
ITX-i2203

Mini-ITX Industrial Motherboard

User's Manual

Version 1.2

CE



2020.04

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Revision History

Version	Release Time	Description
1.0	Aug, 2016	Initial release
1.1	Jun, 2017	Update "A.2 BIOS Update using ACT Utility"
1.2	Apr, 2020	Added "OEM request" to SIM socket

Revision History	i
Table of Contents	ii
Preface	iv
Copyright Notice	iv
Declaration of Conformity	iv
CE.....	iv
FCC Class A	v
RoHS	v
SVHC / REACH	vi
Warning.....	vi
Replacing Lithium Battery	vi
Technical Support	vi
Warranty.....	vii
Chapter 1 - Introduction	1
1.1. Product Highlights.....	2
1.2. About this Manual	2
1.3. Specifications.....	3
1.4. Inside the Package	4
1.5. Ordering Information	4
1.6. RAM Installation.....	5
Chapter 2 - Getting Started	7
2.1. Board Dimensions.....	8
2.2. Block Diagram.....	9
2.3. Jumpers & Connectors	10
2.3.1. Layout.....	10
2.3.2. Jumpers	12
2.3.3. Connectors	16
2.4. Driver Installation Notes	37
Chapter 3 - BIOS	39
3.1. Main	41
3.2. Advanced	42
3.2.1. ACPI Settings.....	43
3.2.2. CPU Configuration.....	44
3.2.3. PPM Configuration.....	45
3.2.4. USB Configuration	46
3.2.5. SATA Configuration.....	47
3.2.6. LPSS & SCC Configuration	48
3.2.7. F81801 Super IO Configuration.....	49
3.2.8. Hardware Monitor	50

3.2.9. S5 RTC Wake Settings	51
3.2.10. CSM Configuration	52
3.2.11. SDIO Configuration	53
3.3. Chipset.....	54
3.3.1. North Bridge.....	55
3.3.2. South Bridge.....	58
3.4. Security.....	60
3.5. Boot.....	61
3.6. Save & Exit	62
Appendices	63
Appendix A. Anti-Crash Technology for BIOS Recovering.....	64
A.1 Auto Recovery	64
A.2 BIOS Update using ACT Utility.....	65
A.3 How to Get ACT Utility.....	67
Appendix B. I/O Port Address Map	68
Appendix C. Interrupt Request Lines (IRQ)	70
Appendix D. BIOS Memory Map.....	71
Appendix E. Watchdog Timer (WDT) Setting.....	72

Copyright Notice

All Rights Reserved.

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

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.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

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 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 do not hesitate to call or e-mail our customer service.

<http://www.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.

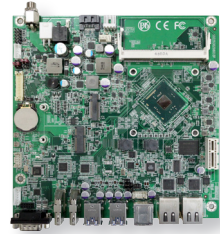
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Chapter 1

Introduction

1.1. Product Highlights

- Low profile design
- Soldered onboard Intel® Celeron® Processor N3160
- Dual Gigabit Ethernet ports
- 2 x HDMI ports, dual Channel 24-bit LVDS
- Dual independent displays supported
- Anti-Crash Technology (ACT) for automatical system BIOS recovering



1.2. About this Manual

This manual is intended for experienced users and integrators with hardware knowledge of computers. If you are not sure about the description in this manual, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

1.3. Specifications

Processor	Soldered onboard Intel® Celeron® Processor N3160 1.6GHz
Memory	1 x DDR3L SO-DIMM socket, supporting up to 8GB 1333/1600MT/s SDRAM
BIOS	AMI BIOS
Watchdog Timer	1~255 levels reset
Super I/O	Fintek F81801
Serial Port	1 x Serial Port, RS-232/422/485 selectable
Keyboard & Mouse	6-pin wafer connector for PS/2 keyboard/ mouse via Y-cable
USB 2.0	4 x USB 2.0 ports
USB 3.0/2.0	4 x USB 3.0/2.0 ports
Expansion	1 x PCIe x1 slot
	1 x NGFF M.2 E-key socket for Wireless
	1 x micro SIM socket (OEM request)
Storage	1 x Serial ATA port with 600MB/s HDD transfer rate
	1 x NGFF M.2 B-key socket for SSD
	Soldered onboard up to 32GB eMMC (OEM request)
Ethernet Chipset	2 x Intel® i210AT PCIe GbE controllers
Audio Interface	Realtek® ALC269 5.1 Channel HD Audio CODEC, Mic-in/ Line-in/ Line-out with Amplifier
Graphic Chipset	Integrated Intel® HD Graphics
Graphic Interface	2 x HDMI ports
	1 x Dual channels 24-bit LVDS via PTN3460BS
OS Support	Windows 8.1 64-bit
Power Input	DC 24V
Power Consumption	0.56A@+24V (max.)
	0.36A@+24V (min.)
Operating Temp.	-20 ~ 70°C (-4 ~ 158°F)
Operating Humidity	10 ~ 95% @ 70°C (non-condensing)
Dimension (L x W)	170 x 170 mm (6.7" x 6.7")

1.4. Inside the Package

Before starting to install the single board, make sure the following items are shipped:



1 x ITX-i2203 Industrial Motherboard w/ Heatsink



1 x Driver CD



1 x Quick Installation Guide

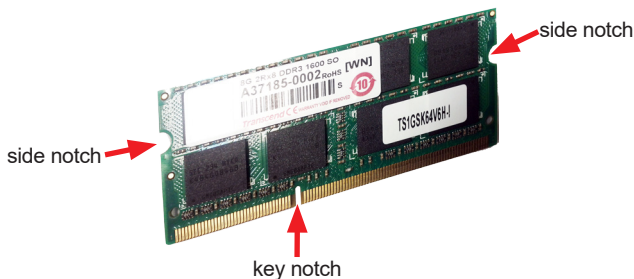
If any of the aforelisted items is damaged or missing, contact your vendor immediately.

1.5. Ordering Information

ITX-i2203-N3160	Intel® Celeron® Processor N3160 Embedded Mini-ITX motherboard w/ ACT
CBK-04-2203-00	Cable Kit 1 x SATA and SATA power cable 1 x Keyboard/ mouse cable 1 x Audio cable 1 x USB cable

1.6. RAM Installation

The main board has one memory module (SO-DIMM) sockets. Load the computer with a memory module of higher capacity to make programs run faster. The memory module for the computer's SO-DIMM socket should be a DDR3L with a "key notch" off the centre among the pins, which enables the memory module for particular applications. There are another two notches at each left and right side of the memory module to help fix the module in the socket.



To install the memory module:

1. Find the SO-DIMM socket on the board as marked in the illustration below. The SO-DIMM socket is horizontal type, and it has two spring-loaded locks to fix the memory module.
2. Confront the memory module's edge connector with the SO-DIMM slot connector. Align the memory module's key notch at the break on the SO-DIMM slot connector.
3. Fully plug the memory module until it gets auto-locked in place.

To uninstall the memory module:

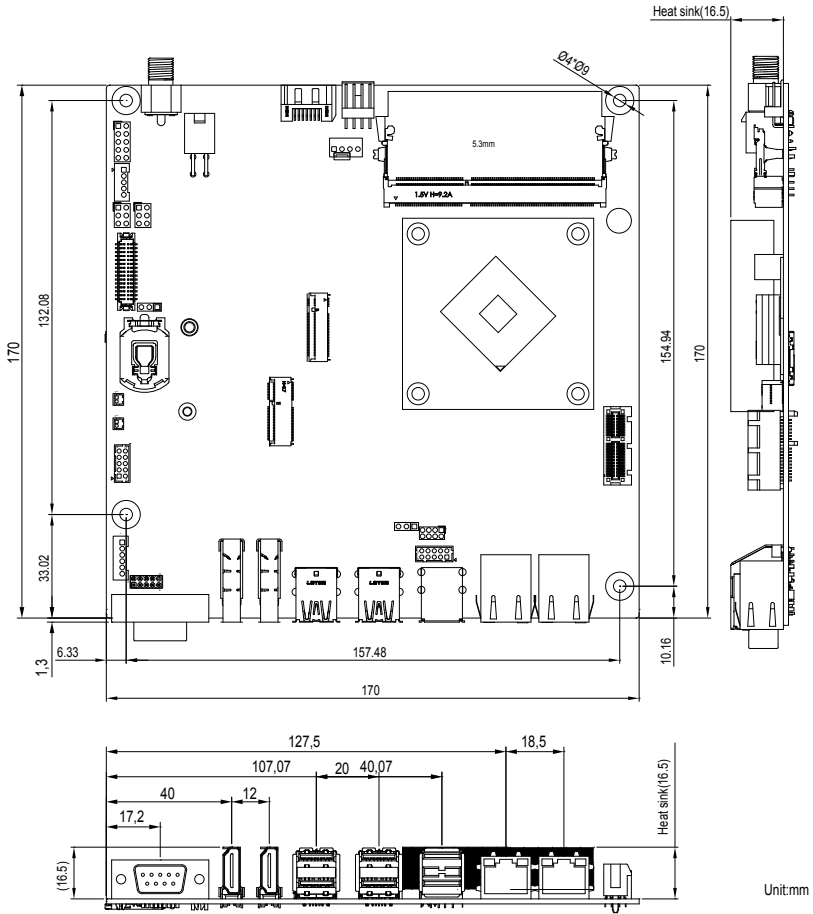
1. Pull back the locks from both sides of the SO-DIMM socket. The memory module will be auto-released from the socket.
2. Remove the memory module.

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Chapter 2

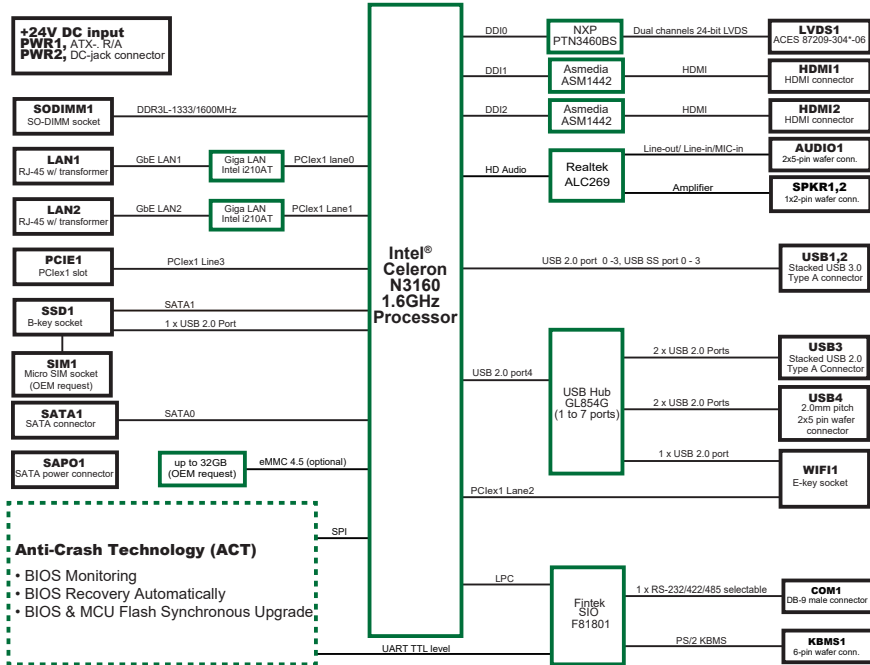
Getting Started

2.1. Board Dimensions



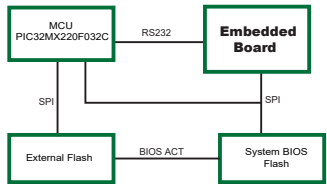
2.2. Block Diagram

Board Block Diagram



- Anti-Crash Technology (ACT)**
- BIOS Monitoring
 - BIOS Recovery Automatically
 - BIOS & MCU Flash Synchronous Upgrade

ACT Block Diagram



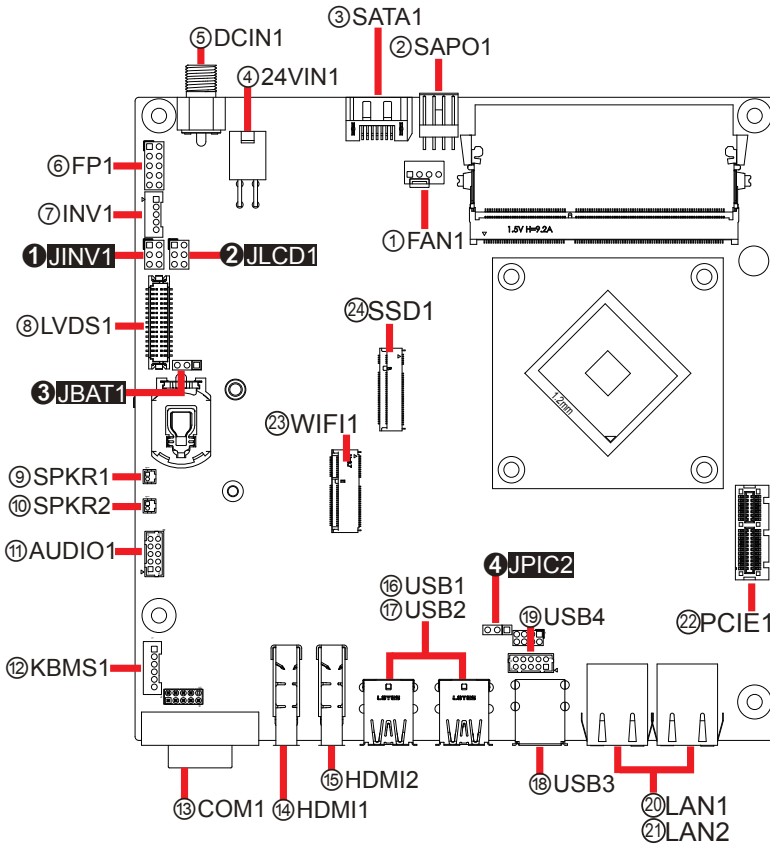
2.3. Jumpers & Connectors

The board comes with some connectors to join some devices and also some jumpers to alter the hardware configuration. The following in this chapter will explicate each of these components one-by-one.

