

Why Buy HP Qualified Memory?

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Introduction

DRAM quality and reliability are more important now than ever, mainly because of the increasing use of server virtualization. Virtualization has many benefits, but it dramatically increases the amount of memory servers need for optimal virtual machine performance. This rise in memory use has caused server manufacturers to expand the memory capacity of their systems. In the last 5 years alone, the average memory installed across all HP ProLiant server lines has grown by more than 500%—from 4 GB to well over 30 GB per server.

The growth in memory use has also caused memory manufacturers to increase the storage capacity of DRAM devices from 512 Mb to 4 Gb per chip. Today, a 4 Gb x4 DRAM chip contains more than 4 billion memory cells. Therefore, a quad-rank 32 GB DDR3 DIMM with 72 of these 4 Gb chips (including ECC) has more than *288 billion* memory cells. As DRAM cells become smaller, manufacturers also lower the operating voltage to increase the memory speed and decrease power use. The shrinking chip geometry and higher memory speeds make DRAM quality critical for reliable operation.

We understand the difference memory quality makes in server uptime. This paper describes how we qualify HP memory in our extensive HP Memory Qualification (HPMQ) program and back it with the best warranty in the industry. But first, let's address a major misconception among some customers that "all memory is the same."

All memory is not the same—the HP difference

In the highly competitive memory market, some third-party memory resellers forego the level of qualification and testing needed for servers because it adds to the price of DRAM modules. These third-party modules are cheaper, but they have poor or inconsistent performance and higher failure rates when operating at faster speeds.

So buying memory based on price is risky. The true costs of using lower quality memory—system downtime, data loss, and reduced productivity—are far greater than the price difference you may pay for HP Qualified memory.

When you see the HP Qualified Memory brand (Figure 1), it means that the DRAM has undergone extensive qualification and testing. We use proprietary diagnostic tools and specialized server memory diagnostic tests that exceed industry standards to ensure the highest level of performance and availability for HP ProLiant servers. Plus, we back our memory quality with the best warranty in the industry (see [Warranty](#) section).

Figure 1: The HP Qualified Memory brand signifies DRAM with the highest quality and reliability in the server industry.

