



***AXIOMTEK***

## **CEM312/313**

**Intel® Atom™ E3950/E3940/E3930,  
Pentium N4200® and Celeron® N3350  
COM Express™ Type 6 Compact  
Module**

**User's Manual**



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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.

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# Chapter 1

## Introduction



The CEM312 is a new COM Express™ Type 6 Compact Module supporting Intel® Atom™ quad core x7-E3950, x5-E3940 and dual core x5-E3930. Meanwhile, CEM313 is a new COM Express™ Type 6 Compact Module supporting Intel® Pentium® quad core N4200 and Celeron® dual core N3350. Both of them deliver outstanding system performance and support excellent multiple I/Os like LVDS, one Gigabit Ethernet, HD Audio interface, two SATA-600, four USB 3.0 and eight USB 2.0 ports. For extension purpose, it provides maximum up to 4 lanes of PCI-Express Gen 2 at 5GT/s.

### 1.1 Features

- CEM312: Intel® Atom™ x7-E3950 and x5-E3940/E3930 processors
- CEM313: Intel® Pentium® N4200 and Celeron® N3350 processors
- Two 204-pin SO-DIMMs supporting up to 8GB memory capacity
- Support max. up to 4 lanes of PCI-Express
- 2 SATA-600
- 4 USB 3.0 and 8 USB 2.0 ports

## 1.2 Specifications

- **CPU**
  - CEM312
    - Intel® Atom™ quad core x7-E3950 1.60GHz.
    - Intel® Atom™ quad core x5-E3940 1.60GHz.
    - Intel® Atom™ dual core x5-E3930 1.30GHz.
  - CEM313
    - Intel® Pentium® quad core N4200 1.10GHz.
    - Intel® Celeron® dual core N3350 1.10GHz.
- **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**
  - Two 204-pin DDR3L 1866MHz SO-DIMM sockets support maximum memory capacity up to 8GB.
- **Expansion Interface**
  - Four PCI-Express x1 (three PCI-Express x1 while onboard LAN is connected) routed through COM Express™ A\_B connector.
- **USB Interface**
  - Four USB ports comply with USB Spec. Rev. 3.0.
  - Eight USB ports comply with USB Spec. Rev. 2.0.
- **SATA Interface**
  - Two SATA 6Gb/s ports supported through COM Express™ connector.
- **TPM**
  - Trusted Platform Module compatible with TPM1.2 Main and PC Client specification based on Intel LPC Bus Interface.
- **Graphics**
  - Integrated in processor HD graphics 505/500.
  - CRT interface supports up to 1920x1200 (optional).
  - 18/24-bit dual channel LVDS interface.
  - Two DDI interfaces support DVI/HDMI/DisplayPort.
- **Ethernet**
  - CEM312
    - One 1000/100/10 Base-T provided by Intel® I210IT with integrated boot ROM.
  - CEM313
    - One 1000/100/10 Base-T provided by Intel® I211AT with integrated boot ROM.
- **Audio**
  - Intel® High Definition Audio interface.
- **eMMC**
  - Support eMMC 5.0 onboard flash (Optional).



- **Power Management**
  - ACPI (Advanced Configuration and Power Interface).
- **Form Factor**
  - Compact module 95mm x 95mm.

### 1.3 Utilities Supported

- Chipset driver
- Graphics driver
- Ethernet utility and driver
- Trusted execution engine
- Sideband fabric device
- USB 3.0 driver



**Note**

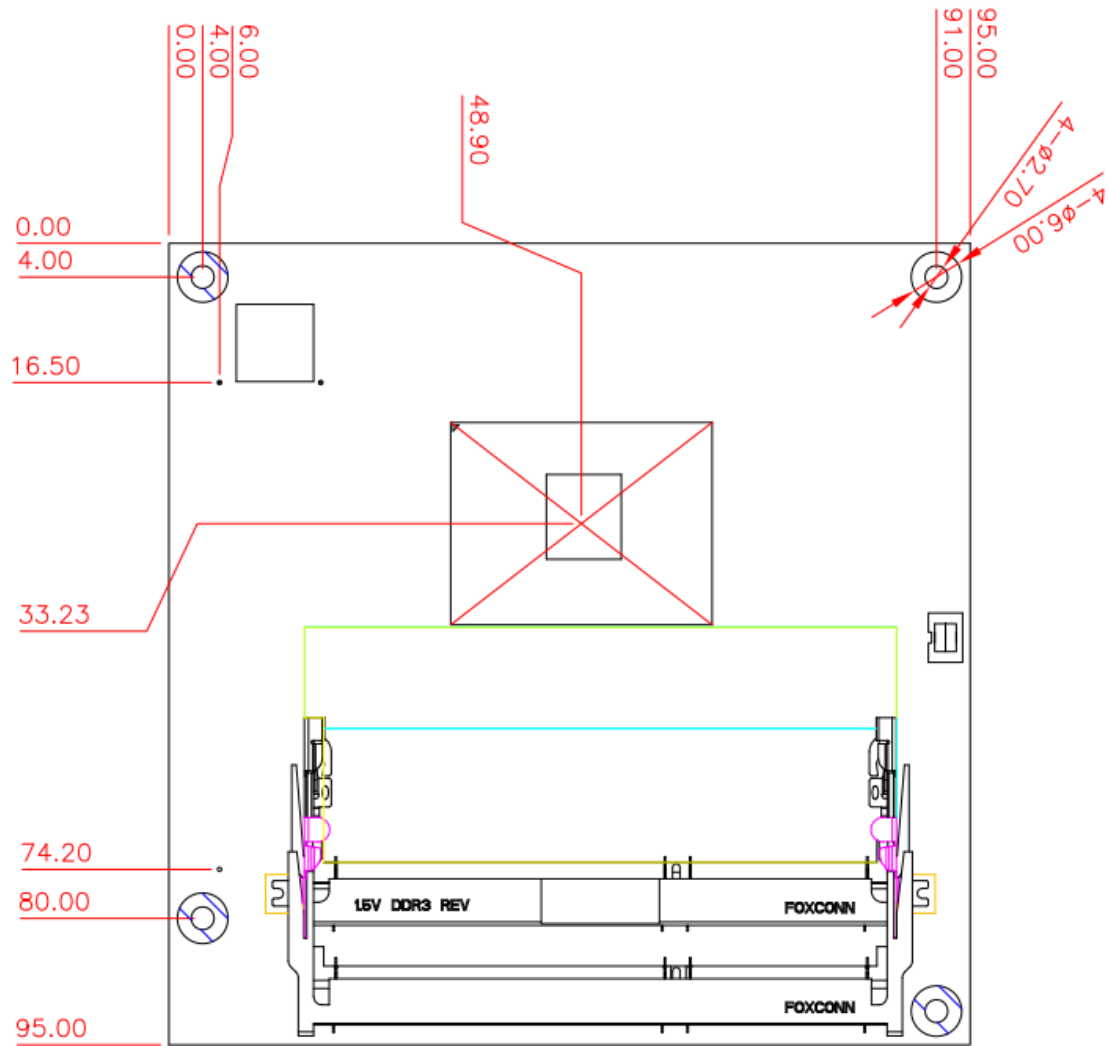
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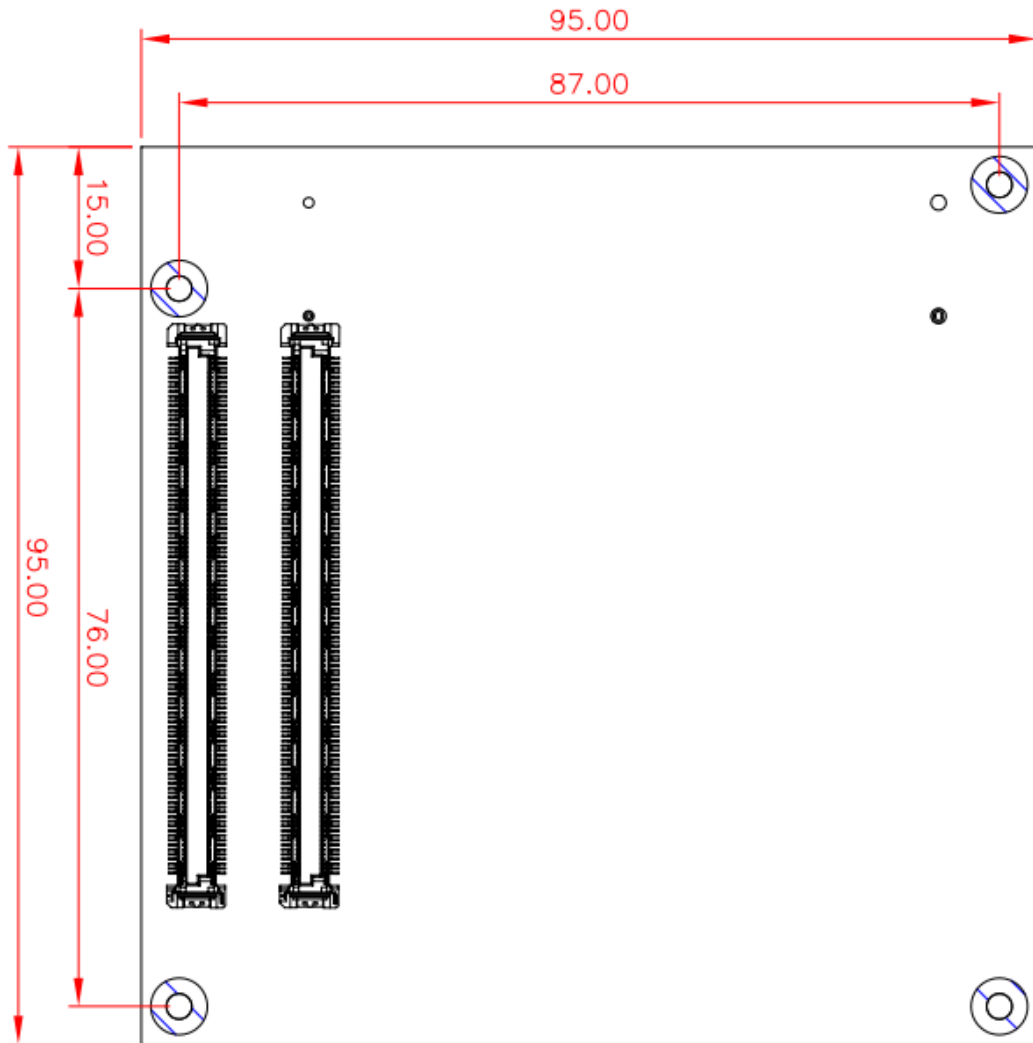
# Chapter 2

## Module and Pin Assignments

### 2.1 Module Dimensions and Fixing Holes

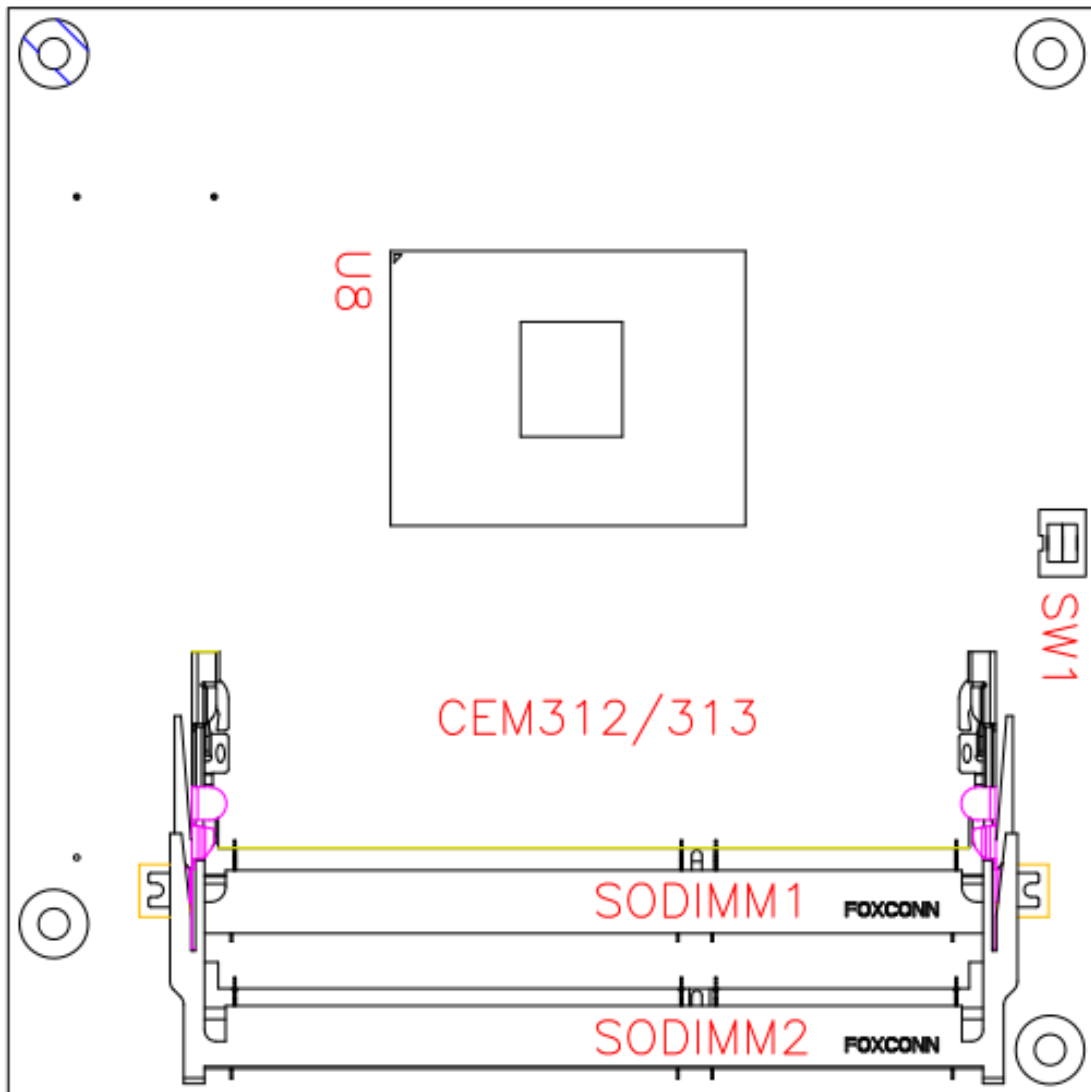


Top View

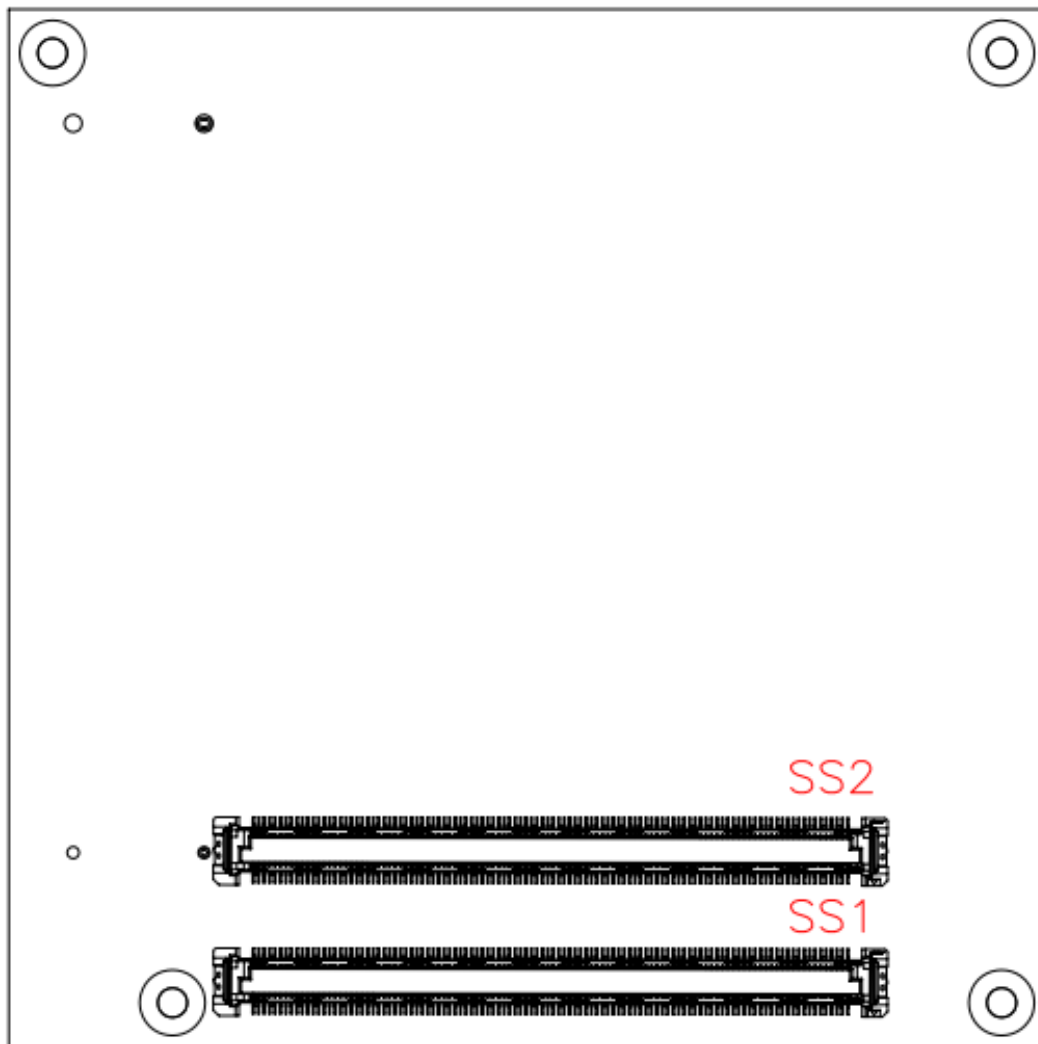


**Bottom View**

## 2.2 Module Layout



Top View

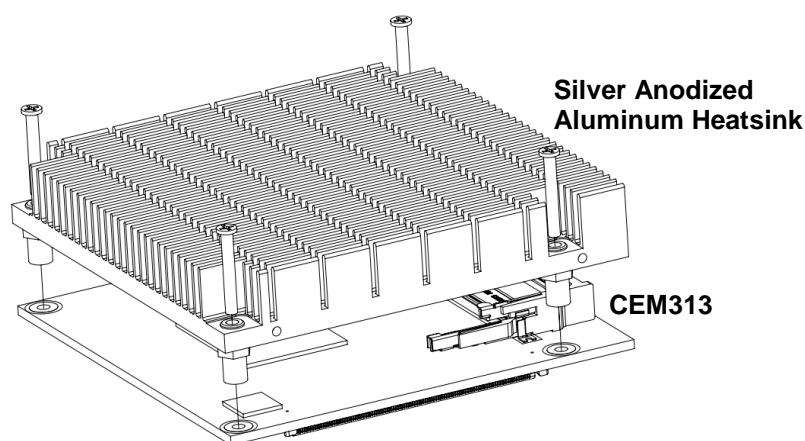
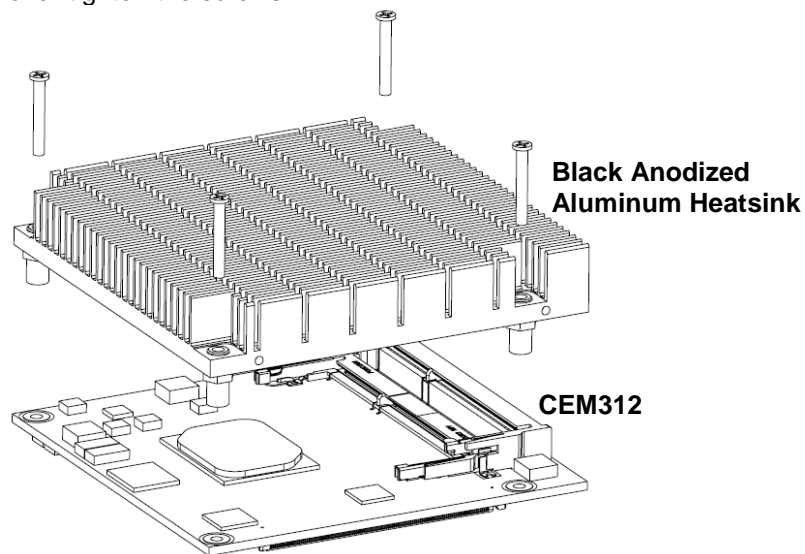


**Bottom View**

## 2.3 Installing Thermal Solution

For thermal dissipation, a thermal solution enables the CEM312/313's components to dissipate heat efficiently. All heat generating components are thermally conducted to the heatsink in order to avoid hot spots. Figure below illustrates how to install the thermal solution on CEM312/313.

