USER MANUAL

BK-0940

Flex-ATX Motherboard
with Intel® 4th Gen. Core™ i7/i5
features 2LAN/1DVI/1VGA/10COM

BK-0940 M1

BK-0940
With Intel® 4th Gen. Core™
Flex-ATX Motherboard

DISCLAIMER

This operation manual is meant to assist both Embedded Computer manufacturers and end users in installing and setting up the system. The information contained in this document is subject to change without any notice.

CE NOTICE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

	**CAUTION:** Danger of explosion may occur when the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

CHAPTER 2 HARDWARE CONFIGURATION

CHAPTER 3 SOFTWARE UTILITIES

INTRODUCTION

CHAPTER

1

This chapter gives you the information for BK-0940. It also outlines the system specifications.

The following topics are included:

- About This Manual
- System Specifications
- Safety Precautions

Experienced users can jump to chapter 2 on page 2-1 for a quick start.

1-1. ABOUT THIS MANUAL

Thank you for purchasing our BK-0940 Flex-ATX Motherboard with Intel® 4th Gen. Core™ i7/i5 processor, Intel® H81/Q87 chipset, 2LAN / 1DVI / 1VGA /, 10COM / 10USB(H81) and 12USB(Q87), and is fully PC/AT compatible. The BK-0940 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the system. It contains four chapters. The user can apply this manual for configuration according to the following chapters:

Chapter 1 Introduction

This chapter introduces you to the background of this manual, and the specifications for this system. The final page of this chapter describes how to avoid damaging this board.

Chapter 2 Hardware Configuration

This chapter outlines the component locations and their functions. AT the end of this chapter, you will learn how to set jumper and how to configure this card to meet your own needs.

Chapter 3 Software Utilities

This chapter contains helpful information for proper installations of the Windows XP/7/8.1 utility, RST Driver utility, VGA utility, LAN utility, Sound utility, etc.

Chapter 4 BIOS Setup

This chapter indicates you how to set up the BIOS configurations.

Appendix A Expansion Bus

This appendix introduces you the expansion bus for PCI_E1, PCI_E2 and PCI Bus connectors.

Appendix B Technical Summary

This appendix gives you the information about the Technical maps and Flash BIOS Update. It also describes the Watchdog-timer configuration.

1-2. SYSTEM SPECIFICATIONS

System

CPU	Intel® 4th Gen. Core™ i5/i7 Processor (LGA1150) • i5-4770S (3.90GHz, 65W) • i5-4570S (3.60GHz, 65W) • i5-4570TE (3.30GHz, 35W) • i3-4340TE (2.60GHz, 35W)
OS Support	Windows XP, Windows 8.1, Windows 7
Chipset	Intel® H81/Q87
Memory	• 4 x SO-DIMM support dual channel DDR3 1600/1333 MHz up to 32GB (Q87) • 2 x SO-DIMM support dual channel DDR3 1600/1333 MHz up to 16GB (H81)
BIOS	AMI
Watchdog	1~255 seconds
RAID	RAID 0, 1, 5(Q87)
Speaker	Internal buzzer
Fan	• 1 x CPU Fan (4 pins) • 1 x System Fan (4 pins) • 1 x System Fan (3 pins)
Hardware Monitor	FAN, 12V, 5V, 5Vsb, Vcore
TPM	Onboard
Power Supply/Request	ATX Power Supply
Dimension	229 mm x 191 mm Flex ATX
Shock	15G peak-to-peak , 11ms duration, non-operation
Vibration	Non-operation : 2G , 5-200Hz, X, Y, Z axis
Certification	CE/FCC Class A
RoHS	RoHS compliance

I/O Ports

Serial Port	10 serial ports: 9 x RS-232, 1 x RS-232/422/485; • COM 2 support RS-232/422/485 auto flow control • COM 3/4 support 5V/12V by jumper selection
USB Port	• 2 x USB 2.0, 2 x USB 3.0 (Rear Panel)

	• 6 x USB 2.0 Internal Connector • 2 x USB 3.0 Internal Connector (Q87)
SATA Interface	• 2 x SATA III • 1 x SATA II
LAN	Dual Ports to support 10/100/1000Mbps, support Wake-on-LAN. • LAN1: Intel® I217-LM/V • LAN2: Intel® I210-AT
Audio	• Realtek ALC888S High Definition Audio • line-out / line-in / mic-in (Rear Panel)
IO and others	• Fintek F81866AD-I • Fintek F81216
Keyboard/Mouse	1 x PS/2
DIO	4in / 4out
Expansion Bus	• 1 x PCI-E(x16) 3.0 • 1 x PCI-E(x4) 2.0 (Q87) • 1 x PCI

Display

Graphics	• 1 x VGA • 1 x DVI-D • 1 x pDP (DF13, 20pin) • Support triple independent displays (Q87) • Support dual independent displays (H81)

Environmental

Operating Temperature	0℃ ~ 60℃ (32℉ ~ 140℉)
Storage Temperature	-40℃ ~ 85℃ (-40℉ ~ 185℉)
Relative Humidity	Operating: 5%~90% (non-condensing)

1-3. SAFETY PRECAUTIONS

Follow the instructions below to prevent your system from damage:

1. Keep your system away from static electricity on all occasions.

2. Prevent electric shock. Don't touch any components on this system when the system is powered on. Always disconnect power when the system is not in use.

3. Disconnect power when you change any hardware devices.
   For instance, when you connect a jumper or install any cards, a surge of power may damage the electronic components or the whole system.

HARDWARE CONFIGURATION

CHAPTER

2

*** QUICK START ***

Helpful information describes the jumper & connector settings, and component locations.

The following topics are included:

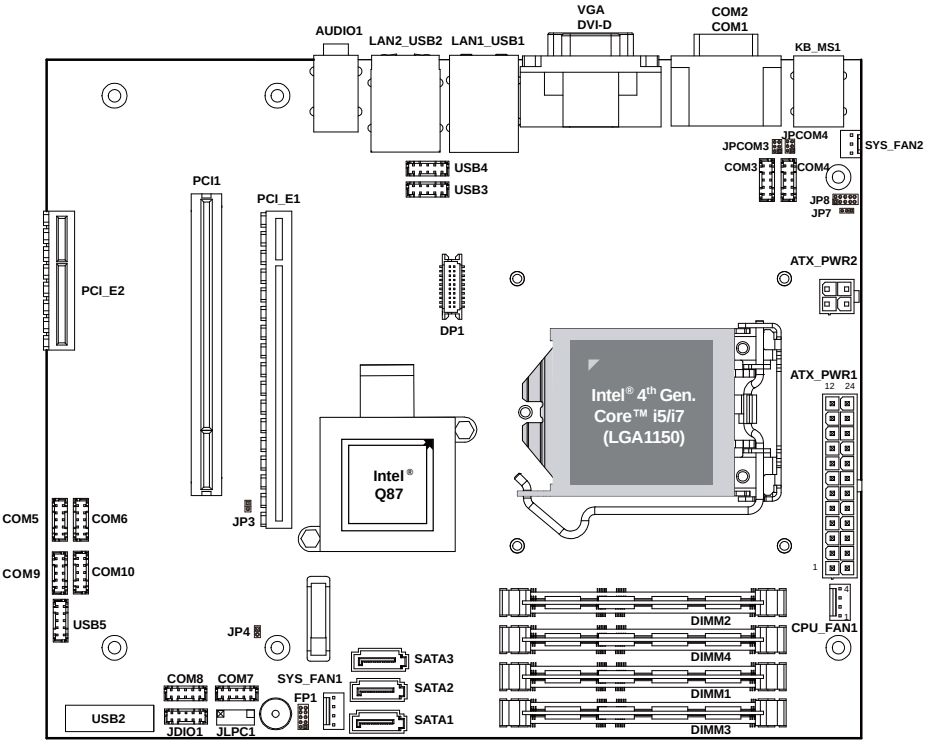
- Jumper & Connector Quick Reference Table
- Component and Jumper Locations
- Configuration and Jumper Settings
- Connector's Pin Assignments

2-1. JUMPER & CONNECTOR QUICK REFERENCE TABLE

JUMPER/CONNECTOR	NAME
COM Port	COM1, COM2
COM Connector	COM3-COM10
DIO Connector	JDIO1
Keyboard & Mouse Port	KB_MS1
DVI Port	DVI-D
VGA Port	VGA
LAN & USB Port	LAN1_USB1, LAN2_USB2
Audio Jack	AUDIO1
COM Port RI & Voltage Selection	JPCOM3, JPCOM4
COM2 RS-232/422/485 Selection	JP8
COM2 RS-485 Selection	JP7
Front Panel Connector & Selection	FP1
Intel® ME Selection	JP3
Clear CMOS Data Selection	JP4
Fan Connector	CPU_FAN1, SYS_FAN1, SYS_FAN2
SATA Connector	SATA1, SATA2, SATA3
USB Connector	USB3, USB4, USB5, USB2
Display Port Connector	DP1
ATX Power Connector	ATX_PWR1, ATX_PWR2
Memory Installation	DIMM1, DIMM2, DIMM3, DIMM4 (DIMM1 and DIMM2 are available only for Q87)

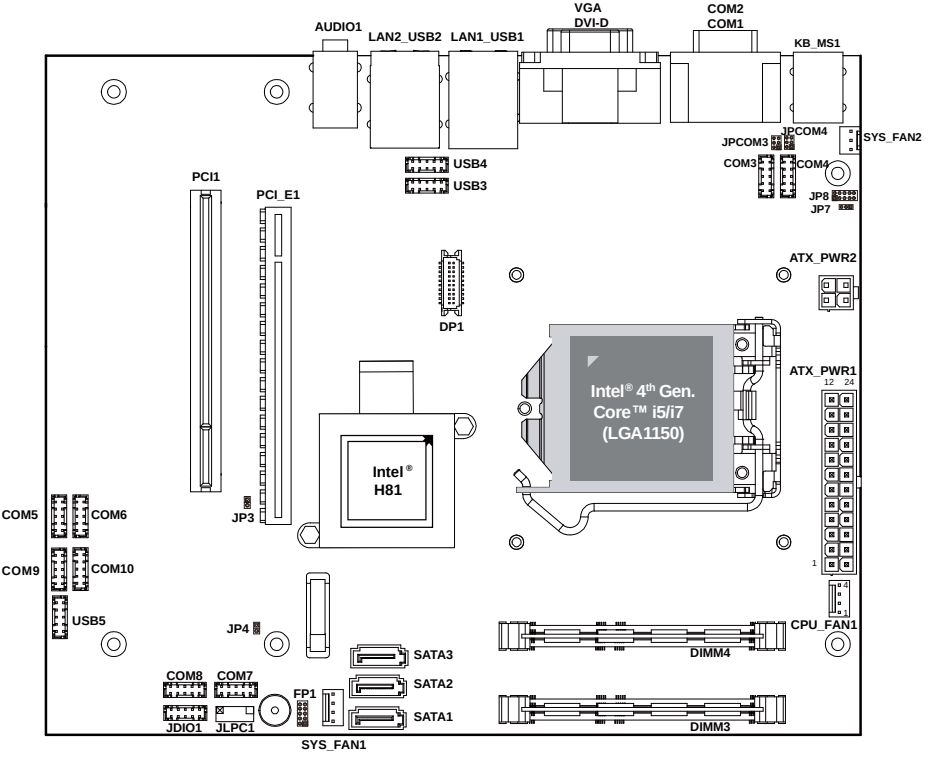
2-2. COMPONENT LOCATIONS

Mainboard for Intel Chip Q87



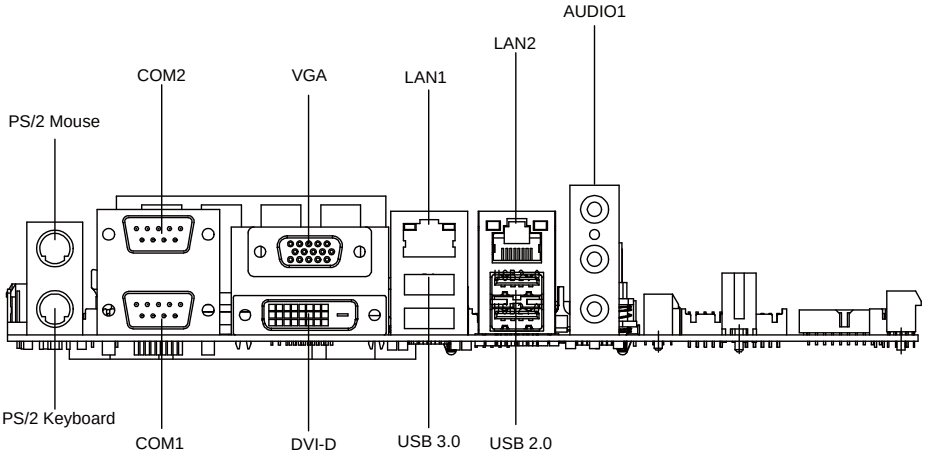
BK-0940 Front Connector, Jumper and Component Locations (for Intel Chip Q87)

Mainboard for Intel Chip H81

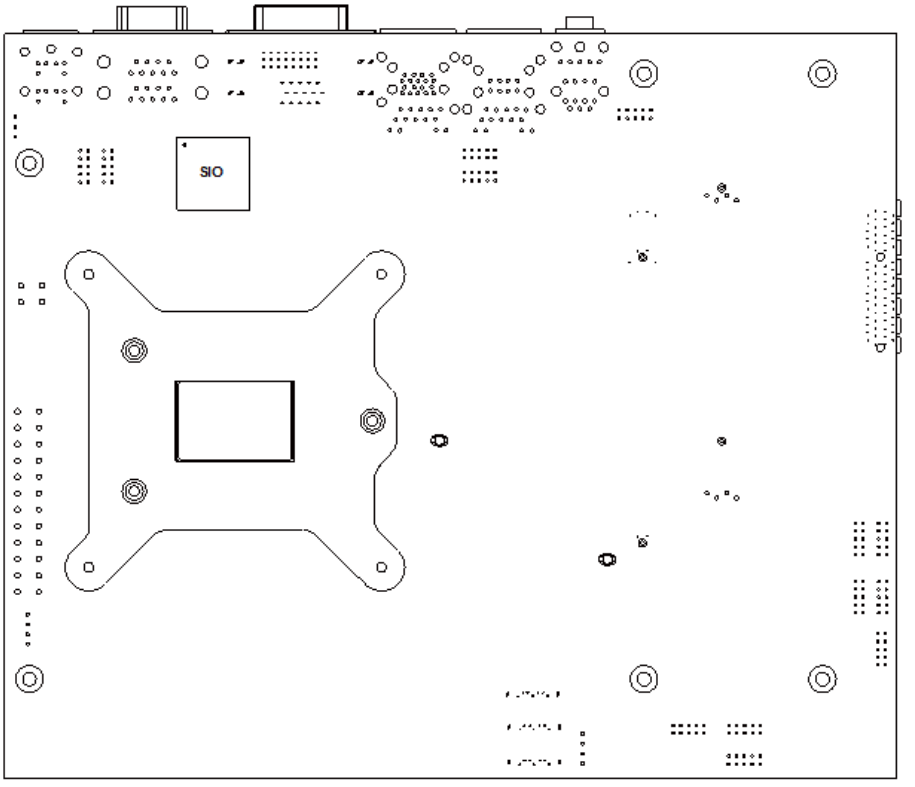


BK-0940 Front Connector, Jumper and Component Locations (for Intel Chip H81)

BK-0940 I/O View



BK-0940 Rear Component Locations



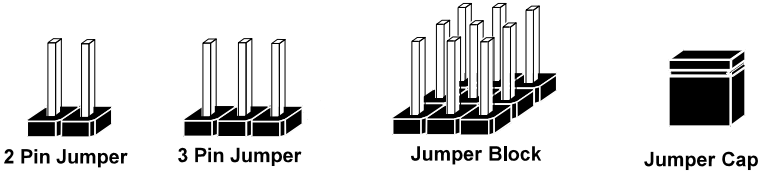
BK-0940 Rear Component Locations

2-3. HOW TO SET JUMPERS

You can configure your board by setting the jumpers. A jumper consists of two or three metal pins with a plastic base mounted on the card. By using a small plastic "cap", also known as the jumper cap (with a metal contact inside), you are able to connect the pins. So you can configure your hardware settings by "opening" or "closing" jumpers.

Jumpers can be combined into sets that are called jumper blocks. When jumpers are all in the block, you have to put them together to set up the hardware configuration. The figure below shows what this looks like.

JUMPERS AND CAPS

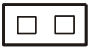


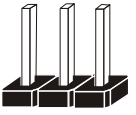
If a jumper has three pins, for example, labelled 1, 2 and 3. You can connect pins 1 and 2 to create one setting and shorting. You can also select to connect pins 2 and 3 to create another setting. The format of the jumper picture will be illustrated throughout this manual. The figure below shows different types of jumpers and jumper settings.

Jumper Diagrams

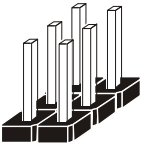
Jumper Cap looks like this

2 pin Jumper looks like this

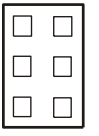




3 pin Jumper looks like this

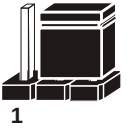


Jumper Block looks like this

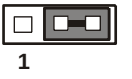


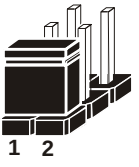
Jumper Settings

2 pin Jumper close(enabled) Looks like this

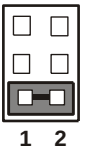


3 pin Jumper 2-3 pin close(enabled) Looks like this





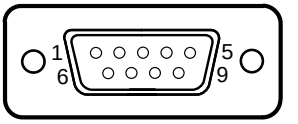
Jumper Block 1-2 pin close(enabled) Looks like this



2-4. COM PORT

COM1: COM Port, fixed as RS-232

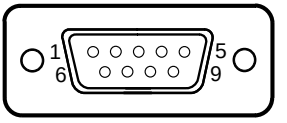
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	-	-



COM1

COM2: COM2 Connector, selectable as RS-232/422/485
Co-lay with the other COM port stacked over COM1.

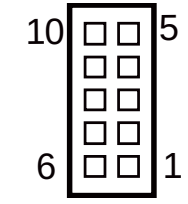
PIN	ASSIGNMENT		
	RS-232	**RS-422**	**RS-485**
1	DCD#	TX-	RS-485-
2	RX	TX+	RS-485+
3	TX	RX+	NC
4	DTR#	RX-	NC
5	GND	GND	GND
6	DSR#	NC	NC
7	RTS#	NC	NC
8	CTS#	NC	NC
9	RI#	NC	NC



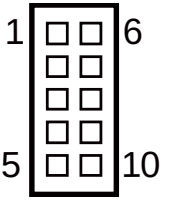
COM2

2-5. COM CONNECTOR

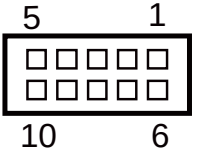
COM3~10 : COM3~10 Connectors, fixed as RS-232.



COM3/4/9/10



COM5~6



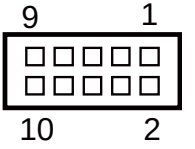
COM7~8

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	10	NC

2-6. DIO Connector

JDIO1: General Purpose Input / Output Connector
The pin assignment is as follows:

PIN	ASSIGNMENT
1	IN1
2	OUT1
3	IN2
4	OUT2
5	IN3
6	OUT3
7	IN4
8	5V
9	GND
10	OUT4



JDIO1

2-7. KEYBOARD & MOUSE PORT

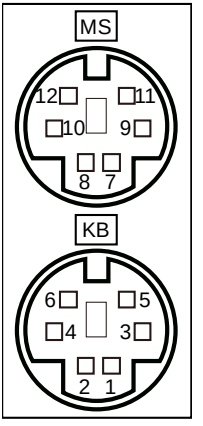
KB_MS1: PS/2 Keyboard & Mouse Port

Mouse:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
7	MSDATA	10	VCC5
8	NC	11	MSCLK
9	GND	12	NC

Keyboard:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	KBDATA	4	VCC5
2	NC	5	KBCLK
3	GND	6	NC

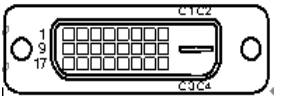


KB_MS1

2-8. DVI PORT

DVI-D: Supports DVI-D.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DP_Data2-	15	Ground
2	DP_Data2+	16	HOT Plug Detect
3	Ground	17	DP_Data0-
4	NC	18	DP_Data0+
5	NC	19	Ground
6	DP_Ctrl_Clock	20	NC
7	DP_Ctrl_Data	21	NC
8	CRT_VSYNC	22	Ground
9	DP_Data1-	23	DP_Clock+
10	DP_Data1+	24	DP_Clock-
11	Ground	C1	CRT_RED
12	NC	C2	CRT_GREEN
13	NC	C3	CRT_BLUE
14	+5V Power	C4	CRT_HSYNC

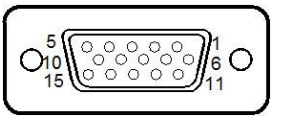


DVI-D

2-9. VGA PORT

VGA: VGA connector.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	DDCA DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDCA CLK
8	GND	-	-



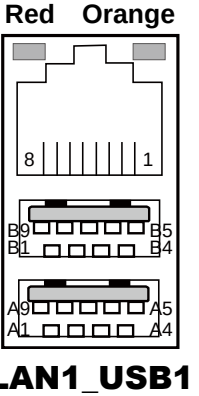
VGA

2-10. LAN & USB PORT

LAN1_USB1: LAN & Two USB 3.0 Ports

LAN1 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	MDI_0P	5	MDI_2P
2	MDI_0N	6	MDI_2N
3	MDI_1P	7	MDI_3P
4	MDI_1N	8	MDI_3N



LAN1_USB1

LAN LED Indicator:

Left Side LED

Red Color On	Giga LAN Speed Indicator
Off	No LAN switch/hub connected.

