



Intel® E7500 MCH A2 x4/x8 DDR Memory Limitations

Application Note (AP-722)

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Revision History

Rev. Date	Doc. Ref. No.	Rev. No.	Description
March 2002	292268	-001	Initial Release.



Reference Documents And Information Sources

Document Name or Information Source	Order Number	Available From
Intel® E7500 Chipset Datasheet: Intel E7500 Chipset Memory Controller Hub (MCH)	290730	Intel
Intel® Xeon™ Processor with 512 KB L2 Cache and Intel® E7500 Chipset Platform Design Guide	298649	Intel
Intel® E7500 Chipset Design Guide: Intel® E7500 Chipset Memory Controller Hub (MCH) Thermal and Mechanical Design Guidelines	298647	Intel
Intel® E7500 Chipset Memory Controller Hub (MCH) Specification Update	290731	Intel
Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2) Specification Update	290735	Intel
Intel® 82801CA I/O Controller Hub 3 (ICH3-S) Specification Update	290739	Intel

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1. Overview

This application note discusses mixing x4 DIMMs with x8DIMMs on a platform that contains the A2 stepping of the Intel® E7500 MCH.

An erratum has been identified for the Intel® E7500 MCH such that mixing of x4 and x8 DIMM types is not allowed. This erratum exists in the A2 stepping of the Intel® E7500 MCH. (Refer to the *Intel® E7500 Chipset Memory Controller Hub (MCH) Specification Update* Order Number 290731).

The solution is to only populate with DIMMs that contain the same device type as each other, (i.e. all x4 based DIMMs or all x8 based DIMMs). This will ensure the correct operation of platforms with the A2 stepping.

System and motherboard vendors have been notified and should not allow for these configurations.

Items that will be discussed in this document are:

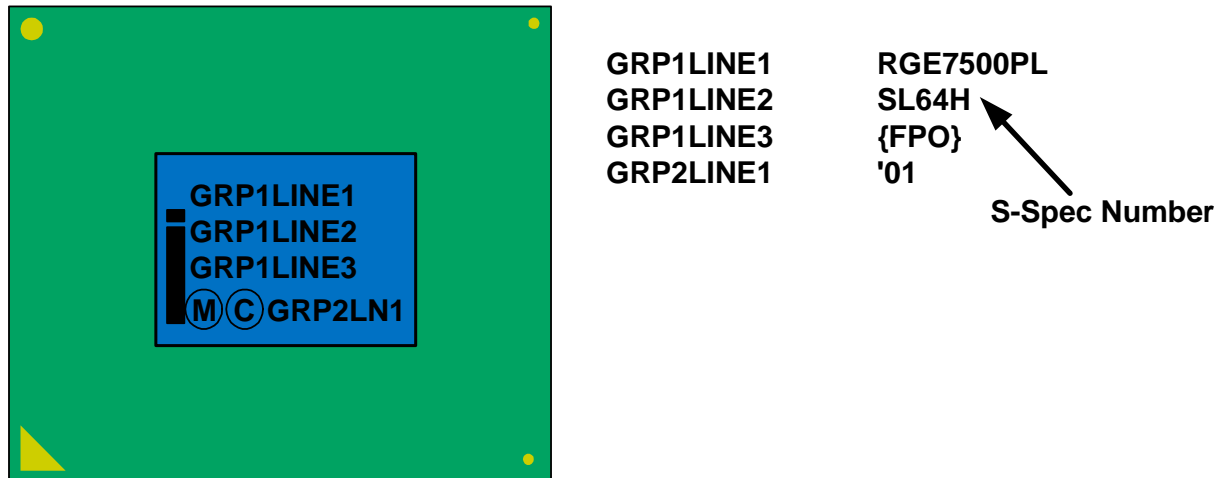
1. Identifying the A2 stepping of the Intel® E7500 MCH
2. Distinguishing between x4 and x8 DIMM modules
3. Memory configuration limitations with systems that have the A2 stepping of the Intel® E7500 MCH

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2. Identifying the A2 stepping of the Intel® E7500 MCH

It is important to be able to identify the A2 stepping of the MCH. The S-Spec number is located at the top of the MCH. If applicable, the removal of a heatsink may be necessary to read the S-Spec number of the MCH (Refer to the *Intel® E7500 Chipset Design Guide – E7500 Memory Control Hub (MCH) Thermal and Mechanical Design Guidelines* Order Number 298647).