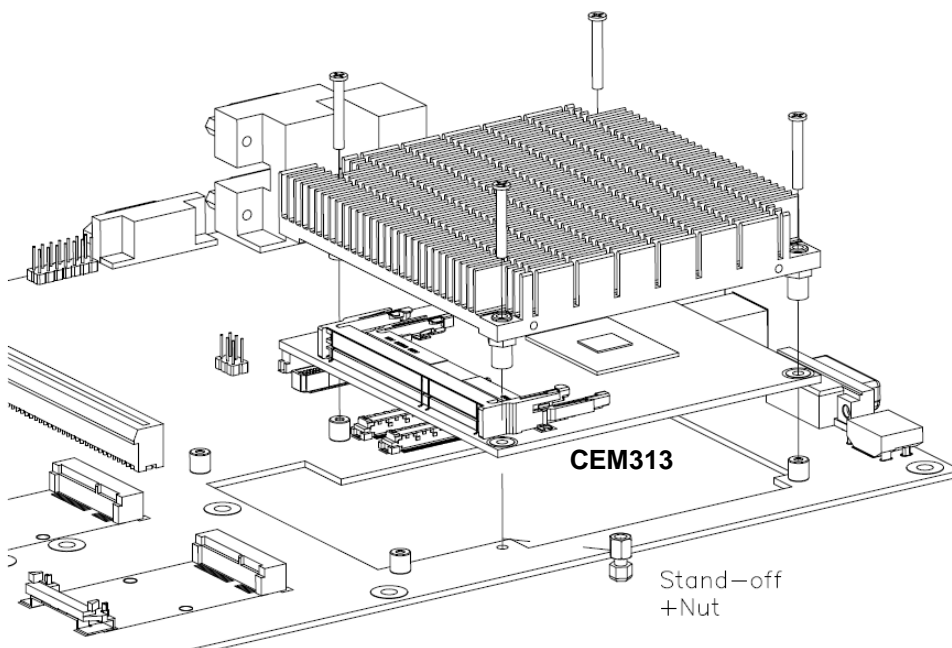
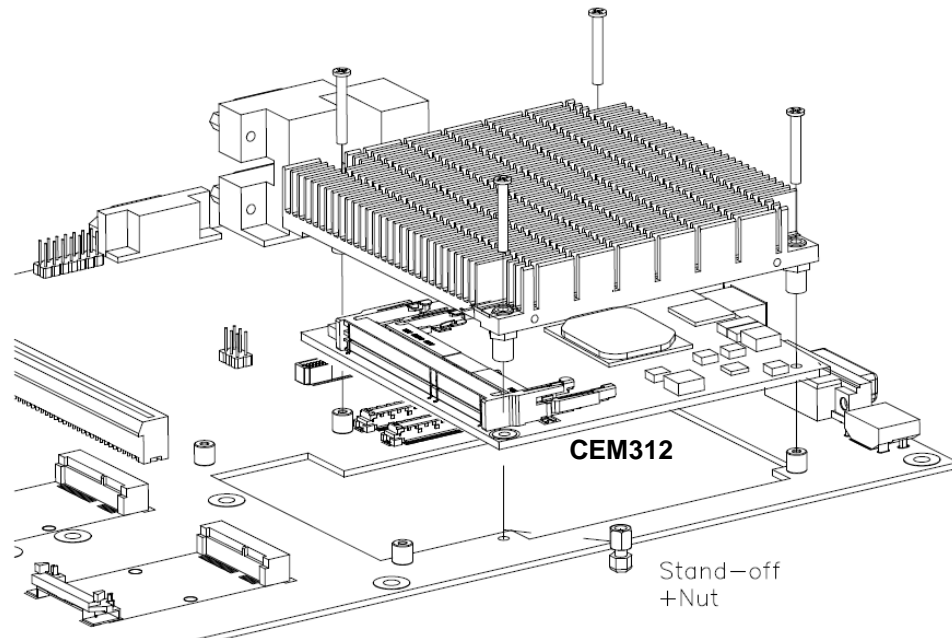
1. There is a protective plastic covering on the thermal pads. This must be removed before the heatsink can be mounted.
2. Each heatsink is designed for a specific CEM module. The thermal pads on the heatsink are designed to make contact with the necessary components on the CEM module. When mounting the heatsink you must make sure that the thermal pads on the heatsink make complete contact (no space between thermal pad and component) with the corresponding components on the CEM module. This is especially critical for CEM modules that have higher CPU speeds (for example 1.46GHz or more) to ensure that the heatsink acts as a proper thermal interface for cooling solutions.
3. Before installing the heatsink to the CPU module, please apply thermal grease on the CPU die. This CPU module has four assembly holes for installing heatsink plate. Use the four screws to secure the heatsink plate to the CEM312/313. Be careful not to over-tighten the screws.





Note

When installing CEM312/313 on CEB94006 or CEB94011, please add stand-off and secure with nut. Then, use the screws to secure heatsink plate to CEM312/313 as indicated in images below.





## 2.4 Switch Settings

Properly configure switch settings on the CEM312/313 to meet your application purpose. Below you can find a summary table of all switches and onboard default settings.



Note

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

Switch	Description	Setting
SW1	Auto Power On Default: Disable	SW1-1 OFF
	Restore BIOS Optimal Defaults Default: Normal Operation	SW1-2 OFF

### 2.4.1 Auto Power On and Restore BIOS Optimal Defaults (SW1)

If dip1 of SW1 (SW1-1) is set to ON position, the system will be automatically power on without pressing soft power button. If this switch is set to OFF position, it is necessary to manually press soft power button to power on the system.

The dip2 of SW1 (SW1-2) is for restoring BIOS default status. Flip SW1-2 to ON position for a few seconds then flip it back to OFF position. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Disable auto power on (Default)	SW1-1 OFF
Enable auto power on	SW1-1 ON
Normal operation (Default)	SW1-2 OFF
Restore BIOS optimal defaults	SW1-2 ON



## 2.5 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
SODIMM1	Channel 1 DDR3L SO-DIMM Socket
SODIMM2	Channel 0 DDR3L SO-DIMM Socket
SS1	COM Express™ Connector
SS2	COM Express™ Connector

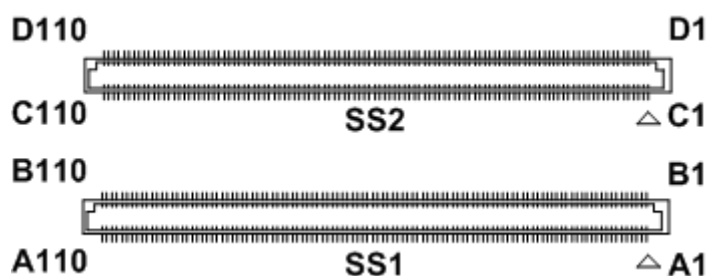


Note

- For single memory channel configuration, install memory module in channel 0 DDR3L SO-DIMM socket (SODIMM2).
- For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in channel 0 (SODIMM2) and channel 1 (SODIMM1) DDR3L SO-DIMM sockets.

### 2.5.1 COM Express™ Connectors (SS1 and SS2)

The following table shows pin assignments of the 220-pin COM Express™ connectors.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND (FIXED)	B1	GND (FIXED)	C1	GND (FIXED)	D1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#	C2	GND	D2	GND
A3	GBE0_MDI3+	B3	LPC_FRAME#	C3	USB_SSRX0-	D3	USB_SSTX0-
A4	GBE0_LINK100#	B4	LPC_AD0	C4	USB_SSRX0+	D4	USB_SSTX0+
A5	GBE0_LINK1000#	B5	LPC_AD1	C5	GND	D5	GND
A6	GBE0_MDI2-	B6	LPC_AD2	C6	USB_SSRX1-	D6	USB_SSTX1-
A7	GBE0_MDI2+	B7	LPC_AD3	C7	USB_SSRX1+	D7	USB_SSTX1+
A8	GBE0_LINK#	B8	N.C.	C8	GND	D8	GND
A9	GBE0_MDI1-	B9	N.C.	C9	USB_SSRX2-	D9	USB_SSTX2-
A10	GBE0_MDI1+	B10	LPC_CLK	C10	USB_SSRX2+	D10	USB_SSTX1+
A11	GND (FIXED)	B11	GND (FIXED)	C11	GND (FIXED)	D11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#	C12	USB_SSRX3-	D12	USB_SSTX3-
A13	GBE0_MDI0+	B13	SMB_CK	C13	USB_SSRX3+	D13	USB_SSTX3+
A14	GBE0_CTREF	B14	SMB_DAT	C14	GND	D14	GND
A15	SUS_S3#	B15	SMB_ALERT#	C15	N.C.	D15	DDI0_CTRLCLK_AUX+
A16	SATA0_TX+	B16	SATA1_TX+	C16	N.C.	D16	DDI0_CTRLDATA_AUX-
A17	SATA0_TX-	B17	SATA1_TX-	C17	N.C.	D17	N.C.
A18	SUS_S4#	B18	SUS_STAT#	C18	N.C.	D18	N.C.
A19	SATA0_RX+	B19	SATA1_RX+	C19	N.C.	D19	N.C.
A20	SATA0_RX-	B20	SATA1_RX-	C20	N.C.	D20	N.C.
A21	GND (FIXED)	B21	GND (FIXED)	C21	GND (FIXED)	D21	GND (FIXED)
A22	N.C.	B22	N.C.	C22	N.C.	D22	N.C.
A23	N.C.	B23	N.C.	C23	N.C.	D23	N.C.
A24	SUS_S5#	B24	PWR_OK	C24	DDI1_HPD	D24	N.C.
A25	N.C.	B25	N.C.	C25	N.C.	D25	N.C.
A26	N.C.	B26	N.C.	C26	N.C.	D26	DDI0_TX0_DP
A27	BATLOW#	B27	WDT	C27	N.C.	D27	DDI0_TX0_DN
A28	(S)ATA_ACT#	B28	N.C.	C28	N.C.	D28	N.C.
A29	AC/HDA_SYNC	B29	N.C.	C29	N.C.	D29	DDI0_TX1_DP
A30	AC/HDA_RST#	B30	AC/HDA_SDIN0	C30	N.C.	D30	DDI0_TX1_DN
A31	GND (FIXED)	B31	GND (FIXED)	C31	GND (FIXED)	D31	GND (FIXED)
A32	AC/HDA_BITCLK	B32	SPKR	C32	DDI1_CTRLCLK_AUXP	D32	DDI0_TX2_DP
A33	AC/HDA_SDOOUT	B33	N.C.	C33	DDI1_CTRLDAT_AUXN	D33	DDI0_TX2_DN
A34	BIOS_DISABLE#	B34	N.C.	C34	N.C.	D34	DDI0_SEL
A35	N.C.	B35	THRM#	C35	N.C.	D35	N.C.
A36	USB6-	B36	USB7-	C36	N.C.	D36	DDI0_TX3_DP
A37	USB6+	B37	USB7+	C37	N.C.	D37	DDI0_TX3_DN
A38	USB_6_7_OC#	B38	USB_4_5_OC#	C38	N.C.	D38	N.C.
A39	USB4-	B39	USB5-	C39	N.C.	D39	DDI1_TX0_DP
A40	USB4+	B40	USB5+	C40	N.C.	D40	DDI1_TX0_DN
A41	GND (FIXED)	B41	GND (FIXED)	C41	GND (FIXED)	D41	GND (FIXED)
A42	USB2-	B42	USB3-	C42	N.C.	D42	DDI1_TX1_DP
A43	USB2+	B43	USB3+	C43	N.C.	D43	DDI1_TX1_DN
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	N.C.	D44	DDI1_HPD_CB
A45	USB0-	B45	USB1-	C45	N.C.	D45	N.C.
A46	USB0+	B46	USB1+	C46	N.C.	D46	DDI1_TX2_DP
A47	VCC_RTC	B47	EXCD1_PERST#	C47	N.C.	D47	DDI1_TX2_DN
A48	N.C.	B48	EXCD1_CPPE#	C48	N.C.	D48	N.C.
A49	N.C.	B49	SYS_RESET#	C49	N.C.	D49	DDI1_TX3_DP
A50	LPC_SERIRQ	B50	CB_RESET#	C50	N.C.	D50	DDI1_TX3_DN
A51	GND (FIXED)	B51	GND (FIXED)	C51	GND (FIXED)	D51	GND (FIXED)
A52	N.C.	B52	N.C.	C52	N.C.	D52	N.C.
A53	N.C.	B53	N.C.	C53	N.C.	D53	N.C.
A54	GPI0	B54	GPO1	C54	N.C.	D54	N.C.
A55	N.C.	B55	N.C.	C55	N.C.	D55	N.C.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A56	N.C.	B56	N.C.	C56	N.C.	D56	N.C.
A57	GND	B57	GPO2	C57	N.C.	D57	TYPE2#
A58	PCIE_TX3+	B58	PCIE_RX3+	C58	N.C.	D58	N.C.
A59	PCIE_TX3-	B59	PCIE_RX3-	C59	N.C.	D59	N.C.
A60	GND (FIXED)	B60	GND (FIXED)	C60	GND (FIXED)	D60	GND (FIXED)
A61	PCIE_TX2+	B61	PCIE_RX2+	C61	N.C.	D61	N.C.
A62	PCIE_TX2-	B62	PCIE_RX2-	C62	N.C.	D62	N.C.
A63	GPI1	B63	GPO3	C63	N.C.	D63	N.C.
A64	PCIE_TX1+	B64	PCIE_RX1+	C64	N.C.	D64	N.C.
A65	PCIE_TX1-	B65	PCIE_RX1-	C65	N.C.	D65	N.C.
A66	GND	B66	WAKE0#	C66	N.C.	D66	N.C.
A67	GPI2	B67	WAKE1#	C67	N.C.	D67	GND
A68	PCIE_TX0+	B68	PCIE_RX0+	C68	N.C.	D68	N.C.
A69	PCIE_TX0-	B69	PCIE_RX0-	C69	N.C.	D69	N.C.
A70	GND(FIXED)	B70	GND(FIXED)	C70	GND(FIXED)	D70	GND(FIXED)
A71	LVDS_A0+	B71	LVDS_B0+	C71	N.C.	D71	N.C.
A72	LVDS_A0-	B72	LVDS_B0-	C72	N.C.	D72	N.C.
A73	LVDS_A1+	B73	LVDS_B1+	C73	GND	D73	GND
A74	LVDS_A1-	B74	LVDS_B1-	C74	N.C.	D74	N.C.
A75	LVDS_A2+	B75	LVDS_B2+	C75	N.C.	D75	N.C.
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	N.C.	D77	N.C.
A78	LVDS_A3+	B78	LVDS_B3-	C78	N.C.	D78	N.C.
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	N.C.	D79	N.C.
A80	GND(FIXED)	B80	GND(FIXED)	C80	GND(FIXED)	D80	GND(FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	N.C.	D81	N.C.
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	N.C.	D82	N.C.
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	C83	N.C.	D83	N.C.
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	GPI3	B85	VCC_5V_SBY	C85	N.C.	D85	N.C.
A86	N.C.	B86	VCC_5V_SBY	C86	N.C.	D86	N.C.
A87	N.C.	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE0_CK_REF+	B88	BIOS_DIS1	C88	N.C.	D88	N.C.
A89	PCIE0_CK_REF-	B89	VGA_RED	C89	N.C.	D89	N.C.
A90	GND (FIXED)	B90	GND (FIXED)	C90	GND (FIXED)	D90	GND (FIXED)
A91	SPI_POWER	B91	VGA_GRN	C91	N.C.	D91	N.C.
A92	SPI_MISO	B92	VGA_BLU	C92	N.C.	D92	N.C.
A93	GPO0	B93	VGA_HSYNC	C93	GND	D93	GND
A94	SPI_CLK	B94	VGA_VSYNC	C94	N.C.	D94	N.C.
A95	SPI_MOSI	B95	VGA_I2C_CK	C95	N.C.	D95	N.C.
A96	TPM_PP	B96	VGA_I2C_DAT	C96	GND	D96	GND
A97	N.C.	B97	SPI_CS#	C97	N.C.	D97	N.C.
A98	SER0_TX	B98	N.C.	C98	N.C.	D98	N.C.
A99	SER0_RX	B99	N.C.	C99	N.C.	D99	N.C.
A100	GND (FIXED)	B100	GND (FIXED)	C100	GND (FIXED)	D100	GND (FIXED)
A101	SER1_TX	B101	FAN_PWMOUT	C101	N.C.	D101	N.C.
A102	SER1_RX	B102	FAN_TACHIN	C102	N.C.	D102	N.C.
A103	LID#	B103	SLEEP#	C103	GND	D103	GND
A104	VCC_12V	B104	VCC_12V	C104	VCC_12V	D104	VCC_12V
A105	VCC_12V	B105	VCC_12V	C105	VCC_12V	D105	VCC_12V
A106	VCC_12V	B106	VCC_12V	C106	VCC_12V	D106	VCC_12V
A107	VCC_12V	B107	VCC_12V	C107	VCC_12V	D107	VCC_12V
A108	VCC_12V	B108	VCC_12V	C108	VCC_12V	D108	VCC_12V
A109	VCC_12V	B109	VCC_12V	C109	VCC_12V	D109	VCC_12V
A110	GND (FIXED)	B110	GND (FIXED)	C110	GND (FIXED)	D110	GND (FIXED)

# Chapter 3

## Hardware Description

### 3.1 Microprocessor

The CEM312/313 supports Intel® Atom™ x7-E3930, x5-E3940/E3950 and 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. You must install the thermal solution or cooler carefully and properly to prevent damage.

### 3.2 BIOS

The CEM312/313 uses AMI Plug and Play BIOS with a single 64Mbit SPI Flash.

### 3.3 System Memory

The CEM312/313 supports two 204-pin DDR3L SO-DIMM sockets for maximum memory capacity up to 8GB DDR3L SDRAMs. The memory module comes in sizes of 1GB, 2GB, 4GB, or 8GB.

