



***AXIOMTEK***

## **MANO500 Series**

**Intel® Socket 1151 Core™ i7/ i5/ i3  
Processors Mini ITX Motherboard**

**User's Manual**



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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 boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board 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 boards and components.

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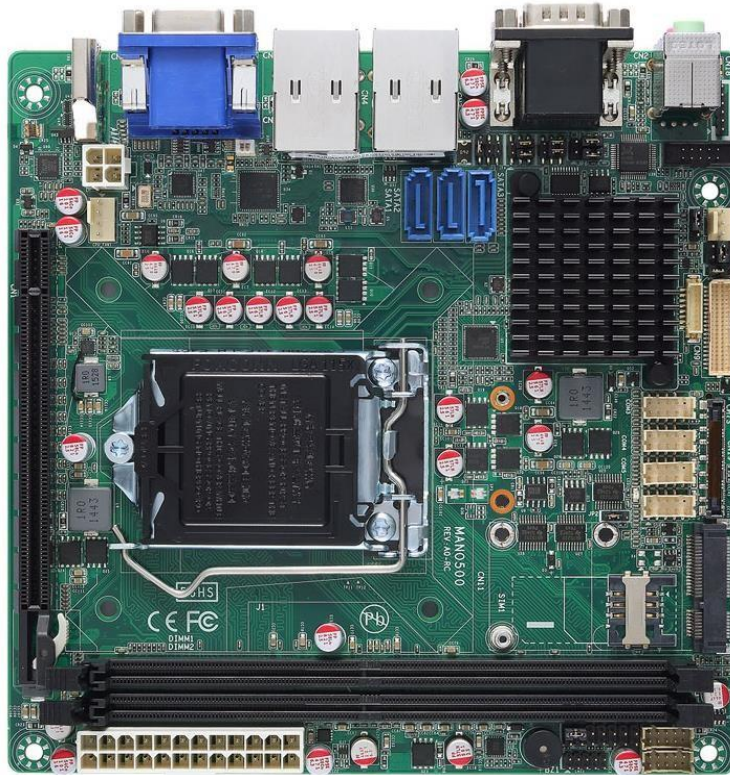
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# Chapter 1

## Introduction



The MANO500 is a Mini-ITX motherboard which supports the new 14nm 6<sup>th</sup>/ 7<sup>th</sup> Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors in LGA1151 package. Featuring the new Intel® H110 /Q170 Express chipset with two DDR4 2133MHz memory support, this motherboard is built to perform best stability and reliability for industrial applications.

The three SATA 3.0, four USB 3.0, and one RS-232/422/485 port provide robust storage and I/O options. Users also can increase board functionality with PCI-Express x16 and PCI-Express Mini Card slot. The high quality MANO500 allows four display interfaces via HDMI, VGA, DisplayPort, and LVDS (co-layout with Embedded DisplayPort (eDP)) in triple views, making it an ideal solution for gaming, workstation, digital signage, medical and other IoT&M2M applications.

### 1.1 Features

- LGA1151 Socket for 6<sup>th</sup>/ 7<sup>th</sup> Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors (Skylake and Kabylake)
- 2 DDR4 2133MHz memory with maximum capacity up to 32 GB
- 1 PCI-Express x16
- 1 PCI-Express Mini Card and 1 SIM card slots
- 3 SATA-600
- 1 mSATA
- 4 USB 3.0 and 4 USB 2.0

## 1.2 Specifications

- **CPU**
  - LGA1151 Socket for 6<sup>th</sup> and 7<sup>th</sup> Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors.
- **Chipset**
  - Intel® H110/Q170.
- **BIOS**
  - AMI BIOS via SPI interface
- **System Memory**
  - Two 288-pin LONG-DIMM sockets.
  - Maximum up to 32GB DDR4 memory.
  - Support 2133MHz.
- **Onboard Multi I/O**
  - Controller: ITE8786.
  - One PS/2 keyboard and mouse.
  - Six serial ports:
    - COM1 supports RS-232/422/485; COM2~COM6 support RS-232 only.
    - COM1~COM2 on the rear I/O; COM3~COM6 in box headers.
- **USB Interface**
  - Four USB 3.0 ports (on the rear I/O).
  - Four USB 2.0 ports (internal).
- **Ethernet**
  - LAN1: 1000/100/10Mbps Gigabit/Fast Ethernet support Wake-on-LAN, PXE with Intel® i219LM.
  - LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet PXE with Intel® i211AT.
- **Serial ATA**
  - Three SATA 3.0 port (6Gb/s).
  - One mSATA slot.
- **Audio**
  - Realtek ALC662 5.1 channel HDA codec.
  - Support MIC-in/line-out.
- **Display**
  - One 15-pin D-Sub as VGA connector. Resolution max. up to 1920x1200.
  - One HDMI with resolution max. up to 3840x2160 @30Hz or 2560x1600 @60Hz.
  - One DisplayPort with resolution max. up to 4096x2304 @60Hz.
  - One 24-bit dual channel LVDS and one 8-pin inverter connector. LVDS resolution is max. up to 1920x1200.
  - One Embedded DisplayPort (eDP) with resolution max. up to 4096x2304 @60Hz; co-layout with LVDS.
- **Expansion Interface**
  - One PCI-Express x16 slot.
  - One PCI-Express Mini Card.
  - One SIM card slot.



