



AOC-AG-i8



User's Guide

Revision 1.0

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Preface

About this User's Guide

This user's guide is written for system integrators, IT technicians, and knowledgeable end users. It provides information for the installation and use of the AOC-AG-i8 add-on card.

About this Add-on Card

The Supermicro® Advanced I/O Module (AIOM) is the latest form factor designed to provide a wide range of networking options and other I/O technologies for server, storage, and IoT systems. The AOC-AG-i8 is a highly flexible and scalable controller with eight Gigabit Ethernet ports. Based on the Intel GbE network controller i350, the AOC-AG-i8 is designed with performance enhancing features and advanced power management technologies for the latest high performance data center and edge solutions.

An Important Note to the User

All images and layouts shown in this user's guide are based upon the latest PCB revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this user's guide.

Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning the add-on card to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and the shipping package is mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete. For faster service, you can also request a RMA authorization online <http://www.supermicro.com/RmaForm/>.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alternation, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Conventions Used in the User's Guide

Pay special attention to the following symbols for proper system installation and for safety instructions to prevent damage to the system or injury to yourself:



Note: Additional information given for proper system setup.

Naming Convention for Standard Network Adapters



Character	Representation	Options
1st	Product Family	AOC: Add On Card
2nd	Form Factor	S: Standard, P: Proprietary, C: MicroLP, M: Super IO Module (SIOM), MH: SIOM Hybrid A: Advanced IO Module (AIOM), AH: AIOM Hybrid
3rd	Product Type/Speed	G: GbE (1Gb/s), TG: 10GbE (10Gb/s), 25G: 25GbE (25Gb/s), 40G: 40GbE (40Gb/s), 50G: 50GbE (50Gb/s), 100G: 100GbE (100Gb/s), IBE: EDR IB (100Gb/s), HFI: Host Fabric Interface
4th	Chipset Model (Optional)	N: Niantec (82599), P: Powerville (i350), S: Sageville (X550), F: Fortville (XL710/X710), L: Lewisburg (PCH)
5th	Chipset Manufacturer	i: Intel, m: Mellanox, b: Broadcom
6th	Number of Ports	1: 1 port, 2: 2 ports, 4: 4 ports, 8: 8 ports
7th	Connector Type (Optional)	S: SFP/SFP+/SFP28, T: 10GBase-T, Q: QSFP+, C: QSFP28
8th	2 nd Controller/Connector Type (Optional)	G: 1x GbE RJ45, 2G: GbE 2x RJ45, S: 1x 10G SFP+, T: 10GBase-T, 2T: 2x 10GBase-T

Networking Adapter List

Model	Type	Form Factor	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
AOC-MGP-i2	GbE	SIOM	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	3.7
AOC-MGP-i4	GbE	SIOM	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	4.4
AOC-MTGN-i2S	10GbE	SIOM	Intel® 82599ES	2 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7.2
AOC-MTG-i4S	10GbE	SIOM	Intel® XL710-BM1	4 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7
AOC-MTG-b2T	10GbE	SIOM	Broadcom® BCM57416	2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	11
AOC-MTG-i2T	10GbE	SIOM	Intel® X550-AT2	2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	13
AOC-MTG-i4T	10GbE	SIOM	2x Intel® X550-AT2	4 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	26
AOC-MHIBF-m1Q2G	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	1 QSFP (56Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	9
AOC-MHIBF-m2Q2G	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	2 QSFP (56Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11
AOC-MHIBE-m1CG	EDR IB GbE	SIOM	Mellanox® ConnectX-4 VPI Intel® i210	1 QSFP28 (100Gb/port) 1 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	19
AOC-MH25G-b2S2G	25GbE	SIOM	Broadcom® BCM57414 Intel® i350	2 SFP28 (25Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	9
AOC-MH25G-m2S2T	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN Intel® X550-AT2	2 SFP28 (25Gb/port) 2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	25
AOC-M25G-m4S	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN	4 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	20
AOC-M25G-i2S	25GbE	SIOM	Intel® XXV710	2 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11.8
AOC-MHFI-H1C	Omni-Path	SIOM	Intel® OP HFI ASIC (Wolf River WFR-B)	1 QSFP28 (100Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	15



Note: The table above is continued on the next page.

