immunity Test

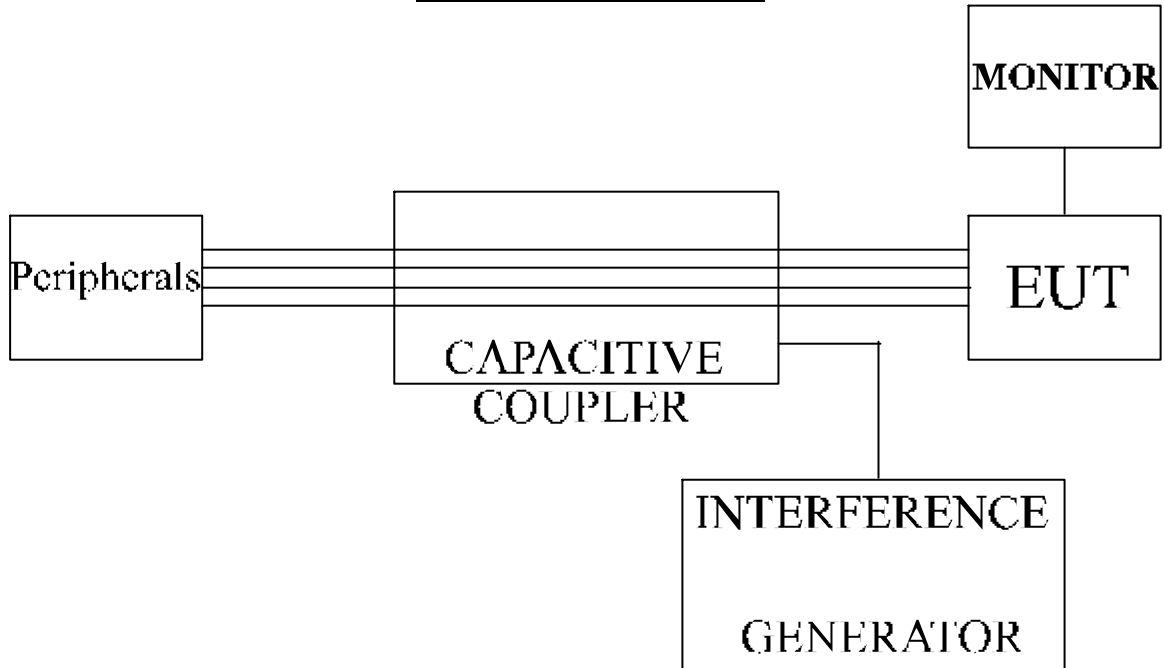
6.1. Test Setup

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

Fast Transient Test



Capacitive Coupling Test



6.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
EM Test	Interference Generator (Burst Generator)	EFT 500	0196-22	23 rd Sep. 2001
HFK	Capacitive Coupler	None	0196-24	NCR

Table 6-1

6.3. EUT

See section 3.1.

6.4. Support Equipment Deviations
None.

6.5. Test Method
As per the specification.

6.6. EUT pass/fail Criteria
See section 2.1.

6.7. Monitoring of EUT
As per performance criteria B.

6.8. Test Results
Environmental Status
23.5°C Temperature, 44% Humidity and 1019mB Barometric Pressure

6.8.1. AC POWERLINE

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

Table 6-2

6.8.2. I/O CABLES (as per list)

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

Table 6-3 Keyboard, Mouse, COM1, COM2, Parallel.

Compliant to performance criteria for this test.

7. EN 61000-4-5 Surge Immunity Test

7.1. Test Setup

The EUT was tested while connected to a coupling decoupling network (CDN). Surges were applied at AC input of the EUT. Line-to-line tests were conducted using a generator source impedance setting of 2 ohms. Line-to-ground tests were conducted using a generator source impedance setting of 12 ohms. Line-to-line tests were conducted using a 0.5kV and 1kV surge. Line to ground tests were conducted using a 1kV and 2kV surge. Five positive and five negative surges were applied at a phase angles of 0, 90, 180 and 270 degrees, with respect to the AC line.

7.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
EM Test	Ultra Compact Simulator	UCS 500	1196-08	23 rd Feb 2001
RS	Variable Transformer	208-563	9495/7	NCR

Table 7-1

7.3. EUT

See section 3.1.

7.4. Support Equipment Deviations

None.

7.5. Test Method

As per the specification.

7.6. EUT pass/fail Criteria

See section 2.1.

7.7. Monitoring of EUT

As per performance criteria B.

7.8. Test Results

Environmental Status

22.5°C Temperature, 54% Humidity and 989mB Barometric Pressure

	+1.0	-1.0	+2.0	-2.0
0 Phase	Pass	Pass	Pass	Pass
90 Phase	Pass	Pass	Pass	Pass
180 Phase	Pass	Pass	Pass	Pass
270 Phase	Pass	Pass	Pass	Pass

Table 7-1 Common mode High line to ground

	+1.0	-1.0	+2.0	-2.0
0 Phase	Pass	Pass	Pass	Pass
90 Phase	Pass	Pass	Pass	Pass
180 Phase	Pass	Pass	Pass	Pass
270 Phase	Pass	Pass	Pass	Pass

Table 7-2 Common mode Low line to ground

	+1.0	-1.0	+2.0	-2.0
0 Phase	Pass	Pass	Pass	Pass
90 Phase	Pass	Pass	Pass	Pass
180 Phase	Pass	Pass	Pass	Pass
270 Phase	Pass	Pass	Pass	Pass

Table 7-3 Common mode High line + Low line to ground

	+1.0	-1.0	+2.0	-2.0
0 Phase	Pass	Pass	Pass	Pass
90 Phase	Pass	Pass	Pass	Pass
180 Phase	Pass	Pass	Pass	Pass
270 Phase	Pass	Pass	Pass	Pass

Table 7-4 Common mode High line to Low line

Compliant to performance criteria for this test.

8. EN 61000-4-6 Immunity to Conducted Disturbances Induced by RF Fields

8.1. Test Setup

The test shall be performed with the test generator and amplifier connected to each of the coupling and decoupling devices in turn. The frequency range is swept through the desired frequency, using the signal levels established during the calibration process. The disturbance signal is 80% amplitude modulated with a 1kHz sinewave, pausing to adjust the RF-signal or to switch coupling devices as necessary

8.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
Amplifier Research	RF Amplifier	25A250A	18921	NCR
Marconi Instruments	Signal Generator	2023	112158/078	4 th May 2001
Marconi Instruments	Injection Probe (Power Sensor)	6912	1305	9 th Mar. 2002
MEB	Current Probe	RK100 Coupler	12709	NCR
MEB	CDN	M3	None	1 st May 2001
MEB	CDN	USB	None	1 st May 2001
MEB	CDN	S9	None	1 st May 2001
MEB	CDN	S25	None	1 st May 2001
MEB	CDN	S9	None	1 st May 2001
MEB	RF Switch for CDN's	HF-Schaitfield	13122	1 st May 2001

Table 8-1

8.3. EUT

See section 3.1.

8.4. Support Equipment Deviations

None.

8.5. Test Method

As per the specification.

8.6. EUT pass/fail Criteria

See section 2.1.

8.7. Monitoring of EUT

As per performance criteria A.

8.8. Test Results

Environmental Status

24°C Temperature, 48% Humidity and 1000mB Barometric Pressure

Compliant to performance criteria for this test.

9. EN 61000-4-11 Voltage Dips and Interruptions

9.1. Test Setup

The test shall be performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT.

The test set-ups for the two types of phenomena described in this standard are:

- Voltage dips and short interruptions
- Voltage variations with gradual transition between the rated voltage and the changed voltage (option).

9.2. Test Equipment

Manufacturer	Description	Model/Part Number	Serial Number	Cal. Due date
EM Test	Ultra Compact Simulator	UCS 500	1196-08	23 rd Feb 2001

Table 9-1

9.3. EUT

See section 3.1.

9.4. Support Equipment Deviations

None.

9.5. Test Method

As per the specification.

9.6. EUT pass/fail Criteria

See section 2.1.

9.7. Monitoring of EUT

As per performance criteria in Table 9-2.

9.8. Test Results

Environmental Status

24°C Temperature, 48% Humidity and 1000mB Barometric Pressure

Voltage Range: Upper: 240V, 50Hz Nominal: N/A Lower: 200V, 50Hz

Environmental Phenomena	Number of Events	Percent Reduction	Duration	Performance Criteria	Status
Dip	3	100%	10mS	B	Pass
Dip	3	30%	500mS	C	Pass
Interruptions	1	100%	5000mS	C	Pass

Table 9-2

Compliant to performance criteria for this test.

10. CONCLUSIONS

The compliance levels achieved by the STL2 Server Board in the Enlight EN-8950 File Server Chassis were:

Environmental Phenomena	Basic Test Method	Performance Criteria	Status
Electrostatic Discharge	EN 61000-4-2 1995	Performance Criteria B specified by EN 55024	Meets
Radio Frequency Electromagnetic Field	EN 61000-4-3 1998	Performance Criteria A specified by EN 55024	Meets
Electrical Fast Transients	EN 61000-4-4 1995	Performance Criteria B specified by EN 55024	Meets
Surge	EN 61000-4-5 1995	Performance Criteria B specified by EN 55024	Meets
Radio Frequency Common Mode	EN 61000-4-6 1997	Performance Criteria A specified by EN 55024	Meets
Voltage Dips 30% Reduction	EN 61000-4-11 1994	Performance Criteria C specified by EN 55024	Meets
Voltage Dips 100% Reduction	EN 61000-4-11 1994	Performance Criteria B specified by EN 55024	Meets
Voltage Interruptions	EN 61000-4-11 1994	Performance Criteria C specified by EN 55024	Meets

Table 10-1