Figure 1. Intel® E7500 MCH Top View



The A2 S-Spec number is **SL64H**

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3. *Distinguishing between X4 and X8 DIMM modules*

It is important to establish the type of DIMMs that a system is populated with prior to adding additional memory unless all existing memory is to be removed from the system and replaced with new identical memory. In the case that additional memory is being added to the existing memory, failure to determine the type of DIMMs in a system prior to adding additional memory can result in incorrect operation. Both x4 and x8 DIMMs come in single-sided and double-sided configurations. A single-sided x8 ECC DDR DRAM will have 9 devices on the module and come in two different styles, as shown (See Figure 2 and 3). A double-sided x4 ECC DDR DRAM will have 36 devices (See Figure 6), in a stacked configuration on the module. Both the double-sided x8 ECC DDR DRAM modules and single-sided x4 ECC DDR DRAM modules have 18 devices (See Figure 4 and Figure 5), making them difficult to distinguish between (See Table 1). In the case that the memory modules have 18 devices, referring to the manufacturers specification sheets will determine if the module is a single-sided x4 DIMM or a double-sided x8 DIMM (See Table 2). If a part number cannot be found for the DIMM then reference to the SDRAM device (See Figure 7) for the SDRAM part number can be used to identify the part type (See Table 3).

Table 1. Number of devices found on a DIMM module

	X4 DIMM	X8 DIMM
Single-sided	18	9
Double-sided	36 (stacked)	18

Figure 2. 184-pin Single-Sided x8 ECC DDR SDRAM DIMM (Example 1)

