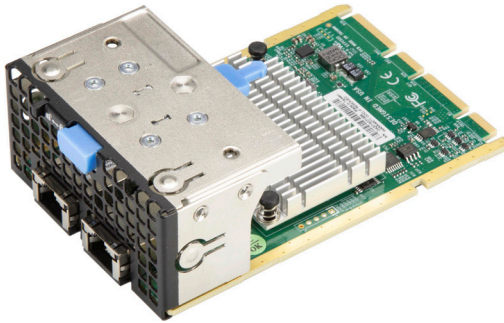
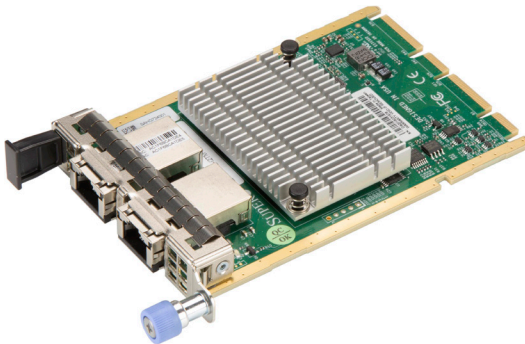




AOC-ATG-i2T



AOC-ATG-i2TM



User's Guide

Revision 1.0

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User's Guide Revision 1.0

Release Date: June 16, 2020

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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-ATG-i2T(M) 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 as well as other I/O technologies. The AOC-ATG-i2T(M) is one of the most feature-rich lower power 10GBase-T controllers in the market today. Based on the Intel® X550 chipset with virtualization features such as VXLAN and NVGRE, it offers flexible connectivity selection for all networking requirements. The integration of 10GbE MAC +PHY with Intel® X550 helps to drive down both cost and power, enabling the most cost-effective solution in the data center. The AOC-ATG-i2T(M) is among the most innovative 10Gbe controllers in the market and is an excellent choice to expand network connectivity in the data centers and enterprise environments.

### 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

### AOC-AHIBE-m2CG



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 <sup>nd</sup> 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-i2T	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-i1C	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-STG5-i1T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT	1 RJ45 (10GbBase-T)	5.9" (150mm) x 2.73" (69mm)	9
AOC-STG5-i2T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GbBase-T)	5.9" (150mm) x 2.73" (69mm)	11
AOC-STG-b2T	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® 82599EN	1 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	10
AOC-STGN-i2S	10GbE	Standard LP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	11.2
AOC-STOF-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-b4S	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57840S	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-S25G-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-S25G-b2S	25GbE	Standard LP	PCI-E x8	Broadcom® BCM57414	2 SFP28 (25Gb/port)	5.6" (142mm) x 2.713" (69mm)	5.2
AOC-S25G-i2S	25GbE	Standard LP	PCI-E x8	Intel® XXV710	2 SFP28 (25Gb/port)	6.1" (155mm) x 2.713" (69mm)	7.2
AOC-S40G-i1Q	40GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	1 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	6.5
AOC-S40G-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-S100G-b1C	100GbE	Standard LP	PCI-E x16	Broadcom® BCM57454	2 QSFP28 (100Gb/port)	6.6" (168mm) x 2.73" (69mm)	17.8
AOC-CGP-i2	GbE	MicroLP	PCI-E x4	Intel® i350 AM2	2 RJ45 (1Gb/port)	4.46" (113mm) x 1.54" (39mm)	4
AOC-CTG-i1S	10GbE	MicroLP	PCI-E x8	Intel® 82599EN	1 SFP+ (10Gb/port)	4.86" (123mm) x 1.54" (39mm)	10
AOC-CTG-i2S	10GbE	MicroLP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.86" (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 2.76" (77mm)	13
AOC-CTG5-i2T	10GbE	MicroLP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GbBase-T)	4.46" (113mm) x 1.54" (39mm)	12
AOC-C25G-m1S	25GbE	MicroLP	PCI-E x8	Mellanox® CX-4 Lx EN	1 SFP28 (25Gb/port)	4.46" (113mm) x 1.54" (39mm)	8.5

## Contacting Supermicro

### Headquarters

Address: Super Micro Computer, Inc.  
980 Rock Ave.  
San Jose, CA 95131 U.S.A.