### 3.4 I/O Port Address Map



















































The Intel® Pentium®/Celeron® N4200/N3350 and Atom™ E3930/E3940/E3950 processors communicate via I/O ports. The I/O port addresses are available for assigning to other devices via I/O expansion cards.



















































The I/O port addresses (with CEB94006 baseboard under Windows® 10) are as follows:

- Input/output (IO)
      - [0000000000000000 - 000000000000006F] PCI Express Root Complex
          - [0000000000000020 - 0000000000000021] Programmable interrupt controller
          - [0000000000000024 - 0000000000000025] Programmable interrupt controller
          - [0000000000000028 - 0000000000000029] Programmable interrupt controller
          - [000000000000002C - 000000000000002D] Programmable interrupt controller
          - [000000000000002E - 000000000000002F] Motherboard resources
          - [0000000000000030 - 0000000000000031] Programmable interrupt controller
          - [0000000000000034 - 0000000000000035] Programmable interrupt controller
          - [0000000000000038 - 0000000000000039] Programmable interrupt controller
          - [000000000000003C - 000000000000003D] Programmable interrupt controller
          - [0000000000000040 - 0000000000000043] System timer
          - [000000000000004E - 000000000000004F] Motherboard resources
          - [0000000000000050 - 0000000000000053] System timer
          - [0000000000000061 - 0000000000000061] Motherboard resources
          - [0000000000000063 - 0000000000000063] Motherboard resources
          - [0000000000000065 - 0000000000000065] Motherboard resources
          - [0000000000000067 - 0000000000000067] Motherboard resources
        - [0000000000000070 - 0000000000000077] System CMOS/real time clock
          - [0000000000000070 - 0000000000000070] Motherboard resources
        - [0000000000000078 - 00000000000000CF7] PCI Express Root Complex
            - [0000000000000080 - 000000000000008F] Motherboard resources
            - [0000000000000092 - 0000000000000092] Motherboard resources
            - [00000000000000A0 - 00000000000000A1] Programmable interrupt controller
            - [00000000000000A0 - 00000000000000A1] Programmable interrupt controller
            - [00000000000000A4 - 00000000000000A5] Programmable interrupt controller
            - [00000000000000A8 - 00000000000000A9] Programmable interrupt controller
            - [00000000000000AC - 00000000000000AD] Programmable interrupt controller
            - [00000000000000B0 - 00000000000000B1] Programmable interrupt controller
            - [00000000000000B2 - 00000000000000B3] Motherboard resources
            - [00000000000000B4 - 00000000000000B5] Programmable interrupt controller
            - [00000000000000B8 - 00000000000000B9] Programmable interrupt controller
            - [00000000000000BC - 00000000000000BD] Programmable interrupt controller
            - [0000000000000248 - 000000000000024F] Communications Port (COM1)
            - [0000000000000258 - 000000000000025F] Communications Port (COM2)
            - [00000000000003B0 - 00000000000003BB] Intel(R) HD Graphics
            - [00000000000003C0 - 00000000000003DF] Intel(R) HD Graphics
            - [0000000000000400 - 000000000000047F] Motherboard resources
            - [00000000000004D0 - 00000000000004D1] Programmable interrupt controller
            - [0000000000000500 - 00000000000005FE] Motherboard resources
            - [0000000000000600 - 000000000000061F] Motherboard resources
            - [0000000000000680 - 000000000000069F] Motherboard resources
        - [0000000000000D00 - 000000000000FFFF] PCI Express Root Complex
          - [000000000000164E - 000000000000164F] Motherboard resources
        - [000000000000E000 - 000000000000EFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB
            - [000000000000E000 - 000000000000EFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB
        - [000000000000F000 - 000000000000F03F] Intel(R) HD Graphics
            - [000000000000F000 - 000000000000F03F] Intel(R) HD Graphics
            - [000000000000F040 - 000000000000F05F] Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
            - [000000000000F060 - 000000000000F07F] Standard SATA AHCI Controller
            - [000000000000F080 - 000000000000F083] Standard SATA AHCI Controller
            - [000000000000F090 - 000000000000F097] Standard SATA AHCI Controller

### 3.5 Interrupt Controller (IRQ) Map



















































The interrupt controller (IRQ) mapping list (with CEB94006 baseboard under Windows® 10) is shown as follows:



















































▼		Interrupt request (IRQ)
		(ISA) 0x00000000 (00) System timer
		(ISA) 0x00000006 (06) <b>Communications Port (COM2)</b>
		(ISA) 0x00000007 (07) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADA
		(ISA) 0x00000007 (07) <b>Communications Port (COM1)</b>
		(ISA) 0x00000008 (08) High precision event timer
		(ISA) 0x00000009 (09) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB
		(ISA) 0x0000000A (10) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD6
		(ISA) 0x0000000B (11) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD7
		(ISA) 0x0000000B (11) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
		(ISA) 0x0000000B (11) Intel(R) HD Graphics
		(ISA) 0x0000000E (14) Intel(R) Serial IO GPIO Host Controller - INT3452
		(ISA) 0x0000000E (14) Intel(R) Serial IO GPIO Host Controller - INT3452
		(ISA) 0x0000000E (14) Intel(R) Serial IO GPIO Host Controller - INT3452
		(ISA) 0x0000000E (14) Intel(R) Serial IO GPIO Host Controller - INT3452
		(ISA) 0x00000036 (54) Microsoft ACPI-Compliant System
		(ISA) 0x00000037 (55) Microsoft ACPI-Compliant System
		(ISA) 0x00000038 (56) Microsoft ACPI-Compliant System
		(ISA) 0x00000039 (57) Microsoft ACPI-Compliant System
		(ISA) 0x0000003A (58) Microsoft ACPI-Compliant System
		(ISA) 0x0000003B (59) Microsoft ACPI-Compliant System
		(ISA) 0x0000003C (60) Microsoft ACPI-Compliant System
		(ISA) 0x0000003D (61) Microsoft ACPI-Compliant System
		(ISA) 0x0000003E (62) Microsoft ACPI-Compliant System
		(ISA) 0x0000003F (63) Microsoft ACPI-Compliant System
		(ISA) 0x00000040 (64) Microsoft ACPI-Compliant System
		(ISA) 0x00000041 (65) Microsoft ACPI-Compliant System
		(ISA) 0x00000042 (66) Microsoft ACPI-Compliant System
		(ISA) 0x00000043 (67) Microsoft ACPI-Compliant System
		(ISA) 0x00000044 (68) Microsoft ACPI-Compliant System
		(ISA) 0x00000045 (69) Microsoft ACPI-Compliant System
		(ISA) 0x00000046 (70) Microsoft ACPI-Compliant System
		(ISA) 0x00000047 (71) Microsoft ACPI-Compliant System
		(ISA) 0x00000048 (72) Microsoft ACPI-Compliant System
		(ISA) 0x00000049 (73) Microsoft ACPI-Compliant System
		(ISA) 0x0000004A (74) Microsoft ACPI-Compliant System
		(ISA) 0x0000004B (75) Microsoft ACPI-Compliant System
		(ISA) 0x0000004C (76) Microsoft ACPI-Compliant System
		(ISA) 0x0000004D (77) Microsoft ACPI-Compliant System
		(ISA) 0x0000004E (78) Microsoft ACPI-Compliant System
		(ISA) 0x0000004F (79) Microsoft ACPI-Compliant System
		(ISA) 0x00000050 (80) Microsoft ACPI-Compliant System
		(ISA) 0x00000051 (81) Microsoft ACPI-Compliant System
		(ISA) 0x00000052 (82) Microsoft ACPI-Compliant System
		(ISA) 0x00000053 (83) Microsoft ACPI-Compliant System
		(ISA) 0x00000054 (84) Microsoft ACPI-Compliant System
		(ISA) 0x00000055 (85) Microsoft ACPI-Compliant System
		(ISA) 0x00000056 (86) Microsoft ACPI-Compliant System
		(ISA) 0x00000057 (87) Microsoft ACPI-Compliant System
		(ISA) 0x00000058 (88) Microsoft ACPI-Compliant System

 (ISA) 0x00000059 (89)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005A (90)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005B (91)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005C (92)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005D (93)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005E (94)	Microsoft ACPI-Compliant System
 (ISA) 0x0000005F (95)	Microsoft ACPI-Compliant System
 (ISA) 0x00000060 (96)	Microsoft ACPI-Compliant System
 (ISA) 0x00000061 (97)	Microsoft ACPI-Compliant System
 (ISA) 0x00000062 (98)	Microsoft ACPI-Compliant System
 (ISA) 0x00000063 (99)	Microsoft ACPI-Compliant System
 (ISA) 0x00000064 (100)	Microsoft ACPI-Compliant System
 (ISA) 0x00000065 (101)	Microsoft ACPI-Compliant System
 (ISA) 0x00000066 (102)	Microsoft ACPI-Compliant System
 (ISA) 0x00000067 (103)	Microsoft ACPI-Compliant System
 (ISA) 0x00000068 (104)	Microsoft ACPI-Compliant System
 (ISA) 0x00000069 (105)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006A (106)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006B (107)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006C (108)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006D (109)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006E (110)	Microsoft ACPI-Compliant System
 (ISA) 0x0000006F (111)	Microsoft ACPI-Compliant System
 (ISA) 0x00000070 (112)	Microsoft ACPI-Compliant System
 (ISA) 0x00000071 (113)	Microsoft ACPI-Compliant System
 (ISA) 0x00000072 (114)	Microsoft ACPI-Compliant System
 (ISA) 0x00000073 (115)	Microsoft ACPI-Compliant System
 (ISA) 0x00000074 (116)	Microsoft ACPI-Compliant System
 (ISA) 0x00000075 (117)	Microsoft ACPI-Compliant System
 (ISA) 0x00000076 (118)	Microsoft ACPI-Compliant System
 (ISA) 0x00000077 (119)	Microsoft ACPI-Compliant System
 (ISA) 0x00000078 (120)	Microsoft ACPI-Compliant System
 (ISA) 0x00000079 (121)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007A (122)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007B (123)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007C (124)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007D (125)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007E (126)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007F (127)	Microsoft ACPI-Compliant System
 (ISA) 0x00000080 (128)	Microsoft ACPI-Compliant System
 (ISA) 0x00000081 (129)	Microsoft ACPI-Compliant System
 (ISA) 0x00000082 (130)	Microsoft ACPI-Compliant System
 (ISA) 0x00000083 (131)	Microsoft ACPI-Compliant System
 (ISA) 0x00000084 (132)	Microsoft ACPI-Compliant System
 (ISA) 0x00000085 (133)	Microsoft ACPI-Compliant System
 (ISA) 0x00000086 (134)	Microsoft ACPI-Compliant System
 (ISA) 0x00000087 (135)	Microsoft ACPI-Compliant System
 (ISA) 0x00000088 (136)	Microsoft ACPI-Compliant System
 (ISA) 0x00000089 (137)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008A (138)	Microsoft ACPI-Compliant System






































































































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 (ISA) 0x0000008B (139)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008C (140)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008D (141)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008E (142)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008F (143)	Microsoft ACPI-Compliant System
 (ISA) 0x00000090 (144)	Microsoft ACPI-Compliant System
 (ISA) 0x00000091 (145)	Microsoft ACPI-Compliant System
 (ISA) 0x00000092 (146)	Microsoft ACPI-Compliant System
 (ISA) 0x00000093 (147)	Microsoft ACPI-Compliant System
 (ISA) 0x00000094 (148)	Microsoft ACPI-Compliant System
 (ISA) 0x00000095 (149)	Microsoft ACPI-Compliant System
 (ISA) 0x00000096 (150)	Microsoft ACPI-Compliant System
 (ISA) 0x00000097 (151)	Microsoft ACPI-Compliant System
 (ISA) 0x00000098 (152)	Microsoft ACPI-Compliant System
 (ISA) 0x00000099 (153)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009A (154)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009B (155)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009C (156)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009D (157)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009E (158)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009F (159)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A0 (160)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A1 (161)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A2 (162)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A3 (163)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A4 (164)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A5 (165)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A6 (166)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A7 (167)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A8 (168)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A9 (169)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AA (170)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AB (171)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AC (172)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AD (173)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AE (174)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AF (175)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B0 (176)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B1 (177)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B2 (178)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B3 (179)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B4 (180)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B5 (181)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B6 (182)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B7 (183)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B8 (184)	Microsoft ACPI-Compliant System
 (ISA) 0x000000B9 (185)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BA (186)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BB (187)	Microsoft ACPI-Compliant System
 (ISA) 0x000000BC (188)	Microsoft ACPI-Compliant System



















































 (ISA) 0x00000BD (189)	Microsoft ACPI-Compliant System
 (ISA) 0x00000BE (190)	Microsoft ACPI-Compliant System
 (ISA) 0x00000BF (191)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C0 (192)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C1 (193)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C2 (194)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C3 (195)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C4 (196)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C5 (197)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C6 (198)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C7 (199)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C8 (200)	Microsoft ACPI-Compliant System
 (ISA) 0x00000C9 (201)	Microsoft ACPI-Compliant System
 (ISA) 0x00000CA (202)	Microsoft ACPI-Compliant System
 (ISA) 0x00000CB (203)	Microsoft ACPI-Compliant System
 (ISA) 0x00000CC (204)	Microsoft ACPI-Compliant System
 (ISA) 0x0000100 (256)	Microsoft ACPI-Compliant System
 (ISA) 0x0000101 (257)	Microsoft ACPI-Compliant System
 (ISA) 0x0000102 (258)	Microsoft ACPI-Compliant System
 (ISA) 0x0000103 (259)	Microsoft ACPI-Compliant System
 (ISA) 0x0000104 (260)	Microsoft ACPI-Compliant System
 (ISA) 0x0000105 (261)	Microsoft ACPI-Compliant System
 (ISA) 0x0000106 (262)	Microsoft ACPI-Compliant System
 (ISA) 0x0000107 (263)	Microsoft ACPI-Compliant System
 (ISA) 0x0000108 (264)	Microsoft ACPI-Compliant System
 (ISA) 0x0000109 (265)	Microsoft ACPI-Compliant System
 (ISA) 0x000010A (266)	Microsoft ACPI-Compliant System
 (ISA) 0x000010B (267)	Microsoft ACPI-Compliant System
 (ISA) 0x000010C (268)	Microsoft ACPI-Compliant System
 (ISA) 0x000010D (269)	Microsoft ACPI-Compliant System
 (ISA) 0x000010E (270)	Microsoft ACPI-Compliant System
 (ISA) 0x000010F (271)	Microsoft ACPI-Compliant System
 (ISA) 0x0000110 (272)	Microsoft ACPI-Compliant System
 (ISA) 0x0000111 (273)	Microsoft ACPI-Compliant System
 (ISA) 0x0000112 (274)	Microsoft ACPI-Compliant System
 (ISA) 0x0000113 (275)	Microsoft ACPI-Compliant System
 (ISA) 0x0000114 (276)	Microsoft ACPI-Compliant System
 (ISA) 0x0000115 (277)	Microsoft ACPI-Compliant System
 (ISA) 0x0000116 (278)	Microsoft ACPI-Compliant System
 (ISA) 0x0000117 (279)	Microsoft ACPI-Compliant System
 (ISA) 0x0000118 (280)	Microsoft ACPI-Compliant System
 (ISA) 0x0000119 (281)	Microsoft ACPI-Compliant System
 (ISA) 0x000011A (282)	Microsoft ACPI-Compliant System
 (ISA) 0x000011B (283)	Microsoft ACPI-Compliant System
 (ISA) 0x000011C (284)	Microsoft ACPI-Compliant System
 (ISA) 0x000011D (285)	Microsoft ACPI-Compliant System
 (ISA) 0x000011E (286)	Microsoft ACPI-Compliant System
 (ISA) 0x000011F (287)	Microsoft ACPI-Compliant System
 (ISA) 0x0000120 (288)	Microsoft ACPI-Compliant System
 (ISA) 0x0000121 (289)	Microsoft ACPI-Compliant System



















































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 (ISA) 0x00000122 (290)	Microsoft ACPI-Compliant System
 (ISA) 0x00000123 (291)	Microsoft ACPI-Compliant System
 (ISA) 0x00000124 (292)	Microsoft ACPI-Compliant System
 (ISA) 0x00000125 (293)	Microsoft ACPI-Compliant System
 (ISA) 0x00000126 (294)	Microsoft ACPI-Compliant System
 (ISA) 0x00000127 (295)	Microsoft ACPI-Compliant System
 (ISA) 0x00000128 (296)	Microsoft ACPI-Compliant System
 (ISA) 0x00000129 (297)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012A (298)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012B (299)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012C (300)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012D (301)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012E (302)	Microsoft ACPI-Compliant System
 (ISA) 0x0000012F (303)	Microsoft ACPI-Compliant System
 (ISA) 0x00000130 (304)	Microsoft ACPI-Compliant System
 (ISA) 0x00000131 (305)	Microsoft ACPI-Compliant System
 (ISA) 0x00000132 (306)	Microsoft ACPI-Compliant System
 (ISA) 0x00000133 (307)	Microsoft ACPI-Compliant System
 (ISA) 0x00000134 (308)	Microsoft ACPI-Compliant System
 (ISA) 0x00000135 (309)	Microsoft ACPI-Compliant System
 (ISA) 0x00000136 (310)	Microsoft ACPI-Compliant System
 (ISA) 0x00000137 (311)	Microsoft ACPI-Compliant System
 (ISA) 0x00000138 (312)	Microsoft ACPI-Compliant System
 (ISA) 0x00000139 (313)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013A (314)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013B (315)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013C (316)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013D (317)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013E (318)	Microsoft ACPI-Compliant System
 (ISA) 0x0000013F (319)	Microsoft ACPI-Compliant System
 (ISA) 0x00000140 (320)	Microsoft ACPI-Compliant System
 (ISA) 0x00000141 (321)	Microsoft ACPI-Compliant System
 (ISA) 0x00000142 (322)	Microsoft ACPI-Compliant System
 (ISA) 0x00000143 (323)	Microsoft ACPI-Compliant System
 (ISA) 0x00000144 (324)	Microsoft ACPI-Compliant System
 (ISA) 0x00000145 (325)	Microsoft ACPI-Compliant System
 (ISA) 0x00000146 (326)	Microsoft ACPI-Compliant System
 (ISA) 0x00000147 (327)	Microsoft ACPI-Compliant System
 (ISA) 0x00000148 (328)	Microsoft ACPI-Compliant System
 (ISA) 0x00000149 (329)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014A (330)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014B (331)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014C (332)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014D (333)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014E (334)	Microsoft ACPI-Compliant System
 (ISA) 0x0000014F (335)	Microsoft ACPI-Compliant System
 (ISA) 0x00000150 (336)	Microsoft ACPI-Compliant System
 (ISA) 0x00000151 (337)	Microsoft ACPI-Compliant System
 (ISA) 0x00000152 (338)	Microsoft ACPI-Compliant System

