



**ADLINK**  
TECHNOLOGY INC.

# NuPRO-A331

Full-Size PICMG 1.0 Intel® Core™ i7/i5/i3  
Q57 Express Chipset SBC

## User's Manual



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**Advance Technologies; Automate the World.**

# Revision History

Revision	Release Date	Description of Change(s)
2.00	2010/12/31	Initial release
2.01	2011/02/17	Correct PICMG "1.3" to "1.0", update DVI cable P/N, remove SATA power cable from packing list
2.02	2016/5/27	I/O spec listing adjusted

# Preface

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## Using this Manual

### Audience and Scope

The NuPRO-A331 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating industrial grade single board computers.

### Manual Organization

This manual is organized as follows:

**Preface:** Presents important copyright notifications, disclaimers, trademarks, and associated information on the proper understanding and usage of this document and its associated product(s).

**Chapter 1, Introduction:** Introduces the NuPRO-A331, its features, specifications and mechanical drawing.

**Chapter 2, Hardware Information:** Provides information on board layout, connectors and jumpers for configuring the NuPRO-A331.

**Chapter 3, Getting Started:** Illustrates how to install components on the NuPRO-A331 such as CPU, heatsink, and memory modules.

**Chapter 4, Driver Installation:** Provides information on how to install the NuPRO-A331 device drivers.

**Chapter 5, BIOS Setup:** Describes basic navigation for the AMIBIOS®8 BIOS setup utility.

**Appendix A, Watchdog Timer:** Presents information on implementing the watchdog timer.

**Appendix B, System Resources:** Presents information on I/O mapping, IRQ routing, and resource allocation.

**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.

## 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.

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

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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 Introduction

## 1.1 Overview

The ADLINK NuPRO-A331 is a PICMG 1.0 Single Board Computer (SBC) supporting the next-generation Intel® Core™ i7/i5/i3 and Pentium® processors in LGA1156 package to deliver a scalable high performance platform for a wide array of industrial applications. The NuPRO-A331 supports 32nm and 45nm process CPUs at up to 3.33GHz with integrated graphics and memory controllers, Direct Media Interface (DMI) and Flexible Display Interface (FDI) connectivity to the Intel® Q57 Express Chipset. Dual-channel DDR3 1066/1333 MHz memory is supported up to a maximum of 8GB in two DIMM slots.

These advanced features, coupled with dual PCI Express®-based Gigabit Ethernet, PCI Express Mini Card slot and diverse I/O and storage make the NuPRO-A331 ideal for instrumentation and automation control applications.

## 1.2 Features

- ▶ Supports Intel® Core™ i7/i5/i3 and Pentium® processors in LGA1156 package
- ▶ Integrated Intel® HD Graphics on dual core 32nm (Clarkdale) processors
- ▶ PCI Express Mini Card slot
- ▶ Dual Gigabit Ethernet
- ▶ 8x USB 2.0 ports (2x on bracket, 6x onboard)
- ▶ 6x SATA 3 Gb/s ports onboard
- ▶ 6x COM ports (including 2x RS-232/422/485/485+)
- ▶ Watchdog Timer, Hardware Monitor
- ▶ Optional HD audio kit (DB-Audio2 daughter board)
- ▶ TPM hardware security chip (optional)
- ▶ RoHS compliant



NOTE:

To purchase the optional DB-Audio2 daughter board, please contact your ADLINK sales representative.

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## 1.3 Specifications

<b>System</b>	
<b>CPU</b>	Intel® Core™ i7/i5/i3 and Pentium® Dual Core processors in LGA1156 package: <ul style="list-style-type: none"> <li>• Intel® Core™ i7-860 Processor, 2.80 GHz, 8M Cache, 45nm, 95W, 4 cores/8 threads</li> <li>• Intel® Core™ i5-750 Processor, 2.66 GHz, 8M Cache, 45nm, 95W, 4 cores/4 threads</li> <li>• Intel® Core™ i5-660 Processor, 3.33 GHz, 4M Cache, 32nm, 73W, 2 cores/4 threads, HD Graphics</li> <li>• Intel® Core™ i3-540 Processor, 3.06 GHz, 4M Cache, 32nm, 73W, 2 cores/4 threads, HD Graphics</li> <li>• Intel® Pentium® G6950 Processor, 2.80 GHz, 3M Cache, 32nm, 73W, 2 cores/2 threads, HD Graphics</li> </ul>
<b>Chipset</b>	<ul style="list-style-type: none"> <li>• Intel® Q57 Platform Controller Hub</li> </ul>
<b>Memory</b>	<ul style="list-style-type: none"> <li>• Two 240-pin DIMM sockets support dual-channel 1066/1333MHz DDR3 (up to 8GB)</li> </ul>
<b>BIOS</b>	<ul style="list-style-type: none"> <li>• AMI BIOS in 64-Mbit SPI Flash</li> </ul>
<b>Audio</b>	<ul style="list-style-type: none"> <li>• Intel® High Definition Audio support via DB-Audio2 daughter board</li> </ul>
<b>Watch Dog Timer</b>	<ul style="list-style-type: none"> <li>• 1-255 second/minute programmable and can generate system reset.</li> </ul>
<b>Hardware Monitor</b>	<ul style="list-style-type: none"> <li>• CPU/System temperature, fan speed and onboard DC voltage</li> </ul>
<b>TPM</b>	<ul style="list-style-type: none"> <li>• Infineon SLB 9635 TT 1.2 (NuPRO-A331DV only)</li> </ul>
<b>Operating Systems</b>	<ul style="list-style-type: none"> <li>• Windows® XP, 7 32/64-bit, Server 2008; Fedora™ 12, Redhat Enterprise Linux 5</li> </ul>

<b>I/O Interfaces</b>	
<b>Serial ATA</b>	<ul style="list-style-type: none"> <li>• 6x SATA 3 Gb/s ports onboard</li> </ul>
<b>I/O Ports</b>	<ul style="list-style-type: none"> <li>• 2x USB 2.0 port on rear panel, 6x via onboard header</li> <li>• 6x serial ports via onboard pin-header (4x RS-232, 2x RS-232/422/485/485+)</li> <li>• 2x GbE RJ45 ports (1x GbE on NuPRO-A331LV)</li> <li>• VGA port (Dsub-15)</li> <li>• Optional DVI-D via onboard header to bracket (NuPRO-A331DV only)</li> <li>• PS/2 Keyboard/Mouse (onboard header)</li> <li>• 1 Parallel port</li> </ul>
<b>Expansion</b>	<ul style="list-style-type: none"> <li>• PCI 32bit/33MHz</li> <li>• PCI-to-ISA Bridge: IT8888 (DMA not supported)</li> <li>• PCI Express Mini Card slot</li> </ul>
<b>Display</b>	
<b>Integrated Graphics</b>	<ul style="list-style-type: none"> <li>• Integrated Intel® HD Graphics on dual core 32nm (Clarkdale) processors</li> </ul>
<b>External Graphics</b>	<ul style="list-style-type: none"> <li>• Onboard PCI Express Mini Card slot for optional mPCIe-8770</li> </ul>
<b>Ethernet</b>	
<b>Controller</b>	<ul style="list-style-type: none"> <li>• Dual Intel® 82574L Gigabit Ethernet Controllers</li> <li>• Supports Preboot Execution Environment (PXE), Wake-On-LAN</li> </ul>
<b>Ports</b>	<ul style="list-style-type: none"> <li>• Two RJ-45 Ethernet ports</li> </ul>
<b>Mechanical and Environment</b>	
<b>Form Factor</b>	<ul style="list-style-type: none"> <li>• Standard full-size PICMG 1.0 SBC</li> </ul>
<b>Dimensions</b>	<ul style="list-style-type: none"> <li>• 338 x 122 mm (L x W)</li> </ul>
<b>Operating Temp.</b>	<ul style="list-style-type: none"> <li>• 0°C to 60°C</li> </ul>
<b>Storage Temp.</b>	<ul style="list-style-type: none"> <li>• -20°C to 80°C</li> </ul>
<b>Relative Humidity</b>	<ul style="list-style-type: none"> <li>• 10% to 90% non-condensing</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>• CE, FCC Class A</li> </ul>

**Table 1-1: NuPRO-A331 General Specifications**

# 1.4 Block Diagram

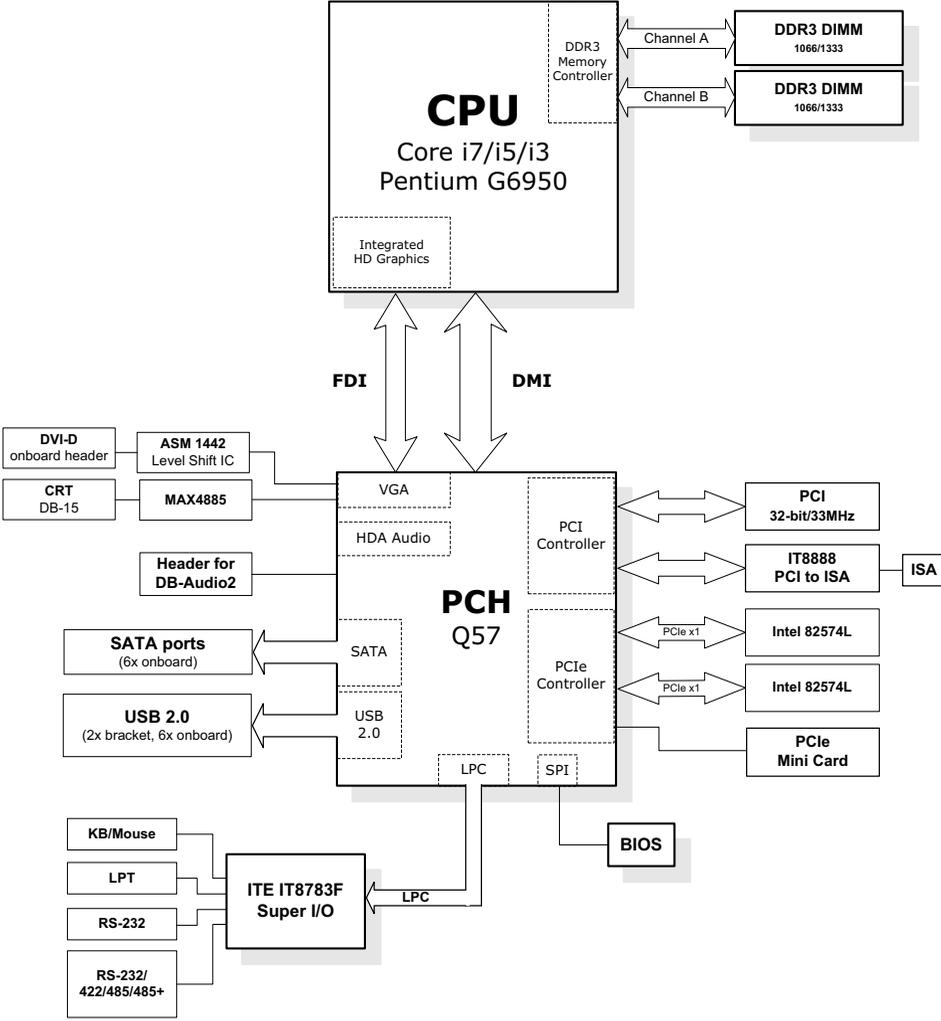


Figure 1-1: NuPRO-A331 Block Diagram

## 1.5 Functional Description

### Processor Support

The NuPRO-A331 is a single processor design for the latest Intel Clarkdale (32nm) and Lynnfield (45nm) processors in LGA1156 socket (Intel® Core™ i7/i5/i3, Pentium® G6950). An integrated memory controller supports dual channel 1066/1333 MHz DDR3 and integrated Intel® HD Graphics is supported on dual core 32nm (Clarkdale) processors. Direct Media Interface (DMI) and Flexible Display Interface (FDI) provide connectivity to the Intel® Q57 Express Chipset.

