



# Enterprise Server Group

## Intel<sup>®</sup> N440BX DP Server System & Baseboard

### Tested Memory List

*Revision 10*  
*February, 1999*



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## Revision History

Revision		Revision History
June, 1998	Rev. 1	Updated list with recently tested memory devices.
August, 1998	Rev. 2	Updated list with recently tested memory devices. Added information CMTL testing and lists.
September, 1998	Rev. 3	Updated list with recently tested memory devices
October, 1998	Rev. 4	Updated list with recently tested memory devices
November, 1998	Rev. 5	Updated list with recently tested memory devices
December, 1998	Rev. 6	Added Dane-Elec to the memory list (shaded modules in table).
December, 1998	Rev. 7	Adding Kingston to the memory list (shaded modules in table).
December, 1998	Rev. 8	Adding Dataram memory to the list (shaded modules in table).
January, 1999	Rev. 9	Adding new memory to the list (shaded modules in table).
February, 1999	Rev. 10	Updated document structure & memory list.

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***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

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The following procedure is used to qualify Dual In-Line Memory Modules (DIMMs) for use with the N440BX server board. Memory is a vital subsystem in a server. Intel requires strict guidelines to be met before a DIMM vendor is put onto the qualified memory list. To be acknowledged on the list as a fully functional DIMM, the memory must pass two different phases of testing:

1. Advanced Environmental Testing
2. Basic Electrical Testing

**Advanced Tested** – DIMMs listed as Advanced Tested have been electrically tested by CMTL or Intel®'s MVL with temperature and voltage margining, and various test software and operating systems for 48-96 hours. The DIMM device is known to be compatible with the Server Board, test software and operating system that was utilized during the test procedure. DIMMs listed as Advanced Tested have also completed all of the requirements of Basic Testing.

**Basic Tested** – DIMMs listed as Basic Tested have completed a paper qualification by the memory vendor. 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. In addition to the paper qualification, a DIMM listed as Basic Tested has been electrically tested at room temperature on the Intel Server Board for which it is qualified. A small sample (normally four DIMMs) has been tested by CMTL<sup>†</sup> at standard voltage and room temperature for 24-72 hours. These devices are listed by Intel as a convenience to Intel's general customer base, but neither CMTL or Intel make any representations or warranties whatsoever regarding quality, reliability, functionality or compatibility of these devices on the Intel Server Board.

A full description of the testing procedure required to reach each phase is described in the document "Qualified Memory Test Procedure Summary" located at:

<http://support.intel.com/support/motherboards/server/>

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<sup>†</sup>CMTL is a leading memory testing organization responsible for testing a broad range of memory products. A memory product, which receives a "PASS" after being tested by CMTL, means it functions correctly and consumers can use the product 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 N440BX server boards.

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## Qualified SDRAM Memory for the N440BX Server Board

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This Server product supports the following memory features:

- 168-pin gold-plated SDRAM DIMM modules
- Support for up to 1 GB ECC SDRAM
- 3.3V memory only
- Support for unbuffered DIMM sizes of 32, 64, 128 MB
- Support for registered DIMM sizes of 64, 128, 256 MB

Memory features are detailed in the *N440BXUP Server Technical Product Specification* available on-line at [www.intel.com/support](http://www.intel.com/support).

The following tables list DIMM devices known to be compatible with the Intel N440BX Pentium® II processor-ready server board. This document and the DIMM list will be updated as qualified memory is added during the life of the N440BX product.

Intel strongly recommends the use of ECC memory in all server systems. The Intel Pentium® II processors used with the N440BX Server board with a 100MHz-system bus must be paired only with 100MHz SDRAM DIMMs.

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. This list is subject to change without notice.

**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.

## N440BX DP SERVER SYSTEM & BASEBOARD - INTEL & CMTL TESTED MEMORY LIST

Shading indicates latest additions to the list. The levels of testing are defined in the Introduction of this document.

<b>Unbuffered, ECC, 100 MHz SDRAM DIMM Modules</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>16 MB Memory</b>					
Viking	PE2721U4SN3-2226	Advanced	N/A	2Mx72	16MB
Viking	PE2721U4SN3-IN02	Advanced	N/A	2Mx72	16MB
<b>32 MB Memory</b>					
Dane-Elec	DP100-0720426	Advanced	N/A	4Mx72	32MB
Micron	MT18LSDT472AG-100	Advanced	692323-001	4Mx72	32MB
Micron	MT18LSDT472AG-10BC4	Advanced	692323-001	4Mx72	32MB
Samsung	KMM374S403CT-GL	Advanced	692323-001	4Mx72	32MB
Samsung	KMM374S403CT-G0	Advanced	692323-001	4Mx72	32MB
Toshiba	THMY7240F1BEG-80	Advanced	N/A	4Mx72	32MB
Viking	PE4722U4SN3-2226	Advanced	N/A	4Mx72	32MB
Viking	PE4722U4SN3-IN02	Advanced	N/A	4Mx72	32MB
<b>64 MB Memory</b>					
Corsair	CM734S64-BX	Advanced	N/A	8Mx72	64MB
Dane-Elec	DP100-072082AU1	Advanced	NA	8Mx72	64MB
Dataram	60085BX	Advanced	N/A	8Mx72	64MB
H Co.	HIN440BX-64E	Advanced	N/A	8Mx72	64MB
Micron	MT9LSDT872AG-10BD2	Advanced	692277-001	8Mx72	64MB
Micron	MT9LSDT872AG-10CD4	Advanced	692277-001	8mx72	64MB
Mitsubishi	MH8S72AALD-8D0	Advanced	N/A	8Mx72	64MB
Mitsubishi	MH8S72AAFD-8C2	Advanced	N/A	8Mx72	64MB
NEC	MC-458CA726F-A10	Advanced	692277-001	8Mx72	64MB
Peripheral Enhancements	DM168-33-064M-EP1002SAM	Advanced	N/A	8Mx72	64MB
Peripheral Enhancements	DM168-33-064M-EP1003SAM	Advanced	N/A	8Mx72	64MB
Samsung	KMM374S823BT-GL	Advanced	692277-001	8Mx72	64MB
Toshiba	THMY7280F1BEG-80	Advanced	N/A	8Mx72	64MB
Viking	PE8721U4SN3-2226	Advanced	N/A	8Mx72	64MB
Viking	PE8721U4SN3-IN02	Advanced	N/A	8Mx72	64MB

<b>Unbuffered, ECC, 100 MHz SDRAM DIMM Modules (continued)</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>128 MB Memory</b>					
Corsair	CM734S128-BX	Advanced	N/A	16Mx72	128MB
Dane-Elec	DP100-072162AU1	Advanced	NA	16Mx72	128MB
Dataram	60086BX	Advanced	N/A	16Mx72	128MB
H Co.	HIN440BX-128E	Advanced	N/A	16Mx72	128MB
Fujitsu	PDC16UV7284A103TS	Advanced	N/A	16Mx72	128MB
Hitachi	HB52E169EN-B6	Advanced	N/A	16Mx72	128MB
InterWorks	IW-8E72X18-4P1	Advanced	N/A	16Mx72	128MB
Kingston	KGM100X72C3/128	Advanced	N/A	16Mx72	128MB
Micron	MT18LSDT1672AG-10BD2	Advanced	692275-001	16Mx72	128MB
Micron	MT18LSDT1672AG-10CD4	Advanced	692275-001	16Mx72	128MB
Mitsubishi	MH16S72AAMD-8D0	Advanced	N/A	16Mx72	128MB
NEC	MC-4516CC726F-A10	Advanced	692275-001	16Mx72	128MB
Peripheral Enhancements	DM168-33-128M-EP1002SAM	Advanced	N/A	16Mx72	128MB
Peripheral Enhancements	DM168-33-128M-EP1003SAM	Advanced	N/A	16Mx72	128MB
Samsung	KMM374S1623BT-GL	Advanced	692275-001	16Mx72	128MB
Viking	PE16722U4SN3-2226	Advanced	N/A	16Mx72	128MB
Viking	PE16722U4SN3-IN02	Advanced	N/A	16Mx72	128MB
<b>256 MB Memory</b>					
Samsung	KMM374S3323T-GL	Advanced	N/A	32Mx72	256MB

<b>Unbuffered, Non-ECC, 100 MHz SDRAM DIMM Modules</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>16 MB Memory</b>					
Viking	PE2641U4SN3-2226	Advanced	N/A	2Mx64	16MB
<b>32 MB Memory</b>					
Viking	PE4642U4SN3-2226	Advanced	N/A	4Mx64	32MB
<b>64 MB Memory</b>					
Dane-Elec	DP100-0640826	Advanced	N/A	8Mx64	64MB
Dane-Elec	DP100-064082AU1	Advanced	NA	8Mx64	64MB
H Co.	HINN440BX-64	Advanced	N/A	8Mx64	64MB
Viking	PE8641U4SN3-2226	Advanced	N/A	8Mx64	64MB
<b>128 MB Memory</b>					
Dane-Elec	DP100-064062AU1	Advanced	NA	16Mx64	128MB
H Co.	HINN440BX-128	Advanced	N/A	16Mx64	128MB
Viking	PE16642U4SN3-2226	Advanced	N/A	16Mx64	128MB

<b>Unbuffered, ECC, 66 MHz SDRAM DIMM Modules</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>16 MB Memory</b>					
Viking	INT272USBABA0A-10	Advanced	N/A	2Mx72	16MB
<b>32 MB Memory</b>					
Hyundai	HYM7V72A400CTFG-10	Advanced	N/A	4Mx72	32MB
Viking	INT472USBABA0A-10	Advanced	N/A	4Mx72	32MB
<b>64 MB Memory</b>					
H Co.	HINN440BX-64E6	Advanced	N/A	8Mx72	64MB
Viking	INT872USSASA0A-10	Advanced	N/A	8Mx72	64MB
<b>128 MB Memory</b>					
H Co.	HINN440BX-128E6	Advanced	N/A	16Mx72	128MB
Peripheral Enhancements	DM168-33-128M-EP66SAM	Advanced	N/A	16Mx72	128MB
Viking	INT1672USSASA0A-10	Advanced	N/A	16Mx72	128MB

<b>Unbuffered, Non-ECC, 66 MHz SDRAM DIMM Modules</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>32 MB Memory</b>					
Viking	INT464US	Advanced	N/A	4Mx64	32MB
<b>64 MB Memory</b>					
Viking	INT864US	Advanced	N/A	8Mx64	64MB
<b>128 MB Memory</b>					
Viking	INT1664US	Advanced	N/A	16Mx64	128MB

<b>Registered SDRAM DIMM Modules</b>					
<b>Manufacturer</b>	<b>Part #</b>	<b>Level</b>	<b>Intel Part #</b>	<b>DIMM Type</b>	<b>Size</b>
<b>64 MB Memory</b>					
Hitachi	HB52E89E1-B6	Advanced	N/A	8Mx72	64MB
IBM	IBM13M8734HCB-360T	Advanced	696019-103	8Mx72	64MB
Micron	MT9LSDT872G-10CD1	Advanced	696019-103	8Mx72	64MB
NEC	MC-458DA726F-A80	Advanced	696019-103	8Mx72	64MB
Samsung	KMM377S823BT1-GL	Advanced	696019-103	8Mx72	64MB
<b>128 MB Memory</b>					
Dataram	60089	Advanced	N/A	16Mx72	128MB
Hitachi	HB52E169E1-B6	Advanced	N/A	16Mx72	128MB
IBM	IBM13M16734BCB-360T	Advanced	696019-104	16Mx72	128MB
NEC	MC-4516DA726F-A80	Advanced	696019-104	16Mx72	128MB
Samsung	KMM377S1620BT1-GL	Advanced	696019-104	16Mx72	128MB
<b>256 MB Memory</b>					
+Corsair	CM754S256-BX/S	Advanced	N/A	32Mx72	256MB
Dataram	60087BX	Advanced	N/A	32Mx72	256MB
Hitachi	HB52R329E2-B6	Advanced	N/A	32Mx72	256MB
IBM	IBM13M32734BCC-360Y	Advanced	696019-105	32Mx72	256MB
Kentron	KT3272SFN5R07	Advanced	N/A	32Mx72	256MB
Samsung	KMM377S3227BT1-GL	Advanced	696019-105	32Mx72	256MB
Staktek†	SM401S012LBSAG-HAC	Advanced	N/A	32Mx72	256MB
Viking	3D32722R4SN3-2226	Advanced	N/A	32Mx72	256MB

† Part number change.

## COMPUTER MEMORY TEST LABS (CMTL) MEMORY TESTING

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### Computer Memory Test Labs (CMTL)

CMTL is a privately owned and operated memory testing organization responsible for testing a broad range of memory products. Memory devices tested by CMTL must undergo a rigorous battery of tests to ensure that the product will perform the intended server functions. Memory capability is a major factor your customers consider. CMTL 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 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 with Intel server products and test procedures defined by Intel's Memory Qualification Lab. Intel routinely audits the CMTL facility 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 processors. This listing is not intended to be all inclusive; it only represents the DIMMs Intel or CMTL 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 boxed Pentium II processor 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 L440GX+ 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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