NuPRO-E42

Full-Size PICMG 1.3 Intel® Core™ i7/i5/i3
LGA 1150 SHB

User's Manual

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Advance Technologies; Automate the World.

Revision History

Revision	Release Date	Description of Change(s)
1.00	2013/11/26	Preliminary release
2.05	2015/4/24	Various errata rectified, spec updated

Preface

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Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Conventions

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

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

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

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-E42 is a PICMG 1.3 System Host Board (SHB) supporting the 4th Generation Intel® Core™ i7/i5/i3 and Pentium® processors in LGA1150 package to deliver a scalable high performance platform for a wide array of industrial applications. The NuPRO-E42 supports 22nm process CPUs at up to 3.5 GHz with integrated graphics and memory controllers, Direct Media Interface (DMI) and Flexible Display Interface (FDI) connectivity to the Intel® Q87 Express Chipset. Dual-channel DDR3 memory is supported up to a maximum of 16 GB in two DIMM slots.

These advanced features, coupled with PCI Express® x16 expansion capability, dual PCI Express®-based Gigabit Ethernet, SATA 6 Gb/s and USB 3.0 support make the NuPRO-E42 ideal for vision and automation control applications.

1.2 Features

- Supports Intel® Core™ i7/i5/i3 and Pentium® processors in LGA1155 package
- Integrated Intel® HD Graphics
- PCI Express® x16 expansion capability via backplane
- Dual Gigabit Ethernet
- 6x USB 3.0 ports (2x on rear panel, 4x on SHB)
- 4x USB 2.0 ports on backplane
- 4x SATA 6 Gb/s ports on SHB
- 6x COM ports (including 1x RS-232/422/485)
- Watchdog Timer, Hardware Monitor
- Optional HD audio kit (DB-Audio2 daughter board)
- TPM hardware security chip
- RoHS compliant

NOTE:

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

1.3 Specifications

System	
CPU	• Intel® Core™ i7-4770S, 3.1 GHz, 8M Cache, 65W TDP (4C) • Intel® Core™ i5-4570S, 2.9 GHz, 6M Cache, 65W TDP (4C) • Intel® Core™ i3-4330S, 3.5 GHz, 3M Cache, 54W TDP (2C) • Intel® Pentium® G3420, 3.2 GHz, 3M Cache, 54W TDP (2C)
Chipset	• Intel® Q87 Platform Controller Hub
Memory	• 2x 240-pin DIMM sockets • Dual-channel DDR3 1333/1600 MHz (up to 16 GB)
BIOS	• AMIBIOS in 64-Mbit SPI Flash
Audio	• Intel® High Definition Audio support via DB-Audio2 daughter board
Watch Dog Timer	• 1-255 second or 1-255 minute programmable and can generate system reset.
Hardware Monitor	• CPU/System temperature, fan speed and onboard DC voltage
TPM	• Infineon SLB 9635 TT 1.2
Operating Systems	• Windows XP 32-bit • WIndows 7/8 32/64-bit • WIndows Server 2008 R2 • Ubuntu 13.10
I/O Interfaces	

I/O Ports	• 6x USB 3.0 ports (2x on rear panel, 4x on SHB) • 4x USB 2.0 on backplane • 4x SATA 6 Gb/s on SHB • 6x serial ports via onboard pin-header (5x RS-232, 1x RS-232/422/485 with auto flow control) • 2x Gigabit Ethernet RJ45 ports • 1x VGA port (Dsub-15) • 1x DVI-D via onboard pin-header (opt. cable bracket) • Pin header for HD Audio DB-Audio2 daughter board • 1x PS/2 KB/MS via onboard pin header (opt. cable bracket)
PCIe/PCI	• PCIe-x16 Gen3, PCIe-x4 and PCI 32bit/33MHz (TI XIO2001) via golden fingers
Graphics	
Integrated	• Integrated Intel® HD Graphics
External	• PCI Express x16
Ethernet	
Controller	• Dual Gigabit Ethernet (Intel® I217LM Gigabit Ethernet PHY, Intel® I211-AT Gigabit Ethernet Controller) • Supports Preboot Execution Environment (PXE), Wake-On-LAN, and Intel® AMT 9.0 on LAN1 (I217LM)
Ports	• Two RJ-45 Ethernet ports
Mechanical and Environment	
Form Factor	• Standard full-size PICMG 1.3 SHB
Dimensions	• 338 x 126 mm (L x W)
Operating Temp.	• 0ºC to 60ºC
Storage Temp.	• -20ºC to 80ºC
Rel. Humidity	• 10% to 90% non-condensing
Safety	• CE, FCC Class A

Table 1-1: NuPRO-E42 General Specifications

1.4 Block Diagram

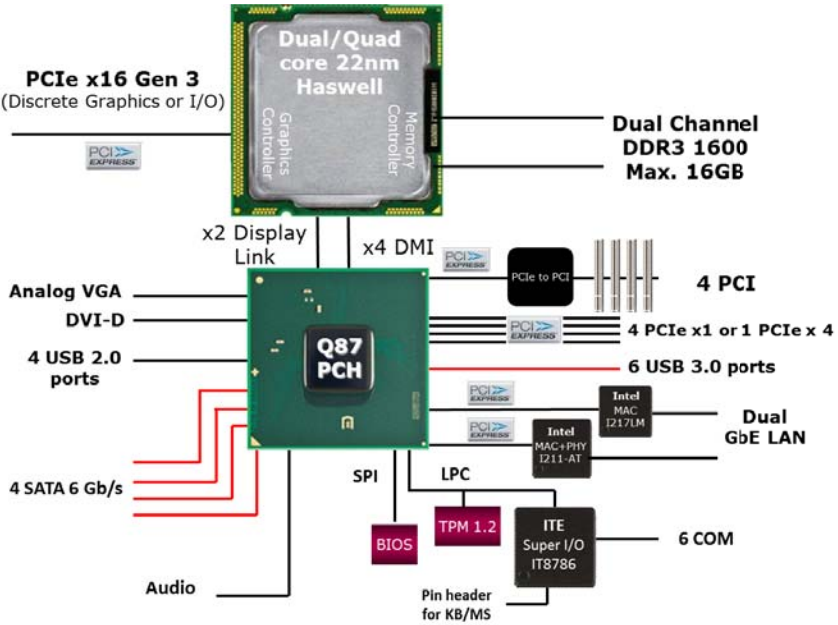


Figure 1-1: NuPRO-E42 Block Diagram

1.5 Functional Description

Processor Support

The NuPRO-E42 is PICMG 1.3 System Host Board supporting the 4th Generation Intel® Core™ processor family (Intel® Core™ i7/i5/i3) in LGA1150 socket. An integrated memory controller supports dual channel DDR3 and Intel® HD Graphics is integrated onboard the CPU. The CPU provides a PCI Express x16 for external graphics or expansion. Direct Media Interface (DMI) and Flexible Display Interface (FDI) provide connectivity to the Intel® Q87 Express Chipset.

Intel® Q87 Express Chipset

The Intel® BD82Q87 Platform Controller Hub (PCH) combines with the processor to provide a compact yet powerful 2-chip solu-

tion. 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, SATA 6 Gb/s, USB 3.0, PCI, LPC, and SPI.

Dual-Channel DDR3 Memory

To meet the requirements of memory-intensive applications, the NuPRO-E42 has a dual-channel memory architecture supporting DDR3 1333/1600 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-E42 utilizes an Intel® I217LM Gigabit Ethernet PHY and Intel® I211-AT Gigabit Ethernet Controller connected to the PCI-E bus of the Q87 PCH. Intel® AMT 9.0 (I217LM on LAN1), Wake-on-LAN and PXE are supported.

Serial ATA

The NuPRO-E42 provides four Serial ATA ports with data transfer rates of up to 6.0 GB/s. Intel® Rapid Storage Technology supports AHCI and RAID 0/1/5/10 functionality.

Universal Serial Bus (USB 2.0/3.0)

The NuPRO-E42 provides 4 USB 2.0 ports (backplane) supporting transfer rates up to 480 Mb/s and 6 USB 3.0 ports (2x on rear panel, 4x on SHB) supporting transfer rates up to 5 Gb/s. All ports are USB 2.0/1.1 compatible.

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 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-E42 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.

Intel® Active Management Technology

Intel® Active Management Technology (Intel® AMT) is hardware-based technology for remotely managing and securing PCs out-of-band. Intel® AMT includes hardware-based remote management, security, power-management, and remote-configuration features. Intel® AMT allows remote access to a system when traditional techniques and methods are not available.

1.6 Mechanical Drawing

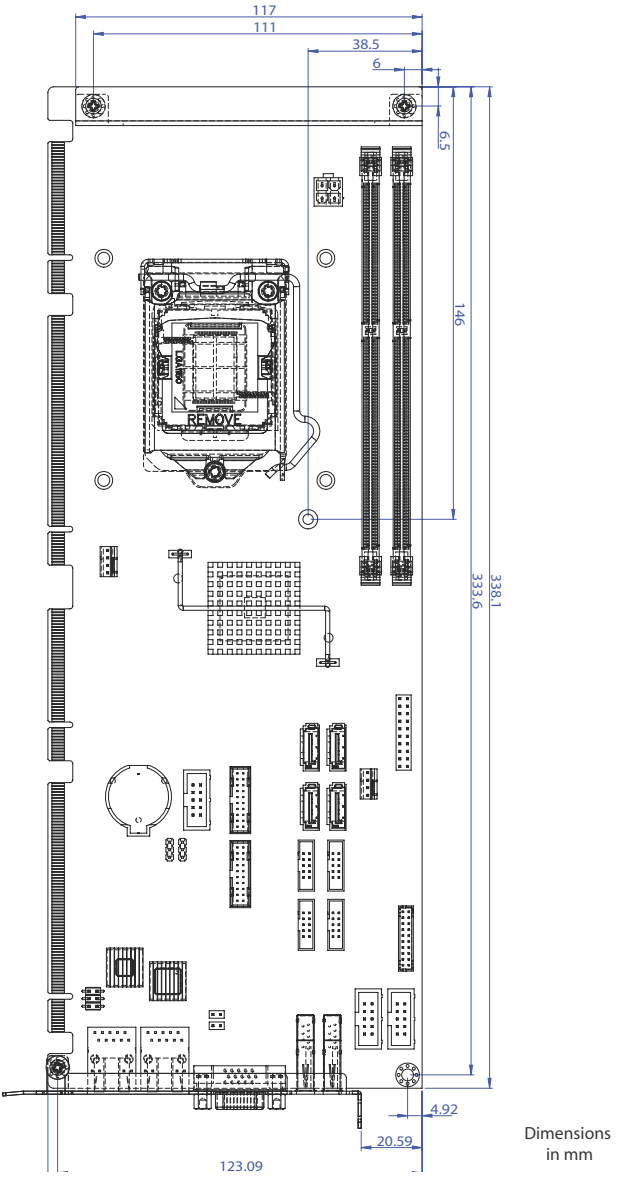


Figure 1-2: NuPRO-E42 Board Dimensions

1.7 I/O Connectivity

I/O	Bracket	Onboard	Golden Finger	Remarks
VGA	Y	—	—	DB-15
DVI-D	—	Y	—	cable w/ bracket optional
LAN1/2 (RJ-45)	Y	—	—	Act/Link/ Speed LEDs
PS/2 KB/MS	—	Y	—	cable w/ bracket optional
USB Rear Panel	2	—	—	USB 3.0
USB 3.0 headers	—	4	—	cable w/ bracket optional
USB backplane	—	—	4	USB 2.0
COM1-2	—	Y	—	2.54” pitch
COM3-6	—	Y	—	2.00" pitch
SATA	—	4	—	—
PCIe x4	—	—	Y	—
PCIe x16	—	—	Y	—
PCI 32bit/33MHz	—	—	Y	via TI XIO2001

