

Intel® Embedded Development Board 1-N450 and Intel® Embedded Development Board 1-D510

User Guide

September 2010

Revision 001



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Revision History

Document Number	Revision Number	Description	Revision Date
324421	001	Initial release.	September 2010

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1 Introduction

This document describes the Intel® Embedded Development Board features and functions. The platform is a modular solution consisting of a compute module and a Mini-ITX carrier.

Two Compute Modules and a single carrier board are available for this platform. The carrier will be populated with one of the following configurations:

- Intel® Atom™ Processor N450 with Intel® 82801HM I/O Controller Compute Module with Intel® Compute Module Mini-ITX Carrier
- Intel® Atom™ Processor D510 with Intel® 82801HM I/O Controller with Intel® Compute Module Mini-ITX Carrier

This manual is written for OEMs, system evaluators, and embedded system developers. This document describes all jumpers, headers, LED functions, and their location of the development board along with subsystem features. This manual assumes basic familiarity with the fundamental concepts involved with installing and configuring hardware for a personal computer system.

Read this document in its entirety prior to applying power to the motherboard. Intel recommends having both the schematic and board present while reading this document.

1.1 Content Overview

Chapter 1, "Introduction": Explains the content in this document, key terminology, where to get product literature and related documents

Chapter 2, "Development Kit Overview" : Explains the high-level features of the development kit.

Chapter 3, "OS Installations": Explains how to install Windows and Linux-based OS.

Chapter 4, "Platform Firmware Update": Explains how to update the Compute Module and the Compute Module Embedded Controller Firmware.

Chapter 5, "Obtaining Support": Explains how to obtain support.

Chapter 6, "Hardware Overview": Explains the Hardware in detail.

Chapter 7 , "Bios Overview": Gives details on BIOS.

Chapter 8, "Inserting/Removing Modules": Gives details on how to insert/remove the compute module into/from carrier.

Chapter 9, "Cable Solutions": Gives details on building cables for the module.

Chapter 10, "Regulatory and Compliance Information"



1.2 Terminology

Term	Description
ACPI	Advanced Configuration Power Interface
BGA	Ball Grid Array
Compute Module	A compute module and CPUDIMM are synonyms
CPUDIMM	A compute module based on the Intel Compute Module Interface Definition.
DDR	Double Data Rate
DMA	Direct Memory Access
EC	Embedded Controller
EFI	Extensible Firmware Interface
FAE	Field Application Engineer
FSB	Front Side Bus
FWH	Firmware Hub
GPIO	General Purpose Input Output
IDE	Integrated Device Electronics
IEGD	Intel® Embedded Graphics Driver
IMVP	Intel® Mobile Voltage Positioning
Intel® HD Audio	Intel® High Definition Audio
ITP	In-Target Probe
JEDEC	Joint Electron Device Engineering Council
KBC	Keyboard Controller
LAN	Local Area Network
LED	Light Emitting Diode
LPC	Low Pin Count
LVDS	Low Voltage Differential Signaling
OS	Operating System
PATA	Parallel AT Attachment



Term	Description
PC	Personal Computer
PCB	Printed Circuit Board
PCIe*	PCI Express*
PGA	Pin Grid Array
PLL	Phase Lock Loop
RTC	Real Time Clock
SIO	Super I/O (Input Output)
SMC	System Management Controller
SO-DIMM	Small Outline Dual In-line Memory Module
SPI	Serial Peripheral Interface
TPM	Trusted Platform Module
TSSOP	Thin Shrink Small Outline Package
UART	Universal Asynchronous Receiver/Transmitter (COM/Serial Port)
UEFI	Unified Extensible Framework Infrastructure
USB	Universal Serial Bus
VGA	Video Graphics Array
VID	Voltage Identification
VR	Voltage Regulator
VTT	Voltage Termination
XDP	eXtended Debug Port

1.3 Technical Support

Support Services for your hardware and software are provided through the secure Intel® Embedded Developers Support Web site at <http://edc.intel.com/Support>.



1.4 Product Literature

You can order product literature from the following Intel® literature centers.

Table 1 Intel® Literature Centers

U.S and Canada	1-800-548-4725
U.S. (from overseas)	708-296-9333
Europe (U.K.)	44(0)1793-431155
Germany	44(0)1793-421333
France	44(0)1793-421777
Japan (fax only)	81(0)120-47-88-32

Product literature and information can also be found on the following sites:

- Intel® Developer Center: <http://developer.intel.com/design/index.htm>
- Intel® Embedded Design Center: <http://edc.intel.com/>

1.5 Related Documents

Table 2 is a partial list of the available collateral. For the complete list, contact your local Intel representative.

Table 2 Related Documents

Document	Document No./Location
Processor and I/O Controller -Related Documents	
Intel® Atom™ Processors 400 and 500 Series with the Intel® 82801HM I/O Controller Platform Design Guide	Contact your local Intel representative for the latest revision
Intel® Atom™ Processors 400 and 500 Series with the Intel® 82801HM I/O Controller Platform Schematics	
Intel® Atom™ Processors 400 and 500 Series with the Intel® 82801HM I/O Controller Mechanical and Cadence / OrCad Symbol Files	
Intel® Atom™ Processor N400 Series Datasheet Volumes I & II	
Intel® Atom™ Processor D400 and D500 Series Datasheet Volumes I & II	
Intel® Atom™ Processor N400 Series – Sightings Report (SR)	
Intel® Atom™ Processor D400 and D500 Series– Sightings Report (SR)	
Intel® Atom™ Processors 400 and 500 Series with the Intel® 82801HM I/O Controller Platform Datasheet Addendum	
Intel® I/O Controller Hub 8 (ICH8) Family Datasheet	



Document	Document No./Location
Intel® I/O Controller Hub (Intel® ICH8M) Specification Update	
Processor and I/O Controller -Related Documents	
Aptio 4.x Whitepaper	http://www.ami.com/aptio

1.6 Notes, Cautions and Warnings



Note

Calls attention to important information



Caution

Cautions are included to help you avoid damaging hardware and losing data



Warnings

Warnings indicated conditions, which if not observed, can cause personal injury



2 *Development Kit Overview*

The development kit is shipped with the following:

- Platform:
 - Intel® Atom™ N450 or D510 Compute Module
 - Mini-ITX carrier board
- External Power Supply Brick

Options available include:

- LVDS Panel and Cable
- Additional serial port cables
- Parallel Port cable
- EC Management Port Serial Cable

2.1 **Intel® Atom™ Processor N450 and D510 Compute Modules**

The Intel® Atom™ Processor N450 and D510 Compute Modules are a new class of platforms which are part of a broader family of compute modules. The Compute Module family is a set of interchangeable compute modules and reference platforms. The platforms are based on a new module design which emphasizes minimal PCB footprint, while maintaining scalability across a broad range of price, performance and power consumption vectors. Each module implements a JEDEC 244-pin DIMM connector to provide unmatched I/O capability in a small form-factor. This high density connector architecture allows each module in the family to support all of the I/O required to support a range of embedded computing requirements.

The first modules in the family are based on the Intel® Atom™ Processor N450 and D510 with the Intel® 82801HM I/O Hub (ICH8M).

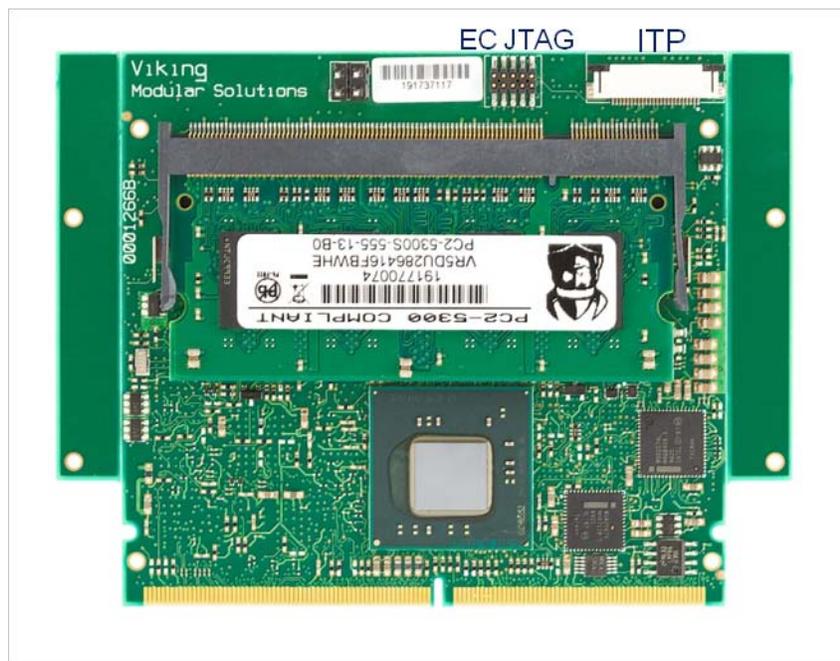


Figure 1 Compute Module (without heat-sink)

2.1.1 General Features

2.1.1.1 Processor

The module is available with either an Intel® Atom™ processor N450 or Intel® Atom™ processor D510.

2.1.1.2 Chipset

The compute Module is built around the Intel® 82801HM I/O Controller.

2.1.1.3 Discrete LAN Adapter

The module has a discrete Intel® 82574 LAN Adapter with side-band support.

2.1.1.4 Integrated LAN adapter

The compute module implements the Intel® 82567 LAN Physical Interface for the integrated LAN adapter in the Intel® 82801HM I/O Controller.

2.1.1.5 24-pin SFF ITP/XDP JTAG Connector

A 24-pin SFF ITP/XDP Processor Debug Connector is provided that allows for 3rd party debuggers to be used for debugging for custom BIOS development.



