Memory Configurator

Lenovo ThinkStation P3 Tower Gen 2, P3 Tiny Gen 2, P3 Ultra SFF Gen 2

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Overview

The ThinkStation P3 Gen 2 Intel Arrow Lake (ARL) platform is the latest desktop workstation replacement for the ThinkStation P3 Gen 1 Intel Raptor Lake platform.

The purpose of this document is to highlight the major differences between the different memory platform architectures from the previous platforms and help guide users to optimally configure their memory configuration in the ThinkStation P3 Gen 2 platform.

Section 1 – P3 Tower Gen 2 Memory Architectural Design

The ThinkStation P3 Tower Gen 2 platform utilizes DDR5 memory with bus speeds up to 5600 MT/s, depending on the system processor and number of DIMMs per channel. This platform offers a dual memory channel design based on Intel ARL processors. There is a total of four memory DIMM slots, allowing the P3 Tower Gen 2 to take full advantage of supporting a two DIMM per channel design.

Figure 1 - P3 Tower Gen 2 Motherboard Layout

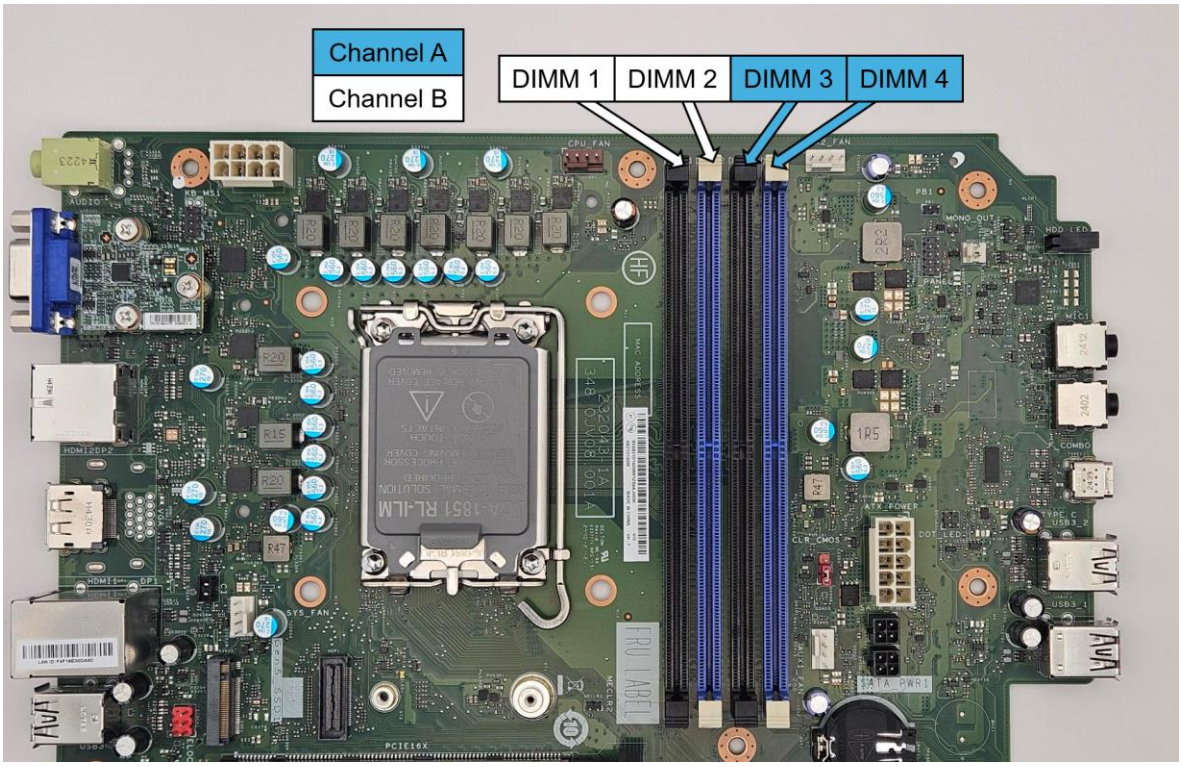
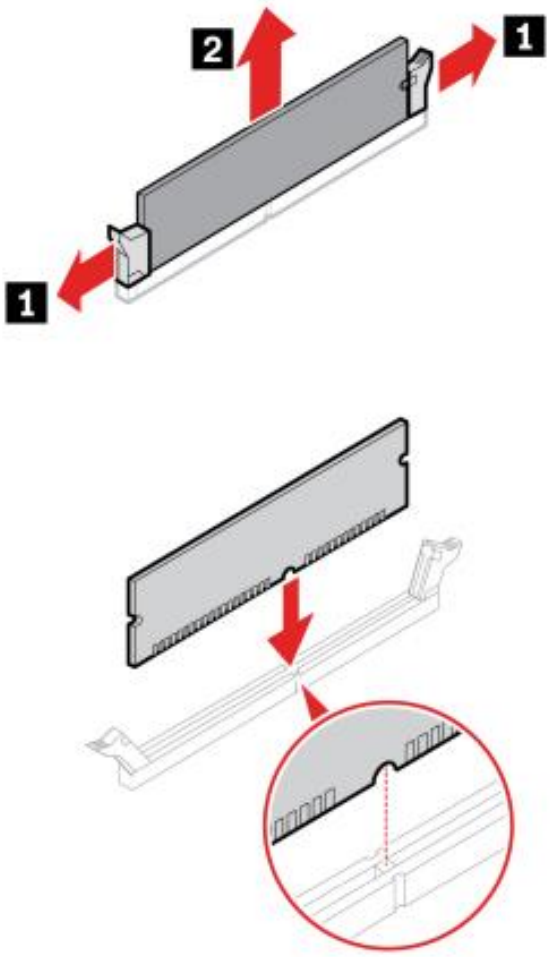