Model	Type	Form Factor	Interface	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
AOC-SGP-I2	GbE	Standard LP	PCI-E x4	Intel® I350 AM2	2 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	3.5
AOC-SGP-I4	GbE	Standard LP	PCI-E x4	Intel® I350 AM4	4 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	5
AOC-STG-I2T	10GbE	Standard LP	PCI-E x8	Intel® X540-AT2	2 RJ45 (10GbBase-T)	5.9" (150mm) x 2.73" (69mm)	13
AOC-STGS-I1T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT	1 RJ45 (10GbBase-T)	5.9" (150mm) x 2.73" (69mm)	9
AOC-STGS-I2T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GbBase-T)	5.9" (150mm) x 2.73" (69mm)	11
AOC-STG-I2T	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57416	2 RJ45 (10GbBase-T)	5.6" (142mm) x 2.73" (69mm)	13.1
AOC-STG-I4T	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 RJ45 (10GbBase-T)	5.9" (149mm) x 2.73" (69mm)	15.5
AOC-STGN-I1S	10GbE	Standard LP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	10
AOC-STGN-I2S	10GbE	Standard LP	PCI-E x8	Intel® 82598ES	2 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	11.2
AOC-STGF-I2S	10GbE	Standard LP	PCI-E x8	Intel® X710-BM2	2 SFP+ (10Gb/port)	5.19" (132mm) x 2.73" (69mm)	5.6
AOC-STG-I4S	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57405	4 SFP+ (10Gb/port)	5.4" (137mm) x 2.73" (69mm)	14
AOC-STG-I4S	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 SFP+ (10Gb/port)	5.9" (150mm) x 2.73" (69mm)	8
AOC-S250-m2S	25GbE	Standard LP	PCI-E x8	Mellanox® CX-4 LX	2 SFP28 (25Gb/port)	5.6" (142mm) x 2.713" (69mm)	8.7
AOC-S250-I2S	25GbE	Standard LP	PCI-E x8	Broadcom® BCM57414	2 SFP28 (25Gb/port)	5.6" (142mm) x 2.713" (69mm)	5.2
AOC-S250-I2S	25GbE	Standard LP	PCI-E x8	Intel® XXV710	2 SFP28 (25Gb/port)	6.1" (155mm) x 2.713" (69mm)	7.2
AOC-S400-I1Q	40GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	1 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	6.5
AOC-S400-I2Q	40GbE	Standard LP	PCI-E x8	Intel® XL710-BM2	2 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	7
AOC-S100G-m2C	100GbE	Standard LP	PCI-E x16	Mellanox® CX-4 EN	2 QSFP28 (100Gb/port)	6.6" (168mm) x 2.73" (69mm)	16.3
AOC-CGP-I2	GbE	MicroLP	PCI-E x4	Intel® I350 AM2	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.54" (39mm)	4
AOC-CTG-I1S	10GbE	MicroLP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	10
AOC-CTG-I2S	10GbE	MicroLP	PCI-E x8	Intel® 82598ES	2 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	11
AOC-CTG-I2T	10GbE	MicroLP	PCI-E x8	Intel® X540-AT2	2 RJ45 (10GbBase-T)	4.8" (123mm) x 2.75" (77mm)	13
AOC-CTGS-I2T	10GbE	MicroLP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GbBase-T)	4.45" (113mm) x 1.54" (39mm)	12
AOC-C250-m1S	25GbE	MicroLP	PCI-E x8	Mellanox® CX-4 Lx EN	1 SFP28 (25Gb/port)	4.45" (113mm) x 1.54" (39mm)	8.5

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Chapter 1

Overview

1-1 Overview

Congratulations on purchasing your add-on card from an acknowledged leader in the industry. Supermicro products are designed with the utmost attention to detail to provide you with the highest standards in quality and performance. For product support and updates, please refer to our website at <http://www.supermicro.com/products/nfo/networking.cfm#adapter>.