### Intel® Q57 Express Chipset

The Intel® BD82Q57 Platform Controller Hub (PCH) combines with the processor to provide a compact yet powerful 2-chip solution. Direct Media Interface (DMI) is the chip-to-chip connection between the processor and PCH. Intel® Flexible Display Interface carries display traffic from the integrated graphics in the processor to the legacy display connectors in the PCH. The PCH supports all other required interfaces including PCI Express, Serial ATA, USB 2.0, PCI, LPC, and SPI.

### Dual-Channel DDR3 Memory

To meet the requirements of memory-intensive applications, the NuPRO-A331 has a dual-channel memory architecture supporting DDR3 1066/1333 MHz DIMMs. The key advantages of DDR3 are the higher bandwidth and the increase in performance at lower power than DDR2. DDR3 memory technology meets the requirements of the latest 3D graphics, multimedia, and network application, and boosts system performance by eliminating bottlenecks.

### Gigabit Ethernet

The NuPRO-A331 utilizes two Intel® 82574L Gigabit Ethernet Controllers connected to the PCIe bus of the Q57 PCH. Wake-on-LAN and PXE are supported.

## Serial ATA

The NuPRO-A331 provides six Serial ATA ports with data transfer rates of up to 3.0 GB/s. Intel® Rapid Storage Technology supports AHCI and RAID 0/1/5/10 functionality.

## Universal Serial Bus (USB) 2.0

The NuPRO-A331 provides eight USB 2.0 ports supporting transfer speeds up to 480 Mbps. All ports are high-speed, fullspeed, and low-speed capable.

## Hardware monitoring

A built-in, proactive hardware monitoring system in the Super I/O monitors the CPU temperature, system fan speed, and voltage levels to prevent overheating and/or component damage, effect timely failure detection, and ensure a stable supply of current for critical components.

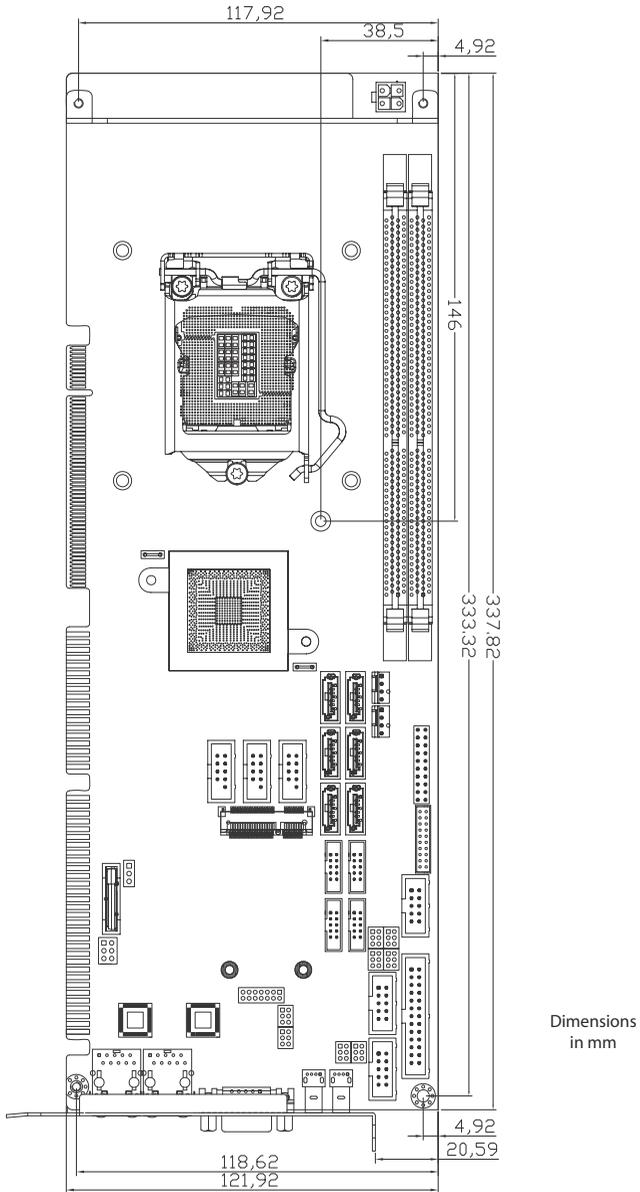
## Watchdog Timer

The watchdog timer (WDT) monitors system operations based on user-defined configurations. The WDT can be programmed for different time-out periods, such as from 1 to 255 seconds or from 1 to 255 minutes. The WDT generates a reset signal, then a reset request, after failure to strobe it within the programmed time period. A register bit may be enabled to indicate if the watchdog timer caused the reset event. The WDT register is cleared during the power-on sequence to enable the operating system to take appropriate action when the watchdog generates a reboot.

## Trusted Platform Module

The NuPRO-A331 optionally supports TPM ver. 1.2 (Trusted Platform Module) for secure storage of keys, passwords and digital certificates. Systems supporting TPM offer improved hardware-based security in numerous applications, such as file and folder encryption, local password management, S-MIME e-mail, VPN and PKI authentication and wireless authentication for 802.1x and LEAP.

## 1.6 Mechanical Drawing



**Figure 1-2: NuPRO-A331 Board Dimensions**

## 1.7 I/O Connectivity

I/O	Bracket	Onboard	Golden Finger	Remarks
VGA	Y	—	—	DB-15
DVI	—	Y (DV only)	—	cable w/ bracket optional
LAN1/2 (RJ-45)	Y (LV: 1x LAN)	—	—	Act/Link/Speed LEDs
PS/2 KB/MS	—	Y	—	cable w/ bracket optional
USB Rear Panel	2	—	—	
USB headers	—	6	—	2.54" pitch
COM1-2	by cable w/ bracket	Y	—	2.54" pitch
COM3-6	by cable w/ bracket	Y	—	2.00" pitch
Parallel port	—	Y	—	—
SATA	—	6	—	—
PCIe Mini Card	—	Y	—	—
PCI 32bit/33MHz	—	—	Y	—
ISA	—	—	Y	—

**Table 1-2: NuPRO-A331 I/O Connectivity**

## 1.8 Power Consumption

### Intel® Core™ i7-860 Processor, 2.80 GHz

Test Configuration	
<b>CPU</b>	Intel® Core™ i7-860 Processor, 2.80 GHz
<b>Memory</b>	ATP AQ56M64B8BJH9S 2GB DDR3 1333 2x 2GB in 2 DIMM slots
<b>Graphics</b>	Intel® Graphics Media Accelerator HD (Integrated)
<b>SATA Channel 1</b>	Seagate ST9160412AS Barracuda 7200.4 160GB
<b>Power Supply</b>	FSP FSP350-60PFG
<b>Backplane</b>	ADLINK HPCI-6S4

DOS (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.041A	3.128A	13.98mA	—
<b>Watts (W)</b>	36.492	15.64	0.046	52.178
Windows XP, logon screen (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	1.966A	2.779A	12.23mA	—
<b>Watts (W)</b>	23.592	13.895	0.040	37.527
Windows XP, Total System Stress (BurnIn Test 6.0)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	7.098A	3.768A	15.5mA	—
<b>Watts (W)</b>	85.176	18.84	0.051	104.067

Table 1-3: Core™ i7-860 Processor Power Consumption

**Intel® Core™ i5-660 Processor, 3.33 GHz**

<b>Test Configuration</b>	
<b>CPU</b>	Intel® Core™ i5-660 Processor, 333 GHz
<b>Memory</b>	ATP AQ56M64B8BJH9S 2GB DDR3 1333 2x 2GB in 2 DIMM slots
<b>Graphics</b>	Intel® Graphics Media Accelerator HD (Integrated)
<b>SATA Channel 1</b>	Seagate ST9160412AS Barracuda 7200.4 160GB
<b>Power Supply</b>	FSP FSP350-60PFG
<b>Backplane</b>	ADLINK HPCI-6S4

<b>DOS (idle)</b>				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.342	0.750	1.583	—
<b>Watts (W)</b>	40.10	3.75	5.23	49.08
<b>Windows XP, logon screen (idle)</b>				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	1.602	0.730	1.572	—
<b>Watts (W)</b>	19.22	3.65	5.19	28.06
<b>Windows XP, Total System Stress (BurnIn Test 6.0)</b>				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.360	1.199	1.644	—
<b>Watts (W)</b>	40.32	5.99	5.43	51.74

**Table 1-4: Core™ i5-660 Processor Power Consumption**

## Intel® Core™ i3-540 Processor, 3.06 GHz

Test Configuration	
<b>CPU</b>	Intel® Core™ i3-540 Processor, 3.06 GHz (2 cores)
<b>Memory</b>	Unigen MUJUUDM8000ACELPAA DDR3 1333MHz 2x 1GB in 2 DIMM slots
<b>Graphics</b>	Integrated on CPU
<b>SATA Channel 1</b>	Seagate Barracuda 7200.10 160GB
<b>Power Supply</b>	LEMACS HG2-6350P 350W
<b>Backplane</b>	ADLINK EBP-5E1

DOS (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.342	0.750	1.583	—
<b>Watts (W)</b>	40.10	3.75	5.23	49.08
Windows XP, logon screen (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	1.602	0.730	1.572	—
<b>Watts (W)</b>	19.22	3.65	5.19	28.06
Windows XP, CPU Stress (Intel Power Thermal Utility)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	4.990	0.726	1.645	—
<b>Watts (W)</b>	59.88	3.63	5.43	68.94
Windows XP, Total System Stress (BurnIn Test 6.0)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.360	1.199	1.644	—
<b>Watts (W)</b>	40.32	5.99	5.43	51.74

**Table 1-5: Core™ i3-540 Processor Power Consumption**

## Intel® Pentium® G6950 Processor, 2.80 GHz

Test Configuration	
<b>CPU</b>	Intel® Pentium® G6950 Processor, 2.80 GHz (2 cores)
<b>Memory</b>	Unigen MUUUDM8000ACELPAA DDR3 1333MHz 2x 1GB in 2 DIMM slots
<b>Graphics</b>	Integrated on CPU
<b>SATA Channel 1</b>	Seagate Barracuda 7200.10 160GB
<b>Power Supply</b>	LEMACS HG2-6350P 350W
<b>Backplane</b>	ADLINK EBP-5E1

DOS (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.030	0.751	1.640	—
<b>Watts (W)</b>	36.36	3.76	5.41	45.53
Windows XP, logon screen (idle)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	1.594	0.728	1.621	—
<b>Watts (W)</b>	19.13	3.64	5.35	28.12
Windows XP, CPU Stress (Intel Power Thermal Utility)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	4.522	0.722	1.635	—
<b>Watts (W)</b>	54.26	3.61	5.40	63.27
Windows XP, Total System Stress (BurnIn Test 6.0)				
<b>Power Req.</b>	+12V	+5V	+3.3V	Total
<b>Current (A)</b>	3.044	1.640	1.568	—
<b>Watts (W)</b>	36.53	8.20	5.17	49.90

**Table 1-6: Pentium® G6950 Processor Power Consumption**

## 1.9 Package Contents

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from the dealer before returning any product to ADLINK.