Right Side LED

Orange Color Blinking	LAN Message Active
Off	No LAN Message Active

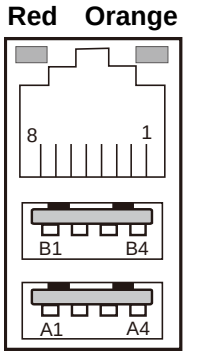
USB 3.0 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC5	B1	VCC5
A2	USBP0N	B2	USBP1N
A3	USBP0P	B3	USBP1P
A4	GND	B4	GND
A5	RX1_DN	B5	RX2_DN
A6	RX1_DP	B6	RX2_DP
A7	GND	B7	GND
A8	TX1_DN	B8	TX2_DN
A9	TX1_DP	B9	TX2_DP

LAN2_USB2: LAN & Two USB 2.0 Ports

LAN2 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	MDI0_DP	5	MDI2_DP
2	MDI0_DN	6	MDI2_DN
3	MDI1_DP	7	MDI3_DP
4	MDI1_DN	8	MDI3_DN



LAN2_USB2

LAN LED Indicator:

Left Side LED

Red Color On	Giga LAN Speed Indicator
Off	No LAN switch/hub connected.

Right Side LED

Orange Color Blinking	LAN Message Active
Off	No LAN Message Active

USB 2.0 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC5	B1	VCC5
A2	USBP2N	B2	USBP3N
A3	USBP2P	B3	USBP3P
A4	GND	B4	GND

2-11. AUDIO JACK

AUDIO1: Line-In, Line-Out & Microphone
The connector can also support only Microphone.

Line-In:

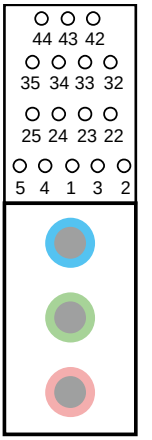
PIN	ASSIGNMENT
32	HD_LINE-IN-L
33	GND
34	GND
35	HD_LINE-IN-R

Line-Out:

PIN	ASSIGNMENT
22	LINE-OUT-L
23	GND
24	GND
25	LINE-OUT-R

Mic-In:

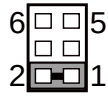
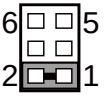
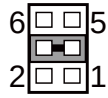
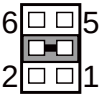
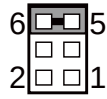
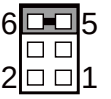
PIN	ASSIGNMENT
1	GND
2	HD_MIC1-L_L
3	GND
4	GND
5	HD_MIC1-R_L



AUDIO1

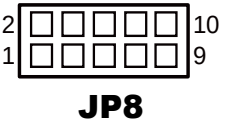
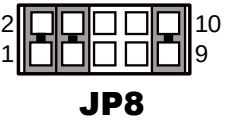
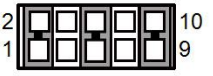
2-12. COM PORT RI & VOLTAGE SELECTION

JPCOM3 & JPCOM4: COM3 & COM4 Ports RI & Voltage Selection

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
RI (default)	1-2	 **JPCOM3**	 **JPCOM4**
12V	3-4	 **JPCOM3**	 **JPCOM4**
5V	5-6	 **JPCOM3**	 **JPCOM4**

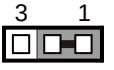
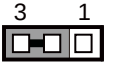
2-13. COM2 RS-232/422/485 SELECTION

JP8: RS-232/422/485 (COM2) Selection Connector, used to set COM2 function.

SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
RS-232 (Default)	All Open	 **JP8**
RS-422	1-2, 3-4, 9-10	 **JP8**
RS-485	1-2, 5-6, 9-10	 **JP8**

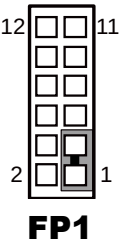
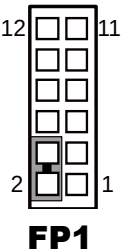
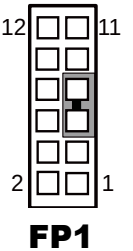
2-14. COM2 RS-485 SELECTION

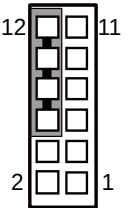
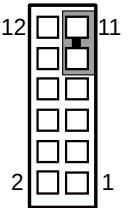
JP7: RS-485 Selection

SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
Normal RS485 (Default)	1-2	 **JP7**
Auto RS485	2-3	 **JP7**

2-15. FRONT PANEL CONNECTOR & SELECTION

FP1: Front Panel Connector

SELECTION	PIN & ASSIGNMENT	JUMPER SETTINGS	JUMPER ILLUSTRATION
HDD LED	1. HDD_LED+	1-3	
	3. HDD_LED-		
Power LED	2. PWR_LED+	2-4	
	4. PWR_LED-		
Reset Button	5. GND	5-7	
	7. RST_BTN		

SELECTION	PIN & ASSIGNMENT	JUMPER SETTINGS	JUMPER ILLUSTRATION
External Speaker	6. SPK_VCC	6-8-10-12	 **FP1**
	8. Speaker signal		
	10. Speaker signal		
	12. Speaker signal		
ATX Power Button	9. GND	9-11	 **FP1**
	11. PWRBTNSW		

2-16. INTEL® ME SELECTION

JP3: Intel® ME Selection

SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
Normal (Default)	Open	 **JP3**
ME Disabled	Close	 **JP3**

2-17. CLEAR CMOS DATA SELECTION

JP4: Clear CMOS Data Selection

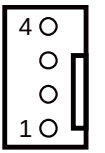
SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
Normal (Default)	Open	 **JP4**
Clear CMOS*	Close	 **JP4**

*To clear CMOS data, users must power off the computer and set the jumper to "Clear CMOS" as shown above. After five to six seconds, set the jumper back to the "Normal" state and power on the computer.

2-18. FAN CONNECTOR

CPU_FAN1: CPU Fan Connector
SYS_FAN1: System Fan Connector

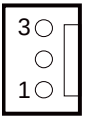
PIN	ASSIGNMENT
1	GND
2	VCC12
3	TAC
4	CTL



CPU_FAN1/ SYS_FAN1

SYS_FAN2: System Fan Connector

PIN	ASSIGNMENT
1	GND
2	VCC12
3	NC

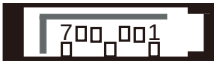


SYS_FAN2

2-19. SATA CONNECTOR

SATA1, SATA2, SATA3: Serial ATA Connectors

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	5	RXNC
2	TXPC	6	RXPC
3	TXNC	7	GND
4	GND	-	-

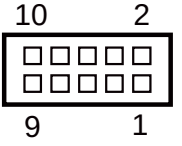


SATA1/
SATA2/
SATA3

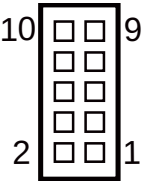
2-20. USB CONNECTOR

USB3, USB4, USB5: USB 2.0 Connectors

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	6	USBP
2	VCC5	7	GND
3	USBN	8	GND
4	USBN	9	NC
5	USBP	10	GND



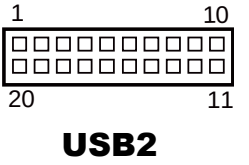
USB3/
USB4



USB5

USB2 : USB 3.0 CONNECTOR
(only available on Intel Chip Q87)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	11	USB1+
2	USB3_RX1_N	12	USB1-
3	USB3_RX1_P	13	GND
4	GND	14	USB3_TX2_P
5	USB3_TX1_N	15	USB3_TX2_N
6	USB3_TX1_P	16	GND
7	GND	17	USB3_RX2_P
8	USB0-	18	USB3_RX2_N
9	USB0+	19	VCC5
10	GND	20	NC

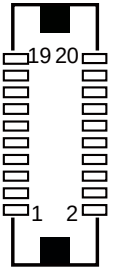


USB2

2-21. DISPLAY PORT CONNECTOR

DP1: Display Port Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DATA0+	11	GND
2	GND	12	DATA3-
3	DATA0-	13	AUX_ENJ
4	DATA1+	14	GND
5	GND	15	AUX+
6	DATA1-	16	HPD
7	DATA2+	17	AUX-
8	GND	18	VCC3_3
9	DATA2-	19	VCC5
10	DATA3+	20	VCC3_3

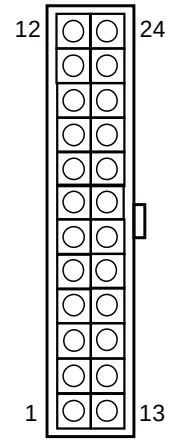


DP1

2-22. ATX POWER CONNECTOR

ATX_PWR1: ATX Power Connector

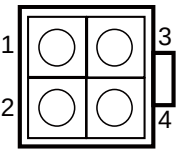
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PSON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	POK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND



ATX_PWR1

ATX_PWR2: ATX Power Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	3	+12V
2	GND	4	+12V



ATX_PWR2

SOFTWARE UTILITIES

CHAPTER

3

This chapter comprises the detailed information of VGA driver, LAN driver, and Sound driver.

The following topics are included:

- Introduction.
- Intel® Chipset Software Installation Utility
- Intel® USB3.0 eXtensible Host Controller Utility
- Intel® Management Engine Components Utility
- VGA Driver Utility
- LAN Driver Utility
- Sound Driver Utility

3-1. INTRODUCTION

Enclosed with our BK-0940 package are our driver utilities, which come in a CD-ROM disc. Refer to the following table for driver locations:

FILENAME (Assume that CD/ROM drive is D:)	PURPOSE	OS	
		DOS	Win7,Win8.1
D:\Driver\Flash BIOS	For Aptio(EFI) BIOS update utility	✓	X
D:\Driver\Platform\Win7, Win8.1\UTILITY	Intel® Chipset Device Software Installation Utility	X	✓
D:\Driver\Platform\ Win7,Win8.1\ME	For Intel Management Engine Interface	X	✓
D:\Driver\Platform\ Win7,Win8.1\VGA	Intel HD Graphics 4600 For VGA Driver installation	X	✓
D:\Driver\Platform\ Win7,Win8.1)\LAN	Intel I217LM & I210AT For LAN Driver installation	X	✓
D:\Driver\Platform\Win7, Win8.1\Audio	Realtek ALC888 For Sound driver installation	X	✓
D:\Driver\Platform\Win7, Win8.1\USB3 (Win7 only)	Intel® USB 3.0 eXtensible Host Controller	X	✓

Note: Be sure to install the Utility right after the OS is fully installed.

FILENAME (Assume that CD/ROM drive is D:)	PURPOSE	OS	
		DOS	WinXP
D:\Driver\Flash BIOS	For Aptio(EFI) BIOS update utility	✓	X
D:\Driver\Platform\WinXP\ UTILITY,USB3	Intel® Chipset Device Software Installation Utility Intel® USB 3.0 eXtensible Host Controller	X	✓
D:\Driver\Platform\WinXP\ ME	For Intel Management Engine Interface	X	✓
D:\Driver\Platform\WinXP\ VGA	Intel HD Graphics 4600 For VGA Driver installation	X	✓
D:\Driver\Platform\WinXP\ LAN	Intel I217LM & I210AT For LAN Driver installation	X	✓
D:\Driver\Platform\WinXP\ Audio	Realtek ALC888 For Sound driver installation	X	✓

Note: Be sure to install the Utility right after the OS fully installed.

3-2. INTEL® CHIPSET SOFTWARE INSTALLATION UTILITY

3-2-1. Introduction

The Intel® Chipset Device Software installs Windows INF files to the target system. These files outline to the operating system how to configure the Intel® chipset components in order to ensure that the following features function properly:

- Core PCI and ISAPNP Services
- PCIe Support
- IDE/ATA33/ATA66/ATA100 Storage Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

3-2-2. Installing Utility for Windows XP/7/8.1

The Utility Pack is to be installed only for Windows XP/7/8.1 series, and it should be installed right after the OS installation is completed. Please follow the steps below:

1. Insert the driver disk into a CD-ROM device.
2. Under the Windows system, go to the directory where the Utility driver is located.
3. Run the application with the administrator privilege.

3-3. INTEL® USB3.0 EXTENSIBLE HOST CONTROLLER UTILITY

3-3-1. Introduction

Intel® USB 3.0 eXtensible Host Controller Driver supports the following Intel® Chipsets/Processors:

- 4th Generation Intel® Core™ Processor Family
- Intel® 8 Series/C220 Series Chipset Family
- 4th Generation U-Series Platform I/O

3-3-2. Installation Instructions for Windows XP/7

To install the utility, simply follow the following steps:

1. Insert the driver disk into a CD-ROM device.
2. Under the Windows system, go to the directory where the driver is located.
3. Run the application with the administrator privilege.

3-4. INTEL® MANAGEMENT ENGINE COMPONENTS UTILITY

3-4-1. Introduction

The Intel® ME software components that need to be installed depend on the system's specific hardware and firmware features. The installer, compatible with Windows XP/7/8.1 series, detects the system's capabilities and installs the relevant drivers and applications.

3-4-2. Installation Instructions for Windows XP/7/8.1

To install the utility, simply follow the following steps:

1. Insert the driver disk into a CD-ROM device.
2. Under the Windows system, go to the directory where the driver is located.
3. Run the application with the administrator privilege.

3-5. VGA DRIVER UTILITY

3-5-1. Introduction

The VGA interface embedded with our BK-0940 can support a wide range of display. You can display DVI simultaneously with the same mode.

3-5-2. Installing VGA Driver

To install the VGA Driver, simply follow the steps below:

1. Insert the driver disk into a CD-ROM device.
2. Under the Windows system, go to the directory where the VGA driver is located.
3. Run the application with the administrator privilege.

3-6. LAN DRIVER UTILITY

3-6-1. Introduction

BK-0940 is enhanced with LAN function that can support various network adapters. Installation programs for LAN drivers are listed as follows:

For more details on Installation procedure, please refer to Readme.txt file found on LAN Driver Utility.

3-7. SOUND DRIVER UTILITY

3-7-1. Introduction

The Realtek sound function enhanced in this system is fully compatible with Windows XP/7/8.1. Below, you will find the content of the Sound driver:

3-7-2. Installing Sound Driver

1. Insert the driver disk into a CD-ROM device.
2. Under the Windows system, go to the directory where the Sound driver is located.
3. Run the application with administrator privilege.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart the system for the changes to take effect.

CHAPTER

4

BIOS SETUP

This chapter shows how to set up the BIOS.

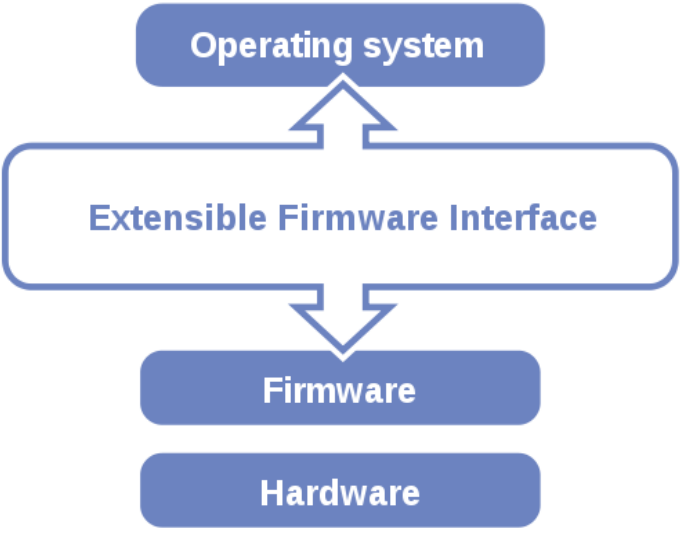
The following topics are included:

- Introduction
- Accessing Setup Utility
- Main
- Advanced
- Chipset
- Boot
- Security
- Save & Exit

4-1. INTRODUCTION

The board BK-0940 (with Intel® H81/Q87) uses an AMI Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the BIOS Setup program, Power-on Self-Test (POST), the PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

Aptio is AMI's BIOS firmware based on the UEFI (Unified Extensible Firmware Interface) Specifications and the Intel Platform Innovation Framework for EFI. The UEFI specification defines an interface between an operating system and platform firmware. The interface consists of data tables that contain platform-related information, boot service calls, and runtime service calls that are available to the operating system and its loader. These elements have combined to provide standard environment for booting an operating system and running pre-boot applications. Following illustration shows Extensible Firmware Interface's position in the software stack.



EFI BIOS provides an user interface allow users the ability to modify hardware configuration, e.g. change system date and time, enable or disable a system component, decide bootable device priorities, setup personal password, etc., which is convenient for modifications and customization of the computer system and allows technicians another method for finding solutions if hardware has any problems.

The BIOS Setup program can be used to view and change the BIOS settings for the computer. The BIOS Setup program is accessed by pressing the <Del> or <ESC> key after the POST memory test begins and before the operating system boot begins. The settings are shown below.

4-2. ACCESSING SETUP UTILITIES

When the system is powered on, the BIOS will enter the Power-On Self-Test (POST) routines and the following message will appear on the lower screen:

POST screen

As long as this message is present on the screen you may press the <Del> key (the one that shares the decimal point at the bottom of the number keypad) to access the Setup program. In a moment, the main menu of the Aptio Setup Utility will appear on the screen:

BIOS setup program initial screen

You may move the cursor by up/down keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear at the bottom of the screen.

4-3. Main

Menu Path *Main*

Use <↑> or <↓> arrow keys to highlight the item and key in the value you want in each item. This menu provides basic system configurations, such as system time and date.

Main Screen

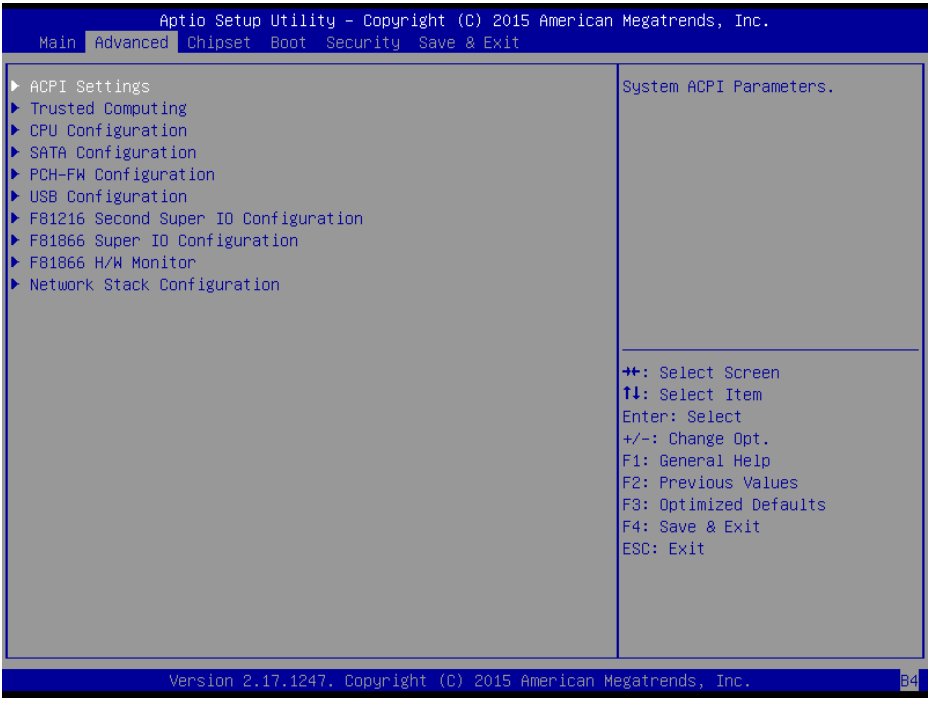
BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the BIOS vendor.
Core Version	No changeable options	Displays the current BIOS core version.
Compliancy	No changeable options	Displays the current UEFI version.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.

