AXIOMTEK

SDM300S

Intel® Smart Display Module (SDM-S) with Intel® Pentium® Processor N4200 and Celeron® Processor N3350

User's Manual

RoHS

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove modules or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the module or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling modules and components.

Trademarks Acknowledgments

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Chapter 1
Introduction

The SDM300S is a new Intel® Smart Display Module (SDM-S) supporting Intel® Pentium® quad core N4200 and Celeron® dual core N3350. It delivers outstanding system performance and support excellent multiple I/Os such as one Gigabyte Ethernet port and two USB 3.0 ports. SDM300S measures only 100 x 60mm and delivers 4K output with streaming content thru the SDM edge connector.

The smart display module carries 4/8GB LPDDR4 onboard memory and 32/64GB eMMC onboard flash. The cost-effective SDM300S features one standard PCIe (thru SDM edge connector) and one M.2 E Key 2230 slot for WiFi/BT option. It also features built-in I/O such as USB 3.0, HDMI 1.4, DisplayPort 1.2, Serial TX/RX and I^2C. In addition SDM300S can be built in or externally plugged into a display for maximum integration flexibility to fit into the sleekest all-in-one designs

1.1 Features

- Intel® Pentium® N4200 and Celeron® N3350 processors
- 4GB LPDDR4 onboard memory supporting up to 8GB memory capacity
- 32/64GB eMMC onboard flash
- One M.2 E Key 2230 for WiFi/BT options
- 2 USB 3.0, one GbE LAN
- Easily integrates into slim designs

1.2 Specifications

- **CPU**
  - Intel® Pentium® quad core N4200 1.10~2.5GHz.
  - Intel® Celeron® dual core N3350 1.10~2.4GHz.

- **BIOS**
  - American Megatrends Inc. BIOS.
  - 64Mbit SPI Flash, DMI, Plug and Play.
  - PXE Ethernet Boot ROM, customized default saving features, LPC-free supported, uses SPI type Flash memory.

- **System Memory**
  - 4GB LPDDR4 2133MHz onboard memory supporting maximum capacity up to 8GB (optional).

- **eMMC**
  - Support 32/64GB eMMC 5.0 onboard flash.

- **Expansion Interface**
  - One M.2 E Key 2230 socket for Wi-Fi/Bluetooth option.

- **USB Interface**
  - Two USB 3.0 ports in Type A on the rear I/O.
  - One USB 3.0 port (thru SDM edge connector).

- **Graphics**
  - Integrated in processor HD graphics 505/500.
  - One DP 1.2 (thru SDM edge connector). The resolution is up to 4096x2160.
  - One HDMI 1.4b (thru SDM edge connector). The resolution is up to 3840x2160.

- **Ethernet**
  - One 1000/100/10 Base-T provided by Intel® I211AT with integrated boot ROM.

- **WatchDog Timer**
  - Timeout value range is 1~255 sec/min.

- **SDM Edge Connector**
  - 98-pin golden finger; containing DP, HDMI, PCI Express x1, USB 3.0, Serial TX/RX, I^2C and SPI.

- **Power Management**
  - ACPI (Advanced Configuration and Power Interface).

- **Form Factor**
  - 100mm x 60mm.

1.3 Utilities Supported

- Chipset driver
- Graphics driver
- TXE driver
- Serial IO driver
- Ethernet utility and driver

Note

All specifications and images are subject to change without notice.

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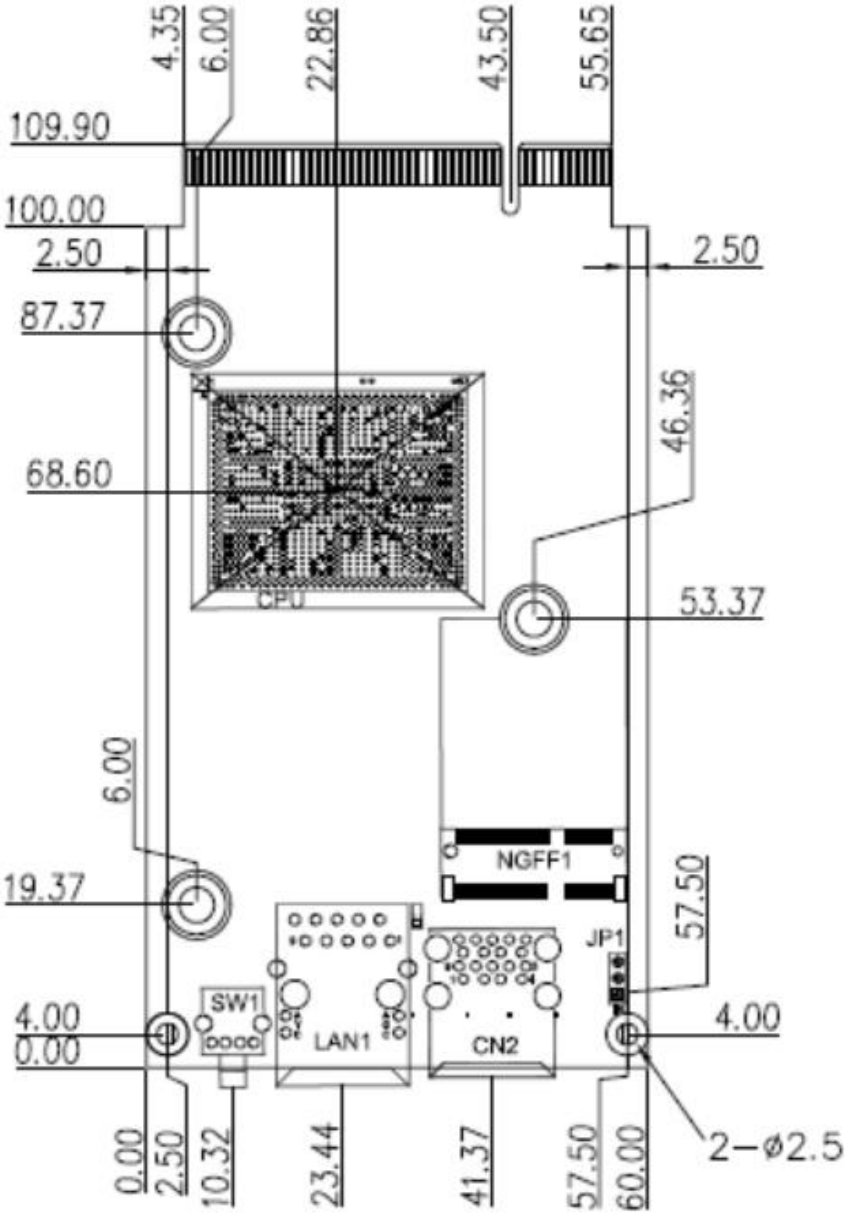
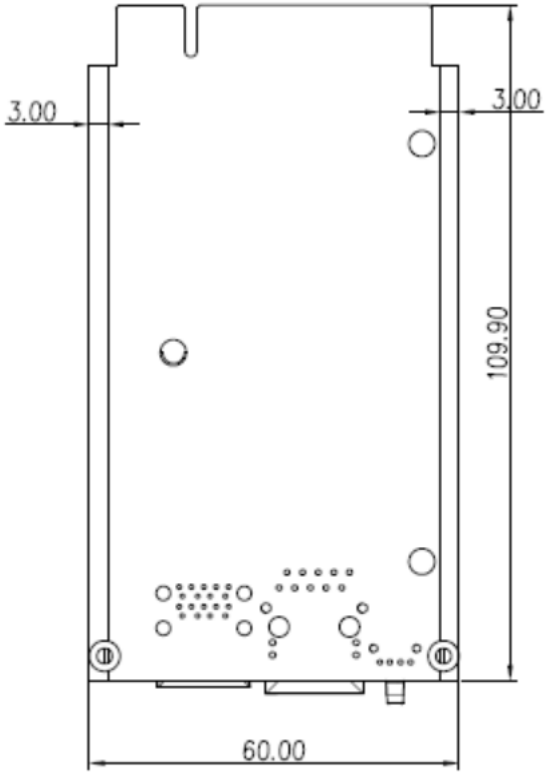
Chapter 2
Module and Pin Assignments

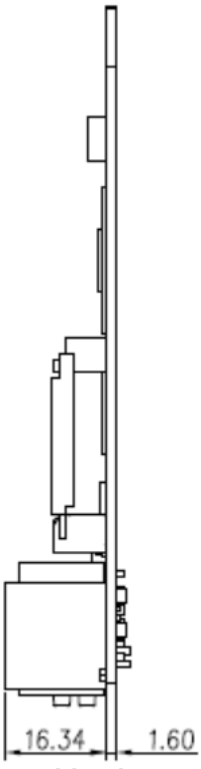
2.1 Module Dimensions and Fixing Holes



Top View

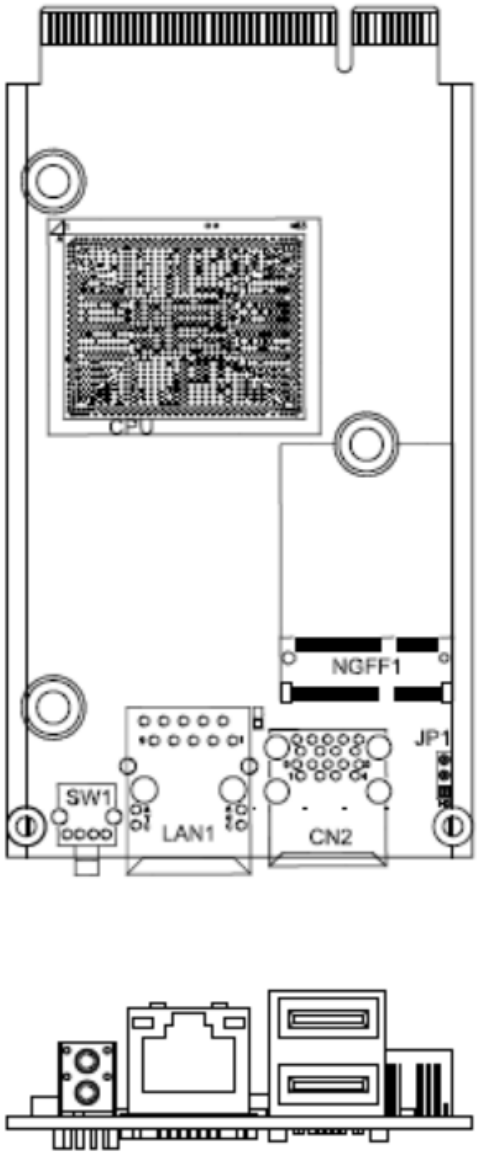


Bottom View

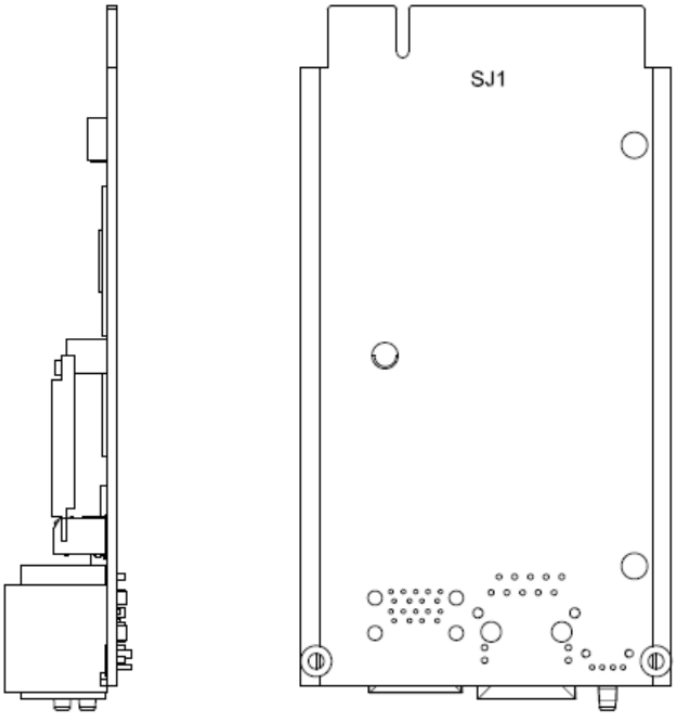


Side View

2.2 Module Layout



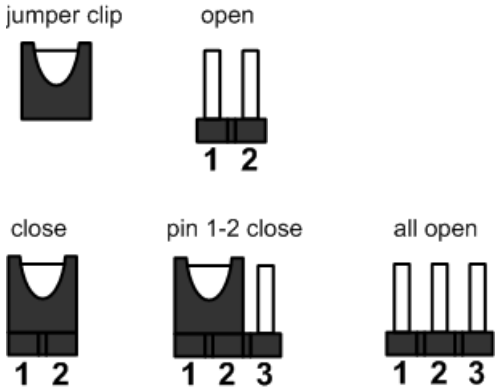
Top View



Bottom View

2.3 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. Below illustration shows how to set up jumper.



