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-S100G-m2C add-on card.

About this Add-on Card

The Supermicro® AOC-S100G-m2C provides exceptionally high performance at 100Gb/s Ethernet connectivity. Utilizing Mellanox ConnectX®-4 EN with features such as VXLAN and NVGRE, this add-on card offers network flexibility, high bandwidth with specific hardware offload for I/O virtualization. It can optimize bandwidth demand from virtualized infrastructure in data centers or cloud deployments. Moreover, the AOC-S100G-m2C supports the RoCE specification with CPU offload, delivering low-latency and high-efficiency over Ethernet networks. Its Supermicro Asset Management and thermal detection provide an extra layer of controller health management. The Supermicro® AOC-S100G-m2C is the building block of choice for the next generation of high speed Ethernet data center networks.

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 to prevent damage to the system or injury to yourself:

Note: Additional information given to differentiate between various models or provides information for correct system setup.

Naming Convention

SMC Networking Add-on Cards
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Form Factor</th>
<th>Interface</th>
<th>Controller</th>
<th>Connection</th>
<th>Dimension (w/o Brackets) (L x H)</th>
<th>Power (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOC-SGP-i2</td>
<td>G64</td>
<td>Standard LP</td>
<td>PC-E x4</td>
<td>Intel® i350 AM2</td>
<td>2 RJ45</td>
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</table>
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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 Key Features

The key features of this add-on card include the following:

- Dual QSFP28 connectors
- Low-Profile, short length standard form factor
- PCI-E 3.0 x16
- Asset Management features with thermal sensor
- Mellanox ConnectX®-4 EN Ethernet controller
- Hardware offloads for VXLАН, NVGRE, and GENEVE encapsulated traffic
- Low latency RDMA over Converged Ethernet (RoCE)
- SR-IOV compliant
- Jumbo Frames support up to 9.6KB
- PXE support
- Erasure coding offload
- NC-SI for IPMI support
- RoHS compliant 6/6
1-3 Specifications

General
- Mellanox ConnectX®-4 EN dual port 100Gbps controller
- Compact size low-profile standard form factor
- PCI-E 3.0 x16 interface
- Dual QSFP28 connectors
- Max power consumption: 16.3W

Host Interface
- PCI-E 3.0 x16
- Message Signal Interrupt (MSI-X)

Networking Features
- IEEE 802.2bj, 802.3bm 100 Gigabit Ethernet
- 25G Ethernet Consortium 25, 50 Gigabit Ethernet
- IEE 802.3ba 40 Gigabit Ethernet
- IEEE 802.3ae 10 Gigabit Ethernet
- IEEE 802.3az Energy Efficient Ethernet
- IEEE 802.3ap based auto-engotation and KR startup
- IEEE 802.ad, 802.1AX link aggregation
- IEEE 802.1Q, 802.1p VLAN tags and priority
- IEEE 802.1Qau (QCN) – congestion notification
- IEEE 802.1Qaz (ETS)
- IEEE 802.1Qbb (PFC)
• IEEE 802.1Qbg

• IEEE 1588v2

• Jumbo frame support (9.6KB)

**CPU Offload Features**

• RDMA over Converged Ethernet (RoCE)

• TCP/UDP/IP stateless offload

• LSO, LRO, checksum offload

• RSS, TSS, HDS, VLAN insertion/stripping. receive flow steering

• Intelligent interrupt coalescence

**Storage Offloads**

• RAID offload – erasure coding (Reed-Solomon) offload

**Overlay Networks**

• Stateless offloads for overlay networks and tunneling protocols

• Hardware offload of encapsulation and decapsulation of NVGRE and VXLAN overlay networks

**Hardware-Based I/O Virtualization**

• Single root IOV

• Multi-function per port

• Address translation and protection

• Multiple queues per virtual machine

• Enhanced QoS for vNICs

• VMware NetQueue support
Virtualization Features

- SR-IOV: up to 256 virtual functions
- SR-IOV: up to 16 physical functions per port
- 1K ingress and egress QoS levels
- Guaranteed QoS for VMs

Operating Systems/Distribution

- RHEL/CentOS
- Windows
- FreeBSD
- VMware
- OpenFabrics Enterprise Distribution (OFED)
- OpenFabrics Windows Distribution (WinOF)