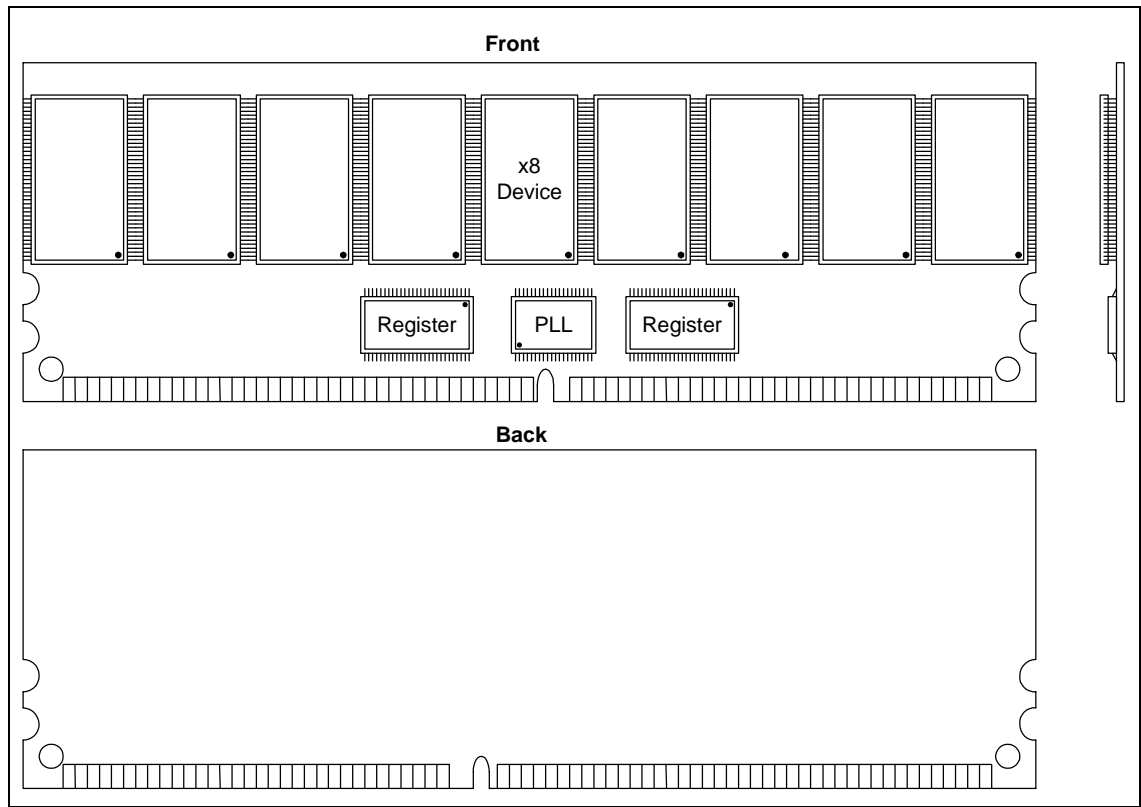


Figure 3. 184-pin Single-Sided x8 ECC DDR SDRAM DIMM (Example 2)