Tel: +1 (408) 503-8000

Fax: +1 (408) 503-8008

Email: [marketing@supermicro.com](mailto:marketing@supermicro.com) (General Information)  
[support@supermicro.com](mailto:support@supermicro.com) (Technical Support)

Website: [www.supermicro.com](http://www.supermicro.com)

### Europe

Address: Super Micro Computer B.V.  
Het Sterrenbeeld 28, 5215 ML  
's-Hertogenbosch, The Netherlands

Tel: +31 (0) 73-6400390

Fax: +31 (0) 73-6416525

Email: [sales@supermicro.nl](mailto:sales@supermicro.nl) (General Information)  
[support@supermicro.nl](mailto:support@supermicro.nl) (Technical Support)  
[rma@supermicro.nl](mailto:rma@supermicro.nl) (Customer Support)

Website: [www.supermicro.nl](http://www.supermicro.nl)

### Asia-Pacific

Address: Super Micro Computer, Inc.  
3F, No. 150, Jian 1st Rd.  
Zhonghe Dist., New Taipei City 235  
Taiwan (R.O.C)

Tel: +886-(2) 8226-3990

Fax: +886-(2) 8226-3992

Email: [support@supermicro.com.tw](mailto:support@supermicro.com.tw)

Website: [www.supermicro.com.tw](http://www.supermicro.com.tw)

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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/info/networking.cfm#adapter>.

### 1-2 Product Highlights

- Advanced I/O Module (AIOM) form factor
- Intel® X550 10GbE controller
- Dual RJ45 connectors
- Network Virtualization Offloads: VXLAN and NVGRE
- VMDq and SR-IOV for virtualized environment
- Jumbo Frames support up to 15.5KB
- Asset Management features with thermal sensor
- NC-SI for Remote Management
- Supports RJ-45 Category-6 and 6A cables
- RoHS compliant 6/6 



## 1-3 Technical Specifications

### General

- Advanced I/O Module (AIOM) form factor
- Intel® X550 dual-port 10GbE controller with integrated MAC and PHY
- Dual RJ45 ports

### I/O Features

- Intel Flow Director
- MSI/MSI-X support
- Tx/Rx IP, SCTP, TCP, and UDP Checksum Offloading (IPv4, IPv6) capabilities
- Tx TCP Segmentation Offload (IPv4, IPv6)
- RSS for Windows Environment Scalable I/O for Linux environments

### Virtualization Features

- Network Virtualization Stateless Offload: VXLAN, NVGRE
- Support for Virtual Machine Device Queues (VMDq)
- 64 Transmit (Tx) and Receive (Rx) Queue Pairs per port
- FFP – 64 VFs per port
- PC-SIG SR-IOV support
- 802.1q VLAN support

### Manageability Features

- Preboot eXecution Environment (PXE) support
- Remote Boot iSCSI and FCoE

- EEEE 1588
- Asset Management support on Supermicro® platforms
- NC-SI for Remote Management on Supermicro® platforms

### Cable Support

- RJ-45 Category-6 up to 55m; Category-6A up to 100m

### Power Consumption

- Maximum power consumption 13W

### 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 115mm (W x D)



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

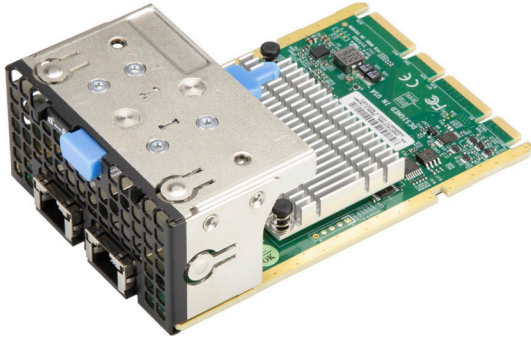
## 1-4 Available SKUs

SKUs	Bracket Included	Description
AOC-ATG-i2T	BKT-0167L	2-port Gigabit Ethernet Adapter with a 1U height bracket
AOC-ATG-i2TM	BKT-0168L	2-port Gigabit Ethernet Adapter with a 0.5U height bracket