Management Features

- NC-SI for IPMI support
- Asset Management with thermal sensor

Remote Boot

- Remote boot over iSCSi
- PXE and UEFI

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
Chapter 1: Overview

Physical Dimensions

- Card PCB dimensions: 16.76cm x 6.89cm (6.6in x 2.71in) (LxW)
- Height of end brackets: standard – 12cm (4.725in), low-profile – 8cm (3.15in)

Weight

- 116.12g (0.2560lb)

Supported Platforms

- Supermicro® motherboards with minimum PCI-E x16 expansion slot
- Supermicro® server systems with low-profile or full-height PCI-E 3.0 x16 expansion slot
- NC-SI feature is only supported by Supermicro motherboards with corresponding NC-SI connectors

Notes: This product is intended to be used with Supermicro server systems or motherboards as an integrated solution package.

Compliance/Environmental

- RoHS Compliant 6/6, Pb Free
1-4  Similar Products

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<tr>
<th>Product Part Number</th>
<th>Form Factor</th>
<th>Speed</th>
<th>PCI-E</th>
<th>Connector Type</th>
<th>Total Ports</th>
<th>Chipset</th>
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<td>Intel® XL710</td>
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<td>Low Profile</td>
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<td>Mellanox ConnectX®-4 Lx EN</td>
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1-5  Optional Parts List

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<th>Description</th>
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<td>Ethernet</td>
<td>CLB-NTWK-0943-SQ28C10M  Ethernet, QSFP28, 100GbE, Passive, 1M</td>
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<td>QSFP28 Transceiver Module</td>
<td>AOM-MMA1B00-C100D-MLN  QSFP28 SR5 Transceiver 70m w/ OM3, 100m w/ OM4, MPO/MMF</td>
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Chapter 2

Hardware Components

2-1 Add-On Card Image and Layout

The AOC-S100G-m2C Image

The AOC-S100G-m2C Layout

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<tr>
<th>1. Mellanox® ConnectX®-4 EN</th>
<th>5. LED2: QSFP28 Port2 Link LED</th>
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<td>2. QSFP28 Port1</td>
<td>6. DIP Switch</td>
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<tr>
<td>3. QSFP28 Port2</td>
<td>7. NC-SI header</td>
</tr>
<tr>
<td>4. LED1: QSFP28 Port1 Link LED</td>
<td>8. PCI-E 3.0 x16</td>
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2-2 Major Components

The following major components are installed on the AOC-S100G-m2C:

1. Mellanox ConnectX®-4 EN controller

2. QSFP28 Port1/2

3. LED1/LED2: QSFP28 Port1/2 Link LEDs

4. NC-SI for IPMI support

5. DIP switch
2-3 QSFP28 Ethernet Connections

QSFP28 Port

Two Quad-Small-Form-Factor-Pluggable 28 (QSFP28) connectors are located at J2/J3 on the add-on card. The QSFP28 ports operate up to 100Gb/s. Plug the Direct Attached Copper (DAC) cable into the QSFP28 ports for network connections. See the layout below for the locations.

QSFP28 PCB LEDs

There are two LEDs on the AOC-S100G-m2C. A solid green LED indicates the link-up connection. See the table and layout below for more information and locations.

<table>
<thead>
<tr>
<th>QSFP28 PCB LEDs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Color/Status</td>
<td>Definition</td>
</tr>
<tr>
<td>Blinking Green</td>
<td>Activity</td>
</tr>
<tr>
<td>Solid Green</td>
<td>Physical Link-up</td>
</tr>
</tbody>
</table>

1. QSFP28 Port1
2. QSFP28 Port2
3. QSFP28 Port1 Link LED
4. QSFP28 Port2 Link LED
NC-SI Header

A Network-Controller Sideband Interface (NC-SI) header is located at JNCSI1 on the add-on card. Connect an appropriate cable from this header to a motherboard to provide the out-of-band (sideband) connection between the onboard Baseboard Management Controller (BMC) and a Network Interface Controller (NIC) for remote management. For the network sideband interface to work properly, you will need to use a motherboard that supports NC-SI and also need to have a special cable. Please contact Supermicro at www.supermicro.com to purchase the cable for this header. See the layout below for the location.