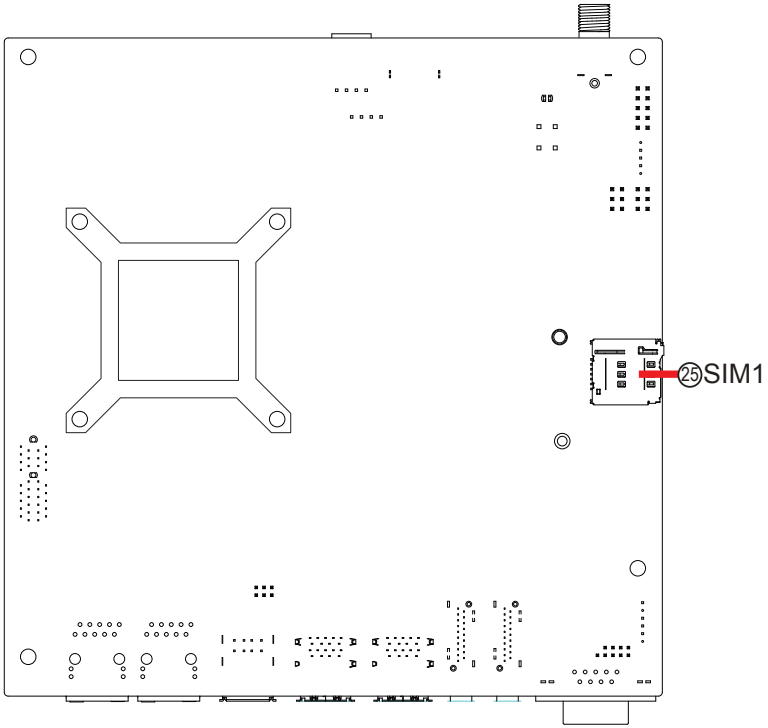
2.3.1. Layout

This section will provide an overview of this board.

Board Top



Board Bottom






2.3.2. Jumpers

① JINV1

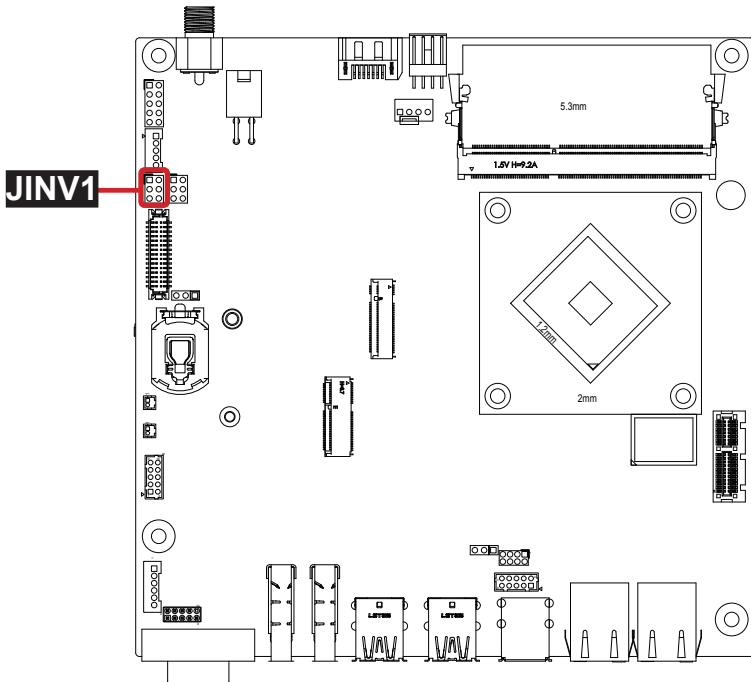
Function: LCD Inverter Voltage Selection

Setting:

Jumper Type: 2.54mm pitch 2x3-pin headers

Pin	Description	
1-2	5V	
3-4	12V (Default)	
5-6	24V	




Board Top



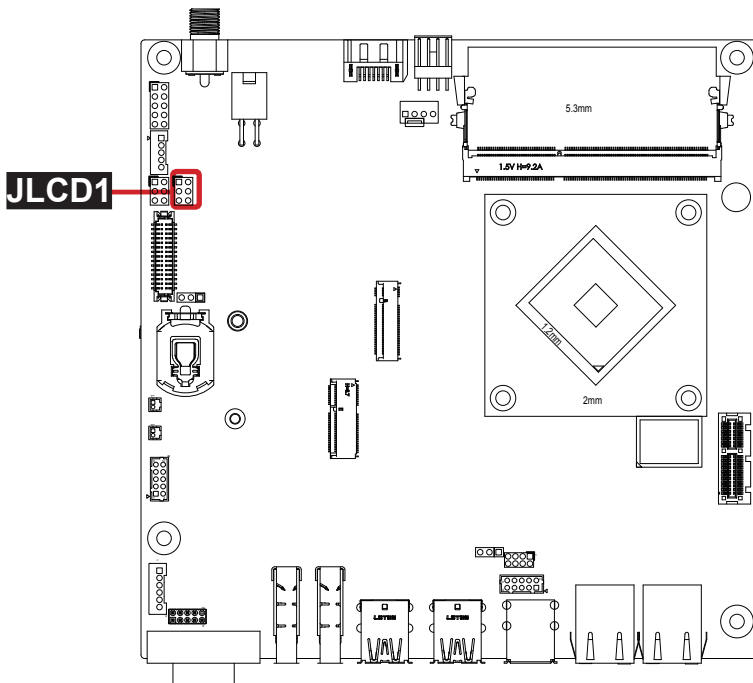
② JLCD1

Function: LCD Panel Voltage Selection
Jumper Type: 2.54mm pitch 2x3-pin headers

Setting:

Pin	Description	
1-2	3.3V (Default)	
3-4	5V	
5-6	12V	



Board Top



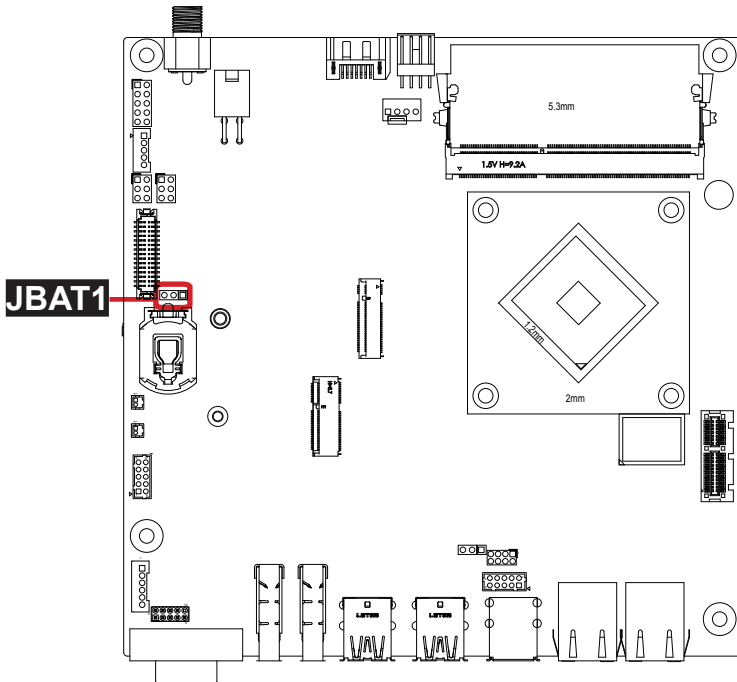
JBAT1

Function: Clear CMOS Selection
Jumper Type: 2.54mm pitch 1x3-pin headers

Setting:

Pin	Description	
1-2	Keep CMOS (Default)	
2-3	Clear CMOS	



Board Top



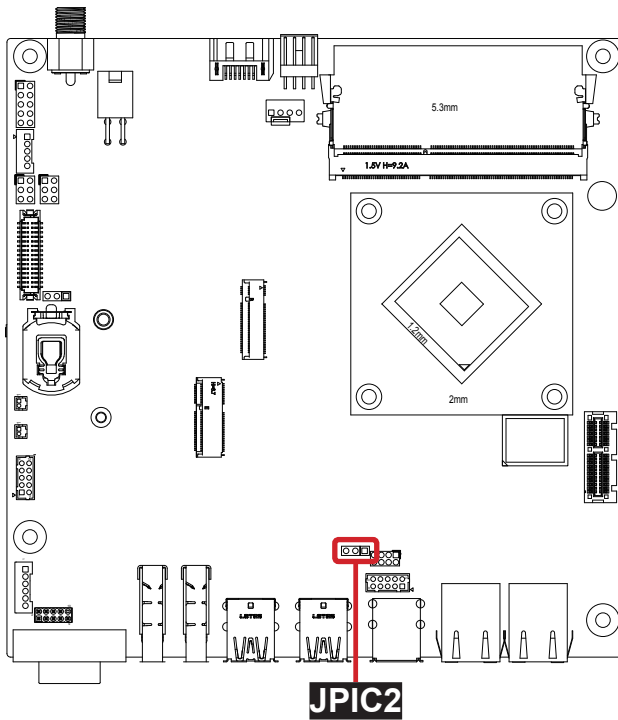
4 JPIC2

Function: AT/ATX Power Mode Selection
Jumper Type: 2.54mm pitch 1x3-pin headers

Setting:

Pin	Description	
1-2	AT	
2-3	ATX (Default)	

Board Top



2.3.3. Connectors

① FAN1

Function: CPU Fan Power Connector

Connector Type: 2.54mm pitch 1x4-pin one-wall connector

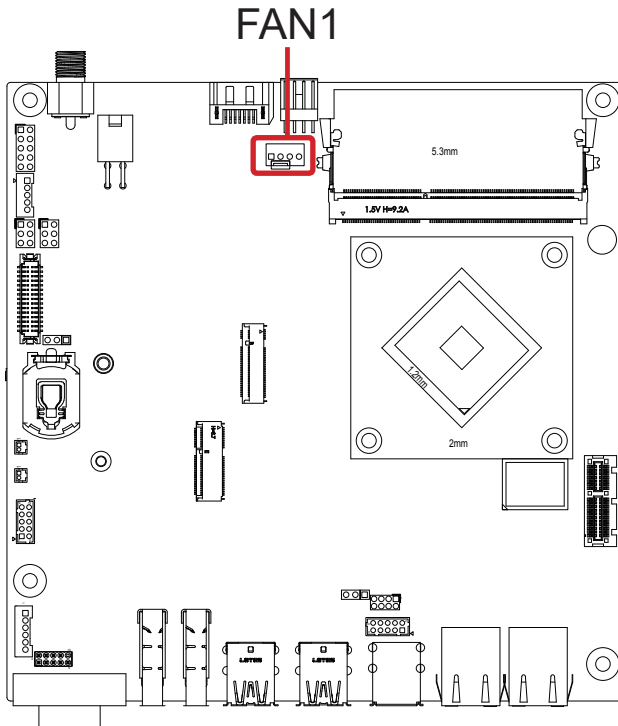
Pin Assignment:

Pin	Description
1	GND
2	+12V
3	RPM
4	Control



Note: The fan must be a 12V fan.

Board Top



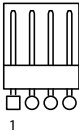
② SAPO1

Function: SATA Power Connector

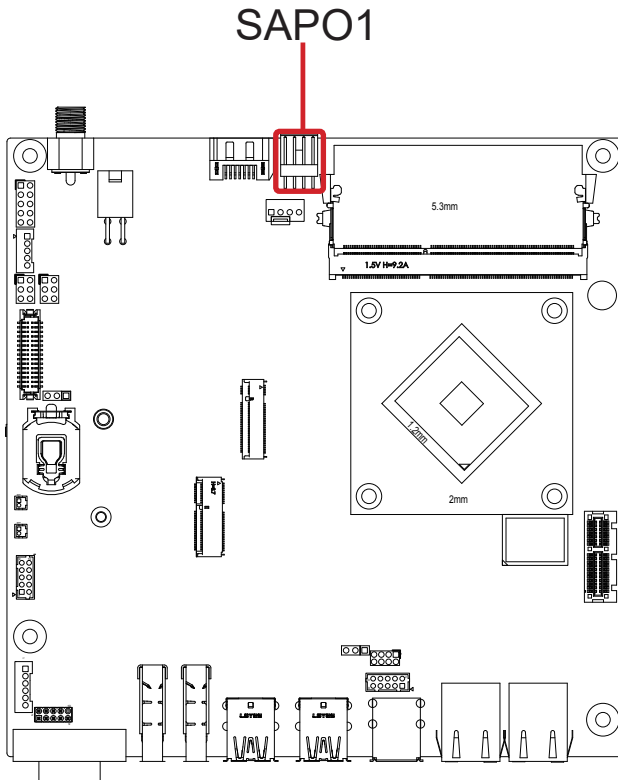
Connector Type: 2.54mm pitch 1x4-pin wafer connector

Pin Assignment:

Pin	Desc.
1	V5S
2	GND
3	GND
4	V12S



Board Top



③ SATA1

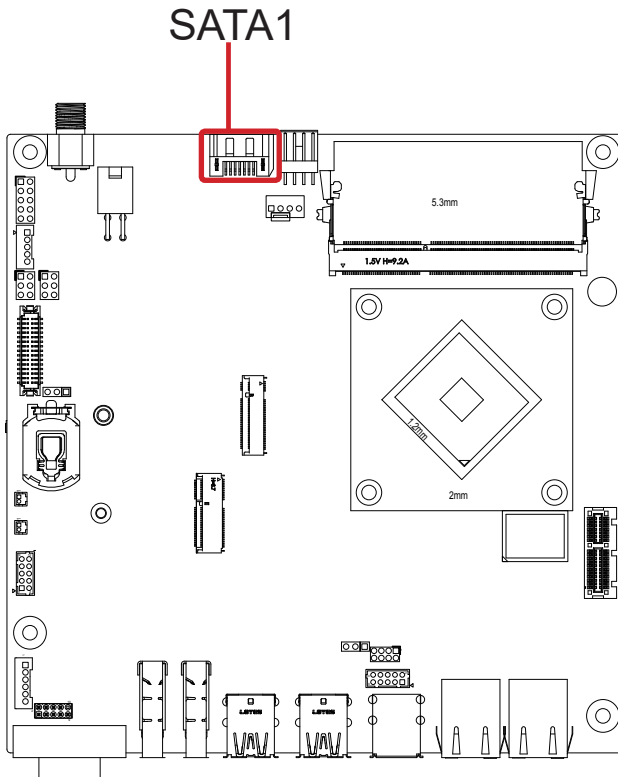
Function: Serial ATA Connector
Connector Type: Serial ATA Connector

Pin Assignment:

The pin assignments conform to the industry standard.



