Report on the EMC Emissions Testing of the STL2 Server Board in the Chenbro* A9891-207 ATX Net Server Lab. Ref. PVCS1399

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

Certificate No FS 28707

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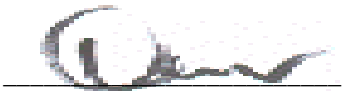
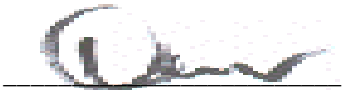
Power Line Conduction (as per BS EN55022 (1998))	Donna Fraser 26/10/00	
Radiated Emissions (E-Field) (as per BS EN55022 (1998))	Donna Fraser 24/10/00	

	APPROVED BY & DATE	SIGNATURE
	Ann Nicholas 31/10/00	

CONTENTS

1. INTRODUCTION

1.1. Introduction

This report presents the results of the EMC Emissions tests on the STL2 Server Board in the Chenbro A9891-207 ATX Net Server – Lab. Ref. PVCS1399 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

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.

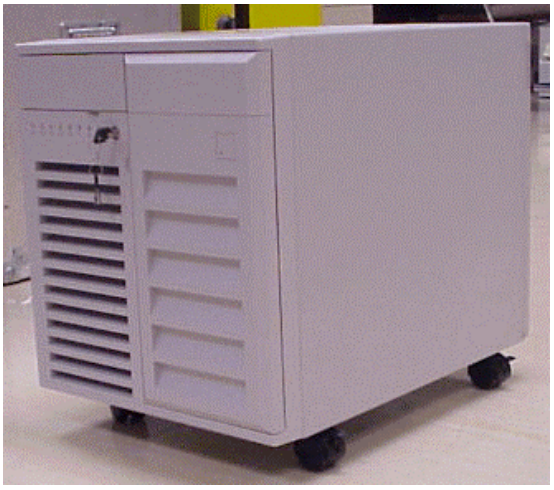


Figure 2-1 Chenbro A9891-207 ATX Net Server Chassis

2.2. EUT Configuration.

Supplier	Description	Model/Part Number	Serial Number	Location
Chenbro	Net Sever Chassis	A9891-207	C001403	N/A
Emacs*	ATX Power supply	RPD-5400F-RV2S	860094	Bottom 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	Top 3.5” drive bay external
Seagate*	18.5GB SCSI Hard Drive	ST318451LW	3CC003YN	Top 3.5” HDD drive bay
Seagate	18.5GB SCSI Hard Drive	ST318451LW	3CC0097R	Middle 3.5” HDD drive bay
Seagate	18.5GB SCSI Hard Drive	ST318451LW	3CC0087L	Bottom 3.5” HDD drive bay
Sony	32X IDE CDROM Drive	CDU701	7004556	Top 5.25” drive bay external
Intel	SRCU31 RAID Controller Card	PBA A2497-010	INGW03700074	PCI slot 4

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 E500
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.
Two Panaflo* 12v 9cm fans (FBK-09A12M) fitted. One positioned front/middle and one positioned top/rear of 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.