2.1.1.6 Renesas Embedded Controller

The μ Controller is responsible for the power management of the module, and provides a serial console interface to allow for basic management of the compute module.

2.1.1.7 Memory

The module supports either a 1 or 2 GB DDR2-667 SODIMM.

2.1.2 Connector Features

2.1.2.1 PCI Express*

The module provides 4 PCI Express lanes. The PCI Express lanes can be configured as follows:

- One PCI Express* X4
- One PCI Express* X2 and two PCI Express* X1
- Four PCI Express* X1

2.1.2.2 SATA-300

The module provides 3 discrete SATA ports.

2.1.2.3 USB 2.0

The module provides 6 USB 2.0 ports.

2.1.2.4 LAN

The module provides two 1 Gigabit Ethernet MDI interfaces.

2.1.2.5 DISPLAY

The module supports both VGA and Single Channel LVDS.

2.1.2.6 LPC

The module provides an LPC interface.

2.1.2.7 Management Interface

The module provides a:

- Serial Console to the Module Management controller.
- I2C Interface to read Carrier Configuration Data and other management sensors on the carrier.



- Power Management signals to support ACPI Power Management of the carrier.

2.1.2.8 Power

12V and 3.3V power

2.2 Mini-ITX Carrier

The carrier platform, as shown in Figure 2, provides all the required interfaces to the capabilities exposed by the Compute Module. In addition, the carrier provides additional interfaces that are typically common across multiple compute module definitions (e.g. Super I/O). The carrier provided as part of this development kit provides a super-set of the interfaces required by the Intel® Atom™ Processor N450 and D510 Compute Modules.

2.2.1 Features

2.2.1.1 PCI Express*

The carrier can be configured to support the following combination:

- 1 PCI Express* X1 and Mini-PCI Express
- 1 PCI Express* X2 and Mini-PCI Express
- 1 PCI Express* X4

2.2.1.2 USB 2.0

The carrier supports 4 external rear-panel over-current protected USB ports and 1 unprotected USB port on an internal header.

2.2.1.3 LAN

The carrier supports 2 X 10/100/1000 Ethernet ports.

2.2.1.4 SATA-300

The carrier supports 6 SATA¹ connectors.

2.2.1.5 Flexible Display Interfaces

The carrier provides the following display interfaces on rear-panel connectors:

¹ Only SATA 0-2 are available with the Atom based Compute Module



- VGA
- Display Port²
- HDMI³

In addition a 50-pin LVDS connector is provided on the carrier. Panel specific cables are required for each display supported.

2.2.1.6 Legacy PS2 Keyboard and Mouse

A legacy keyboard and mouse rear-panel socket is provided.

2.2.1.7 Serial Interfaces

Four RS232 Serial Interfaces are provided on internal headers.

2.2.1.8 Parallel Port

1 Parallel port is provided on an internal header

² Display Port is not available with Atom based Compute Module

³ HDMI is not available with an Atom Based Compute Module

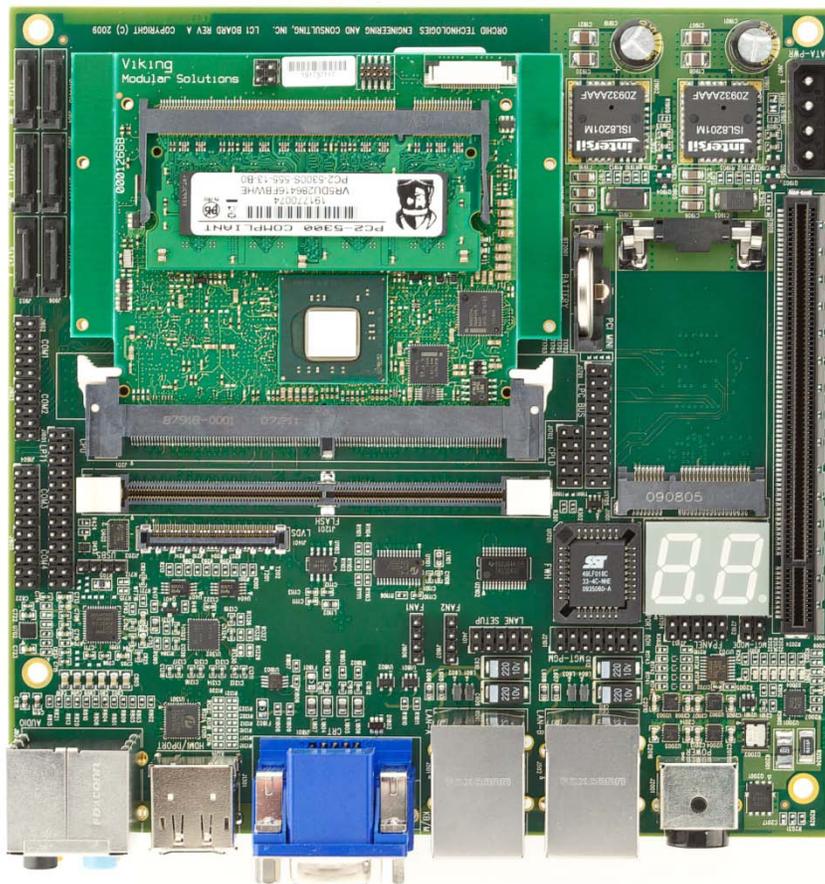


Figure 2 Carrier with Compute Module Installed

2.2.1.9 LPC

A 20-pin extension LPC header is provided on the ITX.

2.2.1.10 RTC Battery

Battery-backed real time clock.

2.2.1.11 Port 80 Decode

Support down on Mini-ITX with 2 seven segment displays.



2.3 Software Overview

2.3.1 OS Support

The following Operating Systems have been tested:

- Windows XP* Service Pack 3
- Windows 2007*
- Moblin* (Linux based)
- Fedora* (Linux based)

2.3.2 UEFI Firmware

This development kit ships with a pre-boot EFI firmware pre-installed. This industry standard EFI firmware runs most standard operating systems, including Microsoft Windows XP*, Microsoft Windows 7*, Microsoft Windows XP Embedded*, Linux, and others.

The following features of the EFI firmware are enabled in the development board:

- DDR2 SDRAM detection, configuration, and initialization
- Intel® Atom™ Processor N450 and D510 with the Intel® 82801HM I/O Controller Hub configuration
- PCI/PCI Express* device enumeration and configuration
- Integrated video configuration and initialization
- Super I/O configuration
- CPU microcode update

2.3.3 EC Firmware

The Compute Module includes an Embedded Microcontroller that is designed to manage the overall module. All power management and system compatibility management is handled through the Embedded Controller. At times it may be required to upgrade the EC firmware. Refer to Section 4.2 for this process.

2.4 Before You Begin

The following additional hardware may be necessary to successfully set up and operate the development board.

VGA Monitor: Any standard VGA monitor may be used. The setup instructions in this chapter assume the use of a standard VGA monitor, TV, or flat panel monitor.

Keyboard: The development board can support either a PS/2 or USB style keyboard.

Mouse: The development board can support either a PS/2 or USB style mouse.



3 OS Installations

The following section provides an overview for installing some of the more common variants of operating systems. Additional OS Live images and instructions are posted at <http://bit.ly/devboard>.

3.1 Driver Overview

Drivers for the various operating systems are either included by default by the OS vendor (depending on release cycle), are available from Intel's support site, <http://downloadcenter.intel.com> or at <http://bit.ly/devboard>.

3.1.1 Network Drivers

<http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&ProductFamily=Ethernet+Components&ProductLine=Ethernet+Controllers&ProductProduct=Intel%20ae+82574+Gigabit+Ethernet+Controller&ProdId=3023&LineId=976&FamilyId=2280>

3.1.2 Graphics Drivers

The Intel® Atom™ Processor N450 and D510 graphics engine is the Intel® Graphics Media Accelerator 3150. The latest drivers can be found at:

<http://support.intel.com/support/graphics/intelgma3150>

3.1.3 Chipset Drivers

The Intel® Atom™ Processor N450 and D510 compute module uses the Intel® 82801HM I/O Hub. The drivers for this chipset are part of the Intel® 900 Series family of chipsets. The drivers can be found at:

<http://support.intel.com/support/chipsets/sb/CS-025753.htm>

3.2 Windows 7

3.2.1 Requirements

- Windows 7 Installation Disk
- Windows Driver and Tools Release-Package



3.2.2 Installation Instructions

3.2.2.1 Base OS

1. Install the Base OS following the instructions as outlined by the Windows 7 Installer.
2. After installation is complete copy the Release-Package-X-Windows.zip to your local hard-drive and extract.

3.2.2.2 Chipset Drivers

Windows does not have the default drivers for the 82801HM I/O Controller Hub (ICH8M) as part of its installation package.

1. Download the latest chipset drivers from the link provided in the Driver Overview Section.
2. Execute the downloaded file
3. Follow the onscreen instructions

3.2.2.3 LAN Drivers

The LAN Driver package supports both LAN Devices on the Compute Module.

1. If you have installed a version before, please uninstall first.
2. Download drivers from the link provided in the Driver Overview section
3. Follow the instructions provided with the LAN Driver Package

The system may require a reboot. It is suggested at this time to carry out the reboot.

3.2.2.4 Display Drivers

Windows 7 does not include the latest display drivers.

1. Download drivers from the link provided in the Driver Overview section
2. Follow the instructions provided with the Display Driver Package

The system may require a reboot. It is suggested at this time to carry out the reboot.

3.3 Windows XP

3.3.1 Requirements

- Windows XP SP3 Installation Disk



- Windows Driver and Tools Release-Package

3.3.2 Installation Instructions

3.3.2.1 Base OS

1. Install the Base OS following the instructions as outlined by the Windows XP Installer Screens.
2. After installation is complete, copy the driver release package on to your local hard-drive and extract.

