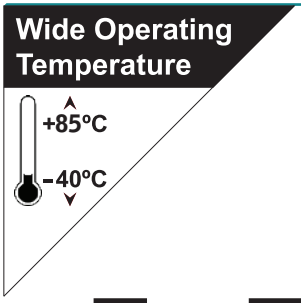

EmETXe-i87M2

Wide-temperature COM Express® Basic Type 6 CPU Module

User's Manual

Version 1.1

2016.04

Revision History

Version	Date	Description
1.0	2016/01	Initial release
1.1	2016/04	Revise CPU 2.0G-->2.6G -Revise Board Dimension -Revise CD Connector -Add HS-87M2-C2

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Copyright Notice

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Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

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Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

Warning
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 Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1)This device may not cause harmful interference, and

(2)This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

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.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Single Board Computer from the power source when you want to work on the inside.

2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry.

3. Use a grounded wrist strap when handling computer components.

4. Place components on a grounded antistatic pad or on the bag that comes with the Single Board Computer, whenever components are separated from the system.

Replacing the Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash-can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at: http://arbor-technology.com/
Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

http://arbor-technology.com/
E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

Chapter 1

Introduction

1.1 The Product

The EmETXe-i87M2 Series is a space-conscious CPU board of 125 mm x 95 mm to take up only small footprint in your system. By the architecture of Type 6, the board has two high-performance connectors to promise stable data passing rate. The soldered onboard Intel® 5th Generation Core™ processor, along with integrated Intel® HD Graphics Gen 7.5 graphics chipset, bring Analog RGB, LVDS and DDI solution for most CRT monitors or LCD video panels.

For system configuration, the board is supported by AMI UEFI BIOS. EmETXe-i87M2 Series is an ideal choice for some demanding industrial control and data communications by its significant processing performance, low power consumption and these features:

- Soldered onboard 5th Generation Intel® Core™ Processor
- Integrated Gigabit Ethernet
- Dual channels 24-bit LVDS, Analog RGB, and 3 x DDI ports
- Supports 3 independent displays
- ECC Memory supported
- Extended Operating Temp.: -40 ~ 85°C

1.2 About This Manual

This user's manual provides general information and installation instructions about the product. This user's manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this booklet. Please consult your vendor before further handling.

1.3 Specifications

System	
CPU	Soldered onboard 5th Generation Intel® Core™ i7-5700EQ 2.6GHz (Base) /3.4GHz (Turbo)
Memory	2 x DDR3L ECC SO-DIMM sockets, supporting 1600MHz up to 16GB SDRAM
Chipset	Intel® PCH QM87
BIOS	AMI® UEFI BIOS
Watchdog Timer	1~255 levels reset
I/O	
USB Port	12 x USB ports: - 8 x USB 2.0 ports - 4 x USB 3.0 ports
Storage	4 x Serial ATA ports: - 2 ports with 600MB/s HDD transfer rate - 2 ports with 300MB/s HDD transfer rate
	SATA RAID 0, 1, 5, 10 supported
Expansion Bus	1 x PCIe x16 Gen3 lanes
	7 x PCIe x1 Gen2 lanes
Ethernet Chipset	1 x Intel® i218LM GbE PHY
Audio	HD Audio link
Display	
Graphics Chipset	Integrated Intel® HD Gen 7.5
Graphics Interface	Analog RGB supports up to 1920x1200@60Hz
	LCD: Dual Channels 24-bit LVDS up to 1920 x 1200 @60Hz (OEM request)
	3 x DDI ports
Mechanical & Environmental	
Power Requirement	+12V, 5VSB
Power Consumption	1.13A@12V, 0.31A@5V, 0.36A@3.3V with i7-5700EQ (Typical)
Operating Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	0% ~ 95% @ 60ºC (non-condensing)
Dimension (L x W)	125 x 95 mm (4.9” x 3.7”)

1.4 Inside the Package

Before you begin installing your single board, please make sure that the following materials have been shipped:

1 x EmETXe-i87M2 COM Express CPU Module

1 x Driver CD
1 x Quick Installation Guide

If any of the above items is damaged or missing, contact your vendor immediately.

1.5 Ordering Information

EmETXe-i87M2-5700EQ	5th Generation Intel® Core i7-5700EQ 2.6GHz (Base) /3.4GHz (Turbo)/QM87 WT COM Express® CPU module

1.5.1 Optional Accessories

HS-87M2-C2	Cooler 125x95x40mm
PBE-1702	COM Express® Type 6 evaluation carrier board (ATX form factor)
CBK-04-1702-00	Cable Kit 1 x SATA cable 2 x COM-port cables 1 x USB cable

1.6 The Installation Paths of CD Driver

The CPU module supports Windows 7 and 8.1 Find the necessary drivers on the CD that comes with your purchase. For different OS, the driver installation may vary slightly, but generally they are similar. Find the drivers on CD by the following paths:

Windows 7

Driver	Path
Chipset	\EmETXe-i87M2\Chipset\Chipset_10.1.1.7
Graphic	32bit: \EmETXe-i87M2\Graphic\32bit\Intel® Graphics Driver Production Version 15.40.8.4281
	64bit: \EmETXe-i87M2\Graphic\64bit\Intel® Graphics Driver Production Version 15.40.8.64.4281
Audio	32bit: \EmETXe-i87M2\Audio\32bit
	64bit: \EmETXe-i87M2\Audio\64bit
Ethernet	\EmETXe-i87M2\Ethernet\20_0_CD
ME	\EmETXe-i87M2\ME\ME9.0_5M_V9.0.13.1402
USB 3.0	\EmETXe-i87M2\USB3.0\Intel_USB_3.0_Driver_3.0.5.69

Windows 8.1

Driver	Path
Chipset	\EmETXe-i87M2\Chipset\Chipset_10.1.1.7
Graphic	32bit: \EmETXe-i87M2\Graphic\32bit\Intel® Graphics Driver Production Version 15.40.8.4281
	64bit: \EmETXe-i87M2\Graphic\64bit\Intel® Graphics Driver Production Version 15.40.8.64.4281
Audio	32bit: \EmETXe-i87M2\Audio\32bit
	64bit: \EmETXe-i87M2\Audio\64bit
Ethernet	\EmETXe-i87M2\Ethernet\20_0_CD
ME	\EmETXe-i87M2\ME\ME9.0_5M_V9.0.13.1402

Chapter 2

Board Overview

2.1 What Is "COM Express®"?

With more and more demands on small and embedded industrial boards, a multi-functional COM (Computer-on-Module) surfaces as a great solution.

COM Express® supports seven pin-out types applying to Basic and Extended form factors:

Module Type 1 and 10 support single connector with two rows (220 pins).

Module Type 2, 3, 4, 5 and 6 support two connectors with four rows (440 pins).

EmETXe-i87M2 Series is a Type-6 module.

Difference between Standard Type 6 and EmETXe-i87M2 Series is listed as below:

Module Type	Standard Type 6	EmETXe-i87M2 Series
Connectors	2	2
Connector Rows	A, B, C, D	A, B, C, D
PCIe Lanes (Max)	24	23
LAN (Max)	1	1
Serial Ports (Max)	2	0
Digital Display I/F (Max)	3	3
USB 3.0 Ports (Max)	4	4

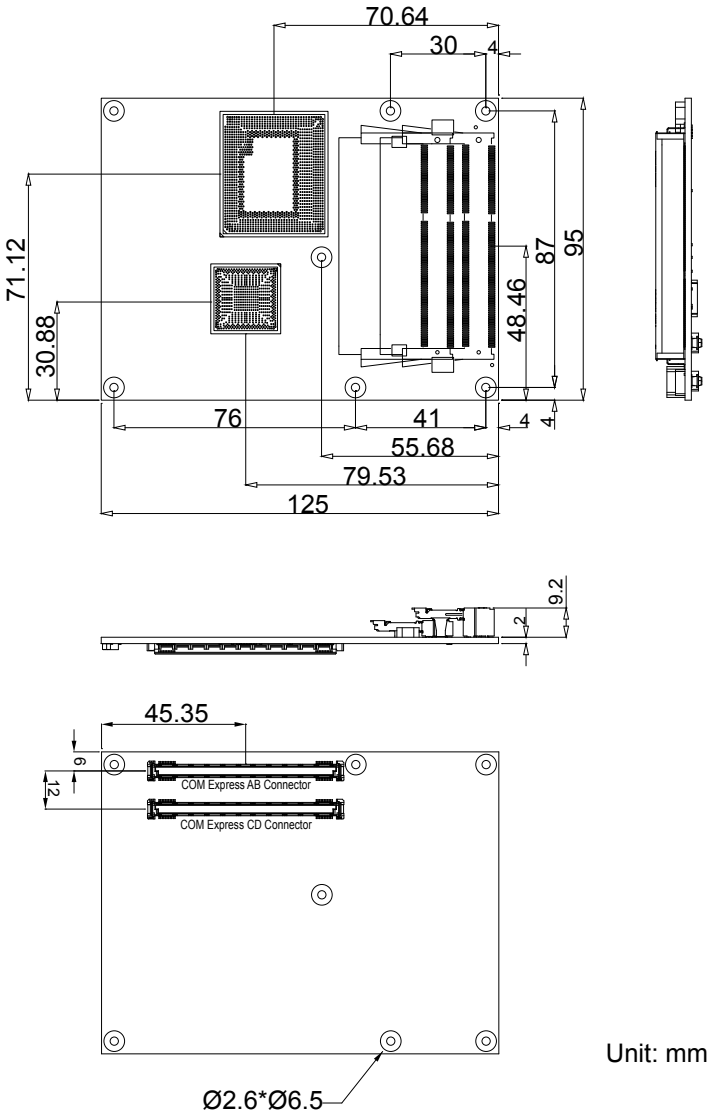
Row AB provides pins for PCI Express, SATA, LVDS, LCD channel, LPC bus, system and power management, VGA, LAN, and power and ground interfaces.

