Intel® AD450NX Server System
Tested Memory List & Report Summary

Revision 16.0
October, 2000

Revision History		
Date	**Rev**	**Modifications**
March, 1999	3.0	Initial release in new format.
April, 1999	3.1	Added 64MB, 128MB and 356MB memory vendors to list.
April, 1999	3.2	Corrected Viking 128MB part number
June, 1999	3.3	Added Kingston 256MB part number
June, 1999	3.4	Added Micron 256MB part number
June, 1999	3.5	Added Dataram 256MB part number
August, 1999	4.0	Updated Table information for MVL and CMTL Advanced Tested Memory
August, 1999	4.1	Added Mitsubishi 64MB and 256MB part numbers
August, 1999	4.2	Added Smart Modular 64MB part numbers
Sept, 1999	4.3	Added Smart Modular and 32, 64 and 256MB part numbers
Oct, 1999	4.4	Added Dataram 128MB part number
Dec, 1999	5.0	Part number changes on Samsung parts and removed disapproved parts. Changed format.
Feb. 2000	6.0	Added Hyundai 64MB & Viking 256MB parts.
Feb. 2000	7.0	Added Hyundai 256MB parts. (Shaded Area)
Mar. 2000	8.0	Added DataRam 128MB & 256MB parts. Part number change for Viking 265MB part. (Shaded Area)
Mar. 2000	9.0	Added DataRam 64MB & Viking 256MB part. Part number updates for Samsung parts. (Shaded Area)
April 2000	10.0	Added DataRam 64MB, 128MB & 256MB parts. (Shaded Area)
May 2000	11.0	Added Dane Elec 32MB parts. (Shaded Area)
June 2000	12.0	Added Smart Modular 256MB part. Part number change for Viking 256MB part. (Shaded Area)
June 2000	13.0	Added DataRam 128MB part. (Shaded Area)
June 2000	14.0	Added Dane-Elec 128MB part. Part number change for Kingston 256MB part. (Shaded Area)
Oct. 2000	15.0	Added Vital 256MB part. (Shaded Area)
Oct. 2000	16.0	Correction on Vital 256MB part. (Shaded Area)

Please Note: *DIMM devices with gold contacts should NOT be placed into DIMM sockets with tin-lead contacts or vice-versa. Mixing dissimilar metal contact types has been shown to result in unreliable memory operation. Intel recommends similar manufacturer and similar speeds in each bank on the memory module. Mixing of dissimilar memory manufacturer and similar speeds in each bank on the memory module is NOT recommended.*

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Overview of Memory Testing

The following procedure is used to qualify dual inline memory modules (DIMMs) for use in the Intel® AD450NX server system. Memory is a vital subsystem in a platform. Intel Corporation requires strict guidelines to be met before a DIMM vendor is put onto the qualified memory list. Each Intel Server Board product has a separate qualified memory list.
Memory qualification for Intel®'s Server Board products is performed by Intel's Memory Validation Laboratory (MVL), and by an independent external test laboratory, Computer Memory Test Lab (CMTL). CMTL is a leading memory testing organization responsible for testing a broad range of memory products. Memory devices tested by Intel's MVL or CMTL must undergo rigorous tests to ensure that the product will perform the intended Server functions.

Intel®'s Server and Workstation Board qualified memory lists categorize memory modules as Advanced Tested. The Advanced Testing process involves a paper qualification, a standard voltage and room temperature functional test, and a voltage and temperature margin functional test. A paper qualification is a review of critical timings, electrical characteristics, timing requirements, environmental requirements, and packaging requirements in order to see if the DIMM meets Intel's memory specifications. The standard voltage and room temperature test involves testing the memory module on the particular Intel Board for which it is being qualified with test software operating under Microsoft* Windows NT* v4.0 for no less than 24 hours. The voltage and temperature margin testing involves testing the memory module on the particular Intel Board for which it is being qualified with various test software and operating systems for 48-72 hours under various voltage and temperature margin conditions. DIMMs that have completed Advanced Testing are known to be compatible with the product on which they were tested, and with the test software and operating system that was utilized during the test procedure.
For information regarding the testing procedure required to reach each phase please contact your Intel Representative.

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†CMTL is a leading memory testing organization responsible for testing a broad range of memory products. Receiving a "PASS" after being tested by CMTL, means that a product functions correctly and consumers can use it to perform the intended server functions. In order to pass these stringent standards, memory products must maintain the highest manufacturing procedures and pass an exacting battery of tests. Testing is performed with equipment and a procedure as defined by Intel's various functional testing levels. Testing is performed on a number of Intel® AD450NX server boards.

