



R440LX Server Platform

Safety, EMC, and NOS Certification Guide

Self-Qualification of SDRAM DIMM Guidelines



Revision 2.0
January, 1998



Revision History

Revision	Revision History	Date
1.0	Initial release	10/97
1.1	Grammar changes	10/97
1.2	Added FCC EMC. Clarified NOS certification as it pertains to board level product	11/97
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1.4	Added CE Mark, LVD, EMC and DoC information	12/97
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Table of Contents






1. INTRODUCTION.....	5
1.1. CERTIFICATION SYMBOLS AND DESCRIPTION.....	5
2. SAFETY CERTIFICATIONS.....	6
2.1. UNDERWRITERS LABORATORIES (UL).....	6
2.2. CANADIAN SAFETY ASSOCIATION (CSA).....	8
2.3. NEMKO (N), DEMKO (D), FIMKO (FI), SEMKO (S).....	10
2.4. TUV RHEINLAND (TUV).....	11
3. EMC CERTIFICATIONS.....	12
3.1. FCC (FEDERAL COMMUNICATIONS COMMISSION) USA.....	12
3.2. C-TICK (AUSTRALIAN COMMUNICATIONS AUTHORITY).....	13
3.3. CE MARK (EUROPEAN UNION DIRECTIVES).....	14
4. NETWORK OPERATING SYSTEM CERTIFICATION.....	16
4.1. CERTIFICATION TESTING OVERVIEW.....	16
4.2. NOVELL NETWARE 3.12 & 4.11 CERTIFICATIONS.....	17
4.3. MICROSOFT WINDOWS NT CERTIFICATION TESTING.....	20
4.4. SCO OPENSERVER v5.0, v5.0MPX, UNIXWARE v2.1 CERTIFICATIONS.....	21
4.5. SOLARIS v 2.5 CERTIFICATIONS.....	22
4.6. BANYAN VINES V6.0 CERTIFICATION.....	23
4.7. IBM OS/2 WARP CERTIFICATIONS.....	24
5. MEMORY SELF-CERTIFICATION.....	25
5.1. MEMORY INTEGRATORS.....	25
5.2. COMPUTER MEMORY TEST LAB (CMTL).....	26

1. Introduction

The information provided in this document is intended as a quick reference guide to the certification processes pertinent to Intel's Server product line and is provided as a convenience to our customers only. ***The information is provided as a guide only and is subject to change as safety, EMC, or OS vendor requirements and policies change. Approximate fees are shown only to give the reader an idea of the approximate cost of some of the certifications, however each system is unique, and the reader needs to get an accurate quote from each vendor for their particular system. This information is provided as is and Intel assumes no responsibility for the accuracy of the data in this paper and does not commit to update this information. Users of this information should satisfy themselves as to the applicability and accuracy of the information provided herein prior to acting upon such information. Intel assumes no responsibility for the accuracy of the data in this paper.*** Further information can be found by accessing the Internet web sites listed in Appendix A of this guide.

Intel's Server system products are tested for safety and EMC certifications through a third-party which specializes in this field. These vendors ensure compliance with all governmental regulations in their area and/or country. Certifications for Operating Systems follow different procedures depending on the OS vendor. These procedures are detailed later in this document.

1.1. Certification Symbols and Description

Safety Marks	Representation/Compliance Description
	Underwriters Laboratories and Canadian UL Standards for Safety of Information Technology Equipment
	Canadian Standard Association Standard for Safety of Information Technology Equipment
	Scandinavian Standards for Safety of Information Technology Equipment (Norway, Sweden, Denmark, Finland)
	European Union standard for Safety of Information Technology Equipment, as verified by a German Certification Organization, TUV Rheinland of N.A.
	European Union standard for Safety of Information Technology Equipment, as verified by the required CE marking
EMC Marks	Description
FCC	USA Regulations (FCC's 47 CFR, Parts 2 and 15) , as verified by testing to CISPR 22 and ANSI C63.4 Requirements
	Applicable standards for electromagnetic compatibility of Information Technology Equipment, in the European Union, as verified by the required CE marking
C-Tick	Australian Regulation based on International CISPR 22 Requirements

2. Safety Certifications

2.1. Underwriters Laboratories (UL)

UL is the leading safety testing organization in the world responsible for testing a broad range of products from computers to life jackets. A product with the UL mark guarantees it meets UL safety requirements and that consumers can use the product to safely perform the functions that it is intended to perform.

Contacts

Northbrook, Illinois	Research Triangle Park, North Carolina
847-272-8800 (voice)	919-549-1400 (voice)
847-509-6220 (fax)	919-547-6010 (fax)
Santa Clara, California	Camas, Washington
408-985-2400 (voice)	360-817-5500 (voice)
408-296-3256 (fax)	360-817-6021 (fax)
Melville, New York	
516-271-6200 (voice)	
516-271-8259 or 8260 (fax)	

Web Address: <http://www.ul.com>

Certification Procedure

Contact the client advisor to begin the process of testing a system. Involvement of the Underwriters Laboratories is recommended as early as possible in the design phases of a project for feedback and catching problems before the product is too far along to go back and fix economically.