PCI-E 3.0 x16 Golden Finger

A PCI-E 3.0 x16 Golden Finger is located at J1 on the add-on card. Insert this connector into a PCI-E 3.0 x16 slot on a motherboard to use the AOC-S100G-m2C add-on card. See the layout below for the location.
2-5  DIP Switch

DIP Switch

The DIP switch at S1 provides SMBUS address selection. You can configure the card with static SMBUS address. Refer to the tables below for address selections. See the layout below for the location.

<table>
<thead>
<tr>
<th>Switch Position</th>
<th>OFF (default)</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SMBUS ARP mode</td>
<td>Static SMBUS address mode</td>
</tr>
<tr>
<td>2-5</td>
<td>Static SMBUS address selection</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Thermal Reading Enable</td>
<td>Thermal Reading Disable</td>
</tr>
</tbody>
</table>

### Static SMBUS address selection table by DIP switch S1

<table>
<thead>
<tr>
<th>SMBUS Address</th>
<th>S1 position #5</th>
<th>S1 position #4</th>
<th>S1 position #3</th>
<th>S1 position #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>30/D0</td>
<td>OFF/ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>32/D2</td>
<td>OFF/ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>34/D4</td>
<td>OFF/ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>36/D6</td>
<td>OFF/ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>38/D8</td>
<td>OFF/ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>3A/DA</td>
<td>OFF/ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>3C/DC</td>
<td>OFF/ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>3E/DE</td>
<td>OFF/ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

1. DIP Switch
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, or peripheral chips.

• 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, be sure to always connect the power cord last, and always remove it before adding, removing or changing any hardware components.
3-2  Before Installation

To install the add-on card properly, be sure to 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 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 the add-on card into your system.

1. Remove the server cover and, if any, set aside any screws for later use.

2. Remove the add-on card slot cover. If the case requires a screw, place the screw aside for later use.

3. Position the add-on card in the slot directly over the connector, and gently push down on both sides of the card until it slides into the PCI connector.

4. Secure the add-on card to the chassis. If required, use the screw that you previously removed.

5. Attach any necessary external cables to the add-on card.

6. Replace the chassis cover.

7. Plug the power cord into the wall socket and power up the system.
3-4 Installing Drivers from the CD-ROM CDR-NIC

Follow the steps below to install the drivers needed for your Windows OS support. The controller comes with a driver on the CD-ROM CDR-NIC.

1. Run the CDR-NIC. (If you do not have a product CD-ROM, download drivers from the Supermicro Support Website and then transfer them to your system.)

2. When the SUPERMICRO window appears, click on the computer icon next to the product model.

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

4. Click on INSTALL DRIVERS AND SOFTWARE.

4. The Install Shield Wizard will start. Follow the prompts to complete the installation.
3-5 Installing Drivers

Use the procedures below to install drivers for the AOC-S100G-m2C add-on card for both Linux and Windows

**Linux Drivers**

Use the following procedures to install drivers on the Linux operating system.

*Installing 100G Drivers for the Linux Operating System*

1. From the CDR-NIC LAN driver CD, go to the following directory: Mellanox > Linux. You may also go to the Supermicro website at https://www.supermicro.com/wftp/Networking_Drivers/Mellanox/

2. Download the Linux driver package file.

3. Install the driver by entering the following commands:

   ```
   tar xzvf MLNX_OFED_LINUX-<ver>.tgz
   cd MLNX_OFED_LINUX-<ver>
   ./mlnxofedinstall -without-fw-update
   ```

   This installs the Linux drivers to your system.

   *Note: Driver installation may require root privileges.*
Windows Drivers

Use the following procedures to install drivers on the Windows operating system.

**Installing 100G Drivers for the Windows Operating System**

1. From the CDR-NIC LAN driver CD, go to the following directory: Mellanox > Windows. You may also go to the Supermicro website at https://www.supermicro.com/wftp/Networking_Drivers/Mellanox/

2. Choose the desired Windows driver package file.

3. Double-click to run and install the executable (.exe) file in the driver package.

4. The Install Shield Wizard will start. Follow the prompts to complete the installation.

*Note:* For more driver installation information, please refer to Mellanox Support Website.