- **Power Input**
  - One ATX power input connector.
  - One 12V ATX power input connector for CPU Power.
- **Operating Temperature**
  - 0°C ~60°C.
- **Storage Temperature**
  - -20°C ~60°C.
- **Form Factor**
  - Mini ITX (6.7" x 6.7", 17.0cm x 17.0cm).



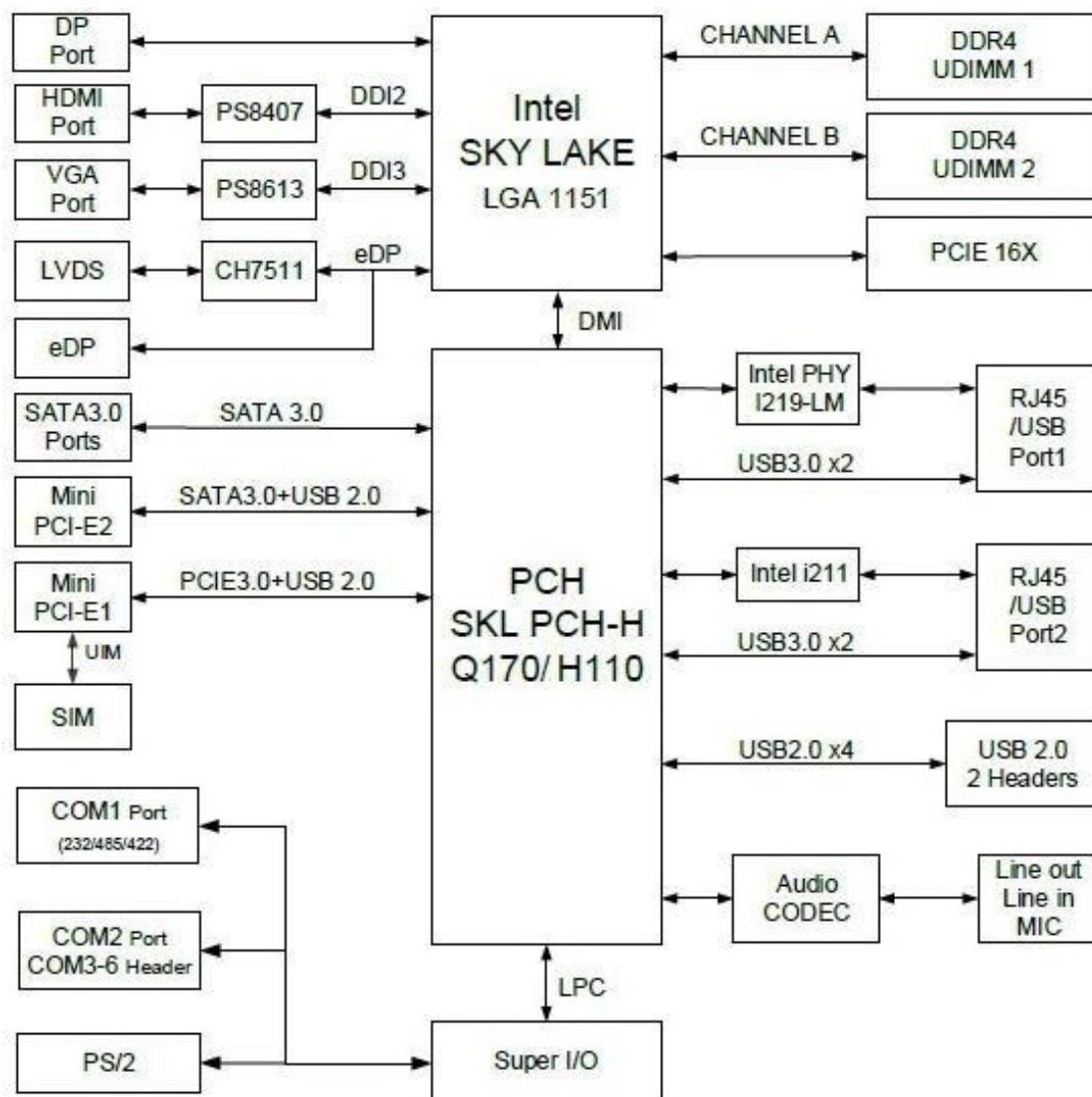
**Note**

*All specifications and images are subject to change without notice.*

## 1.3 Utilities Supported

- Chipset driver
- Ethernet driver
- Graphics driver
- Audio driver

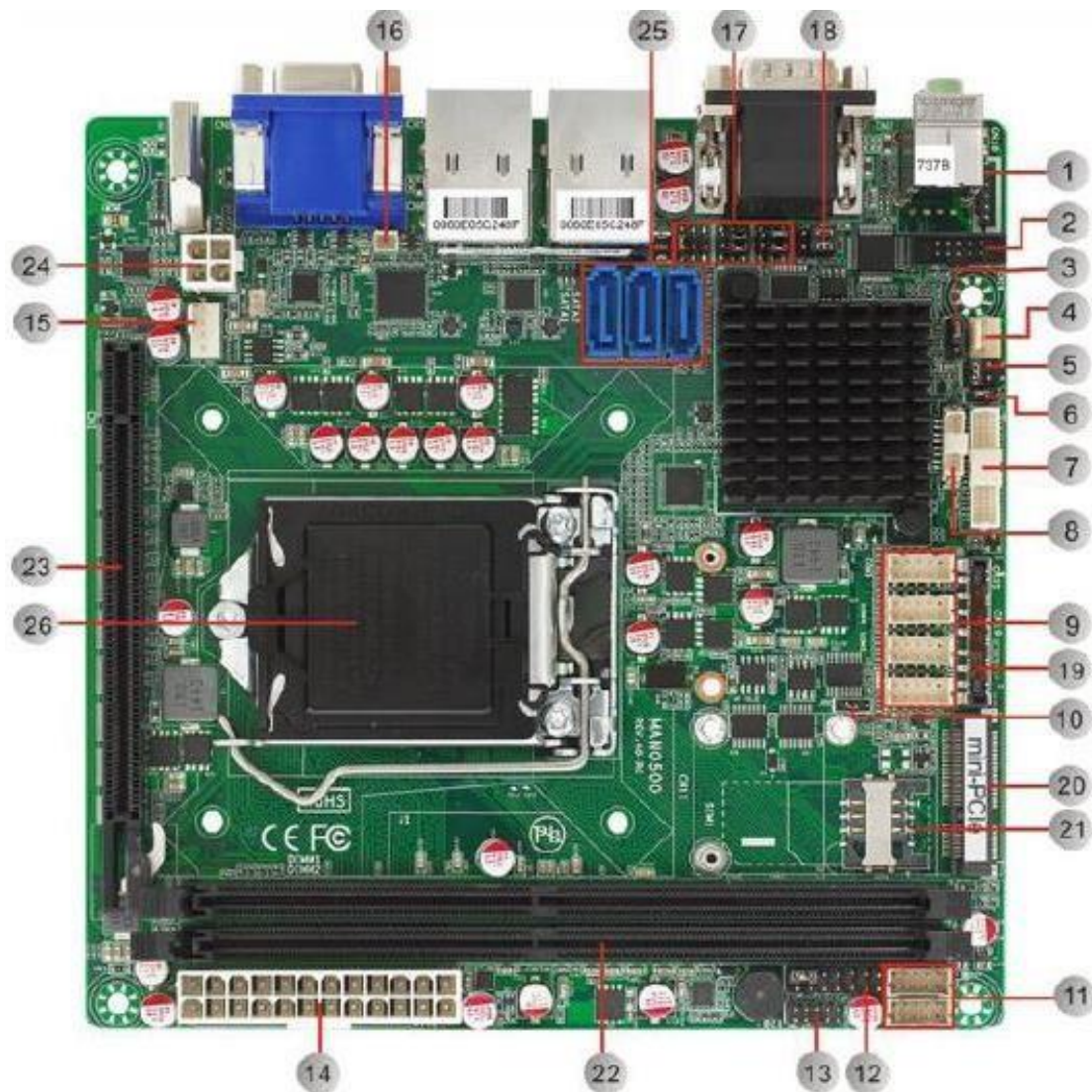
## 1.4 Block Diagram



# Chapter 2

## Board and Pin Assignments

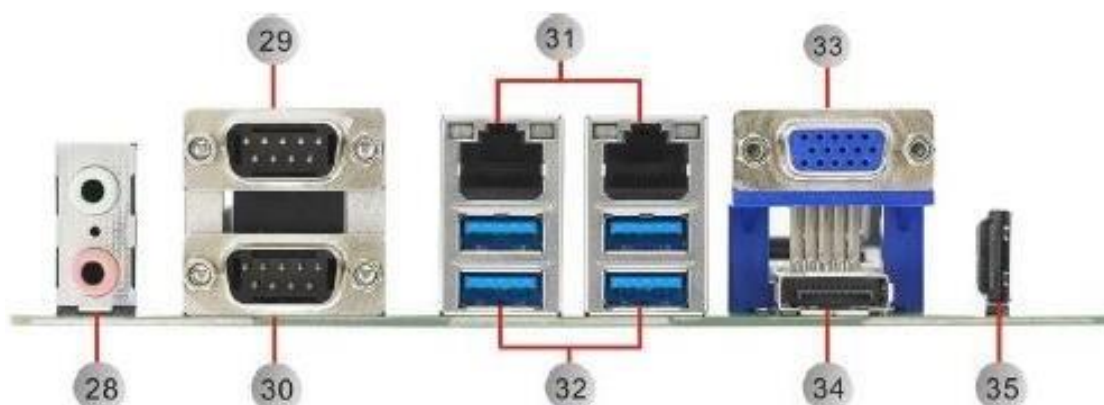
### 2.1 Board Layout







## 2.2 Rear I/O



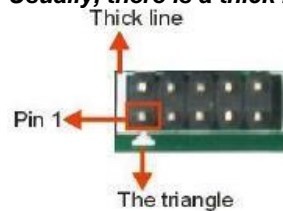
