



Customer Service Note

Proper Handling Procedures for Micron® DRAM Modules and SSDs

Introduction

This guide includes information on the parts of a module and an SSD, how to hold the product, and how to insert and remove the product from a socket. Follow these guidelines at all times to help ensure prolonged, reliable operation of Micron® board-level memory products.



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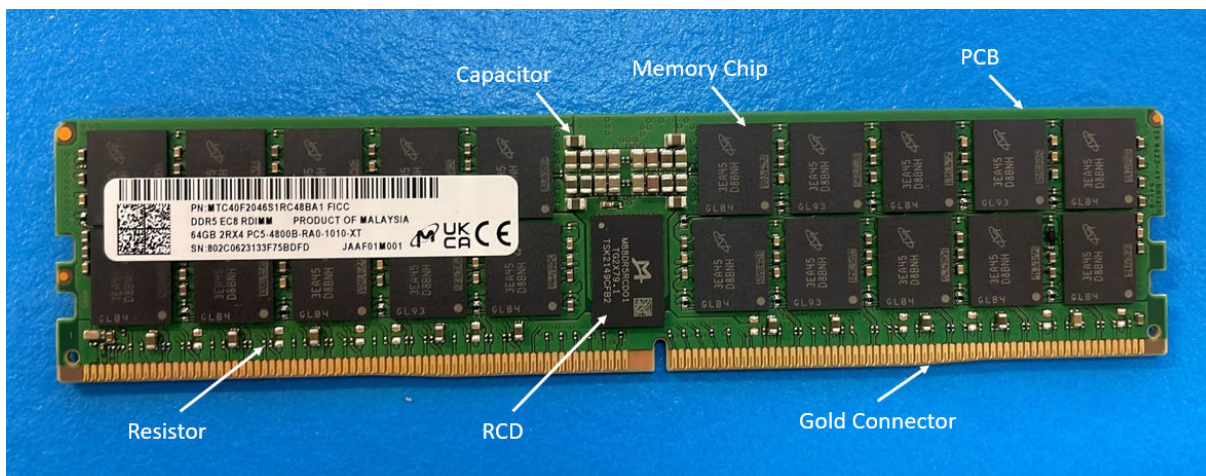


Parts of a Memory Module/SSD

A memory module and SSD consist of more than just memory chips. As shown in the following figures, they may also include a printed circuit board (PCB), capacitors, resistors, gold connectors, EEPROMs /SPDs, and other parts. Being able to identify these parts will enable safer handling practices.

- **Memory chips.** The largest parts of a module, SSD, or memory chip are typically mounted in thin small-outline packages (TSOP) or fine-pitch ball grid array (FBGA) packages. Four or more memory chips soldered onto the PCB comprise a standard module or SSD. Each is linked to the other by connections or traces on the PCB.
- **PCB.** Usually green, the PCB is the long flat board onto which the memory chips and other devices are soldered. It includes metal lines or traces that connect the various chips together.
- **Capacitors.** Also located on the PCB, capacitors provide a stable power supply to the memory chips.
- **Resistors.** Resistor chips or resistor packs on the PCB work to improve the electrical signals flowing between the memory chips and the motherboard. They are typically located near the gold connector.
- **Gold connector.** Comprised of numerous gold traces or “fingers,” the gold connector transfers signals between the module or SSD and the motherboard through the module or SSD connector. Gold provides the best long-term signal reliability.
- **EEPROM/SPD.** The electrically erasable programmable read-only memory (EEPROM) or serial presence-detect (SPD) is a chip that stores data about the module or SSD.
- **PMIC.** A power management integrated circuit (PMIC) is a highly integrated device that manages power on a Module/ SSD that may have a range of voltages. PMICs can be either in BGA or leadless package form.
- **Inductor.** An inductor is a passive electrical component that stores energy in a magnetic field when electric current flows through it.
- **Hub.** An IC device that receives I2C/I3C communication from the system host and then re-drives this communication to other I2C/I3C capable devices on the module. In addition, the HUB contains the SPD information and has an integrated thermal sensor.
- **RCD.** Register Clock Driver is an IC with the primary function to buffer the command address bus, chip selects, and clock signals between the host controller and the DRAM devices.

Figure 1: Dual In-Line Memory Module (DIMM)





**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Parts of a Memory Module/SSD**

Figure 2: Small-Outline DIMM (SODIMM)

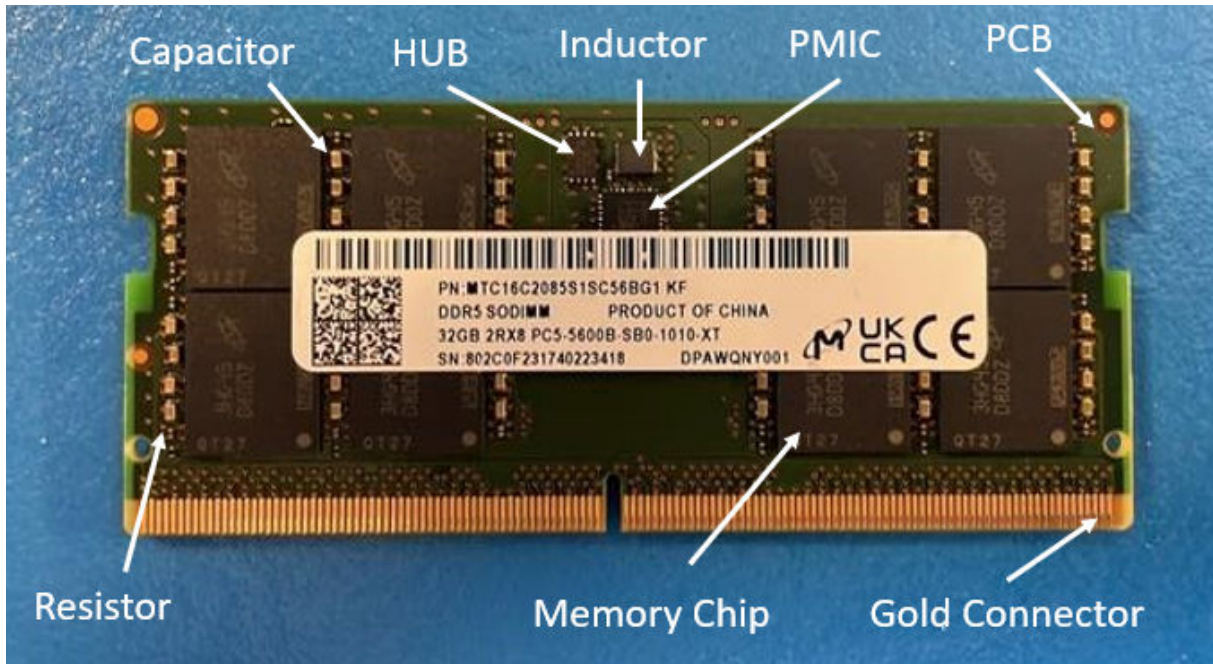


Figure 3: mini Serial Advanced Technology Attachment (mSATA)



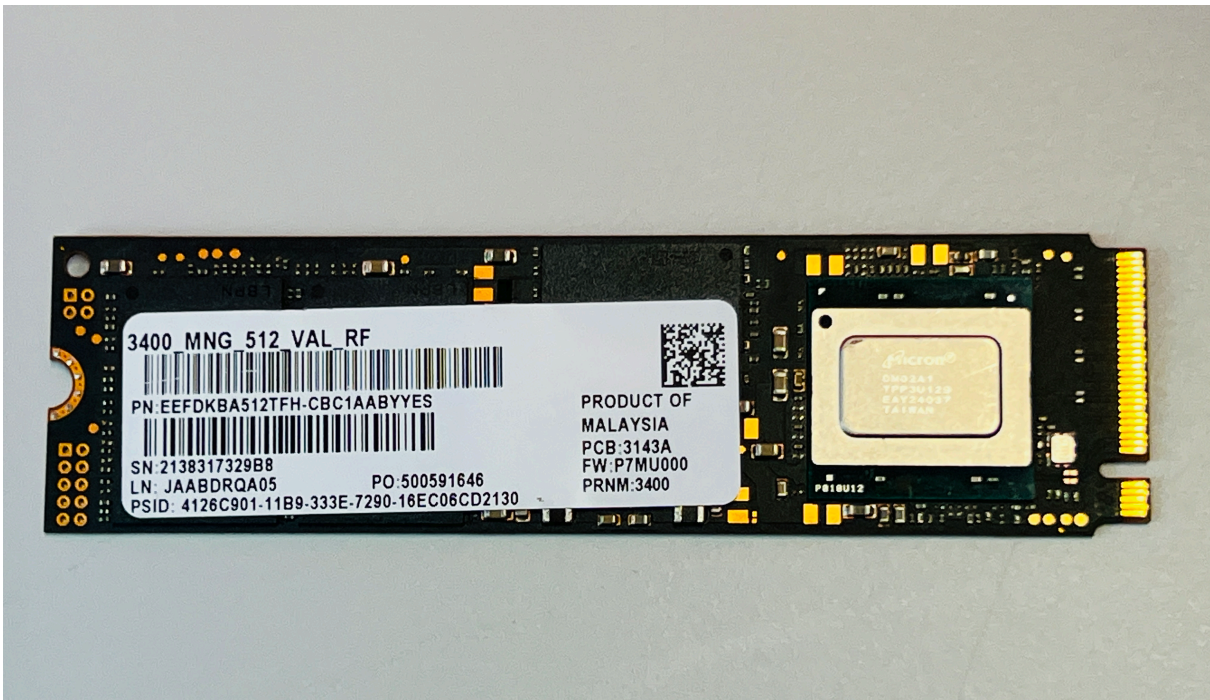


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Parts of a Memory Module/SSD

Figure 4: 2.5" Solid State Drive (SSD)



Figure 5: M.2 2280 Solid State Drive (SSD)





ESD Precautions

Modules and SSDs must be protected against static electricity or electrostatic discharge (ESD). When handling modules or SSDs, protect them by wearing an ESD strap that is properly grounded. This includes when you remove the devices from the ESD-marked protective shipping container/bag, and when you are installing or removing the devices from sockets. Leave the module/SSD inside its ESD protective shipping bag or container until ready to install.

Static electricity can build up by walking on carpet or tile of certain types. When ESD occurs, an arc of voltage discharges from the person and travels to the module or SSD. Even though it may appear minor, the discharge can contain enough voltage to seriously damage electrical components. To avoid the transference of static electricity, always wear ESD straps when inserting modules and SSDs into a socket.

Figure 6: Always Wear ESD Straps When Handling, Inserting, or Removing Modules and SSDs into Sockets





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Technique for Holding a Memory Module/SSD

Proper Technique for Holding a Memory Module/SSD

Because a memory product can be damaged by ESD or improper handling, it should remain in the original, sealed shipping tray until ready for use. The factory packaging includes ESD-safe materials that protect the electrical performance of the product, which is particularly important when a device is moved or placed in storage. However, after the product is removed from the original packaging, certain procedures must be followed to help prevent electrical and structural damage.

As shown in Figures 7-10, the proper way to hold a module or SSD is by gently gripping the non-connector edge or side of the device (the edge/side to the left and to the right of the gold connector).

Figure 7: Proper Way to Hold a Module is by the Edges





CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Technique for Holding a Memory Module/SSD

Figure 8: Proper Way to Hold an mSATA is by the Edges





**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Technique for Holding a Memory Module/SSD**

Figure 9: Proper Way to Hold an SSD is by the Sides





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Technique for Holding a Memory Module/SSD

Figure 10: Proper Way to Hold an M.2 SSD is by the Sides



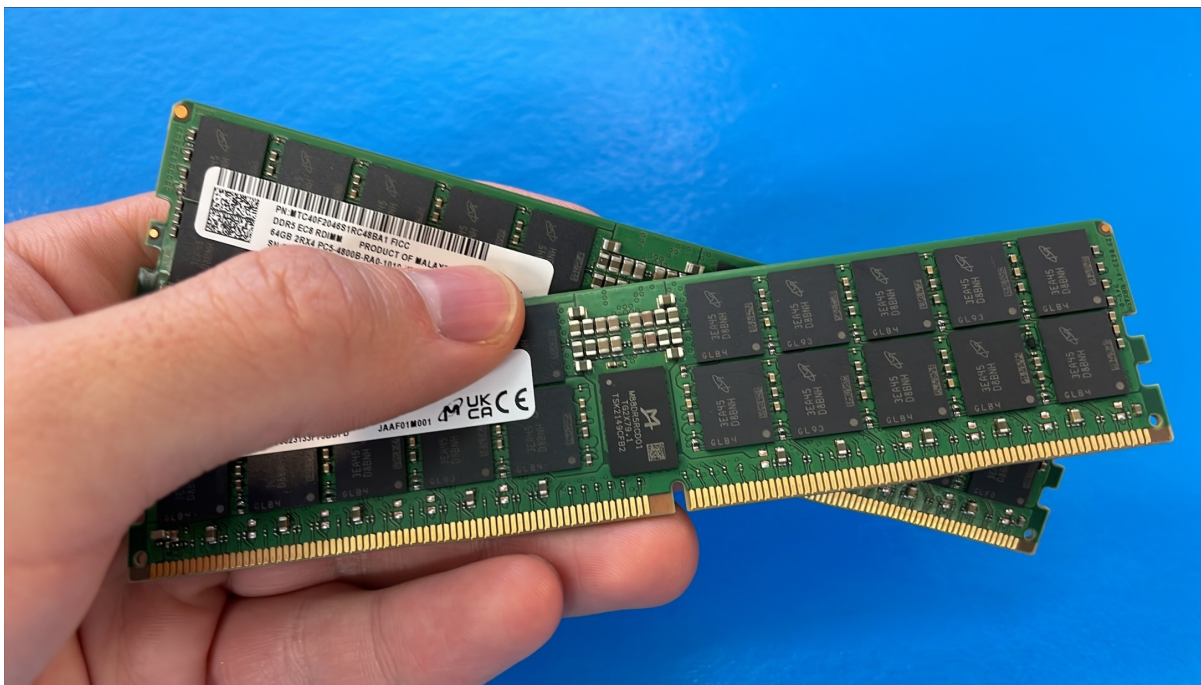
Figures 11-18 depict incorrect ways to handle memory products. Do not hold memory modules or SSDs in any of the following ways:

- Never hold two or more modules or SSDs together.
- Never touch the gold connectors.
- Never press on the gold connectors to pick up a module or an SSD.
- Never press on the side of a module or an SSD using three points of pressure.
- Never bend or twist a module or an SSD.
- Never drop a module or an SSD.
- Never stack two or more modules or SSDs.



