

# ThinkStation **Thunderbolt 4** and **USB4**

## Installation & Setup Guide

P5, P7, P8, PX

P3 Tiny and P3 Tiny Gen 2

P3 Ultra and P3 Ultra SFF Gen 2

P3 Tower, Gen 1 and Gen 2



# Table of Contents

|   |    |
|---|----|
| ThinkStation Thunderbolt and USB4 Overview .....          | 3  |
| P5, P7, PX, P3 Tower Thunderbolt 4 Solution .....         | 5  |
| P3 Tiny & P3 Tiny Gen 2 Thunderbolt 4 Solution .....      | 9  |
| P3 Ultra & P3 Ultra SFF Gen 2 Thunderbolt 4 Solution..... | 24 |
| P8 & P3 Tower Gen 2 USB4 Solution .....                   | 33 |
| Appendix – Part Numbers .....                             | 38 |
| Revision History .....                                    | 43 |



## ThinkStation Thunderbolt and USB4 Overview

All of the current Lenovo ThinkStation Desktop systems support either Thunderbolt 4 or USB4 for data transfer (I/O) between the workstation and peripheral devices.

Thunderbolt and USB4 are currently two of the fastest I/O interfaces for connecting peripheral devices to your workstation. Both interfaces can transfer data, video/audio signals, networking – all through the simple, industry standard USB-C connector.

Table 1 shows a feature comparison of Thunderbolt 3, 4, and USB 4.

*Table 1 – Thunderbolt 3, 4, USB4 Industry Specification Comparison<sup>1</sup>*

| Feature              | Thunderbolt 3   | Thunderbolt 4   | USB4            |
|----------------------|-----------------|-----------------|-----------------|
| <b>Data Transfer</b> |                 | 40Gbs           |                 |
| <b>Ethernet</b>      |                 | 10 GbE          |                 |
| <b>DisplayPort</b>   | DisplayPort 1.2 | DisplayPort 2.0 | DisplayPort 2.0 |
| <b>Daisy Chain</b>   | Yes             | Yes             | No              |

Current Lenovo ThinkStation Desktop systems that support Thunderbolt 4 or USB4 are shown in Table 2, along with the number of available ports. Only P3 Ultra SFF has an onboard Thunderbolt 4 solution, all others are available via add in cards (AIC).

*Table 2 – ThinkStation System I/O Comparison*

| System                    | Thunderbolt 4 Ports | USB4 Ports |
|---------------------------|---------------------|------------|
| <b>P5</b>                 | 1                   |            |
| <b>P7</b>                 | 1                   |            |
| <b>PX</b>                 | 1                   |            |
| <b>P3 Tower</b>           | 1                   |            |
| <b>P3 Tiny</b>            | 1                   |            |
| <b>P3 Tiny Gen 2</b>      | 1                   |            |
| <b>P3 Ultra SFF</b>       | 2                   |            |
| <b>P3 Ultra SFF Gen 2</b> | 1                   |            |
| <b>P8</b>                 |                     | 2          |
| <b>P3 Tower Gen 2</b>     |                     | 2          |

<sup>1</sup> These are industry standards – your system performance may vary.

This document serves as a guide for the installation and setup of the optional Thunderbolt or USB4 solutions listed in Table 2. The Appendix at the end of the document lists part numbers for all of the associated hardware.



# P5, P7, PX, P3 Tower Thunderbolt 4 Solution

ThinkStation P5, P7, PX, and P3 Tower all support a single Thunderbolt 4 port via the rear-accessible Thunderbolt 4 PCIe card, shown here:

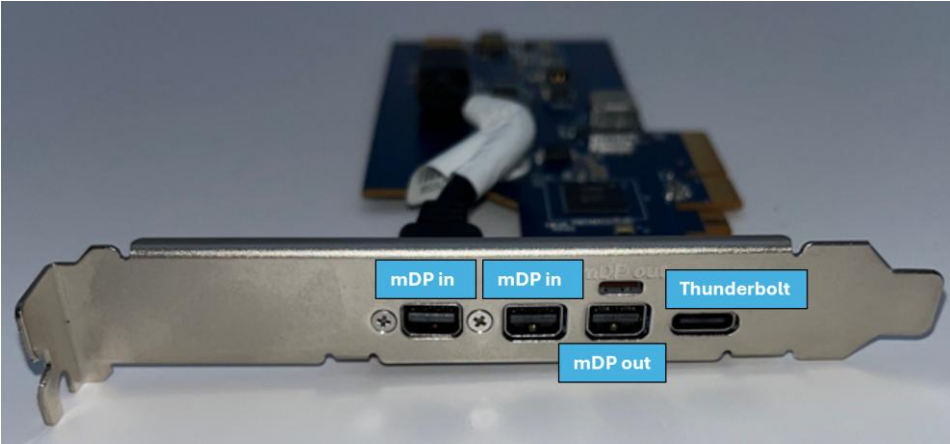


The following photo shows the connectors available on the back of the card:

2x mini-DisplayPort (mDP) inputs

1x mDP output

1x bi-directional Thunderbolt 4 port



This card is available from Lenovo either pre-installed, as part of a Configure To Order (CTO) system, or as an aftermarket purchase that can be installed by the end user.

### Card Installation

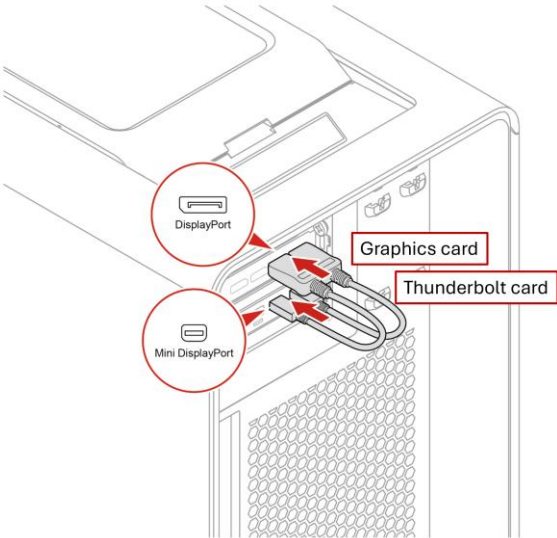
The Thunderbolt 4 card is a low-profile, half-length, PCIe4 card that should be installed in an approved PCIe slot, as designated by Table 3. The optimal slot priority, where applicable, is listed high to low from left to right.

*Table 3 – P5/7/X PCIe Thunderbolt Card Supported PCIe Slots*

| System          | Approved Slot(s) & Priority |
|-----------------|-----------------------------|
| <b>P5</b>       | Slot 6 > Slot 4 > Slot 2    |
| <b>P7</b>       | Slot 4 > Slot 7             |
| <b>PX</b>       | Slot 9                      |
| <b>P3 Tower</b> | Slot 3                      |

Previous ThinkStation Thunderbolt 3 solutions required the connection of additional sideband and/or power cabling between the Thunderbolt 3 card and the system motherboard. This cabling is not necessary when installing the current Thunderbolt 4 card in P5, P7, PX, or P3 Tower, even though some of the peripheral connectors are still available on the motherboards.

The Thunderbolt 4 card requires input from two mini-DisplayPort (mDP) connectors to pass dual display signals out to monitors. Therefore, after the card is installed into the PCIe slot, it must be connected to a graphics card via the included DisplayPort (DP) to mini-DisplayPort (mDP) cables, as shown here<sup>2</sup>:



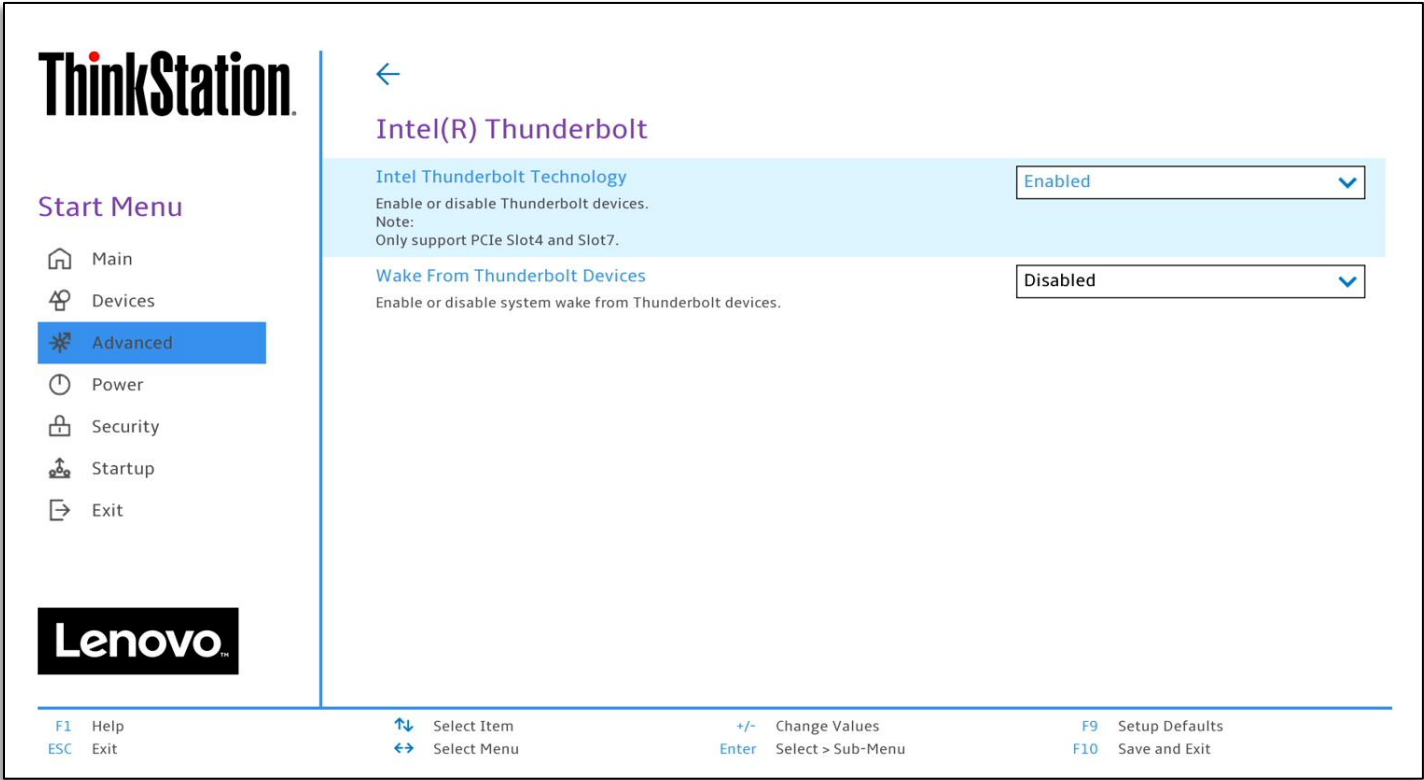
If the graphics card only has mDP ports available, an mDP to DP dongle may be used to make the necessary conversion. This dongle, along with all other Thunderbolt 4 parts can be found in the Appendix at the end of this document.

### BIOS Settings

Once the card and cables have been installed, Thunderbolt needs to be enabled in BIOS Setup. Additionally, you can choose to enable Wake From Thunderbolt via BIOS settings.

<sup>2</sup> Actual system configuration may vary in appearance from this diagram.

Enter BIOS Setup by powering the system on and then repeatedly hitting F1 as soon as the Lenovo logo screen appears. When the main menu appears, use the arrow keys or the mouse to navigate to the Thunderbolt settings screen: Main > Advanced > Intel(R) Thunderbolt, shown here:



On this screen, Thunderbolt can be Enabled (default) or Disabled, and the ability to Wake From Thunderbolt Devices can also be Enabled or Disabled (default).<sup>3</sup>

<sup>3</sup> This BIOS Setup screen is from P7 – the other systems in this section may vary slightly, but the same basic settings are available. Also note that other Thunderbolt device settings may be added with newer BIOS versions.

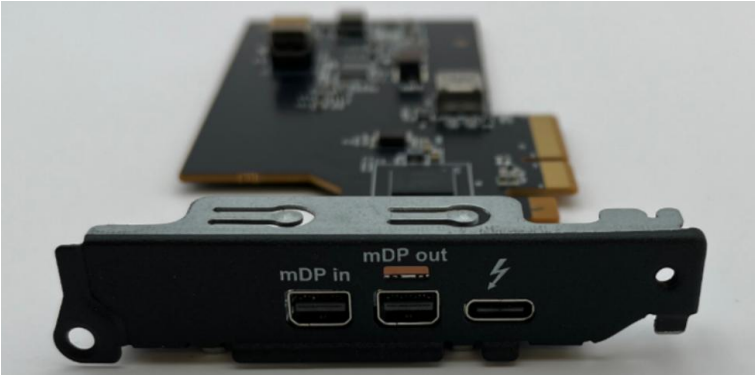
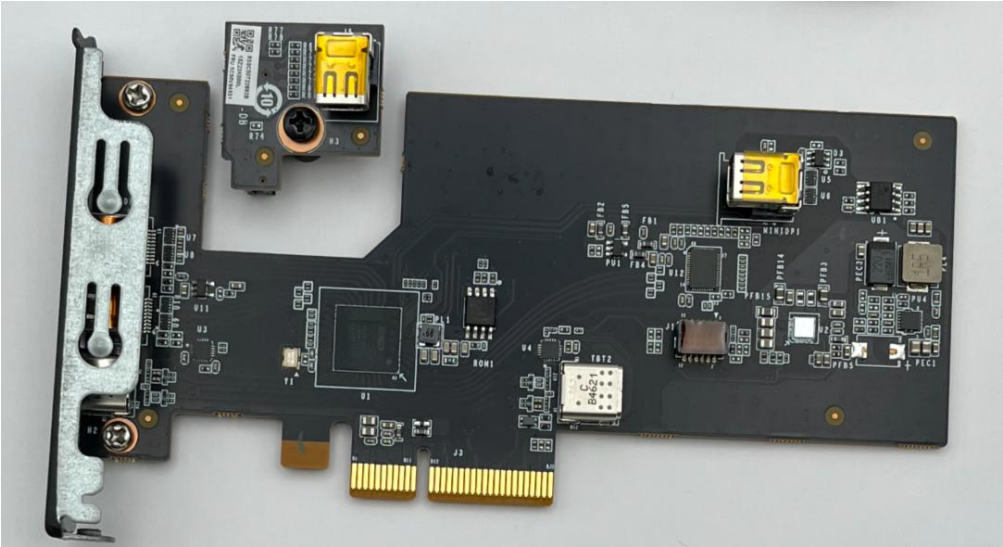
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## P3 Tiny & P3 Tiny Gen 2 Thunderbolt 4 Solution

ThinkStation P3 Tiny and P3 Tiny Gen 2 both have options for a single Thunderbolt 4 port on the rear panel; however, the hardware solutions are different for each platform. The installation steps for each platform are included in this section.

### P3 Tiny

The P3 Tiny rear Thunderbolt 4 port is provided by a PCIe card and a smaller board-to-board (BTB) card, shown here:



The installation also requires the Tiny8 PClex4 Riser card<sup>4</sup>, shown here:



Depending on the base P3 Tiny being used for this install, the x4 riser card might already be installed. If not, one will need to be purchased for the Thunderbolt card install. Orderable part numbers can be found in the Appendix at the end of this document.

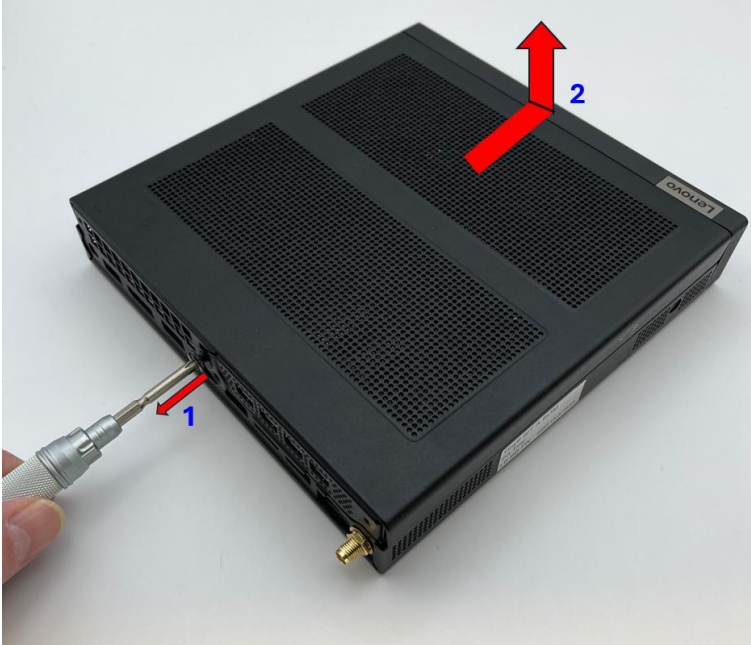
Note that the Thunderbolt 4 solution cannot coexist with any other PCIe cards.

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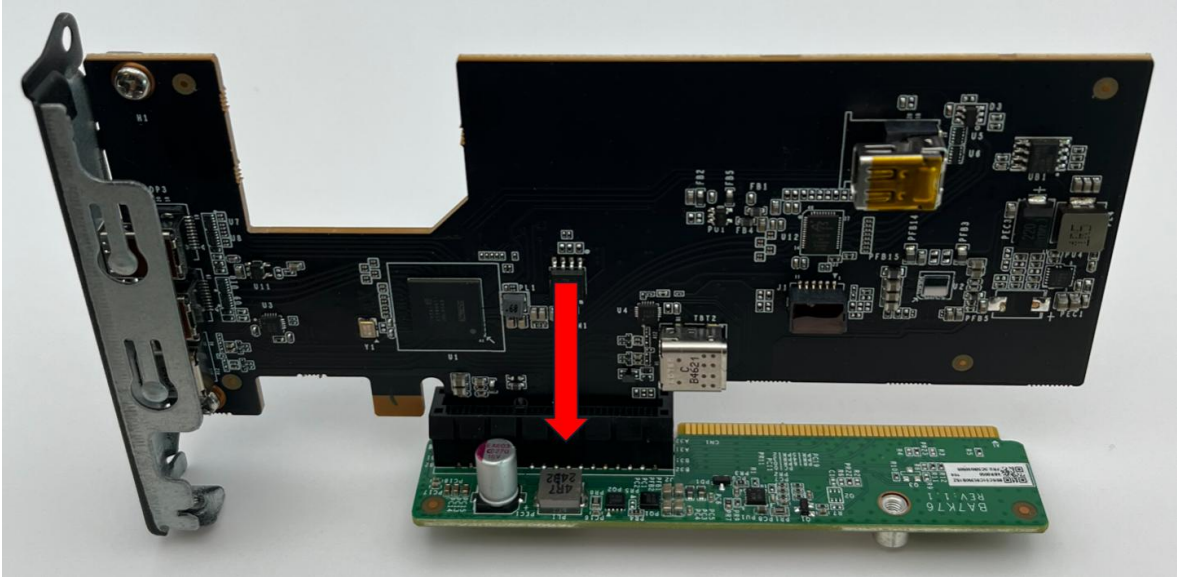
<sup>4</sup> Be to use the x4 riser card, not the x16 riser card.

# Card Installation

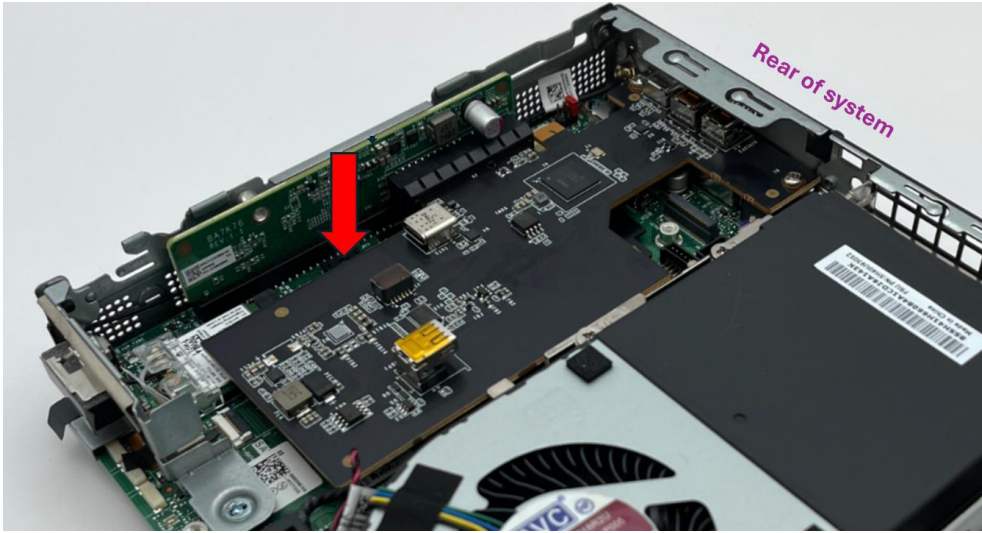
- 1. Remove the system cover.



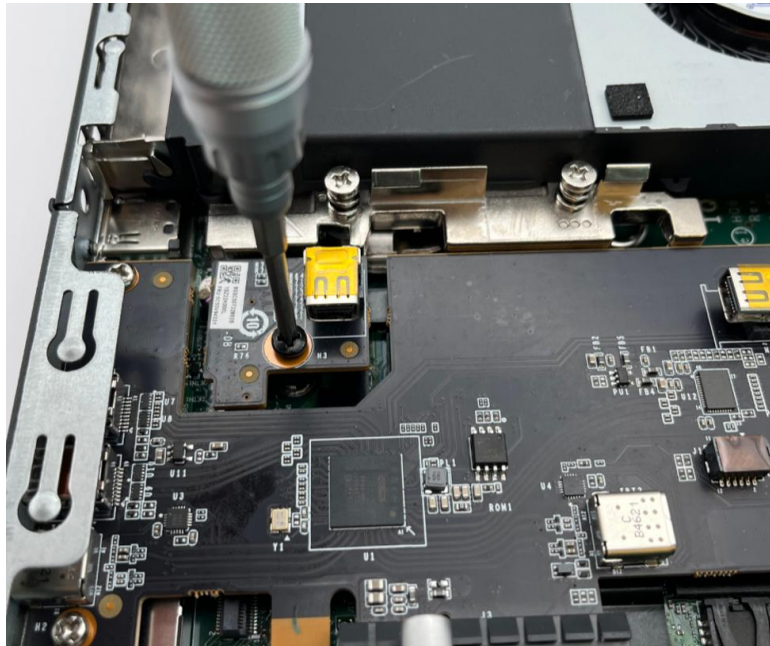
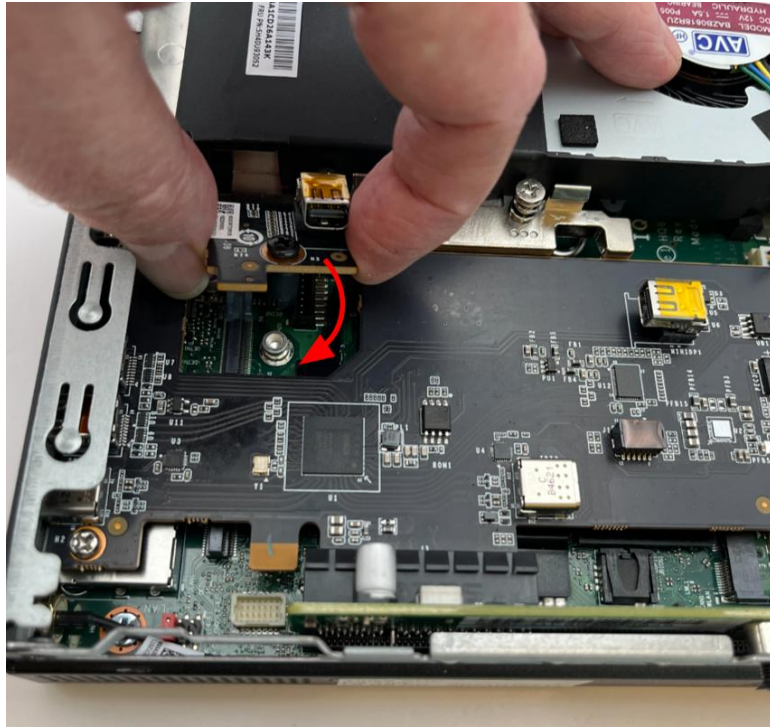
- 2. Remove any existing PCIe cards from the system.
- 3. Install the Thunderbolt PCIe card into the x4 Riser card.



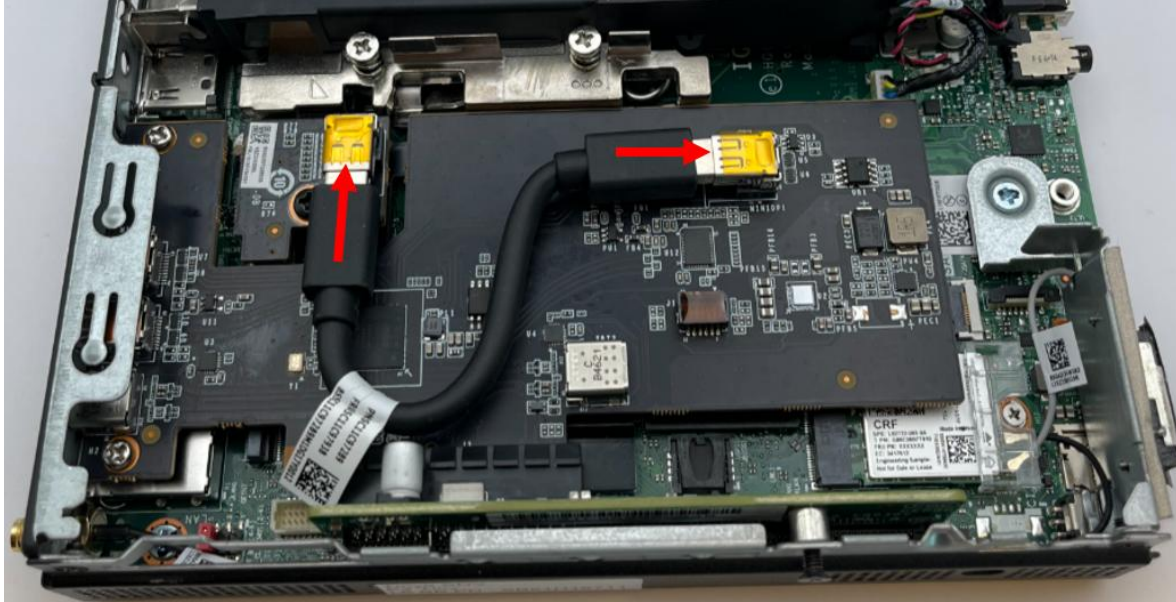
4. Install the card assembly into the PCIe slot on the motherboard and secure with three Phillips head mounting screws.



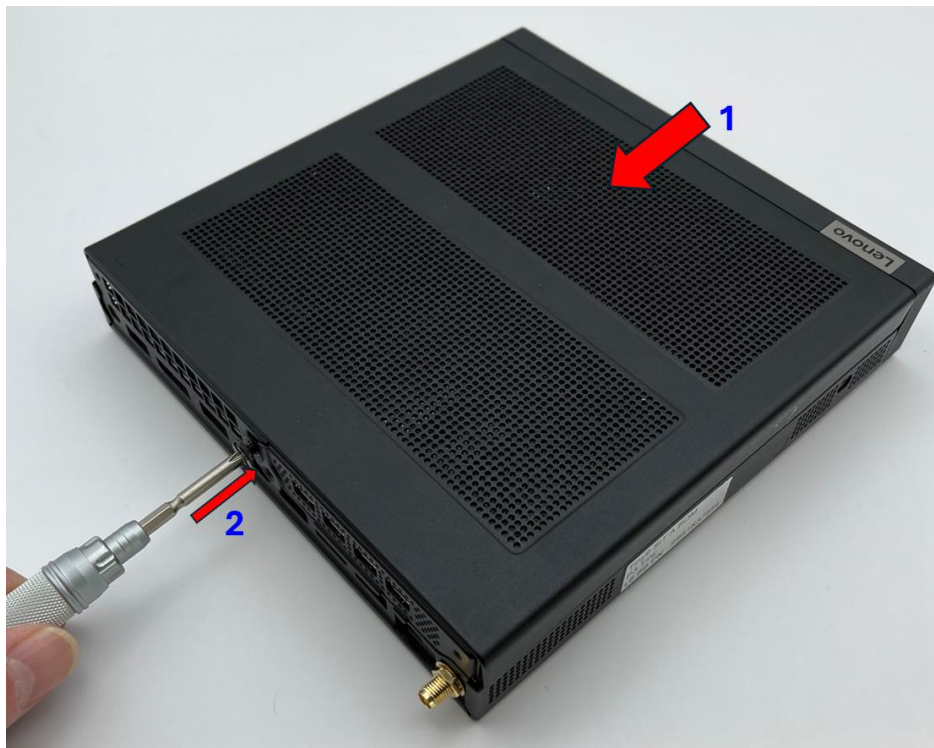
5. Install the BTB card onto the BTB connector and tighten the screw with a Phillips head screwdriver.



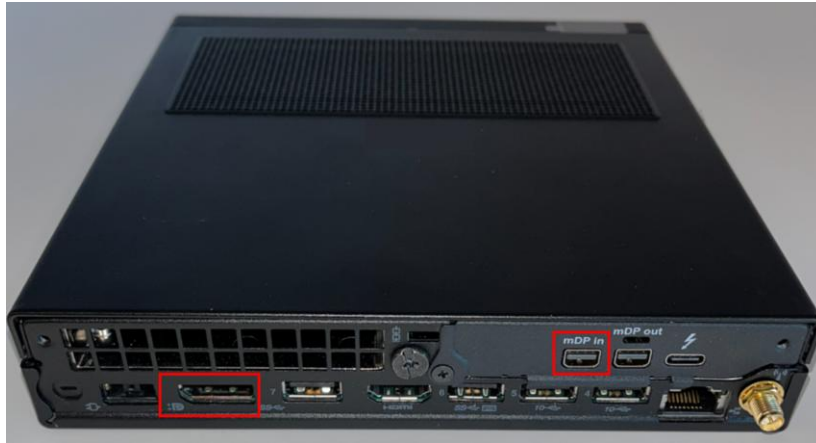
6. Connect the internal mDP to mDP cable.



7. Reassemble the system cover and secure with the Phillips head screw.



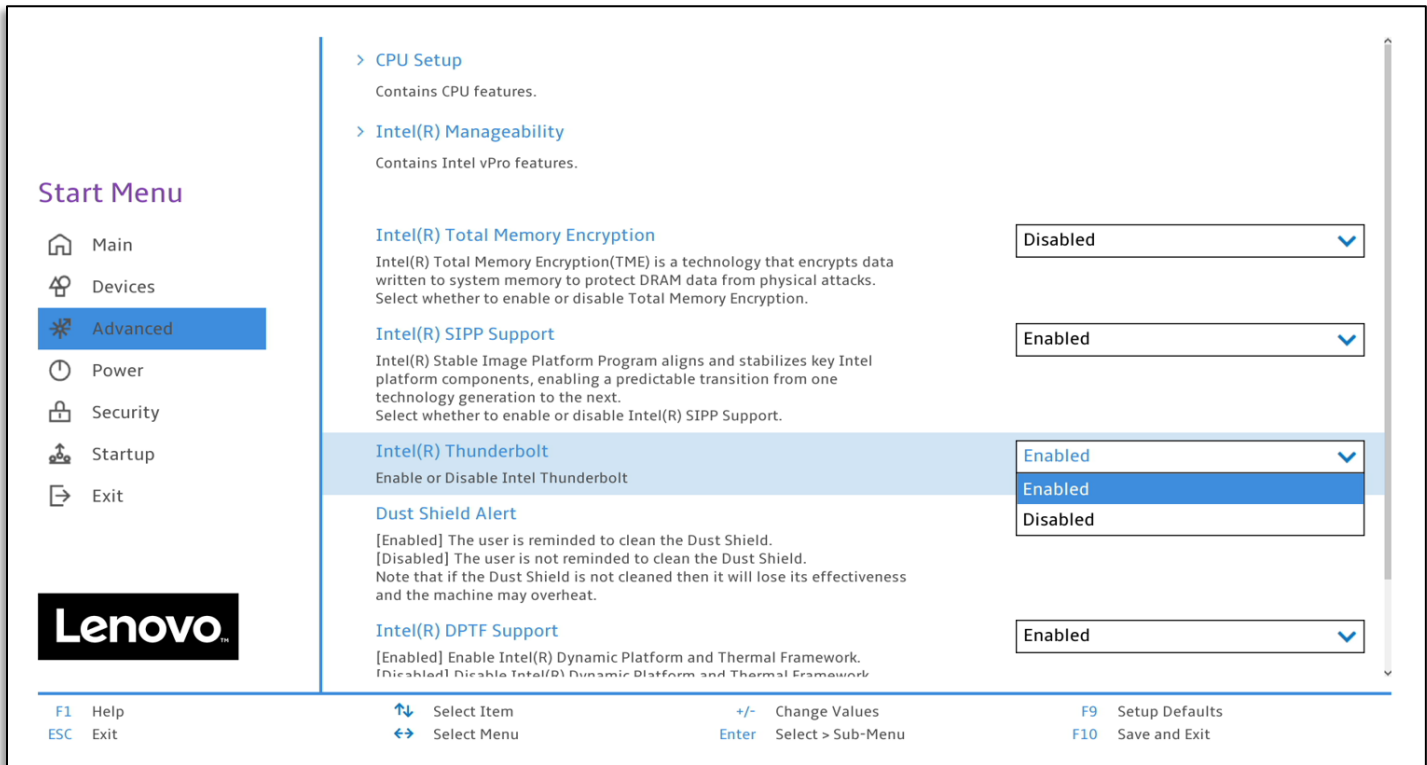
8. Connect the **DP** port on the rear of the system to the **mDP in** port on the Thunderbolt card.



## BIOS Settings

Once the card and cables have been installed, Thunderbolt needs to be enabled in BIOS Setup.

Enter BIOS Setup by powering the system on and then repeatedly hitting F1 as soon as the Lenovo logo screen appears. When the main menu appears, use the arrow keys or the mouse to navigate to the Thunderbolt settings screen: Main > Advanced > Intel(R) Thunderbolt, shown here:

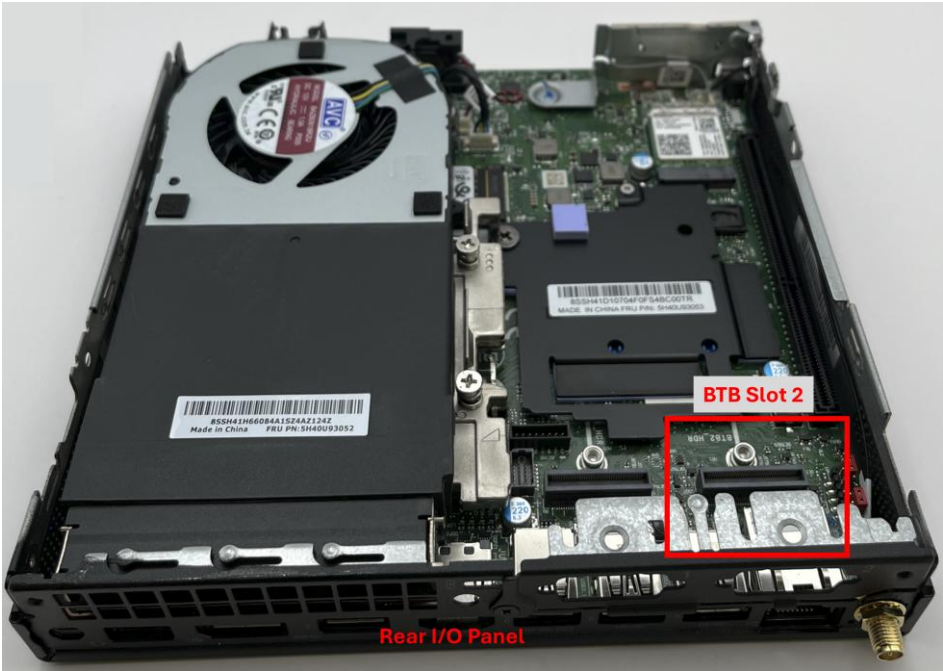


### P3 Tiny Gen 2

The P3 Tiny Gen 2 rear Thunderbolt 4 port is provided by a board-to-board (BTB) card, shown here:



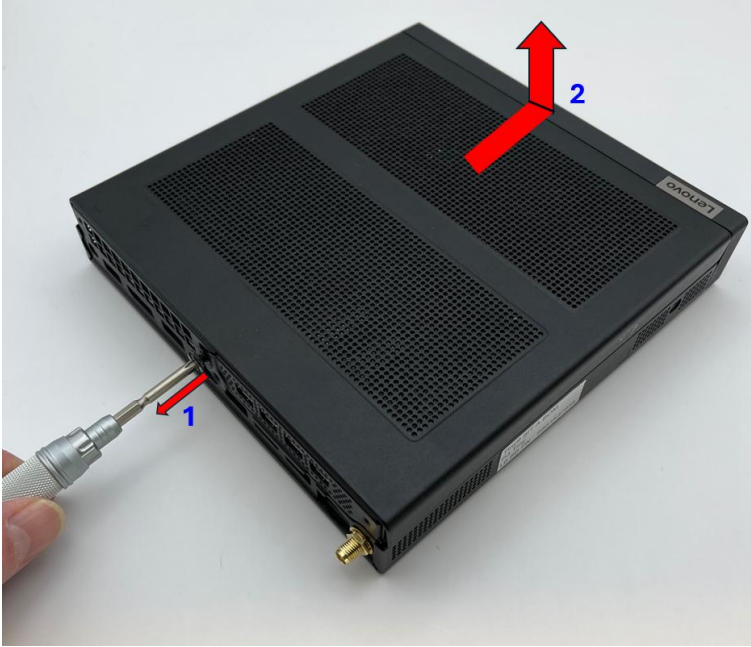
The card is installed in BTB Slot 2 in the rear of the chassis, shown here:



The card will not fit into BTB Slot 1, nor can it be installed concurrently with any other PCIe cards.

# Card Installation

- 1. Remove the system cover.

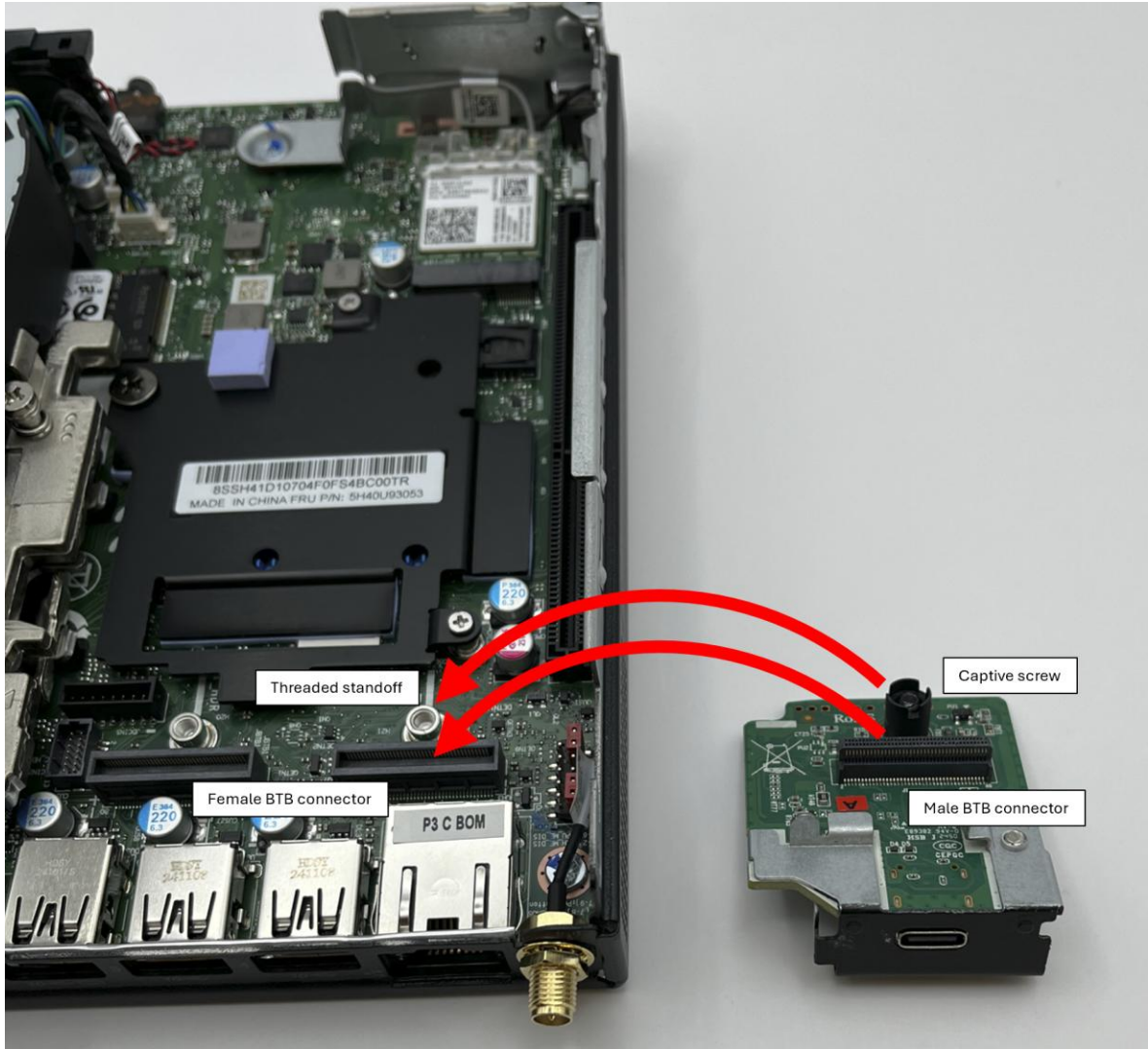


- 2. Remove any existing PCIe cards. If your system originally came without any PCIe cards, you should have the rear panel Tiny Punch Out Bracket, shown here:



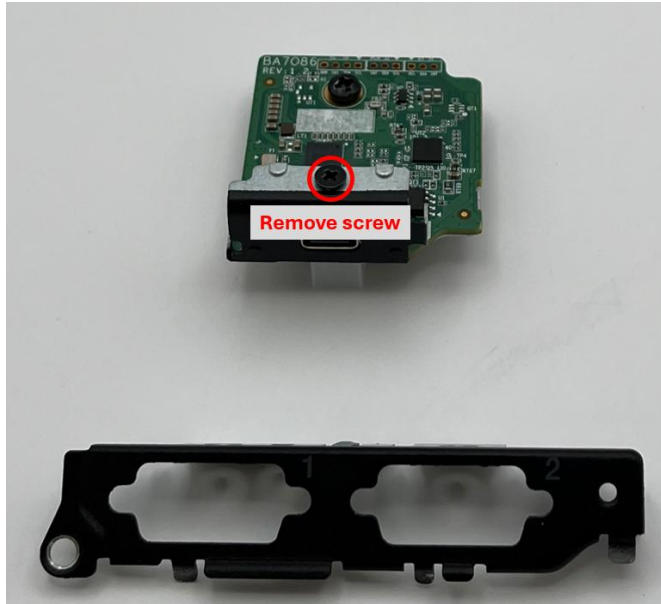
If you don't have this bracket, you will need to order one for the Thunderbolt 4 install. Orderable part number information can be found in the Appendix at the end of this document. Use a Phillips head screwdriver to pry out the covering on the right-hand port.

