ARES-1965

Machine Vision Controller with 6th/7th Gen. Intel® Core™ Processor

User's Manual

Version 1.0

P/N: 4016196500100P

2019.03

Revision History

Version	Date	Description
1.0	2019.03	Initial release

Copyright Notice

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.

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.

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)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User's Manual for later reference.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Lithium Battery Replacement

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://www.arbor.com.tw

Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

https://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 one year 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. Features

- 6th/7th generation Intel® SkyLake-U/Kaby Lake-U platform
- 4CH GbE PoE (Power over Ethernet), IEEE 802.3af compliant designed for GigE camera
- 16 x DI and 16 x DO with 1.5KV isolation protection
- Supports 4 x USB3.0, 2 x RS-232 and 1 x VGA
- Internal USB2.0 Type-A connector

1.2. About this Manual

This manual is meant for the experienced users and integrators with hardware knowledge of personal computers. If you are not sure about the description herein, 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

System	
CPU	Soldered onboard Intel® Celeron® processor, Max. 15W TDP
	Soldered onboard Intel® Core™ i7/i5/i3, Max. 15W TDP
Memory	1 x 260-pin DDR4 SO-DIMM socket, supporting 2133MHz SDRAM up to 16GB
Chipset	Intel® SoC Integrated
Graphics	Intel® HD Graphics
LAN Chipset	1x Intel® i219LM PCIe controller
	4x Intel® i211AT PCIe controller for PoE
Watchdog Timer	1~255 levels reset
I/O	
Serial Port	2 x RS232 DB-9 connectors
USB Port	4 x USB 3.0/2.0 Type A connectors
	1 x Vertical USB 2.0 (type A) internal
LAN	4 x RJ-45 ports for PoE, IEEE802.3af (30W total power budget)
	1 x RJ-45 ports for PHY Giga
Video Port	1 x VGA
Storage	1 x SATA 3.0 Port and 1 x SATA Power connector
	1 x mSATA port
Digital I/O	16 x DI, 16 x DO (1.5KV isolation protection / DO support current 24V 200mA)
Expansion Bus	1 x mSATA (SATA, Full size)
	1 x Mini PCIe slot (PCIe x 1 + USB2.0, Full size)
Environmental	
Operating Temp.	0 ~ 55 °C (32 ~ 131°F), ambient w/ air flow
Storage Temp.	-20 ~ 60°C (-4 ~ 140°F)
Operating Humidity	10 ~ 95% @ 55 °C (non-condensing)

Vibration	5 ~ 500Hz 3 Grms X,Y,Z axis w/mSATA, according to IEC 68-2-64
Shock & Crash	10G peak acceleration (11 m sec. duration), operation
	30G peak acceleration (11 m sec. duration), nonoperation
	According to IEC 68-2-27
Qualification	
Certification	CE, FCC Class A
Power Requirement	
Power Input	DC 9 ~ 36V
Power Consumption	Max. 55W (w/o I/O card)
Storage	
Type	1 x SATA 3.0 Port and 1 x SATA Power connector
	1 x mSATA port
Mechanical	
Construction	Metal + Aluminum Alloy
Mounting	Wall-mount / DIN-rail
Weight	2.3KG
Dimensions (W x D x H)	195 x 140 x 90 mm (7.68” x 5.51” x 3.54”)
OS Support	
Window 7/ Windows 10 IoT Linux: Ubuntu (Kernel: 3.1X)	

1.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

1 x ARES-1965

1 x **Accessory Box** that contains the following items:

- User's manual
- Screws/cable
- 4-pin plug for terminal block

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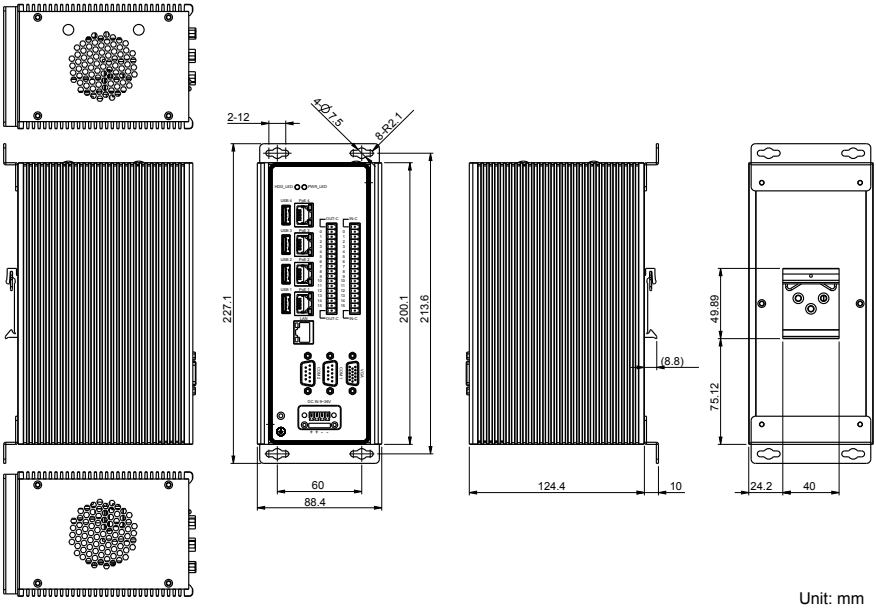
Chapter 2

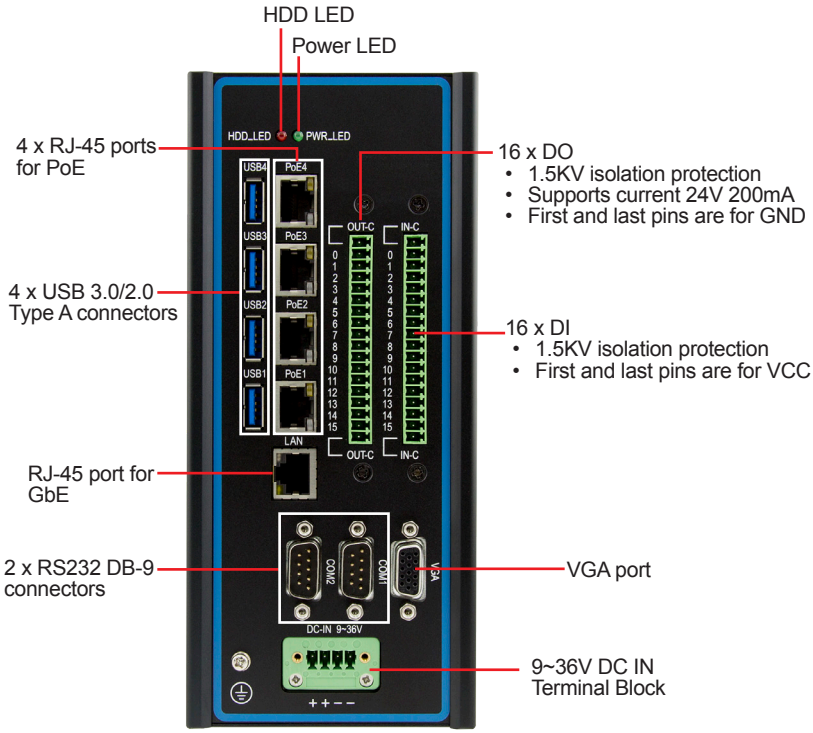
Getting Started

2.1. Dimensions



Unit: mm

2.2. Tour the Computer



2.3. LED Status

LED	Color	Description
PWR LED	Green	On: The power supply is functioning correctly. Off: The system is off.
HDD LED	Red	Blink: HDD read/write operations are in progress.

2.4. Driver Installation

For operating system of Windows 10, please visit our website at **www.arbor-technology.com** and download the driver pack from the product page. Then unzip the downloaded file and follow the sequence below to install the drivers to prevent errors:

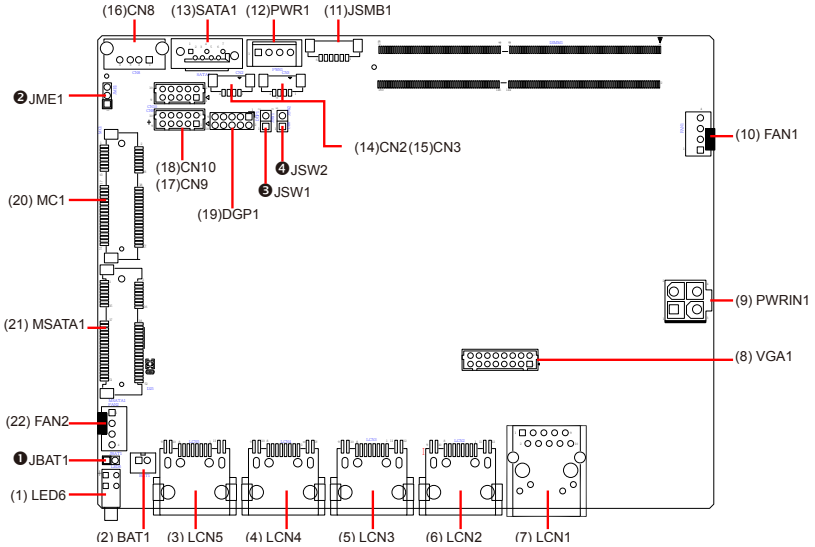
Chipset → Graphics → Ethernet → ME

Chapter 3

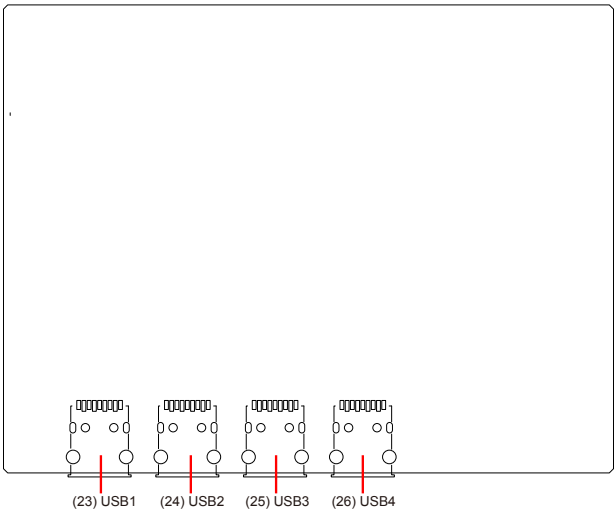
Engine of the Computer

3.1. Main Board - FMB-i89U2

Board Top



Board Bottom



Jumpers

Label	Description
❶JBAT1	Clear CMOS selection
❷JME1	ME Flash selection
❸JSW1	Power button
❹JSW2	Reset button