1-2 Product Highlights

- Advanced I/O Module (AIOM) form factor
- Intel® i350 GbE controller
- Eight RJ45 connectors
- Energy Efficient Ethernet (EEE)
- Reliable and proven Gigabit Ethernet technology
- Asset Management features with thermal sensor
- Efficient storage communication with new 8K and 10K MTUs
- NC-SI for Remote Management
- RoHS compliant 6/6



1-3 Technical Specifications

General

- Advanced I/O Module (AIOM) form factor
- Intel® i350 GbE controller
- Eight RJ45 ports

Ethernet Features

- IEEE 802.3 auto-negotiation for speed, duplex, and flow control
- IEEE 802.3x and 802.3z compliant flow control support
- Automatic cross-over detection function (MDI/MDI-X)
- 1Gb/s Ethernet IEEE 802.3, 802.3u, 802.3ab PHY specifications compliant
- IEEE 1588 protocol and 802.1AS implementation

Power Management and Efficiency

- Energy Efficient Ethernet (EEE)
- DMA Coalescing reduces platform power consumption
- Active State Power Management (ASPM) support
- LAN disable function
- Low power link up – link speed control

Virtualization Features

- PC-SIG SR-IOV support
- VM to VM packet forwarding (packet loopback)
- Flexible port partitioning

- IEEE 802.1q VLAN support
- IEEE 802.1q advanced packet filtering
- Jumbo frames support

Performance Features

- TCP/UDP, IPv4 and IPv6 checksum offloads to improve CPU usage
- Low latency interrupts
- Tx TCP segmentation offload (IPv4, IPv6) increases throughput and lowers processor usage
- Receive Side Scaling (RSS) for Windows environment, Scalable I/O for Linux environments
- Intelligent interrupt generation

Management Features

- Preboot eXecution Environment (PXE) support
- iSCSI remote boot support
- Asset Management support on Supermicro® platforms
- NC-SI for remote management

OS Support

- Windows
- RedHat Linux
- SUSE Linux
- FreeBSD
- UEFI
- VMWare

Cable Support

- RJ45 category 5/5e up to 100m

Power Consumption

- Typical 7.4W; maximum 8.8W

Operating Conditions

- Operating temperature: 0°C to 55°C (32°F to 131°F)
- Storage temperature: -40°C to 70°C (-40°F to 158°F)
- Storage humidity: 90% non-condensing relative humidity at 35°C

Physical Dimensions

- Card PCB dimensions: 76mm x 108.9mm (W x D)



Note: This product is only sold as part of an integrated solution with Supermicro server systems.

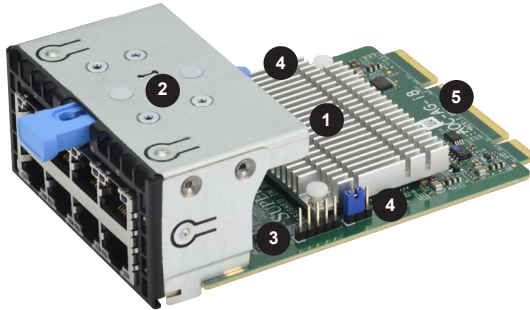
1-4 Available SKUs

SKUs	Part Number	Description
AOC-AG-i8	BKT-0155L	8-port Gigabit Ethernet Adapter with an 1U height bracket

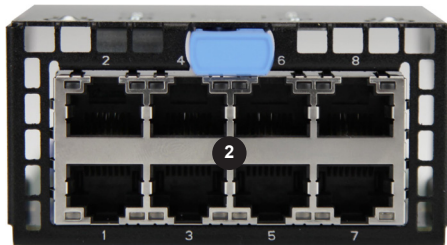
Chapter 2

Hardware Components

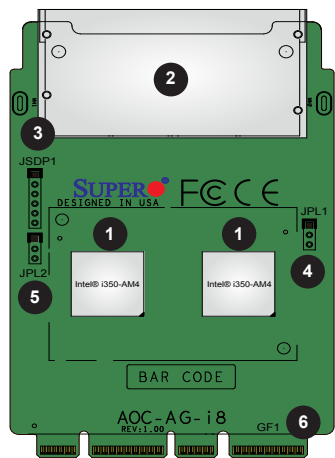
2-1 Add-On Card Image and Layout



The side view of the AOC-AG-i8



The front view of the AOC-AG-i8



The AOC-AG-i8 Layout

1. Intel® i350-AM4 controllers	4. JPL1
2. Eight RJ45 ports	5. JPL2
3. JSDP1	6. PCI-E 2.0 x8

2-2 Major Components

The following components are on the AOC-AG-i8:

1. Two Intel® i350 controllers
2. Eight RJ45 ports (1Gb/s per port)
3. AIOM (Advanced IO module) form factor
4. JPL1 LAN port Enable/Disable
5. JPL2 LAN port Enable/Disable
6. PCI-E 2.0 x8 interface
7. JSDP1

2-3 LED Indicators and Connectors

LAN Ports

There are eight 1GbE LAN ports on the AOC-AG-i8. These LAN ports support connection speeds of 1Gbps. Use a direct-attach RJ45 type LAN cable.