BIOS Setting	Options	Description/Purpose
Build Date and Time	No changeable options	Displays the date of the current BIOS version.
System Date	Month, day, year	Sets the system date. The format is [Day Month/ Date/ Year]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it. The "Day" is automatically changed.
System Time	Hour, minute, second	Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it.
Access Level	No changeable options	Displays the current user level.

4-4. Advanced

Menu Path *Advanced*

This menu provides advanced configurations such as ACPI Settings, Trusted Computing, CPU Configuration, SATA Configuration, PCH-FW Configuration, etc.



Advanced Screen

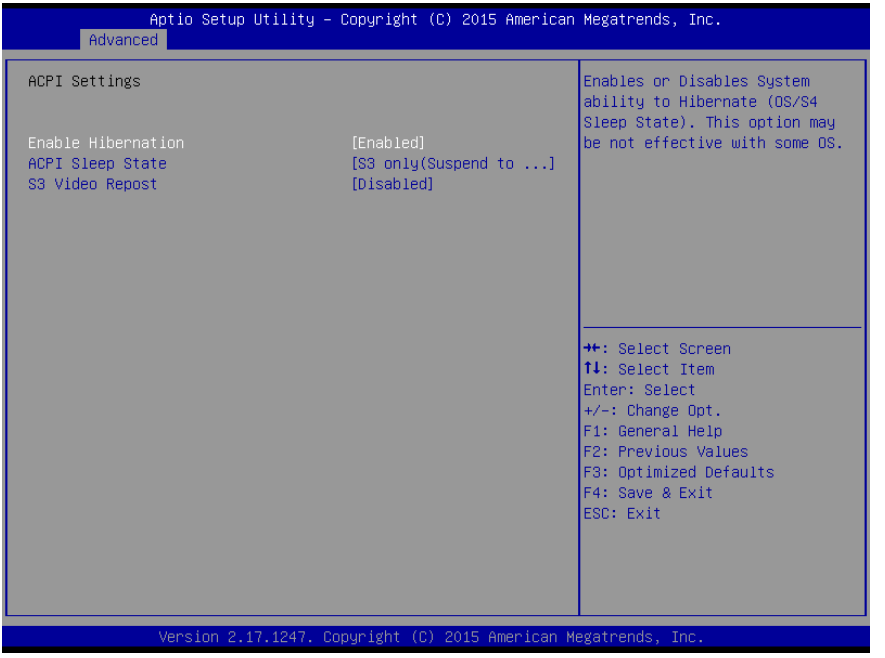
BIOS Setting	Options	Description/Purpose
ACPI Settings	Sub-Menu	System ACPI parameters.
Trusted Computing	Sub-Menu	Trusted Computing parameters.
CPU Configuration	Sub-Menu	CPU Configuration parameters.
SATA Configuration	Sub-Menu	SATA Configuration parameters.
PCH-FW Configuration	Sub-Menu	Configures Management Engine Technology parameters.
USB Configuration	Sub-Menu	USB Configuration parameters.

BIOS Setting	Options	Description/Purpose
F81216 Second Super IO Configuration	Sub-Menu	System Second Super IO Chip parameters.
F81866 Super IO Configuration	Sub-Menu	System Super IO Chip parameters.
F81866 H/W Monitor	Sub-Menu	Monitor the hardware status.
Network Stack Configuration	Sub-Menu	Network Stack Settings

4-4-1. ACPI Settings

Menu Path *Advanced > ACPI Settings*

This menu allows users to configure relevant ACPI (Advanced Configuration and Power Management Interface) settings, such as Enable/Disable the functions of Hibernation, ACPI Sleep State and S3 Video repost.

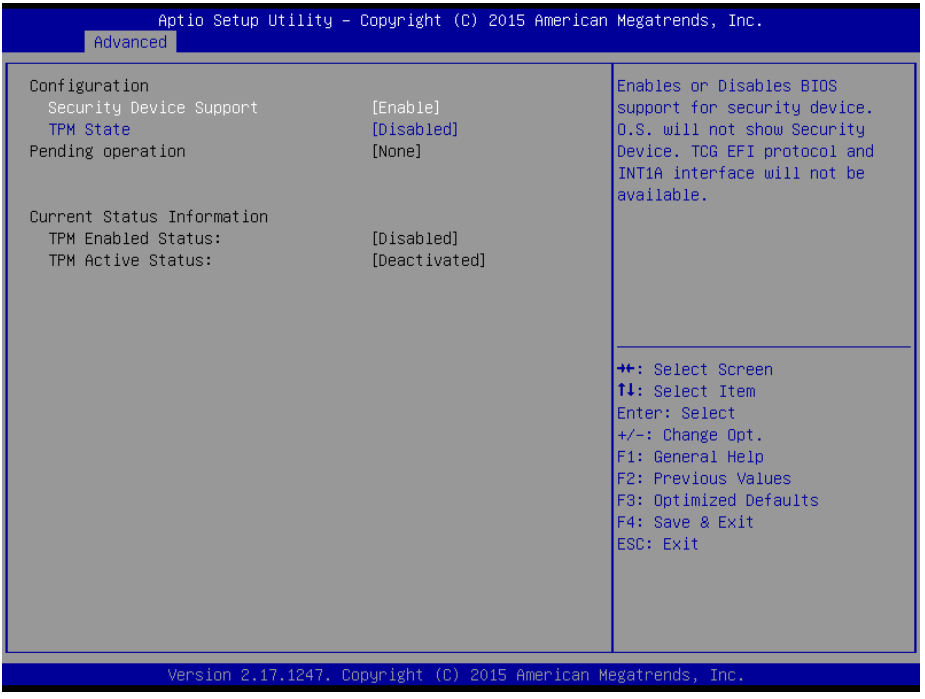


ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable Hibernation	- Disabled - Enabled	Enables or Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	- Suspend Disabled - S1 (CPU Stop Clock) - S3 (Suspend to RAM) - Both S1 and S3 available for OS to choose from	Specifies the ACPI sleep state. ▪ **Suspend Disabled** disables ACPI sleep feature. ▪ **S1** mode allows the CPU to enter the Stop Clock mode to stop executing instructions. ▪ **S3** allows the platform to enter the Suspend to RAM mode. ▪ **Both S1 and S3 available for OS to choose from** allows the OS to choose the sleep state type.
S3 Video Repost	- Disabled - Enabled	Enable or Disable S3 video Repost.

4-4-2. Trusted Computing

Menu Path *Advanced > Trusted Computing*



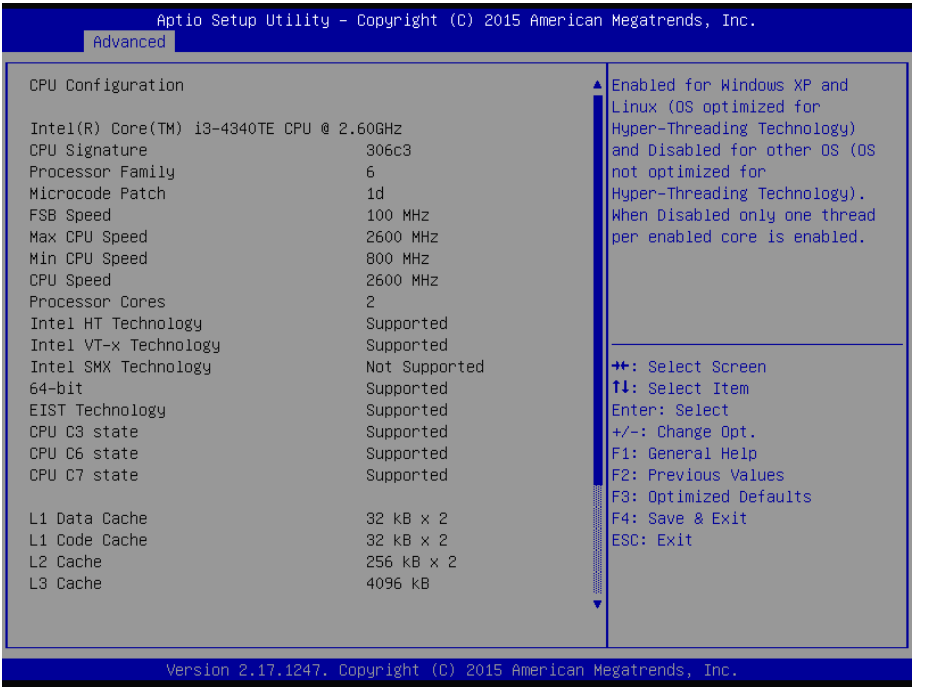
Trusted Computing Screen

BIOS Setting	Options	Description/Purpose
Security Device Support	- Disabled - Enabled	Enables or Disables BIOS support for security device.
TPM State	- Disabled - Enabled	Enables/Disable s Security Device. Note: Your computer will reboot during the restart process in order to change the device state.
Pending operation	- None - TPM Clear	Schedules an operation for the security device. Note: Your computer will reboot during the restart process in order to change the state of the

BIOS Setting	Options	Description/Purpose
		security device.
Current Status Information	No changeable options	Displays the current security device information

4-4-3. CPU Configuration

Menu Path *Advanced > CPU Configuration*

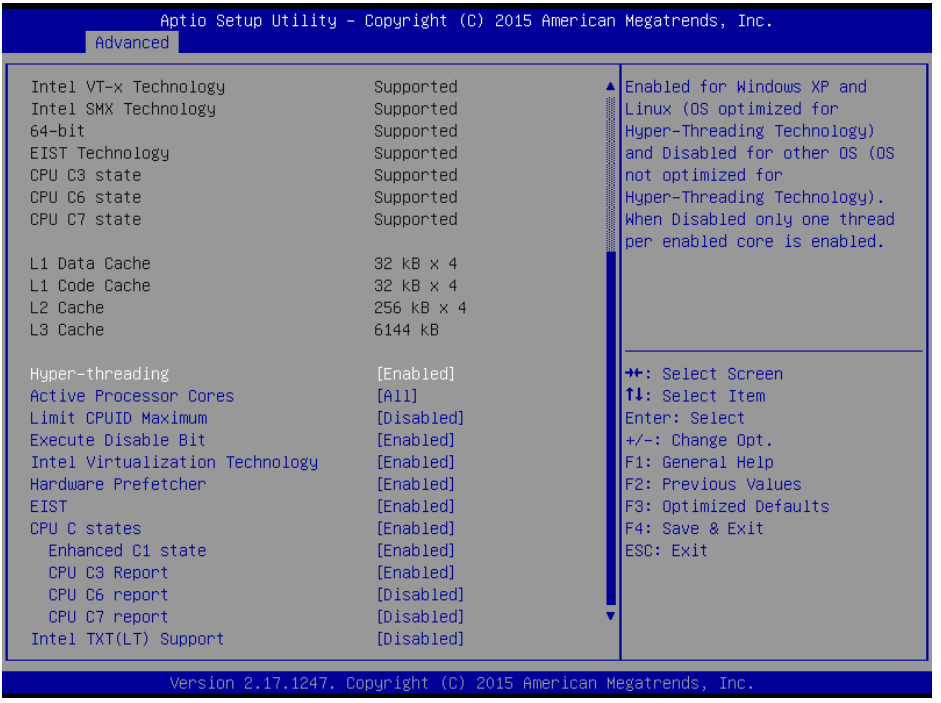


CPU Configuration Screen (1)

BIOS Setting	Options	Description/Purpose
CPU Signature	No changeable options	Reports the CPU signature.
Processor Family	No changeable options	Reports the CPU family.
Microcode Patch	No changeable options	Reports the CPU Microcode Patch Version.

BIOS Setting	Options	Description/Purpose
FSB Speed	No changeable options	Displays the FSB speed.
Max CPU Speed	No changeable options	Reports the maximum CPU speed.
Min CPU Speed	No changeable options	Reports the minimum CPU speed.
CPU Speed	No changeable options	Displays the CPU speed.
Processor Cores	No changeable options	Displays the number of the physical cores in the processor.
Intel HT Technology	No changeable options	Reports if Intel Hyper-Threading Technology is supported by the processor.
Intel VT-x Technology	No changeable options	Reports if Intel VT-x Technology is supported by the processor.
Intel SMX Technology	No changeable options	Reports if Intel SMX Technology is supported by the processor.
64-bit	No changeable options	Reports if the processor supports Intel x86-64 (amd64) implementation.
EIST	No changeable options	Reports if EIST is supported by the processor.
CPU C3/C6/C7 state	No changeable options	Reports if C3/C6/C7 is supported by the processor.
L1 Data Cache	No changeable options	Displays the size of L1 data cache.
L1 Code Cache	No changeable options	Displays the size of L1 code cache.
L2 Cache	No changeable options	Displays the size of L2 cache.
L3 Cache	No changeable options	Displays the size of L3 cache.

Intel Hyper Threading Technology is Intel's term for its simultaneous multithreading implementation in their CPUs. Enable this function will improve parallelization of computation performed on PC microprocessor. For each processor core that is physically present, the operating system addresses two virtual processors, and shares the workload between them when possible.



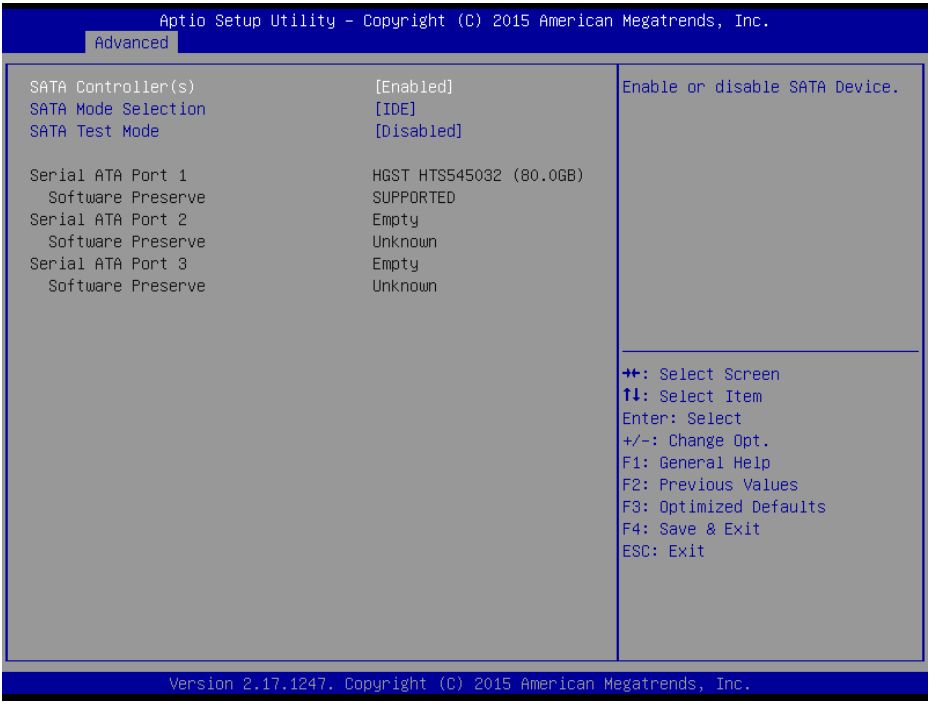
CPU Configuration Screen (2)

BIOS Setting	Options	Description/Purpose
Hyper-threading	- Disabled - Enabled	Enables for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.
Active Processor Cores	- All - 1 to (Processor Cores-1)	Indicates the number of cores to be enabled in the processor.
Limit CPUID Maximum	- Disabled - Enabled	Enables for legacy operating systems to boot processors with extended CPUID functions. When this option is enabled, the processor will limit the maximum CPUID input value to 03h when queried. When disabled, the processor will return the actual maximum CPUID input value of the processor when queried. Set

BIOS Setting	Options	Description/Purpose
		"Disabled" for WinXP.
Execute Disable Bit	- Disabled - Enabled	XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (such as Windows Server 2003 SP1, Windows XP Sp2, SuSE Linux 9.2, Redhat Enterprise 3 Update 3.)
Intel Virtualization Technology	- Disabled - Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vander pool Technology.
Hardware Prefetcher	- Disabled - Enabled	Enables the Mid-Level Cache (L2) streamer prefetcher.
EIST	- Disabled - Enabled	Enables or disables EIST.
CPU C states	- Disabled - Enabled	Enables or disables CPU C states.
Enhanced C1 state	- Disabled - Enabled	Enables or disables enhanced C1 state.
CPU C3 Report	- Disabled - Enabled	Enables or disables CPU C3 report to OS.
CPU C6 Report	- Disabled - Enabled	Enables or disables CPU C6 report to the OS.
CPU C7 Report	- Disabled - Enabled	Enables or disables CPU C7 report to the OS.
Intel TXT(LT) Support	- Disabled - Enabled	Enables or disables Intel® TXT (LT) support.

4-4-4. SATA Configuration

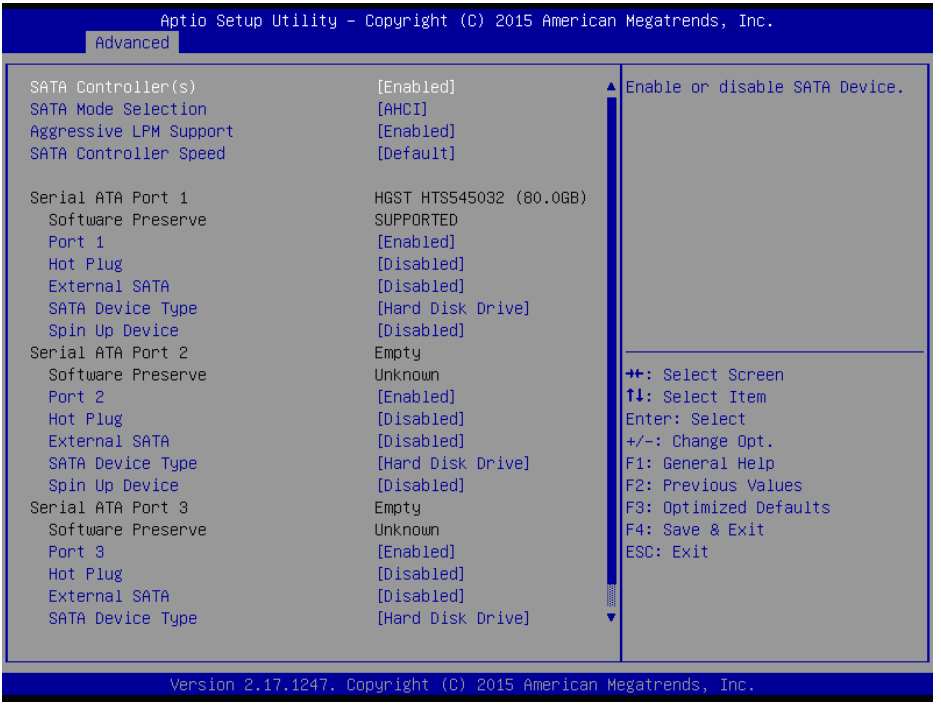
Menu Path *Advanced > SATA Configuration*



SATA Configuration Screen

BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables or disables the SATA device(s).
SATA Mode Selection	- IDE - AHCI - RAID	Configures SATA as IDE, AHCI or RAID (Q87 only) mode.
SATA 1/2/3	No changeable options	Displays the drive installed on the SATA port 1/2/3. Shows [Empty] if no drive is installed.

When you select SATA Mode as [AHCI] or [RAID], it shows more options as below.