Before continuing, look closely at the *bottom* of the BTB Thunderbolt card and the rear corner of the chassis where it will be mounted.

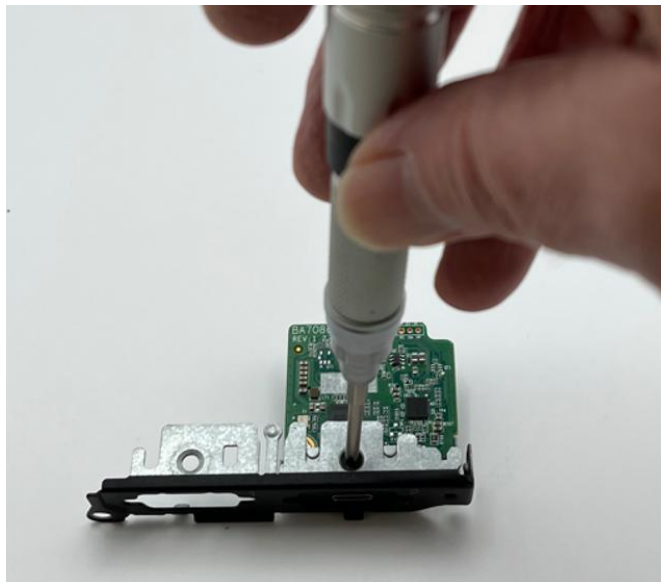


During the next few steps of the install process, the BTB card will be flipped so that both the male connector and captive screw on the bottom of the board can mate with the female connector and threaded standoff on the chassis.

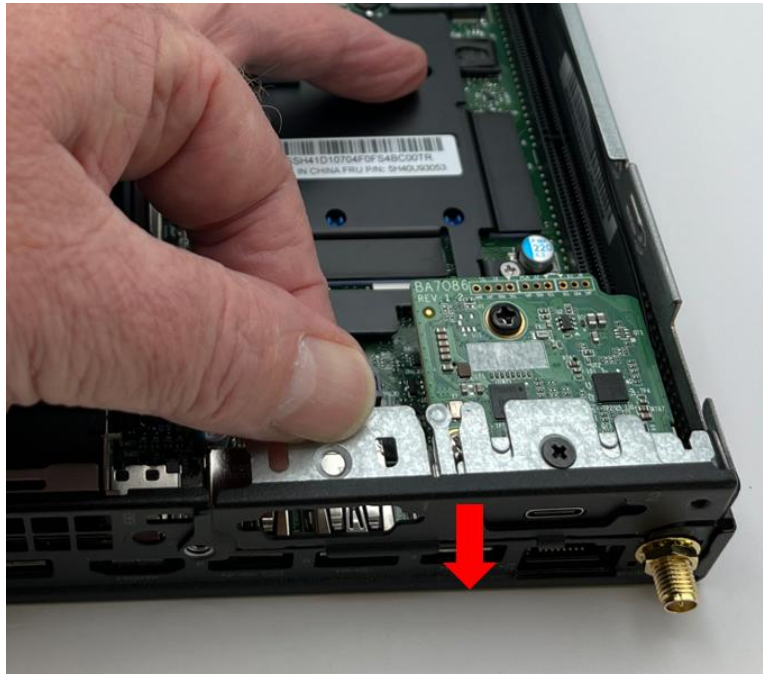
3. The BTB card must be attached to the Tiny Punch Out Bracket before being installed in the system. Prepare for this step by removing the M3 x .5 screw from the BTB card.



4. Mate the BTB card with the righthand port of the Tiny Punch Out Bracket and secure with the screw removed in the previous step. Note: The cards will still have a small amount of play when the screw is fully tightened. This will help with card alignment and insertion in the next step.



5. Align the card-bracket assembly with the rear of the system chassis and press it down to fully seat the BTB connector.



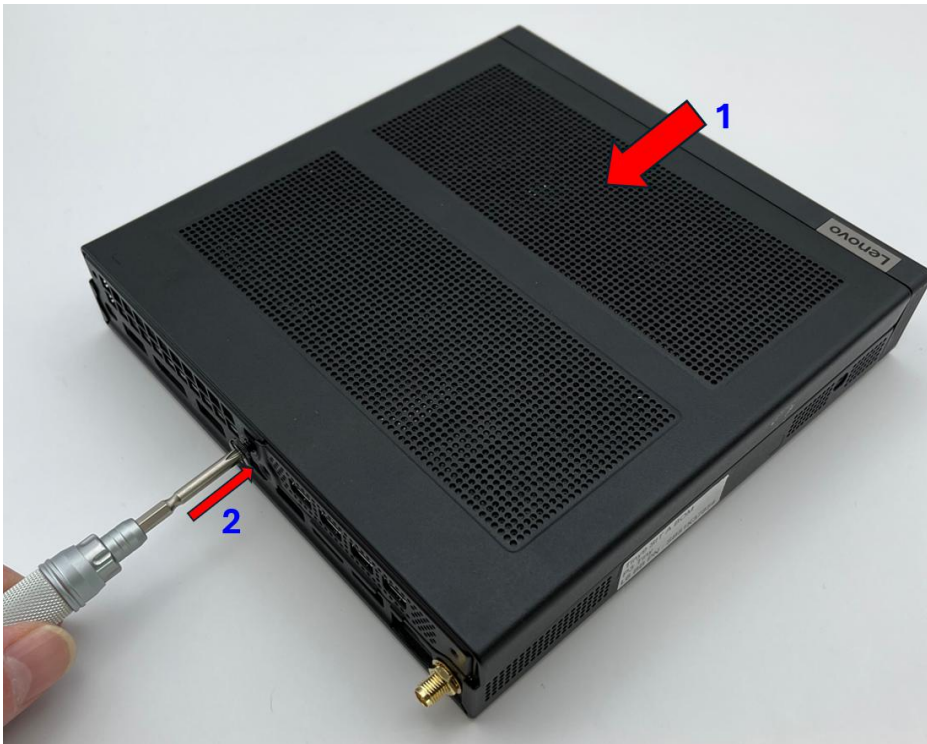
Tighten the mounting screw with a Phillips head screwdriver.



6. Secure the bracket into place with 2 M2 x .4 screws.



7. Reassemble the system cover and secure with the Phillips head screw.



8. This is a close-up photo of the installed Thunderbolt 4 port.



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## P3 Ultra & P3 Ultra SFF Gen 2 Thunderbolt 4 Solution

P3 Ultra SFF Gen 1 and Gen 2 both support Thunderbolt 4 via front panel ports.

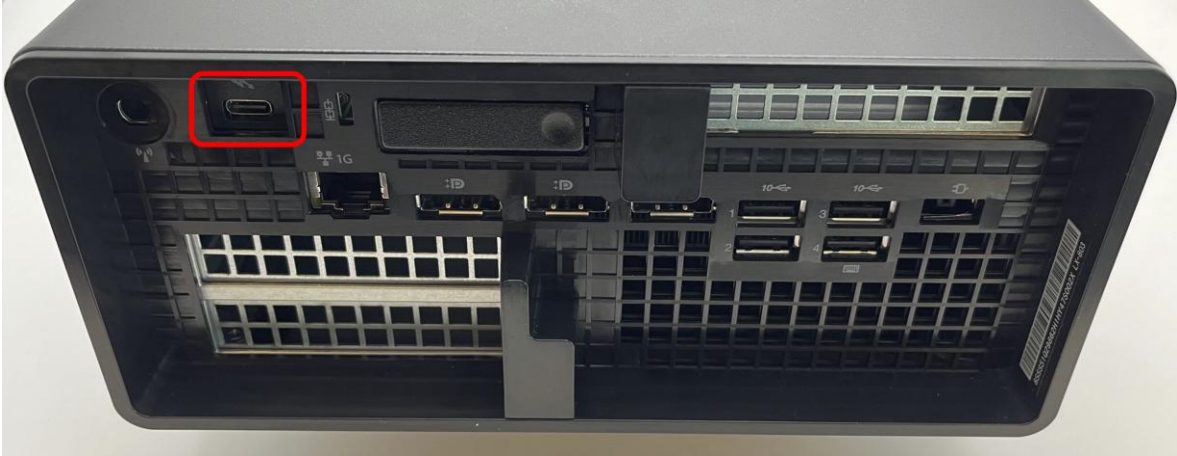
### P3 Ultra SFF

All P3 Ultra SFF models ship with two integrated front panel Thunderbolt 4 ports, as shown here:



### P3 Ultra SFF Gen 2

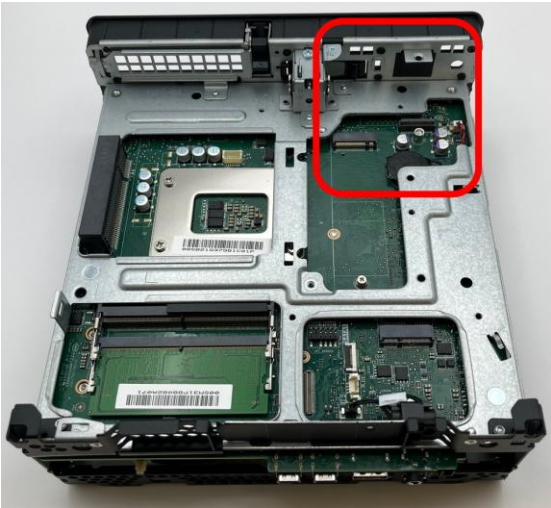
P3 Ultra SFF Gen 2 supports a single rear panel Thunderbolt 4 port, as shown here:



The port is provided by this board-to-board (BTB) Thunderbolt 4 module:

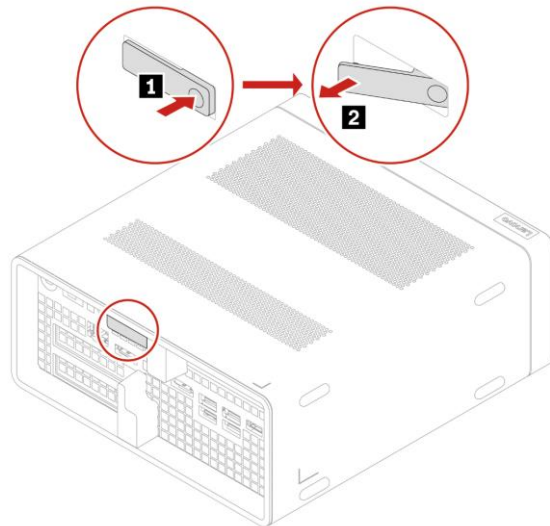


The module is installed inside the rear of the system chassis, here:

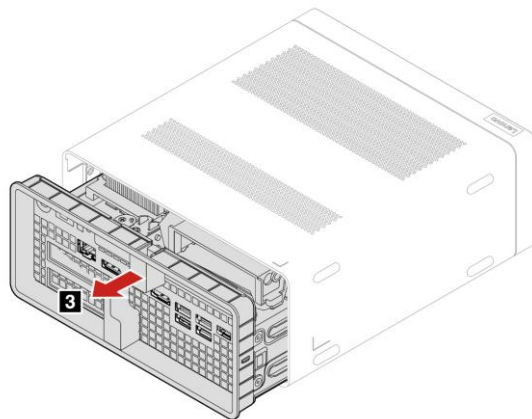


## B2B Thunderbolt 4 Module Installation

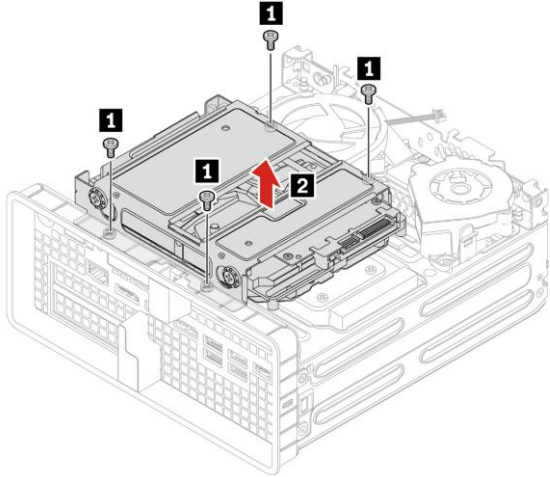
1. Push and remove the chassis latch.



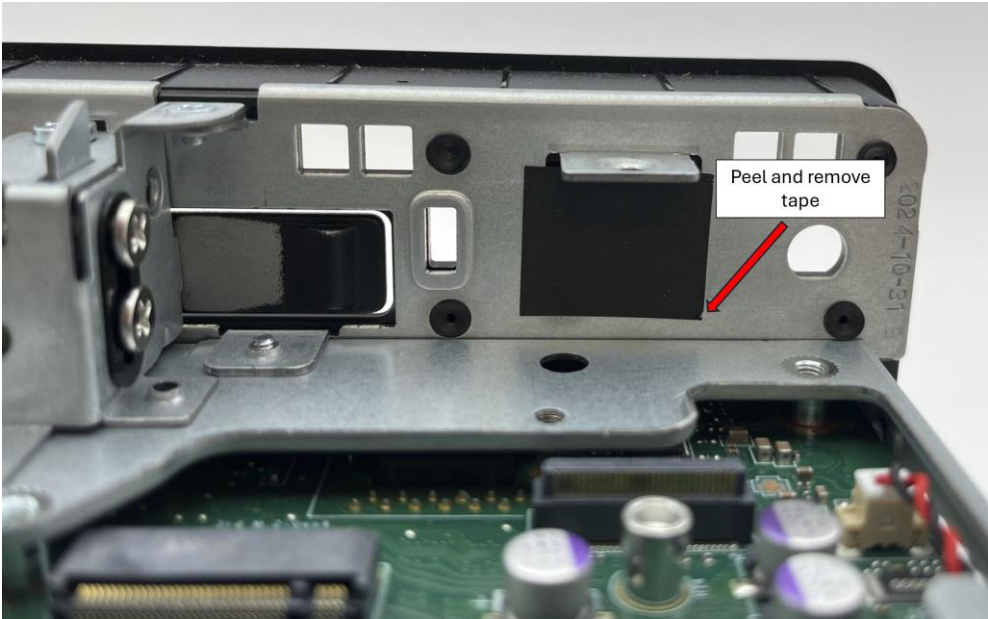
2. Pull the latch to remove the chassis.



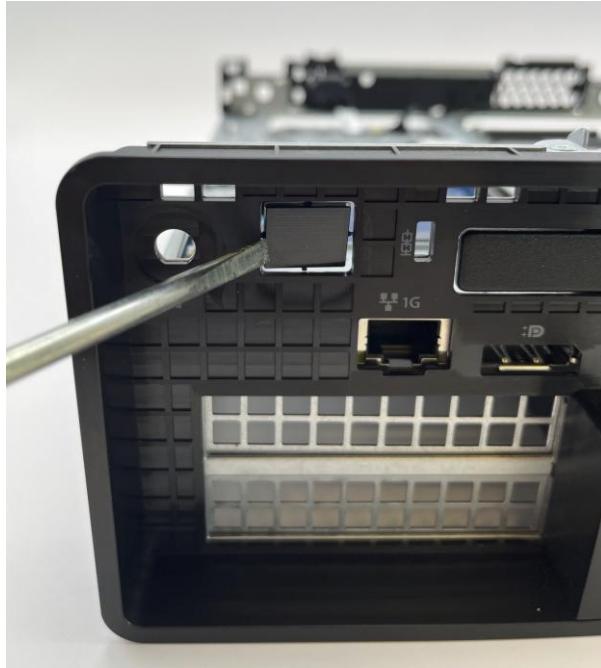
- 3. If necessary, remove the HDD bracket kit by removing the four M3 x L5 hex screws and lifting the kit from the chassis.



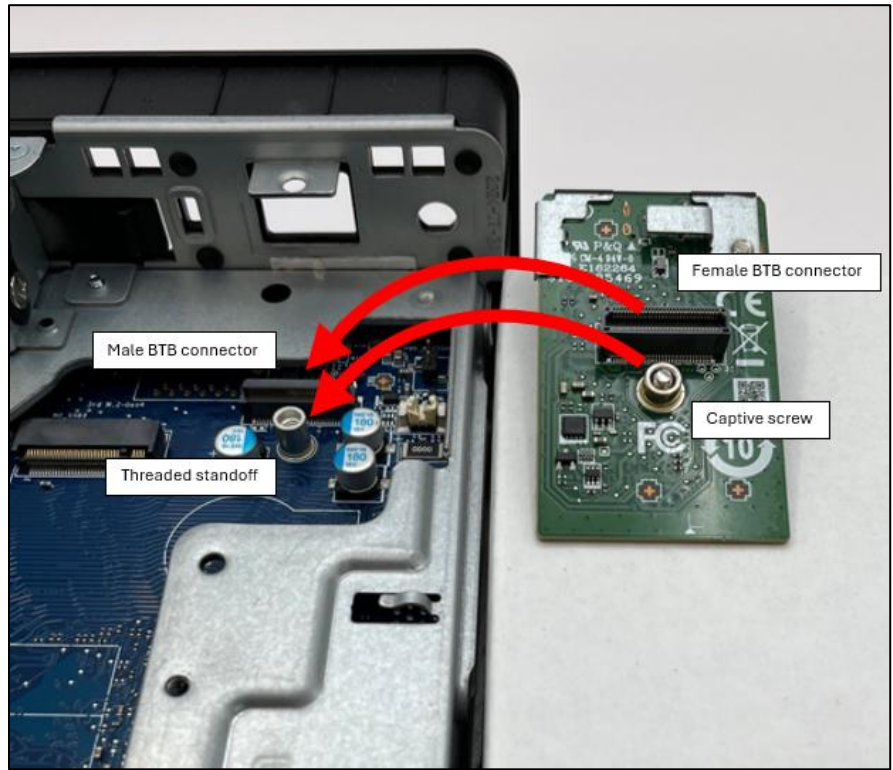
- 4. Using a small screwdriver or the point of a knife, peel and remove the tape covering the inside of the rear panel knockout access hole.



5. Use a flat blade screwdriver to remove the plastic knockout from the rear panel.



Before continuing the installation, look closely at the *bottom* of the BTB Thunderbolt card and the rear corner of the chassis where it will be mounted.



During the next few steps of the install process, the BTB card will be flipped so that both the female connector and captive screw on the bottom of the board can mate with the male connector and threaded standoff on the chassis:

6. Angle the front edge of the BTB card into the chassis and then rotate the rear of the board down onto the BTB connector and threaded standoff.



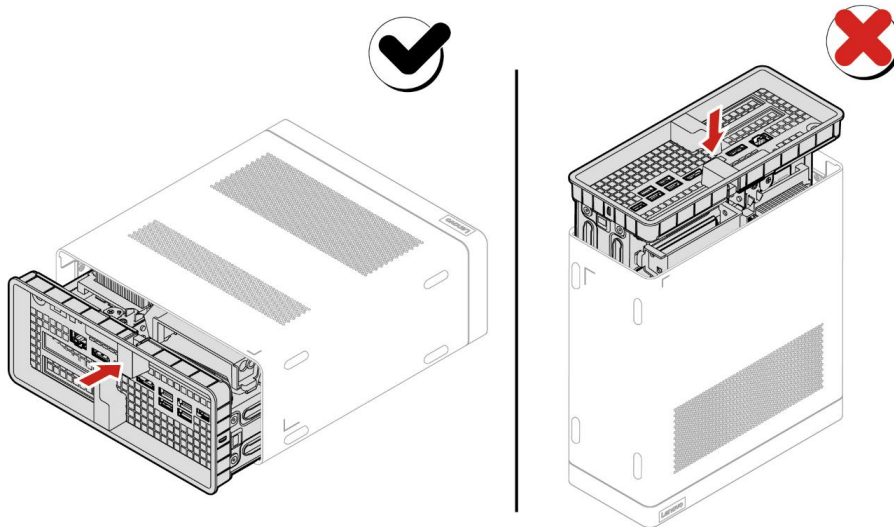
7. Press on the screw head to seat the board securely into place.



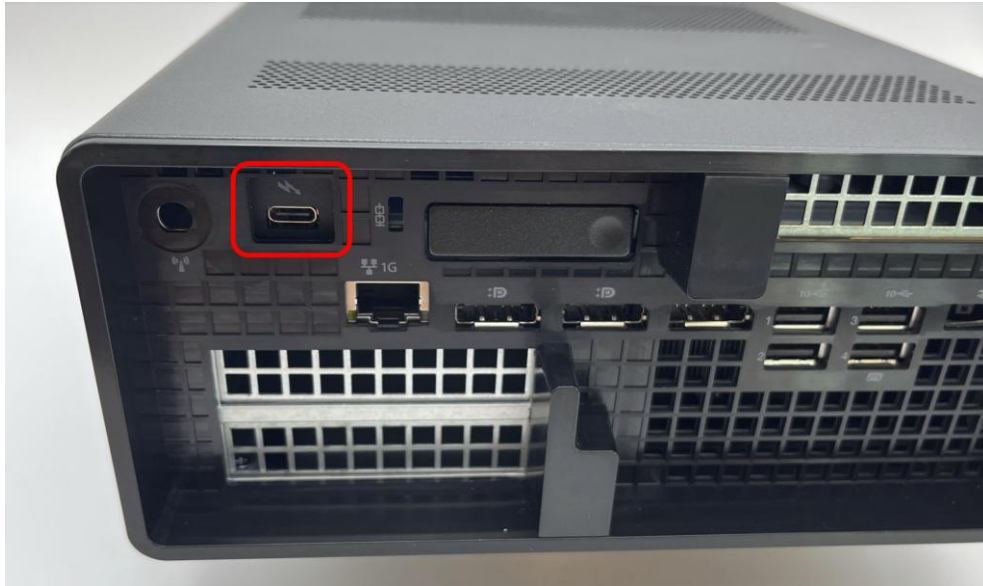
8. Tighten the retaining screw with a Phillips head screwdriver.



9. Reinstall the chassis by pushing it back into the system cover until it clicks into place.



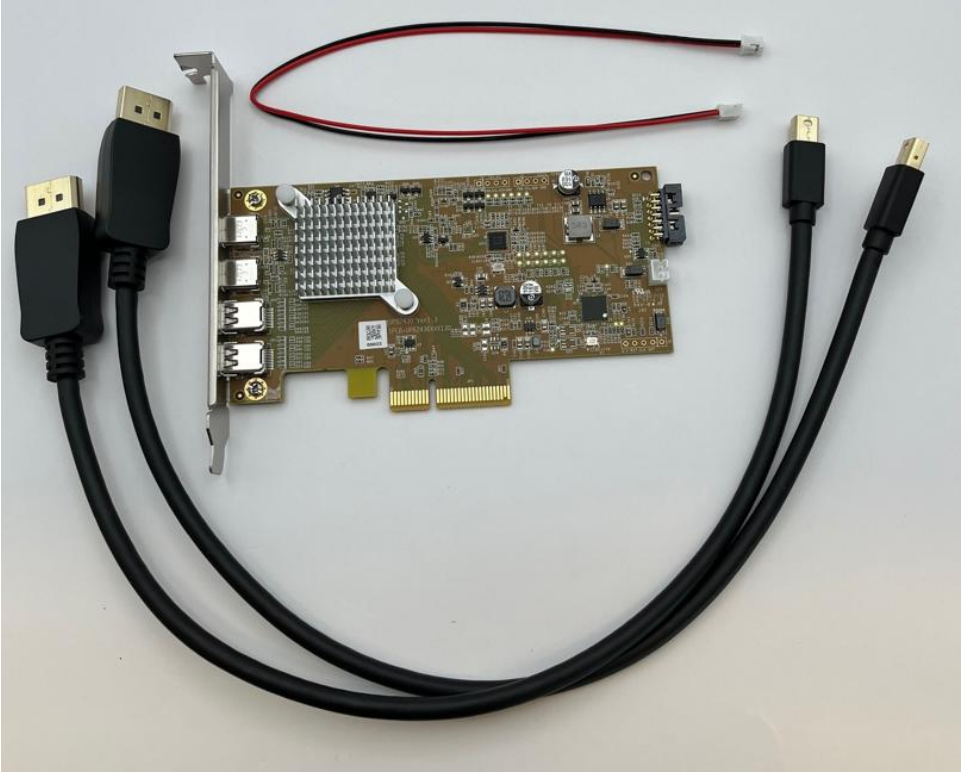
10. This is a close-up photo of the installed Thunderbolt 4 port:



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## P8 & P3 Tower Gen 2 USB4 Solution

Both P8 and P3 Tower Gen 2 have a rear-accessible 2-port USB4 solution, provided by the ThinkStation USB4 PCIe Card, shown here:



The following photo shows the connectors available on the back of the card:

2x mini-DisplayPort (mDP) inputs

2x USB4 ports (USB-C connector)



This card is available from Lenovo, either pre-installed as part of a Configure To Order (CTO) system, or as an aftermarket purchase that can be installed by the end user.

### Card Installation

The ThinkStation BIXIE Card USB4 PCIe Card is a low-profile, half-length, PCIe x4 card that should be installed in an approved PCIe slot, as designated in Table 4. The optimal slot priority, where applicable, is listed high to low from left to right.

*Table 4 – P8/P3 Tower Gen 2 USB4 Card Supported PCIe Slots*

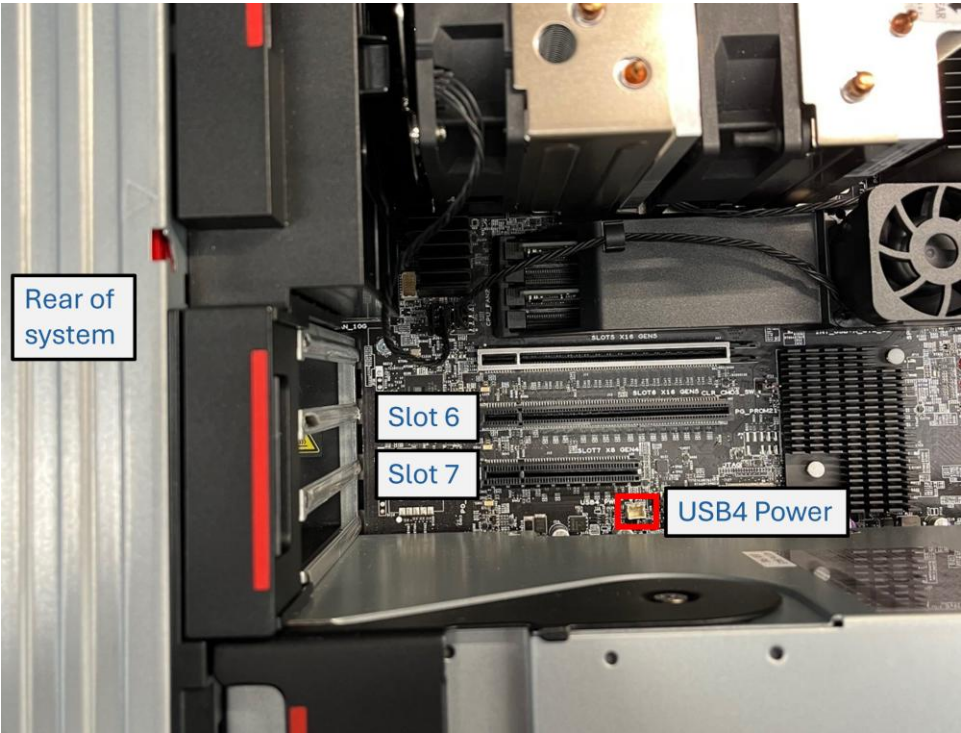
| System        | Approved Slot(s) & Priority |
|---------------|-----------------------------|
| P8            | Slot 6 > Slot 7             |
| P3 Tower Gen2 | Slot 3                      |

In addition to installing the card into the appropriate PCIe slot, there are some additional cable connections that must be made. First, the two wire USB4 power cable must be connected between the motherboard and the card. The female connector on the USB4 card is shown here:

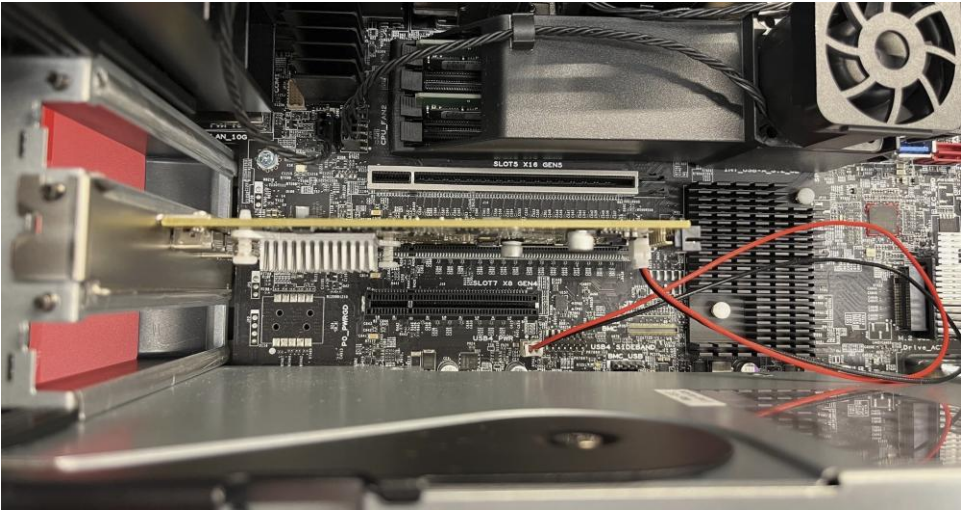


The corresponding motherboard power connector for each system is shown below.

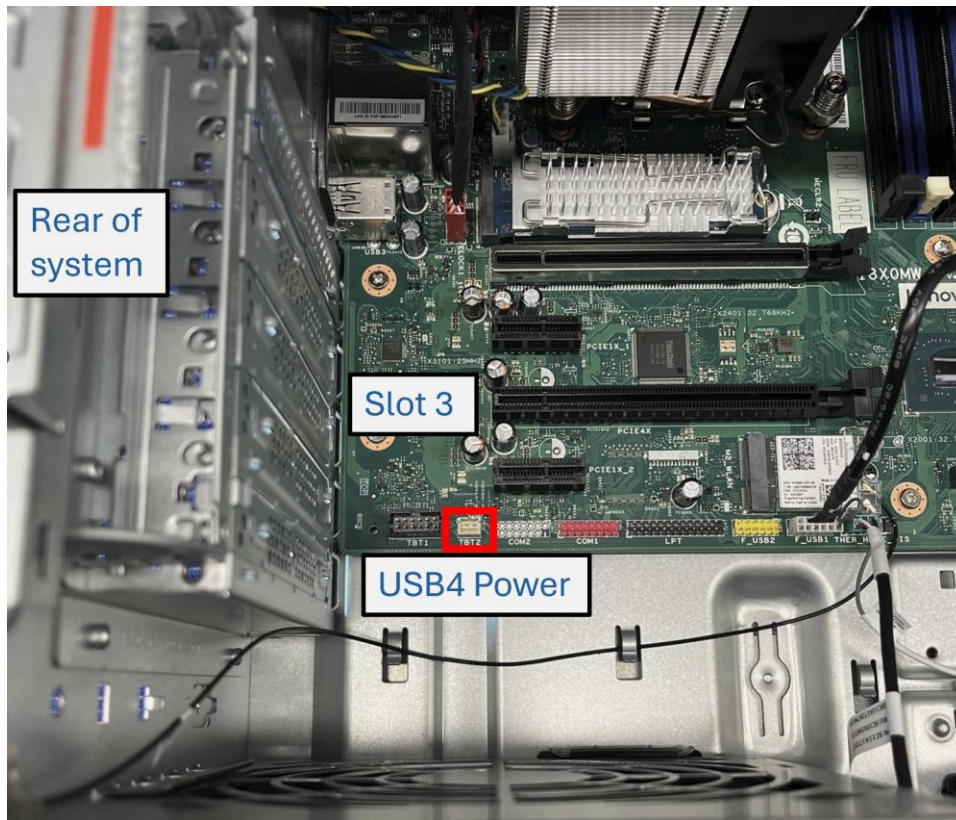
**P8**



Here is a picture of the card installed in Slot 6 with the power cable connected.



## P3 Tower Gen 2



Note: The USB4 power connector on P3 Tower Gen 2 is labeled TBT, but it should be used for the USB4 card power.

The USB4 card requires input from two mini-DisplayPort (mDP) connectors to pass dual display signals out to monitors. Therefore, after the card is installed into the PCIe slot, it must be connected to a graphics card via the two DisplayPort (DP) to mini-DisplayPort (mDP) cables, as shown here<sup>5</sup>:



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<sup>5</sup> P8 is shown in this photo, but the cable connection on P3 Tower Gen 2 will be similar.

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## Appendix – Part Numbers

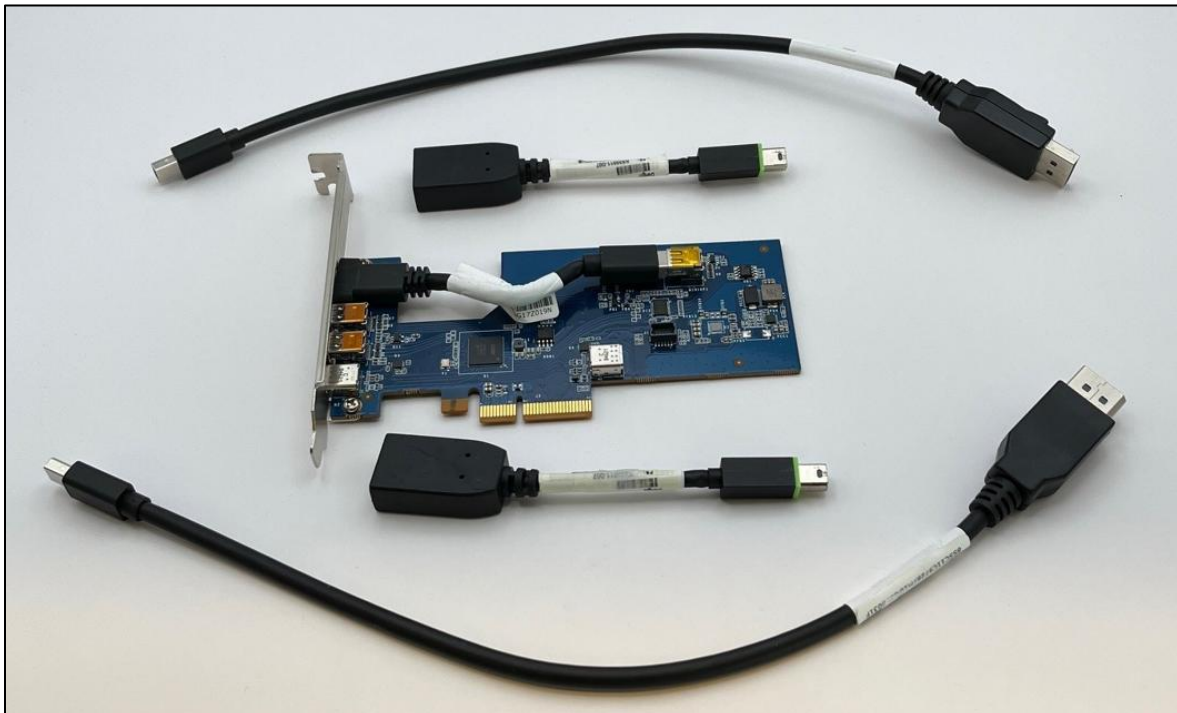
In this section you will find option, FRU, and/or part numbers for all of the Thunderbolt 4/USB4 hardware described in this guide.

### P5, P7, PX, P3 Tower (Thunderbolt 4)

#### ThinkStation Thunderbolt 4 PCIe Card with HP Bracket (Option [4XF1L53431](#))

This option kit contains the following parts:

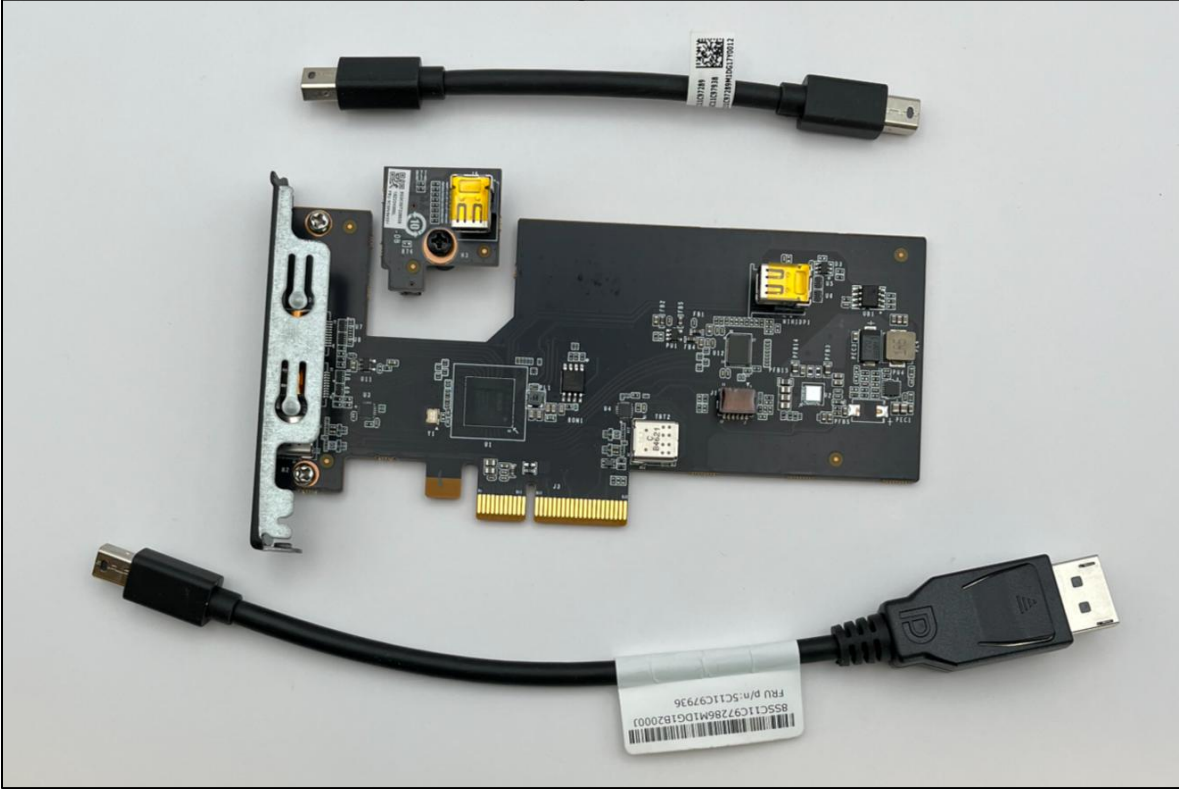
- 1 pc Thunderbolt 4 PCIe card kit (FRU # 5C51M21343)
  - o Thunderbolt 4 PCIe card
  - o High speed panel mount miniDP cable
  - o 330mm DP to miniDP cable, 2pcs
- 2 pcs miniDP to DP dongle (FRU # 5C10V05978)



# P3 Tiny (Thunderbolt 4)

No option kit exists for Thunderbolt 4 enablement on P3 Tiny. However, the following FRU parts can be ordered individually

- Thunderbolt 4 PCIe Card FRU kit (FRU # 5C51H31593)
  - o Thunderbolt 4 PCIe card
  - o Internal high speed panel mount mDP cable
  - o BTB card
  - o External DP to mDP cable (200mm)



Tiny8 PCIe x4 Riser Card (FRU # 5C50W00909)



## P3 Tiny Gen 2 (Thunderbolt 4)

Tiny BTB Thunderbolt 4 Card (FRU # 5C50W32100)



Tiny8 Punch Out Bracket (FRU # 5M11C16882)



## P3 Ultra SFF Gen 2 (Thunderbolt 4)

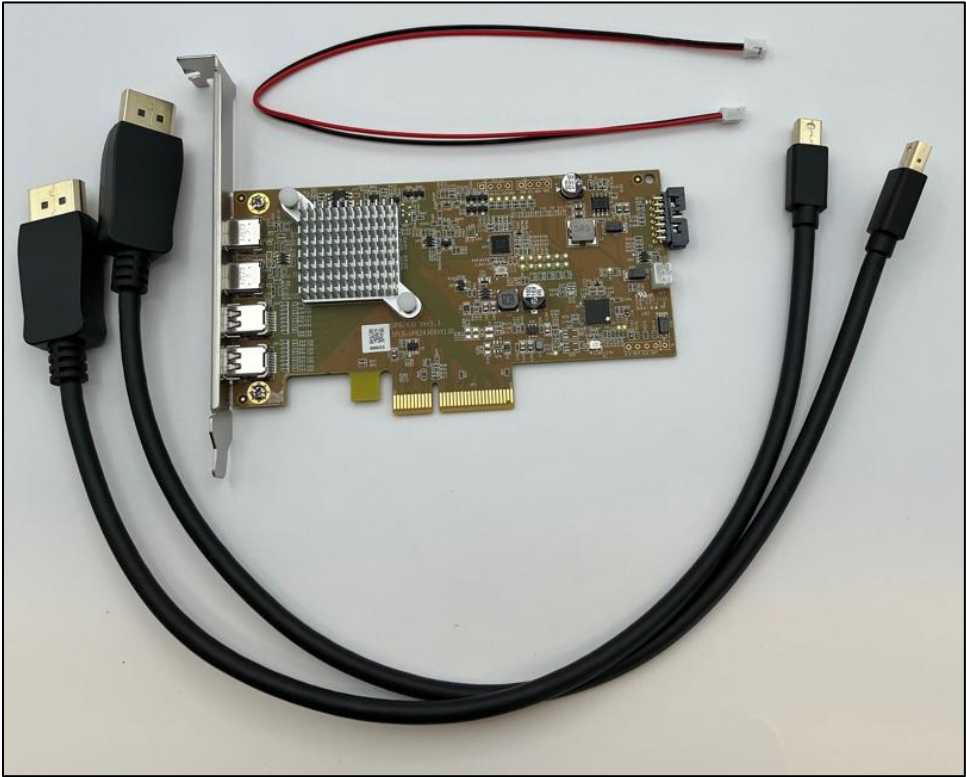
Thunderbolt 4 BTB Card (FRU # 5C51M21375)



# P8 & P3 Tower Gen 2 (USB4)

No option kit exists for USB4 enablement on P8 and P3 Tower Gen 2. However, the following parts can be purchased individually:

- 1 pc BIXIE Card USB4 PCIe Card (FRU # 5C51M21378)
- 1 pc power cable (FRU # 5C11H31608)
- 2 pcs DP to Mini DP cable (FRU # 5C11H31610)



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## Revision History

| Version | Date       | Author | Changes/Updates |
|---------|------------|--------|-----------------|
| 1.0     | 11/13/2025 | JP     | Draft           |