LAN Port LED Indicators

Each LAN port has two LEDs to indicate speed and data activity. Refer to the table below for LED colors and definitions.

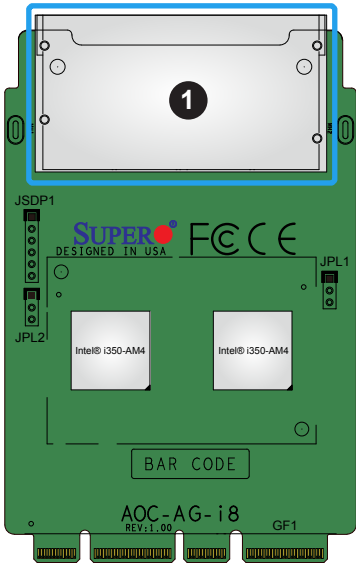
Link LED



Activity LED

LAN Port Link LED (Left) LED States	
LED Status	Definition
Green	100 Mbps
Amber	1 Gbps
Off	No Connection

LAN Port Activity LED (Right) LED States	
LED Status	Definition
Yellow Flashing	Active

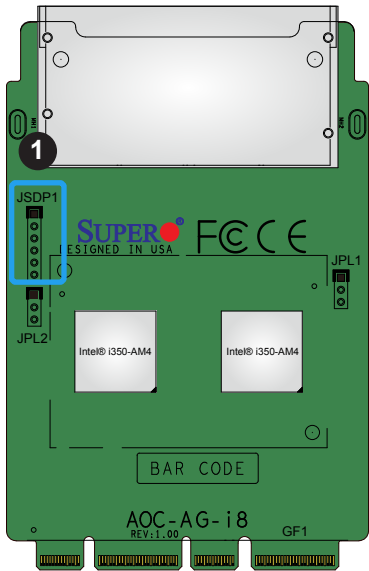


1. Eight RJ45 connectors

JSDP1

Use Header JSDP1 to connect to a cable and communicate with the SDP of the LAN chips on the AOC-AG-i8. See the table below for header settings.

JSDP1 Header Pin Definitions	
Pin#	Definition
1	B_SDP2_0
2	B_SDP2_1
3	B_SDP2_2
4	B_SDP2_3
5	GND



1. JSDP1

2-4 Jumpers

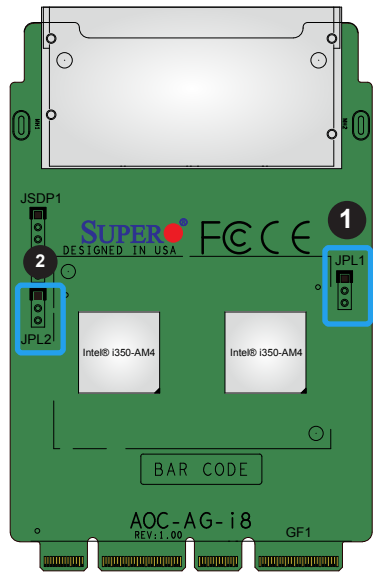
Explanation of Jumpers

To modify the operation of the add-on card, a jumper can be used to choose between optional settings. A jumper creates shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the add-on card layout below for the jumper location.

LAN Port Enable/Disable

Use Jumpers JPL1 and JPL2 to enable or disable LAN ports on the AOC-AG-i8. On the AOC-AG-i8, these jumpers will enable or disable LAN ports 1, 2, 3, 4, 5, 6, 7 and 8. See the table below for jumper settings. The default setting is **Enabled**.