3.3.2.2 Chipset Drivers

Windows does not have the default drivers for the 82801HM I/O Controller Hub (ICH8M) as part of its installation package.

4. Download the latest chipset drivers from the link provided in the Driver Overview Section.
5. Execute the downloaded file
6. Follow the onscreen instructions

3.3.2.3 LAN Drivers

The LAN Driver package supports both LAN Devices on the Compute Module.

1. If you have installed a version before, please uninstall first.
2. Download drivers from the link in the Driver Overview section above.

The system may require a reboot. It is suggested at this time to carry out the reboot.

3.3.2.4 Display Drivers

WARNING: The current display drivers will blank your screen after an initial OS Reboot. Please follow these instructions carefully!!

Windows XP does not include the latest display drivers.

1. Download drivers from the link provided in the Driver Overview section
2. Navigate to the extracted location and run setup. Note: If you have installed a previous version you MUST uninstall first, otherwise the changes will not take place.
3. Install the drivers



4. Reboot

When the system reboots with the provided drivers, the monitor and screen will be black. By default, windows will be at the login prompt waiting for a password.

- 1) Enter your password. If you make a mistake, you will need to do a hard-reset as you will not be able to see the screen
 - a) The display will become visible after you logon.
- 2) Change the Display Settings as follows:
 - a) Right Click on the icon of the Intel Graphics Media Accelerator Driver in the task bar
 - b) Select "Graphics Properties"
 - c) Change Operating Mode to: "Single Display"
 - d) Change Display Selection (Primary Device) to: "Monitor"
- 3) Press Apply and then Ok
- 4) Reboot

The next time system reboots, you should have a visible display. If the screen is still black please repeat the above steps.

3.3.2.5 Audio Drivers

The LC1 Carrier card has a HD Audio Subsystem based on a Conexant AD1989B.

1. The audio driver package is located under <ReleasePackage>\Mini-ITX\Windows\Audio
2. Extract the archive AD1884A XP Flat Generic Driver.zip
3. Navigate to the extracted location and run setup.
4. Install the drivers
5. Reboot

3.4 MeeGo

3.4.1 Requirements

- Software
- Download MeeGo for Netbooks from <http://meego.com>



3.4.2 OS Installation Instructions

1. Insert the CD/DVD into the CD/DVD drive.
2. You will be presented with 3 options
3. Go to "Install to disk" and press **<enter>**
4. Follow Installation instructions as provided.

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4 Platform Firmware Update

4.1 BIOS Update

To update the EFI image in DOS to a newer release, use the EFI binary image and a BIOS update utility. One utility that can be used is the AFUDOS BIOS update utility, also referred to as a BIOS flash utility, with a command line interface for MS-DOS. This utility is available through AMI and can be accessed [here](#).

4.1.1 Windows

Copy the AFUWIN.EXE executable file to any storage location accessible by the host system and then run AFUWIN in a Windows DOS environment command prompt.

Basic Usage:

- AFUWIN <BIOSROMIMAGE>.ROM /P (XXXX is the BIOS version to be flashed)
 - Program main BIOS image, reset CMOS to defaults



Your keyboard and mouse will be suspended during the burn process.



You can alternatively use the GUI version (see AMI documentation)

4.1.2 MS- DOS

Copy the AFUDOS.EXE executable file to any storage location accessible by the host system and then run AFUDOS in a DOS environment command prompt.

Basic Usage:

- AFUDOS <BIOSROMIMAGE>.ROM /P /C (XXXX is the BIOS version to be flashed)
 - Program main BIOS image, reset CMOS to defaults
- AFUDOS ROMFILE.ROM /P /B /N /C
 - Program main BIOS image & bootblock image
 - Reset CMOS and NVRAM to defaults



Note: Afudos.exe comes in two versions, one for legacy BIOS update and one for EFI BIOS update. These two versions are not cross compatible. Using afudos.exe for legacy BIOS to update an EFI BIOS will generate an error message such as



memory error. Please make sure to download the latest afudos.exe for EFI BIOS to update the evaluation board. AMI's EFI BIOS is called AMI Aptio.

4.2 Management Controller Update

The management controller firmware can be updated through the management interface on the Mini-ITX.

4.2.1 Requirements

- Appropriate Serial Cable
- Windows Machine with a Terminal Client supporting XModem
- The latest Management Controller Firmware

4.2.2 Installation Steps

1. Configure the Terminal Client as shown in Figure 3
2. Connect the serial Port cable to the serial port on the PC and to J2101 on the mini-itx.
3. Make sure that the terminal client is in the connect state
4. Hit the reset switch on the carrier or recycle power
5. When the Embedded Controller boots, you will see a display as shown in Figure 4.
6. Within 3 seconds press any key and you will see a dialog as shown in Figure 5.
7. Select Option 1 if you want to reflash firmware
8. When prompted to start Xmodem, select Transfer->Send File from the Terminal Client Menu as shown in Figure 6.
9. Enter the file that you want to download and press send.
10. After the firmware has been downloaded, press any key and the menu will reappear.
11. Select 3 to boot the Embedded Controller or recycle power

