# AMC-7000

AdvancedMC™ SATA Drive Module

**User's Manual**




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# Revision History

| Revision | Release Date | Description of Change(s) |
|---|---|---|
| 2.00 | 2011/11/09 | Initial Release |

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# Preface

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## Using this Manual

### Audience and Scope

The AMC-7000 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating AMC modules.

### Manual Organization

This manual is organized as follows:

**Chapter 1, Overview:** Introduces the AMC-7000, its features, and package contents.

**Chapter 2, Installation:** Provides detailed instructions for installing the AMC-7000.

**Chapter 3, Functional Description:** Describes the major functional features and capabilities of the AMC-7000

**Chapter 4, Connector Pin Assignments:** Describes the connector pin assignments of the AMC-7000.

**Chapter 5, Specifications:** Describes the environmental and mechanical specifications of the AMC-7000.

**Chapter 6, Front Panel Indicators:** Describes the the Front Panel LED indicators.

**Important Safety Instructions:** Presents safety instructions all users must follow for the proper setup, installation and usage of equipment and/or software.

**Getting Service:** Contact information for ADLINK's worldwide offices.

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## Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.


NOTE:

Additional information, aids, and tips that help users perform tasks.


CAUTION:

Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.


WARNING:

Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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# 1 Overview

## 1.1 Introduction

The AMC-7000 is an Advanced Mezzanine Card (AMC) module which provides embedded systems designers with an in-chassis storage solution that utilizes a SATA hard drive. SATA technology generally boasts the greatest reliability and performance needed by mission critical enterprise applications. The Module is as single-width AMC with mid-size panel and hard drive in 2.5” small form factor, to provide the greatest spindle density for your ATCA or MicroTCA application. The AMC-7000 also includes a modular management controller (MMC).

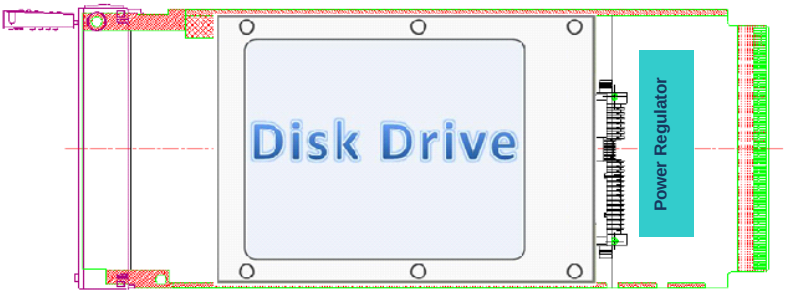



**Figure 1-1: AMC-7000 Assembly Diagram**

## 1.2 Features

The AMC-7000 is a single-width mid-size AMC Module with the following features:

- Supports a single 2.5" SATA hard drive on Port 2
- General Advanced Mezzanine Card Features
- Ejector switches for hot swap
- One Hot Swap LED
- One Module Active (ACT) LED

Refer to *Chapter 5: Specifications* for additional details regarding environmental and mechanical.

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## 1.3 PICMG Standards Compliance

The AMC-7000 is fully compliant with the following PCI Industrial Computer Manufacturers Group (PICMG) specifications:

- PICMG AMC.0 R2.0
- PICMG AMC.3 R1.0 storage signaling option




This product must be protected from static discharge and physical shock. Never remove any of the components except at a static-free workstation. Use the anti-static bag shipped with the product when putting the board on a surface. Wear an anti-static wrist strap properly grounded on one of the system's ESD ground jacks when installing or servicing system components.

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# 2 Installation

This chapter contains the procedures for installing and removing the AMC-7000 AMC module.

The AMC-7000 Module can be installed into an ATCA AdvancedMC carrier board or MicroTCA chassis with slots designed to accept AMC.3 installations. The module slot height must properly match the panel height fitted to the AMC.

## 2.1 Important Information about Your Chassis

### Maximum Module Power Requirements

Be sure to validate the host chassis, and the intended AMC slot is cable of meeting the AMC modules with maximum power requirements.

**AMC-7000 Max. Power Draw:** 6 W

## 2.2 Before Installing or Removing the AMC

Boards may be damaged if improperly installed or handled. Please read and follow the guidelines in this section to protect your equipment.