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Qualified DRAM DIMM Memory for the AD450NX Server System

The AD450NX memory module has 16 DIMM sockets, which support up to 4 GB of EDO/ECC system memory. These sockets are divided into four banks of four sockets labeled A through D on the memory module. These banks support 4:1 interleaving only. All DIMMs within a given bank should be identical. From bank to bank, the Intel® 82450NX PCIset supports different varieties of DIMM size, manufacturer, and speed. The BIOS automatically detects the memory type, size, and speed. The following memory features are supported:

- 168-pin DIMMs with gold-plated contacts
- Buffered EDO/ECC DIMMs; 50 ns or 60 ns
  - -- 16* MB: 16 Mbit, 2Mx8 DRAM; 2K refresh
  - -- 32 MB: 16 Mbit, 4Mx4 DRAM; 2K or 4K refresh
  - -- 64 MB: 64 Mbit, 8Mx8 DRAM; 4K refresh
  - -- 128* MB: 64 Mbit, 16x4 DRAM; 4K or 8K refresh
  - -- 256 MB: Double-high, 64 Mbit, 16x4 DRAM; 4K or 8K refresh
- 3.3 V memory only
- CAS-before-RAS refresh only
- Single or double-sided DIMMs
- Double-high DIMMs with maximum height of 2.1 inches
- TSOP package only, SOJ not supported due to spacing

*Should function correctly, but will not be validated

Intel strongly recommends the use of ECC memory in all server systems. The EDO/ECC DIMMS can be installed four at a time on the memory module used on the AD450NX server platform. The AD450NX with the Intel® Pentium® II Xeon™ processors can meet a wide range of needs, with processing speeds starting at 400 MHz and cache sizes ranging from 512KB to 2 MB. In addition, the AD450NX offers true scalability by supporting from one to four Pentium II Xeon processors. This document will be updated with the latest tested EDO/ECC memory modules as qualified memory is added for the life of the AD450NX server system product. The most recent version of this document supercedes all other versions.
The following tables list DIMM devices known to be compatible with the Intel AD450NX Pentium II Xeon processor-ready server platform system. Intel recommends that Advanced Tested DIMMs be used to establish reliable system operation. DIMM devices not listed can be used; but, in the event of unreliable system operation, the DIMM devices should be replaced with functionally Advanced Tested DIMMs to determine whether the DIMM devices are causing the problem. The memory devices shown are categorized according to three levels of qualification: Memory modules not listed in the following tables may be used. However, Intel recommends the use of Advanced Tested ECC modules, and in the event of unreliable system operation, the modules should be replaced with Advanced Tested ECC modules to determine whether the unlisted or non -ECC modules are causing the problem. Intel recommends that module and DRAM vendors not be mixed in the same system.

Caution: Third party memory vendors may use the same module part number with different DRAM vendors and die revisions. To insure proper system operation, verify that each DRAM vendor and die revision has been separately tested and qualified. Please notify CMTL if there is a discrepancy.

Note: This list is not intended be all-inclusive. It is provided as a convenience to Intel's general customer base, but Intel does not make any representations or warranties whatsoever regarding the quality, reliability, functionality, or compatibility of these memory modules.

This list is subject to change without notice.

AD450NX Server System

Buffered EDO/ECC DIMM Modules
32MB Sizes

Manufacturer	Part Number	DRAM Part Number	DRAM Vendor	PCB Part Number	Date	CMTL Test #	EOL
Samsung	KMM372F404AS-6						EOL
Samsung	M372F0400CF0-C5000				6/13/98		
Samsung	M372F0400CF0-C6000				6/18/98		
Mitsubishi	MH4V7245DATJ-6				6/20/98		
Texas Instruments	TM4EP72BPB-60				6/23/98		
Samsung	M372F0404BT0-C5000				12/23/98		
Samsung	M372F0404BT0-C6000				12/29/98		
Samsung	M372F0404CT0-C6000				1/6/99		
Samsung	M372F0404CT0-C5000				1/18/99		
Smart Modular	SM5IN4M72001-80	HY51V16404CT-60	Hyundai	P532168PESJ76CX	8/17/99	A415	
Smart Modular	SM5IN4M72001	KM44V4004CS-50	Hyundai	P532168PESJ7GCX	8/30/99	A410	
Smart Modular	SM5IN4M72001-90	M5M4V16405DTP	Hyundai	P532168PESJ76CX	9/9/99	A413	
*Dane Elec	DE07204VB42-G6R	HYB3117405BT-60	Siemens	4072V rev B	5/12/00	A899	

* For further information contact CMTL at www.GOLD@cmtlabs.com.