Properly configure jumper settings on the SDM300S to meet your application purpose. Below you can find a summary table of jumper and onboard default settings.

Note

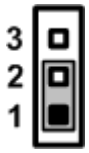
Once the default jumper setting needs to be changed, please do it under power-off condition.

Jumper	Description	Setting
JP1	Auto Power On Default: Enable	1-2 Close

2.3.1 Auto Power On (JP1)

If JP1 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP1 is disabled for power input, it is necessary to manually press soft power button to power on the system.

Function	Setting
Enable auto power on (Default)	1-2 close
Disable auto power on	2-3 close



2.4 Connectors

Signals go to the other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows connectors on the hardware.

Connector	Description
CN2	USB 3.0 Port 0~1
LAN1	Ethernet Port
NGFF1	M.2 E Key 2230 Socket
SW1	Power and Reset Button
SJ1	SDM Edge Connector

2.4.1 USB 3.0 Port (CN2)

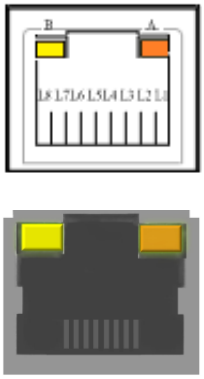
The Universal Serial Bus (compliant with USB 3.0 (5Gb/s)) connector on the rear I/O is for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	Signal	Pin	Signal
1	USB_VCC (+5V)	10	USB_VCC (+5V)
2	USB #0_D-	11	USB #1_D-
3	USB #0_D+	12	USB #1_D+
4	GND	13	GND
5	SSRX0-	14	SSRX1-
6	SSRX0+	15	SSRX1+
7	GND	16	GND
8	SSTX0-	17	SSTX1-
9	SSTX0+	18	SSTX1+

2.4.2 Ethernet Port (LAN1)

The board has one RJ-45 Ethernet connector, LAN1. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10-Base-T hub.

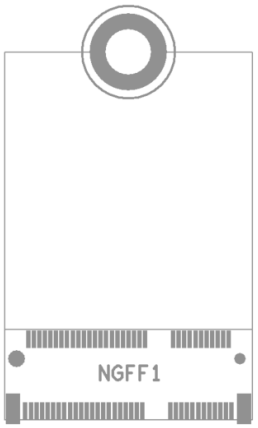
Pin	1000 Base-T	100/10 Base-T	Description
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
B	Active Link LED (Yellow) Off: No link Blinking: Data activity detected		
A	Speed LED 1000: Orange 100/10: Green/OFF		



2.4.3 M.2 E Key 2230 Socket (NGFF1)

The module has one M.2 E Key 2230 socket on the top side supporting PCI Express x1 and USB 2.0.

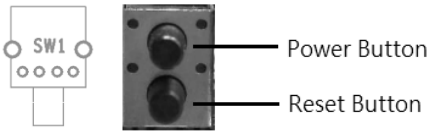
Pin	Signal	Pin	Signal
1	GND	2	3.3V
3	USB_D+	4	3.3V
5	USB_D-	6	NC
7	GND	8	I2S_SCL
9	NC	10	I2S_WS
11	NC	12	I2S_SD_OUT
13	NC	14	I2S_SD_IN
15	NC	16	NC
17	NC	18	GND
19	NC	20	WAKE#
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	GND	34	NC
35	PETP0	36	NC
37	PETN0	38	NC
39	GND	40	NC
41	PERP0	42	NC
43	PERN0	44	NC
45	GND	46	NC
47	REFCLKPP	48	NC
49	REFCLKPN	50	SUSCLK
51	GND	52	RST
53	PCIE_CLKREQ	54	NC
55	PEWAKE#	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	3.3V
73	NC	74	3.3V
75	GND		



2.4.4 Power and Reset Button (SW1)

The upper power button allows users to control SDM300S power on/off. And the lower reset button allows users to reset SDM300S during system abnormal situation.

Power Button	Description
Press	Turn on/off system
Release	Keep system status



Reset Button	Description
Press	Reset system
Release	Keep system status

2.4.5 SDM Edge Connector (SJ1)

The following table shows pin assignments of the 98-pin SDM PCIEx8 edge connector.

Pin	Side B (Top)	Pin	Side A (Bottom)
1	+12V	1	+12V
2	+12V	2	+12V
3	+3.3VSB	3	+12V
4	GND	4	GND
5	GND	5	GND
6	PWRBTN#	6	PWRGD#
7	RESET#	7	SLP_S4
8	SYSFAN#	8	SDM_DET#
9	GND	9	CEC/NC
10	I2C1_SDA	10	I2C0_SDA
11	I2C1_SCL	11	I2C0_SCL
12	GSPI_MOSI	12	GSPI_CLK
13	GSPI_MISO	13	GSPI_CS0#
14	GND	14	GND
15	UART_TXD	15	PCIe_TX+
16	UART_RXD	16	PCIe_TX-
17	GND	17	GND
18	USB_SSTX+	18	PCIe_RX+
19	USB_SSTX-	19	PCIe_RX-
20	GND	20	GND
21	USB_SSRX+	21	PCIe_Clk+
22	USB_SSRX-	22	PCIe_Clk-
23	GND	23	GND
24	USB+	24	PCIE_WAKE#
25	USB-	25	PCIE_CLKREQ#
26	USB_OC#	26	PCIE_RST#
27	GND	27	GND
28	DP3-	28	TMDS_CLK-
29	DP3+	29	TMDS_CLK+
30	GND	30	GND
31	DP2-	31	TMDS0-
32	DP+	32	TMDS0+
33	GND	33	GND
34	DP1-	34	TMDS1-
35	DP1+	35	TMDS1+
36	GND	36	GND
37	DP0-	37	TMDS2-
38	DP0+	38	TMDS2+
39	GND	39	GND
40	DP_AUX-	40	DDC_DATA
41	DP_AUX+	41	DDC_CLK
42	DP_HPD	42	TMDS_HPD
43	GND	43	GND
44	RSVD	44	RSVD
45	RSVD	45	RSVD
46	RSVD	46	RSVD
47	RSVD	47	RSVD
48	RSVD	48	RSVD
49	RSVD	49	RSVD

Chapter 3
Hardware Description

3.1 Microprocessor

The SMD300S supports Intel® Pentium® N4200 and Celeron® N3350 processors which enable your system to operate under Windows® 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for the installed microprocessor to prevent the CPU from damages.

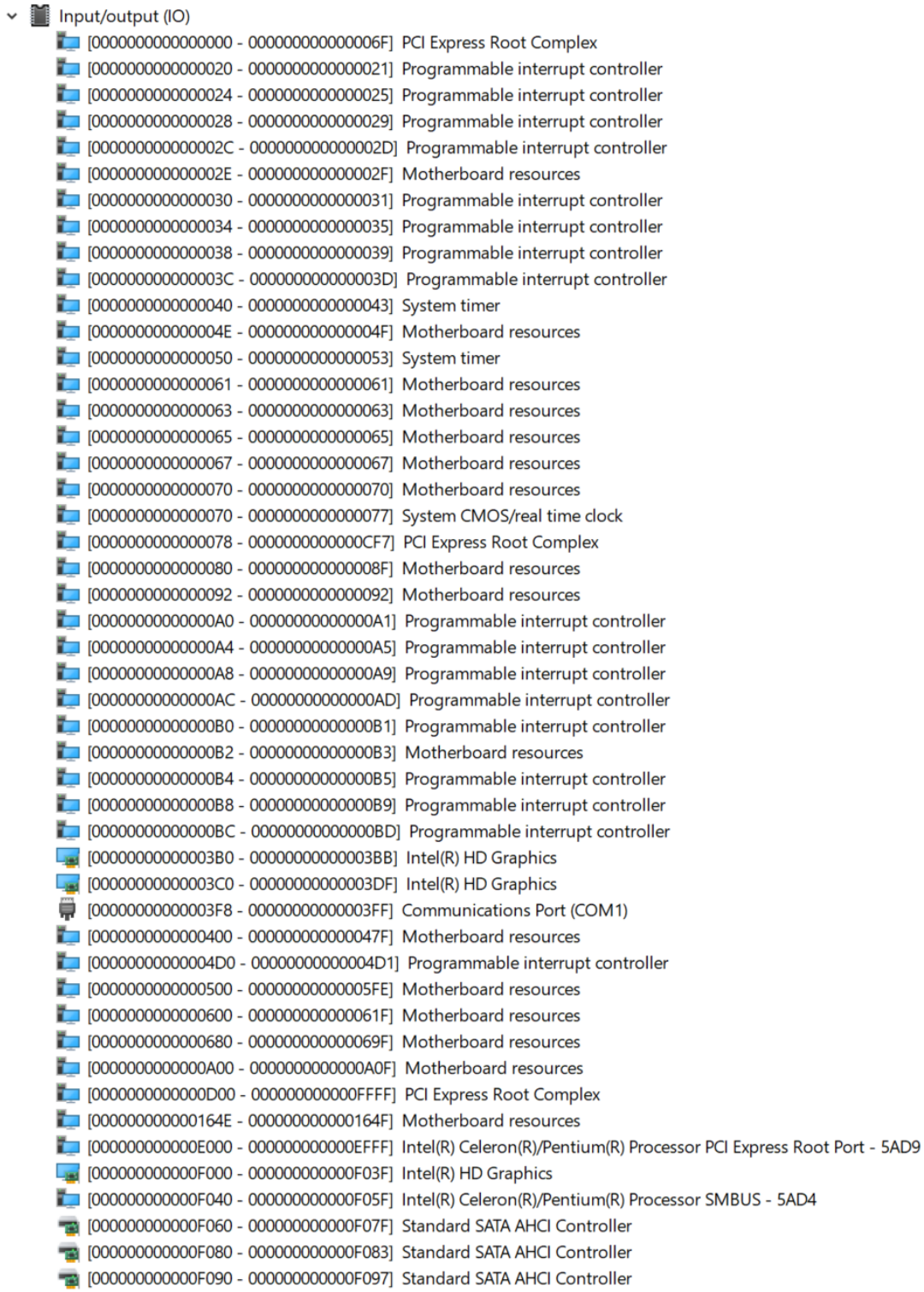
3.2 BIOS

The SDM300S uses AMI Plug and Play BIOS with a single 64Mbit SPI Flash.