 (ISA) 0x00000153 (339)	Microsoft ACPI-Compliant System
 (ISA) 0x00000154 (340)	Microsoft ACPI-Compliant System
 (ISA) 0x00000155 (341)	Microsoft ACPI-Compliant System
 (ISA) 0x00000156 (342)	Microsoft ACPI-Compliant System
 (ISA) 0x00000157 (343)	Microsoft ACPI-Compliant System
 (ISA) 0x00000158 (344)	Microsoft ACPI-Compliant System
 (ISA) 0x00000159 (345)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015A (346)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015B (347)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015C (348)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015D (349)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015E (350)	Microsoft ACPI-Compliant System
 (ISA) 0x0000015F (351)	Microsoft ACPI-Compliant System
 (ISA) 0x00000160 (352)	Microsoft ACPI-Compliant System
 (ISA) 0x00000161 (353)	Microsoft ACPI-Compliant System
 (ISA) 0x00000162 (354)	Microsoft ACPI-Compliant System
 (ISA) 0x00000163 (355)	Microsoft ACPI-Compliant System
 (ISA) 0x00000164 (356)	Microsoft ACPI-Compliant System
 (ISA) 0x00000165 (357)	Microsoft ACPI-Compliant System
 (ISA) 0x00000166 (358)	Microsoft ACPI-Compliant System
 (ISA) 0x00000167 (359)	Microsoft ACPI-Compliant System
 (ISA) 0x00000168 (360)	Microsoft ACPI-Compliant System
 (ISA) 0x00000169 (361)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016A (362)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016B (363)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016C (364)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016D (365)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016E (366)	Microsoft ACPI-Compliant System
 (ISA) 0x0000016F (367)	Microsoft ACPI-Compliant System
 (ISA) 0x00000170 (368)	Microsoft ACPI-Compliant System
 (ISA) 0x00000171 (369)	Microsoft ACPI-Compliant System
 (ISA) 0x00000172 (370)	Microsoft ACPI-Compliant System
 (ISA) 0x00000173 (371)	Microsoft ACPI-Compliant System
 (ISA) 0x00000174 (372)	Microsoft ACPI-Compliant System
 (ISA) 0x00000175 (373)	Microsoft ACPI-Compliant System
 (ISA) 0x00000176 (374)	Microsoft ACPI-Compliant System
 (ISA) 0x00000177 (375)	Microsoft ACPI-Compliant System
 (ISA) 0x00000178 (376)	Microsoft ACPI-Compliant System
 (ISA) 0x00000179 (377)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017A (378)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017B (379)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017C (380)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017D (381)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017E (382)	Microsoft ACPI-Compliant System
 (ISA) 0x0000017F (383)	Microsoft ACPI-Compliant System
 (ISA) 0x00000180 (384)	Microsoft ACPI-Compliant System
 (ISA) 0x00000181 (385)	Microsoft ACPI-Compliant System
 (ISA) 0x00000182 (386)	Microsoft ACPI-Compliant System
 (ISA) 0x00000183 (387)	Microsoft ACPI-Compliant System
 (ISA) 0x00000184 (388)	Microsoft ACPI-Compliant System

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	(ISA) 0x00000185 (389)	Microsoft ACPI-Compliant System
	(ISA) 0x00000186 (390)	Microsoft ACPI-Compliant System
	(ISA) 0x00000187 (391)	Microsoft ACPI-Compliant System
	(ISA) 0x00000188 (392)	Microsoft ACPI-Compliant System
	(ISA) 0x00000189 (393)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018A (394)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018B (395)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018C (396)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018D (397)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018E (398)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018F (399)	Microsoft ACPI-Compliant System
	(ISA) 0x00000190 (400)	Microsoft ACPI-Compliant System
	(ISA) 0x00000191 (401)	Microsoft ACPI-Compliant System
	(ISA) 0x00000192 (402)	Microsoft ACPI-Compliant System
	(ISA) 0x00000193 (403)	Microsoft ACPI-Compliant System
	(ISA) 0x00000194 (404)	Microsoft ACPI-Compliant System
	(ISA) 0x00000195 (405)	Microsoft ACPI-Compliant System
	(ISA) 0x00000196 (406)	Microsoft ACPI-Compliant System
	(ISA) 0x00000197 (407)	Microsoft ACPI-Compliant System
	(ISA) 0x00000198 (408)	Microsoft ACPI-Compliant System
	(ISA) 0x00000199 (409)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019A (410)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019B (411)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019C (412)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019D (413)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019F (415)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A0 (416)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A1 (417)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A2 (418)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A3 (419)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A4 (420)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A5 (421)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A6 (422)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A7 (423)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A8 (424)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A9 (425)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AA (426)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AB (427)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AC (428)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AD (429)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AE (430)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AF (431)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B0 (432)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B1 (433)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B2 (434)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B3 (435)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B4 (436)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B5 (437)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B6 (438)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B7 (439)	Microsoft ACPI-Compliant System

-  (ISA) 0x000001B8 (440) Microsoft ACPI-Compliant System
-  (ISA) 0x000001B9 (441) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BA (442) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BB (443) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BC (444) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BD (445) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BE (446) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BF (447) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C0 (448) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C1 (449) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C2 (450) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C3 (451) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C4 (452) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C5 (453) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C6 (454) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C7 (455) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C8 (456) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C9 (457) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CA (458) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CB (459) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CC (460) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CD (461) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CE (462) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CF (463) Microsoft ACPI-Compliant System
-  (ISA) 0x000001D0 (464) Microsoft ACPI-Compliant System
-  (ISA) 0x000001B8 (440) Microsoft ACPI-Compliant System
-  (ISA) 0x000001B9 (441) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BA (442) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BB (443) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BC (444) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BD (445) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BE (446) Microsoft ACPI-Compliant System
-  (ISA) 0x000001BF (447) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C0 (448) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C1 (449) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C2 (450) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C3 (451) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C4 (452) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C5 (453) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C6 (454) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C7 (455) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C8 (456) Microsoft ACPI-Compliant System
-  (ISA) 0x000001C9 (457) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CA (458) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CB (459) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CC (460) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CD (461) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CE (462) Microsoft ACPI-Compliant System
-  (ISA) 0x000001CF (463) Microsoft ACPI-Compliant System
-  (ISA) 0x000001D0 (464) Microsoft ACPI-Compliant System

 (ISA) 0x000001D1 (465)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D2 (466)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D3 (467)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D4 (468)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D5 (469)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D6 (470)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D7 (471)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D8 (472)	Microsoft ACPI-Compliant System
 (ISA) 0x000001D9 (473)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DA (474)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DB (475)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DC (476)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DD (477)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DE (478)	Microsoft ACPI-Compliant System
 (ISA) 0x000001DF (479)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E0 (480)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E1 (481)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E2 (482)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E3 (483)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E4 (484)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E5 (485)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E6 (486)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E7 (487)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E8 (488)	Microsoft ACPI-Compliant System
 (ISA) 0x000001E9 (489)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EA (490)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EB (491)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EC (492)	Microsoft ACPI-Compliant System
 (ISA) 0x000001ED (493)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EE (494)	Microsoft ACPI-Compliant System
 (ISA) 0x000001EF (495)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F0 (496)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F1 (497)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F2 (498)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F3 (499)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F4 (500)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F5 (501)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F6 (502)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F7 (503)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F8 (504)	Microsoft ACPI-Compliant System
 (ISA) 0x000001F9 (505)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FA (506)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FB (507)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FC (508)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FD (509)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FE (510)	Microsoft ACPI-Compliant System
 (ISA) 0x000001FF (511)	Microsoft ACPI-Compliant System
 (PCI) 0x00000003 (03)	Intel SD Host Controller
 (PCI) 0x00000019 (25)	High Definition Audio Controller
 (PCI) 0x00000027 (39)	Intel SD Host Controller
 (PCI) 0x0000002A (42)	Intel SD Host Controller
 (PCI) 0x00000400 (1024)	Intel SD Host Controller
 (PCI) 0xFFFFFFFF4 (-12)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFF5 (-11)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFF6 (-10)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFF7 (-9)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFF8 (-8)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFF9 (-7)	Intel(R) I211 Gigabit Network Connection #2
 (PCI) 0xFFFFFFFFFA (-6)	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
 (PCI) 0xFFFFFFFFFB (-5)	Intel(R) Trusted Execution Engine Interface
 (PCI) 0xFFFFFFFFFC (-4)	Intel(R) HD Graphics
 (PCI) 0xFFFFFFFFFD (-3)	Standard SATA AHCI Controller
 (PCI) 0xFFFFFFFFFE (-2)	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB

## 3.6 Memory Map

The memory (with CEB94006 baseboard under Windows® 10) mapping list is shown as follows:

- ▼ Memory
  - ▼ [0000000000A0000 - 0000000000BFFFF] PCI Express Root Complex
    - [0000000000A0000 - 0000000000BFFFF] Intel(R) HD Graphics
    - [0000000000C0000 - 0000000000DFFFF] PCI Express Root Complex
    - [0000000000E0000 - 0000000000FFFFFF] PCI Express Root Complex
    - [000000007B800001 - 000000007BFFFFFF] PCI Express Root Complex
    - [000000007C000001 - 000000007CFFFFFF] PCI Express Root Complex
  - ▼ [0000000080000000 - 00000000CFFFFFFF] PCI Express Root Complex
    - ▼ [0000000080000000 - 000000008FFFFFFF] Intel(R) HD Graphics
      - [0000000080000000 - 000000008FFFFFFF] Intel(R) HD Graphics
    - ▼ [0000000090000000 - 000000009FFFFFFF] Intel(R) HD Graphics
      - [0000000090000000 - 000000009FFFFFFF] Intel(R) HD Graphics
    - [0000000091000000 - 00000000910FFFFFF] High Definition Audio Controller
  - ▼ [0000000091100000 - 00000000911FFFFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB
    - ▼ [0000000091100000 - 00000000911FFFFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD6
      - [00000000911DC000 - 00000000911DFFFF] Intel(R) I211 Gigabit Network Connection #2
      - [00000000911E0000 - 00000000911FFFFFF] Intel(R) I211 Gigabit Network Connection #2
  - ▼ [0000000091200000 - 00000000912FFFFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB
    - ▼ [0000000091200000 - 00000000912FFFFFF] Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
      - [0000000091200000 - 000000009120FFFF] Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
      - [0000000091210000 - 0000000091213FFF] High Definition Audio Controller
      - [0000000091214000 - 0000000091215FFF] Standard SATA AHCI Controller
      - [0000000091216000 - 00000000912160FF] Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
      - [0000000091217000 - 0000000091217FFF] Intel SD Host Controller
      - [0000000091218000 - 0000000091218FFF] Intel SD Host Controller
      - [0000000091219000 - 0000000091219FFF] Intel SD Host Controller
      - [000000009121A000 - 000000009121AFFF] Intel SD Host Controller
      - [000000009121B000 - 000000009121BFFF] Intel SD Host Controller
      - [000000009121C000 - 000000009121CFFF] Intel SD Host Controller
      - [000000009121D000 - 000000009121D7FF] Standard SATA AHCI Controller
      - [000000009121E000 - 000000009121E0FF] Standard SATA AHCI Controller
      - [0000000091221000 - 0000000091221FFF] Intel(R) Trusted Execution Engine Interface
    - [00000000D0C00000 - 00000000D0C00653] Intel(R) Serial IO GPIO Host Controller - INT3452
    - [00000000D0C40000 - 00000000D0C40763] Intel(R) Serial IO GPIO Host Controller - INT3452
    - [00000000D0C50000 - 00000000D0C5076B] Intel(R) Serial IO GPIO Host Controller - INT3452
    - [00000000D0C70000 - 00000000D0C70673] Intel(R) Serial IO GPIO Host Controller - INT3452
  - ▼ [00000000E0000000 - 00000000EFFFFFFF] PCI Express Root Complex
    - [00000000E0000000 - 00000000EFFFFFFF] Motherboard resources
    - [00000000FEA00000 - 00000000FEAFFFFF] Motherboard resources
    - [00000000FED00000 - 00000000FED003FF] High precision event timer
    - [00000000FED01000 - 00000000FED01FFF] Motherboard resources
    - [00000000FED03000 - 00000000FED03FFF] Motherboard resources
    - [00000000FED06000 - 00000000FED06FFF] Motherboard resources
    - [00000000FED08000 - 00000000FED09FFF] Motherboard resources
    - [00000000FED1C000 - 00000000FED1CFFF] Motherboard resources
    - [00000000FED40000 - 00000000FED4087F] Trusted Platform Module 2.0
    - [00000000FED80000 - 00000000FEDBFFFF] Motherboard resources
    - [00000000FEE00000 - 00000000FEEFFFFF] Motherboard resources



# 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.



**Note**

*If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting SW1-2 (see section 2.4.1).*

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.



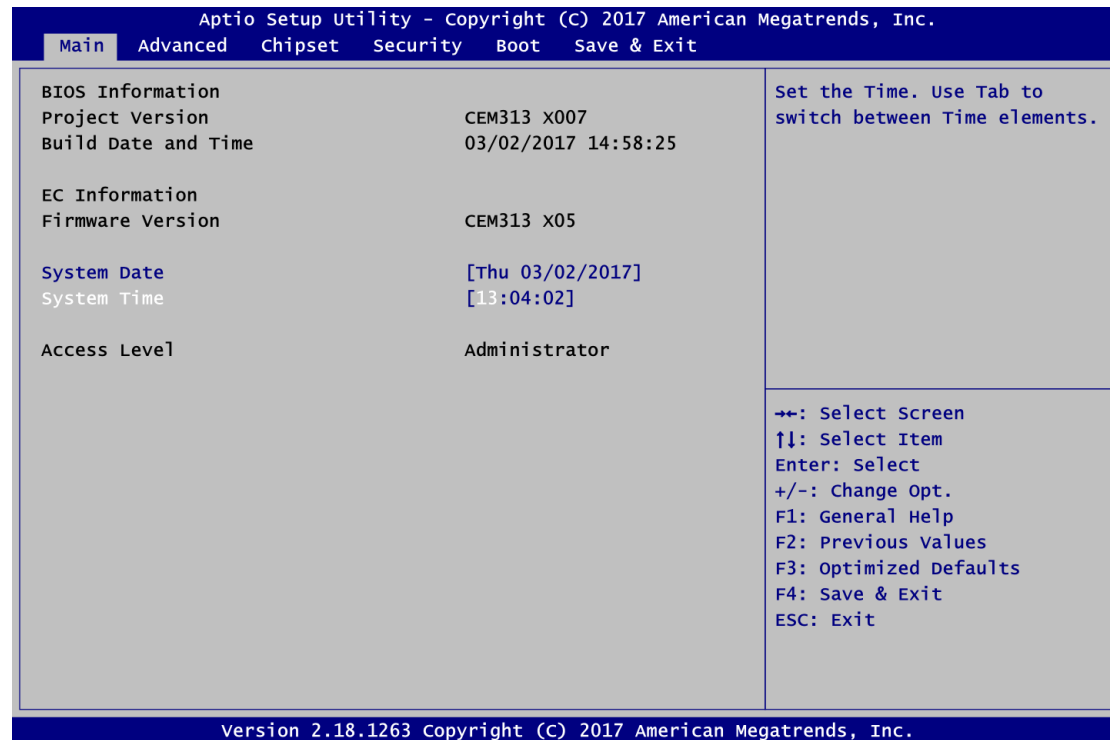
**Note**

*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.

### Access Level

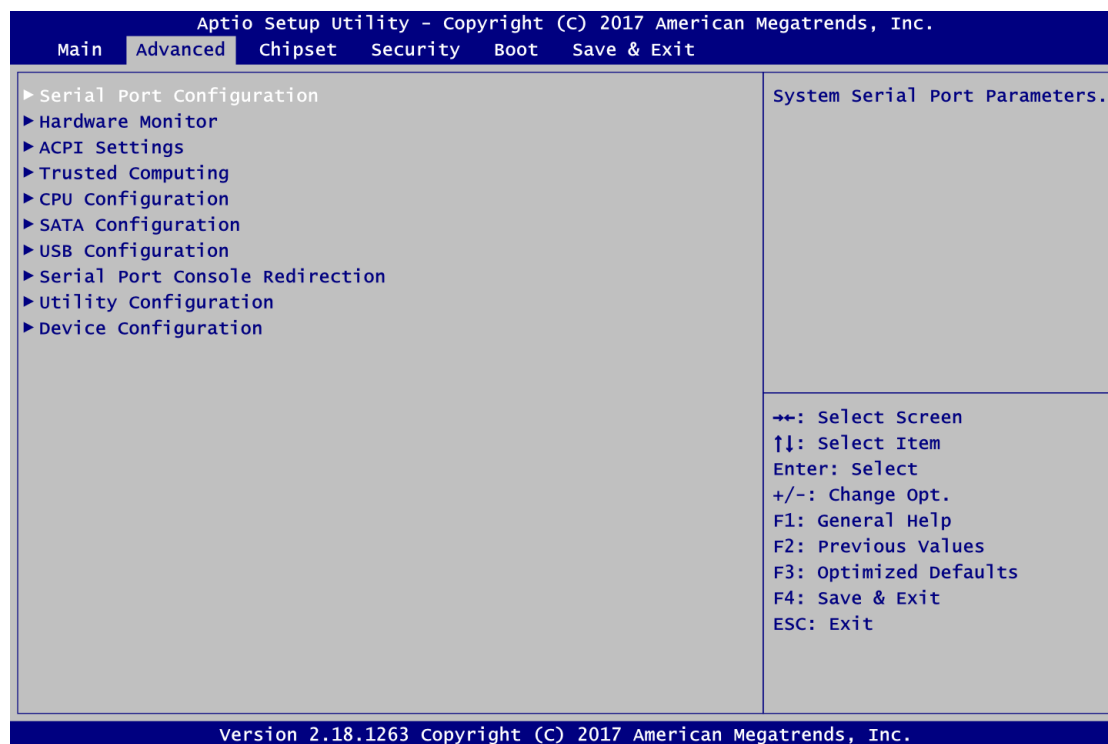
Display the access level of current user.