Jumpers/Headers/Connectors			
1	Keyboard and Mouse Header (CN18)	18	COM1 Data/Power Select Jumper (JP6)
2	Front Audio Header (CN16)	19	eDP Connector (CN19)
3	Clear CMOS Jumper (JP1)	20	PCI-Express Mini Card Connector (CN11)
4	System Fan Connector (SYS_FAN1)	21	SIM Card Slot (SIM1)
5	LVDS VDD Select Jumper (JP7)	22	DDR4 LONG-DIMM Sockets (DIMM1, DIMM2)
6	LVDS Backlight PWM/CCFL Select Jumper (JP8)	23	PCI-Express x16 Slot (CN1)
7	LVDS Signal Header (CN9)	24	ATX1 Power Input Connector (ATX1)
8	LVDS Backlight Control Header (CN17)	25	SATA 3.0 Connectors (SATA1~SATA3)
9	COM3~COM6 Headers (COM3~COM6)	26	CPU Socket
10	AT/ATX Power Mode Select Jumper (JP2)	27	mSATA Slot (CN12)
11	USB 2.0 Wafers (CN13, CN14)	28	Audio Jack (CN2)
12	Front Panel Header (CN10)	29, 30	COM1 and COM2 Connector (CN7)
13	GPIO Header (CN15)	31	LAN Connectors (CN3, CN4)
14	ATX2 Power Input Connector (ATX2)	32	USB 3.0 Connectors (CN3, CN4)
15	CPU Fan Connector (CPU_FAN1)	33	VGA Connector (CN6)
16	CMOS Battery Connector (BAT1)	34	DisplayPort Connector (CN5)
17	COM1 RS-232/422/485 Mode Select Jumpers (JP3~JP5)	35	HDMI Connector (CN8)



Note

To identify the first pin of a header or jumper, please refer to the following information:

- Usually, there is a thick line or a triangle near the header or jumper pin 1.



- Square pad, which you can find on the back of the motherboard, is usually used for pin 1.