Connectors

Label	Description
(1) LED6	Power and HDD LED indicator
(2) BAT1	RTC battery connector
(3)~(7) LCN5, 4, 3, 2, 1	RJ-45 Ethernet connectors (LCN5-2 w/ PoE)
(8) VGA1	Analog RGB Connector
(9) PWRIN1	Power input terminal block
(10) FAN1	System fan power connectors
(11) JSMB1	SMbus connector for DIO
(12) PWR1	SATA power input
(13) SATA1	SATA connector
(14)(15) CN2, 3	USB connector
(16) CN8	USB2.0 Type A connector
(17)(18) CN9, 10	RS-232 COM port connector (CN9 for COM1, CN10 for COM2)
(19) DGP1	External 80 debug port
(20) MC1	PCI Express MiniCard socket
(21) MSATA1	mSATA socket
(22) FAN2	System fan power connector
(23)~(26) USB1~4	USB 3.0 Type A connector

3.1.1. Jumpers

❶JBAT1

Function: Clear CMOS selection
Jumper Type: 2.00 mm pitch 1x2-pin header
Setting:

Pin	Description	
Short	Clears CMOS	
Open	Keeps CMOS (default)	

❷JME1

Function: ME Flash descriptor security overide jumper
Jumper Type: 2.00 mm pitch, 1x3-pin header
Setting:

Pin	Description	
1-2	Disable (default)	
2-3	Enable	

❸ JSW1

Function: Power button
Connector Type: 2.54 mm pitch 1x2-pin header
Setting:

Pin	Desc.
1	PWR_IN_SW#
2	GND

❹ JSW2

Function: Reset button
Connector Type: 2.54 mm pitch 1x2-pin header
Setting:

Pin	Desc.
1	RST_SW#
2	GND

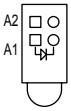
3.1.2. Connectors

(1) LED6

Function Power and HDD LED indicator

LED Type:

Color	Desc.
Green	Power status
Red	HDD status



See 2.3. LED Status on page 10 for details.

(2) BAT1

Function: RTC battery connector

Connector Type: Onboard 1x2-pin box connector

Pin Assignment:

Pin	Desc.
1	BAT+
2	BAT-

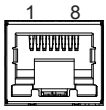
(3)~(7) LCN5, 4, 3, 2, 1 (LCN5-2 w/ PoE)

Function: RJ-45 Ethernet connectors

Connector Type: RJ-45 connector that supports 10/100/1000Mbps fast Ethernet

LCN5-2 supports PoE, IEEE 802.3af compliant

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



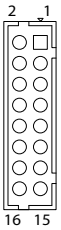
(8) VGA1

Function: Analog RGB connector

Connector Type: 2.00 mm pitch 2x8-pin headers

Pin Assignment:

Pin	Description	Pin	Description
1	CRT_R	2	CRT_G
3	CRT_B	4	N.C
5	GND	6	GND
7	GND	8	GND
9	VCC5	10	GND
11	N.C	12	CRT_SDA
13	CRT_HSYNC	14	CRT_VSYNC
15	CRT_SCL	16	N.C



(9) PWRIN1

Function: Power input terminal block
Connector Type: 2X2-pin terminal block
Pin Assignment:

Pin	Desc.
1	GND
2	GND
3	VCC
4	VCC

(10) FAN1

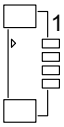
Function: System fan power connector (the fan must be a +12V fan)
Connector Type: 2.54 mm-pitch 1x4-pin wafer connector with one wall
Pin Assignment:

Pin	Description
1	GND
2	+12V
3	FANIN
4	FANCTL

(11) JSMB1

Function: SMbus connector for DIO
Connector Type: 1.25 mm pitch 1x6 wafer connector
Pin Assignment:

Pin	Desc.
1	VCC3
2	GND
3	SMB_CLK_MAIN
4	GND
5	SMB_DATA_MAIN
6	VCC12



(12) PWR1

Function: SATA power input

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

Pin Assignment:

Pin	Desc.
1	+5V
2	GND
3	GND
4	+12V

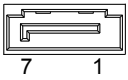
(13) SATA1

Function: SATA connector

Connector Type: On-board 7-pin Serial ATA connector

Pin Assignment:

Pin	Desc.
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



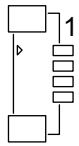
(14)(15) CN2, 3

Function: USB2.0 connector

Connector Type: 1.25 mm pitch 1x4 wafer connector

Pin Assignment:

Pin	Desc.
1	VCC5
2	DATA-
3	DATA+
4	GND



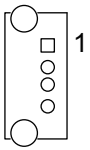
(16) CN8

Function: USB2.0 Type A connector

Connector Type: Onboard USB connector

Pin Assignment:

Pin	Desc.
1	VCC5
2	DATA-
3	DATA+
4	GND



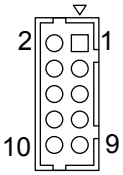
(17)(18) CN9, 10

Function: RS-232 COM port connector (CN9 for COM1, CN10 for COM2)

Connector Type: 2.00 mm-pitch 2x5-pin header

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	N.C



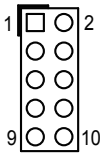
(19) DGP1

Function: External 80 debug port

Connector Type: 2.00 mm-pitch 2x5-pin header

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	24MHz Clock	2	GND
3	LPC_FRAME#	4	LPC_LAD0
5	PLTRST#	6	N.C
7	LPC_LAD3	8	LPC_LAD2
9	VCC3	10	LPC_LAD1

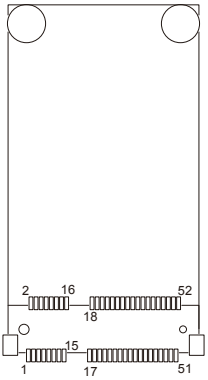


(20) MC1

Description: PCI Express MiniCard socket, supporting USB2.0 signal

Connector Type: Onboard 0.8mm pitch 52-pin edge card connector

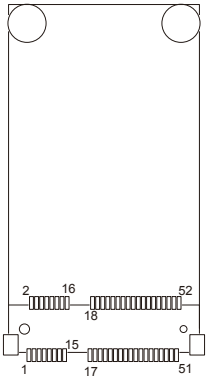
Pin	Desc.	Pin	Desc.	Pin	Desc.
1	Wake	20	W_Disable#	39	+3.3V
2	+3.3V	21	GND	40	GND
3	COEX1	22	PERST#	41	+3.3V
4	GND	23	PERn0	42	LED_WWAN#
5	COEX2	24	+3.3V	43	GND
6	+1.5V	25	PERp0	44	LED_WLAN#
7	CLKREQ#	26	GND	45	Reserved
8	UIM_PWR	27	GND	46	LED_WPAN#
9	GND	28	+1.5V	47	Reserved
10	UIM_DATA	29	GND	48	+1.5V
11	REFCLK-	30	SMB_CLK	49	Reserved
12	UIM_CLK	31	PETn0	50	GND
13	REFCLK+	32	SMB_DATA	51	Reserved
14	UIM_RESET	33	PETp0	52	+3.3V
15	GND	34	GND		
16	UIM_VPP	35	GND		
17	UIM_C8/Reserved	36	USB_D-		
18	GND	37	GND		
19	UIM_C4/Reserved	38	USB_D+		



(21) MSATA1

Description: mSATA socket
Connector Type: Onboard 0.8mm pitch 52-pin edge card connector

The pin assignments conform to the industry standard.



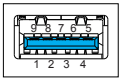
(22) FAN2

Function: System fan power connector (the fan must be a +12V fan)
Connector Type: 2.54 mm-pitch 1x4-pin wafer connector with one wall
Pin Assignment:

Pin	Description
1	GND
2	+12V
3	FANIN
4	FANCTL

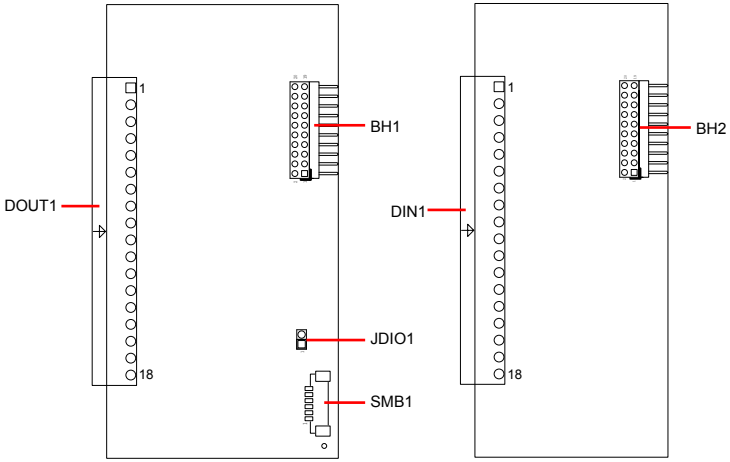
(23)~(26) USB 1~4

Function: USB 3.0 connector
Connector Type: USB 3.0/2.0 type-A connectors
Pin Assignment: The pin assignments conform to the industry standard.