Table 1-2: NuPRO-E42 I/O Connectivity

1.8 Rear Panel I/O Ports

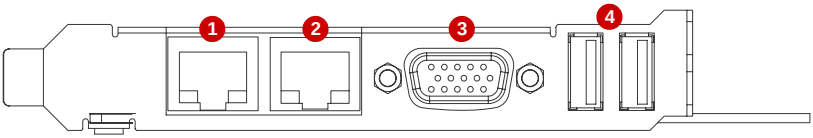
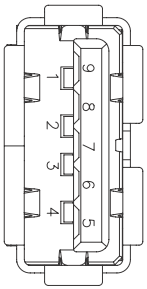


Figure 1-3: Rear Panel I/O Ports

	Connector	Description
1	LAN1 port (RJ-45)	Gigabit Ethernet (supports Intel® AMT)
2	LAN2 port (RJ-45)	Gigabit Ethernet

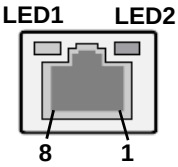
	Connector	Description
3	VGA port	DB-15 connector for CRT or LCD monitor
4	USB 3.0 ports	SuperSpeed USB 3.0 ports

USB 3.0 Connectors



Pin #	Signal Name
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP

LAN (RJ-45) Ports



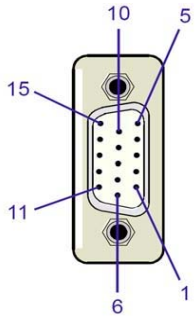
Pin #	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	BI_DA+
2	TX-	BI_DA-
3	RX+	BI_DB+
4	--	BI_DC+
5	--	BI_DC-
6	RX-	BI_DB-
7	--	BI_DD+
8	--	BI_DD-

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	Amber	1 Gb connection

VGA Port



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

1.9 Board Layout

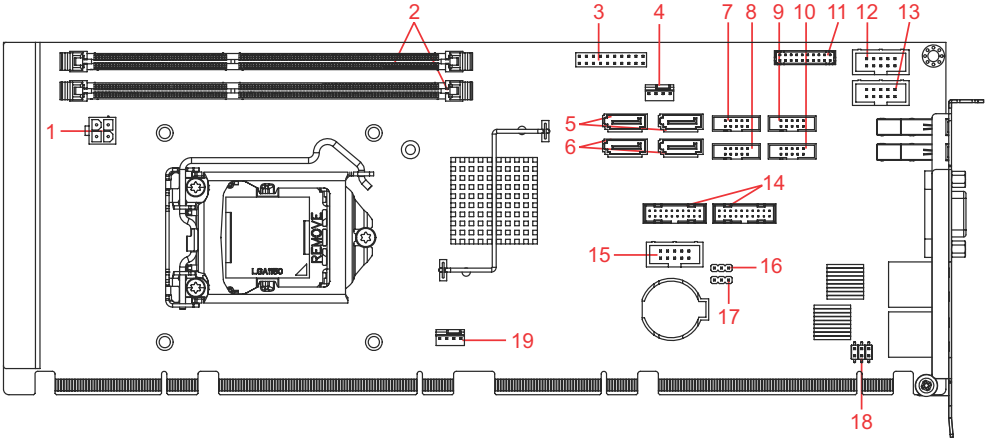
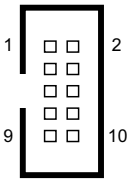


Figure 1-4: Connectors and Jumpers

	Connector	Description
1	CN24	ATX 12V Power connector
2	CN28/29	DDR3 DIMM slots
3	CN45	System Panel pin header
4	FAN1	CPU fan connector
5	CN30/32	SATA 6 Gb/s connectors
6	CN31/33	SATA 6 Gb/s connectors
7	CN16	COM6 connector
8	CN14	COM5 connector
9	CN13	COM4 connector
10	CN12	COM3 connector
11	CN17	DVI-D pin header
12	CN23	COM1 connector
13	CN11	COM2 connector
14	CN36/37	USB 3.0 pin headers
15	CN40	HD Audio Daughter Board pin header
16	JBAT2	Clear RTC
17	JBAT1	Clear CMOS
18	CN27	PS/2 Keyboard/Mouse pin header
19	FAN2	System fan connector
20	SW13	COM1 mode switch (on solder side, near the rear I/O USB 3.0 connectors)

1.10 Onboard Connectors

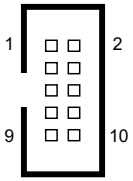
COM1~6 Connector (RS-232) (CN11~14/16/23)



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

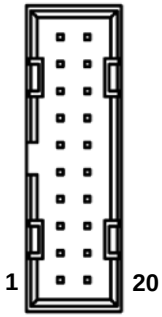
	COM1	COM2	COM3	COM4	COM5	COM6
Connector	CN23	CN16	CN11	CN12	CN13	CN14
Pitch	2.54 mm	2.54 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm

COM1 Connector (RS-422/485) (CN23)



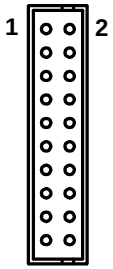
Pin #	RS-422	RS-485
1	TXD-	Data-
2	NC	NC
3	TXD+	Data+
4	NC	NC
5	RXD+	NC
6	NC	NC
7	RXD-	NC
8	NC	NC
9	GND	GND
10	NC	NC

USB 3.0 Connectors (CN36/37)



Pin #	Signal	Pin #	Signal
1	P5V_USB3B	20	NC
2	S_USB3_RN3_R	19	P5V_USB3B
3	S_USB3_RP3_R	18	S_USB3_RN4_R
4	GND	17	S_USB3_RP4_R
5	S_USB3_TN3_R	16	GND
6	S_USB3_TP3_R	15	S_USB3_TN4_R
7	GND	14	S_USB3_TP4_R
8	S_USB2_N2_R	13	GND
9	S_USB2_P2_R	12	S_USB2_N3_R
10	S_USB_OC1#	11	S_USB2_P3_R

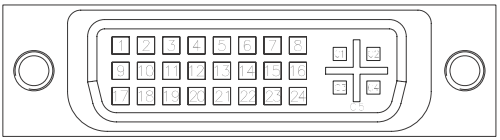
DVI-D Onboard Connector(CN17)



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 -

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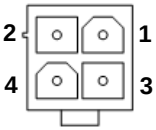
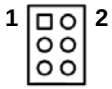
ATX 12V Power Connector (CN24)



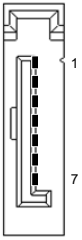
Pin #	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC

PS/2 Keyboard/Mouse Pin Header (CN27)



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

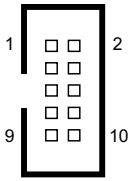
Serial ATA Connectors (CN30~33)



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

HD Audio Daughter Board Connector (CN40)

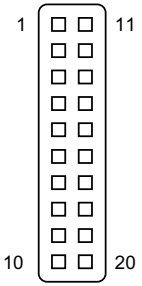
This connector is designed for use with the ADLINK DB-Audio2 daughter board.



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

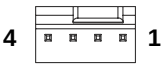
System Panel Connector (CN45)

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



Pin #	Signal	Function	Pin Group
1	WDSPK	Speaker signal	Chassis Speaker
2	NC		
3	NC		
4	+5V	Power	
5	NC		
6	GND	Ground	Key Lock
7	KEYLOCK	Keyboard lock	
8	PLED	Power LED signal	Power LED
9	NC		
10	+5V	Power LED pull-up	
11	GND	Ground	Reset Button
12	RESETBT	RESET signal	
13	NC		
14	GND	Ground	Power Button
15	POWERBT	Power-on signal	
16	NC		
17	NC		
18	HDDLED	Hard Disk LED signal	HDD LED
19	+3.3V	Hard Disk LED pull-up	
20	NC		

Fan Connectors (FAN1/2)



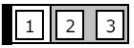
Pin #	Signal
1	GND
2	Fan power (+12V)
3	Fan Tachometer
4	Fan Speed Control

1.11 Jumpers & Switches

Clear CMOS Jumper (JBAT1)

To clear the BIOS settings (RTCRTS# asserts):

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. Wait 3 seconds or more.
5. Power down and disconnect power from the system.
6. Re-short pins 1-2, and power up the system..

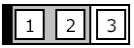
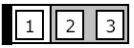
CMOS Status	Connection	JBAT1
Normal	1 – 2	
Clear CMOS	2 – 3	

Clear RTC Jumper (JBAT2)

To clear the BIOS settings and data/time (SRTCRST# and RTCRST# assert):

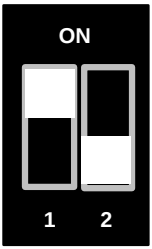
1. Power down and disconnect power from the system.
2. Short pins 2-3 on JP1.
3. Reconnect power and power up the system.

After power up, remove the jumper cap from pins 2-3 and reinstall it to pins 1-2.

CMOS Status	Connection	JBAT2
Normal	1 – 2	
Clear CMOS	2 – 3	

To clear CMOS, clear both CMOS and RTC jumpers at the same time.

