

Customer Service Note

Proper Handling Procedures for Micron® DRAM Modules

Introduction

This guide includes information on the parts of a module, how to hold a module, and how to insert and remove a module from a socket. Follow these guidelines at all times to help ensure prolonged, reliable operation of Micron's memory products.

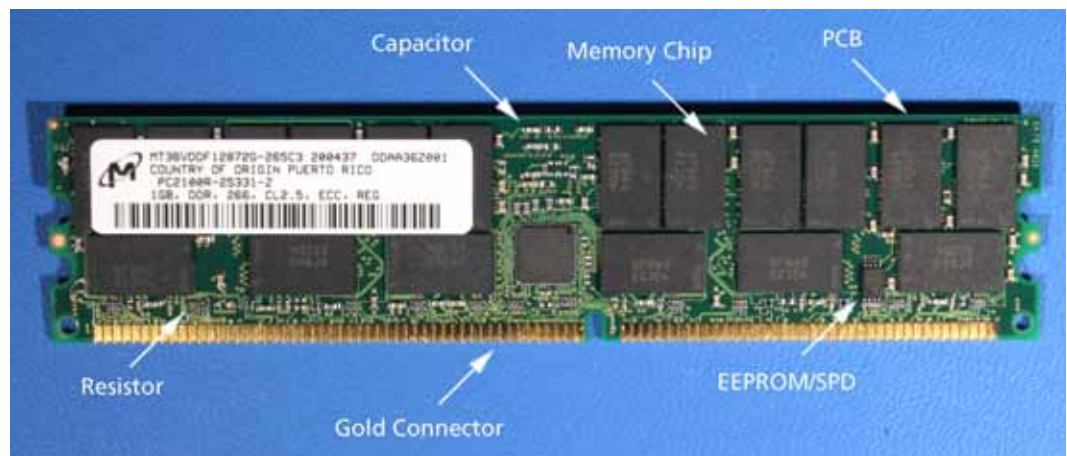
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The Parts of a Memory Module

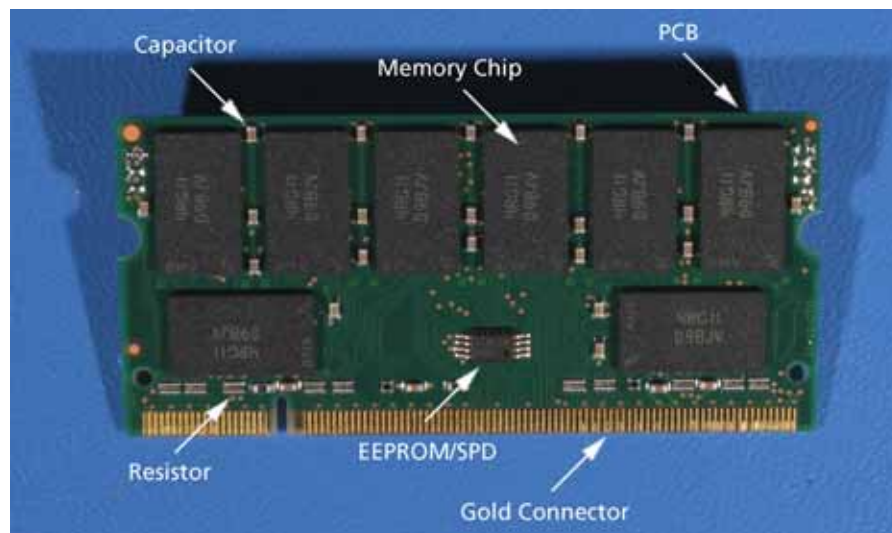
Memory modules consist of more than just memory chips. As shown in Figure 1, they also include a printed circuit board (PCB), capacitors, resistors, gold connectors, EEPROMs/SPDs, and other parts. Being able to identify these parts will enable safer handling practices.