Figure 2 - P3 Tower Gen 2 Memory Install and Removal



Section 2 – P3 Tower Gen 2 Memory Configurations

Below are guidelines on how to optimally configure memory for best overall performance and bandwidth for the ThinkStation P3 Tower Gen 2 platform.

- P3 Tower Gen 2 utilizes a two DIMMs per channel (2DPC) configuration. Install DIMM slots in multiples of two to fully take advantage of both memory channels.
- Unregistered Dual In-Line Memory Modules (UDIMMs) and Clocked Unregistered Dual In-Line Memory Modules (CUDIMMs) are only supported in the P3 Tower Gen 2 platform.
- DIMM slots should be filled in the order listed in *Figure 3*.
- Maximum frequency is partially dependent on the ranks of DIMMs installed in the system. Due to the 2DPC design, maximum speed is limited to 5600 MT/s (*See Figure 4*).
- Refer to Section 7 for other considerations.

Figure 3 - P3 Tower Gen 2 Slot Fill Order Recommendations

# of DIMMs	DIMM slots used
1 DIMM	DIMM slot 2
2 DIMMs	DIMM slot 2, DIMM slot 4
3 DIMMs	Unsupported[1]
4 DIMMs	DIMM slot 2, DIMM slot 4, DIMM slot 1, DIMM slot 3

Figure 4 – 1R (single rank) and 2R (dual rank) Memory Installation and Maximum Frequency

Slot 1	Slot 2	Slot 3	Slot 4	Actual Speed
	1R			5600 MT/s
	1R		1R	5600 MT/s
1R	1R	1R	1R	4800 MT/s
	2R			5600 MT/s
	2R		2R	5600 MT/s
2R	2R	2R	2R	4400 MT/s

[1] Lenovo does not support or recommend this number of DIMM quantity as it results in an unbalanced memory configuration across the dual channels.

Section 3 – P3 Tiny Gen 2 Memory Architectural Design

The ThinkStation P3 Tiny Gen 2 platform utilizes DDR5 memory with bus speeds up to 6400 MT/s, depending on the system processor, and number of DIMMs per channel.

This platform offers two memory channels based on Intel ARL processors. There is a total of two memory DIMM slots, allowing the P3 Tiny Gen 2 to take advantage of supporting a single DIMM per channel design.