- ▶ NuPRO-A331 SBC
- ▶ Driver DVD
- ▶ User Manual
- ▶ SATA data cable with latch x2
- ▶ 2-port USB cable w/ bracket
- ▶ 2-port COM cable w/ bracket for COM1/COM2 (2.54mm pitch)
- ▶ 2-port COM cable w/ bracket x2 for COM3-6 (2.00mm pitch)



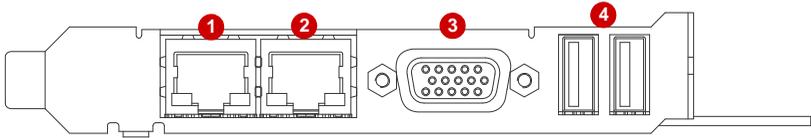
The NuPRO-A331 must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the board. Wear a grounded wrist strap when installing and/or servicing.

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## 2 Hardware Information

This chapter provides information on the NuPRO-A331 board layout, connector pin assignments, and jumper settings.

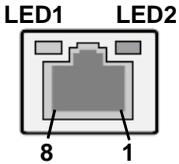
### 2.1 Rear Panel I/O Ports



**Figure 2-1: Rear Panel I/O Ports**

	Connector	Description
1	LAN1 port	Gigabit Ethernet (RJ-45)
2	LAN2 port	Gigabit Ethernet (RJ-45)
3	VGA port	DB-15 connector for CRT or LCD monitor
4	USB 2.0 ports	High-speed USB 2.0 ports

## LAN (RJ-45) Ports



Pin #	10BASE-T/ 100BASE-TX	1000BASE-T
1	TX+	BI_DA+
2	TX-	BI_DA-
3	RX+	BI_DB+
4	--	BI_DC+
5	--	BI_DC-
6	RX-	BI_DB-
7	--	BI_DD+
8	--	BI_DD-

Refer to the table below for the LAN port LED definitions.

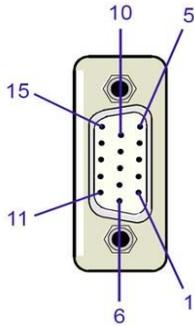
LED1		LED2	
Status	Description	Status	Description
Off	No Link	Off	10 Mb connection
On	Linked	Green	100 Mb connection
Blinking	Data Activity	Orange	1 Gb connection

## USB Connector



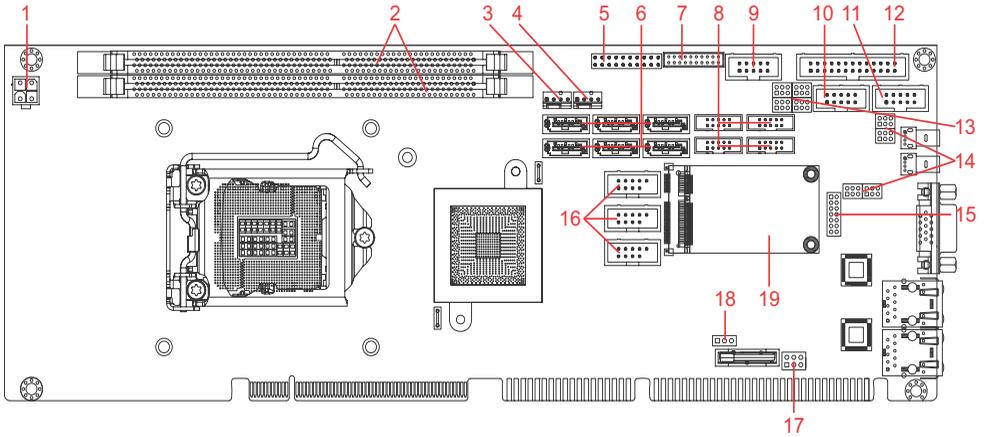
Pin #	Signal Name
1	Vcc
2	Data-
3	Data+
4	GND

## VGA Port



Pin #	Signal
1	Red
2	Green
3	Blue
4	NC
5	Ground
6	Ground
7	Ground
8	Ground
9	+5 V
10	Ground
11	NC
12	DDC DAT
13	HSYNC
14	VSYNC
15	DDC CLK

## 2.2 Board Layout

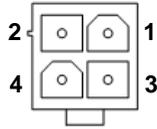


**Figure 2-2: Connectors and Jumpers**

	Connector	Description
1	CN1	ATX 12V Power connector
2	DIMM1/2	DDR3 DIMM slots
3	FAN1	FAN1 connector
4	FAN2	FAN2 connector
5	CN27	System Panel pin header
6	CN7/8/11/12/28/29	SATA connectors
7	CN2	DVI-D onboard connector
8	CN13/14/17/18	COM3/4/5/6 connector
9	CN26	Audio connector
10	CN10	COM2 connector
11	CN6	COM1 connector
12	CN5	Parallel Port connector
13	JP8-11	COM2 mode jumpers
14	JP1-4	COM1 mode jumpers
15	JP6	PCIe Mini Card VGA pin header
16	CN19/20/21	USB connectors
17	CN4	Keyboard/Mouse pin header
18	JBAT1	Clear CMOS
19	SLOT1	PCIe Mini Card slot

## 2.3 Onboard Connectors

### ATX 12V Power Connector (CN1)



Pin #	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC

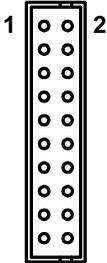


NOTE:

The ATX 12V power connector must be connected to provide sufficient power to the SBC in either ATX or AT modes. See “Installing the Power Connectors” on page 36.

### DVI-D Onboard Connector(CN2)

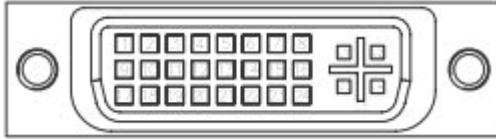
(2x10 Wafer connector, 2.00mm pitch)



Pin #	Signal	Pin #	Signal
1	GND	2	GND
3	DVI-Clock+	4	DVI-Data0-
5	DVI-Clock-	6	DVI-Data0+
7	GND	8	GND
9	DVI-I2C-Clock	10	DVI-Data1-
11	DVI-I2C-Data	12	DVI-Data1+
13	GND	14	GND
15	DVI-HPD	16	DVI-Data2-
17	+5V	18	DVI-Data2+
19	GND	20	GND

## DVI-D Bracket Connector

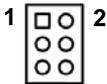
(optional cable w/ bracket, P/N 30-01052-2000)



Pin #	Signal	Pin #	Signal
1	TMDS Data2-	13	TMDS Data3+
2	TMDS Data2+	14	+5 V Power
3	TMDS Data2/4 Shield	15	GND
4	TMDS Data4-	16	Hot Plug Detect
5	TMDS Data4+	17	TMDS Data0-
6	DDC Clock [SCL]	18	TMDSData0+
7	DDC Data [SDA]	19	TMDS Data0/5 Shield
8	Analog vertical sync	20	TMDS Data5-
9	TMDS Data1-	21	TMDS Data5+
10	TMDS Data1+	22	TMDS Clock Shield
11	TMDS Data1/3 Shield	23	TMDS Clock +
12	TMDS Data3-	24	TMDS Clock -

## PS/2 Keyboard/Mouse Pin Header (CN4)

(2x3 pin header, 2.54mm pitch)



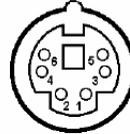
Pin #	Signal	Pin #	Signal
1	KBDATA	2	KBCLK
3	MSDATA	4	MSCLK
5	KM_VCC	6	GND

## PS/2 Keyboard/Mouse Bracket Connectors

(optional cable w/ bracket, P/N: 30-01019-2000)

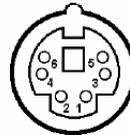
### PS/2 Mouse Port (green)

Pin #	Signal	Function
1	MSDATA	Mouse Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



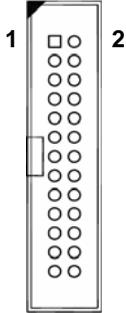
### PS/2 Keyboard Port (purple)

Pin #	Signal	Function
1	KBDATA	Keyboard Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



## Parallel Port Onboard Connector (CN5)

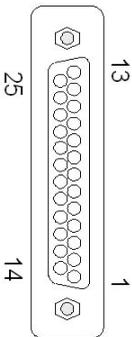
(2x13 box header, 2.54mm pitch)



Pin #	Signal	Pin #	Signal
1	Line Printer Strobe	2	Auto-Feed
3	Parallel Data 0	4	Error
5	Parallel Data 1	6	Initialize
7	Parallel Data 2	8	Select
9	Parallel Data 3	10	Ground
11	Parallel Data 4	12	Ground
13	Parallel Data 5	14	Ground
15	Parallel Data 6	16	Ground
17	Parallel Data 7	18	Ground
19	Acknowledge	20	Ground
21	Busy	22	Ground
23	Paper Empty	24	Ground
25	Select	26	NC

## Parallel Port Bracket Connector

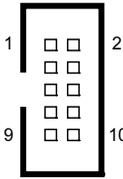
(optional cable w/ bracket, P/N: 30-25004-0000)



Pin #	Signal	Pin #	Signal
1	Line Printer Strobe	14	Auto-Feed
2	Parallel Data 0	15	Error
3	Parallel Data 1	16	Initialize
4	Parallel Data 2	17	Select
5	Parallel Data 3	18	Ground
6	Parallel Data 4	19	Ground
7	Parallel Data 5	20	Ground
8	Parallel Data 6	21	Ground
9	Parallel Data 7	22	Ground
10	Acknowledge	23	Ground
11	Busy	24	Ground
12	Paper Empty	25	Ground
13	Select		

## COM1/2 Connector (RS-232/422/485/485+) (CN6/10)

(2x5 box header, 2.54mm pitch)

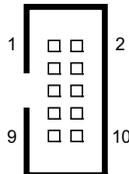


Pin #	RS-232	RS-422/485+	RS-485
1	DCD	TXD-	Data-
2	DSR	NC	NC
3	RXD	TXD+	Data+
4	RTS	NC	NC
5	TXD	RXD+	NC
6	CTS	NC	NC
7	DTR	RXD-	NC
8	RI	NC	NC
9	GND	GND	GND
10	NC	NC	NC

**Note:** See “COM1/2 Mode Jumper Settings” on page 28 for instructions on how to set COM1/2 to RS-232/422/485/485+ mode.

## COM3/4/5/6 Connectors (RS-232) (CN18/17/14/13)

(2x5 box header, 2.00mm pitch)

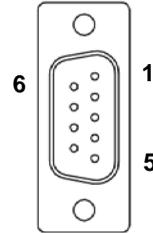


Pin #	RS-232 Signal
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND
10	NC

## COM Bracket Connectors

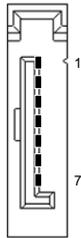
(cables w/ bracket supplied with the NuPRO-A331 - DB9 connector)

Pin #	RS-232	RS422/485+	RS485
1	DCD	TXD-	Data-
2	RXD	TXD+	Data+
3	TXD	RXD+	--
4	DTR	RXD	--
5	GND	GND	GND
6	DSR	--	--
7	RTS	--	--
8	CTS	--	--
9	RI	--	--



## Serial ATA Connectors (CN7/8/11/12/28/29)

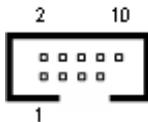
(7P L-connector, 1.27mm pitch)



Pin #	Signal
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

## USB 2.0 Connectors (CN19/20/21)

(2x5 box header, 2.54mm pitch)

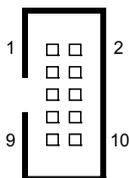


Pin #	Signal	Pin #	Signal
1	+5V	2	+5V
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key	10	NC

## HD Audio Daughter Board Connector (CN26)

(2x5 box header, 2.54mm pitch)

This connector is designed for use with the ADLINK DB-Audio2 daughter board.