### ESD Precautions

ADLINK strongly recommends that you use an antistatic wrist strap and a conductive foam pad when installing or upgrading a system. Electronic components, such as disk drives, computer boards, and memory modules, can be extremely sensitive to electrostatic discharge (ESD). After removing the component from its protective wrapper or from the system, place the component flat on a grounded, static-free surface (and, in the case of a board, component side up). Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available at electronics stores) that is attached to an active electrical ground. Note that a system chassis may not be grounded if it is unplugged.

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## Bent Pins or Other Damage

Bent pins or loose components can cause damage to the board, the backplane, or other system components. Carefully inspect your board and the backplane for both pin and component integrity before installation. Our suppliers take significant steps to ensure there are no bent pins on the backplane or connector damage to the boards prior to leaving our factory. Bent pins caused by improper installation or by boards with damaged connectors could void the warranty for the backplane or boards.

If a system contains one or more crushed pins, power off the system and contact your local sales representative to schedule delivery of a replacement chassis assembly.

## Caution Areas




When first installing boards in an empty chassis or onto a carrier board, we recommend that you start at the left of the card cage and work to the right.

When inserting or removing a board in a slot adjacent to other boards, use extra caution to avoid damage to the pins and components located on the primary or secondary sides of the boards.

## Preserving EMI Compliance

To preserve compliance with applicable standards and regulations for electromagnetic interference (EMI), during operation all front and rear openings on the chassis or board faceplates must be filled with an appropriate card or covered with a filler panel. If the EMI barrier is open, devices may cause or be susceptible to excessive interference.

## Understanding Hot Swap

Your AMC-7000 is electrically designed for hot swap within a fully powered chassis.  To facilitate hot swap, there is a blue LED on the front faceplate. This LED is under software control.

If your system is using software that provides full hot swap capabilities, the software will illuminate the blue hot swap LED on the

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AMC faceplate when software has stopped and it is safe to remove the AMC module.

If your system does not have hot-swap aware software running, behavior of the blue LED is indeterminate. In this case, you may need to manually shut down applications or operating systems running on the board prior to board removal, even if the blue LED is lit.

Powering down or removing a board before the operating system or other software running on the board has been properly shut down may cause corruption of data or file systems.

## 2.3 Module Hot Swap

This section describes a recommended procedure for installing a board module in a chassis. The AMC-7000 module has a latching mechanism. The Latch Mechanism includes the module handle with an integrated multi-position shaft and micro-switch (see figure below).

The module handle is held in place by the faceplate, while the micro-switch is mounted on the module printed circuit board. The module handle is used to activate the micro-switch, which allows for Hot Swap switch as well as for extracting the module out of the connector and the AMC bay.

There are 3 positions of the Module Handle:

1. Pushed all the way in (IN) - When IN the module sends a signal to the Shelf Manager that the module is not in the Hot Swap state and the Shelf Manager will communicate with the MMC. This is the position that the Module Handle should be in during normal operation.
2. Half Way (HW) - When the Module Handle is in the HW position, the Hot Swap switch is open and the MMC will send a Hot Swap event to the Shelf manager.
3. Out (OUT) - When the Module Handle is in the OUT position the latching mechanism is released and the module can be extracted.

The use of the Module Handle is used in conjunction with the Blue LED. Please refer to the text below for more detailed instructions on insertion and extraction.

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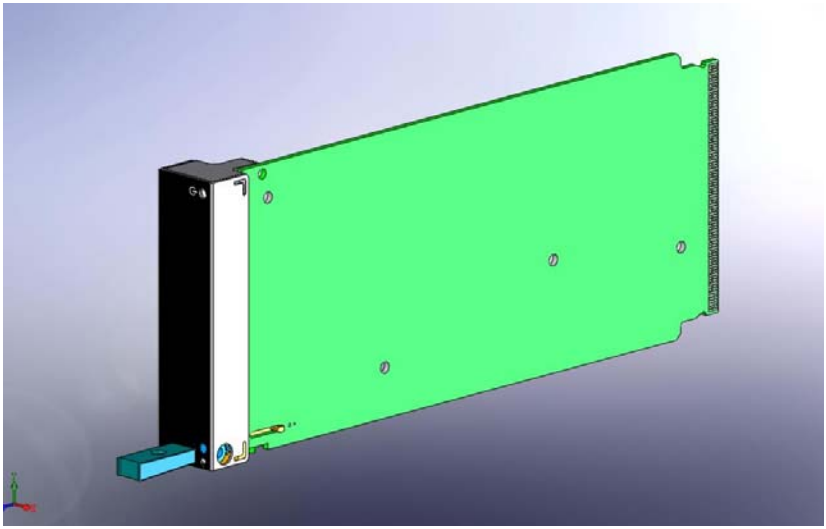


**Figure 2-1: AMC Module Handle**

## 2.4 Installing the AMC-7000 Module

This section describes a recommended procedure for installing a board module in a chassis.