Row CD provides SDVO and legacy PCI and IDE signals next to additional PCI Express, LAN and power and ground signals. The COM are targeted at following applications:

- Retail & Advertising
- Medical
- Test & Measurement
- Gaming & Entertainment
- Industrial & Automation
- Military & Government
- Security

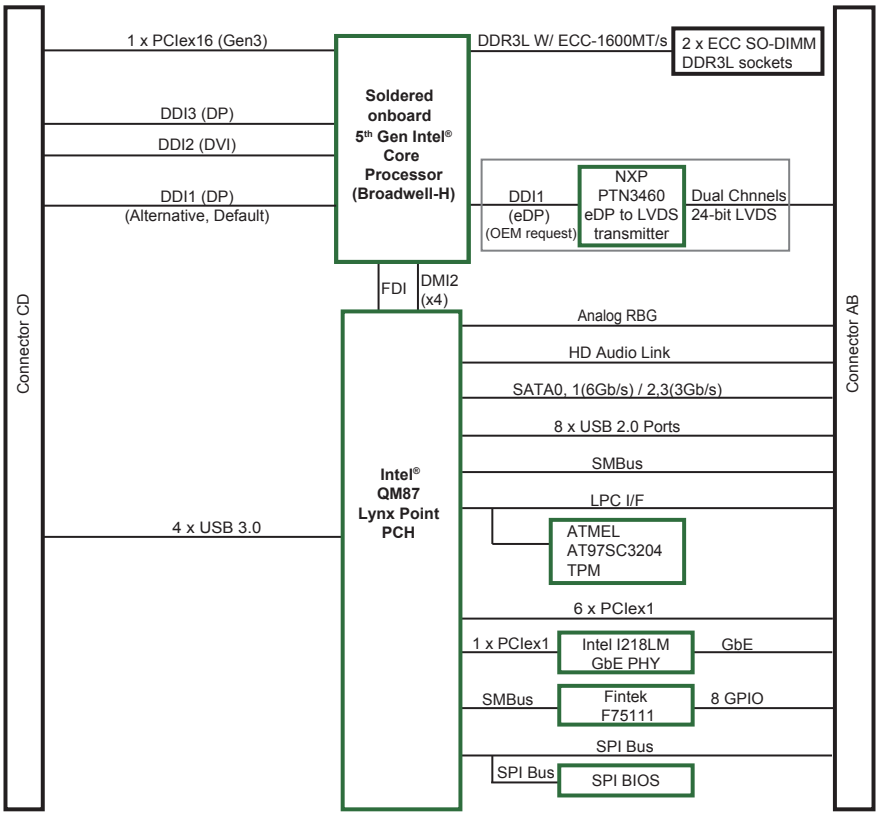
2.2 Board Dimensions

The following illustration shows the dimension of EmETXe-i87M2 Series, with the measurements in width, depth, and height called out.



Unit: mm

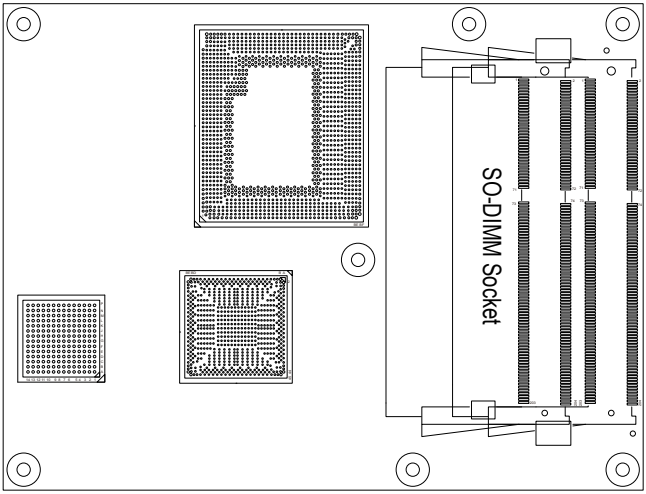
2.3 Block Diagram



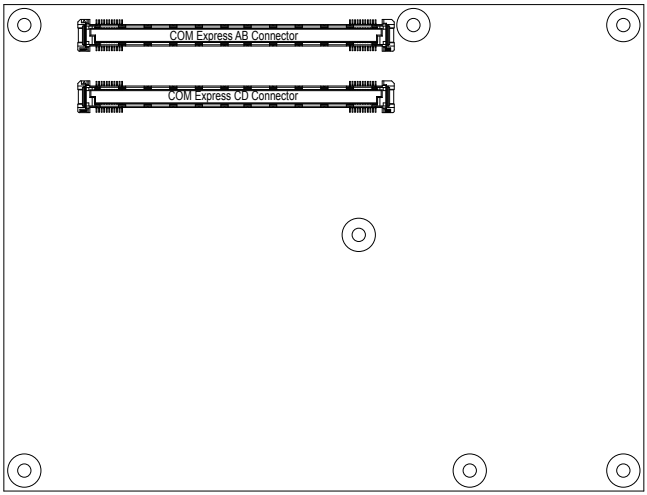
2.4 Connector Pin Definition

Being a most commonly-used Type 6, the EmETXe-i87M2 Series features two board-to-board connectors on bottom side.

Top Side



Bottom Side



COM Express AB Connector (bottom side)

B1	GND (FIXED)	GND (FIXED)	A1	B56	PCIE_RX4-	PCIE_TX4-	A56
B2	GBE0_ACT#	GBE0_MDI3-	A2	B57	GPO2	GND	A57
B3	LPC_FRAME#	GBE0_MDI3+	A3	B58	PCIE_RX3+	PCIE_TX3+	A58
B4	LPC_AD0	GBE0_LINK100#	A4	B59	PCIE_RX3-	PCIE_TX3-	A59
B5	LPC_AD1	GBE0_LINK1000#	A5	B60	GND	GND	A60
B6	LPC_AD2	GBE0_MDI2-	A6	B61	PCIE_RX2+	PCIE_TX2+	A61
B7	LPC_AD3	GBE0_MDI2+	A7	B62	PCIE_RX2-	PCIE_TX2-	A62
B8	LPC_DRQ0#	N/C	A8	B63	GPO3	GPI1	A63
B9	LPC_DRQ1#	GBE0_MDI1-	A9	B64	PCIE_RX1+	PCIE_TX1+	A64
B10	LPC_CLK	GBE0_MDI1+	A10	B65	PCIE_RX1-	PCIE_TX1-	A65
B11	GND (FIXED)	GND (FIXED)	A11	B66	WAKE0#	GND	A66
B12	PWRBTN#	GBE0_MDI0-	A12	B67	WAKE1#	GPI2	A67
B13	SMB_CK	GBE0_MDI0+	A13	B68	PCIE_RX0+	PCIE_TX0+	A68
B14	SMB_DAT	GBE0_CTREF	A14	B69	PCIE_RX0-	PCIE_TX0-	A69
B15	SMB_ALERT#	SUS_S3#	A15	B70	GND	GND	A70
B16	SATA1_TX+	SATA0_TX+	A16	B71	LVDS_B0+	LVDS_A0+	A71
B17	SATA1_TX-	SATA0_TX-	A17	B72	LVDS_B0-	LVDS_A0-	A72
B18	SUS_STAT#	SUS_S4#	A18	B73	LVDS_B1+	LVDS_A1+	A73
B19	SATA1_RX+	SATA0_RX+	A19	B74	LVDS_B1-	LVDS_A1-	A74
B20	SATA1_RX-	SATA0_RX-	A20	B75	LVDS_B2+	LVDS_A2+	A75
B21	GND (FIXED)	GND (FIXED)	A21	B76	LVDS_B2-	LVDS_A2-	A76
B22	SATA3_TX+	SATA2_TX+	A22	B77	LVDS_B3+	LVDS_VDD_EN	A77
B23	SATA3_TX-	SATA2_TX-	A23	B78	LVDS_B3-	LVDS_A3+	A78
B24	PWR_OK	SUS_S5#	A24	B79	LVDS_BKLT_EN	LVDS_A3-	A79
B25	SATA3_RX+	SATA2_RX+	A25	B80	GND	GND	A80
B26	SATA3_RX-	SATA2_RX-	A26	B81	LVDS_B_CK+	LVDS_A_CK+	A81
B27	WDT	BATLOW#	A27	B82	LVDS_B_CK-	LVDS_A_CK-	A82
B28	AC_SDIN2	ATA_ACT#	A28	B83	CKLVDS_BKLT_CTRL	LVDS_I2C_CK	A83
B29	AC_SDIN1	AC_SYNC	A29	B84	VCC_5V_SBY	LVDS_I2C_DAT	A84
B30	AC_SDIN0	AC_RST#	A30	B85	VCC_5V_SBY	GPI3	A85
B31	GND	GND	A31	B86	VCC_5V_SBY	RSV4	A86
B32	SPKR	AC_BITCLK	A32	B87	VCC_5V_SBY	RSV3	A87
B33	I2C_CK	AC_SDOUT	A33	B88	BIOS_DIS1#	PCIE0_CK_REF+	A88
B34	I2C_DAT	BIOS_DISABLE0#	A34	B89	VGA_RED	PCIE0_CK_REF-	A89
B35	THRM#	THRMTRIP#	A35	B90	GND	GND	A90
B36	USB7-	USB6-	A36	B91	VGA_GRN	SPI_POWER	A91
B37	USB7+	USB6+	A37	B92	VGA_BLU	SPI_MISO	A92
B38	USB_4_5_OC#	USB_6_7_OC#	A38	B93	VGA_HSYNC	GPO0	A93
B39	USB5-	USB4-	A39	B94	VGA_VSYNC	SPI_CLK	A94
B40	USB5+	USB4+	A40	B95	VGA_I2C_CK	SPI_MOSI	A95
B41	GND	GND	A41	B96	VGA_I2C_DAT	TPM_PP	A96
B42	USB3-	USB2-	A42	B97	SPI_CS#	TYPE10#	A97
B43	USB3+	USB2+	A43	B98	RSV2	(N/C)SERR0_TX	A98
B44	USB_0_1_OC#	USB_2_3_OC#	A44	B99	RSV1	(N/C)SERR0_RX	A99
B45	USB1-	USB0-	A45	B100	GND	GND	A100
B46	USB1+	USB0+	A46	B101	FAN_PWMOUT	(N/C)SERR1_TX	A101
B47	EXCD1_PERST#	VCC_RTC	A47	B102	FAN_TACHIN	(N/C)SERR1_RX	A102
B48	EXCD1_CPPE#	EXCD0_PERST#	A48	B103	SLEEP#	LID#	A103
B49	SYS_RESET#	EXCD0_CPPE#	A49	B104	VCC_12V	VCC_12V	A104
B50	CB_RESET#	LPC_SERIRQ	A50	B105	VCC_12V	VCC_12V	A105
B51	GND	GND	A51	B106	VCC_12V	VCC_12V	A106
B52	PCIE_RX5+	PCIE_TX5+	A52	B107	VCC_12V	VCC_12V	A107
B53	PCIE_RX5-	PCIE_TX5-	A53	B108	VCC_12V	VCC_12V	A108
B54	GPO1	GPI0	A54	B109	VCC_12V	VCC_12V	A109
B55	PCIE_RX4+	PCIE_TX4+	A55	B110	GND	GND	A110