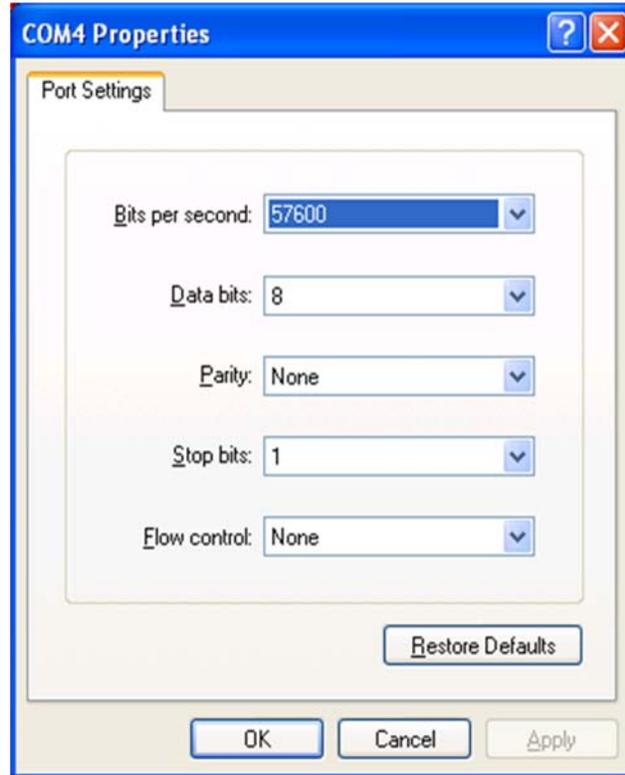


Figure 3 Terminal Window Settings

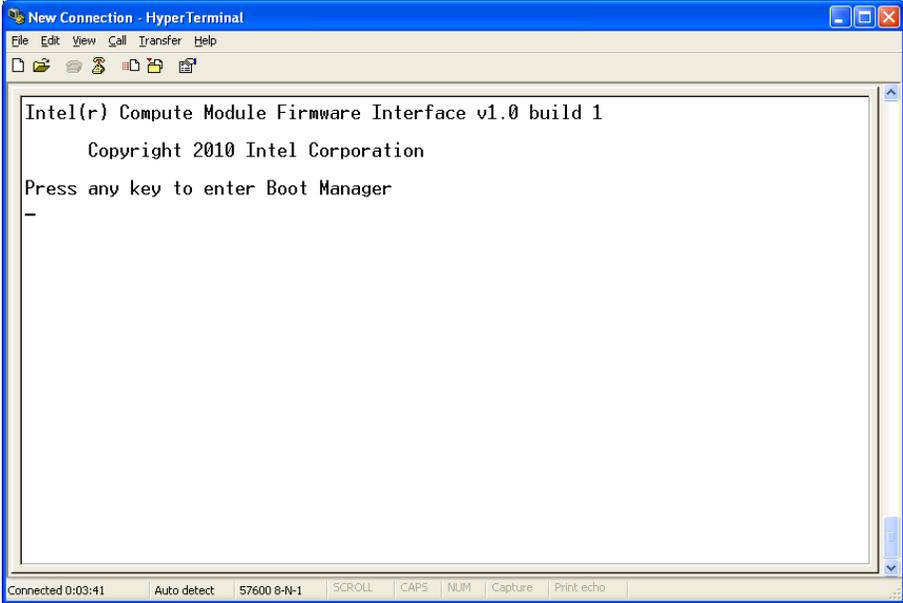


Figure 4 Boot Manager Screen

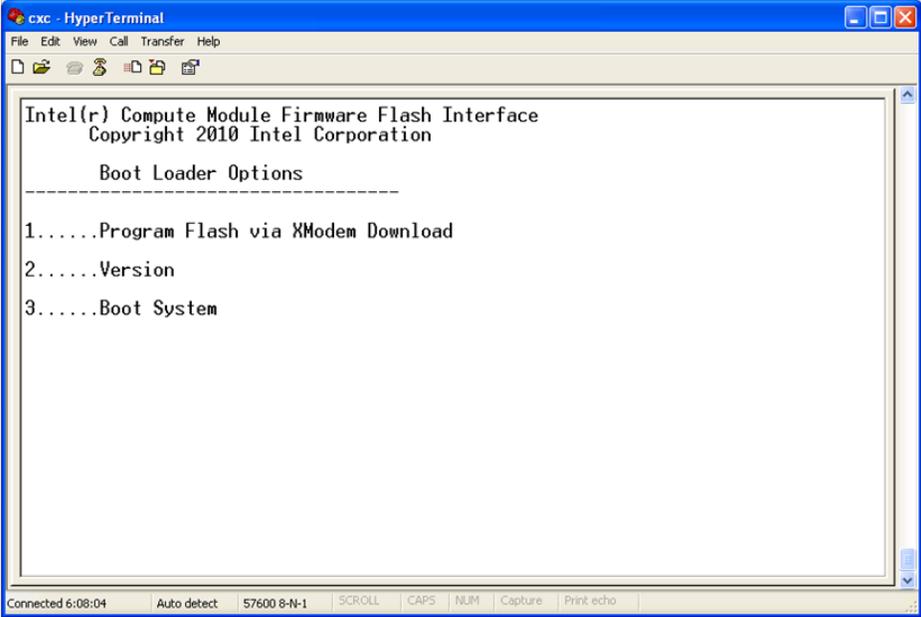


Figure 5 Boot Manager Interface Menu in HyperTerminal

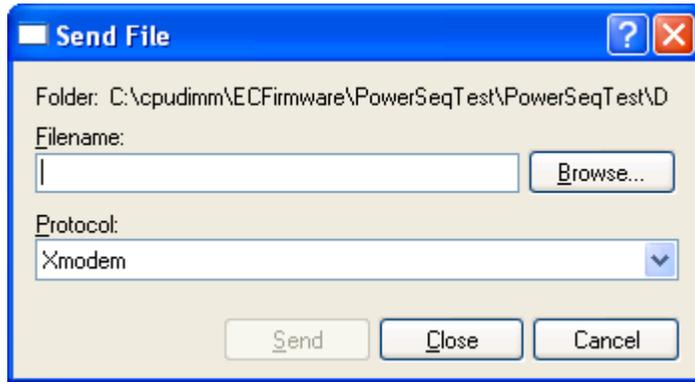


Figure 6 Xmodem Send File

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5 ***Obtaining Support***

When requesting support, you may be asked for specific information about the system. This information is both available on the boards themselves or through BIOS.

To obtain the information through BIOS, power-cycle the system while holding the key. When the BIOS screen appears, select the Platform Configuration option. Displayed will include the following information:

- BIOS Firmware Version
- EC Firmware Version
- Atom Module Serial Number
- Mini-ITX Serial Number.

6 Hardware Overview

6.1 Certified Devices

The following devices have been certified to function correctly with the system.

6.1.1 MINI-PCI Express

- Intel® Mini-PCI Express WIFI card Model#: 4965AGN

6.2 Mini-ITX Carrier Overview

6.2.1 Back-panel

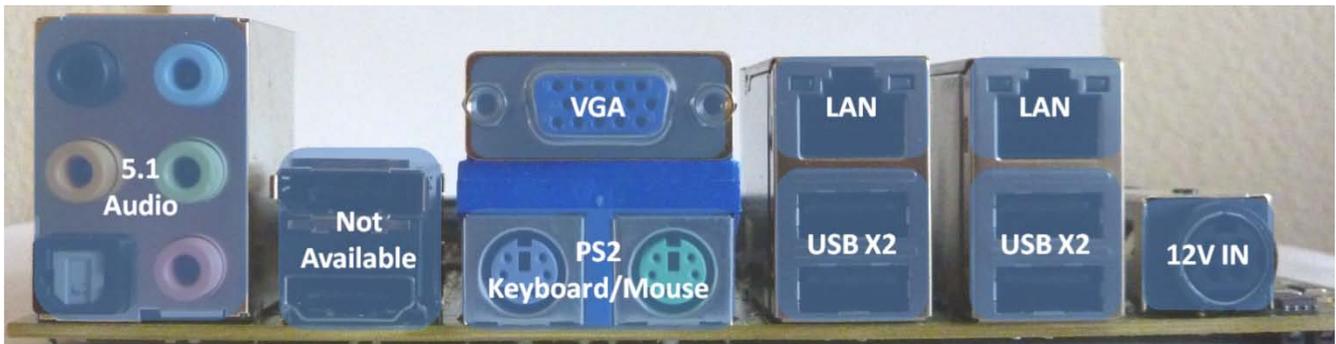


Figure 7 Mini-ITX Back-Panel

6.2.1.1 Audio Sub-System



The 5.1 Audio sub-system has a non-standard mapping on the connector

1. Standard Audio (Head Phone Out/Line out) is on Black
2. For 5.1 Surround sound use Black , Green (Back Surround) and Pink (Center Channel / Sub-woofer)
3. MIC IN – Orange (Yellow in diagram above)



6.2.2 Internal Interfaces

6.2.2.1 Front Panel Header

 Voltages supplied to the front panel connector such as VCC (+3.3 V) are not over-current protected and should connect only to devices inside the computer’s chassis. Do not use these connectors to power devices external to the computer’s chassis. A fault in the load presented by an external device could cause damage to the computer, the interconnecting cable, and the external device itself. It is strongly recommended that power provided to the external connector shall always implement over-current protection. Figure 8 gives the pin-out definition for the Front-Panel Header.

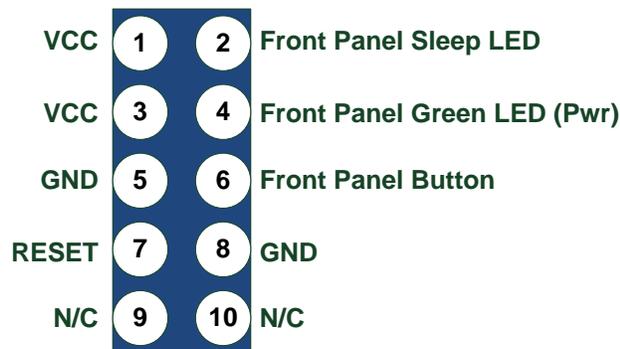


Figure 8 Front Panel Header (J2103)

6.2.2.1.1 Sleep /Message Waiting Activity Light

This feature is currently not supported in release.

6.2.2.1.2 Power / Message Waiting Light

Connecting pins 1 and 2 to a single, front panel mounted LED provides power on/off, sleep and message waiting indication. The states of the LED are shown below

Table 3 Power Front Panel LED States

LED State	Description	ACPI State
Off	Sleeping or Power Off	S1, S3, S5
Steady	Running	S0
Blinking	Running/Message Waiting	Currently Not Supported



Currently Message Waiting functionality is not supported, but may be included as part of an EC and BIOS firmware release in the future.

6.2.2.1.3 Reset Switch

Supporting of the reset function requires connecting pins 7 and 8 to a momentary-contact switch that is normally open. When the switch is closed power to the Compute Module will be reset, causing the power manager (EC) to recycle.

6.2.2.1.4 Power Switch



The implementation of the Power Switch provides slightly different behavior from a traditional power switch.

Supporting the power on/off function requires connecting pins 5 and 6 to a momentary-contact switch that is normally open. When the switch is held according to the actions in Table 4, the system can be powered on and off.

Table 4 Front Panel Power Switch Behavior

System State	Action	ACPI State
G3Soft/S5/S3	Held for less than 4 seconds and released	Final State S0
S0	Held for less than 4 seconds and released	Based on OS Configuration
Any	Held for more than 4 seconds and released	S5, G3Soft

6.2.3 USB5



The USB 5 port does not have over-current protection. It is recommended that it be always connected to an external powered USB Hub that provides appropriate over-current protection. Figure 9 gives the pin-out for USB 5.

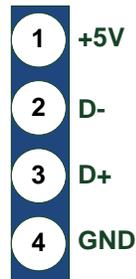


Figure 9 USB Port 5 Header

6.2.4 Serial Ports

1. The pin-outs for Serial Ports COM1 – COM4 are shown in Figure 10.
2. Pin 1 is identified with a bold square.

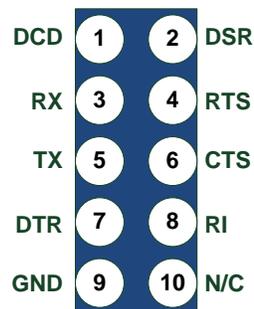


Figure 10 Serial Port Header

6.2.5 LPT Port

Figure 11 shows the pin-out for the LPT Header.

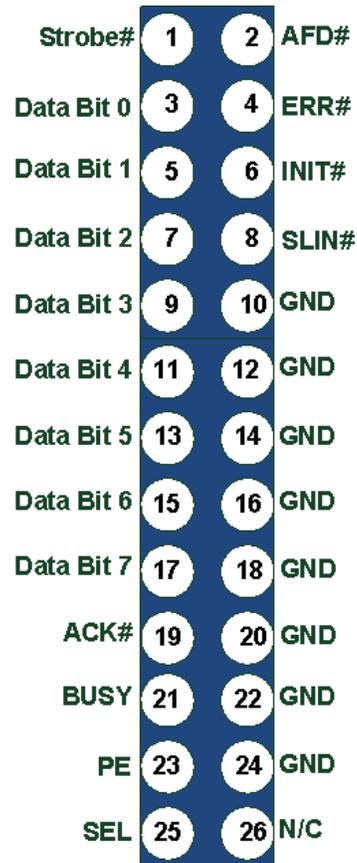


Figure 11 LPT Header

6.2.6 Lane Setup

The Mini-ITX Carrier is designed to provide flexibility in the configuration of PCIe, SATA and USB Ports. Figure 12 shows the pin-out for the lane setup header.