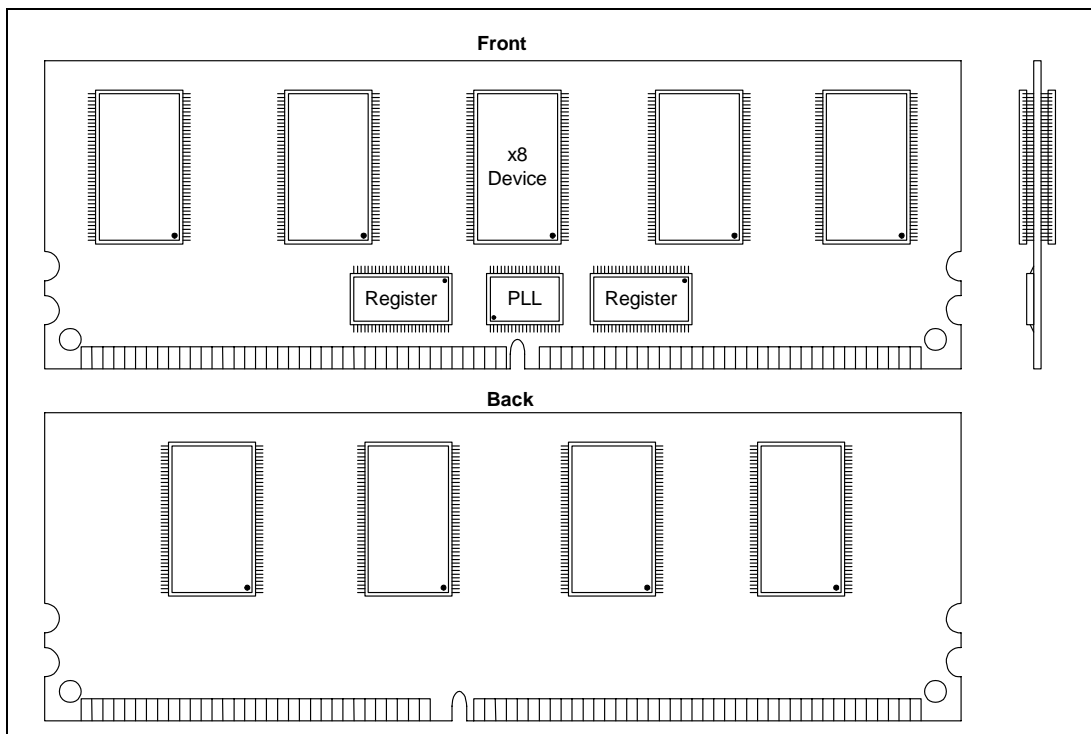


Figure 4. 184-pin Double-Sided x8 ECC DDR SDRAM DIMM

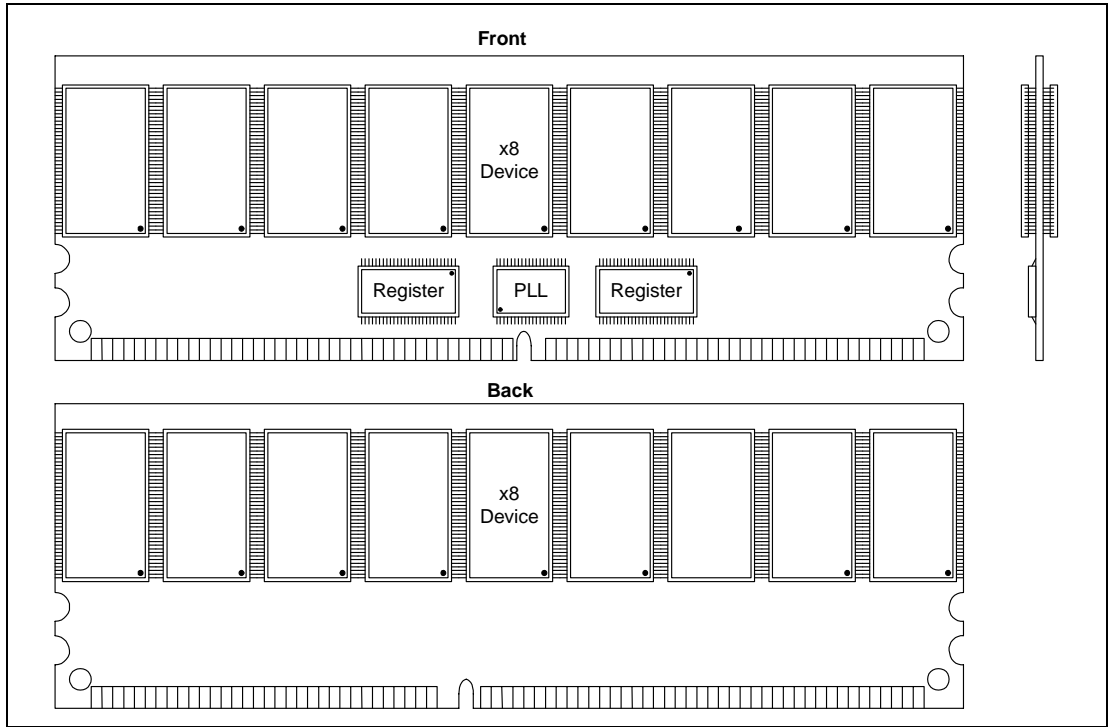


Figure 5. 184-pin Single-Sided x4 ECC DDR SDRAM DIMM