## 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. The following illustration shows how to set up jumper.

jumper clip



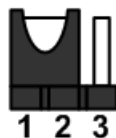
open



close



pin 1-2 close



all open



Before applying power to MANO500 Series, please make sure all of the jumpers are in factory default position. Below you can find a summary table of all jumpers 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	Clear CMOS Default: Normal Operation	1-2 Close
JP2	AT/ATX Power Mode Select Default: ATX Mode	1-2 Close
JP3	COM1 RS-232/422/485 Mode Select Default: RS-232	1-2 Close
JP4		3-5, 4-6 Close
JP5		3-5, 4-6 Close
JP6	COM1 Data/Power Select Default: RS-232 Data	CN7 Pin 1: DCD 3-5 Close
		CN7 Pin 9: RI 4-6 Close
JP7	LVDS VDD Select Default: +3.3V	1-2 Close
JP8	LVDS Backlight PWM/CCFL Select Default: PWM	1-2 Close

### 2.3.1 Clear CMOS (JP1)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper clip from pins 1-2 (default) to pins 2-3. Keep the clip on pins 2-3 for about 5~10 seconds, then move the clip back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

Function	Setting
Normal operation (Default)	1-2 close
Clear CMOS	2-3 close



### 2.3.2 AT/ATX Power Mode Select (JP2)

This 3x1-pin p=2.54mm jumper allows you to select AT or ATX power mode.

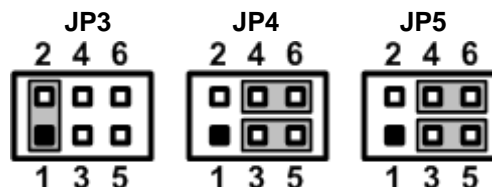
Function	Setting
ATX mode (Default)	1-2 close
AT mode	2-3 close



### 2.3.3 COM1 RS-232/422/485 Mode Select (JP3, JP4, JP5)

Use these jumpers (3x2-pin p=2.54mm) to set COM1 port to operate in RS-232, RS-422 or RS-485 communication mode.

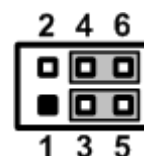
Function	Setting
RS-232 mode (Default)	JP3 1-2 close JP4 3-5, 4-6 close JP5 3-5, 4-6 close
RS-422 mode	JP3 3-4 close JP4 1-3, 2-4 close JP5 1-3, 2-4 close
RS-485 mode	JP3 5-6 close JP4 1-3, 2-4 close JP5 1-3, 2-4 close



### 2.3.4 COM1Data/Power Select (JP6)

The COM1 port has +5V power capability on DCD and +12V on RI by setting this jumper (3x2-pin p=2.54mm).

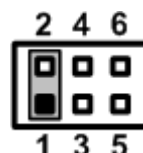
Function	Setting
Power: Set COM1 pin 1 to +5V	1-3 close
Data: Set COM1 pin 1 to DCD (Default)	3-5 close
Power: Set COM1 pin 9 to +12V	2-4 close
Data: Set COM1 pin 9 to RI (Default)	4-6 close



### 2.3.5 LVDS VDD Select (JP7)

This motherboard supports voltage selection for flat panel displays. Use this 3x2-pin p=2.54mm jumper to set up VDD power of the LVDS connector. To prevent hardware damage, before connecting please make sure that the input voltage of LVDS panel is correct.

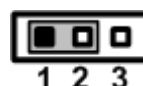
Function	Setting
+3.3V (Default)	1-2 close
+5V	3-4 close
+12V	5-6 close



### 2.3.6 LVDS Backlight PWM/CCFL Select (JP8)

This 3x1-pin p=2.54mm jumper enables you to select PWM or voltage control mode for LVDS backlight control header (CN17). These two control modes are for adjusting the brightness of LVDS panel.

Function	Setting
Controlled by PWM (Default)	1-2 close
Controlled by DC Voltage	2-3 close





## 2.4 Connectors

Signals go to 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 showing connectors on the hardware.

Connector	Description
CN1	PCI-Express x16 Slot
CN2	Audio Jack
CN3, CN4	LAN and USB 3.0 Connectors
CN5	DisplayPort Connector
CN6	VGA Connector
CN7	COM1 and COM2 Connector
CN8	HDMI Connector
CN9	LVDS Signal Header
CN10	Front Panel Header
CN11	PCI-Express Mini Card Connector
CN12	mSATA Slot
CN13, CN14	USB 2.0 Wafers
CN15	GPIO Header
CN16	Front Audio Header
CN17	LVDS Backlight Control Header
CN18	Keyboard and Mouse Header
CN19	eDP Connector
BAT1	CMOS Battery Connector
ATX1	ATX1 Power Input Connector
ATX2	ATX2 Power Input Connector
COM3~COM6	COM3~COM6 Headers
CPU_FAN1	CPU Fan Connector
SYS_FAN1	System Fan Connector
SIM1	SIM Card Slot
SATA1~SATA3	SATA 3.0 Connectors
DIMM1~DIMM2	DDR4 LONG-DIMM Sockets

### 2.4.1 Audio Jack (CN2)

The motherboard provides HD audio jack on the rear I/O. Install audio driver, and then attach audio devices to CN2.