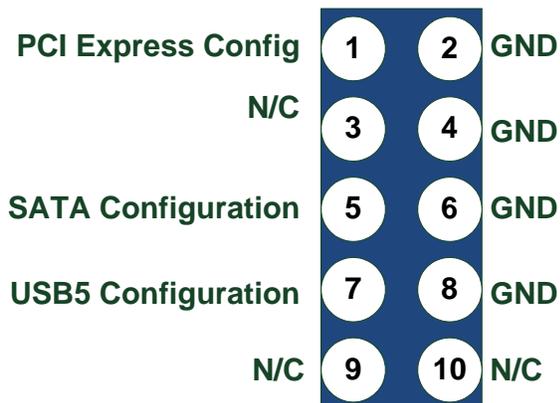


Figure 12 Lane Configuration Header

6.2.6.1 PCIe Lane Configuration

Pins 1-2 will indicate to the Embedded Controller on the Compute Module how to configure the Intel® 82801HM I/O Controller PCIe* controller and the carrier. The jumper configuration can be over-ridden through BIOS, as described later in this document.

When **No** Jumper is placed on pins 1-2, the lanes are configured as follows:

- Lane 0 and 1 are connected to the PCIeX16 connector
- Lane 2 is connected to the Mini-PCIe Port
- Lane 3 is connected to the Flash-DIMM Connector J1201

When a jumper is placed on pins 1-2, the lanes are configured as follows:

- Lane 2 and 3 are connected to the PCIeX16 to create a PCIeX4 configuration

6.2.6.2 SATA Lane Configuration

Pins 5-6 configure the destination of SATA Port 0.

When **No** Jumper is placed, SATA Port 0 is connected to SATA-0 on the carrier.

When a jumper is placed, SATA Port 0 is connected to the FLASH-DIMM Connector J1201.

6.2.6.3 USB 5 Lane Configuration

Pin 7-8 configures the destination for USB-5.

When **No** Jumper is placed, USB-5 is available on header J1202.

When a jumper is placed, USB-5 is available on the FLASH-DIMM Connector J1201.

6.2.7 Management Header

Figure 13 defines the pin-out for the Management Header, J2101. Please see section on creating an appropriate serial cable for connecting to a RS232 Terminal Client (e.g. Windows Terminal Client).

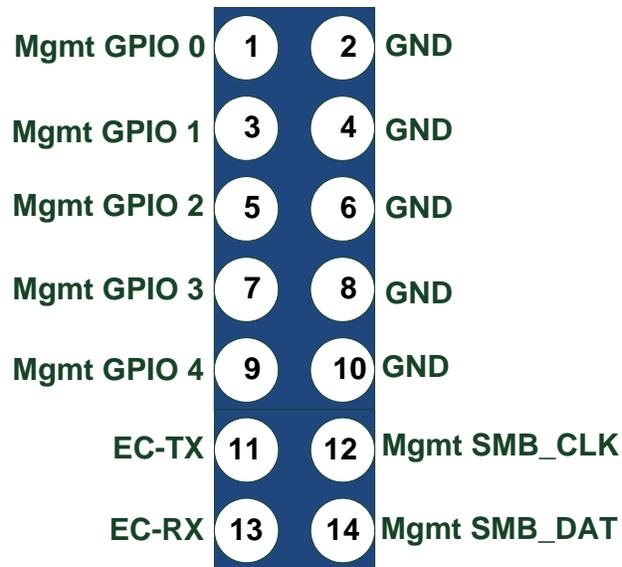


Figure 13 Management Header



The serial interface is level shifted on the carrier to the correct voltage levels for RS232.

6.2.7.1 Serial Interface

The Management Controller currently provides visibility for debugging purposes, programming BIOS and LAN Firmware through the serial Interface. Later in this document (Platform Configuration), the process is described in detail.

6.2.7.2 Enable/Disable LVDS

Place a jumper GPIO1 (pin 3 and 4) of J2101 to enable LVDS.

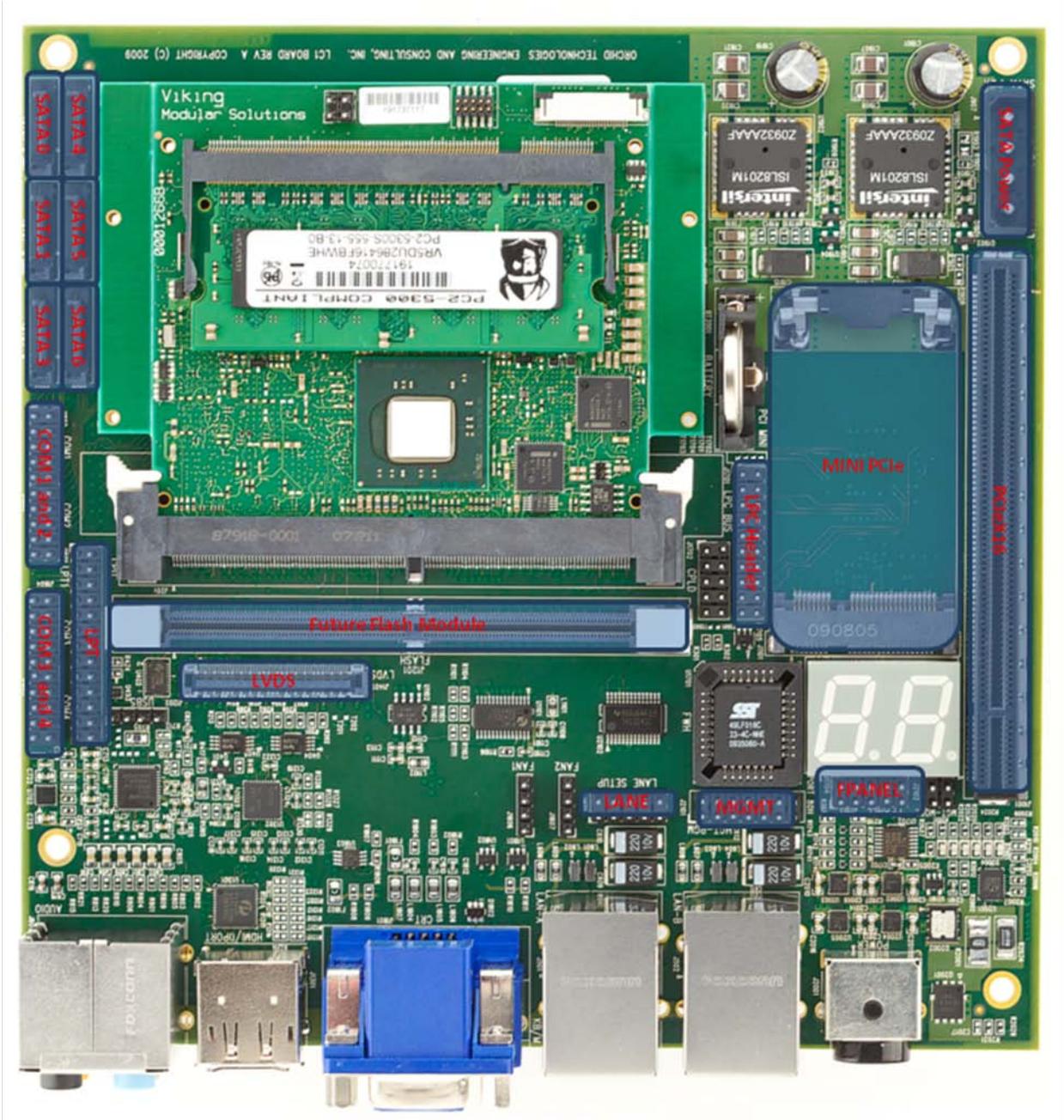


Figure 14 LC1 Headers and Connectors

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7 BIOS Overview

The BIOS is UEFI based, using AMI's Aptio 4.x implementation. The following section describes some salient features of BIOS.



Certain BIOS settings changes require that the platform be cold booted. In these circumstances, you will be required to restart the system by either pressing the power button, or by issuing a command on the Management Serial Console Interface.

7.1 BIOS Main Screen

Figure 15 shows the main screen of BIOS. The version of BIOS installed is determined by looking at the Project Version and Build Date.

It is recommended that you set the correct date and time on initial boot.

Figure 15 BIOS Main Screen



The compute module does not have an onboard battery to backup the real-time clock. Removing the module from the carrier, will result in the real-time clock not reflecting the current date and time.



7.1.1 Platform Version Information

From the Main Screen, the platform Information can be obtained, by selecting the “Platform Information” entry. Figure 16 shows the Platform Information Screen. The information may be required by support.

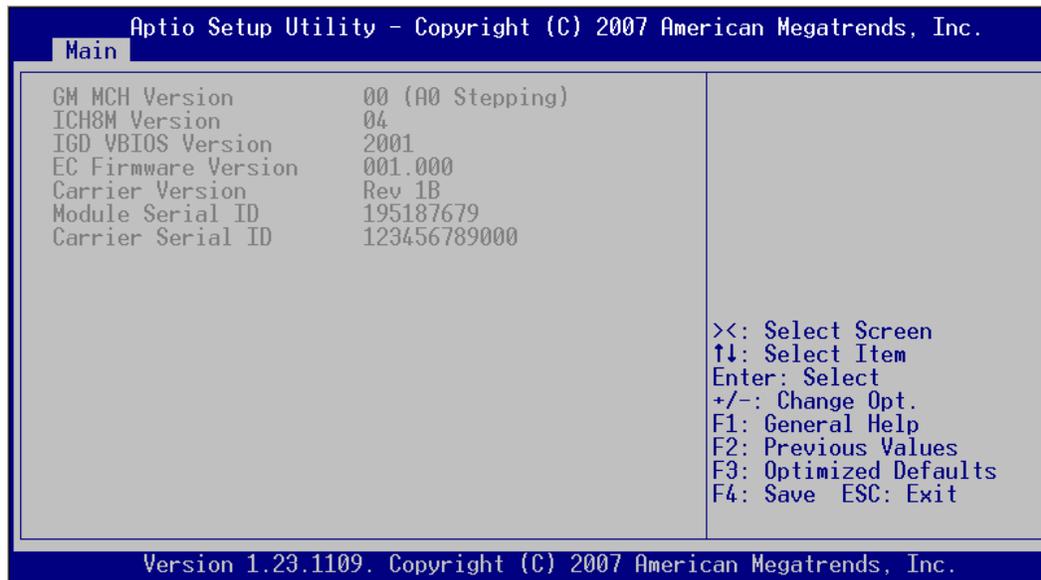


Figure 16 Platform Information Screen

7.2 Advanced Configuration

Figure 17 shows the advanced configuration screen. Via this screen, it is possible to configure advanced platform options.

