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## Intel® Xeon® Processor E3-1200 Product Family Memory Configuration Guide

<table>
<thead>
<tr>
<th>DIMM Slots per Channel</th>
<th>DIMMs Populated per Channel</th>
<th>DIMM Type</th>
<th>POR Speeds</th>
<th>Ranks per DIMM (any combination)</th>
<th>Supported Board Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>Unbuffered DDR3 ECC</td>
<td>1066, 1333</td>
<td>SR, DR</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Unbuffered DDR3 ECC</td>
<td>1066, 1333</td>
<td>SR, DR</td>
<td>4</td>
</tr>
</tbody>
</table>

- **Support for UDIMMs only**: no support for LV DIMMs or RDIMMs
- **Non-ECC UDIMMs not supported** on server platforms; supported on workstation platforms
- Mixing ECC and non-ECC UDIMMs on the platform is **not supported**
- All channels in a system will run at the fastest common frequency
- Static CLTT supported via BMC (requires ECC DIMMs with thermal sensor)

### Max Memory Possible**

<table>
<thead>
<tr>
<th>1Gb DRAM Technology</th>
<th>2Gb DRAM Technology</th>
<th>4Gb DRAM Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Rank UDIMM</td>
<td>4GB (4x 1GB UDIMMs)</td>
<td>8GB (4x 2GB UDIMMs)</td>
</tr>
<tr>
<td>Dual Rank UDIMMs</td>
<td>8GB (4x 2GB UDIMMs)</td>
<td>16GB (4x 4GB UDIMMs)</td>
</tr>
</tbody>
</table>

| 16GB (4x 4GB UDIMMs) | 32GB (4x 8GB UDIMMs) |

Enables cost-optimized value platforms with up to 8GB/core
## Intel® C200 Series Chipset Memory Support

<table>
<thead>
<tr>
<th>Platform</th>
<th>DIMM Configuration</th>
<th>Intel® Xeon® processor E3-1200 product family</th>
<th>Intel® Core™ i3 processor series</th>
<th>Intel® Core™ i5-2400/2500 and i7-2600 processor series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® C202 Chipset (Cougar Point Essential Server)</td>
<td>UDIMM Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>UDIMM ECC</td>
<td><strong>Supported</strong></td>
<td><strong>Supported</strong></td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>UDIMM Mix ECC with Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Intel® C204 Chipset (Cougar Point Standard Server)</td>
<td>UDIMM Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>UDIMM ECC</td>
<td><strong>Supported</strong></td>
<td><strong>Supported</strong></td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>UDIMM Mix ECC with Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Intel® C206 Chipset (Cougar Point Workstation and Advanced Server)</td>
<td>UDIMM Non-ECC</td>
<td><strong>Supported (Client OS)</strong></td>
<td><strong>Supported (Server OS)</strong></td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Supported (Server OS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UDIMM ECC</td>
<td><strong>Supported</strong></td>
<td><strong>Supported</strong></td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>UDIMM Mix ECC with Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Intel® 6 Series Chipset (Cougar Point Desktop)</td>
<td>UDIMM Non-ECC</td>
<td>Not Supported</td>
<td><strong>Supported</strong></td>
<td><strong>Supported</strong></td>
</tr>
<tr>
<td></td>
<td>UDIMM ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
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<td>UDIMM Mix ECC with Non-ECC</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

**Note:** No RDIMM support; “Not Supported” configurations may still boot
Value of ECC Memory

• What is ECC Memory?
  – Error Correcting Code memory enables detection and correction of memory errors

• Why ECC Memory?
  – Memory errors cause system failures and security vulnerabilities
  – Overclocking and system age greatly increase failure rates
  – Recurrent failures are common and happen quickly
    – 97% occur within 10 days of first failure

• Do I need ECC memory?
  – ECC is crucial for reducing memory errors
    – ~4000 correctable errors per memory module per year

Business Impact of Memory Errors

• Memory errors cause unplanned downtime that costs money
  – Average rate of memory error for a server with 4GB memory running 24x7 is **150 times a year**\(^1,2\)
  – If 10% of errors cause a system crash, and each crash interrupts business for 10 minutes, the cost is **$4,300 to $50,000 a year** for Windows-based server applications\(^3\)

• Memory errors cause unpredictable business problems
  – Erroneous data affects accounting, inventory, health records, etc.

• Systems with ECC memory correct vast majority of errors
  – For a server with lifespan of 3 to 5 years, chance for system failure unc Żc correctable memory error is **less than 0.001%**\(^1,2\)

---

\(^3\) 2005 North American Linux and Windows TCO Comparison Report, Part 1

Why Take the Risk?
Choose a Real Server with ECC Memory

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Key Messages for Intel® Xeon® Processor E3-1200 Product Family

• Server Class Memory Capacity
  – Up to 32GB (4x 8GB UDIMMs)

• Supports UDIMM ECC Memory
  – No support for LV DIMMs or RDIMMs

• ECC memory helps ensure 24x7 data availability
  – Memory errors can cause system crashes or bad data
  – ECC corrects up to 99.988% of all memory errors\textsuperscript{1,2}

Real Servers with ECC Memory
Protect Your Business Investment


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Backup
Intel® Xeon® Processor E3-1200 Platform Overview

Intel® Xeon® Processor E3-1200 Product Family Key Features
- Next-Generation 32nm Intel® Microarchitecture
- Intel® Turbo Boost 2.0 Technology for dynamic frequency scaling
- Intel® Hyper-Threading technology for 8 thread processing with quad core performance frequency scaling
- Up to 8MB of Intel® Smart Cache
- Integrated memory controller for 2 channels of DDR3
- Up to 4 UDIMMs of memory, up to 1333 MHz of speed
- Flexible PCI Express* 2.0 Configurations: 1x16+1x4, 2x8+1x4, or 4x4

Intel® C200 Series Chipset Key Features
- New single chip architecture
- Up to 8 PCI Express 2.0 x1 Ports (5.0 GT/s) for flexible device support
- Up to 2 (6Gb/s) ports plus 4 (3Gb/s) ports with Intel® Rapid Storage Technology for RAID 0/1/5/10
- Up to 12 USB 2.0 Ports with integrated USB 2.0 Rate Matching Hub

Not all features are available on every processor SKU

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Google Report: Key Findings

- Memory errors much more common than previously thought
  - About 1/3 of Google’s systems had at least one correctable memory error a year
  - Memory errors are one of the most common hardware problems to lead to machine crashes
- Correctable errors are strongly correlated by memory module
  - A DIMM that sees a correctable error is up to 200 times more likely to see another correctable error in the same month
- Memory error rates are strongly correlated with system utilization and age
- Consequence of a memory error is system dependent
  - In systems without ECC memory, a memory error can lead to a machine crash or applications using corrupted data

Source: DRAM Errors in the Wild: A Large-Scale Field Study © 2009 Google Inc.
Microsoft Report: Key Findings

“Overall, we found operating system crashes due to hardware failures to be much more frequent than we had expected.”

“While ECC memory will detect and correct single-bit failures, that vast majority of commodity machines have no such protection. Unfortunately, ECC memory is seen as a premium part. Therefore, most machines remain vulnerable.”

“Once a machine suffers a single hardware failure, the probability of another hardware failure increases by two orders of magnitude.”

Source: Cycles, Cells and Platters: An empirical analysis of hardware failures on a million commodity PCs © 2009 Microsoft Corporation