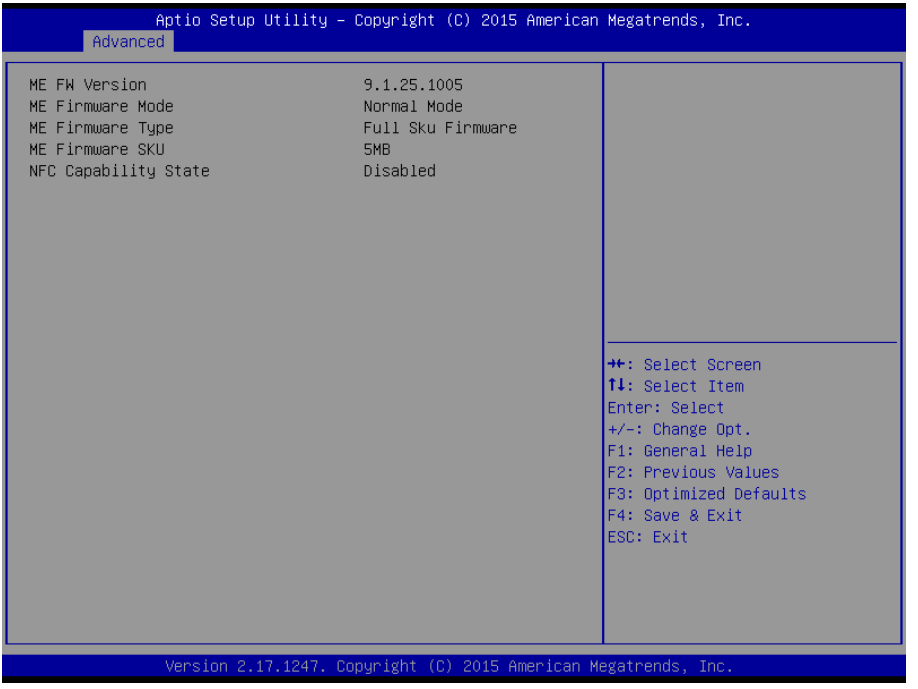
SATA Configuration – AHCI/RAID Mode Screen

BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables/disables SATA Controller(s).
Aggressive LPM Support	- Disabled - Enabled	Enables PCH to aggressively enter the link power state.
SATA Controller Speed	- Gen1 - Gen2 - Gen3	Indicates the maximum speed the SATA controller can support.
Port 1/2/3	- Disabled - Enabled	Enables or disables SATA port 1/2/3.
Hot Plug	- Disabled - Enabled	Designates this port as Hot Pluggable.
External SATA	- Disabled - Enabled	External SATA Support.

BIOS Setting	Options	Description/Purpose
SATA Device Type	- Hard Disk Driver - Solid State Drive	Identifies the SATA port that is connected to Solid State Drive or Hard Disk Drive.
Spin Up Device	- Disabled - Enabled	On an edge detect from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.

4-4-5. PCH-FW Configuration

Menu Path *Advanced > PCH-FW Configuration*



BIOS Setting	Options	Description/Purpose
ME FW Version	No changeable options	Displays ME FW Version.
ME Firmware Mode	No changeable options	Displays ME Firmware Mode.
ME Firmware Type	No changeable options	Displays ME Firmware Type.
ME Firmware SKU	No changeable options	Displays ME Firmware SKU.
NFC Capability State	No changeable options	Report NFC Capability State.

4-4-6. USB Configuration

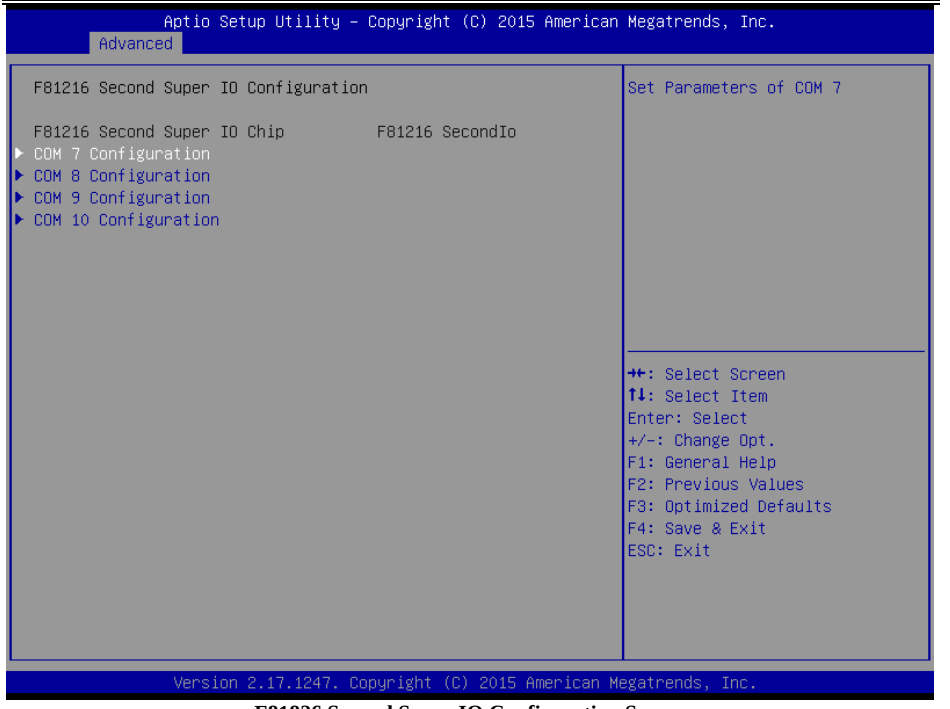
Menu Path *Advanced > USB Configuration*

USB Configuration Screen

BIOS Setting	Options	Description/Purpose
USB Devices	No changeable options	Displays the number of the available USB devices.
Legacy USB Support	- Enabled - Disabled - Auto	Sets to "Enabled" if you want to use USB device in the legacy operating system.
XHCI Hand-off	- Enabled - Disabled	This is a workaround for OSes without XHCI (Extensible Host Controller Interface) hand-off support.
EHCI Hand-off	- Disabled - Enabled	This is a workaround for OSes without EHCI (Enhanced Host Controller Interface) hand-off support.
USB transfer time-out	1/5/10/20 sec	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10/20/30/40 sec	Configures the time-out value of the Start Unit command for the USB mass storage device.
Device power-up delay	- Auto - Manual	The maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses the default value: for a Root port, it is 100 ms; for a Hub port, the delay is taken from Hub descriptor. If "Manual" is specified, the "Device power-up delay in second" option will display for users to configure the delay time range.
Device power-up delay in seconds	Multiple options ranging from 1 to 40	The delay time range is from 1 to 40 seconds in one second increment.
Mass Storage Devices	- Auto - Floppy - Force FDD - Hard Disk - CD-ROM	Displays the device name and chooses the mass storage emulation type.

4-4-7. F81216 Second Super IO Configuration

Menu Path *Advanced > F81216 Second Super IO Configuration*

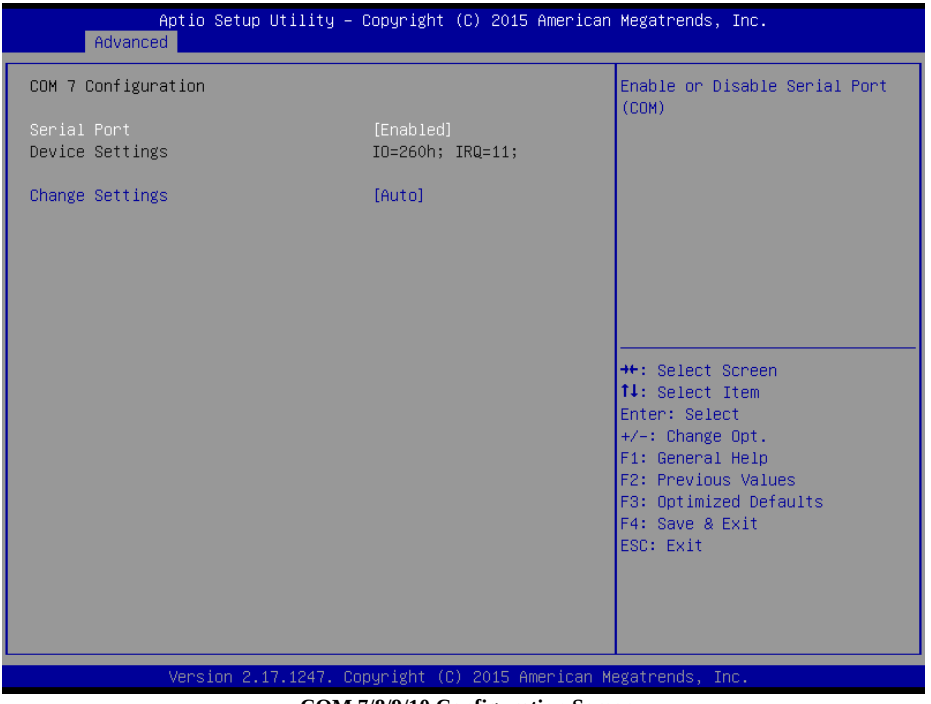


F81826 Second Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
F81216 Super IO Chip	No changeable options	Displays the super IO chip model.
COM 7/8/9/10 Configuration	Sub-menu	Sets the configuration parameters for COM 7/8/9/10.

4-4-7-1. COM 7/8/9/10 Configuration

Menu Path	*Advanced > F81216 Second Super IO Configuration > COM 7/8/9/10 Configuration*



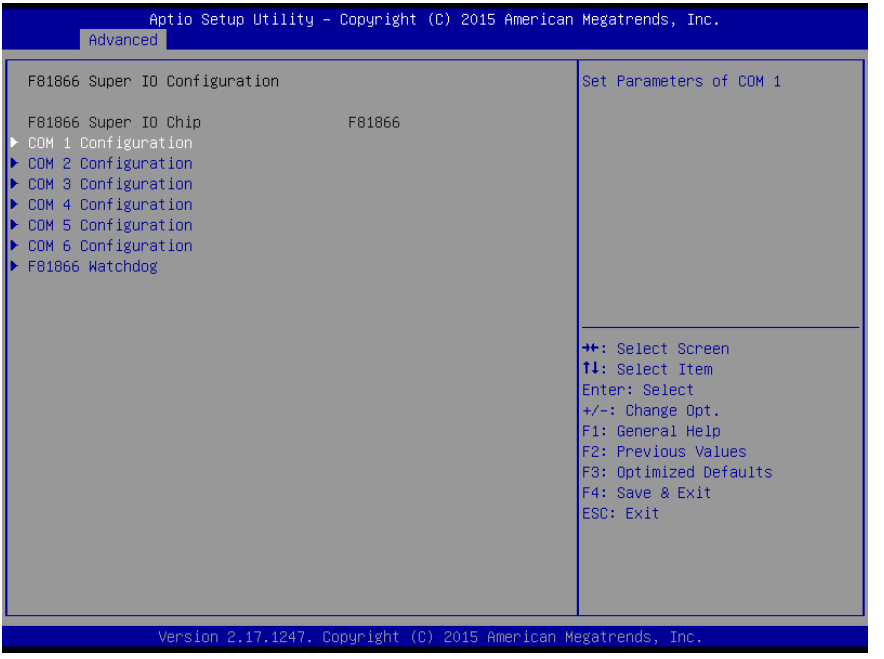
COM 7/8/9/10 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables/Disables COM 7/8/9/10 port.
Device Settings	No changeable options	Reports the current COM port setting.
Change Settings	- Auto - IO=260h; IRQ=11; (COM7) - IO=268h; IRQ=11; (COM8) - IO=270h; IRQ=11; (COM9) - IO=278h; IRQ=11; (COM10) - IO=260h; IRQ=10,11,12;	Specifies the base I/O address and interrupt request for the serial port if enabled.

BIOS Setting	Options	Description/Purpose
	- IO=268h; IRQ=10,11,12; - IO=270h; IRQ=10,11,12; - IO=278h; IRQ=10,11,12;	

4-4-8. F81866 Super IO Configuration

Menu Path *Advanced > F81866 Super IO Configuration*

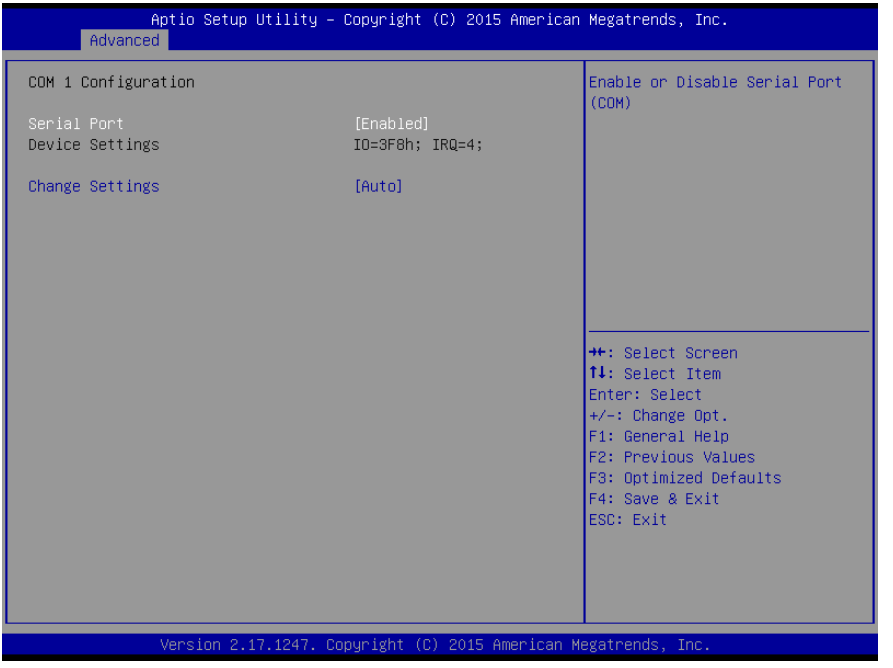


F81866 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
F81866 Super IO Chip	No changeable options	Displays the super IO chip model.
COM 1/2/3/4/5/6	Sub-menu	Sets the configuration parameters for COM 1/2/3/4/5/6 port.
F81866 Watchdog	Sub-menu	Sets the time-out for the watchdog timer.

4-4-8-1. COM 1/2/3/4/5/6 Configuration

Menu Path	*Advanced > F81866 Super IO Configuration > COM 1/2/3/4/5/6 Configuration*



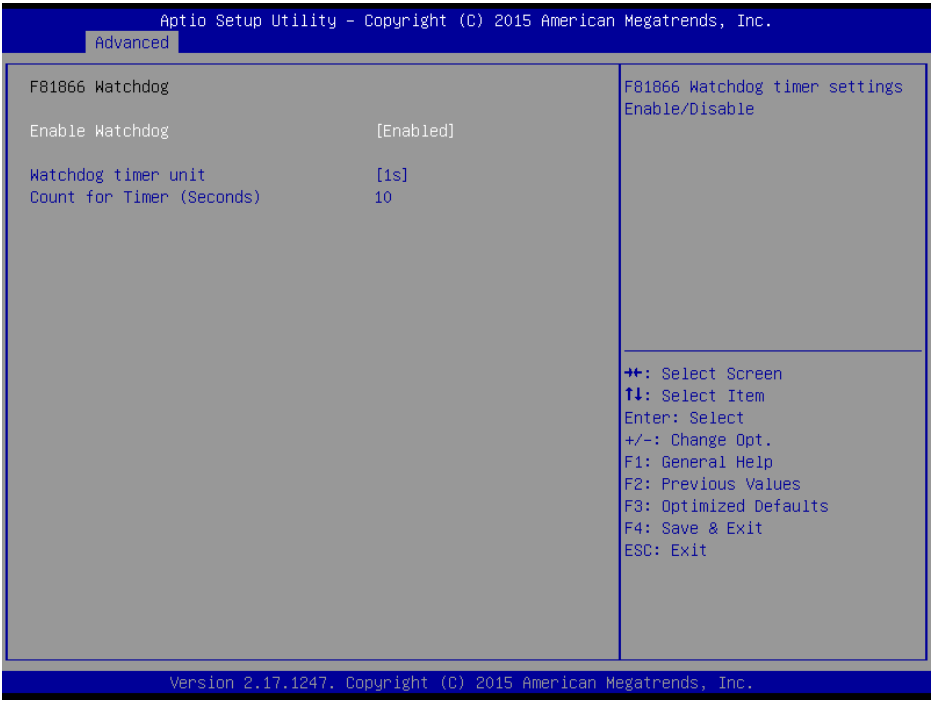
COM 1/2/3/4/5/6 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables/Disables COM 1/2/3/4/5/6.
Device Settings	No changeable options	Reports the current COM port setting.
Change Settings	- Auto - IO=3F8h; IRQ=4; (COM1) - IO=2F8h; IRQ=3; (COM2) - IO=3E8h; IRQ=7; (COM3) - IO=2E8h; IRQ=7; (COM4) - IO=2F0h; IRQ=10; (COM5)	Specifies the base I/O address and interrupt request for the serial port if enabled.

BIOS Setting	Options	Description/Purpose
	- IO=3F8h; IRQ=10; (COM6) - IO=3F8h; IRQ=3,4,5,6,7,10,11,12; - IO=2F8h; IRQ=3,4,5,6,7,10,11,12; - IO=3E8h; IRQ=3,4,5,6,7,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	

4-4-8-2. F81866 Watchdog

Menu Path *Advanced > F81866 Super IO Configuration > F81866 Watchdog*



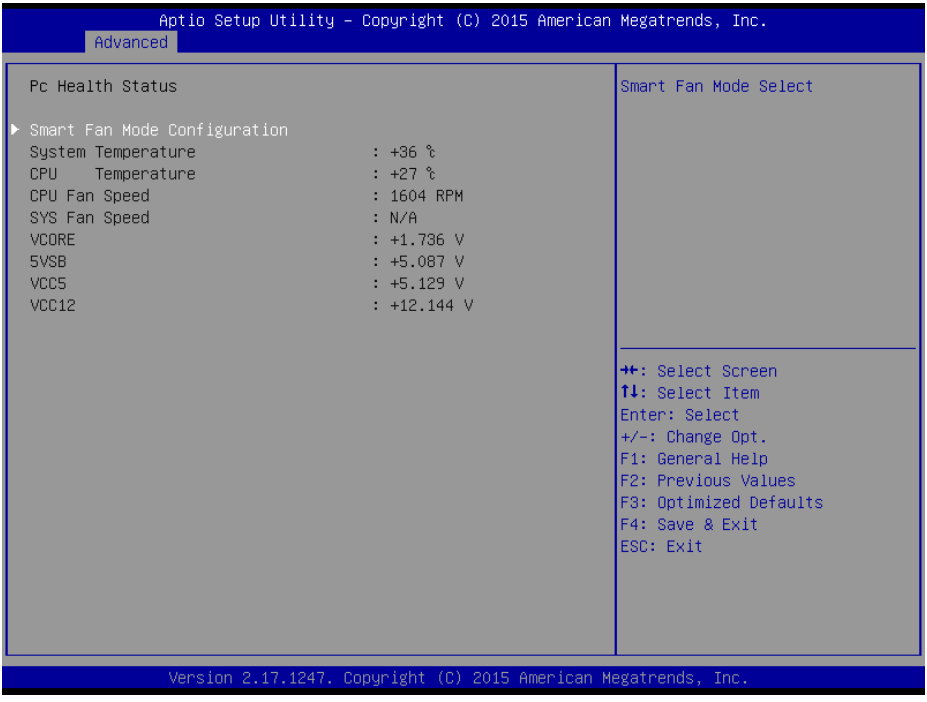
F81866 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable watchdog	- Disabled	Enables/Disables F81866 Watchdog timer.

BIOS Setting	Options	Description/Purpose
	- Enabled	
Watchdog timer unit	- 1s - 60s	Configures the time unit for the watchdog timer.
Count for Timer (Seconds)	Multiple options ranging from 1 to 255	The number of seconds for the timer (Range: 1-255 seconds).