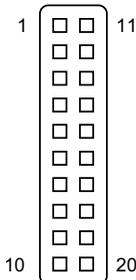


Pin #	Signal	Function
1	GND	Ground
2	AUD_BCLK	Audio Clock
3	GND	Ground
4	ICH_AUD_SDIN1	Audio Data Input
5	P5V	+ 5V
6	ICH_AUD_SDOUT	Audio Data Output
7	P5V_AUD	+ 5V
8	P3V3_DVDD	3.3V
9	AUD_SYNC	Audio Synchronous
10	AUD_RSTJ	Audio Reset

## System Panel Pin Header (CN27)

(2x10 pin header, 2.54mm pitch)

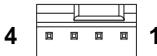
Connects to chassis-mounted buttons, speakers, and LEDs.



Pin #	Signal	Function	Pin Group
1	P5V	+5V Power	Power LED
2	NC		
3	HC_PLED-L	Power LED signal	
4	NC		
5	GND	Ground	ATX Power
6	GND	Ground	
7	NC		
8	ATX_PSON-L	ATX Power-On signal	
9	P5V_SB_ATX	+5V Standby	Chassis Speaker
10	PMEJ	Power Control signal	
11	HC_SPKR	Speaker signal	
12	NC		
13	NC		Reset Button
14	P5V	+5V Power	
15	HC_RSTBN-L	Reset signal	HDD LED
16	GND	Ground	
17	HDLED_PWR	HDD LED signal	Power Button
18	P5V	+5V Power	
19	HC_PBTNJ	Power-On signal	
20	GND	Ground	

## Fan Connectors (FAN1/2)

(1x4 Wafer connector, 2.54mm pitch)

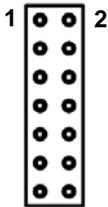


Pin #	Signal
1	GND
2	Fan power (+12V)
3	Fan Tachometer
4	Fan Speed Control

## PCIe Mini Card VGA Pin Header(JP6)

(2x7 pin header, 2.00mm pitch)

This header is connected to the optional mPCIe-8770 to provide graphics output to the VGA connector on the rear panel.



Pin #	Signal	Pin #	Signal
1	NC	2	CRTDAT
3	NC	4	CRTCLK
5	GND	6	CRTR
7	GND	8	CRTG
9	GND	10	CRTB
11	GND	12	CRTHS
13	GND	14	CRTVS

## 2.4 Jumpers

### Clear CMOS (JBAT1)

The CMOS RAM data contains the date/time and BIOS setting information. CMOS is powered by the onboard button cell battery. To erase the CMOS RAM data:

1. Power down and disconnect power from the system.
2. Short pins 2-3 on JP1.
3. Reconnect power and power up the system.
4. After power up, remove the jumper cap from pins 2-3 and reinstall it to pins 1-2.

RTC status	Connection	JBAT1
Normal	1 – 2	
Clear CMOS	2 – 3	

### COM1/2 Mode Jumper Settings

Short the jumper pins according to the following settings to set COM1/2 to RS-232/422/485/485+ mode.

#### COM1 (JP1-4)



	RS-232	RS-422	RS-485	RS-485+
JP1	-	1-3, 2-4	1-3, 2-4	3-5, 4-6
JP2	1-3, 2-4	3-5, 4-6	3-5, 4-6	3-5, 4-6
JP3	1-3, 2-4	3-5, 4-6	3-5, 4-6	3-5, 4-6
JP4	1-2	3-4	5-6	5-6

#### COM2 (JP8-11)



	RS-232	RS-422	RS-485	RS-485+
JP11	-	1-3, 2-4	1-3, 2-4	3-5, 4-6
JP9	1-3, 2-4	3-5, 4-6	3-5, 4-6	3-5, 4-6
JP10	1-3, 2-4	3-5, 4-6	3-5, 4-6	3-5, 4-6
JP8	1-2	3-4	5-6	5-6

## 3 Getting Started

This chapter provides information on how to install components on the NuPRO-A331 SBC.

### 3.1 Installing the CPU

The NuPRO-A331 supports an Intel® Core™ i7/i5/i3 or Pentium® processor in an LGA1156 socket.



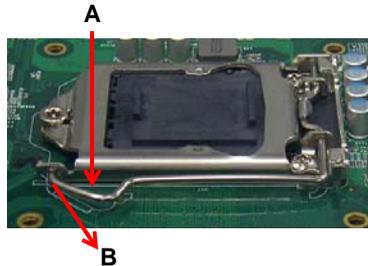
Disconnect all power to the board before installing a CPU to prevent damaging the board and CPU.

Do not touch socket contacts. Damaging the contacts voids the product warranty. Follow the installation instructions carefully to avoid damaging the board components.

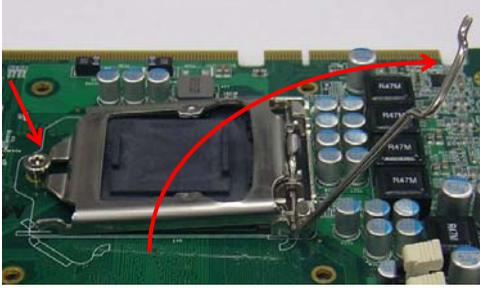


To install the CPU:

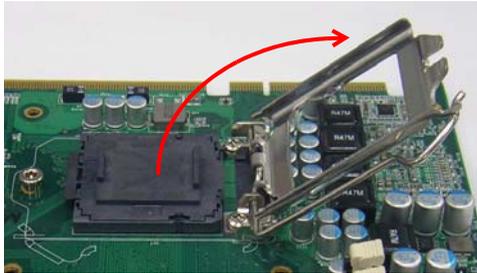
1. Press down on the locking arm (A), then push it away from the socket to disengage it from the retention tab (B).



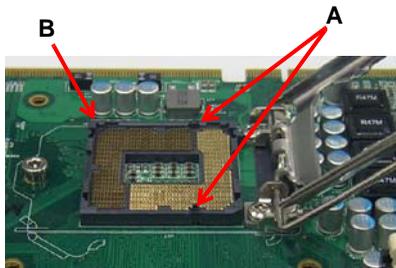
2. Raise the locking arm to unlock the load plate.



3. Lift the load plate to uncover the socket.

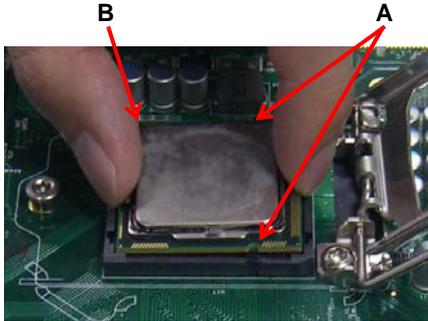


4. Remove the plastic protective cover from the socket. Note the locations of the alignment keys (A) and Pin 1 indicator (B).



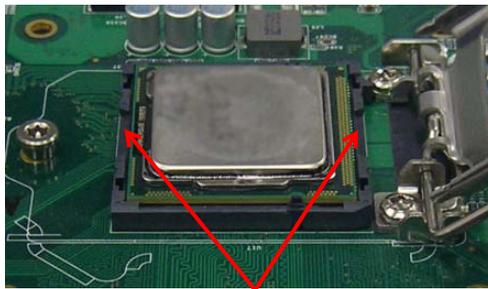
DO NOT touch socket contacts.

5. Hold the CPU using thumb and forefinger as shown. Position the CPU over the socket, matching the notches on the sides of the CPU with the alignment keys on the socket (A). The golden triangle on the CPU must be positioned at the corner of the socket with the Pin 1 indicator as shown (B).



The CPU fits into the socket in only one orientation. **DO NOT** force it into the socket to avoid causing damage.

6. Carefully place the CPU into the socket vertically. The socket has cutouts for your fingers to fit into.



**Cutouts**

7. Gently lower the load plate. Make sure the front edge of the plate is under the screw as indicated.



8. Lower the locking arm and fasten it to the retention tab (A). The load plate should be locked underneath the screw as shown (B)..



## 3.2 Installing the CPU Fan and Heatsink



The CPU requires a chassis with an airflow inlet and maximum internal ambient temperature of 60° C. An approved CPU heatsink and fan must be installed before using the SBC. Failure to install a CPU fan and heatsink may damage the system host board and/or the CPU.

---

When the CPU fan installation procedures presented here are inconsistent with the installation procedures you obtained from the CPU fan and heatsink package, follow the latter.

To install the CPU fan:

1. Apply thermal grease evenly on top of the installed CPU.
2. Lower the CPU fan to the CPU, then secure it using the provided attachments or screws.
3. Connect the CPU fan cable to the CPU fan connector on the SBC labeled FAN1 (see “Board Layout” on page 18).

### 3.3 Installing Memory Modules

The NuPRO-A331 supports up to 8 GB of DDR3 1066/1333 MHz memory modules in two DIMM sockets. A DDR3 module has a 240-pin footprint compared to the legacy 184-pin DDR DIMM. DDR3 modules are notched to facilitate correct installation in the DIMM sockets.



Disconnect all power to the board before installing a memory module to prevent damaging the board and memory module .

#### Memory Configuration Options

The NuPRO-A331 supports 1GB, 2GB and 4GB unbuffered non-ECC DDR3 DIMMs in the following configurations:

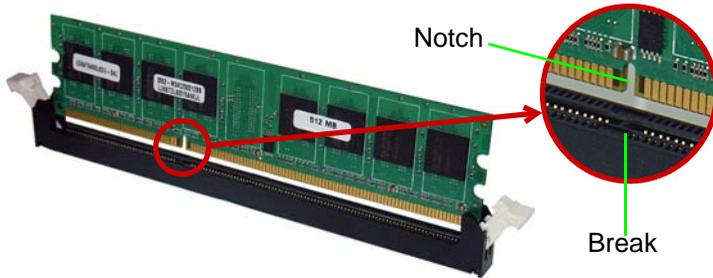
- ▶ Channel A: DIMM1  
Channel B: DIMM2
- ▶ For dual-channel configuration, the total size of memory module installed per channel must be the same (DIMM1 = DIMM2).
- ▶ It is recommended that you install DIMMs with the same CAS latency. For maximum compatibility, install memory modules with the same brand, model, and/or rating.

To install a memory module:

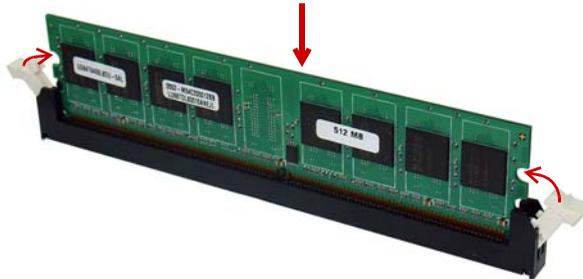
1. Locate the DIMM sockets on the motherboard.
2. Press the socket's retaining clips outward to unlock.



3. Align the memory module on the socket making sure that the notch matches the break on the socket.



4. Insert the module firmly into the slot until the retaining clips snap back inwards and the module is securely seated.



## 3.4 Installing the Power Connectors

Refer to **Section 2.2 Board Layout** on page 18 and **Section 2.3 Onboard Connectors** on page 19 for detailed information on connectors and pin definitions referred to below.