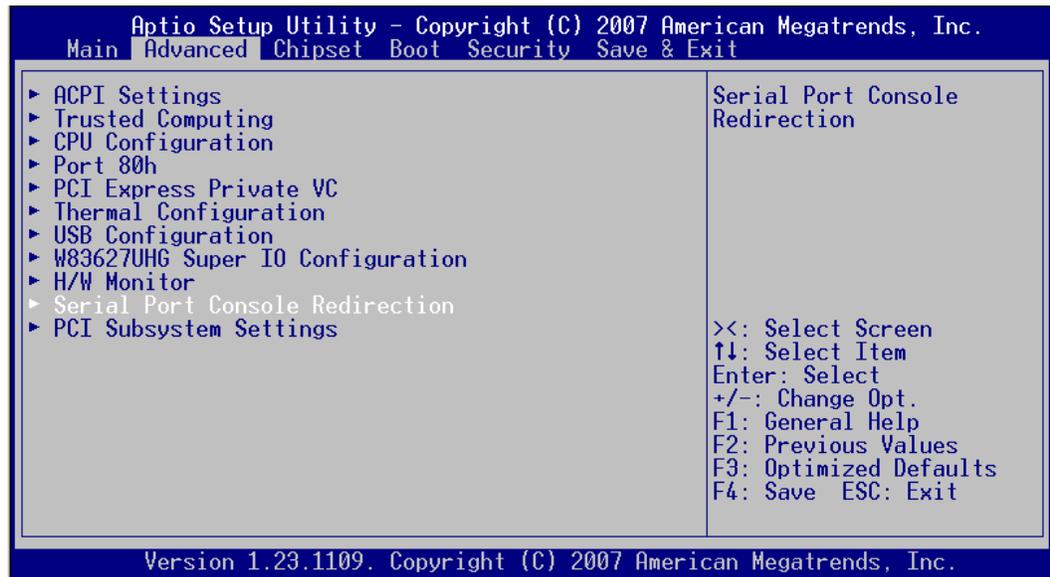


Figure 17 Advanced Configuration Screen

It is not recommended that these settings be changed, unless you have a clear understanding of the impact of the setting or you are directed to do so by support. One exception is Serial Port Console redirection.

7.2.1 Serial Port Console Redirection

In certain application and operating systems it is desirable to interact with the platform through a serial console. Ports 1 and 2 of the Super I/O on the carrier can be utilized for this purpose. Figure 18 shows the available settings.

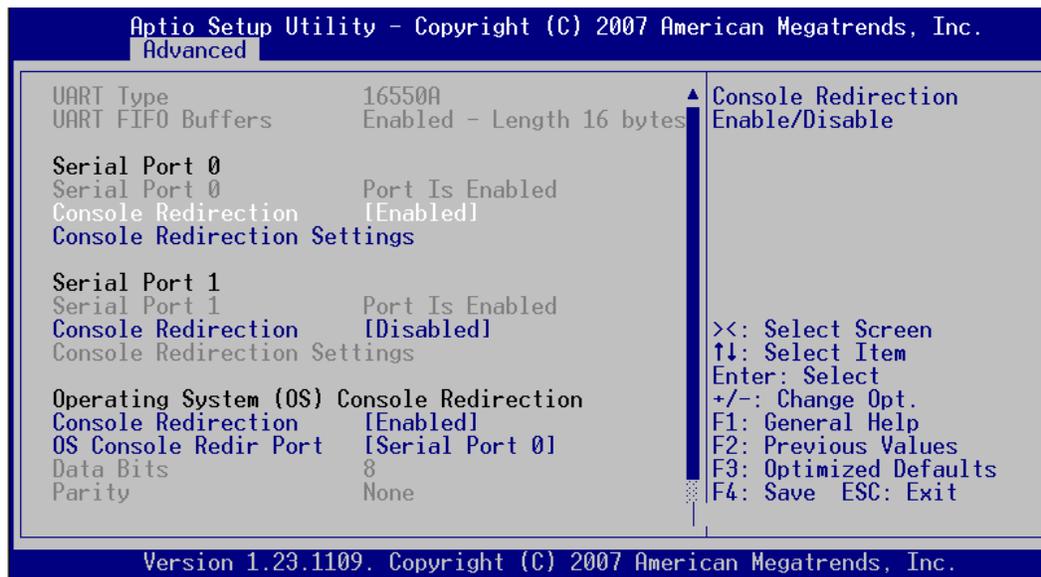


Figure 18 Serial Port Console Redirection

7.3 Chipset Configuration Screen

Figure 19 shows the chipset configuration screen. Through this screen it is possible to configure the behavior of the I/O subsystems of the platform, including graphics, memory, LAN, USB, PCIe*, etc.

One particular feature (not present in other platform implementations) is the ability to configure the PCIe* Lane width. The configuration screen can be accessed by selecting "South Bridge Configuration"

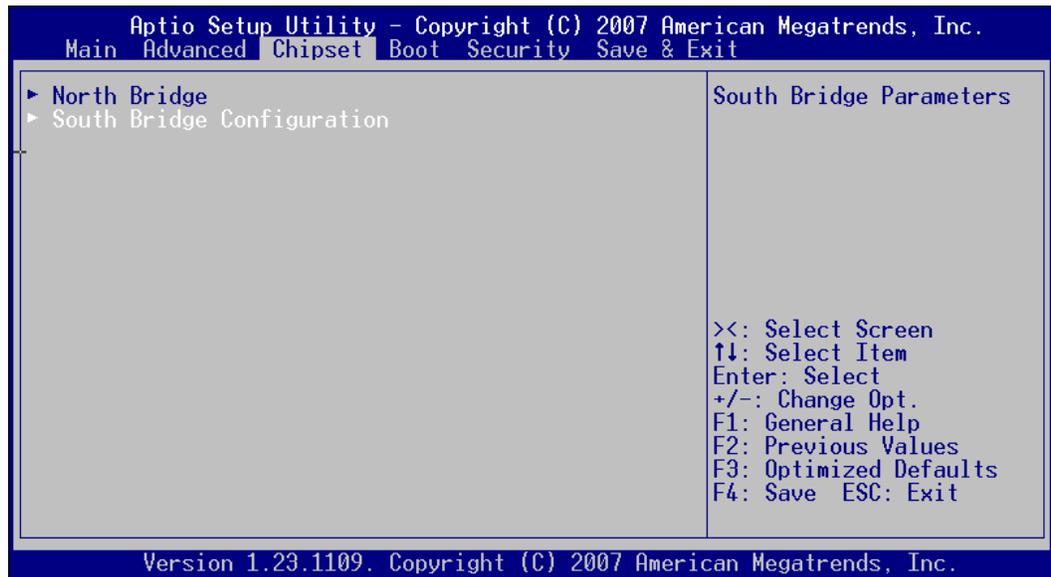


Figure 19 Chipset Configuration Screen

7.3.1 South Bridge Configuration

Figure 20 shows the South Bridge Configuration Screen. Two settings are of particular importance as the impact how the PCIe* subsystem is configured on the compute module and carrier.

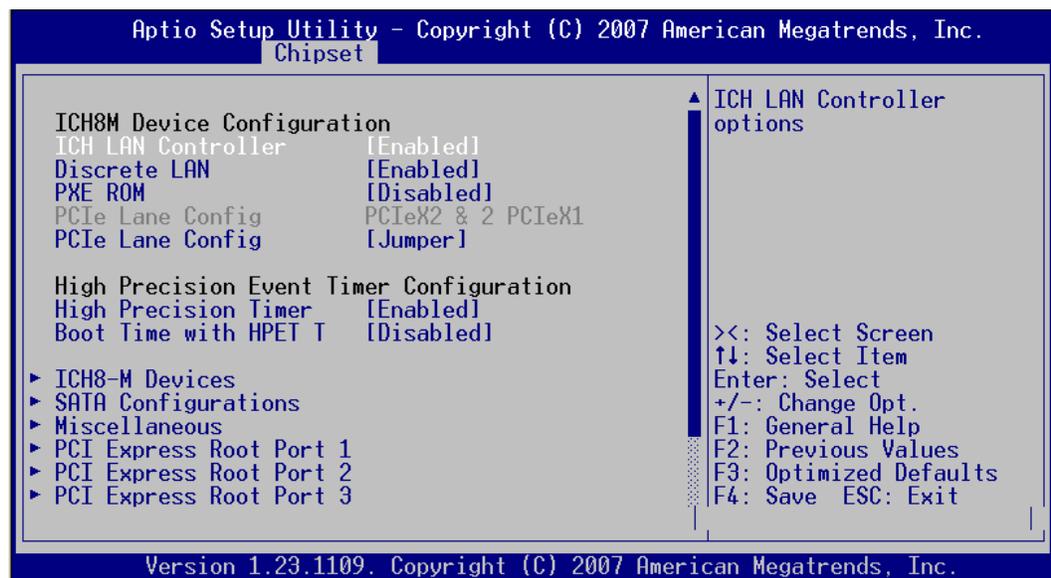


Figure 20 South Bridge Configuration Screen



As described earlier in the guide, it is possible to use a jumper on the carrier to set the desired lane configuration. By default, the jumper is used by the Embedded Controller to determine the lane setup. However, the jumper configuration can be overridden through BIOS by changing the PCIe Lane Config Option.