3.2. Daughter Board - SCDB-348B / SCDB-348C

Function: DIO daughter boards



SCDB-348B
DO board

SCDB-348C
DI board

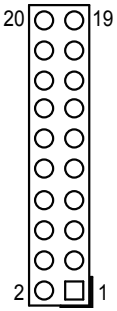
BH1

Function: DI board connector

Connector Type: 2.00 mm-pitch 2x10-pin header for connection to DI board (SCDB-348C)

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	DI_VDD	2	+V5S
3	GND	4	GND
5	GPIO7	6	GPIO6
7	GPIO5	8	GPIO4
9	GPIO3	10	GPIO2
11	GPIO1	12	GPIO0
13	GPIO17	14	GPIO16
15	GPIO15	16	GPIO14
17	GPIO13	18	GPIO12
19	GPIO11	20	GPIO10



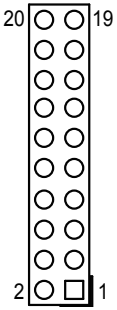
BH2

Function: DO board connector

Connector Type: 2.00 mm-pitch 2x10-pin header for connection to DO board (SCDB-348B)

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	DI_VDD	2	+V5S
3	GND	4	GND
5	GPIO7	6	GPIO6
7	GPIO5	8	GPIO4
9	GPIO3	10	GPIO2
11	GPIO1	12	GPIO0
13	GPIO17	14	GPIO16
15	GPIO15	16	GPIO14
17	GPIO13	18	GPIO12
19	GPIO11	20	GPIO10



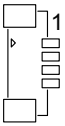
SMB1

Function: SMbus Wafer connector for DIO

Connector Type: 1.25 mm pitch 1x6 wafer connector

Pin Assignment:

Pin	Desc.
1	+V3.3S
2	GND
3	CLK
4	GND
5	DATA
6	+V12S



JDIO1

Function: DIO supported voltage setting

Jumper Type: 2.00 mm pitch 1x3-pin header

Setting:

Pin	Desc.	
1-2	+12V	
2-3	+5V (default)	

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Chapter 4

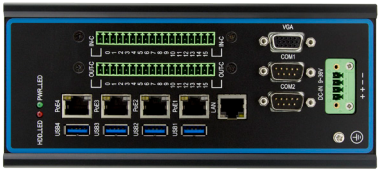
Installation & Maintenance

4.1. Disassembling and Assembling the Computer

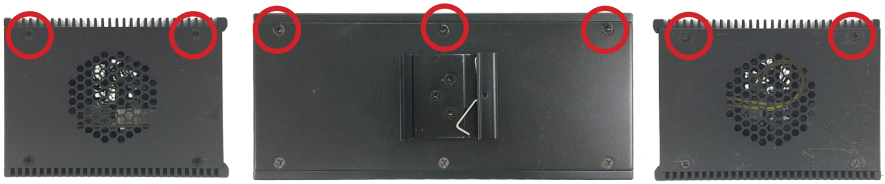
4.1.1. Disassembling the Computer

To use onboard jumpers/connectors or to install/remove internal components, you will need to open the computer to access the inside of the computer. Follow through the guide below to disassembly the computer.

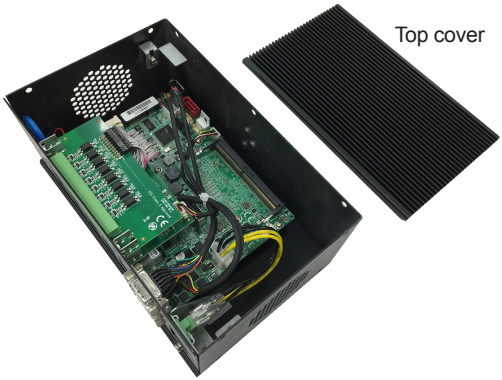
1. Place the computer in a horizontal position with the front side facing you as shown below.



2. Remove the screws that secure the top cover.

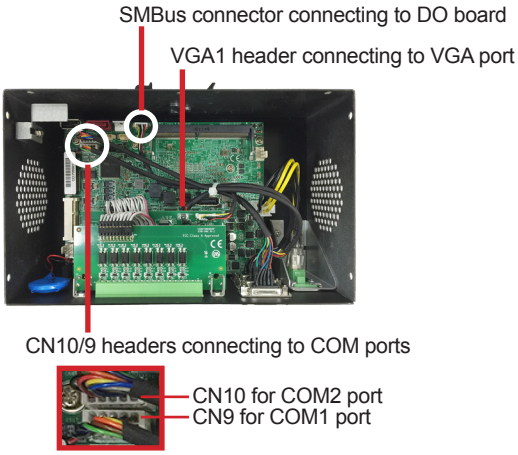


3. Then lift the top cover away from the assembly.

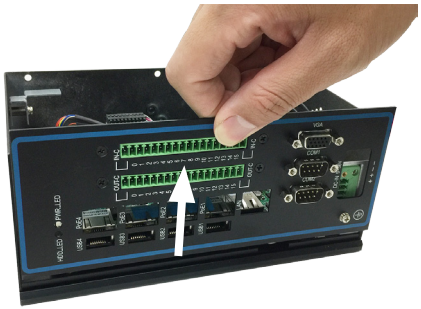


4. If you need to access the mSATA connector or connectors/jumpers on the main board:

   - Disconnect the cables connecting to the COM, VGA and SMBus headers.



   - Lift and remove the front panel away from the assembly.

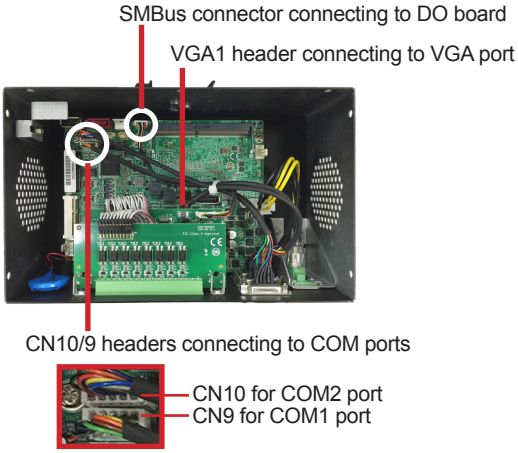


5. Then you are ready to access the components on the main board and make required configurations and connections.

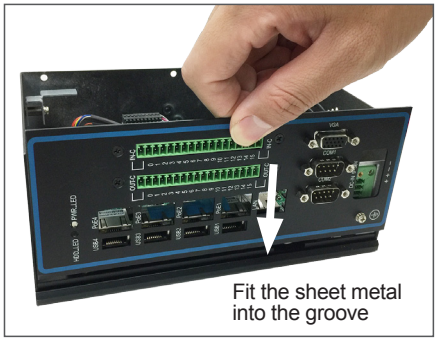
4.1.2. Assembling the Computer

After you make required hardware installation and jumpers settings, assemble the computer by performing the proceeding steps in reverse order.

1. Reconnect the cables connecting to the COM, VGA and SMBus headers.

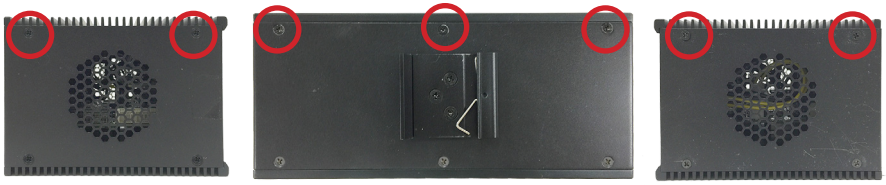


2. Insert the front panel into the groove of the bottom cover.



3. Replace the top cover. Make sure to place the top cover with the groove side towards the panel side.

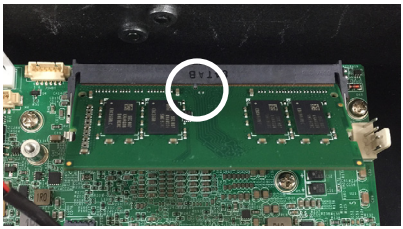
4. Fasten the screws as shown below to secure the top cover.



4.2. Installing Hardware

4.2.1. Installing Memory Module

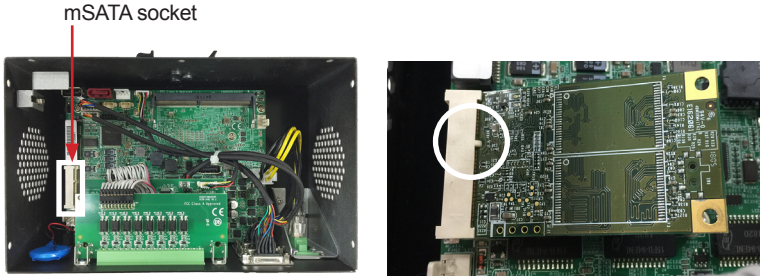
1. Align the notch on the memory module with the key in the module socket.



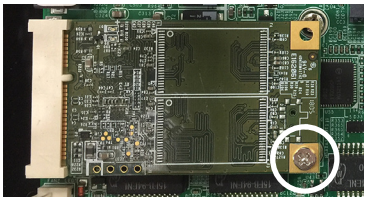
2. Press it fully into the socket until the latches lock in place.

4.2.2. Installing mSATA Module

1. Locate the mSATA socket. Insert the mSATA module into the socket by aligning the notch on the module with the small slot on the socket.



2. Insert and fasten a screw into the standoff.

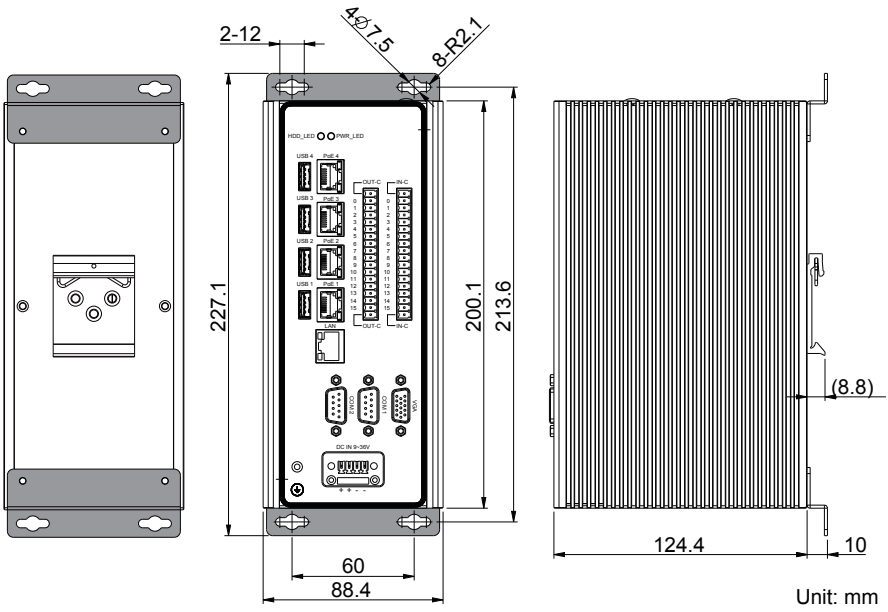


4.3. Mounting

4.3.1 Wall Mount

To wall mount the computer using the provided wall-mount kit:

1. Select a proper mounting location with adequate wall strength to support the mounted unit.
2. Locate the 4 screw holes on the computer's rear side. Use the screws included in the wall-mount kit to assemble the brackets to the computer's rear side.
3. Use the other screw holes and cutouts on both wall-mount brackets to mount the computer to a wall.