COM1 Mode Switch (SW13)



DIP #1	DIP #2	COM1 Mode
On	Off	RS-232
On	On	RS-422
Off	On	RS-485

1.12 Power Consumption

Intel® Core™ i7-4770S, 3.1 GHz, 8M Cache, 65W TDP (4C)

Test Configuration	
Memory	Transcend TS1GLK64V6H DDR3-1600 8GB x2
Graphics	Integrated Intel® HD Graphics
SATA Channel 1	ALDINK ASD26-MLC32G-CT
Power Supply	FSP FSP350-60PFG 350W
BIOS	Rev. 0.91

Mode	Current (A) / Voltage (V)	Power (W)	Total (W)
S1	0.86A / 12V	10.32	15.044
	0.43A / 5V	2.15	
	0.78A / 3.3V	2.574	
S3	129mA / 5VSB	0.645	0.645
S5	81mA / 5VSB	0.405	0.405

Mode	Current (A) / Voltage (V)	Power (W)	Total (W)
Idle Load	0.38A / 12V	4.56	10.534
	0.68A / 5V	3.4	
	0.78A / 3.3V	2.574	
CPU Max	6.53A / 12V	78.36	85.151
	0.85A / 5V	4.25	
	0.77A / 3.3V	2.541	
Max. Load	6.50A / 12V	78	86.324
	1.15A / 5V	5.75	
	0.78A / 3.3V	2.574	

Table 1-3: Core™ i7-4770S Processor Power Consumption

Intel® Core™ i5-4330S, 2.7 GHz, 3M Cache, 54W TDP (2C)

Test Configuration	
Memory	Transcend TS1GLK64V6H DDR3-1600 8GB x2
Graphics	Integrated Intel® HD Graphics
SATA Channel 1	ALDINK ASD26-MLC32G-CT
Power Supply	FSP FSP350-60PFG 350W
BIOS	Rev. 0.91

Mode	Current (A) / Voltage (V)	Power (W)	Total (W)
S1	0.99A / 12V	11.88	15.813
	0.45A / 5V	2.25	
	0.51A / 3.3V	1.683	
S3	169mA / 5VSB	0.845	0.845
S5	103mA / 5VSB	0.515	0.515
Idle Load	0.45A / 12V	5.4	10.795
	0.65A / 5V	3.25	
	0.65A / 3.3V	2.145	

Mode	Current (A) / Voltage (V)	Power (W)	Total (W)
CPU Max	3.61A / 12V	43.32	49.548
	0.81A / 5V	4.05	
	0.66A / 3.3V	2.178	
Max. Load	3.80A / 12V	45.6	54.395
	1.33A / 5V	6.65	
	0.65A / 3.3V	2.145	

Table 1-4: Core™ i5-4430S Processor Power Consumption

1.13 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-E42
- SATA data cable with latch x2
- 2-port USB 3.0 cable with bracket
- 2-port COM cable with bracket for COM1/COM2 (2.54 mm pitch)
- 2-port COM cable with bracket x2 for COM3-6 (2.0 mm pitch)
- Driver DVD
- User's manual

The NuPRO-E42 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.

2 Getting Started

2.1 Installing the CPU

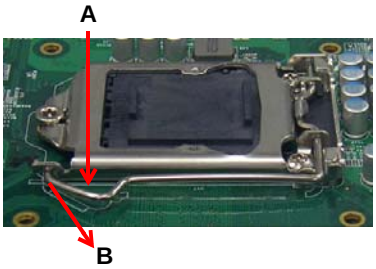
The NuPRO-E42 supports an Intel® Core™ i7/i5/i3 or Pentium® processor in an LGA1150 socket.

WARNING:

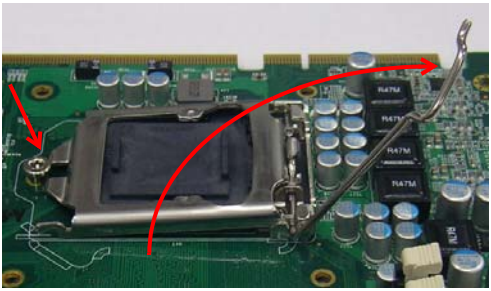
- Disconnect all power to the board before installing a CPU to prevent damaging the board and CPU.
- Do not touch socket contacts. Damaging the contacts voids the product warranty. Follow the installation instructions carefully to avoid damaging the board components.

To install the CPU:

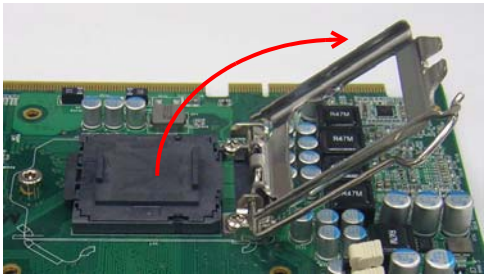
1. Press down on the locking arm (A), then push it away from the socket to disengage it from the retention tab (B).



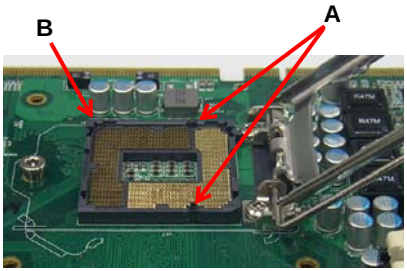
2. Raise the locking arm to unlock the load plate.



3. Lift the load plate to uncover the socket.



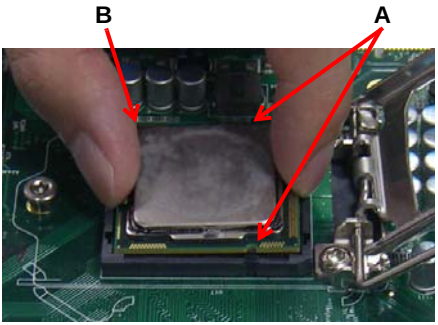
4. Remove the plastic protective cover from the socket. Note the locations of the alignment keys (A) and Pin 1 indicator (B).



WARNING: 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 indi-

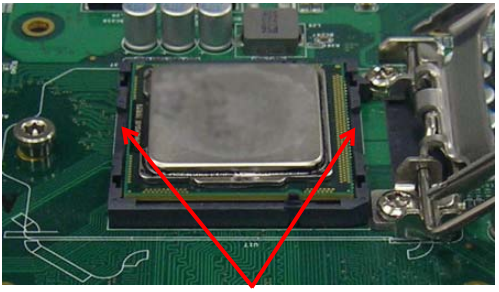
cator as shown (B).



WARNING:

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

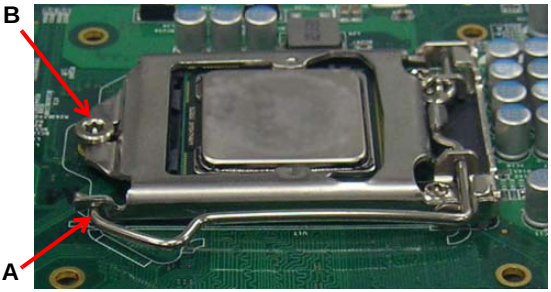
6. Carefully place the CPU into the socket vertically. The socket has cutouts for your fingers to fit into.



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).



2.2 Installing the CPU Fan and Heatsink

The CPU requires a chassis with an airflow inlet and maximum internal ambient temperature of 50° C. A especially-designed CPU fan and heatsink must be installed before using the SHB. Failure to install a CPU fan and heatsink may damage the system host board and/or the CPU..

If 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 SHB labeled FAN2.

2.3 Installing Memory Modules

The NuPRO-E42 supports up to 16 GB of DDR3 1333/1600 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

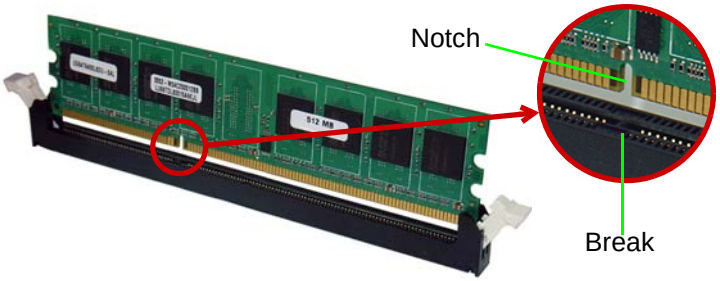
The NuPRO-E42 supports 1GB, 2GB, 4GB and 8GB unbuffered non-ECC DDR3 DIMMs in the following configurations:

- 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.

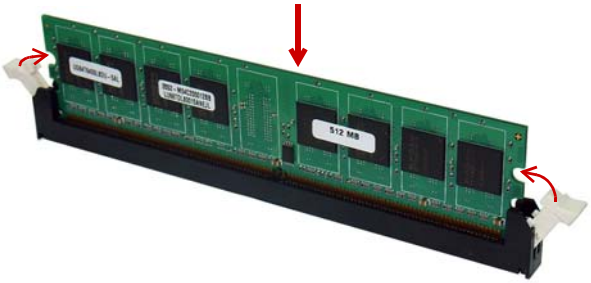
To install a memory module:

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.



2.4 Driver Installation

This chapter provides information on how to install the NuPRO-E42 device drivers under Windows 7 64-bit. The device drivers are located in the following ADLINK All-in-One DVD directories:

Chipset	\NuPRO\NuPRO-E42\Chipset\
Display	\NuPRO\NuPRO-E42\VGA\
Ethernet	\NuPRO\NuPRO-E42\Ethernet\
Rapid Storage	\NuPRO\NuPRO-E42\Others\RST\
USB 3.0	\NuPRO\NuPRO-E42\Others\

Management Engine	\NuPRO\NuPRO-E42\Others\ME_Driver\

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

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.
*Not required for Windows Vista and Windows 7.

2.4.1 Intel® Q87 Express Chipset Driver

This section describes the installation of the Intel® Q87 Express chipset driver.

1. Locate the directory **X:\NuPRO\NuPRO-E42\Chipset** on the ADLINK All-in-One DVD, run the program **infinst_autol.exe** and follow the onscreen instructions. Restart the system if prompted.

2.4.2 Display Driver

Integrated Intel® HD Graphics

This section describes the driver installation for the Integrated Intel® HD Graphics.

Follow these instructions to install the display driver:

1. Locate the directory **X:\NuPRO\NuPRO-E42\VGA\64 Bit** on the ADLINK All-in-One DVD, and extract the contents of the following archive: **Win64.zip**
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

2.4.3 Ethernet Driver

Follow these instructions to install the Ethernet driver.

1. Locate the directory **X:\NuPRO\NuPRO-E42\Ethernet\Windows\64** on the ADLINK All-in-One DVD, run the program **PROWinx64.exe**

and follow the onscreen instructions. Restart the system if prompted.

2.4.4 Management Engine

Follow these instructions to install the Management Engine driver.

1. Locate the directory **X:\NuPRO\NuPRO-E42\Others\ME_Driver** on the ADLINK All-in-One DVD, and extract all files from the following archive: **ME90.zip**.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

2.4.5 USB 3.0 Driver

Follow these instructions to install the USB 3.0 driver.

1. Locate the directory **X:\NuPRO\NuPRO-E42\USB3** on the ADLINK All-in-One DVD, and extract all files from the following archive: **USB3.zip**.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

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Appendix A BIOS Setup

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

A.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.

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.