COM Express CD Connector (bottom side)

D1	GND (FIXED)	GND (FIXED)	C1	D56	PEG_TX1-	PEG_RX1-	C56
D2	GND	GND	C2	D57	TYPE2#	TYPE1#	C57
D3	USB_SSTX0-	USB_SSRX0-	C3	D58	PEG_TX2+	PEG_RX2+	C58
D4	USB_SSTX0+	USB_SSRX0+	C4	D59	PEG_TX2-	PEG_RX2-	C59
D5	GND	GND	C5	D60	GND (FIXED)	GND (FIXED)	C60
D6	USB_SSTX1-	USB_SSRX1-	C6	D61	PEG_TX3+	PEG_RX3+	C61
D7	USB_SSTX1+	USB_SSRX1+	C7	D62	PEG_TX3-	PEG_RX3-	C62
D8	GND	GND	C8	D63	RSVD	RSVD	C63
D9	USB_SSTX2-	USB_SSRX2-	C9	D64	RSVD	RSVD	C64
D10	USB_SSTX2+	USB_SSRX2+	C10	D65	PEG_TX4+	PEG_RX4+	C65
D11	GND (FIXED)	GND (FIXED)	C11	D66	PEG_TX4-	PEG_RX4-	C66
D12	USB_SSTX3-	USB_SSRX3-	C12	D67	GND	RSVD	C67
D13	USB_SSTX3+	USB_SSRX3+	C13	D68	PEG_TX5+	PEG_RX5+	C68
D14	GND	GND	C14	D69	PEG_TX5-	PEG_RX5-	C69
D15	DDI1_CTRLCLK_AUX+	(N/C)DDI1_PAIR6+	C15	D70	GND (FIXED)	GND (FIXED)	C70
D16	DDI1_CTRLCLK_AUX-	(N/C)DDI1_PAIR6-	C16	D71	PEG_TX6+	PEG_RX6+	C71
D17	RSVD	RSVD	C17	D72	PEG_TX6-	PEG_RX6-	C72
D18	RSVD	RSVD	C18	D73	GND	GND	C73
D19	PCIE_TX6+	PCIE_RX6+	C19	D74	PEG_TX7+	PEG_RX7+	C74
D20	PCIE_TX6-	PCIE_RX6-	C20	D75	PEG_TX7-	PEG_RX7-	C75
D21	GND(FIXED)	GND(FIXED)	C21	D76	GND	GND	C76
D22	PCIE_TX7+ (N/C)	(N/C)PCIE_RX7+	C22	D77	RSVD	RSVD	C77
D23	PCIE_TX7- (N/C)	(N/C)PCIE_RX7-	C23	D78	PEG_TX8+	PEG_RX8+	C78
D24	RSVD	DDI1_HPD	C24	D79	PEG_TX8-	PEG_RX8-	C79
D25	RSVD	(N/C)DDI1_PAIR4+	C25	D80	GND (FIXED)	GND (FIXED)	C80
D26	DDI1_PAIR0+/SDV0_RED+	(N/C)DDI1_PAIR4-	C26	D81	PEG_TX9+	PEG_RX9+	C81
D27	DDI1_PAIR0-	RSVD	C27	D82	PEG_TX9-	PEG_RX9-	C82
D28	RSVD	RSVD	C28	D83	RSVD	RSVD	C83
D29	DDI1_PAIR1+	(N/C)DDI1_PAIR5+	C29	D84	GND	GND	C84
D30	DDI1_PAIR1-	(N/C)DDI1_PAIR5-	C30	D85	PEG_TX10+	PEG_RX10+	C85
D31	GND(FIXED)	GND (FIXED)	C31	D86	PEG_TX10-	PEG_RX10-	C86
D32	DDI1_PAIR2+	DDI2_CTRLCLK_AUX+	C32	D87	GND	GND	C87
D33	DDI1_PAIR2-	DDI2_CTRLCLK_AUX-	C33	D88	PEG_TX11+	PEG_RX11+	C88
D34	DDI1_DDC_AUX_SEL	DDI2_DDC_AUX_SEL	C34	D89	PEG_TX11-	PEG_RX11-	C89
D35	RSVD	RSVD	C35	D90	GND (FIXED)	GND (FIXED)	C90
D36	DDI1_PAIR3+	DDI3_CTRLCLK_AUX+	C36	D91	PEG_TX12+	PEG_RX12+	C91
D37	DDI1_PAIR3-	DDI3_CTRLCLK_AUX-	C37	D92	PEG_TX12-	PEG_RX12-	C92
D38	RSVD	DDI3_DDC_AUX_SEL	C38	D93	GND	GND	C93
D39	DDI1_PAIR0+	DDI3_PAIR0+	C39	D94	PEG_TX13+	PEG_RX13+	C94
D40	DDI1_PAIR0-	DDI3_PAIR0-	C40	D95	PEG_TX13-	PEG_RX13-	C95
D41	GND(FIXED)	GND(FIXED)	C41	D96	GND	GND	C96
D42	DDI1_PAIR1+	DDI3_PAIR1+	C42	D97	RSVD	RSVD	C97
D43	DDI1_PAIR1-	DDI3_PAIR1-	C43	D98	PEG_TX14+	PEG_RX14+	C98
D44	DDI2_HPD	DDI3_HPD	C44	D99	PEG_TX14-	PEG_RX14-	C99
D45	RSVD	RSVD	C45	D100	GND (FIXED)	GND (FIXED)	C100
D46	DDI2_PAIR2+	DDI3_PAIR2+	C46	D101	PEG_TX15+	PEG_RX15+	C101
D47	DDI2_PAIR2-	DDI3_PAIR2-	C47	D102	PEG_TX15-	PEG_RX15-	C102
D48	RSVD	RSVD	C48	D103	GND	GND	C103
D49	DDI2_PAIR3+	DDI3_PAIR3+	C49	D104	VCC_12V	VCC_12V	C104
D50	DDI2_PAIR3-	DDI3_PAIR3-	C50	D105	VCC_12V	VCC_12V	C105
D51	GND (FIXED)	GND (FIXED)	C51	D106	VCC_12V	VCC_12V	C106
D52	PEG_TX0+	PEG_RX0+	C52	D107	VCC_12V	VCC_12V	C107
D53	PEG_TX0-	PEG_RX0-	C53	D108	VCC_12V	VCC_12V	C108
D54	PEG_LANE_RV#	TYPE0#	C54	D109	VCC_12V	VCC_12V	C109
D55	PEG_TX1+	PEG_RX1+	C55	D110	GND (FIXED)	GND (FIXED)	C110

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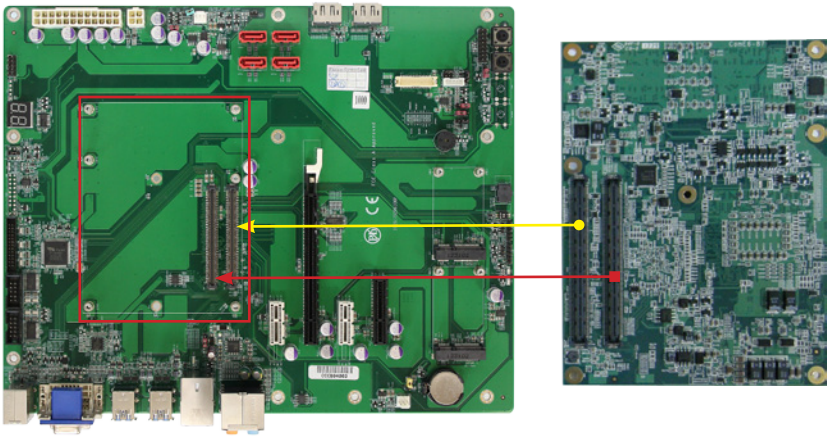
Chapter 3

Installation & Maintenance

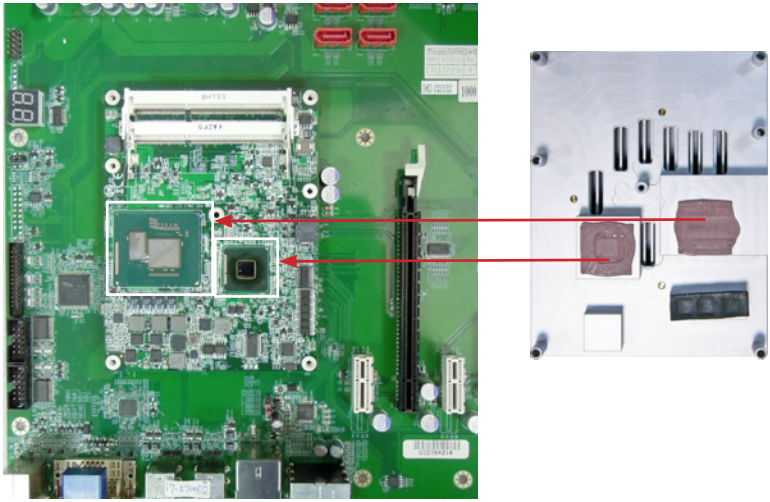
3.1 Installing the CPU Module on Carrier Board

1. Find the COM Express connectors on carrier board PBE-1702, which is available in Section 1.5.1 Optional Accessories on page 5.
2. Embed EmETXe-i87M2 Series into PBE-1702 via COM Express connectors as below; that is, COM Express AB to AB and CD to CD.