## 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:

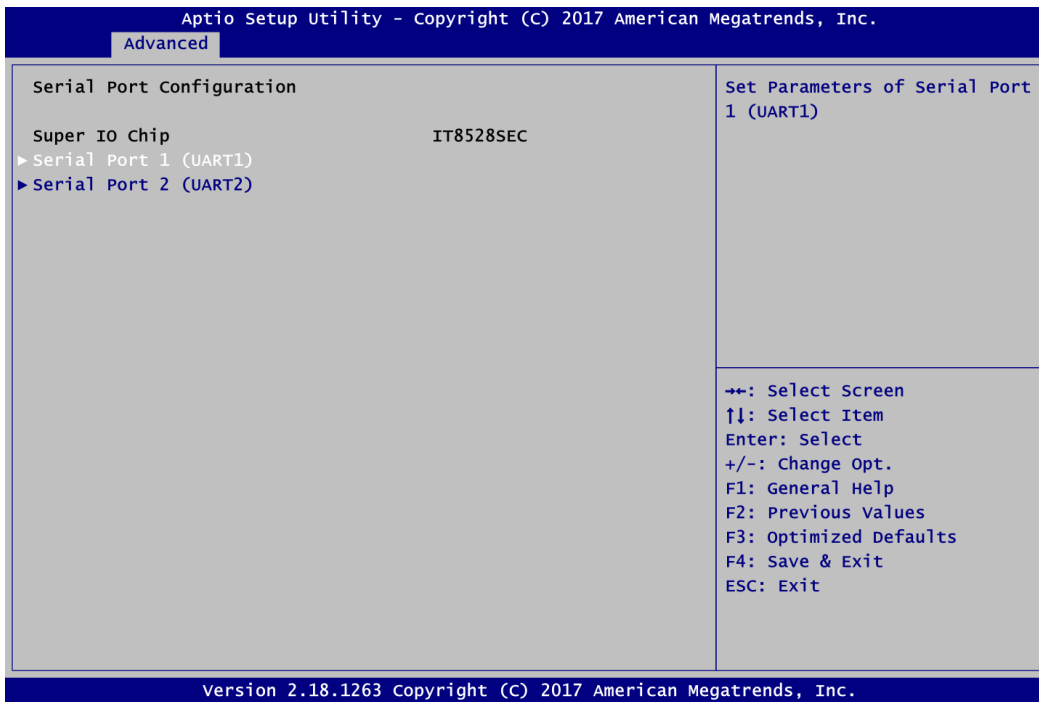
- ▶ Serial Port Configuration
- ▶ Hardware Monitor
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ USB Configuration
- ▶ Serial Port Console Redirection
- ▶ Utility Configuration
- ▶ Device Configuration

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



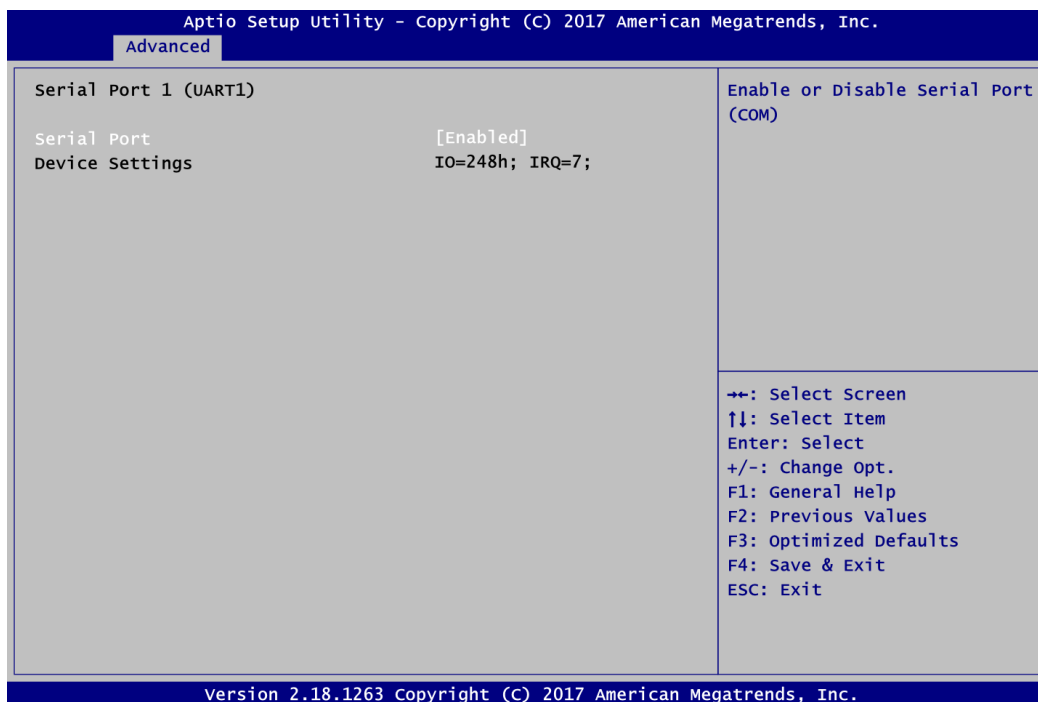
- **Serial Port Configuration**

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 1~2 (UART1~2)**

Set the parameters of serial port 1~2 .

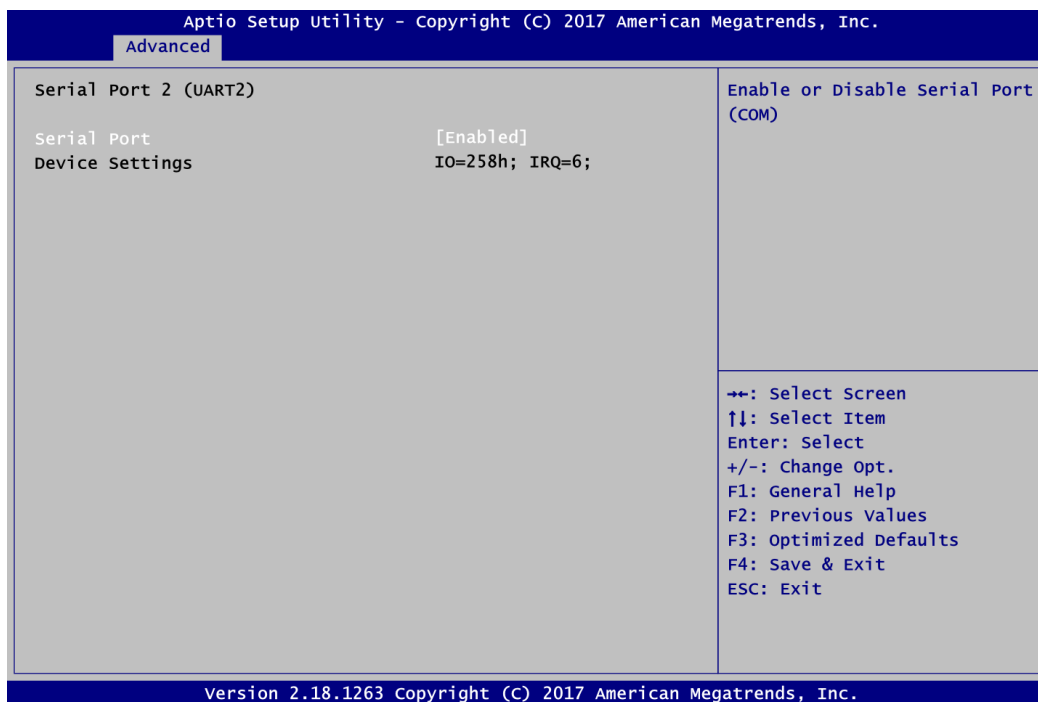
- **Serial Port 1 (UART1)**



**Serial Port**

Enable or disable serial port 1. The optimal setting for base I/O address is 248h and for interrupt request line is IRQ7.

- **Serial Port 2 (UART2)**

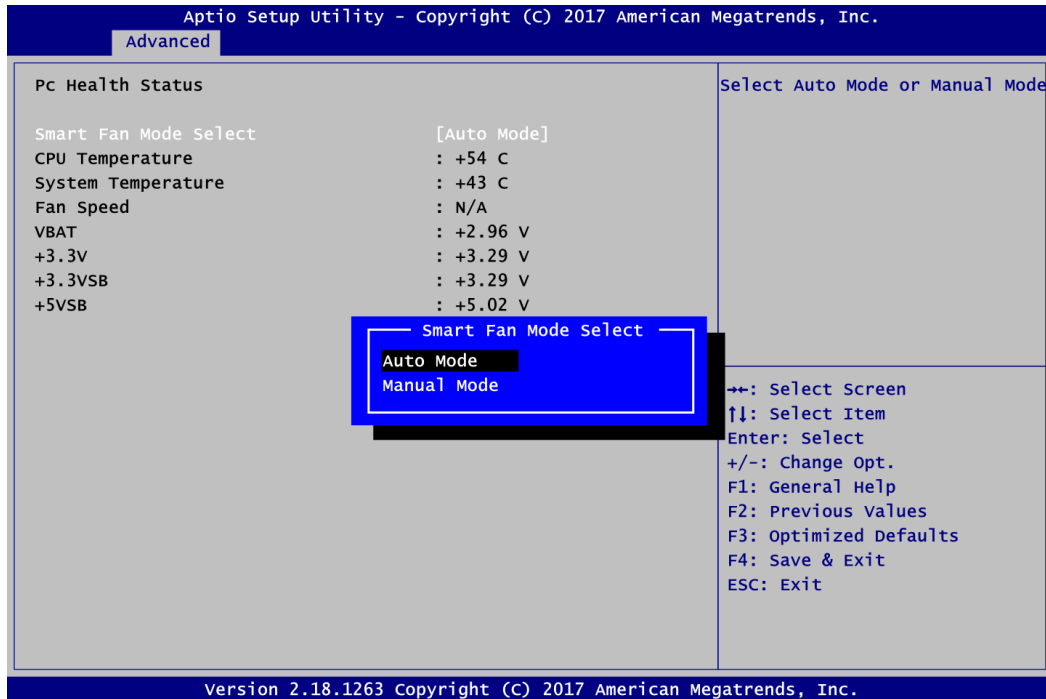


**Serial Port**

Enable or disable serial port 2. The optimal setting for base I/O address is 258h and for interrupt request line is IRQ6.

- **Hardware Monitor**

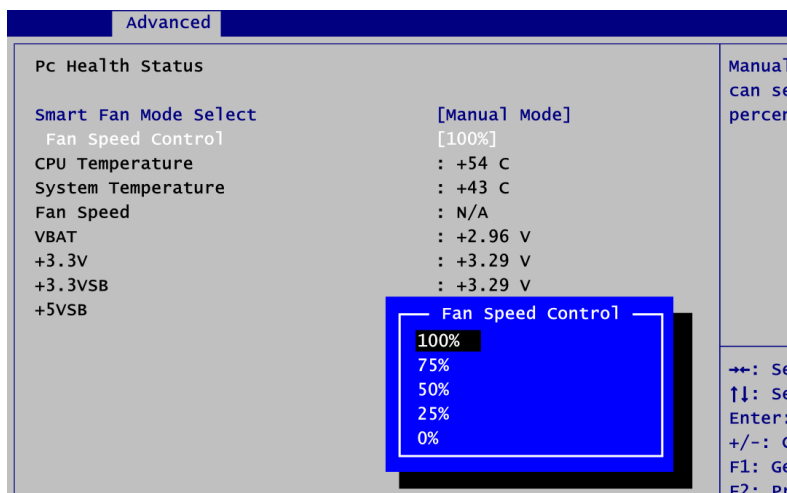
This screen is for fan speed control and hardware health status monitoring.



This screen displays the temperature of system and CPU, fan speed in RPM and system voltages (VBAT, +3.3V, +3.3VSB and +5VSB).

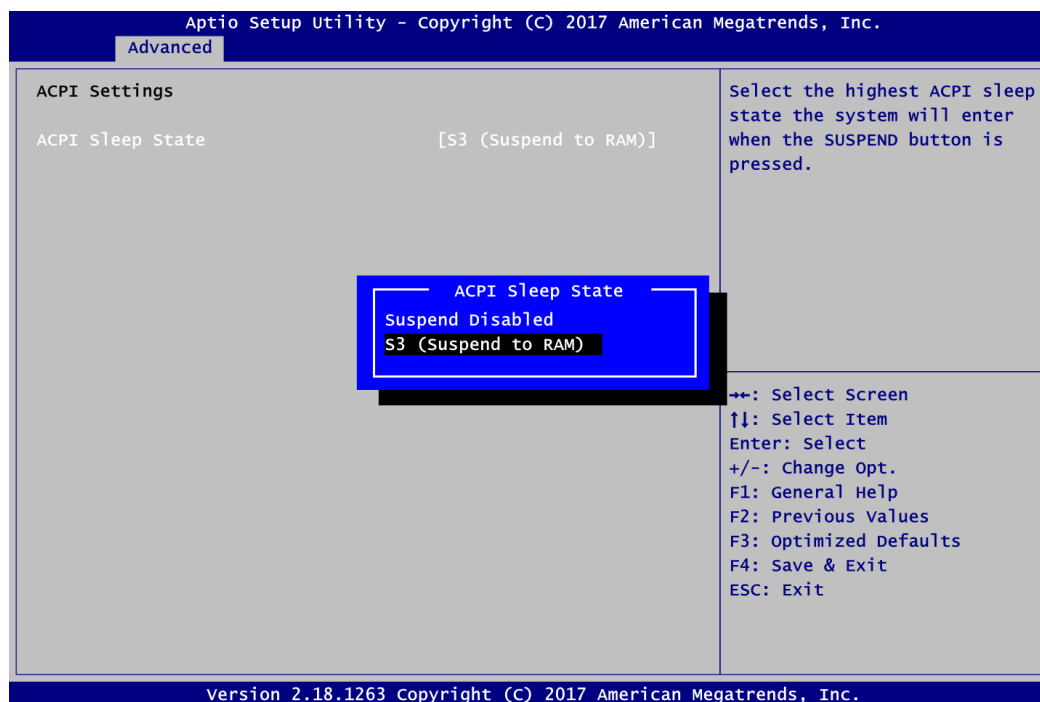
### Smart Fan Mode Select

Set Smart Fan mode. The default is Auto Mode. If Smart Fan is in Auto Mode, the system fan spins at different speed depending on system temperature; the higher the temperature, the faster the system fan spins. If Smart Fan is in Manual Mode, user can manually change system fan speed to 0%, 25%, 50%, 75% or 100% as indicated in image below.



- **ACPI Settings**

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



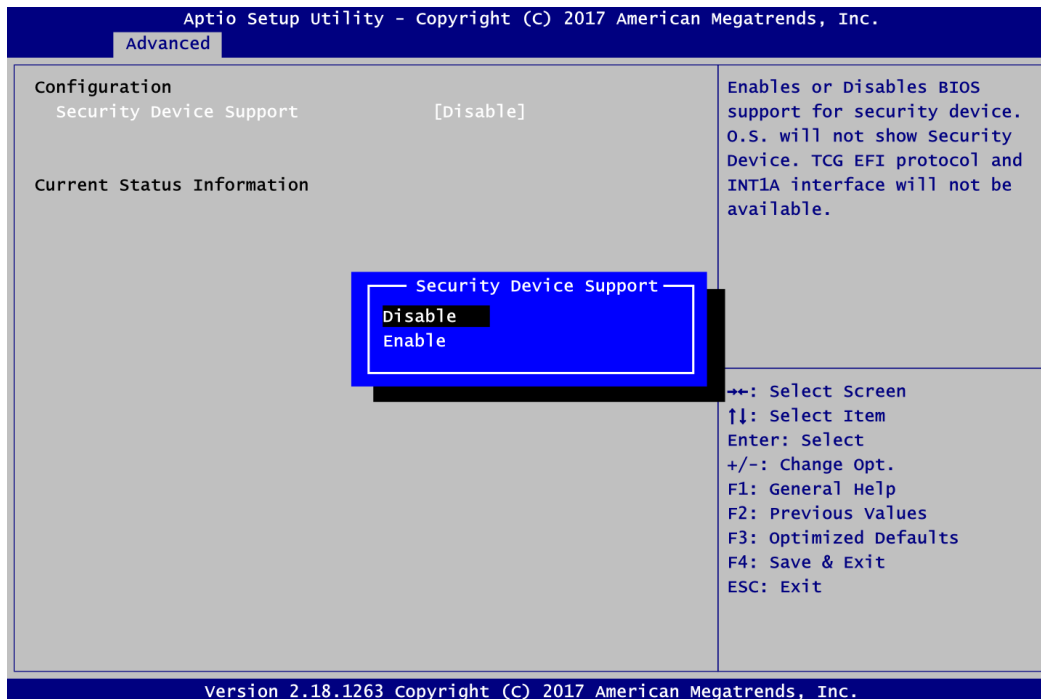
**ACPI Sleep State**

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.



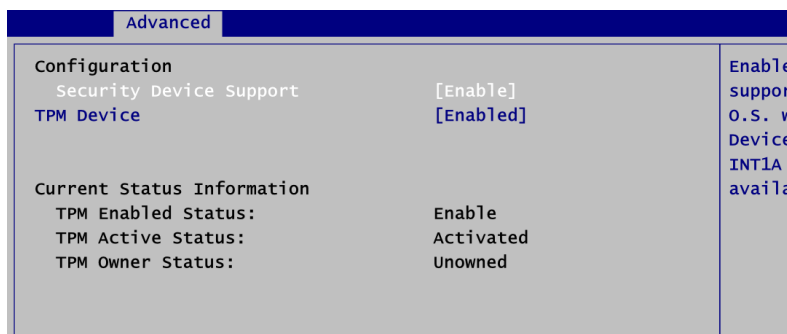
- **Trusted Computing**

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. The default is Disabled. Once the Security Device Support is enabled, you will see the following screen.



### TPM Device

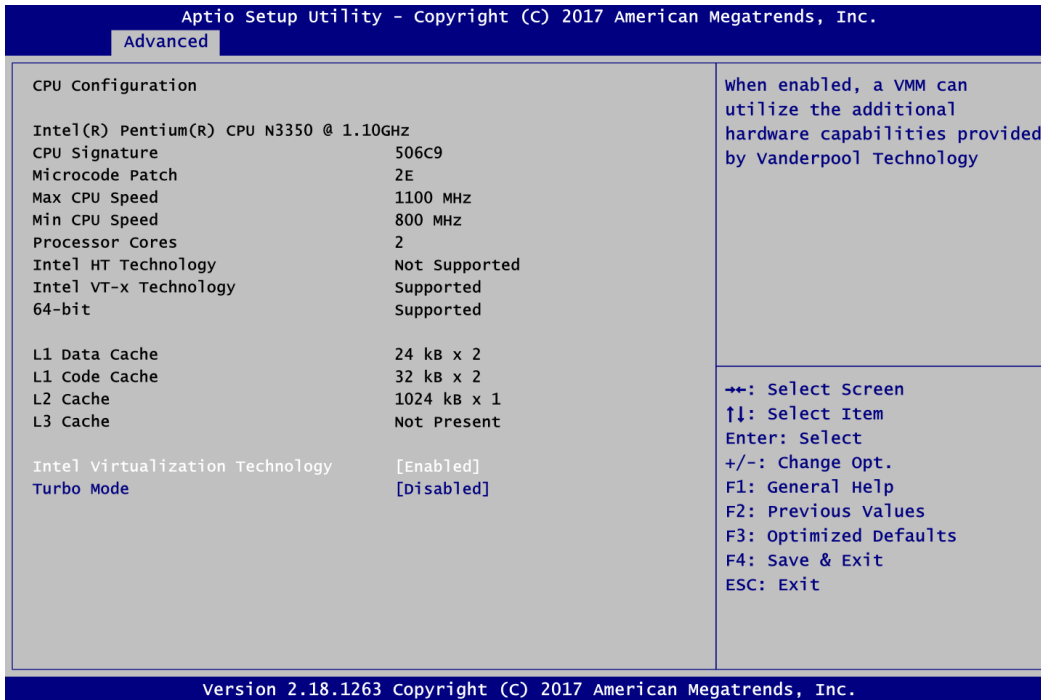
Specify whether TPM can be used by the operating system.

### Current Status Information

Display current TPM status information.