The PCIe Lane Config option provides the following options:

- 4X PCIeX1
- 1X PCIeX2 , 2X PCIeX1
- 1X PCIeX4
- Jumper

The PCIe Lane Config Text field will provide the configuration selected (e.g. in the screen shot, the Embedded Controller is using the jumper settings to determine the lane setup which is "1X PCIeX2 & 2X PCIeX1"



8 *Inserting/Removing the Module*



Please ensure that all necessary electrostatic precautions are taken when inserting or removing a module from the system. In addition, all power must be removed from the system during this process.

The compute module is screwed down to the carrier board to ensure that the module does not move during shipping. If for, any reason, the compute module needs to be removed from the carrier, the following guidelines need to be followed:

8.1 Removal

1. Ensure that all necessary ESD steps have been taken.
2. Ensure the system is disconnected from wall power.
3. Remove the 2 screws holding the module in place.
4. Unlatch the module from the DIMM connector by simultaneously pushing on the white clips on the DIMM connector.

8.2 Insertion

Figure 21 and Figure 22 show the required finger positions when inserting a module. The module is inserted fully when the clips on the DIMM connector close. It is recommend the spaces be inserted and the module secured to the carrier.



Figure 21 Compute Module Insertion Step#1

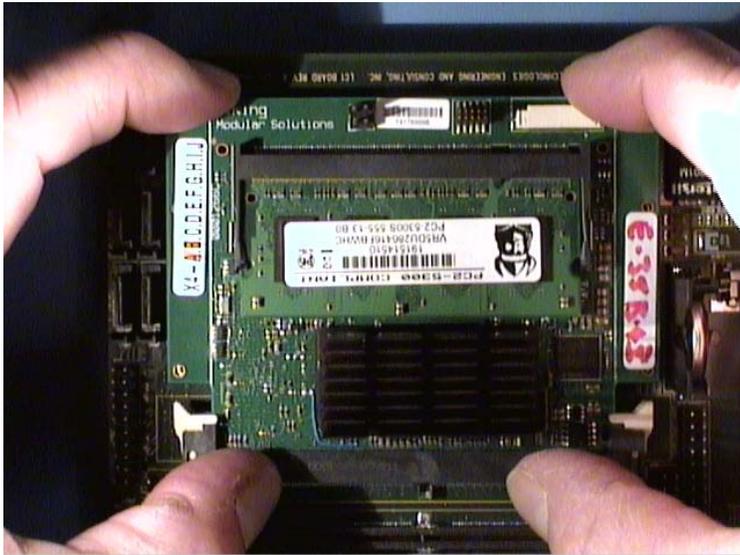


Figure 22 Compute Module Insertion Step#2

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9 Cable Solutions

9.1 EC Serial Console Cable

A console cable may be provided in the box. If not, the following instructions should be followed to create an appropriate cable.

9.1.1 Requirements

The following hardware is required:

1. Female DB9 Connector
2. Cable with at least 3 wires
3. 3 single female header connectors

9.1.2 Wiring Instructions

Connect the 3 wires to the following pins on the DB9 Connector:

Table 5 Management Port Wiring

2X14	Signal	DB9
1	---	
2	---	
3	---	
4	---	
5	---	
6	---	
7	---	
8	---	
9	---	
10	GND	5
11	TX	2
12	---	
13	RX	3
14	---	



9.2 Serial Port Cable (COM1 – COM4)

COM Ports 1 and 2, and Com Ports 3 and 4 are implemented on 2X10 headers. The following is the map of each of the serial ports to a DB9 connector.

9.2.1 Requirements

The following hardware is required:

1. 2X Female DB9 Connector
2. Cable with at least 9 wires (or 18 wires if 2 COM Ports are being wired)
3. 2X10 header

9.2.2 Wiring Instructions

The header for each COM port is wired as follows (note for COM Port 2 and 4 pin 1 would be pin 11 on a 2X10 header):

Table 6 Serial Port Wiring

2X5 pin	Signal Name	DB9 pin
1	DCD	1
2	DSR	6
3	RxD#	2
4	RTS	7
5	TxD#	3
6	CTS	8
7	DTR	4
8	RI	9
9	Ground	5
10	---	

§



10 Regulatory Compliance

USA

These boards were tested and must be installed in a host chassis.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japan

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-B

European Union

European Community (CE) Mark of Conformity Statement



This product is in conformity with the protection requirements of EC Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The boards must be installed in a host chassis to remain in compliance. Intel cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product.

When installed in a host chassis, this product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Properly shielded and grounded cables, connectors, and a host chassis must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment.

This product bears the CE Mark complying with the EMC (EN55022 & EN 55024) and Low Voltage Directives.

This product complies with the Low Voltage Directive 2006/95/EC through compliance with EN 60950-1, Ed. 2.

A signed copy of the Declaration of Conformity is on file and is available from Intel.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

European Power Notices



IMPORTANT: For 230 VAC operation, be sure to use a harmonized grounded 3-conductor cord, rated 8 Amp minimum, with a suitable cord for connection to the equipment and terminating in an IEC approved plug for proper connection to the branch circuit.

ATTENTION: Aucun composant situé à l'intérieur du boîtier ne peut être manipulé par l'utilisateur. Pour toute intervention, vous devez faire appel à un technicien spécialisé.

IMPORTANT: Pour un fonctionnement à 230 VAC, vous devez utiliser un câble conducteur à 3 fils avec mise à la terre, 8 Ampères minimum, doté d'un cordon approprié pour la connexion à l'appareil et se terminant par une prise conforme à la norme IEC, pour le raccordement au réseau électrique.

ATTENTION: Para operacion a 230 VAC, ten cuidado usarse un alambre armonizado & conectado con la tierra, potencia nominal de 8 Amp, con un cordon propiamente terminada para conexion al equipaje y el otro cordon que esta terminando en una clavija de conexion IEC visto bueno para conexion al circuito gajo.



VORSICHT: In der Stromversorgungsabdeckung befindliche Teile können nicht vom Benutzer gewartet werden. Die Wartung ist ausschließlich qualifiziertem Wartungspersonal zu überlassen.

WICHTIG: Beim Betrieb mit 230 VAC ist unbedingt ein harmonisiertes, geerdetes Kabel mit 3 Leitern und minimalem Nennwert von 8 Ampere zusammen mit einem passenden Kabel für den Geräteanschluß zu verwenden, das in einem IEC-genehmigten Stecker für den ordnungsgemäßen Anschluß an den Abzweigkreis endet.

European Regulatory Information

The CE Marking has been applied to this product to demonstrate compliance with the following European Directives:

- 2004/108/EC -- for electromagnetic compatibility
- 2006/95/EC -- for safety

Warnungen

Das Wort 'Warnung' erscheint immer dann, wenn Verletzungsgefahr für Personen oder ein Beschädigungsrisiko für Geräte besteht. Leisten Sie in einem solchen Fall den Anweisungen Folge.

Elektrostatische Entladung

Eine elektrostatische Entladung vom Betriebspersonal an den Computer kann das Gerät beschädigen. Sie müssen beim Anbringen eines Kabels Vorsichtsmaßnahmen hinsichtlich elektrostatischer Entladung treffen:

- Fassen Sie sämtliche Verbindungen ausschließlich am Plastikgehäuse oder der Steckerabschirmung an. Kommen Sie beim Einstecken niemals mit den Metallteilen innerhalb des Steckers in Berührung.
- Bevor Sie die Schnittstellenkabel einstecken, müssen Sie das Gerät 'erden'. Kann Ihre Stromversorgung ein- und ausgeschaltet werden, müssen Sie den Schalter während dieses Vorgangs in der 'Aus'-Position belassen.
- Vor dem Anbringen von Kabeln müssen Sie sich selbst ebenfalls 'erden', um eine eventuelle, an Ihnen haftende statische Aufladung abzuleiten. Dazu berühren Sie einfach die hintere Abdeckung des Gerätegehäuses einige Sekunden lang.
- Vergessen Sie niemals, sich vor dem Umgang mit gedruckten Leiterplatten oder deren Komponenten sorgfältig zu 'erden'.

Diese Vorsichtsmaßnahmen verringern das Beschädigungsrisiko für das Gerät durch elektrostatische Entladungen deutlich.

Interaktion mit anderen Geräten

Sollen andere Komponenten, einschließlich Kabel, zwischen dem Gerät und dem Anschlußpunkt an einen digitalen Circuit angeschlossen werden, müssen alle anderen Komponenten den folgenden Richtlinien entsprechen:

1. Die allgemeinen Übertragungseigenschaften aller anderen Komponenten dürfen keine materiellen Auswirkungen auf die elektrischen Bedingungen der Komponenten untereinander und zu dem speziellen digitalen Circuit hervorrufen.



2. Alle anderen Komponenten dürfen lediglich folgende Geräte umfassen:

- Zugelassene Geräte (siehe Hinweis) zum Erstellen einer Verbindung zwischen dem Gerät und einem bestimmten digitalen Circuit; und

Hinweis: *Derartige Geräte wurden möglicherweise nur für den eingeschränkten Einsatz zugelassen.*

Ventilation im Installationsumfeld

Es muß stets für ausreichende Luftzirkulation um das Gerät gesorgt sein.

WARNING: *Endast Intel kvalificerade tekniker har tillstånd att utföra underhållsarbete på enheten.*

WARNING: *Vid åskväder ska du aldrig ansluta eller koppla ur kablar eller arbeta med installation, underhåll eller omkonfigurering av utrustningen.*

WARNING: *För att undvika elolycksfall:*

- Nätkabeln måste anslutas till ett rätt kopplat jordat eluttag.
- Även annan utrustning som ska anslutas till den här produkten måste anslutas till jordat uttag.