Board Top



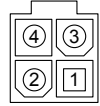
④ 24VIN1

Function: 24V DC IN Connector

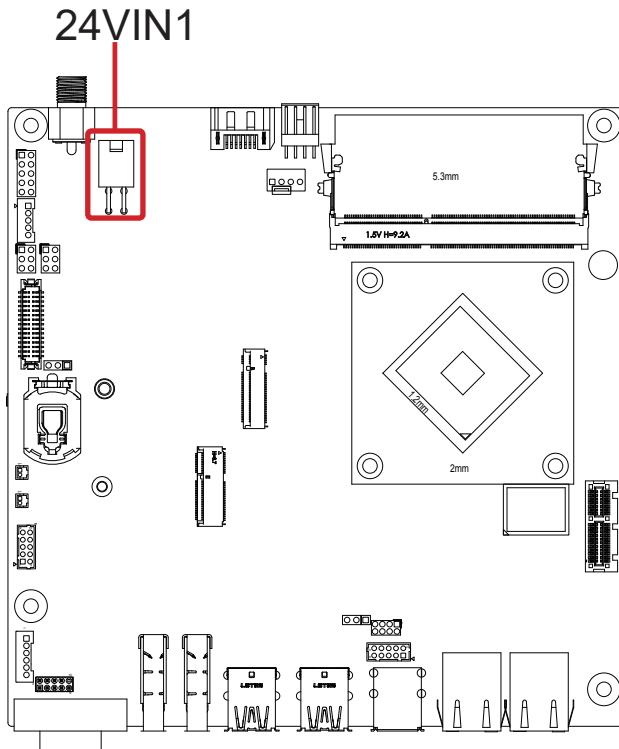
Connector Type: 4-pin power connector

Pin Assignment:

Pin	Desc.	Pin	Desc.
4	+24V	3	+24V
2	Chassis GND	1	Chassis GND



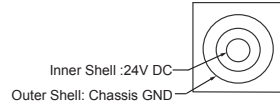
Board Top



⑤ DCIN1

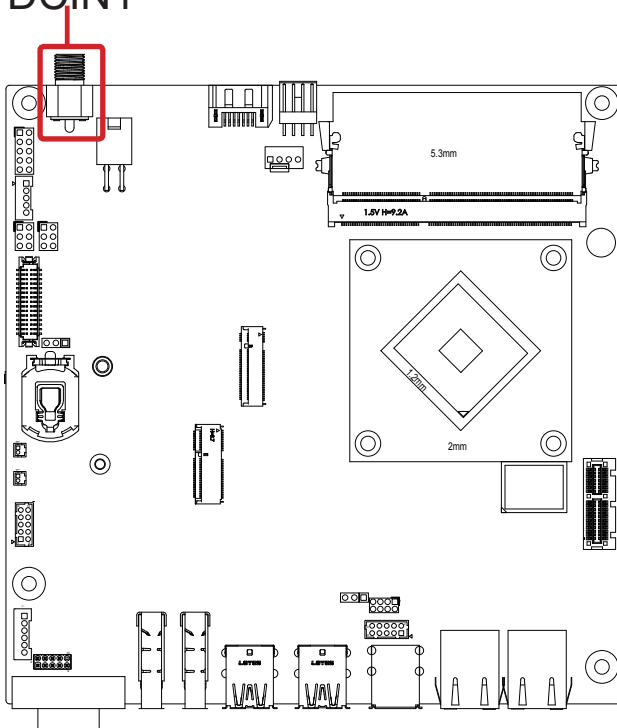
Function: DC In Power Jack
Connector Type: DC Φ 7.4 Male connector

Pin Assignment:



Board Top

DCIN1



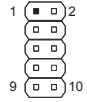
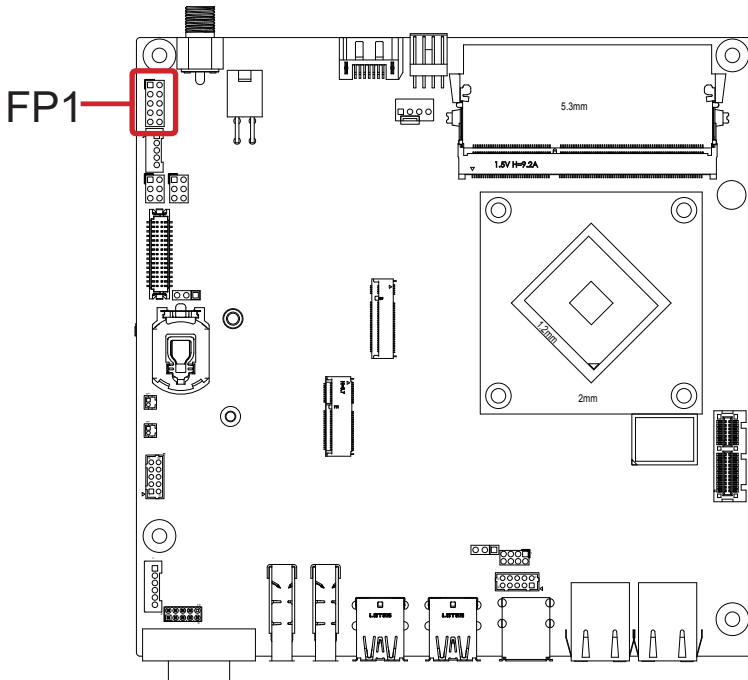
⑥ FP1

Function: Front Panel LED & Audio Header

Connector Type: 2.54mm pitch 2x5-pin headers

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	RESET+	2	RESET-
3	PLED+	4	PLED-
5	HLED+	6	HLED-
7	SPEAK+	8	SPEAK-
9	PSON+	10	PSON-

**Board Top**

⑦ INV1

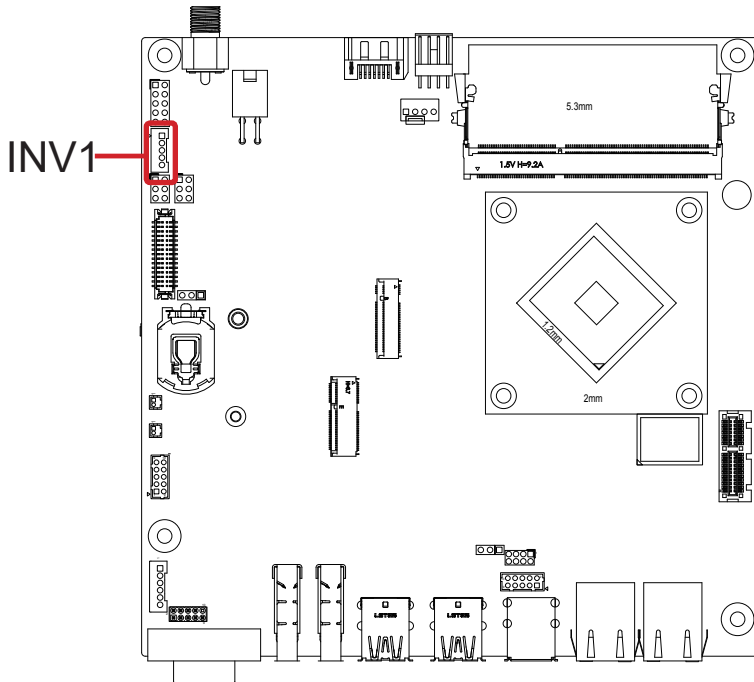
Function: Inverter Power Output
Connector Type: 2.00mm pitch 1x5-pin box wafer connector

Pin Assignment:

Pin	Desc.
1	Vin
2	GND
3	On/Off
4	Brightness control
5	GND



Board Top



⑧ LVDS1

Function: LVDS Connector (30-Pin)

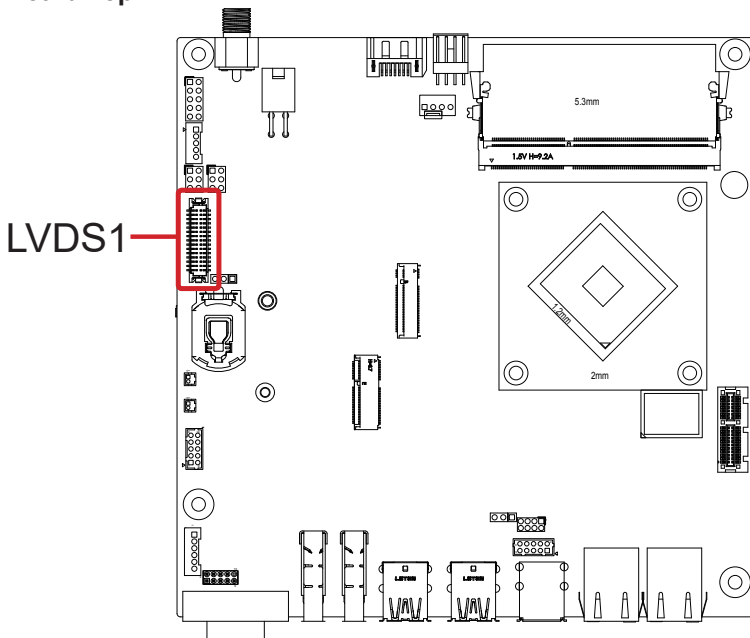
Connector Type: DF-13-30DP-1.25V connector

Pin Assignment:

Pin	Desc.	Pin	Desc.
2	VDD2	1	VDD1
4	TX2_CLK+	3	TX1_CLK+
6	TX2_CLK-	5	TX1_CLK-
8	GND5	7	GND1
10	TX2_D0+	9	TX1_D0+
12	TX2_D0-	11	TX1_D0-
14	GND6	13	GND2
16	TX2_D1+	15	TX1_D1+
18	TX2_D1-	17	TX1_D1-
20	GND7	19	GND3
22	TX2_D2+	21	TX1_D2+
24	TX2_D2-	23	TX1_D2-
26	GND8	25	GND4
28	TX2_D3+	27	TX1_D3+
30	TX2_D3-	29	TX1_D3-



Board Top



9 10 SPKR1/2

Function: Speaker Connector

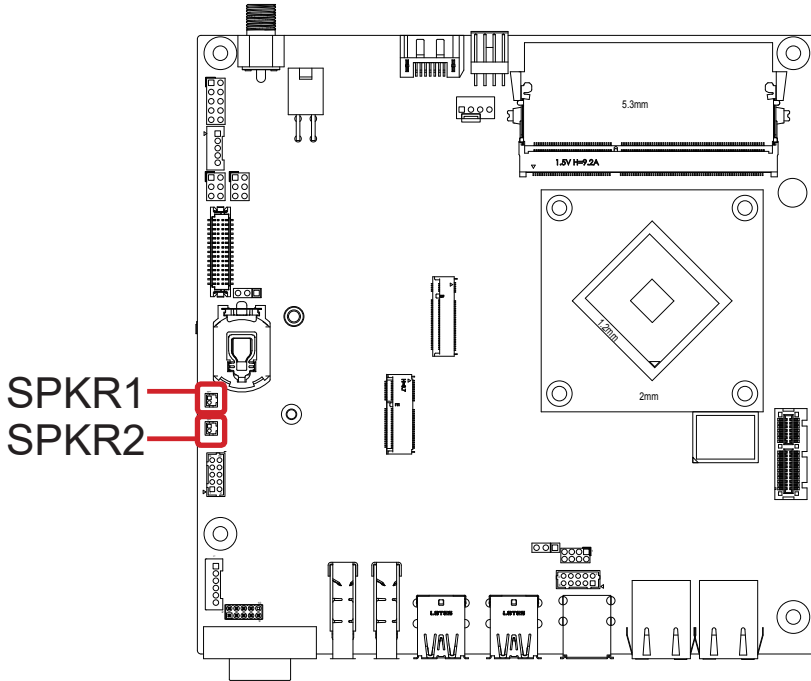
Connector Type: 1.25mm pitch 1x2 pin wafer connector

Pin Assignment:

Pin	Description
1	INSPL+
2	INSPL-



Board Top



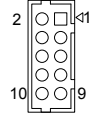
⑪ AUDIO1

Function: Audio Header

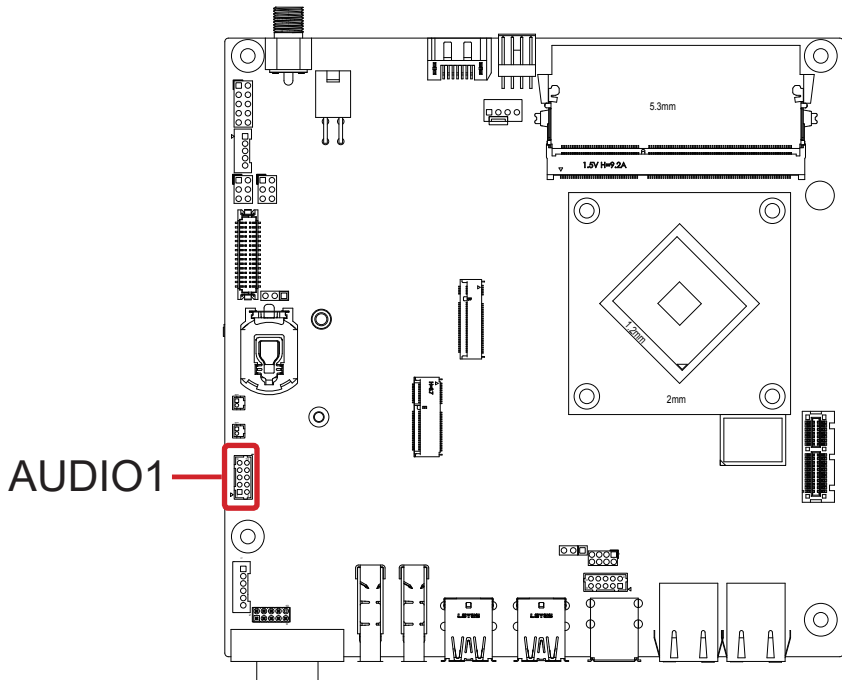
Connector Type: 2.0mm pitch 2x5 pin wafer connector

Pin Assignment:

Pin Desc.	Pin Desc.
2 LINE_R	1 LINE_L
4 GND1	3 GND3
6 MIC_L	5 MIC_R
8 GND2	7 GND4
10 LOUT_L	9 LOUT_R



Board Top



12 KBMS1

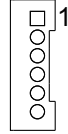
Function: Keyboard & Mouse Connector

Connector Type: 2.0mm pitch 1x6-pin header

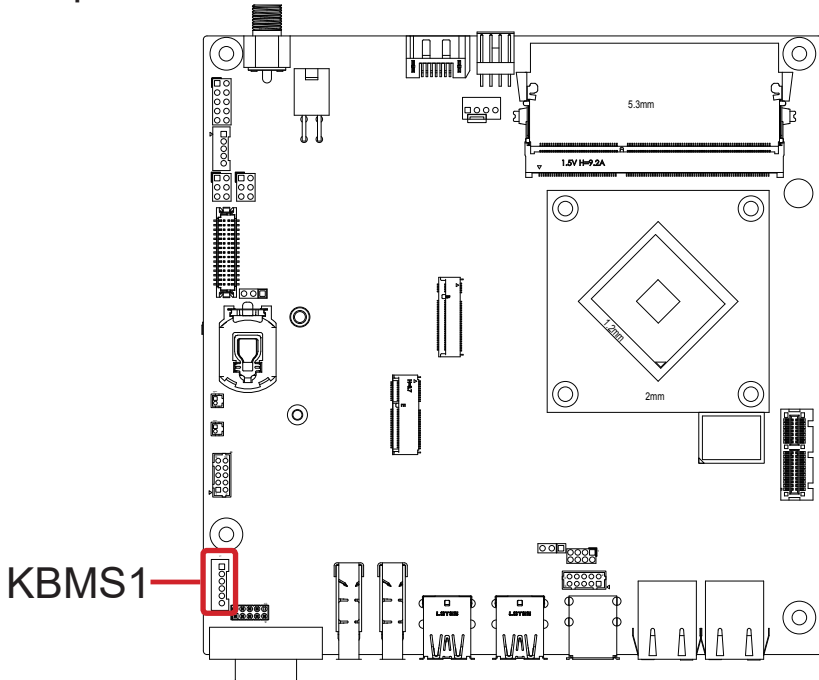
Pin Assignment:

Pin Desc.