### ATX 12V Power Connector

The NuPRO-A331 requires +12V DC power connected to CN1 for proper operation in either ATX or AT modes. If necessary, order a ATX12V Convert Cable from ADLINK for use with Molex 4-pin power connectors (P/N 30-00006-0000).

### Front Panel Connector

Before powering up the NuPRO-A331, connect the necessary signals from the backplane to the System Panel pin header (CN27). The ATX Power Connector pin group (pins 6, 8, 9, 10) and Power Button pin group (pins 19, 20) must be connected for the system to power up in ATX mode.

## 4 Driver Installation

This chapter provides information on how to install the NuPRO-A331 device drivers under Windows XP 32-bit. The device drivers are located in the following ADLINK All-in-One DVD directories:

<b>Chipset</b>	\NuPRO\NuPRO-A331\Chipset\
<b>Display</b>	\NuPRO\NuPRO-A331\VGA\ \Add-On Card\mPCIe-8770\
<b>Ethernet</b>	\NuPRO\NuPRO-A331\Ethernet\
<b>TPM</b>	\NuPRO\NuPRO-A331\TPM\
<b>.Net Framework</b>	\NuPRO\NuPRO-A331\Others\
<b>Rapid Storage</b>	\NuPRO\NuPRO-A331\Others\
<b>ISA</b>	\NuPRO\NuPRO-A331\ISA
<b>Audio</b>	\Audio Daughter Board\DB-Audio2\

Install the Windows operating system before installing any driver. Most standard I/O device drivers are installed during Windows installation.



NOTE:

In order to enable RAID or AHCI mode, you must pre-install the Intel® Rapid Storage Technology driver during the Windows installation process, using the F6 installation method.

### 4.1 Intel® Rapid Storage Technology Driver

1. Create a floppy image as described in the F6Readme.txt file contained in **X:\NuPRO\NuPRO-A331\Others\F6\_SATA\_Floppy\_Install\_Image\_9.6.0.1014\_Windows7\_XP\_32.zip**.
2. During Windows installation, press **F6** when you see the message “*Press F6 if you need to install a third party SCSI or RAID driver.*” Then press **S** to *Specify Additional Device*.
3. Insert the floppy disk and follow the remaining instructions. Leave the disk in until the system has rebooted and copied the necessary files, then remove the disk.

## 4.2 Intel® Q57 Express Chipset Driver

This section describes the installation of the Intel® Q57 Express chipset driver.

1. Locate the directory **X:\NuPRO\NuPRO-A331\Chipset\** on the ADLINK All-in-One DVD, and extract the contents of the following archive:  
**Intel Chipset Device Software\_All OS\_9.1.2.1007.zip.**
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

## 4.3 Display Driver

### Integrated Intel® HD Graphics

This section describes the driver installation for the Integrated Intel® HD Graphics on dual core 32nm (Clarkdale) processors.

Before installing the graphics driver, first install **Microsoft .NET Framework 3.5 SP1** (not required for Windows 7).

1. Locate the directory **X:\NuPRO\NuPRO-A331\Others\** on the ADLINK All-in-One DVD, and extract the contents of the following archive: **Microsoft\_Net\_Framework\_v3.5\_SP1.zip**
2. Run the program **Microsoft\_Net\_Framework\_v3.5\_SP1.exe** and follow the onscreen instructions. Restart the system if prompted.

Follow these instructions to install the graphics driver:

1. Locate the directory **X:\NuPRO\NuPRO-A331\VGA\** on the ADLINK All-in-One DVD, and extract the contents of the following archive:  
**Intel\_Graphics\_Driver\_6.14.10.5268\_Windows XP\_32.zip.**
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

## mPCIe-8770 Graphics Card

This section describes the driver installation for the mPCIe-8770 graphics card.

Follow these instructions to install the display driver:

1. Locate the directory **X:\NuPRO\NuPRO-A331\Add-On Card\mPCIe-8770\** on the ADLINK All-in-One DVD, and extract the contents of the following archive:  
**mPCIe-8770\_VGA\_driver\_Z11\_All\_WinOS\_v6.14.10.1130.zip.**
2. Run the program **xgurun.exe** and follow the onscreen instructions. Restart the system if prompted.

## 4.4 Ethernet Driver

Follow these instructions to install the Ethernet driver.

1. Locate the directory **X:\NuPRO\NuPRO-A331\Ethernet\** on the ADLINK All-in-One DVD, and extract the contents of the following archive:  
**Network Adapter Driver\_15.4.1\_Windows XP\_32.zip.**
2. Run the program **Network Adapter Driver\_15.4.1\_Windows XP\_32.exe** and follow the onscreen instructions. Restart the system if prompted.

## 4.5 Intel® Rapid Storage Technology Utility

Follow these instructions to install the Intel® Rapid Storage Technology utility.

1. Locate the directory **X:\NuPRO\NuPRO-A331\Others\** on the ADLINK All-in-One DVD, and extract the file the contents from the following archive: **Intel\_Rapid\_Storage\_Technology\_All\_WinOS\_v9.6.0.1014.zip.**
2. Run the program **Intel\_Rapid\_Storage\_Technology\_All\_WinOS\_9.6.0.1014.exe** and follow the onscreen instructions. Restart the system if prompted.

## 4.6 TPM Driver

Follow these instructions to install the TPM driver (not required for Windows 7).

1. Locate the directory **X:\NuPRO\NuPRO-A331\TPM\** on the ADLINK All-in-One DVD, and extract the contents of the following archive: **ST\_TPM\_All\_WinOS\_v3.5.SP1.zip**.
2. Run the program **\win32\setup.exe** and follow the onscreen instructions. Restart the system if prompted.

## 4.7 ISA Driver

Follow these instructions to install the ISA driver (not required for Windows 7).

1. Open the **Device Manager** on your system.
2. Right click on '**Other PCI Bridge Devices**'.
3. A dialog box will appear. Select '**Update Driver...**'
4. The '**Hardware Update Wizard**' dialog box will open. Read the instructions and then click option 3, '**No, not this time**', then click '**Next**' to continue.
5. The next screen will prompt you to search for the location of the driver for your device. Click option 2, '**Install from a list or specific location (Advanced)**' and then click '**Next**'.
6. Locate the following folder on the ADLINK All-in-One DVD: **X:\NuPRO\NuPRO-A331\ISA**. Press '**Next**' to install the **ite.inf** file.
7. After successfully installing the files, the '**Hardware Update Wizard**' will display the '**Completing the Hardware Update Wizard**' screen. Click '**Finish**'.

## 4.8 Audio Driver

Follow these instructions to install the audio driver for the optional DB-Audio2 daughter board.



NOTE:

Before installing the audio driver, check the BIOS settings to make sure that audio is enabled: **Chipset > PCH Configuration > HDA Controller** (see “PCH Configuration” on page 70).

1. Place the ADLINK All-in-One DVD to the optical drive.
2. Locate the audio driver from the directory **X:\Audio Daughter Board\DB-Audio2\**, then double-click on the **setup.exe** file to start installation.
3. Follow the screen instructions to complete installation, then restart the system if prompted.

## 4.9 Management Engine

After installing all required drivers, Windows Device Manager will show one device without a driver: **PCI Simple Communications Controller**. This device is the Intel Active Management Technology Management Engine. Intel Active Management Technology is not supported by the NuPRO-A331, but the driver can be installed in order to remove the “question mark” from the Device Manager.

Follow these instructions to install the Intel® Active Management Technology driver.

1. Locate the directory **X:\NuPRO\NuPRO-A331\Others\** on the ADLINK All-in-One DVD, and extract the contents of the following archive: **Intel\_Management\_Engine\_Interface\_SOL\_driver\_All\_WinOS.zip**.
2. Run the program **\ME\_Drivers\MEI\_SOL\_Installer\Setup.exe** and follow the onscreen instructions. Restart the system if prompted.

This page intentionally left blank.

## 5 BIOS Setup

The following chapter describes basic navigation for the AMIBIOS® BIOS setup utility.

### 5.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:  
< Press DEL to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as Chipset and Power menus.



**Note:** In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

## Setup Menu

The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

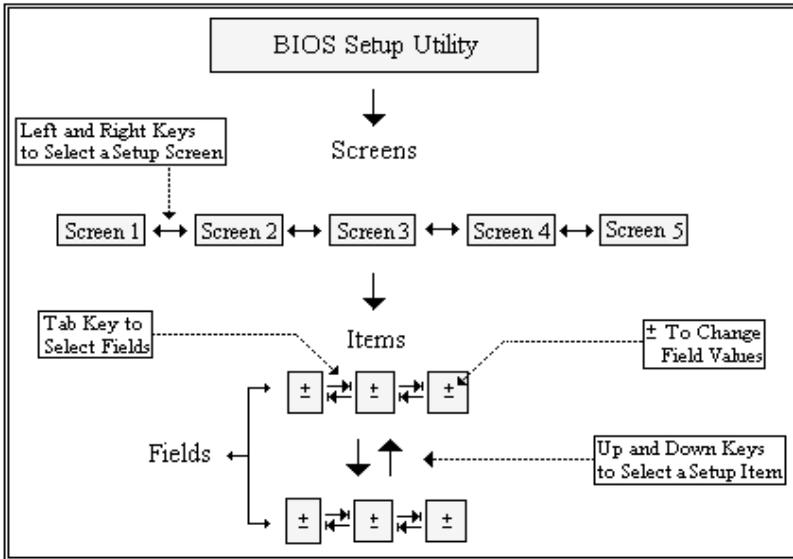
```

Main  Advanced  PCIPnP  Boot  Security  Chipset  Exit
*****
* System Overview                                     * Use [ENTER], [TAB]
* *****                                           * or [SHIFT-TAB] to
* AMIBIOS                                           * select a field.
* Version      :08.00.15                             *
* Build Date: 12/08/10                             * Use [+] or [-] to
* ID          :NA331T07                             * configure system Time.
*
* Processor
* Intel(R) Core(TM) i5 CPU          660 @ 3.33GHz
* Speed       :3333MHz
* Count      :1
*
* System Memory
* Size       :1592MB
*
* System Time      [22:40:11]
* System Date     [Tue 01/01/2002]
*
*
*
*****
* *      Select Screen
* **     Select Item
* +-     Change Field
* Tab    Select Field
* F1     General Help
* F10    Save and Exit
* ESC    Exit
*
*****
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```

## Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.

These keys include < F1 >, < F10 >, < Enter >, < ESC >, < Arrow > keys, and so on. .



**Note:** There is a hot key legend located in the right frame on most setup screens.

The < F8 > key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the < F8 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

## Hotkey Descriptions

**F1** The < F1 > key allows you to display the General Help screen.

Press the < F1 > key to open the General Help screen.

<b>General Help</b>			
↔	Select Screen	↓↑	Select Item
+ -	Change Screen	Enter	Go to Sub Screen
PGDN	Next Page	PGUP	Previous Page
Home	Go to Top of the Screen	End	Go to Bottom of Screen
F2/F3	Change Colors	F7	Discard Changes
F8	Load Failsafe Defaults	F9	Load Optimal Defaults
F10	Save and Exit	ESC	Exit
[Ok]			

- F10** The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:

Save configuration changes and exit now?	
[Ok]	[Cancel]

Press the < Enter > key to save the configuration and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

- ESC** The < Esc > key allows you to discard any changes you have made and exit the Setup. Press the < Esc > key to exit the setup without saving your changes. The following screen will appear:

Discard changes and exit setup now?	
[Ok]	[Cancel]

Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

- Enter** The < Enter > key allows you to display or change the setup option listed for a particular setup item. The < Enter > key can also allow you to display the setup sub-screens.

## 5.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