3.3 System Memory

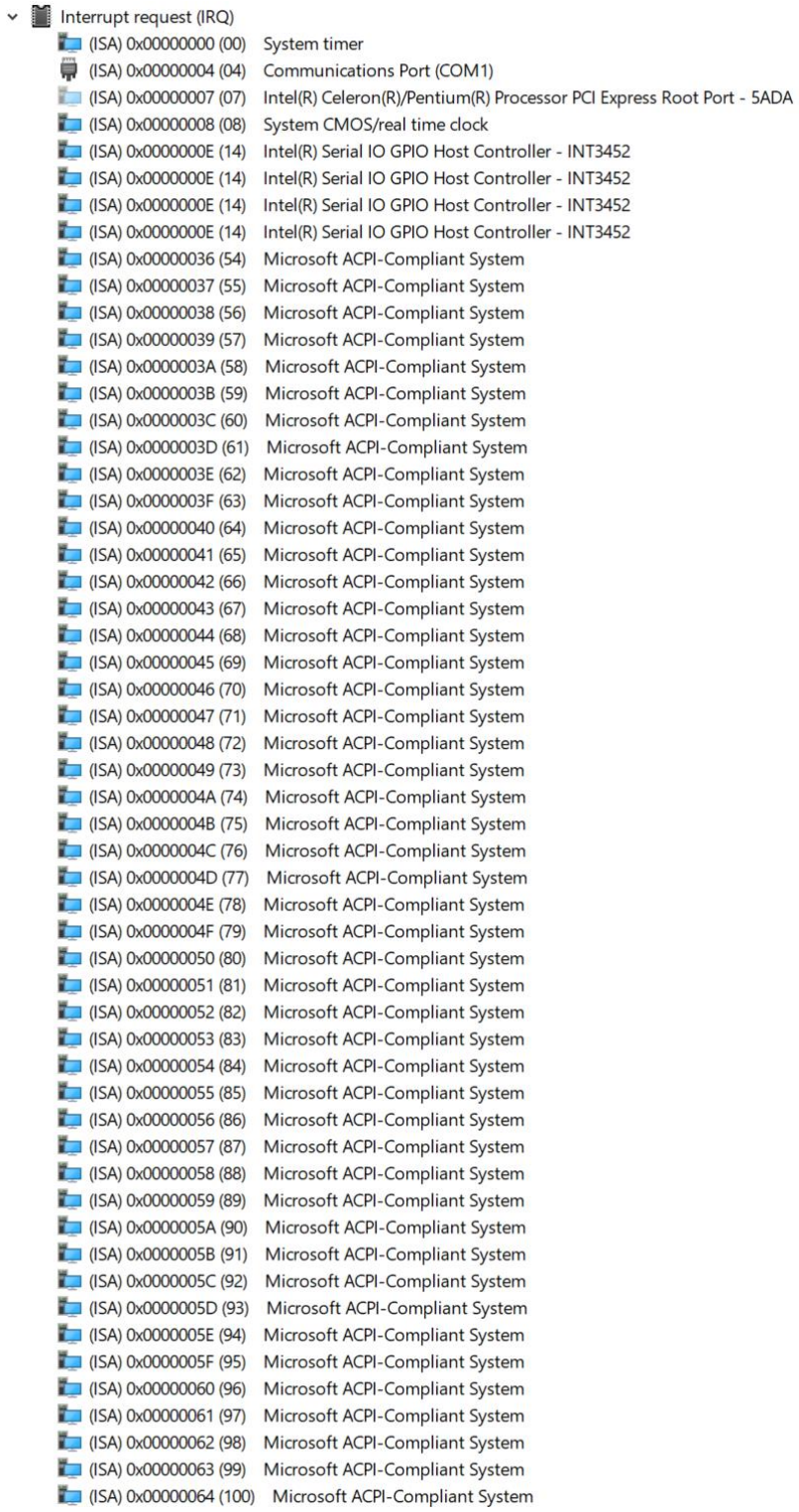
By default, the SDM300S comes with 4GB LPDDR4 onboard memory. It supports maximum memory capacities up to 8GB.

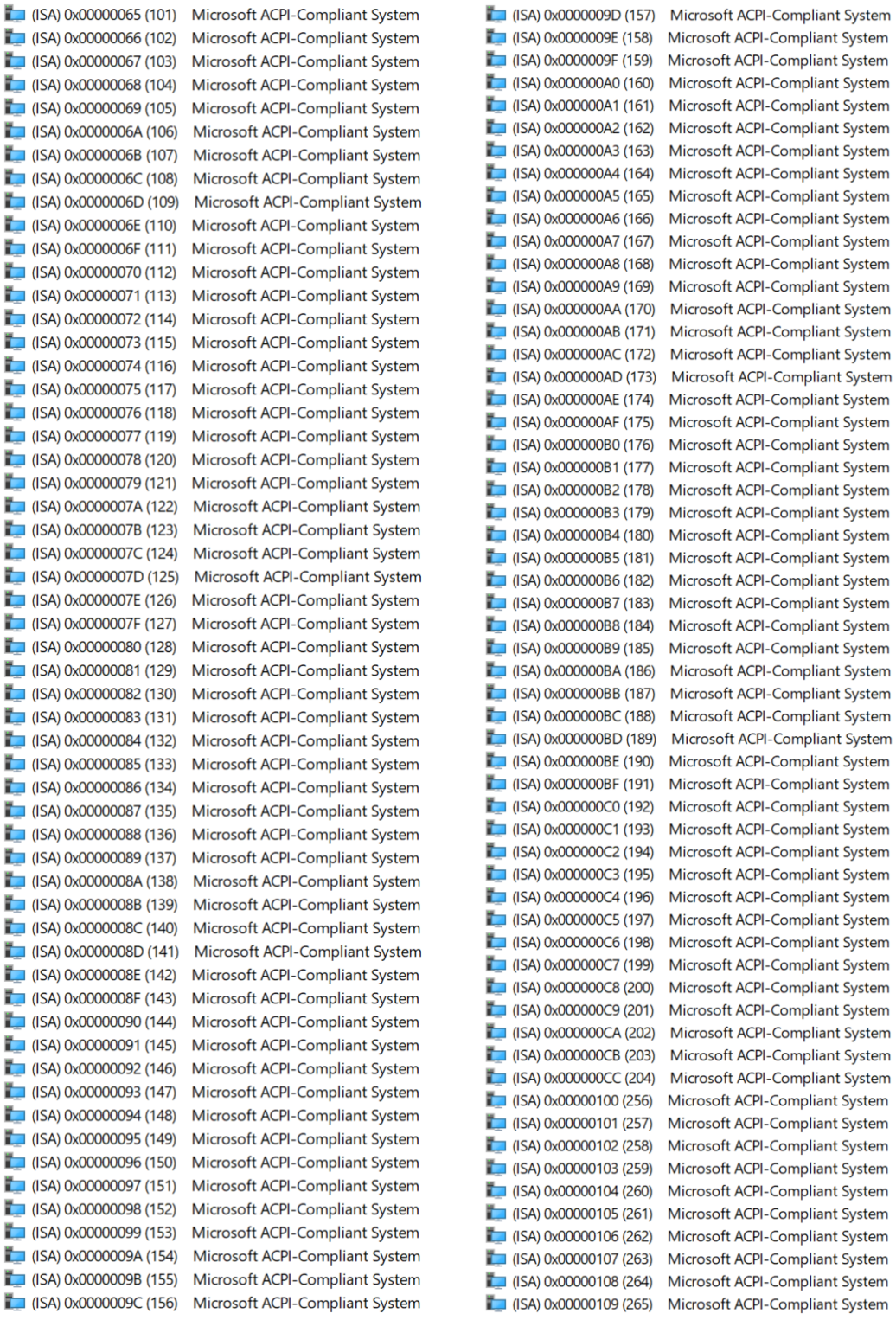
3.4 I/O Port Address Map



3.5 Interrupt Controller (IRQ) Map

The interrupt controller (IRQ) mapping list is shown as follows:

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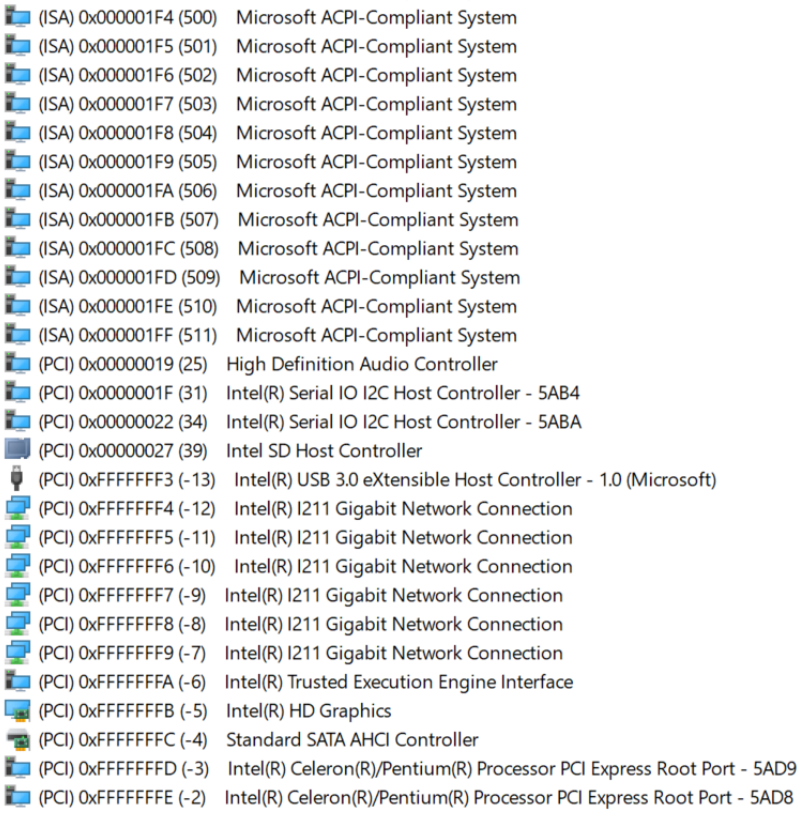
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(PCI) 0x00000019 (25) High Definition Audio Controller
(PCI) 0x0000001F (31) Intel(R) Serial IO I2C Host Controller - 5AB4
(PCI) 0x00000022 (34) Intel(R) Serial IO I2C Host Controller - 5ABA
(PCI) 0x00000027 (39) Intel SD Host Controller
(PCI) 0xFFFFFFF3 (-13) Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
(PCI) 0xFFFFFFF4 (-12) Intel(R) I211 Gigabit Network Connection
(PCI) 0xFFFFFFF5 (-11) Intel(R) I211 Gigabit Network Connection
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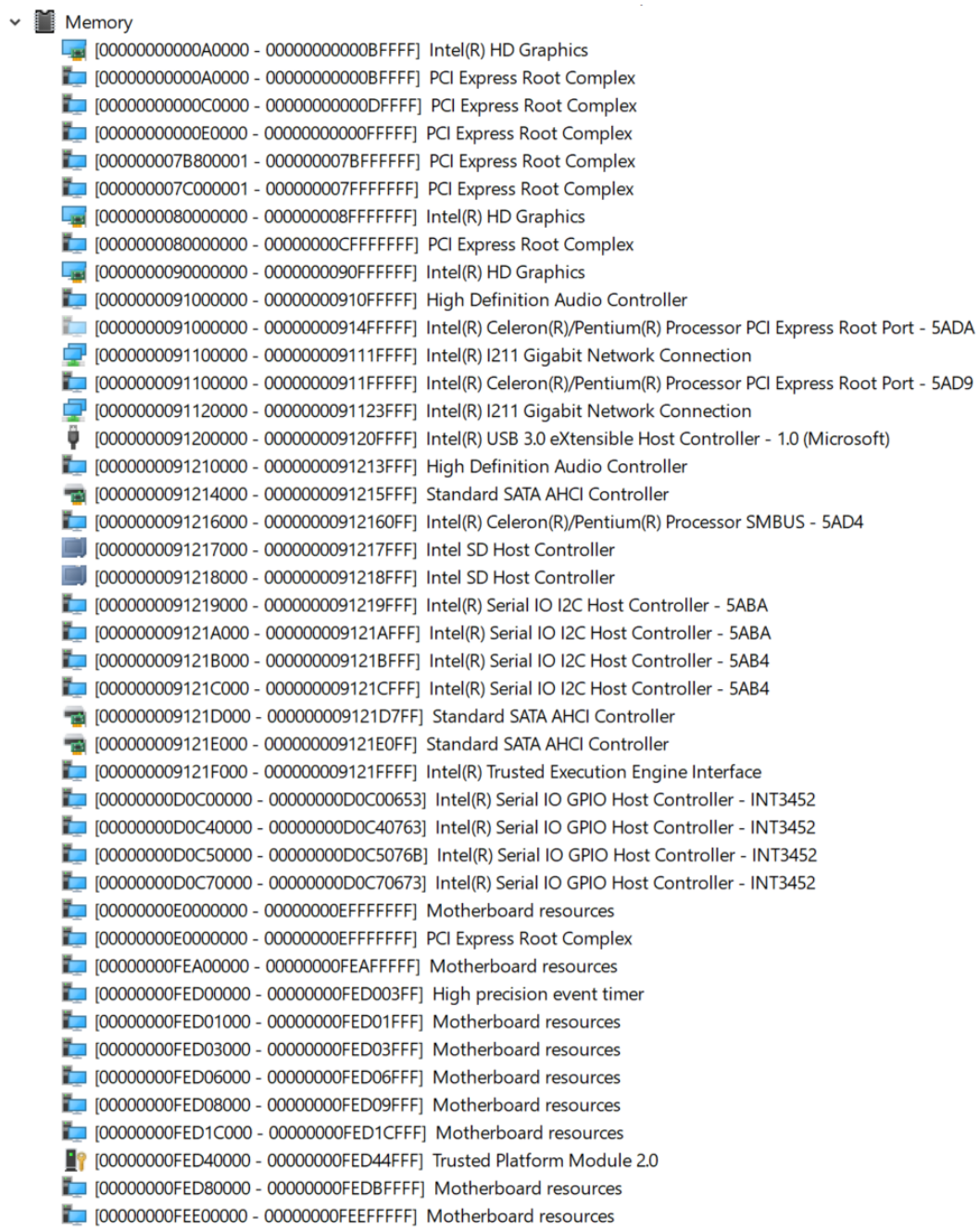
(PCI) 0xFFFFFFF9 (-7) Intel(R) I211 Gigabit Network Connection
(PCI) 0xFFFFFFFA (-6) Intel(R) Trusted Execution Engine Interface
(PCI) 0xFFFFFFFB (-5) Intel(R) HD Graphics
(PCI) 0xFFFFFFFC (-4) Standard SATA AHCI Controller
(PCI) 0xFFFFFFFD (-3) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
(PCI) 0xFFFFFFFE (-2) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