The request for a UL product evaluation must be made in writing. Included in the request should be basic technical information about the product to be evaluated. Additional information should include:

- A description of the intended use(s) of the product
- Identification of the components and materials used in the final product
- Wiring diagrams and/or design drawings or photographs
- A copy of any information that will be supplied with the product such as an instruction manual, safety tips, and installation instructions
- A description of any alternate materials, components, or arrangements of parts that may be used to reduce test work in the future
- The exact company name as it will appear on the product and the exact address of the location(s) where the product will be manufactured

Once UL has this information, it will identify where and by what department the evaluation will be conducted. Upon submission of the application, preliminary deposits, and receipt of the test systems, testing will begin.

Fees

Assessed on a per case basis.

Requirements

A witness from the agency must be present for the safety testing and investigation of the construction of products to safety standards. The testing can be done at the manufacturer's site or submitted to the safety agency. If testing is performed in-house, all testing equipment must be calibrated.

Product documentation is also required. This may be provided by the manufacturer and/or the agency after it has finished drafting its reports, gathering information on the components and studying schematics. From this documentation final reports, listings, licenses, and declarations are generated for the final approvals.

Additionally the manufacturer needs to meet EMC requirements. To get EMC compliance, the manufacturer needs to go to a certified lab to have their product tested for radiated, conducted emissions and immunity.

2.2. Canadian Safety Association (CSA)

The CSA mark is registered in Canada and other countries. When a product carries the CSA mark, it is telling consumers that it meets the requirements of a standard for safety and/or performance. The product cannot carry the CSA mark until it has been thoroughly tested and certified by CSA.

Contacts

Etobicoke (Toronto)
416-747-4007
In U.S. and Canada only:
1-800-463-6727 (Option #2)
416-747-4149
certinfo@csa.ca

Edmonton
403-450-2111
In U.S. and Canada only:
1-800-463-6727 (Option #2)
403-451-5322
certinfo@csa.ca

Richmond (Vancouver)
604-273-4581
In U.S. and Canada only:
1-800-463-6727 (Option #2)
604-273-5815
certinfo@csa.ca

Pointe-Claire (Montreal)
514-694-8110
In U.S. and Canada only:
1-800-463-6727 (Option #2)
514-694-5001
certinfo@csa.ca

Web Address: <http://www.csa.ca>

Certification Procedure

Contact a CSA representative to set up a CSA certification test.

CSA offers four different testing models depending on your expertise and the types of facilities you have access to:

1. **Model certification** – traditional approach. A sample is submitted for review.
2. **Witness testing** – your own staff tests equipment in your own facility with a CSA representative present.
3. **Category certification** – offers maximum flexibility over how and when product enters market. Requester arranges tests, either at own facility or at another approved facility. The requester then documents the results, prepares the test reports and determines if the product meets the necessary requirements. This allows CSA to give certifications without any delays. The requester must be CSA certified before they can use this option. In order to certify the requester must have a working knowledge of the applicable product standards, a demonstrated ability to design and manufacture products that consistently comply with the standards, and access to suitable test facilities. Once qualification is obtained, the requester will be able to test their products within a certain product category. A CSA representative will visit the facility usually four times a year to audit the control systems and the production process and examine the products.
4. **Field certification** – CSA representative does testing at requester's site.

Fee

Assessed on a per case basis.

Requirements

A witness from the agency must be present for the safety testing and investigating of the construction of products to safety standards (unless requester is certified for the Category Certification process). The testing can be done at the manufacturer's site or submitted to the safety agency. If done at the manufacturer's site, calibrated test equipment is a must.

Product documentation is also required. This may be provided by the manufacturer and/or the agency after it has finished drafting its reports, gathering information on the components and studying schematics. From this documentation final reports, listings, licenses, and declarations are generated for the final approvals.

Additionally the manufacturer needs to meet EMC requirements. To get EMC compliance, the manufacturer needs to go to a certified lab to have their product tested for radiated, conducted emissions and immunity. Once this testing is done and the product is found compliant, certification reports are generated and these reports are used to obtain or self-declare compliance.

2.3. Nemko (N), Demko (D), Fimko (FI), Semko (S)

Nemko, Demko, Fimko, and Semko are all independent test houses based in Scandinavia that offer test and certification services worldwide.

Contacts

NEMKO AS
Gaustadaleen 30
P.O. Box 73 Blindern
N 0314 OSLO
Norway
Tel: +47 22 96 03 30
Fax: +47 22 96 05 50

FIMKO LTD
P.O.Box 30
Särkiniementie 3
FIN-00210 Helsinki
Telephone +358 9 696 361
Telefax +358 9 692 5474

DEMKO A/S
Lyskaer 8
P.O. Box 514
DK-2730 Herlev
Denmark
Telephone: +45 44 85 65 65
Fax: +45 44 85 65 00

SEMKO AB
Torshamnsgatan 43
Box 1103
164 22 KISTA, SWEDEN
Telephone: +46-8-750 00 00
Fax: +46 8 750 60 30

Web Addresses:

<http://www.nemko.no/>

<http://www.demko.dk/>

<http://www.semko.se/>

<http://prosafety.fi/englanti.html>

Certification Procedure

Coordinate testing procedures with the appropriate safety organization representative.

