DELL CERTIFIED MEMORY WHITE PAPER
Why Dell Memory

Introduction

One of the biggest misconceptions when buying memory is that “all memory is the same.” In reality, memory modules (DIMMs) are made and assembled by many different manufacturers. Due to fierce competition, some manufacturers may simplify their processes to save time and costs—which can result in memory with varying levels of quality. From the servers in your data center to your notebooks in the field, these machines are there to keep your business running non-stop. Using price as the determining factor when purchasing memory is a result of not understanding or acknowledging the critical role of system memory. System designers are constantly updating architectures to keep up with customer demand for higher performance in all applications. The design and quality of DIMMs are critical to system availability and performance.

Reliability and stability

Processors use system memory to temporarily store information: the operating system, mission-critical applications, and the data they use and manipulate. Therefore, the reliability of the applications and data are essentially tied to the quality of the DIMMs. The main challenge in evaluating memory quality is that memory defects are not visible to the human eye. Memory defects are concealed on a microscopic level, and if these defects are not detected through testing, they will eventually be detected by the customer after the DIMM is installed inside the server. Unfortunately, when problems related to lower quality memory occur, they are often passed off as a “glitch” and not properly diagnosed.

The effects of lower quality memory components may appear as system crashes and system slowdowns. System crashes are highly visible because they cause downtime and can result in the permanent loss of business data. System slowdowns and periodic system freezes silently steal your business productivity by reducing the number of transactions in a given period or by increasing the time it takes to retrieve or back up data.
System performance

The amount of system memory available has a significant impact on overall system performance. A system may have enough memory to meet the minimum requirements of the operating system (OS) and software applications; however, the minimum memory requirement is exactly what the name implies. For example, 512 MB of memory is the minimum requirement for the Microsoft® Windows® Vista Home operating system; however, to achieve optimum performance, 2 GB is recommended.

Because of the continuous development and enhancement of high-performance software applications and operating systems, the minimum memory requirements are increasing with each new software version. Therefore, to maintain the same level of system performance, customers need to add more memory when they buy new software or upgrade to newer versions of software.

Running multiple applications simultaneously increases system memory requirements. If the open applications and data cannot fit into system memory, then the OS uses virtual memory. With virtual memory, the OS copies portions of memory to the hard drive, and then swaps pages back and forth between system memory and the hard drive as needed. Because the read/write speed of a hard drive is thousands of times slower than system memory, overuse of virtual memory will significantly lower overall system performance.

A common perception is that upgrading to a faster processor will improve overall system performance. For systems with insufficient memory, a faster processor will not result in higher overall performance. In fact, adding memory is the easiest way to boost system performance; and it is more cost effective than upgrading the processor.

When adding memory, it is important to use comparable DIMMs to those installed in the system. For example, adding faster DIMMs will increase the amount of memory, but system memory will still run at the speed of the slowest DIMM. For a full line of memory modules compatible with Dell systems, please visit the online memory selector via the Electronics & Accessories link at www.dell.com.

Strict qualification procedures

Who knows Dell Memory requirements better than Dell? Before Dell purchases memory modules for testing at its facility, it qualifies each DIMM manufacturer’s design and manufacturing processes to strict Dell standards. Dell requires manufacturers to rigorously test their DIMMs to prevent lower quality memory modules from being shipped to the Dell testing facility.

Even after Dell qualifies a DIMM manufacturer, it maintains information about DIMM production issues during manufacturing periods (date code ranges) and about die revisions that may cause failures in Dell systems. Thus, Dell tracks and avoids using lower quality memory that does not meet Dell standards. Other memory resellers lack this tracking capability and may sell lower quality memory that does not work properly in Dell systems (see pages 5 & 6).

Every DIMM that is on the Dell authorized vendor list must pass this extensive qualification process on every server it will be used on. If the DIMM is marked as Certified Dell, then it has been qualified and tested to ensure its compatibility, performance, and reliability.
Value versus price

In the highly competitive memory market, some memory resellers forego the level of qualification and testing needed for systems because it adds to the price of DIMMs. Dell is committed to memory quality because it has a direct impact on the reliability of your data and your productivity. The costs of system downtime, data loss, and reduced productivity caused by lower quality memory are far greater than the price difference between Dell Certified memory and other DIMMs on the market.

When you choose Non Dell Certified memory because of lower price, you may think you are saving money. But are you really saving money over the life of the server when you use Non Dell Certified memory? Focusing on price alone is a short-term view that does not take into account downtime, quality, reliability, integration, procurement and support costs, and even costs you may not be aware of. Some of these expenses may be invisible, but they definitely cost you—often more than buying the most compatible and reliable memory module in the first place.