- 1 KB_DATA
- 2 GND
- 3 MS_DATA
- 4 KB_CLK
- 5 PS2_VCC
- 6 MS_CLK



Board Top



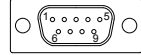
⑬ COM1

Function: RS-232/422/485
Serial Connector

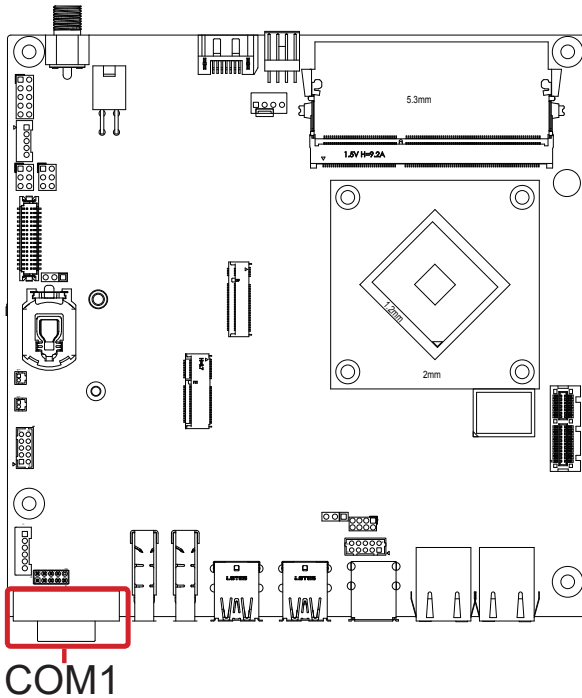
Pin Assignment:

Connector Type: DB-9 male connector

	RS232	RS422	RS485
Pin	Desc.	Desc.	Desc.
1	DCD#	TX-	D-
2	RXD	TX+	D+
3	TXD	RX-	
4	DTR	RX+	
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI		



Board Top



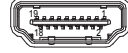
⑭ ⑮ HDMI1&2

Function: HDMI Connector

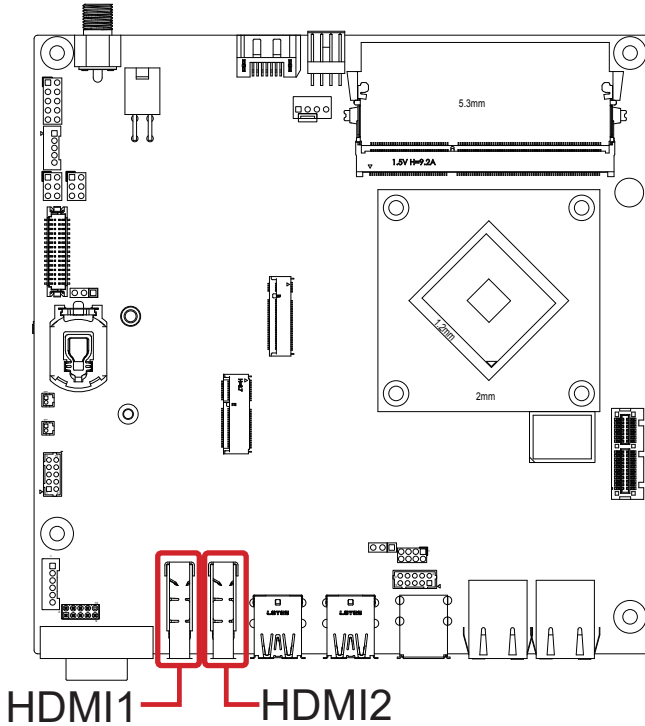
Pin Assignment:

Connector Type: 19-pin HDMI connector

The pin assignments conform to the industry standard.



Board Top



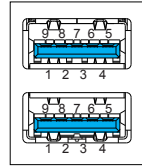
⑩⑪ USB1&2

Function: USB 3.0/2.0 Stack Connectors

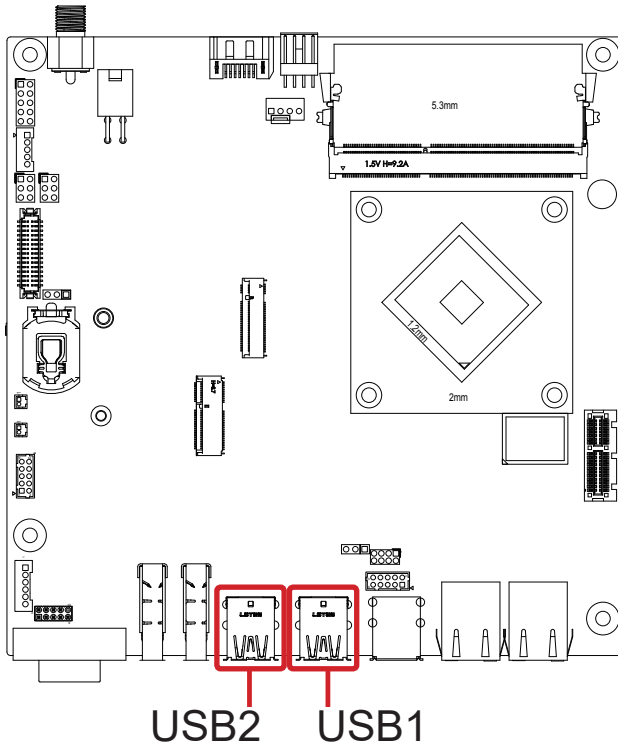
Connector Type: Double-stacked USB 3.0/2.0 type-A connectors

Pin Assignment:

The pin assignments conform to the industry standard.



Board Top



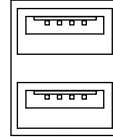
⑱ USB3

Function: USB 2.0 Stack Connectors

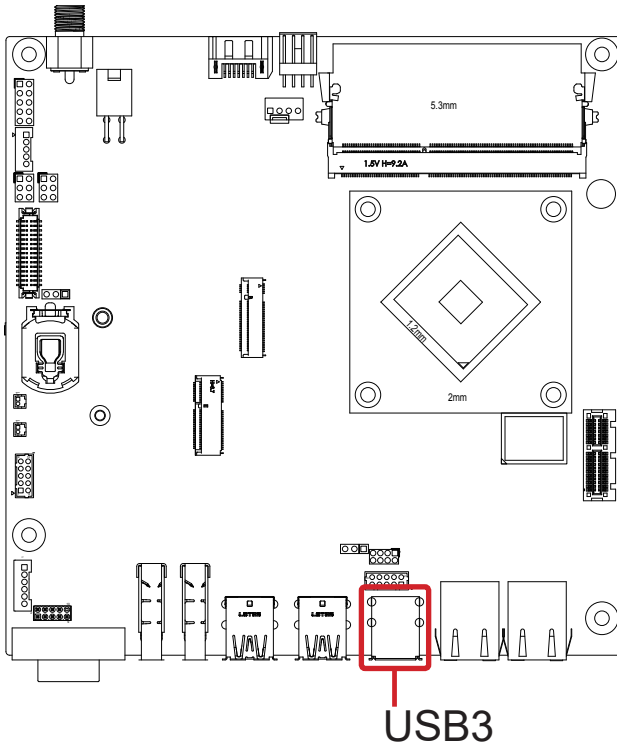
Connector Type: Double-stacked USB 2.0 type-A connectors

Pin Assignment:

The pin assignments conform to the industry standard.



Board Top



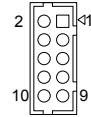
19 USB4

Function: USB 2.0 Connector

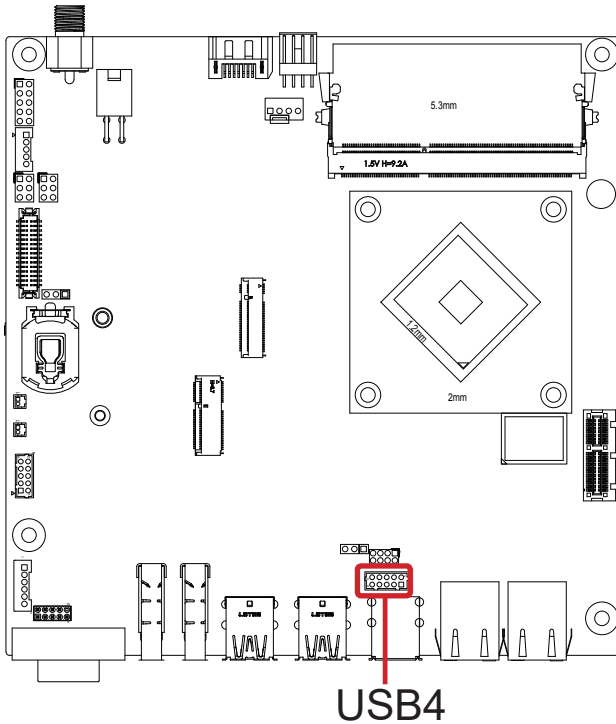
Connector Type: 2.0mm pitch 2x5 pin wafer connector

Pin Assignment:

Pin Desc.	Pin Desc.
2 +5V	1 +5V
4 USBDN4N	3 USBDN3N
6 USBDN4N	5 USBDN3P
8 GND	7 GND
10 GND	9 GND



Board Top

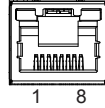


②② LAN1&2

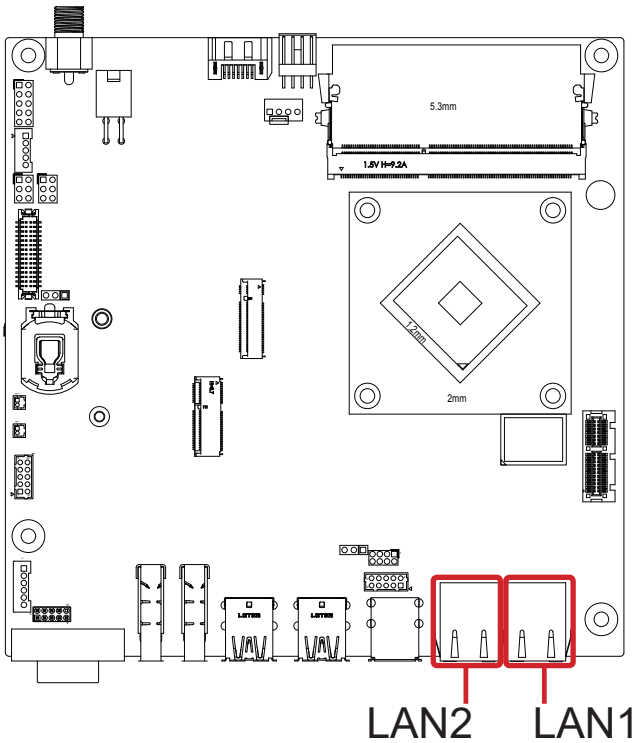
Function: Ethernet Connectors
Connector Type: 10/100/1000Mbps fast Ethernet RJ-45 connector

Pin Assignment:

The pin assignments conform to the industry standard.



Board Top



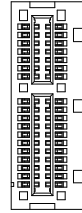
② PCIe1

Function: PCIe x1 Connector

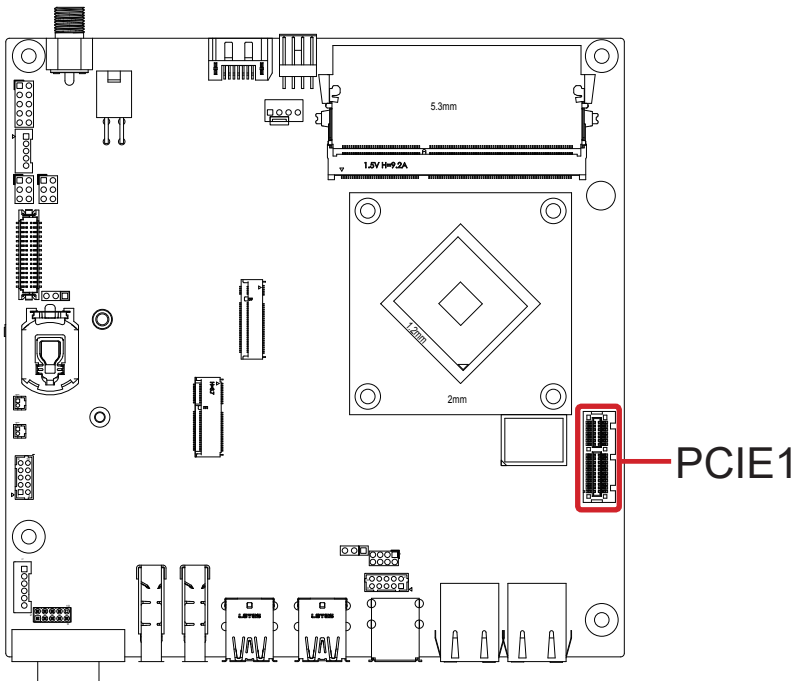
Connector Type: PCIe x1 Gen 2.0 slot

Pin Assignment:

The pin assignments conform to the industry standard.



Board Top

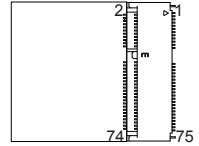


②3 WIF11

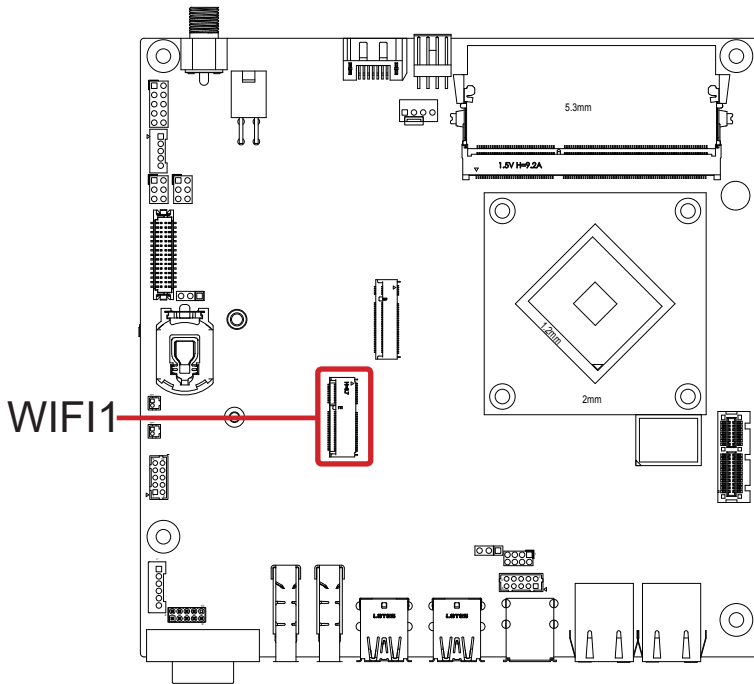
Function: NGFF M.2 E-Key Socket

Connector Type: NGFF M.2 E-Key socket for WIFI, supporting 22x30 module

Pin Assignment: The pin assignments conform to the industry standard.