Figure 5 - P3 Tiny Gen 2 Motherboard Layout

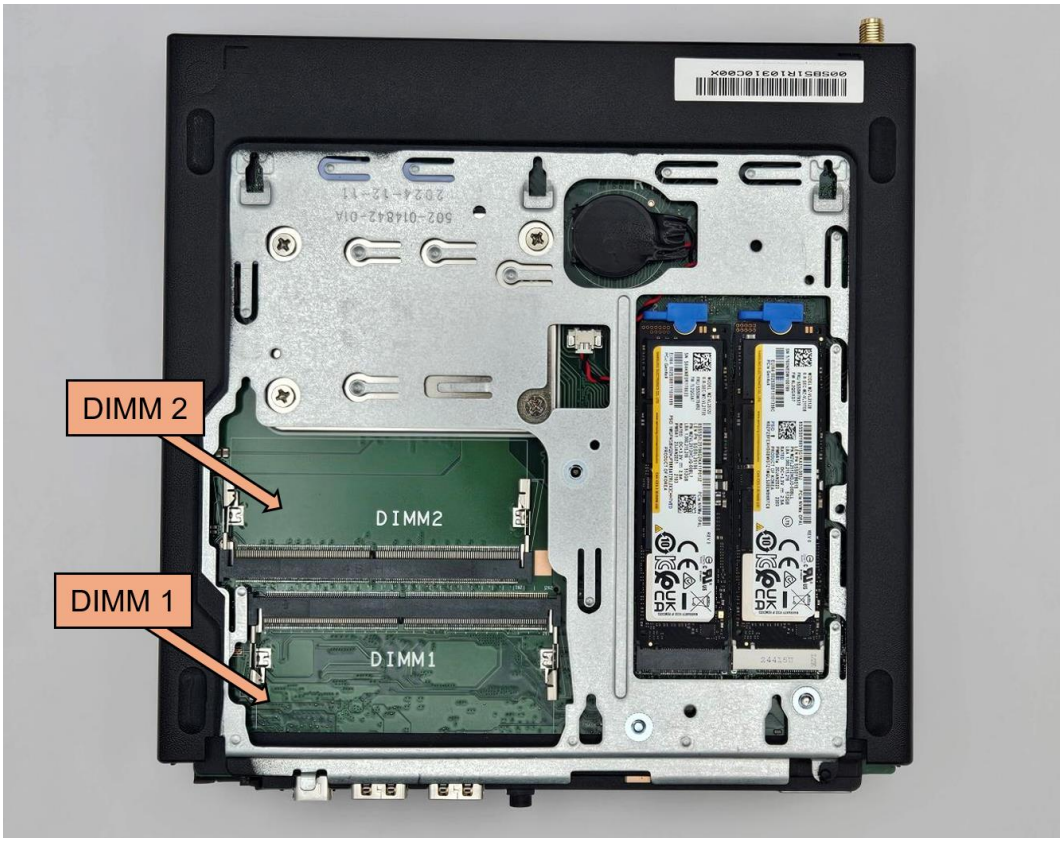
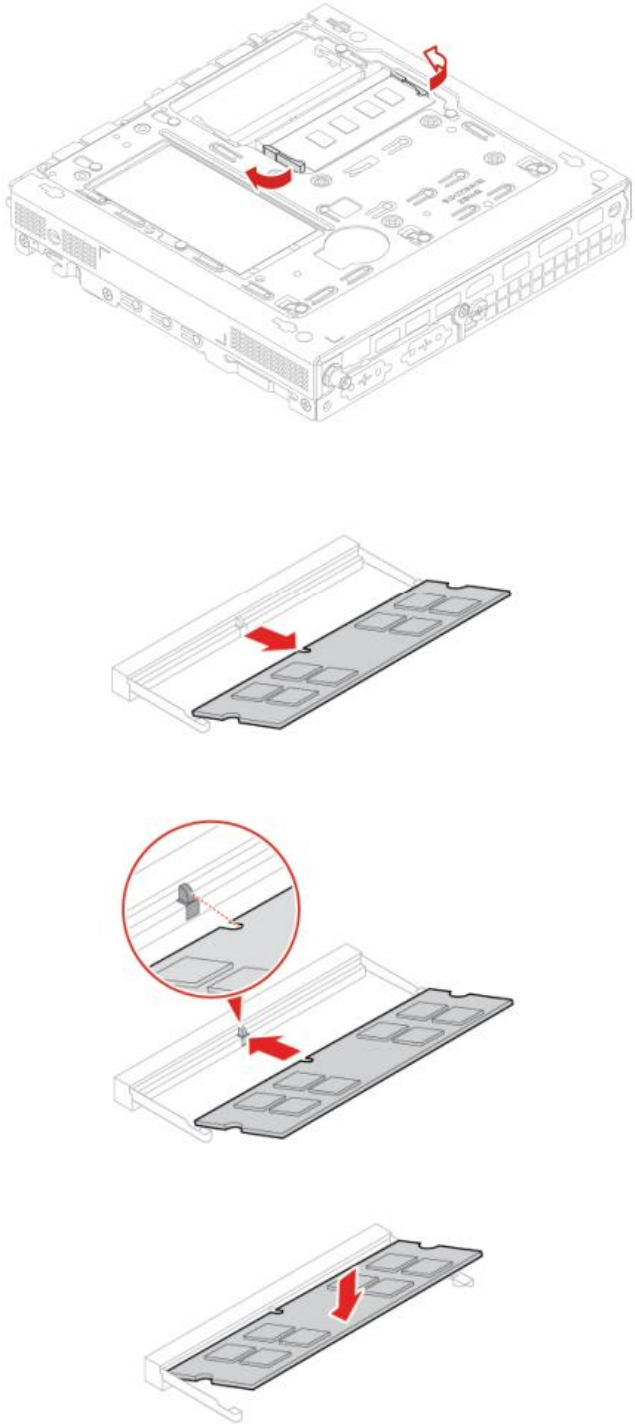