3.2 Installing the Heatsink

1. Locate EmETXe-i87M2 Series mounted on PBE-1702.
2. Prepare the heatspred included in optional accessories. (See Section 1.5.1 Optional Accessories on page 5) Put heatspred on the CPU module and lock it. Make sure thermal grease in contact with CPU and chipset on CPU module. Plug power cable into appropriate connector if there is a fan.



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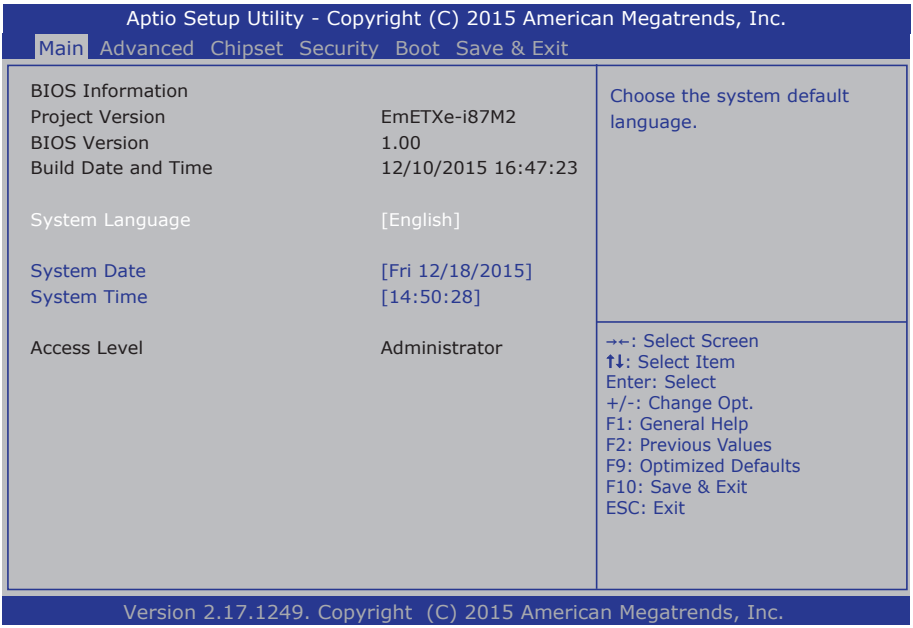
Chapter 4

BIOS

4.1 Main

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS RAM of the system stores the Setup utility and configurations. When you turn on the computer, the BIOS is immediately activated. To enter the BIOS SETUP UTILITY, press **"Delete"** once the power is turned on. When the computer is shut down, the battery on the motherboard supplies the power for BIOS RAM.

The **Main Setup** screen lists the following information:



Setting	Description
System Language	Choose the system default language.
System Date	Set the system date. Use Tab to switch between Data elements. Note that the 'Day' automatically changes when you set the date. ► The date format is: **Day:** Sun to Sat **Month:** 1 to 12 **Date:** 1 to 31 **Year:** 1998 to 2099

System Time	Set the system time. Use Tab to switch between Time elements. ► The time format is: **Hour:** 00 to 23 **Minute:** 00 to 59 **Second:** 00 to 59

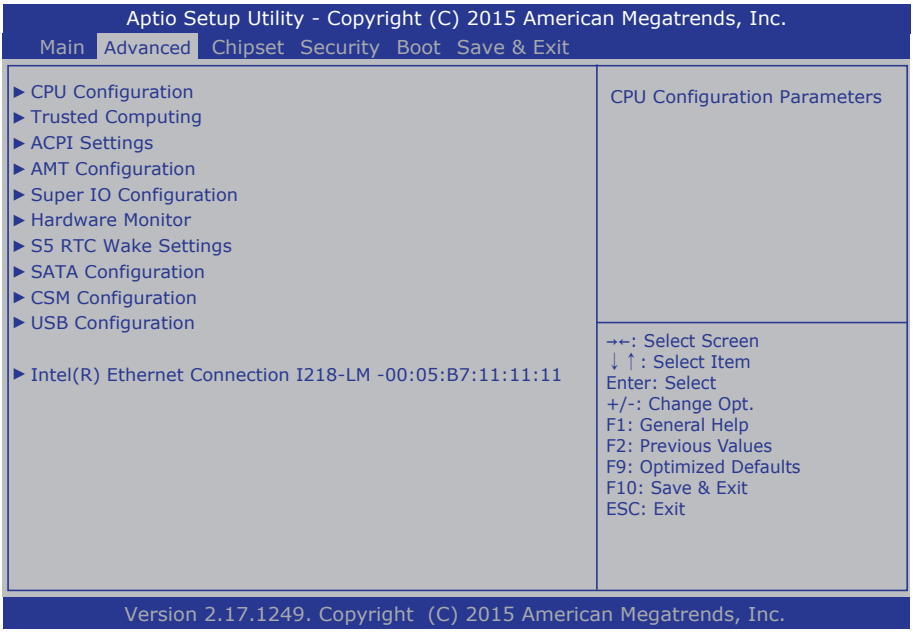
Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

Keystroke	Function
◄ ►	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
▼ ▲	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select “OK” or “Cancel” for exiting and discarding changes. Use “←” and “→” to select and press “Enter” to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down -	Decrease the numeric value on a selected setup item / make change
F1	Activate “General Help” screen
F10	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select “OK” or “Cancel” for exiting and saving changes. Use “←” and “→” to select and press “Enter” to confirm)

4.2 Advanced

The “Advanced” setting page provides you the options to configure the details of your hardware, such as ACPI, CPU, SATA, AMT, USB and Super IO.



Setting	Description
CPU Configuration	See Section 4.2.1 CPU Configuration on page 24
Trusted Computing	See Section 4.2.2 Trusted Computing on page 25
ACPI Settings	See Section 4.2.3 ACPI Settings on page 25
AMT Configuration	See Section 4.2.4 AMT Configuration on page 25
Super IO Configuration	See Section 4.2.5 Super IO Configuration on page 26
H/W Monitor	See Section 4.2.6 Hardware Monitor on page 27
S5 RTC Wake Settings	See Section 4.2.7 S5 RTC Wake Settings on page 28
SATA Configuration	See Section 4.2.8 SATA Configuration on page 29
CSM Configuration	See Section 4.2.9 CSM Configuration on page 30

USB Configuration	See Section 4.2.10 USB Configuration on page 31
Intel(R) Ethernet Connection I218-LM	See Section 4.2.11 Intel(R) Ethernet Connection I218-LM on page 33

4.2.1 CPU Configuration

Setting	Description
Hyper-threading	**Enabled** (default) for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and **Disabled** for other OS (OS not optimized or Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.
Active Processor Cores	Number of cores to enable in each processor package. ► Options: **All** (default) and **1**
Limit CPUID Maximum	Disabled for Windows XP ► Options: **Enabled** or **Disabled** (default)
Execute Disable Bit	XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.) ► Options: **Enabled** (default) or **Disabled**
Intel Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology ► Options: **Enabled** (default) or **Disabled**
EIST	**Enable** (default)/**Disable** Intel SpeedStep
Turbo Mode	**Enable** (default)/**Disable** the Turbo Mode
Performance/Watt	Set the mode of Performance/Watt ► Options: **Performance** (default), **Balanced Performance, Balanced Energy** or **Energy Efficient**.

4.2.2 Trusted Computing

Access this submenu to enable/disable the Trusted Computing function.

Setting	Description
Security Device Support	Enable/Disable (default) the TPM Support
TPM State	Enable (default) /disable Security Device
Device Select	Set the supported device ► Options: **Auto** (default), **TPM1.2** or **TPM 2.0**.

4.2.3 ACPI Settings

Setting	Description
ACPI Sleep State	Select ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: **Suspend Disabled**, **S1 only(CPU Stop Clock)**, **S3 only(Suspend to RAM)**(default), **Both S1 and S3 available for OS to choose from**
Enable Hibernation	**Enable** (default)/**Disable** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

4.2.4 AMT Configuration

Setting	Description
Intel AMT	**Enable** (default)/**Disable** Intel(R) Active Management Technology BIOS Extension. Note : iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

4.2.5 Super IO Configuration

Setting	Description
Serial Port 1 Configuration	See below
Serial Port 2 Configuration	
Parallel Port Configuration	
Restore AC Power loss	Sets whether the system should power on or power off when the power resumes after accidental power loss. ► Options: Last State, Power On (default), and Power Off.