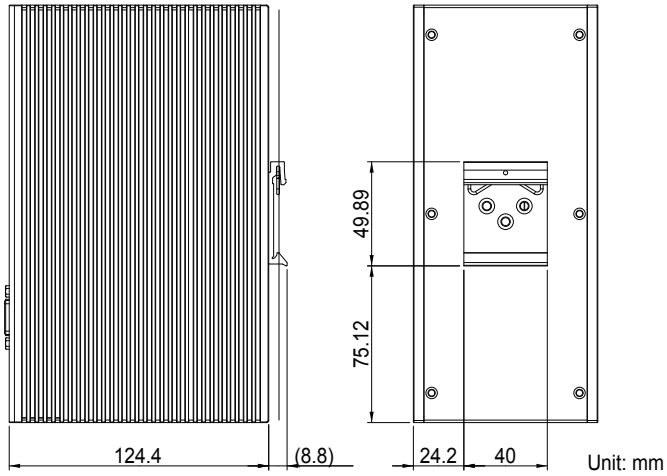


Wall Mount Dimensions

4.3.2 DIN-Rail Mounting

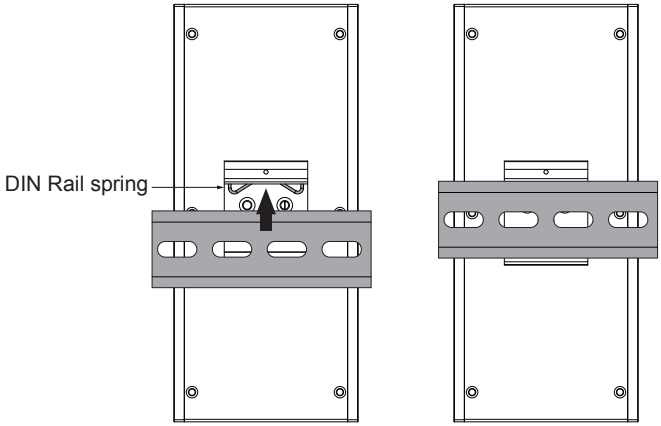
To mount the computer using the provided DIN-rail mounting kit:

1. Select a proper mounting location with adequate wall strength to support the mounted unit.
2. Screw the DIN-rail mounting clip to the rear side of the computer.



DIN-Rail Mount Dimensions

3. Pus the DIN rail to the spring edge of the mounting clip until it “snaps” into place.



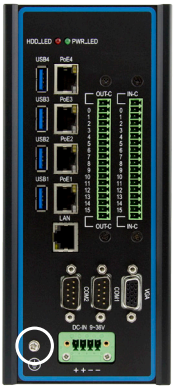
4.4. Ground the Computer

Follow the instructions below to ground the computer to land. Be sure to follow every grounding requirement in your place.

> **Warning** Whenever the unit is installed, the ground connection must always be made first of all and disconnected lastly.

1. Remove the ground screw from the front panel.

2. Attach a ground wire to the rear panel with the screw.

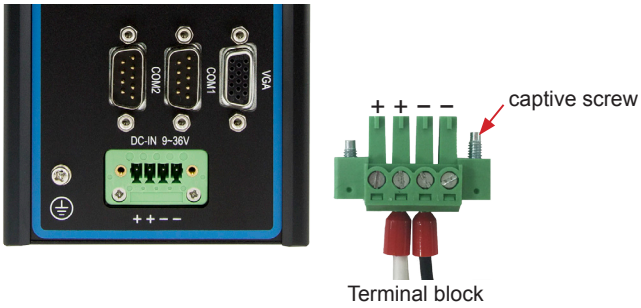


4.5. Wire DC-in Power Source

> **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

Follow the instructions below for connecting the computer to a DC-input power source.

1. Before wiring, make sure the power source is disconnected.
2. Find the terminal block in the accessory box.
3. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
4. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
5. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
6. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.



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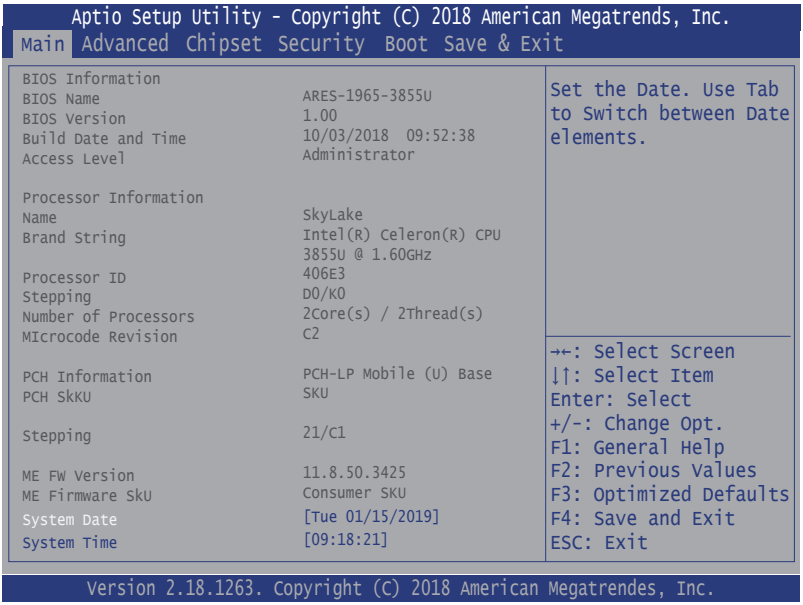
Chapter 5

BIOS

The BIOS Setup utility is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.



Note: Actual model name and board information varies according to your model.

Menu	Description
Main	See 5.1. Main on page 38
Advanced	See 5.2. Advanced on page 39
Chipset	See 5.3. Chipset on page 51
Security	See 5.4 Security on page 57
Boot	See 5.5. Boot on page 58
Save & Exit	See 5.6. Save & Exit on page 59

Key Commands

The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and use the utility.

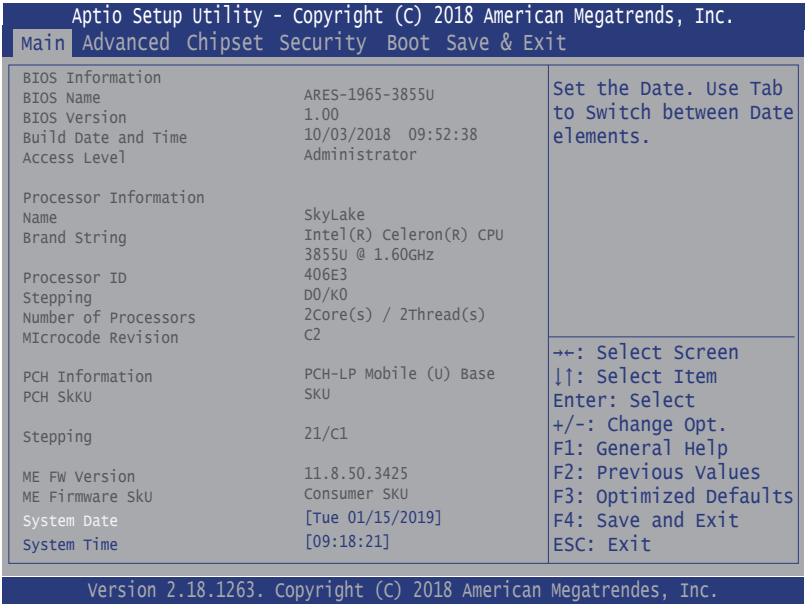
Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	► On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **Yes** or **No** to exit discarding changes. ► On the submenus: Use **Esc** to quit current screen and return to the top menu.
F1	Opens the **Help** of the BIOS Setup utility.
F2	Loads previous values.
F9	Loads optimized defaults.
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **Yes** or **No** to exit saving changes.)

Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

5.1. Main

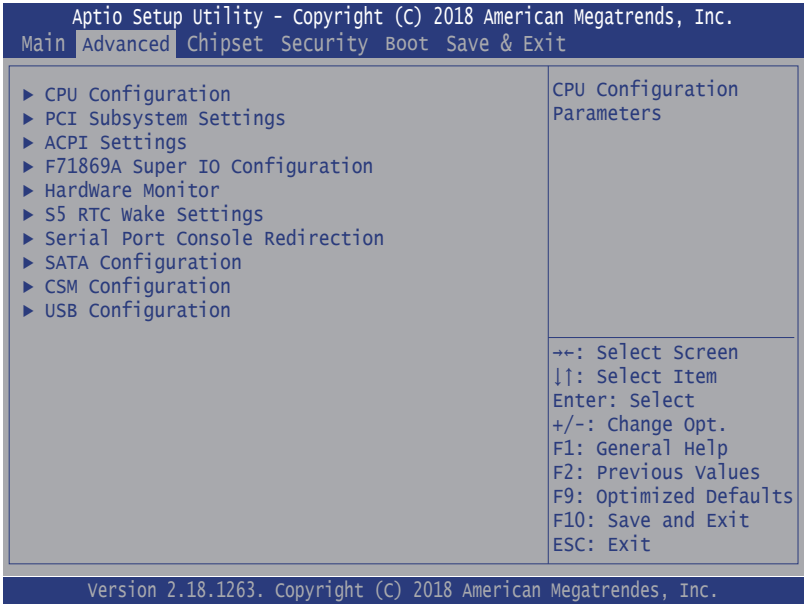
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



Note: Actual model name and board information varies according to your model.