3.6 Memory Map

The memory mapping list is shown as follows:



Chapter 4
AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

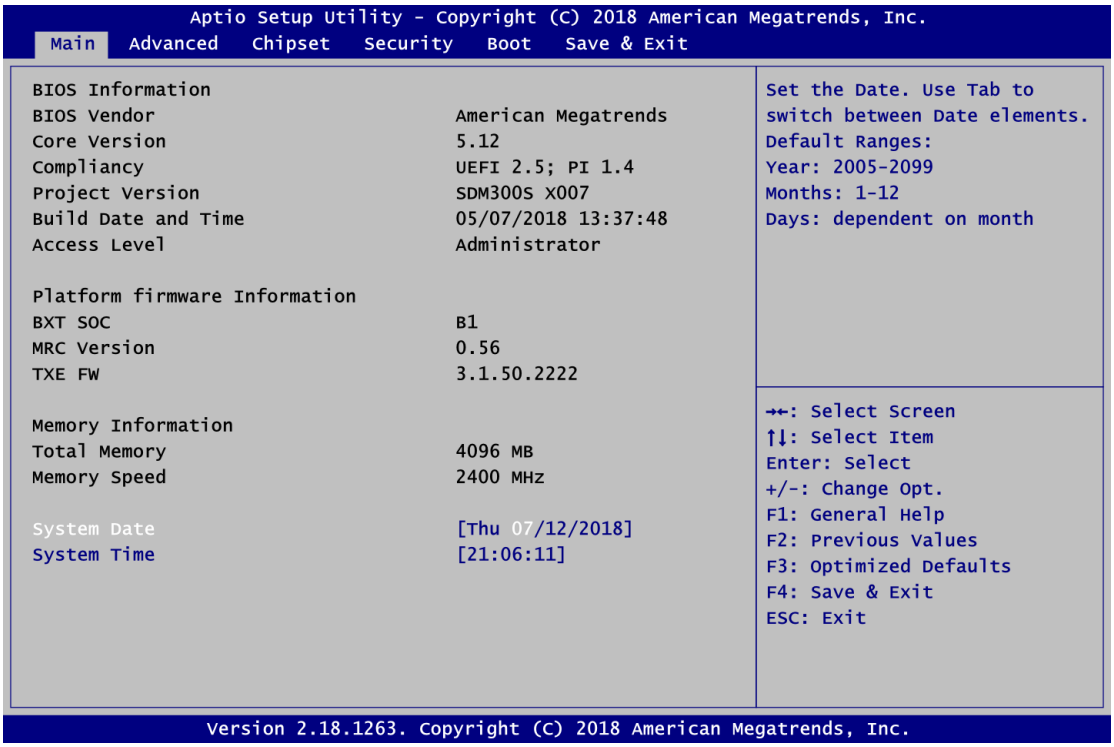
Note

Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



BIOS Information
Display BIOS and EC firmware information.

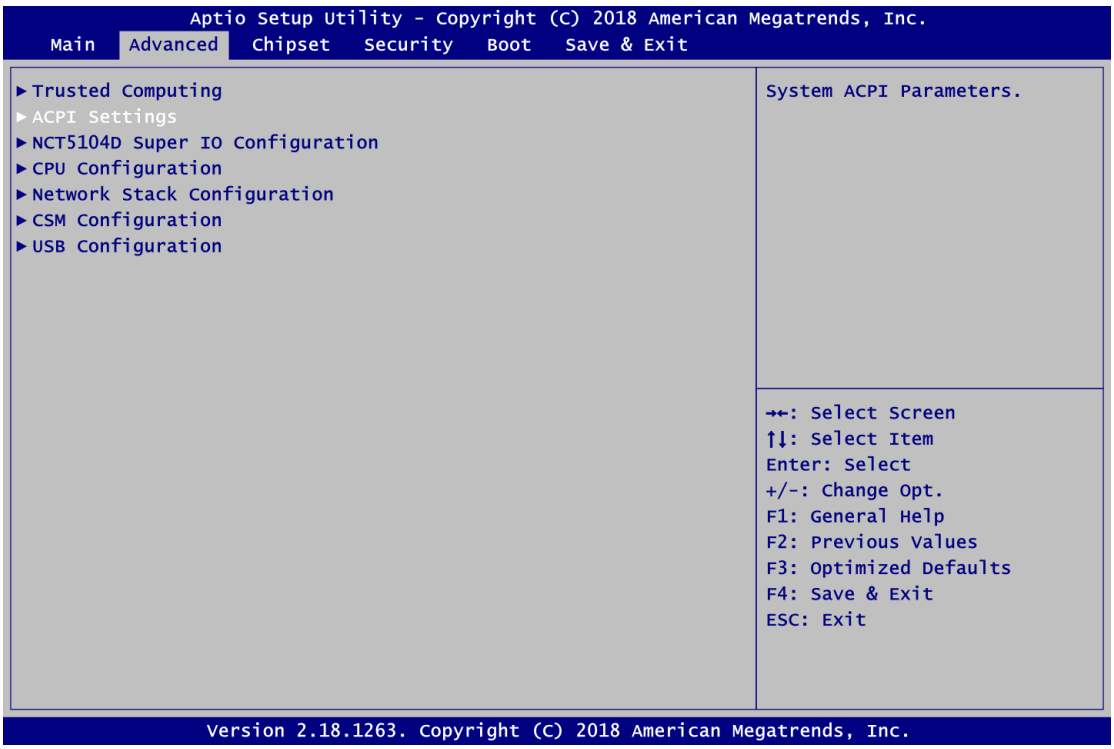
System Date/Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

4.4 Advanced Menu

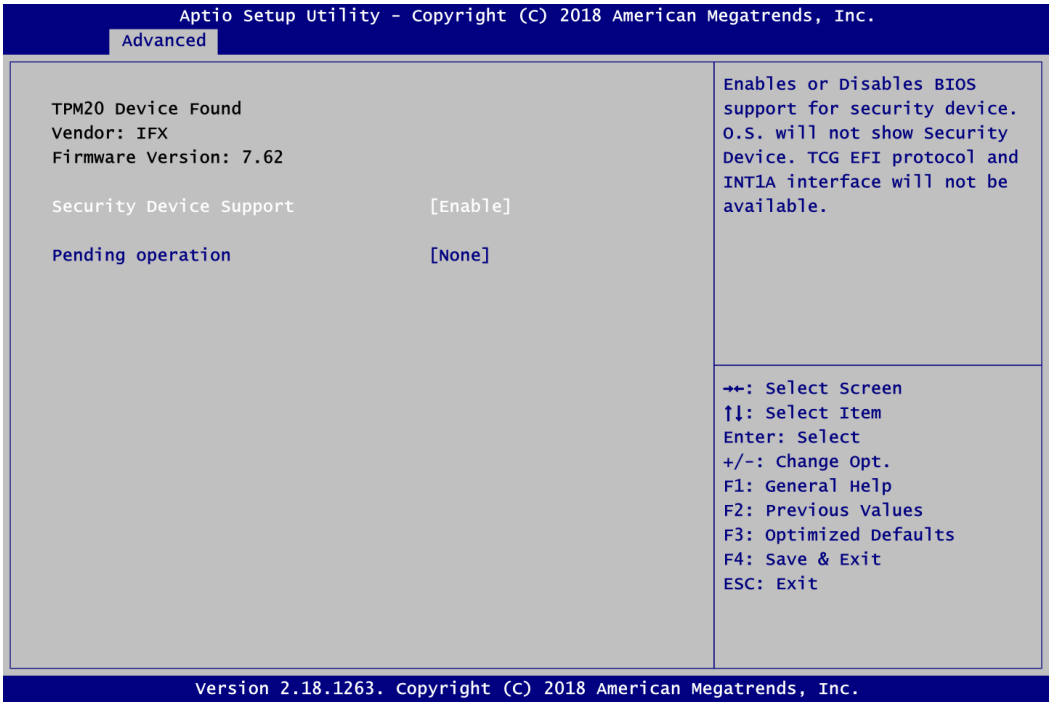
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ Trusted Computing
- ▶ ACPI Settings
- ▶ NCT5104D Super IO Configuration
- ▶ CPU Configuration
- ▶ Network Stack Configuration
- ▶ CSM Configuration
- ▶ USB Configuration