LAN Port Enable/Disable Jumper Settings	
Jumper setting	Definition
Pin 1-2	Enabled
Pin 2-3	Disabled



1. JPL1
2. JPL2

Chapter 3

Installation

3-1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your add-on card, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the add-on card from the antistatic bag.
- Handle the add-on card by its edges only; do not touch its components.
- Put the add-on card back into the antistatic bags when not in use.
- For grounding purposes, make sure that your system chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the add-on card.

Unpacking

The add-on card is shipped in antistatic packaging to avoid static damage. When unpacking your component or system, make sure that you are static protected.



Note: To avoid damaging your components and to ensure proper installation, always connect the power cord last, and always unplug it before adding, removing or changing any hardware components.

3-2 Before Installation

Before you install the add-on card, follow the instructions below.

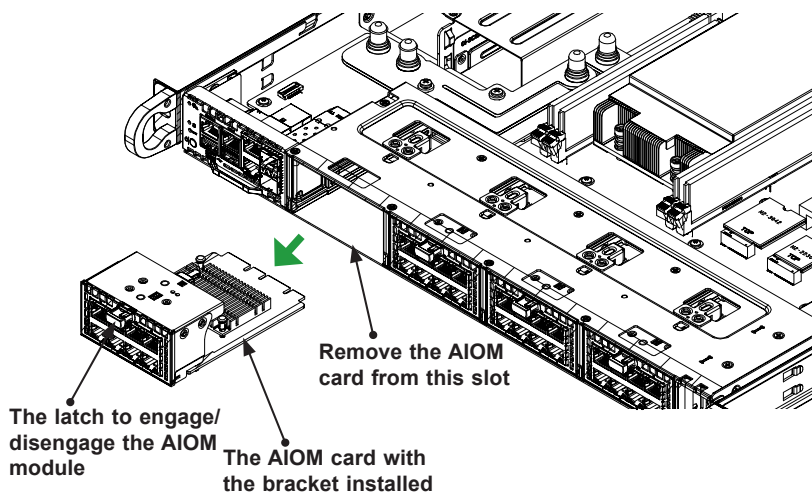
1. Power down the system.
2. Unplug the power cord.
3. Use industry-standard anti-static equipment such as gloves or a wrist strap and follow the precautions on page 3-1 to avoid damage caused by ESD.
4. Familiarize yourself with the server, motherboard, and/or chassis documentation.
5. Confirm that your operating system includes the latest updates and hotfixes.

3-3 Installing the Add-on Card

Follow the steps below to install an add-on card into your system. (If the system is fixed onto a rack, the removal of server top cover is not required. If the system is not anchored to a fixed structure, it is recommended to remove the system top cover for ease of installation)

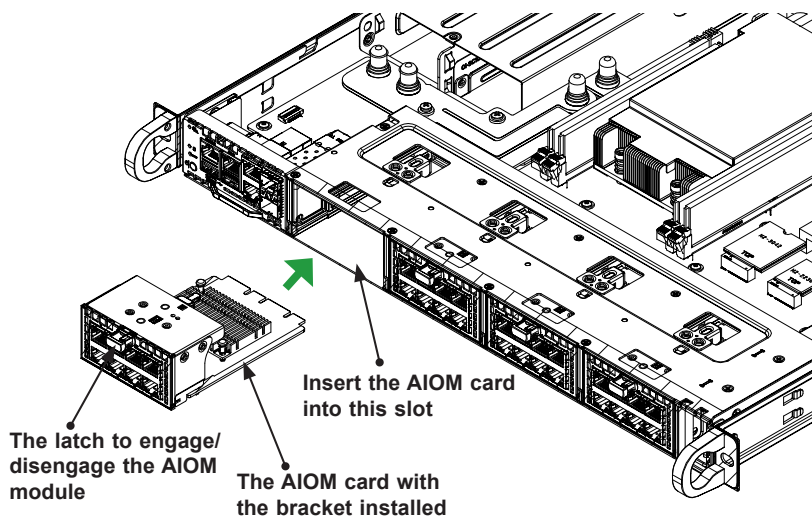
A. Uninstalling an AIOM module (A slot with an AIOM module installed)

1. Press the blue latch to disengage the AIOM module from the chassis structure; the blue latch will extend outward.
2. Pull the blue latch to disengage the AIOM module from the motherboard connector, then gently slide the AIOM module out.