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

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

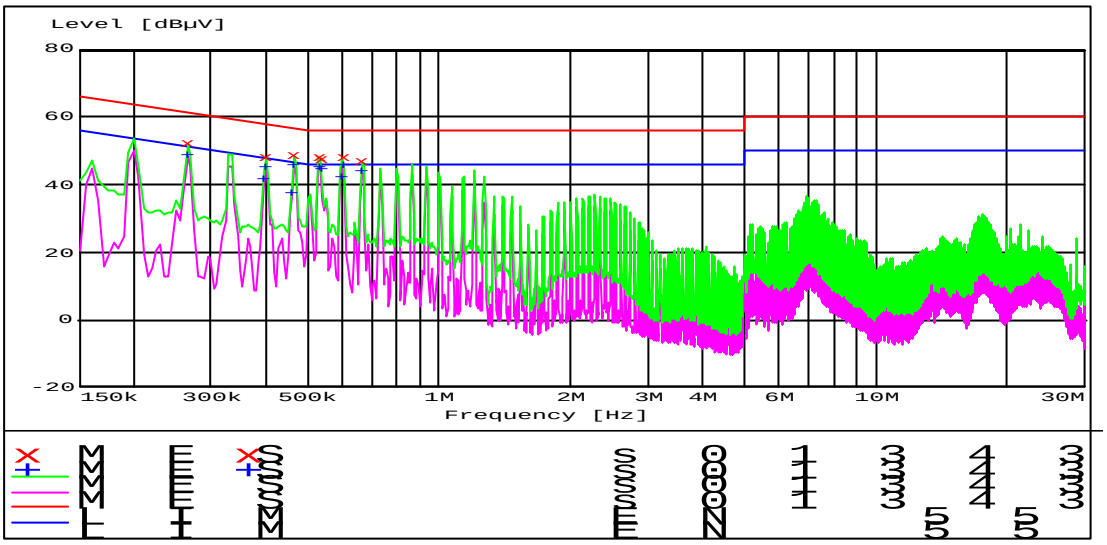


Figure 3-1

Frequency MHz	AV Level dBuV	AV Limit dBuV	AV Delta dB	Phase	PE
0.265	48.85	51.27	2.43	N	GND
0.395	41.79	47.96	6.16	L1	GND
0.4	45.21	47.85	2.65	L1	GND
0.46	37.43	46.69	9.26	L1	GND
0.465	45.87	46.6	0.73	L1	GND
0.53	45.47	46	0.53	N	GND
0.535	44.66	46	1.34	N	GND
0.595	42.55	46	3.45	N	GND
0.6	45.61	46	0.39	N	GND
0.665	43.98	46	2.02	L1	GND

Table 3-2

Frequency MHz	QP Level dBuV	QP Limit dBuV	QP Delta dB	Phase	PE
0.265	52.19	61.27	9.09	L1	GND
0.4	48.17	57.85	9.69	L1	GND
0.465	48.63	56.6	7.97	L1	GND
0.53	48.35	56	7.65	N	GND
0.535	47.55	56	8.45	N	GND
0.6	48.39	56	7.61	N	GND
0.665	47.2	56	8.8	N	GND

