# Enterprise Server Group

Intel® N440BX DP Server System & Baseboard
Tagged Memory List

Tested Memory List

intel.

## 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. |

***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.*

# Overview of Memory Testing

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$_†$ 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/

$_†$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

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.

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.

| Manufacturer | Part # | Level | Intel Part # | DIMM Type | Size |
|---|---|---|---|---|---|
| **Unbuffered, ECC, 100 MHz SDRAM DIMM Modules** | | | | | |
| **16 MB Memory** | | | | | |
| Viking | PE2721U4SN3-2226 | Advanced | N/A | 2Mx72 | 16MB |
| Viking | PE2721U4SN3-IN02 | Advanced | N/A | 2Mx72 | 16MB |
| **32 MB Memory** | | | | | |
| 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 |
| **64 MB Memory** | | | | | |
| 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 |

| Unbuffered, ECC, 100 MHz SDRAM DIMM Modules (continued) | | | | | |
|---|---|---|---|---|---|
| Manufacturer | Part # | Level | Intel Part # | DIMM Type | Size |
| **128 MB Memory** | | | | | |
| 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 |
| **256 MB Memory** | | | | | |
| Samsung | KMM374S3323T-GL | Advanced | N/A | 32Mx72 | 256MB |

| Unbuffered, Non-ECC, 100 MHz SDRAM DIMM Modules | | | | | |
|---|---|---|---|---|---|
| Manufacturer | Part # | Level | Intel Part # | DIMM Type | Size |
| **16 MB Memory** | | | | | |
| Viking | PE2641U4SN3-2226 | Advanced | N/A | 2Mx64 | 16MB |
| **32 MB Memory** | | | | | |
| Viking | PE4642U4SN3-2226 | Advanced | N/A | 4Mx64 | 32MB |
| **64 MB Memory** | | | | | |
| 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 |
| **128 MB Memory** | | | | | |
| 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 |

| Unbuffered, ECC, 66 MHz SDRAM DIMM Modules | | | | | |
|---|---|---|---|---|---|
| Manufacturer | Part # | Level | Intel Part # | DIMM Type | Size |
| **16 MB Memory** | | | | | |
| Viking | INT272USBABA0A-10 | Advanced | N/A | 2Mx72 | 16MB |
| **32 MB Memory** | | | | | |
| Hyundai | HYM7V72A400CTFG-10 | Advanced | N/A | 4Mx72 | 32MB |
| Viking | INT472USBABA0A-10 | Advanced | N/A | 4Mx72 | 32MB |
| **64 MB Memory** | | | | | |
| H Co. | HINN440BX-64E6 | Advanced | N/A | 8Mx72 | 64MB |
| Viking | INT872USSASA0A-10 | Advanced | N/A | 8Mx72 | 64MB |
| **128 MB Memory** | | | | | |
| 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 |

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

## Registered SDRAM DIMM Modules

| Manufacturer | Part # | Level | Intel Part # | DIMM Type | Size |
|---|---|---|---|---|---|
| **64 MB Memory** | | | | | |
| 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 |
| **128 MB Memory** | | | | | |
| 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 |
| **256 MB Memory** | | | | | |
| +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

### 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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