Fees

Assessed on a per case basis.

Requirements

A witness from the agency must be present for the safety testing and investigating of the construction of products to safety standards. The testing can be done at the manufacturers site or submitted to the safety agency. If done at the manufacturer's site, calibrated test equipment is a must.

Product documentation is also required. This may be provided by the manufacturer and/or the agency after it has finished drafting its reports, gathering information on the components and studying

schematics. From this documentation final reports, listings, licenses, and declarations are generated for the final approvals.

Additionally the manufacturer needs to meet EMC requirements. To get EMC compliance, the manufacturer needs to go to a certified lab to have their product tested for radiated, conducted emissions and immunity. Once this testing is done and the product is found compliant, certification reports are generated and these reports are used to obtain or self-declare compliance.

2.4. TUV Rheinland (TUV)

TUV Rheinland provides expertise in product assessment, product safety testing and certification to assure compliance with both national and international standards.

Contacts

TUV Rheinland of North America, Inc.
1-TUV-WRLD-WID
(1-888-975-3943)

Web Address: <http://www.tuev-rheinland.de/enghome.htm>

Certification Procedure

Contact a TUV representative to set up a TUV compliance test.

Fees

Assessed on a per case basis.

Requirements

Contact a TUV representative for information on requirements for certification.

3. EMC Certifications

Electromagnetic compatibility (EMC) refers to the ability of an electrical or electronic device or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic interference (EMI) to anything in that environment. EMC encompasses controls of both unintentional emissions from a range of products that can interfere with radio communications as well as protection of a range of devices that may be susceptible to intentional transmissions.

The effects of EMI can result in serious disruption for consumers, commerce and industry through product failure. As we expand our use of mobile communications and make greater use of devices that incorporate microprocessor controls, the lack of compatibility between electronic products and the electromagnetic environment will become more and more of a problem unless steps are taken to ensure compatibility.

3.1. FCC (Federal Communications Commission) USA

The mission of this independent government agency is to encourage competition in all communications markets and to protect the public interest. In response to direction from the Congress, the FCC develops and implements policy concerning interstate and international communications by radio, television, wire, satellite, and cable.

In the area of computers, they regulate the EMC emissions. This includes both conducted emissions and radiated emissions. The FCC has established two levels of certification for computers. They are listed below.

Class A

Class A devices are defined as digital devices marketed for use in a commercial, industrial or business environment. Class A devices excludes devices which are marketed for use by the general public or are intended to be used in the home.

Class B

Class B devices are defined as digital devices marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

Contacts

Federal Communications Commission
1919 M Street N.W.
Washington DC 20554
(202) 418-0200.

Web Address: <http://www.fcc.gov/>

<http://www.access.gpo.gov/nara/> (for copies of the FCC Rules [47 CFR]).

Certification Procedure

Contact an FCC approved EMC contract test house to set up a compliance test. A list of approved test sites (both domestic and international) can be found at: <http://www.fcc.gov/oet/info/database/testsite/>

Fees

Assessed on a per case basis but average between \$1,000 - \$2,000 US dollars.

Requirements

Requires that a complete system be submitted to the test house for testing. System is returned at the end of the test.

3.2. C-Tick (Australian Communications Authority)

The C-Tick marking may be used only for the purpose of denoting product compliance according to the terms specified by the Australian Communications Authority (ACA) under the Radio Communications Act 1992. This marking is required to sell most electronic and a electrical equipment in Australia.

Contacts

Canberra	Melbourne
Purple Building	5 Queens Road
Benjamin Offices	PO Box 7443
PO Box 78	St Kilda Road
BELCONNEN ACT 2616	MELBOURNE VIC 3004
Australia	Australia
Phone: (06) 256 5555	Phone: (03) 9828 7300
Fax: (06) 256 5353	Fax: (03) 9820 3021

Web Site Address: <http://www.sma.gov.au/>

Certification Procedure

Product needs to be tested by a testing organization that will test for Electromagnetic Compliance (see ACA homepage for a list of possible test houses in Australia). Once the product has been tested and complies with the EMC framework (set forth by the ACA) compliance can be obtained by either one of two routes. The procedure really depends on the nature of the device. Some devices require either the application of a test report or documentation through the Technical Construction File (TCF).