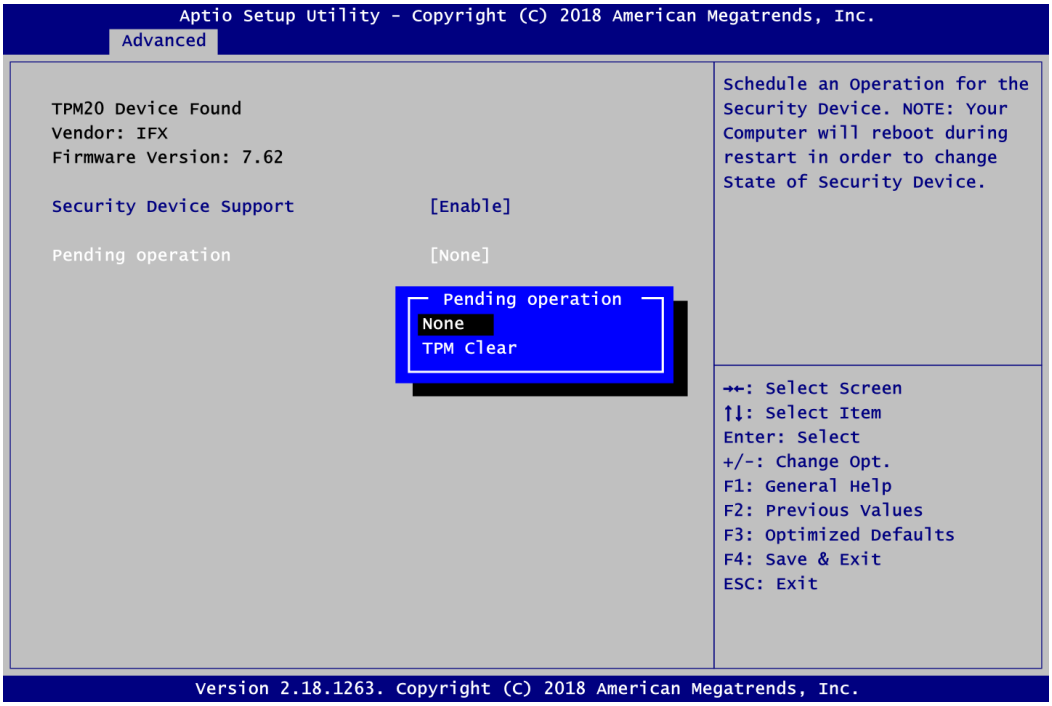
For items marked with "▶", please press <Enter> for more options.



- **Trusted Computing**
  You can use this screen for TPM (Trusted Platform Module) configuration. It also shows current TPM status information.

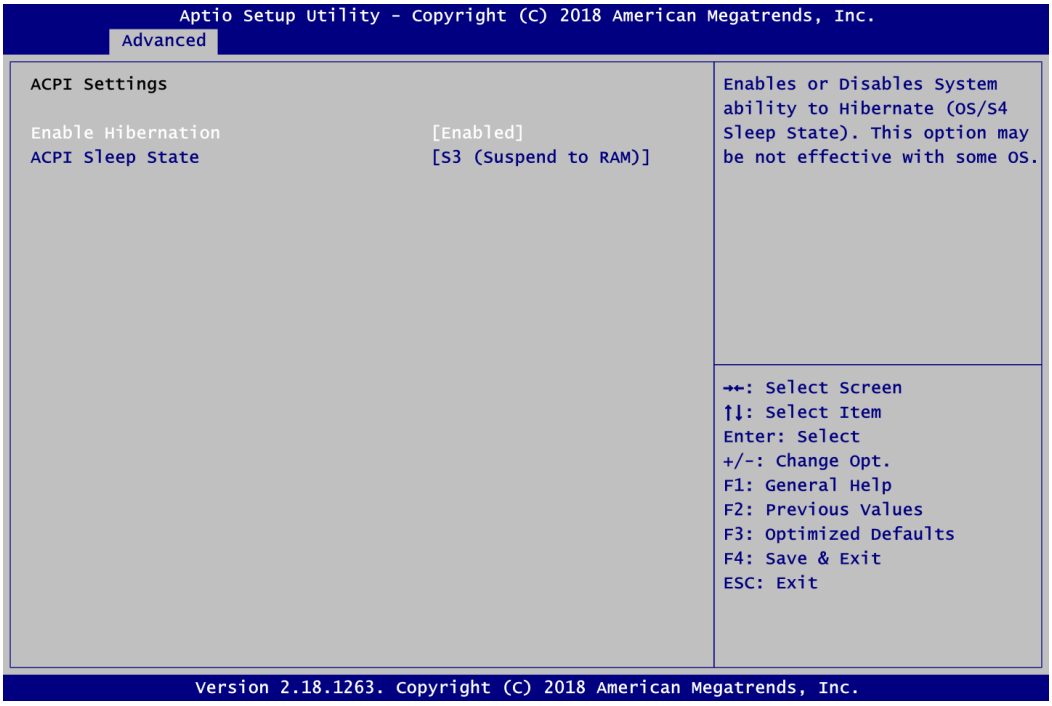


Security Device Support
Enable or disable BIOS support for security device.



Pending operation
Schedule a TPM operation which will take effect at the next bootup process.

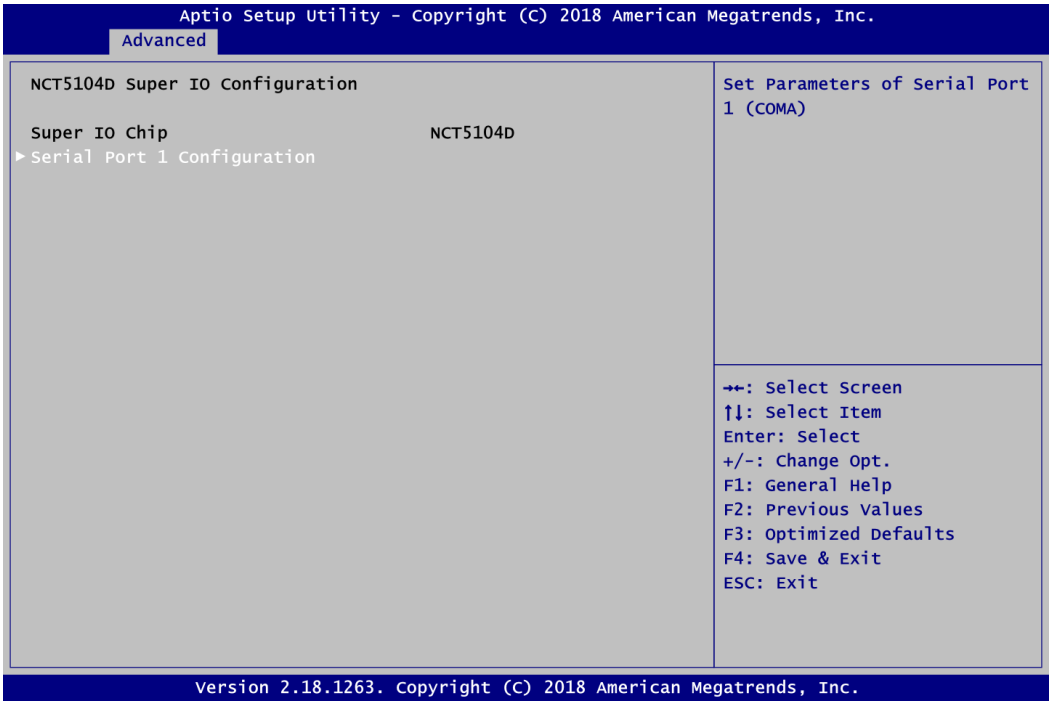
- **ACPI Settings**
  You can use this screen to select options for system ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



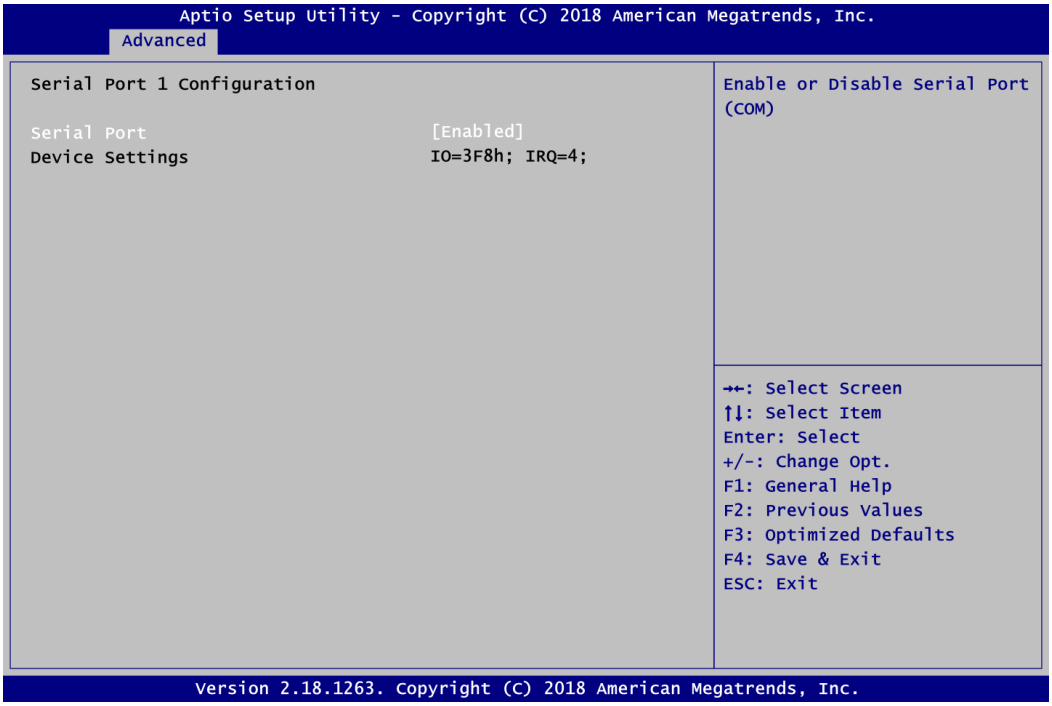
Enable Hibernation
Enable or disable system ability to hibernate mode.

ACPI Sleep State
Select the ACPI (Advanced Configuration and Power Interface) sleep state. Configuration options are Suspend Disabled and S3 (Suspend to RAM). The S3 (Suspend to RAM) option selects ACPI sleep state the system will enter when suspend button is pressed.

- **NCT5104D Super IO Configuration**
  You can use this screen to select options for the Serial Port Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.