4-4-9. F81866 Hardware Monitor

Menu Path *Advanced > F81866 H/W Monitor*

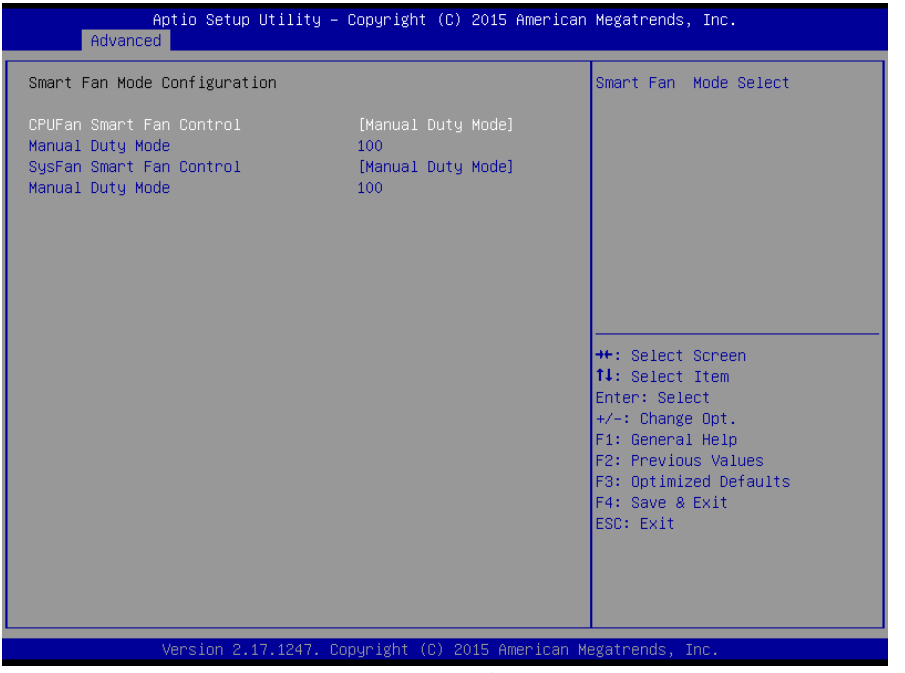


F81866 Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart Fan Mode Configuration	Sub-menu	Selects a smart fan mode.
System Temperature	No changeable options	Displays the temperature in the remote thermal sensor zone.
CPU Temperature	No changeable options	Displays the processor's temperature.
CPU Fan Speed	No changeable options	Displays the speed of the CPU fan.
SYS Fan Speed	No changeable options	Displays the speed of the system fan.
VCORE	No changeable options	Displays the voltage level of the +Vcore in supply.
5VSB	No changeable options	Displays the voltage level of the +5V in supply.
VCC5	No changeable options	Displays the voltage level of the +5V in supply.
VCC12	No changeable options	Displays the voltage level of the +12V in supply.

4-4-9-1. Smart Fan Mode Configuration

Menu Path	*Advanced > F81866 H/W Monitor > Smart Fan Mode Configuration*

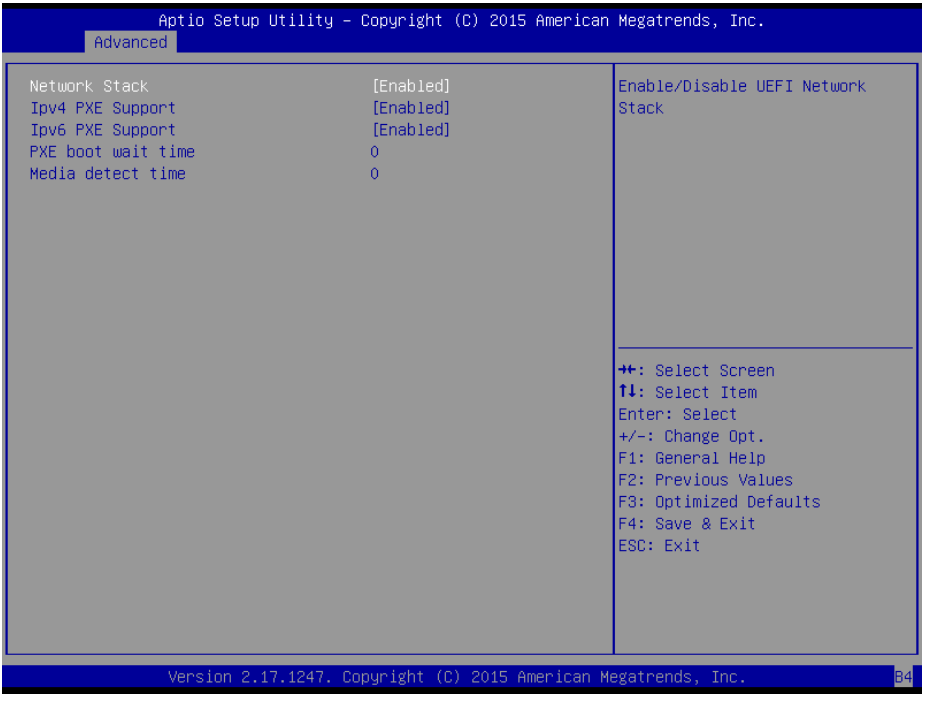


Smart Fan Mode Configuration Screen

BIOS Setting	Options	Description/Purpose
CPUFan Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode	Selects a smart fan mode for the CPU fan.
Manual Duty Mode	Multiple options ranging from 1 to 100	Manual mode fan control. Users can write the expected duty cycle (PWM fan type) from 1 to 100.
SysFan Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode	Selects a smart fan mode for system fan
Manual Duty Mode	Multiple options ranging from 1 to 100	Manual mode fan control. Users can write the expected duty cycle (PWM fan type) from 1 to 100

4-4-10. Network Stack Configuration

Menu Path *Advanced > Network Stack Configuration*



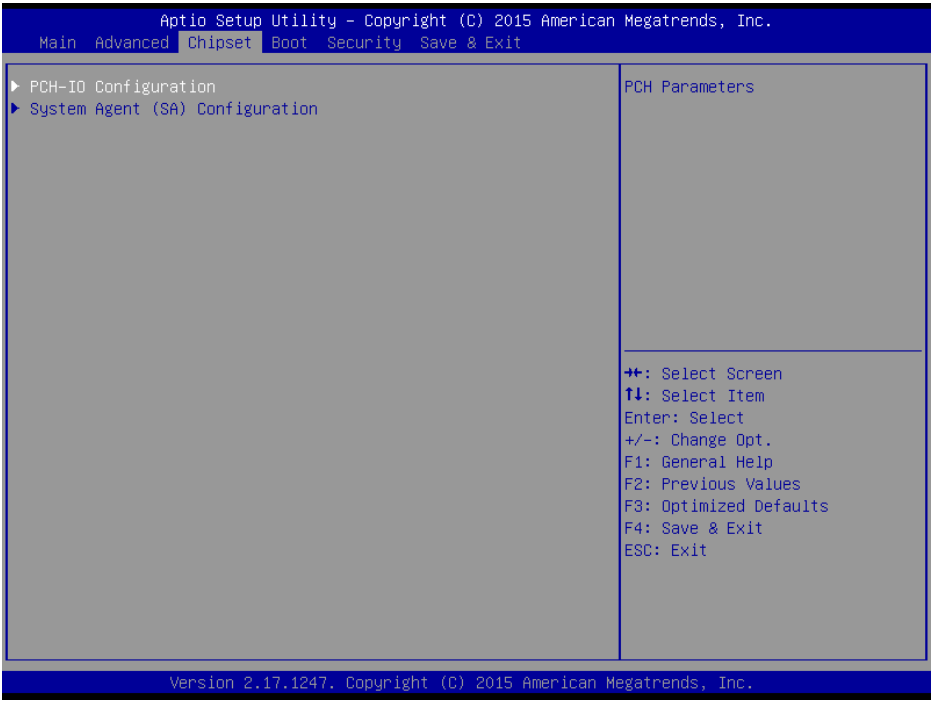
Network Stack Screen

BIOS Setting	Options	Description/Purpose
Network Stack	- Disabled - Enabled	Enables/Disables UEFI Network stack.
Ipv4 PXE Support	- Disabled - Enabled	Enables Ipv4 PXE boot support. If disabled, IPV4 PXE boot option will not be created.
Ipv6 PXE Support	- Disabled - Enabled	Enables Ipv6 PXE boot support. If disabled, IPV6 PXE boot option will not be created.
PXE boot wait time	Numeric	Wait time to press ESC key to abort the PXE boot.

BIOS Setting	Options	Description/Purpose
Media detect time	Numeric	Wait time in seconds to detect the media.

4-5. CHIPSET

Menu Path *Chipset*



Chipset Screen

BIOS Setting	Options	Description/Purpose
PCH-IO Configuration	Sub-menu	Sets the configuration parameters for Lynx Point (South Bridge) configuration.
System Agent (SA) Configuration	Sub-menu	Sets the configuration parameters for Haswell (North Bridge) configuration.

4-5-1. PCH-IO Configuration

Menu Path *Chipset > PCH-IO Configuration*

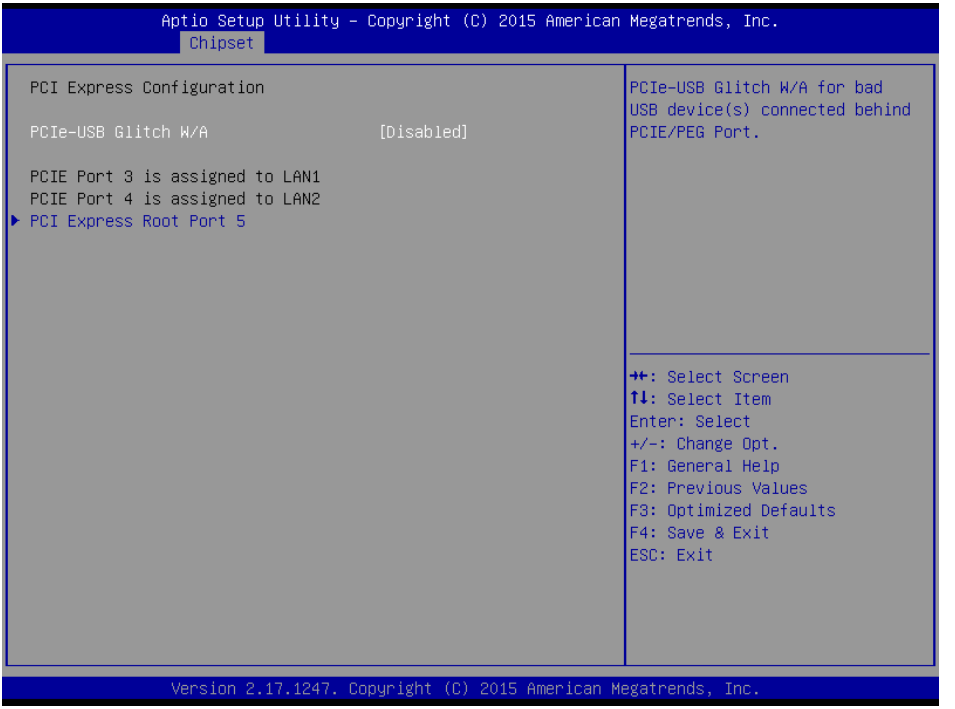
PCH-IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Intel PCH RC Version	No changeable options	Displays the PCH source code module version.
Intel PCH SKU Name	No changeable options	Displays PCH product SKU name.
Intel PCH Rev ID	No changeable options	Displays onboard PCH chip revision.
PCI Express Configuration	Sub-menu	Configures PCI Express settings.
USB Configuration	Sub-menu	Configures USB settings.

BIOS Setting	Options	Description/Purpose
PCH Azalia Configuration	Sub-menu	Configures PCH Azalia settings.
LAN1 Controller	- Disabled - Enabled	Enables or disables onboard NIC.
Wake on LAN	- Disabled - Enabled	Enables or disables integrated LAN to wake up the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)
Restore AC Power Loss	- Power off - Power on - Last State	Selects AC power state when the power is re-applied following a power failure. • **Power off** keeps the system powered off till the Power button is pressed. • **Power on** keeps the system powered on after the system restores AC power to the board. • **Last State** brings the system back to the last power state when the AC power is removed.

4-5-1-1. PCI Express Configuration

Menu Path	*Chipset > PCH-IO Configuration > PCI Express Configuration*



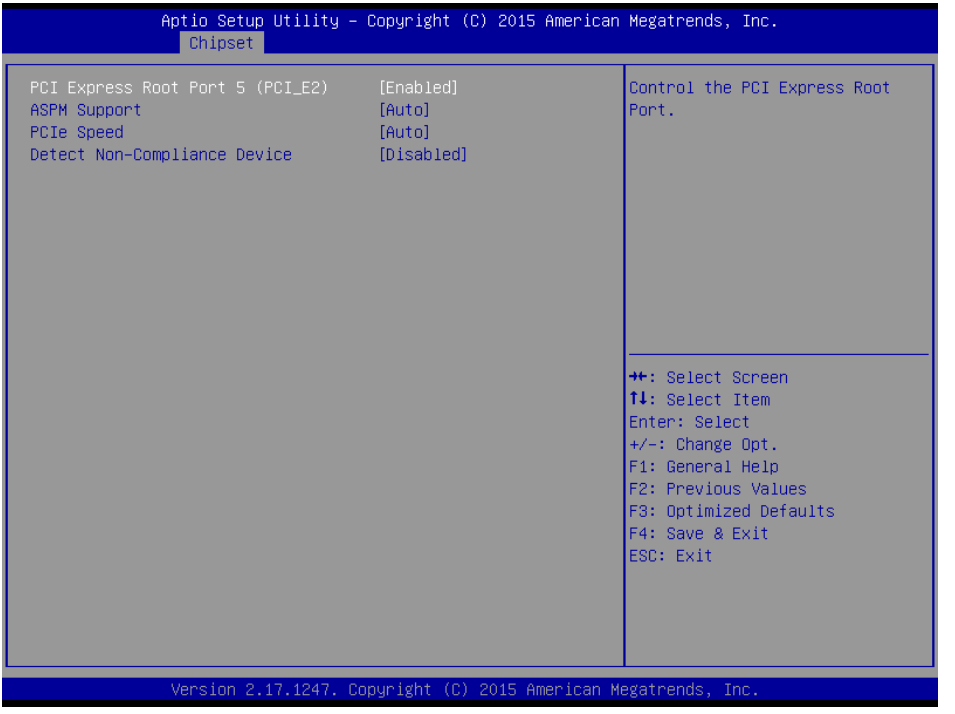
PCI Express Configuration Screen

BIOS Setting	Options	Description/Purpose
PCIe-USB Glitch W/A	- Disabled - Enabled	PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIE/PEG port.
PCIE Port 3 is assigned to LAN1	No changeable options	Displays LAN 1 that is located at PCIE port 3.
PCIE Port 4 is assigned to	No changeable options	Displays LAN 2 that is located at PCIE port 4.

BIOS Setting	Options	Description/Purpose
LAN2		
PCI Express Root Port 5	Sub-menu	Configures PCI Express Root Port 5 settings.

4-5-1-2. PCI Express Root Port 5 Configuration

Menu Path *Chipset > PCH-IO Configuration > PCI Express Root Port 5 Configuration*

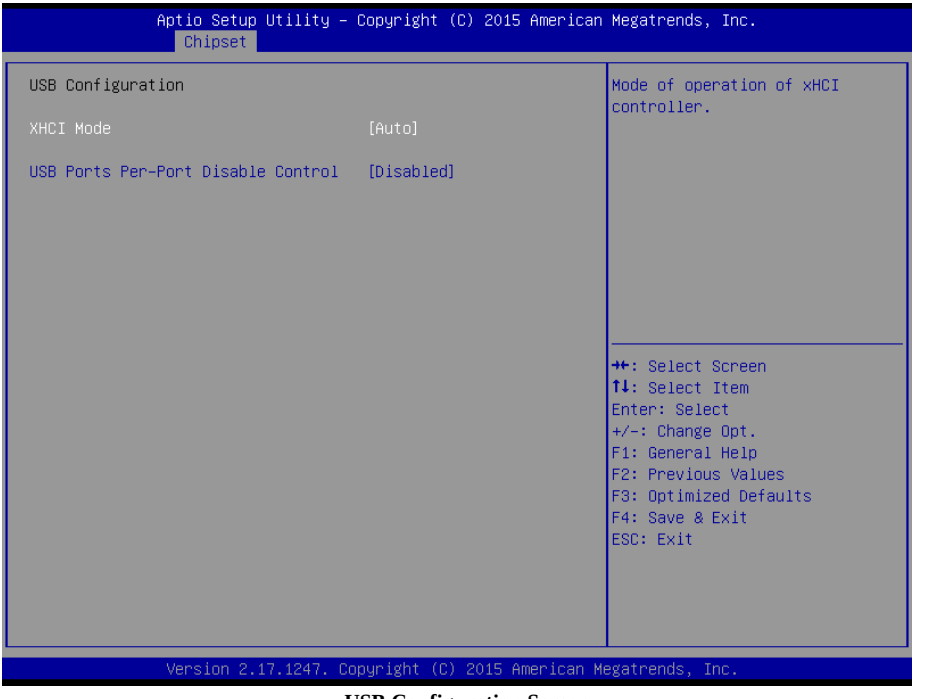


BIOS Setting	Options	Description/Purpose
PCI Express Root Port 5 (PCI_E2)	- Disabled - Enabled	Controls the PCI Express Root Port.
ASPM Support	- Disabled	Sets the ASPM Level. Selects **L0s** to force

BIOS Setting	Options	Description/Purpose
	- L0s - L1 - L0sL1 - Auto	all links to L0s State. **Auto** – BIOS auto configure. **Disabled** – Disables ASPM.
PCIe Speed	- Auto - Gen1 - Gen2	Selects the speed for PCI Express port.
Detect Non-Compliance Device	- Disabled - Enabled	Detects Non-Compliance PCI Express Device. If set to "Enabled", it will take more time to run the POST.

4-5-1-3. USB Configuration

Menu Path *Chipset > PCH-IO Configuration > USB Configuration*



USB Configuration Screen

BIOS Setting	Options	Description/Purpose
XHCI Mode	- Smart Auto - Auto - Enabled - Disabled - Manual	Selects the operation mode of XHCI controller.
USB Ports Per-Port Disable Control	- Disabled - Enabled	Enables/Disables each USB port.
USB Port # 0/1/2/3/4/5/6/7/8/9/10/11 USB3.0 Port #0/1/4/5	- Disabled - Enabled	After the "USB Ports Per-Port Disable Control" option is enabled, users are allowed to enable/disable each USB 2.0/3.0 port.

4-5-1-4. PCH Azalia Configuration

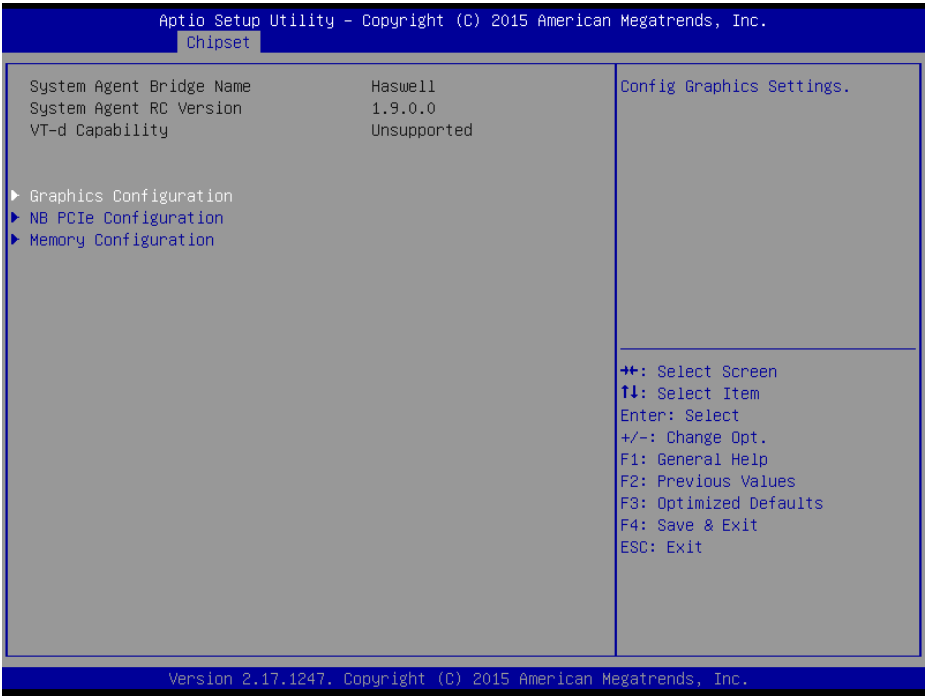
Menu Path *Chipset > PCH-IO Configuration > PCH Azalia Configuration*

PCH Azalia Configuration Screen

BIOS Setting	Options	Description/Purpose
Azalia	- Disabled - Enabled - Auto	Enables or disables internal HDMI codec for Azalia.

