# R440LX Chassis Test Report
# Test Report Summary

intel®

| Revision History | | |
|---|---|---|
| **Date** | **Rev** | **Modifications** |
| 1/98 | 1.0 | Out for review |
| 1/98 | 1.1 | Initial release |
| 2/98 | 1.2 | Added 1 new chassis and defined test levels. |

# Executive Summary of Results

The results of testing the R440LX DP baseboard in six chassis configurations;  Intel Columbus II, Chenbro A9661, Evercase EC888, Shin-G GT-312ATX , Chieftec FT01W, and the In-Win IWA-Q500A (Config. #2) show that the Pentium®® II processors (300MHz) and the 82443LX PAC controller component are adequately cooled and function normally under the established system temperatures.

Furthermore, the testing shows that for two additional chassis configurations; GodSpeed GS-130L and In-Win IWA-Q500A (Config. #1), the Pentium® II processors (266MHz) and the 82443LX PAC controller are adequately cooled and function normally under the established system temperatures.

Finally, the only chassis to pass FCC Class-B EMI testing was the Intel Columbus II chassis. The  Chenbro A9661, Evercase EC888, In-Win IWA-Q500A, and the GodSpeed GS-130L pass the FCC Class-A EMI testing.

| Chassis | 2 x 300MHz Thermal level 2 | 2 x 300MHz Thermal level 3 | 2 x 266MHz Thermal level 2 | FCC-EMI |
|---|---|---|---|---|
| Chenbro A9661 | Pass | Pass* | Pass* | Class A |
| Chieftec FT01W | Pass | Pass* | Pass* | Not tested |
| Intel Columbus II | Pass | Pass* | Pass* | Class B |
| Evercase EC888 | Pass | Pass* | Pass* | Class A |
| Godspeed GS-130L | Fail | Pass | Pass | Class A |
| In-Win IWA-Q500A (Config. #1) | Fail | Pass | Pass | Class A |
| In-Win IWA-Q500A (Config. #2) | Pass | Pass* | Pass* | Not tested |
| Shin-G GT-312ATX | Pass | Pass* | Pass* | Not tested |
| Yeong Yang YY-1240 | Pass | Pass* | Pass* | Not tested |

* It is assumed that if the system passes thermals with 300MHz processors that it will pass with 266MHz processors.

# Chassis Evaluation

For a complete list of ATX chassis vendors, visit: http: //www.teleport.com/~atx/chas/index.htm
The inclusion of any chassis in the lists and tables below does not imply any kind of endorsement by Intel of these chassis. It is simply a compilation of the data known about different chassis.

## *Overall Test Strategy*

The goal of this program was to enable server system integrators by providing them a list of chassis that had already been tested with the R440LX server baseboard. The testing was conducted in the following logical order:

1. Identify which chassis subassemblies can house R440LX server baseboard.
2. Test the  R440LX server baseboard in chassis for processor and chip set temperatures.
3. Test the  R440LX server baseboard for EMI emissions in some of the chassis.

# Mechanical Evaluation of Chassis (fit)

The R440LX is a modified ATX form factor baseboard (it is longer than true ATX) so it will not fit in all ATX chassis. Evaluatic included checking hole mounting locations, proper fit of I/O shield, and the ease of integrating peripherals into the drive bays on the R440LX server baseboard was installed.