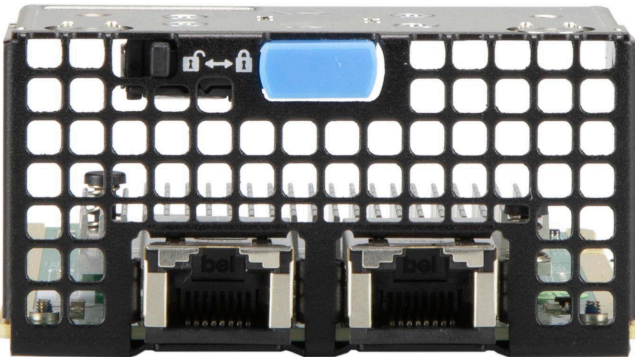
## Chapter 2

### Hardware Components

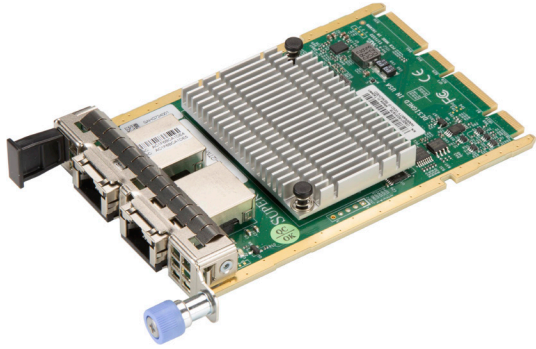
#### 2-1 Add-On Card Image and Layout



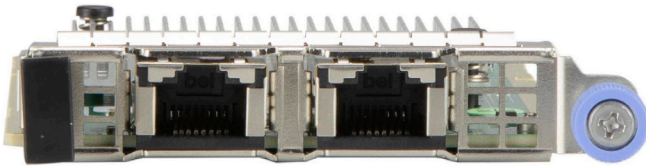
Side view of the AOC-ATG-i2T



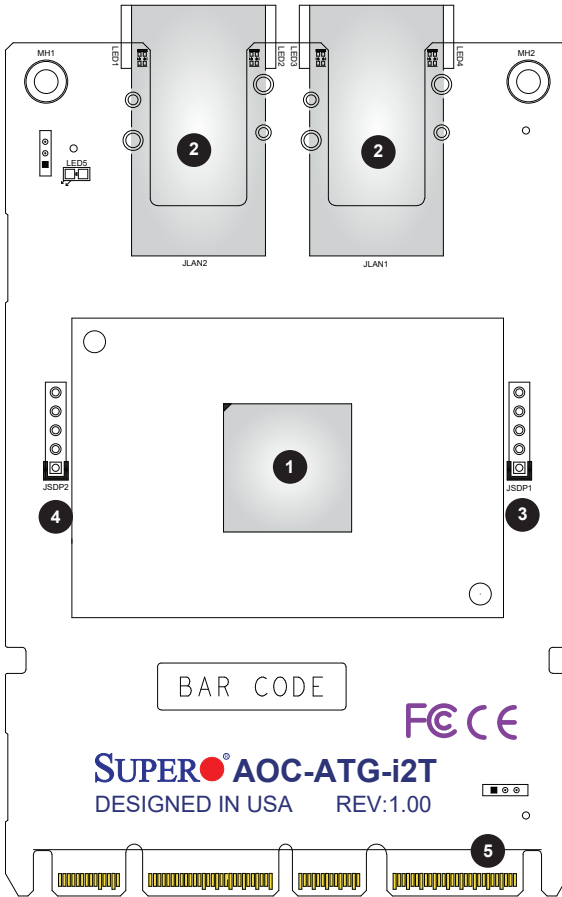
Front view of the AOC-ATG-i2T



**Side view of the AOC-ATG-i2TM**



**Front view of the AOC-ATG-i2TM**



## 2-2 Major Components


The following components are on the AOC-ATG-i2T(M):