There are four basic items required before compliance with the EMC framework can be met. These are:

- Establishment of sound technical grounds for product compliance
- A formal Declaration of Conformity must be made and held in Australia
- A Compliance Folder must be prepared and maintained
- The C-Tick label must be applied to the product

The Compliance Folder is a set of documentation that must be assembled and maintained in order to adequately support the Declaration of Conformity for a particular product. There are five main components to the Compliance Folder. They are:

- Test reports or TCF
- A signed supplier's Declaration of Conformity
- A description of the apparatus which positively identifies it, possibly including a photograph and /or block diagram
- A reference to specifications for conformity

- A technical description of the apparatus

The Declaration of Conformity should only be made after an experienced person has reviewed the contents of the Compliance Folder and made their recommendation to do so.

Fee

Assessed on a per case basis

Requirements

The Declaration of Conformity must be held by the supplier in Australia, but the rest of the contents of the Compliance Folder may be held outside Australia. The contents of the folder, however, must be accessible to the Australian supplier of the product within 10 days of a written request. This declaration is required if an audit by the ACA is needed.

3.3. CE Mark (European Union Directives)

The CE Marking is the manufacturer's self-declaration, showing compliance with all applicable European Union directives. For most products sold in the European Community, the use of the CE Marking and the Declaration of Conformity are mandatory. In the year 1997, we saw the inclusion of the Low Voltage Directive (LVD) into the CE marking regimen. CE marking for PCs now encompasses two very different directives; the Low voltage Directive and the EMC Directive. With this mark of conformity, products can circulate freely throughout the member countries. The CE Marking must be shown on the device or, if not possible, on the package. This information is an indication of what is required to be compliant with the LVD and EMC Directive and how to 'CE mark' for both directives where applicable.

Further information and a detailed analysis can be found at: **Error! Bookmark not defined.**

The CE mark and most of the EU directives are designed to ensure free movement of goods and services across the borders of the member states. The directives themselves, however, do not carry the force of the law. The member states must enact enabling legislation to comply with the directive. Both the low voltage and EMC directives are 'self declaration' directives. A blank version of the DoC (Declaration Of Conformance) is available upon request. The emission test is by far the most difficult for a PC to meet. Of the two emission tests(immunity or radiated) the radiated test is typically the more difficult. Most power supplies filter out high frequency emissions but failures are not unknown. Declaring as Class A product gives a huge extra emission margin over Class B. Class A products are permitted to emit more than three times the signal strength of Class B products. If you declare as a Class A product, the R440LX Integrator must put the warning in the user documentation.

The R440LX Integrator declares compliance and there is no obligation to submit the declaration to any authority. Some of the required information includes:

- Name and address of responsible person
- Description of product
- Numbers and titles of standards applied
- Declaration that the product complies with the directives
- Signature of manufacturer representative
- Date of issue

The R440LX Integrator has the responsibility to keep and make available on request the declarations of conformity for a period up to ten years after the last sale of the product in question. There is no

obligation under the directives to maintain copies of the test reports or any other documentation other than the Declaration of Conformance. The guidelines are not the law and there is a large disclaimer at the start of the document pointing out that national legislation transposing the EMC directive is the law. If a GiD/IPI/IPD business is prosecuted for breaches of the EMC directive, Intel would like to hear about it. Contact your local Intel representative with full details.

Integration tips for better EMC

- Chassis
 - * chassis elements must make good electrical contact
 - * make sure all fixings used, use any EMC clips supplied
 - * do not use chassis with bezel mounted LED's

- Internal Cables
 - * keep data cables away from power cables
 - * keep cables close to chassis and as short as possible

- Add-in Cards
 - * no gaps between card panel and chassis

- R440LX server baseboard
 - * insure that all ground points are properly mounted
 - * insure I/O shield is securely mounted to the chassis

4. Network Operating System Certification

Certification is a process to validate that a baseboard or system is able to effectively perform when configured under specific operating system environments and using a series of special test suites designed by OS vendors. Testing of products for operating system certification is performed both in-house through the Intel Server Compatibility Lab (SCL) and externally at the OS vendor, depending on the testing policy of the OS vendor. This document outlines the policies, including hardware requirements and logistics, necessary for certifying an operating system with a test platform.

4.1. Certification Testing Overview

The table below summarizes the procedure for obtaining operating system certifications. SunSoft is the only vendor that allows a board level certification. All other vendors require certification at a system level. Details of the certification process for each operating system are documented in the following pages.

OPERATING SYSTEM	IN-HOUSE CERTIFICATIONS	VENDOR CERTIFICATIONS
Banyan VINES* V6.0	N/A	Performed at Banyan facility
Microsoft Windows NT* v3.51 & v4.0	N/A	Performed at Microsoft facility
Microsoft Windows 95*	N/A	Performed at Microsoft facility
Novell NetWare* v3.12 & v4.11	N/A	Performed at Novell facility
SCO OpenServer* v5.0 & v5.0MPX	N/A	Performed at SCO facility
SCO UnixWare* v2.1	N/A	Performed at SCO facility
Solaris* v2.5	Completed in-house compatibility test run.	Not required by SunSoft

4.2. Novell NetWare 3.12 & 4.11 Certifications

Contacts

Novell Inc.
1555 North Technology Way
Orem, UT 84097

Web Address: *Error! Bookmark not defined.*

Testing Policy:

Two systems are used in certification testing.