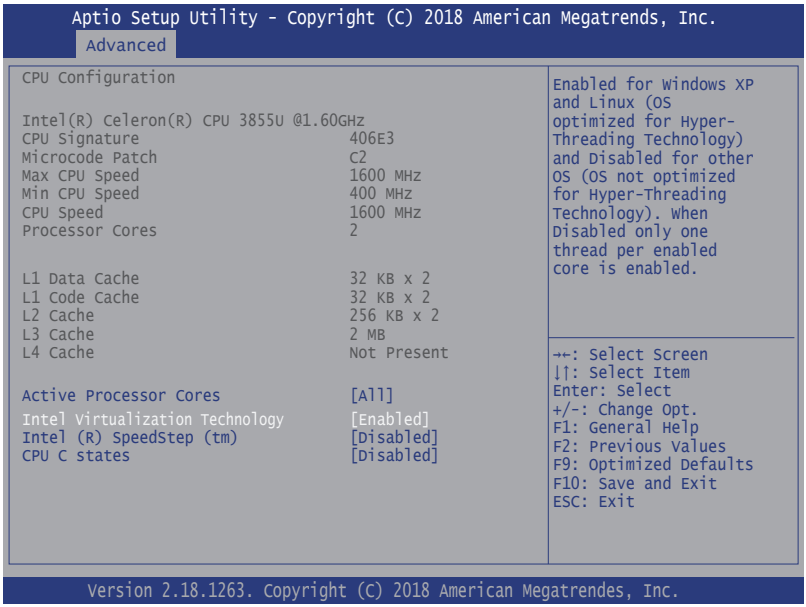
Setting	Description
Project Name	Delivers the model name of the computer.
BIOS Version	Delivers the computer's BIOS version.
Build Date and Time	Delivers the date and time when the BIOS Setup utility was made/ updated.
Access Level	Delivers the level that the BIOS is being accessed at the moment.
System Date	Sets system date.
System Time	Sets system time.

5.2. Advanced



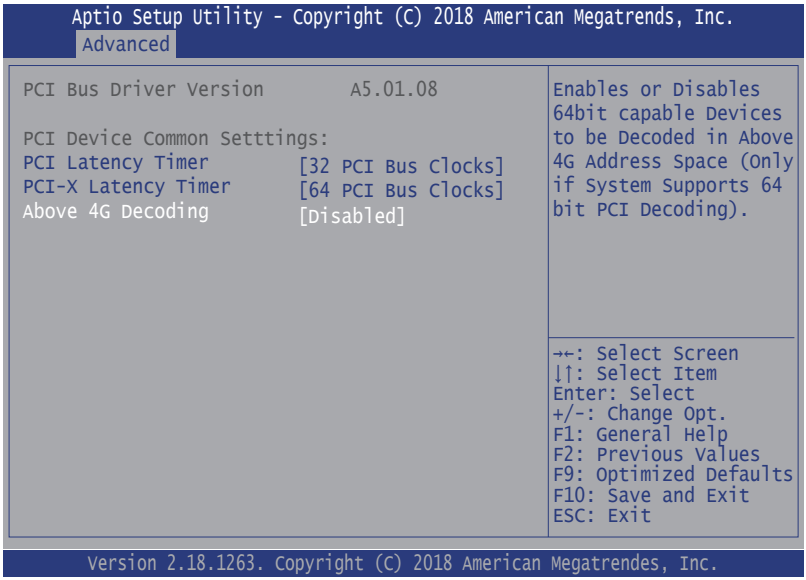
Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 40
PCI Subsystem Settings	See 5.2.2. PCI Sybsystem Settings on page 41
ACPI Settings	See 5.2.3. ACPI Settings on page 42
F71869A Super IO Configuration	See 5.2.4. F871869A Super IO Configuration on page 43
Hardware Monitor	See 5.2.5. Hardware Monitor on page 44
S5 RTC Wake Settings	See 5.2.6. S5 RTC Wake Settings on page 45
Serial Port Console Redirection	See 5.2.7. Serial Port Console Configuration on page 46.
SATA Configuration	See 5.2.8. SATA Configuration on page 47.
CSM Configuration	See 5.2.9. CSM Configuration on page 48
USB Configuration	See 5.2.10. USB Configuration on page 49

5.2.1. CPU Configuration



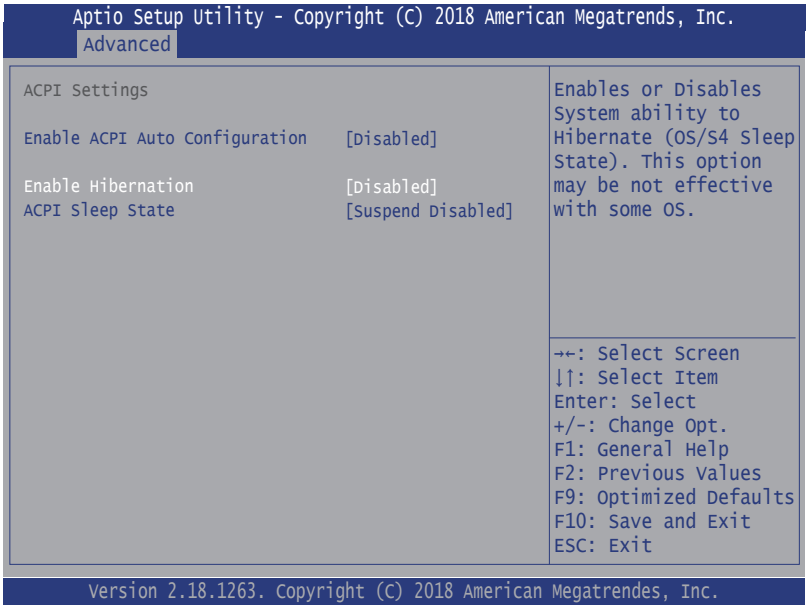
Setting	Description
Active Processor Cores	Number of cores to enable in each processor package. ► Options: **All** (default), and **1**
Intel Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology ► Options: **Enabled** (default) or **Disabled**
Intel (R) Speed Step (tm)	**Enable**/**Disable** (default) Intel SpeedStep
Turbo Mode	Only available when Intel Speed Step is **Enabled**. **Enable**/**Disable** (default) Turbo Mode
CPU C States	**Enable**/**Disable** (default) CPU C States

5.2.2. PCI Sybsystem Settings



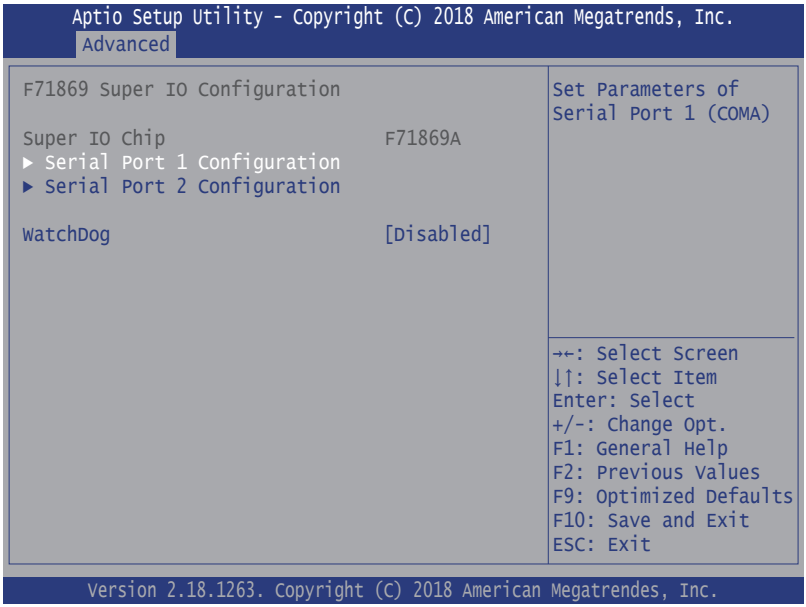
Setting	Description
PCI Latency Timer	Value to be programmed into PCI Latency Timer Register. ► **Options: 32** (default), **64**, **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**.
PCI-X Latency Timer	Value to be programmed into PCI-X Latency Timer Register. ► **Options: 32**, **64** (default), **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**.
Above 4G Decoding	**Enable/Disable** (default) 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).

5.2.3. ACPI Settings



Setting	Description
Enable ACPI Auto Configuration	**Enable** or **Disable** (default) BIOS ACPI Auto Configuration
Enable Hibernation	Only available when BIOS ACPI Auto Configuration is enabled. **Enables** or **Disables** (default) System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Only available when BIOS ACPI Auto Configuration is enabled. Select ACPI sleep state the system will enter when the SUSPEND button is pressed. ► **Options: Suspend Disabled** (default) and **S3 (Suspend to RAM)**

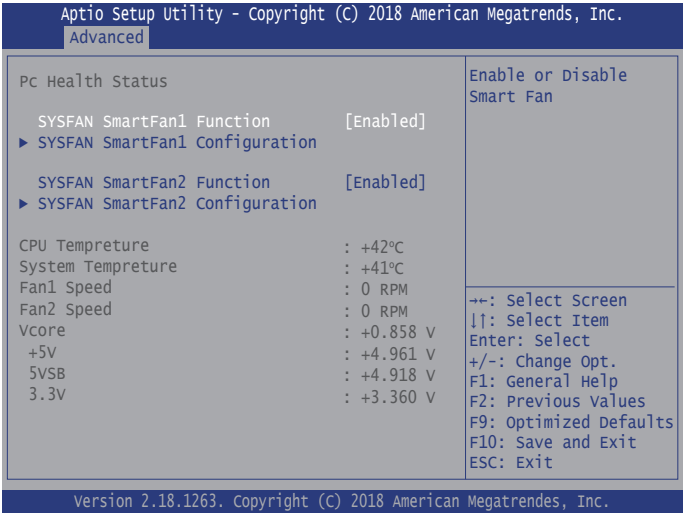
5.2.4. F871869A Super IO Configuration



Note: The quantity of serial ports varies according to your model.