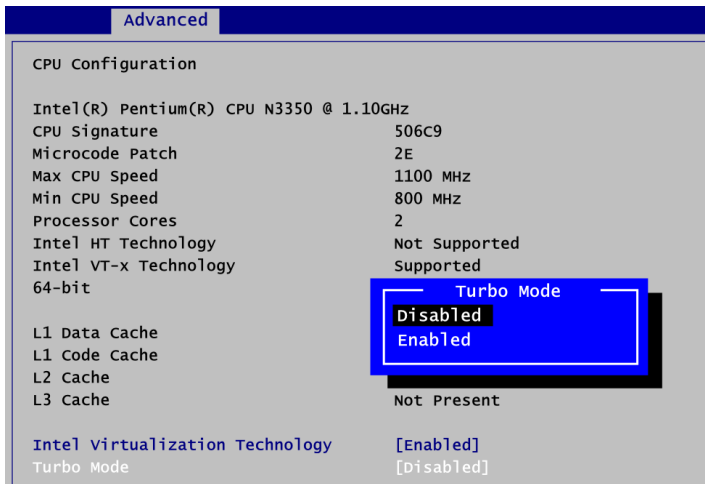
● **CPU Configuration**

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



**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.

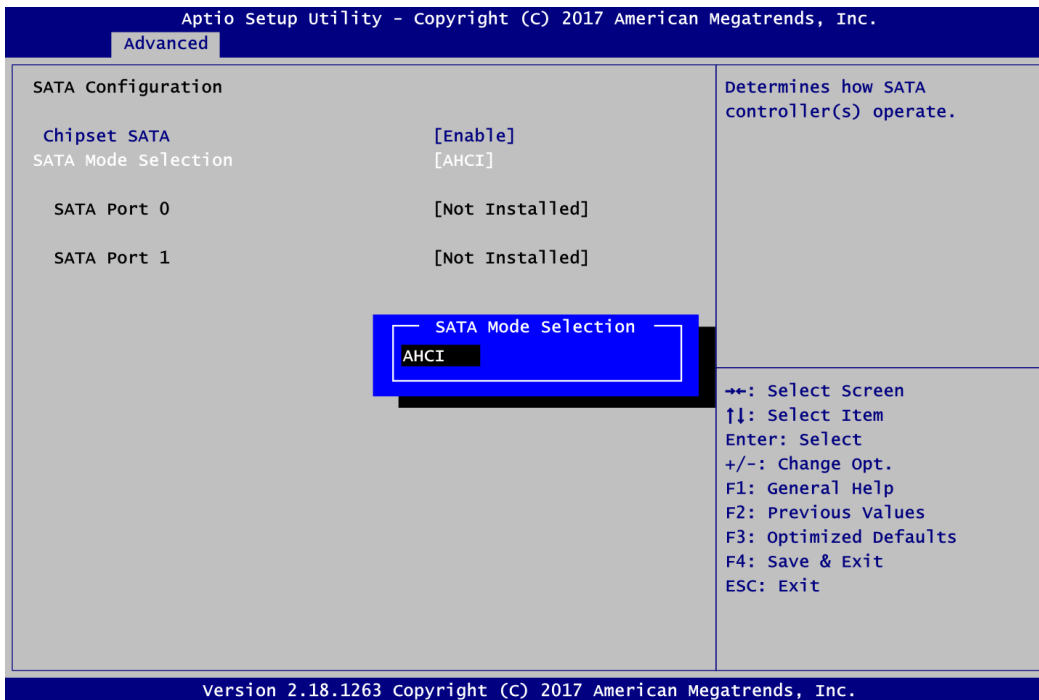


**Turbo Mode**

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

- **SATA Configuration**

In the SATA Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.

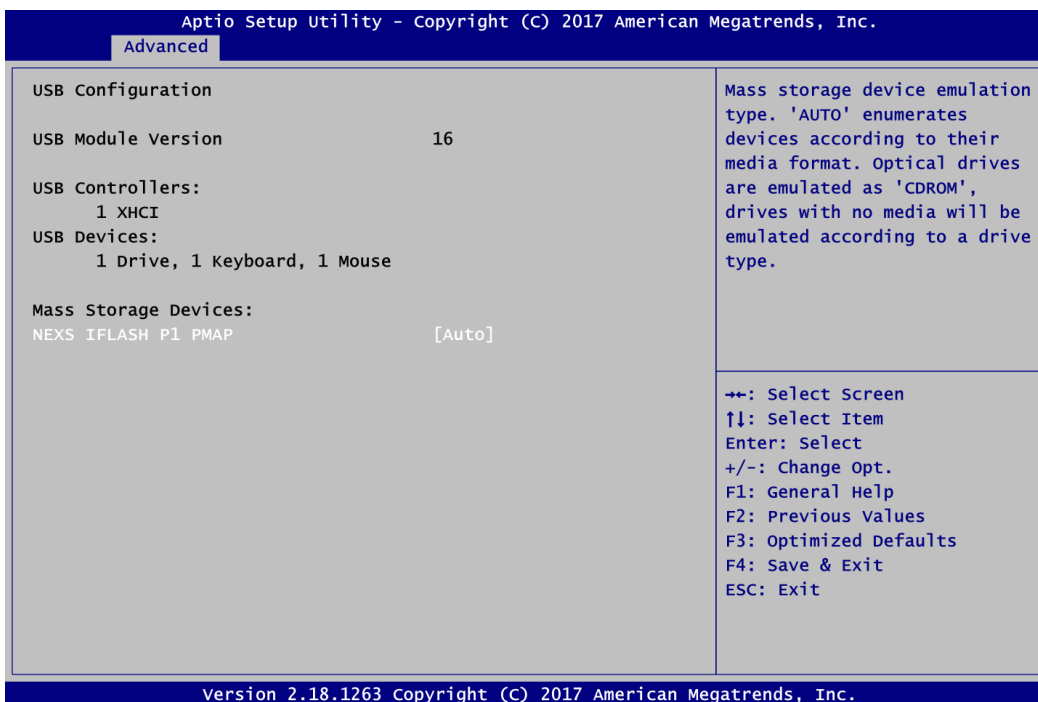
**Chipset SATA**

Enable or disable SATA controller.

**SATA Mode Selection**

Select the operation mode on SATA controller.

● **USB Configuration**



**USB Devices**

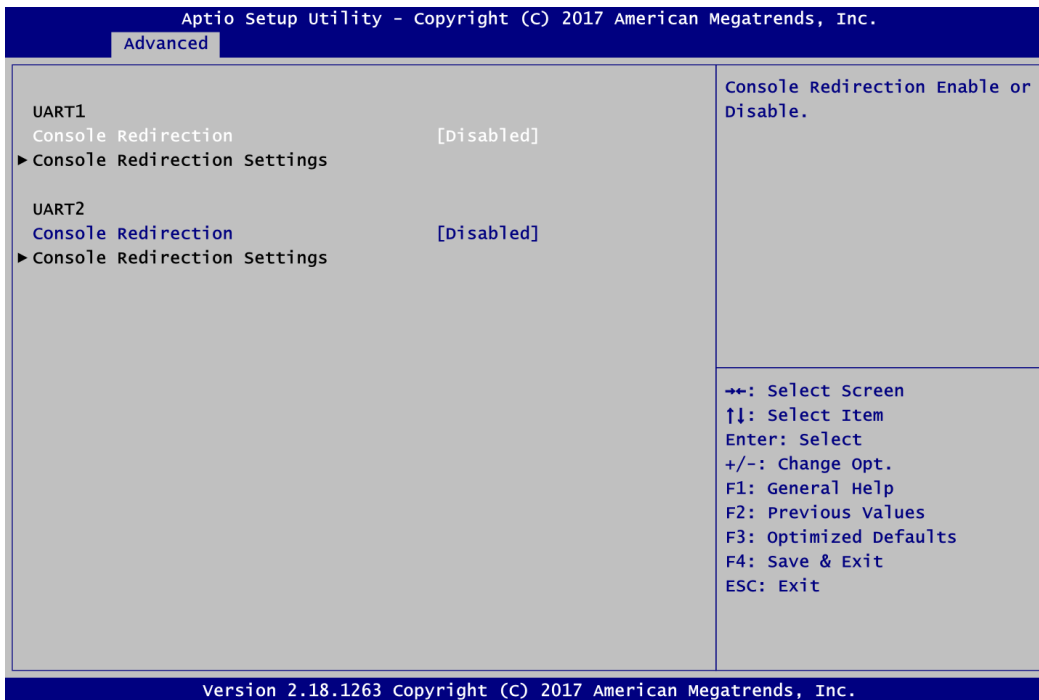
Display all detected USB devices.

**Mass Storage Devices**

Mass storage device emulation type. Auto option enumerates devices according to their media format. Optical drives are emulated as CDROM, drives with no media will be emulated according to a drive type.

- **Serial Port Console Redirection**

You can use this screen to select options for Serial Port Console Redirection, 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.



#### **UART1\UART2 Console Redirection**

Enable or disable UART1\UART2 console redirection.

#### **UART1\UART2 Console Redirection Settings**

When enabled, the settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

● Console Redirection Settings

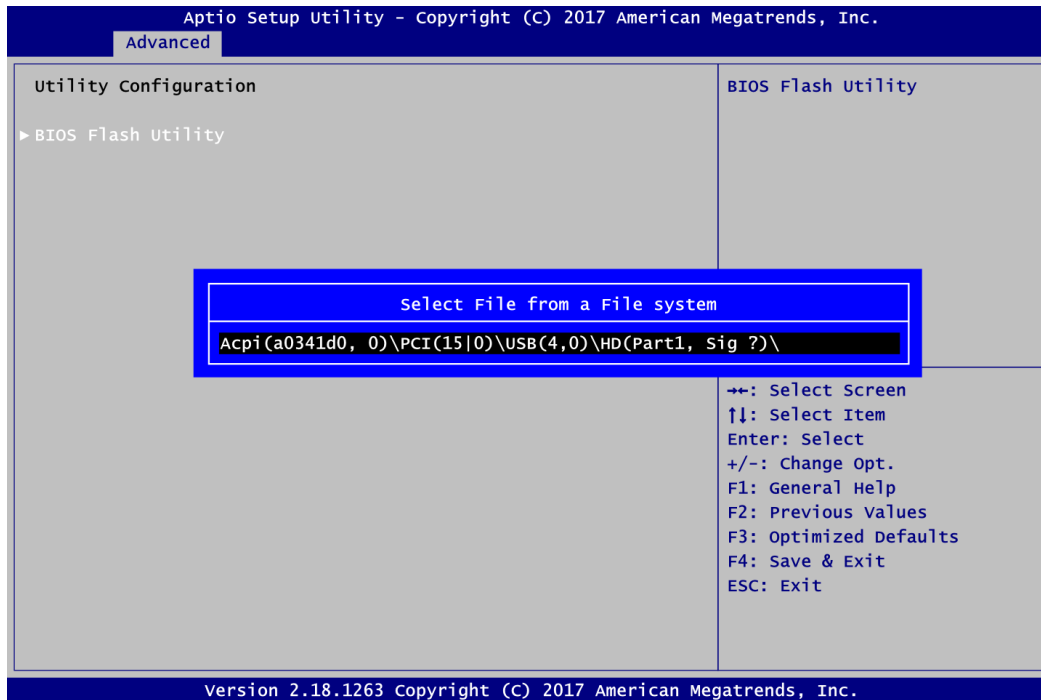
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.

Advanced

UART1 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Terminal Type	[ANSI]	
Bits per second	[115200]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Data Bits	[8]	
Parity	[None]	
Stop Bits	[1]	
Flow Control	[None]	
VT-UTF8 Combo Key Support	[Enabled]	
Recorder Mode	[Disabled]	
Resolution 100x31	[Disabled]	
Legacy OS Redirection Resolution	[80x24]	
Putty keypad	[VT100]	
Redirection After BIOS POST	[Always Enable]	

Version 2.18.1263 Copyright (C) 2017 American Megatrends, Inc.

- Utility Configuration

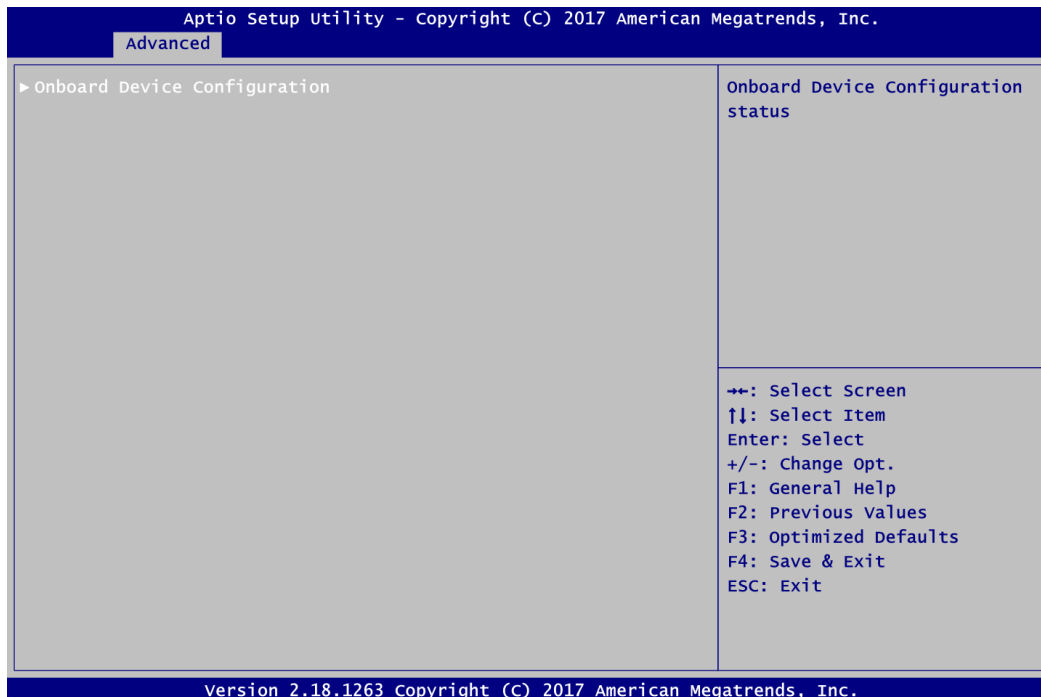


### BIOS Flash Utility

BIOS flash utility configuration. For more detailed information, please refer to Appendix B.

- Device Configuration

A description of selected item appears on the right side of the screen. For items marked with “►”, please press <Enter> for more options.

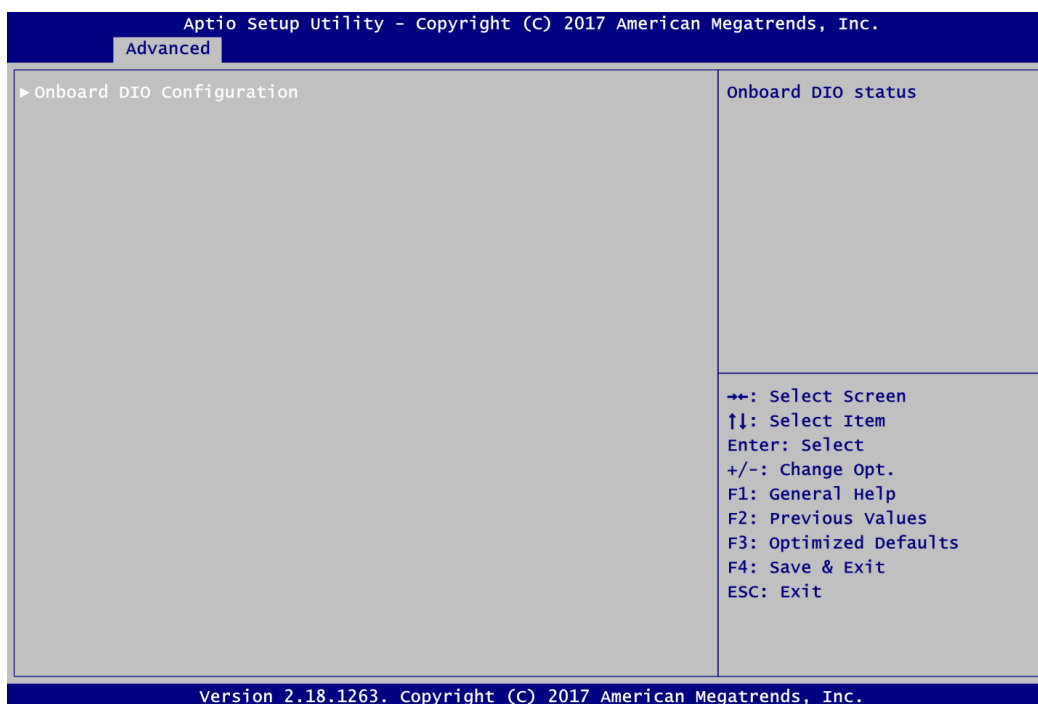


### Onboard Device Configuration

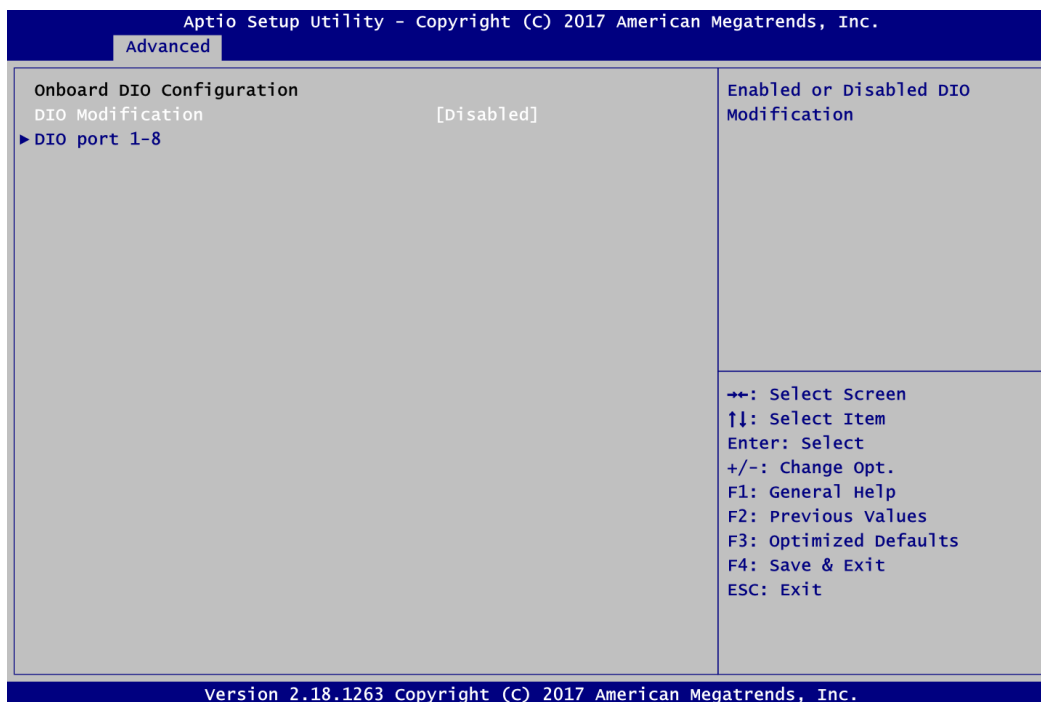
Use this option to configure onboard device (e.g., Digital I/O setting).

- **Onboard DIO Configuration**

A description of selected item appears on the right side of the screen. For items marked with “▶”, please press <Enter> for more options.







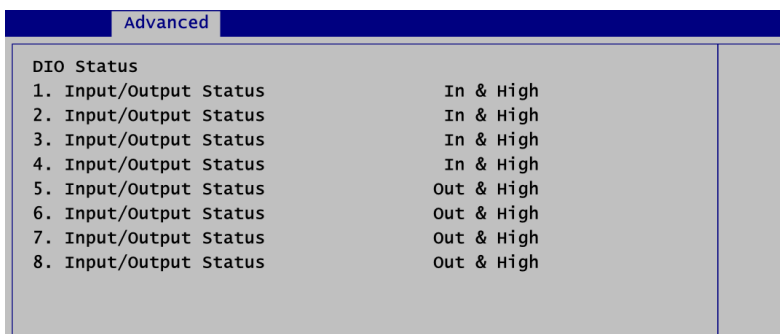
**DIO Modification**

Enable or disable digital I/O modification. The default is Disabled.

