

USER'S MANUAL

BM-0972

**Mini-ITX Motherboard with
Intel® Pentium® and
Celeron® N3000 Series
Processor (Braswell)**

BM-0972 M2

BM-0972
Mini-ITX CPU Board supporting
Intel® Celeron® /Pentium® Processor
With DP/ LVDS/ Audio/ 2LAN/
6COM/4 USB

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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 if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

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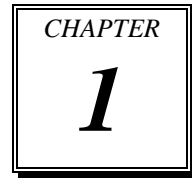
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INTRODUCTION



This chapter gives you the information for BM-0972. It also outlines the system specifications.

The following sections 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 BM-0972 Mini-ITX Motherboard with Intel® Pentium® and Celeron® N3710/N3060 processor. The BM-0972 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 will indicate how to avoid damaging this board.

Chapter 2 Hardware Configuration

This chapter outlines the component locations and their functions. In 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 VGA utility, LAN utility, Sound utility, and Flash BIOS Update. It also describes the Watchdog-timer configuration.

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 PCIe connectors.

Appendix B Technical Summary

This appendix gives you the information about the Technical maps.

1-2. SYSTEM SPECIFICATIONS

		BM-0972RC-06N	BM-0972RC-71N	BM-0972RC-72N
01	RoHS	: RoHS Version		
02	Formfactor	: Mini-ITX		
	Dimension	: 170mm x 170mm		
03	CPU	: Onboard Intel® Celeron® Processor N3060	Intel® Pentium® Processor N3710	
	Chipset	: Braswell SOC		
	BIOS	: AMI UEFI		
04	Memory Type	: 1 x SO-DIMM socket, DDR3L 1600/1333MHz, up to 4 GB (non-ECC)	2 x SO-DIMM socket , DDR3L 1600/1333MHz, up to 8 GB (non-ECC),4GB for one SO-DIMM	
05	Display	: LVDS: dual channel 48-bit up to 1920 x 1200 (Internal Connector) Display Port 1.2: up to 2560 x 1600 (Rear Panel)	VGA: up to 1920 x 1200 (Rear Panel) LVDS: dual channel 48-bit up to 1920 x 1200 (Internal Connector) Display Port 1.2: up to 2560 x 1600 (Rear Panel) *Support triple independent displays	
06	LAN	: Dual Ports to support 10/100/1000Mbps, supporting Wake-on-LAN LAN1: Intel I211AT LAN2: Intel I211AT		
	Sound	: 1 x line-out (Rear Panel) 1 x mic-in (Internal Connector) CODEC IC: Realtek ALC888S		
	Super IO	: Fintek 81866AD-I	Fintek 81866AD-I	
	SATA	: 1 x SATA III		
	USB	: Total 4 ports: 4 x USB3.0 (Rear Panel)	Total 7 ports: 4 x USB3.0 (Rear IO) 3 x USB2.0 (Internal Connector)	
	Serial port	: Total 2 ports: 1 x RS-232, 1 x RS-232/422/485;	Total 6 ports: COM1/3/4/5/6: RS232 COM2: RS232/422/485 (selected by jumper), supporting auto flow control COM 6 supports RI/5V/12V, selected by jumper	
	GPIO/ DIO	: 8bit DIO: 4in/4out		
	Keyboard/ Mouse	: 1 x KB Port(internal connector) 1 x MS Port(internal connector)		
	Expansion Bus	: 1 x PCIe (x1) 1 x Half Mini PCIe (no USB signal) 1 x Full mSATA 1 x I2C wafer 1 x SMBus wafer	1 x PCIe (x1) 1 x Half Mini PCIe 1 x Full mSATA 1 x I2C wafer 1 x SMBus wafer	

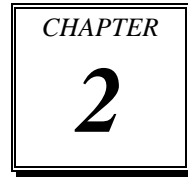
	SIM Card Holder	: N/A	1 x Mini-SIM holder for half miniPCIe	
08	Power Support	Mode1. DC 12V only input (p/s BIOS default: disable S3) Connector: 1 x DC jack on rear panel; 1 x Internal 4-pin (2x2) power connector; Mode2. ATX PSU Connector: 1 x DC jack on rear panel and 1 x 3-pin internal wafer (Note1. An adapting cable is required if using ATX PSU) (Note2. Please refer to your provider FAE for how to install a PSU) (Note3. It can't support S3 mode if main power is obtained by a PSU.) (Note4. BIOS default setting: disable S3-mode)		
	Power Consumption	: +12V: 1.59A		
09	OS	Windows 7 64bit/32bit Windows 8.1 64bit Windows10 32bit/64bit Ubuntu14.04		
10	Watchdog	: 1~255 sec		
	RAID function	: N/A		
	Speaker	: Internal buzzer		
	FAN	: 1 x CPU FAN(4pin), 1 x System FAN(4pin)		
	Hardware monitor	: FAN, 12V, 5V, 5Vsb, Vcore		
11	Operation Temp	0 ~ 60 °C w/ Fanless Heatsink (heatsink height: 18mm)	0 ~ 60 °C w/ Fanless Heatsink (heatsink height: 31mm)	0 ~ 50 °C w/ Fanless Heatsink (heatsink height: 18mm)
	Storage Temp	: -40 ~ 85 °C(-40 ~ 185 °F)		
12	Shock	: 15G peak-to-peak , 11ms duration, non-operation		
	Vibration	: Non-operation : 2G , 5-200Hz, X, Y, Z axis		
	CERTIFIED	: CE/ FCC Class A		
13	Peripheral	: N/A		
	API	: I2C API, SMBUS API, Fan Control API, Backlight Control API, DIO API, HW monitor API, Watch dog API		
	Battery	Two modes as follows (default setting : Mode2, but can be selected by jumper) Mode1: Able to Measure Battery voltage, while unable to boot up without battery. Mode2: Able to Boot up without Battery while unable to measure actual voltage.		

1-3. SAFETY PRECAUTIONS

Follow the messages below to avoid your systems from damage:

1. Keep your system away from static electricity on all occasions.
2. Prevent electric shock. Don't touch any components of this card when the card is power-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



***** QUICK START *****

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

The following sections are included:

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

2-1. JUMPER & CONNECTOR QUICK REFERENCE TABLE

JUMPER Description	NAME
OS Selection	JP2, JP3
Clear CMOS	JP6
LVDS Resolution Selection	JP8,JP9
RS-232/422/485(COM2) selection	JP10
RS-485 Auto Flow Control Selection	JP11
Inverter PWM Voltage Selection	JP14
LVDS VCC Voltage Selection	JP15
Backlight_Enable Voltage for JINV1	JP16
RTC Battery Voltage Detection Function Selection	JP18
COM6 Pin9 RI/5V/12V Selection	JP_COM6

CONNECTOR Description	NAME
COM Connector	JCOM1, JCOM2, JCOM3, JCOM4, JCOM5, JCOM6
LAN Port (Rear)	LAN1, LAN2
Digital I/O (DIO) pin header	JDIO1
HD Audio Line-Out Port(Rear)	JLINE-OUT1
HD Audio Mic-in Port	JMIC1
RTC Battery Wafer	JBAT1
4-pin FAN Connector	JCPU_FAN1, JSYS_FAN1
DC jack Connector(12V)	DC_IN1
Front Panel Connector	JFP1
Inverter Wafer for panel	JINV1
LVDS Connector	JLVDS1
Internal DC jack Connector(12V)	ATX_PWR1
2 ports USB 3.0(Rear)	JUSB1
2 ports USB 3.0(Rear)	JUSB2

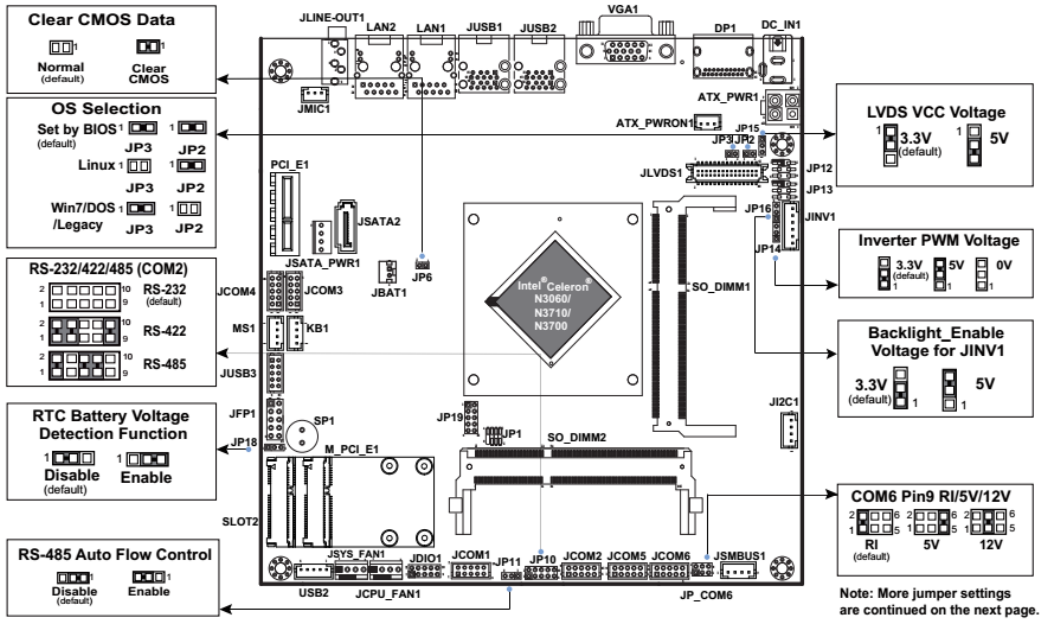
CONNECTOR Description	NAME
2 ports USB 2.0 internal Connector	JUSB3
1 port USB2.0 internal Connector	USB2
Half-sized Mini-PCIe slot	M_PCI_E1
Full-sized mSATA slot	SLOT2
Display Port Connector(Rear)	DP1
VGA Connector(Rear)	VGA1
PS/2 Connector for mouse	MS1
PS/2 Connector for Keyboard	KB1
ATX PSU Power Control Connector	ATX_PWRON1
SMbus Wafer	JSMBUS1
I2C Wafer	JI2C1
PCIe(x1) Connector	PCI_E1
SATA Connector	JSATA2
SATA Power Connector	JSATA_PWR1
DDR3L SO-DIMM memory socket	SO_DIMM1/SO_DIMM2
BIOS re-flash pin header	JP1
Debug Connector	JP19

2-2. TOP VIEW & Jumper setting

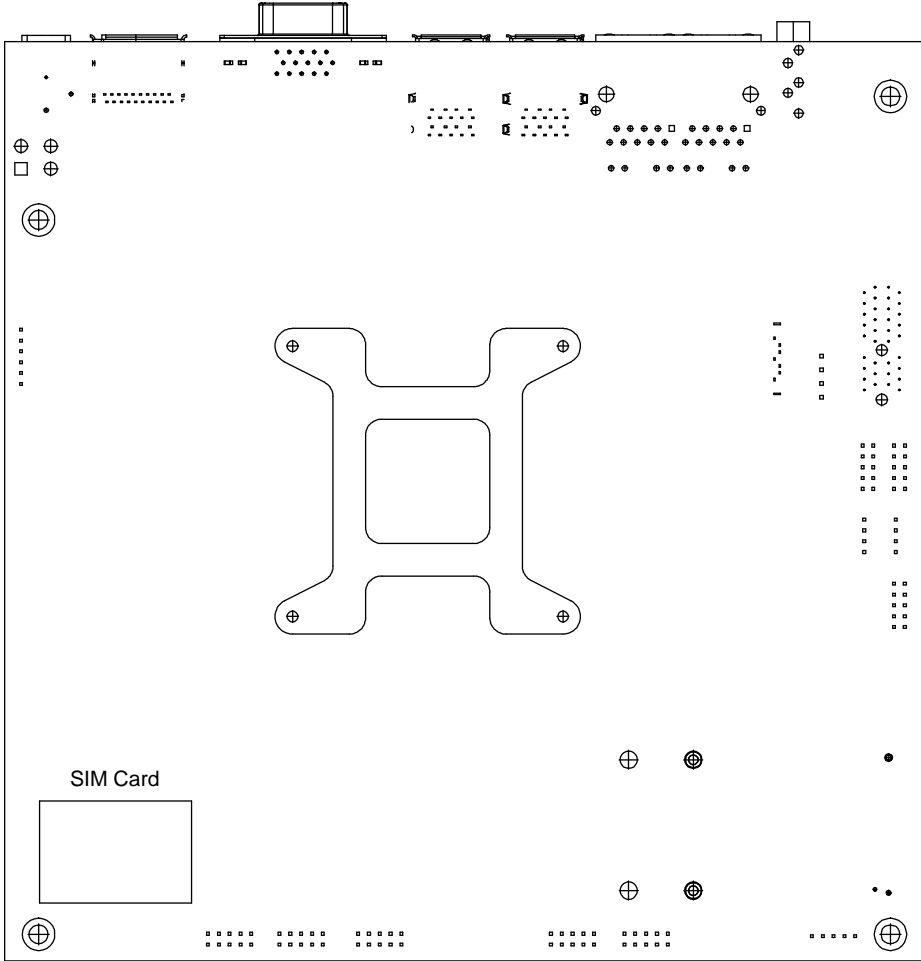
Top View of BM-0972RC-71N



Jumper Setting of BM-0972RC-***N

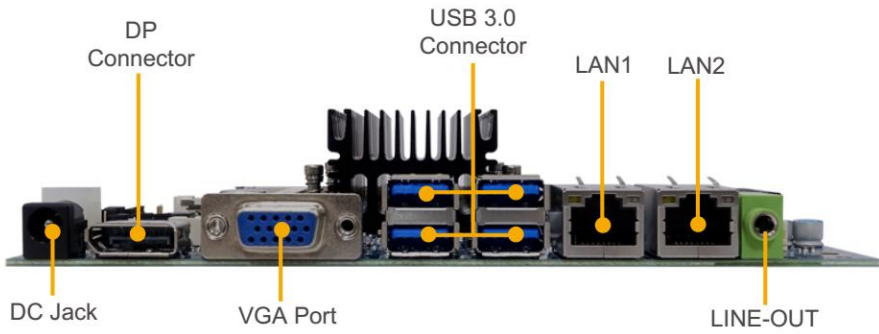


Bottom View of BM-0972RC-***N



BM-0972 Connector, Jumper and Component Locations (Rear Side)

I/O View of BM-0972RC-71N

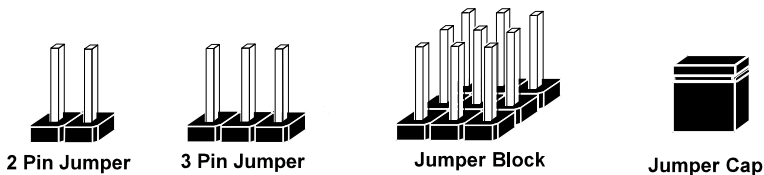


2-3. HOW TO SET JUMPERS

You can configure your board by setting jumpers. Jumper consists of two or three metal pins with a plastic base mounted on the card, and 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 set-up your hardware configuration by "open" or "close" pins.

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

JUMPERS AND CAPS

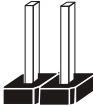


If a jumper has three pins (for examples, labelled PIN1, PIN2, and PIN3), you can connect PIN1 & PIN2 to create one setting by shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams look and what they represent.