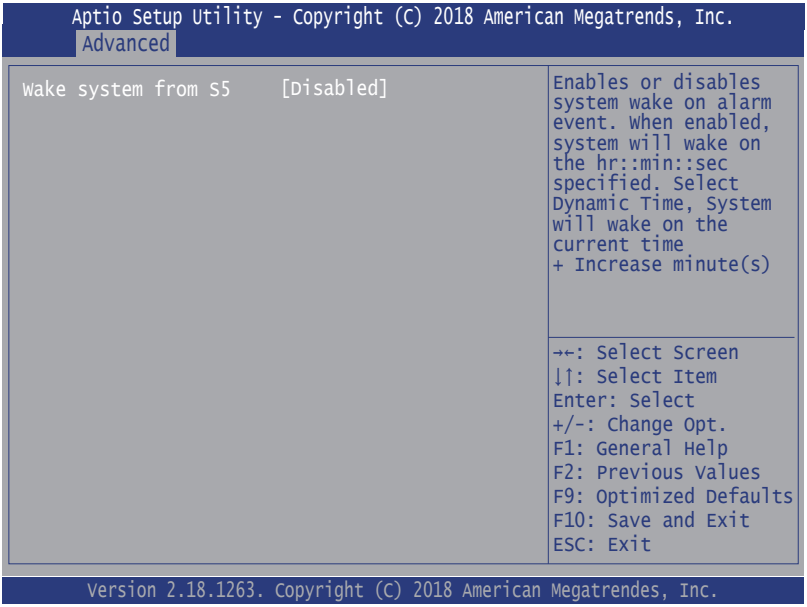
Setting	Description
Serial Port 1/2 Configuration	To configure each COM port settings. Note: The quantity of serial ports varies according to your model.
Serial Port	**Enable** (default) or **Disable** the Serial Port (COM).
Change Settings	Select an optimal setting for Super IO device. ▶ Options for Serial Port 1: **Auto**; **IO=3F8h; IRQ=4** (default) ; **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; ▶ Options for Serial Port 2: **Auto;** **IO=2F8h; IRQ=3** (default) ; **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**; **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**;
WatchDog	**Enable** or **Disable** (default) WatchDog Timer.

5.2.5. Hardware Monitor



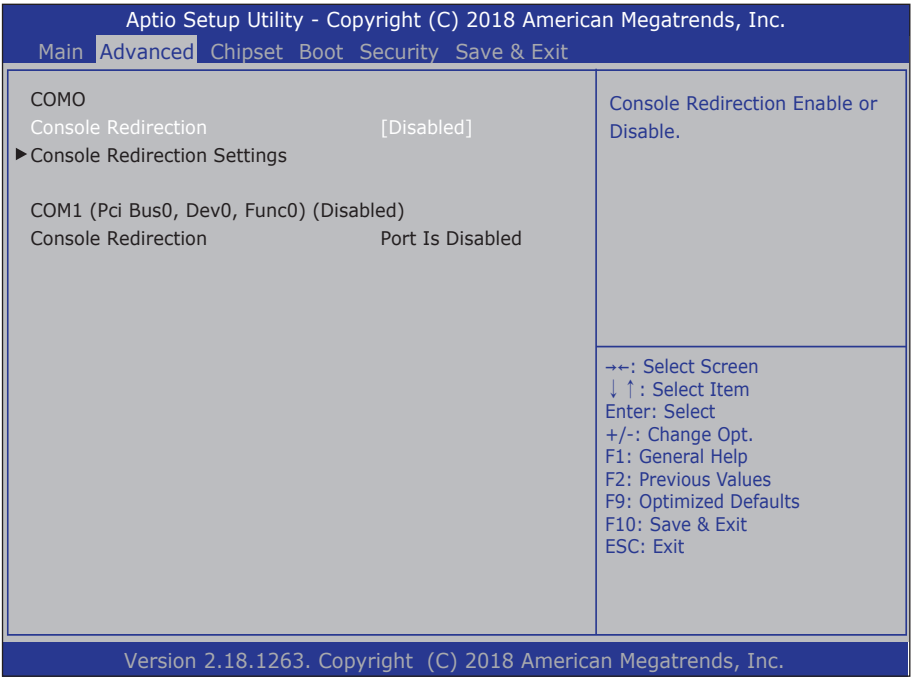
Setting	Description
SYSFAN SmartFan1/2 Function	**Enables** (default) or **Disables** CPU Smart Fan
SYSFAN SmartFan 1/2 Configuration`	**Temperature 1~4 & RPM Percentage 1~4** Auto fan speed control. Fan speed will follow different temperature by different PRM 1-100.

5.2.6. S5 RTC Wake Settings



Setting	Description
Wake System from S5	**Enable** or **Disable** (default) system wake on alarm event. ► Options available are: **Disabled** (default): **Fixed Time:** System will wake on the hr::min::sec specified. **DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s).

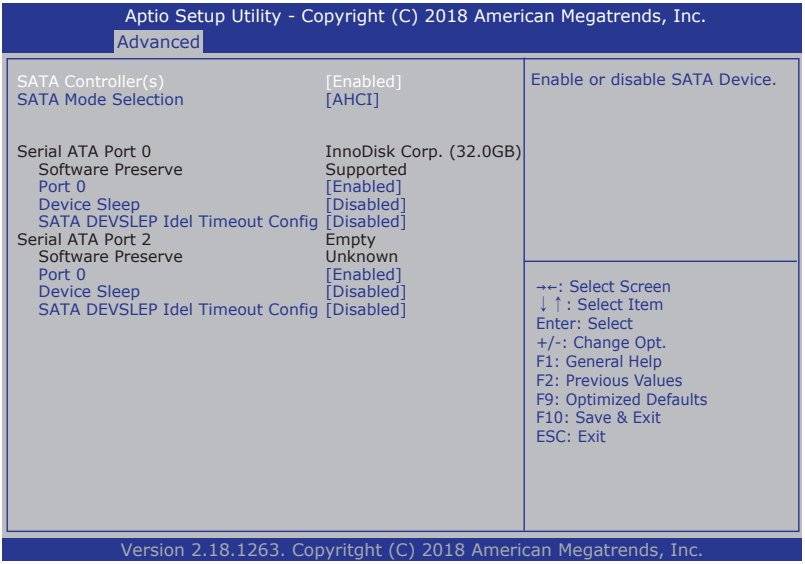
5.2.7. Serial Port Console Configuration



Setting	Description
Console Serial Redirection	**Enable** or **Disable** (default) the Console Serial Redirection

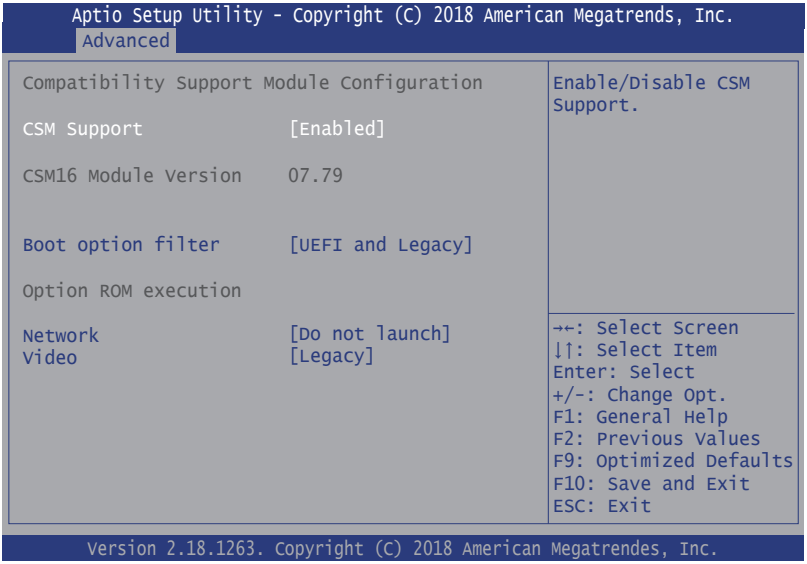
5.2.8. SATA Configuration

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



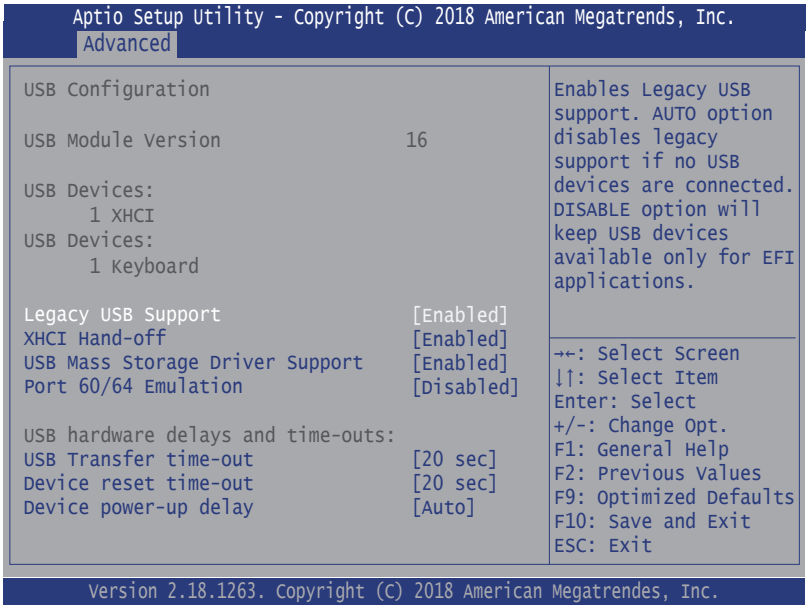
Setting	Description
SATA Controller(s)	**Enables** (default) / **disables** SATA device(s).
SATA Mode Selection	Configures how SATA controller(s) operate. ► Options: **AHCI** (default)
Serial ATA Port 0 ,1	SATA device information
Port 0, 1	**Enables** (default) / **disables** the SATA port 0, 1
Device Sleep	**Enables** / **disables** (default) the mSATA for RTD3.
SATA DEVSLEP Idle Timeout Config	**Enables** / **disables** (default) SATA DTIO config.