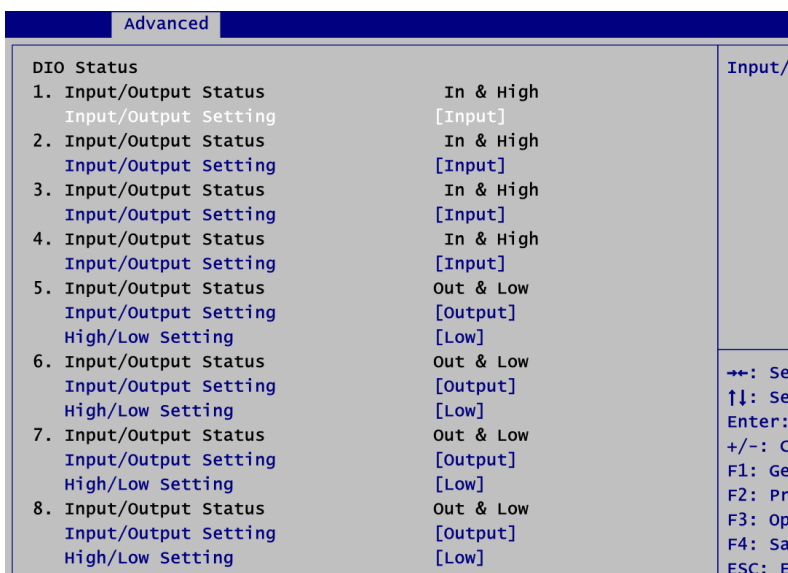
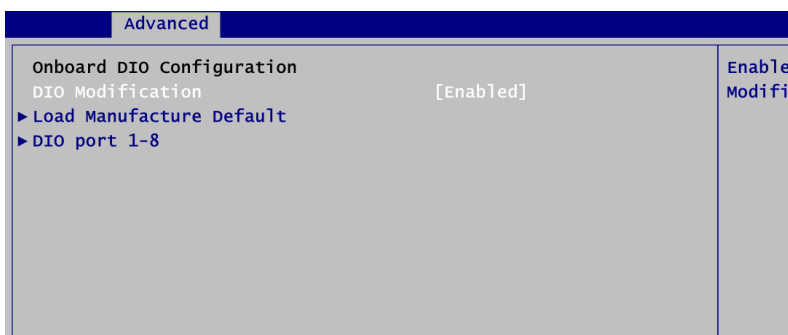
**DIO port 1-8**

Select this option to open DIO status sub screen.

If DIO Modification is disabled, you are not allowed to change input/output setting. The DIO status sub screen is as follows:



If DIO Modification is enabled, you can load manufacture default and access to the DIO status sub screen to change input/output setting, see image below.

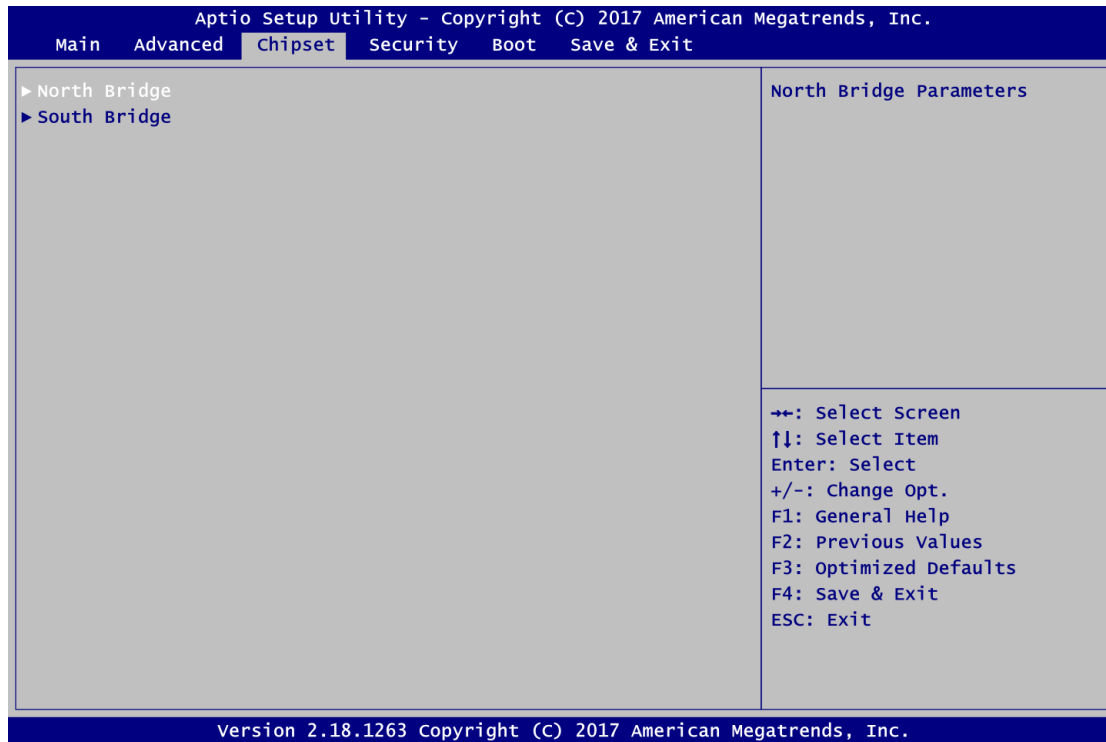


## 4.5 Chipset Menu

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:

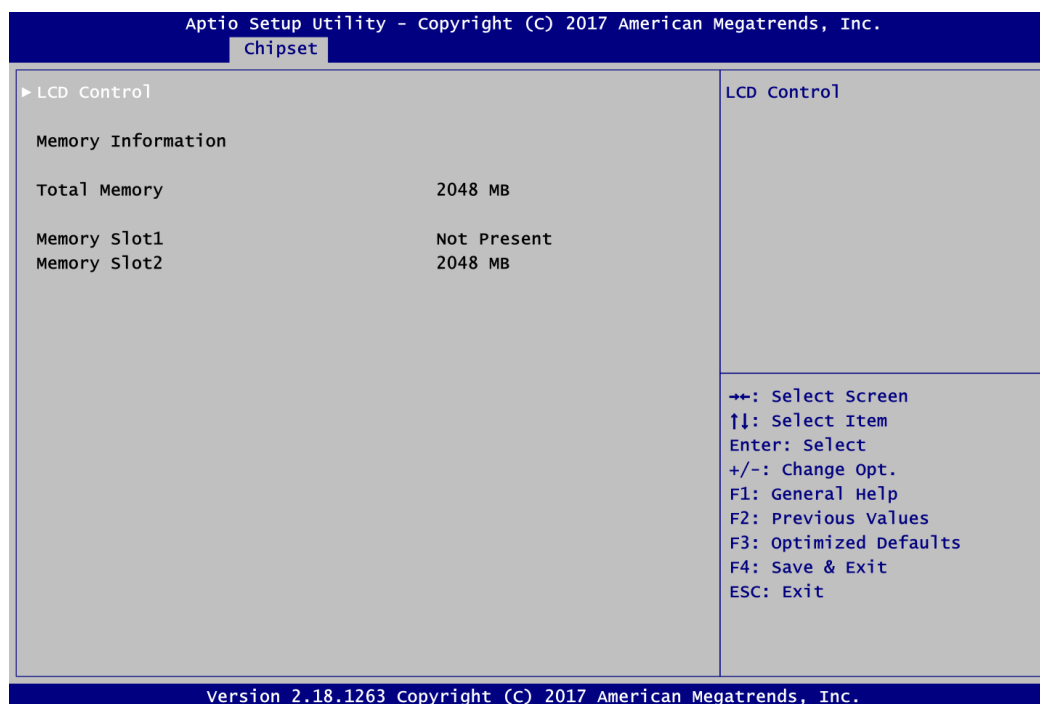
- ▶ North Bridge
- ▶ South Bridge

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



- **North Bridge**

This screen shows system memory information and allows users to configure parameters of North Bridge chipset.

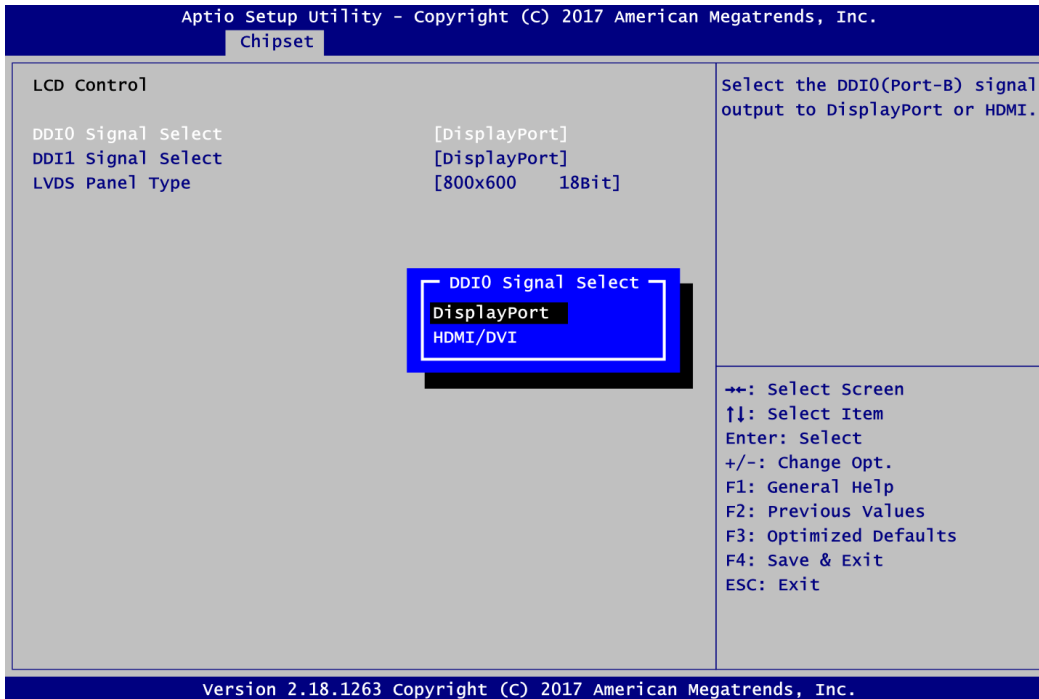


**LCD Control**

This item allows you to select LCD panel control options. Please press <Enter> to go to the sub menu.

**Memory Information**

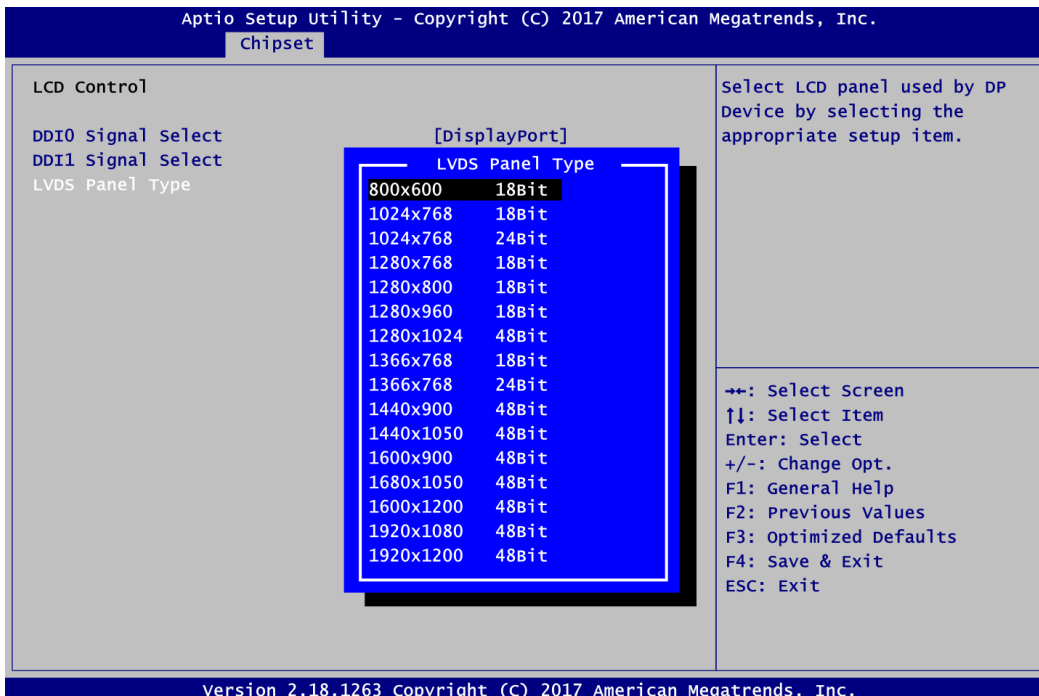
Display system memory information.

**DDI0 Signal Select**

Select the DDI0 signal output to DisplayPort or HDMI/DVI.

**DDI1 Signal Select**

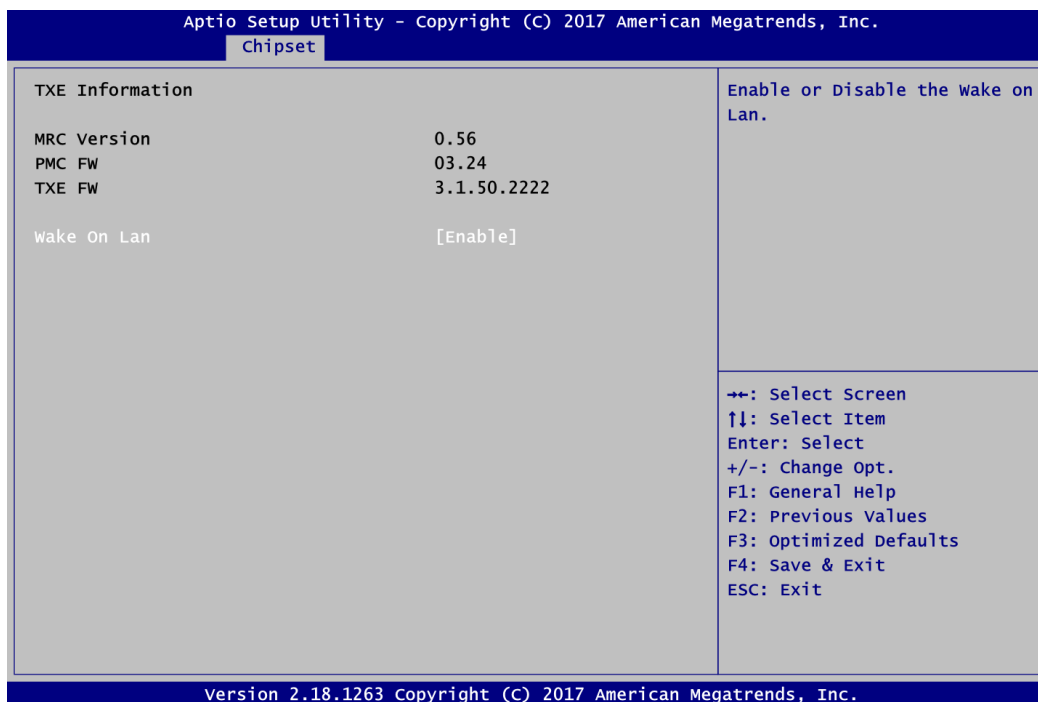
Select the DDI1 signal output to DisplayPort or HDMI/DVI.

**LVDS Panel Type**

Select LVDS panel resolution for the display device by selecting the appropriate setup item.

- **South Bridge**

This screen allows users to configure parameters of South Bridge chipset.



**Wake on Lan**

Enable or disable integrated LAN to wake the system.

## 4.6 Security Menu

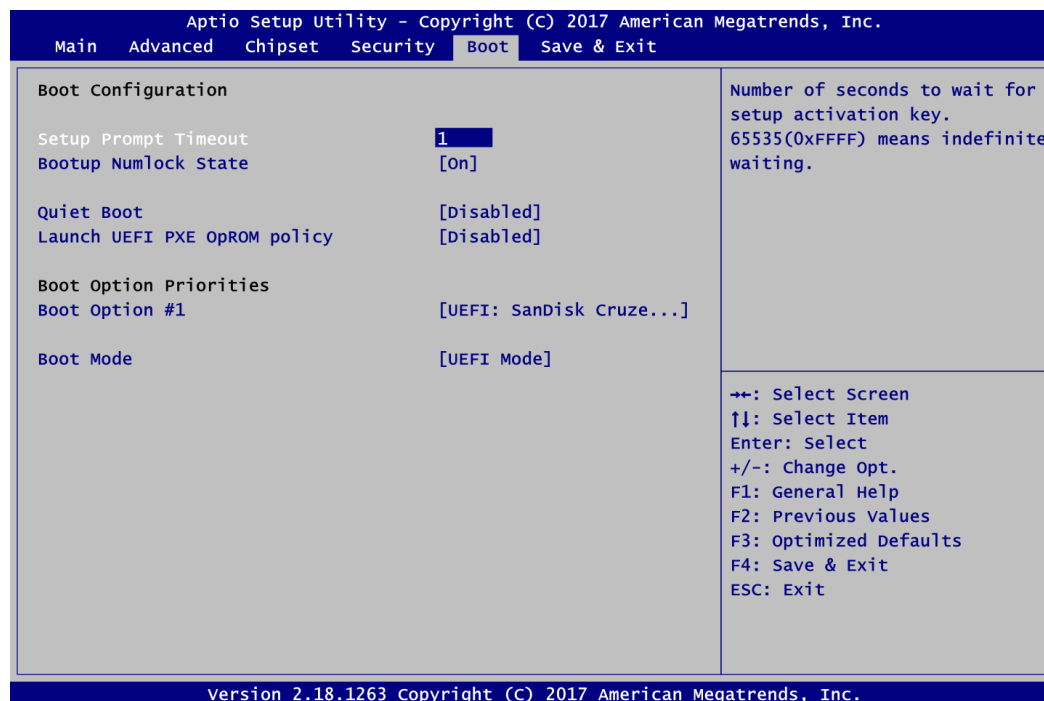
The Security menu allows users to change the security settings for the system.



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

## 4.7 Boot Menu

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



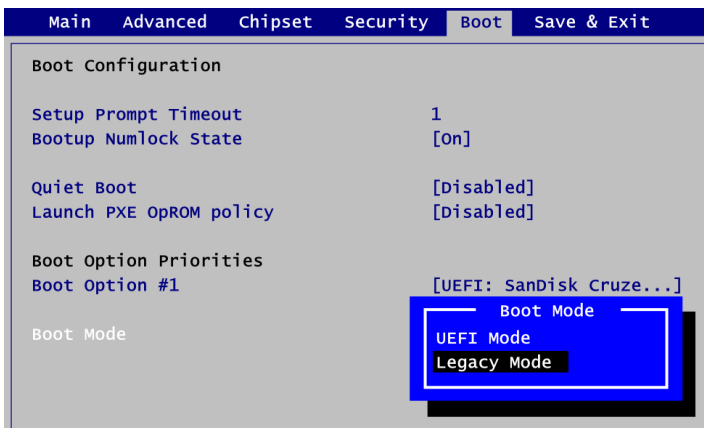
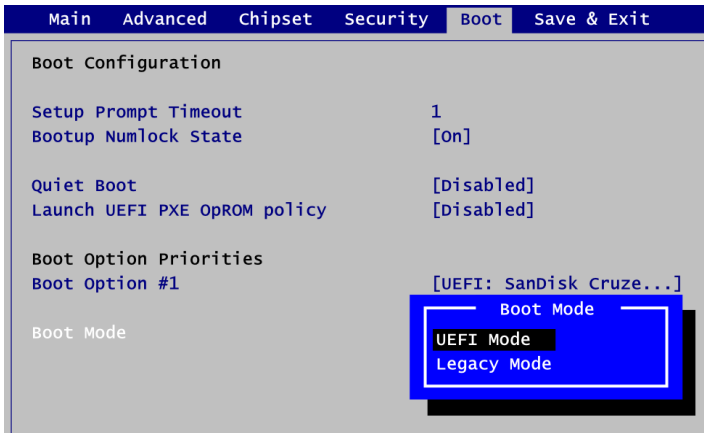
- Setup Prompt Timeout**  
 Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- Bootup NumLock State**  
 Use this item to select the power-on state for the keyboard NumLock.
- Quiet Boot**  
 Select to display either POST output messages or a splash screen during boot up.
- Launch UEFI PXE OpROM policy**  
 Control the execution of UEFI PXE OpROM.
- Boot Option Priorities [Boot Option #1, ...]**  
 These are settings for boot priority. Specify the boot device priority sequence from the available devices.



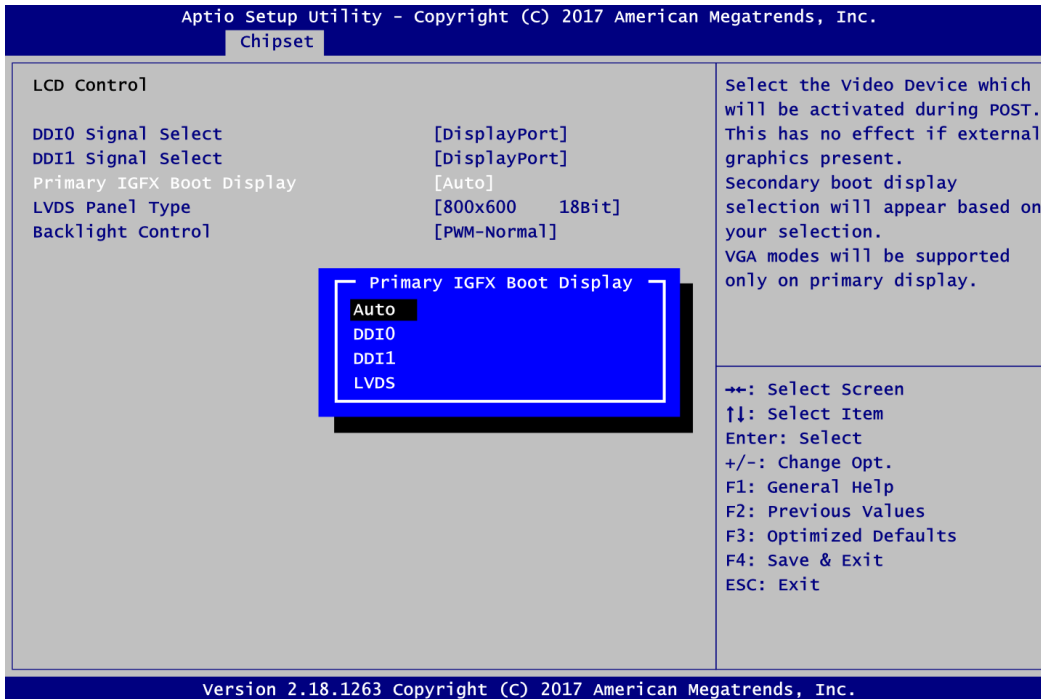
- **Boot Mode**

Use this item for boot mode settings.

- UEFI Boot: Select support to boot any UEFI-capable OS.
- Legacy Boot: Select support to boot non UEFI-capable OS that expects a legacy BIOS interface.

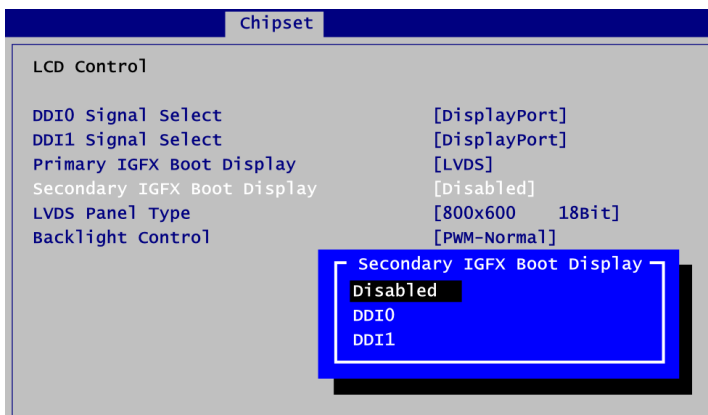
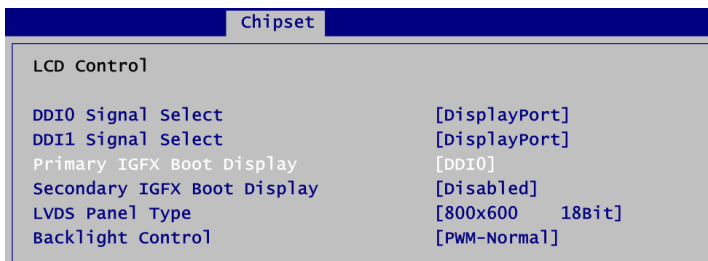


Note that the Primary IGFX Boot Display option appears only if Legacy Mode is selected, see images below.



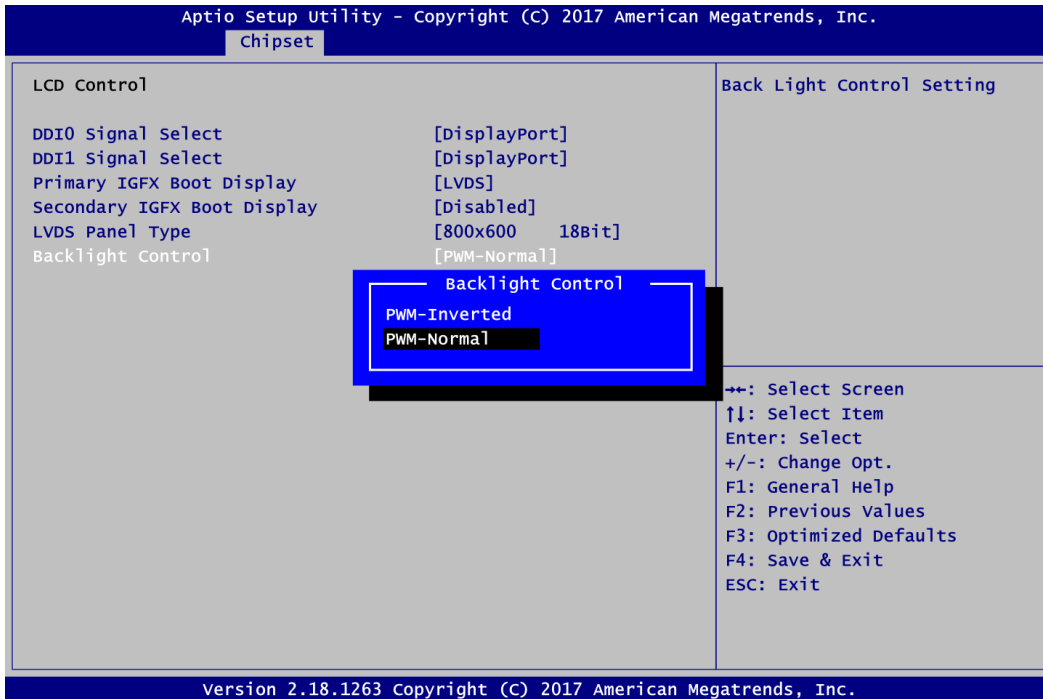
### Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self Test). The default is Auto. The Secondary IGFX Boot Display selection appears only if you set this option to LVDS, DDI0 or DDI1, see image below.



### Secondary IGFX Boot Display

Select secondary boot display device.

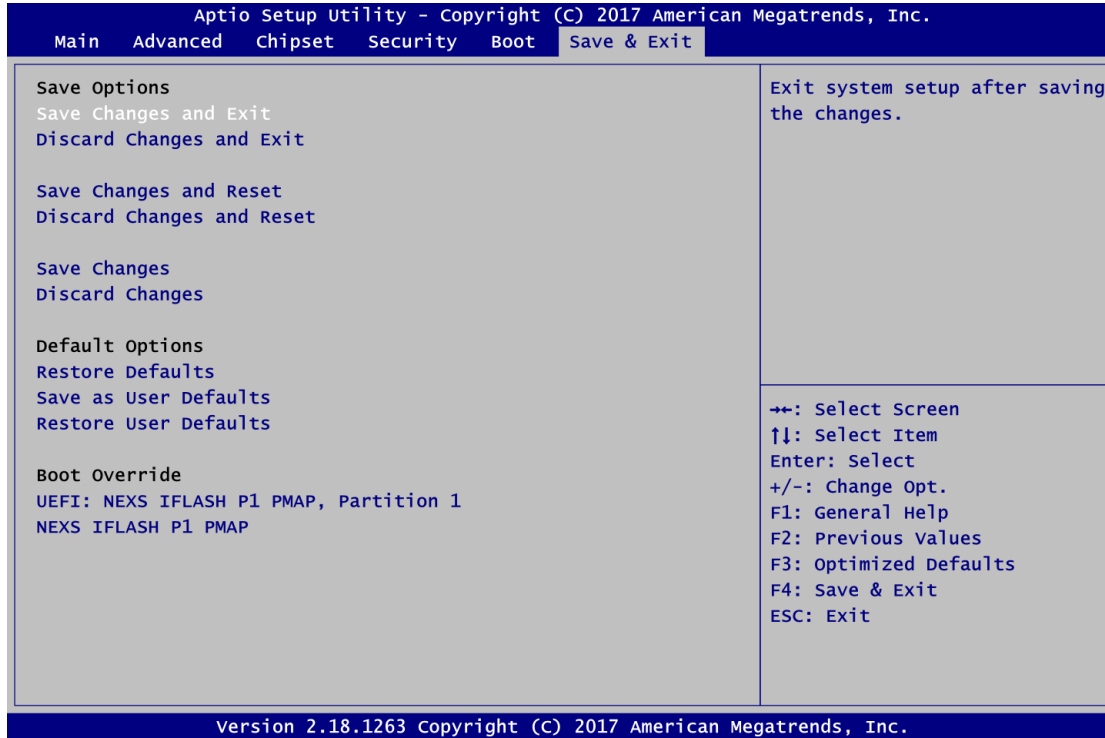


### Backlight Control

Use this item to select backlight control mode.

## 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.

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# Appendix A

## Watchdog Timer and GPIO

### B.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.

### B.2 How to Use Watchdog Timer

Assembly sample code :

```
mov     dx,fa10           ; 5 seconds (Maximum is 65535 seconds; fill in
                        ; 0xFA10 and 0xFA11 register, ex: 0xFA11=0x01,
                        ; 0xFA10=0x68 means 360 seconds)
mov     al,05
out     dx,al

mov     dx,fa12           ; Enable WDT
mov     al,01
out     dx,al
```

### B.3 About GPIO

The onboard GPIO (general input and output) has 8 bits (GPIO~3 and GPO0~3). In default, all pins are pulled high with +3.3V level (according to main power). The BIOS default settings are 4 inputs and 4 outputs where all of these pins are set to 1. Use these GPIO signals to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control.

## B.4 Sample Program

Assembly sample code :

```
mov    dx,fa18          ; Set DIO 0-7 to Output
mov    al,00
out    dx,al

mov    dx,fa19          ; Set DIO 4-7 to High
mov    al,f0
out    dx,al

mov    dx,fa18          ; Set DIO 0-7 to Input
mov    al,ff
out    dx,al

mov    dx,fa19          ; Get DIO 0-7 status
in     al,dx

mov    dx,fa18          ; Set DIO 0-4 to Input, 5-7 to Output
mov    al,1f            ; al = 1F => 00011111
out    dx,al

mov    dx,fa19          ; Set DIO 6 to High
mov    al,40            ; al = 40 => 01000000
out    dx,al

in     al,dx            ; Get DIO 0-7 status
```

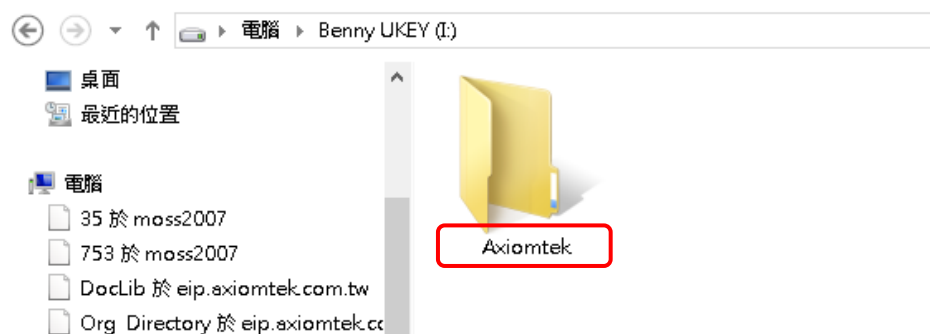


# Appendix B

## BIOS Flash Utility

The BIOS Flash utility is a new helpful function in BIOS setup program. With this function you can easily update system BIOS without having to enter operating system. In this appendix you may learn how to do it in just a few steps. Please read and follow the instructions below carefully.

1. In your USB flash drive, create a new folder and name it “Axiomtek”, see figure below.



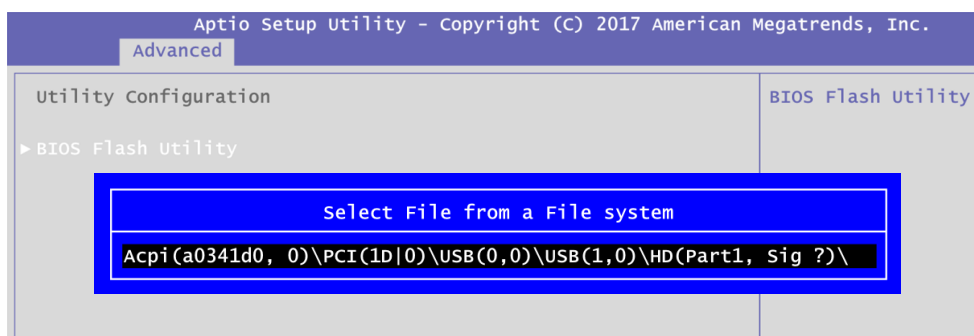
2. Copy BIOS ROM file (e.g. CEM312X.005) to “Axiomtek” folder.



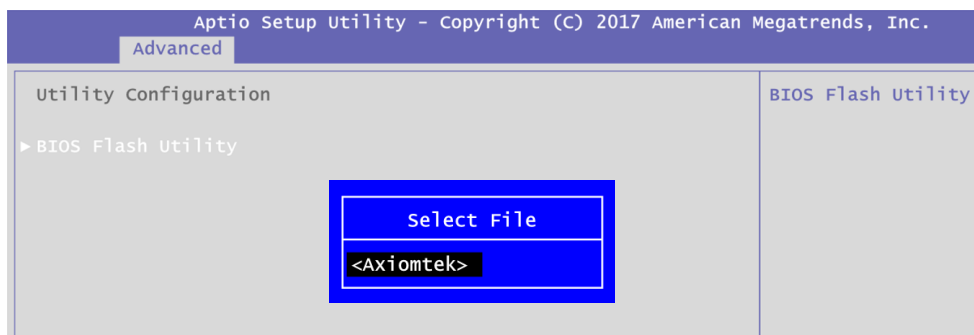
3. Insert the USB flash drive to your system.
4. Enter BIOS setup menu and go to Advanced\Utility Configuration. Select BIOS Flash Utility and press <Enter>.



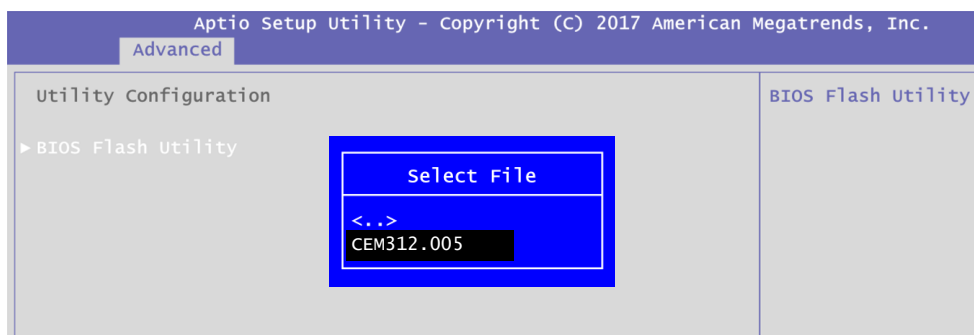
5. BIOS automatically detect all USB drive(s) attached to the system. In this example only one USB drive is attached to the system. That's why, you can see only one device is displayed in figure below.



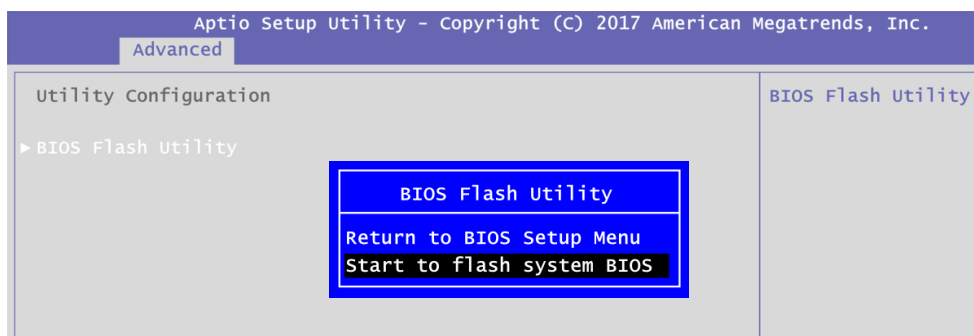
6. Select the USB drive containing BIOS ROM file you want to update using the <↑> or <↓> key. Then press <Enter> to get into "Axiomtek" folder.



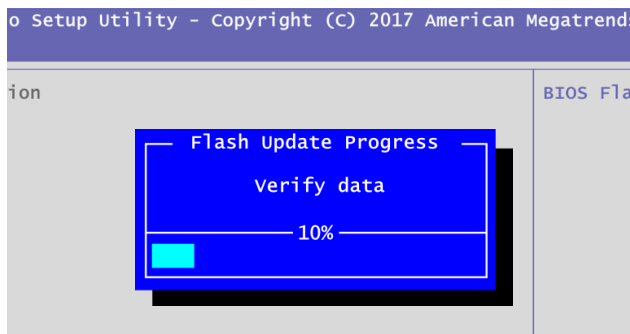
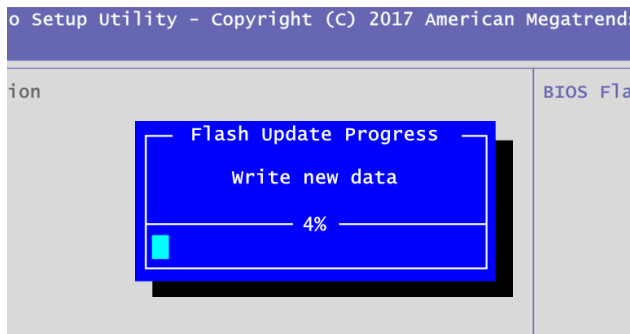
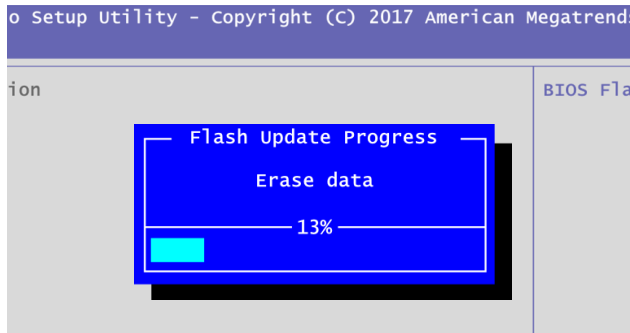
7. Now you can see the BIOS ROM file on the screen, press <Enter> to select.



8. Select Start to flash system BIOS option to begin updating procedure.



- Please wait while BIOS completes the entire flash update process: erase data, write new data and verify data.



- When you see the following figure, press <Enter> to finish the update process. After that the system will shut down and restart immediately.