Before you install your module, please read all cautions, warnings, and instructions presented in this section.

CAUTION:

Handling modules and peripherals can result in static damage. Use a grounded wrist strap, static-dissipating work surface, and antistatic containers when handling and storing components.

Insert the board by holding the Module Handle—do not exert unnecessary pressure on the faceplate.

CAUTION:

Hot swap compliant modules may be installed while the system is powered on. If a module is not hot swap compliant (or the system does not support hot swap), you should remove power to the slot or system before installing the module.

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1. Verify that you have taken the necessary antistatic precautions.
2. Inspect the ATCA carrier board or MicroTCA chassis, and locate the desired AMC slot.
3. Remove the slot filler panel from the selected AMC slot, if necessary.
4. Carefully align the edges of the module with the rail guides in the appropriate slot or carrier card.
5. Taking care to keep the module aligned in the guides, apply equal and steady pressure and slide the module in until the fingers of the module snap into the internal AMC connector.
6. DO NOT FORCE THE BOARD INTO THE SLOT.
7. Push the Module Handle to the IN position.
8. Power on the system, if necessary. Refer to your system manual for instructions on correctly powering on the system. Once power is applied to the chassis, the internal MMC controller runs a self-test that runs for approximately 10 seconds. Upon a successful power up self-test, the blue hot swap LED will blink and then turn off, indicating that the module has been placed in operation.

## 2.5 Removing the AMC Module

The AMC-7000 is hot-swappable and can be removed from the chassis without powering down the associated host carrier or chassis. This section describes the recommended procedure for removing an AMC module.




Before you remove your module, please read all cautions, warnings, and instructions presented in this section. Hot swap compliant modules may be removed while the system is powered on. If the chassis is not hot swap compliant, you should remove power to the slot or system before removing the module.

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To remove the AMC module, follow these steps:

1. Begin to remove your module by pulling the Module Handle to the half way (HW) position. Do not remove the module immediately.
2. Powering down or removing a board before the operating system or other software running on the board has been properly shut down may cause corruption of data or file systems.
3. If your module is hot swap compliant and you are running fully functional hot swap-aware software, unlatching this ejector lever will start the shutdown process on the board. The software will slowly blink the blue hot swap LED indicating the module is in the process of being de-activated.
4. Once the module has been de-activated, the Blue LED will solidly illuminate. Once this is done you can extract the module by pulling on the module handle.
5. **WARNING:** Some AMC-7000 models may display this symbol to indicate the possible presence of a hot surface or component reaching up to 85ºC. To reduce the risk of injury from a hot component when servicing, allow the surface to cool before touching.



6. If your board or system is not running hot swap-aware software, the blue LED may illuminate without regard to software processes still running on the board. Be sure to manually shut down applications or operating systems running on the board prior to board removal.
7. Carefully pull the module from the chassis. If the card slot is to remain empty, install a filler panel in the slot.

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# 3 Functional Description

This chapter provides a functional description of the major components and devices on the AMC-7000.

## 3.1 Overview

The AMC-7000 contains three major functional blocks. These are:

1. The Serial Storage interface
2. The Power Regulator, and
3. The IPMI subsystem (Module Management Controller - MMC)

The following block diagram illustrates the major components and switch locations on the AMC-7000.

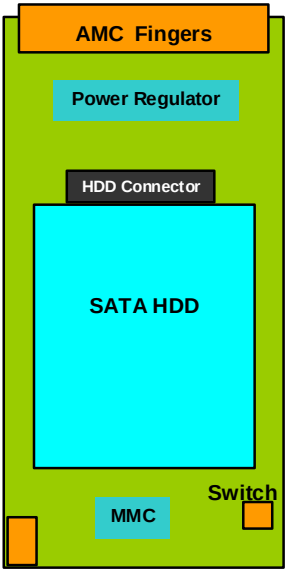



**Figure 3-1: AMC-7000 Functional Blocks**

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## 3.2 Power Regulator

The Power Regulator is the part of the module that generates the required power from the payload power (+12V) that is delivered to the module through the AMC connector. This power is current limited by the onboard regulator.

