Very Low Profile (VLP) DDR2

Reviewing the Design Overview and Examining Applications

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Design Overview

The Very Low Profile, or VLP, DDR2 is a new compact DIMM with the full power of standard DDR2 in a smaller form factor. VLP modules use the same width and pinout as standard JEDEC DDR2 modules, making them functionally identical to and compatible with the industry standard. As seen in figure 1, the VLP DDR2 measures 0.70 inches in height, compared to 1.18 inches for standard DDR2 modules.

Figure 1: Height Comparison of VLP DIMM vs. Standard DIMM

VLP DDR2 modules are ideal for space-limited systems, since they use about 60% less board space than standard DIMMs. Their lower height allows VLP DDR2 to be mounted vertically instead of at the standard 25 degree angle used for mounting regular DDR2 modules in server systems. The smaller size of VLP DIMMs increases airflow, improving system cooling.

The two markets that employ VLP DDRs are the server industry and the telecommunications industry. This paper examines these applications.

Applications

Standard Server

A server is a computer or device that manages network resources. There are many types of servers including: client, communications, database, file, network, print, and Web. For example, a network server is a computer that manages network traffic.

Figure 2: A Common Server Rack [1]

A standard server rack, seen in figure 2, is measured in U (unit). Each rack is 1U, which is 19'' tall and 1.75'' wide. This is the minimum possible size of a server device. The most common server rack size is 42U high, imposing a limit of 42 discrete computer devices for a server.

Four categories can be used to distinguish different types of servers. The first category is the server's application, such as Web server or database server. The second category is form factor: blade, rack, or tower. The third category is platform: RISC/UNIX, Linux, or Windows. The last category is by segment: entry-level, midrange, or high-end. When selecting components for a server device, system builders choose memory modules based on the server's application. The application will determine a server's requirements for DIMM speed, density, bandwidth, height, and form factor.

Blade Server

A blade server is a self contained computer server because its enclosure contains components such as hard drives, power supplies, IOs, and storage network connections in its system. In a standard server, these components are external. This "all-in-one" architecture" gives blade servers a simpler and smaller design than standard servers.

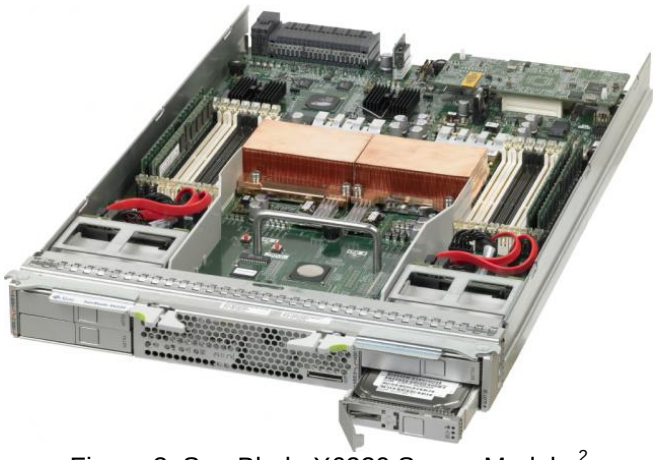

Figure 3: Sun Blade X6220 Server Module [2]

The blade server contains many thin electronic server boards known as server "blades." Each blade is a server and is usually dedicated to a single application. Blade servers require VLP DDR modules due to their small height. The vertically-aligned VLP DDR DIMMs improve airflow in the blade server, improving cooling.

Blade servers are designed for high density. Standard servers have a finite density design because the rack dimensions are restricted. As stated above, standard servers only allow for 42 computing components since they can be only 42U high. Blade servers do not have this limitation, allowing for densities of 100 computers per rack.

Blade installations also provide up to 85% reduction in cabling when compared to standard servers. This is because blade servers consolidate components into one localized place that is managed through a single interface. As a result, blade servers are more easily manageable.

Another advantage of blade servers is improved signal quality and timing, since DIMM sockets are closer together. The close proximity of the sockets also increases the MTBF. This

architecture also saves on raw material cost since manufacturers can install 10 DIMMS per panel instead of 8 DIMMS per panel.

Blade servers can run any of the server applications mentioned in this paper. Each application can run on one rack or blade of the server. Common blade server applications include file sharing, web page serving, web page caching, SSL encrypting of WEB communication, transcoding of Web page content for smaller displays, and streaming audio and video content.

ATCA

The telecommunications industry also has applications that use VLP DDRs. PCIMG 3 (PCI Industrial Manufacture's Group) is a set of specifications that defines the architecture for carrier grade equipment.

ATCA stands for Advanced Telecommunications Architecture. ATCA is a set of PCIMG specifications for communications equipment. These specifications are aimed at central office grade equipment in the telecom industry, which is a $100 billion market. Products that are used in the communications equipment are required to meet these specifications. By supporting the ATCA standard, vendors can incorporate their products into telecommunications equipment.

The ATCA board itself is 280mm deep and 322mm high. Each shelf slot is about 30.38mm wide. Thus, the system can allow 14 boards for a 19'' rack mount system and 16 boards for an ETSI system. VLP DDR2 has a height of 0.70 inches, which fits below the 21.33mm specification described by ATCA. ATCA requires the low height because of airflow demands.

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Footnotes

(1) www.cns.ufl.edu/operations.shtml
(2) http://sunsolve.sun.com/handbook_pub/Systems/SunBladeX6220/SunBladeX6220.html