- **Memory chips.** Generally the largest parts of a module, memory chips are typically mounted in thin small-outline packages (TSOP) or fine-pitch ball grid array (FBGA) packages. Usually four or more memory chips, which are soldered onto the PCB, comprise a standard module. 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 on the module.
- **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 module's gold connector.
- **Gold connector.** Comprised of a number of gold traces or "fingers," the gold connector transfers signals between the module and the motherboard through the module connector. Gold is used because it provides the best long-term reliability for the signals.
- **EEPROM/SPD.** The electrically erasable programmable read-only memory (EEPROM) or serial presence-detect (SPD) is a chip that stores data about the module.

Figure 1: The Parts of a Memory Module



DIMM (Dual In-Line Memory Module)



SODIMM (Small-Outline DIMM)

ESD Precautions

Modules must be protected against electrostatic discharge (ESD), or static electricity. When handling modules, protect them by wearing an ESD strap that is properly grounded. Static electricity can build up by walking on carpet or certain types of tile. When ESD occurs, an arc of voltage discharges from the person and travels to the modules. Even though it may appear minor, the discharge can contain enough voltage to seriously damage electrical components. Always wear ESD straps when inserting modules into sockets to avoid the transference of static electricity.

Figure 2: Always Wear ESD Straps When Inserting Modules into Sockets



The Proper Technique for Holding a Memory Module

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

As shown in Figure 3, the only way to hold modules is by gently gripping the short edges of the device. These are the edges to the left and to the right side of the gold connector.

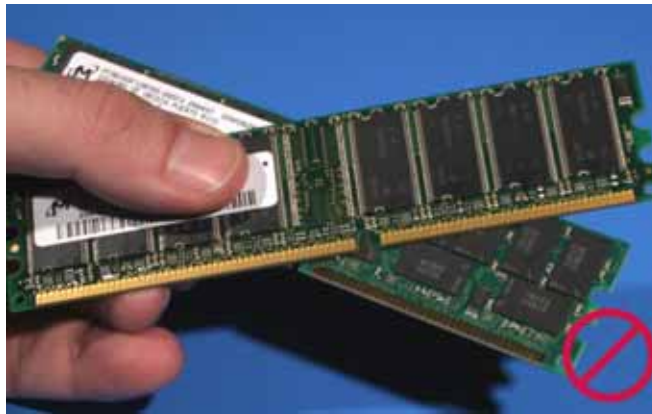
Figure 3: The Only Way to Hold a Module is by the Edges



Figures 4–10 depict incorrect ways to handle memory products. Do not hold memory modules in any of the following ways:

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

Figure 4: Never Hold Two or More Modules Together



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

Figure 5: Never Touch the Gold Connectors



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

Figure 6: Never Press on the Gold Connectors and Pick Up a Module



Figure 7: Never Press on the Side of a Module and Pull It Up



Figure 8: Never Hold a Module Using Three Points of Pressure



Figure 9: Never Bend or Twist a Module

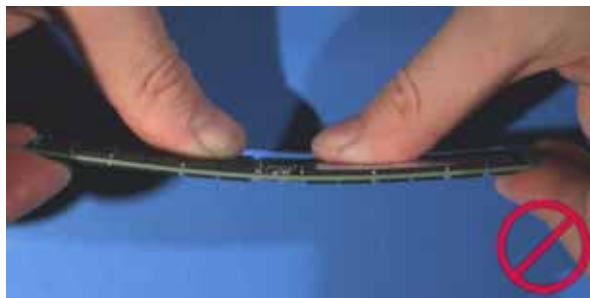


Figure 10: Never Drop a Module



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

Figure 11: Never Stack Two or More Modules



The Proper Way to Insert a Memory Module into a Socket

Properly inserting a memory module is critical to preventing damage to the socket and the module. The steps for inserting small-outline dual in-line memory modules (SODIMMs), which are used in notebooks, are different from those for regular dual in-line memory modules (DIMMs), which are used in workstations, desktops, and servers. This section outlines the correct technique for inserting each type of module.

Inserting SODIMMs into Mobile and Notebook Applications

When inserting Micron SODIMMs into applications such as mobile products or notebooks, follow these steps:

1. Hold the module by the edges only (Figure 3 on page 3). Gently insert the module into the socket at an angle, inserting the edge with the gold connectors first (Figure 12 on page 7).