4-5-2. System Agent (SA) Configuration

Menu Path *Chipset > System Agent (SA) Configuration*



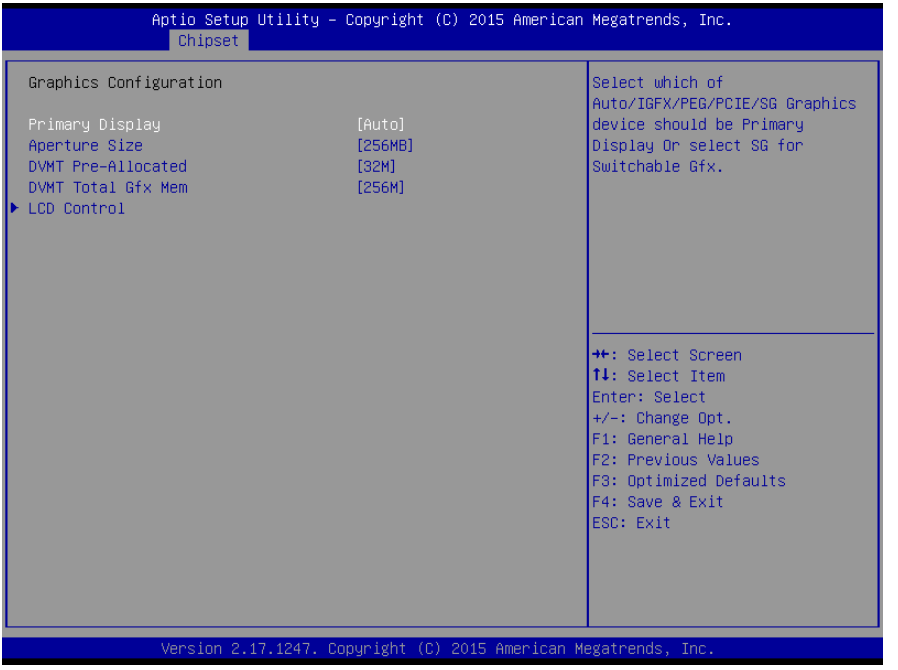
System Agent (SA) Configuration Screen

BIOS Setting	Options	Description/Purpose
System Agent Bridge Name	No changeable options	Displays the system bridge name.
System Agent RC Version	No changeable options	Displays the IVB source code module version.
VT-d Capability	No changeable options	Reports if VT-d capability is supported by the processor.
Graphics Configuration	Sub-menu	Configures Graphic settings.
NB PCIe Configuration	Sub-menu	Configures NB PCIe settings.

BIOS Setting	Options	Description/Purpose
Memory Configuration	Sub-menu	Configures memory parameters.

4-5-2-1. Graphics Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > Graphics Configuration*

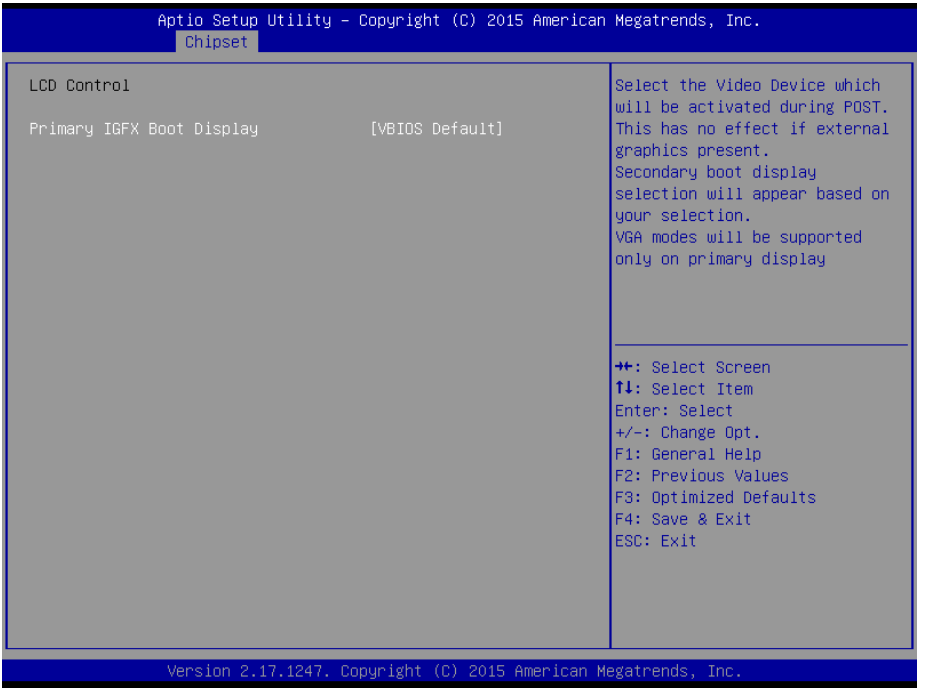


Graphics Configuration Screen

BIOS Setting	Options	Description/Purpose
Primary Display	- AUTO - IGFX - PCIE - PEG - SG	Selects which of **Auto/IGFX/PEG/PCIE/SG** Graphics device that should be Primary Display or selects **SG** for Switchable Gfx.
Aperture Size	- 128MB	Selects the Aperture size.

BIOS Setting	Options	Description/Purpose
	- 256MB - 512MB	
DVMT Pre-Allocated	- 32M ~ 1024M	Selects DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	- 128M - 256M - MAX	Selects DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device.
LCD Control	Sub-menu	Displays the device active selection.

Menu Path *Chipset > System Agent (SA) Configuration > Graphics Configuration > LCD Control*

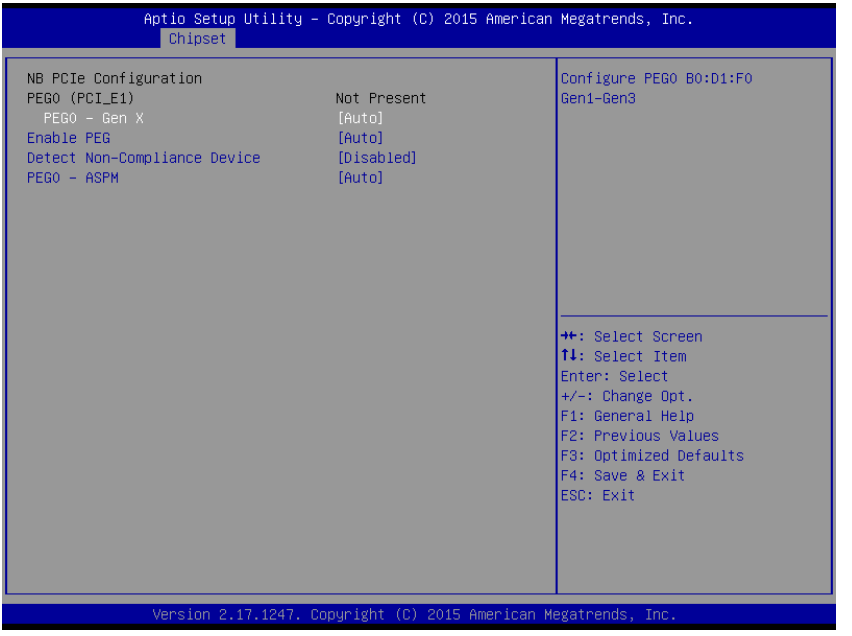


Graphics Configuration - LCD Control Screen

BIOS Setting	Options	Description/Purpose
Primary IGFX Boot Display	- VBIOS Default - VGA - DVI-D - pDP	Selects the video device that will be activated during POST. However, this setting will be invalidated when external graphics is present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on the primary display.
Secondary IGFX Boot Display	- Disabled - VGA - DVI-D - pDP	Selects the secondary display device.

4-5-2-2. NB PCIe Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > NB PCIe Configuration*



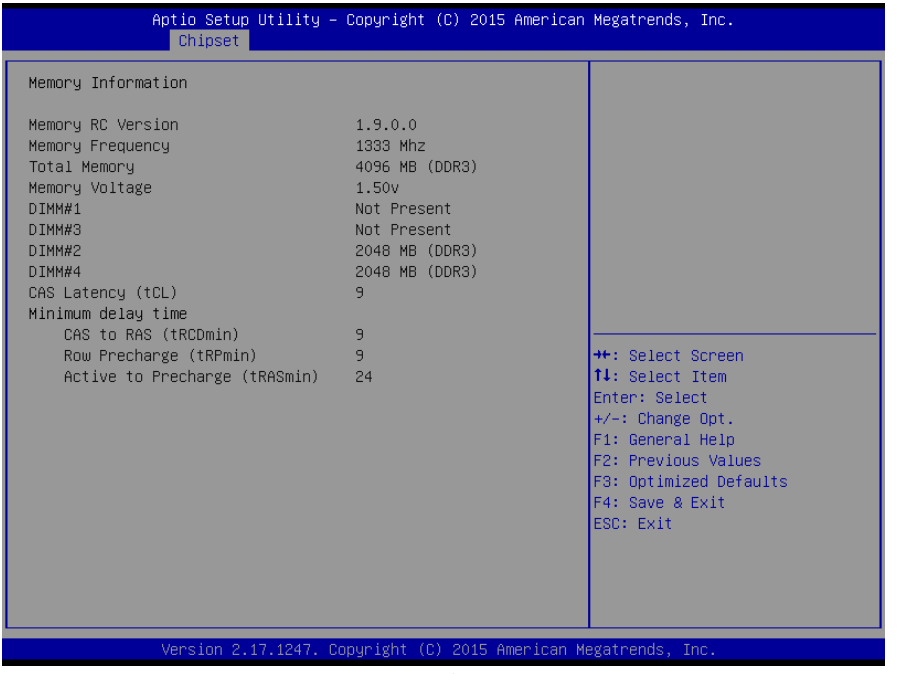
NB PCIe Configuration Screen

BIOS Setting	Options	Description/Purpose
PEG0 (PCI_E1)	No changeable options	Displays PEG device that exists
PEG0 – Gen X	- Auto - Gen1 - Gen2 - Gen3	Configures PEG0 Gen1~3
Enable PEG	- Disabled - Enabled - Auto	Enables or disables the PEG
Detect Non-Compliance Device	- Disabled - Enabled	Enables or disables Detect Non-Compliance Device in PEG

BIOS Setting	Options	Description/Purpose
PEG0 - ASPM	- Disabled - Auto - ASPM L0s - ASPM L1 - ASPM L0sL1	Controls ASPM support for the PEG device. However, this setting will be invalidated if PEG is currently not the active device.

4-5-2-3. Memory Configuration

Menu Path *Chipset > System Agent (SA) Configuration > Memory Configuration*

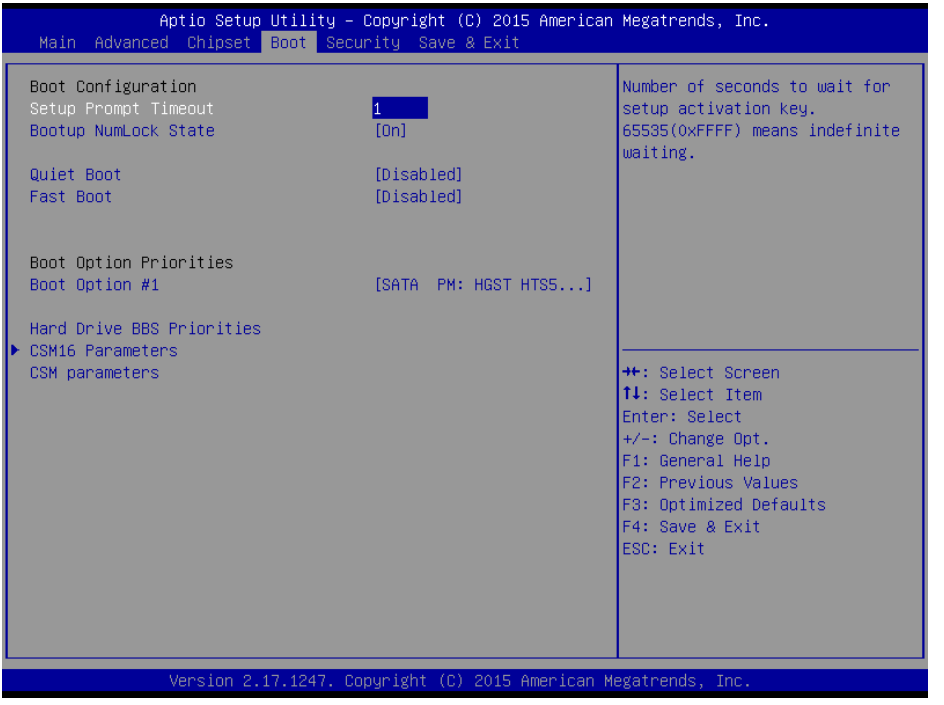


Memory Configuration Screen

BIOS Setting	Options	Description/Purpose
Memory Information	No changeable option lists.	Displays the detailed DRAM information on the platform.

4-6. BOOT

Menu Path *Boot*



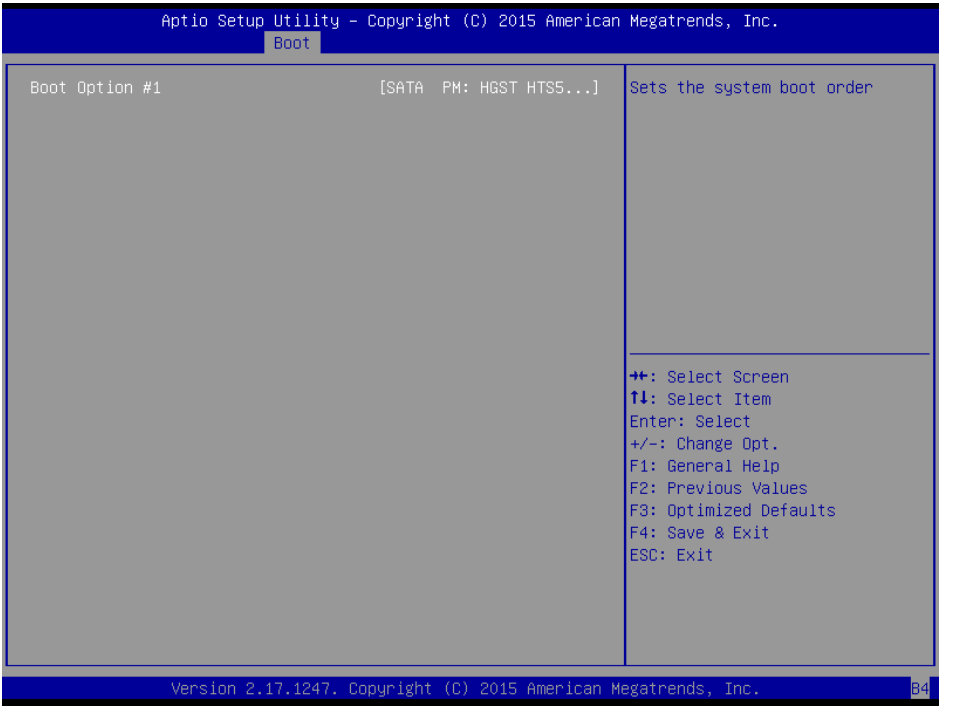
Boot Screen

BIOS Setting	Options	Description/Purpose
Setup Prompt Timeout	Numeric	Number of seconds to wait for setup activation key.
Bootup NumLock Status	- On - Off	Selects the NumLock sate after the system is powered on. • **On:** Enables the NumLock function automatically after the system is powered on. • **Off:** Disables the NumLock function after the system is powered on.

BIOS Setting	Options	Description/Purpose
Quiet Boot	- Disabled - Enabled	Enables/Disables Quiet Boot options. When this option is set to "Disabled", BIOS will display normal POST messages.
Fast Boot	- Disabled - Enabled	Enables or disables boot with initialization of a minimal set of devices that are required to launch the active boot option. Has no effect for BBS boot options. If "Enabled" is specified, it will display more options, including SATA Support, USB Support, PS2 Devices Support and Network Stack Driver Support.
SATA Support	- Last Boot HDD only - All Sata Devices	Selects the policy for SATA fast boot.
USB Support	- Full Initial - Partial Initial	If **Partial Initial** is specified, USB Mass Storage and specific USB port/device will NOT be initialized before the OS boot is finished. If **Full Initial** is specified, all USB devices will be initialized while the OS boot and POST are running.
PS2 Devices Support	- Disabled - Enabled	If set to "Disabled", PS2 devices will be skipped.
Network Stack Driver Support	- Disabled - Enabled	If set to "Disabled", Network Stack Driver will be skipped.
Boot Option #1~#n	- [Drive(s)] - Disabled	Allows setting the boot options listed in Hard Drive BBS Priorities.
Hard Drive BBS Priorities	Sub-menu	Sets the order of the legacy devices in this group.
CSM16 Parameters	Sub-menu	CSM16 configuration: Enable/Disable, Option ROM execution settings, etc.
CSM parameters	Sub-menu	Option ROM execution, boot options filter, etc.

4-6-1. Hard Drive BBS Priorities

Menu Path	*Boot > Hard Drive BBS Priorities*

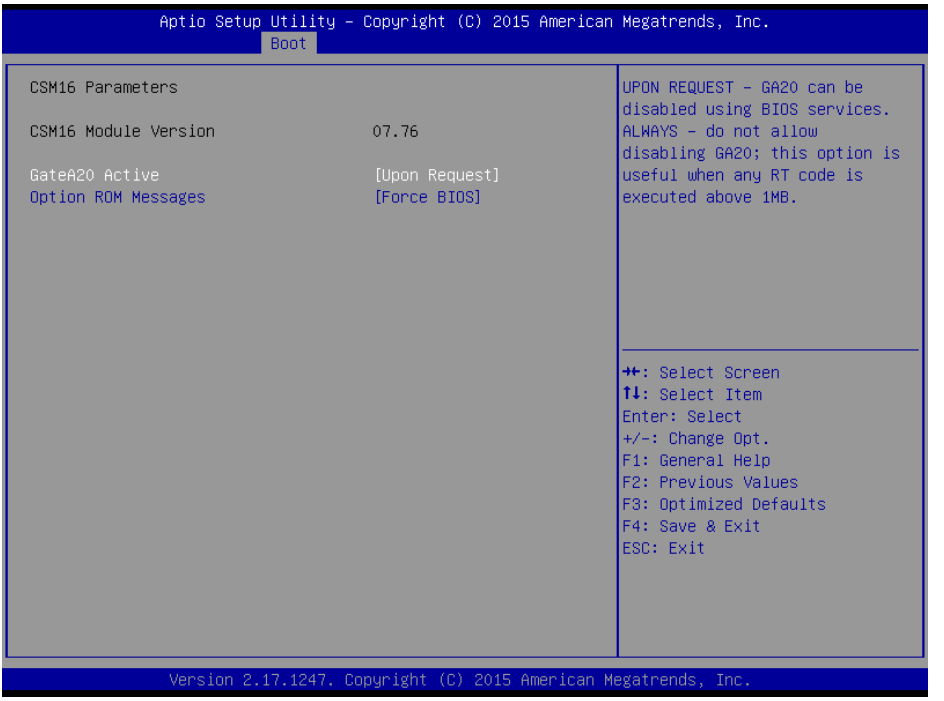


Hard Drive BBS Priorities Screen

BIOS Setting	Options	Description/Purpose
Boot Option #1 - #n	- [Drive(s)] - Disabled	Allows setting the boot order of the available drive(s).

4-6-2. CSM16 Parameters

Menu Path *Boot > CSM16 Parameters*

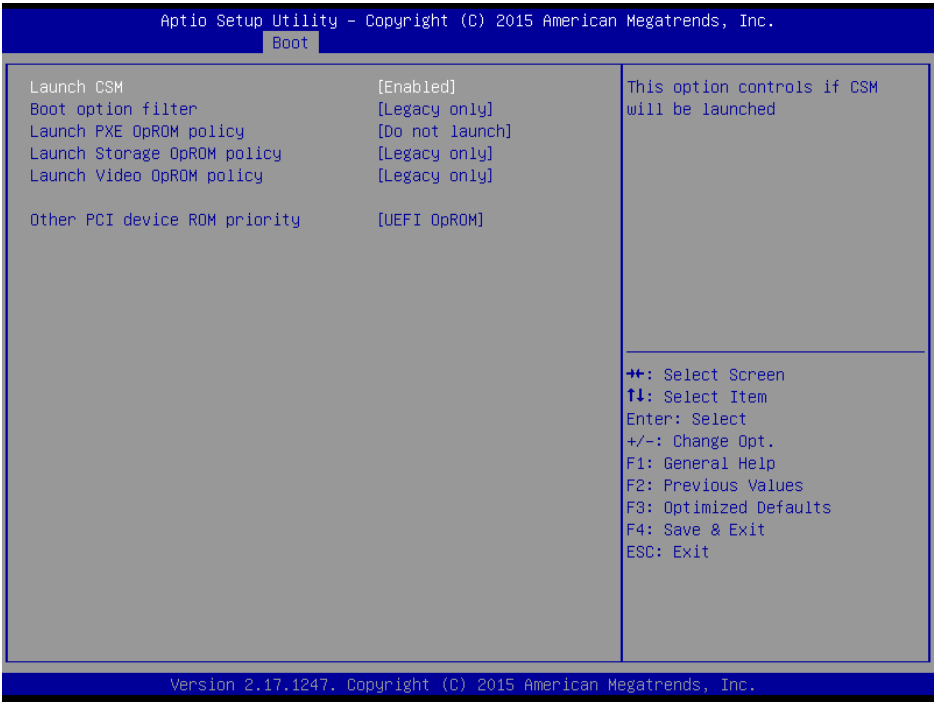


CSM16 Parameters Screen

BIOS Setting	Options	Description/Purpose
CSM16 Module Version	07.76	CSM version information.
GateA20 Active	- Upon Request - Always	Specifies Gate-A20 logic gate status. At boot time, Gate-A20 is enabled when the system is counting and testing all the system's memory, and disabled before transferring control to OS.
Option ROM Messages	- Force BIOS - Keep Current	Allows the POST screen to display Option ROM messages.