## *Summary of Results*

| | Style | Fit | # of Power Supplies | # of 3.5 Drive Bays (exposed) | # of 5.25 Drive Bays (exposed) | Manufacturer or Distributors  * |
|---|---|---|---|---|---|---|
| Intel Columbus II | Mid-Tower | Pass | 1 | 6 | 3 | Intel Authorized Distributors |
| Chenbro - A9661 | Server | Pass | 2 | 9 (1) | 12 (12) | Chenbro Micom  Co., Ltd. Taiwan: 886-2-248-9505<br><br>Chenbro America, Inc. USA: 510-505-9795<br><br>Sander Computer System Germany: 49-02-174-6760<br><br>Indi Computers B.V. Netherlands: 31-78-629-2222 |
| Evercase - EC888 | Server | Pass | 2 | 0 | 11 (9) | Evercase 1925 Lundy Ave., San Jose, CA. USA<br>USA- 408-894-9003<br><br>Taiwan-886-2-796-3049 |
| Godspeed - GS130L | Mid-Tower | Pass | 1 | 3 (2) | 3 (3) | Godspeed Computer Corp. Taiwan: 886-2-703-6201 |
| In-Win - IW-Q500A | Tower | Pass | 1 | 7(1) | 5(5) | In-Win Development Inc.  No. 57 Lane 350, Nanshang Road, Gueishan Hsiang, Taoyuan Hsien, Taiwan, R.O.C. : 3-352-7357<br><br>In-Win Development Inc. 14343 E. Don Julian Road, City of Industry, Ca. : 818-333-1986<br><br>M.W.  Elbgaustrasse 248, D. Gewerbegebiet 2000, Hamburg 53, Germany: 494-0847732-35 |
| Evercase - ECE4103 | Mid-Tower | Pass | 1 | 5 (3) | 2 (2) | Same as CE888 model |
| Chenbro - A5711-300 | Mid-Tower | Pass | 1 | 6(1) | 6(6) | Same as A9661 model |
| Chenbro - A6831-300 | Tower | Pass | 1 | 4(3) | 3(3) | Same as A9661 model |
| Evercase - ECE6102 | Tower | Pass | 2 | 3(2) | 7(6) | Same as CE888 model |
| In-Win IWA-500 | Mid-Tower | Pass | 1 | 3(2) | 3(3) | Same as IW-Q500A model |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chieftec – FT01W<br><br>ACME – FT01W<br><br>Arena – FT01W | Tower | Pass | 1 | 1(1)* | 10(10)* | Taiwan -  Jason Yang   -  886-2-883-2491<br>USA – ASC - Derrick Chen -  1-626-401-9595<br><br>United Kingdom  - Gregory Shue - 44-181-863-6768<br><br>Europe -  Heiko Werber  -  49-211-964-840 |
| Shin-G – GT-312ATX | Tower | Pass | 1 | ?(2) | ?(4) | Shin-G No. 24, Lane 568, Sec. 2,  Chung Shan Rd., Chung Ho, Taipei Hsien, Taiwan, R.O.C.  TEL: (886-2) 2211021<br><br>CTS CO., LTD. Address: 244-1 SHIMOKURATA-MACHI, 244, JAPAN  ATTN: Mr. KIMITAKA OTSUKI  Tel: 81-45-8618986<br><br>American ProImage, Inc. 13017 E. 166th Street, Cerritos, CA, 90703, USA  Tel: 562-926-6667 |
| Task - TK-450D | Mid-Tower | Failed 1 | | | | TASK INTERNATIONAL, INC.<br> 5F., No. 327 Fu Ho Road, Yung Ho City,<br> Taipei Hsien, Taiwan, R.O.C.<br> Tel: 886-29284856 |
| Song Cheer - TP600 | Tower | Failed 1 | | | | Song Cheer (Taiwan Office)  No.14 industrial Rd.<br> Il Kuan-Yin Industrial Park<br>Tao Yuan Hsien, Taiwan R.O.C.   886-3-4838710 (Tel)<br><br>Suncheer International (USA Office) 124 Tices Lane, Suite C East Brunswick, NJ 08816  908-651-7500 (Tel) |
| SunTec - TH983 | Mid-Tower | Failed 2 | | | | SUNUS SUNTEK  47626 Kato Road, Fremont, CA 94538<br>510-226-8168 |
| SunTec - TH883 | Tower | Failed 1 | | | | Same as TH983 model |
| GodSpeed - GS120L | Tower | Failed 2 | | | | Same as GS130L model |
| Axxion - RM-06-7M | Rack | Failed 1 | | | | Axxion Group Corp. 7801 Trade Center, El Paso, TX. 79912<br>916-877-3990 |

1. I/O cutout in the back of the chassis was not fully 2.01 compliant at the time of testing.
2. The R440LX server baseboard did not fit due to interference with drive bays.