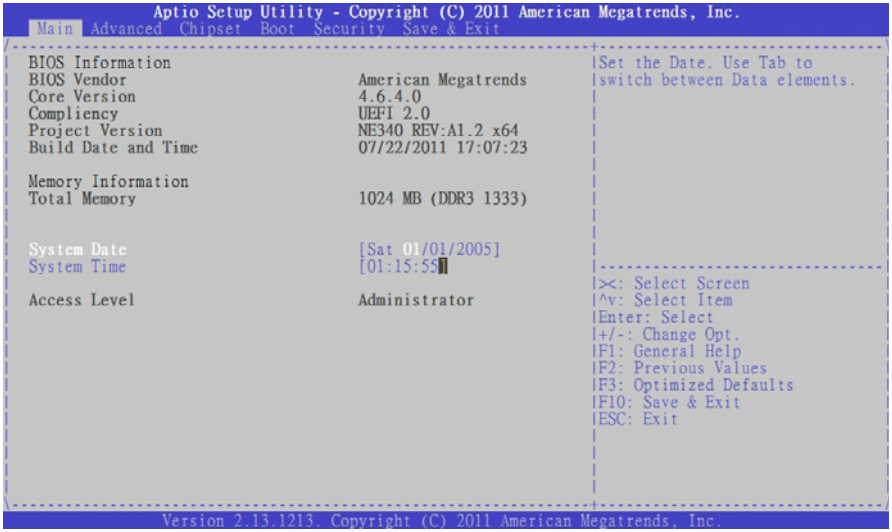
Setup Menu

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

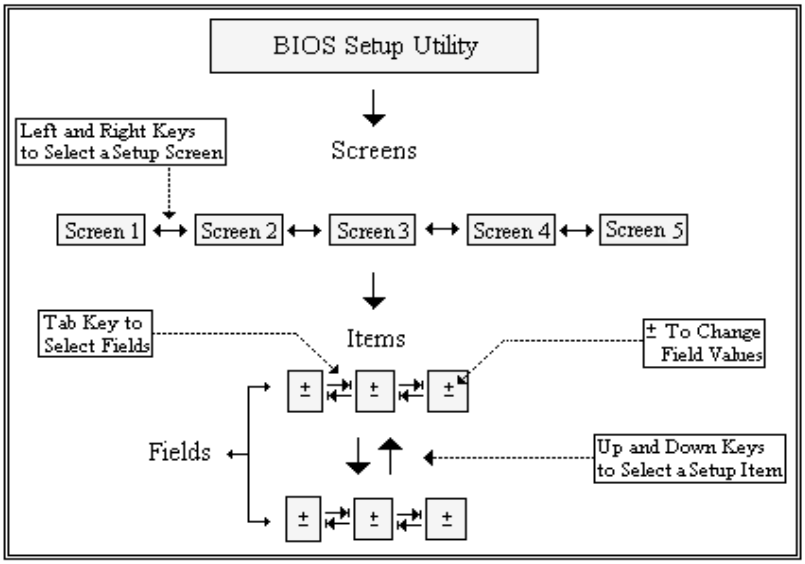
in the left frame, it is highlighted in white. Often a text message will accompany it.



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.

NOTE:

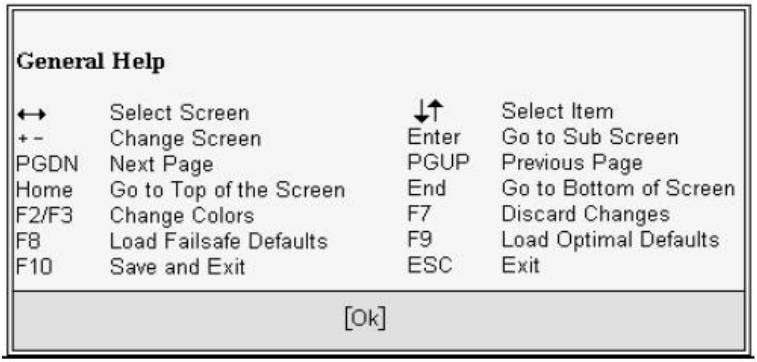
There is a hot key legend located in the right frame on most setup screens..

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.

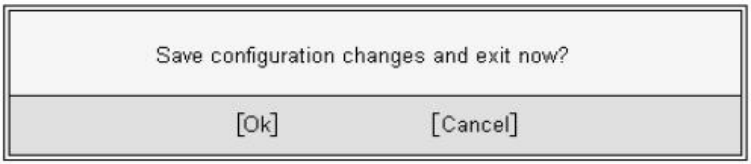
Hotkey Descriptions

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

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

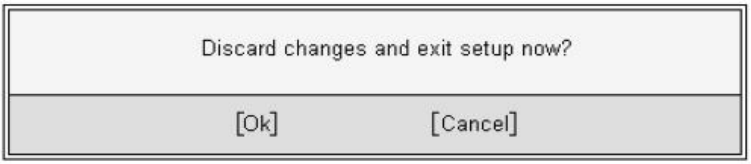


F10 The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:



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:



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.

A.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.

System & Board Info

BIOS Vendor

Displays the BIOS vendor.

Core Version

Displays the BIOS core version.

Compliancy

Displays the current BIOS compliancy.

Project Version

Displays the current BIOS revision.

Build Date and Time

Displays the BIOS build data.

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.

Access Level

Displays the current system access level.

A.3 Advanced BIOS Setup

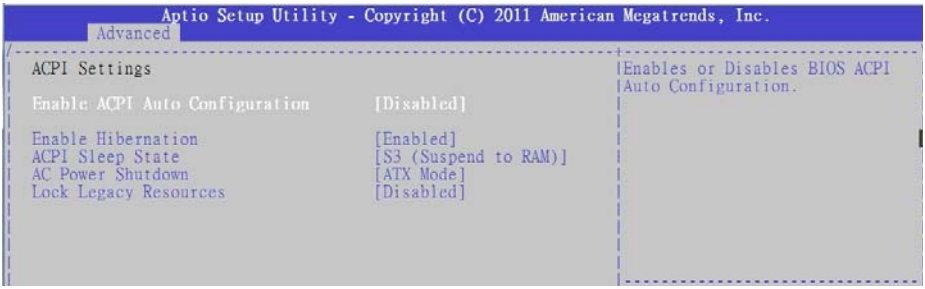
Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the < Arrow > keys. The Advanced BIOS Setup screen is shown below.

The sub menus are described on the following pages.

Launch PXE OpROM

Boot Option for Legacy Network Devices. Options: Enabled/ Disabled.

A.3.1 ACPI Settings



Enable APIC Auto Configuration

BIOS ACPI Auto Configuration. Options: Enabled/Disabled.

Enable Hibernation

Enable or disable the system's ability to hibernate (S4 sleep state). This option may be not effective with some OS's.

ACPI Sleep State

Select the highest ACPI sleep state the system will enter, when the SUSPEND button is pressed. Options: S1, S3, Suspend Disable.

AC Power Shutdown

ATX mode: OS will turn off system power when shutdown.
AT mode: OS show It is now safe to turn off your computer.

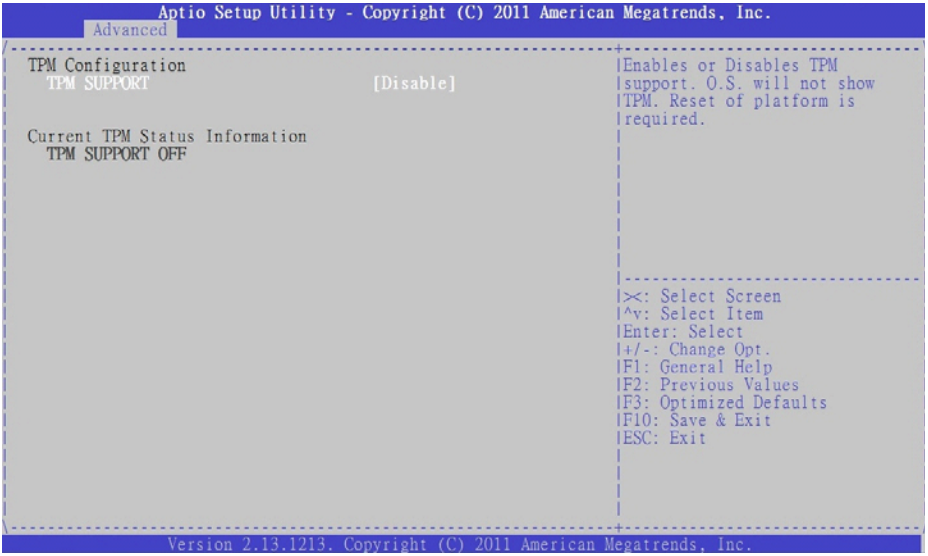
NOTE: AT mode will not support S3 & S4.

Lock Legacy Resources

Enable or disable Lock of Legacy Resources.

A.3.2 Trusted Computing

Trusted computing is an industry standard to make personal computers more secure through a dedicated hardware chip, called a Trusted Platform Module (TPM).



TPM Support

This option enables or disables the TPM support. System reset is required. Options: Enabled/Disabled.

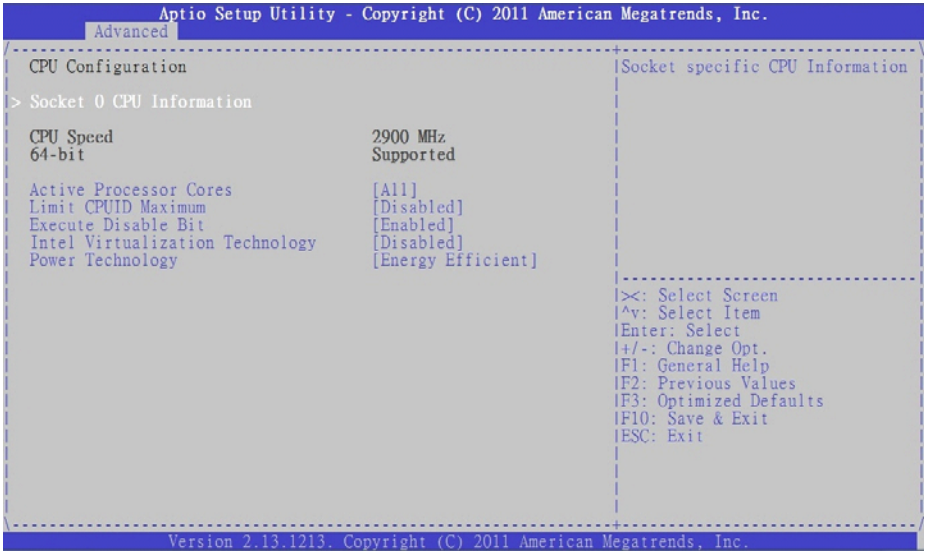
TPM State

Determine whether TPM state change requires Password Authentication. Options: Enabled/Disabled.

Pending TPM Operation

Scheduled TPM operation. The settings for this value are Enable, Disable and Clear.

A.3.3 CPU Configuration



Active Processor Cores

Number of cores to enable in processor. Options: All, 1, 2.

Limit CPUID Value Maximum

When Enabled, the processor will limit the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. When Disabled, the processor will return the actual maximum CPUID input value of the processor when queried. Enable this option to allow compatibility with older operating systems.

Execute Disable Bit

Allows you to enable or disable the No-Execution Page Protection Technology. Setting this item to [Disabled] forces the XD feature flag to always return a zero (0). Options: Enabled, Disabled.

Intel® Virtualization Tech

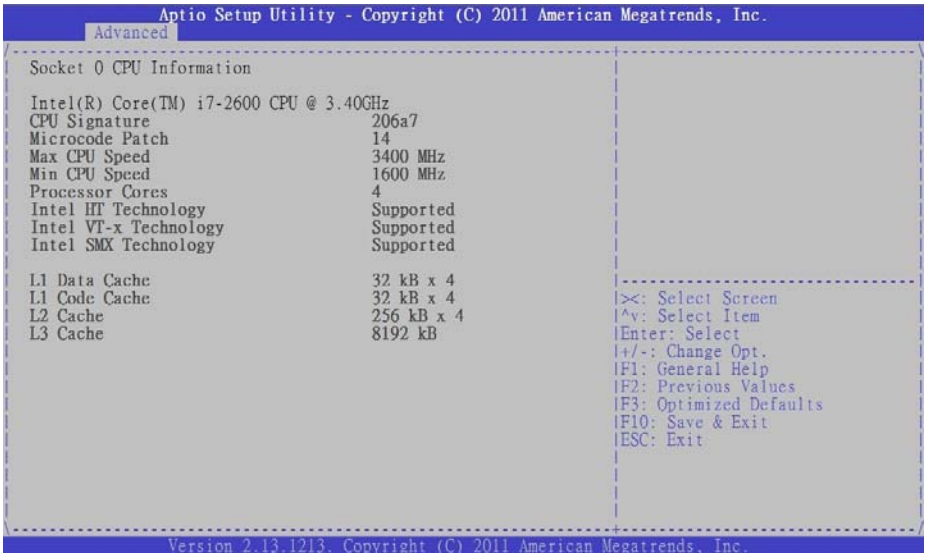
When enabled, Intel® Virtualization Technology (Intel® VT) makes a single system appear as multiple independent sys-

tems to software. This allows for multiple, independent operating systems to be running simultaneously on a single system.

Power Technology

Sets the power management features. Options: Disable, Energy Efficient, Custom.

Socket 0 CPU Information



A.3.4 SATA Configuration

SATA Mode

Options: IDE, RAID, AHCI.

Serial ATA Controller 0/1

Appears when SATA mode is set to IDE. This item specifies whether Serial ATA Controller 0/1 is initialized in Compatible or Enhanced mode of operation. The settings are Disabled, Compatible and Enhanced.

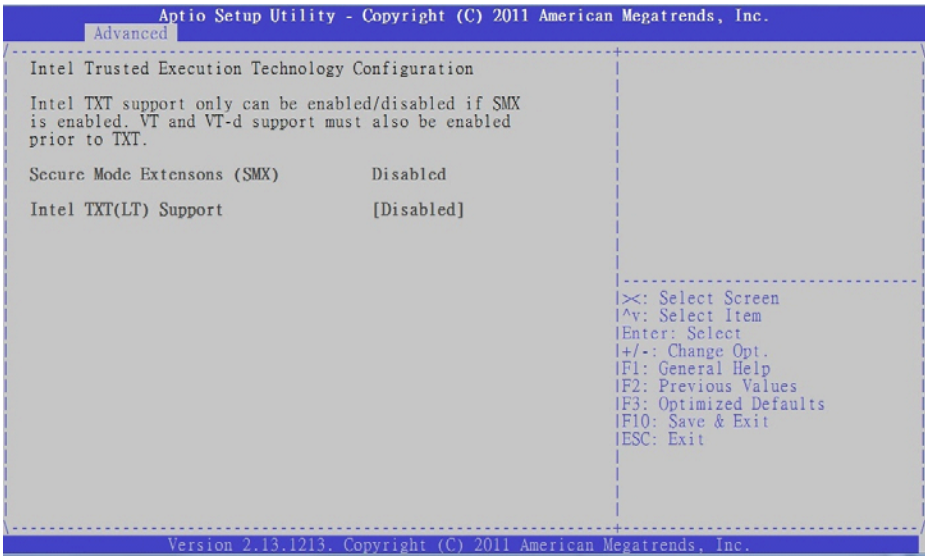
Aggressive Link Power Management

Appears when SATA mode is set to AHCI. The settings are Disabled and Enabled.

SATA Port 0~5

The **Staggered Spin-up**, **External SATA Port (eSATA)** and **Hot Plug** options appear when SATA Mode is set to AHCI. Options: Enabled/Disabled.

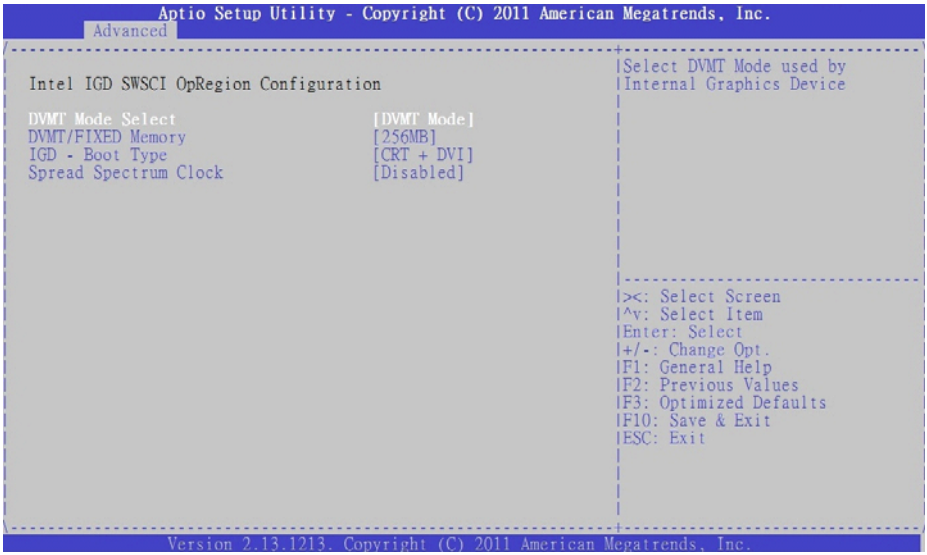
A.3.5 Intel TXT Configuration



Intel Trusted Execution Technology (Intel TXT) support can only be enabled when TPM is enabled, if the CPU supports Safer Mode

Extensions (SMX), and Intel® Virtualization Technology (Intel® VT) and Intel® Virtualization Technology for Directed I/O (VT-d) are enabled.

A.3.6 Intel IGD SWSCI OpRegion



DVMT Mode

This item allows the user to enable or disable the DVMT function.

DVMT/Fixed Memory

Select DVMT/Fixed memory size used by the Integrated Graphics Device. Options: 128MB, 256MB, Maximum.

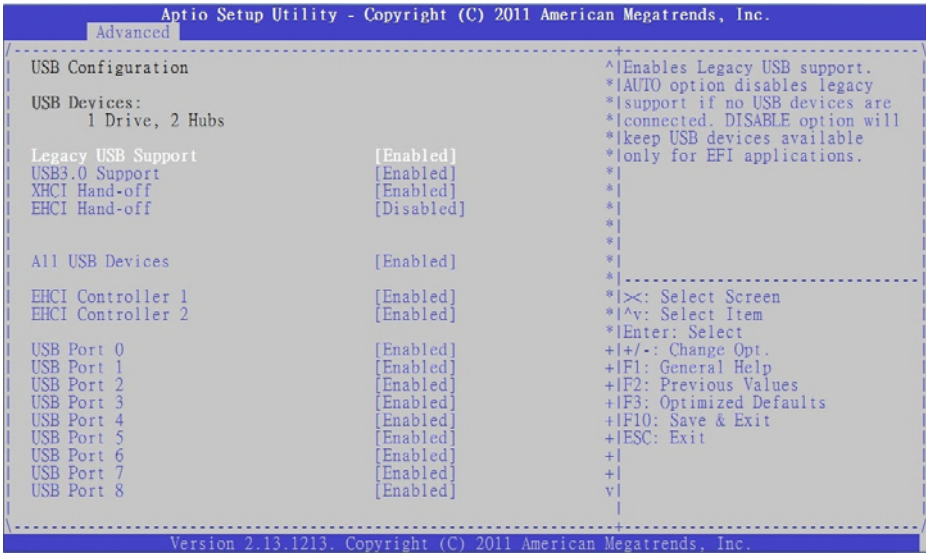
IGD - Boot Type

Select the video device which will be activated during POST. This has no effect if an external graphics device is present. Options: CRT+DVI, CRT, DVI.

Spread Spectrum Clock

IGD device spread spectrum clock function. Options: Enabled/ Disabled.

A.3.7 USB Configuration



Legacy USB Support

Legacy USB Support refers to USB mouse and keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there are no USB drivers loaded on the system. Set this value to enable or disable the Legacy USB Support.

- **Disabled:** Set this value to prevent the use of any USB device in DOS or during system boot.
- **Enabled:** Set this value to allow the use of USB devices during boot and while using DOS.
- **Auto:** This option auto detects USB Keyboards or Mice and if found, allows them to be utilized during boot and while using DOS.

USB 3.0 Support

USB 3.0 Controller support. Options: Enable, Disable.

XHCI Hand-Off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. Options: Enable, Disable.

EHCI Hand-Off

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver. Options: Enable, Disable.

All USB Devices

Enabled/Disabled All USB devices. Options: Enable, Disable.

EHCI Controller 1/2

Enabled/Disabled USB 2.0 (EHCI) Support. Options: Enable, Disable.

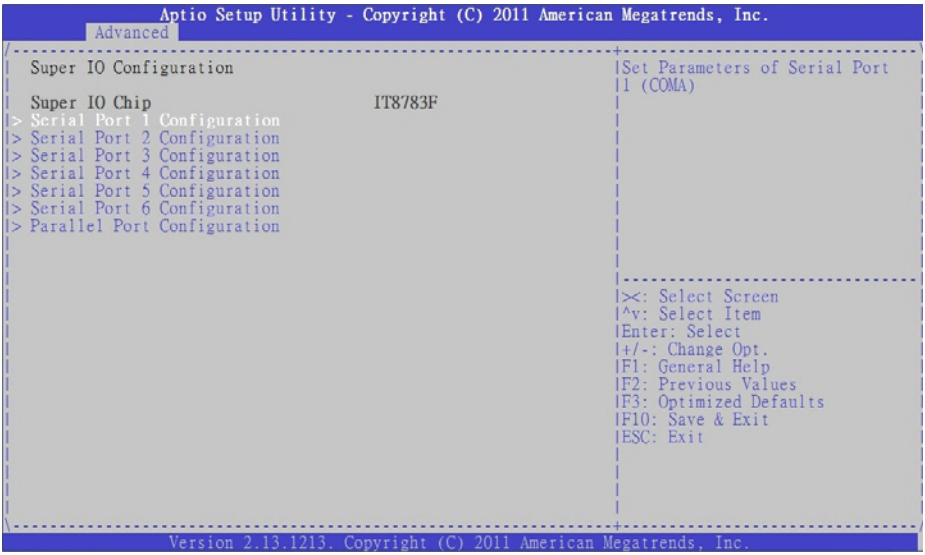
USB Port 0~13

Enabled/Disabled USB Port 0~13. Options: Enable, Disable.

Mass Storage Devices:

Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type. Options: Auto, Floppy, Forced FDD, Hard Disk, CD-ROM.