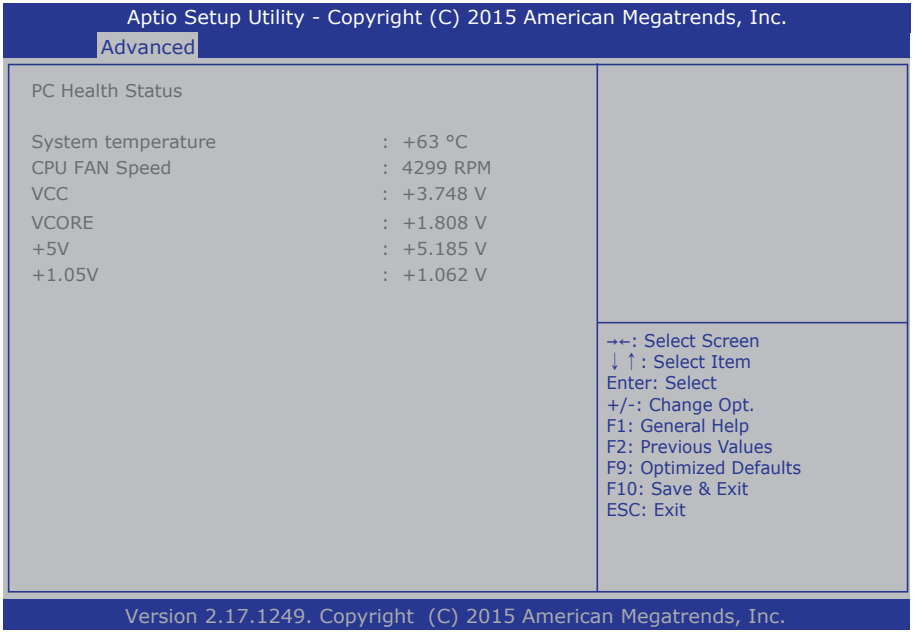
Serial Port 1~2 Port Configuration

Setting	Description
Serial Port	**Enable** (default)/**Disable** Serial Port (COM).
Change Settings	Select an optimal setting for Super IO device. ► Options: **IO=3F8h; IRQ=4** (default for Serial Port 1); **IO=2F8h; IRQ=3** (default for Serial Port 2);
Device Mode	Select the Serial Port mode for Port 2 ► Options: **Disable IR1 function; (default)** **Enable IR1 function, active pulse 1.6uS;** **Enable IR1 function, active pulse 3/16 bit time**

Parallel Port Configuration

Setting	Description
Parallel Port	**Enable** (default)/**Disable** Parallel Port (LPT/LPTE).
Change Settings	Select an optimal setting for Super IO device. ► Options: **Auto(default); -- IO=378h; IRQ5 -- IO=378h; IRQ3, 4, 5, 6, 7, 10, 11, 12 -- IO=3BCh; IRQ3, 4, 5, 6, 7, 10, 11, 12 -- IO=378h -- IO=278h -- IO=3BCh.**
Device Mode	Select the Serial Port mode for Port 2 ► Options: **STD Printer Mode(default), SPP Mode, EPP-1.9 and SPP Mode, EPP-1.7 and SPP Mode, ECP Mode, ECP Mode and EPP 1.9 Mode, ECP and EPP 1.7 Mode.**

4.2.6 Hardware Monitor



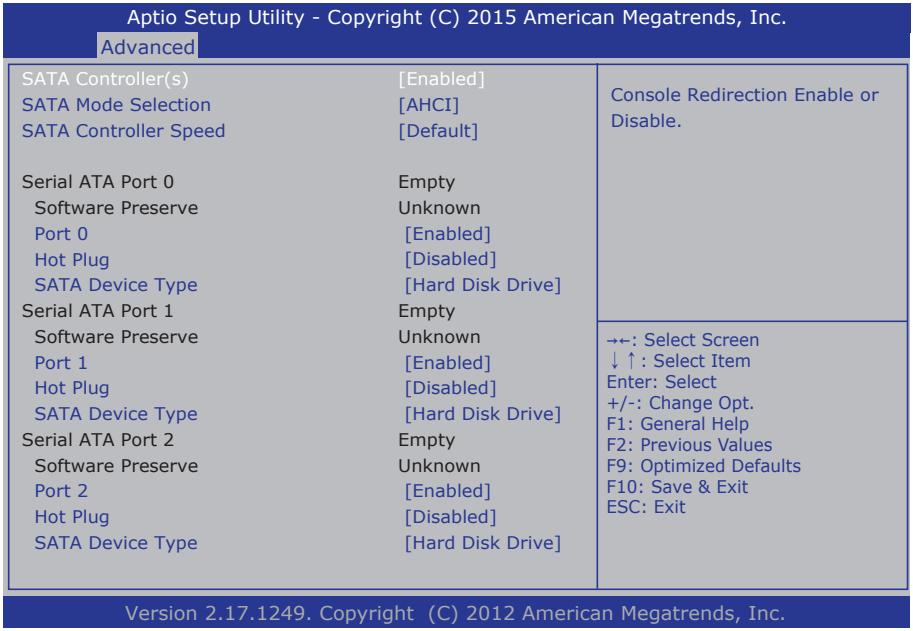
4.2.7 S5 RTC Wake Settings

Access this submenu to enable/disable the system to wake up on a specified time.

The featured setting is:

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake System with Fixed TIme</td><td>Sets if to awake the system at a defined moment.
▸ Options available are Enabled and Disabled (default).
▸ Enable this feature to awake the system at a defined moment in time. When enabled, the following settings become available:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake up hour</td><td>Defines the (hour) time to awake the system.
▸ 0 to 23 configurable.</td></tr>
<tr><td>Wake up minute</td><td>Defines the (minute) time to awake the system.
▸ 0 to 59 configurable.</td></tr>
<tr><td>Wake up second</td><td>Defines the (second) time to awake the system.
▸ 0 to 59 configurable.</td></tr>
</table></td></tr>
<tr><td>Wake System with Dynamic TIme</td><td>Sets if to awake the system some time in the future.
▸ Options available are Enabled and Disabled (default).
▸ Enable this feature to awake the system some time from now. When enabled, the following setting becomes available:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake up minute increase</td><td>Defines how long from now to awake the system.
▸ 1 to 5 minutes configurable.</td></tr>
</table></td></tr>
</table>

4.2.8 SATA Configuration



Setting	Description
SATA Controller(s)	**Enable** (default)/**disable** SATA Device.
SATA Mode Selection	Determines how SATA controller(s) operate. ► Options: **IDE**, **AHCI** (default) or **RAID**
SATA Controller Speed	Indicates the maximum speed the SATA controller can support. ► Options: **Default** (default), **Gen1**, **Gen2**, **Gen3**
Port 0/1/2/3/4/5	**Enable** (default)/**disable** SATA Port.
Hot plug	**Enable** /**disable** (default) the SATA port Hot plug.
External SATA	**Enable** (default)/**disable** External SATA support.
SATA Device Type	Identify the SATA port is connected to **Solid State Drive** or **Hard Disk Drive** (default).

Spin Up Device	On an edge detect from 0 to 1, the PCH starts a COM-RESET initialization sequence to the device. ► Options: **Enabled** or **Disabled** (default)

4.2.9 CSM Configuration

Setting	Description
GateA20 Active	Select setting for GateA20. ► Options: **UPON REQUEST** - GA20 can be disabled using services or **ALWAYS** -do not allow disabling GA20
Option ROM Messages	Set display mode for Option ROM. ► Options: **Force BIOS** (default) and **Keep Current**
Boot option filter	This option controls Legacy/UEFI ROMs priority. ► Options: **[UEFI and Legacy]**(default); **[Legacy only]**; and **[UEFI only]**.
Network	Control the execution of UEFI and Legacy PXE OpROM ► Options: **Do not lauch (default)** and **Legacy**
Storage	Control the execution of UEFI and Legacy Storage OpROM ► Options: **Do not launch** (default) and **Legacy**
Other PCI devices	Control the OpROM execution policy for device other than Network, Storage or Video ► Options: **Do not launch** (default), **UEFI** and **Legacy**

4.2.10 USB Configuration

Setting	Description
Legacy USB Support	**Enables** (default) Legacy USB support. **AUTO** option disables legacy support if no USB devices are connected. **DISABLE** option will keep USB devices available only for EFI applications.
USB3.0 Support	**Enable** (default)/**Disable** USB3.0 (XHCI) Controller support.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. The optional settings are: **Enabled / Disabled.**
EHCI Hand-off	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver. The optional settings are: **Disabled / Enabled.**
USB Mass Storage Driver Support	**Enable** (default)**/disable** USB Mass Storage Driver Support.