Figure 6 - P3 Tiny Gen 2 Memory Install and Removal



Section 4 – P3 Tiny Gen 2 Memory Configurations

The following recommended guidelines will help obtain the best overall memory bandwidth from the P3 Tiny Gen 2 system:

- P3 Tiny Gen 2 utilizes one DIMM per channel (DPC) to allow for full maximum memory bandwidth performance. Max memory speed may be dependent on CPU SKU and the maximum rated speed of the DIMMs installed.
- DIMM slots should be filled in the order listed in *Figure 7*.
- Small Outline Dual In-Line Memory Modules (SODIMMs) and Clocked Small Outline Dual In-Line Memory Modules (CSODIMMs) only are supported in the P3 Tiny Gen 2 platform.
- Memory speed dependent on CPU and DIMM capabilities.
- Refer to Section 7 for other considerations.

Figure 7 - P3 Tiny Gen 2 Slot Fill Order Recommendations

# of DIMMs	DIMM slots used
1 DIMM	DIMM slot 1
2 DIMMs	DIMM slot 1, DIMM slot 2

Section 5 – P3 Ultra SFF Gen 2 Memory Architectural Design

The ThinkStation P3 Ultra SFF Gen 2 is Lenovo's latest small form factor workstation platform, utilizing DDR5 memory with bus speeds up to 6400 MT/s, depending on the system processor and number of DIMMs per channel. There are a total of two memory DIMM slots, allowing the P3 Ultra SFF Gen 2 to take advantage of supporting a single DIMM per channel design.

Figure 8 - P3 Ultra SFF Gen 2 Motherboard Layout (RAM Side)