1. One Intel® X550 10GbE controller
2. Dual RJ45 ports
3. JSDP1
4. JSDP2
5. PCI-E 3.0 x4 interface


## 2-3 LED Indicators and Connectors

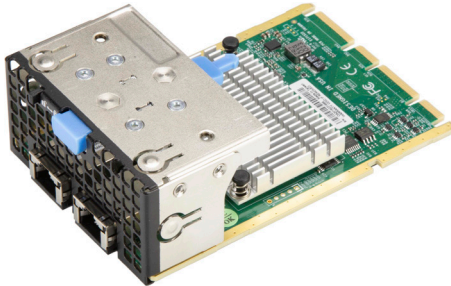
### LAN Ports

The AOC-ATG-i2T(M) has two network LAN (SFP+) ports. These LAN ports support connection speeds up to 1Gbps. Plug the Direct Attached Copper (DAC) cable into the SFP+ port for network connections.

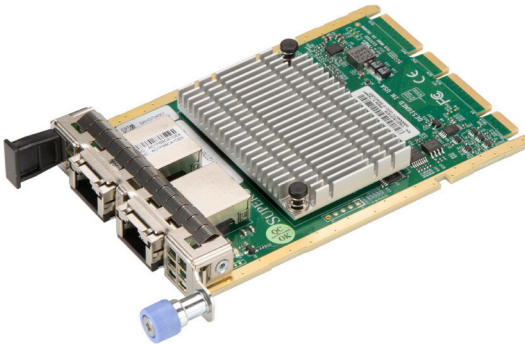
 **Note 1:** To make sure that LAN port functions properly, be sure to use the following cable specified by the manufacturer:

- Direct-attached twin-axial copper cable, or
- Short Range or Long Range fiber optic cable used in conjunction with optional optical transceiver.

 **Note 2:** For detailed information on the cable and transceiver recommended by the manufacturer, please refer to "Optional Accessories" on Page 1-4 or SMC product information posted online.



The AOC-ATG-i2T

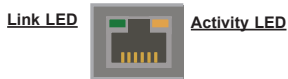


The AOC-ATG-i2TM

LED	Color	Definition
Link (Left)	Amber	1G Link Speed
	Green	10G Link Speed
Activity (Right)	Green Flashing	Activity

## LAN LED

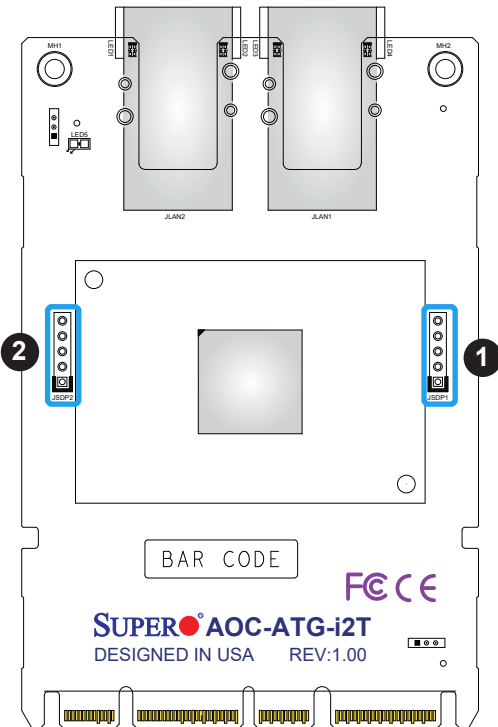
Each SFP+ connector has two LEDs. The LED on the top indicates link speeds, and the LED on the bottom indicates the status of activity of the connector. See the table above for more information.