Pin Color	Signal
Green	Line-out
Pink	MIC-in

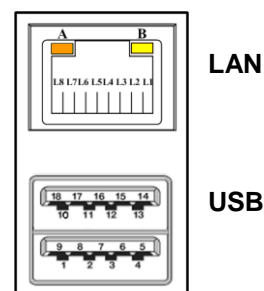


### 2.4.2 LAN and USB 3.0 Connectors (CN3 and CN4)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10 Base-T hub.

The Universal Serial Bus (compliant with USB 3.0) connectors on the rear I/O are for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
A	Speed LED	B	Active LED



Note

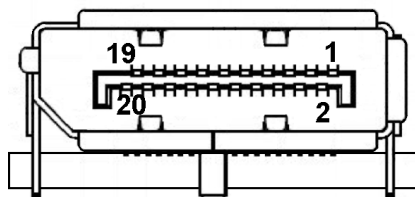
- Speed LED turns orange for 1000Mbps or green for 100Mbps.
- CN3 supports AMT when chipset is customized into Intel® Q170 and Wake-on-LAN.

Pin	USB Signal	Pin	USB Signal
1	USB3_POWER	2	USB -
3	USB +	4	GND
5	USB3_SSRX	6	USB3_SSRX+
7	GND	8	USB3_SSTX
9	USB3_SSTX+		

### 2.4.3 DisplayPort Connector (CN5)

The DisplayPort interface is available through CN5.

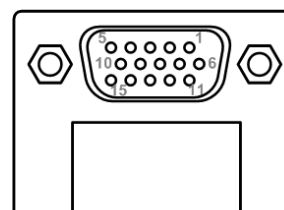
Pin	Signal
1	DP_TX0_P
2	GND
3	DP_TX0_N
4	DP_TX1_P
5	GND
6	DP_TX1_N
7	DP_TX2_P
8	GND
9	DP_TX2_N
10	DP_TX3_P
11	GND
12	DP_TX3_N
13	GND
14	GND
15	DP_AUXP
16	GND
17	DP_AUXN
18	DP_HPD
19	GND
20	+3.3V



### 2.4.4 VGA Connector (CN6)

The CN6 is a high rise 15-pin D-Sub connector which is commonly used for VGA display. This VGA interface configuration can be configured via software utility.

Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	NC
5	GND	6	DETECT
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



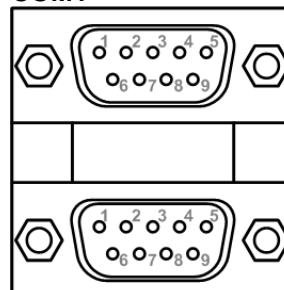
## 2.4.5 COM Connector (CN7)

The CN7 is a double-deck DB-9 connector for COM1 and COM2 serial port interfaces where only COM1 is selectable for RS-232/422/485 mode by jumper settings (see section 2.3.3). The pin assignments of RS-232/422/485 are listed in table below.

### COM1:

Pin	RS-232	RS-422	RS-485
1	DCD# <sup>[1]</sup>	TX-	485-
2	RXD	TX+	485+
3	TXD	RX+	N/C
4	DTR#	RX-	N/C
5	GND	GND	GND
6	DSR#	N/C	N/C
7	RTS#	N/C	N/C
8	CTS#	N/C	N/C
9	RI# <sup>[1]</sup>	N/C	N/C

### COM1



### COM2



**Note**

<sup>[1]</sup>: Pin 1 of COM1 can be DCD/+5V and pin 9 of COM1 can be RI/+12V by selecting JP6 (see section 2.3.4).

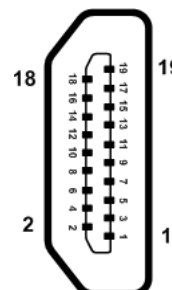
### COM2:

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

## 2.4.6 HDMI Connector (CN8)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

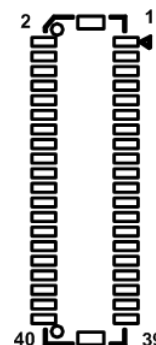
Pin	Signal	Pin	Signal
1	HDMI OUT_DATA2+	2	GND
3	HDMI OUT_DATA2-	4	HDMI OUT_DATA1+
5	GND	6	HDMI OUT_DATA1-
7	HDMI OUT_DATA0+	8	GND
9	HDMI OUT_DATA0-	10	HDMI OUT_Clock+
11	GND	12	HDMI OUT_Clock-
13	N/C	14	GND
15	HDMI OUT_SCL	16	HDMI OUT_SDA
17	GND	18	+5V
19	HDMI_HTPLG		



## 2.4.7 LVDS Signal Header (CN9)

This motherboard has a 20x2-pin p=1.00mm header for LVDS panel interface.

Pin	Signal	Pin	Signal
1	VDD <sup>[1]</sup>	2	VDD <sup>[1]</sup>
3	VDD <sup>[1]</sup>	4	VDD <sup>[1]</sup>
5	VDD <sup>[1]</sup>	6	VDD <sup>[1]</sup>
7	N/C	8	N/C
9	GND	10	GND
11	LVDS_B_DATA3-	12	LVDS_B_DATA0-
13	LVDS_B_DATA3+	14	LVDS_B_DATA0+
15	GND	16	GND
17	LVDS_B_CLK-	18	LVDS_B_DATA1-
19	LVDS_B_CLK +	20	LVDS_B_DATA1+
21	GND	22	GND
23	LVDS_A_DATA0-	24	LVDS_B_DATA2-
25	LVDS_A_DATA0+	26	LVDS_B_DATA2+
27	GND	28	GND
29	LVDS_A_DATA1-	30	LVDS_A_DATA3-
31	LVDS_A_DATA1+	32	LVDS_A_DATA3+
33	LVDS_PRSENT#(Detect) <sup>[2]</sup>	34	GND
35	LVDS_A_DATA2-	36	LVDS_A_CLK-
37	LVDS_A_DATA2+	38	LVDS_A_CLK +
39	GND	40	GND



Note

- **CN9 is co-layout with eDP connector (CN19); they can't be accessed simultaneously.**
- **LVDS header P/N (CN9): GEAN-LEA electronic GLA1001WV-S-2x20.**

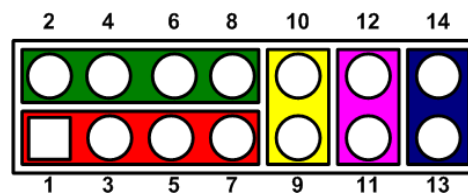
<sup>[1]</sup>: Panel power VDD is 3.3V by default, 5V or 12V is selectable by jumper JP7, see section 2.3.5.

<sup>[2]</sup>: Grounding of this pin is required to ensure normal LVDS output.

## 2.4.8 Front Panel Header (CN10)

This is front panel header (7x2-pin p=2.54mm).

Pin	Signal
1	Power LED+
2	SPK- <sup>[1]</sup>
3	GND
4	BUZZER-
5	Power LED-
6	N/C
7	N/C
8	SPK+ <sup>[1]</sup>
9	PWR-
10	PWR+
11	RESET-
12	RESET+
13	HD LED-
14	HD LED+



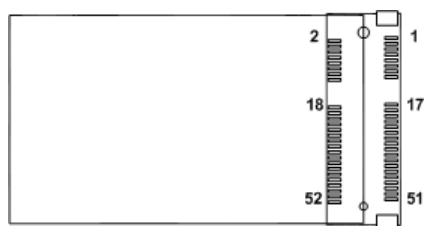
**Note**

<sup>[1]</sup>: The buzzer on motherboard will be active when pin 2 and pin 4 is connected; the external speaker on chassis will be active when pin 2 and pin 4 is open.

## 2.4.9 PCI-Express Mini Card Connector (CN11)

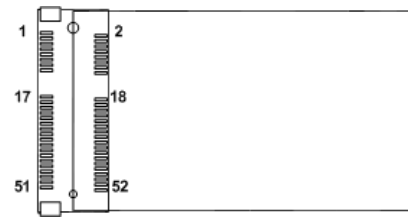
The CN11 complies with PCI-Express Mini Card Spec. V1.2.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VAUX
3	N/C	4	GND
5	N/C	6	+1.5V
7	+3.3VAUX	8	UIM_PWR
9	GND	10	UIM_DAT
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_REST
15	GND	16	UIM_VPP
17	N/C	18	GND
19	N/C	20	W_DISABLE#
21	GND	22	PERST#
23	PERN0	24	+3.3VAUX
25	PERP0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETN0	32	SMB_DATA
33	PETP0	34	GND
35	GND	36	USB_10-
37	GND	38	USB_10+
39	+3.3VAUX	40	GND
41	+3.3VAUX	42	N/C
43	GND	44	N/C
45	CL_CLK	46	N/C
47	CL_DATA	48	+1.5V
49	CL_RST_N	50	GND
51	N/C	52	+3.3VAUX



