Configuring Memory on the HP Business Desktop dx5150

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Abstract

By incorporating processors, chipset and integrated graphics from AMD and ATI, the HP Business Desktop dx5150 delivers the latest technologies at an extremely competitive price.

The ATI RADEON XPRESS 200 chipset built into the dx5150 brings both high-performance 3D graphics and the PCI-Express upgradability to the mainstream PC user. The RADEON XPRESS 200 is the first chipset solution in the market with a DirectX 9.0 graphics core that is a derivative of RADEON X300.

Because the integrated Radeon Xpress 200 graphics core receives an allocation of DDR main memory, graphics performance can be tied directly to main memory performance. The graphics memory allocation is hidden from the operating system and cannot be used for other purposes.

The dx5150 business desktop supports single-channel and dual-channel memory configurations. Performance tests carried out by HP indicate that a dual-channel memory configuration can lead to significant performance gains.

This white paper outlines memory configurations issues and describes the constraints and options that are important for optimizing the memory configuration.

Glossary of Terms

DIMM (Dual In-line Memory Module)—a circuit board that holds memory chips

DRAM (Dynamic Random Access Memory)—a type of memory for computers

SDRAM (Synchronous DRAM)—a type of DRAM that can run at much higher clock speeds than conventional memory. SDRAM actually synchronizes itself with the CPU's bus.

DDR-SDRAM (Double Data Rate Synchronous DRAM)—a type of SDRAM designed to transfer data twice as fast as standard SDRAM

Double Data Rate SDRAM is an established, high-bandwidth DRAM technology that is cost-effective and suitable for every PC market segment. AMD Athlon processors are designed to work with memory that meets the DDR I specification at speed ratings of 266 MHz, 333 MHz, and 400 MHz to provide the power for computing systems that deliver extraordinary performance.

UMA (Unified Memory Architecture)—a computer design that incorporates a graphics controller into the basic chipset of the system, such that some of the main memory can be dedicated to the graphics subsystem

Introduction

The HP Business Desktop dx5150 continues the successful AMD-based business desktop line from HP, further broadening the range of high-performance desktops available to the customer. The dx5150 incorporates the latest AMD Athlon 64 and Sempron processors, supporting up to 4 Gigabytes (GB) of dual-channel DDR I PC3200 memory. Paired with the first integrated PCI Express graphics chipset from ATI for the Athlon 64 line, the RADEON XPRESS 200, it provides a flexible, fast, and reliable desktop solution for today's business customers.

This document will discuss the key features, controls, and constraints for the memory components of the HP Business Desktop dx5150:

- Main Memory Configuration
- Memory Speed and Type
- Graphics Memory Allocation (for Integrated Graphics)

Main Memory Configuration

Single-channel vs. Dual-channel

The dx5150 business desktop includes four DIMM slots, organized in two independent memory channels. A "dual channel" configuration might put identical DIMMs in the first slot of each channel, for example, so that both channels operate simultaneously. This organization provides better memory performance. The first slot of each memory channel is colored black. The second slot of each channel is colored blue. Each pair of colored slots can either contain one DIMM (in the first slot), or a pair of identical (in size and organization) DIMMs.

- In single-channel mode, the memory bus is 64 bits wide. The processor can often waste valuable CPU cycles waiting for access to memory.
- In dual-channel mode, the memory bus is 128 bits wide, doubling the maximum memory bandwidth. Memory performance can improve significantly.