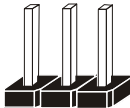
Jumper Diagrams



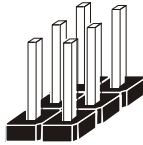
Jumper Cap
looks like this



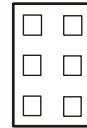
2 pin Jumper
looks like this



3 pin Jumper
looks like this



Jumper Block
looks like this



Jumper Settings



2 pin Jumper close(enabled)
Looks like this



1

1



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

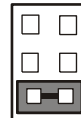


1

1



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



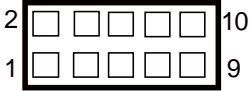
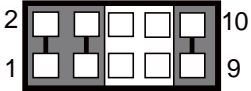
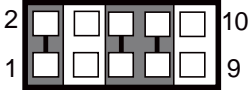
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1 2

2-4. RS-232/422/485 (COM2) Selection Guide

Jumper Name: JP10

Description: RS-232/422/485 (COM2) Selection



Selection	Jumper Setting	Jumper Illustration
RS-232	Open (Default Setting)	 <p>The diagram shows a 2x5 grid of pins. The top row is labeled '2' on the left and '10' on the right. The bottom row is labeled '1' on the left and '9' on the right. All 10 pins are shown as open squares.</p> <p style="text-align: center;">JP10</p>
RS-422	Close: 1-2, 3-4, 9-10	 <p>The diagram shows a 2x5 grid of pins. The top row is labeled '2' on the left and '10' on the right. The bottom row is labeled '1' on the left and '9' on the right. Vertical bars connect pins 1-2, 3-4, and 9-10, indicating they are closed.</p> <p style="text-align: center;">JP10</p>
RS-485	Close: 1-2, 5-6, 7-8	 <p>The diagram shows a 2x5 grid of pins. The top row is labeled '2' on the left and '10' on the right. The bottom row is labeled '1' on the left and '9' on the right. Vertical bars connect pins 1-2, 5-6, and 7-8, indicating they are closed.</p> <p style="text-align: center;">JP10</p>

Note: Users can change the configuration of COM2 with jumper setting while without any BIOS setting.

2-5. RS-485 Auto Flow Control Selection Guide

Jumper Name: JP11

Description: RS-485 Auto Flow Control Selection

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Disabled	Close: 1-2 <i>(Default Setting)</i>	 JP11
Enabled	Close: 2-3	 JP11

2-6. CLEAR CMOS DATA Guide

Jumper Name: JP6

Description: Clear CMOS

Guide:



Step1. Remove the main power of the PC

Step2. Close JP6(pin1-2) for 6 seconds by a cap

Step3. Remove the cap which is just used on JP6(1-2), so that JP6 returns to “OPEN”.

Step4. Power-on the PC, then the PC will auto-reboot for once, in order to set SoC’s register.

Step5. Done!

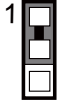

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Normal	Open <i>(Default Setting)</i>	 JP6
Clear CMOS	Close: 1-2	 JP6

Note: Please make sure the main power is off before clearing CMOS. .

2-7. LVDS VCC Voltage Selection Guide

Jumper Name: JP15

Description: Voltage selection jumper for selecting PIN1 (LVDS_VCC) voltage of JINV1.




SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
3.3V	1-2 <i>(Default Setting)</i>	 JP15
5V	2-3	 JP15

Note: Please refer to 2-22 for more information about pin definition of JINV1.

2-8. Inverter PWM Voltage Selection Guide

Jumper Name: JP14

Description: PWM voltage level selection for PIN4 of INV1 (Panel Inverter)

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
3.3V	1-2 <i>(Default Setting)</i>	 JP14
5V	2-3	 JP14
GND	Open	 JP14

Note: Users can change the setting according to panel specification



2-9. RTC Battery Voltage Detection Setting Guide

Jumper Name: JP18

Description:

Default Setting cannot support RTC voltage detection but can boot up without RTC Battery.

Close pin (2-3) for detecting RTC battery voltage, but cant not boot up without RTC battery nor low battery voltage.

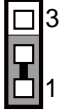
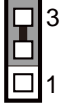
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Disabled	Close: 1-2 <i>(Default Setting)</i>	 JP18
Enabled	Close: 2-3	 JP18

Note: Please make sure to power off the PC before setting the jumper.

2-10. BACKLIGHT ENABLE PIN Voltage Selection Guide

Jumper Name: JP16

Description: Jumper for selecting PIN6 (BACKLIGHT EN) voltage of JINV1.

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
3.3V	1-2 <i>(Default Setting)</i>	 <p>JP16</p>
5V	2-3	 <p>JP16</p>

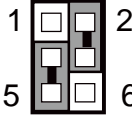
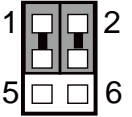
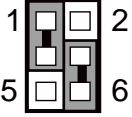
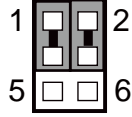
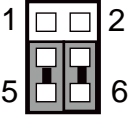
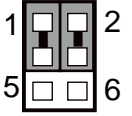
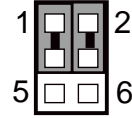
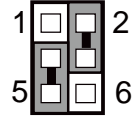
Note 1: Users can change the setting according to panel specification

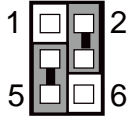
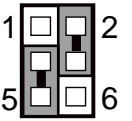
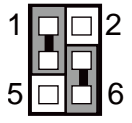
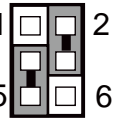
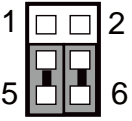
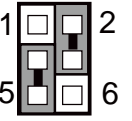
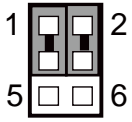
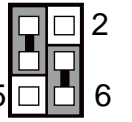
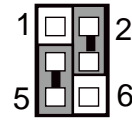
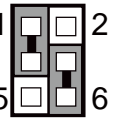
Note 2: Please refer to 2-22 for more details about pin definition of JINV1.

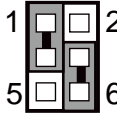
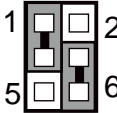
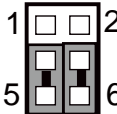
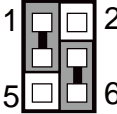
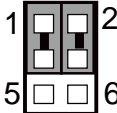
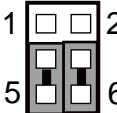
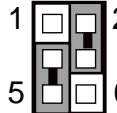
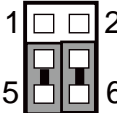
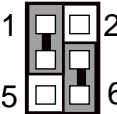
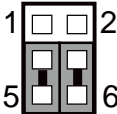
2-11. LVDS RESOLUTION SELECTION

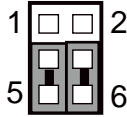
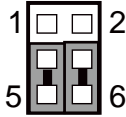
Jumper Name: JP8 & JP9

Description: LVDS Resolution/Channel/Colour Bit Selection

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
1024x768 (24 bit)	JP8(3-5) JP8(2-4) JP9(3-5) JP9(4-6)	 <p>JP12</p>	 <p>JP13</p>
1024x768 (18 bit)	JP8(1-3) JP8(4-6) JP9(3-5) JP9(4-6)	 <p>JP12</p>	 <p>JP13</p>
1680x1050 2CH/24bit	JP13(2-4) JP13(1-3) JP12(4-6) JP12(3-5)	 <p>JP12</p>	 <p>JP13</p>
1600x900 2CH/24bit	JP13(2-4) JP13(3-5) JP12(2-4) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
1400x1050 2CH/24bit	JP13(2-4) JP13(3-5) JP12(2-4) JP12(3-5)	 <p>JP12</p>	 <p>JP13</p>
1440x900 2CH/24bit	JP13(2-4) JP13(3-5) JP12(4-6) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>
1366x768 1CH/24bit	JP13(2-4) JP13(3-5) JP12(4-6) JP12(3-5)	 <p>JP12</p>	 <p>JP13</p>
1366x768 1CH/18bit	JP13(4-6) JP13(1-3) JP12(2-4) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>
1280x1024 2CH/24bit	JP13(4-6) JP13(1-3) JP12(2-4) JP12(3-5)	 <p>JP12</p>	 <p>JP13</p>







SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
1280x960 1CH/24bit	JP13(4-6) JP13(1-3) JP12(4-6) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>
1280x800 1CH/18bit	JP13(4-6) JP13(1-3) JP12(4-6) JP12(3-5)	 <p>JP12</p>	 <p>JP13</p>
1280x768 1CH/18bit	JP13(4-6) JP13(3-5) JP12(2-4) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>
1024x768 1CH/24bit	JP13(4-6) JP13(3-5) JP12(2-4) JP12(3-5) <i>(Default Setting)</i>	 <p>JP12</p>	 <p>JP13</p>
1024x768 1CH/18bit	JP13(4-6) JP13(3-5) JP12(4-6) JP12(1-3)	 <p>JP12</p>	 <p>JP13</p>

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
<p>800x600 1CH/18bit</p>	<p>JP13(4-6) JP13(3-5) JP12(4-6) JP12(3-5)</p>	 <p>JP12</p>	 <p>JP13</p>

2-12. Operating System (OS) SELECTION Guide

Jumper Name: JP2, JP3

Description: OS Selection via Jumper

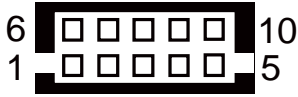
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION	
Set By BIOS	JP3(1-2) JP2(1-2) (Default Setting)	1  JP3	1  JP2
Linux	JP2(1-2)	1  JP3	1  JP2
Win7 DOS (Legacy System)	JP3(1-2)	1  JP3	1  JP2

Note 1: BIOS default setting is for **Win8.1/Win10**.

Note 2: If users need to change to different OS, we highly recommend users to change the BIOS setting while keeping default jumper setting.

Note 3: Please refer to CHAPTER 4 BIOS SETUP for more details.

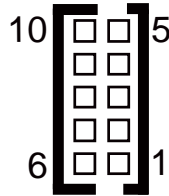
2-13. COM CONNECTOR



JCOM1/

JCOM5/

JCOM6



JCOM3/

JCOM4

JCOM1, JCOM3, JCOM4, JCOM5, JCOM6: COM Connector, fixed as RS-232.

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

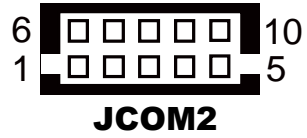
Note 1: Pin 9 is selectable for RI, +5V or +12V for JCOM6 only.

Note 2: Please refer to 2-14 for Pin 9 selection guide of COM6

JCOM2: COM2 Connector, selectable for RS-232/422/485 by jumper.

The pin assignments are as follows:

PIN	Signal		
	RS-232	RS-422	RS-485
1	DCD	TX-	D-
2	RXD	TX+	D+
3	TXD	RX+	-
4	DTR	RX-	-
5	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-
9	RI	-	-
10	NC	-	-





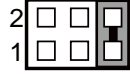
Note 1: Default jumper setting is RS232.

Note 2: Please refer to 2-4 jumper setting guide for COM2.

2-14. COM6 PIN9 Definition Selection Guide

Jumper Name: JP_COM6

Description COM6 Port pin9 RI/5V/12V Selection

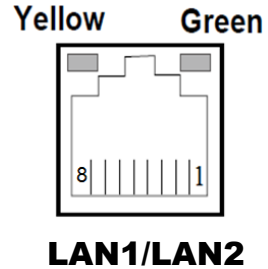
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
RI	1-2 <i>(Default Setting)</i>	 <p>JP_COM6</p>
12V	3-4	 <p>JP_COM6</p>
5V	5-6	 <p>JP_COM6</p>

2-15. LAN PORT

LAN1/LAN2: Provides dual LAN ports.

The pin definitions of LAN1 and LAN2 Port are as follows:

PIN	ASSIGNMENT
1	TX_D1+
2	TX_D1-
3	RX_D2+
4	BI_D4+
5	BI_D4-
6	RX_D2-
7	BI_D3+
8	BI_D3-



LAN1 / LAN2 LED Indicator:

Right Side LED

Green Color Blinking	LAN Message Active
Off	No LAN Message Active

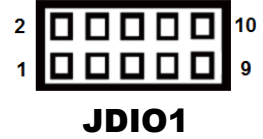
Left Side LED

Yellow Color On	10/100 LAN Speed Indicator
Orange Color On	Giga LAN Speed Indicator
Off	No LAN switch/ hub connected.

2-16. Digital I/O Pin Header

JDIO1: Digital Input / Output pin header and 5v power

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	5V	2	GND
3	DIN1	4	DOUT1
5	DIN2	6	DOUT2
7	DIN3	8	DOUT3
9	DIN4	10	DOUT4

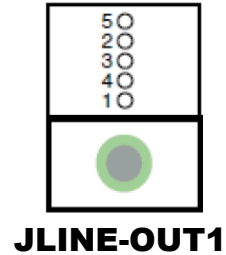


2-17. LINE-OUT/MIC-IN PORT

Line-Out & Mic-in

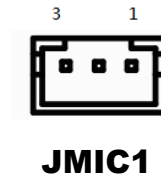
JLINE-OUT1: Line-Out Port

PIN	ASSIGNMENT
1	GND
2	LINE-OUT-L
3	NC
4	LINE-OUT-R
5	NC



JMIC1: MIC-IN Connector

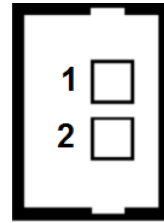
PIN	ASSIGNMENT
3	MIC_L
2	GND
1	MIC_R



2-18. BATTERY WAFER

JBAT1: Battery Wafer

PIN	ASSIGNMENT
1	RTC_BAT
2	GND



JBAT1

2-19. FAN CONNECTOR

JCPU_FAN1: CPU Fan Connector

JSYS_FAN1: System Fan Connector

PIN	ASSIGNMENT
1	GND
2	12V
3	SENSE
4	PWM CONTROL

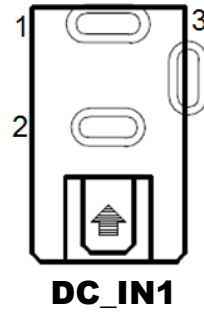


**JCPU_FAN1/
JSYS_FAN1**

2-20. DC Power Input (12V only)

DC_IN1: DC 12V Connector

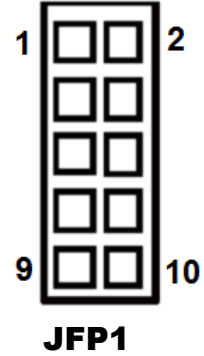
PIN	ASSIGNMENT
1	12V
2	GND
3	GND



2-21. FRONT PANEL CONNECTOR

JFP1: Front Panel Connector

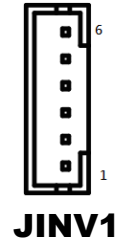
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	HDD_LED+	2	POWER_LED+
3	HDD LED -	4	NC
5	GND	6	GND
7	RESET BUTTON	8	GND
9	NC	10	POWER BUTTON



2-22. INVERTER WAFER

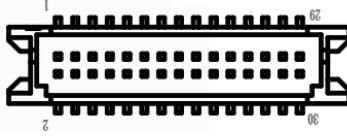
JINV1: Inverter for panel backlight

PIN	ASSIGNMENT
6	BACKLIGHT EN
5	GND
4	PWM SIGNAL
3	GND
2	12V
1	12V



2-23. LVDS CONNECTOR

JLVDS1: LVDS Connector



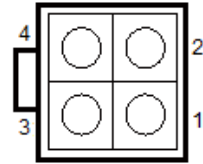
JLVDS1

PIN	ASSIGNMENT	PIN	ASSIGNMENT
2	GND	1	LVDS_VCC
4	LVDS1_CLK+	3	LVDS1_CLK-
6	LVDS1_CLK-	5	GND
8	GND	7	LVDS1_D2+
10	LVDS1_D1+	9	LVDS1_D1-
12	LVDS1_D3-	11	LVDS1_D3+
14	LVDS1_D0-	13	LVDS1_D0+
16	LVDS0_CLK+	15	GND
18	GND	17	LVDS0_CLK-
20	LVDS0_D2+	19	LVDS0_D2+
22	LVDS0_D1+	21	GND
24	GND	23	LVDS0_D1-
26	LVDS0_D0-	25	LVDS0_D0+
28	LVDS0_D3-	27	LVDS0_D3+
30	LVDS_VCC	29	LVDS_VCC

2-24. POWER CONNECTOR

ATX_PWR1: Power Connector

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

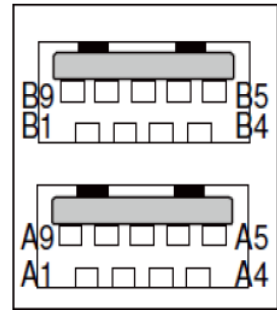


ATX_PWR1

2-25. USB 3.0 PORT

JUSB1, JUSB2: USB 3.0 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	5V	B1	5V
A2	USB-A_D-	B2	USB-B_D-
A3	USB-A_D+	B3	USB-B_D+
A4	GND	B4	GND
A5	USB-A_SSRX-	B5	USB-B_SSRX-
A6	USB-A_SSRX+	B6	USB-B_SSRX+
A7	GND	B7	GND
A8	USB-A_SSTX-	B8	USB-B_SSTX-
A9	USB-A_SSTX+	B9	USB-B_SSTX+

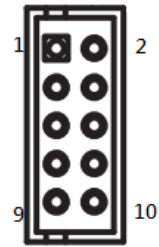


**JUSB1/
JUSB2**

2-26. USB 2.0 CONNECTOR

JUSB3: Internal dual port USB 2.0 Connector

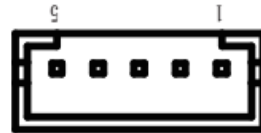
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	5V	2	5V
3	D-	4	D-
5	D+	6	D+
7	GND	8	GND
9	GND	10	GND



JUSB3

USB2: Internal single port USB 2.0 Connector

PIN	ASSIGNMENT
5	GND
4	GND
3	D+
2	D-
1	5V

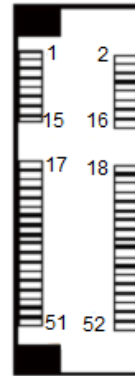


USB2

2-27. MINI-PCIE CONNECTOR

M_PCI_E1: Mini-PCIE Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	WAKE#	27	GND
2	3.3V	28	1.5V
3	NC	29	GND
4	GND	30	SMB_CLK
5	NC	31	PETn0
6	1.5V	32	SMB_DATA
7	CLKREQ#	33	PETp0
8	SIM_PWR	34	GND
9	GND	35	GND
10	SIM_DATA	36	USB_D-
11	REFCLK-	37	GND
12	SIM_CLK	38	USB_D+
13	REFCLK+	39	3.3V
14	SIM_RESET	40	GND
15	GND	41	3.3V
16	SIM_VPP	42	NC
17	SMI_SW1	43	GND
18	GND	44	NC
19	SMI_SW1	45	NC
20	NC	46	NC
21	GND	47	NC
22	PERST#	48	1.5V
23	PERn0	49	NC
24	SB_3.3V	50	GND
25	PERp0	51	NC
26	GND	52	3.3V

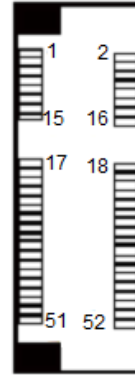


M_PCI_E1

2-28. mSATA CONNECTOR

SLOT2: mSATA Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Reserved	27	GND
2	3.3V	28	Reserved
3	NC	29	GND
4	GND	30	Reserved
5	NC	31	Reserved
6	1.5V	32	SMB_DATA
7	Reserved	33	SATA_TXP
8	NC	34	GND
9	GND	35	GND
10	NC	36	NC
11	NC	37	GND
12	NC	38	NC
13	NC	39	3.3V
14	NC	40	GND
15	GND	41	3.3V
16	NC	42	NC
17	NC	43	Reserved
18	GND	44	Reserved
19	NC	45	NC
20	NC	46	NC
21	GND	47	NC
22	Reserved	48	NC
23	SATA_RXP	49	NC
24	3.3V	50	GND
25	SATA_RXN	51	NC
26	GND	52	3.3V

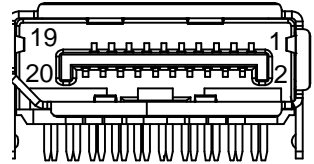


SLOT2

2-29. Display Port CONNECTOR

DP1: Display Port Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DATA0+	11	GND
2	GND	12	DATA3-
3	DATA0-	13	AUX_EN#
4	DATA1+	14	GND
5	GND	15	AUX+
6	DATA1-	16	GND
7	DATA2+	17	AUX-
8	GND	18	HPD
9	DATA2-	19	GND
10	DATA3+	20	3.3V

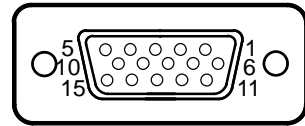


DP1

2-30. VGA CONNECTOR

VGA1: VGA Connector

The pin assignments are as follows:



VGA1

PIN	ASSIGNMENT
1	RED
2	GREEN
3	BLUE
4	SPC
5	GND
6	GND
7	GND
8	GND
9	+5V
10	GND
11	SPD
12	SDA
13	HSYNC
14	VSYNC
15	SCL

2-31. Keyboard / Mouse CONNECTOR

MS1: Internal Mouse Connector

PIN	ASSIGNMENT
4	5V
3	GND
2	DATA
1	CLK



MS1

KB1: Internal Keyboard Connector

PIN	ASSIGNMENT
4	5V
3	GND
2	DATA
1	CLK

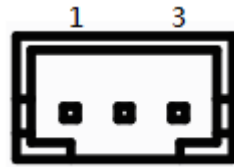


KB1

2-32. ATX PSU power control connector

ATX_PWRON1: ATX Connector
The pin assignments are as follows:

PIN	ASSIGNMENT
1	5VSB
2	PS_ON
3	GND



ATX_PWRON1

2-33. SMBus / I2C WAFER

JSMBUS1, JI2C1: SM bus and I2C Wafer
The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	5V
3	SCL
4	SDA



JSMBUS1

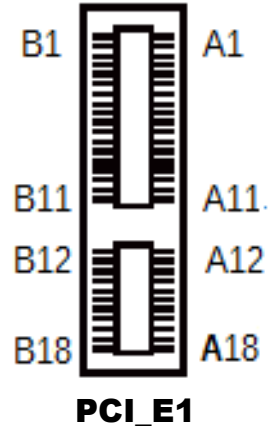


JI2C1

2-34. PCIE BUS

PCI_E1: PCIE BUS

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	NC	B1	12V
A2	12V	B2	12V
A3	12V	B3	12V
A4	GND	B4	GND
A5	NC	B5	SMB_CLK
A6	NC	B6	SMB_DATA
A7	NC	B7	GND
A8	NC	B8	3.3V
A9	3.3V	B9	NC
A10	3.3V	B10	3.3V_SB
A11	PWRGD	B11	WAKE#
A12	GND	B12	NC
A13	REFCLK+	B13	GND
A14	REFCLK-	B14	HSOP0
A15	GND	B15	HSO0
A16	HSIP0	B16	GND
A17	HSIN0	B17	PRSNT#
A18	GND	B18	GND



2-35. SATA CONNECTOR

JSATA2: Serial ATA Connector

PIN	ASSIGNMENT
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

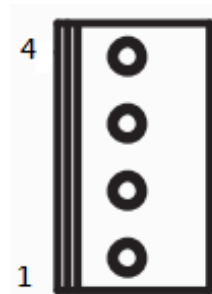


JSATA2

2-36. SATA POWER CONNECTOR

JSATA_PWR1: SATA Power Connector

PIN	ASSIGNMENT
4	12V
3	GND
2	GND
1	5V



JSATA_PWR1

SOFTWARE UTILITIES

CHAPTER **3**

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

The following sections are included:

- Introduction.
- Intel® Chipset Software Installation Utility
- Intel® Trusted Execution Engine Installation Utility
- VGA Driver Utility
- LAN Driver Utility
- Sound Driver Utility

3-1. INTRODUCTION

Enclosed with our BM-0972 package are our driver utilities, which come in a CD-ROM disk. Refer to the following table for driver locations.

Filename (Assume that CD ROM drive is D :)	Purpose	OS	
		DOS	Win7 32&64
D:\Driver\FIash BIOS	For Aptio(EFI) BIOS update utility	✓	X
D:\Driver\Platfrom\Win7(32,64-bit)\Chipset	Intel(R) Chipset Device Software Installation Utility	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\TXE	For Intel Trusted Execution Engine Interface	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\VGA	Intel HD Graphics	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\LAN	Intel I211AT & I211AT For LAN Driver installation	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\Audio	Realtek ALC888 For Sound driver installation	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\Serial IO	Intel(R) Serial IO Driver	X	✓
D:\Driver\Platfrom\Win7(32,64-bit)\USB3	Intel(R) USB 3.0 eXtensible Host Controller	X	✓

Filename (Assume that CD ROM drive is D :)	Purpose	OS	
		DOS	Win8.1 64
D:\Driver\FIash BIOS	For Aptio(EFI) BIOS update utility	✓	X
D:\Driver\Platfrom\ Win8.1(64-bit)\Chipset	Intel(R) Chipset Device Software Installation Utility	X	✓
D:\Driver\Platfrom\ Win8.1(64-bit)\TXE	For Intel Trusted Execution Engine Interface	X	✓
D:\Driver\Platfrom\Win8.1(64-bit)\VGA	Intel HD Graphics	X	✓
D:\Driver\Platfrom\ Win8.1(64-bit)\LAN	Intel I211AT & I211AT For LAN Driver installation	X	✓
D:\Driver\Platfrom\ Win8.1(64-bit)\Audio	Realtek ALC888 For Sound driver installation	X	✓
D:\Driver\Platfrom\Win8.1(64-bit)\Serial IO	Intel(R) Serial IO Driver	X	✓

Filename(Assume that DVD ROM drive is D :)	Purpose	OS	
		DOS	Win10 32&64
D:\Driver\Flash BIOS	For Aptio(EFI) BIOS update utility	✓	X
D:\Driver\Platform\ Win10(32,64-bit)\Chipset	Intel(R) Chipset Device Software Installation Utility	X	✓
D:\Driver\Platform\ Win10(32,64-bit)\TXE	For Intel Trusted Execution Engine Interface	X	✓
D:\Driver\Platform\Win10(32,64-bit)\VGA	Intel HD Graphics	X	✓
D:\Driver\Platform\ Win10(32,64-bit)\LAN	Intel I211AT & I211AT For LAN Driver installation	X	✓
D:\Driver\Platform\ Win10(32,64-bit)\Audio	Realtek ALC888 For Sound driver installation	X	✓
D:\Driver\Platform\Win10(32,64-bit)\Serial IO	Intel(R) Serial IO Driver	X	✓

X : Not support

✓: Support

3-2. Intel® Chipset Device Software installer

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. Installation of Utility for Windows 7/8.1/10

The Utility Pack is to be installed only for Windows 7/8.1/10 series, and it should be installed right after the OS installation. Please follow the steps below:

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

3-3. INTEL® TRUSTED EXECUTION ENGINE INSTALLATION UTILITY

3-3-1. Introduction

Pre-install Microsoft's Kernel-Mode Driver Framework (KMDF) version 1.11 for Windows 7/8.1/10 before you install the Intel® Trusted Execution Engine (TXE) driver in order to avoid errors in Device Manager.

3-3-2. Installation Instructions for Windows 7/8.1/10

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

3-4. VGA DRIVER UTILITY

3-4-1. Introduction

The VGA interface embedded with our BM-0972 can support a wide range of display.

3-4-2. Installation of VGA Driver

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

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

3-5. LAN DRIVER UTILITY

3-5-1. Introduction

BM-0972 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.

3-6. SOUND DRIVER UTILITY

3-6-1. Introduction

The Realtek sound function enhanced in this system is fully compatible with Windows 7/8.1/10 Below, you will find the content of the Sound driver:

3-6-2. Installation of Sound Driver

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

AMI BIOS SETUP

CHAPTER

4

This chapter shows how to set up the AMI BIOS.

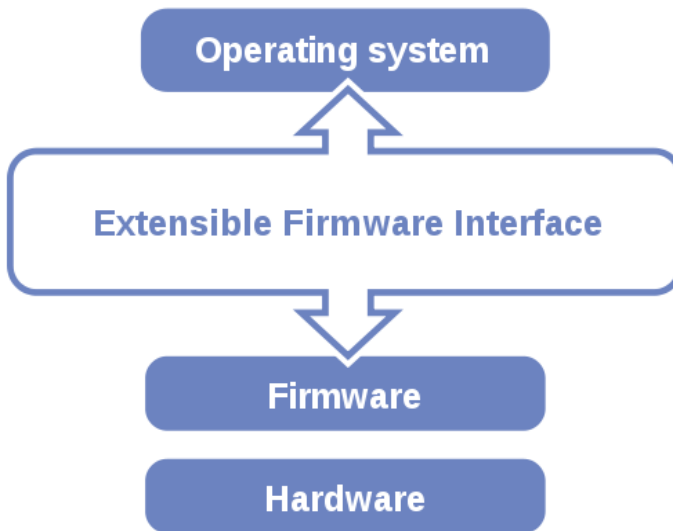
The following sections are included:

- Introduction
- Entering Setup
- Main
- Advanced
- Chipset
- Boot
- Security
- Save & Exit

4-1. INTRODUCTION

The board BM-0972 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 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 or <F2> key after the POST memory test begins and before the operating system boot begins. The settings are shown below.

4-2. ENTERING SETUP

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:



As long as this message is present on the screen you may press the 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 Initialization 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 date and time.



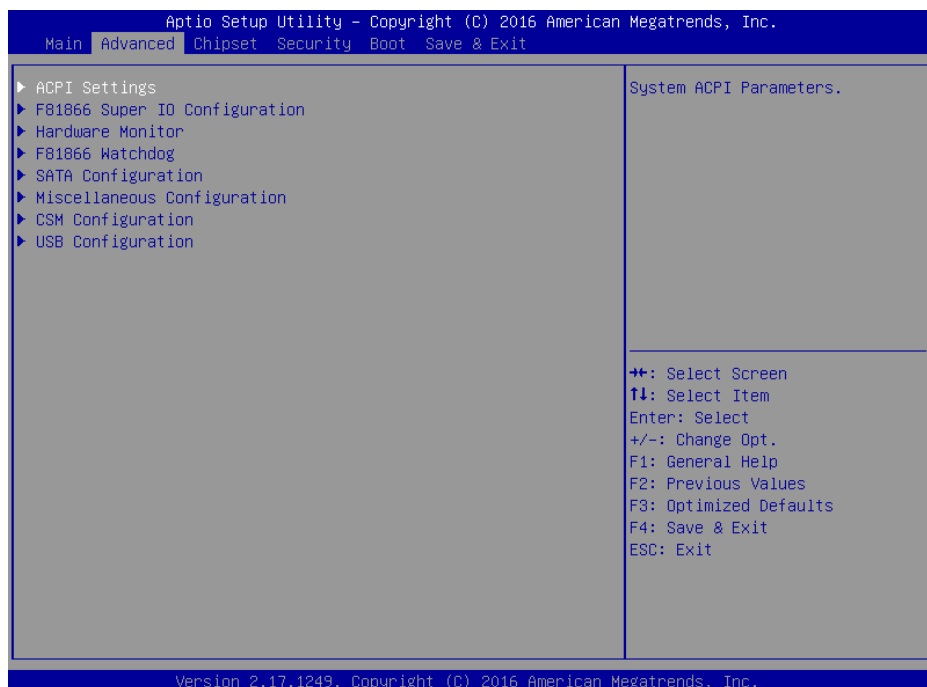
BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the BIOS vendor.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.
Build Date and Time	No changeable options	Displays the date that the

BIOS Setting	Options	Description/Purpose
		current BIOS version is built.
Access Level	Display only	Displays "Administrator".
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.

4-4. ADVANCED

Menu Path *Advanced*

This menu provides advanced configurations such as ACPI (Advanced Configuration and Power Management Interface) Settings, F81866 Super IO Configuration, Hardware Monitor, F81866 Watchdog, SATA Configuration, Miscellaneous Configuration, CSM Configuration, USB Configuration, etc.