2. The module socket includes two alignment notches. Visually inspect the module to make sure that it is flat and the alignment notches are in the correct position (Figures 13 and 14). Do this before pushing the module down in Step 3. If the module is not correctly aligned, damage could occur when you perform Step 3.
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 (Figure 15 on page 8).

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 16 on page 9).

Figure 12: Step 1 – Place the Module in the Socket, Holding It by the Edges



Figure 13: Step 2a – Visually Inspect the Module Alignment in the Socket



Figure 14: Step 2b – Visually Inspect the Angle of Insertion



Figure 15: Step 3 – Press Down on the PCB to Set the Module into Its Final Position



Figure 16: If the Module Cannot Be Inserted Easily, Remove It from the Socket and Start Over



Improper Ways to Insert Modules into Mobile and Notebook Applications

Figures 17–19 show incorrect ways of inserting SODIMMs. Do not perform any of the following actions:

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

Figure 17: Never Touch the Memory Chips When Inserting the Module



Figure 18: Never Press on the Memory Chips When Pushing the Module into Its Final Position

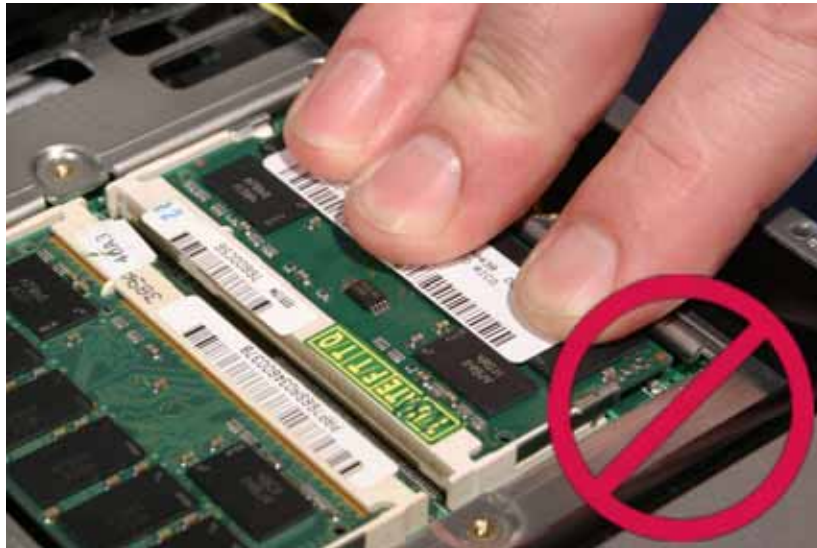


Figure 19: Never Insert Modules at an Angle or One Side at a Time



Inserting DIMMs into Desktops, Workstations, and Servers

A different procedure is used to insert sockets into applications such as desktop computers, workstations, and servers. Several types of DIMMs are used for these applications:

- 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 20 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 21 and 22.

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 20: Socket for a 168-Pin SDR DIMM