* denotes information supplied by the manufacturer

# Thermal evaluation of chassis

## *Purpose*

The purpose of this testing is to ensure the thermal management for the R440LX DP server baseboard meets Pentium® II processor and 440LX chip set specifications. The systems were tested with several different power supplies and fans, and may not represent the power supply or fans that are normally shipped with the chassis. See Appendix A for system configuration. The basic test process was to test the complete system (with fans and power supply) as it ships from the vendor. If this configuration failed thermally, then different combinations of power supplies and fans were tried. Only the processor and chip set temperatures were monitored. No consideration was given to whether the chassis had adequate cooling of hard drives, add-in cards, or other peripherals. For a complete discussion of thermal issues as they relate to the Pentium® II processor, read the paper <u>Pentium® II Processor Thermal Design Guidelines</u> at:
http://developer.intel.com/design/PentiumII/applnots/243331.htm

## *Evaluation Procedures*

This section details the requirements and procedures used to perform thermal evaluations of the R440LX server baseboard. The test configurations and test software used and the thermal data collected are presented in this section.

### Thermocouple Placement

The thermocouples were attached to the selected devices such that a good thermal bond was obtained between the thermocouple and the device being measured. Hysol Epoxi-Patch #309 was used.
The processor heatsinks with fans were drilled to place the thermocouple over the cavity location as described in the Pentium® II processor documentation. The thermocouple was then epoxied into the heatsink such that the junction would be in contact with the processor heat spreader, but not disturb the normal interface of the heatsink to the part.

### Temperature Measurement and Test Equipment

For processor and 82443LX thermal testing, all systems were loaded (using load cards) to 15 watts per PCI slot and 16 watts to the ISA slot for a total of 76 watts. The system was allowed to stabilize at each ambient temperature for a period of one hour. Temperature measurement was taken and monitored not to change within a +/- 5 minutes. Thermocouple measurements were monitored and logged with a calibrated Fluke Hydra Data Logger model 2625A. Measurements were taken at ambient temperature, and then calculated at 35° C. This would represent a worst case scenerio.

### System Test Software

The system was loaded with DOS 6.22 and Windows NT WorkStation version 4.0 and WIN 95. These operating systems are present to allow the running of other appropriate diagnostic software. To exercise the Pentium® II processors, the system was run in Windows NT and a proprietary program that exercises the processors to 100% of their capacity was run during the measurement phase. To exercise the 82443LX component, the system was run in WIN 95 and a proprietary program that exercises the 82443LX component to 100% of it's theoretical capacity on the R440LX was used

## *S*ummary Results of Thermal Testing

# Thermal Results with Pentium® II Processor at 300MHz:

| Component | Limit Temp. | Ambient Temp. | Reading @ room temp. | 35°C (adjusted) | Minimum Margin | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|
| **Intel Columbus** | | 35.0 | | | | | |
| Proc #1 | 72° | | 62.1 | 62.1 | +9.9 | **Pass** | |
| Proc #2 | 72° | | 61.0 | 61.0 | +11.0 | | |
| **Chenbro A9661** | | 22.2 | | | | | |
| Proc #1 | 72° | | 57.2 | 70.0 | +2.0 | **Pass** | |
| Proc #2 | 72° | | 56.6 | 69.4 | +0.6 | | |
| **Evercase EC888** | | 26.9 | | | | | |
| Proc#1 | 72° | | 60.2 | 68.3 | +3.7 | **Pass** | |
| Proc #2 | 72° | | 62.7 | 70.8 | +1.2 | | |
| **In-Win IWA-Q500A** Config. #1 | | 23.1 | | | | | |
| Proc#1 | 72° | | 68.5 | -- | -- | **Fail** | System Locked up* |
| Proc #2 | 72° | | 65.5 | -- | -- | | |
| **In-Win IWA-Q500A** Config. #2 | | 27.4 | | | | | |
| Proc#1 | 72° | | 61.6 | 69.2 | +2.8 | **Pass** | |
| Proc #2 | 72° | | 59.9 | 67.5 | +4.5 | | |
| **In-Win IWA-500** | | 23.1 | | | | | |
| Proc #1 | 72° | | 47.5 | -- | -- | **Fail** | System Locked up* |
| Proc #2 | 72° | | 41.4 | -- | -- | | |
| **Chenbro A5711-300** | | 22.3 | | | | | |
| Proc#1 | 72° | | 64.7 | 77.4 | -5.4 | **Fail** | Over Temp. |
| Proc #2 | 72° | | 62.8 | 75.5 | -3.5 | | |
| **Chenbro A6831-300** | | 21.1 | | | | | |
| Proc #1 | 72° | | 46.0 | -- | -- | **Fail** | System Locked up* |
| Proc #2 | 72° | | 56.2 | -- | -- | | |
| **Evercase ECE4103** | | 22.0 | | | | | |
| Proc #1 | 72° | | 65.5 | -- | -- | **Fail** | System Locked up* |
| Proc #2 | 72° | | 66.2 | -- | -- | | |
| **Evercase ECE6102** | | 22.5 | | | | | |
| Proc #1 | 72° | | 46.1 | -- | -- | **Fail** | System Locked up* |
| Proc #2 | 72° | | 48.5 | -- | -- | | |
| **Godspeed GS-130L** | | 20.3 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Proc#1 | 72° | | 57.9 | 72.6 | -0.6 | **Fail** | Over Temp. |
| Proc #2 | 72° | | 62.8 | 77.5 | -5.5 | | |
| **Chieftec FT01W** | | 35.0 | | | | | |
| Proc #1 | 72° | | 71.0 | 71.0 | +1.0 | **Pass** | |
| Proc #2 | 72° | | 64.5 | 64.5 | +7.5 | | |
| **Shin-G GT-312ATX** | | 35.0 | | | | | |
| Proc#1 | 72° | | 71.2 | 71.2 | +0.8 | **Pass** | |
| Proc #2 | 72° | | 67.4 | 67.4 | +4.6 | | |

*System lockup in this case was due to the processors exceeding their maximum operating temperature. The systems did not stabilize at a temperature before locking up.

All numbers shown for temperature are in degrees C.

## Thermal Results with Pentium® II  Processor at 266MHz:

| Component | Limit Temp. | Ambient Temp. | Reading @ room temp. | 35°C (adjusted) | Minimum Margin | Pass/ Fail | Comments |
|---|---|---|---|---|---|---|---|
| **In-Win IWA-Q500A**  Config.#1 | | 25.8 | | | | | |
| Proc#1 | 75° | | 64.5 | 73.7 | +1.3 | **Pass** | |
| Proc #2 | 75° | | 62.0 | 71.2 | +3.8 | | |
| **In-Win IWA-500** | | 21.5 | | | | | |
| Proc #1 | 75° | | 63.9 | 77.4 | -2.4 | **Fail** | Over Temp. |
| Proc #2 | 75° | | 72.1 | 85.6 | -10.6 | | |
| **Chenbro A5711-300** | | 22.5 | | | | | |
| Proc#1 | 75° | | 62.3 | 74.8 | +0.2 | **Fail** | Over Temp. |
| Proc #2 | 75° | | 66.6 | 79.1 | -4.1 | | |
| **Chenbro A6831-300** | | 23.5 | | | | | |
| Proc#1 | 75° | | 53.4 | -- | -- | **Fail** | System locked up* |
| Proc #2 | 75° | | 61.3 | -- | -- | | |
| **Evercase ECE6102** | | 21.5 | | | | | |
| Proc#1 | 75° | | 65.0 | 78.5 | -3.5 | **Fail** | Over Temp. |
| Proc #2 | 75° | | 65.5 | 79.0 | -4.0 | | |
| **Evercase ECE4103** | | 24.6 | | | | | |
| Proc#1 | 75° | | 72.8 | 83.2 | -8.2 | **Fail** | Over Temp. |
| Proc #2 | 75° | | 72.8 | 83.2 | -8.2 | | |
| **Godspeed GS-130L** | | 21.0 | | | | | |
| Proc#1 | 75° | | 55.7 | 69.7 | +5.3 | **Pass** | |
| Proc #2 | 75° | | 58.7 | 72.7 | +2.3 | | |

*System lockup in this case was due to the processors exceeding their maximum operating temperature. The systems did not stabilize at a temperature before locking up.

All numbers shown for temperature are in degrees C.