<table>
<tr>
<td>USB hardware delay and time-out</td>
<td>This is a submenu to configure the features of USB hardware delay and time-out. The featured settings are:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>USB Transfer time-out</td><td>Use this item to set the time-out value for control, bulk, and interrupt transfers.
▸ Options available are: 1 sec, 5 sec, 10 sec, 20 sec</td></tr>
<tr><td>Device reset time-out</td><td>Use this item to set USB mass storage device start unit command time-out.
▸ Options available are: 10 sec, 20 sec, 30 sec, 40 sec</td></tr>
<tr><td>Device power-up delay</td><td>Use this item to set maximum time the device will take before it properly reports itself to the host controller. ‘Auto’ uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor.
▸ Options available are:
Auto: Default
Manual: Select Manual you can set value for the following sub-item: ‘Device Power-up delay in seconds’, the delay range in from 1 to 40 seconds, in one second increments.</td></tr>
</table>
</td>
</tr>
</table>

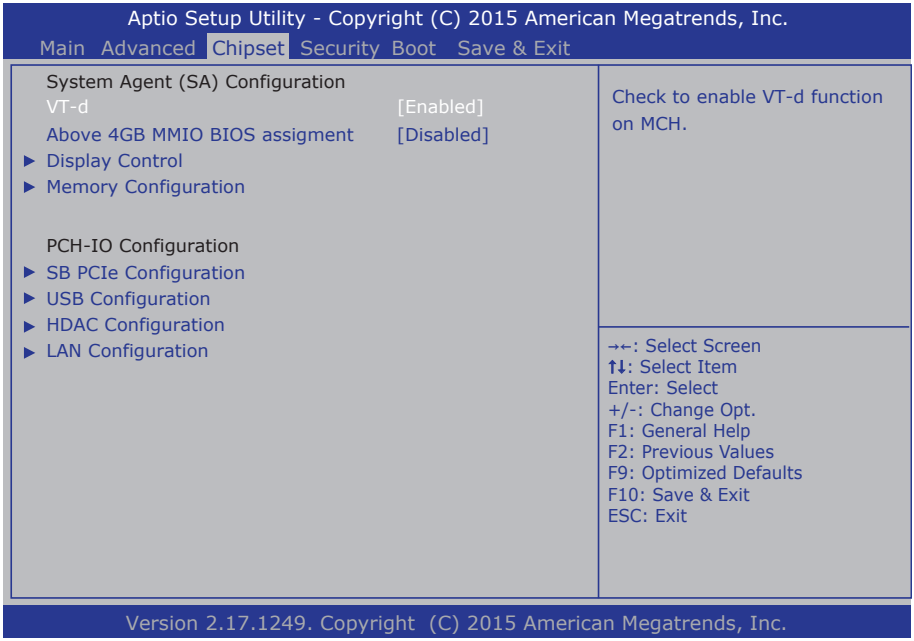
4.2.11 Intel(R) Ethernet Connection I218-LM

Setting	Description
NIC Configuration	See next page.
Blink LEDs (range 0-15 seconds)	Blink LEDs for the specified duration (up to 15 seconds).
Link Status	Link Status

NIC Configuration

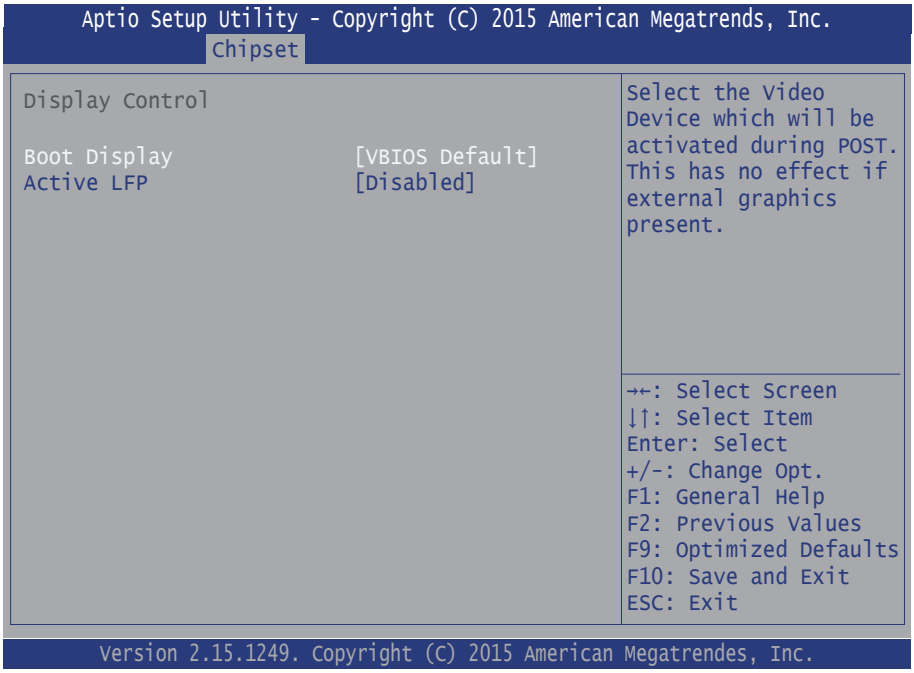
Setting	Description
Link Speed	Change link speed and duplex for current port. ► Options: **AutoNeg** (default), **10 Mbps Half**, **10 Mbps Full**, **100 Mbps Half**, **100 Mbps Full**
Wake on LAN	Enable this option to wake the system with a magic packet. ► Options: **Enabled** (default) or **Disabled**

4.3 Chipset



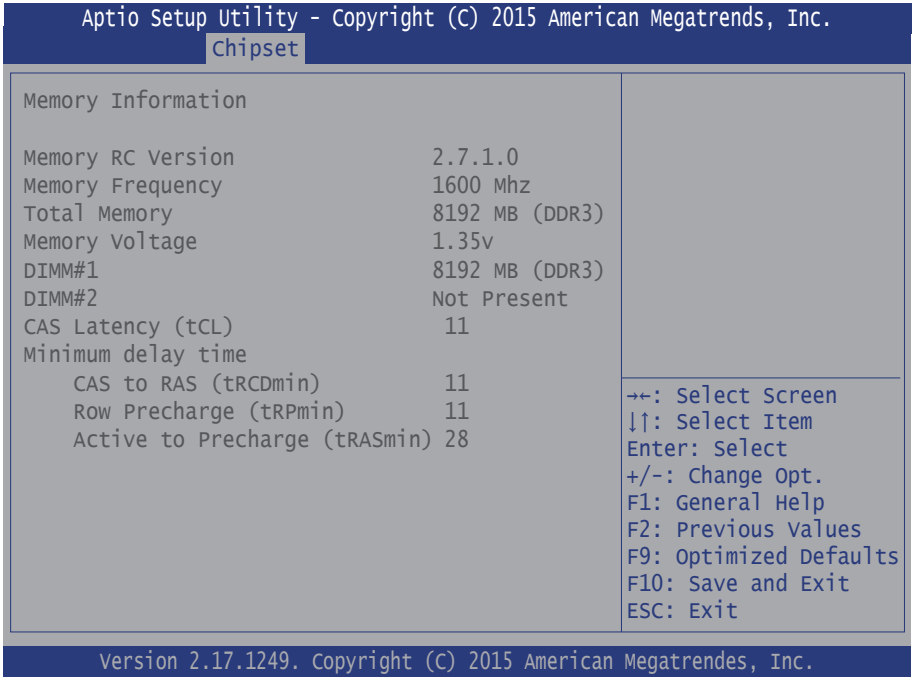
Setting	Description
VT-d	Enables/disables Intel virtualization technology for directed I/O on the MCH (memory controller hub).
Above 4GB MMIO BIOS assignment	Enables/disables Above 4GB MMIO BIOS assignment
Display Control	See Section 4.3.1 Display Control on page 35
Memory Configuration	See Section 4.3.2 Memory Configuration on page 36
SB PCIe Configuration	See Section 4.3.3 SB PCIe Configuration on page 37
USB Configuration	See Section 4.3.4 USB Configuration on page 38
HDAC Configuration	See Section 4.3.5 HDAC Configuration on page 39
LAN Configuration	See Section 4.3.6 LAN Configuration on page 40

4.3.1 Display Control

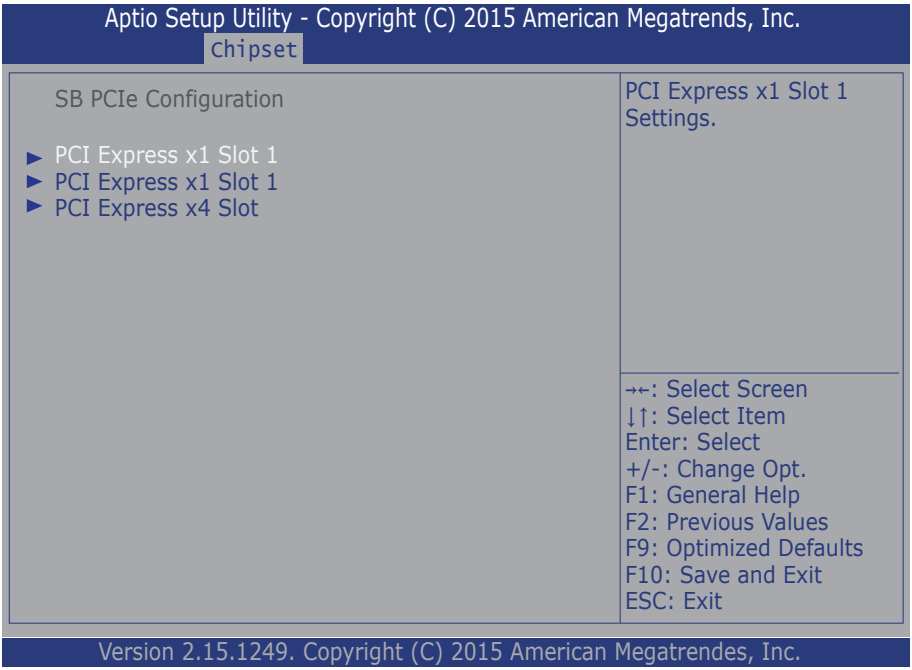


Setting	Description
Boot Display	Select the Video Device which will be activated during POST. This has no effect if external graphics present. ► Options: **VBIOS (default)**, **CRT**, **DigitalPort1, LVDS**, **DVI**, and **DigitalPort2**
Active LFP	Control LFP driven by Int-Displayport encoder from Port -A **Enable/disable** (default) Active LFP.