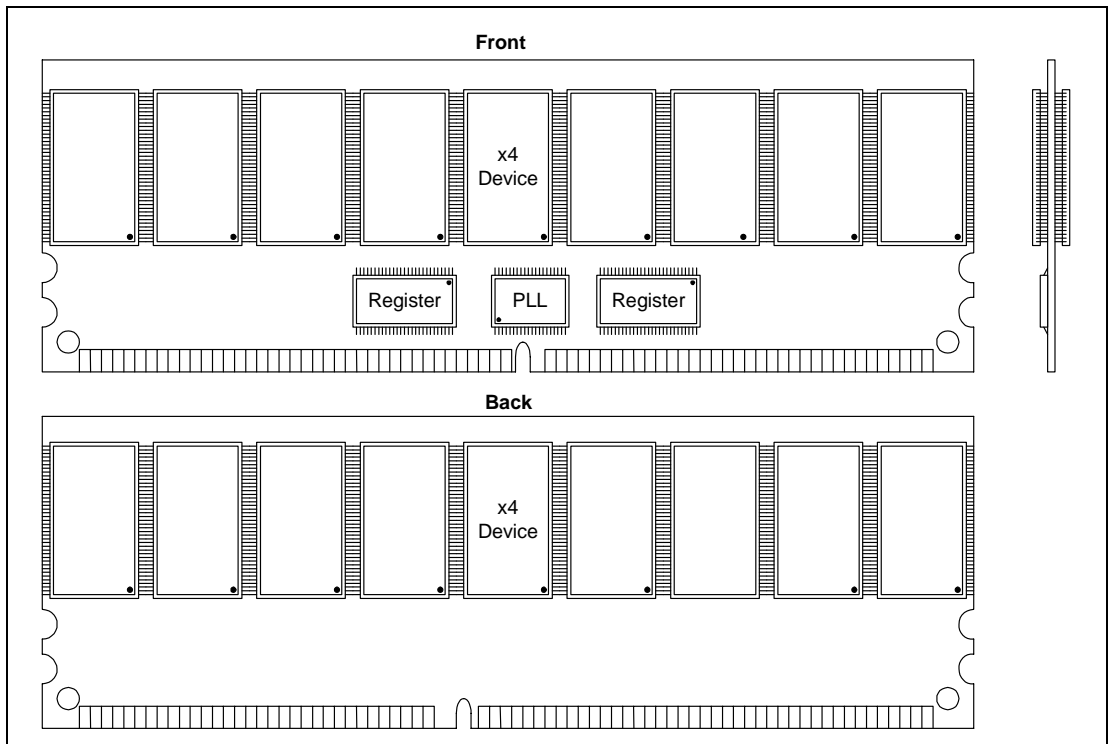


Figure 6. 184-pin Double-Sided x4 ECC DDR SDRAM DIMM

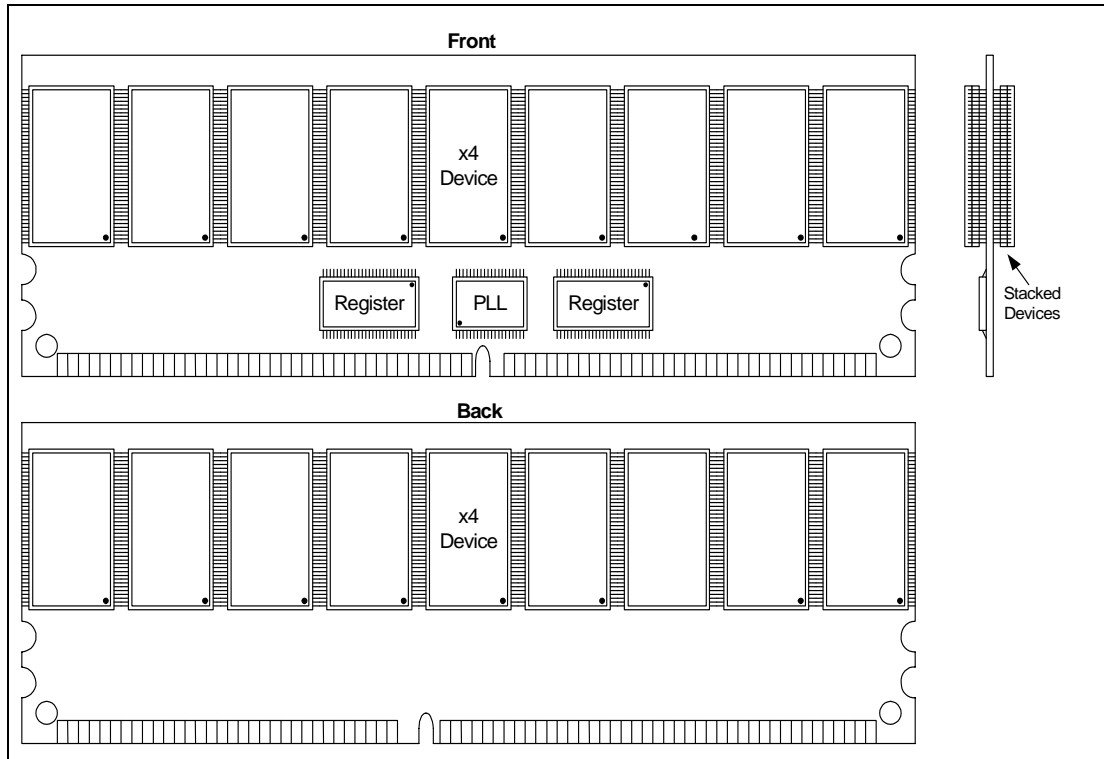


Table 2. Example datasheet table to find device type for a 128MB and 256MB x8 DIMM