## Thermal Results of 82443LX:

| Component | Limit Temp. | Ambient Temp. | Reading @ room temp. | 35°C (adjusted) | Minimum Margin | Pass/ Fail | Comments |
|---|---|---|---|---|---|---|---|
| **Intel Columbus II** | | 35.0 | | | | | |
| 82443LX | 100° | | 94.4 | 94.4 | +5.6 | **Pass** | |
| **Chenbro A9661** | | 21.8 | | | | | |
| 82443LX | 100° | | 68.1 | 81.3 | +18.7 | **Pass** | |
| **Evercase EC888** | | 26.8 | | | | | |
| 82443LX | 100° | | 73.4 | 81.6 | +18.4 | **Pass** | |
| **In-Win IWA-Q500A** Config. #1 | | 20.5 | | | | | |
| 82443LX | 100° | | 74.8 | 88.3 | +11.7 | **Pass** | |
| **In-Win IWA-Q500A** Config. #2 | | 27.4 | | | | | |
| 82443LX | 100° | | 78.2 | 85.6 | +14.4 | **Pass** | |
| **Godspeed GS-130L** | | 20.3 | | | | | |
| 82443LX | 100° | | 69.4 | 84.1 | +15.9 | **Pass** | |
| **Chieftec FT01W** | | 35.0 | | | | | |
| 82443LX | 100° | | 81.4 | 81.4 | +18.6 | **Pass** | |
| **Shin-G GT-312ATX** | | 35.0 | | | | | |
| 82443LX | 100° | | 64.3 | 64.3 | +35.7 | **Pass** | |

All numbers shown for temperature are in degrees C.

# EMI Evaluation of Chassis

Some of the chassis that passed thermal evaluation were subjected to EMI testing. The test methodology was to first test each chassis in accordance with CISPR 22 Class B and EN 55022 Class B requirements. If the chassis failed that, then it was tested in accordance with CISPR 22 Class A and EN 50082-1 Class A requirements.

## *Summary of Results*

| ATX Chassis * | FCC Class | Conducted Emissions | Radiated Emissions | Peripherals list * | Modifications to the chassis required to obtain EMI compliance |
|---|---|---|---|---|---|
| **Intel** Columbus II | Passed Class B | Margin of 4.4 dB | Margin of 2.9 dB | List #1 | None |
| **Chenbro** A9661 | Passed Class A | Margin of 7.4 dB | Margin of 5.6 dB | List #2 | None |
| **Evercase** EC888 | Passed Class A | Margin of 12.8 dB | Margin of 2.3 dB | List #2 | None |
| **GodSpeed** GS-130L | Passed Class A | Margin of 10.7 dB | Margin of 8.5 dB | List #2 | None |
| **IN-WIN** IN-Q500A | Passed Class A | Margin of 10.2 dB | Margin of 9.3 dB | List #2 | None |

* see Appendix B for system configuration details, and peripherals list.
Input power for Tests – 230 VAC, 50Hz;  100 VAC, 50Hz;  115 VAC, 60 Hz

# Appendix A

## *System Configurations for 300 MHz Testing:*

**Intel Columbus II**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Intel | Columbus II |
| R440LX BASEBOARD | Intel | 674688-002 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 64MB  (2x32MB) | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST19171W |
| HARD DRIVE 2 | Seagate | ST19171W |
| HARD DRIVE 3 | Seagate | ST19171W |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Sony | CDU311 |
| POWER SUPPLY | Delta | DPS-275BB-1 A Rev.03 |
| FANS (2) | Sanyo | 109R1212T1H142 |

**Chenbro A9661**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | AA9661 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QAU |
| HARD DRIVE 2 | Fujitsu | M2954QUA |
| HARD DRIVE 3 | Quantum | Atlas II |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado  T3000 |
| POWER SUPPLY (2) | Senstron | RPD-5300F |
| FANS (4) | Oriental Computers | MD-1209PTS3 |

**Evercase EC888**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | EC888 |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST32155W |
| HARD DRIVE 2 | Seagate | ST32155W |
| HARD DRIVE 3 | Seagate | ST32155W |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado |
| POWER SUPPLY | I-STAR | TC-300R |

| | Sanyo (back) | 109R0612H401 |
|---|---|---|
| | Jamicon (front) | JF 1225 S1H |

**In-Win IWA-Q500A    Configuration 1**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In-Win | IWA-Q500A |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | Quantum | Fireball |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Jamicom | JF 0825 B1L2 |

**In-Win IWA-Q500A    Configuration 2**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In Win | IWA Q500A |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 2 | Western Digital | Caviar 21600 |
| 3.5" FLOPPY | Teac | FD-235MG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sanyo | 109R812H01 |
| | Sanyo | 109R812H01 |

**In-Win IWA-500**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In Win | IWA-500 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QAU |
| HARD DRIVE 2 | Fujitsu | M2954QUA |
| HARD DRIVE 3 | N/A | |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado  T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (1) | Jamicon | JF 0825 B1L2 |

**Chenbro A5711-300**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | A5711-300 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QAU |
| HARD DRIVE 2 | Fujitsu | M2954QUA |
| HARD DRIVE 3 | Quantum | Atlas II |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado  T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sanyo (by PS) | 109R0812H401 |
| | Sanyo (by speaker) | 109P0812M602 |

**Chenbro A6831-300**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | A6831-300 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QAU |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | Quantum | Fireball |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sanyo (front) | 109R0812H401 |
| | Sunon (back) | 109R0612H401 |

**Evercase ECE4103**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | ECE4103 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | N/A | |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sunon | KD1206PIS2 |
| | Sanyo (back) | 109R0812H401 |

**Evercase ECE6102**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | ECE6102 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QAU |
| HARD DRIVE 2 | N/A | |
| HARD DRIVE 3 | N/A | |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado  T3000 |
| POWER SUPPLY | I-Star | TC-300R |
| FANS (2) | Sanyo (front) | 109R0612H401 |
| | Jamicon (back) | 109R0612H401 |

**Godspeed GS-130L**

| FUNCTION | MFG. | PART # |
| --- | --- | --- |
| CHASSIS | Godspeed | GS-130L |
| R440LX BASEBOARD | Intel | 674688-022 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (3) | Sanyo (in front) | 109P0812M601 |
| | Sanyo (2 in back) | 109R0812H401 |

**Chieftec FT01W**

| FUNCTION | MFG. | PART # |
| --- | --- | --- |
| CHASSIS | Chieftec | FT01W |
| R440LX BASEBOARD | Intel | R440LX DP |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST19171W SCSI |
| 3.5" FLOPPY | Teac | FD-235HF |
| CD-ROM | Sony | CDU611 IDE |
| TAPE DRIVE | Conner | CTT8000-S |
| POWER SUPPLY | Seasonic | 250GTX 250W |
| FANS (2) | Craft Fan (upper) | |
| | Craft Fan (lower) | |

**Shin-G GT-312ATX**

| FUNCTION | MFG. | PART # |
| --- | --- | --- |
| CHASSIS | Shin-G | GT-312ATX |
| R440LX BASEBOARD | Intel | R440LX DP |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST19171W SCSI |
| 3.5" FLOPPY | Teac | FD-235HF |
| CD-ROM | Sony | CDU611 IDE |
| TAPE DRIVE | HP | Colorado T4000S |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sunon  (upper) | KD1209PTS3-6 |
| | Sunon  (lower) | KD1209PTS3-6 |

# System Configuration for 266 MHz Testing:

**In-Win IWA-Q500A    Configuration 1**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In Win | IWA Q500A |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 2 | Western Digital | Caviar 21600 |
| 3.5" FLOPPY | Teac | FD-235MG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Power Man | SPI-300HA |
| FANS (2) | Jamicon | JF 0825 |
| | Jamicon | JF 0825 |

**In-Win IWA-500**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In-Win | IWA-500 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Atlas II |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | N/A | |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300 HP |
| FANS (1) | Sanyo | 109P0812M602 |

**Chenbro A5711-300**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | A5711-300 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Atlas II |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | Quantum | Fireball |
| 3.5" FLOPPY | Teac | FD-235HG |

| FUNCTION | MFG. | PART # |
|---|---|---|
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300 HP |
| FANS (4) | Sanyo (front) | 109R0812H401 |
| | Sanyo (back,small) | 109R0612H401 |
| | Sanyo (back) | 109P0812M602 |
| | Jamicon (back) | JF 0825 B1L2 |

**Chenbro A6831-300**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | A6831-300 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Fujitsu | M2954QUA |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | Quantum | Fireball |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300 HP |
| FANS (2) | Sanyo (back) | 109R0612H401 |
| | Sanyo (front) | 109R0812H401 |

**Evercase ECE4103**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | ECE4103 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 3 | Fujitsu | M2954QUA |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado  T3000 |
| POWER SUPPLY | Sparkle | SPI-300 HP |
| FANS (2) | Sanyo (front) | 109R0812H401 |
| | Sanyo ( back) | 109P0812M602 |