5.2.9. CSM Configuration



Setting	Description
CSM Support	**Enable** (default) or **Disable** CSM Support.
Boot option filter	Control the Legacy/UEFI ROMs priority. ► Options: **UEFI and Legacy** (default), **Legacy only**, **UEFI only**
Network	Control the execution of UEFI and Legacy PXE OpROM ► Options: **Do not launch** (default), **UEFI** and **Legacy**
Video	Control the execution of UEFI and Legacy Video OpROM ► Options: **UEFI** and **Legacy** (default)

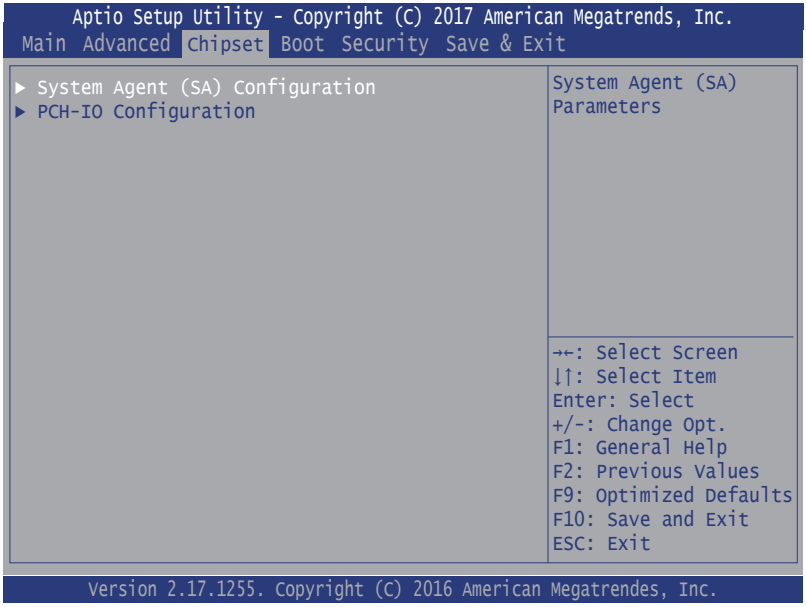
5.2.10. USB Configuration



Setting	Description
Legacy USB Support	Enables/disables legacy USB support. ► Options available are **Enabled** (default), **Disabled** and **Auto**. ► Select **Auto** to disable legacy support if no USB device are connected. ► Select **Disabled** to 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. ► The optional settings are: **Enabled** (default) **/ Disabled**.
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support. ► The optional settings are: **Enabled** (default) **/ Disabled**.
Port 60/64 Emulation	**Enables** / **Disables** (default) I/O port 60/64h emulation support.
USB hardware delay and time-out	
USB transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► Options: **1 sec, 5 sec, 10 sec, 20 sec** (default)

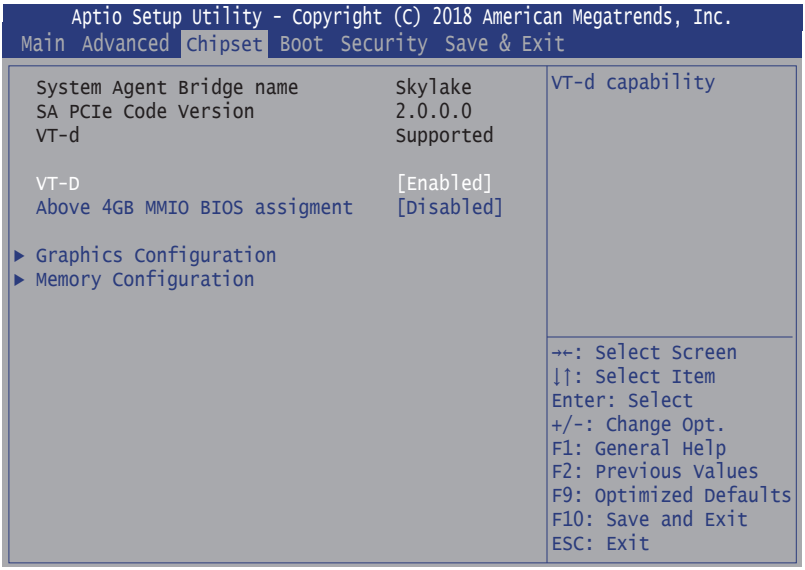
Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ► Options available are: **10 sec, 20 sec** (default)., **30 sec, 40 sec**
Device power-up delay	Use this item to set maximum time the device will take before it properly reports itself to the host controller. '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.

5.3. Chipset



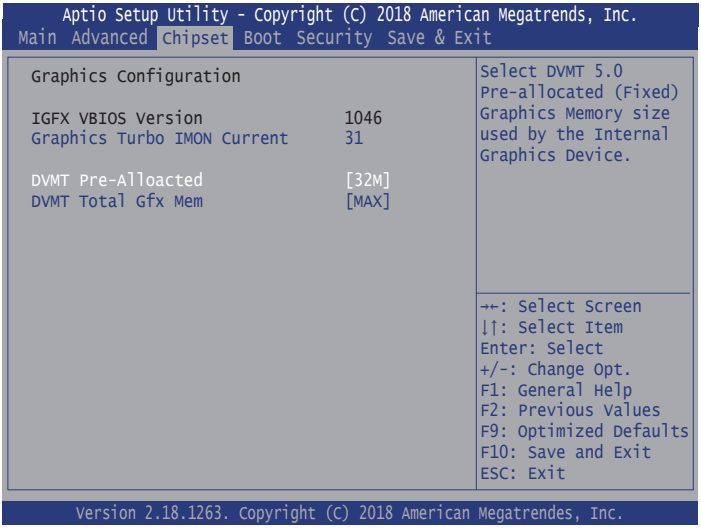
Submenu	Description
System Agent (SA) Configuration	See 5.3.1. System Agent (SA) Configuration on page 52
PCH-IO Configuration	See 5.3.2. PCH-IO Configuration on page 55

5.3.1. System Agent (SA) Configuration



Submenu	Description
System Agent (SA) Configuration	
VT-d	**Enable** (default) or **Disable** VT-d function
Above 4GB MMIO BIOS assignment	**Enable** or **Disable** (default) Above 4GB MMIO BIOS assignment
Graphics Configuration	See 5.3.1.2. Graphics Configuration on page 53
Memory Configuration	See 5.3.1.1. Memory Configuration on page 54

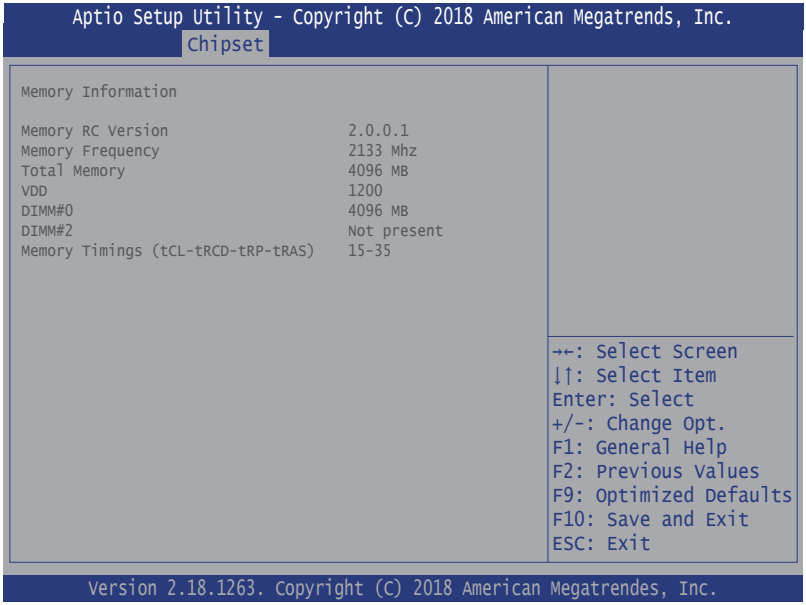
5.3.1.2. Graphics Configuration



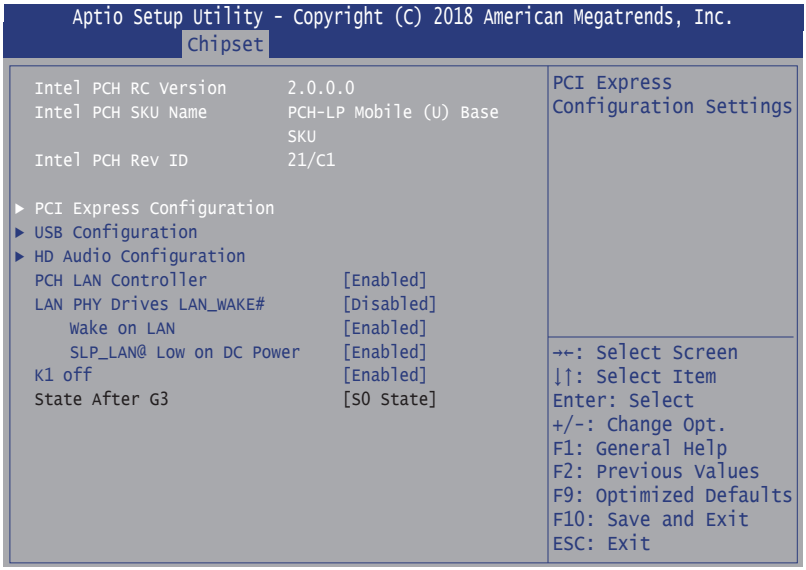
Setting	Description
Graphics Turbo IMON Current	Sets the graphics turbo IMON current values. ► Options available are 14 to 31. 31 is the default.
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ► 32M is the default.
DVMT Total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ► Options: **128MB, 256MB** (default) and **Max**

5.3.1.1. Memory Configuration

Access this submenu to view the memory configuration.



5.3.2. PCH-IO Configuration



Setting	Description
PCI Express Configuration	See 5.3.2.1. PCI Express Configuration on page 56
USB Configuration	See 5.3.2.2. USB Configuration on page 56
HD Audio Configuration	Control Detection of the HD-Audio device. ► Options available are: **Disabled**: HDA will be unconditionally disabled **Enabled**: HDA will be unconditionally Enabled **Auto** (default) = HDA will be enabled if present, disabled otherwise.
PCH LAN Controller	**Enables** (default) / **Disables** onboard NIC.
LAN PHY Drives LAN_WAKE#	**Enables** / **Disables** (default) LAN Phy driving LAN_WAKE# else platform drives LAN_Wake#.
Wake on LAN	This option is only available when **"PCH LAN Controller"** is enabled. **Enable** (default) / **Disable** integrated LAN to wake the system. (the Wake On LAN cannot be disabled if ME is on at Sx state.)