Advanced Screen

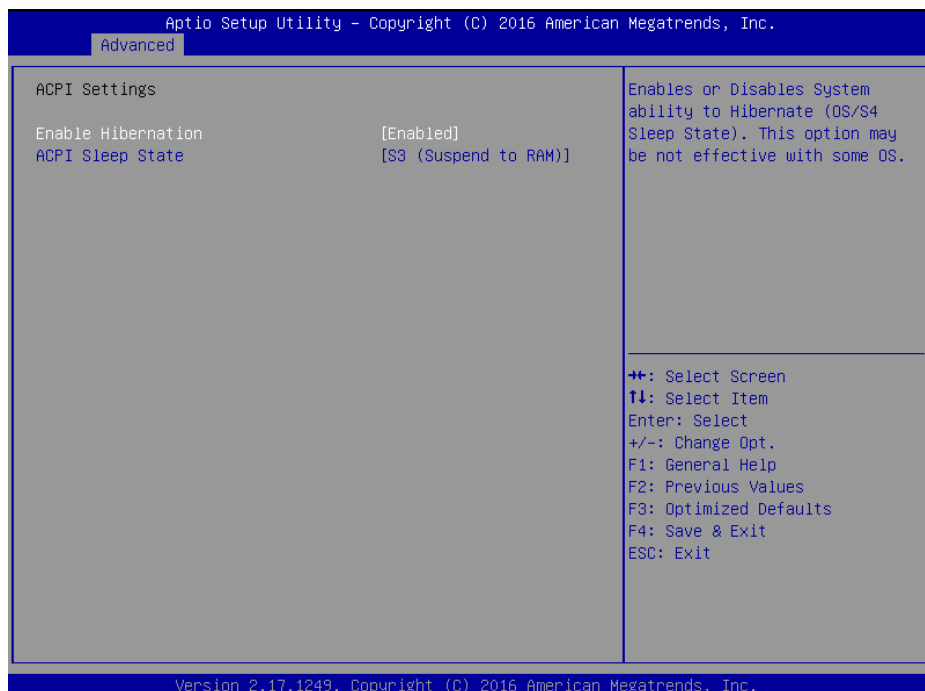
BIOS Setting	Options	Description/Purpose
ACPI Settings	Sub-Menu	System ACPI parameters.
F81866 Super IO Configuration	Sub-Menu	Super I/O Chip Configuration.

BIOS Setting	Options	Description/Purpose
Hardware Monitor	Sub-Menu	Monitor hardware status
F81866 Watchdog	Sub-Menu	F81866 Watchdog Parameters.
SATA Configuration	Sub-Menu	SATA Configuration Parameters.
CSM Configuration	Sub-Menu	Configure Option ROM execution, boot options filters, etc.
USB Configuration	Sub-Menu	USB Configuration Parameters.

4-4-1. ACPI Settings

Menu Path *Advanced > ACPI Settings*

The **ACPI Settings** allows users to configure relevant ACPI (Advanced Configuration and Power Management Interface) settings, such as ACPI Sleep State, Hibernation, lock legacy resources, etc.



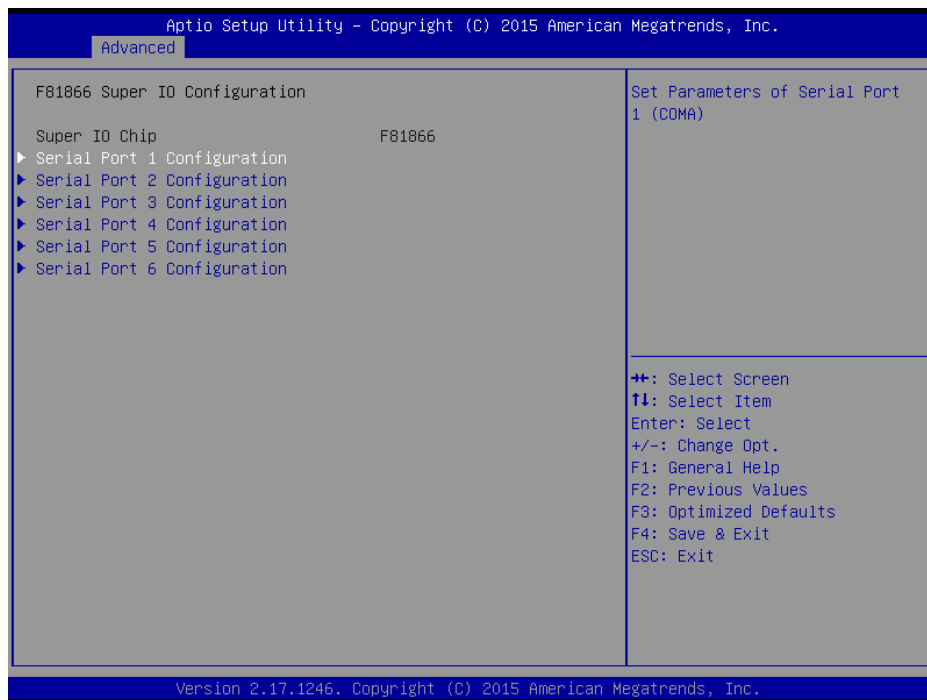
ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable Hibernation	- Disabled - Enabled	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	- Suspend Disabled	Specifies the ACPI sleep state.

BIOS Setting	Options	Description/Purpose
	- S3 Only (Suspend to RAM)	<ul style="list-style-type: none">▪ Suspend Disabled disables ACPI sleep feature.▪ S3 allows the platform to enter Suspend to RAM mode.

4-4-2. Super IO Configuration

 Menu Path *Advanced > F81866 Super IO Configuration*



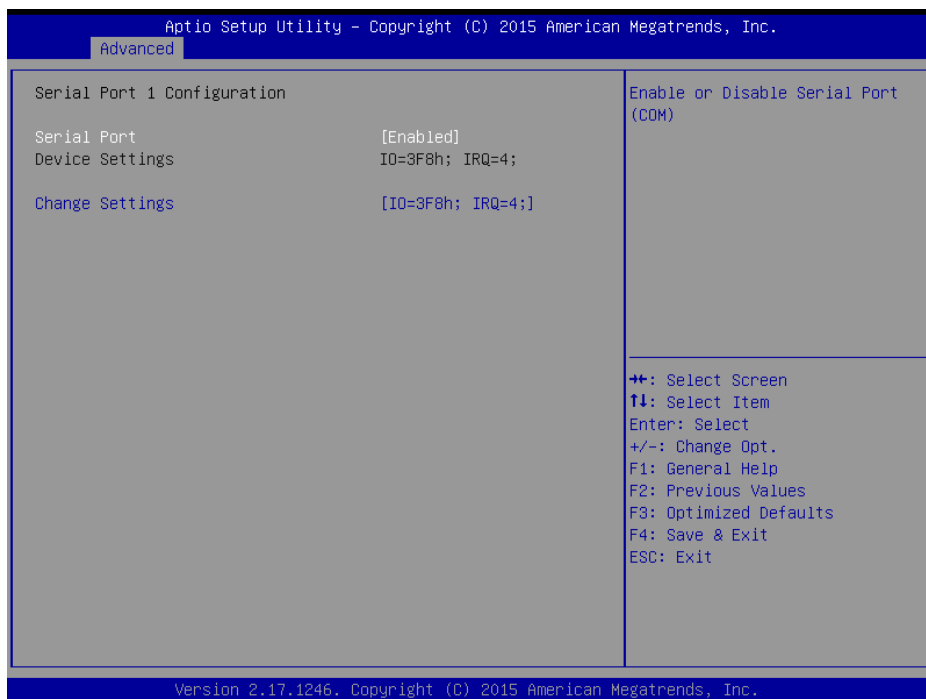
Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Super IO Chip	No changeable options	Displays the super IO chip model and its manufacturer.
Serial Port 1 Configuration	Sub-menu	Sets Parameters for COMA.
Serial Port 2 Configuration	Sub-menu	Sets Parameters for COMB.
Serial Port 3 Configuration	Sub-menu	Sets Parameters for COMC.

BIOS Setting	Options	Description/Purpose
Serial Port 4 Configuration	Sub-menu	Sets Parameters for COMD.
Serial Port 5 Configuration	Sub-menu	Sets Parameters for COME.
Serial Port 6 Configuration	Sub-menu	Sets Parameters for COMF.

4-4-2-1. Serial Port 1 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 1 Configuration*

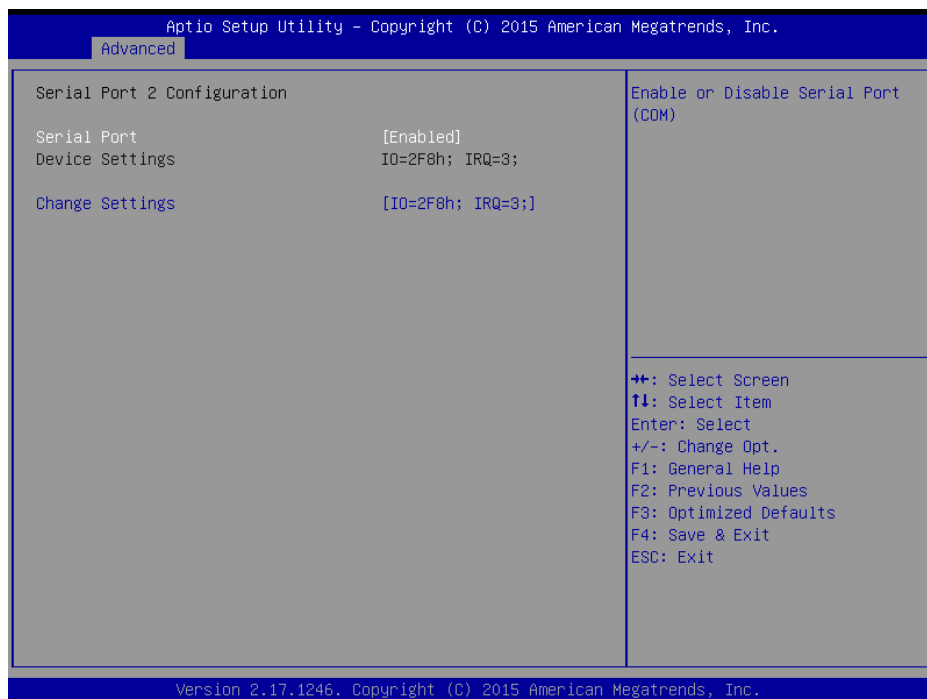


Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 1.
Device Settings	No changeable options	Displays the current settings of serial port 1.
Change Settings	-IO=3F8h; IRQ=4 -IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 -IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12 -IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12	Selects IRQ and I/O resource settings for the serial port 1.

4-4-2-2. Serial Port 2 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 2 Configuration*



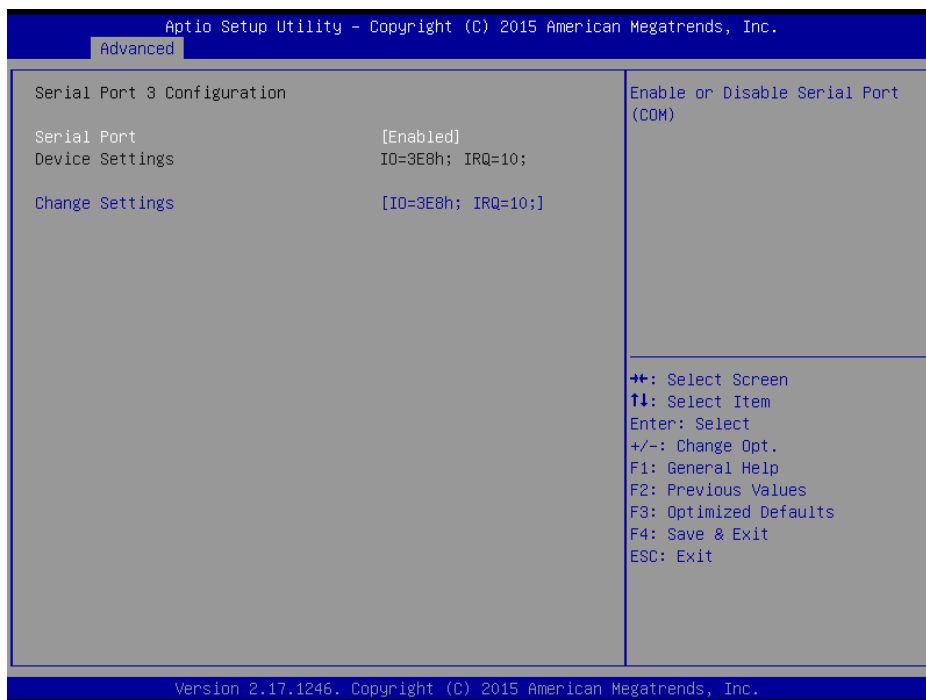
Serial Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 2.
Device Settings	No changeable options	Displays the current settings of serial port 2.
Change Settings	-IO=2F8h; IRQ=3 -IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 -IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12	Select IRQ and I/O resource settings for the serial port 2.

BIOS Setting	Options	Description/Purpose
	-IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12	

4-4-2-3. Serial Port 3 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 3 Configuration*



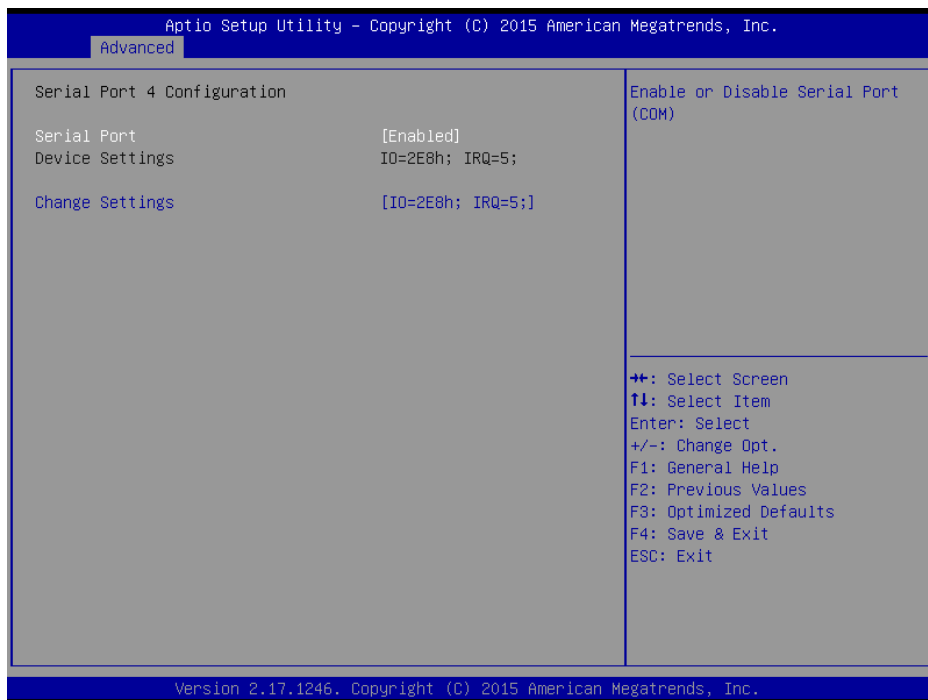
Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 3.

BIOS Setting	Options	Description/Purpose
Device Settings	No changeable options	Displays the current settings of serial port 3.
Change Settings	-IO=3E8h; IRQ=10 -IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 -IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12 -IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12 -IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12	Selects IRQ and I/O resource settings for the serial port 3.

4-4-2-4. Serial Port 4 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 4 Configuration*

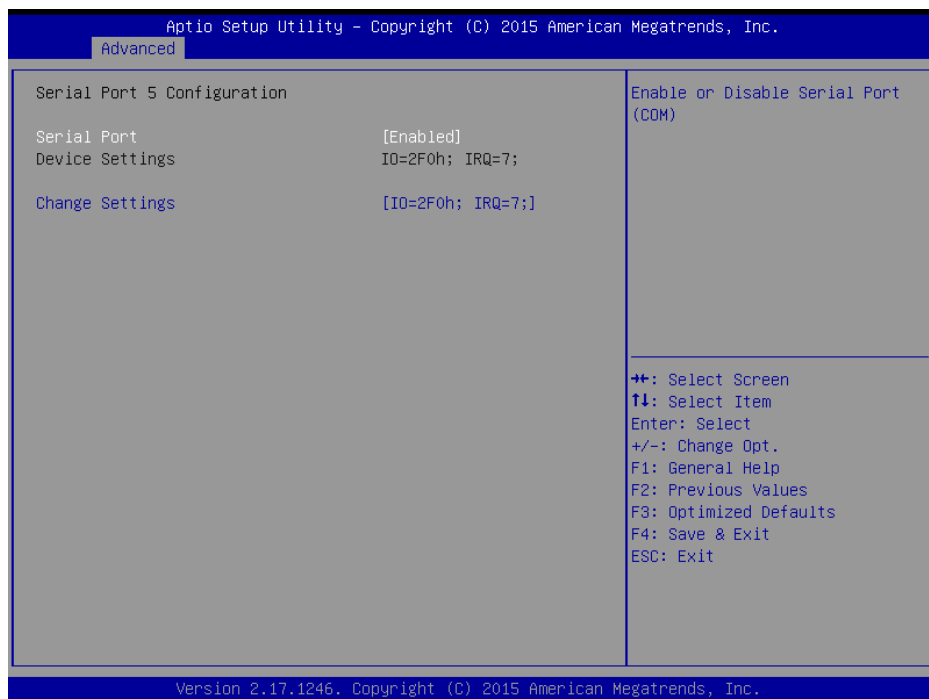


Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 4.
Device Settings	No changeable options	Displays the current settings of serial port 4.
Change Settings	-IO=2E8h; IRQ=5 -IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2F0h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E0h;IRQ=3,4,5,6,7,9,10,11,12	Select IRQ and I/O resource settings for the serial port 4.

4-4-2-5. Serial Port 5 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 5 Configuration*



Serial Port 5 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 5.
Device Settings	No changeable options	Displays the current settings of serial port 5.
Change Settings	-IO=2F0h; IRQ=7 -IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12	Select IRQ and I/O resource settings for the serial port 5.

BIOS Setting	Options	Description/Purpose
	-IO=2F0h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E0h;IRQ=3,4,5,6,7,9,10,11,12	

4-4-2-6. Serial Port 6 Configuration

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 6 Configuration*



Serial Port 6 Configuration Screen

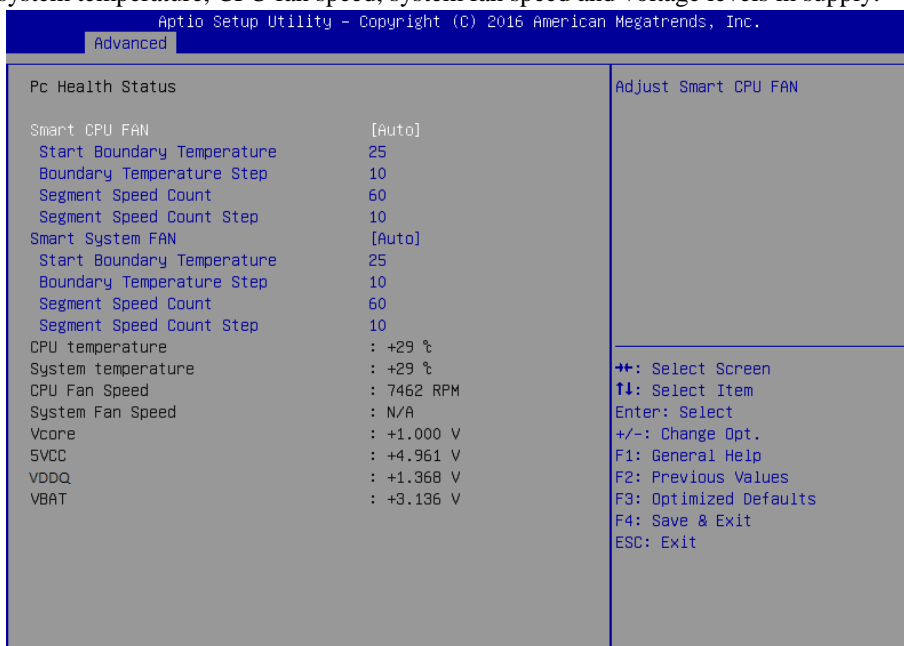
BIOS Setting	Options	Description/Purpose
Serial Port	-Disabled -Enabled	Enables or disables serial port 6.
Device Settings	No changeable options	Displays the current

BIOS Setting	Options	Description/Purpose
		settings of serial port 6.
Change Settings	-IO=2E0h; IRQ=6 -IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2F0h;IRQ=3,4,5,6,7,9,10,11,12 -IO=2E0h;IRQ=3,4,5,6,7,9,10,11,12	Selects IRQ and I/O resource settings for the serial port 6.

4-4-3. Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

The **Hardware Monitor** allows users to adjust Smart CPU and System FAN parameters (including start boundary temperature, boundary temperature, segment speed), and monitor the health and status of the system such as CPU temperature, system temperature, CPU fan speed, system fan speed and voltage levels in supply.



Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart CPU FAN	-Auto -Disabled -Manual	Adjusts Smart CPU Fan.
Start Boundary Temperature	-20 ~ 60	Adjusts Start Boundary Temperature. If the Boundary temperature is set to 25°C and

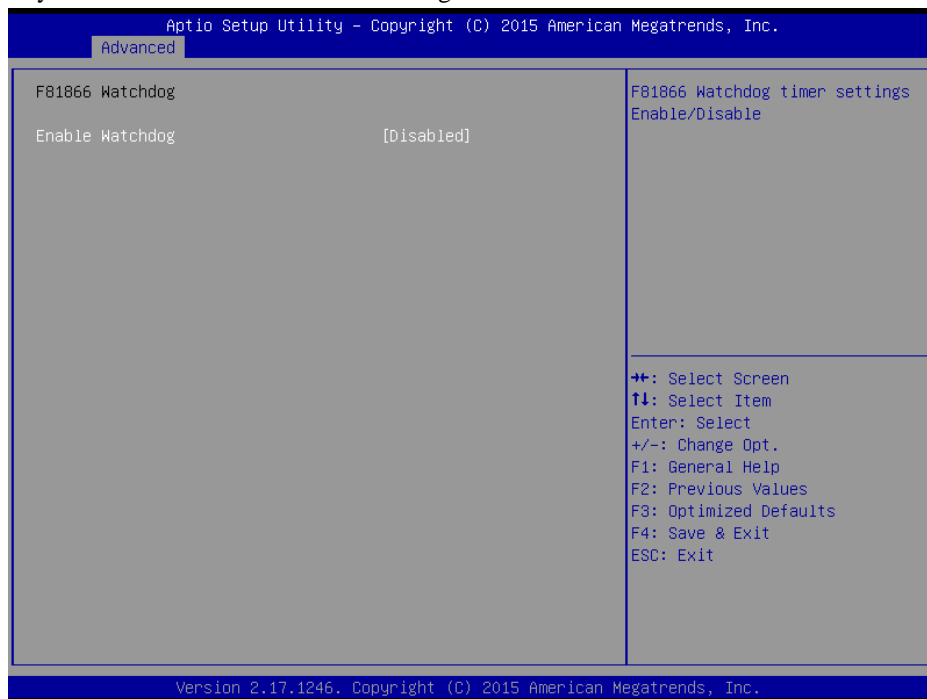
BIOS Setting	Options	Description/Purpose
		Step is set to 10, the boundary temperature will be set to 25°C, 35°C, 45°C, 55°C.
Boundary Temperature Step	-5~10	Adjusts boundary Temperature Step.
Segment Speed Count	-20~60	Adjusts Segment Speed Count.(%) If Segment Speed Count is set to 60% and Step is set to 10%, the segment speed will be set to 60% , 70%, 80% , 90% , 100%
Segment Speed Count Step	- 5~ 10	Adjusts Segment Speed Count Step(%).
Smart System FAN	-Auto -Disabled -Manual	Adjusts Smart System Fan.
Start Boundary Temperature	-20 ~ 60	Adjusts Start Boundary Temperature. If the Boundary temperature is set to 25°C and Step is set to 10, the boundary temperature will be set to 25°C, 35°C, 45°C, 55°C.
Boundary Temperature Step	-5~10	Adjusts boundary Temperature Step.
Segment Speed Count	-20~60	Adjusts Segment Speed Count.(%) If Segment Speed Count is set to 60% and Step is set to 10%, the segment speed will be set to 60% , 70%, 80% , 90% , 100%.
Segment Speed Count Step	- 5~ 10	Adjusts Segment Speed Count Step(%).
CPU Temperature	No changeable options	Displays the processor's temperature.
System Temperature	No changeable options	Displays the system's temperature.
CPU Fan Speed	No changeable options	Displays the CPU fan's speed by

BIOS Setting	Options	Description/Purpose
		RPM (Revolutions Per Minute).
System Fan Speed	No changeable options	Displays the system fan's speed
VCORE	No changeable options	Displays the voltage level of the +VCORE in supply.
5VCC	No changeable options	Displays the voltage level of the +5VCC in supply.
VDDQ	No changeable options	Displays the voltage level of the +VDDQ in supply.
VBAT	No changeable options	Displays the voltage level of the +VBAT in supply.

4-4-4. F81866 Watchdog

Menu Path *Advanced > F81866 Watchdog*

If the system hangs or fails to respond, enable the F81866 watchdog function to trigger a system reset via the 255-level watchdog timer.



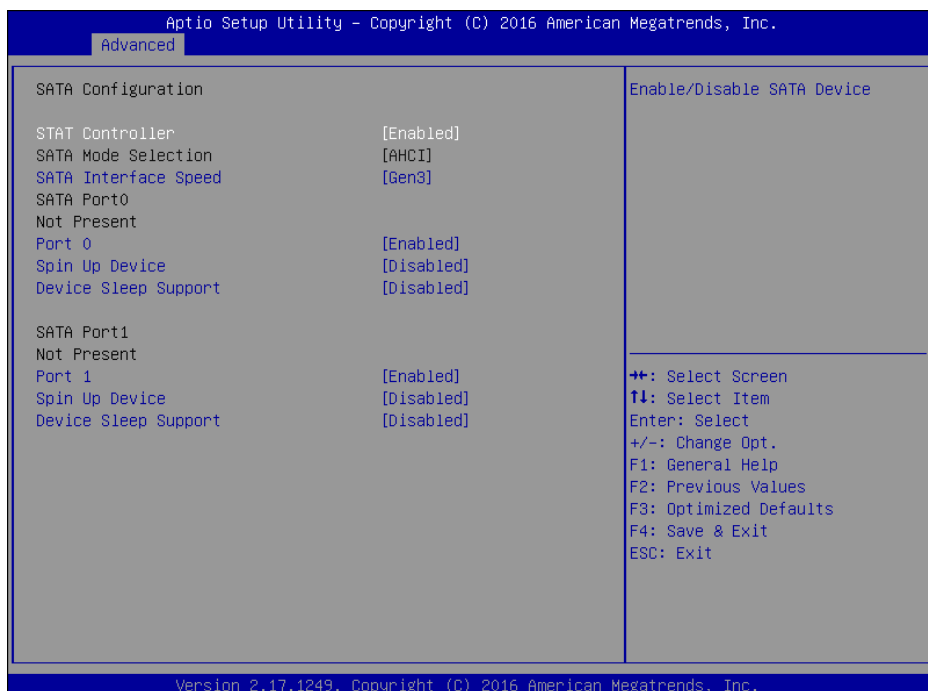
F81866 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable WatchDog	-Enabled -Disable	Enables/ Disables Watchdog timer.
Watchdog timer unit	-1s -60s	Selects seconds or minutes
Count for Timer (Seconds)	Multiple options ranging from 1 to 255	Sets the desired value (seconds) for watchdog timer.

4-4-5. SATA Configuration

Menu Path *Advanced > SATA Configuration*

The **SATA Configuration** allows users to enable / disable the SATA controller as well as the operational mode after the SATA controller is enabled. The following screen indicates the functions available when the SATA controller is enabled and the AHCI (Advanced Host Controller Interface) mode is selected.



SATA Configuration Screen

BIOS Setting	Options	Description/Purpose
SATA Controller	- Disabled - Enabled	Enables or disables SATA Device.
SATA Interface	- Gen3	Selects SATA Interface Speed. Gen1 Speed

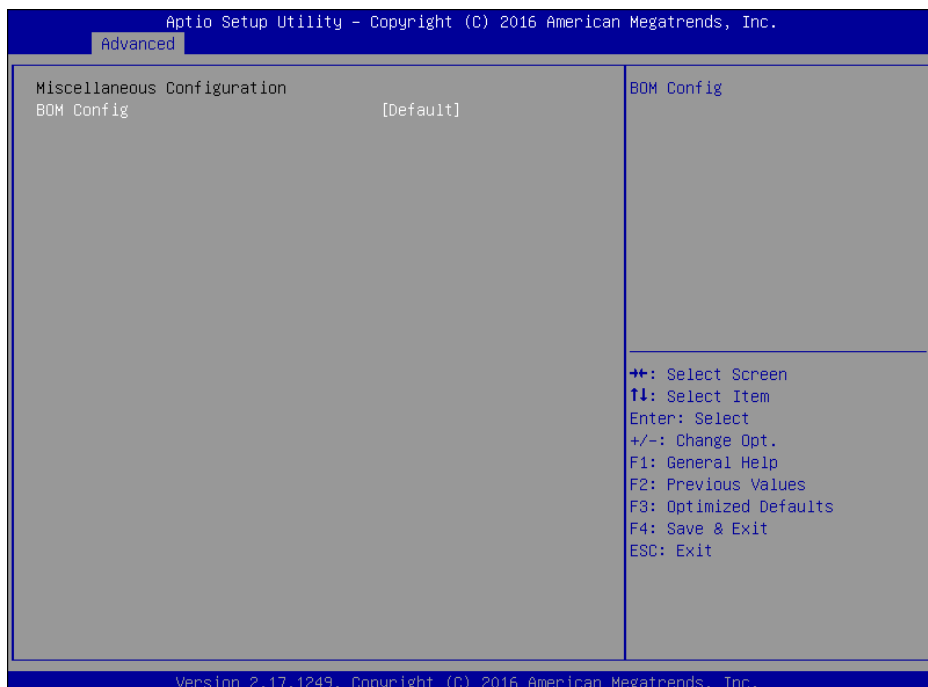
BIOS Setting	Options	Description/Purpose
Speed	- Gen2 - Gen1	can be selected only for CHV A1.
Port x	- Disabled - Enabled	Enables or Disables SATA Port.
Spin Up Device	- Disabled - Enabled	If enabled for any of the ports, Staggered Spin Up will be performed and only the drives with this option enabled will spin up at boot; otherwise, all drives spin up at boot.
Device Sleep Support	- Enabled - Disabled	Enables / Disables Device Sleep Support on the port.

Staggered spin-up is a physical performance strategy for serial ATA hard disk drives systems. With staggered spin-up, engineers handle the electrical load and system capacity during startup by staggering the times when disk drives begin input/output (I/O) operations.

With the traditional strategy, all drives spin up when device or system power is turned on, but staggered spin-up delays the spin up of some drives to provide a more stable demand to the power supply. Staggered spin-up is typically accommodated by a power-on self-test (POST) method, where the basic input/output system (BIOS) controls the boot process.

4-4-6. Miscellaneous Configuration

Menu Path *Advanced > Miscellaneous Configuration*



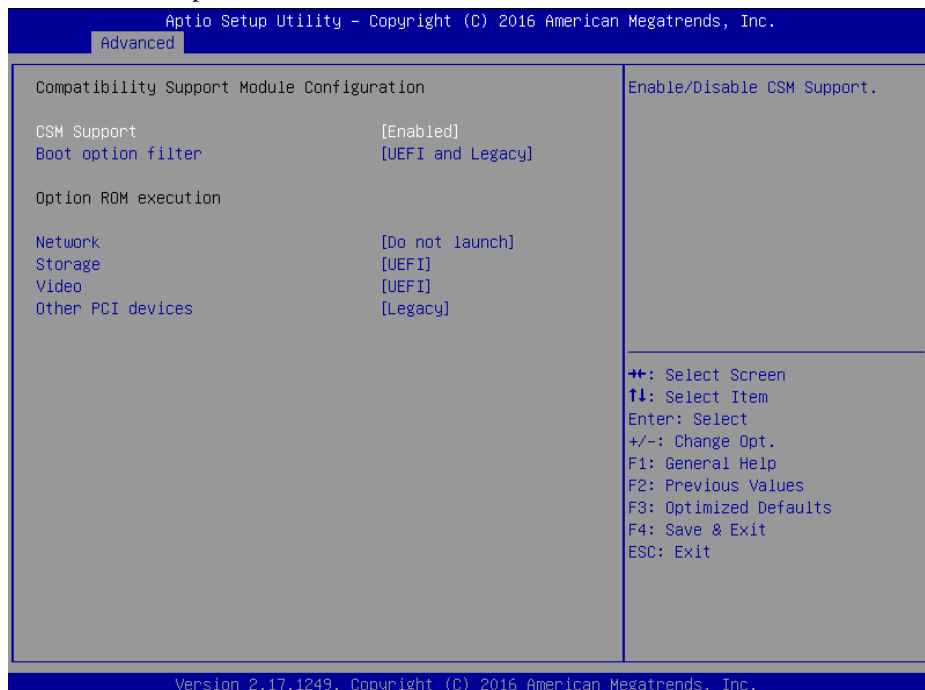
Miscellaneous Configuration Screen

BIOS Setting	Options	Description/Purpose
BOM Config	<ul style="list-style-type: none"> - Default - Legacy System - Yocto Linux 	BOM Configuration <ul style="list-style-type: none"> • Default: Selects Windows 8 or above. • Legacy System: Selects Windows 7. • Yocto Linux: Selects Linux system.

4-4-7. CSM Configuration

Menu Path *Advanced > CSM Configuration*

The **CSM Configuration** provides advanced CSM (Compatibility Support Module) configurations such as Enable/Disable CSM Support, configure Option ROM execution, boot option filter, etc.



CSM Configuration Screen

BIOS Setting	Options	Description/Purpose
CSM Support	- Disabled - Enabled	Disables or Enables CSM support.
Boot option filter	- UEFI and Legacy - Legacy only - UEFI only	This option controls what kind of devices the system can boot.

BIOS Setting	Options	Description/Purpose
Network	<ul style="list-style-type: none">- Do not launch- UEFI only- Legacy only	Controls the execution of UEFI or Legacy PXE.
Storage	<ul style="list-style-type: none">- Do not launch- UEFI only- Legacy only	Controls the execution of UEFI or Legacy Storage.
Video	<ul style="list-style-type: none">- Do not launch- UEFI only- Legacy only	Controls the execution of UEFI and Legacy Video.
Other PCI devices	<ul style="list-style-type: none">- UEFI first- Legacy only	Determines Option ROM execution policy for devices such as NIC, mass storage or video card.

4-4-8. USB Configuration

Menu Path *Advanced > USB Configuration*

The **USB Configuration** allows users to configure advanced USB settings such as Legacy USB support.



USB Configuration Screen

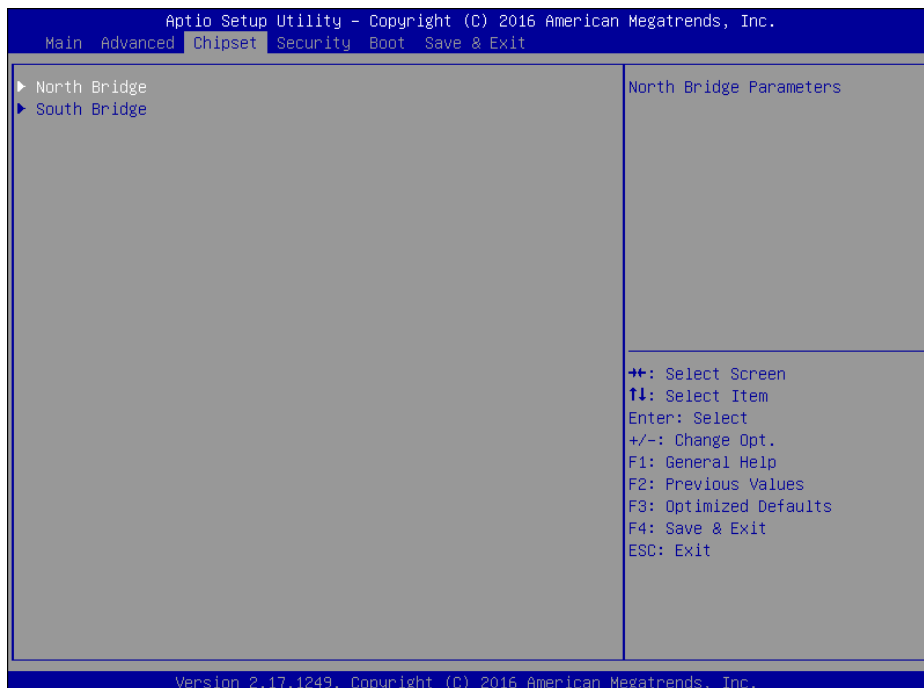
BIOS Setting	Options	Description/Purpose
USB Devices	No changeable options	Displays the number of the available USB devices.
Legacy USB Support	- Disabled - Enabled - Auto	Enables support for legacy USB.
XHCI Hand-off	- Disabled	This is a workaround for OSES without XHCI hand-off support.

BIOS Setting	Options	Description/Purpose
	- Enabled	
USB Mass Storage Driver Support.	- Disabled - Enabled	Enables/Disables USB mass storage driver 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	USB mass storage device Start Unit command time-out.
Device power-up delay	- Auto - Manual	The maximum time that 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.
Mass Storage Devices:	- Auto - Force FDD - Hard Disk - CD-ROM	Displays the device name and choose the device emulation type.

4-5. CHIPSET

Menu Path *Chipset*

This menu allows users to configure advanced Chipset settings such as North Bridge and South Bridge configuration parameters.



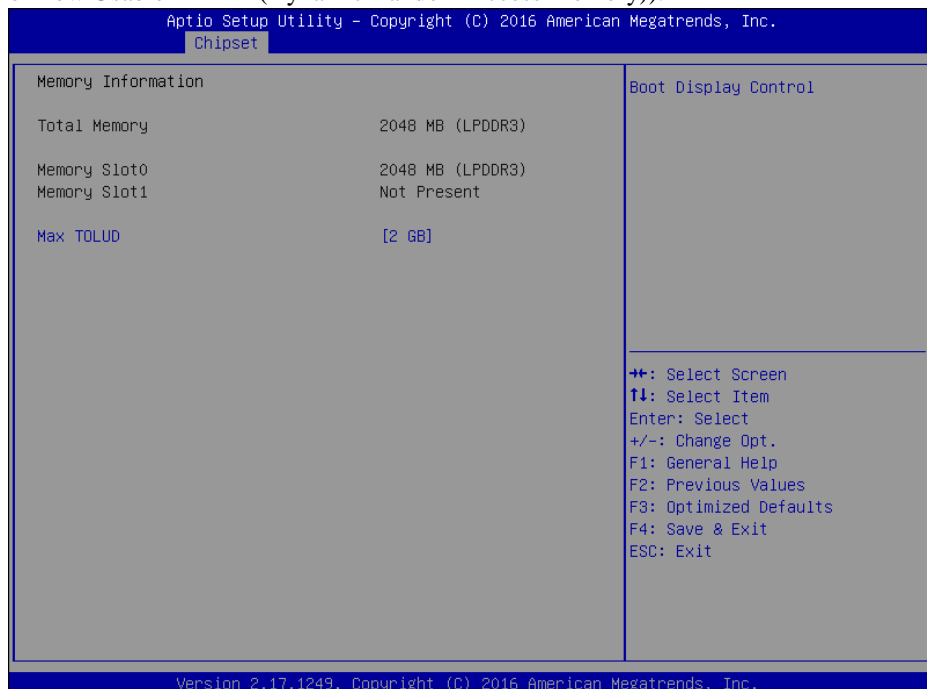
Chipset Screen

BIOS Setting	Options	Description/Purpose
North Bridge	Sub-menu	Sets Parameter for (North Bridge) configuration.
South Bridge	Sub-menu	Sets Parameter for (South Bridge) configuration.

4-5-1. North Bridge

Menu Path *Chipset > North Bridge*

The **North Bridge** configuration allows users to check for the information about the total DRAM size, SO-DIMM#1, 2 size, and select the maximum size of TOLUD (Top of Low Usable DRAM (Dynamic Random Access Memory)).



North Bridge Screen

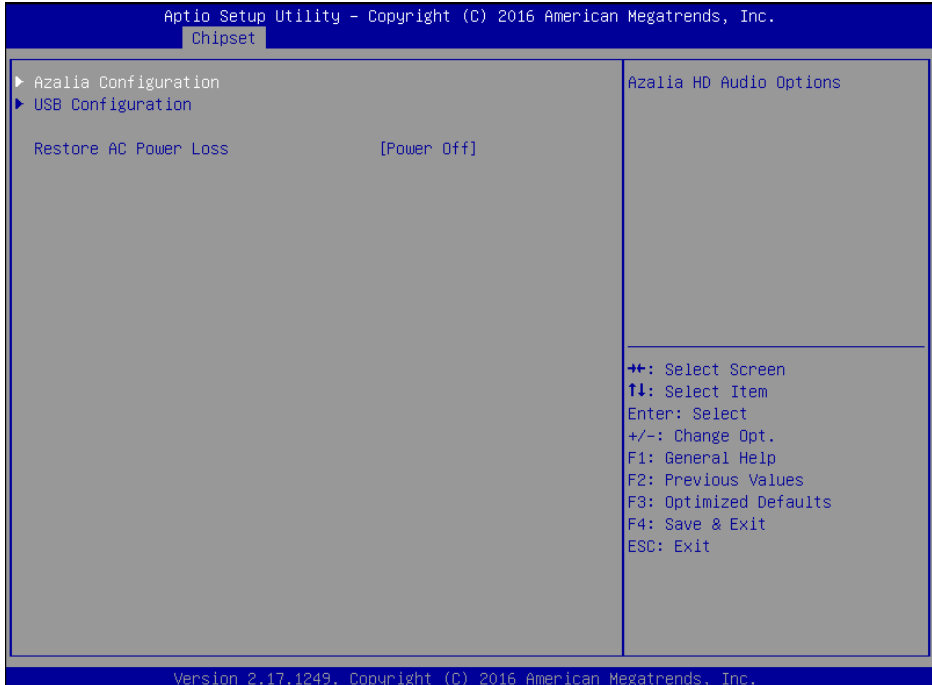
BIOS Setting	Options	Description/Purpose
Memory Information	No changeable options	Displays the DRAM information on the platform.
Total Memory	No changeable options	Displays the DRAM size
Max TOLUD	- 2 GB - 2.25 GB	Allows to select the maximum TOLUD size.

BIOS Setting	Options	Description/Purpose
	- 2.5 GB - 2.75 GB - 3 GB	

4-5-2. South Bridge

Menu Path *Chipset > South Bridge*

The **South Bridge** configuration allows users to configure Azalia HD Audio Options and configure USB settings, and determines the AC power state when the power is re-applied after a power failure occurs.



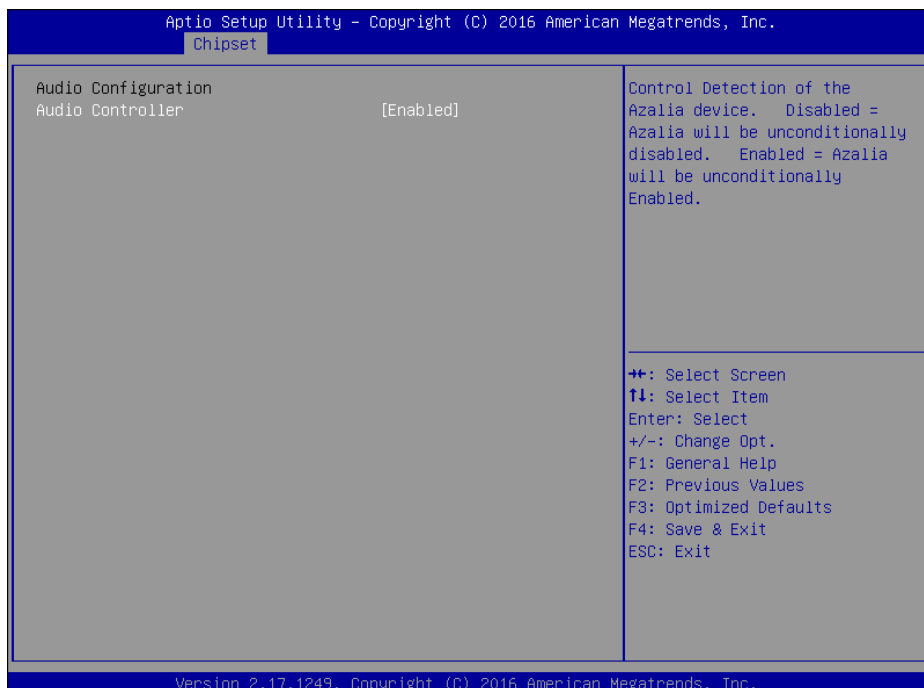
South Bridge Screen

BIOS Setting	Options	Description/Purpose
Azalia Configuration	Sub-menu	Azalia HD Audio options. Intel High Definition Audio (also called HD Audio or Azalia) is a specification for the audio subsystem of personal computers. It was released by Intel in 2004 as successor to their AC'97 PC audio standard. During development, it had the codename "Azalia".
USB Configuration	Sub-menu	USB configuration settings.
Restore AC Power Loss	<ul style="list-style-type: none">- Power Off- Power On- Last State	Selects AC power state when the power is re-applied after a power failure occurs. <ul style="list-style-type: none">▪ Power Off keeps the power off till the power button is pressed.▪ Power On makes the system power on after AC power is restored to the board.▪ Last State brings the system back to the last power state before AC remove.

4-5-2-1. South Bridge – Azalia Configuration

Menu Path *Chipset > South Bridge > Azalia Configuration*

The **Azalia Configuration** allows users to enable/disable the HD (High Definition) audio controller – Azalia device.



Azalia Configuration Screen

BIOS Setting	Options	Description/Purpose
Audio Controller	- Disabled - Enabled	Controls the detection of the Azalia device. <ul style="list-style-type: none"> • Disabled: Azalia device will be disabled unconditionally. • Enabled: Azalia will be enabled unconditionally.

4-5-2-2. South Bridge – USB Configuration

Menu Path *Chipset > South Bridge > USB Configuration*

The **USB Configuration** allows users to select the operation mode of XHCI (Extensible Host Controller Interface) controller. **XHCI** is a computer interface specification that defines a register-level description of a host controller for Universal Serial Bus (USB), which is capable of interfacing with USB 1.x, 2.0, and 3.x compatible devices. The specification is also referred to as the USB 3.0 host controller specification.



USB Configuration Screen

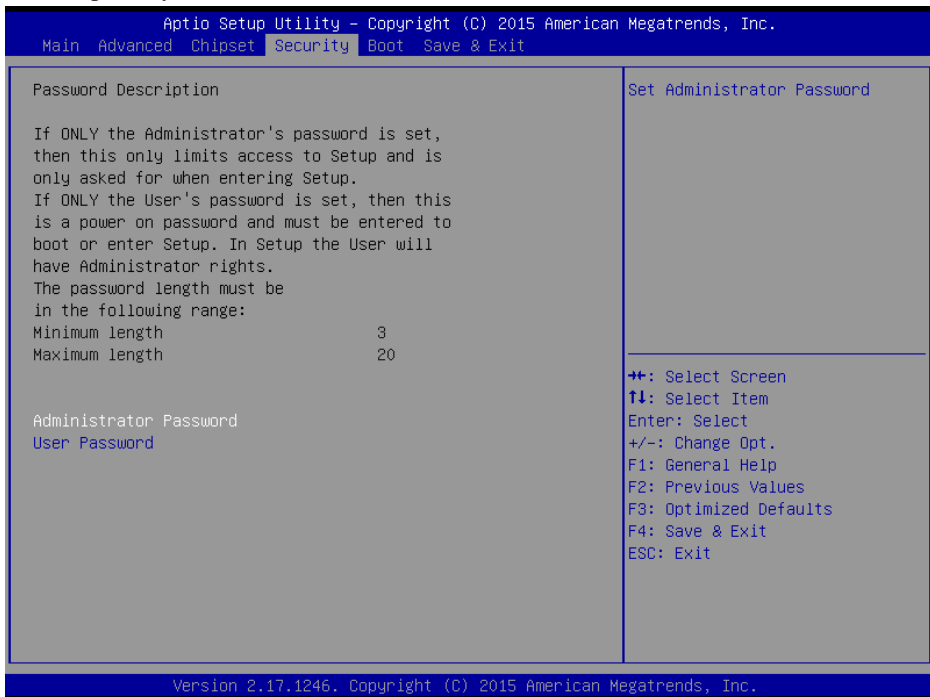
BIOS Setting	Options	Description/Purpose
XHCI Mode	- Disabled - Enabled	Select the operation mode of XHCI controller.

4-6. SECURITY

Menu Path	Security
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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 can 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 most of the features in the Setup utility.



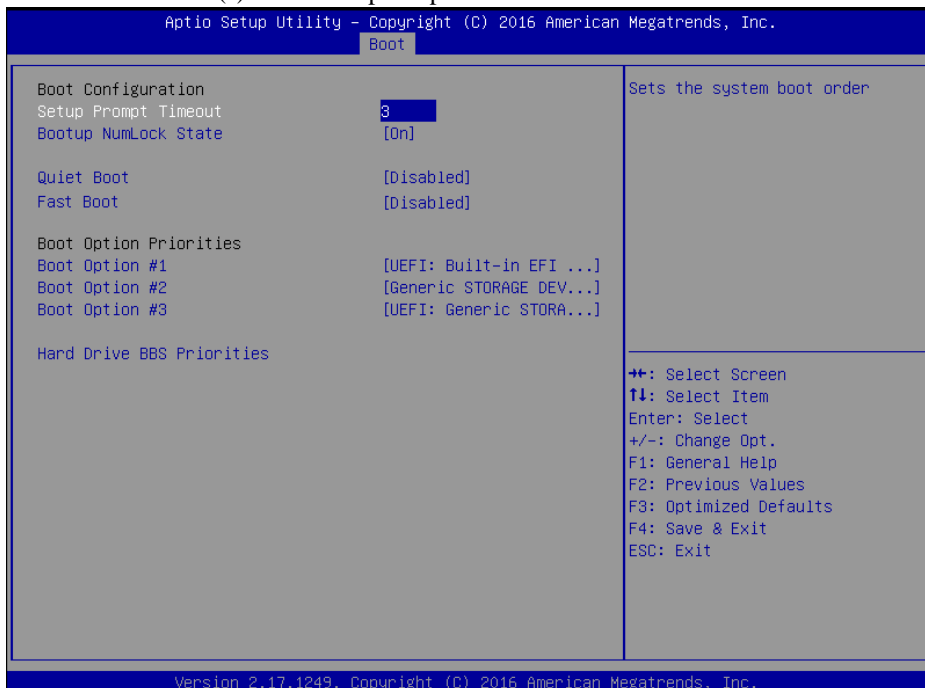
Security Screen

BIOS Setting	Options	Description/Purpose
Administrator Password	Password can be 3-20 alphanumeric characters.	Specifies the administrator password.
User Password	Password can be 3-20 alphanumeric characters.	Specifies the user password.

4-7. BOOT

Menu Path *Boot*

This menu provides control items for system boot configuration such as setting prompt timeout, enabling/disabling quiet boot and fast boot, selecting the boot sequence from the available device(s) and BBS option priorities.



Boot Screen

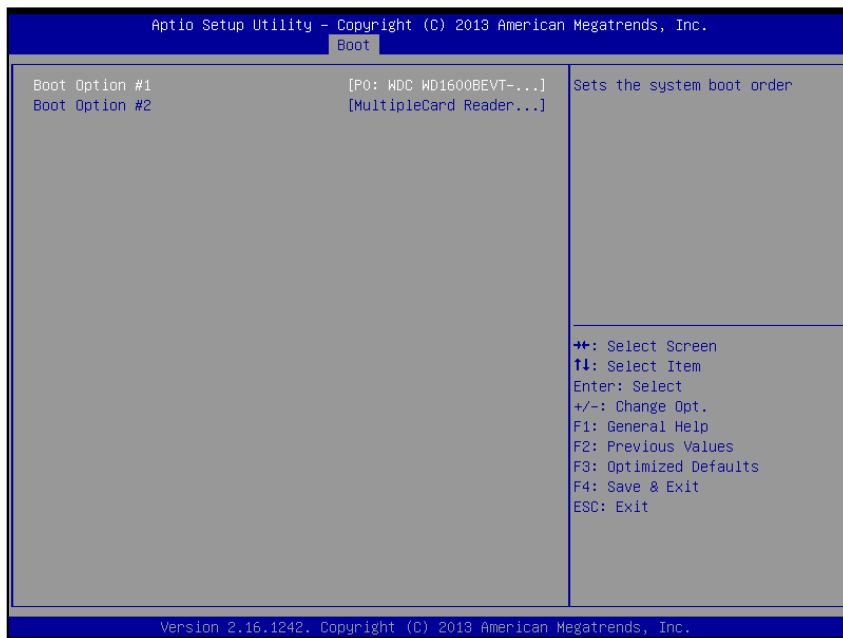
BIOS Setting	Options	Description/Purpose
Setup Prompt Timeout	Numeric	Number of seconds to wait for setup activation key.
Bootup NumLock State	- On - Off	Selects the NumLock state after the system is powered on. <ul style="list-style-type: none"> • On: Enables the NumLock function automatically after the

BIOS Setting	Options	Description/Purpose
		<p>system is powered on.</p> <ul style="list-style-type: none"> • Off: Disables the NumLock function after the system is powered on.
Quiet Boot	- Disabled - Enabled	Enables or 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 required to launch active boot option. It will have no impact for BBS boot options.
Boot Option #1~#n	- [Drive(s)] - Disabled	Allows users to choose the boot sequence from the available device(s). Note that in the menu displayed, you will only see the device with the highest priority for a specific boot device type.
Hard Drive BBS Priorities	Sub-Menu	Allow user to select the boot order of the available drive(s).
Network Drive BBS Priorities	Sub-Menu	Allow user to select the boot order of the available drive(s).

4-7-1. Hard Drive BBS Priorities

Menu Path *Boot > Hard Drive BBS Priorities*

Select **Hard Drive BBS Priorities** from the **Boot** menu to configure the boot sequence and priority of the available drives.



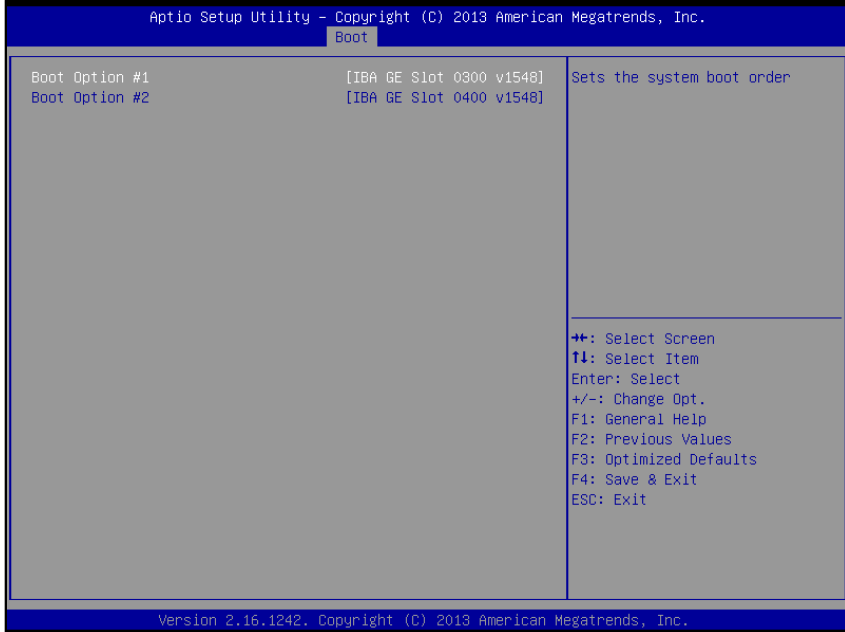
Hard Drive BBS Priorities Screen

BIOS Setting	Options	Description/Purpose
Boot Option #1 - #n	- [Drive(s)] - Disabled	Allows users to set the priority of all the drives connected to the system or another bootable USB storage. Press Enter to enter the sub-menu and press <↑> or <↓> arrow keys to select the device. Another way is to press <+> or <-> to move the selected device up/down in the priority list.

4-7-2. Network Drive BBS Priorities

Menu Path *Boot > Network Drive BBS Priorities*

Select **Network Drive BBS Priorities** from the **Boot** menu to configure the boot sequence and priority of the available drives that are connected to the network.



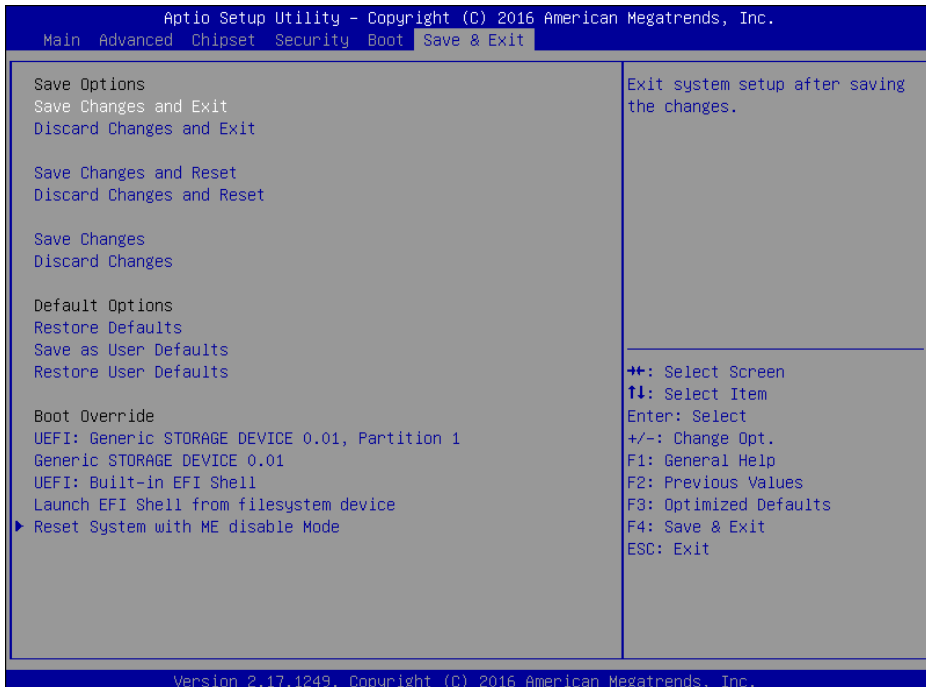
Hard Drive BBS Priorities Screen

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

4-8. SAVE & EXIT

Menu Path *Save & Exit*

To save and validate the changed BIOS settings, select the **Save & Exit** menu and the following picture will display:

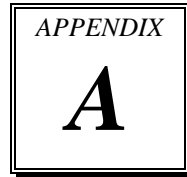


Save & Exit Screen

BIOS Setting	Options	Description/Purpose
Save Changes and Exit	No changeable options	Exits system setup after saving the changes.
Discard Changes and Exit	No changeable options	Exits system setup without saving any changes.
Save Changes	No changeable options	Saves the system after saving the

BIOS Setting	Options	Description/Purpose
and Reset		changes.
Discard Changes and Reset	No changeable options	Resets the system without saving the changes.
Save Changes	No changeable options	Save Changes done so far to any of the setup options.
Discard Changes	No changeable options	Discard Changes done so far to any of the setup options.
Restore Defaults	No changeable options	Loads the optimized defaults for BIOS settings.
Save as User Defaults	No changeable options	Save the changes done so far as User Defaults.
Restore User Defaults	No changeable options	Restore the User Defaults to all the setup options.
Boot Override	- [Drive(s)]	Forces to boot from selected [drive(s)].

EXPANSION BUS



This appendix indicates the pin assignments of expansion bus.

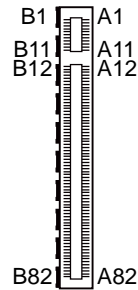
The following section is included:

- PCIe Bus

PCIE BUS

PCI_E1 (X16) with 164 pins is optional on BM-0972.

The pin assignments are as follows:



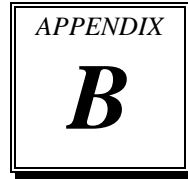
PCI_E1 (X16) Pin Assignment:

PCI_E1

A				B			
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	Reserved	A42	GND	B1	+12V	B42	EXP_A_TX_6_D N
A2	+12V	A43	EXP_A_RX_6_D P	B2	+12V	B43	GND
A3	+12V	A44	EXP_A_RX_6_D N	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_D P	B6	SMB_DATA_	B47	GND
A7	Reserved	A48	EXP_A_RX_7_D N	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_D P	B55	Reserved
A15	GND	A56	Reserved	B15	EXP_A_TX_0_D N	B56	Reserved
A16	EXP_A_RX_0_DP	A57	Reserved	B16	GND	B57	Reserved
A17	EXP_A_RX_0_DN	A58	Reserved	B17	PCIEX16_PRSN T2	B58	Reserved
A18	GND	A59	Reserved	B18	GND	B59	Reserved
A19	Reserved	A60	Reserved	B19	EXP_A_TX_1_D P	B60	Reserved
A20	GND	A61	Reserved	B20	EXP_A_TX_1_D N	B61	Reserved

A				B			
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A21	EXP_A_RX_1_D P	A62	Reserved	B21	GND	B62	Reserved
A22	EXP_A_RX_1_D N	A63	Reserved	B22	GND	B63	Reserved
A23	GND	A64	Reserved	B23	EXP_A_TX_2_D P	B64	Reserved
A24	GND	A65	Reserved	B24	EXP_A_TX_2_D N	B65	Reserved
A25	EXP_A_RX_2_D P	A66	Reserved	B25	GND	B66	Reserved
A26	EXP_A_RX_2_D N	A67	Reserved	B26	GND	B67	Reserved
A27	GND	A68	Reserved	B27	EXP_A_TX_3_D P	B68	Reserved
A28	GND	A69	Reserved	B28	EXP_A_TX_3_D N	B69	Reserved
A29	EXP_A_RX_3_D P	A70	Reserved	B29	GND	B70	Reserved
A30	EXP_A_RX_3_D N	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_D P	B74	Reserved
A34	GND	A75	Reserved	B34	EXP_A_TX_4_D N	B75	Reserved
A35	EXP_A_RX_4_D P	A76	Reserved	B35	GND	B76	Reserved
A36	EXP_A_RX_4_D N	A77	Reserved	B36	GND	B77	Reserved
A37	GND	A78	Reserved	B37	EXP_A_TX_5_D P	B78	Reserved
A38	GND	A79	Reserved	B38	EXP_A_TX_5_D N	B79	Reserved
A39	EXP_A_RX_5_D P	A80	Reserved	B39	GND	B80	Reserved
A40	EXP_A_RX_5_D N	A81	Reserved	B40	GND	B81	Reserved
A41	GND	A82	Reserved	B41	EXP_A_TX_6_D P	B82	Reserved

TECHNICAL SUMMARY

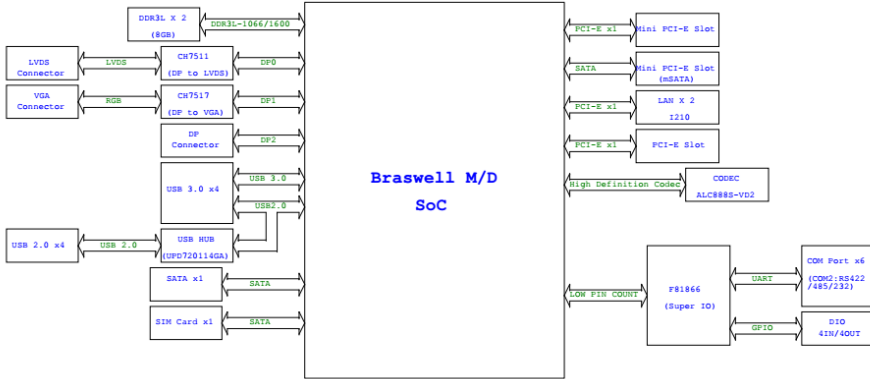


This section introduce you the maps concisely.