Figure 1. Channels and Colors

Item	Description	Socket Color
1	DIMM socket XMM1, Channel A	Black
2	DIMM socket XMM2, Channel B	Black
3	DIMM socket XMM3, Channel A	Blue
4	DIMM socket XMM4, Channel B	Blue
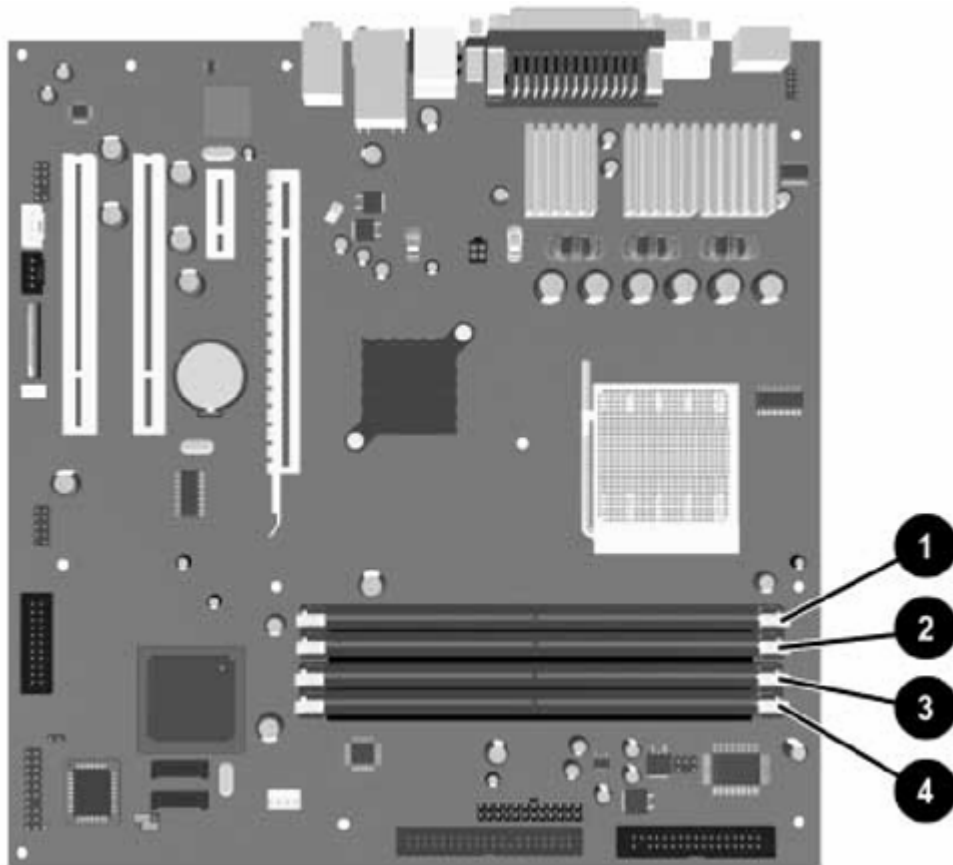
There are four DIMM sockets on the system board, with two sockets per channel. The sockets are labeled XMM1, XMM2, XMM3, and XMM4. Sockets XMM1 and XMM3 operate in memory channel A. Sockets XMM2 and XMM4 operate in memory channel B.

The system will automatically operate in single channel mode or a higher-performing dual channel mode, depending on how the DIMMs are installed.

If the user installs a pair of identical DIMMs in the same channel (slots 1 and 3), the system will display a warning message during boot, suggesting that the 2 DIMMs should be in slots 1 and 2 for optimum performance (dual channel).

"Identical" in this sense generally means that the DIMMs are the same size and have the same number of memory chips on each side. If the user installs two DIMMs that are not identical in a dual-channel pair of slots, then the system will display an error message stating that the memory is not in a valid configuration.

Note that the first DIMM slot (XMM1), closest to the processor, must be populated for the system to boot. If this is not done, the system will not boot, but the power LED on the front panel will blink red 5 times.