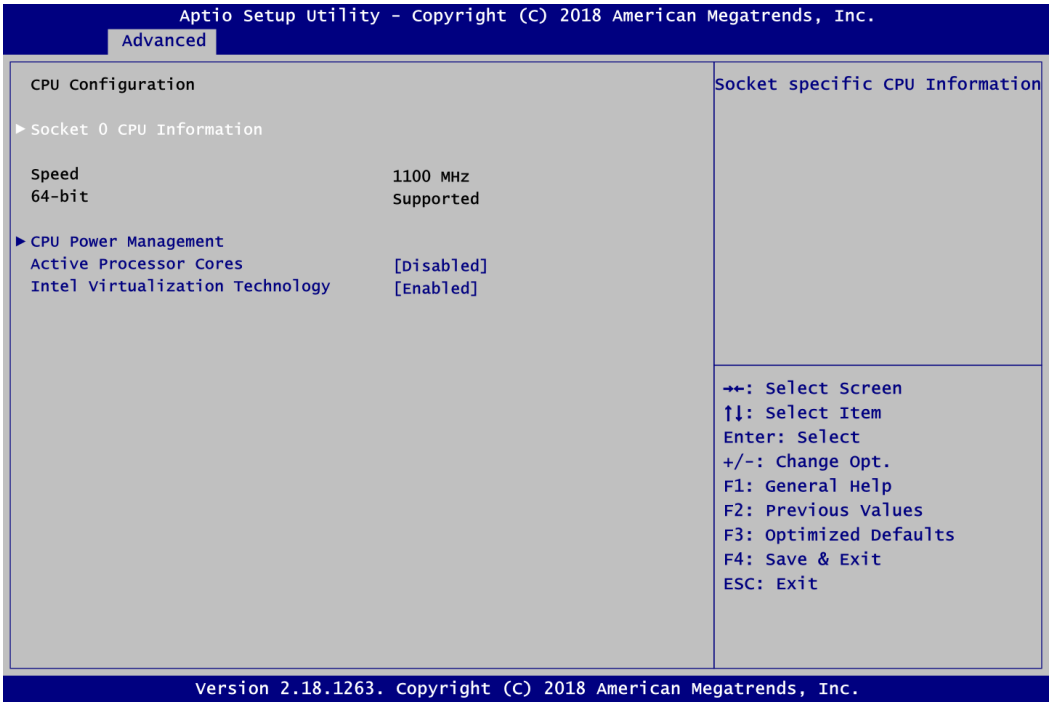


- **Serial Port 1 Configuration**

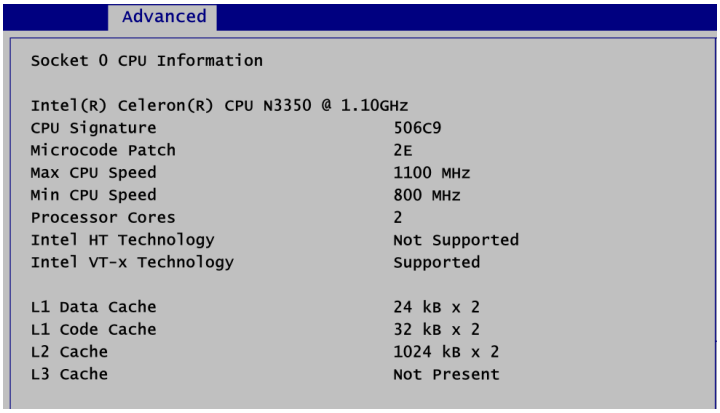


Serial Port
Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request line is IRQ4.

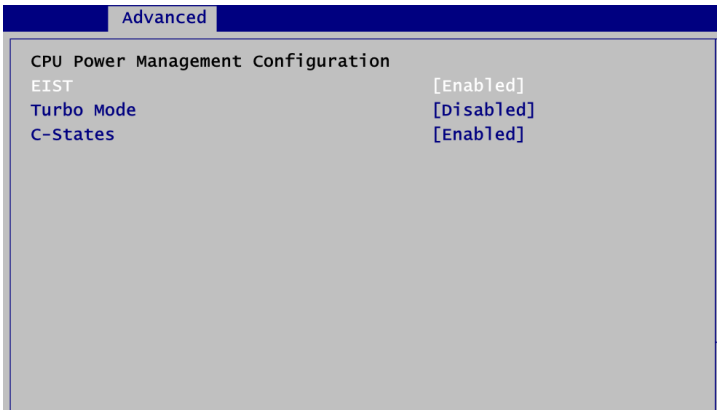
- **CPU Configuration**
  This screen shows the CPU Configuration, and you can change the value of the selected option.



Socket 0 CPU Information
This screen shows the CPU information.



CPU Power Management Configuration



EIST
Enable or disable Intel SpeedStep mode. The default setting is Enabled.

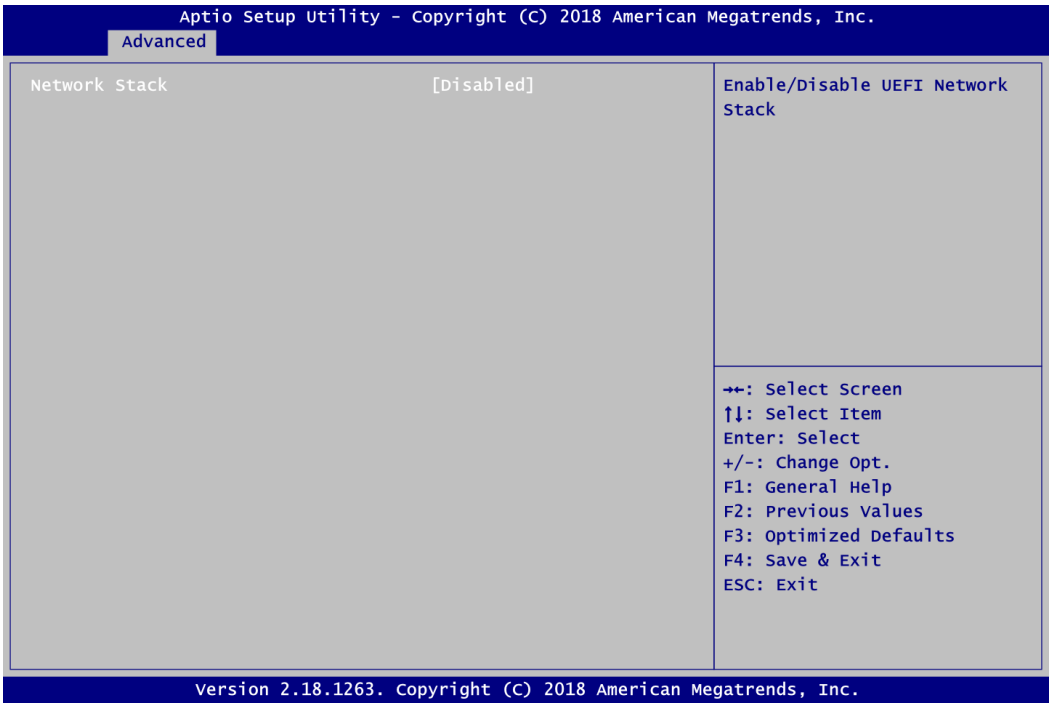
Turbo Mode
Enable or disable turbo mode. The default setting is Disabled.

C-states
Enable or disable C states. The default setting is Enabled.

Active Processor Cores
Enable or disable CPU cores. The default setting is Disabled.

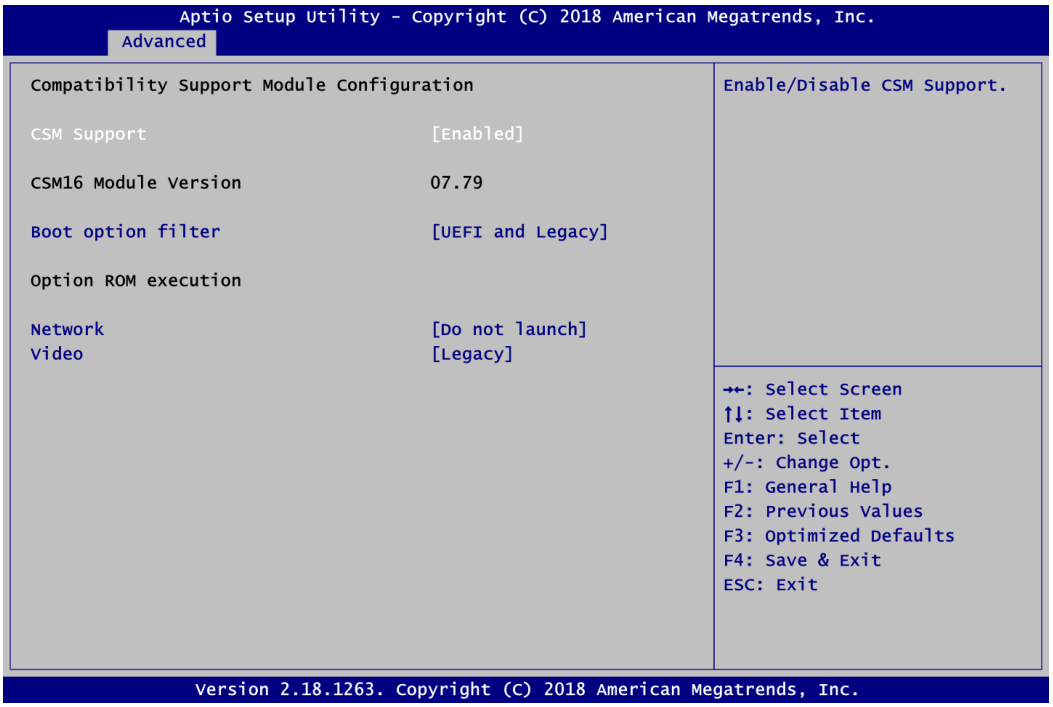
Intel Virtualization Technology
Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a computer system to work as several virtual systems.

- **Network Stack Configuration**



Network Stack
Enable or disable UEFI Network stack. The default setting is Disabled.

- **CSM (Compatibility Support Module) Configuration**



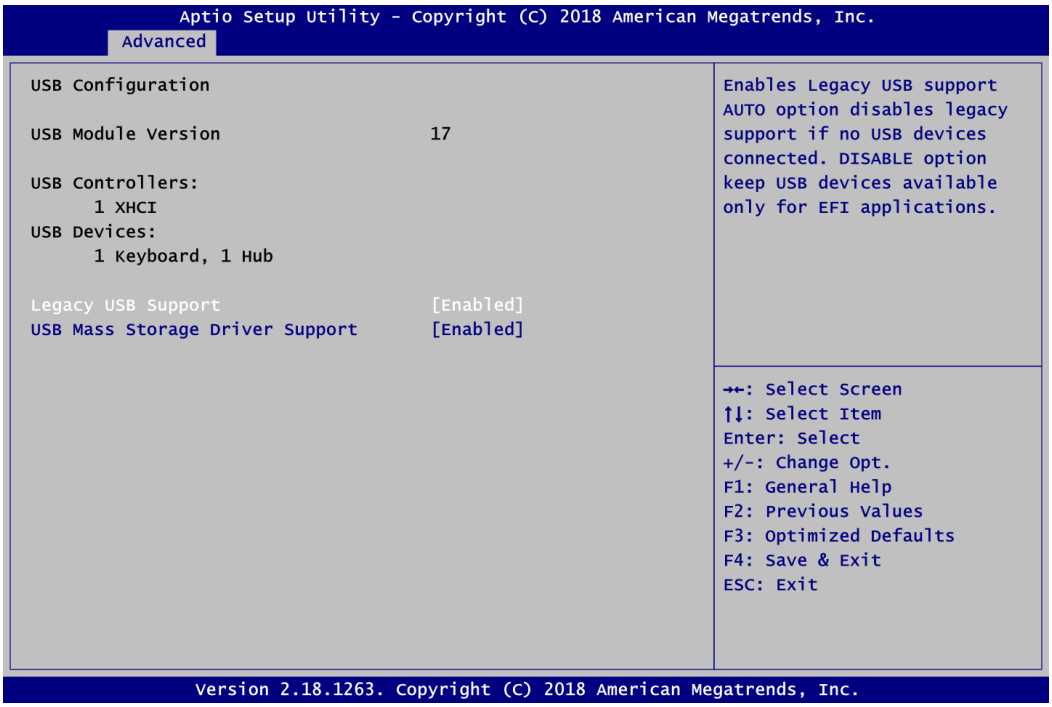
CSM Support
Enable or disable CSM support. The default setting is Enabled.

Boot optional filter
Controls the priority of Legacy and UEFI ROMs.

Network
Controls the execution of UEFI and Legacy PXE OpROM.

Video
Controls the execution of UEFI and Legacy Video OpROM.

- **USB Configuration**



USB Devices
Display all detected USB devices.

Legacy USB Support
Enable or disable legacy USB support.