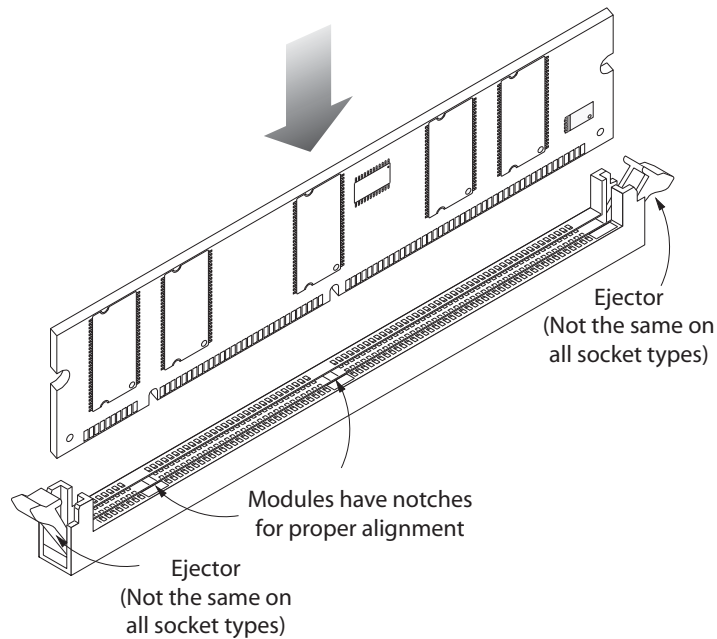


Figure 21: Socket for a 186-Pin DDR DIMM

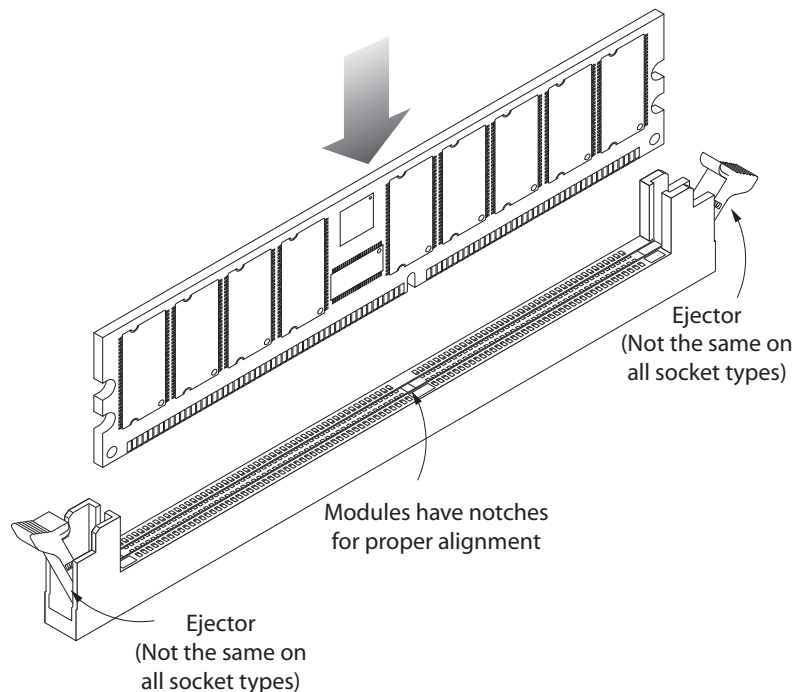
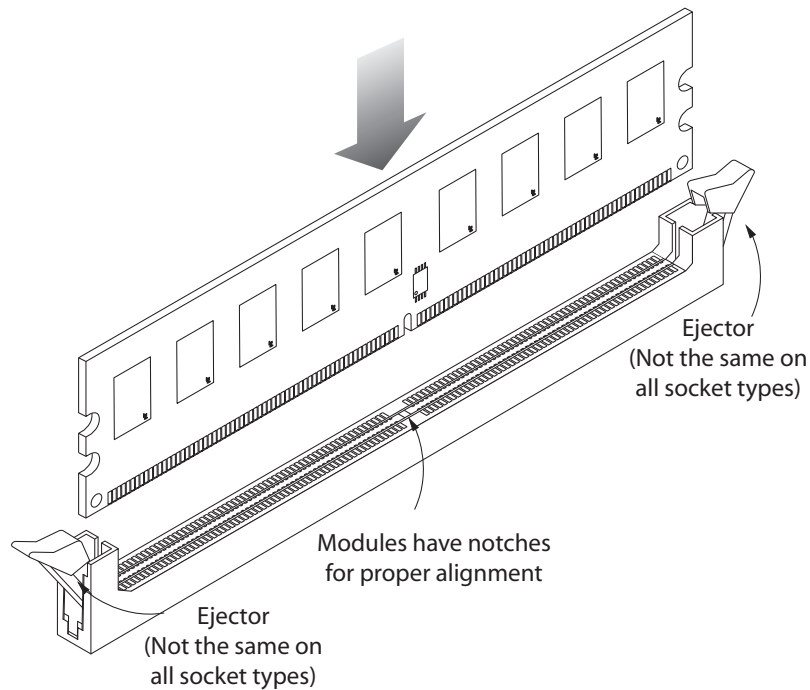