Board Top

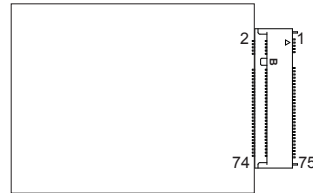
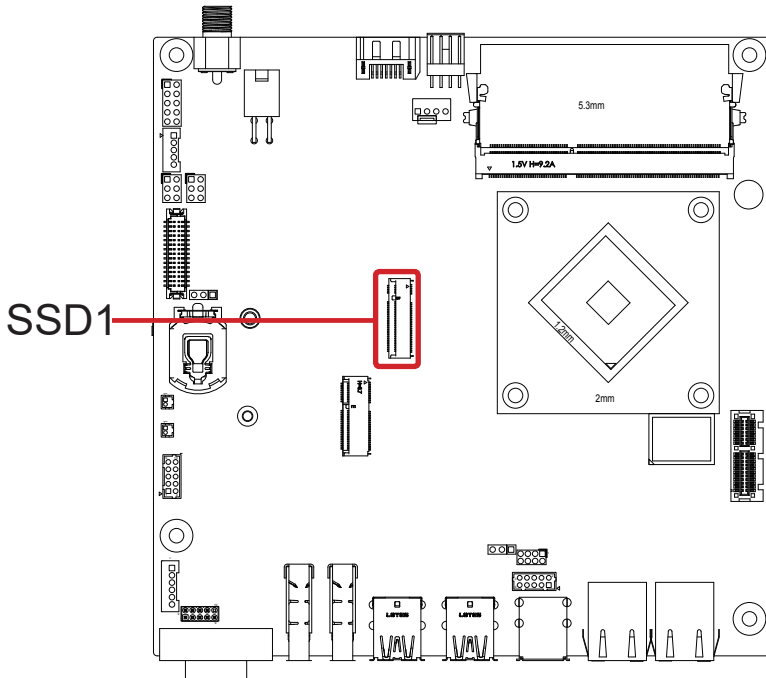


④SSD1

Function: NGFF M.2 B-Key Socket

Connector Type: NGFF M.2 B-Key socket for SSD, supporting 22x42 and 30x42 modules

Pin Assignment: The pin assignments conform to the industry standard.

**Board Top**

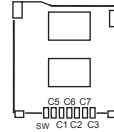
SIM1

Function: Micro SIM card socket (OEM request)

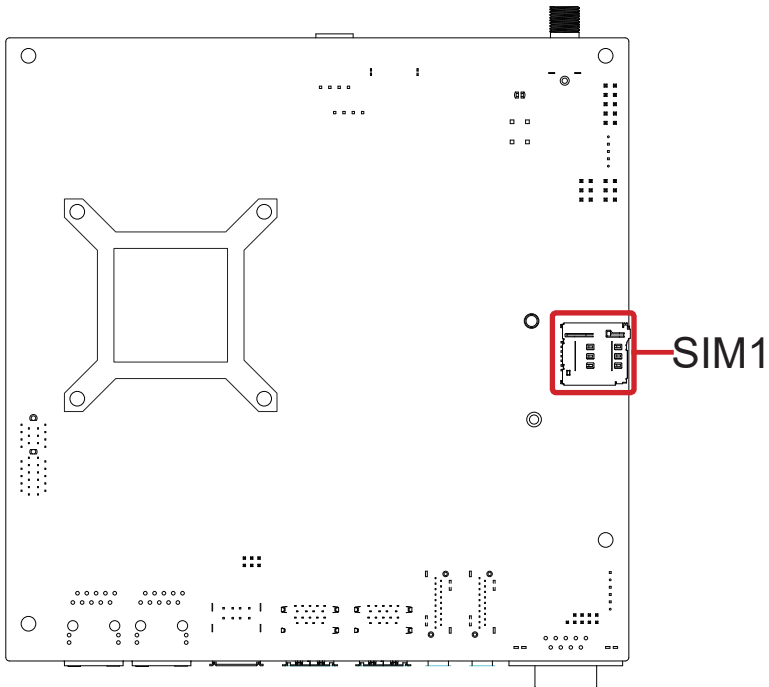
Connector Type: REGO 80440GIH-061T-120L socket

Pin Assignment:

Pin	Description	Pin	Description
C1	VCC	C2	RST
C3	CLK	C5	GND
C6	VPP	C7	I/O



Board Bottom



2.4. Driver Installation Notes

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

Windows 8.1

Driver	Path
CHIPSET	\\i220X\Chipset\Chipset_10.1.1.11_Public
GRAPHIC	\\i220X\Graphic\IntelR Graphics Driver Production Version 15.40.14.64.4352
ETHERNET	\\i220X\Ethernet
AUDIO	\\i220X\Audio
TXE	\\i220X\TXE\win8.1\Installers
USB3.0	\\i220X\USB3.0\win8.1\Intel(R) USB 3.0 eXtensible PV 1.0.0.42
SERIAL IO	\\i220X\Serial IO\win8.1 64bit\SerialIO_BSW_x64

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Chapter 3

BIOS

BIOS

The BIOS Setup utility is featured by AMI BIOS to configure the system settings stored in the system's BIOS ROM. AMI BIOS is activated once the computer powers on.

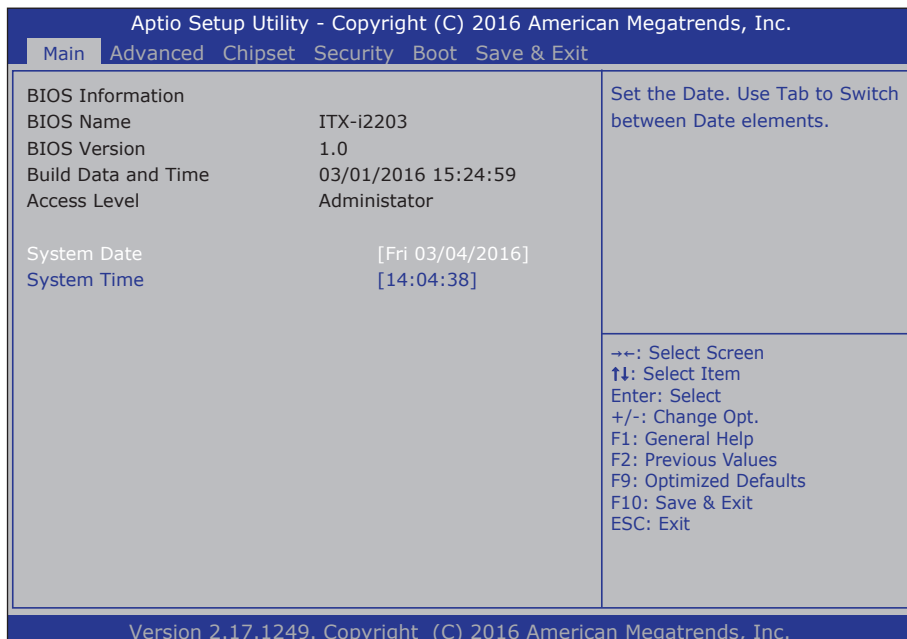
After entering the utility, use the left/right arrow keys to navigate between the top menus and use the down arrow key to access one.

Menu	Description
Main	See 3.1. Main on page 41 .
Advanced	See 3.2. Advanced on page 42 .
Chipset	See 3.3. Chipset on page 54 .
Boot	See 3.5. Boot on page 41 .
Security	See 3.3.2.1 Azalia Configuration on page 61 .
Exit	See 3.6. Save & Exit on page 62 .

NOTE: For system stability and performance, this BIOS utility is constantly improved. The screenshots demonstrated and descriptions hereinafter are for reference only and may not exactly meet what is presented onscreen.

3.1. Main

The **Main** menu displays some BIOS info and features the settings of **System Date** and **System Time**.



The BIOS info displayed is:

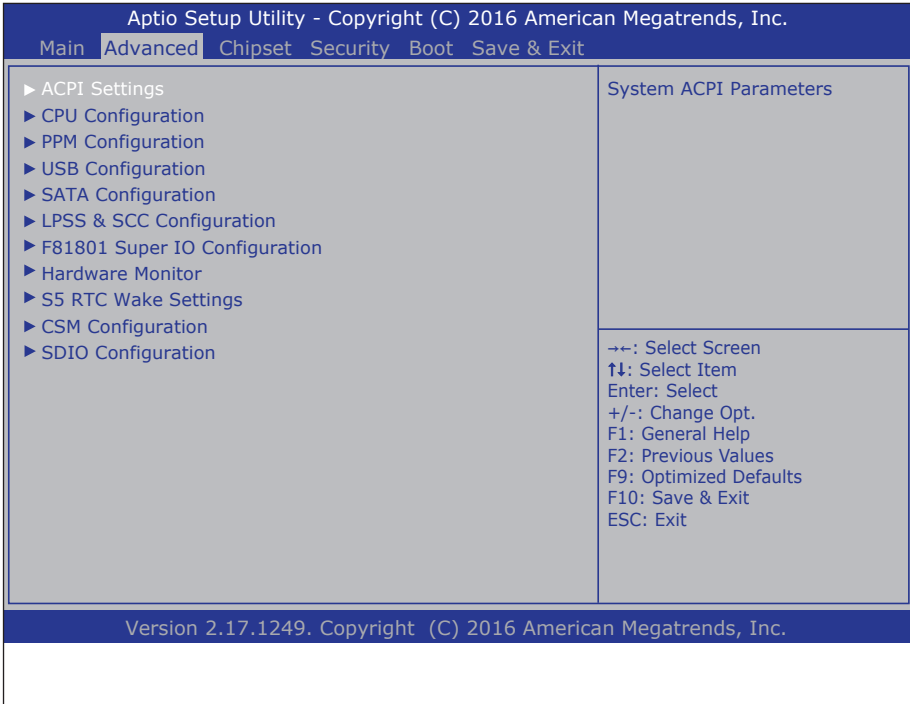
Info Item	Description
BIOS Name	Delivers the name of the project
System Serial Number	Delivers the computer's BIOS version
Build Date and Time	Delivers the date and time when the BIOS Setup utility was created/ updated
Access Level	Shows user's access level

The featured settings are:

Setting	Description
System Time	Sets system time.
System Date	Sets system date.

3.2. Advanced

The **Advanced** menu controls the system’s CPU, IDE, Super IO, SATA and USB. It also helps users monitor hardware health.

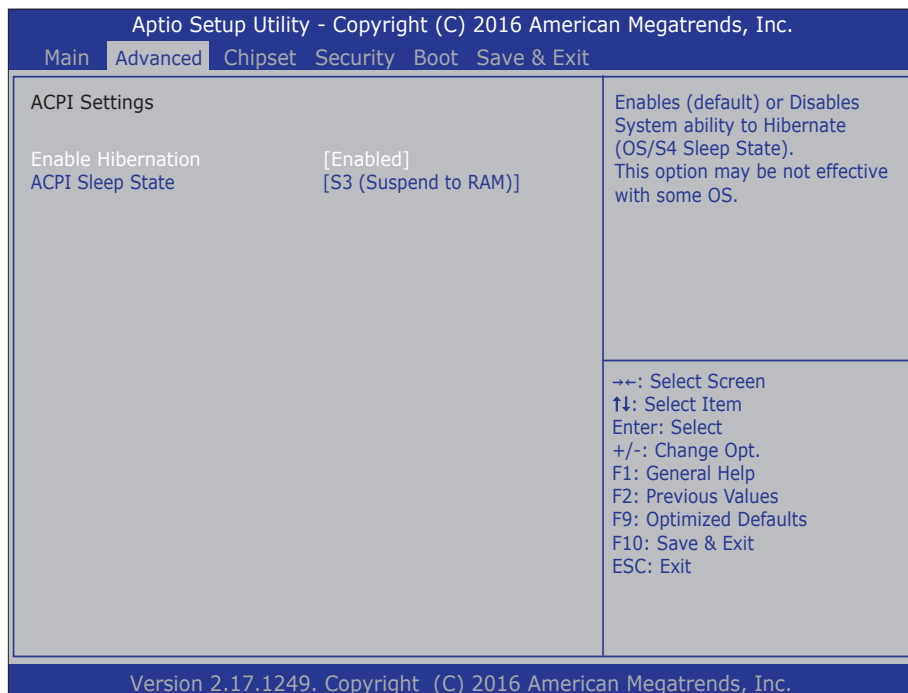


The featured submenus are:

Submenu	Description
ACPI Settings	See 3.2.1. ACPI Settings on page 43.
CPU Configuration	See 3.2.2. CPU Configuration page 44.
PPM Configuration	See 3.2.3. PPM Configuration on page 45.
SATA Configuration	See 3.2.5. SATA Configuration on page 47.
LPSS & SCC Configuration	See 3.2.6. LPSS & SCC Configuration on page 48.
F81801 Super IO Configuration	See 3.2.7. F81801 Super IO Configuration on page 49.
Hardware Monitor	See 3.2.8. Hardware Monitor on page 50.
S5 RTC Wake Settings	See 3.2.9. S5 RTC Wake Settings on page 51.
CSM Configuration	See 3.2.10. CSM Configuration on page 52.
SDIO Configuration	See 3.2.11. SDIO Configuration on page 53.

3.2.1. ACPI Settings

Access this submenu to configure the highest ACPI sleep state when the system enters suspend.

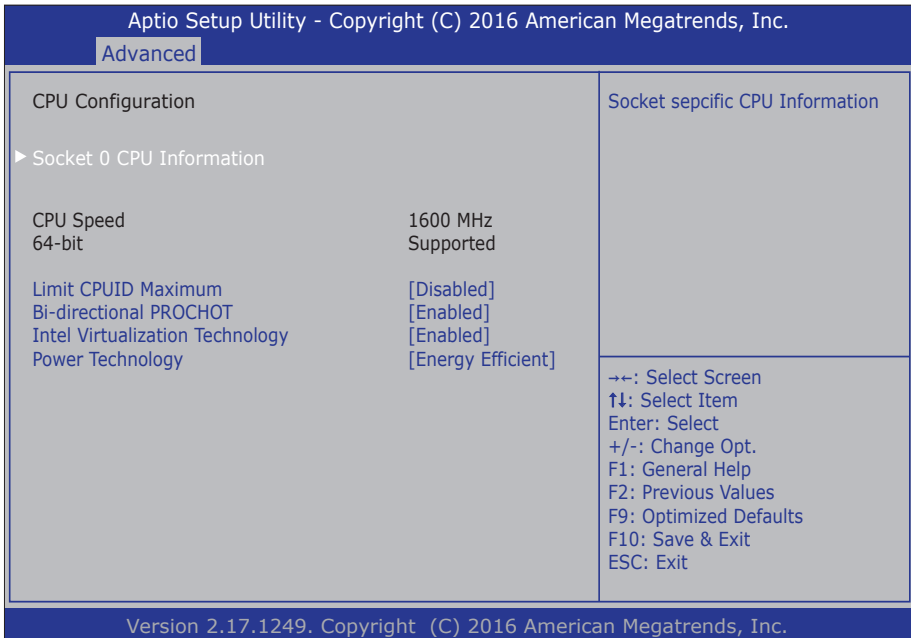


The featured submenus are:

Setting	Description
Enable Hibernation	Enables/disables the system to/from hibernation (OS/S4 Sleep State). Options available are: <ul style="list-style-type: none"> ▶ This option may not be effective with some OS. ▶ Enabled is the default
ACPI Sleep State	Sets the highest ACPI sleep state that system enters when the suspend button is hit. Options available are: <ul style="list-style-type: none"> ▶ Suspend Disabled ▶ S3 only (Suspend to RAM) (default)

3.2.2. CPU Configuration

Access this submenu to setup the CPU Configuration.



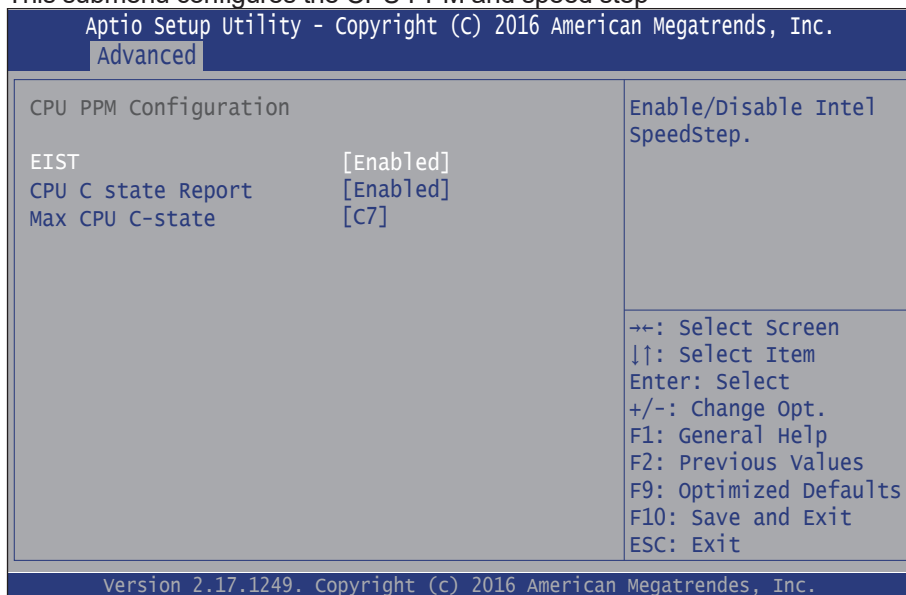
The featured submenus are:

Setting	Description
Socket 0 CPU Information	Enter the submenu to view the socket specific CPU info
Limit CPUID Maximum	Enables/disables the maximum CPUID value limit. Enable this item to prevent the system from "rebooting" when trying to install Windows XP. ▶ Disabled is the default.
Bi-directional PROCHOT	Enables/disables Bi-directional PROCHOT ▶ Enabled is the default.
Intel Virtualization Technology	Enables/disables the Intel Virtualization Technology. When enabled, a VMM can utilize the additional hardware capabilities provided by Vendor Pool Technology. ▶ Enabled is the default.

Power Technology	<p>Sets the Energy mode of the processor. Options available are:</p> <ul style="list-style-type: none"> ▶ Disabled ▶ Energy Efficient (default) ▶ Custom <ul style="list-style-type: none"> • EIST :Enables (default) or Disable Intel Speed Step. • Turbo Mode :Enables (default) or Disable Turbo Mode. • P-STATE Coordination : Change P-STATE coordination type. • Package C State limit : Set the Package C State limit.
-------------------------	--

3.2.3. PPM Configuration

This submenu configures the CPU PPM and speed step



The featured submenus are:

Setting	Description
EIST	Enables (default) or Disable Intel Speed Step. ▶ Enabled is the default.
CPU C State Report	Enables (default) or Disable CPU C State Report. ▶ Enabled is the default.
Max CPU C-state	Set the Max C-state Options available are: ▶ C7 (default), C6 , and C1

3.2.4. USB Configuration

USB Configuration displays the status of USB connection and configures USB parameters.

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Advanced

USB Configuration		Enables 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.
USB Module Version	11	→←: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit
USB Controllers: 1 XHCI		
USB Devices: 1 Keyboard, 1 Mouse, 2 Hubs		
Legacy USB Support	[Enabled]	
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
USB hardware delays and time-outs:		
USB transfer time-out	[20 sec]	
Device reset time-out	[20 sec]	
Device power-up delay	[Auto]	

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The featured submenus are:

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.
XHCI Hand-off	This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. ▶ Enabled is the default.
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support ▶ Options: Disabled (default), Enabled
USB transfer time-out	Configures the USB transfer timeout value for control, bulk and interrupt transfers. ▶ Options: 20 sec (default), 10 sec , 5 sec and 1 sec .
Device reset time-out	Configures the timeout value for the USB mass storage device Start Unit command. ▶ Options: 40 sec , 30 sec , 20 sec (default) and 10 sec .

Device power-up delay	<p>Configures the maximum time allowed for device to report itself to the Host Controller, .</p> <p>► Options:</p> <p>Auto (default): Root port devices will be given 100 ms; a hub port device will be given the time as specified in the hub descriptor,</p> <p>Manual: If set to Manual, a delay from 1 to 40 seconds can be selected. The default is 5 seconds.</p>
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3.2.5. SATA Configuration

SATA Configuration manages the system’s SATA configuration and also delivers its status.

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Advanced

<p>SATA Controller(s) [Enabled] SATA Controller Speed [Gen3]</p> <p>SATA Port 0 Not Present Port 0 [Enabled]</p>	<p>Enable or disable SATA Device.</p>	
		<p>←→: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit</p>

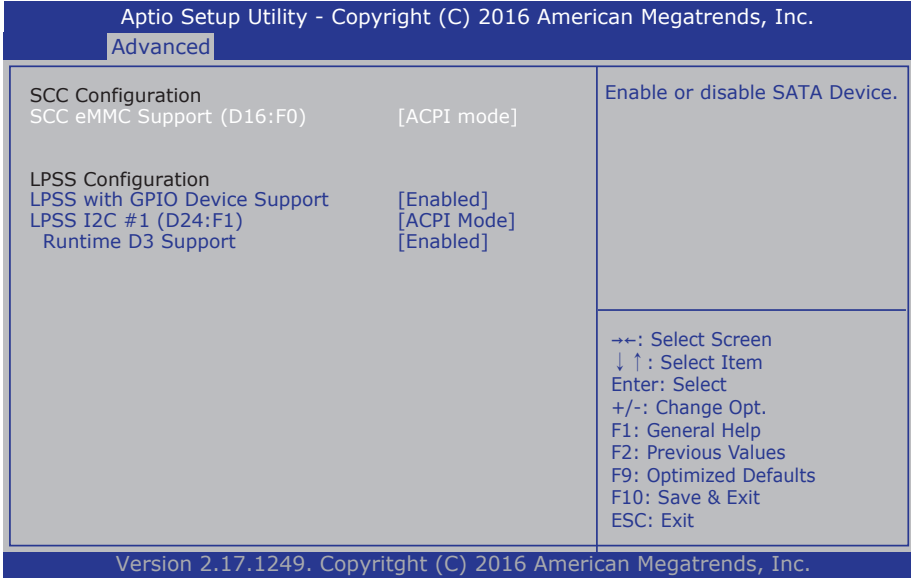
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

The featured submenus are:

Setting	Description
SATA Controller	Enables/disables SATA device. ► Enabled is the default.
SATA Interface Speed	Configures the maximum speed of SATA controller. ► Options available are Gen1 , Gen2 and Gen3(default) .
Port 0	Enables/disables SATA Port 0. ► Enabled is the default.

3.2.6. LPSS & SCC Configuration

Access this submenu to setup the LPSS & SCC Configuration



The featured submenus are:

Setting	Description
SCC eMMC Support (D16:F0)	Set the mode of SCC eMMC Support mode. ▶ Options: ACPI mode(default)/PCI mode/Disabled
LPSS with GPIO Device Support	Enable or disable GPIO ACPI device Support. Disable it will disable all LPSS devices. ▶ Enabled is the default.
LPSS I2C #1 (D24:F1)	Set the mode of LPSS I2C #1. ▶ Options: ACPI mode(default)/PCI mode/Disabled
Runtime D3 Support	Enable or disable Runtime D3 Support. ▶ Enabled is the default.

3.2.7. F81801 Super IO Configuration

Access this submenu to setup the F81801 Super IO Configuration

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Advanced

<p>F81801 Super IO Configuration</p> <p>Super IO Chip F81801</p> <p>▶ Serial Port 1 Configuration</p> <p>Power Failure [Always off]</p>	<p>Set Parameters of Serial Port 1 (COM1)</p> <p>→←: Select Screen ↓ ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit</p>
--	--

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The featured submenus are:

Setting	Description								
Serial Port 1 Configuration	Set the Parameters of Serial Port 1 (COM1).								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Serial Port</td> <td>Enable or disable Serial Port (COM). ▶ Enabled is the default.</td> </tr> <tr> <td>Change Setting</td> <td>Select an optimal setting for Super IO device.</td> </tr> <tr> <td>COM mode select</td> <td>Select COM mode ▶ Options: RS-422, RS-232, RS-485, RS-422 with termination resistor, and RS-485 with termination resistor.</td> </tr> <tr> <td>RS485 AutoFlow</td> <td>Enable or disable RS485 AutoFlow. ▶ Disabled is the default.</td> </tr> </table>	Serial Port	Enable or disable Serial Port (COM). ▶ Enabled is the default.	Change Setting	Select an optimal setting for Super IO device.	COM mode select	Select COM mode ▶ Options: RS-422, RS-232, RS-485, RS-422 with termination resistor, and RS-485 with termination resistor.	RS485 AutoFlow	Enable or disable RS485 AutoFlow. ▶ Disabled is the default.
	Serial Port	Enable or disable Serial Port (COM). ▶ Enabled is the default.							
	Change Setting	Select an optimal setting for Super IO device.							
COM mode select	Select COM mode ▶ Options: RS-422, RS-232, RS-485, RS-422 with termination resistor, and RS-485 with termination resistor.								
RS485 AutoFlow	Enable or disable RS485 AutoFlow. ▶ Disabled is the default.								
Power Failure	Specify how the computer behaves in the event of a power failure. ▶ Options: Always on, Always off (default)								

3.2.8. Hardware Monitor

Access this submenu to monitor of the overall inboard hardware health events, such as System temperature, CPU voltage, CPU & System fan speed... etc.

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Advanced

PC Health Status	
CPU Temperature	: +46° C
System Temperature	: +40° C
Fan1 Speed	: N/A
Vcore	: +0.976 V
VDDQ	: +1.366 V
VCC3V	: +3.360 V
VSB3V	: +3.376 V
VBAT	: +3.024 V

→+: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

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3.2.9. S5 RTC Wake Settings

Access this submenu to setup S5 RTC Wake Setting

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 Advanced

Wake system from S5	[Disabled]	Enables or disables system wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s)
		+-: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit

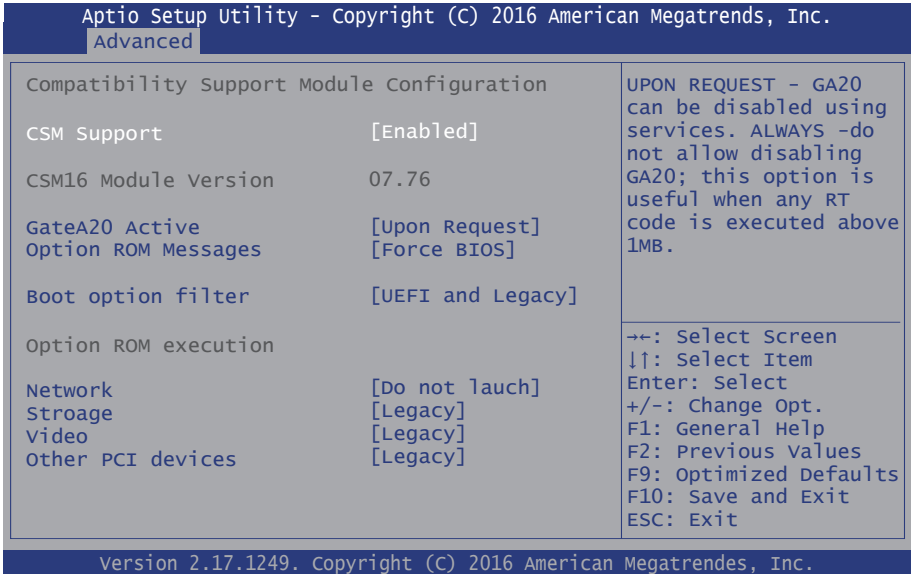
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

The featured submenus are:

Setting	Description						
Wake system from S5	Select System wake on alarm Event ▶ Options: Disabled(default)/Fixed Time/Dynamic Time						
Wake System with Fixed Time	Sets if to awake the system at a defined moment.						
	<table border="1"> <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 23 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>	Wake up hour	Defines the (hour) time to awake the system. ▶ 0 to 23 configurable.	Wake up Minute	Defines the (minute) time to awake the system. ▶ 0 to 23 configurable.	Wake up second	Defines the (second) time to awake the system. ▶ 0 to 59 configurable.
	Wake up hour	Defines the (hour) time to awake the system. ▶ 0 to 23 configurable.					
Wake up Minute	Defines the (minute) time to awake the system. ▶ 0 to 23 configurable.						
Wake up second	Defines the (second) time to awake the system. ▶ 0 to 59 configurable.						
Wake System with Dynamic Time	Sets if to awake the system some time in the future. <table border="1"> <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>	Wake up minute increase	Defines how long from now to awake the system. ▶ 1 to 5 minutes configurable.				
Wake up minute increase	Defines how long from now to awake the system. ▶ 1 to 5 minutes configurable.						

3.2.10. CSM Configuration

Access this submenu to setup CSM Configuration



The featured submenus are:

Setting	Description
CSM Support	Enable and Disable CSM Support ▶ Enabled is the default.
GateA20 Active	Select setting for GateA20. ▶ Options: Upon Request, and Always.
Option ROM Messages	Set display mode for Option ROM. ▶ Options: Force BIOS, and Keep Current.
Boot ROM filter	Control the Legacy/UEFI ROMs priority. ▶ Options: UEFI and Legacy, Legacy only, and UEFI only.
Network	Control the execution of UEFI and Legacy PXE OpROM. ▶ Options: Do not launch, UEFI and Legacy.
Storage	Control the execution of UEFI and Legacy Storage OpROM. ▶ Options: Do not launch, UEFI and Legacy.
Video	Control the execution of UEFI and Legacy Video OpROM. ▶ Options: Do not launch, UEFI and Legacy.
Other PCI device	Set the OpROM execution policy for devices other than Network, Storage, or Video. ▶ Options: Do not launch, UEFI and Legacy.