The Dell Memory hardware warranty

The confidence of Dell in its superior testing and certification procedures is reflected in the warranty on Dell Certified Memory. Dell Certified Memory is supported by the same comprehensive existing hardware warranty as its associated Dell system, resulting in simple and timely resolution of system warranty issues.

Dell cannot guarantee the quality of Non Dell Certified memory, so its warranty does not cover service or parts damage resulting specifically from the failure of Non Dell Certified memory products. A typically unforeseen impact of using Non Dell Certified memory is record keeping requirements for multiple vendor warranties, resulting in additional warranty management costs and possibly longer system downtimes when problems occur. Installing Non Dell Certified memory does not void the system warranty; however, Dell will not replace the memory if it is identified to be the cause of a system failure. Customers are responsible for any parts or labor required to repair a system where Non Dell Certified memory is the cause of failure. Please note that the Dell System Hardware Warranty does not cover problems caused to the system by the installation of non-Dell components.

www.dell.com/warranty

The Dell Memory Limited Lifetime warranty (only in US, not applicable to APJ)

The confidence of Dell in its superior testing and certification procedures is not only reflected through its system hardware warranty support. Dell Certified memory also contains a Limited Lifetime warranty that guarantees that if our Dell Certified memory should ever fail, Dell will replace it. Even after your system hardware warranty expires, Dell still has you covered. APJ Warranty is 1 year/integrated with the system hardware warranty.
Summary

Why should you buy Dell Certified memory? Dell provides only the highest quality memory for Dell systems. The superior, specific qualification and testing from Dell ensures the highest level of system availability and performance. In essence, customers who buy Dell Certified memory get additional value through reduced downtime and increased productivity.

• All DRAMs are supplied only from authorized vendors.
• Only the highest quality components are allowed and utilized.
• Strict qualification procedures are mandatory.
• System-level testing and specialized diagnostic tests are adhered to (tested by Dell Engineering on Dell systems).
• Complete, tested compatibility with your systems.
• Maximum performance from your systems.
• Unmatched reliability and peace of mind.
• Warranty is integrated with the system hardware warranty.
• One-stop shopping for enhancing your entire Dell system workforce.
• Limited Lifetime Warranty - guarantees that if our Dell memory should ever fail, we will replace it (ONLY IN US)
• 1 yr/follow system warranty whichever is longer - guarantees that if our Dell memory should ever fail, we will replace it (ONLY IN APJ)
OEM- vs. Non OEM-Grade Comparison

Non OEM-Grade memory QA testing skips critical steps to ensuring long-term reliability

In the graphic below, you'll see that there are critical steps omitted in the Non-OEM Grade memory process. This leads to higher failure rate for Non-OEM memory.

- **Burn-in**: Extended powered stress testing performed to “weed out” weak components (early life failures).
- **Component Test**: Testing performed at DRAM component level.
- **Module Test**: Testing performed at DIMM level (with all DRAM components already mounted on DIMM pcb).
OEM- vs. Non OEM-Grade Comparison

Hardware errors are often microscopic, and in order to catch them in the supply chain process, there needs to be a very rigorous and validated testing process. Working with authorized vendors means that we can require them to have the very best quality control processes in place.

There are no mandatory controls in place for Non-OEM grade memory while Dell has strict controls in place. A few examples are given below.

<table>
<thead>
<tr>
<th></th>
<th>Non-OEM Grade</th>
<th>OEM Grade</th>
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<tbody>
<tr>
<td>Wafer grade</td>
<td>Normal</td>
<td>Premium</td>
</tr>
<tr>
<td>Component grade</td>
<td>Normal</td>
<td>Premium</td>
</tr>
<tr>
<td>Module grade</td>
<td>Normal</td>
<td>Premium</td>
</tr>
<tr>
<td>VLRR</td>
<td>No control</td>
<td>SODIMM = 260 DPPM</td>
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<tr>
<td></td>
<td></td>
<td>UDIMM = 123 DPPM</td>
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<td></td>
<td></td>
<td>RDIMM = 423 DPPM</td>
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<td>Regular L2 FA &amp; CIP (Yes or No) system</td>
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<td>Yes</td>
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<td>CLCA/8D for excursion management system</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Warranty period</td>
<td>1~3 years</td>
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VLRR = Verify Lots Reject Rate (a measure of DPPM)
DPPM = Defective Part Per Million
CLCA/8D = Closed Loop Corrective Action / 8 Disciplines Problem Solving