### JSDP1 and JSDP2

Use Header JSDP1 and JSDP2 to connect to a cable to communicate with the SDP of the LAN chips on the AOC-ATG-i2T(M). JSDP1 is for the first LAN port and JSDP2 is for the second port. See the table below for header settings.

JSDP1/2 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. JSDP2



## 2-4 Major Components of AIOM Module

The major components of the Supermicro® Advanced I/O Modules (AIOM) are the card and bracket. Before a computer system can operate, all slots are required to be populated. If an AIOM module is used, be sure that the bracket is firmly installed into the chassis. This will ensure that the card that is installed to the bracket is seated securely in the motherboard connector. For instructions on how to install and uninstall an AIOM module please refer to chapter 3.

## 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.

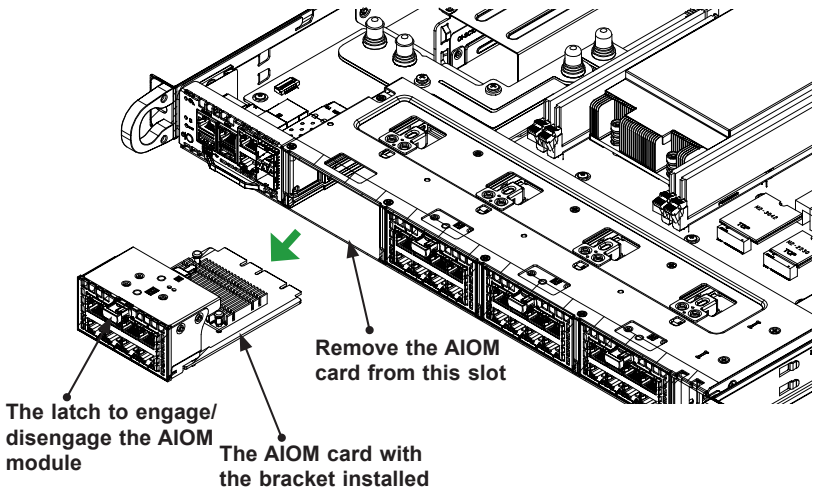
1. Power down the system.
2. Unplug the power cord.
3. Use industry-standard anti-static equipment such as gloves or a wrist strap and follow the precautions on page 3-1 to avoid damage caused by ESD.
4. Familiarize yourself with the server, motherboard, and/or chassis documentation.
5. Confirm that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

### 3-3 Installing the Add-on Card AOC-ATG-i2T (with 1U bracket)

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

1. Slide the black latch to the left to "unlock" position, then disengage the AIOM module from the chassis structure by pushing the blue latch once to extend it outward.

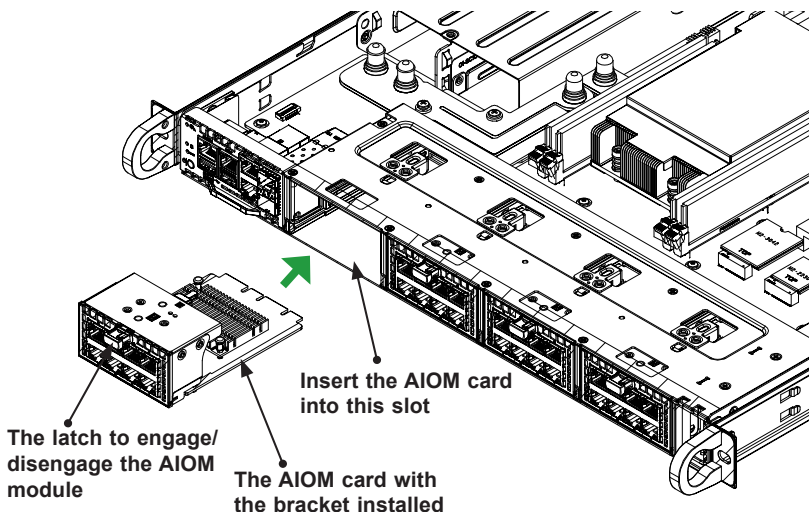



### B. Installing an AIOM module (Reinstalling an AIOM module into an empty slot)

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 and move the black latch to the right to "lock" position.