FARE: *Kun Intel kvalifiserte teknikere er berettiget til å utføre servicearbeid på enheten.*

FARE: *For å unngå elektrisk støt må ikke kabler kobles til eller fra. Du må heller ikke foreta installering, vedlikehold eller rekonfigurering av dette produktet i tordenvær.*

FARE: *For å unngå elektrisk støt:*

- Nettkabelen må være plugget i en korrekt koblet og jordet stikkontakt.
- Alt utstyr som er koblet til dette produktet må være plugget i en korrekt koblet stikkontakt.

FARE: *Slå av nettspenningen og trekk nettkabelen ut av stikkontakten før du kobler signalkabler til eller fra.*

FARE! *Undgå elektrisk stød:*

Produktet må hverken installeres, vedlikeholdes eller omkonfigureres i tordenvejr. Det samme gælder for tilslutning eller afmontering af kabler.

FARE! *Undgå elektrisk stød:*

- Netledningen skall tilsluttes en korrekt installeret stikkontakt med forbindelse til jord.
- Sørg for korrekt installation af stikkontakterne, både til produktet og til det udstyr, det tilsluttes.

FARE! *Før signalkablerne tilsluttes eller afmonteres: Sluk, for strømmen, og træk netledningen ud af stikkontakten.*

GEVAAR: *Alleen technische personen van Intel hebben de bevoegheid om dit produkt te onderhouden.*



GEVAAR: *Om het gevaar voor elektrische schokken te vermijden, mag u geen kabels aansluiten of loskoppelen en dit product niet installeren, onderhouden of opnieuw instellen tijdens een onweer.*

GEVAAR: *Om elektrische schokken te vermijden:*

- moet het netsnoer aangesloten zijn op een correct bedraad en geaard stopcontact.
- moeten alle machines waarmee dit product zal worden verbonden ook op correcte bedraden stopcontacten zijn aangesloten.

GEVAAR: *Zet de netschakelaar op O (Uit) en trek de stekker uit het stopcontact vooraleer u signaalkabels los- of vastkoppelt.*

VORSICHT: *Aus Sicherheitsgründen bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs oder Rekonfigurationsarbeiten durchführen.*

VORSICHT: *Aus Sicherheitsgründen*

- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktstckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

VORSICHT: *Aus Sicherheitsgründen is der Netzstecker zu ziehen, bevor Signalkabel angeschlossen oder aufgetrennt werden.*

DANGER: *Le service pour l'entretien de cette unité est seulement autorisé aux techniciens qualifiés de Intel.*

DANGER: *Pour éviter tout risque de choc électrique, ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit pendant l'occurrence d'un orage.*

DANGER: *Pout éviter tout risque de choc électrique:*

- Le cordon d'alimentation doit être branché sur une prise d'alimentation correctement câblée et mise en terre.
- D'autre part, tout le matériel connecté à ce produit doit également être branché sur des prises d'alimentation correctement câblées et mises en terre.

AVERTISSEMENT: *Débranchez la prise du contrôleur hors tension et du cordon d'alimentation avant de connecter ou de déconnecter les câbles d'interface.*

PERICOLO: *La manutenzione dell'unità deve essere consentita solo a tecnici qualificati per Intel*

PERICOLO: *Per evitare scosse elettriche, non collegare o scollegare cavi o effettuare installazioni, riconfigurazioni o manutenzione di quest prodotto durante un temporale.*

PERICOLO: *Per evitare scosse elettriche:*



- Il cavo di alimentazione deve essere collegato a una presa munita di terra di sicurezza e propriamente cablata.
- Tutte le unità esterne di questo prodotto, devono essere collegate a prese munite di terra di sicurezza e propriamente cablate.

PERICOLO: *Spegnere l'unità e scollegare il cavo di alimentazione dalla presa, prima di collegare o scollegare i cavi segnali.*

PERIGO: *Somente os técnicos qualificados Intel estão autorizados à prestarem serviços nesta unidade.*

PERIGO: *Para evitar possíveis choques elétricos, favor não ligar ou desligar cabos, não instale, repare ou reconfigure este produto durante tempestade.*

PERIGO: *Para evitar choques elétricos:*

- O cabo de alimentação deve estar ligado à uma tomada de corrente corretamente instalada, com ligação terra.
- Todo o equipamento ligado à este produto deve estar também ligado à tomadas corretamente instaladas.

PELIGRO: *Solamente los técnicos calificados de Intel están autorizados para reparar la unidad.*

CUIDADO: *Desligue a corrente e retire o cabo de corrente elétrica da tomada, antes de ligar ou desligar os cabos de sinal.*

PELIGRO: *Para evitar la posibilidad de descargas, no conecte o desconecte ningún cable, ni realice ninguna instalación, servicio de mantenimiento o reconfiguración de este producto durante una tormenta eléctrica.*

PELIGRO: *Para evitar el peligro de descargas:*

- Los cables de alimentación deben estar conectados a receptáculos con conexión a tierra y cableado adecuados.
- Todos los equipos a los que se conecte este producto también deberán conectarse a receptáculos con el cableado adecuado.

PRECAUCIÓN: *Desconecte la alimentación eléctrica y desenchufe el cable de alimentación del receptáculo antes de conectar o desconectar los cables de señal.*

PERIGO: *Para evitar perigo de choque, não conecte ou desconecte quaisquer cabos ou faça instalação, manutenção ou reconfiguração deste produto durante uma tempestade magnética.*

PERIGO: *Para evitar perigo de choque:*

- O cabo de força deve estar conectado a tomadas com fios e aterramento adequados.
- Qualquer equipamento ao qual este produto seja ligado também deverá estar conectado a tomadas com fiação adequada.



PERIGO: *Desligue a força e desconecte o cabo de força da caixa antes de conectar out desconectar os cabos de sinal.*

VAARA: *Voit saada sähköiskun äläkä asenna tai huolla tätä laitetta tai muuta sen kokoonpanoa ukonilman aikana. Muutoin voit saada sähköiskun.*

VAARA: *Voit saada sähköiskun, jos et noudata seuraavia ohjeita:*

- Tämän laitteen verkkojohdon saa kytkeä vain toimintakunnossa olevaan maadoitettuun pistorasiaan.
- Tähän laitteeseen liitettävät laitteet on kytkettävä toimintakunnossa olevaan maadoitettuun pistorasiaan.

VAARA: *Katkaise virta ja irrota verkkojohto pistorasiasta, ennen kuin kyket tai irrotat liitäntäkaapeleita.*

Lithium Battery: This device contains a Lithium Battery. There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the vendor's instructions and in accordance with local environmental regulations.

Perchlorate Material: Special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate. This notice is required by California Code of Regulations, Title 22, Division 4.5, Chapter 33: Best Management Practices for Perchlorate Materials. This device includes a battery which contains perchlorate material.

<p>Power Requirements</p> 	<p>Power Supply Input: USA/Canada 100-240 VAC, 2/1 Amps, 50/60 Hz. International 100-240 VAC, 2/1 Amps, 50/50 Hz Power Supply Output/Chassis Input: 12 VDC, 12.5 Amps, 150 Watts</p>
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Electrostatic Discharge Warning: This device must be installed on a properly grounded ESD protection surface to avoid damage to the components. A properly grounded ESD wrist strap must be worn during operation/installation of the device, or connection of cables.

The power supply cord is the main disconnect device to mains (AC power). The socket outlet shall be installed near the equipment and shall be readily accessible.



- Obtain an AC power cord approved for use in your region that is compatible with the AC outlet. Do not modify the cord in any way.
- The cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system for USA/Canada.
- The connector that plugs into the wall outlet must be a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.

关于符合中国《电子信息产品污染控制管理办法》的声明

Management Methods on Control of Pollution From Electronic Information Products

(China RoHS declaration)

产品中有毒有害物质的名称及含量

Hazardous Substances Table

部件名称 (Parts)	有毒有害物质或元素 (Hazardous Substance)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷板组件 Printed Board Assemblies (PBA)	×	○	○	○	○	○
外围驱动组件 Peripheral drive assemblies	×	○	○	○	○	○
电源 Power Supply	×	○	○	○	○	○
电缆及电缆组件	×	○	○	○	○	○

Cables & Cable Assemblies						
<p>○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006标准规定的限量要求以下。</p> <p>○：Indicates that this hazardous substance contained in all homogeneous materials of this part is below the limit requirement in SJ/T 11363-2006.</p> <p>×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006标准规定的限量要求。</p> <p>×：Indicates that this hazardous substance contained in at least one of the homogeneous materials of this part is above the limit requirement in SJ/T 11363-2006.</p> <p>对销售之日的所售产品, 本表显示我公司供应链的电子信息产品可能包含这些物质。 注意：在所售产品中可能会也可能不会含有所有所列的部件。</p> <p>This table shows where these substances may be found in the supply chain of our electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product.</p>						
<p>除非另外特别的标注, 此标志为针对所涉及产品的环保使用期限标志。 某些可更换的零部件可能会有一个不同的环保使用期限(例如, 电池单元模块)。</p> <p>此环保使用期限只适用于产品在产品手册中所规定的条件下工作。</p> <div data-bbox="386 1182 506 1283" data-label="Image">  </div> <p>The Environment-Friendly Use Period (EFUP) for all enclosed products and their parts are per the symbol shown here, unless otherwise marked. Certain field-replaceable parts may have a different EFUP (for example, battery modules) number. The Environment-Friendly Use Period is valid only when the product is operated under the conditions defined in the product manual.</p>						