**Evercase ECE6102**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | ECE6102 |
| R440LX BASEBOARD | Intel | 674688-001 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Atlas II |
| HARD DRIVE 2 | Quantum | Fireball |

| | | |
|---|---|---|
| HARD DRIVE 3 | N/A | |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | I-Star | TC-300R |
| FANS (2) | Sanyo (front) | 109R0812H401 |
| | Sanyo (back) | 109R0612H401 |

**Godspeed GS-130L**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Godspeed | GS-130L |
| R440LX BASEBOARD | Intel | 674688-022 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (3) | Sanyo (in front) | 109P0812M601 |
| | Sanyo (2 in back) | 109R0812H401 |

# *System Configuration for 82443LX:*

**Intel Columbus II**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Intel | Columbus II |
| R440LX BASEBOARD | Intel | 674688-002 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 64MB  (2x32MB) | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST19171W |
| HARD DRIVE 2 | Seagate | ST19171W |
| HARD DRIVE 3 | Seagate | ST19171W |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Sony | CDU311 |
| POWER SUPPLY | Delta | DPS-275BB-1 A Rev.03 |
| FANS (2) | Sanyo | 109R1212T1H142 |

**Chenbro A9661**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | AA9661 |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |
| HARD DRIVE 1 | Seagate | ST32155W |
| HARD DRIVE 2 | Seagate | ST3620N |
| HARD DRIVE 3 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Iomega | Easy3200 |
| POWER SUPPLY | I-STAR | TC-300R |
| FANS (4) | Oriental Computers | MD-1209PTS3 |

**Evercase EC888**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | EC888 |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |

| HARD DRIVE 1 | Seagate | ST32155W |
|---|---|---|
| HARD DRIVE 2 | Seagate | ST32155W |
| HARD DRIVE 3 | Seagate | ST32155W |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado Part # ? |
| POWER SUPPLY | I-STAR | TC-300R |
| FANS (2) | Sanyo (back) | 109R0612H401 |
| | Jamicon (front) | JF 1225 S1H |

**In-Win IWA-Q500A    Configuration 1**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | IN-WIN | IW-Q500A |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Western Digital | Caviar 21600 |
| HARD DRIVE 3 | Quantum | Atlas II |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado |
| POWER SUPPLY | Power Man | SPI-300HA |
| FANS (2) | Jamicon | JF 0825 |

**In-Win IWA-Q500A    Configuration 2**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In Win | IWA Q500A |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Quantum | Fireball |
| HARD DRIVE 2 | Western Digital | Caviar 21600 |
| 3.5" FLOPPY | Teac | FD-235MG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sanyo | 109R812H01 |
| | Sanyo | 109R812H01 |

**Godspeed GS-130L**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Godspeed | GS-130L |
| R440LX BASEBOARD | Intel | 674688-022 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |

| | | |
|---|---|---|
| HARD DRIVE 1 | Seagate | ST32155W |
| HARD DRIVE 2 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (3) | Sanyo (in front) | 109P0812M601 |
| | Sanyo (2 in back) | 109R0812H401 |

## Chieftec FT01W

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chieftec | FT01W |
| R440LX BASEBOARD | Intel | R440LX DP |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |
| HARD DRIVE 1 | Seagate | ST19171W SCSI |
| 3.5" FLOPPY | Teac | FD-235HF |
| CD-ROM | Sony | CDU611 IDE |
| TAPE DRIVE | Conner | CTT8000-S |
| POWER SUPPLY | Seasonic | 250GTX 250W |
| FANS (2) | Craft Fan (upper) | |
| | Craft Fan (lower) | |

## Shin-G GT-312ATX

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Shin-G | GT-312ATX |
| R440LX BASEBOARD | Intel | R440LX DP |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY - 128MB | NEC | MC-4516CC724F-A10 |
| HARD DRIVE 1 | Seagate | ST19171W SCSI |
| 3.5" FLOPPY | Teac | FD-235HF |
| CD-ROM | Sony | CDU611 IDE |
| TAPE DRIVE | HP Colorado | T4000S |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Sunon  (upper) | KD1209PTS3-6 |
| | Sunon  (lower) | KD1209PTS3-6 |