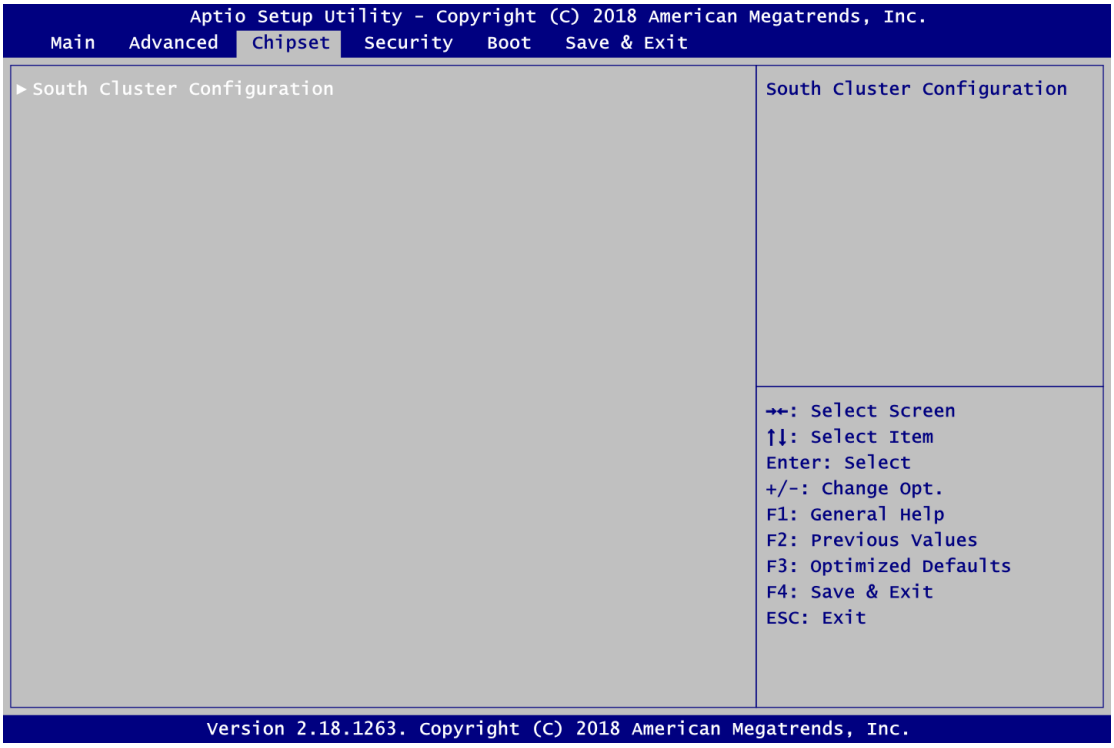
USB Mass Storage Driver Support
Enable or disable USB mass storage driver support.

4.5 Chipset Menu

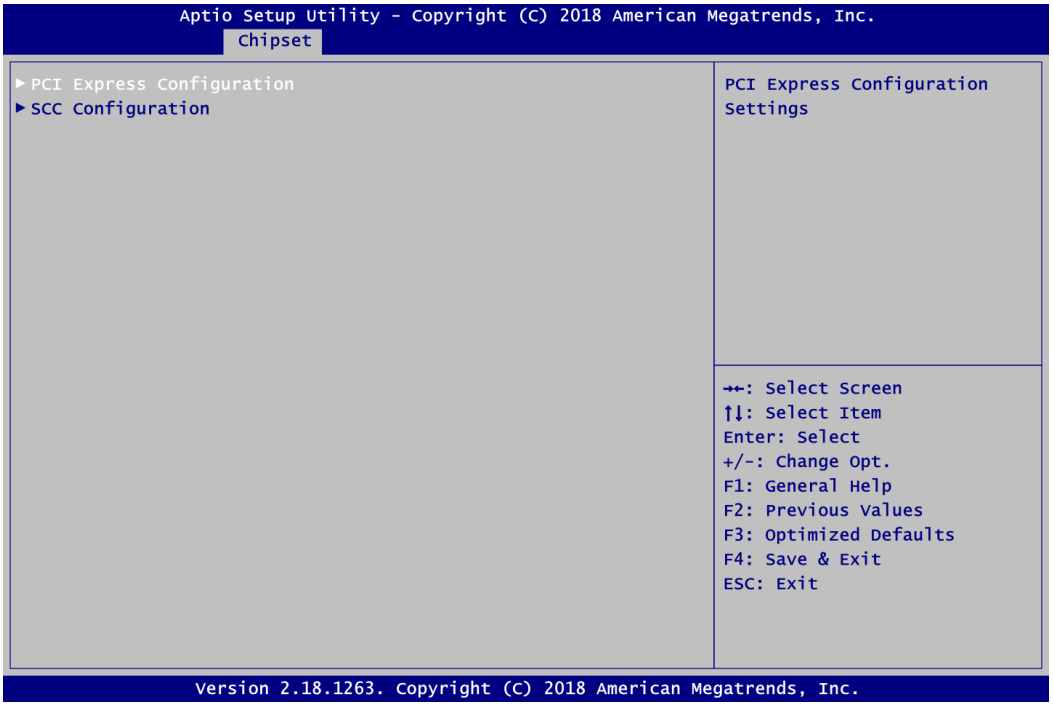
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

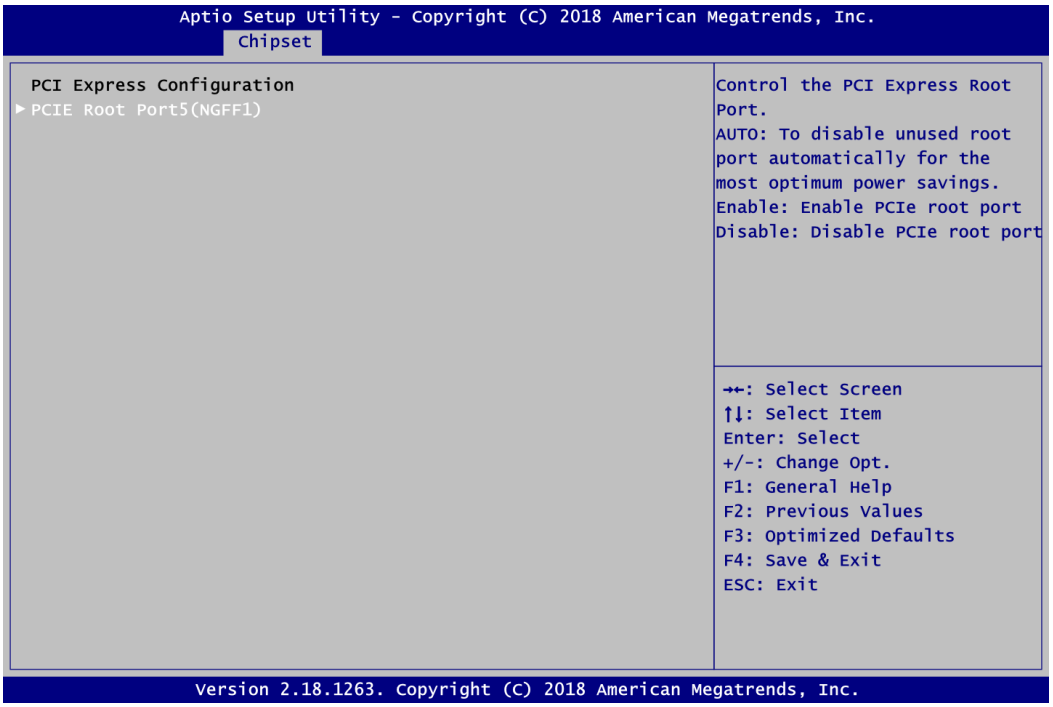
► South Cluster Configuration

For items marked with "►", please press <Enter> for more options.

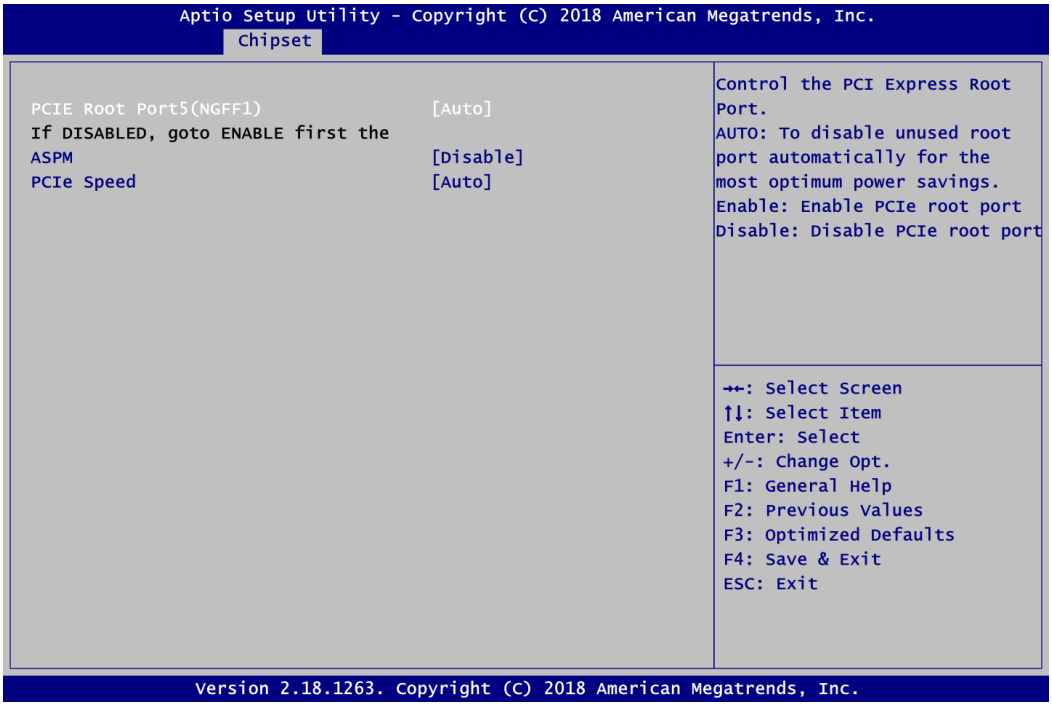


- **South Cluster Configuration**
  This screen shows South Cluster configuration. For items marked with "▶", please press <Enter> for more options.





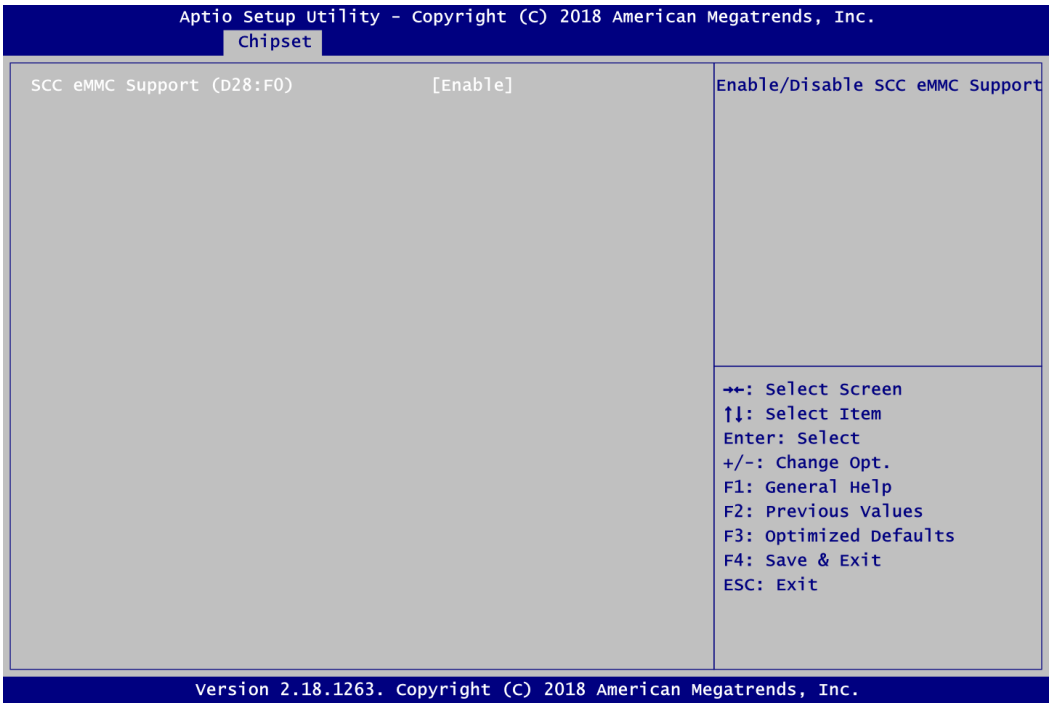
- **PCI Express Configuration**
  This screen shows PCI Express configuration. For items marked with "▶", please press <Enter> for more options.