## 3.3 IPMI Subsystem

The IPMI subsystem provides management control for the board. It is based on an Atmel microcontroller (Module Management Controller - MMC). Its function is to monitor module functions such as power, temperature, and hot swap requests via the ejector handle and report these to the base controller in the enclosure. It also stores information about the module including serial number and E-Keying.

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# 4 Connector Pin Assignments

This chapter provides connector pin assignments for AMC-7000. This module is AMC.3 compliant and uses Port 2 as defined in the AMC.3 specification.

## 4.1 AMC-7000 Port Assignments

Below are the specific ports that are used by the AMC-7000. All other pins match the AMC.0 specification.

| Port | Signal |
|---|---|
| 2 | AMC.3 Serial Storage Port 2 |

**Table 4-1: AMC-7000 AMC Port Assignments**

### AMC-7000 Card-edge Interface Pin Assignments

The AMC-7000 includes an AMC connector which conforms to the single slot B+ extended connector, with 170 signal contacts. The pin assignments are as follows.

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| Pin# | Signal | Pin# | Signal |
|---|---|---|---|
| 1 | GND | 86 | GND |
| 2 | 12V | 87 | No Connect |
| 3 | AMC_PS1-L | 88 | No Connect |
| 4 | P3V3_AMC_MP | 89 | GND |
| 5 | AMC_GA0 | 90 | No Connect |
| 6 | No Connect | 91 | No Connect |
| 7 | GND | 92 | GND |
| 8 | No Connect | 93 | No Connect |
| 9 | 12V | 94 | No Connect |
| 10 | GND | 95 | GND |
| 11 | No Connect | 96 | No Connect |
| 12 | No Connect | 97 | No Connect |
| 13 | GND | 98 | GND |
| 14 | No Connect | 99 | No Connect |
| 15 | No Connect | 100 | No Connect |
| 16 | GND | 101 | GND |
| 17 | AMC_GA1 | 102 | No Connect |
| 18 | 12V | 103 | No Connect |
| 19 | GND | 104 | GND |
| 20 | No Connect | 105 | No Connect |
| 21 | No Connect | 106 | No Connect |
| 22 | GND | 107 | GND |
| 23 | No Connect | 108 | No Connect |
| 24 | No Connect | 109 | No Connect |
| 25 | GND | 110 | GND |
| 26 | AMC_GA2 | 111 | No Connect |
| 27 | 12V | 112 | No Connect |
| 28 | GND | 113 | GND |
| 29 | SATA_RX-P | 114 | No Connect |
| 30 | SATA_RX-N | 115 | No Connect |

**Table 4-2: AMC Module Card-edge Interface Pin Assignment**

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| Pin# | Signal | Pin# | Signal |
|---|---|---|---|
| 31 | GND | 116 | GND |
| 32 | SATA_TX-P | 117 | No Connect |
| 33 | SATA_TX-N' | 118 | No Connect |
| 34 | GND | 119 | GND |
| 35 | No Connect | 120 | No Connect |
| 36 | No Connect | 121 | No Connect |
| 37 | GND | 122 | GND |
| 38 | No Connect | 123 | No Connect |
| 39 | No Connect | 124 | No Connect |
| 40 | GND | 125 | GND |
| 41 | ENABLE_L | 126 | No Connect |
| 42 | 12V | 127 | No Connect |
| 43 | GND | 128 | GND |
| 44 | No Connect | 129 | No Connect |
| 45 | No Connect | 130 | No Connect |
| 46 | GND | 131 | GND |
| 47 | No Connect | 132 | No Connect |
| 48 | No Connect | 133 | No Connect |
| 49 | GND | 134 | GND |
| 50 | No Connect | 135 | No Connect |
| 51 | No Connect | 136 | No Connect |
| 52 | GND | 137 | GND |
| 53 | No Connect | 138 | No Connect |
| 54 | No Connect | 139 | No Connect |
| 55 | GND | 140 | GND |
| 56 | IPMB_SCL_O | 141 | No Connect |
| 57 | 12V | 142 | No Connect |
| 58 | GND | 143 | GND |
| 59 | No Connect | 144 | No Connect |
| 60 | No Connect | 145 | No Connect |