# Appendix B

## *System Configurations for EMI Testing:*

**Intel Columbus II**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Intel | Columbus II |
| R440LX BASEBOARD | Intel | 674688-021 |
| Two 266MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Western Digital | WD21600 |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Hitachi | CDR-8130 |
| POWER SUPPLY | Delta | DPS-275BB-1 A Rev.04 |
| FANS (2) | Sanyo | 109R1212T1H142 |

**Chenbro A9661**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Chenbro | A9661 |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Iomega | Easy3200 |
| POWER SUPPLY (2) | Senstron | RPD-5300F |
| FANS (4) | Oriental Computers | MD-1209PTS3 |

**Evercase EC888**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Evercase | EC888 |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Seagate | ST32155W |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado |
| POWER SUPPLY | I-STAR | TC-300R |
| FANS (2) | Sanyo (back) | 109R0612H401 |
| | Jamicon (front) | JF 1225 S1H |

**In-Win IWA-Q500A**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | In-Win | IWA-Q500A |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (2) | Jamicom | JF 0825 B1L2 |

**Godspeed GS-130L**

| FUNCTION | MFG. | PART # |
|---|---|---|
| CHASSIS | Godspeed | GS-130L |
| R440LX BASEBOARD | Intel | 674688-020 |
| Two 300MHz Pentium® II processors | Intel | |
| MEMORY – 32MB | NEC | MC-454AC724-A10 |
| HARD DRIVE 1 | Quantum | Fireball |
| HARD DRIVE 2 | Seagate | ST3620N |
| 3.5" FLOPPY | Teac | FD-235HG |
| CD-ROM | Panasonic | CR-585-B |
| TAPE DRIVE | Hewlett Packard | Colorado T3000 |
| POWER SUPPLY | Sparkle | SPI-300HP |
| FANS (3) | Sanyo (in front) | 109P0812M601 |
| | Sanyo (2 in back) | 109R0812H401 |

**EMI Tested System Details – Peripherals List #1**

| Peripheral | Make/Model or Description |
|---|---|
| Monitor | IBM P70 |
| Monitor | Viewsonic Model 7034T |
| Serial Printer | Epson P850A |
| Parallel Printer | Epson P732A |
| Headphones | Sony Model MDR-55 |
| Keyboard | Cherry Model MX3000 |
| Mouse | Microsoft Model 2.0A |
| PS/2 Mouse | Microsoft Model 2.1A |
| **Cables:** | |
| Power (system) | 1.6 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Power (monitor) | 1.6 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Power (printer) | 1.8 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Monitor | 1.8 meter in length. Shielded and no ferrites attached. |
| Serial | 1.1 meter in length. Shielded and no ferrites attached. Metal connector backshells. |
| Serial | 1.5 meter in length. Shielded and no ferrites attached. Metal connector backshells. |
| Parallel | 1.1 meter in length. Shielded and no ferrites attached. Metal connector backshells. |
| Network | 50 meters in length. Unshielded and no ferrites attached. Connected to the server. |
| Mouse | 1.8 meters in length. Shielded and no ferrites attached. |
| Keyboard | 1.8 meters in length. Shielded and no ferrites attached. |
| Headphones | 2 meters in length. Unshielded and no ferrites attached. |

**EMI Tested System Details – Peripherals List #2**

| Peripheral | Make/Model or Description |
|---|---|
| Monitor | IBM P70 |
| Monitor | Viewsonic Model 7034T |
| Printer | Epson FX-1050 |
| Printer | Hewlett Packard Model C2114A |
| Modem | Epson Link 1200 |
| Keyboard | Hewlett Packard Model C3758-60201 |
| Keyboard | Epson T026A |
| Mouse | Microsoft Model 2.0A |
| PS/2 Mouse | Microsoft Model 2.0A |
| **Cables:** | |
| Power (system) | 1.6 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Power (monitor) | 1.6 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Power (printer) | 1.8 meters in length. Unshielded and no ferrites attached. US/AC connector. |
| Monitor | 1.8 meter in length. Shielded and no ferrites attached. |
| Serial | 1.1 meter in length. Shielded and no ferrites attached. Metal connector backshells. |
| Parallel | 1.1 meter in length. Shielded and no ferrites attached. Metal connector backshells. |
| Network | 3 meters in length. Unshielded and no ferrites attached. Connected to the server. |
| Mouse | 1.8 meters in length. Shielded and no ferrites attached. |
| Keyboard | 2 meters in length. Shielded and no ferrites attached. |