Turnaround Time:

Certification will be granted approximately eight weeks after the certification testing has completed. At that time, Novell will list the system as certified on their web page and send an official bulletin to the originator.

Fee:

Contact Novell or one of their authorized test houses for an exact quote. Two authorized outside test houses are:

<http://www.keylabs.com>

<http://www.xxcal.com>

Basic Netware certification (3.x, 4.x, SFT) for file servers will vary between \$7,000 - \$10,000 US dollars. Novell Super Stress Lab testing is additional.

Requirements:

The following lists the hardware to comply with Novell's requirements. Additional hardware may be added to the configuration provided it fits into one system and is functional.

Item	Requirement	Note
Systems	Two Systems	System box with power supply, 3.5" floppy disk drive, SCU or ICU, power cord, manual, and any other system requirements to make it functional.
BIOS	Released BIOS required	N/A
Memory	16MB of memory minimum per system	N/A
Processor	Determined by the submitter	System should hold the maximum number of processors.
Hard Drives	Total of two SCSI or two IDE Hard Drives (all drives must be at least 500MB in size) i.e. one per system	Must be Novell Certified
CD-ROM	One preferred per system	Must be Novell Certified
Video	Either onboard or add-in PCI video in each system	Must support VGA

Additional Testing Criteria:

If the system to be certified utilizes a onboard LAN adapter, an onboard SCSI controller, multiple processor speeds, or two or more processors, there are additional requirements. They are as follows:

Onboard LAN	The onboard LAN must be Novell certified before proceeding with the system certification. Onboard LAN certification can be conducted at Intel's NIO (Network Infrastructure Operation) Compatibility Lab. The onboard LAN bulletin is not issued as a stand-alone bulletin, but only in conjunction with a system certification. The process takes one week per network condition. Network condition options currently are: half duplex or full duplex, and 10 MB/s or 100 MB/s. A new network chipset solution requires a full 4-week onboard LAN certification, encompassing all the network conditions. The LAN drivers must be release level.
Onboard SCSI	The onboard SCSI controller must be Novell certified. This work can be done at Intel. The process takes one week and precedes the system certification. The SCSI drivers must be release-level.
Multiple Processor Speeds	Multiple processor speeds may be certified on a platform as required. Work can be done at Intel and requires two additional days of test time for each processor speed tested. If the baseboard cannot be jumpered to a slower speed, then each processor speed requires a 4-week certification.
Custom Peripherals	Custom peripherals may be included into the test configuration provided that the peripherals and drivers are already Novell certified. One test configuration may represent a superset of configuration requests from more than one customer.

Novell Super Lab Stress Testing

Additionally, a system can be shipped to Novell for Super Lab stress testing. This special testing involves shipping one fully configured system to Novell for up to two weeks. Novell runs this system as a server for 24 hours, connected to multiple clients (from 64 to 200+). The details and results of this testing are documented by Novell, posted on their website, and the system is returned.

The benefit of the stress test is an assurance that the product functions properly as a server in a multiple client Novell environment. This also provides documented evidence from a qualified source that the Intel product is Novell ready. This may be done concurrently to certification and may be scheduled to complete testing in a shorter time frame. The Super Lab stress testing need only be done once during a product's life cycle.

Requirements for Novell Super Lab Stress Testing:

Item	Requirement	Note
Systems	One System	System box with power supply, 3.5" floppy disk drive, power cord, manual, and any other system requirements to make the system functional.
BIOS	Released BIOS required	N/A
Memory	32 MB for Workstation 96 MB for Servers	N/A
Processor	As requested by the submitter	Single or Dual Stress testing is available.
Hard Drives	Quantity: at least one, Size: at least 1GB	Can be SCSI, IDE or a mixture
CD-ROM	Not Required	N/A
Video	Any onboard or add-in	Must support VGA
Cache	Enough cache for the system to function	N/A
SCSI Controller	Required	Any onboard or add-in

4.3. Microsoft Windows NT* Certification Testing

Contacts

Microsoft Corporation
Building 26 South, Room 3515
One Microsoft Way
Redmond, WA 98052

Web Address: <http://www.microsoft.com/hwtest/>

Testing Policy:

It is the policy of Microsoft Corporation that official system certification with Microsoft products must be obtained through Microsoft directly. The service is restricted to products that are commonly available to the marketplace and must be certified in an "as shipped" configuration by the company that sells the product. Microsoft will not certify baseboard products or unbranded products.

Eligible systems must be submitted to Microsoft directly by the company selling the system to the public. Intel is not permitted to act as an agent for a company in obtaining certification per Microsoft's request. Microsoft will provide technical support for Windows NT* on all products certified. Three systems are required by Microsoft for certification testing, one of which is retained for customer support.

Turnaround Time:

This will be negotiated through interface with Microsoft.