3.2.11. SDIO Configuration

Access this submenu to setup CSM Configuration

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Advanced

<p>SDIO Configuration</p> <p>SDIO Access Mode [Auto]</p> <p>Sdio Device 1 Details: Bus 0 Dev 10 Func 0</p>	<p>Auto Option: Access SD device in DMA mode if controller support it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode. PIO option: Access SD device in PIO mode.</p> <hr/> <p>++: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit</p>
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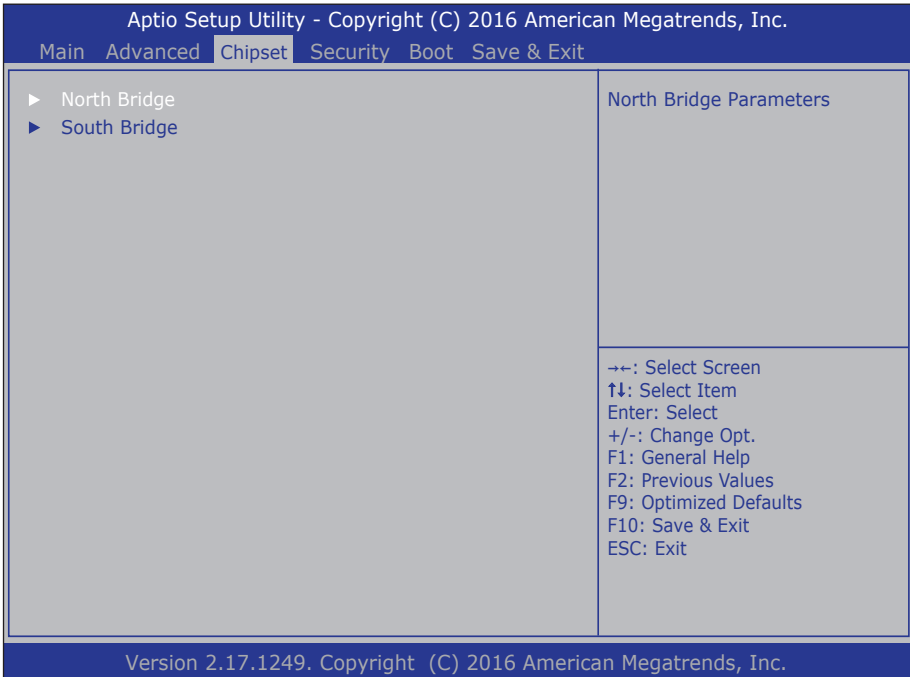
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The featured submenus are:

Setting	Description
SDIO Access Mode	Select SDIO Access Mode. Auto: Access SD device in DMA mode if controller supports, otherwise in PIO mode. DMA: Access SD device in DMA mode. PIO: Access SD device in PIO mode. ▶ Options: Auto (default), DMA , PIO

3.3. Chipset

Access this **Chipset** menu to configure the system’s chipset.

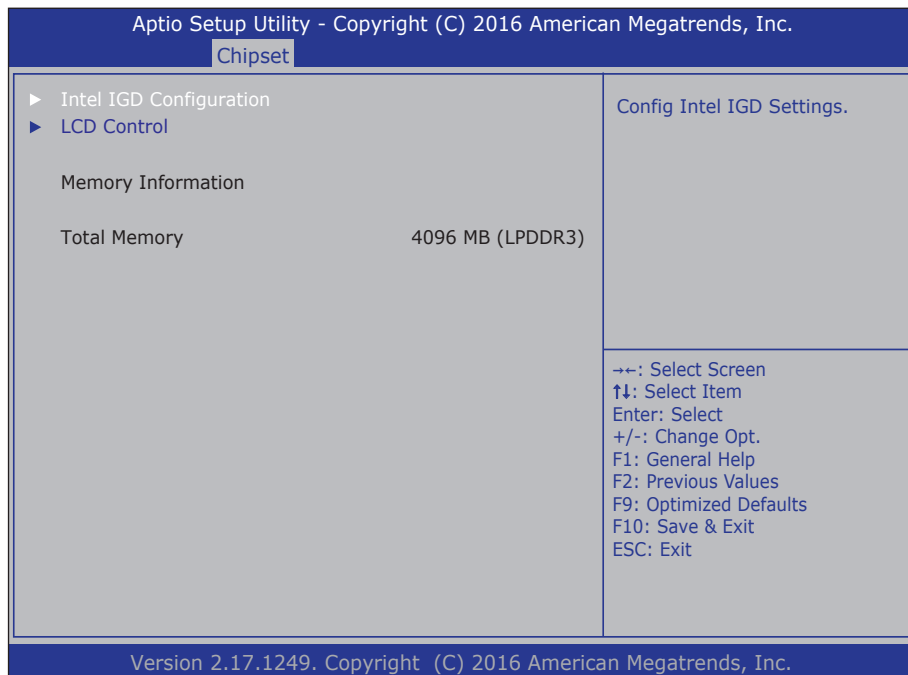


The featured submenu are **North Bridge** and **South Bridge**, which are covered in the following sections:

Submenu	Description
North Bridge	Configures the North Bridge. ▶ See 3.3.1. North Bridge on page 55 for more details.
South Bridge	Delivery South Bridge. ▶ See 3.3.2. South Bridge on page 58 for more details.

3.3.1. North Bridge

Access this submenu to configure North Bridge.



The featured settings are:

Setting/Submenu	Description
Intel IGD Configuration	Configures the Intel IGD Configuration.
LCD Control	Configures the LCD Control.

3.3.1.1 Intel IGD Configuration

Access this submenu to configure Intel IGD Configuration.

Setting	Description		
GOP Driver	Enable and Disable GOP Driver ▶ Enabled is the default.		
Integrated Graphics Device	Enable and Disable IGD. ▶ Enabled is the default.		
IGD Turbo	Select the IGD Turbo. If Auto selected, IGD Turbo will only be enabled when SOC steeping is B0 or above. ▶ Options: Auto (default), Enabled and Disabled .		
Primary Display	Set IGD or PCI graphic device as the Primary Display. ▶ Options: IGD , PCIe , and Auto (default).		
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ▶ Options: 32M is the default.		
DVMT total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ▶ Options: 256MB (default), 128MB and Max .		
Aperture Size	Select the Aperture Size. ▶ Options: 256MB (default), 128MB and 512MB .		
GTT Size	Select the GTT Size. ▶ Options: 4MB (default), 2MB and 8MB .		
ISP Enable/Disable	Enable and Disable ISP Device Selection. ▶ Disabled is the default. <table border="1" data-bbox="409 935 577 1118"> <tr> <td>ISP PCI Device Selection</td> <td>Default ISP is PCI B0D2F0 for window Boot. Linux Boot to Select B0D3F0. The option won't be activated if ISP is disabled. ▶ Options: ISP PCI Device as B0D3F0 (default), Disabled, ISP PCI Device as B0D2F0 and ISP PCI Device as B0D3F0 with Virtual ISP B0D2F0.</td> </tr> </table>	ISP PCI Device Selection	Default ISP is PCI B0D2F0 for window Boot. Linux Boot to Select B0D3F0. The option won't be activated if ISP is disabled. ▶ Options: ISP PCI Device as B0D3F0 (default), Disabled , ISP PCI Device as B0D2F0 and ISP PCI Device as B0D3F0 with Virtual ISP B0D2F0 .
ISP PCI Device Selection	Default ISP is PCI B0D2F0 for window Boot. Linux Boot to Select B0D3F0. The option won't be activated if ISP is disabled. ▶ Options: ISP PCI Device as B0D3F0 (default), Disabled , ISP PCI Device as B0D2F0 and ISP PCI Device as B0D3F0 with Virtual ISP B0D2F0 .		

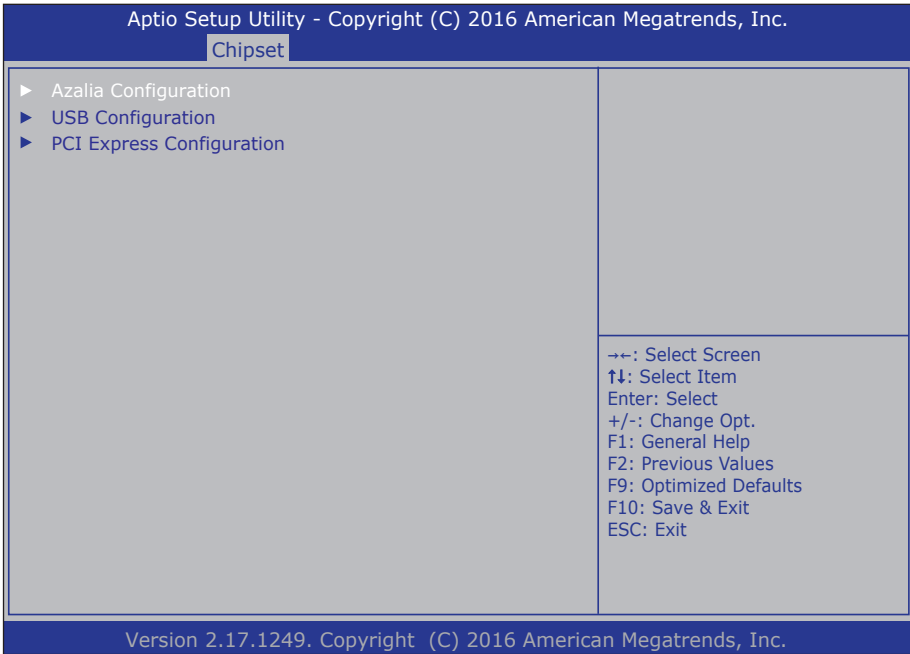
3.3.1.2 LCD Control

Access this submenu to configure LCD Control.

Setting	Description
LCD Panel Type	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item. ▶ Options: 1024x768 (default), 800x600 , 1280x1024 , 1366x768 LVDS and 1440x900 LVDS .
Panel Scaling	Select LCD panel scaling option used by the Internal Graphics Device. ▶ Options: Auto (default), Off , and Force Scaling
Backlight Control	Select Light Control setting ▶ Options: PWM Normal (default), PWM Inverted , GMBus Inverted , and GMBus Normal
LVDS Channel Type	Select single and dual channel. ▶ Options: PWM Normal (default), PWM Inverted , GMBus Inverted , and GMBus Normal
LVDS Panel Color Format	Select LVDS color display mode. ▶ Options: 18-BIT (default), 24-BIT

3.3.2. South Bridge

Access this submenu to configure South Bridge.



The featured settings are:

Setting	Description
Azalia Configuration	Configures the Azalia Configuration
USB Configuration	Configures the USB Configuration
PCI Express Configuration	Configures the PCI Express Configuration

3.3.2.1 Azalia Configuration

Access this submenu to configure Azalia Configuration.

Setting	Description
Audio Controller	Enable and Disable Audio Controller ▶ Enabled is the default.

3.3.2.2 USB Configuration

Access this submenu to configure USB Configuration.

Setting	Description
XHCI Mode	Enable and Disable XHCI Mode ▶ Enabled is the default.
USB Port 0/1/2/3/4	Enable and Disable USB Port 0/1/2/3/4 ▶ Enabled is the default.
SSIC Support Enable	Enable and Disable SSIC Support Enable ▶ Disabled is the default.
SSIC Port 1/2	Enable and Disable SSIC Port 1/2 ▶ Disabled is the default.
HSIC Port 1/2	Enable and Disable HSIC Port 1/2 ▶ Enabled is the default.

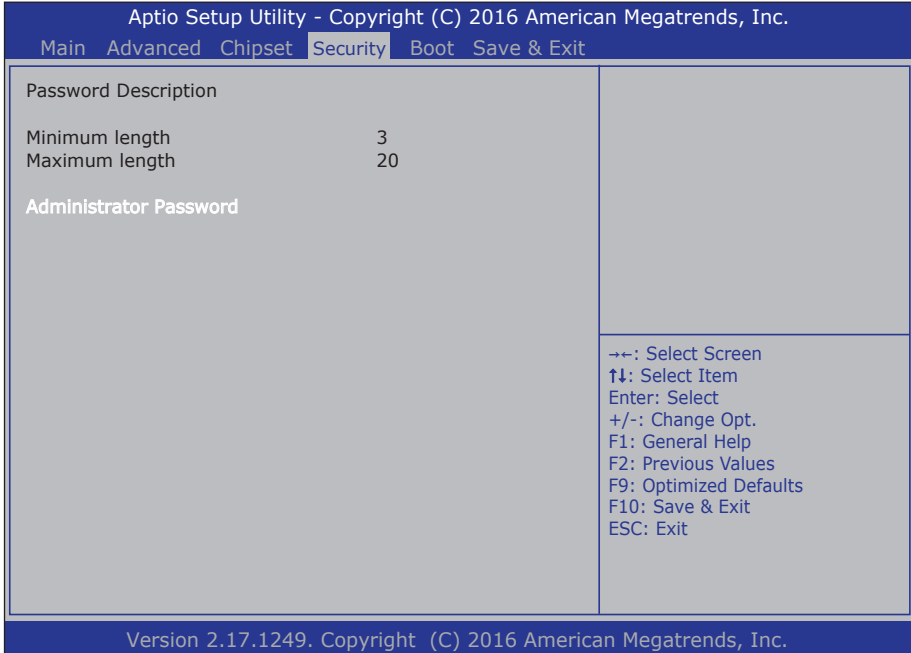
3.3.2.2 PCI Express Configuration

Access this submenu to configure PCI Express Configuration.

Setting	Description
PCI Express Root Port 1/2/3/4	Control the PCI Express Root Port. ▶ Enabled is the default.
ASPM	PCI Express Active State Power Management settings. ▶ Options: Disabled (default), L0s , L1 , L0sL1 and Auto .
PCIe Speed	Configure PCIe Speed. CHV A1 always with Gen1 speed. ▶ Options: Auto (default), Gen 2 and Gen 1 .

3.4. Security

The **Security** menu sets up the administrator password. Once an administrator password is set up, this BIOS Setup utility is limited to access and will ask for the password each time any access is attempted.

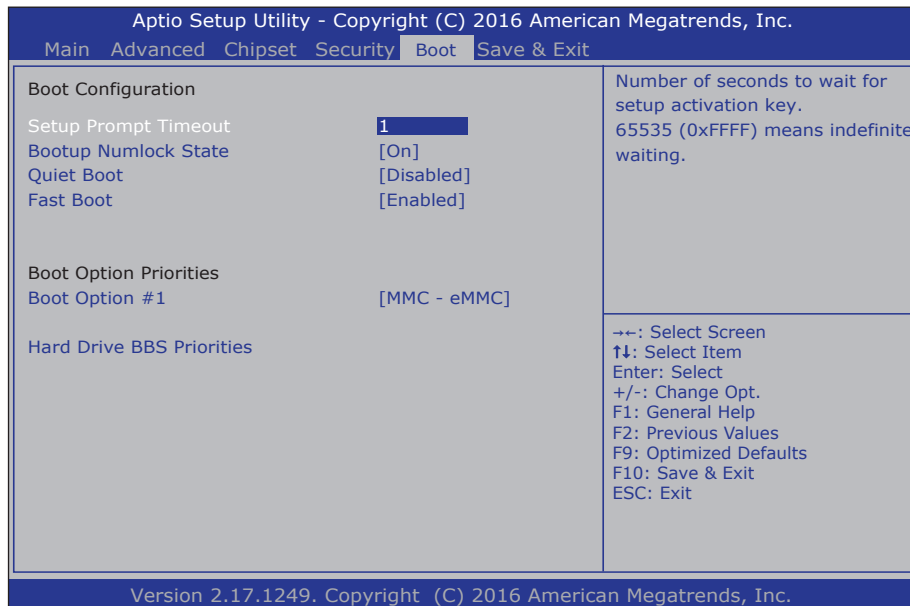


The featured settings are:

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

3.5. Boot

Access this menu to change system boot settings.