	128MB	256MB
Refresh Count	4K	8K
Row Addressing	4K(A0-A11)	8K(A0-A12)
Device Bank Addressing	4(BA0, BA1)	4(BA0, BA1)
Device Type	16 Meg x 8	32 Meg x 8
Column Addressing	1K(A0-A9)	1K(A0-A9)
Module Bank Addressing	1(S0#)	1(S0#)

Figure 7. SDRAM part number location

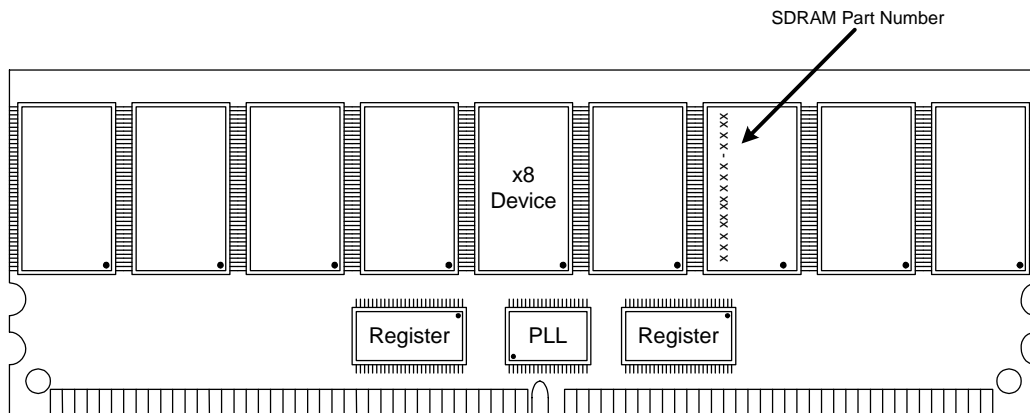


Table 3. Example datasheet table to find device specifications for 64MB x4 SDRAM

Part Number	Configuration	Timing
x x xx xx x x x - x x xx	64 Meg x 4	133Mhz w/ CL=2

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4. Memory configuration limitations for the A2 stepping

The A2 stepping of the Intel® E7500 MCH may not function correctly if x4 and x8 DIMMs are mixed within the same system. DIMMs must be populated in pairs, the DIMM pairs must be identical and additional DIMM pairs must have the same device type as every other DIMM pairs in the system. Refer to Tables 4 and 5 for examples of allowable and illegal memory configurations.

Table 4. Table of DIMM configurations by module size in Megabytes

DIMM size (MB)	DRAM Technology (Mbit)	DRAM Width (bits)	# of Sides
64	64	8	1
128	64	8	2
128	128	8	1
256	128	8	2
256	256	8	1
512	256	8	2
512	512	8	1
1024	512	8	2
1024	1024	8	1
2048	1024	8	2
128	64	4	1
256	64	4	2
256	128	4	1
512	128	4	2
512	256	4	1
1024	256	4	2
1024	512	4	1
2048	512	4	2
2048	1024	4	1
4096	1024	4	2

Note: Not all configurations listed above may be currently available.

Table 5. Legal and Illegal Memory Configurations

	Total Memory Capacity	# of DIMMS	DIMM Size (Technology and # of sides)
Legal Configuration	1GB	4	256MB (128Mbit x8 - double sided)
Illegal Configuration	1GB	2	256MB (128Mbit x8 - double sided)
		2	256MB (128Mbit x4 - single sided)
Legal Configuration	1.5GB	6	256MB (128Mbit x8 - double sided)
Illegal Configuration	1.5GB	2	256MB (128Mbit x8 - double sided)
		2	512MB (256Mbit x4 -single sided)
Legal Configuration	4GB	2	1024 (512Mbit x4 - single sided)
		2	512MB (256Mbit x4 - single sided)
		2	512MB (128Mbit x4 - double sided)
Illegal Configuration	4GB	2	1024MB (512Mbit x8 - double sided)
		2	512MB (256Mbit x4 - single sided)
		2	512MB (128Mbit x4 - double sided)