```

Main  Advanced  PCIPnP  Boot  Security  Chipset  Exit
*****
* System Overview                               * Use [ENTER], [TAB] *
* ****                                         * or [SHIFT-TAB] to *
* ****                                         * select a field.   *
* AMIBIOS                                       *                   *
* Version   :08.00.15                          *                   *
* Build Date:12/08/10                          * Use [+] or [-] to *
* ID        :NA331T07                          * configure system Time.*
* ****                                         *                   *
* Processor                               *                   *
* Intel(R) Core(TM) i5 CPU                    660 @ 3.336Hz *
* Speed     :3333MHz                          *                   *
* Count     :1                                *                   *
* ****                                         *                   *
* System Memory                               * * Select Screen   *
* Size      :1592MB                          * ** Select Item   *
* ****                                         * +- Change Field  *
* System Time [22:40:11]                      * Tab Select Field *
* System Date [Tue 01/01/2002]                * F1 General Help  *
* ****                                         * F10 Save and Exit*
* ****                                         * ESC Exit         *
* ****                                         *                   *
*****
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```

### System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the < Arrow > keys. Enter new values using the keyboard. Press the < Tab > key or the < Arrow > keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

**Note:** The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.



## 5.3.1 CPU Configuration

```

Advanced
*****
* Configure advanced CPU settings
* Module Version:01.08
* *****
* Manufacturer: Intel
* Intel(R) Core(TM) i7 CPU          860 @ 2.80GHz
* Frequency : 2.80GHz
* BCLK Speed : 133MHz
* Cache L1 : 256 KB
* Cache L2 : 1024 KB
* Cache L3 : 8192 KB
* Ratio Status: Unlocked (Min:09, Max:21)
* Ratio Actual Value:21
*
* Intel(R) Virtualization Tech [Enabled]
* Intel(R) C-STATE tech [Enabled]
* Intel(R) SpeedStep(tm) tech [Enabled]
*
*
* When enabled, a UMM
* can utilize the
* additional HW Caps.
* provided by Intel(R)
* Virtualization Tech.
* Note: A full reset is
* required to change
* the setting.
*
*
* * Select Screen
* ** Select Item
* +- Change Option
* F1 General Help
* F10 Save and Exit
* ESC Exit
*
*****
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:01H

```

### Intel® Virtualization Tech

When enabled, Intel® Virtualization Technology (Intel® VT) makes a single system appear as multiple independent systems to software. This allows for multiple, independent operating systems to be running simultaneously on a single system.

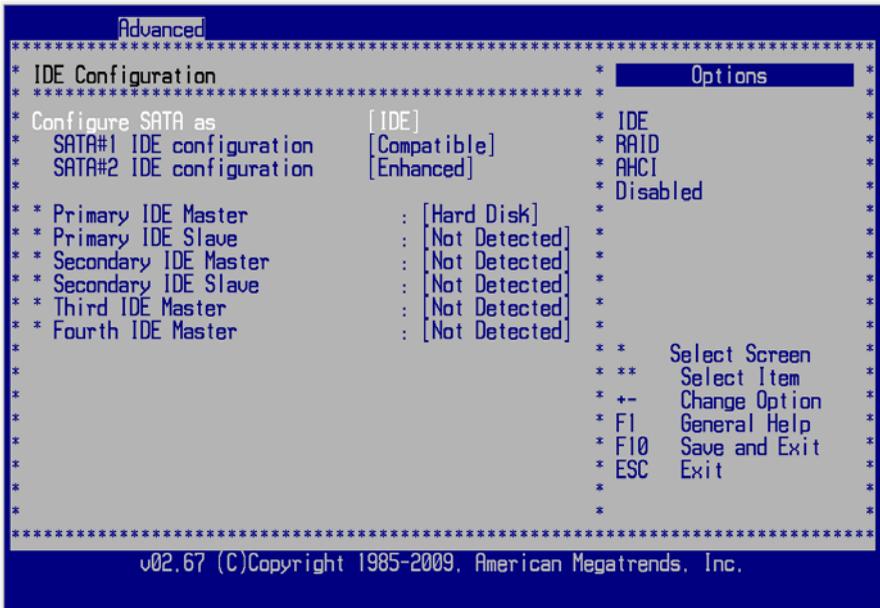
### Intel® C-STATE Tech

C-states are processor power states within the S0 system state that provide for various levels of power savings.

### Intel® SpeedStep™ Tech

This option allows you to enable or disable Intel® SpeedStep Technology.

## 5.3.2 IDE Configuration



### Configure SATA as

Options: IDE, RAID, AHCI, Disabled

### SATA#1 IDE Configuration

When running in Compatible mode, SATA channels 1, 2, 3 and 4 can be configured as legacy IDE channels.

### SATA#2 IDE Configuration

When running at compatible mode, SATA channels 5 and 6 can be configured as legacy IDE channels.

### IDE Master/Slave

Select one of the hard disk drives to configure it. Press < Enter > to access its submenu.

### 5.3.3 Super IO Configuration

```

Advanced
*****
* Configure ITE8783F Super IO Chipset                               * Allows BIOS to Select *
* *****                                                         * Serial Port1 Base    *
* Serial Port1 Address [3F8]                                       * Addresses.          *
* Serial Port1 IRQ [4]                                           *                      *
* Serial Port2 Address [2F8]                                       *                      *
* Serial Port2 IRQ [4]                                           *                      *
* Serial Port3 Address [3E8]                                       *                      *
* Serial Port3 IRQ [4]                                           *                      *
* Serial Port4 Address [2E8]                                       *                      *
* Serial Port4 IRQ [4]                                           *                      *
* Serial Port5 Address [2F0]                                       *                      *
* Serial Port5 IRQ [3]                                           *                      *
* Serial Port6 Address [2E0]                                       * * Select Screen     *
* Serial Port6 IRQ [5]                                           * ** Select Item     *
* Parallel Port Address [378]                                       * +- Change Option   *
* Parallel Port IRQ [IRQ7]                                       * F1 General Help   *
*                                                                * F10 Save and Exit *
*                                                                * ESC Exit          *
*                                                                *                   *
*****
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```

#### Serial Port1-6 Address/IRQ

Specifies the serial port addresses. The options are:

- ▶ Port1-2: 3F8, 2F8, 3E8, 2E8, Disabled
- ▶ Port3-6: 3F8, 2F8, 3E8, 2E8, 2F0, 2E0, Disabled

IRQ settings are fixed as shown.

#### Parallel Port Address/IRQ

This option specifies the base I/O port address and IRQ of the parallel port.

### 5.3.4 Hardware Health Configuration

This option displays the current status of all of the monitored hardware devices/components such as voltages and temperatures. The options are Enabled and Disabled.

#### H/W Health Function

Select this option to enable or disable the BIOS Hardware Health Monitoring Device.

#### Fan 1/2 Mode Setting

Three modes are provided for each fan: Full On mode, Automatic mode, and PWM Manually mode. Full On mode runs the fan at full speed. Automatic mode is Smart Fan mode. PWM Manually mode runs the fan at the set speed.

#### Full On Mode

```

Advanced
*****
* Hardware Health Configuration                               * Enables Hardware *
* ****                                                    * Health Monitoring *
* H/W Health Function [Enabled]                             * Device.          *
* FAN 1 Mode Setting  [Full On mode]                       *                 *
* FAN 2 Mode Setting  [Full On mode]                       *                 *
* ****                                                    *                 *
* CPU Temperature*   :37°C/98°F                             *                 *
* System Temperature :43°C/109°F                           *                 *
* ****                                                    *                 *
* Fan 1 Speed        :N/A                                   *                 *
* Fan 2 Speed        :1591 RPM                              *                 *
* ****                                                    *                 *
* CPU Core           :1.216 U                               * *   Select Screen *
* +3.30U             :3.344 U                               * **  Select Item   *
* +5.00U             :4.828 U                               * +-  Change Option *
* +12.0U             :11.862 U                              * F1  General Help  *
* VBAT               :3.376 U                               * F10 Save and Exit *
* ****                                                    * ESC  Exit         *
* ****                                                    *                 *
*****
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```









### 5.3.7 Remote Access Configuration

Remote access configuration provides the settings to allow remote access by another computer to get POST messages and send commands through serial port access.

```

Advanced
*****
* Configure Remote Access type and parameters * Select Remote Access *
* ***** * type. *
* Remote Access [Enabled] * *
* * * *
* Serial port number [COM1] * *
* Base Address, IRQ [3F8h, 4] * *
* Serial Port Mode [115200 8,n,1] * *
* Flow Control [None] * *
* Redirection After BIOS POST [Always] * *
* Terminal Type [ANSI] * *
* UT-UTF8 Combo Key Support [Enabled] * *
* Sredir Memory Display Delay [No Delay] * *
* * * *
* * * * Select Screen *
* * * * Select Item *
* +- Change Option *
* F1 General Help *
* F10 Save and Exit *
* ESC Exit *
* * * *
*****
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```

#### Remote Access

Select this option to enable or disable the BIOS remote access feature.



NOTE:

Enabling Remote Access requires a dedicated serial port connection. When the assigned serial port is disabled, Remote Access should also be disabled to prevent the system from booting abnormally.

#### Serial Port Number

Select the serial port you want to use for the remote access interface. You can set the value for this option to COM1 or COM2.

### **Serial Port Mode**

Select the baud rate you want the serial port to use for console redirection. The options are 115200 8,n,1; 57600 8,n,1; 19200 8,n,1; and 09600 8,n,1.

### **Flow Control**

Set this option to select Flow Control for console redirection. The settings for this value are None, Hardware, or Software.

### **Redirection After BIOS POST**

This option allows you to set Redirection configuration after BIOS POST. The settings for this value are Disabled, Boot Loader, or Always.

- ▶ **Disabled:** Set this value to turn off the redirection after POST
- ▶ **Boot Loader:** Set this value to allow the redirection to be active during POST and Boot Loader.
- ▶ **Always:** Set this value to allow the redirection to be always active.

### **Terminal Type**

This option is used to select either VT100/VT-UTF8 or ANSI terminal type. The settings for this value are ANSI, VT100, or VT-UTF8.

### **VT-UTF8 Combo Key Support**

This option enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals. The settings for this value are Enabled or Disabled.

### **Sredir Memory Display Delay**

This option gives the delay in seconds to display memory information. The options for this value are No Delay, Delay 1 Sec, Delay 2 Sec, or Delay 4 Sec.







## 5.4 PCI/PnP Settings

Select the PCI/PnP tab from the setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the < Arrow > keys. The Plug and Play BIOS Setup screen is shown below.

```

Main   Advanced  PCIPnP  Boot   Security  Chipset  Exit
*****
*          may cause system to malfunction.          ** Enabled: LPT 278h will *
*                                                    ** have conflict with ISA *
*                                                    ** PnP configuration port *
*                                                    **                       *
* IRQ3                [Ava i l a b l e]                ** **                       *
* IRQ4                [Ava i l a b l e]                ** **                       *
* IRQ5                [Ava i l a b l e]                ** **                       *
* IRQ7                [Ava i l a b l e]                ** **                       *
* IRQ9                [Ava i l a b l e]                ** **                       *
* IRQ10               [Ava i l a b l e]                ** **                       *
* IRQ11               [Ava i l a b l e]                ** **                       *
* IRQ14               [Ava i l a b l e]                ** **                       *
* IRQ15               [Ava i l a b l e]                ** **                       *
*
* DMA Channel 0       [Ava i l a b l e]                ** *   Select Screen   *
* DMA Channel 1       [Ava i l a b l e]                ** **   Select Item     *
* DMA Channel 3       [Ava i l a b l e]                ** +-   Change Option   *
* DMA Channel 5       [Ava i l a b l e]                ** **   F10 General Help *
* DMA Channel 6       [Ava i l a b l e]                ** **   Save and Exit    *
* DMA Channel 7       [Ava i l a b l e]                ** **   ESC Exit         *
*
* Enable ISA PnP configuration [Enabled]                ** **                       *
*****
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```

### 5.4.1 IRQ/DMA

Set this value to allow the IRQ settings to be modified. Available – This setting allows the specified IRQ/DMA to be used by a PCI/PnP device. Reserved – This setting allows the specified IRQ/DMA to be used by a legacy ISA device.