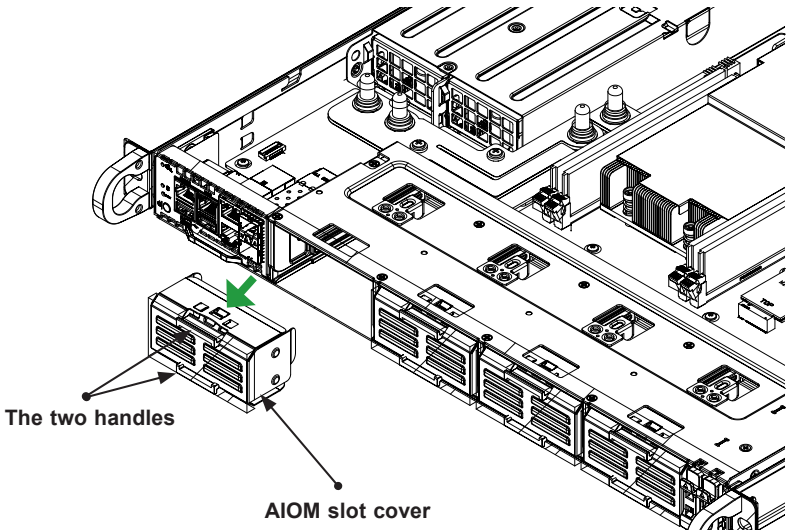
Black Latch




 **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.



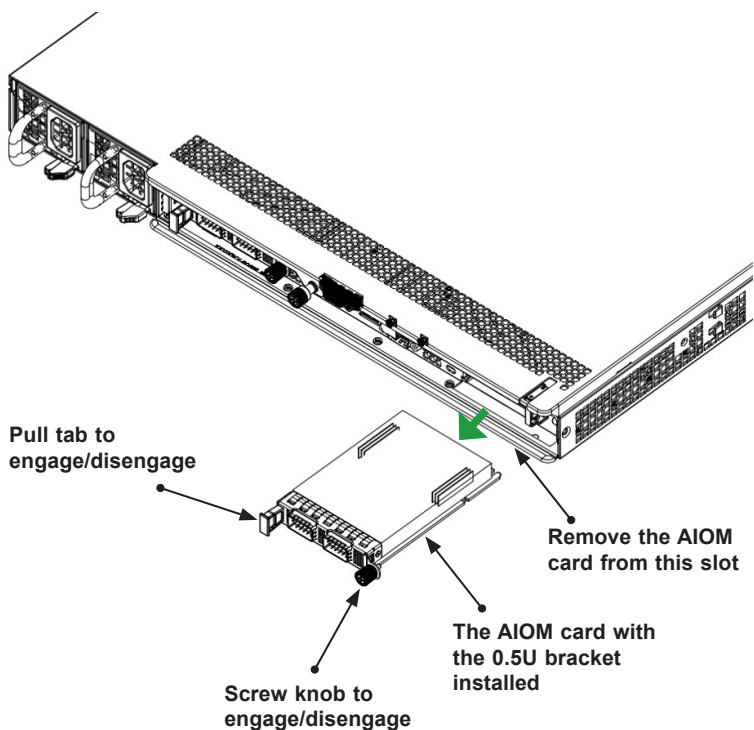
 **Note:** This AIOM module does not support hot plug. Please turn off the AC power and remove the power cord from the wall socket before installing or removing an AIOM module.