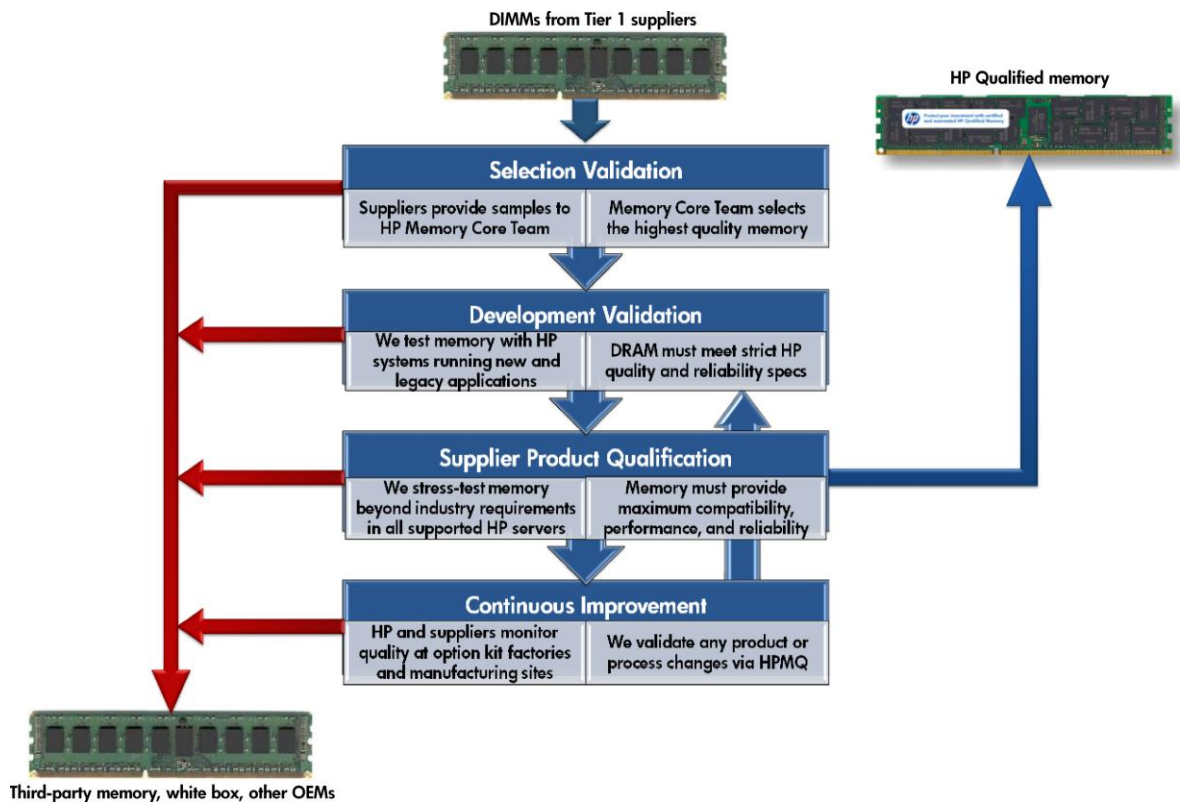


HP memory undergoes extensive qualification processes

Before DRAM earns the HP Qualified Memory brand, it undergoes our intensive four-phase qualification process. But first, HP provides Tier 1 memory suppliers with DRAM requirements far in advance of product development. We do not “spot buy” DRAM memory on the market or use generic and B-grade memory.

The HPMQ process begins when the HP Memory Core Team receives DIMMs from the Tier 1 suppliers. The team consists of HP development engineers, program managers, procurement engineers, product engineers, and marketing managers. The diagram of the HPMQ process in Figure 2 is followed by summaries of the four qualification phases.

Figure 2: The HPMQ process ensures the highest memory quality, reliability, performance, and compatibility in ProLiant servers.



HP selects the highest quality DRAM from manufacturers

During the Selection Validation phase, the HP Memory Core Team assesses each supplier’s technologies, product design, program plans, track record, past failure rates, and manufacturing capabilities. The team selects the best memory supplier and the highest quality memory product. The team submits the memory product for the Development Validation phase.

HP verifies that DRAM meets our quality and reliability specifications

The Development Validation phase requires tight collaboration between the HP and memory suppliers using HP-developed specifications, procedures, and test software. HP memory development engineers test the compatibility of the supplier’s DIMMs with several HP systems running new and legacy

applications. Our engineers measure the initial quality and reliability of the memory products to ensure that they conform to HP specifications.

HP stress-tests DRAM beyond industry requirements

In the Supplier Product Qualification phase we stress-test the memory in every supported HP server. We stress the memory by changing the workloads and system temperature to simulate the most demanding operating environments. We make these tests even more stressful by running our proprietary software on the platforms to push memory utilization limits. This is key because these tests consider the robustness and signal integrity of the overall solution to further reduce the possibility of memory failures. Most third-party suppliers cannot or choose not to perform this level of extensive testing.

Our goals during the Supplier Product Qualification are to

- Validate the supplier's process capability and the process controls to maintain consistent quality
- Make sure that HP Qualified memory provides maximum compatibility, performance, and reliability among all ProLiant server platforms

After the DIMMs pass the first three phases of the HPMQ process, the memory supplier begins volume production.

HP continuously improves DRAM quality during volume production

In the Continuous Improvement phase, HP and several suppliers monitor memory quality at our respective option kit factories and manufacturing sites using the HP closed-loop quality control system. This system allows us to take corrective actions if memory quality issues arise at any time. Another component of the Continuous Improvement phase is the HP change management process in which we validate any proposed changes to memory products or the manufacturing process.