A.3.8 Super IO Configuration



Serial Port1-6 Configuration

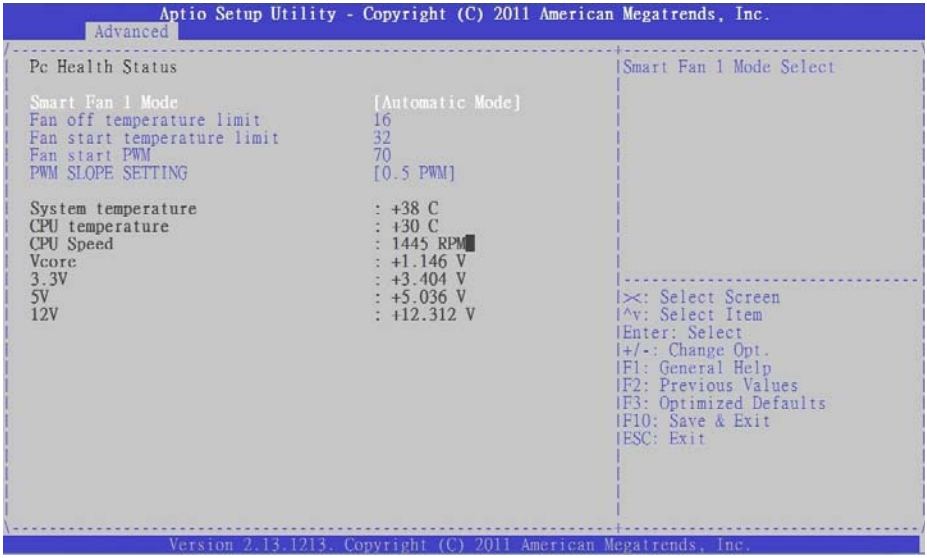
Enter the submenu for each serial port to enable/disable and view the I/O port and IRQ settings.

Parallel Port Configuration

Enter the submenu to enable/disable the parallel port and specify the base I/O port address.

A.3.9 Hardware Monitor

You can use this screen to view System Status information and to select options for FAN1 settings (FAN2 is set to *Full On* by default).



Smart Fan 1 Mode Setting

Three operating modes are provided for FAN1: **Full Mode**, **Automatic Mode**, and **Manual Mode**. Full Mode runs the fan at full speed. Automatic Mode is *Smart Fan* mode. Manual Mode runs the fan at the set speed (minimum is 0, maximum is 127).

Automatic Mode

In Automatic Mode, the following settings are visible.

Fan Off Temperature Limit

Sets the temperature below which the fan will turn off in degrees Celsius (°C). When the temperature is higher than the set value, FAN1 will run at Fan Start PWM speed. When the temperature is lower than the set value, FAN1 will stop.

Fan Start Temperature Limit

When the temperature in degrees (°C) is higher than the set value, FAN1 will increase its speed according to the PWM Slope Setting value.

Fan Start PWM

Sets the PWM value of the fan between **Fan Off Temperature Limit** and **Fan Start Temperature Limit**. Minimum value is 0 and maximum is 127.

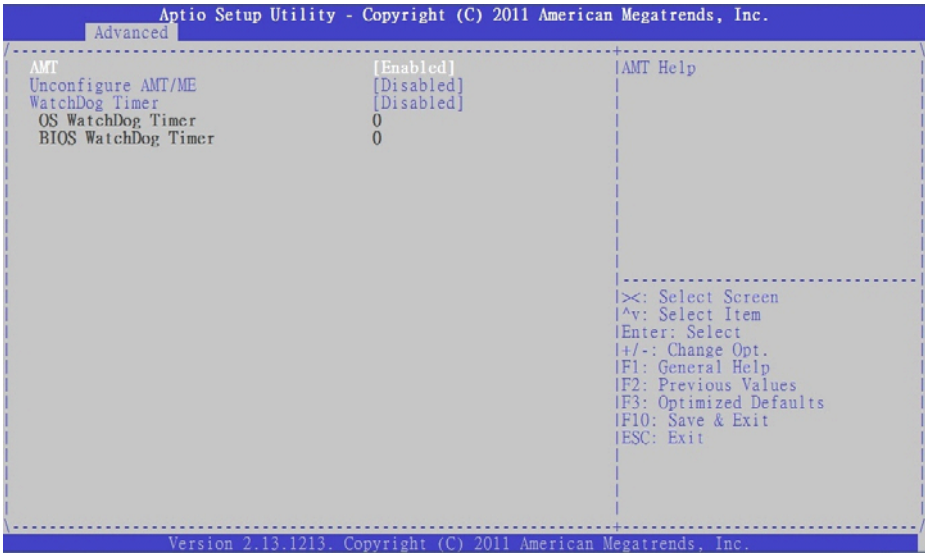
PWMSlope Setting

The Slope PWM Value sets the rate of increase the fan speed when the temperature is above **Fan Start Temperature Limit**.

System Status

System temperature, CPU temperature and fan speed (FAN1), system voltages.

A.3.10 AMT Configuration



AMT

This item allows the user to Enable/Disable the Intel AMT function.

Unconfigure AMT/ME

This item allows the user to unprovision the AMT/ME function without a password.

WatchDog Timer

Options: Enabled/Disabled.

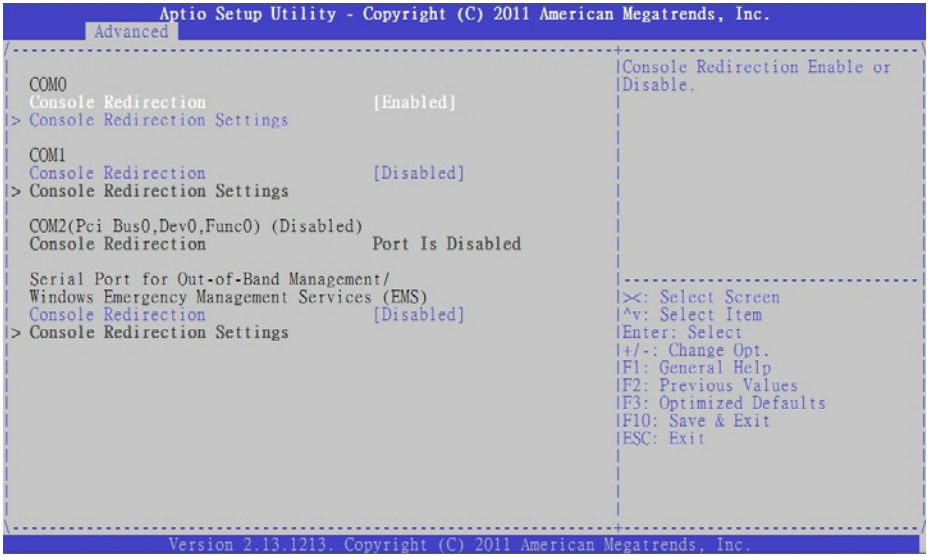
OS WatchDog Timer

Sets the OS WatchDog Timer (seconds).

BIOS WatchDog Timer

Sets the BIOS WatchDog Timer (seconds).

A.3.11 Serial Port Console Redirection

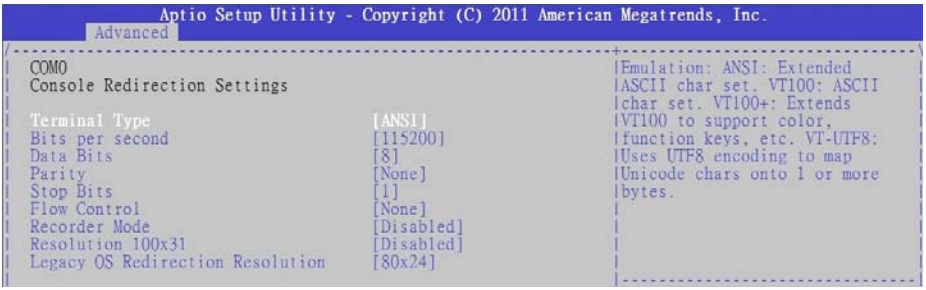


COM0/1 Console Redirection

Options: Enabled/Disabled.

Console Redirection Settings

The settings specify how the host computer and the remote computer exchange data. Both computers should have the same or compatible settings.



Terminal Type

This option is used to select either VT100/VT-UTF8 or ANSI terminal type. Options: VT100, VT100+, VT-UTF8, ANSI.

Bits per second

Select the bits per second you want the serial port to use for console redirection. The options are 115200, 57600, 38400, 19200, 9600.

Data Bits

Select the data bits you want the serial port to use for console redirection. Set this value to 7 and 8.

Parity

Set this option to select Parity for console redirection. The settings for this value are None, Even, Odd, Mark and Space.

Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit. Set this value to 1 and 2.

Flow Control

Set this option to select Flow Control for console redirection. The settings for this value are None, Hardware RTS/CTS.

Record Mode

With this mode enabled only text will be sent., allowing capture of Terminal data. Set this value to Enabled or Disabled.

Resolution 100x31

Enable or disable extended terminal resolution. Set this value to Enabled or Disabled.

Legacy OS Redirection Resolution

On a legacy OS, the number of Rows and Columns supported by redirection. Set this value to 80x24 and 80x25.

Serial Port for Out-of-Band Management

These settings control the ACPI serial port redirection table (SPCR) which is used by Windows servers to provide Windows Emergency Management Services (EMS) and is independent from console redirection output. OoB Management or EMS allows the remote management of selected components of

Windows servers, even when a server is not connected to the network or the network is not available

Terminal Type

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation. Options: **VT100, VT100+, VT-UTF8, ASNI.**

Bits per second

Select the bits per second you want the serial port to use for console redirection. The options are 115200, 57600, 38400, 19200, 9600.

Flow Control

Set this option to select Flow Control for console redirection. The settings for this value are None, Hardware RTS/CTS.

Data Bits

Displays the frame width for Out-of-Band Management.

Parity

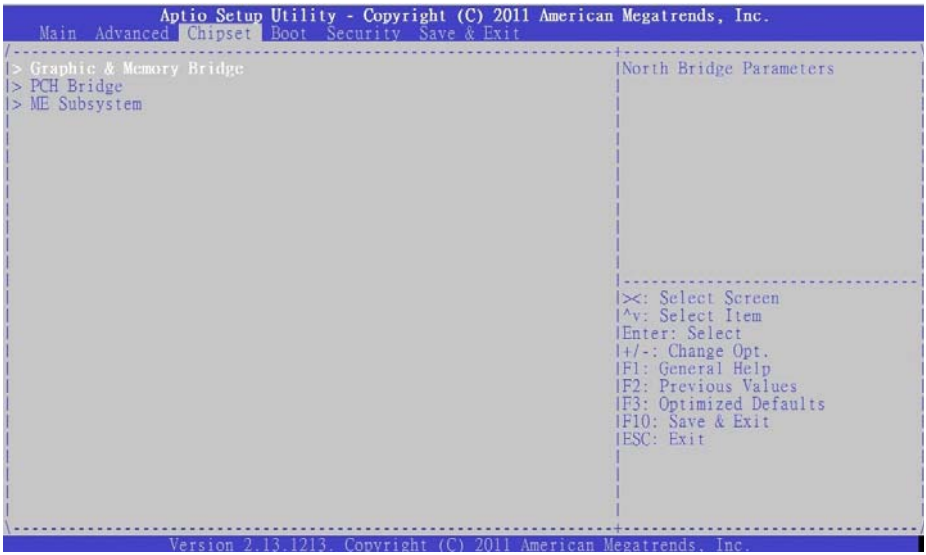
Displays the parity for Out-of-Band Management.