Figure 22: Socket for a 240-Pin DDR2 DIMM



Because they employ different sockets than notebook computers, the insertion technique for memory modules is slightly different. To insert Micron's DIMMs into desktop, workstation, and server applications, 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 (Figure 23).
2. Hold the module by the edges only (Figure 3). Gently place it flat in the socket—not at an angle—but do not press it completely into the socket (Figure 24).
3. Visually inspect the module. It must be directly aligned with the socket opening. Ensure the alignment notches on the module match the notches in the socket (Figures 25–26). 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 (Figure 27). After insertion, check to make sure 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.

Figure 23: Step 1 – Open and Fully Extend the Socket Ejector Pins/Latches

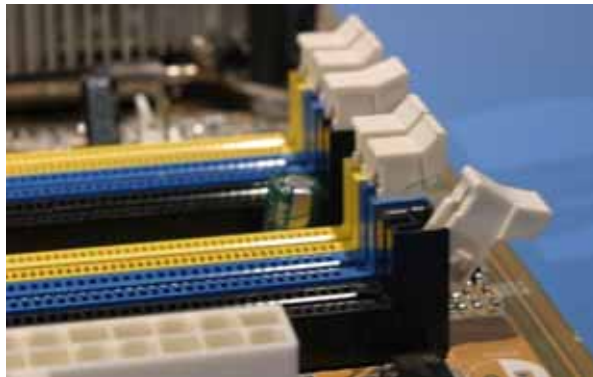


Figure 24: Step 2 – Gently Place the Module at the Top of the Socket; Do Not Push the Module Fully into the Socket at This Time



Figure 25: Step 3a – Check the Alignment of the Module and the Ejector Pins/Latches



Figure 26: Step 3b – Visually Inspect the Alignment Notches in the Socket



Figure 27: Step 4 – Press Down on the PCB to Set the Module into Its Final Position



Improper Ways to Insert DIMMs into Desktops, Workstations, and Servers

Figures 28–31 show incorrect ways of inserting DIMMs. Do not perform any of the following actions:

- Never touch the memory module chips 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 28: Never Touch the Memory Chips or Other Parts on the Module



Figure 29: Never Insert the Memory Module at an Angle



Figure 30: Never Insert the Memory Module by Pushing on One Side Only



Figure 31: Never Touch the Edge Connector



The Proper Way to Remove a Memory Module from a Socket

Memory upgrades or exchanges require the removal of existing memory modules from application sockets. Just as specific procedures must be followed when inserting memory, set guidelines must be observed when removing memory to prevent damage to the module and the socket. The following sections outline the steps for removing SODIMMs and DIMMs from memory sockets.

Removing SODIMMs from Sockets

To avoid damaging the memory module and socket, remove SODIMMs 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 32: Release the Clips on the Sides of the Socket



Figure 33: Remove the Module, Touching Only the Edges of the PCB



Improper Ways to Remove SODIMMs

The following diagrams show incorrect ways of removing SODIMMs from sockets. Do not perform any of the following actions:

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

Figure 34: Never Touch the Memory Chips During Removal



Figure 35: Never Remove the Module at an Angle



Removing DIMMs from Sockets

Prevent damage to the socket and memory module by removing DIMMs 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 36: Simultaneously Depress the Alignment Latches to Lift the Module



Figure 37: Remove the Module, Touching Only the Edges of the PCB



Improper Ways to Remove DIMMs

Figures 38–40 show incorrect ways of removing DIMMs from sockets. Do not perform any of the following actions:

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

Figure 38: Never Use One Alignment Notch Alone



Figure 39: Never Touch the Memory Chips During Removal



Figure 40: 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**; the posters are available in several languages.



8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-3900
prodmtg@micron.com www.micron.com Customer Comment Line: 800-932-4992

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