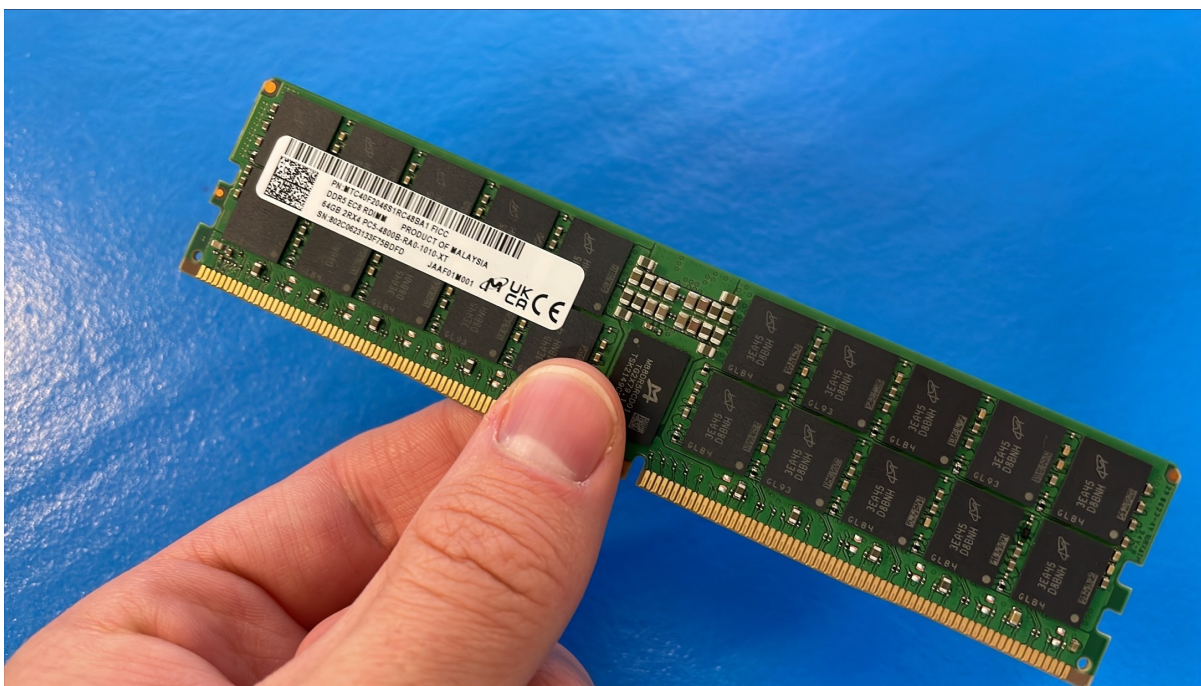
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Technique for Holding a Memory Module/SSD

Figure 11: Never Hold Two or More Board-Level Products Together



Holding memory products together can cause them to scrape against each other, which can damage or detach components as well as detach the circuit board.

Figure 12: Never Touch the Gold Connectors



Touching the gold connector can leave contaminants that will cause damage or prevent proper electrical operation when the memory product is inserted into a socket.



**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Technique for Holding a Memory Module/SSD**

Figure 13: Never Press on the Gold Connectors and Pick Up a Board-Level Product

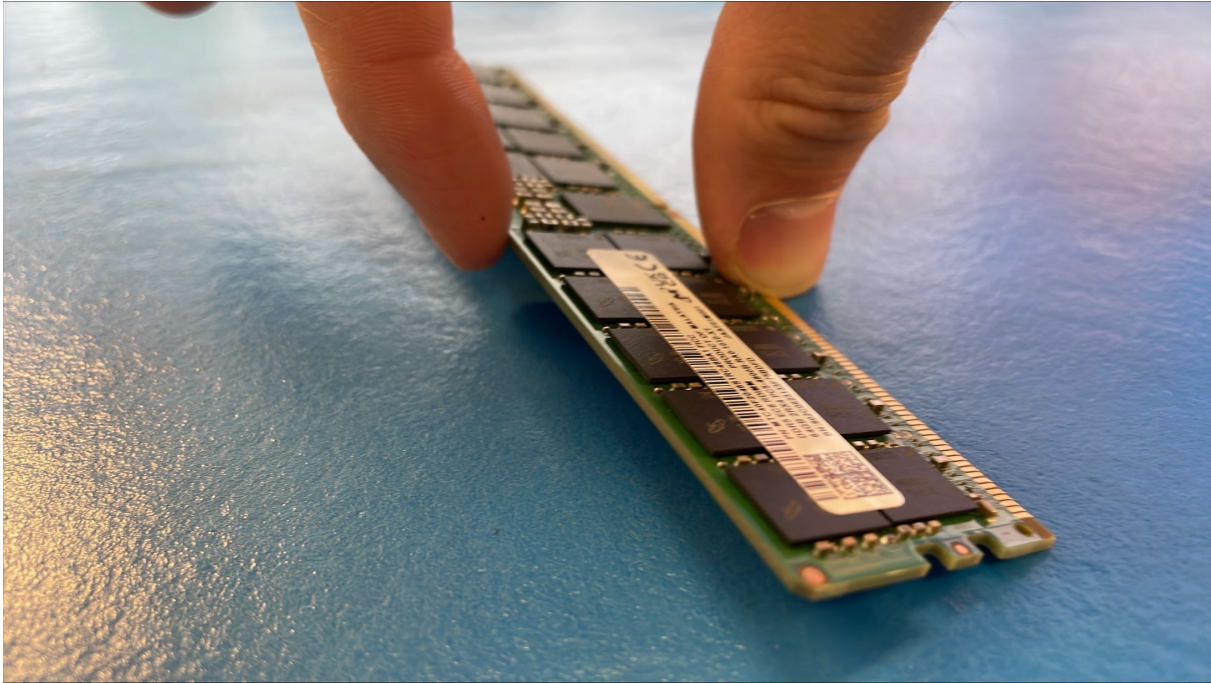
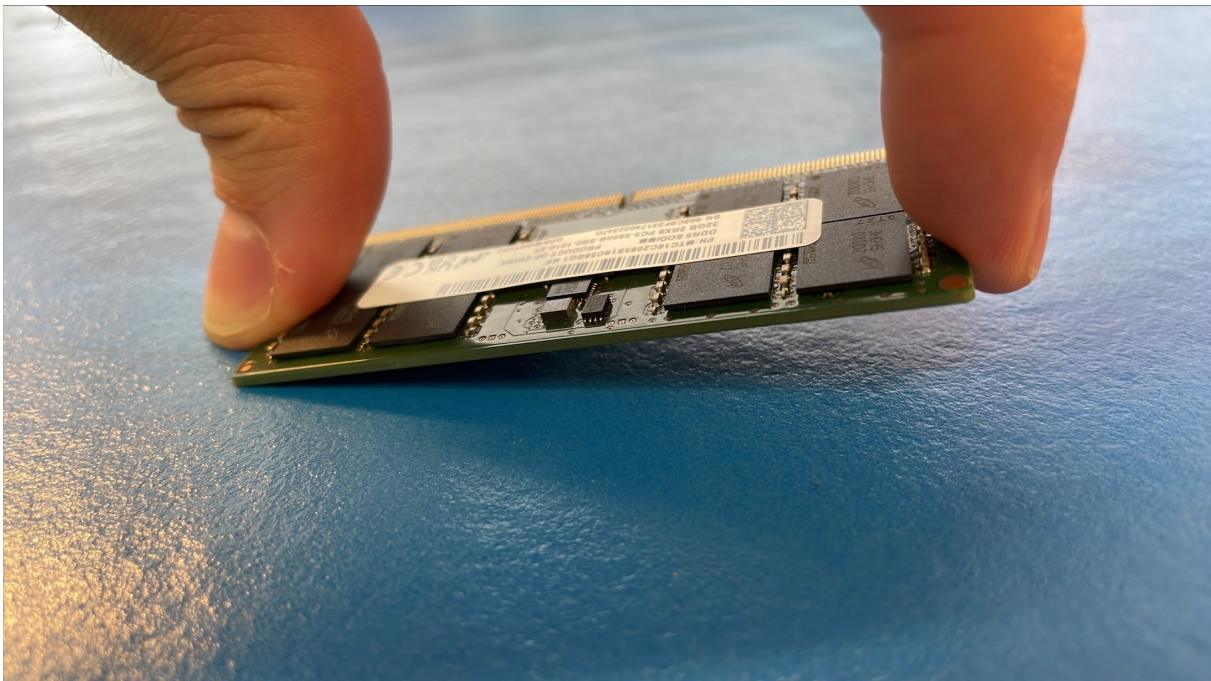


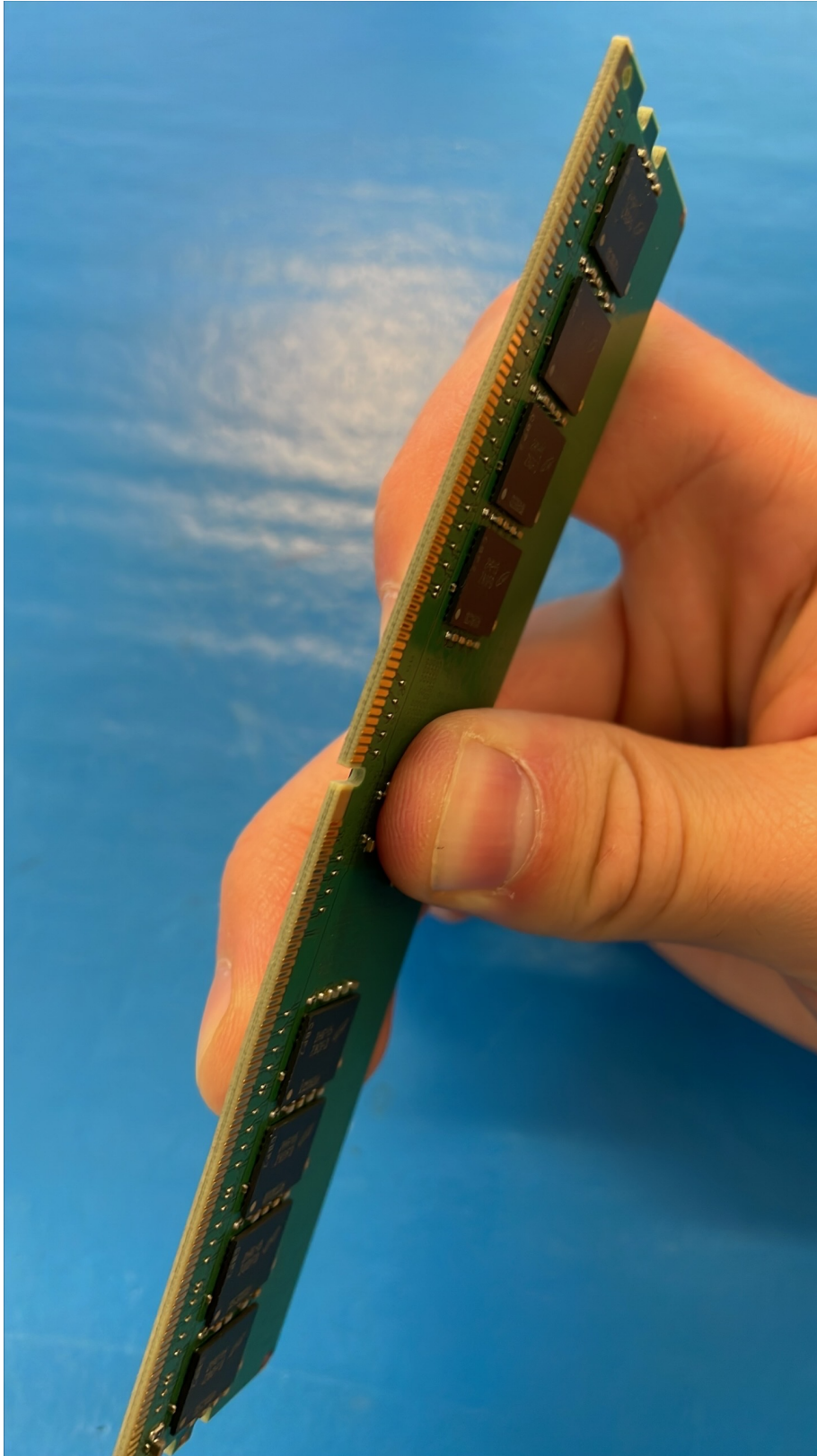
Figure 14: Never Press on the Side of a Board-Level Product and Pull It Up





**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Technique for Holding a Memory Module/SSD**

Figure 15: Never Hold a Board-Level Product Using Three Points of Pressure





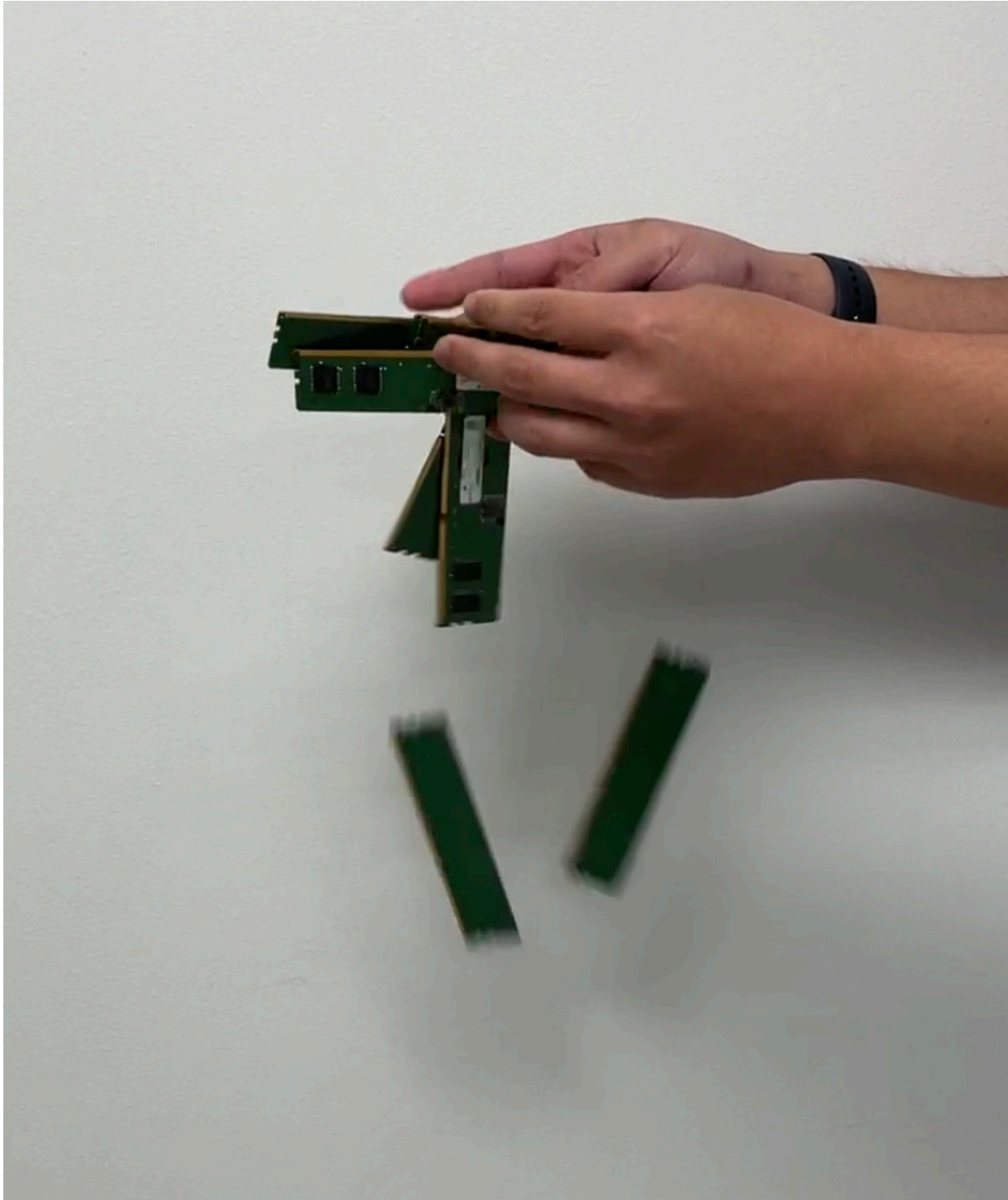
**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Technique for Holding a Memory Module/SSD**

Figure 16: Never Bend or Twist a Board-Level Product





Figure 17: Never Drop a Board-Level Product



Do not drop Board-level products. A short drop can cause damage that may not be visually detectable. Even if a dropped product appears undamaged, run a full memory test on it to ensure that it is not damaged.



Figure 18: Never Stack Two or More Board-Level Products



Electrical Overstress (EOS) Precaution Steps prior to Module/SSD Installation

1. Recommend adding EMI (Electro Magnetic Interference) filter to the power supply to mitigate potential high voltage pulse.
2. Ensure power supply unit is turned off before inserting or removing module/SSD.

Important: Hot plugging/unplugging of module/SSD is strictly prohibited.



Proper Way to Insert a Memory Module/SSD into a Socket

Properly inserting a memory module/SSD is critical to preventing damage to the socket and the product. Steps for inserting a small-outline dual in-line memory module (SODIMM) used in a notebook are different from the steps for a regular dual in-line memory module (DIMM) used in a workstation, desktop, or server. Similarly, M.2 SSD installation is unique compared to memory module installation. This section outlines the correct techniques for inserting different modules and the M.2 SSD.

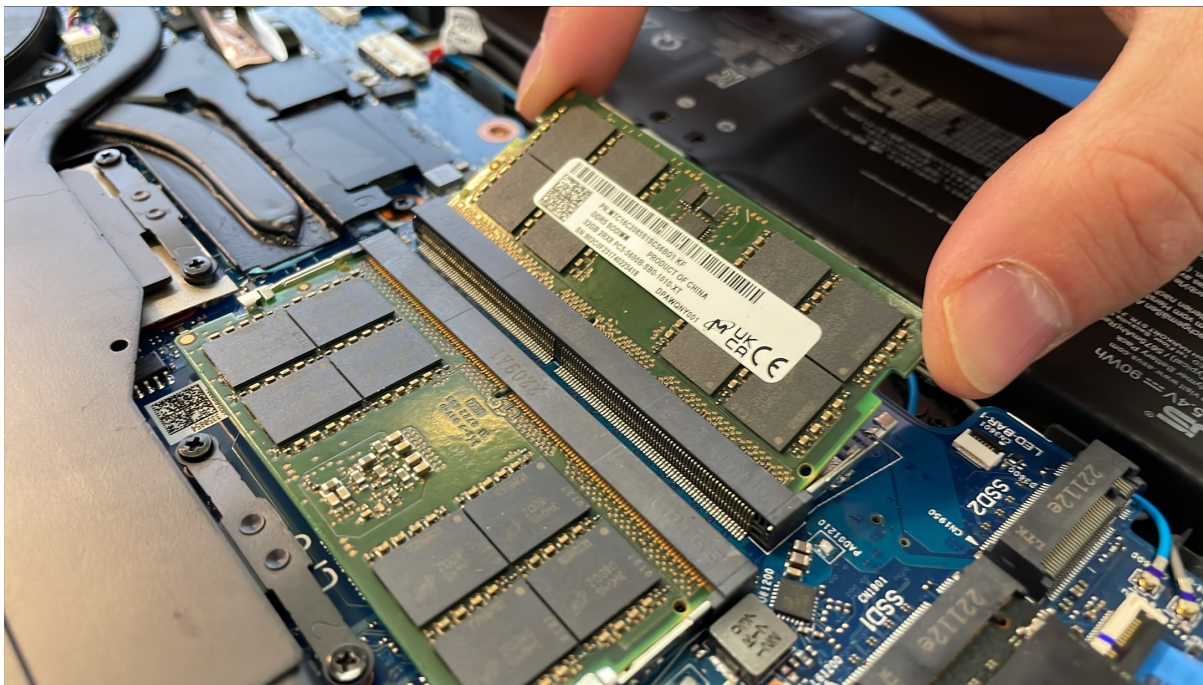
Inserting an SODIMM into Mobile and Notebook Devices

When inserting a Micron SODIMM into a device such as a mobile product or a notebook, follow these steps:

1. Hold the module by the edges only as shown in Figure 7. Gently insert the module into the socket at an angle, inserting the edge with the gold connectors first (See Figure 19).
2. The module socket includes two alignment notches. Before pushing the module down, visually inspect the module to ensure it is flat and that the alignment notches are in the correct position as shown in Figures 20 and 21. If the module is not correctly aligned, damage can occur when it is pushed down.
3. Push the module down into its final position in the socket. Only push down on the PCB itself. Do not touch the memory components, capacitors, resistors, or other components on the module (See Figure 22).

If the module cannot be inserted easily, do not force it into position. Instead, remove it from the socket and start over at Step 1.

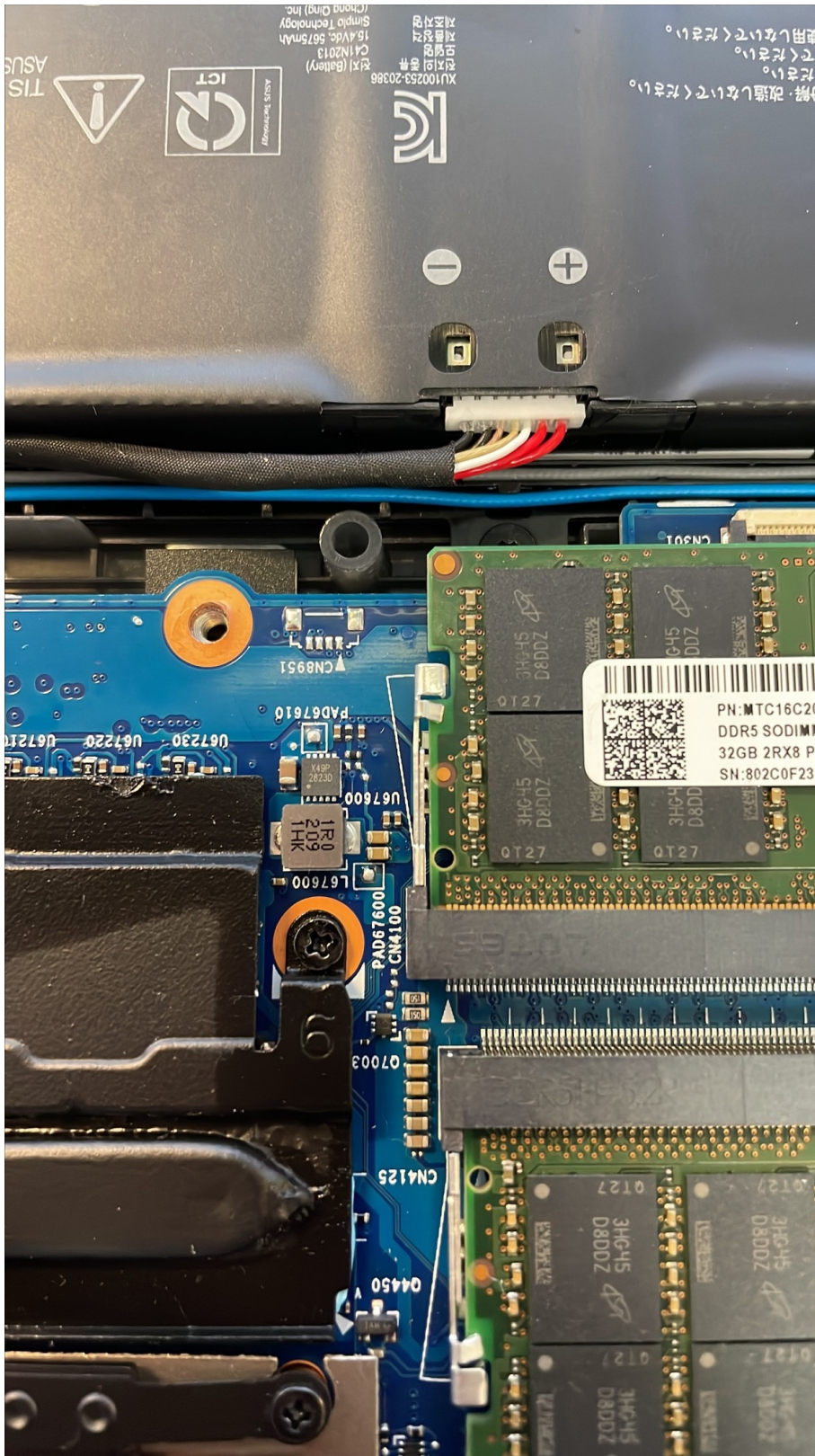
Figure 19: Step1 – Place the Module in the Socket, Holding It by the Edges





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 20: Step2a – Visually Inspect the Module Alignment in the Socket





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 21: Step2b – Visually Inspect the Angle of Insertion





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 22: Step3 – Press Down on the PCB to Set the Module into Its Final Position





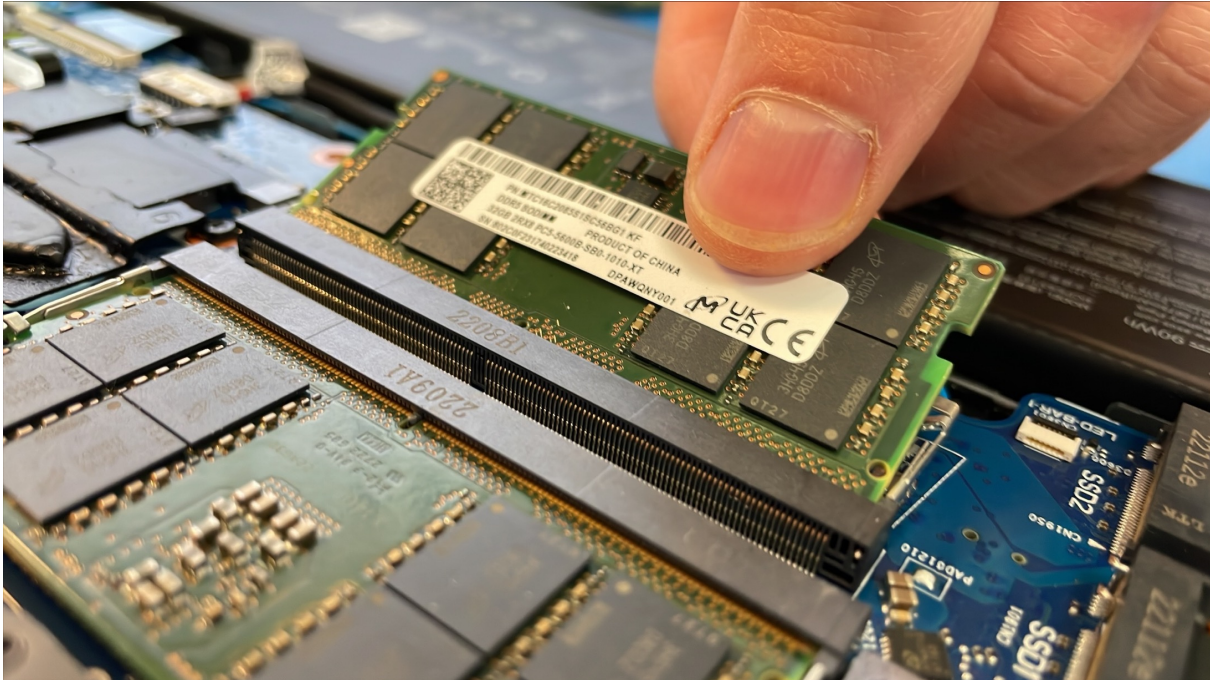
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Improper Ways to Insert a Module into a Mobile or Notebook Device

Figures 23–25 show incorrect ways of inserting an SODIMM. Do not perform any of the following actions:

- Never touch the memory chip or other parts of the module.
- Never press on the memory chip when pushing the module into its final position.
- Never insert a module at an angle or by one side at a time.

Figure 23: Never Touch the Memory Chips When Inserting the Module





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 24: Never Press on the Memory Chips When Pushing the Module into Its Final Position

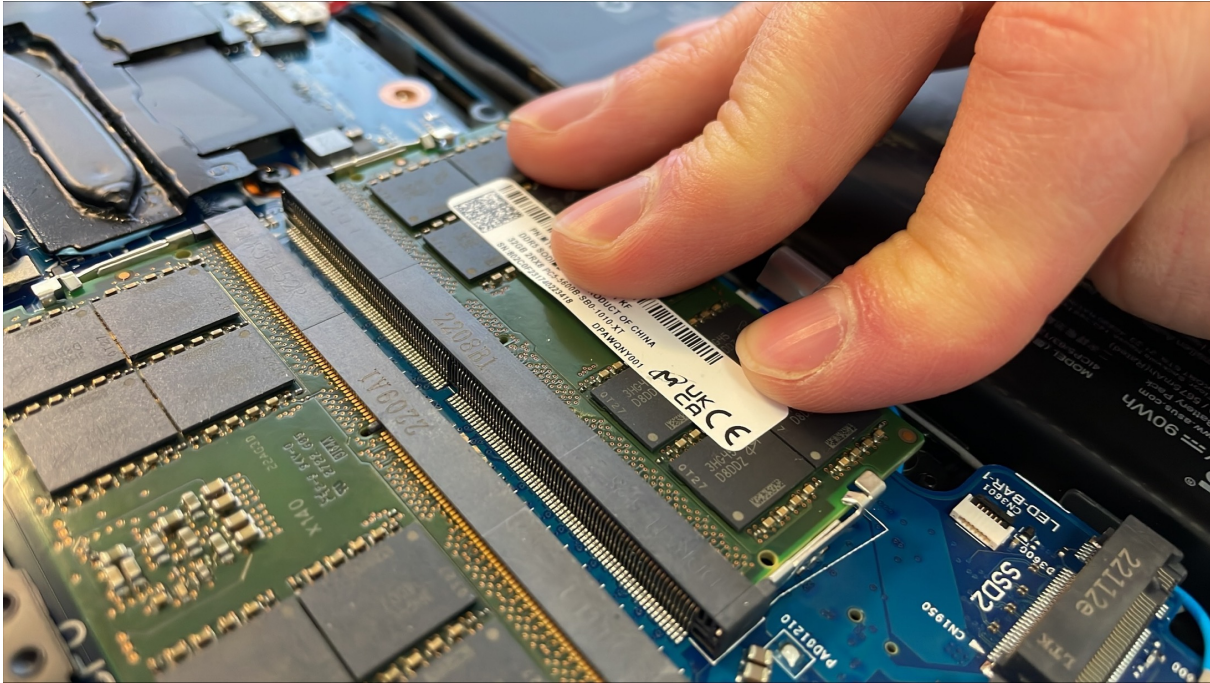


Figure 25: Never Insert Modules at an Angle and Never Insert One Side at a Time





Inserting a DIMM into Desktop, Workstation, or Server

Inserting a memory module into a socket on a desktop computer, workstation, or server device is different than inserting a module into the socket of a mobile or notebook device. The socket is different. And several types of DIMMs are used for the desktop computer, workstation, or server device:

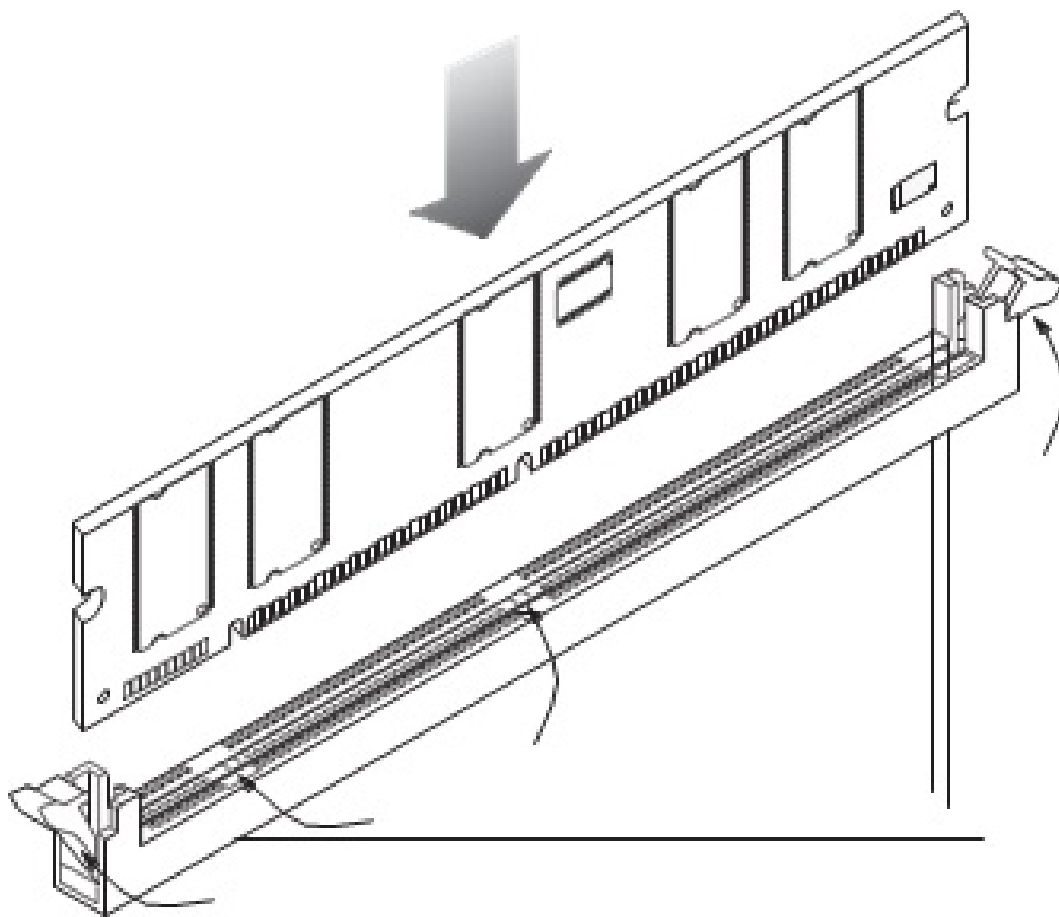
- DIMM or UDIMM. A standard DIMM is referred to as a DIMM, or an unbuffered DIMM (UDIMM), and is typically used in desktops and workstations.
- RDIMM. Registered DIMMs (RDIMMs) have extra components or registers and are generally used in heavily loaded systems such as servers.
- FBDIMM. The fully buffered DIMM (FBDIMM) is used in servers.

Figure 26 shows a DIMM socket for a 168-pin DIMM. This DIMM is typically used for single data rate (SDR) or SDR-based modules. Other connectors are used for double data rate (DDR) or DDR-based and DDR2-based modules. They are also shown in Figures 27 and 28.

Note that these modules have notches so they cannot be used in the same connector as another technology. Never attempt to force a module into a socket because the module, socket, and system can be damaged beyond repair.

Similar notches and keying are incorporated into SODIMM modules but are not shown here.

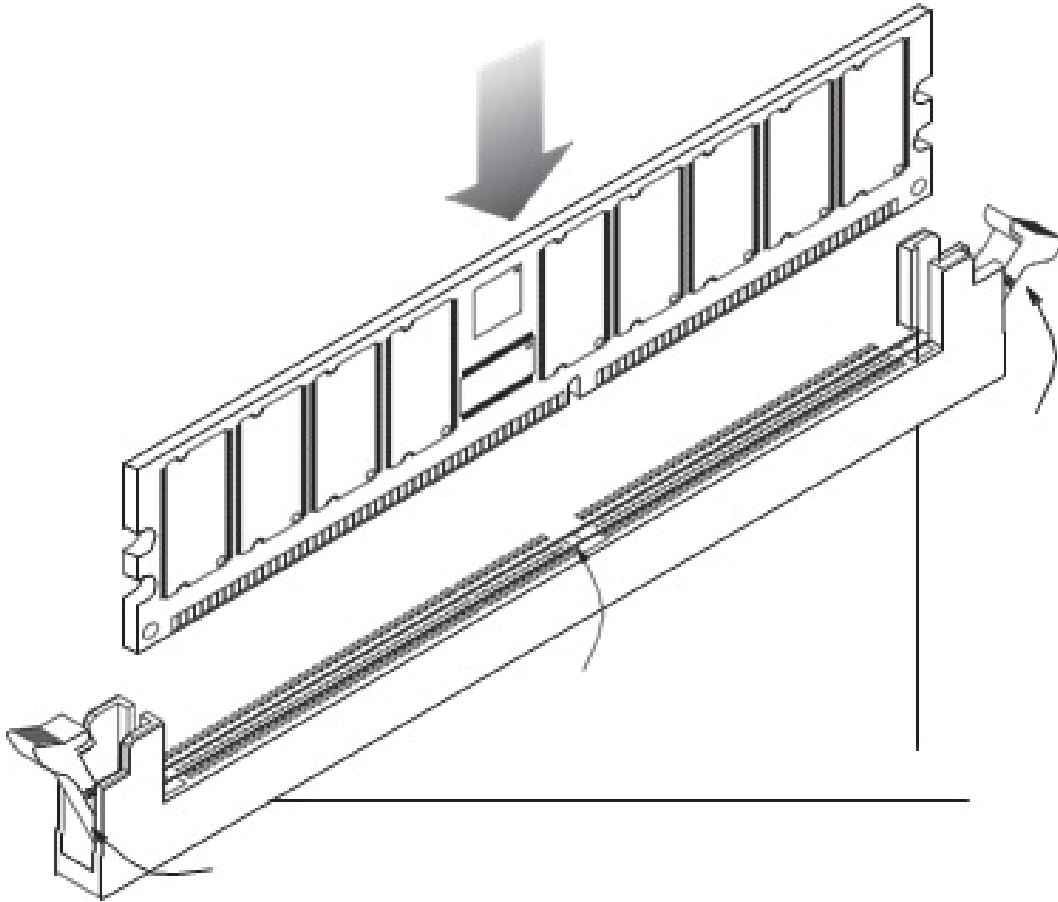
Figure 26: Socket for a 168-Pin SDR DIMM





**CSN-23: Proper Handling Procedures for Modules/SSD Drives
Proper Way to Insert a Memory Module/SSD into a Socket**

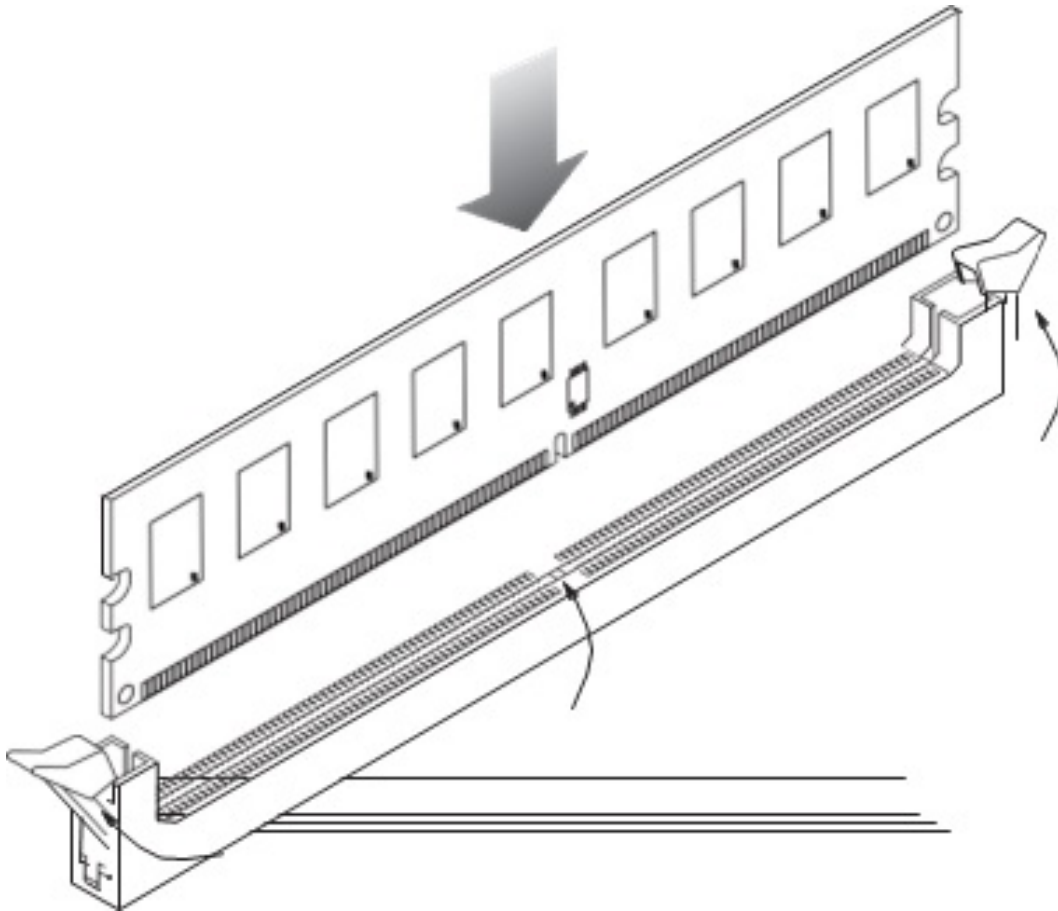
Figure 27: Socket for a 186-Pin DDR DIMM





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 28: Socket for a 240-Pin DDR2 DIMM



Because a desktop computer, workstation, or server device has a different type of socket, the insertion technique is slightly different. To insert a Micron DIMM into a desktop, workstation, or server device, follow these steps:

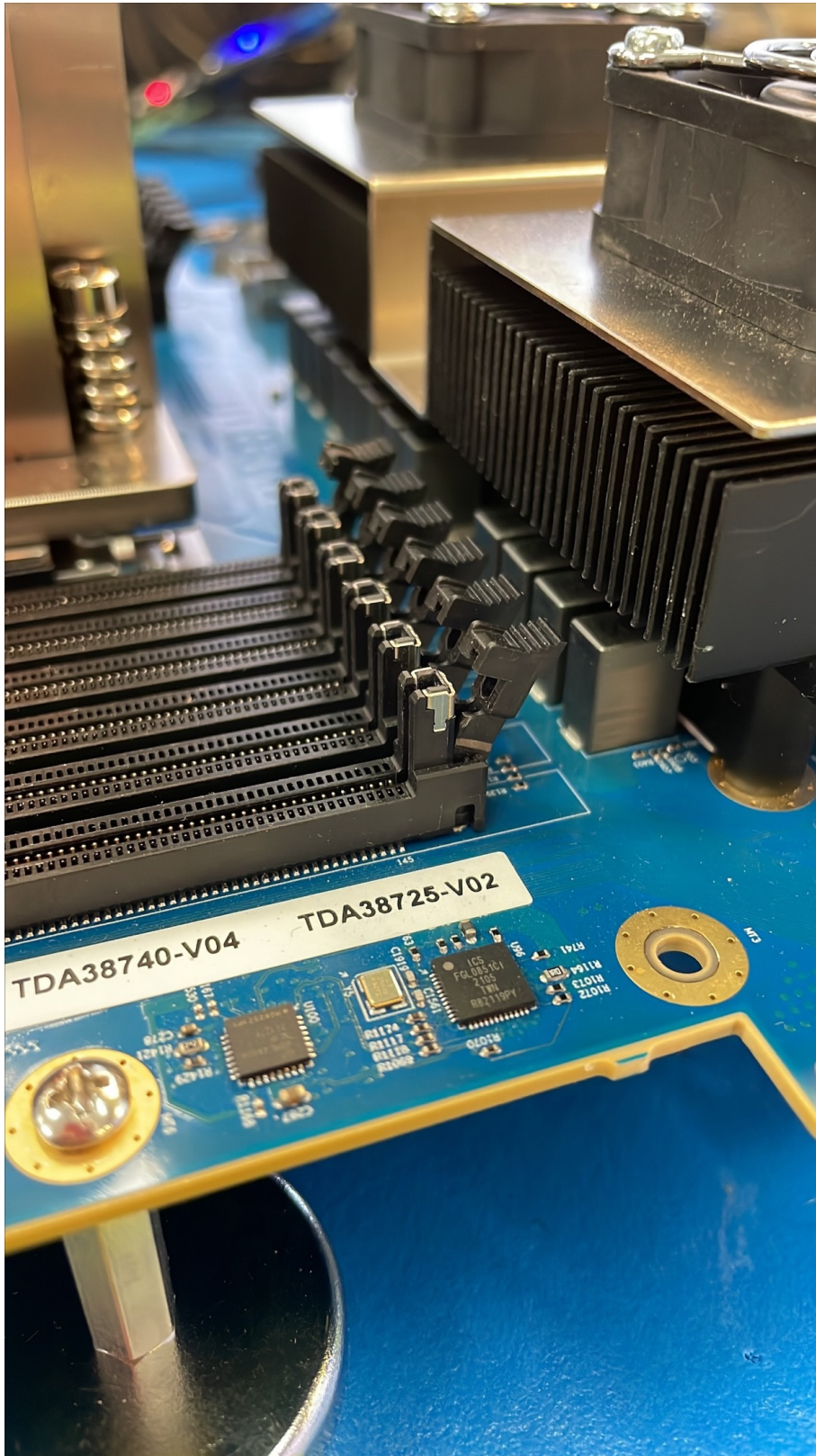
1. Open and fully extend the socket's ejector pins/latches, if applicable. Note that not all sockets have ejector pins or latches (See Figure 29).
2. Hold the module by the edges only (See Figure 7). Gently place it flat in the socket—not at an angle—but do not press it completely into the socket (See Figure 30).
3. Visually inspect the module. It must be directly aligned with the socket opening. Ensure the alignment of notches on the module and the socket match (See Figures 31-32). If the module is not in correct alignment, damage can occur in Step 4.
4. Push the module into its final position in the socket. Push only at the top of the PCB. Do not push on only one side of the PCB. Push down on both edges at the same time. Do not touch the memory components. Do not touch the capacitors, resistors, or other components on the module (See Figure 33). After insertion, ensure the latches are in the correct position against the sides of the module.

If the module cannot be inserted easily, do not force it into position. Instead, remove it from the socket, and start over at Step 1.



CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 29: Step 1 – Open and Fully Extend the Socket Ejector Pins/Latches





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 30: Step 2 – Gently Place the Module at the Top of the Socket, Not Pushing It Fully into the Socket

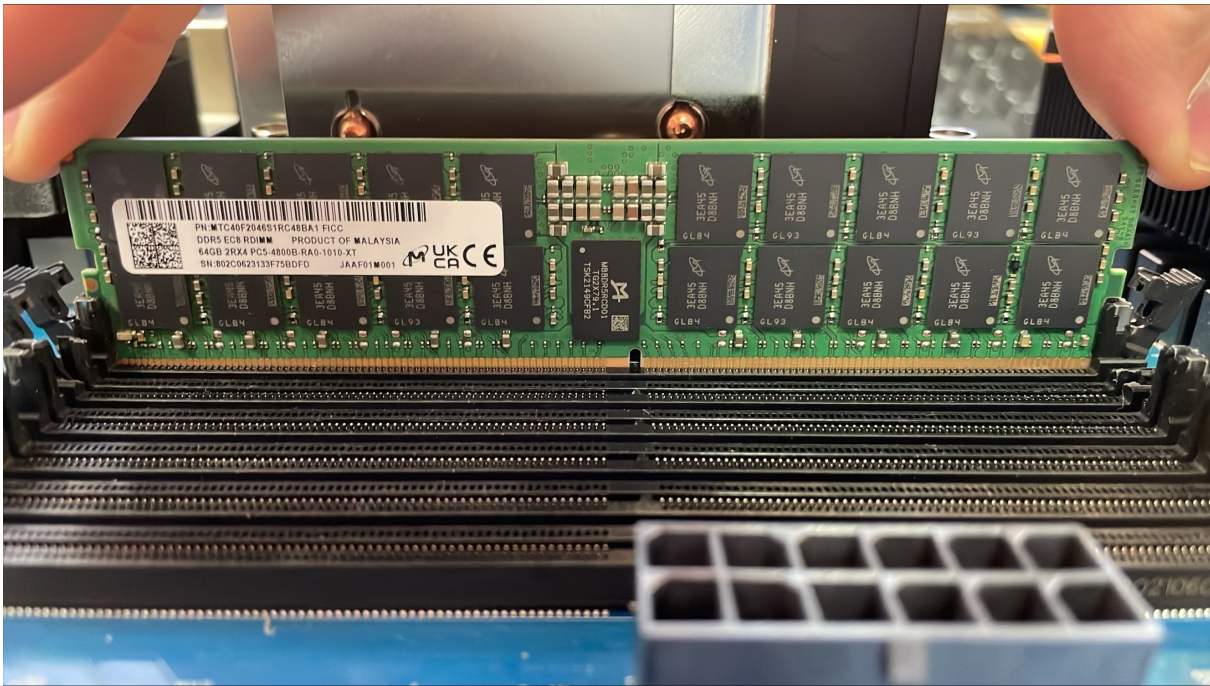


Figure 31: Step 3a – Check the Alignment of the Module and the Ejector Pins/Latches





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 32: Step 3b – Visually Inspect the Alignment Notches in the Socket

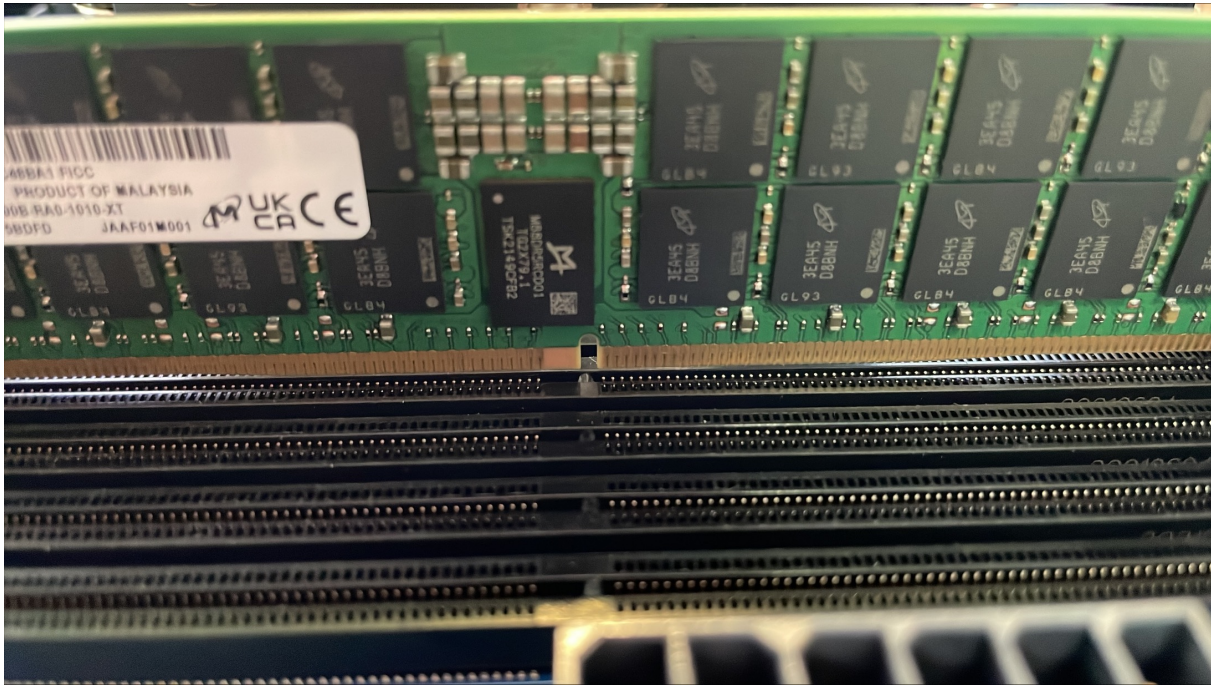
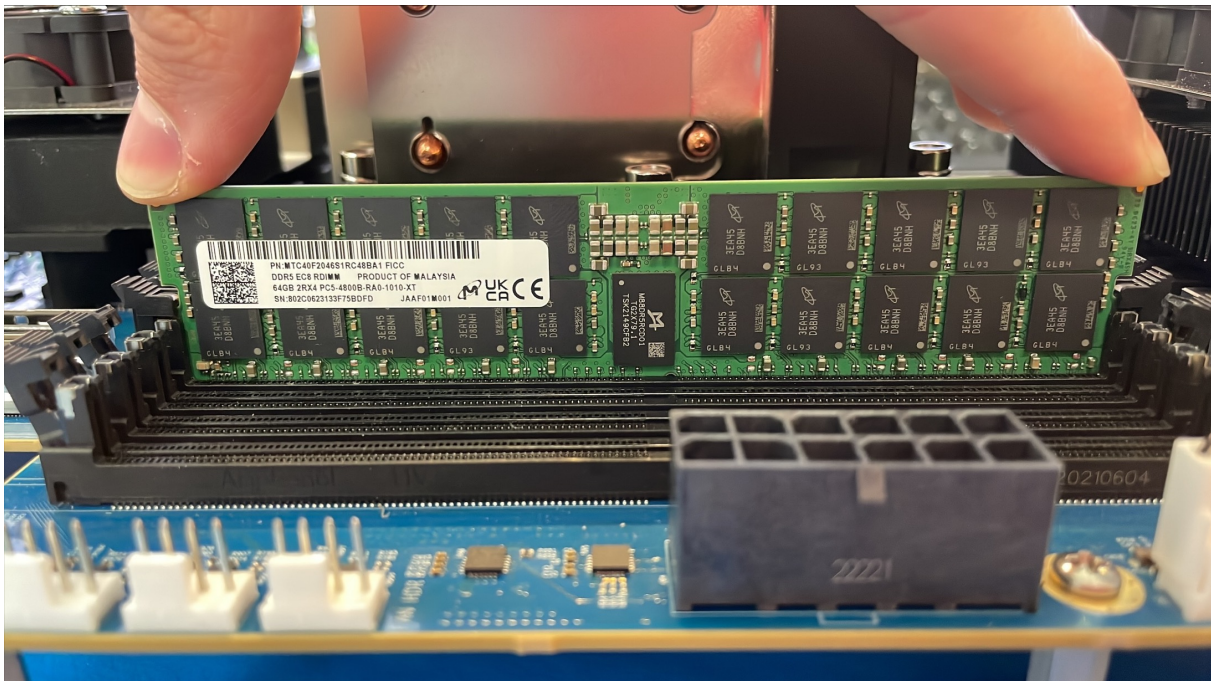


Figure 33: Step 4 – Press Down on the PCB to Set the Module into Its Final Position





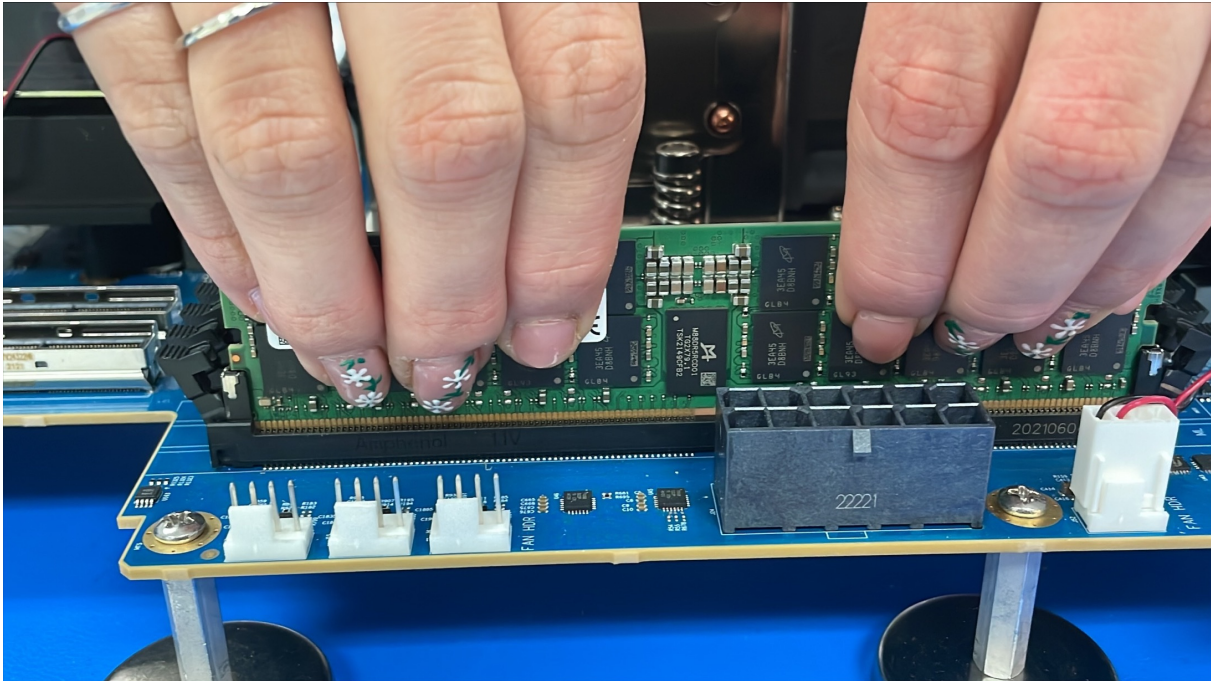
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Improper Ways to Insert a DIMM into a Desktop, Workstation, or Server

Figures 34-37 show incorrect ways of inserting a DIMM. Do not perform any of the following actions:

- Never touch the memory module chip or other parts on the module.
- Never insert the memory module at an angle.
- Never insert the memory module by pushing on one side only.
- Never touch the edge connector

Figure 34: Never Touch the Memory Chips or Other Parts on the Module





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 35: Never Insert the Memory Module at an Angle

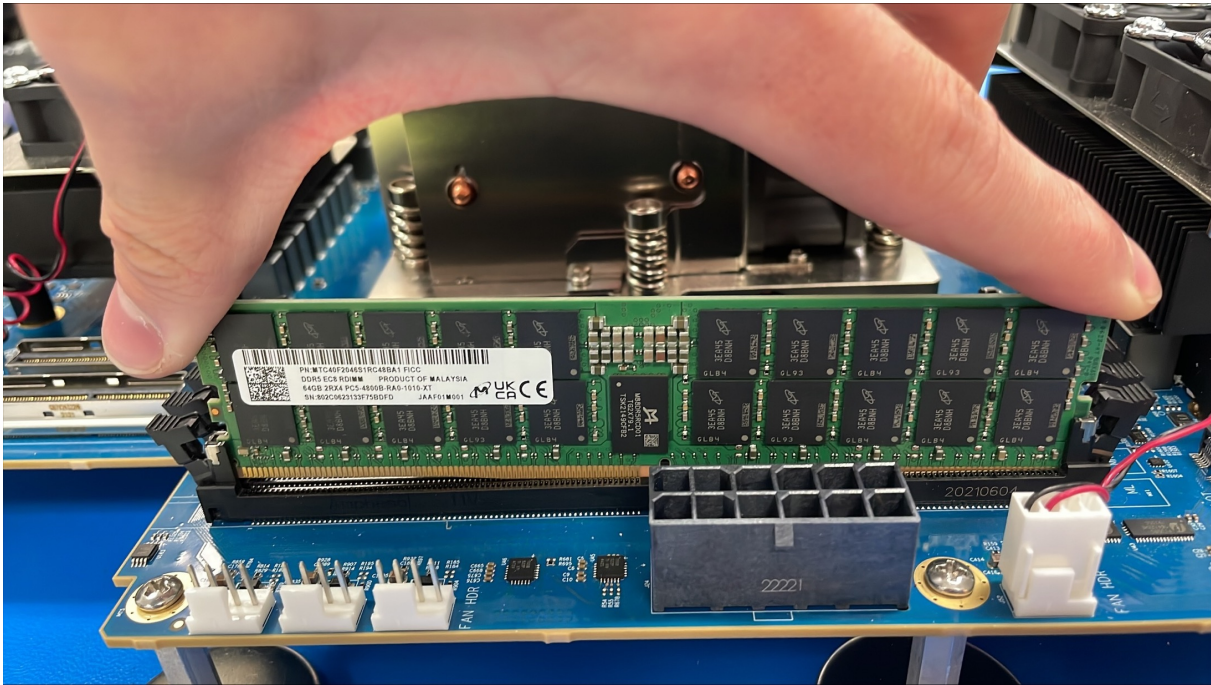
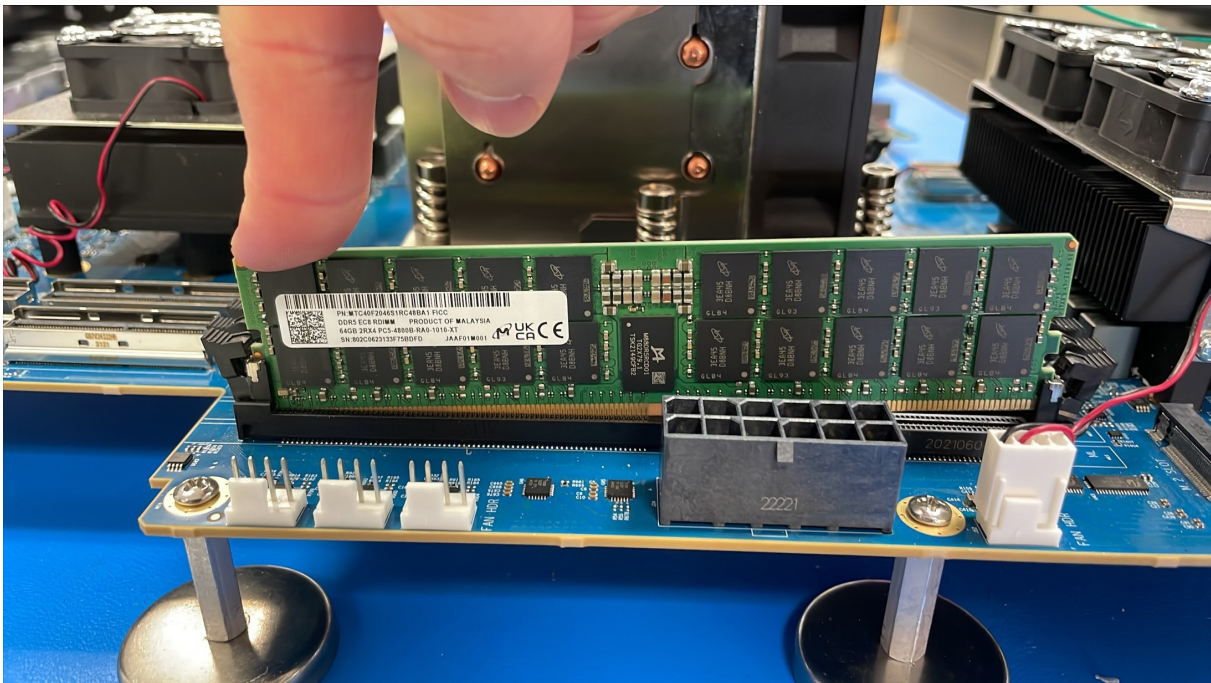


Figure 36: Never Insert the Memory Module by Pushing on One Side Only





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 37: Never Touch the Edge Connector





Inserting M.2 into the Connector Socket

Prior to M.2 installation, verify below set-up on motherboard to prevent damage to SSD.

1. Ensure the standoff height for screw is compatible to the connector insertion height. (Figure 38).
2. If spacers need to be used, ensure it doesn't deform the M.2 PCB excessively (Figure 39). Correct installation position can be seen in Figure 40.
3. Some newer motherboards have a heatsink covering the M.2 slot. If your motherboard comes with a heatsink, remove it by unscrewing it from the motherboard (Figure 41).

Figure 38: Incorrect Standoff Height Installation

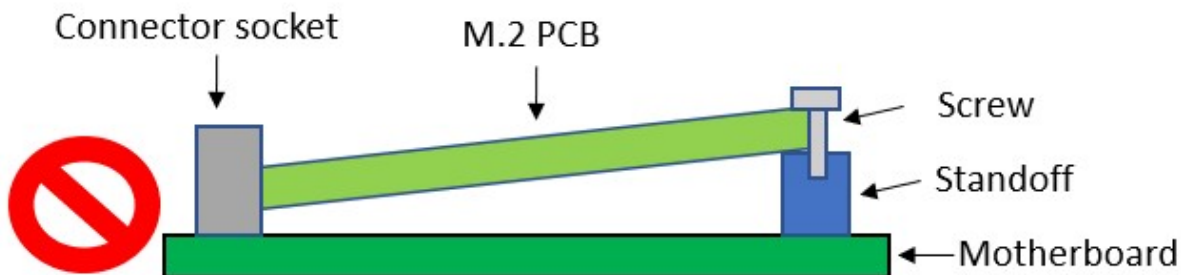


Figure 39: Incorrect Use of Spacer Height during Installation

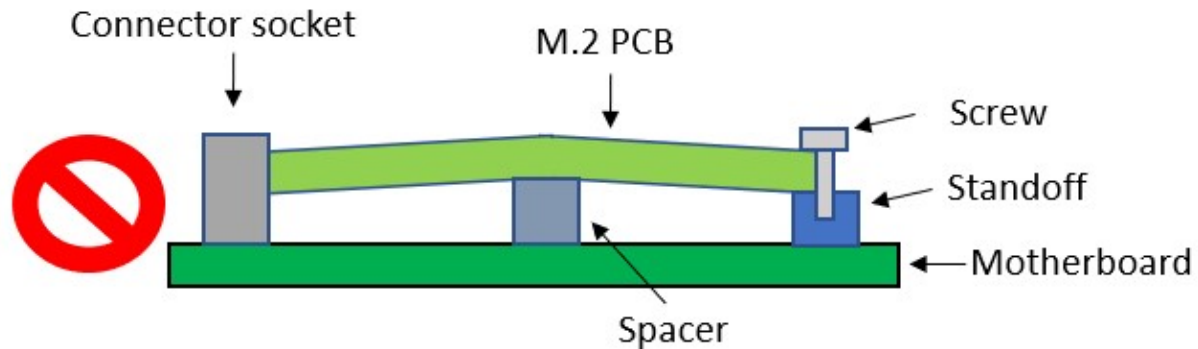
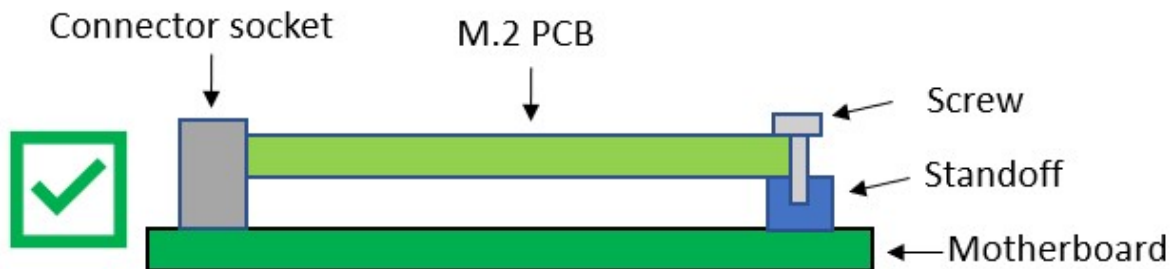


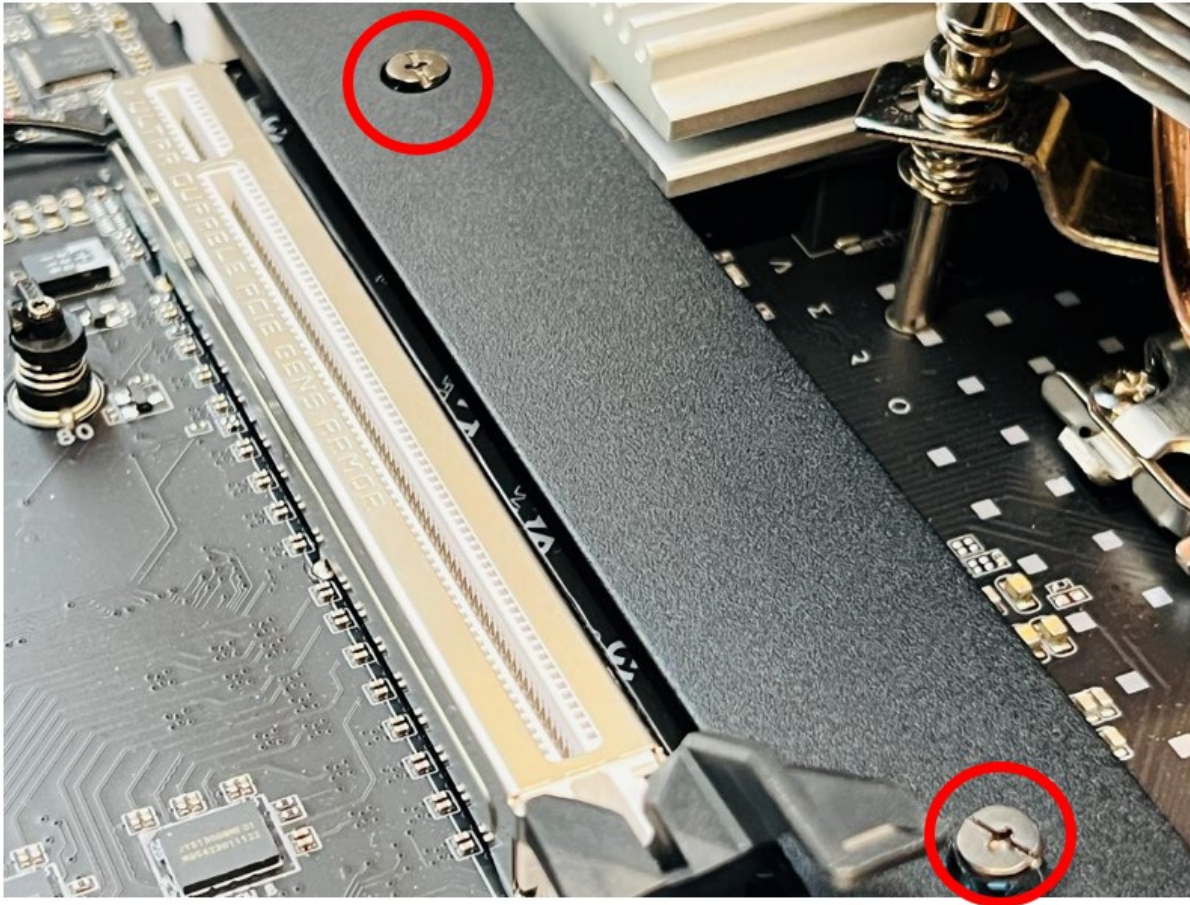
Figure 40: Correct Installation Orientation and Height





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 41: Heatsink Removal prior to M.2 Installation



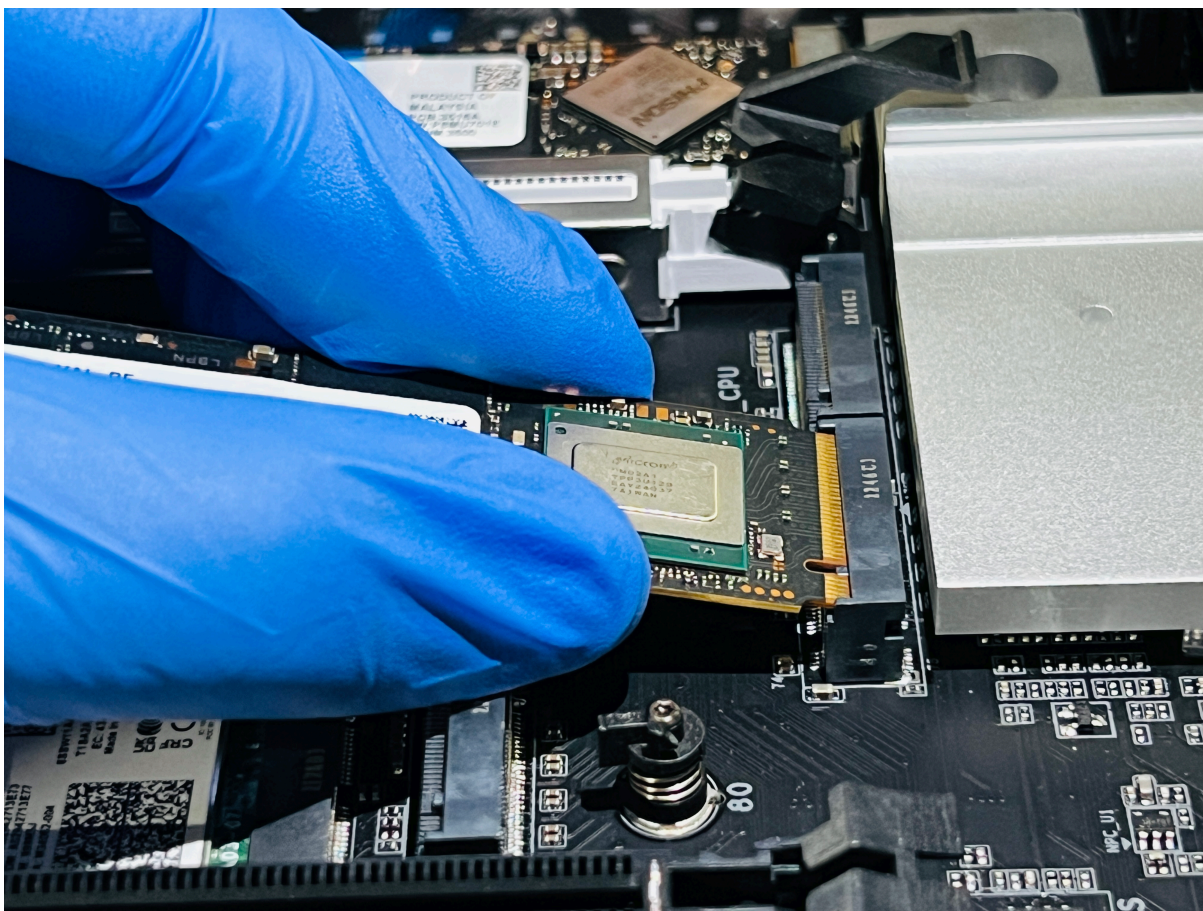


CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Recommended Procedure for M.2 Installation

1. Hold the M.2 PCB by its sides closer to the edge connector. Insert the M.2 into the connector socket at an angle (Figure 42).
2. Gently press down the M.2 PCB on the corners away from the edge connector so that it contacts the screw standoff. Ensure the edge connector is still completely inserted into the socket and not visible from outside (Figure 43).
3. While still holding down the corners, insert the screw into the standoff to engage with the threads. Do not apply torque (Figure 44).
4. Release the hand hold and the screw should prevent the PCB from becoming loose. Tighten the screw appropriately.

Figure 42: Insert M.2 at an Angle





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 43: Hold the PCB Against Standoff after Insertion





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Figure 44: Screw Insertion and Tightening to Complete Installation





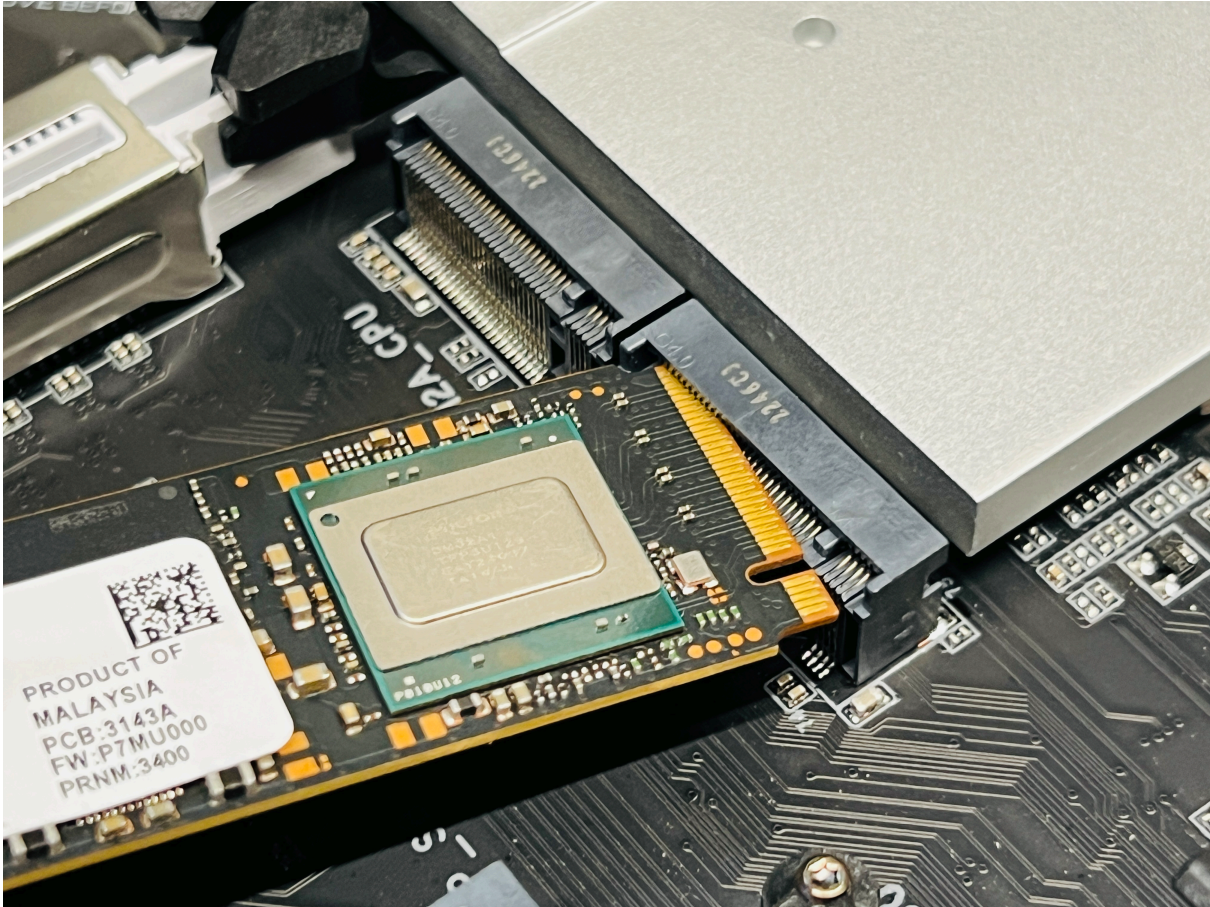
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Insert a Memory Module/SSD into a Socket

Improper Way to Insert M.2.SSD into a Socket

- Do not push the M.2 into the socket sideways (Figure 45).
- Do not overtighten the screw above the maximum recommended value of 0.2 Nm.

To remove the M.2 SSD, follow the above steps in reverse order.

Figure 45: Incorrect M.2 Insertion





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Proper Way to Remove a Memory Module from a Socket

Memory upgrades or exchanges require the removal of existing memory modules from device sockets. Just as specific procedures must be followed to insert memory, set guidelines must be observed to remove memory to prevent damage to the module and the socket. The following sections outline the steps for removing an SODIMM or a DIMM from a memory socket.

Removing an SODIMM from a Socket

To avoid damaging the memory module and socket, remove an SODIMM in this manner:

1. Carefully release the clips on the sides of the socket.
2. Grasp the module, touching only the short edges of the PCB, and pull the device straight out of the socket.

Figure 46: Release the Clips on the Sides of the Socket





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Figure 47: Remove the Module, Touching Only the Edges of the PCB





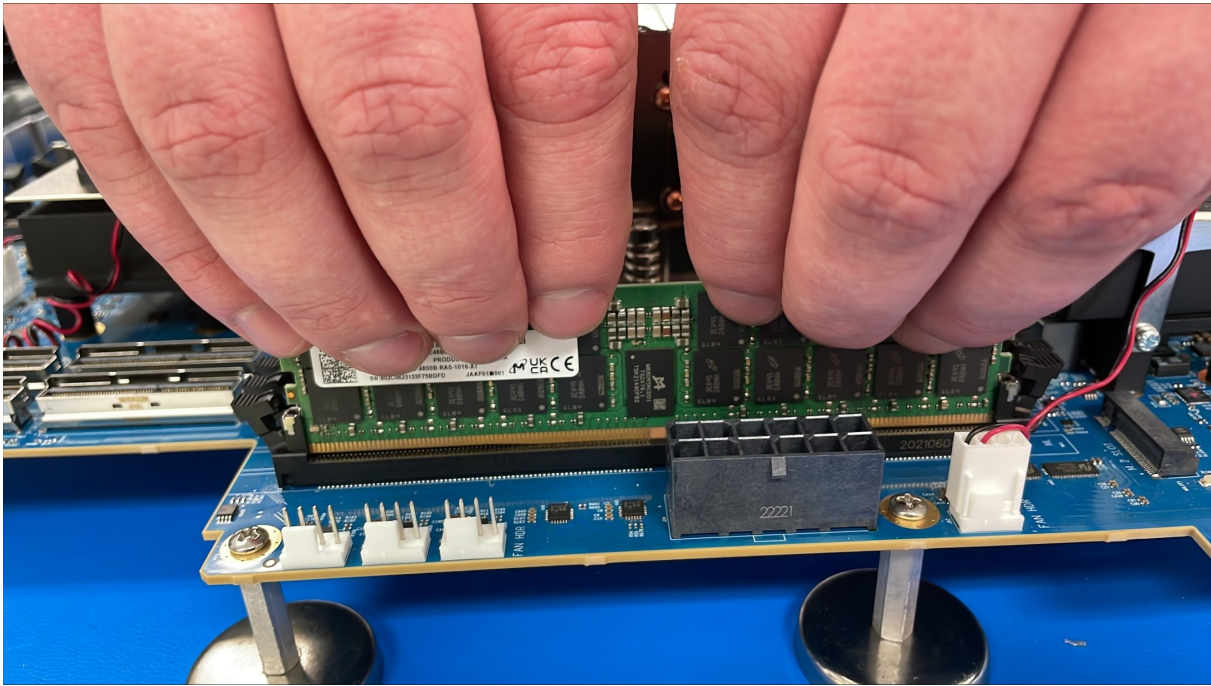
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Improper Ways to Remove an SODIMM

The following diagrams show incorrect ways of removing an SODIMM from a socket. Do not perform any of the following actions:

- Never touch the memory chip during removal.
- Never remove the module at an angle.

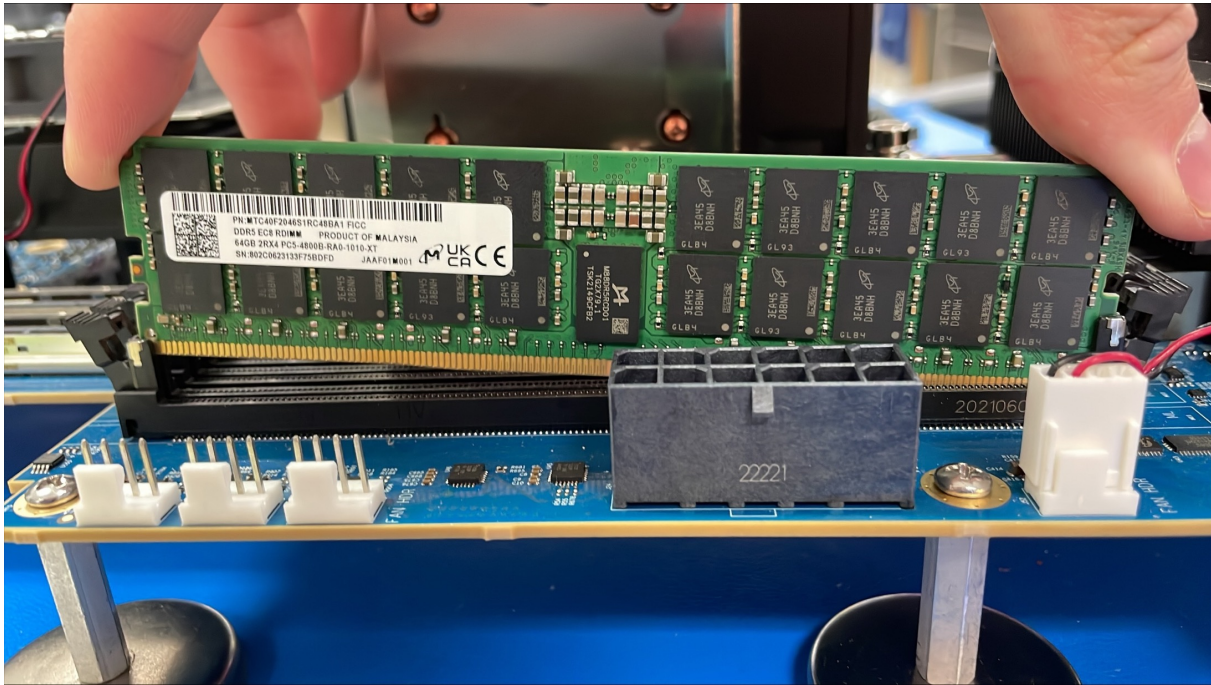
Figure 48: Never Touch the Memory Chip During Removal





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Figure 49: Never Remove the Module at an Angle





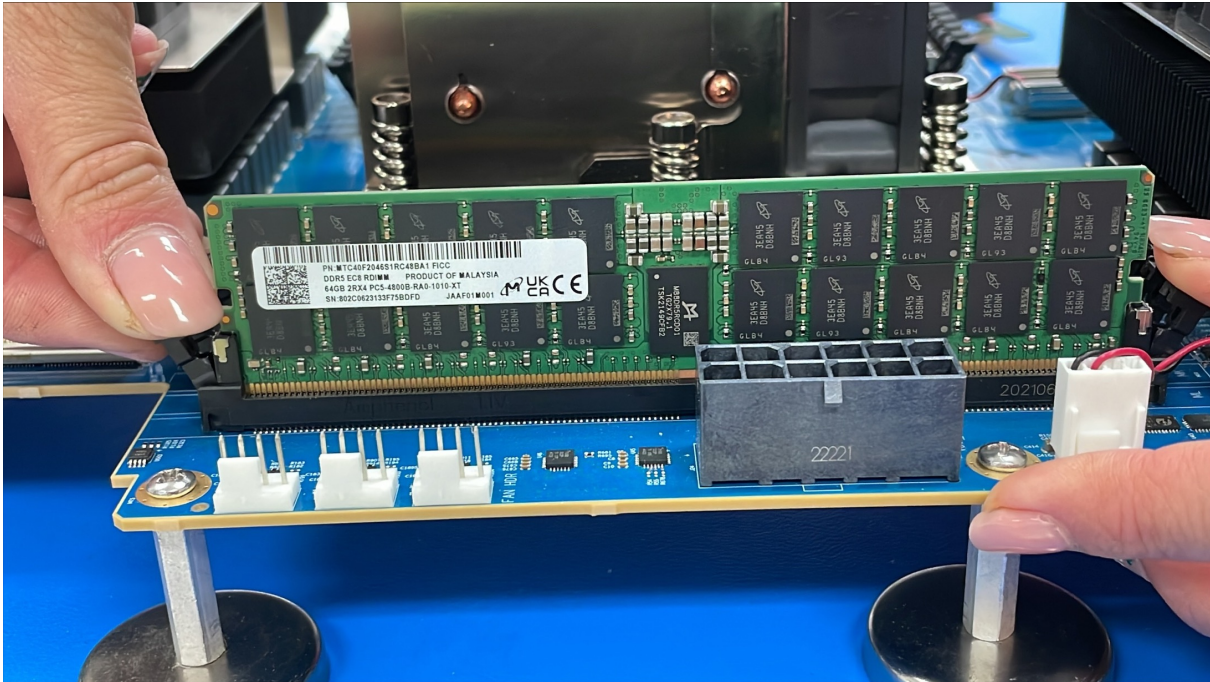
CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Removing a DIMM from a Socket

Prevent damage to the socket and memory module by removing a DIMM using this approach:

1. Simultaneously depress the two alignment latches on either side of the socket. This action will lift the module partially out of the socket.
2. Grasp the module, touching only the short edges of the PCB, and pull the device straight out of the socket.

Figure 50: Simultaneously Depress the Alignment Latches to Lift the DIMM





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Figure 51: Remove the DIMM, Touching Only the Edges of the PCB





CSN-23: Proper Handling Procedures for Modules/SSD Drives Proper Way to Remove a Memory Module from a Socket

Improper Ways to Remove a DIMM

Figures 52-54 show incorrect ways of removing a DIMM from a socket. Do not perform any of the following actions:

- Never use one alignment notch alone.
- Never touch the memory chip during removal.
- Never remove the memory at an angle.

Figure 52: Never Use One Alignment Notch Alone

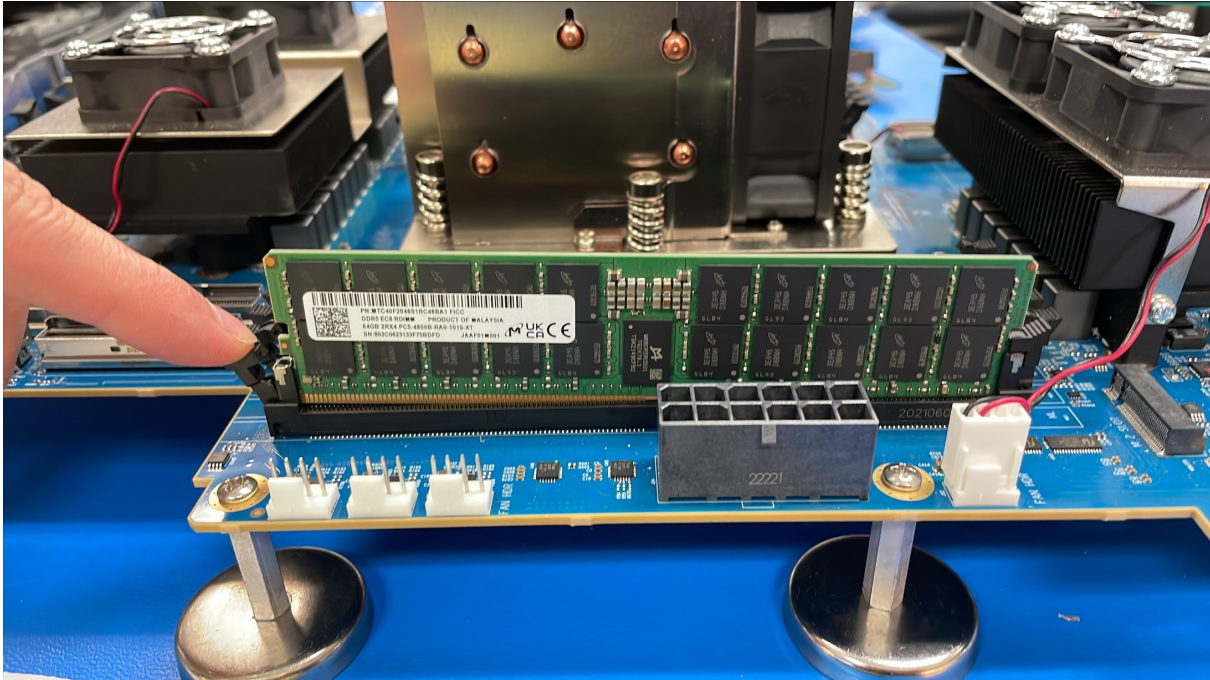
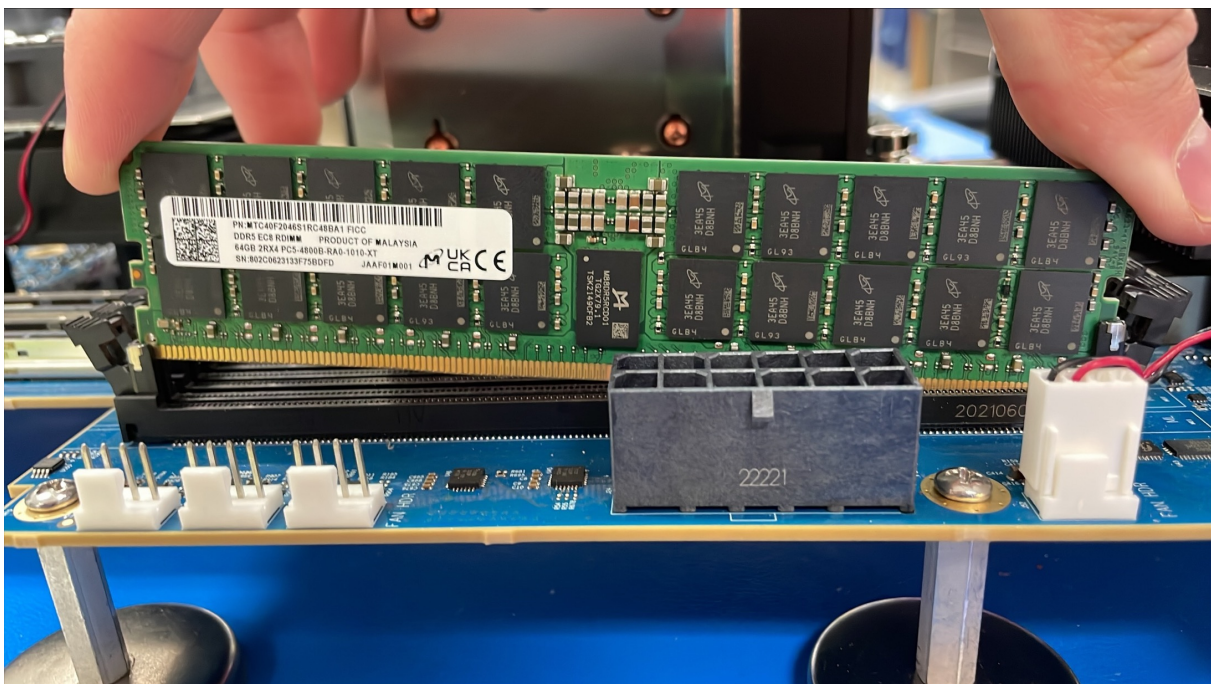




Figure 53: Never Touch the Memory Chips During Removal



Figure 54: Never Remove the Module at an Angle



Conclusion

Proper memory handling, insertion, and removal means less damage to the memory and the memory socket/system. Please use these guidelines when handling memory. Visit Micron.com to download module handling posters, which are available in several languages.



Revision History

Rev. D – 08/2023

- Added PMIC, Inductor, Hub, and RCD bullets to Parts of a Memory Module/SSD topic.
- Revised first paragraph and Figure title in ESD Precautions topic .
- Added Electrical Overstress (EOS) Precaution Steps prior to Module/SSD Installation topic.
- Revised all images.

Rev. C – 06/2023

- Added M.2 information.
- Updated template.

Rev. B – 05/2013

- Added SSD information.

Rev. A – 08/2009

- Updated template.

Rev. A – 12/2007

- Added reference to module posters online.
- Updated template.

Rev. A – 03/2005

- Initial release.

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