### 3-4 Installing the Add-on Card AOC-ATG-i2TM (with 0.5U bracket)

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)

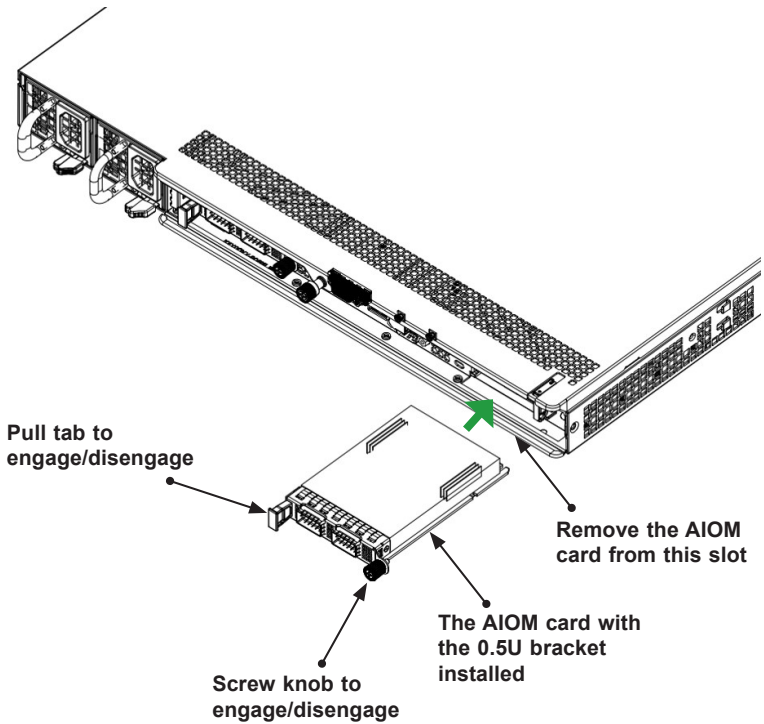
#### A. Uninstalling an AIOM module

1. Unscrew the blue knob from the system.
2. Pull on the tab and a knob evenly on both sides of the card to disengage the AIOM module from the motherboard connector, then gently slide the AIOM module out.



## B. Installing an AIOM module

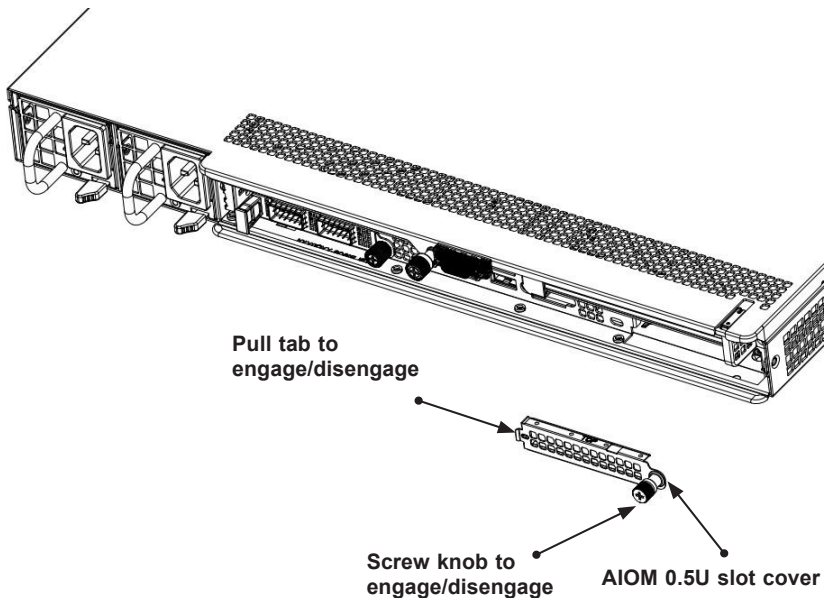
1. Position the AIOM module in front of the empty slot and gently push onto the metal bracket. The AIOM module should slide into the chassis until the card is securely seated in the connector.
2. Press the blue knob and secure it onto the chassis by turning the knob clockwise.






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

1. Remove the AIOM slot cover by unscrewing the knob and screw that attaches the bracket to the chassis. Pull the bracket away and set it aside.
2. Position the AIOM module in front of the empty slot and gently push onto the metal bracket. The AIOM module should slide into the chassis until the card is securely seated in the connector.
3. Press the blue knob and secure it onto the chassis by turning the knob clockwise.