SLP_LAN# Low on DC power	This option is only available when **"PCH LAN Controller"** is enabled. **Enable** (default) / **Disable** SLP_LAN# Low on DC power.
K1 off	This option is only available when **"PCH LAN Controller"** is enabled. **Enable** (default) / **Disable** K1 off feature (CLKREQ).
State After G3	This option is set to S0 State.

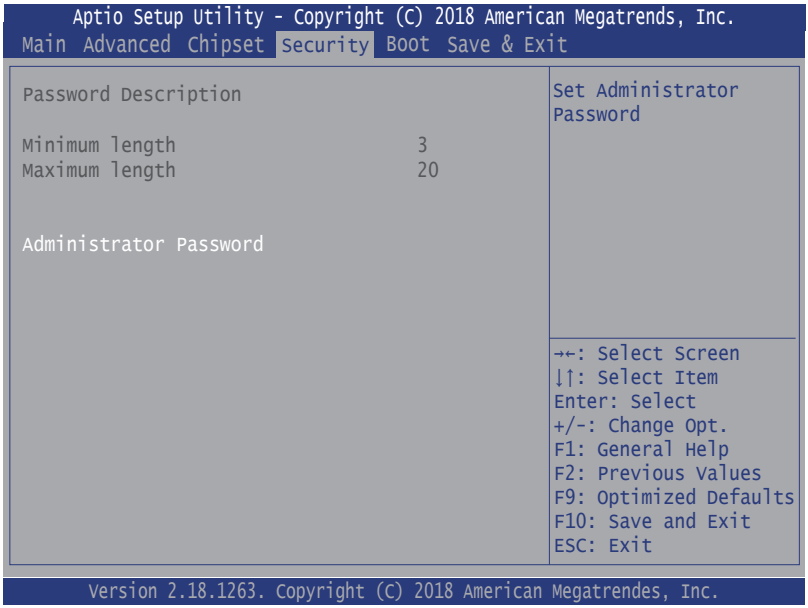
5.3.2.1. PCI Express Configuration

Setting	Description
PCI Express Root Port 1, 5, 6, 10	**Enable** (default) or disable the PCI Express Port.
ASPM Support	Disable or set the ASPM level. Force L0s will force all inks to L0s state. “Auto” will allow BIOS to auto configure.”Disable” will disable ASPM. ► Options: **Disabled** (default), **L0s**, **L1**, **L0sL1** and **Auto**.
L1 Substates	PCI Express L1 Substates settings. ► Options: **Disabled**, **L1.1**, **L1.2**, **L1.1 & L1.2** (default)
PCIe Speed	Select PCI Express port speed. ► Options: **Auto** (default), **Gen1**, **Gen2** and **Gen3**

5.3.2.2. USB Configuration

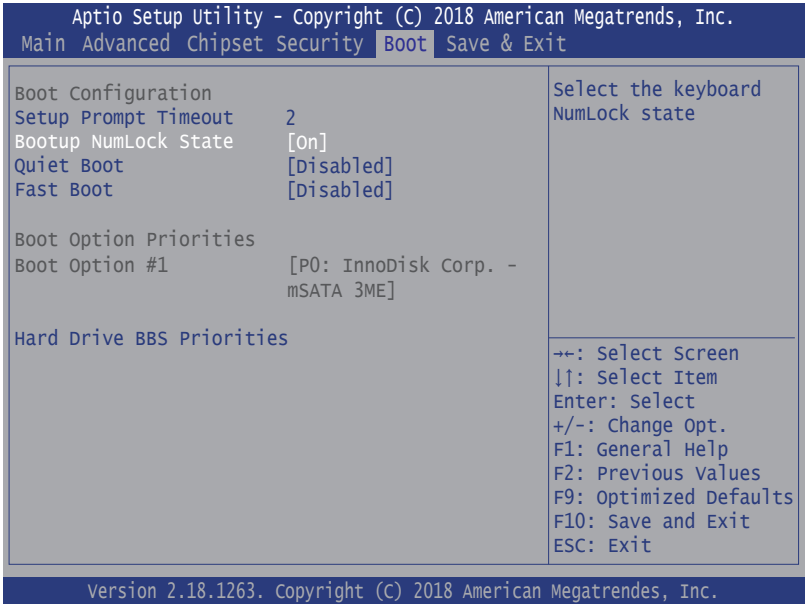
Setting	Description
USB Precondition	Precondition work on USB hose controller and root ports for faster enumeration. ► Options: **Enabled / Disabled** (default)
XHCI Disable Compliance Mode	Options to disable Compliance Mode. Default is **FALSE** (default) to not disable Compliance Mode. Set **TRUE** to disable Compliance Mode.
xDCI Support	**Enable**/**disable** (default) xDCI (USB OTG Device).
USB Port Disable Override	Selectively **enable**/**disable** (default) the corresponding USB port from reporting a Device Connection to the controller.

5.4. Security



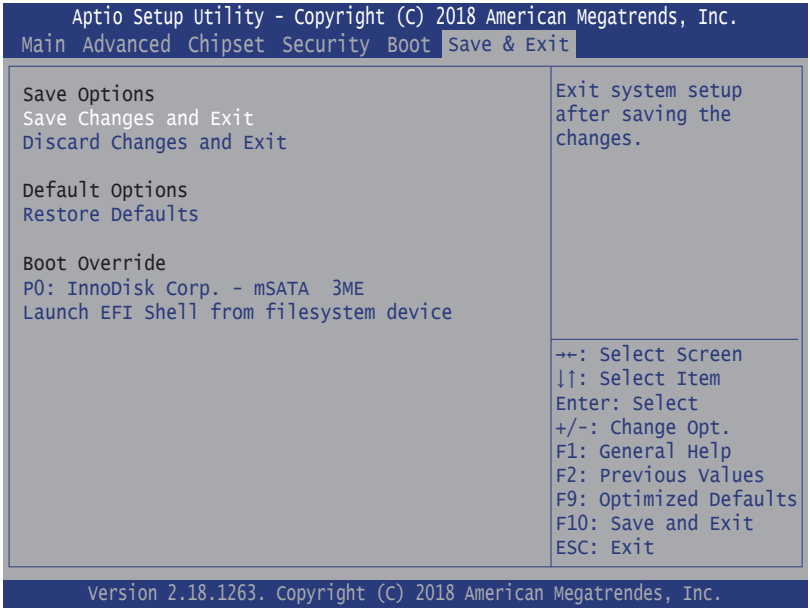
Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. 2. An **Create New Password** dialog then pops up onscreen. 3. Enter your desired password that is no less than 3 characters and no more than 20 characters. 4. Hit [Enter] key to submit.

5.5. Boot



Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ► The default setting is **2** (sec). ► Set it to **65535** to wait indefinitely.
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	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ► Select **Disabled** to display the normal POST message, which is the default.
Fast Boot	Enables or disables (default) boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Boot Option Priority	Set the system boot priorities.
Hard Drive BBS Priorities	Sets the order of the legacy devices in this group. BBS means "BIOS Boot Specification".

5.6. Save & Exit



Setting	Description
Save Changes and Reset	Saves the changes and quits the BIOS Setup utility.
Discard Changes and Exit	Quits the BIOS Setup utility without saving the change(s).
Restore Defaults	Restores all settings to defaults. ► This is a command to launch an action from the BIOS Setup utility.
Boot Override	**Boot Override** presents a list in context with the boot devices in the system. ► **P0:** Select the device to boot up the system regardless of the currently configured boot priority. ► **Launch EFI Shell from filesystem device:** Attempts to launch EFI Shell Application (Shell.efi) from one of the available filesystem devices.

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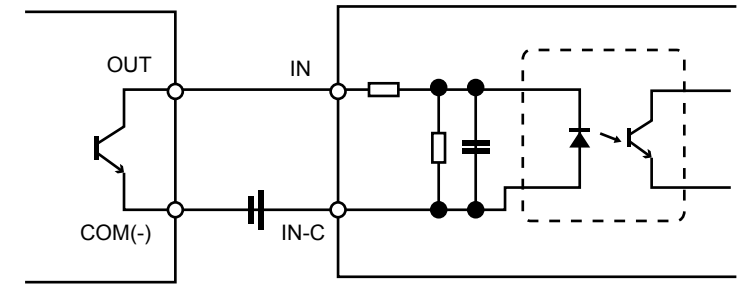
Appendix

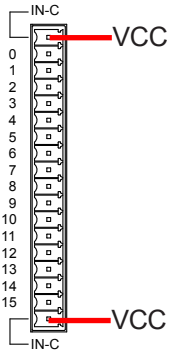
Appendix A. 32-bit DIO Signal Connections

A.1. Isolated Digital Input Connections

The input (IN-C) will accept supply voltages of up to 24 V. Make sure the Von (IN-C to IN) is more than 12V and Voff (IN-C to IN) is less than 5V. The following diagram shows the connection between outside signal and the system.

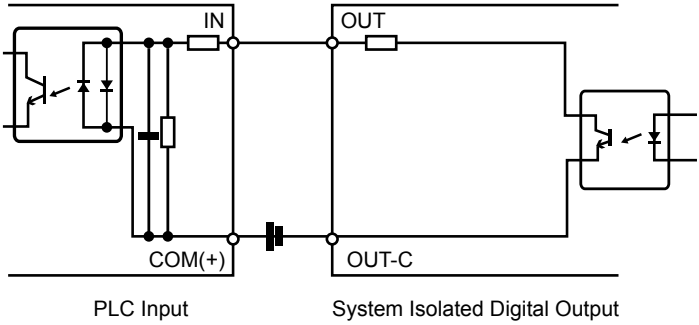


Note that the input's (IN-C) first and last pins are for VCC.



A.2. Isolated Digital Output Connections

When an isolated output channel is being used as an output channel, if an external voltage (maximum 24V) is applied, the current will flow from the external voltage source to the system. Make sure that the current through each out pin does not exceed 100 mA.



Note that the output's (OUT-C) first and last pins are for GND.