4-6-3. CSM Parameters

Menu Path *Boot > CSM Parameters*



CSM Parameters Screen

BIOS Setting	Options	Description/Purpose
Launch CSM	- Disabled - Enabled	This option controls if CSM will be launched.
Boot option filter	- UEFI and Legacy - Legacy only - UEFI only	Allows the system to run the boot option ROM type.
Launch PXE OpROM policy	- Do not launch - UEFI only - Legacy only	Controls the execution of UEFI and Legacy PXE Option ROM.
Launch Storage OpROM policy	- Do not launch - UEFI only	Controls the execution of UEFI and Legacy Storage Option ROM.

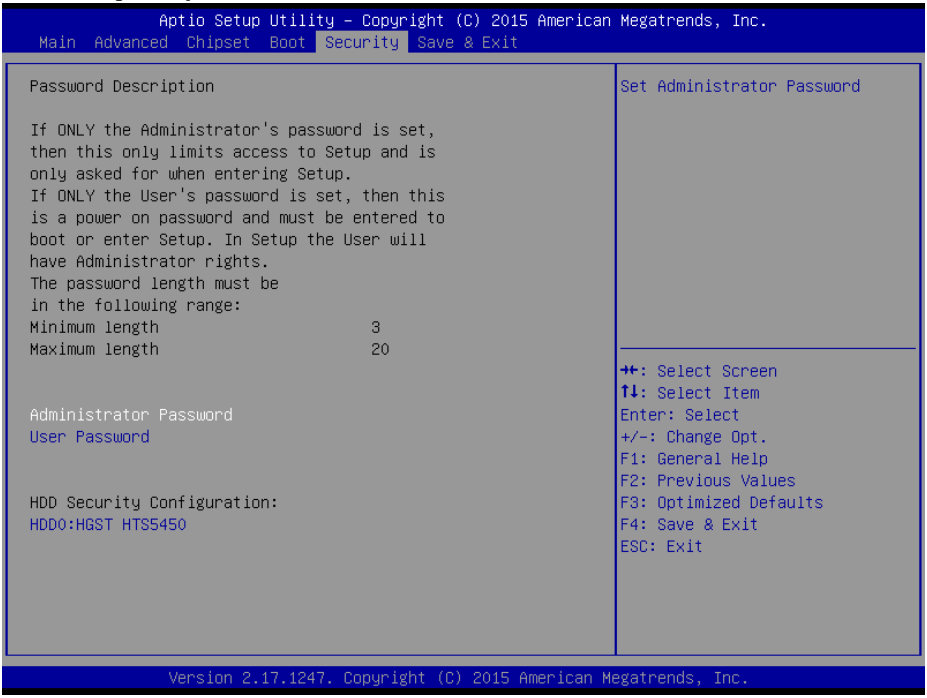
BIOS Setting	Options	Description/Purpose
	- Legacy only	
Launch Video OpROM policy	- Do not launch - UEFI only - Legacy only	Controls the execution of UEFI and Legacy Video Option ROM.
Other PCI device ROM priority	- UEFI OpROM - Legacy OpROM	For PCI devices other than Network, Mass storage or Video defines which Option ROM to launch.

4-7. SECURITY

Menu Path *Security*

From the **Security** menu, you are allowed to configure or change the administrator password. You will be asked to enter the configured administrator password before you are allowed to access the Setup Utility.

By setting an administrator password, you will prevent other users from changing your BIOS settings. You can configure an Administrator password and then configure a user password. Heed that a user password does not provide access to many of the features in the Setup utility.



Security Screen

Configure the Administrator Password according to the password policy specified below:

BIOS Setting	Options	Description/Purpose
Administrator Password	3-20 alphanumeric characters	Configure the administrator password.
User Password	3-20 alphanumeric characters	Configure the user password.
HDD Security Configuration:	Sub-menu	Set HDD password.

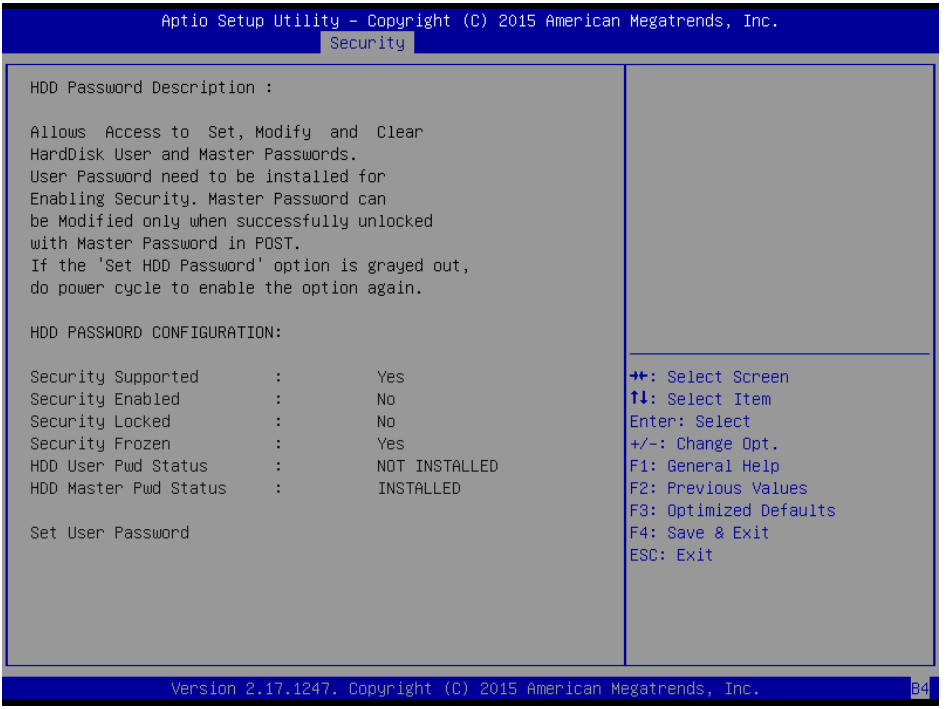
Follow the instructions below to configure the administrator password:

1. Select the **Administrator Password** item and press **Enter**.
2. Type in the new administrator password and press **Enter** when you are finished.
3. Another dialog box prompts you to retype the password for confirmation. Retype the password correctly and press **Enter**.
4. Navigate back to the main menu and select **SAVE & EXIT** menu. Your system will then reboot and you'll be prompted for the password.

To remove the password protection, highlight the **Administrator Password** item and type in the current password. Press **Enter** to disable the password protection from the dialog box that opens.

4-7-1. HDD Security Configuration- HDD 0: [drive]

Menu Path *Security > HDD Security Configuration > HDD 0: [drive]*



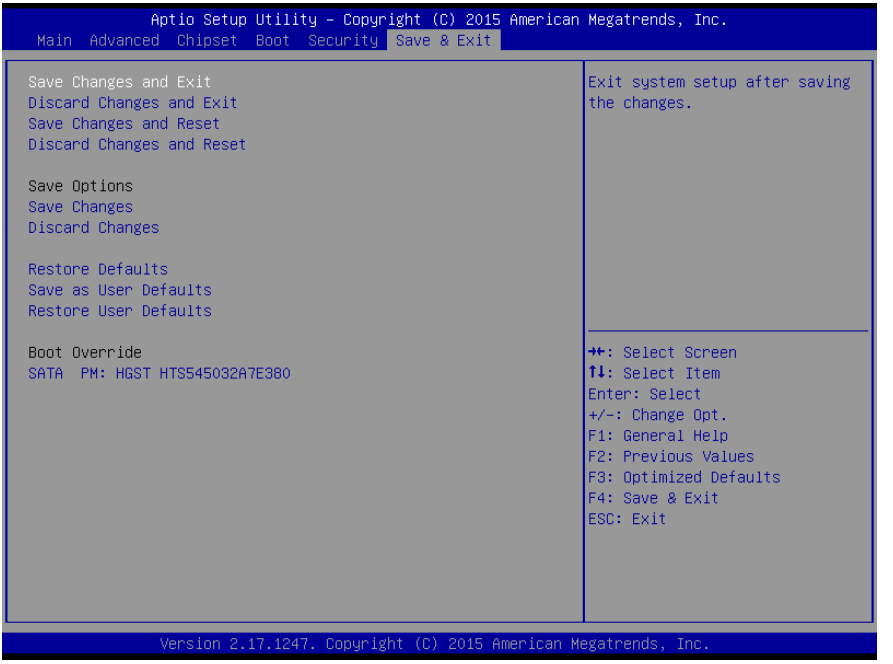
HDD Security Configuration Screen

BIOS Setting	Options	Description/Purpose
Security Supported	No changeable options	Reports if the security feature is available.
Security Enabled	No changeable options	Reports if the security feature is enabled.
Security Locked	No changeable options	Reports if the security feature is locked.
Security Frozen	No changeable options	Reports if the security feature is frozen.
HDD User Pwd	No changeable options	Reports if any HDD User Password is

BIOS Setting	Options	Description/Purpose
Status		installed.
HDD Master Pwd Status	No changeable options	Reports if any HDD Master Password is installed.
Set User Password	Password can be up to 32 alphanumeric characters.	Sets the user password. (Need TPM module)
Set Master Password	Password can be up to 32 alphanumeric characters.	Specifies the master password.

4-8. SAVE & EXIT

Menu Path *Save & Exit*



Save & Exit Screen

BIOS Setting	Options	Description/Purpose
Save Changes and	No changeable options	Exits the BIOS menu and saves the

BIOS Setting	Options	Description/Purpose
Exit		changes in NVRAM.
Discard Changes and Exit	No changeable options	Exits the BIOS menu without saving any changes made in BIOS settings.
Save Changes and Reset	No changeable options	Resets the system after saving the changes configured in BIOS settings.
Discard Changes and Reset	No changeable options	Resets the system without saving any changes configured in BIOS settings.
Save Changes	No changeable options	Saves the changes configured in BIOS settings so far.
Discard Changes	No changeable options	Cancels the changes configured in BIOS settings.
Restore Defaults	No changeable options	Loads the optimized defaults for BIOS settings.
Save as User Defaults	No changeable options	Saves the changes done so far as user defaults.
Restore User Defaults	No changeable options	Restores the user defaults to all the setup options.
Boot Override	- [Drive(s)]	Forces to boot from selected [drive(s)].

EXPANSION BUS

APPENDIX

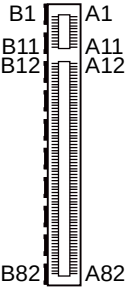
A

This appendix indicates the pin assignments of the expansion bus.

The following topics are included:

- PCI_E1 Bus
- PCI_E2 Bus
- PCI Bus

PCIE BUS

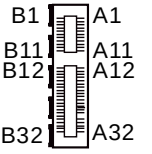


You will find the **PCI_E1** connector with 164 pins on BK-0940. The pin assignments are as follows:

PCI_E1: **PCI_E1**

A				B			
PIN	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**
A1	Reserved	A42	GND	B1	+12V	B42	EXP_A_TX_6_DN
A2	+12V	A43	EXP_A_RX_6_DP	B2	+12V	B43	GND
A3	+12V	A44	EXP_A_RX_6_DN	B3	+12V	B44	GND
A4	GND	A45	GND	B4	GND	B45	EXP_A_TX_7_DP
A5	Reserved	A46	GND	B5	SMB_CLK	B46	EXP_A_TX_7_DN
A6	Reserved	A47	EXP_A_RX_7_DP	B6	SMB_DATA_	B47	GND
A7	Reserved	A48	EXP_A_RX_7_DN	B7	GND	B48	Reserved
A8	Reserved	A49	GND	B8	+3.3V	B49	GND
A9	+3.3V	A50	Reserved	B9	Reserved	B50	Reserved
A10	+3.3V	A51	Reserved	B10	+3.3SB	B51	Reserved
A11	PWRGD	A52	Reserved	B11	Wakeup	B52	Reserved
A12	GND	A53	Reserved	B12	Reserved	B53	Reserved
A13	PEG1_CLK_P	A54	Reserved	B13	GND	B54	Reserved
A14	PEG1_CLK_N	A55	Reserved	B14	EXP_A_TX_0_DP	B55	Reserved
A15	GND	A56	Reserved	B15	EXP_A_TX_0_DN	B56	Reserved
A16	EXP_A_RX_0_DP	A57	Reserved	B16	GND	B57	Reserved
A17	EXP_A_RX_0_DN	A58	Reserved	B17	PCIEX16_PRSNT2	B58	Reserved
A18	GND	A59	Reserved	B18	GND	B59	Reserved
A19	Reserved	A60	Reserved	B19	EXP_A_TX_1_DP	B60	Reserved
A20	GND	A61	Reserved	B20	EXP_A_TX_1_DN	B61	Reserved
A21	EXP_A_RX_1_DP	A62	Reserved	B21	GND	B62	Reserved
A22	EXP_A_RX_1_DN	A63	Reserved	B22	GND	B63	Reserved
A23	GND	A64	Reserved	B23	EXP_A_TX_2_DP	B64	Reserved

A				B			
PIN	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**
A24	GND	A65	Reserved	B24	EXP_A_TX_2_DN	B65	Reserved
A25	EXP_A_RX_2_DP	A66	Reserved	B25	GND	B66	Reserved
A26	EXP_A_RX_2_DN	A67	Reserved	B26	GND	B67	Reserved
A27	GND	A68	Reserved	B27	EXP_A_TX_3_DP	B68	Reserved
A28	GND	A69	Reserved	B28	EXP_A_TX_3_DN	B69	Reserved
A29	EXP_A_RX_3_DP	A70	Reserved	B29	GND	B70	Reserved
A30	EXP_A_RX_3_DN	A71	Reserved	B30	Reserved	B71	Reserved
A31	GND	A72	Reserved	B31	Reserved	B72	Reserved
A32	Reserved	A73	Reserved	B32	GND	B73	Reserved
A33	Reserved	A74	Reserved	B33	EXP_A_TX_4_DP	B74	Reserved
A34	GND	A75	Reserved	B34	EXP_A_TX_4_DN	B75	Reserved
A35	EXP_A_RX_4_DP	A76	Reserved	B35	GND	B76	Reserved
A36	EXP_A_RX_4_DN	A77	Reserved	B36	GND	B77	Reserved
A37	GND	A78	Reserved	B37	EXP_A_TX_5_DP	B78	Reserved
A38	GND	A79	Reserved	B38	EXP_A_TX_5_DN	B79	Reserved
A39	EXP_A_RX_5_DP	A80	Reserved	B39	GND	B80	Reserved
A40	EXP_A_RX_5_DN	A81	Reserved	B40	GND	B81	Reserved
A41	GND	A82	Reserved	B41	EXP_A_TX_6_DP	B82	Reserved



PCI_E2

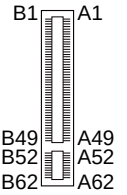
You will find the **PCI_E2** connector with 64 pins on BK-0940. The pin assignments are as follows:

PCI_E2:

A				B			
PIN	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**
A1	Reserved	A2	+12V	B1	+12V	B2	+12V
A3	+12V	A4	GND	B3	+12V	B4	GND
A5	Reserved	A6	Reserved	B5	SMB_CLK	B6	SMB_DATA_
A7	Reserved	A8	Reserved	B7	GND	B8	+3.3V
A9	+3.3V	A10	+3.3V	B9	Reserved	B10	+3.3SB
A11	PWRGD	A12	GND	B11	Wakeup	B12	Reserved
A13	PEG1_CLK_P	A14	PEG1_CLK_N	B13	GND	B14	EXP_A_TX_0_DP
A15	GND	A16	EXP_A_RX_0_DP	B15	EXP_A_TX_0_DN	B16	GND
A17	EXP_A_RX_0_DN	A18	GND	B17	PCIEX16_PRSNT2	B18	GND
A19	Reserved	A20	GND	B19	EXP_A_TX_1_DP	B20	EXP_A_TX_1_DN
A21	EXP_A_RX_1_DP	A22	EXP_A_RX_1_DN	B21	GND	B22	GND
A23	GND	A24	GND	B23	EXP_A_TX_2_DP	B24	EXP_A_TX_2_DN
A25	EXP_A_RX_2_DP	A26	EXP_A_RX_2_DN	B25	GND	B26	GND
A27	GND	A28	GND	B27	EXP_A_TX_3_DP	B28	EXP_A_TX_3_DN
A29	EXP_A_RX_3_DP	A30	EXP_A_RX_3_DN	B29	GND	B30	Reserved
A31	GND	A32	Reserved	B31	Reserved	B32	GND

PCI BUS CONNECTOR PIN ASSIGNMENT

You will find the 32bit 3.3V PCI bus connector on BK-0940.
The pin assignments are as follows:



A				B			
PIN	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**	**PIN**	**ASSIGNMENT**
A1	-12V	A31	+3.3V	B1	TRST#	B31	AD18
A2	TCK	A32	AD17	B2	+12V	B32	AD16
A3	GND	A33	C/BE2#	B3	TMS	B33	+3.3V
A4	TDO	A34	GND	B4	TDI	B34	FRAME#
A5	+5V	A35	IRDY#	B5	+5V	B35	GND
A6	+5V	A36	+3.3V	B6	INTA#	B36	TRDY#
A7	INTB#	A37	DEVSEL#	B7	INTC#	B37	GND
A8	INTD#	A38	GND	B8	+5V	B38	STOP#
A9	REQ3#	A39	LOCK#	B9	CLKC	B39	+3.3V
A10	REQ1#	A40	PERR#	B10	+5V(I/O)	B40	SDONE
A11	GNT3#	A41	+3.3V	B11	CLKD	B41	SB0#
A12	GND	A42	SERR#	B12	GND	B42	GND
A13	GND	A43	+3.3V	B13	GND	B43	PAR
A14	CLKA	A44	C/BE1#	B14	GNT1#	B44	AD15
A15	GND	A45	AD14	B15	RST#	B45	+3.3V
A16	CLKB	A46	GND	B16	+5V(I/O)	B46	AD13
A17	GND	A47	AD12	B17	GNT0#	B47	AD11
A18	REQ0#	A48	AD10	B18	GND	B48	GND
A19	+5V(I/O)	A49	GND	B19	REQ2#	B49	AD09
A20	AD31	A52	AD08	B20	AD30	B52	C/BE0#
A21	AD29	A53	AD07	B21	+3.3V	B53	+3.3V
A22	GND	A54	+3.3V	B22	AD28	B54	AD06
A23	AD27	A55	AD05	B23	AD26	B55	AD04
A24	AD25	A56	AD03	B24	GND	B56	GND
A25	+3.3V	A57	GND	B25	AD24	B57	AD02
A26	C/BE3#	A58	AD01	B26	GNT2#	B58	AD00
A27	AD23	A59	+5V(I/O)	B27	+3.3V	B59	+5V(I/O)
A28	GND	A60	ACK64#	B28	AD22	B60	REQ64#
A29	AD21	A61	+5V	B29	AD20	B61	+5V
A30	AD19	A62	+5V	B30	GND	B62	+5V

TECHNICAL SUMMARY

APPENDIX

B

This section introduce you the technical information concisely.