Stop Bits

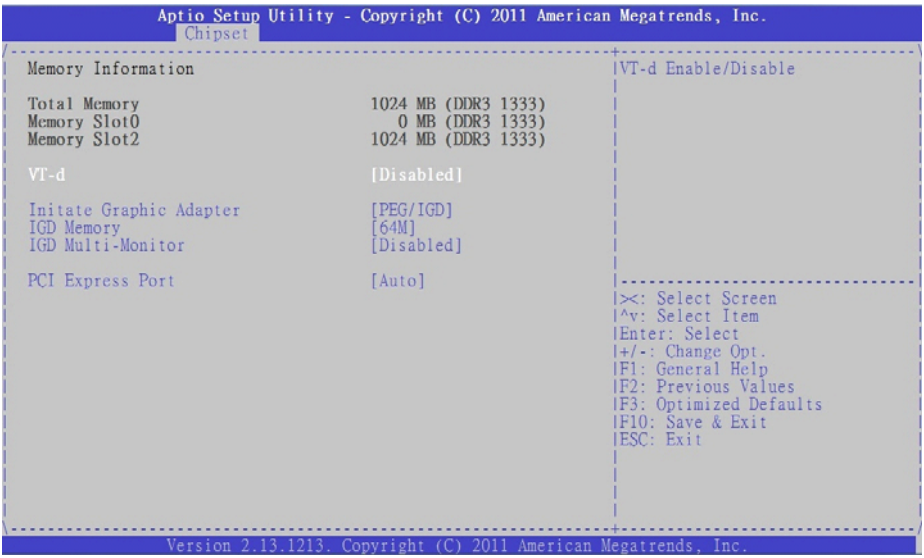
Displays the number of stop bits for Out-of-Band Management.

A.4 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 sub menu for that item. The Chipset BIOS Setup screen is shown below.



A.4.1 Graphics and Memory Bridge Configuration



VT-d

Intel Virtualization Technology for Directed I/O. Options: Enabled/ Disabled.

Initial Graphics Adapter

Allows you to select which graphics controller to use as the primary boot device. Options: IGD, PCI/IGD, PCI/PEG, PEG/IGD, PEG/PCI.

IGD Memory

IGD shared memory size, Options: Disable/32M/64M/128M.

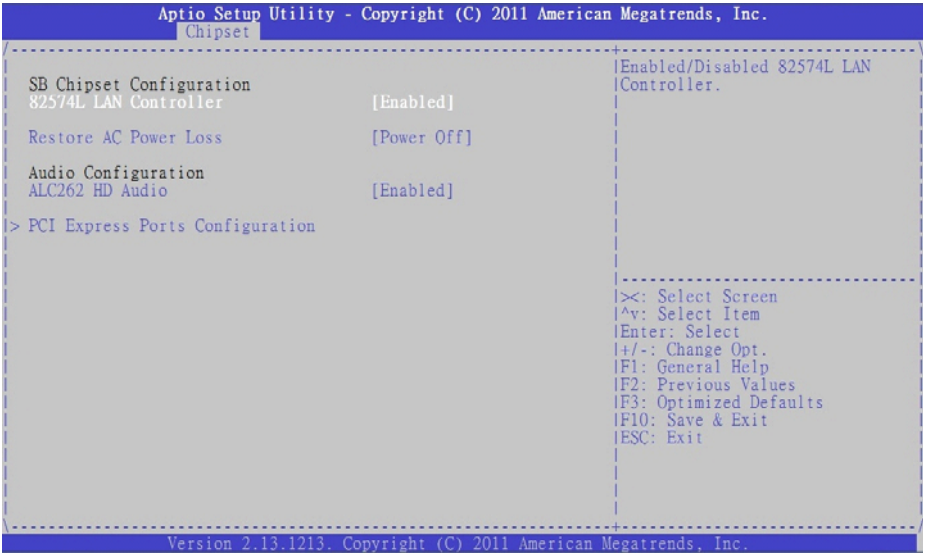
IGD Multi-Monitor

Multi-monitor support by the Internal Graphics Device. Options: Enabled/Disabled

PCI Express Port

This option enables auto negotiation with a PEG device, disables the use of the PEG port, or select enables use of the PEG port

A.4.2 PCH Bridge Configuration



82574L LAN Controller

Controls the onboard Intel 82574L LAN controller. Options: Enabled/Disabled.

Restore on AC Power Loss

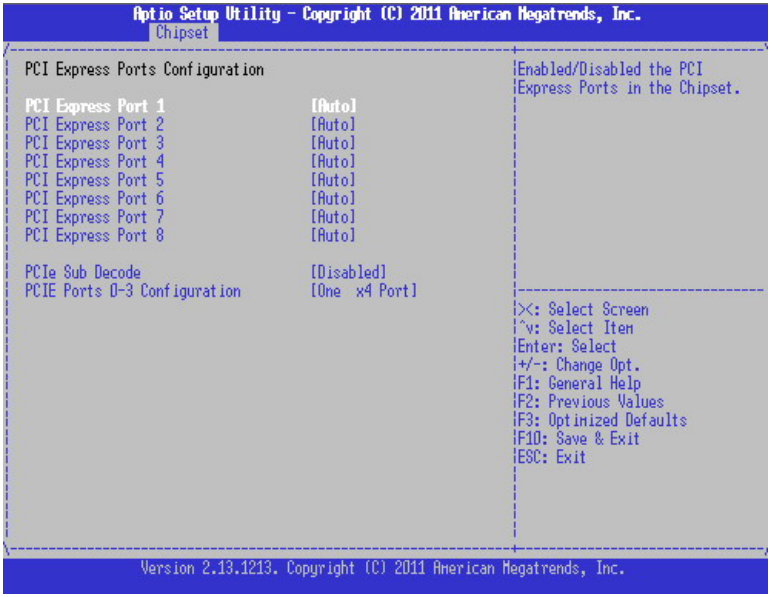
Determines which state the computer enters when AC power is restored after a power loss. The options for this value are Last State, Power On and Power Off.

- **Power Off:** Set this value to always power off the system while AC power is restored.
- **Power On:** Set this value to always power on the system while AC power is restored.
- **Last State:** Set this value to power off/on the system depending on the last system power state while AC power is restored.

ALC626 HD Audio

Set this value to Enable/Disable the HD Audio Controller.

PCI Express Port Configuration



PCI Express Port 1~8

Configures the PCI Express ports in of the chipset. Options: Auto, Enable, Disable.

PCIe Sub Decode

Enable or disable the PCIe Sub Decode port. This option is available when the Subtractive Decode Agent is enable (PCHTrap9[14]) = '1b'.

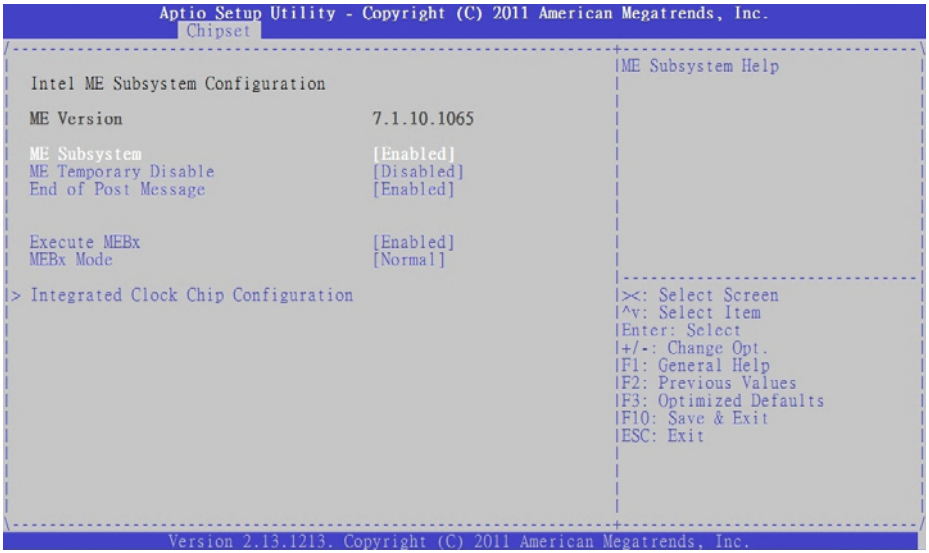
PCIE Ports 0-3 Configuration

Use this option to configure PCIe ports 0-3 of the PCH to "One x4 Port" or "Four x1 Ports".

NOTE:

The *PCIE Ports 0-3 Configuration* option is available in BIOS version A1.6 and later.

A.4.3 Management Engine Subsystem



ME Subsystem

Options: Enabled/Disabled.

ME Temporary Disable

Options: Enabled/Disabled (reset required).

End of POST Message

Options: Enabled/Disabled.

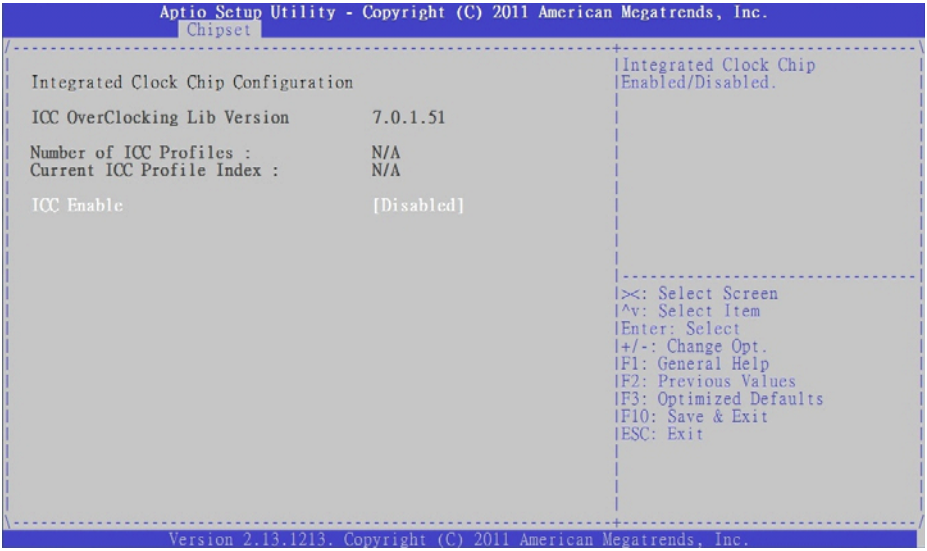
Execute MEBx

Options: Enabled/Disabled.

MEBx Mode

Options: Normal, Hidden Ctrl+P, Enter MEBx setup.