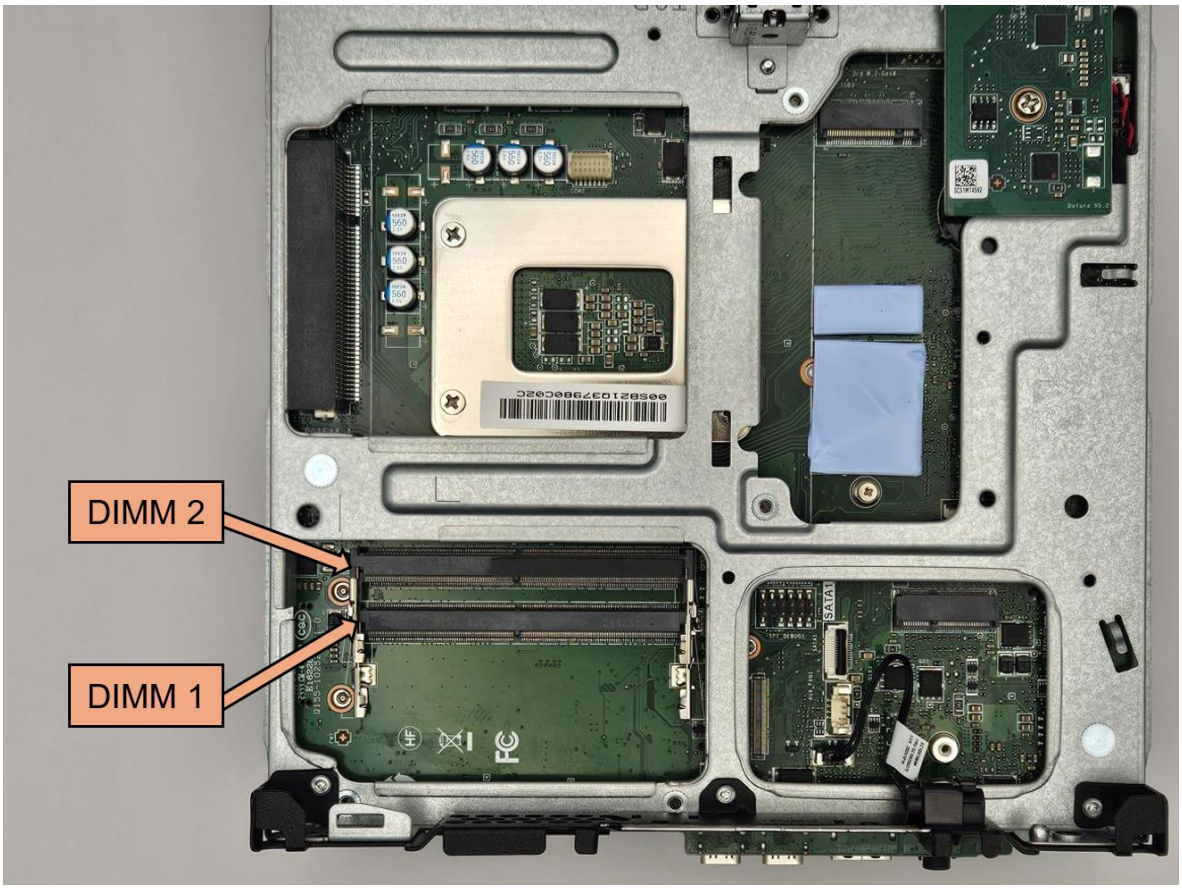
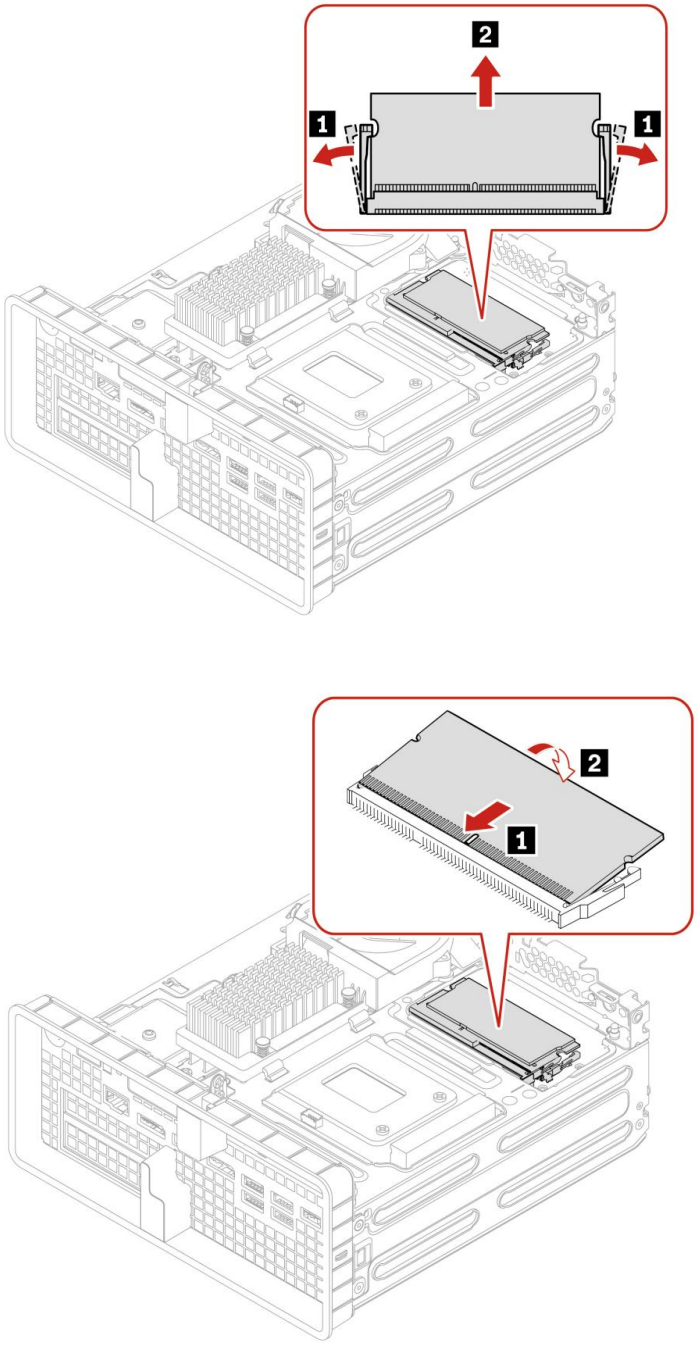