Fee:

Contact Microsoft for this information. Certification can cost over \$10,000 US dollars.

Requirements:

Intel dealers can contact Microsoft directly to obtain a test package enabling the certification testing at their site. They may then send in the results to Microsoft. Once the results are reviewed, Microsoft will send a letter to the company, informing them of the certification, as well as adding their product name to Microsoft's "Hardware Compatibility List" (HCL). Alternately, dealers may elect to send the system to Microsoft testing labs to have the certification testing performed there.

4.4. SCO OpenServer v5.0, v5.0MPX, UnixWare v2.1 Certifications

Contacts

Santa Cruz Operations, Inc.
400 Encinal Av., PO Box 1900
Santa Cruz, CA 95061-1900

Web Address: *http://www.sco.com*

Testing Policy:

Two systems are required for testing. Both systems are retained by SCO for customer support.

Turnaround Time:

Certification will be granted approximately three weeks after testing is complete (in-house testing takes seven days). At that time SCO will list the system as certified on their web page and send an official bulletin to the originator.

Fee:

Contact SCO for this information.

Requirements:

The following lists the hardware to comply with SCO's requirements. Additional hardware may be added to the configuration provided it fits into one system and is functional.

Item	Requirement	Note
Systems	Two systems	System box with power supply, 3.5" floppy disk drive, power cord, manual, and any other system requirements to make it functional.
BIOS	Beta BIOS required.	Released BIOS strongly advised
Memory	24 MB in each system	Memory should be the fastest architecture the design supports (example EDO or SDRAM).
Processor	Fastest processor available at the time	If it is a MP system, it should be fully populated.
Hard Drives	Two identical 1GB IDE or SCSI hard disk drives in each system	One for each OS
CD-ROM	IDE or SCSI CD-ROM drive in each system	For IDE, the CD-ROM must be configured as slave device on primary channel.
Video	Either onboard or add-in PCI video in each system	Maximum amount of video memory is desired
Cache	Secondary "L2" cache, if applicable, of the largest and fastest type supported is preferred	N/A
NIC	Intel Ethernet card	Onboard, or PCI add-in in each system
Keyboard	PS/2 keyboard & 3-button mouse for each system	N/A
Mouse	3-button mouse for each system	N/A

4.5. Solaris v 2.5 Certifications

Contacts

SunSoft, Inc.
6601 Center Drive West, Suite 700
Los Angeles, CA 90045
1-415-786-4743
solaris-cert@sun.COM

Web Address: <http://www.sun.com/developers/solbrand/cert-pro-data-sheet.html>

Testing Policy:

Solaris certification can be obtained at either the baseboard level or the system level. The baseboard or system is returned at the completion of certification testing.

Turnaround Time:

Certification will be awarded four weeks after the certification testing is complete. At that time, SunSoft will list the system as certified on their web page and send an official bulletin to the originator. The Solaris Certification Bulletin can be referenced online at <http://access1.sun.com/certify/reports/reports.html>

Fee:

None - since Intel has submitted the R440LX Server Board for Solaris 2.5 certification. Certification should be complete by the end of December 1997. Intel dealers can then use this certification in their promotion of the board.

Requirements:

Item	Requirement	Note
All items	Same requirements as Intel compatibility run.	Testing done at either board or system level.
BIOS	Beta BIOS acceptable	Released BIOS is recommended.

4.6. Banyan VINES V6.0 Certification

Contacts

Banyan Systems Incorporated
120 Flanders Road
Westboro, MA 98052
1-800-222-6926
(1-800-2-BANYAN)

Web Address: <http://www.banyan.com/thirdpty/programs.html>

Testing Policy:

Banyan retains the tested system for customer support.

Turnaround Time:

Certification will be granted approximately three weeks after pre-certification testing is complete. At that time Banyan will list the system as certified on their web page and send an official bulletin to the originator. The in-house pre-certification test suite takes seven days to complete. The average total turnaround time is four weeks.

Fee:

A purchase order for \$500.00 must be sent to Banyan upon scheduling certification testing.

Requirements:

The following table lists the hardware to comply with Banyan's requirements. Additional hardware may be added to the configuration provided that it fits into one system and is functional.

Item	Requirement	Note
Systems	One System	System box with power supply, 3.5" floppy disk drive, power cord, manual, and any other items to make the system functional.
BIOS	Released BIOS required	Production Released as recorded on Intel database system.
Memory	32MB minimum	Validated/Qualified SIMMs or DIMMs only.
Processor	Fastest processor supported by the system	Banyan does not support multiple-processor configurations.
Hard Drives	At least one SCSI hard drive	At least 1GB in size each.
Video	Required	Any onboard or add-in video card.
Cache	No requirements	There must be at least enough cache for the system to function.
SCSI Controller	Required	Any onboard or add-in SCSI controller.
Keyboard	Required	Any keyboard.
Mouse	Required	Any mouse.
Monitor	Required	Any monitor.