The following sections are included:

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

BLOCK DIAGRAM



INTERRUPT MAP

IRQ	ASSIGNMENT
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Communications Port (COM4)
IRQ 6	Communications Port (COM6)
IRQ 7	Communications Port (COM5)
IRQ 10	Communications Port (COM3)
IRQ 11	Intel(R) Celeron(R)/Pentium(R) SM Bus Controller - 2292
IRQ 12	PS/2 Compatible Mouse
IRQ 19	Standard SATA AHCI Controller
IRQ 22	High Definition Audio Controller
IRQ 48	Intel Serial IO GPIO Controller
IRQ 49	Intel Serial IO GPIO Controller
IRQ 50	Intel Serial IO GPIO Controller
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
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IRQ 88	Microsoft ACPI-Compliant System
IRQ 89	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 90	Microsoft ACPI-Compliant System
IRQ 91	Microsoft ACPI-Compliant System
IRQ 91	Intel Serial IO GPIO Controller
IRQ 92	Microsoft ACPI-Compliant System
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IRQ 95	Microsoft ACPI-Compliant System
IRQ 96	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
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IRQ	ASSIGNMENT
IRQ 361	Microsoft ACPI-Compliant System
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IRQ 377	Microsoft ACPI-Compliant System
IRQ 378	Microsoft ACPI-Compliant System
IRQ 379	Microsoft ACPI-Compliant System
IRQ 380	Microsoft ACPI-Compliant System
IRQ 381	Microsoft ACPI-Compliant System
IRQ 382	Microsoft ACPI-Compliant System
IRQ 383	Microsoft ACPI-Compliant System
IRQ 384	Microsoft ACPI-Compliant System
IRQ 385	Microsoft ACPI-Compliant System
IRQ 386	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 387	Microsoft ACPI-Compliant System
IRQ 388	Microsoft ACPI-Compliant System
IRQ 389	Microsoft ACPI-Compliant System
IRQ 390	Microsoft ACPI-Compliant System
IRQ 391	Microsoft ACPI-Compliant System
IRQ 392	Microsoft ACPI-Compliant System
IRQ 393	Microsoft ACPI-Compliant System
IRQ 394	Microsoft ACPI-Compliant System
IRQ 395	Microsoft ACPI-Compliant System
IRQ 396	Microsoft ACPI-Compliant System
IRQ 397	Microsoft ACPI-Compliant System
IRQ 398	Microsoft ACPI-Compliant System
IRQ 399	Microsoft ACPI-Compliant System
IRQ 400	Microsoft ACPI-Compliant System
IRQ 401	Microsoft ACPI-Compliant System
IRQ 402	Microsoft ACPI-Compliant System
IRQ 403	Microsoft ACPI-Compliant System
IRQ 404	Microsoft ACPI-Compliant System
IRQ 405	Microsoft ACPI-Compliant System
IRQ 406	Microsoft ACPI-Compliant System
IRQ 407	Microsoft ACPI-Compliant System
IRQ 408	Microsoft ACPI-Compliant System
IRQ 409	Microsoft ACPI-Compliant System
IRQ 410	Microsoft ACPI-Compliant System
IRQ 411	Microsoft ACPI-Compliant System
IRQ 412	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 413	Microsoft ACPI-Compliant System
IRQ 414	Microsoft ACPI-Compliant System
IRQ 415	Microsoft ACPI-Compliant System
IRQ 416	Microsoft ACPI-Compliant System
IRQ 417	Microsoft ACPI-Compliant System
IRQ 418	Microsoft ACPI-Compliant System
IRQ 419	Microsoft ACPI-Compliant System
IRQ 420	Microsoft ACPI-Compliant System
IRQ 421	Microsoft ACPI-Compliant System
IRQ 422	Microsoft ACPI-Compliant System
IRQ 423	Microsoft ACPI-Compliant System
IRQ 424	Microsoft ACPI-Compliant System
IRQ 425	Microsoft ACPI-Compliant System
IRQ 426	Microsoft ACPI-Compliant System
IRQ 427	Microsoft ACPI-Compliant System
IRQ 428	Microsoft ACPI-Compliant System
IRQ 429	Microsoft ACPI-Compliant System
IRQ 430	Microsoft ACPI-Compliant System
IRQ 431	Microsoft ACPI-Compliant System
IRQ 432	Microsoft ACPI-Compliant System
IRQ 433	Microsoft ACPI-Compliant System
IRQ 434	Microsoft ACPI-Compliant System
IRQ 435	Microsoft ACPI-Compliant System
IRQ 436	Microsoft ACPI-Compliant System
IRQ 437	Microsoft ACPI-Compliant System
IRQ 438	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 439	Microsoft ACPI-Compliant System
IRQ 440	Microsoft ACPI-Compliant System
IRQ 441	Microsoft ACPI-Compliant System
IRQ 442	Microsoft ACPI-Compliant System
IRQ 443	Microsoft ACPI-Compliant System
IRQ 444	Microsoft ACPI-Compliant System
IRQ 445	Microsoft ACPI-Compliant System
IRQ 446	Microsoft ACPI-Compliant System
IRQ 447	Microsoft ACPI-Compliant System
IRQ 448	Microsoft ACPI-Compliant System
IRQ 449	Microsoft ACPI-Compliant System
IRQ 450	Microsoft ACPI-Compliant System
IRQ 451	Microsoft ACPI-Compliant System
IRQ 452	Microsoft ACPI-Compliant System
IRQ 453	Microsoft ACPI-Compliant System
IRQ 454	Microsoft ACPI-Compliant System
IRQ 455	Microsoft ACPI-Compliant System
IRQ 456	Microsoft ACPI-Compliant System
IRQ 457	Microsoft ACPI-Compliant System
IRQ 458	Microsoft ACPI-Compliant System
IRQ 459	Microsoft ACPI-Compliant System
IRQ 460	Microsoft ACPI-Compliant System
IRQ 461	Microsoft ACPI-Compliant System
IRQ 462	Microsoft ACPI-Compliant System
IRQ 463	Microsoft ACPI-Compliant System
IRQ 464	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 465	Microsoft ACPI-Compliant System
IRQ 466	Microsoft ACPI-Compliant System
IRQ 467	Microsoft ACPI-Compliant System
IRQ 468	Microsoft ACPI-Compliant System
IRQ 469	Microsoft ACPI-Compliant System
IRQ 470	Microsoft ACPI-Compliant System
IRQ 471	Microsoft ACPI-Compliant System
IRQ 472	Microsoft ACPI-Compliant System
IRQ 473	Microsoft ACPI-Compliant System
IRQ 474	Microsoft ACPI-Compliant System
IRQ 475	Microsoft ACPI-Compliant System
IRQ 476	Microsoft ACPI-Compliant System
IRQ 477	Microsoft ACPI-Compliant System
IRQ 478	Microsoft ACPI-Compliant System
IRQ 479	Microsoft ACPI-Compliant System
IRQ 480	Microsoft ACPI-Compliant System
IRQ 481	Microsoft ACPI-Compliant System
IRQ 482	Microsoft ACPI-Compliant System
IRQ 483	Microsoft ACPI-Compliant System
IRQ 484	Microsoft ACPI-Compliant System
IRQ 485	Microsoft ACPI-Compliant System
IRQ 486	Microsoft ACPI-Compliant System
IRQ 487	Microsoft ACPI-Compliant System
IRQ 488	Microsoft ACPI-Compliant System
IRQ 489	Microsoft ACPI-Compliant System
IRQ 490	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 491	Microsoft ACPI-Compliant System
IRQ 492	Microsoft ACPI-Compliant System
IRQ 493	Microsoft ACPI-Compliant System
IRQ 494	Microsoft ACPI-Compliant System
IRQ 495	Microsoft ACPI-Compliant System
IRQ 496	Microsoft ACPI-Compliant System
IRQ 497	Microsoft ACPI-Compliant System
IRQ 498	Microsoft ACPI-Compliant System
IRQ 499	Microsoft ACPI-Compliant System
IRQ 500	Microsoft ACPI-Compliant System
IRQ 501	Microsoft ACPI-Compliant System
IRQ 502	Microsoft ACPI-Compliant System
IRQ 503	Microsoft ACPI-Compliant System
IRQ 504	Microsoft ACPI-Compliant System
IRQ 505	Microsoft ACPI-Compliant System
IRQ 506	Microsoft ACPI-Compliant System
IRQ 507	Microsoft ACPI-Compliant System
IRQ 508	Microsoft ACPI-Compliant System
IRQ 509	Microsoft ACPI-Compliant System
IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967278	Intel® I210 Gigabit Network Connection #4
IRQ 4294967279	Intel® I210 Gigabit Network Connection #4
IRQ 4294967280	Intel(R) I210 Gigabit Network Connection #4
IRQ 4294967281	Intel(R) I210 Gigabit Network Connection #4
IRQ 4294967282	Intel(R) I210 Gigabit Network Connection #4

IRQ	ASSIGNMENT
IRQ 4294967283	Intel(R) I210 Gigabit Network Connection #4
IRQ 4294967284	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967285	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967286	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967287	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967288	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967289	Intel(R) I210 Gigabit Network Connection #5
IRQ 4294967290	Intel(R) Trusted Execution Engine Interface
IRQ 4294967291	Intel(R) USB 3.0 eXtensible Host Controller - 0100 (Microsoft)
IRQ 4294967292	Intel(R) HD Graphics
IRQ 4294967293	PCI Express standard Root Port
IRQ 4294967294	PCI Express standard Root Port

I/O MAP

I/O MAP	ASSIGNMENT
0x00000000-0x0000006F	PCI Express Root Complex
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
0x00000040-0x00000043	System timer

I/O MAP	ASSIGNMENT
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000078-0x000000CF7	PCI Express Root Complex
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
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
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000002E0-0x000002E7	Communications Port (COM6)
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F0-0x000002F7	Communications Port (COM5)
0x000002F8-0x000002FF	Communications Port (COM2)

I/O MAP	ASSIGNMENT
0x000003E8-0x000003EF	Communications Port (COM3)
0x000003F8-0x000003FF	Communications Port (COM1)
0x00000400-0x0000047F	Motherboard resources
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000500-0x000005FE	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000D000-0x0000DFFF	PCI Express standard Root Port
0x0000E000-0x0000EFFF	PCI Express standard Root Port
0x0000F000-0x0000F03F	Intel(R) HD Graphics
0x0000F040-0x0000F05F	Intel(R) Celeron(R)/Pentium(R) SM Bus Controller - 2292
0x0000F060-0x0000F07F	Standard SATA AHCI Controller

MEMORY MAP

MEMORY MAP	ASSIGNMENT
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFEAA0000-0xFEAF0000	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Intel Serial IO GPIO Controller
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFFFF	Motherboard resources
0x81400000-0x815FFFFFFF	PCI Express standard Root Port
0x81400000-0x815FFFFFFF	Intel(R) I210 Gigabit Network Connection #5
0x81615000-0x816157FF	Standard SATA AHCI Controller
0x81614000-0x8161401F	Intel(R) Celeron(R)/Pentium(R) SM Bus Controller - 2292
0x80000000-0x80FFFFFFF	Intel(R) HD Graphics
0x80000000-0x80FFFFFFF	PCI Express Root Complex
0x90000000-0x9FFFFFFF	Intel(R) HD Graphics
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0xFED88000-0xFED8FFFF	Intel Serial IO GPIO Controller
0xFED90000-0xFED97FFF	Intel Serial IO GPIO Controller
0xFED98000-0xFED9FFFF	Intel Serial IO GPIO Controller
0x81200000-0x813FFFFFFF	PCI Express standard Root Port
0x81200000-0x813FFFFFFF	Intel(R) I210 Gigabit Network Connection #4
0x81600000-0x8160FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 0100

MEMORY MAP	ASSIGNMENT
	(Microsoft)
0x81500000-0x81503FFF	Intel(R) I210 Gigabit Network Connection #5
0x81100000-0x811FFFFFF	Intel(R) Trusted Execution Engine Interface
0x81000000-0x810FFFFFF	Intel(R) Trusted Execution Engine Interface
0x81300000-0x81303FFF	Intel(R) I210 Gigabit Network Connection #4
0x81610000-0x81613FFF	High Definition Audio Controller
0xA0000-0xBFFFF	PCI Express Root Complex
0xC0000-0xDFFFF	PCI Express Root Complex
0xE0000-0xFFFFF	PCI Express Root Complex

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

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.

Example Program

Enable the watchdog timer and set 30 sec. as the time-out interval

```
;----- 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,    030h  
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,    30h
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

I. Before System BIOS update

1. Prepare a bootable media (e.g. USB storage device) which can boot the system to DOS prompt.
2. Download and save the BIOS file (e.g. M9720P01.bin) to the bootable device.
3. Copy AMI flash utility – AFUDOS.exe (V5.06.01) 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 <F2> or 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], set the USB bootable device to be the 1st boot device.
 - (6) Press <F4> key to save the configuration and exit the BIOS setup menu.



II. AFUDOS Command for System BIOS Update

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

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

You can type **AFUDOS /?** to see all the definition of each control options. The recommended options for BIOS ROM update consist of following parameters:

/P: program main BIOS image

/B: program Boot Block

/N: program NVRAM

/X: don't check ROM ID

III. BIOS update procedure

1. Use the bootable USB device to boot up system into the MS-DOS command prompt.
2. Type in `AFUDOS M972xxxx.bin /p /b /n /x` and press enter to start the flash procedure.
Note: `xxxx` means the BIOS revision part, ex. 0PM1.
3. During the update procedure, you will see the BIOS update process status and its percentage. Beware! Do not turn off system power or reset your computer if the whole procedure are not complete yet, or it may crash the BIOS ROM and make system unable to boot up next time.
4. After BIOS update procedures is complete, the messages should be like the figure shown below:

```
C:\AFU>afudos.exe M9720PM1.BIN /p /b /n /x
+-----+
|                AMI Firmware Update Utility  v5.06.01                |
|                Copyright (C)2014 American Megatrends Inc. All Rights Reserved.                |
+-----+
Reading flash ..... done
- ME Data Size checking . ok
- FFS checksums ..... ok
Erasing Boot Block ..... done
Updating Boot Block ..... done
Verifying Boot Block ..... done
Erasing Main Block ..... done
Updating Main Block ..... done
Verifying Main Block ..... done
Erasing NURAM Block ..... done
Updating NURAM Block ..... done
Verifying NURAM Block ..... done

C:\AFU>
C:\AFU>_
```

5. Restart the system and boot up with the new BIOS configurations.
6. The BIO Update is completed after the system is restarted.

7. Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.



Revision History

Date	Version	Description	Approval
20161227	M2	<ol style="list-style-type: none">1. The version of BM-0972 User Manual is changed to M2.2. In Chapter 2, the title of “Bottom View of BM-0972RC-**N” has been corrected.3. Chapter 2 (2-10. BACKLIGHT ENABLE PIN Voltage Selection Guide): Modified Backlight Enable default setting to 3.3V.4. Updated Appendix B: Block Diagram.	Jerry Hsu