Figure 9 - P3 Ultra SFF Gen 2 Memory Install & Removal Instructions



Section 6 – P3 Ultra SFF Gen 2 Memory Configurations

Below are guidelines on how to optimally configure memory for best overall performance and bandwidth for the ThinkStation P3 Ultra SFF platform.

- P3 Ultra SFF Gen 2 utilizes one DIMM per channel (DPC) to allow for full maximum memory bandwidth performance. Max memory speed may be dependent on CPU SKU and the maximum rated speed of the DIMMs installed.
- DIMM slots should be filled in the order listed in *Figure 10.*
- Small Outline Dual In-Line Memory Modules (SODIMMs) and Clocked Small Outline Dual In-Line Memory Modules (CSODIMMs) only are supported in the P3 Ultra SFF Gen 2 platform.
- Refer to Section 7 for other considerations.

Figure 10 - P3 Ultra SFF Gen 2 Slot Fill Order Recommendations

# of DIMMs	DIMM slots used
1 DIMM	DIMM slot 1
2 DIMMs	DIMM slot 1, DIMM slot 2

Section 7 – Considerations

The following is a list of situations a user should consider in order to optimally configure memory for the best overall system performance. The configuration guidelines below apply generally to the P3 Tower Gen 2, P3 Ultra SFF Gen 2, and P3 Tiny Gen 2.

- Mixing ECC and non-ECC memory is not supported.
- Lenovo recommends using the same capacity, rank, and brand within the same channel.
- Lenovo does not support mixing different memory DIMM capacities or mixing single rank (1R) and dual rank (2R) memory DIMMs.

Platform-specific limitations:

P3 Tower Gen 2

- Lenovo does not support installing three (3) DIMMs resulting in an unbalanced memory channel configuration.
- Intel Core Ultra 5 225 does not support ECC memory.
- 4x 48GB or 4x 64GB DIMMs is not supported with Windows 11 Home.
- Registered DIMMs (RDIMMs) & Load-Reduced DIMMs (LRDIMMs) are not supported.

P3 Ultra SFF Gen 2

- Intel Core Ultra 5 225 and Intel Core Ultra 5 225T do not support ECC memory.
- If the system uses 32GB, 48GB, or 64GB memory, the Bottom Side M.2 Heatsink Kit must be installed.

P3 Tiny Gen 2

- Supported CSODIMM memory is non-ECC only.

Revision History

Version	Date	Author	Changes/Updates
v1.0	6/23/25	Chris C	Initial Release