4.7. IBM OS/2 WARP Certifications

Contacts

IBM Corporation
Bldg 906/2C014
11400 Burnett Road
Austin, TX 78758

Web Address: <http://www.Austin.IBM.com/pspinfo/os2hw.html>

Testing Policy:

There are two methods of certification available from IBM.

1. Customers can arrange to submit systems to IBM for testing in the ITL Compatibility Lab. These systems are tested for compatibility and then may be made available for OS/2 developers and Service organizations depending upon contract terms.
2. Customers can perform compatibility testing using a test kit supplied by IBM, and submit results to the program office. The suite of tests that are in the test kit are the same as those used by the ITL Lab.

Turnaround Time:

Running the compatibility tests supplied in the test kit takes about two (2) days.

Certification will be awarded approximately three weeks after certification testing is completed. At that time, IBM will list the board or system as certified on their web page and send an official bulletin to the originator.

Fee:

None

Requirements:

The following table lists the required hardware for IBM OS/2 v3.0 WARP certification testing.

Item	Requirement	Note
All items	Contact IBM for this information.	
BIOS	Beta BIOS acceptable.	Release BIOS is recommended.

5. Memory Self-Certification

5.1. Memory Integrators

Contacts

This listing is not intended to be all inclusive; it only represents some of the memory integrators which have been tested in the past. 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 R440LX server baseboard.

Advantage Memory (800) 245-5299	LG Semicon 82-2-3459-3114
Camintonn Z-RAM (714) 454-1500	PNY Technologies 973-515-9700
Celestica (416) 448-5790	Simple Tech 800-367-7330
Crucial Technology, A division of Micron (800) 932-4992	Unigen (800) 826-0808
Dataram Corp (800)-DATARAM (800) 328-2726	Viking Components 714-643-7255
Kingston Technology (800) 337-8410	Vision Tek (800) 726-9695

Certification Procedure

The following procedure is used to qualify Dual In-Line Memory Modules (DIMMs) for use in the R440LX DP server baseboard. 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 five different phases of testing:

Paper Qualification - The Paper Qualification is a review of memory vendor data sheets for critical features and parameters. The first step can be performed by memory vendors, memory integrators or distributors.

Basic Testing - The DIMM device is electrically tested for 24 hours. The second step can be performed by memory vendors, memory integrators, distributors, or compliant test laboratories.

Functional Testing; Environmental - The DIMM device has been electrically using rigorous environmental parameters along with voltage margin parameters for 12-18 hours. The third step is performed by a Computer Memory Test Laboratory (CMTL). See 5.2 for contact information for CMTL.

Functional Testing; Shock and Vibration - The DIMM device has been put into a fixture that simulates a generic ATX-compatible chassis and put through shock and vibration tests for 1-3 hours. The fourth step is performed by a CMTL.

Functional Testing; Signal Integrity - The DIMM device is electrically tested while about 100

measurements are performed to look at clock frequencies, duty cycles, overshoot, undershoot, edge quality, rise/fall timings, any skew/jitter/glitch violations, and the setup/hold timings at both the DIMM and the baseboard memory controller. The last step is performed by CMTL.

The memory integrators, memory vendors, or distributors can do the following:

- Obtain R440LX memory timing specification. This specification is available on the following web site (www.channel.intel.com).
- By comparing the DIMM timing and DIMM physical/mechanical specifications to the R440LX memory timing specifications, the memory integrator engineering team can determine the
- Send a description of the DIMM product to CMTL, an independent memory test laboratory.
- Obtain the R440LX Diagnostic Tool. This diagnostic tool is available on this web site (www.channel.intel.com).
- Install four (4) DIMMs into a R440LX server board and run the diagnostic tool.
- Execute the diagnostics for 24 hours (or more) on a R440LX server board at room temperature.
- Install two (2) DIMMs into a R440LX server board and run the diagnostic tool.
- Execute the diagnostics for 24 hours (or more) on a R440LX server board at room temperature.
- Send the results; log/test file to CMTL, an independent memory test laboratory. The results are sent either by diskette or electronic transmission.

Once results are verified, the memory vendor's SKU/part number will be displayed on the CMTL and Intel websites.

Fees

There are no fees.

Requirements

The log file(s) must be valid.

5.2. Computer Memory Test Lab (CMTL)

CMTL is a leading memory testing organization responsible for testing a broad range of memory products. A memory product tested by CMTL means it works and that 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.

Contact

John Deters	Computer Memory Test Lab (CMTL)
714-631-9271 (voice)	2370 Qume Drive
714-631-8724 (fax)	San Jose, CA 95131

Web Address: *Error! Bookmark not defined.*

Certification Procedure

The Environmental Testing Phase for DIMM qualification involves a set of functional tests using the latest release of the R440LX server baseboards and evaluation software. The Environmental Testing Phase is the second level of actual testing performed on the R440LX server baseboard. All *Basic Lab*

Testing has been performed on two different configurations and passed with no errors. This Environmental level of testing must be performed before going to the Shock/Vibration Testing Phase.