### 5.4.2 Enable ISA PnP Configuration

This option allows you to enable or disable the ISA PnP function.





### 5.5.2 Boot Device Priority

The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system. First press <Enter> to enter the sub-menu. Then you may use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list.

### 5.5.3 Boot Device Groups

The Boot devices are listed in groups by device type. First press <Enter> to enter the sub-menu. Then you may use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list. Only the first device in each device group will be available for selection in the Boot Device Priority option.



## **Remember the Password**

Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM.

To access the submenu for the following items, select the item and press < Enter >:

- ▶ Change Supervisor Password
- ▶ Change User Password
- ▶ Clear User Password

## **Supervisor Password**

Indicates whether a supervisor password has been set.

## **User Password**

Indicates whether a user password has been set.

## **Change Supervisor Password**

Select this option and press < Enter > to access the submenu. You can use the submenu to change the supervisor password.

## **Change User Password**

Select this option and press < Enter > to access the submenu. You can use the submenu to change the user password.

## 5.7 Chipset Setup

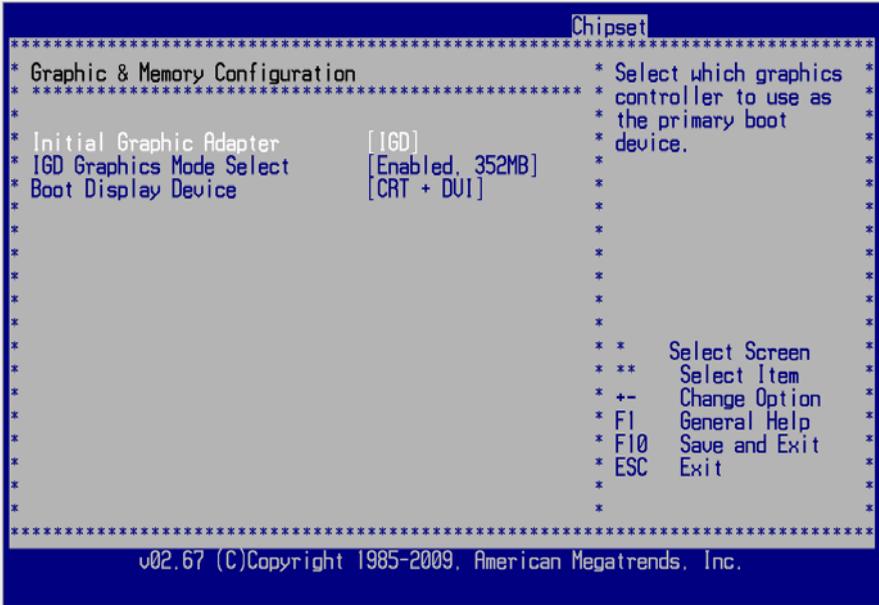
Select the Chipset tab from the setup screen to enter the Chipset BIOS Setup screen. You can select any of the items in the left frame of the screen to go to the submenu for that item. The Chipset BIOS Setup screen is shown below.



NOTE:

The Power Button Mode option is not available in this BIOS kernel.

## 5.7.1 Graphics and Memory Configuration



### Initial Graphics Adapter

Select which graphics controller to use as the primary boot device. ("PCI" includes PCI slot and and PCIe Mini Card. PCI will be first.)

- ▶ **IGD:** Integrated graphics only.
- ▶ **PCI/IGD:** Detect PCI graphics first, then integrated graphics

### IGD Graphics Mode Select

Selects the amount of system memory used by the integrated graphics device.

### Boot Display Device

This item allows the user to configuration the type of external display used during boot up.

- ▶ **CRT:** VGA display only during POST and DOS.
- ▶ **DVI:** DVI display only during POST and DOS.
- ▶ **CRT+DVI:** VGA and DVI display during POST and DOS.





Discard Changes and Exit Setup Now?

[Ok] [Cancel]

appears in the window. Select Ok to discard changes and exit.

## **Discard Changes**

Select Discard Changes from the Exit menu and press < Enter >.

Select Ok to discard changes.

## **Load Optimal Defaults**

Automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems.

Select Load Optimal Defaults from the Exit menu and press < Enter >.

Select Ok to load optimal defaults.

## **Load Failsafe Defaults**

Automatically sets all Setup options to a complete set of default settings when you select this option. The Failsafe settings are designed for maximum system stability, but not maximum performance. Select the FailSafe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press < Enter >.

Load FailSafe Defaults?

[Ok] [Cancel]

appears in the window. Select Ok to load FailSafe defaults.

## Appendix A - Watchdog Timer

A sample program for configuring the NuPRO-A331's watchdog timer is included on the ADLINK All-in-One DVD in the following directory: `\NuPRO\NuPRO-A331\WDT`.

### A.1 Sample Code

```
#include<stdio.h>
#include<dos.h>

static unsigned int IT8783_ioPort = 0x2e;

void Enter_IT8783_Config(unsigned int flag)
{
    if(flag) IT8783_ioPort = 0x4e;

    switch(IT8783_ioPort)
    {
        case 0x2E: //Address port = 0x2E, enter keys =
            0x87, 0x01, 0x55, 0x55
                outportb(0x2E, 0x87);
                outportb(0x2E, 0x01);
                outportb(0x2E, 0x55);
                outportb(0x2E, 0x55);
                break;
        case 0x4E: //Address port = 0x4E, enter keys =
            0x87, 0x01, 0x55, 0xAA
                outportb(0x4E, 0x87);
                outportb(0x4E, 0x01);
                outportb(0x4E, 0x55);
                outportb(0x4E, 0xAA);
                break;
        default:
            break;
    }
}

void Exit_IT8783_Config(unsigned int flag)
{
    if(flag) IT8783_ioPort = 0x4e;

    outportb(IT8783_ioPort, 0x02);
    outportb(IT8783_ioPort+1, 0x02);
}
```

```
}

void Get_IT8783_ID(unsigned int &ID1, unsigned int &ID2)
{
    outportb(IT8783_ioPort, 0x20);
    ID1 = inportb(IT8783_ioPort+1);
    outportb(IT8783_ioPort, 0x21);
    ID2 = inportb(IT8783_ioPort+1);
}

void IT8783_WDTRun(unsigned int count_value, unsigned int
    PLEDflag) //for NuPRO-A331
{
    unsigned long tempCount;
    unsigned int registerValue;

    outportb(IT8783_ioPort, 0x07);
    outportb(IT8783_ioPort+1, 0x07); // Device 7

    outportb(IT8783_ioPort, 0xf8);
    outportb(IT8783_ioPort+1, 0x00); // PLED mapping to
        nothing, disable PLED function

    if(PLEDflag == 1)
    {
        outportb(IT8783_ioPort, 0x27);
        registerValue = inportb(IT8783_ioPort + 1);
        registerValue |= 0x80; // set Pin09 is GPIO
            function GP37
        outportb(IT8783_ioPort+1, registerValue);

        outportb(IT8783_ioPort, 0xc2);
        registerValue = inportb(IT8783_ioPort + 1);
        registerValue &= 0x7fb; // set GP37 is alternate
            function
        outportb(IT8783_ioPort+1, registerValue);

        outportb(IT8783_ioPort, 0xca);
        registerValue = inportb(IT8783_ioPort + 1);
        registerValue |= 0x80; // set GP42 is output
        outportb(IT8783_ioPort+1, registerValue);
    }
}
```

```

    outportb(IT8783_ioPort, 0xf8);
    outportb(IT8783_ioPort+1, 0x1f); // PLED mapping to
    GP37

    outportb(IT8783_ioPort, 0xf9);
    registerValue = inportb(IT8783_ioPort + 1);
    registerValue |= 0x02;
    registerValue &= 0xfb;
    outportb(IT8783_ioPort+1, registerValue);
}

outportb(IT8783_ioPort, 0x71);
registerValue = inportb(IT8783_ioPort + 1);
registerValue &= 0xfe;
outportb(IT8783_ioPort+1, registerValue);

outportb(IT8783_ioPort, 0x72);
registerValue = inportb(IT8783_ioPort + 1);
registerValue &= 0xdf;
outportb(IT8783_ioPort+1, registerValue);

if(count_value >= 60)
{
    outportb(IT8783_ioPort, 0x72);
    registerValue = inportb(IT8783_ioPort+1);
    registerValue &= 0x8f;
    registerValue |= 0x40; //enable WDT output through
    PRST
    outportb(IT8783_ioPort+1, registerValue); // set
    WDT count is minute

    tempCount = count_value / 60;
    if((count_value%60) > 30)
        tempCount++;
    if(tempCount > 65535)
        tempCount = 65535;
    printf("WDT timeout in %d minutes.\n", tempCount);
}
else
{
    outportb(IT8783_ioPort, 0x72);

```

```
registerValue = inportb(IT8783_ioPort+1);
registerValue |= 0x80;

tempCount = count_value;
if(tempCount != 0)
{
    printf("WDT timeout in %d seconds.\n",
tempCount);
    registerValue |= 0x40; //Enable WDT output
through KBRST
}
else
{
    printf("WDT is Disabled.\n");
    registerValue &= 0xbf; //Disable WDT output
through KBRST
}

outportb(IT8783_ioPort+1, registerValue); // set
WDT count is second
}

outportb(IT8783_ioPort, 0x71);
registerValue = inportb(IT8783_ioPort + 1);
registerValue |= 0x60; // set Mouse & Keyboard
interrupt Enable
outportb(IT8783_ioPort+1, registerValue);

outportb(IT8783_ioPort, 0x73);
outportb(IT8783_ioPort+1, tempCount); // set WDT count
LSB

}
```

# Appendix B - System Resources

## B.1 System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
(4GB-2MB)	FFE00000 – FFFFFFFF	2 MB	High BIOS Area
(4GB-18MB) – (4GB-17MB-1)	FEE00000 – FEEFFFFFF	1 MB	FSB Interrupt Memory Space
(4GB-20MB) – (4GB-19MB-1)	FEC00000 – FECFFFFFF	1 MB	APIC Configuration Space
960 K – 1024 K	F0000 – FFFFF	64 KB	System BIOS Area
896 K – 960 K	E0000 – EFFFF	64 KB	Extended System BIOS Area
768 K – 896 K	C0000 – DFFFF	128 KB	PCI expansion ROM area C0000 – C7FFF: Onboard VGA BIOS CB800 – CC7FFF: Intel 82578DM PXE option ROM when onboard LAN boot ROM is enabled.
640 K – 768 K	A0000 – BFFFF	128 KB	Video Buffer & SMM space
0 K – 640 K	00000 – 9FFFF	640 KB	DOS Area

**Table B-1: System Memory Map**

## B.2 Direct Memory Access Channels

Channel Number	Data Width	System Resource
0	8-bits	Parallel port <sup>(1)</sup>
1	8-bits	Parallel port <sup>(1)</sup>
2	8-bits	Diskette drive <sup>(1)</sup>
3	8-bits	Parallel port <sup>(1)</sup>
4		Reserved - cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

**Table B-2: Direct Memory Access Channels**

**Note (1):** DMA channel 0/1/3 is selected when using parallel port. Floppy and parallel port cannot be used at the same time.