B. Installing an AIOM module (Reinstalling an AIOM module into an empty slot)

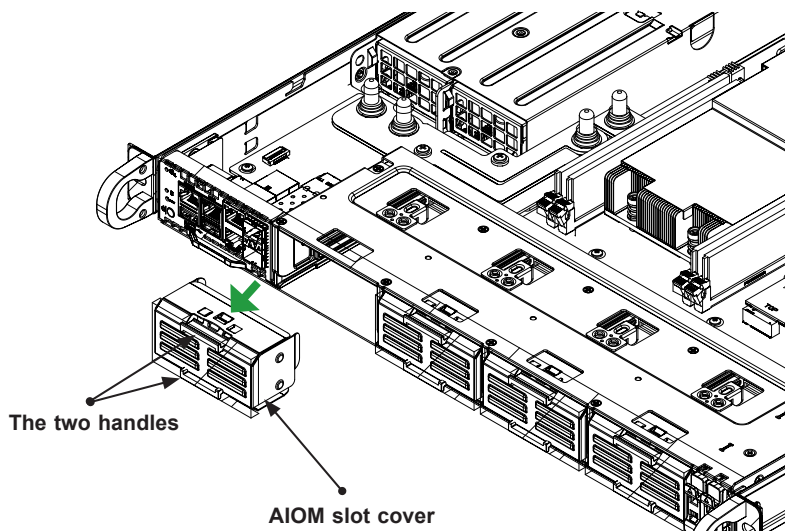
1. Position the AIOM module in front of the empty slot and gently push onto the metal bracket (do not use the blue latch). The AIOM module should slide into the chassis until the card is securely seated in the connector.
2. Press the blue latch to properly secure it onto the chassis.



 **Note:** A computer system should not be operating with an empty AIOM slot. All slots should be populated with AIOM modules, AIOM slot covers, or combinations of both.

C. Installing an AIOM module (An AIOM slot with an AIOM slot cover)

1. Remove the AIOM slot cover by pulling it with two handles.
2. Position the AIOM module in front of the empty slot and gently push onto the metal bracket (do not use the blue latch). The AIOM module should slide into the chassis until the card is fully seated inside the connector.
3. Press the blue latch to secure it onto the chassis structure.

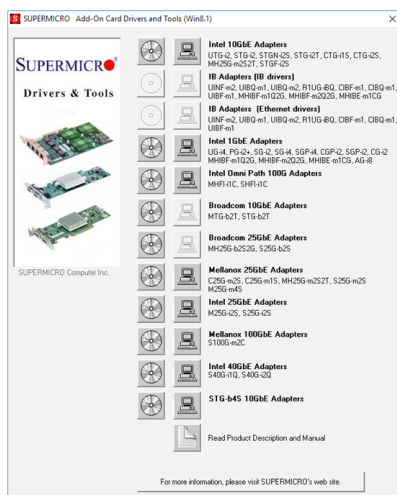


 **Note:** This AIOM module does not support hot plug. Please turn off the AC power and remove the power cord from the wall socket before installing or removing an AIOM module.

3-4 Installing Drivers on Windows (for Intel® i350-AM4)

Follow the steps below to install the drivers for the Windows operating systems. Download the drivers from Intel Download Center or the Supermicro site at https://www.supermicro.com/wftp/Networking_Drivers.

1. Run CDR-NIC.
2. When the SUPERMICRO window appears, click on the computer icon next to the product model.



Note: If the *FOUND NEW HARDWARE WIZARD* screen displays on your system, click CANCEL.

3. Click on INSTALL DRIVERS AND SOFTWARE.
4. Follow the prompts to complete the installation.

3-5 Installing Drivers on Linux (for Intel® i350-AM4)

Download the drivers from Intel Download Center or the Supermicro site at https://www.supermicro.com/wftp/Networking_Drivers.

Build a Binary RPM Package

1. Run 'rpmbuild -tb <filename.tar.gz>'
2. Replace <filename.tar.gz> with the specific filename of the driver.



Note: For the build to work properly, the current running kernel **MUST** match the version and configuration of the installed kernel sources. If you have just recompiled the kernel, reboot the system at this time.

Follow the instructions below to build the driver manually.