- Four configurations are used for the environmental testing;
 1. The first configuration will have one Pentium® II Processor and one DIMM in its appropriate socket. One R440LX system will be utilized in this configuration.
 2. The second configuration will have two Pentium® II Processors and four DIMMs in their appropriate sockets. Two R440LX systems will be utilized in this configuration.
 3. The third configuration will have one Pentium® II Processor and four DIMMs in their appropriate sockets. Three R440LX systems will be utilized in this configuration.
 4. The fourth configuration will have two Pentium® II Processors and two DIMMs in their appropriate sockets. Four R440LX systems will be utilized in this configuration.
- The configurations are tested at various temperatures and voltages for no less than 18 hours

Summary of Test Points used in Environmental Testing

TEST POINT	TEMPERATURE	5V ± 6%	3.3V ± 6%	HOURS RUN
A	0°C	5.3 V	3.5 V	18 HOURS
B	55°C	4.7 V	3.1 V	18 HOURS
C	0°C	4.7 V	3.1 V	18 HOURS
D	55°C	5.3 V	3.5 V	18 HOURS

The Shock and Vibration Testing Phase for DIMM qualification involves testing a R440LX server baseboard in a fixture which simulates a generic ATX-compatible chassis. The test is intended to verify the DIMMs are able to withstand specified shock/vibration limits. The Shock and Vibration Testing Phase is the third level of actual testing performed on the R440LX server baseboard. This level of testing must be performed before going to the Signal Integrity Testing Phase. The R440LX diagnostic test suite is used on the R440LX server baseboard after it is removed from the shock/vibration fixture.

The Signal Integrity Testing Phase for DIMM qualification involves taking over 100 measurements to identify any issues in clock frequencies, duty cycles, overshoot, undershoot, edge quality, rise/fall timings, any skew/jitter/glitch violations, and the setup/hold timings at both the DIMM and the baseboard memory controller. The Signal Quality Testing Phase is the last level of testing performed on the R440LX server baseboard by a CMTL. Only one configuration is used during this testing phase; a R440LX server board with two Pentium® II Processors and four DIMMs in their appropriate sockets. Two R440LX systems will be utilized in this configuration. The measurements are performed with a Digital Sampling Oscilloscope with 2G sample/second (or better) and a 1GHz Active FET scope probe with 1pf (or less) probe capacitance.

Fees

Testing fees are assessed on a per case basis. If the memory vendor chooses to be fully tested and approved, the total cost is approximately \$3,500 US dollars. When fully tested and approved this means the DIMM device has been electrically tested with in-depth signal measurement analysis by a memory test lab (CMTL) in addition to the shock/vibration and environmental testing. This is the highest level of qualification given to a DIMM device. The process takes 3-5 days to be fully tested. Intel, CMTL, the associated distributor and the memory vendor fully support that DIMM device on the R440LX server board.

If a memory vendor chooses have CMTL perform just the environmental stress test, the total cost is approximately \$2,500 US dollars. When stress tested, this means the DIMM device has been rigorously environmentally tested with voltage margins and limited shock, and vibration testing were conducted.

The process takes 2-4 days to be environmentally and shock/vibration tested. Intel, CMTL and the memory vendor support that DIMM device on the R440LX server board.

Requirements

1. The memory vendor or distributor must send in a minimum of (12) DIMMs for testing. One DIMM will be retained by CMTL upon the completion of the testing.
2. The memory vendor must provide a timing specification data sheet, a block diagram/chip location data sheet, and an assembly drawing.
3. The memory vendor must retain the bill of materials which match that DIMM SKU part number. If a DRAM or other component on that DIMM printed board assembly (PBA) is changed due to a die change or design upgrade, or manufacturability reasons, a limited test is run by CMTL to quickly qualify the DIMM device. An updated DIMM SKU will be requested to reflect change. This updated DIMM SKU will then be posted on the CMTL and Intel websites.

Appendix A Reference Information

For more information, please check the following internet addresses:

Mark	URL
UL	http://www.ul.com
CSA	http://www.csa.ca
Nemko	http://www.nemko.no
Semko	http://www.semko.se
Demko	http://www.demko.dk/
Fimko	http://prosafety.fi/englanti.html
TUV	http://www.tuev-rheinland.de/enghome.htm (World Headquarters Site) http://www.us.tuv.com/ (North American Site)
VCCI	http://www1a.meshnet.or.jp/vcci/vccie/
FCC	http://www.fcc.gov
C-Tick	http://www.sma.gov.au

NOS	URL
Novell NetWare*	http://developer.novell.com/cgi-bin/devnet
Microsoft Windows NT*	http://www.microsoft.com/hwtest/
SCO OpenServer*	http://www.sco.com
Solaris	http://www.sun.com/developers/solbrand/cert-pro-data-sheet.html
Banyan VINES*	http://www.banyan.com/thirdpty/programs.html
IBM OS/2*	http://www.software.ibm.com/os/warp/hw-cert/