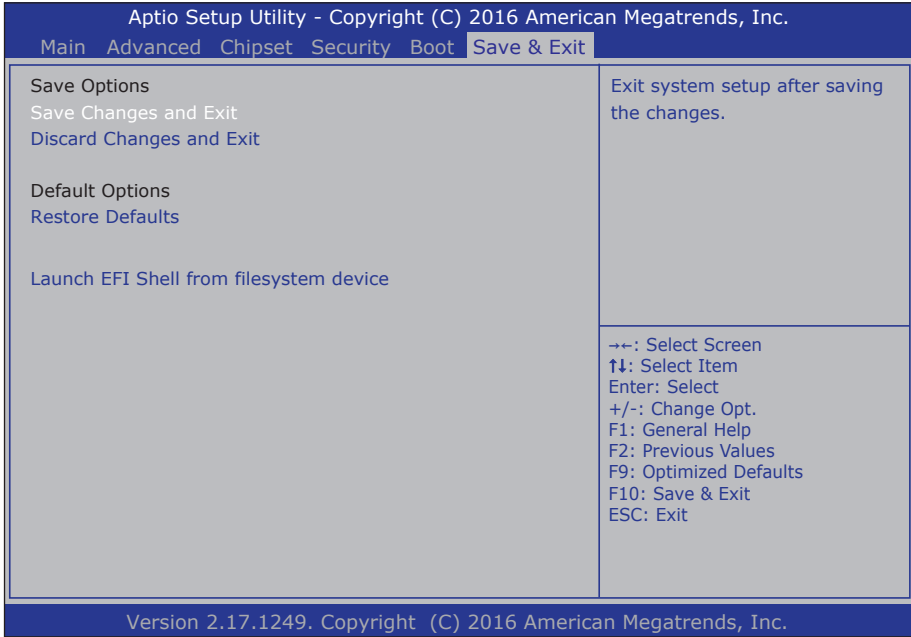


The featured submenu is:

Setting	Description
Setup Prompt Timeout	Configures the seconds allowed to stay in BIOS setup prompt screen. ▶ Options available are 1 (default) and ?? .
Bootup NumLock State	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ▶ Options available are On (default) and Off .
Quiet Boot	Enables or Disables Quiet Boot option. ▶ Disabled is the default.
Fast Boot	Enables/disables initializing only a minimal set of devices required to launch the active boot options when booting up the system. ▶ Disabled is the default. ▶ This setting has no effect for BBS (BIOS Boot Specification) options.
Boot Option #1 /2 /3 /4 /5 /6	Sets boot priority for all boot devices. Options are: USB Flash, CD/DVD, Hard Disk: Windows..., USB CD/DVD, USB Hard Disk, Network

3.6. Save & Exit

The **Exit** menu features a handful of commands to launch actions from the BIOS Setup utility regarding saving changes, quitting the utility and recovering defaults.



The featured settings are:

Setting	Description
Save Changes and Exit	<p>Saves the changes and quits the BIOS Setup utility.</p> <ul style="list-style-type: none"> ▶ This is a command to launch an action from the BIOS Setup utility. ▶ When prompted for confirmation, select OK to save the changes and quit the BIOS Setup, or select Cancel to return to BIOS Setup.
Discard Changes and Exit	<p>Discards the changes and quits the BIOS Setup utility.</p> <ul style="list-style-type: none"> ▶ This is a command to launch an action from the BIOS Setup utility. ▶ When prompted for confirmation, select OK to quit BIOS Setup without saving the change(s), or select Cancel to return to the BIOS setup.
Restore Defaults	<p>Loads the defaults to all settings.</p> <ul style="list-style-type: none"> ▶ This is a command to launch an action from the BIOS Setup utility. ▶ When prompted for confirmation, select OK to load the defaults, or select Cancel to return to the BIOS setup.

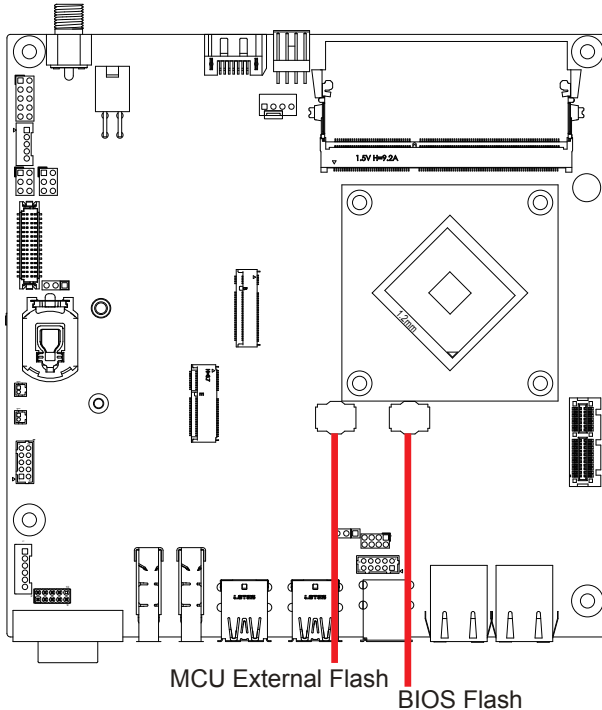
Appendices

Appendix A. Anti-Crash Technology for BIOS Recovering

The motherboard supports Anti-Crash Technology (ACT) for automatical system BIOS recovering. This section describes the recovery process.

A.1 Auto Recovery

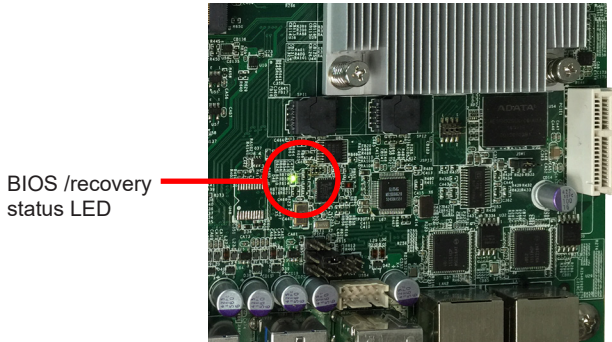
The motherboard comes with two BIOS ROMs mounted onto the board as shown below.



- BIOS Flash: Master ROM for BIOS
- MCU External Flash: Slave ROM for backup BIOS

In case the motherboard fails to boot, it will run BIOS self diagnostics to verify the BIOS status on the master ROM. If problem is detected on the BIOS, then the recovery process will automatically start to load the backup BIOS from the slave ROM. The whole process will take about 2~3 minutes where a BIOS recovery status LED will show the recovery status as described below:

- The LED blinks fast to indicate erasing data from the master ROM.
- The LED blinks slowly to indicate the MCU is writing system backup BIOS from the slave ROM to the master one.
- The LED turns off to indicate the process is finished and the motherboard will automatically boot to your system.



If you cannot see the LED status, just **wait for about 3 minutes** for the motherboard to complete the recovery and then reboot to your system.

A.2 BIOS Update using ACT Utility

When a new version of BIOS is available and you want to update the BIOS, you need to update the BIOS in the master ROM as well as the slave ROM to the same version; otherwise the master BIOS will load a different version upon BIOS recovery.

ARBOR's proprietary ACT Utility is designed to update the BIOS in the master ROM as well as the slave ROM at the same time. The ACT Utility is a DOS-based program:

```
C:\I89q1>dir /w
Volume in drive C is DOS USB
Volume Serial Number is D0A5-AA5A
Directory of C:\I2203

[.]          [..]  I2203.BAT      AFUDOS.EXE      I2203B.101
BACKUP.TXT
      4 file(s)    5,429,730 bytes
      2 dir(s)     2,590.02 MB free

C:\I2203>i2203
```

After running the program on command prompt, the utility performs these tasks:

1. Provides a specific protection to the BIOS. This ensures the BIOS will not become corrupted if power failure occurs while the BIOS update is in progress.
2. Update the BIOS in master ROM to the new version.

```
[.]          [..] I2203.BAT    AFUDOS.EXE    I2203B.101
BACKUP.TXT
      4 file(s)    5,429,730 bytes
      2 dir(s)    2,590.02 MB free

C:\I2203>i2203
C:\I89Q1>afudos i2203B.101 /B /P /N /R

C:\I89Q1>fpt11.exe - SAVEMAC -F i89Q1.023
+-----+
:                AMI Firmware Update Utility V5.07.01                :
:  Copyright (c)2014 American Megatrends Inc. All Rights Reserved.    :
+-----+

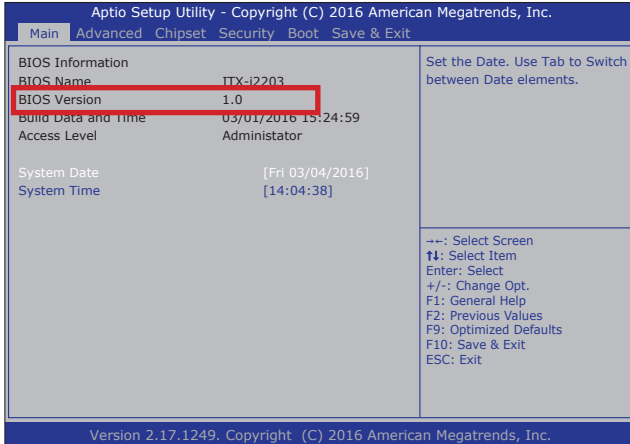
Reading Flash .....done
Secure Flash enabled, recalculate ROM size with signarure ....Enable.
- FFS checksums .....OK
Loading Boot Block.....0x004EF000 (94%)

- Loading Boot Block.....0x004EF000 (94%)
- Erasing Boot Block [0x274000] - 100 percent complete.
- Programming Flash [0x274000] - 12KB of 12KB - 100 percent complete.
- Erasing Flash Block [0xA0A000] - 100 percent complete.
- Programming Flash [0xA0A000] - 40KB of 40KB - 100 percent complete.
- Erasing Flash Block [0x0A2000] - 100 percent complete.
- Programming Flash [0x0A2000] - 4KB of 4KB - 100 percent complete.
- Erasing Flash Block [0xA51000] - 100 percent complete.
- Programming Flash [0xA51000] - 4KB of 4KB - 100 percent complete.
- Erasing Flash Block [0xA59000] - 100 percent complete.
- Programming Flash [0xA59000] - 8KB of 8KB - 100 percent complete.
- Erasing Flash Block [0x882000] - 62 percent complete.
```

3. Backup the new version of BIOS to the slave ROM. During this stage:
 - The system will shut down and the screen goes black.
 - The BIOS recovery status LED blinks fast to indicate erasing data from the slave ROM.
 - The BIOS recovery status LED blinks slowly to indicate the MCU is writing system BIOS from the mater ROM to the slave one.

4. Once the programming procedure is done, the computer soon reboots to verify if both the master/slave BIOS functions properly. If yes, then the computer will boot to your system.

After using the ACT Utility to perform the BIOS update, user can verify the BIOS version by accessing the BIOS:



A.3 How to Get ACT Utility

ARBOR’s ACT Utility is provided upon request. Please contact your local ARBOR sales office or sales representative for more information.

Appendix B. 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
0x0000F080-0x0000F087	Microsoft Basic Display Adapter
0x000003B0-0x000003BB	Microsoft Basic Display Adapter
0x000003C0-0x000003DF	Microsoft Basic Display Adapter
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
0x00000070-0x00000070	Motherboard resources
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000400-0x0000047F	Motherboard resources
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
0x00000000-0x0000006F	PCI Express Root Complex
0x00000078-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000E000-0x0000E0FF	PCI standard PCI-to-PCI bridge
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

Address	Device Description
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
0x0000E000-0x0000E0FF	Realtek PCIe GBE Family Controller
0x0000F000-0x0000F01F	SM Bus Controller
0x0000F070-0x0000F077	Standard SATA AHCI Controller
0x0000F060-0x0000F063	Standard SATA AHCI Controller
0x0000F050-0x0000F057	Standard SATA AHCI Controller
0x0000F040-0x0000F043	Standard SATA AHCI Controller
0x0000F020-0x0000F03F	Standard SATA AHCI Controller
0x00000070-0x00000070	System CMOS/real time clock
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

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
IRQ4	SM Bus Controller
IRQ8	High Precision Event Timer
IRQ16	PCI standard PCI-to-PCI bridge
IRQ18	Realtek PCIe GBE Family Controller
IRQ18	PCI standard PCI-to-PCI bridge
IRQ19	Standard SATA AHCI Controller
IRQ19	PCI standard PCI-to-PCI bridge
IRQ22	High Definition Audio Controller
IRQ81~IRQ511	Microsoft ACPI-Compliant System
IRQ4294967294	Intel(R) USB 3.0 eXtensible Host Controller - 0100 (Microsoft)

Appendix D. BIOS Memory Map

Address	Device Description
0xD0716000-0xD07167FF	Standard SATA AHCI Controller
0xE0000000-0xFFFFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED04000-0xFED04FFF	Motherboard resources
0xFED0C000-0xFED0FFFF	Motherboard resources
0xFED08000-0xFED08FFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFFFF	Motherboard resources
0xFE000000-0xFEFFFFFFF	Motherboard resources
0xD0000000-0xD03FFFFFFF	Microsoft Basic Display Adapter
0xC0000000-0xCFFFFFFF	Microsoft Basic Display Adapter
0xA0000-0xBFFFF	Microsoft Basic Display Adapter
0xA0000-0xBFFFF	PCI Express Root Complex
0xFED00000-0xFED003FF	High Precision Event Timer
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0xC0000-0xDFFFF	PCI Express Root Complex
0xE0000-0xFFFFF	PCI Express Root Complex
0x80000000-0xD0716FFF	PCI Express Root Complex
0xD0700000-0xD070FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 0100 (Microsoft)
0xD0500000-0xD05FFFFFFF	PCI Encryption/Decryption Controller
0xD0400000-0xD04FFFFFFF	PCI Encryption/Decryption Controller
0xD0710000-0xD0713FFF	High Definition Audio Controller
0xD0604000-0xD0604FFF	Realtek PCIe GBE Family Controller
0xD0600000-0xD0603FFF	Realtek PCIe GBE Family Controller
0xD0600000-0xD0603FFF	PCI standard PCI-to-PCI bridge
0xD0714000-0xD071401F	SM Bus Controller

Appendix E. 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 Address */
#define _SMBSA 0x6E /* SMBus Slave Address, 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);
}
```