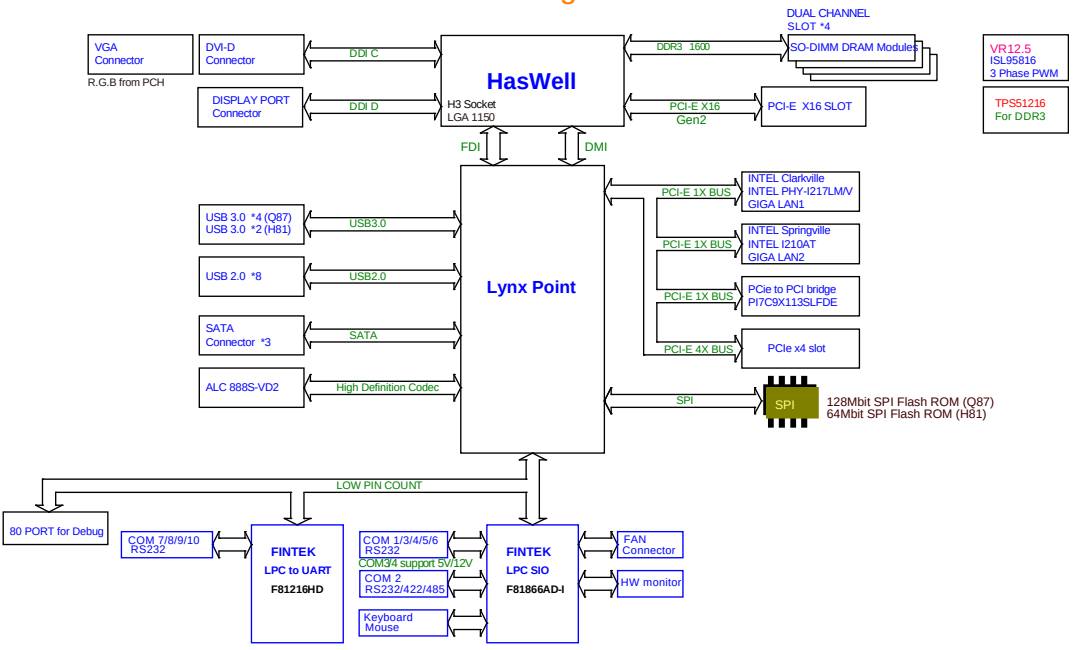
The following topics are included:

- Block Diagram
- Interrupt Map
- DMA Channel Map
- I/O Map
- Memory Map
- Watchdog Timer Configuration
- Flash BIOS Update

BLOCK DIAGRAM

BK-0940R Flex-ATX Mother Board

Block Diagram



INTERRUPT MAP

IRQ	ASSIGNMENT
4294967282	Intel® Management Engine Interface
13	Numeric data processor
17	PCI standard PCI Express to PCI/PCI-X Bridge
4294967294	Intel® 8 Series/C220 Series PCI Express Root Port #1 - 8C10
19	Intel® Active Management Technology - SOL (COM11)
19	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02
4294967291	Intel® HD Graphics 4600
4294967292	Intel® 8 Series/C220 Series PCI Express Root Port #4 - 8C16
0	System timer
12	Microsoft PS/2 Mouse
22	High Definition Audio Controller
1	Standard PS/2 Keyboard
4	Communications Port (COM1)
5	Intel® 8 Series/C220 Series SMBus Controller - 8C22
11	Communications Port (COM7)
11	Communications Port (COM8)
11	Communications Port (COM9)
11	Communications Port (COM10)
81	Microsoft ACPI-Compliant System
82	Microsoft ACPI-Compliant System
83	Microsoft ACPI-Compliant System
84	Microsoft ACPI-Compliant System
85	Microsoft ACPI-Compliant System
86	Microsoft ACPI-Compliant System
87	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
88	Microsoft ACPI-Compliant System
89	Microsoft ACPI-Compliant System
90	Microsoft ACPI-Compliant System
91	Microsoft ACPI-Compliant System
92	Microsoft ACPI-Compliant System
93	Microsoft ACPI-Compliant System
94	Microsoft ACPI-Compliant System
95	Microsoft ACPI-Compliant System
96	Microsoft ACPI-Compliant System
97	Microsoft ACPI-Compliant System
98	Microsoft ACPI-Compliant System
99	Microsoft ACPI-Compliant System
100	Microsoft ACPI-Compliant System
101	Microsoft ACPI-Compliant System
102	Microsoft ACPI-Compliant System
103	Microsoft ACPI-Compliant System
104	Microsoft ACPI-Compliant System
105	Microsoft ACPI-Compliant System
106	Microsoft ACPI-Compliant System
107	Microsoft ACPI-Compliant System
108	Microsoft ACPI-Compliant System
109	Microsoft ACPI-Compliant System
110	Microsoft ACPI-Compliant System
111	Microsoft ACPI-Compliant System
112	Microsoft ACPI-Compliant System
113	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
114	Microsoft ACPI-Compliant System
115	Microsoft ACPI-Compliant System
116	Microsoft ACPI-Compliant System
117	Microsoft ACPI-Compliant System
118	Microsoft ACPI-Compliant System
119	Microsoft ACPI-Compliant System
120	Microsoft ACPI-Compliant System
121	Microsoft ACPI-Compliant System
122	Microsoft ACPI-Compliant System
123	Microsoft ACPI-Compliant System
124	Microsoft ACPI-Compliant System
125	Microsoft ACPI-Compliant System
126	Microsoft ACPI-Compliant System
127	Microsoft ACPI-Compliant System
128	Microsoft ACPI-Compliant System
129	Microsoft ACPI-Compliant System
130	Microsoft ACPI-Compliant System
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132	Microsoft ACPI-Compliant System
133	Microsoft ACPI-Compliant System
134	Microsoft ACPI-Compliant System
135	Microsoft ACPI-Compliant System
136	Microsoft ACPI-Compliant System
137	Microsoft ACPI-Compliant System
138	Microsoft ACPI-Compliant System
139	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
140	Microsoft ACPI-Compliant System
141	Microsoft ACPI-Compliant System
142	Microsoft ACPI-Compliant System
143	Microsoft ACPI-Compliant System
144	Microsoft ACPI-Compliant System
145	Microsoft ACPI-Compliant System
146	Microsoft ACPI-Compliant System
147	Microsoft ACPI-Compliant System
148	Microsoft ACPI-Compliant System
149	Microsoft ACPI-Compliant System
150	Microsoft ACPI-Compliant System
151	Microsoft ACPI-Compliant System
152	Microsoft ACPI-Compliant System
153	Microsoft ACPI-Compliant System
154	Microsoft ACPI-Compliant System
155	Microsoft ACPI-Compliant System
156	Microsoft ACPI-Compliant System
157	Microsoft ACPI-Compliant System
158	Microsoft ACPI-Compliant System
159	Microsoft ACPI-Compliant System
160	Microsoft ACPI-Compliant System
161	Microsoft ACPI-Compliant System
162	Microsoft ACPI-Compliant System
163	Microsoft ACPI-Compliant System
164	Microsoft ACPI-Compliant System
165	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
166	Microsoft ACPI-Compliant System
167	Microsoft ACPI-Compliant System
168	Microsoft ACPI-Compliant System
169	Microsoft ACPI-Compliant System
170	Microsoft ACPI-Compliant System
171	Microsoft ACPI-Compliant System
172	Microsoft ACPI-Compliant System
173	Microsoft ACPI-Compliant System
174	Microsoft ACPI-Compliant System
175	Microsoft ACPI-Compliant System
176	Microsoft ACPI-Compliant System
177	Microsoft ACPI-Compliant System
178	Microsoft ACPI-Compliant System
179	Microsoft ACPI-Compliant System
180	Microsoft ACPI-Compliant System
181	Microsoft ACPI-Compliant System
182	Microsoft ACPI-Compliant System
183	Microsoft ACPI-Compliant System
184	Microsoft ACPI-Compliant System
185	Microsoft ACPI-Compliant System
186	Microsoft ACPI-Compliant System
187	Microsoft ACPI-Compliant System
188	Microsoft ACPI-Compliant System
189	Microsoft ACPI-Compliant System
190	Microsoft ACPI-Compliant System
4294967288	Intel® I210 Gigabit Network Connection

IRQ	ASSIGNMENT
4294967287	Intel® I210 Gigabit Network Connection
4294967286	Intel® I210 Gigabit Network Connection
4294967285	Intel® I210 Gigabit Network Connection
4294967284	Intel®) I210 Gigabit Network Connection
4294967283	Intel® I210 Gigabit Network Connection
23	Intel® 8 Series/C220 Series USB EHCI #1 - 8C26
3	Communications Port (COM2)
7	Communications Port (COM3)
7	Communications Port (COM4)
4294967289	Intel® Ethernet Connection I217-LM
16	Intel® 8 Series/C220 Series USB EHCI #2 - 8C2D
10	Communications Port (COM5)
10	Communications Port (COM6)
8	System CMOS/real time clock
4294967293	Intel® 82801 PCI Bridge - 244E
4294967290	Intel® USB 3.0 eXtensible Host Controller

Note: These resource information were gathered on Windows 7 (the IRQ could be assigned differently depending on your OS.)

DMA CHANNELS MAP

TIMER CHANNEL	ASSIGNMENT
Channel 4	Direct memory access controller

I/O MAP

I/O MAP	ASSIGNMENT
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000080-0x00000080	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x00001C00-0x00001CFE	Motherboard resources
0x00001D00-0x00001DFE	Motherboard resources
0x00001E00-0x00001EFE	Motherboard resources
0x00001F00-0x00001FFE	Motherboard resources
0x00001800-0x000018FE	Motherboard resources

I/O MAP	ASSIGNMENT
0x0000164E-0x0000164F	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x0000F0E0-0x0000F0E7	Intel® Active Management Technology - SOL (COM11)
0x00001854-0x00001857	Motherboard resources
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x000004D0-0x000004D1	Motherboard resources
0x0000F000-0x0000F03F	Intel® HD Graphics 4600
0x000003B0-0x000003BB	Intel® HD Graphics 4600
0x000003C0-0x000003DF	Intel® HD Graphics 4600
0x0000E000-0x0000EFFF	Intel® 8 Series/C220 Series PCI Express Root Port

I/O MAP	ASSIGNMENT
	#4 - 8C16
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00000000-0x0000001F	Direct memory access controller
0x00000000-0x0000001F	PCI bus
0x00000081-0x00000091	Direct memory access controller
0x00000093-0x0000009F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x000003F8-0x000003FF	Communications Port (COM1)
0x0000F040-0x0000F05F	Intel® 8 Series/C220 Series SMBus Controller - 8C22
0x00000260-0x00000267	Communications Port (COM7)
0x00000268-0x0000026F	Communications Port (COM8)
0x00000270-0x00000277	Communications Port (COM9)
0x00000278-0x0000027F	Communications Port (COM10)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F0-0x000002F7	Communications Port (COM5)
0x000002E0-0x000002E7	Communications Port (COM6)
0x00000D00-0x0000FFFF	PCI bus
0x00000010-0x0000001F	Motherboard resources
0x00000022-0x0000003F	Motherboard resources
0x00000044-0x0000005F	Motherboard resources
0x00000062-0x00000063	Motherboard resources

I/O MAP	ASSIGNMENT
0x00000072-0x0000007F	Motherboard resources
0x00000084-0x00000086	Motherboard resources
0x00000088-0x00000088	Motherboard resources
0x0000008C-0x0000008E	Motherboard resources
0x00000090-0x0000009F	Motherboard resources
0x000000A2-0x000000BF	Motherboard resources
0x000000E0-0x000000EF	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000F0D0-0x0000F0D7	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02
0x0000F0C0-0x0000F0C3	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02
0x0000F0B0-0x0000F0B7	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02
0x0000F0A0-0x0000F0A3	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02
0x0000F060-0x0000F07F	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02

MEMORY MAP

MEMORY MAP	ASSIGNMENT
0xF7D40000-0xF7D4000F	Intel® Management Engine Interface
0xFED40000-0xFED44FFF	Trusted Platform Module 1.2
0xFF000000-0xFFFFFFFF	Intel® 82802 Firmware Hub Device
0xFF000000-0xFFFFFFFF	Motherboard resources
0xF7D3E000-0xF7D3EFFF	Intel® Active Management Technology - SOL (COM11)
0xF7800000-0xF7BFFFFF	Intel® HD Graphics 4600
0xE0000000-0xEFFFFFFF	Intel® HD Graphics 4600
0xA0000-0xBFFFF	Intel® HD Graphics 4600
0xA0000-0xBFFFF	PCI bus
0xF7C00000-0xF7CFFFFF	Intel® 8 Series/C220 Series PCI Express Root Port #4 - 8C16
0xF7C00000-0xF7CFFFFF	Intel® I210 Gigabit Network Connection
0xFED00000-0xFED003FF	High precision event timer
0xF7D30000-0xF7D33FFF	High Definition Audio Controller
0xF7D39000-0xF7D390FF	Intel® 8 Series/C220 Series SMBus Controller - 8C22
0xF7C80000-0xF7C83FFF	Intel® I210 Gigabit Network Connection
0xF7D3B000-0xF7D3B3FF	Intel® 8 Series/C220 Series USB EHCI #1 - 8C26
0xF7D00000-0xF7D1FFFF	Intel® Ethernet Connection I217-LM
0xF7D3D000-0xF7D3DFFF	Intel® Ethernet Connection I217-LM
0xF7D3C000-0xF7D3C3FF	Intel® 8 Series/C220 Series USB EHCI #2 - 8C2D
0xD0000-0xD3FFF	PCI bus
0xD4000-0xD7FFF	PCI bus
0xD8000-0xDBFFF	PCI bus
0xDC000-0xDFFFF	PCI bus

MEMORY MAP	ASSIGNMENT
0xE0000-0xE3FFF	PCI bus
0xE4000-0xE7FFF	PCI bus
0xDF200000-0xFEAFFFFF	PCI bus
0xF7D20000-0xF7D2FFFF	Intel® USB 3.0 eXtensible Host Controller
0xFED1C000-0xFED1FFFF	Motherboard resources
0xFED10000-0xFED17FFF	Motherboard resources
0xFED18000-0xFED18FFF	Motherboard resources
0xFED19000-0xFED19FFF	Motherboard resources
0xF8000000-0xFBFFFFFF	Motherboard resources
0xFED20000-0xFED3FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xF7FDF000-0xF7FDFFFF	Motherboard resources
0xF7FE0000-0xF7FEFFFF	Motherboard resources
0xF7D3A000-0xF7D3A7FF	Intel® 8 Series/C220 Series SATA AHCI Controller - 8C02

WATCHDOG TIMER CONFIGURATION

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. User must first assign the address of register by writing address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

Configuration Sequence

To program F81866 configuration registers, the following configuration sequence must be followed:

(1) Enter the extended function mode
(2) Configure the configuration registers
(3) Exit the extended function mode

(1) Enter the extended function mode

To place the chip into the Extended Function Mode, two successive writes of 0x87 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

(2) Configure the configuration registers

The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1). First, write the Logical Device Number (i.e. 0x07) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required. Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

(3) Exit the extended function mode

To exit the Extended Function Mode, writing 0xAA to the EFER is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

Code example for watch dog timer

Enable the watchdog timer and set the timeout interval to 30 seconds.

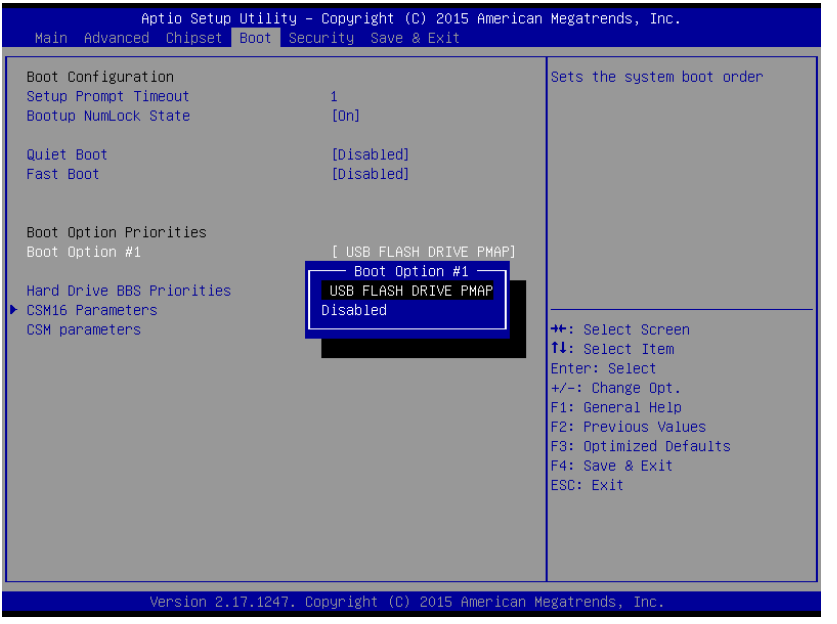
```
;------ Enter to extended function mode ------------------------------------------------------
mov     dx,     2eh
mov     al,     87h
out     dx,     al
out     dx,     al
;------ Select Logical Device 7 of watchdog timer ---------------------------------------------
mov     al,     07h
out     dx,     al
inc     dx
mov     al,     07h
out     dx,     al
;------ Enable Watch dog feature ---------------------------------------
mov     al,     30h
out     dx,     al
inc     dx
mov     al,     01h
out     dx,     al
;------ Enable Watch PME-----------------------------------------
dec     dx
mov     al,     0FAh
out     dx,     al
inc     dx
in      al,     dx
and     al,     51h
out     dx,     al
;------ Set second as counting unit ------------------------------------------------------------
dec     dx
mov     al,     0f5h
out     dx,     al
inc     dx
in      al,     dx
and     al,     20h
out     dx,     al
;------ Set timeout interval as 30seconds and start counting ----------------------------------
dec     dx
mov     al,     0f6h
```

```
out     dx,     al
inc     dx
mov     al,     1Eh
out     dx,     al
;------ Exit the extended function mode ------------------------------------------------------
dec     dx
mov     al,     0aah
out     dx,     al
```

Flash BIOS Update

A. Prerequisites

1. Prepare a bootable media (ex. USB storage device) which can boot system to DOS prompt.
2. Download and save the BIOS file (ex. B9400PQ1.bin) to the bootable device.
3. Copy AMI flash utility – AFUDOS.exe (v3.07.01) into bootable device.
4. Make sure the target system can first boot to the bootable device.
   (1) Connect the bootable USB device.
   (2) Turn on the computer and press <Del> or <ESC> key during boot to enter BIOS Setup.
   (3) The system will go into the BIOS setup menu.
   (4) Select [Boot] menu.
   (5) Select [Hard Drive BBS Priorities] and set the USB bootable device as the 1st boot device.
   (6) Press <F4> key to save the configuration and exit the BIOS setup menu.



B. AFUDOS Command for System BIOS Update

AFUDOS.exe is the AMI firmware update utility; the command line is shown below:

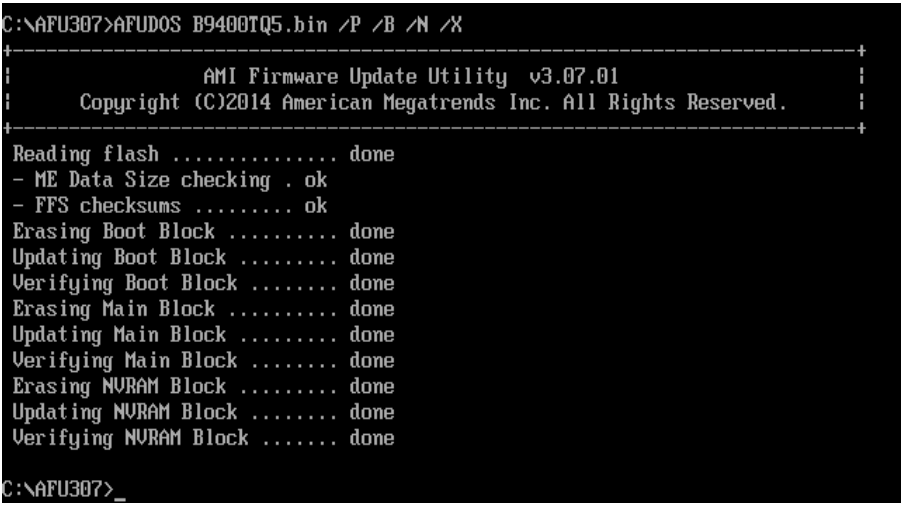
AFUDOS <ROM File Name> [option1] [option2]….

Users can type "AFUDOS/ ?" to read all the definition of each control option. The recommended options for BIOS Rod M update include the following parameters:

/P: Program main BIOS image.
/B: Program Boot Block.
/N: Program NVRAM.
/X: Don't check ROM ID.

C. BIOS Update Procedure

1. Use the bootable USB storage to boot up the system into the DOS command prompt.
2. Type "**AFUDOS B940xxxx.bin /p /b /n /x"** and press **Enter** to start the flash procedure.
   (Note that xxxx means the BIOS revision part, ex. 0PQ1…)
3. During the update procedure, you will see the BIOS update process status and its completion percentage. **Beware!** Do not turn off the system power or reset your computer when the whole procedure are not completed yet; otherwise, it may crash the BIOS ROM and the system will be unable to boot up next time.
4. After the BIOS update procedures is completed, the following message will be shown as in the picture below:



5. Users can restart the system and boot up the system with the new BIOS configuration.
6. The BIOS flash update procedure is completed after the system is restarted.
7. In the boot process, verify that the BIOS version displayed on the initialization screen has updated.