

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

**Power Line Conduction  
Radiated Emissions (E-Field)**

**(as per BS EN55022 (1998))  
(as per BS EN55022 (1998))**



Certificate No. FS 28707



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Power Line Conduction (as per BS  
EN55022 (1998))

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Radiated Emissions (E-Field) (as per BS  
EN55022 (1998))

Donna Fraser 16/10/00



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SIGNATURE

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## 1. INTRODUCTION

### 1.1. Introduction

This report presents the results of the EMC Emissions tests on the STL2 Server Board in the Enlight EN-8950 ATX File Server – Lab. Ref. PVCS1400 to the following Standards

- Power Line Conduction (as per BS EN55022 (1998))
- Radiated Emissions (E-Field) (as per BS EN55022 (1998))

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	and	Intel Corporation (UK) Ltd Sheppards Farm Chiseldon Swindon Wiltshire England
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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 to the Class A limit. To sell Class A products for use in the EC the following warning must be included in the product documentation.  
**This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.**

## 2. EQUIPMENT UNDER TEST (EUT)

### 2.1. EUT.



Figure 2-1 Enlight, EN8950 File Server Tower Chassis

### 2.2. 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 <sup>st</sup> Hot Swap Bay
Seagate	18.5GB SCSI Hard Drive (Hot Swap)	ST318451LL	3CC007MA	2 <sup>nd</sup> Hot Swap Bay
Seagate	18.5GB SCSI Hard Drive (Hot Swap)	ST318451LL	3CC006MM	3 <sup>rd</sup> 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 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* E500
Intel Corporation	Serial Emulator	C12573
Intel Corporation	Parallel Emulator	C12574
Intel Corporation	USB Camera	680942-002

Table 2-2

#### 2.3.2. Open Area Test Site (OATS 2) 10 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 2-3

#### 2.3.3. 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 2-4

### 2.4. 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.

## 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.

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### 3. Power Line Conduction (as per BS EN55022 (1998))

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#### 3.1. Test Setup

The EUT was placed on top of a fixed wooden table.

#### 3.2. Test Equipment

##### 3.2.1. Powerline Conduction

Supplier	Description	Model/Part Number	Serial Number
Rohde & Schwarz	LISN	ESH3-Z5	839135/022
Rohde & Schwarz	EMI Test Receiver	ESHS 10	839698/002

Table 3-1

#### 3.3. EUT

See section 2.1

#### 3.4. Support Equipment Deviations

None

#### 3.5. Test Method

The EUT was powered up via the LISN and the EUT exercising software was invoked to exercise all sub systems of the EUT. The RF conducted emissions from the EUT were measured using the R&S ESHS 10 via the LISN under computer control. Using R&S ES-K1 version 1.4x software the "Average" and "Peak" levels were measured at the same time for all frequencies in the range 150kHz to 30 MHz. Any frequency over the Av or QP limit respectively constituted a failure.

### 3.6. Test Results

#### Environmental Status

25.5°C Temperature, 36% Humidity and 988mB Barometric Pressure

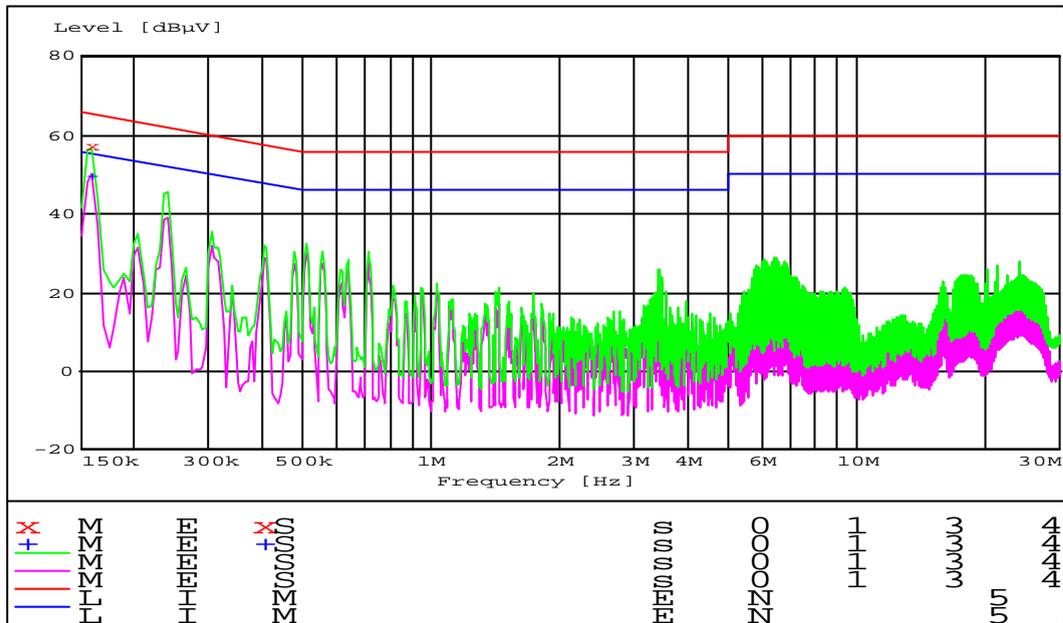


Figure 3-1

<u>Frequency MHz</u>	<u>AV Level dBuV</u>	<u>AV Limit dBuV</u>	<u>AV Delta dB</u>	<u>Phase</u>	<u>PE</u>
0.16	49.73	55.46	5.73	L1	GND

Table 3-2

<u>Frequency MHz</u>	<u>QP Level dBuV</u>	<u>QP Limit dBuV</u>	<u>QP Delta dB</u>	<u>Phase</u>	<u>PE</u>
0.16	57.34	65.46	8.12	N	GND

Table 3-3

No frequencies were determined to be over the Av or QP limits.

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**4. Radiated Emissions (E-Field) (as per BS EN55022 (1998))**

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4.1. Test Setup



Figure 4-1 Generic test set-up

See section 2.3 for details of support equipment.

## 4.2. Test Equipment

### 4.2.1. Radiated Emissions (E-FIELD)

Reference	Supplier	Description	Model/Part Number	Serial Number
1	Chase	BiLog Antenna	CBL6112B	2556
2	Chase	BiLog Antenna	CBL6112A	2204
3	Rohde & Schwarz	EMI Test Receiver (OATS 2)	ESVS 10	843744/013
4	Rohde & Schwarz	EMI Test Receiver	ESVS 10	842122/008
5	n/a	10m OATS	SF2	n/a

Table 4-1

## 4.3. EUT

See section 2.1

## 4.4. Support Equipment Deviations

None.

## 4.5. Test Method

EUT is first tested in 3 meter Anechoic Chamber as outlined below and if any frequencies are determined to be over or within 7dB of limit then the EUT is further tested at the Open Area Test Site (OATS) also outlined below.

### Test Method in 3 meter Anechoic Chamber

The EUT was placed on or beside (if floor standing) a table. The top of the table was 0.8 meters above the ground plane and 3 meters from the antenna. The antenna was positioned 1.5 meters up from the ground plane. From 30MHz to 1000MHz a BiLog antenna was used. The receiver was equipment reference 4 and the antenna used was equipment reference 1. The test was run automatically under computer control using R&S ESK1 version 1.4. The algorithm used was as follows:

Five scans of the EUT were performed using the peak detector and the resulting graphs superimposed. Up to Thirty frequencies on the resultant graph with amplitude within 10dB of the quasi peak limit detected between 30MHz to 1GHz were selected. With the receiver set to each of the selected frequencies the EUT was rotated, the antenna raised and lowered from 2 meters to 1 meter and the antenna polarisation was changed from the vertical to the horizontal and the maximum Quasi-Peak (QP) signal strength noted.

### Test Method in 10 meter Open Area Test Site (OATS)

The EUT was tested on OATS equipment reference 5 where it was placed on or beside a table 0.8 meters above the ground plane and 10 meters from the antenna. The EUT was powered on and ran the referenced EUT exercising software (see section 2). The antenna was mounted on a mast permitting movement from 1.0 meter to 4.0 meters above the ground plane in horizontal or vertical polarisation. From 30MHz to 1000MHz a BiLog antenna equipment reference 2 was used. The receiver was a Rohde and Schwarz ESVS equipment reference 3. All frequencies found to be over or within 7dB of the quasi peak limit when tested in the 3 meter Anechoic Chamber were measured. The EUT was rotated and the antenna raised and lowered from 1 meter to 4 meters and the antenna was also changed from the vertical polarisation to the horizontal polarisation and the maximum Quasi Peak (QP) signal strength noted.