Figure 2. Valid Population Combinations

These are the 4 possible population combinations:
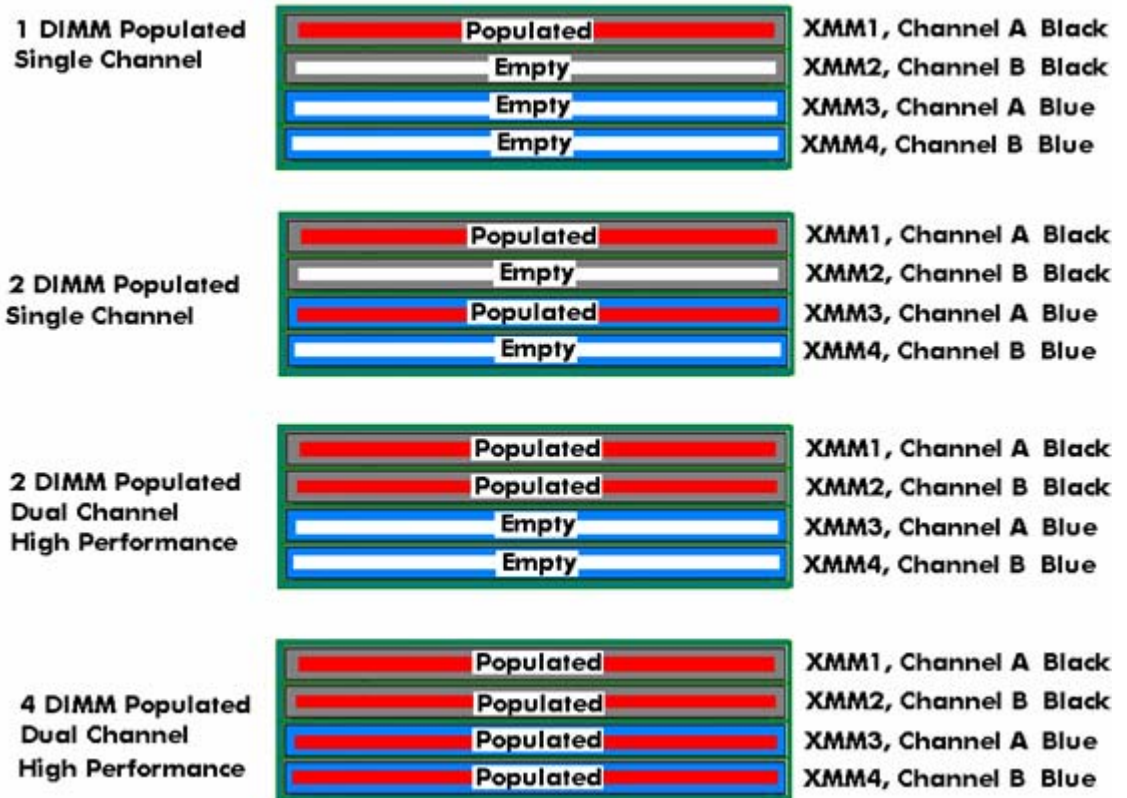
Memory Type and Speed

Supported Memory Types

The dx5150 HP Business Desktop supports industry-standard 184-pin unbuffered DDR I SDRAM DIMMs, designed with 128Mbit, 256Mbit, 512Mbit, and 1Gbit memory technologies. ECC is not supported.

Supported Memory Speeds

The dx5150 HP Business Desktop ships with memory that meets the PC3200 specification, which runs at a memory bus speed of 400 MHz. PC3200 is the recommended memory speed/type for this system. However, it will also operate with PC2700 (333 MHz) or PC2100 (266 MHz) memory. The system will set the memory bus to the speed of the slowest memory installed. Therefore, while memory speeds can be mixed, this would not result in the optimum performance.

Graphics Memory Allocation

The RADEON XPRESS 200 graphics integrated on the system board uses part of the main system memory for its video frame buffer, texture cache, and other graphics rendering functions. This memory is allocated at boot time, and is not available for use by the operating system. By default the amount of memory allocated to graphics is 64 MB. Thus, a system with 512 MB of main memory installed will have 448 MB available for use by the operating system and applications, and 64 MB for the graphics subsystem.

The amount of memory reserved for the integrated graphics can be set to 16 MB, 32 MB, 64 MB or 128 MB. To change the graphics memory allocation, access the BIOS Setup utility at boot time by hitting the F10 key when prompted. Select the Advanced Chipset Features menu (4th item down). Change the value of UMA Frame Buffer Size to the desired setting, then save changes and reboot.

If a PCI Express graphics card is added, the integrated graphics will automatically be disabled, and no graphics memory will be allocated.

For more information

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