1. Move the base driver tar file to the directory of your choice. For example:

```
/home/username/igb
```

or

```
/usr/local/src/igb
```

2. Untar/unzip archive, where <x.x.x> is the version number for the driver tar file:

```
tar xzf igb-x.x.x.tar.gz
```

3. Change to the driver src directory, where <x.x.x> is the version number for the driver tar:

```
cd igb-x.x.x/src/
```

4. Compile the driver module:

```
make install
```

The binary will be installed as:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/igb/igb.ko
```

The install locations listed above are the default locations. They may not be correct for certain Linux distributions. For more information, see the `ldistrib.txt` file included in the driver tar.



Note: IGB_NO_LRO is a compile time flag. The user can enable it at compile time to remove support for LRO from the driver. The flag is used by adding `CFLAGS_EXTRA="-DIGB_NO_LRO"` to the make file when it's being compiled.

```
make CFLAGS_EXTRA="-DIGB_NO_LRO" install
```

1. Load the module:

For kernel 2.6.x, use the `modprobe` command:

```
modprobe igb <parameter>=<value>
```

For 2.6 kernels, the `insmod` command can be used if the full path to the driver module is specified. For example:

```
insmod /lib/modules/<KERNEL VERSION>/kernel/drivers/net/  
igb/igb.ko
```

In addition, when using 2.6-based kernels, make sure that older `igb` drivers are removed from the kernel before loading the new module. To do this, use:

```
rmmod igb; modprobe igb
```

2. Assign an IP address to the interface by entering the following, where `x` is the interface number:

```
ifconfig ethx <IP_address> netmask <netmask>
```

3. Verify that the interface works. Enter the following, where `<IP_address>` is the IP address for another machine on the same subnet as the interface that is being tested:

```
ping <IP_address>
```

3-6 Installing Drivers on FreeBSD (for Intel® i350-AM4)

Follow the instructions below to install the drivers for FreeBSD kernel 4.8 or later. In the instructions below, `x.x.x` is the driver version as indicated in the name of the driver tar file.



Note: You must have kernel sources installed in order to compile the driver module.

1. Move the base driver tar file to the directory of your choice. For example, use `/home/username/igb` or `/usr/local/src/igb`.

2. Untar/unzip the archive:

```
tar xfz igb-x.x.x directory
```

3. To install man page:

```
cd igb-x.x.x  
gzip -c igb.4 > /usr/share/man/man4/igb.4.gz
```

1. To load the driver onto a running system, perform the following steps:

```
cd igb-x.x.x
make
or
cd igb-x.x.x/src
make load
```

2. To assign an IP address to the interface, enter the following:

```
ifconfig igb<interface_num> <IP_address>
```

3. Verify that the interface works. Enter the following, where <IP_address> is the IP address for another machine on the same subnet as the interface that is being tested:

```
ping <IP_address>
```

4. If you want the driver to load automatically when the system is booted:

```
cd igb-x.x.x/src
make load
cp if_igb.ko /modules
```

Edit /boot/loader.conf, and add the following line:

```
if_igb_load="YES"
```

or

compile the driver into the kernel (see item 8). Edit /etc/rc.conf, and create the appropriate `ifconfig_igb<interface_num>` entry:

```
ifconfig_igb<interface_num>=<ifconfig_settings>
```

Example usage:

```
ifconfig_igb0="inet 192.168.10.1 netmask 255.255.255.0"
```

1. If you want to compile the driver into the kernel, enter:

```
cd igb-x.x.x/src
mkdir /usr/src/sys/dev/igb
cp if_igb* /usr/src/sys/dev/igb
cp igb* /usr/src/sys/dev/igb
cp Makefile.kernel /usr/src/sys/modules/igb/Makefile
```

Edit the `/usr/src/sys/conf/files.i386` file, and add the following line:

```
dev/igb/igb_hw.c optional igb
dev/igb/igb_ee.c optional igb
dev/igb/if_igb.c optional igb
```

Remove the following lines from the `/usr/src/sys/conf/files.i386` file, if they exist:

```
/dev/igb/if_igb_fx_hw.c optional igb
/dev/igb/if_igb_phy.c optional igb
```

Edit the kernel configuration file (i.e., `GENERIC` or `MYKERNEL`) in `/usr/src/sys/i386/conf`, and ensure the following line is present:

```
device igb
```

Compile and install the kernel. Reboot the system for the kernel updates to take affect.