**Table 4-2: AMC Module Card-edge Interface Pin Assignment (cont'd)**

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| Pin# | Signal | Pin# | Signal |
|---|---|---|---|
| 61 | GND | 146 | GND |
| 62 | No Connect | 147 | No Connect |
| 63 | No Connect | 148 | No Connect |
| 64 | GND | 149 | GND |
| 65 | No Connect | 150 | No Connect |
| 66 | No Connect | 151 | No Connect |
| 67 | GND | 152 | GND |
| 68 | No Connect | 153 | No Connect |
| 69 | No Connect | 154 | No Connect |
| 70 | GND | 155 | GND |
| 71 | IPMB_SDA_O | 156 | No Connect |
| 72 | 12V | 157 | No Connect |
| 73 | GND | 158 | GND |
| 74 | No Connect | 159 | No Connect |
| 75 | No Connect | 160 | No Connect |
| 76 | GND | 161 | GND |
| 77 | No Connect | 162 | No Connect |
| 78 | No Connect | 163 | No Connect |
| 79 | GND | 164 | GND |
| 80 | No Connect | 165 | No Connect |
| 81 | No Connect | 166 | No Connect |
| 82 | GND | 167 | No Connect |
| 83 | AMC_PS0-L | 168 | No Connect |
| 84 | 12V | 169 | No Connect |
| 85 | GND | 170 | GND |

**Table 4-2: AMC Module Card-edge Interface Pin Assignment (cont'd)**

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# 5 Specifications

This chapter contains the environmental and mechanical specifications for the AMC-7000. The environmental specifications relate to and vary with the SATA hard drive that the AMC-7000 is configured with.

## 5.1 Hard Drive Operation and Storage Specifications

| Specification | | Enterprise SATA |
|---|---|---|
| Temperature | Operating (ambient) | 5ºC to 55ºC |
| | Non-operating | -40ºC to 70ºC |
| Relative humidity | Operating | 5% to 90% |
| Performance | RPM | 5400 |
| | Seek time Avg | Read 14 ms |
| | Seek time Max | Read 300 ms |
| | Interface | SATA 3 Gb |

**Table 5-1: AMC-7000 Environmental Specifications**

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# 6 Front Panel Indicators

The faceplate of the AMC-7000 module has 2 LED indicators. The figure and table below describe their functions.




**Figure 6-1: AMC-7000 Front Panel Indicators**

| Indicator | Color | State | Function |
|---|---|---|---|
| Hot Swap (**HS**) | Blue | On | Management power available to the module and the module can safely be extracted |
| | | Off | The module is operational and is unsafe for extraction |
| | | Long Blink | Delay before module is activated |
| | | Short Blink | Delay before module is deactivated |
| Module Active (**ACT**) and “in service” | Green | On | 12V payload power is being supplied to board |
| | | Off | 12V payload power is not detected |

**Table 6-1: AMC-7000 LED Functions**

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# Important Safety Instructions

Please read and follow all instructions marked on the product and in the documentation before operating the system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User's Manual for future reference.
- The equipment should be operated within the recommended operating temperature.
- The equipment should be operated only from the type of power source indicated on the rating label. Make sure the voltage of the power source is correct when connecting the equipment to the power outlet.
- If the user's equipment has a voltage selector switch, make sure that the switch is set to the proper position for the area. The voltage selector switch is set at the factory to the correct voltage.
- For pluggable equipment, ensure they are installed near a socket-outlet that is easily accessible.
- Secure the power cord to prevent unnecessary accidents. Do not place anything over the power cord.
- If the equipment will not be in use for long periods of time, disconnect the equipment from mains to avoid being damaged by transient overvoltage.
- All cautions and warnings on the equipment should be noted.
- Please keep this equipment away from humidity.
- Do not use this equipment near water or a heat source.
- Place this equipment on a reliable surface when installing. A drop or fall could cause injury.
- Never pour any liquid into the opening, this could cause fire or electrical shock.

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- Openings in the case are provided for ventilation. Do not block or cover these openings. Make sure there is adequate space around the system for ventilation when setting up the work area. Never insert objects of any kind into the ventilation openings.
- To avoid electrical shock, always unplug all power and modem cables from the wall outlets before removing covers.
- Lithium Battery provided (real time clock battery)

  **“CAUTION - Risk of explosion if battery is replaced by an incorrect type. Dispose used batteries as instructed in the instructions”**
- The equipment should be checked by service personnel if one of the following situation arises:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - The equipment has been exposed to moisture.
  - The equipment is not functioning or does not function according to the user’s manual.
  - The equipment has been dropped and damaged.
  - If the equipment has obvious sign of breakage.
- Never open the equipment. For safety reasons, the equipment should only be opened by qualified service personnel.

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# Getting Service

Contact us should you require any service or assistance.

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