## 4.6. Test Results

### 4.6.1. Preliminary Scan in 3 meter Anechoic Chamber

Environmental Status

22.5°C Temperature, 44% Humidity and 989mB Barometric Pressure

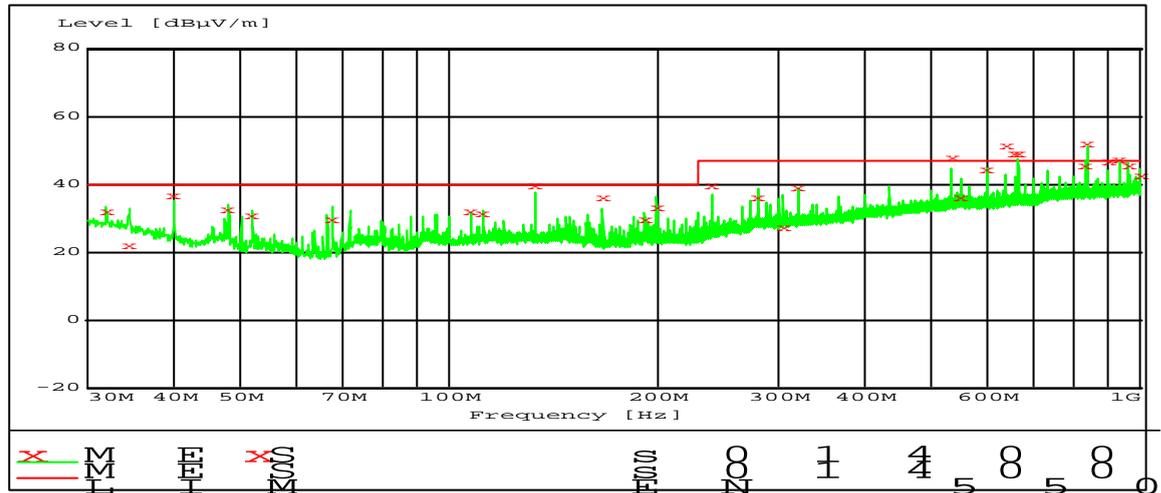


Figure 4-2

Frequency MHz	OP Level dBuV/M	Class B Limit dBuV/M	Delta dB	Rotation °	Height	Orientation
40.02	36.88	40	3.12	235	100	Vertical
47.94	32.21	40	7.79	47	100	Vertical
107.86	31.89	40	8.11	242	227	Horizontal
111.88	31.53	40	8.47	241	212	Horizontal
133.3	39.41	40	0.59	189	132	Vertical
166.6	36.09	40	3.91	225	100	Vertical
199.9	33.14	40	6.86	6	101	Vertical
240.02	39.37	47	7.63	81	117	Vertical
320.06	38.96	47	8.04	299	105	Vertical
533.14	47.78	47	-0.78	248	100	Horizontal
600.1	44.58	47	2.42	10	132	Vertical
640.06	51.09	47	-4.09	285	100	Horizontal
660.04	48.91	47	-1.91	292	106	Horizontal
666.52	49.05	47	-2.05	100	167	Vertical
833.02	45.71	47	1.29	0	138	Horizontal
840.1	51.92	47	-4.92	355	100	Vertical
899.68	46.73	47	0.27	315	106	Vertical
932.98	47.51	47	-0.51	248	124	Horizontal
960.1	45.52	47	1.48	22	123	Horizontal
999.7	42.46	47	4.54	286	132	Vertical

Table 4-2 Results from maximizing frequencies in the 3M chamber at Class B limit

Fifteen frequencies were determined to be over or within 7dB of limit so further testing at 10 meter Open Area Test Site was required.

4.6.2. Results from testing at the 10M OATS

Environmental Status

13°C Temperature, 65% Humidity and 903mB Barometric Pressure

<u>Frequency MHz</u>	<u>QP Level dBuV/M</u>	<u>Class A Limit dBuV/M</u>	<u>Delta dB</u>	<u>Rotation °</u>	<u>Height</u>	<u>Orientation</u>
40.02	Ambient only – no signal detected coming from the EUT					
133.30	30.20	40	9.80	100	400	Horizontal
166.60	31.60	40	8.40	90	200	Horizontal
199.90	23.60	40	16.40	190	150	Vertical
533.14	36.70	47	10.30	300	210	Horizontal
600.10	32.00	47	15.00	10	260	Horizontal
640.06	Ambient only – no signal detected coming from the EUT					
660.04	Ambient only – no signal detected coming from the EUT					
666.52	38.40	47	8.60	320	230	Horizontal
833.02	35.70	47	11.30	330	150	Horizontal
840.10	38.70	47	8.30	20	150	Horizontal
899.68	36.30	47	10.70	10	150	Horizontal
932.98	41.30	47	5.70	285	100	Vertical
960.10	35.80	47	11.20	320	180	Horizontal
999.70	35.70	47	11.30	215	100	Vertical

Table 4-3 Results from testing at the 10M OATS

As can be seen from the results in Table 4-3, no frequencies were determined to be over the Class A limit.