Table 3-3

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

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

4.1. Test Setup

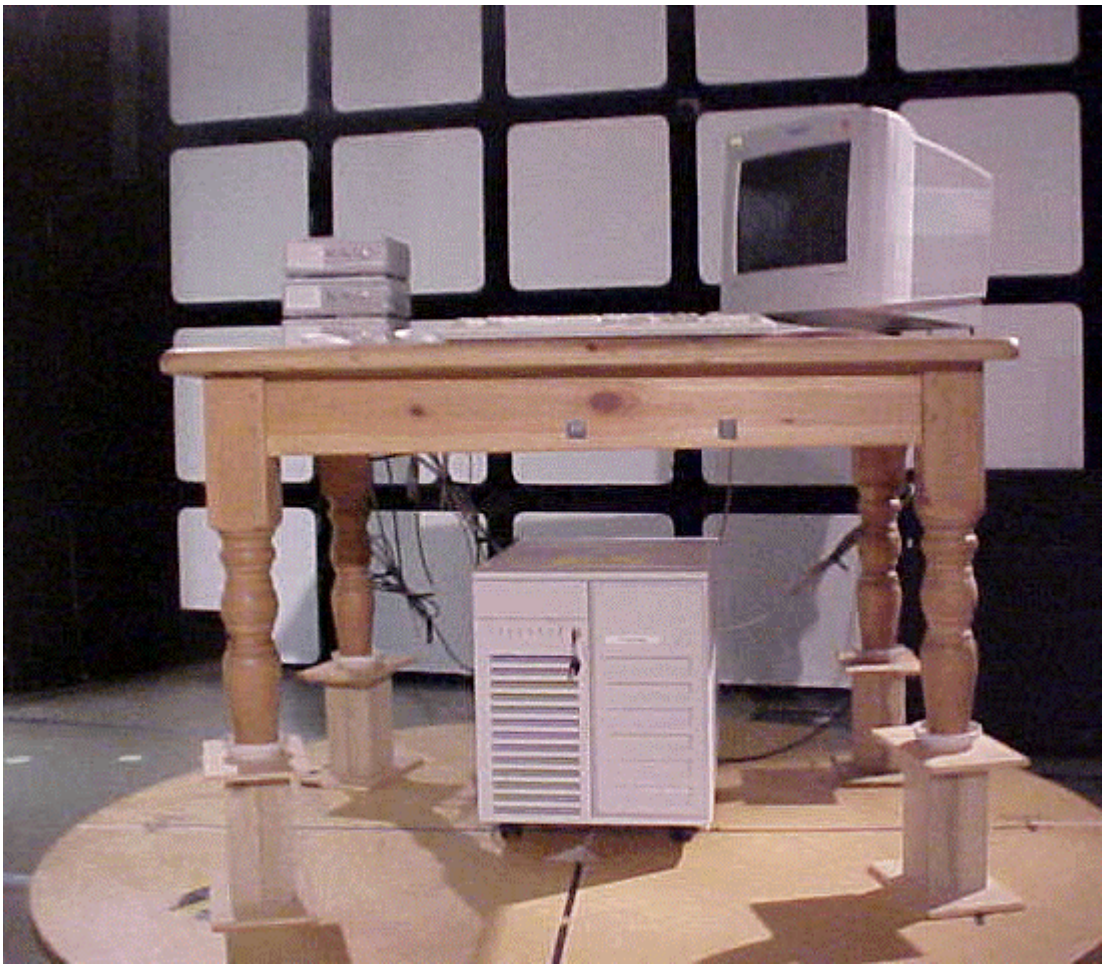


Figure 4-1 Generic test set-up

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, 64% Humidity and 1009mB Barometric Pressure

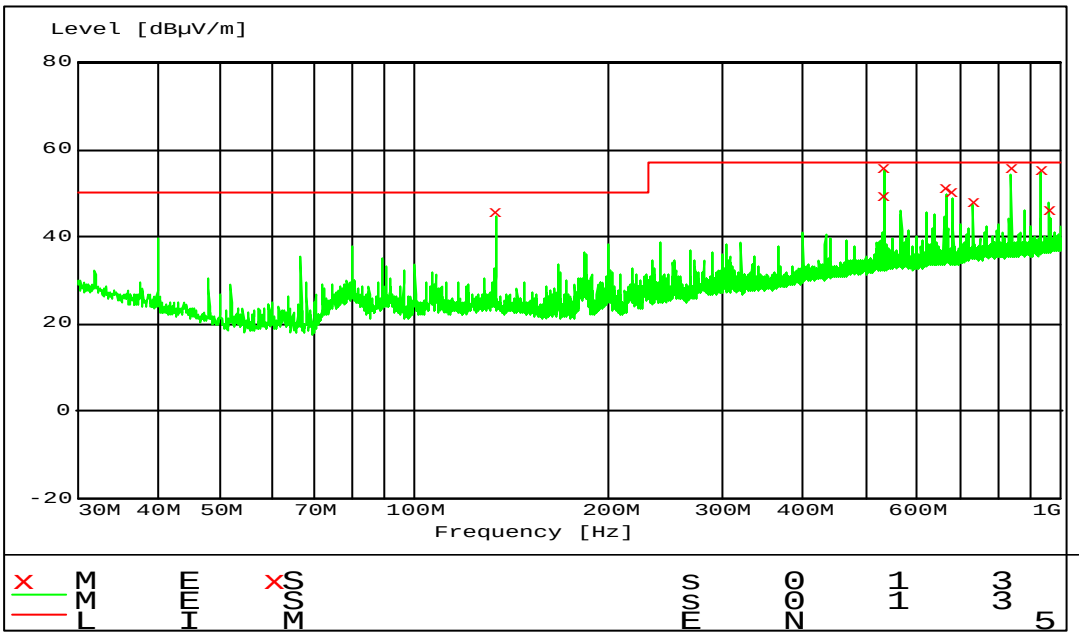


Figure 4-2

Frequency MHz	QP Level dBuV/M	Class A Limit dBuV/M	Delta dB	Rotation °	Height	Orientation
133.3	45.32	50	4.68	191	100	Vertical
533.2	55.67	57	1.33	189	128	Horizontal
533.38	49.31	57	7.69	189	123	Horizontal
666.46	51.11	57	5.89	87	151	Horizontal
680.02	49.99	57	7.01	184	100	Vertical
733.12	47.75	57	9.25	225	184	Horizontal
840.1	55.32	57	1.68	16	100	Vertical
932.98	55.08	57	1.92	190	133	Vertical
960.1	46	57	11	2	133	Horizontal

Table 4-2 Results from maximizing frequencies in the 3M chamber

Six frequencies were determined to be 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
11°C Temperature, 42% Humidity and 998mB Barometric Pressure

Frequency MHz	QP Level dBuV/M	Class A Limit dBuV/M	Delta dB	Rotation °	Height	Orientation
133.30	32.60	40	7.40	240	150	Vertical
533.20	40.10	47	6.90	330	150	Horizontal
666.46	38.80	47	8.20	350	150	Horizontal
680.02	Ambient only – no signal detected coming from the EUT					
840.10	43.90	47	3.10	20	100	Vertical
932.98	46.20	47	0.80	200	150	Horizontal

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.