AD450NX Server System

Buffered, ECC, EDO DIMM Module
64MB Sizes

Manufacturer	Part Number	DRAM Part Number	DRAM Vendor	PCB Part Number	Date	CMTL Test #	EOL
Samsung	KMM372F803BS-5						EOL
Samsung	KMM372F803BS-6						EOL
+Samsung	(Old #) KMM372F803CS-5 (New #) M372F0803CT0-C5000						
Mitsubishi	MH8V7245AZTJ-6				6/12/98		
*DataRam	DTM60092NX	MT4LC8M8C2TG-5	Micron	40442	12/1/98	A162	
Hyundai	HYM5V72A804ATHG-50	HY51V65804ATC-50	Hyundai	9801-4	1/16/99	A200	
Smart Modular	SM5IN8M72001	M5M465805BTP	Hyundai	P528168NEBJB60X	7/15/99	A420	
Mitsubishi Electronics	MH8V7245BBZTJ-5	MSM465805BTP-5	Mitsubishi	2021940-001	8/6/99	A406	
Smart Modular	SM5IN8M72001	KM48V8104CS-6	Hyundai	P528168NEBJ8G0X	8/20/99	A439	
Smart Modular	SM5IN8M72001	HY51V65804ATC-60	Hyundai	P528168NEBJ8G0X	8/24/99	A418	
Hyundai	GMMS773828OCTG-5	GM71V65803CT-5	Hyundai	N/A	1/22/00	A504	
*DataRam	DTM60092	GM71V65803CT-5 rev C	Hyundai	40442 rev B	3/13/00	A818	
*DataRam	DTM60092	MT4LC8M8C2TG-5	Micron	40442 rev B	4/12/00	A873	

+Samsung parts are available under both part numbers.

* For further information contact CMTL at www.GOLD@cmtlabs.com.

AD450NX Server System

Buffered, ECC, EDO DIMM Modules
128MB Sizes

Manufacturer	Part Number	DRAM Part Number	DRAM Vendor	PCB Part Number	Date	CMTL Test #	EOL
+Samsung	(Old #) KMM372F1600CS-5 (New #) M372F1600CT0-C5000						
Micron	MT18LDT1672G-6X				9/10/98		
Micron	CT16M72EB6.18LDTGX				9/10/98		
*Viking	VE16722B4EN3-60AHG				11/17/98		
Hyundai	HYM5V72A1604ATNG-50	HY51V65404ATC-50	Hyundai	9838-2	1/28/99	A202	
Legend	ASPEN128	V53C365805AT50	Mosel-Vitelic	16872V	3/1/99	A228	
*DataRam	DTM60093	MT4LC16M4H9TG-5	Micron	40379	10/11/99	A507	
*DataRam	DTM60093	GM71V65403CT5 rev C	Hyundai	40379 rev A	3/2/00	A808	
*DataRam	DTM60135	MT4LC16M4G3TG-5 rev D	Micron	40379 rev A	4/20/00	A849	
*DataRam	DTM60093	MT4LC16M4H9TG-5	Micron	40379	6/7/00	A869	
*Dane-Elec	DE07216VBC4-G5U	TC5165405BFTS-50	Toshiba	KO-6209 rev A	6/21/00	A897	

+Samsung parts are available under both part numbers.

* For further information contact CMTL at www.GOLD@cmtlabs.com.