4.3.2 Memory Configuration



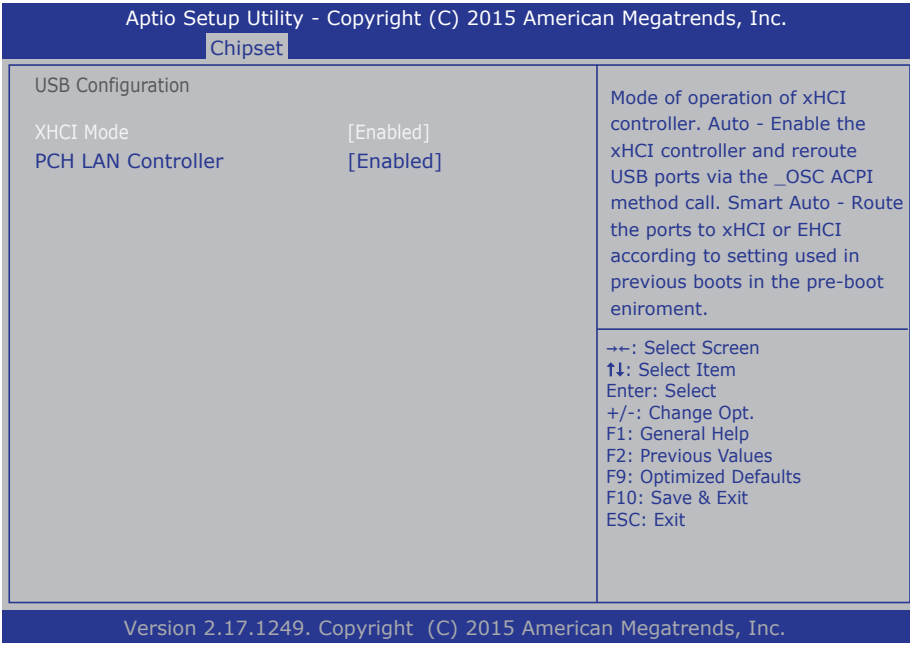
4.3.3 SB PCIe Configuration



Configures PCI Express by the following settings:

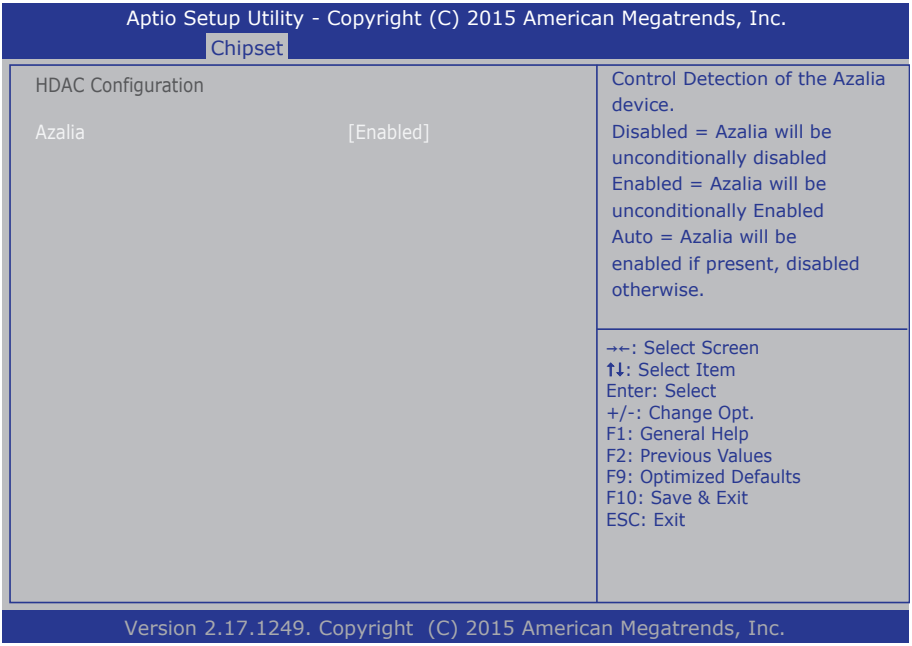
Setting	Description
PCI Express x1 slot 1/2 & PCI Express x4 slot	▸ PCI Express Root Port 1/2/5 Enable and Disable the port ▸ ASPM Support Options are: **Disable** : disables ASPM (Default) **L0s** : force all links to L0s state **L1** : force all links to L1 state **L0sL1** : force all links to L0s+L1 state **Auto** : BIOS auto configure ▸ PCIe Speed Options are: **Auto** (Default) **Gen 1** **Gen 2**

4.3.4 USB Configuration



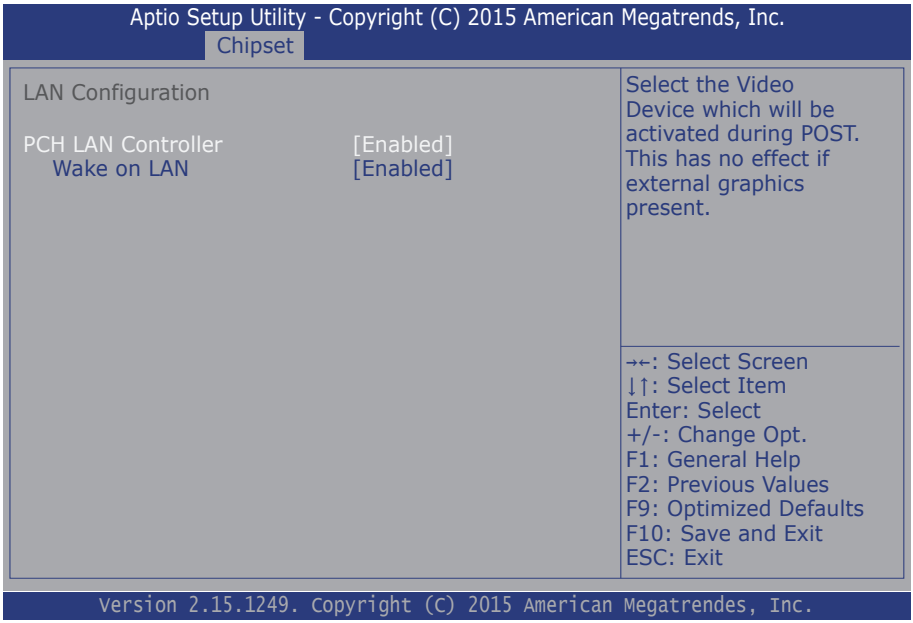
Setting	Description
XHCI Mode	Select the XCHI Mode. ► Options: **Smart Auto, Auto (default), Enabled** or **Disabled** (default)
USB Ports Per-Port Disable Control	Control each of the USB ports (0~13) disabling. ► Options: **Enabled** or **Disabled** (default)
USB Port #0~13	Enable/Disable USB Port

4.3.5 HDAC Configuration



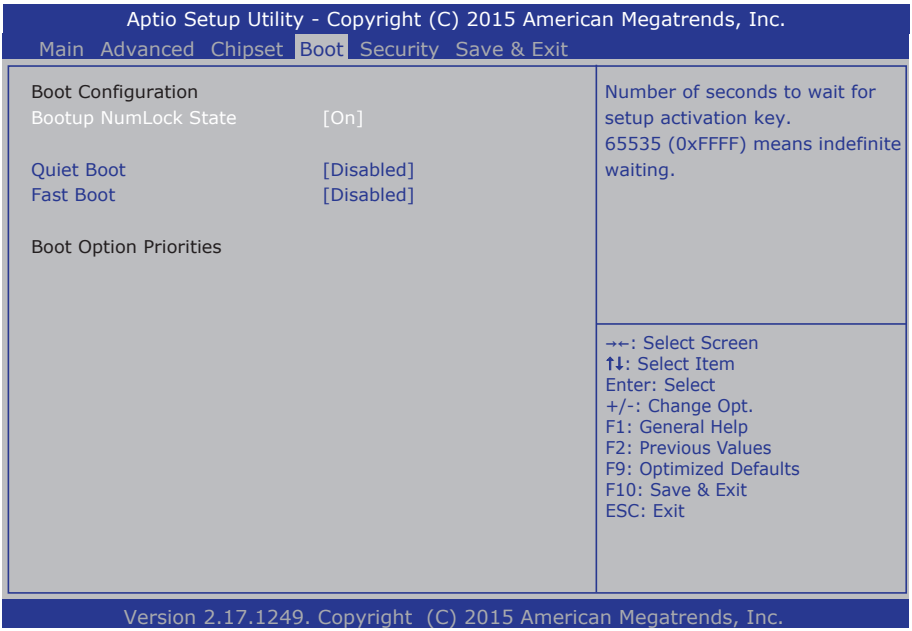
Setting	Description
Azalia	Control Detection of the Azalia device. **Disabled** = Azalia will be unconditionally disabled **Enabled** (default) = Azalia will be unconditionally Enabled **Auto** = Azalia will be enabled if present, disabled otherwise.

4.3.6 LAN Configuration



Setting	Description
PCH LAN Controller	Enables/Disables the onboard NIC ▸ **Enabled** is the default.
Wake on LAN	Enables/Disables the Wake on LAN ▸ **Enabled** is the default.