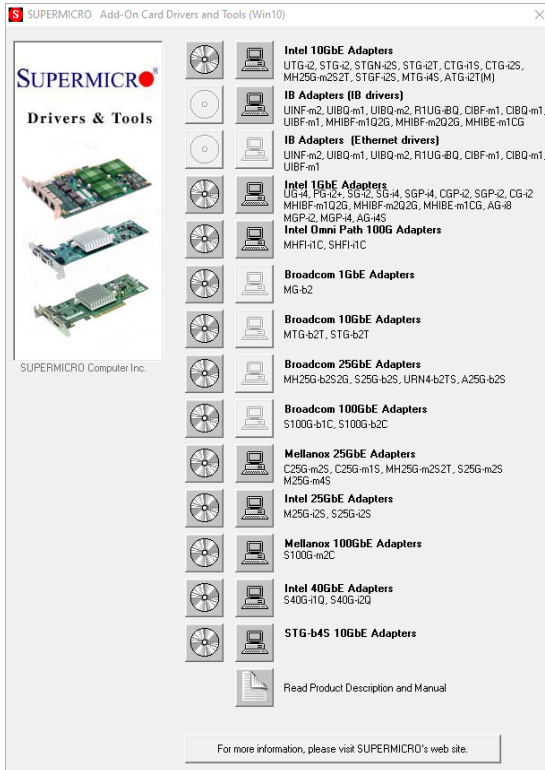
 **Note 1:** This AIOM module does not support hot plug. Please turn off the AC power and remove the power cord from the wall socket before installing or removing an AIOM module.

**Note 2:** Graphics shown above are for illustration purposes only. Actual products may vary due to product enhancement.

## 3-5 Installing Drivers on Windows (for Intel® X550-AT2)

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](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.

## 3-6 Installing Drivers on Linux (for Intel® X550-AT2)

Download the drivers from Intel Download Center or the Supermicro site at [https://www.supermicro.com/wftp/Networking\\_Drivers](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.

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

```
/home/username/ixgbe
```

or

```
/usr/local/src/ixgbe
```

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

```
tar xzf ixgbe-x.x.x.tar.gz
```

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

```
cd ixgbe-x.x.x/src/
```

5. Compile the driver module:

```
make install
```

The binary will be installed as:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/ixgbe/ixgbe.[k]o
```

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:** IXGBE\_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
```

6. Load the module:

For kernel 2.6.x, use the modprobe command:

```
modprobe ixgbe <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/  
ixgbe/ixgbe.ko
```

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

```
rmmod ixgbe; modprobe ixgbe
```

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

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

8. 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>
```

### 3-7 Installing Drivers on FreeBSD (for Intel® X550-AT2)

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 drive 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/ixgbe or /usr/local/src/ixgbe.

2. Untar/unzip the archive:

```
tar xzf ixgbe-x.x.x directory
```

3. To install man page:

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

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

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

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

```
ifconfig ixgbe<interface_num> <IP_address>
```

6. 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>
```

7. If you want the driver to load automatically when the system is booted, please enter the following:

```
cd ixgbe-x.x.x/src
make load
cp if_ixgbe.ko /modules
```

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

```
if_ixgbe_load="YES"
```

or

compile the driver into the kernel (see item 8).

Edit `/etc/rc.conf`, and create the appropriate `ifconfig_ixgbe<interface_num>` entry:

```
ifconfig_ixgbe<interface_num>=<ifconfig_settings>
```

Example usage:

```
ifconfig_ixgbe0="inet 192.168.10.1 netmask 255.255.255.0"
```

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

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

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

```
dev/ixgbe/ixgbe_hw.c optional ixgbe
dev/ixgbe/ixgbe_ee.c optional ixgbe
dev/ixgbe/if_ixgbe.c optional ixgbe
```

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

```
/dev/ixgbe/if_ixgbe_fx_hw.c optional ixgbe
/dev/ixgbe/if_ixgbe_phy.c optional ixgbe
```

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

```
device ixgbe
```

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