AD450NX Server System

Buffered, ECC, EDO DIMM Modules
256MB Sizes

Manufacturer	Part Number	DRAM Part Number	DRAM Vendor	PCB Part Number	Date	CMTL Test #	EOL
Samsung	KMM372F3280BS1-5						EOL
Micron	CT32M72E4B6.36LDTGX				9/10/98		
Micron	MT36LDT3272G-6X (C die DRAM)				9/10/98		
*DataRam	DTM60094NX	HY51V65404ATC-50	Hyundai	40404	1/21/99	A163	
*DataRam	DTM60094NX	NT4LC16B4H9TG-50	Micron	40404	1/21/99	A164	
Hyundai	HYM5V72A3204ATNG-50	HY51V65404ATC-50	Hyundai	9835-1	1/27/99	A201	
Micron	MT36LDT3272G-6X (D die DRAM)				2/11/99		
Tanisys Tech	TNE7232E15AG5C0	HY51V65404ATC-50	Hyundai	50-1316-71	2/21/99	A223	
*Viking (1)	INT25612	KM44V16104BS-6	Samsung	639G	3/2/99	A236	
Kingston	~KVR32X72V44-50EG-IS	KM44V16104CS-5	Samsung	200198-001	5/27/99	A350	
Micron	MT36LDT3272G-5X	MT4LC16M4H9TG-5	Micron	6670	6/9/99	A321	
Hyundai	HYM5V72A3204ATNG-50	HY51V65404ATC-50	Hyundai	9920-2	7/14/99	A230B	
Hyundai	HYM5V72A3204ATNG-50	HY51V65404ATC-50	Hyundai	9920-2	7/14/99	A436	
Smart Modular	SM5IN32M72001	HY51V64404ATC-60	Hyundai	P556168NESJ860X	7/27/99	A411	
Mitsubishi Elecontronics	MH32V7245BTJ-5	MSM465405BTP5	Mitsubishi	2022198-001	8/13/99	A408	
*Viking	VE32722B4EN3-UN02	Siemens	HYB3165405AT-50	9825639 rev	1/28/00	A649	
Hyundai	GMMA77332280CTG-5	GM71V65403CT5	Hyundai	N/A	2/9/00	A693	
*DataRam	DTM60094	GM71V65403CT-5	Hyundai	40404 rev B	3/9/00	A810	
+*+Viking	VE32722B4EN3-UN05 or ~INT25619	D4265405G5-A50-7JD	NEC	9825639A	3/20/00	A841	
*DataRam	DTM60134	MT4LC16M4G3TG-5 rev D	Micron	40404 rev B	4/2/00	A847	
Smart Modular	SM5IN32M72002	GM71V65403CT5 rev C	Hyundai	P556168NESJ8G0X rev A	5/19/00	B096	
Vital	VT32MX72-EDO-BGA	ED16MX41SCB4NA	~Vertical Circuits Inc. (VCI)	VT16/32MX72-EDO-BGA	9/29/00	B532	

1) Intel has found that these DRAM modules are sensitive to the difference between FCT and LVT buffering. Please note that only Viking DIMMs using the TI buffer component, LVT162244 are qualified as Advanced. Viking DIMMs with the Cypress buffer component, CY74FCT163244 are not considered approved for this list.

+ Parts can be order under both part numbers.
~ Part number change/Correction.
* For further information contact CMTL at www.GOLD@cmtlabs.com.

Computer Memory Test Labs (CMTL[SM])

CMTL[SM] is a privately owned and operated memory testing organization responsible for testing a broad range of memory products. Memory devices tested by CMTL[SM] must undergo a rigorous battery of tests to ensure that the product will perform the intended server functions. Memory capability is a major factor customers consider. CMTL[SM] has the ability to test and certify memory on Intel-based server platforms. The list of memory modules, which have undergone testing through the CMTL[SM] facility, should be referenced when considering modules for integration into this Intel server product. Stringent standards with regard to manufacturing procedures and quality must be met to pass the exacting tests required for qualification through the independent testing facility. Testing is performed by CMTL[SM] with Intel server products and test procedures defined by Intel's Memory Qualification Lab. Intel routinely audits the CMTL[SM] factuality to ensure all procedures, process handling, and testing methodologies are met.

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IMPORTANT NOTE

DIMM devices with gold contacts should NOT be placed into DIMM sockets with tin-lead contacts or vice-versa. Mixing dissimilar metal contact types has been shown to result in unreliable memory operation. Intel recommends similar manufacturer and similar speeds in each bank on the memory module. Mixing of dissimilar memory manufacturer devices or dissimilar memory device speeds is not recommended. This document contains information which is the proprietary property of Intel Corporation. Nothing in this document constitutes a guaranty, warranty, or license, express or implied. Intel has tested the following DIMMs for minimum electrical and functional compatibility with boxed Pentium® II Xeon™ processors. This listing is not intended to be all inclusive; it only represents the DIMMs Intel or CMTL[SM] has tested. Users of this list are reminded to check with the DIMM manufacturer or Distributor to ensure that a particular DIMM model is adequate for the intended purpose on the Pentium® II Xeon™ baseboard. Intel provides no indemnities for and expressly disclaims all liabilities for any and all such guaranties, representations, and warranties (oral or written) whether express or implied, related to DIMMs in a SC450NX product, including without limitation to: fitness for a particular purpose; merchantability; noninfringement of intellectual property or other rights of any third party or of Intel. The reader is advised that third parties may have intellectual property rights which may be relevant to this document and the technologies discussed herein, and is advised to seek the advice of competent legal counsel, without obligation of Intel. Intel retains the right to make changes to this document at any time, without notice. Intel makes no warranty or representation with respect to the use of this document or reliance by the reader upon its contents, and assumes no responsibility for any errors which may appear in the document nor does it make a commitment to update the information contained herein.

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