Integrated Clock Chip Configuration



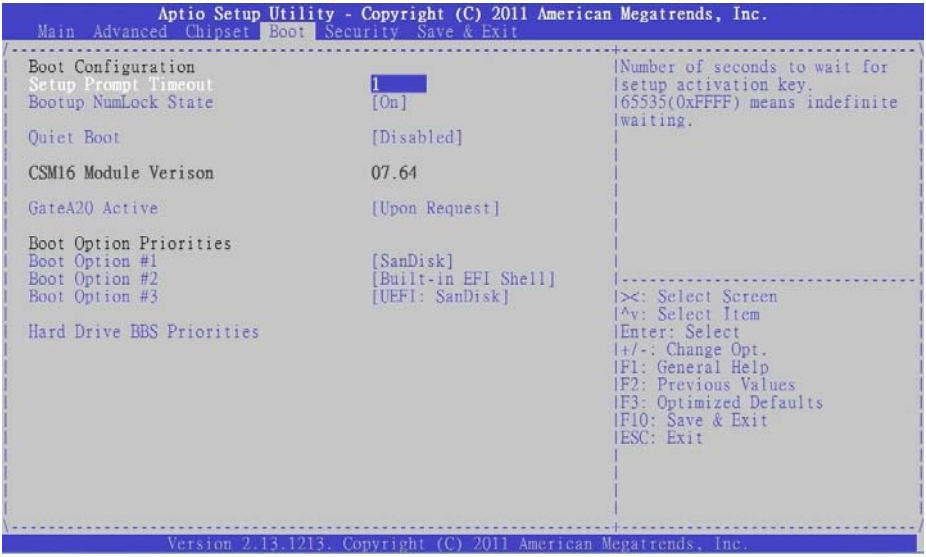
ICC Enable

Integrated Clock Chip. Options: Enabled/Disabled.

A.5 Boot Configuration

Select the Boot tab from the setup screen to enter the Boot BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display a Boot BIOS setup option by highlight-

ing it using the < Arrow > keys. The Boot Configuration screen is shown below:



Setup Prompt Timeout

Number of seconds to wait for setup activation. 65535 (0xFFFF) means wait indefinitely.

Bootup NumLock State

This setting determines the state of the NumLock function on bootup. Options: On, Off.

Quiet Boot

When this feature is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.

Gate A20 Active

Options: Upon Request, Always.

Boot Option Priorities

Set the boot device options to determine the sequence in which the computer checks which device to boot from.

Hard Drive BBS Priorities

The Boot devices are listed in groups by device type. First press <Enter> to enter the sub-menu. You may then use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list. For example, USB storage disks will be listed as "USB Drives" in the sub-menu. Only the first device in each device gr

A.6 Security Setup

Password Support

Two Levels of Password Protection

Provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The system can be configured so that all users must enter a password every time the system boots or when Setup is exe-

cuted, using either or either the Supervisor password or User password.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and re-configure.

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 sub menu for the following items, select the item and press < Enter >:

- Change Administrator Password
- Change User Password
- Clear User Password

Administrator Password

Indicates whether a Administrator password has been set.

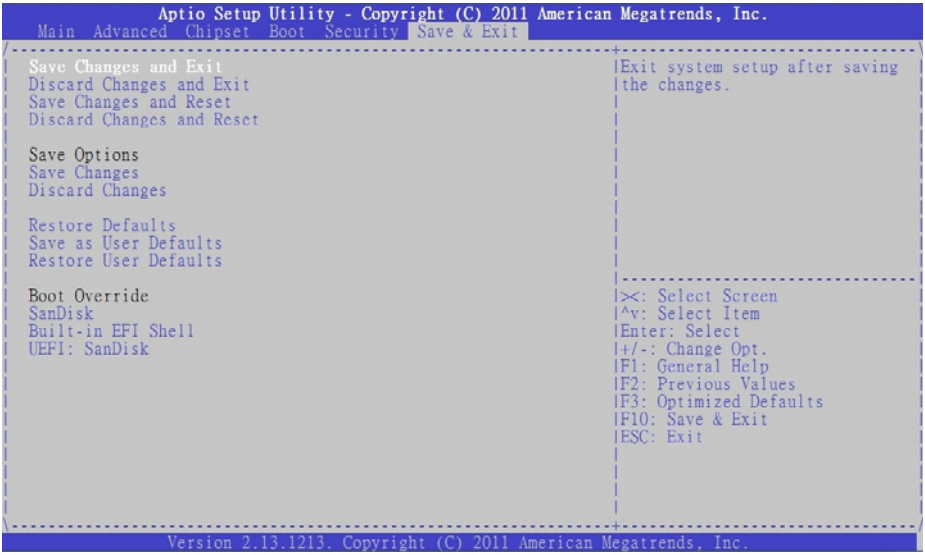
User Password

Indicates whether a user password has been set.

A.7 Exit Menu

Select the Exit tab from the setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by high-

lighting it using the < Arrow > keys. The Exit BIOS Setup screen is shown below.



Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect.

Save Configuration Changes and Exit Now?

[Ok] [Cancel]

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

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

Discard Changes and Exit Setup Now?

[Ok] [Cancel]

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

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save changes made so far to any of the setup options.

Discard Changes

Select Discard Changes from the Exit menu and press < Enter >. Select OK to discard changes.

Restore Defaults

Restore/Load Default values for all the setup options.

Save as User Defaults

Save the changes made so far as User Defaults.

Restore User Defaults

Restore the User Defaults to all the setup options.

Boot Override

This group of functions includes a list of devices within the boot order. Select a drive to immediately boot that device regardless of

the current boot order. If you are booting to the EFI Shell, an exit from the shell returns to Setup.

Appendix B - Watchdog Timer

A sample program for configuring the NuPRO-E42's watchdog timer is included on the ADLINK All-in-One DVD in the following directory: **\NuPRO\NuPRO-E42\WDT**.

B.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-E42
{
   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 C - System Resources

C.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 – FEEFFFFF	1 MB	FSB Interrupt Memory Space
(4GB-20MB) – (4GB-19MB-1)	FEC00000 – FECFFFFF	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 82577LM 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 C-1: System Memory Map

C.2 Direct Memory Access Channels

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

Table C-2: Direct Memory Access Channels

Note (1): DMA channel 0, 1, or 3 will be occupied when using the parallel port.

C.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
0C0-0DF	DMA controller 2, 8237A-5 equivalent
0F0	Read: PCI and Master abort. (Note 1) Write: FERR#/ IGNNE# /Interrupt controller
2E0 - 2F7	Serial Port 6
2E8 – 2EF	Serial Port 4
2F0 – 2F7	Serial Port 5
2F8 – 2FF	Serial Port 2
170-177 and 1F0-1F7 376 and 3F6	SATA controller or PCI
378 - 37F	Parallel port
3B0 – 3BB	Mono/VGA mode video
3C0- 3DF	VGA registers
3E8 – 3EF	Serial Port 3
3F8 – 3FF	Serial Port 1
4D0 and 4D1	Interrupt controller
400 – 47F	SB PM Base Address
500 – 57F	SB GPIO
A00 – A3F	SIO PME Base Address
CF9	Reset Control register (8 bit I/O)
1180 – 119F	SMBus

Table C-3: IO Map

Note: A read to this address will subtractively go to PCI, where it will master abort.

C.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 2 (COM2)	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Serial Port 1 (COM1) / PCI / ISA	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	PCI / ISA	IRQ5 via SERIRQ, IRQ5 at ISA bus	Note (1)
6	N/A	N/A	No
7	PCI / ISA	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	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	Note (1)
15	PCI / ISA	N/A	No

Table C-4: IRQ Lines PIC Mode

Notes:

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

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

IRQ Lines APIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
0	System Timer	N/A	No
1	Keyboard controller	N/A	No
2	PCI / ISA	N/A	No
3	Serial Port 2 (COM2) / PCI / ISA	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Serial Port 1 (COM1) / PCI / ISA	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	Serial Port 3 (COM3) / PCI / ISA	IRQ5 via SERIRQ, IRQ5 at ISA bus	Note (1)
6	Serial Port 4 (COM4) / PCI / ISA	IRQ6 via SERIRQ	No
7	Parallel Port / Serial Port 5 (COM5) / PCI / ISA	IRQ7 via SERIRQ, IRQ7 at ISA bus	Note (1)
8	Real-time clock	N/A	No
9	ACPI-Compliant system	IRQ9 via SERIRQ, IRQ9 at ISA bus	Note (1), (2)
10	PCI / ISA	IRQ10 via SERIRQ, IRQ10 at ISA bus	Note (1)
11	Serial Port 6 /PCI / ISA	IRQ11 via SERIRQ, IRQ11 at ISA bus	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	Note (1)
15	Secondary IDE controller / PCI / ISA	IRQ15 via SERIRQ, IRQ15 at ISA bus	Note (1)
16	N/A	PCIE Port 0/1/2/3/4/5/6/7, P.E.G. Root Port, I.G.D, EHCI Controller #2, MEI Controller.	Yes
17	N/A	PCIE Port 0/1/2/3/4/5/6/7, P.E.G. Root Port, KT Controller	Yes

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
18	N/A	PCIE Port 0/1/2/3/4/5/6/7, P.E.G. Root Port, SATA Host controller, SMBus Controller, Thermal Controller, SOL (COM7)	Yes
19	N/A	PCIE Port 0/1/2/3/4/5/6/7, P.E.G. Root Port, SATA Host controller, SATA Host controller#1,	Yes
20	N/A	PCH internal GBE controller, PCI Slot 3	No
21	N/A	PCI Slot 0, PCI Slot 4	No
22	N/A	PCH HDA, PCI Slot 1	No
23	N/A	EHCI Controller #1, PCI Slot 2	No

Table C-5: IRQ Lines APIC Mode

Notes:

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

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

PCI Configuration Space Map

Bus #	Device #	Function #	Routing	Description
00h	00h	00h	N/A	Intel Host Bridge
00	02H	00H	Internal	Intel IGD
02	00H	0FFH	N/A	P.E.G. 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 controller
00h	16h	03h	Internal	PCI Serial 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
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
11h	00h	0FFh	Internal	PCIE Port #0
12h	00h	0FFh	Internal	PCIE Port #1
13h	00h	0FFh	Internal	PCIE Port #2

Bus #	Device #	Function #	Routing	Description
14h	00h	0FFh	Internal	PCIE Port #3
15h	00h	0FFh	Internal	Intel 82574L LAN Controller
16h	00h	0FFh	Internal	PCIE Port #5
17h	00h	0FFh	Internal	USB 3.0 Controller
18h	00h	0FFh	Internal	PCIE Port #7
20h	0Fh	00h	Internal	PCI Slot 0
20h	0Eh	00h	Internal	PCI Slot 1
20h	0Dh	00h	Internal	PCI Slot 2
20h	0Ch	00h	Internal	PCI Slot 3
20h	0Bh	00h	Internal	PCI Slot 4

Table C-6: PCI Configuration Space Map

PCI Interrupt Routing Map

PIRQ	A	B	C	D	E	F	G	H
INT Line	INTA	INTB	INTC	INTD				
P.E.G. Root Port	INTA	INTB	INTC	INTD				
VGA	X							
SATA Controller			X	X				
SATA Controller 1				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						
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	INTC	INTD	INTA	INTB				
PCIE port 7	INTD	INTA	INTB	INTC				
PCI Slot 0						X		
PCI Slot 1							X	
PCI Slot 2								X
PCI Slot 3					X			
PCI Slot 4						X		

Table C-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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