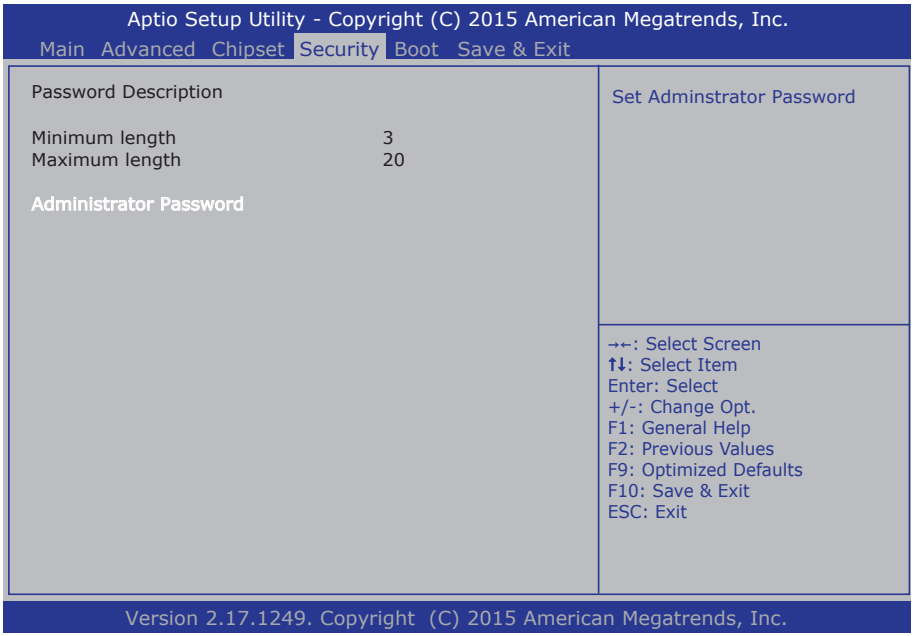
4.4 Boot



Setting	Description
Boot NumLock State	Select the keyboard NumLock state. ► Options: **On** (default) and **Off**.
Quiet Boot	**Enable/Disable** (default) Quiet Boot option.
Fast Boot	**Enable/Disable** (default) Fast Boot option.
Boot option Priorities	This option controls device boot priorities.

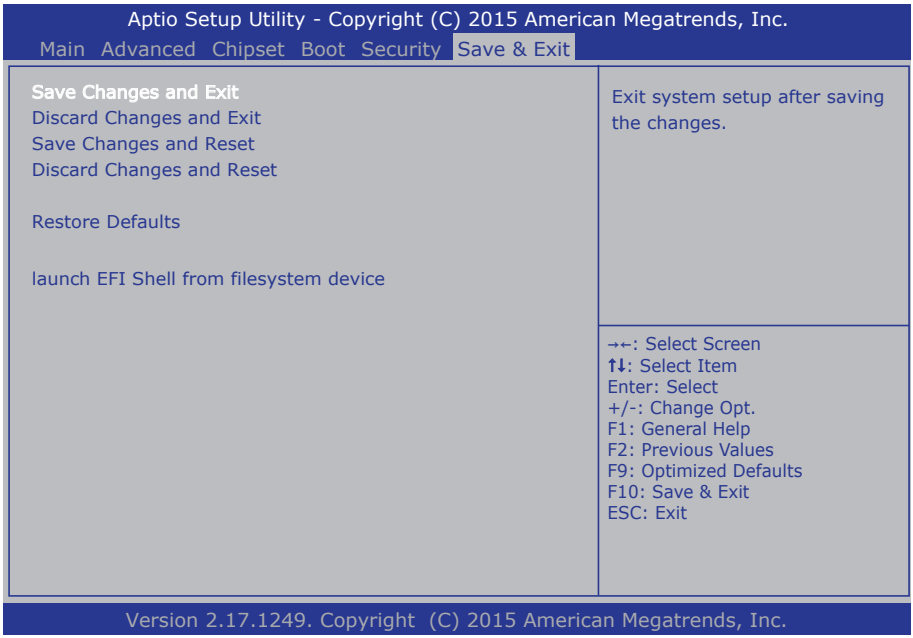
4.5 Security

The **Security** menu sets up the administrator password.



Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. The screen then pops up an **Create New Password** dialog. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.

4.6 Save & Exit



Setting	Description
Save Changes and Exit	Exit system setup after saving the changes. ► Enter the item and then a dialog box pops up: **Save configuration and exit? (Yes/ No)**
Discard Changes and Exit	Exit system setup without saving the changes. ► Enter the item and then a dialog box pops up: **Quit without saving? (Yes/ No)**
Save Changes and Reset	Reset the system after saving the changes.
Discard Changes and Reset	Reset the system after saving the changes.
Restore Defaults	Restore/Load Default values for all the setup options. ► Enter the item and then a dialog box pops up: **Load Optimized Defaults? (Yes/ No)**
Launch EFI Shell from filesystem device	Attempt to launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices. Press “Enter” to proceed.

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Appendix

Appendix A: I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00000000-0x0000001F	Direct memory access controller
0x00000081-0x00000091	Direct memory access controller
0x00000093-0x0000009F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller
0x00003080-0x0000309F	Ethernet Controller
0x00000070-0x00000077	Motherboard resources
0x00000A00-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000A30-0x00000A3F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x00001800-0x000018FE	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000800-0x0000087F	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x00000000-0x0000001F	PCI bus
0x00000D00-0x0000FFFF	PCI bus
0x000030E0-0x000030E7	PCI Serial Port
0x00000378-0x0000037F	Printer Port (LPT1)
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller

0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00003040-0x0000305F	SM Bus Controller
0x000030D0-0x000030D7	Standard AHCI 1.0 Serial ATA Controller
0x000030C0-0x000030C3	Standard AHCI 1.0 Serial ATA Controller
0x000030B0-0x000030B7	Standard AHCI 1.0 Serial ATA Controller
0x000030A0-0x000030A3	Standard AHCI 1.0 Serial ATA Controller
0x00003060-0x0000307F	Standard AHCI 1.0 Serial ATA Controller
0x00003000-0x0000303F	Standard VGA Graphics Adapter
0x000003B0-0x000003BB	Standard VGA Graphics Adapter
0x000003C0-0x000003DF	Standard VGA Graphics Adapter
0x00000070-0x00000077	System CMOS/real time clock
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

Appendix B: BIOS Memory Mapping

Address	Device Description
0xB2000000-0xB201FFFF	Ethernet Controller
0xB203C000-0xB203CFFF	Ethernet Controller
0xB2034000-0xB2037FFF	High Definition Audio Controller
0xB2030000-0xB2033FFF	High Definition Audio Controller
0xFED00000-0xFED003FF	High precision event timer
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0xB0000000-0xFEAFFFFF	Motherboard resources
0xFED1C000-0xFED1FFFF	Motherboard resources
0xFED10000-0xFED17FFF	Motherboard resources
0xFED18000-0xFED18FFF	Motherboard resources
0xFED19000-0xFED19FFF	Motherboard resources
0xF8000000-0xFBFFFFFF	Motherboard resources
0xFED20000-0xFED3FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xB0010000-0xB001FFFF	Motherboard resources
0xA0000-0xBFFFF	PCI bus
0xB0000000-0xFEAFFFFF	PCI bus
0xB203D000-0xB203DFFF	PCI Serial Port
0xB203F000-0xB203F00F	PCI Simple Communications Controller
0xB2038000-0xB20380FF	SM Bus Controller
0xB2039000-0xB20397FF	Standard AHCI 1.0 Serial ATA Controller
0xB203B000-0xB203B3FF	Standard Enhanced PCI to USB Host Controller
0xB203A000-0xB203A3FF	Standard Enhanced PCI to USB Host Controller
0xA0000-0xBFFFF	Standard VGA Graphics Adapter
0xB1000000-0xB1FFFFFF	Standard VGA Graphics Adapter
0xC0000000-0xCFFFFFFF	Standard VGA Graphics Adapter

0xFED40000-0xFED44FFF	Trusted Platform Module 1.2
0xB2020000-0xB202FFFF	Universal Serial Bus (USB) Controller

Appendix C: Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System timer
IRQ3	Communications Port (COM2)
IRQ4	Communications Port (COM1)
IRQ8	System CMOS/real time clock
IRQ10	Ethernet Controller
IRQ11	Universal Serial Bus (USB) Controller
IRQ11	PCI Simple Communications Controller
IRQ11	PCI Serial Port
IRQ11	SM Bus Controller
IRQ13	Numeric data processor
IRQ16	Standard Enhanced PCI to USB Host Controller
IRQ16	High Definition Audio Controller
IRQ19	Standard AHCI 1.0 Serial ATA Controller
IRQ22	High Definition Audio Controller
IRQ23	Standard Enhanced PCI to USB Host Controller
IRQ81~190	Microsoft ACPI-Compliant System

Appendix D: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and reset the system automatically to avoid abnormal operation.

This board supports 255 levels watchdog timer by software programming I/O ports. Below are the source codes written in C, please take them as WDT application example.

```
#include "math.h"
#include "stdio.h"
#include "dos.h"

#define   DELAY_TIME                          10

#define _SMBBA                                0xF040          /*  SMBus  Base  Ad-
dress */
#define _SMBSA                                0x6E            /*  SMBus  Slave  Ad-
dress , 75111R's Add = 6Eh or 9Ch */

unsigned char DIO_Set(unsigned char oMode, unsigned char oData);
unsigned char SMB_Byte_READ(int SMPORT, int DeviceID, int iREG_INDEX);
void SMB_Byte_WRITE(int SMPORT, int DeviceID, int oREG_INDEX, int oREG_DATA);

void main()
{
        WDT_Start(10);

        while(1)
        {
                iCount = WDT_Count();
                printf("\r Counts : %d ",iCount);

                delay(1000);
        }
}

void WDT_Start(int iCount)
{
        int iData;

        /* Configuration and function select Register - Enable WDTOUT2# output */
        iData = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x03);
        iData = iData | 0x03;
        SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x03,iData);
    delay(DELAY_TIME);

        /* Watchdog Timer Range Register */
        SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x37,iCount);
```

```
    delay(DELAY_TIME);

    /* Watchdog Timer Control Register */
    SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x36,0x72);
}

int WDT_Count(void)
{
    int iData;

    /* Watchdog Timer Range Register */
         iData = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x37);

    return iData;
}

void WDT_Clear(int iCount)
{
         /* Watchdog Timer Range Register */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x37,iCount);
}

void WDT_Stop(void)
{
         /* Watchdog Timer Control Register */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x36,0x52);
}
```