Closed-loop quality control system

This system includes multiple quality controls and monitoring processes that alert us if any memory products do not meet HP quality and reliability requirements. We monitor product quality data daily, weekly, or monthly from the following sources:

- Memory suppliers perform in-process Ongoing Reliability Testing (ORT) and post-process Out-of-Box Audit (OBA) testing. If they discover any quality issues, we hold the shipment of any nonconforming product until the supplier completes a detailed failure analysis and implements corrective actions. We also continually monitor manufacturing failure rate data to determine if there are any spikes in DIMM fallout.
- HP Option Kit Configuration Centers monitor quality through functional testing and on-going OBA testing of memory option kits.
- HP product engineers monitor product reliability in the field by performing root cause analysis of field returns.

After analyzing the quality data from these monitoring processes, HP determines if reaction plans are required based on statistical process control and continuous sample plan methods.

Change management

The change management process ensures that a change in product or process does not negatively affect product quality, reliability, or system compatibility. If a design change is required for a product or process, the memory supplier or HP submits a change request for review. We revalidate any changes through the HPMQ process. Other memory suppliers just cannot scale to this level of quality commitment.

HP constantly improves memory testing

We constantly make hardware and software improvements to memory testing at supplier manufacturing sites and HP factories. We try new ways to test memory—from using different test algorithms to adjusting the voltage, temperature, and frequency during testing to exercise all memory operating modes. Our goal is to improve the quality of HP Qualified memory even further.

HP Pre-failure Notification

The Pre-failure Notification, which is standard on all HP ProLiant servers, extends the advantage of an HP three-year, limited warranty on critical components, such as memory, before they actually fail. Specifically, the Pre-failure Notification ensures that when customers receive notification from HP Systems Insight Manager that a critical server component may fail, the component is replaced free of charge under the warranty. With the Pre-failure Notification, system administrators can proactively schedule downtime for maintenance and not interrupt critical business operations that rely on these enterprise servers.

During the warranty period, the Pre-failure Notification covers the replacement of DIMMs used in a server's main memory when the predefined thresholds for correctable errors have been exceeded. The predefined thresholds can differ among system architectures.

HP Advanced Memory Protection technologies

System memory has become more reliable over the years because of better manufacturing processes and memory protection technologies like error checking and correcting or error correcting code (ECC). HP was the first to introduce ECC and Advanced ECC in industry-standard servers. However, as memory component density and server memory capacity continue to increase, there is a higher probability of memory errors occurring. Memory errors can corrupt data and cause servers to crash, resulting in the permanent loss of business data and lost revenue from downtime.

To meet this memory reliability challenge, HP offers two levels of Advanced Memory Protection that provide increased fault tolerance for applications requiring higher levels of availability. HP customers can choose a system with the level of memory protection they prefer—Online Spare Memory or Mirrored Memory.

The HP memory warranty is the best in the industry

The HP memory warranty reflects confidence in our superior testing and certification procedures. We support HP Qualified memory with the same comprehensive warranty as ProLiant servers. This makes it easier and faster for you to resolve warranty issues, and it helps you avoid an unforeseen consequence of using third-party memory—additional record keeping for multiple vendor warranties. These extra warranty management costs, and potentially longer system downtimes, can add up when problems occur.

The HP memory warranty is superior to “lifetime” warranties from other memory vendors. These warranties are usually for replacement only. That is, once the DIMM fails, you can exchange it for a new one. The vendor has no other responsibility, and you incur the cost of and responsibility for any downtime and lengthy troubleshooting.

We cannot guarantee the quality of third-party memory. Installing third-party memory does not void the ProLiant server warranty; however, HP will not replace third-party 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 third-party memory is the cause of failure.

Summary

Why buy HP Qualified memory? We work closely with Tier 1 suppliers to qualify memory products through our HPMQ process and we back HP Qualified memory through our comprehensive ProLiant server warranty. We continuously monitor the quality and reliability of HP Qualified memory at manufacturing sites, at HP option kit factories, and after it reaches you.

These processes should assure you that you are buying the most reliable and high-quality memory available for the least number of interruptions to your IT operations.

For more information

To read more about HP memory, go to <http://h18004.www1.hp.com/products/servers/options/memory-description.html>.

Also for more information on other HP Qualified Options, go to www.hp.com/go/hpgo.

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