PCIE Root Port5 (NGFF1)
Control PCIE root port5. The default setting is Enable.

ASPM
Control PCI Express active state power management settings.

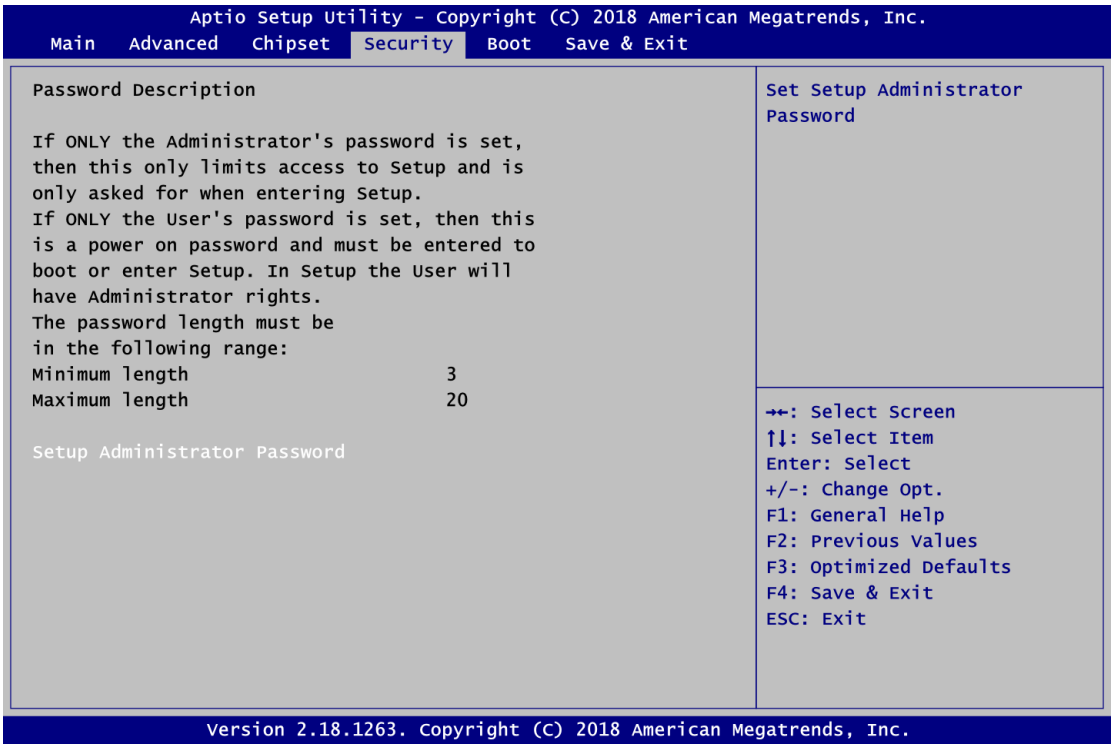
PCIe Speed
Control PCIe speed.



SCC eMMC Support (D28:F0)
Enable or disable eMMC support. The default setting is Enable.

4.6 Security Menu

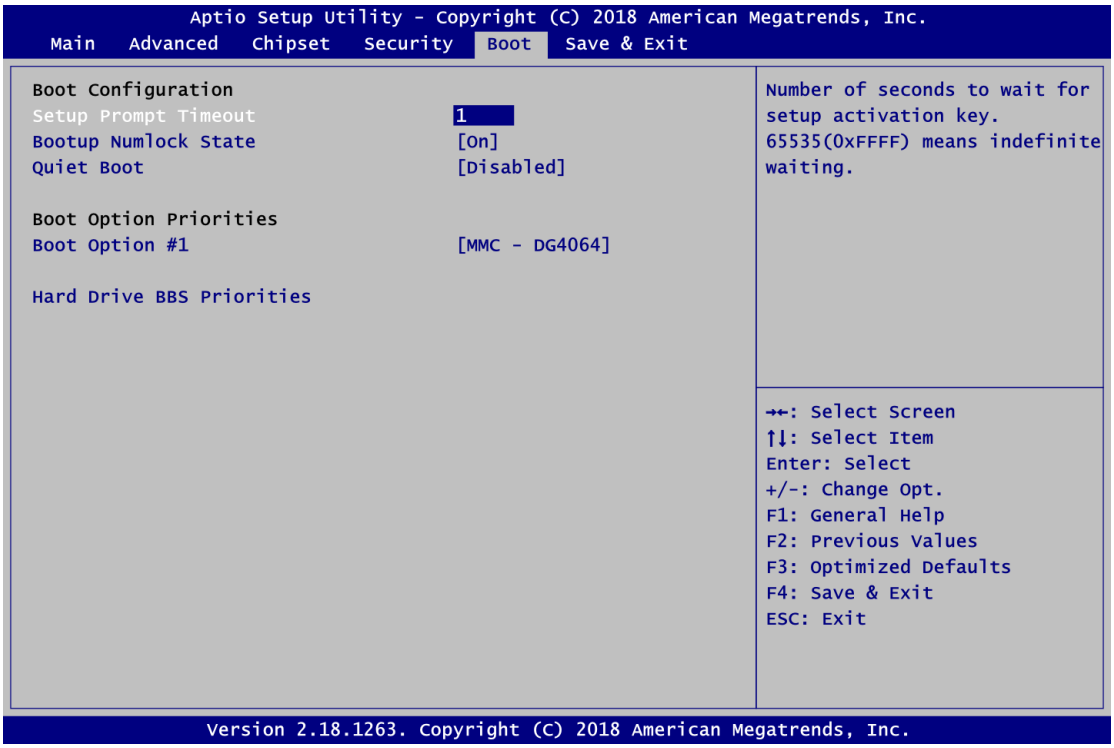
The Security menu allows users to change the security settings for the system.



- **Setup Administrator Password**
  Set setup administrator password.

4.7 Boot Menu

The Boot menu allows users to change boot options of the system.



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

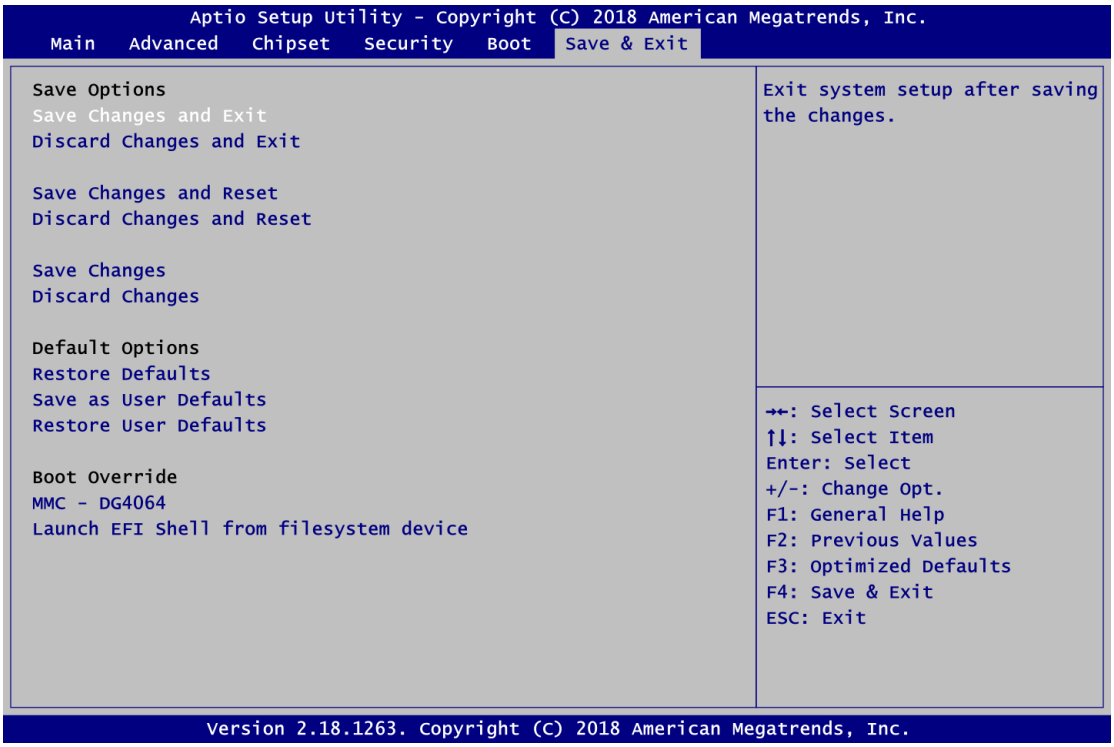
- **Bootup NumLock State**
  Use this item to select the power-on state for the keyboard NumLock.

- **Quiet Boot**
  Select to display either POST output messages or a splash screen during boot up.

- **Boot Option Priorities [Boot Option #1]**
  These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- **Save Changes and Exit**
  When you have completed the system configuration changes, select this option to leave Setup and continue to boot to operating system. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

- **Discard Changes and Exit**
  Select this option to quit Setup without making any permanent changes to the system configuration and continue to boot to operating system. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

- **Save Changes and Reset**
  When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

- **Discard Changes and Reset**
  Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

- **Save Changes**
  When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

- **Discard Changes**
  Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

- **Restore Defaults**
  It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

- **Save as User Defaults**
  Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

- **Restore User Defaults**
  It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

- **Boot Override**
  Select a drive to immediately boot that device regardless of the current boot order.

Appendix A
Watchdog Timer

A.1 About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

A.2 How to Use Watchdog Timer

Start
↓
Un-Lock WDT:
O 2E 87 ; Un-lock super I/O
O 2E 87 ; Un-lock super I/O
↓
Select Logic device:
O 2E 07
O 2F 08
↓
Enable WDT:
O 2E 30
O 2F 01
↓
Set Second or Minute:
O 2E F0
O 2F N ; N=00 or 08 (See *Note* below)
↓
WDT counting re-set timer:
O 2E F1
O 2F M ; M=00,01,02,…FF (See *Note* below)

;IF to disable WDT:
O 2E 30
O 2F 00 ; Can be disabled at any time

- Timeout Value Range
  - 1 to 255
  - Minute / Second

Note:

*If **N**=00h, the time base is set to second.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 second
02h: Time-out occurs after 2 seconds
03h: Time-out occurs after 3 seconds
.
.
FFh: Time-out occurs after 255 seconds

*If **N**=08h, the time base is set to minute.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 minute
02h: Time-out occurs after 2 minutes
03h: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes