BladeCenter HS21 XM Memory Configurations
Positioning Information (withdrawn product)

Memory DIMM placement

The logical memory DIMM configuration is shown in Figure 2.
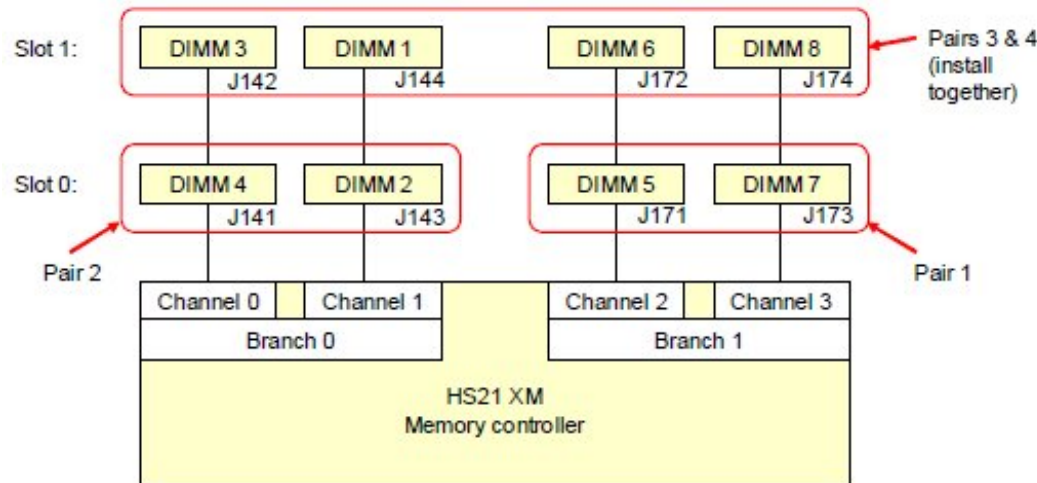

Figure 2. HS21 XM memory configuration

The standard HS21 XM models have two 512 MB DIMMs installed into sockets 5 and 7 as shown in Figure 2. The installation order is as follows:

1. The first pair of DIMMs are installed in sockets 5 and 7.

2. The second pair of DIMMs are installed in sockets 4 and 2.

3. The third and fourth pair are installed together at the same time in sockets 1, 3, 6, and 8.

The following table lists the blade server HS21 XM memory options. The number of ranks per DIMM is important when determining the space set aside for the hot spare memory in sparing mode.

Part number	Memory description	Ranks per DIMM
39M5782	1 GB (2x512 MB) PC2-5300 667 MHz ECC Chipkill DDR2 FB-DIMM	Single (512 MB rank)
39M5785	2 GB (2x1 GB) PC2-5300 667 MHz ECC Chipkill DDR2 FB-DIMM	Dual (512 MB rank)
39M5791	4 GB (2x2 GB) PC2-5300 667 MHz ECC Chipkill DDR2 FB-DIMM	Dual (1 GB rank)
39M5797	8 GB (2x4 GB) PC2-5300 667 MHz ECC Chipkill DDR2 FB-DIMM	Dual (2 GB rank)
46C7418	2 GB (2x1GB) Single Rank PC2-5300 CL5 ECC FBD 667MHz Low Power Memory	Single
46C7419	4 GB (2x2GB) Dual Rank PC2-5300 CL5 ECC FBD 667MHz Low Power Memory	Dual
46C7420	8 GB (2x4GB) Quad Rank PC2-5300 CL5 ECC FBD 667MHz Low Power Memory	Quad
46C7577	16 GB (2x8GB) PC2-5300 CL5 ECC FBDIMM 667Mhz AMB+	Quad

The Ranks per DIMM are significant. You can mix DIMMs of different rank counts, subject to the configuration rules described below.

Memory modes

The HS21 XM supports three mutually-exclusive memory modes: normal, mirroring, and sparing. The configuration is enabled in BIOS under Advanced Option.

Normal (Flat Mode)

The full capacity of all DIMMs is available to the operating system, however, no hot-spare or memory mirroring capabilities.

Configuration rules:
- The above installation sequence applies.

- DIMMs must be installed in matched pairs:
  - DIMMs 2 and 4 must match.
  - DIMMs 5 and 7 must match.
  - DIMMs 3 and 1 must match.
  - DIMMs 6 and 8 must match.

Memory mirroring (Mirroring Mode)

In mirroring mode, the server maintains two identical copies of all data in memory. The contents of branch 0 (see Figure 2) is duplicated in the DIMMs of branch 1. In the event of an uncorrectable error in one of the copies, the system can retrieve the mirrored copy of the data.

The use of memory mirroring means that only half of the installed memory is available to the operating system. Therefore, if 8 GB of memory is installed with mirroring enabled (for example, using four 2 GB DIMMs), only 4 GB is visible to the operating system.

Configuration rules:
- To use memory mirroring, both branches (see Figure 2) must be populated using identical DIMMs. This means that:
  - DIMMs 2, 4, 5, and 7 (the row of DIMMs in Figure 2 labelled Slot 0) must match.
  - DIMMs 1, 3, 6, and 8 (top row labelled Slot 1) must match.
- The top row and bottom row of DIMMs do not have to match.

- If you have eight DIMMs installed, the DIMMs in each channel can be different sizes. For example, you can enable mirroring with 4 GB DIMMs in the row labelled Slot 0 and 2 GB DIMMs in the row labelled Slot 1.

- If you have eight DIMMs installed, the rows of DIMMs (Slots) can be different rank technology. For example, the four DIMMs in the bottom row (Slot 0) can be all single-rank DIMMs (512 MB each) while the four DIMMs in the top row (Slot 1) can all be dual-rank DIMMs (1 GB, 2 GB, or 4 GB).

Hot spare memory (Sparing Mode)

This mode provides a degree of memory redundancy but not to the extent of memory mirroring. It also leaves relatively more memory to the operating system than mirroring.

In sparing mode, the trigger for fail-over is a preset threshold of correctable errors. When this threshold is reached for an active memory rank, the content of that rank is copied to the spare rank. The failed rank of memory is taken offline, and the spare rank is put online and used as active memory in place of the failed rank.
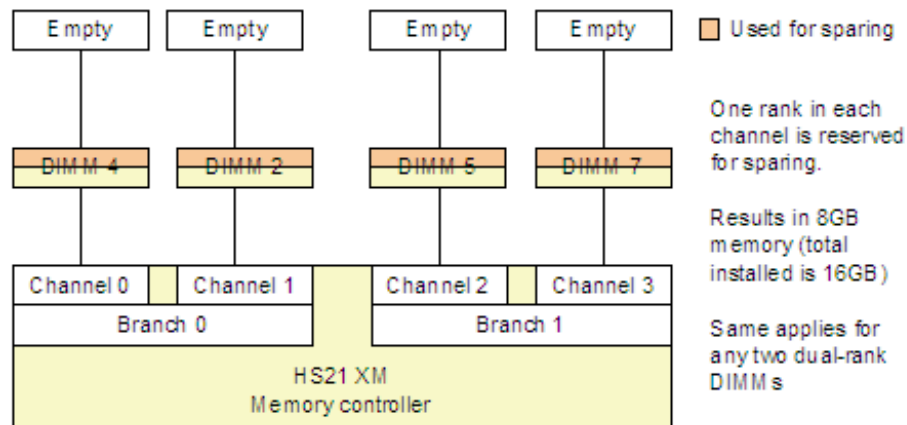
The memory set aside for the spare memory is one rank per channel. The size of the rank (and therefore the amount set aside for sparing) varies depending on the DIMMs used, as listed in the table of DIMMs above.
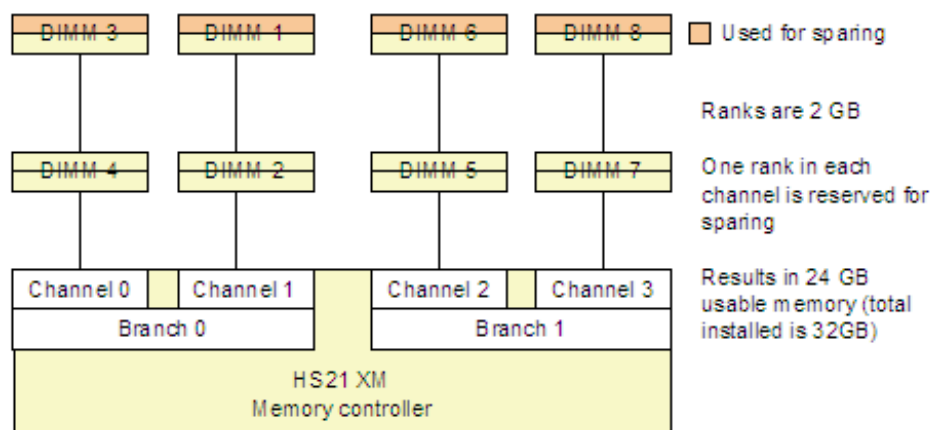
Configuration rules:
- DIMMs must be installed in matched pairs and in the same installation order as described above.
- All DIMMs in a row (slot 0 or slot 1 must match). For example, if you have four DIMMs installed (in sockets 2, 4, 5, and 7), they must be identical.
- Both DIMMs in a channel must be either single-rank or dual-rank and cannot be mixed. This effectively means that you cannot mix dual-rank DIMMs (1, 2, and 4 GB DIMMs) and single-rank DIMMs (512 MB DIMMs) in the server if you wish to enable sparing.
- You can mix different sizes of dual-rank DIMMs (1 GB, 2 GB, and 4 GB) and still enable sparing. The rank set aside for sparing will be the largest sized rank. For example, if you have four 2 GB DIMMs (dual-ranked meaning the rank size is 1 GB) and four 4 GB DIMMs (dual-ranked meaning the rank size is 2 GB), then the space reserved for sparing will be a 2 GB rank per channel (a total of 8 GB).

Figure 3 shows four example configurations (Example 1 - 4) that are supported.

Example 1: Four 4 GB dual-rank DIMMs

Used for sparing

One rank in each channel is reserved for sparing.

Results in 8GB memory (total installed is 16GB)

Same applies for any two dual-rank DIMMs

Example 2: Eight DIMMs – all 4 GB dual-rank

Used for sparing

Ranks are 2 GB

One rank in each channel is reserved for sparing

Results in 24 GB usable memory (total installed is 32GB)

Example 3: Eight DIMMs – four 2GB and four 4GB

4GB DIMMs (2 GB ranks)

| DIMM 3 | DIMM 1 | | DIMM 6 | DIMM 8 |

☐ Used for sparing

2GB DIMMs (1 GB ranks)

| DIMM 4 | DIMM 2 | | DIMM 5 | DIMM 7 |

Mixed rank sizes. The "spare rank" is one of the largest ones (2GB here)

| Channel 0 | Channel 1 | | Channel 2 | Channel 3 |
| Branch 0 | | | Branch 1 | |

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Results in 16GB usable space (total installed is 24GB).
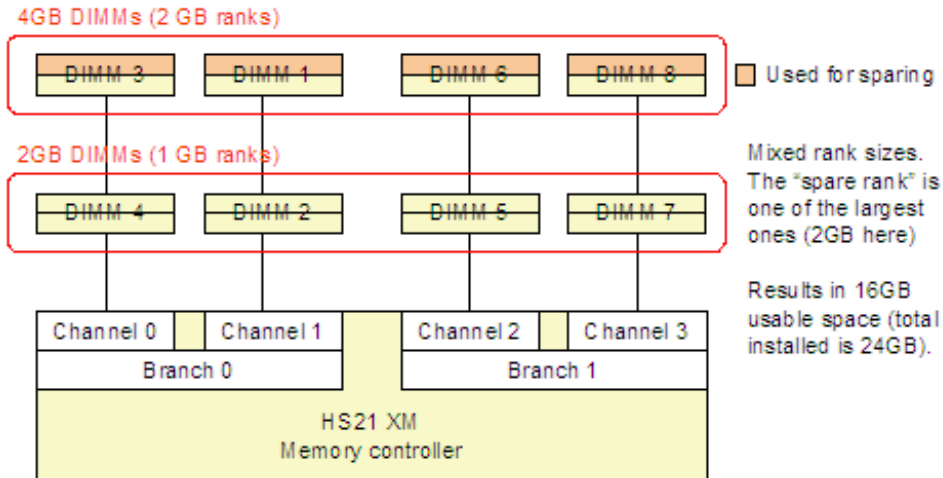
Example 4: Two 4 GB dual-rank DIMMs

| Empty | Empty | | Empty | Empty |

☐ Used for sparing

| DIMM 4 | DIMM 2 | | Empty | Empty |

One rank in each channel is reserved for sparing.

| Channel 0 | Channel 1 | | Channel 2 | Channel 3 |
| Branch 0 | | | Branch 1 | |

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Results in 4GB memory (total installed is 8GB)
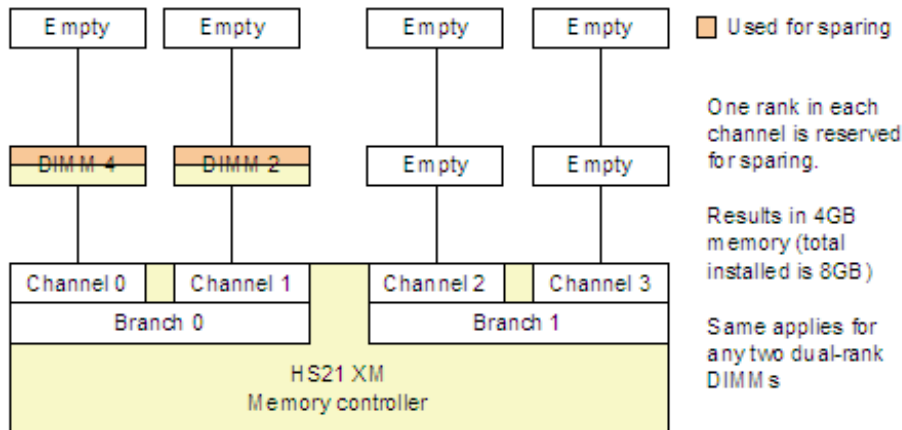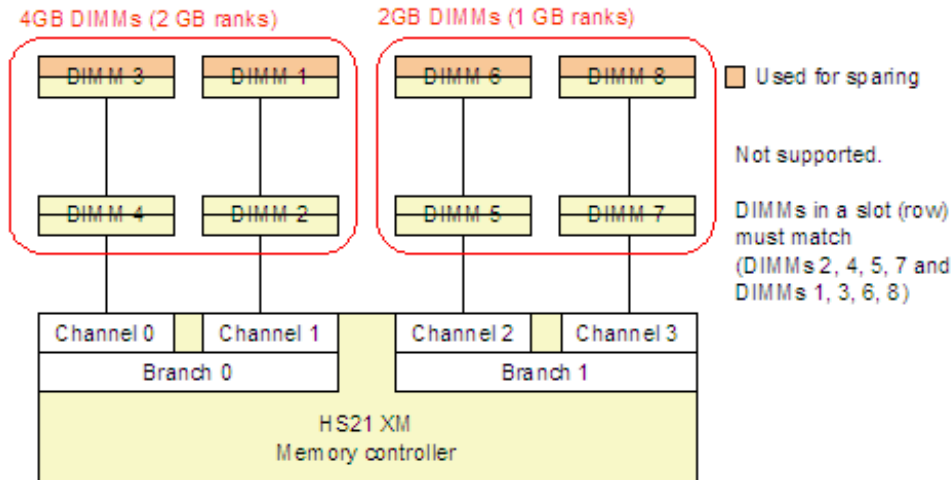
Same applies for any two dual-rank DIMMs

Figure 3. Examples 1-4 show supported memory sparing configurations

Note: The examples in Figure 3 (Examples 1 - 4) show that a specific rank is reserved for sparing. This is for illustrative purposes and is not meant to indicate that the rank that is the greatest distance from the controller is the rank that is always used.

Figure 4 shows Example 5 and Example 6, which are configurations that are not supported.

Example 5: Eight DIMMs – four 2GB and four 4GB

4GB DIMMs (2 GB ranks) 2GB DIMMs (1 GB ranks)

| DIMM 3 | DIMM 1 | | DIMM 6 | DIMM 8 |

☐ Used for sparing

| DIMM 4 | DIMM 2 | | DIMM 5 | DIMM 7 |

Not supported.

DIMMs in a slot (row) must match
(DIMMs 2, 4, 5, 7 and DIMMs 1, 3, 6, 8)

| Channel 0 | Channel 1 | Channel 2 | Channel 3 |

Branch 0 Branch 1

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Example 6: Eight DIMMs – four 1GB and four 512MB

1GB DIMMs (512 MB ranks - double)

| DIMM 3 | DIMM 1 | DIMM 6 | DIMM 8 |

☐ Used for sparing

512 MB DIMMs (512 MB ranks - single)

| DIMM 4 | DIMM 2 | DIMM 5 | DIMM 7 |

Not supported.

With sparing enabled, you cannot mix single-rank and dual-rank DIMMs on a channel.

| Channel 0 | Channel 1 | Channel 2 | Channel 3 |

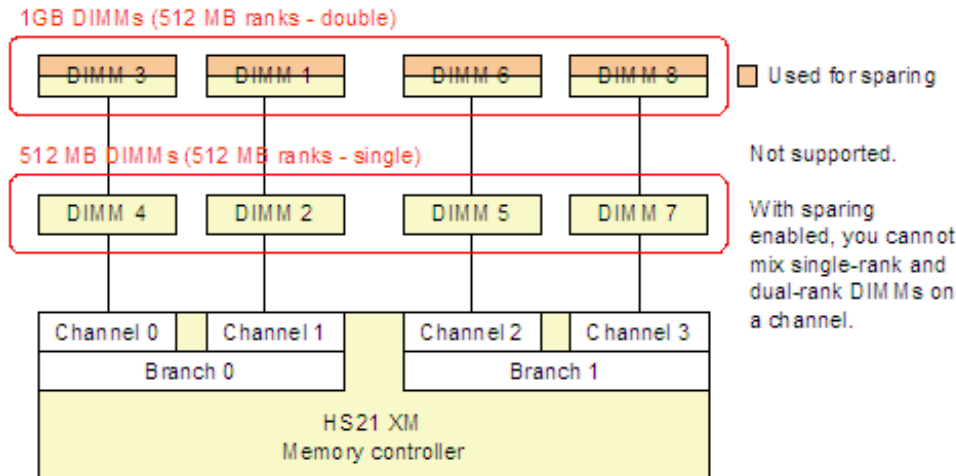Branch 0 Branch 1

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Figure 4. Example 5 and Example 6 show memory configurations that are not supported.

Related product families

Product families related to this document are the following:

- Blade Servers
- Memory

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This document, TIPS0671, was created or updated on October 26, 2009.

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