## B.3 IO Map

Hex Range	Device
000-01F	DMA controller 1, 8237A-5 equivalent
020-02D and 030-03F	Interrupt controller 1, 8259 equivalent
02E-02F, 04E-04F	LPC SIO (ITE8783) configuration index/data registers
040-042, 050-052	Timer, 8254-2 equivalent
060, 062, 064, 066	8742 equivalent (keyboard)
061	NMI control and status
070-077	Real Time Clock Controller( bit 7 -NMI mask)
080-091	DMA page register
092	Reset (Bit 0)/ Fast Gate A20 (Bit 1)
093-09F	DMA page registers continued
0A0-0B1 and 0B4-0BD	Interrupt controller 2, 8259 equivalent
0B2 and 0B3	APM control
0C0-0DF	DMA controller 2, 8237A-5 equivalent
0F0	Read: PCI and Master abort <sup>(1)</sup> Write: FERR#/ IGNNE# /Interrupt controller
170-177 and 1F0-1F7, 376 and 3F6	SATA controller or PCI
2E0-2FF, 3E0-3FF	Serial port 1~6
378-37F	Parallel port
4D0 and 4D1	Interrupt controller
A70-A7F	ISA PNP port
CF9	Reset Control register (8 bit I/O)
4700	Infineon TPM

**Table B-3: IO Map**

**Note:**

(1) A read to this address will subtractively go to ISA, where it will master abort.

## B.4 Interrupt Request (IRQ) Lines

### IRQ Lines PIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard controller	N/A	No
2	Cascade interrupt from slave PIC	N/A	No
3	Serial Port 5 (COM5)	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Serial Port 1-4 (COM1/2/3/4)	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	Serial Port 6 (COM6)	IRQ5 via SERIRQ, IRQ5 at ISA bus	Note (1)
6	PCI / ISA	N/A	No
7	Parallel port	IRQ7 via SERIRQ, IRQ7 at ISA bus	Note (1)
8	Real-time clock	N/A	No
9	SCI/PCI	IRQ9 via SERIRQ, IRQ9 at ISA bus	Note (1), (2)
10	PCI/ISA	N/A	Note (1)
11	PCI / ISA	N/A	Note (1)
12	PS/2 Mouse / PCI / ISA	IRQ12 via SERIRQ, IRQ12 at ISA bus	Note (1)
13	Math Processor	N/A	No
14	Primary IDE controller / PCI / ISA	IRQ14 via SERIRQ, IRQ14 at ISA bus	No
15	Primary IDE controller / PCI / ISA	IRQ15 via SERIRQ, IRQ15 at ISA bus	No

**Table B-4: IRQ Lines PIC Mode**

#### Notes

(1) These IRQs can be used for PCI devices when onboard device is disabled. If IRQ is from ISA, user must reserve IRQ for ISA in BIOS setup menu.

(2) BIOS does not open IRQ 9 setting for ISA bus.

## IRQ Lines APIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard controller	N/A	No
2	Cascade interrupt from slave PIC	N/A	No
3	Serial Port 5 (COM5)	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Serial Port 1-4 (COM1.2.3.4)	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	Serial Port 6 (COM6)	IRQ5 via SERIRQ, IRQ5 at ISA bus	Note (1)
6	PCI / ISA	N/A	No
7	Parallel port	IRQ7 via SERIRQ, IRQ7 at ISA bus	Note (1)
8	Real-time clock	N/A	No
9	ACPI	IRQ9 via SERIRQ, IRQ9 at ISA bus	Note (1)
10	SMBus	IRQ10 via SERIRQ, IRQ14 at ISA bus	No
11	PCI / ISA	N/A	No
12	PS/2 Mouse / PCI / ISA	IRQ12 via SERIRQ, IRQ12 at ISA bus	Note (1)
13	Math Processor	N/A	No
14	Primary IDE controller / PCI / ISA	IRQ14 via SERIRQ, IRQ14 at ISA bus	No
15	Primary IDE controller / PCI / ISA	IRQ15 via SERIRQ, IRQ14 at ISA bus	No
16	N/A	PCIE Port #0, PCIE Port #4, EHCI controller #2, UHCI Controller #2, HECI Host #1, HECI Host #2, I.G.D., NAND Controller	Yes
17	N/A	PCIE Port #1, PCIE Port #5, PCIE Root Port #0, KT Controller	Yes

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
18	N/A	PCIE Port #2, UHCI Controller #3, UHCI Controller #6, Thermal Controller, SMBus Controller, SATA Host Controller, IDER Controller	Yes
19	N/A	PCIE Port #3, UHCI Controller #1, UHCI Controller #7, SATA Host Controller1	Yes
20	N/A	PCI Slot 4 , GbE Controller	No
21	N/A	PCI Slot 1, PCI Slot 5, UHCI Controller #5	No
22	N/A	PCI Slot 2, PCI Slot 6, High Definition Audio Controller	No
23	N/A	PCI Slot 3, PCI Slot 7, EHCI Controller #1, UHCI Controller #4	No

**Table B-5: IRQ Lines APIC Mode**

**Notes**

- (1) These IRQs can be used for PCI devices when onboard device is disabled. If IRQ is from ISA, user must reserve IRQ for ISA in BIOS setup menu.
- (2) BIOS does not open IRQ 9 setting for ISA bus.

## PCI Configuration Space Map

Bus #	Device #	Function #	Routing	Description
00h	00h	00h	N/A	Intel PCH 5 Series Bridge
00h	01h	00h	Internal	PEG #1 Root Port
01h	00h	0FFh	N/A	PEG #1 Portt
00h	02h	00h	Internal	PEG #2 Root Port
02	00h	0FFh	N/A	PEG #2 Portt
00h	03h	00h	Internal	PEG #3 Root Port
03	00h	0FFh	N/A	PEG #3 Portt
00h	03h	00h	Internal	PEG #4 Root Port
04	00h	0FFh	N/A	PEG #4 Portt
00h	05h	00h	Internal	PEG #5 Root Port
05	00h	0FFh	N/A	PEG #5 Portt
00h	06h	00h	Internal	PEG #6 Root Port
06	00h	0FFh	N/A	PEG #6 Port
00h	02h	00h	Internal	Intel Integrated Graphics Device
00h	16h	00h	Internal	Intel Management Engine Interface #1
00h	16h	01h	Internal	Intel Management Engine Interface #2
00h	16h	02h	Internal	IDE-R
00h	16h	03h	Internal	KT
00h	18h	03h	Internal	NAND Controller
00h	19h	00h	Internal	GbE Controller
00h	1Ah	00h	Internal	Intel USB EHCI Controller #2
00h	1Bh	00h	Internal	High Definition Audio controller
00h	1Ch	00h	Internal	PCI Express Root port 1
00h	1Ch	01h	Internal	PCI Express Root port 2
00h	1Ch	02h	Internal	PCI Express Root port 3
00h	1Ch	03h	Internal	PCI Express Root port 4
00h	1Ch	04h	Internal	PCI Express Root port 5
00h	1Ch	05h	Internal	PCI Express Root port 6
00h	1Ch	06h	Internal	PCI Express Root port 7
00h	1Ch	07h	Internal	PCI Express Root port 8

Bus #	Device #	Function #	Routing	Description
00h	1Dh	00h	Internal	Intel USB EHCI Controller #1
00h	1Eh	00h	N/A	Intel PCI to PCI Bridge
00h	1Fh	00h	N/A	Intel LPC Interface Bridge
00h	1Fh	02h	Internal	Intel SATA controller #1
00h	1Fh	03h	Internal	Intel SMBus Controller
00h	1Fh	05h	Internal	Intel SATA controller #2
00h	1Fh	06h	Internal	Thermal Controller
1Eh	0Fh	00h	Internal	PCI Slot 1
1Eh	0Eh	00h	Internal	PCI Slot 2
1Eh	0Dh	00h	Internal	PCI Slot 3
1E0h	0Ch	00h	Internal	PCI Slot 4
1E0h	0Bh	00h	Internal	PCI Slot 5
1E0h	0Ah	00h	Internal	PCI Slot 6
1E0h	09h	00h	Internal	PCI Slot 7
20h	00h	0FFh	Internal	PCIE Port #0
21h	00h	0FFh	Internal	PCIE Port #1
22h	00h	0FFh	Internal	PCIE Port #2
23h	00h	0FFh	Internal	PCIE Port #3
24h	00h	0FFh	Internal	PCIE Port #4
25h	00h	0FFh	Internal	PCIE Port #5
26h	00h	0FFh	Internal	PCIE Port #6
27h	00h	0FFh	Internal	PCIE Port #7

**Table B-6: PCI Configuration Space Map**

**Note:**

(1) SATA controller 2 (D31:F5) is only visible in PCH desktop components and when D31:F2 CC.SCC=01h.

## PCI Interrupt Routing Map

PIRQ	A	B	C	D	E	F	G	H
INT Line	INTA	INTB	INTC	INTD				
PEG Root Port 1-6	INTA	INTB	INTC	INTD				
VGA	X							
SATA Controller			X	X				
SATA Controller1				X				
SMBUS controller			X					
Thermal Controller			X					
EHCI 1								X
EHCI 2	X							
HDA							X	
Intel GbE					X			
HECI Host 1	X							
HECI Host 2	X							
IDER Controller			X					
KT Controller		X						
NAND Controller	X							
PCIE Port 0	INTA	INTB	INTC	INTD				
PCIE Port 1	INTB	INTC	INTD	INTA				
PCIE Port 2	INTC	INTD	INTA	INTB				
PCIE Port 3	INTD	INTA	INTB	INTC				
PCIE Port 4	INTA	INTB	INTC	INTD				
PCIE Port 5	INTB	INTC	INTD	INTA				
PCIE Port 6	INTA	INTB	INTC	INTD				
PCIE Port 7	INTB	INTC	INTD	INTA				
PCI Slot 0						X		
PCI Slot 1							X	
PCI Slot 2								X
PCI Slot 3					X			

**Table B-7: PCI Interrupt Routing Map**

# Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS**, and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- ▶ Read these safety instructions carefully.
- ▶ Keep this user's manual for future reference.
- ▶ Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- ▶ When installing/mounting or uninstalling/removing equipment:
  - ▷ Turn off power and unplug any power cords/cables.
- ▶ To avoid electrical shock and/or damage to equipment:
  - ▷ Keep equipment away from water or liquid sources;
  - ▷ Keep equipment away from high heat or high humidity;
  - ▷ Keep equipment properly ventilated (do not block or cover ventilation openings);
  - ▷ Make sure to use recommended voltage and power source settings;
  - ▷ Always install and operate equipment near an easily accessible electrical socket-outlet;
  - ▷ Secure the power cord (do not place any object on/over the power cord);
  - ▷ Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - ▷ If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- ▶ Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

---



Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries appropriately.

---

- ▶ Equipment must be serviced by authorized technicians when:
  - ▷ The power cord or plug is damaged;
  - ▷ Liquid has penetrated the equipment;
  - ▷ It has been exposed to high humidity/moisture;
  - ▷ It is not functioning or does not function according to the user's manual;
  - ▷ It has been dropped and/or damaged; and/or,
  - ▷ It has an obvious sign of breakage.

# Getting Service

Contact us should you require any service or assistance.

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