### 2.4.10 mSATA Slot (CN12)

Pin	Signal	Pin	Signal
1	N/C	2	+3.3VAUX
3	N/C	4	GND
5	N/C	6	+1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	N/C	12	N/C
13	N/C	14	N/C
15	GND	16	N/C
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	PERST#
23	SATA0_RX_DP	24	+3.3VAUX
25	SATA0_RX_DN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	SATA0_TX_DN	32	SMB_DATA
33	SATA0_TX_DP	34	GND
35	GND	36	USB_9-
37	GND	38	USB_9+
39	+3.3VAUX	40	GND
41	+3.3VAUX	42	N/C
43	GND	44	N/C
45	N/C	46	N/C
47	N/C	48	+1.5V
49	N/C	50	GND
51	N/C	52	+3.3VAUX

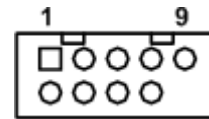




### 2.4.11 USB 2.0 Wafers (CN13 and CN14)

These are 5x2-pin p=2.00mm headers for USB 2.0 interface.

Pin	CN13 Signal	Pin	CN13 Signal
1	+5V	2	+5V
3	USB5-	4	USB6-
5	USB5+	6	USB6+
7	GND	8	GND
9	N/C		

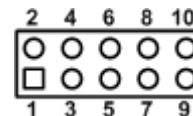


Pin	CN14 Signal	Pin	CN14 Signal
1	+5V	2	+5V
3	USB7-	4	USB8-
5	USB7+	6	USB8+
7	GND	8	GND
9	N/C		

### 2.4.12 GPIO Header (CN15)

This header (5x2-pin p=2.54mm) is for digital I/O interface.

Pin	Signal	Pin	Signal
1	SIO_GPO74 (0xA06 Bit4, H) <sup>[1]</sup>	2	SIO_GPI70 (0xA06 Bit0, H)
3	SIO_GPO75 (0xA06 Bit5, H)	4	SIO_GPI71 (0xA06 Bit1, H)
5	SIO_GPO76 (0xA06 Bit6, H)	6	SIO_GPI72 (0xA06 Bit2, H)
7	SIO_GPO77 (0xA06 Bit7, H)	8	SIO_GPI73 (0xA06 Bit3, H)
9	GND	10	GND



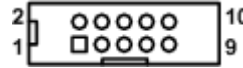
**Note**

<sup>[1]</sup>: “H” or “L” means the default voltage is High or Low level, and GPIO output is 5V.

### 2.4.13 Front Audio Header (CN16)

This is front audio header (5x2-pin p=2.00mm) for convenient connection and control of audio devices.

Pin	Signal	Pin	Signal
1	MIC_IN	2	GND
3	LINE_IN_L	4	GND
5	LINE_IN_R	6	GND
7	AUD_OUT_L	8	GND
9	AUD_OUT_R	10	GND



### 2.4.14 LVDS Backlight Control Header (CN17)

This is an 8x1-pin p=1.25mm header for LVDS backlight control interface.

Pin	Signal
1	+12V
2	+12V
3	+5V
4	LVDS_BKL_EN
5	GND
6	GND
7	GND
8	LVDS_BKL_CTL <sup>[1]</sup>



Note

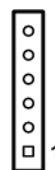
- LVDS backlight control header P/N (CN17): GEAN-LEA electronic GLA1252WV-S-8P.

<sup>[1]</sup>: This signal is selectable by jumper JP8, see section 2.3.6.

### 2.4.15 Keyboard and Mouse Header (CN18)

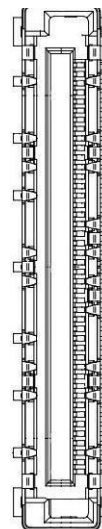
This is a 6x1-pin p=2.00mm header for keyboard and mouse interface.

Pin	Signal	Pin	Signal
1	KB_CLK	2	KB_DATA
3	MS_CLK	4	GND
5	+5V	6	MS_DATA



## 2.4.16 eDP Connector (CN19)

Pin	Signal	Pin	Signal
1	VDD <sup>[1]</sup>	2	VDD <sup>[1]</sup>
3	VDD <sup>[1]</sup>	4	VDD <sup>[1]</sup>
5	VDD <sup>[1]</sup>	6	GND
7	GND	8	GND
9	GND	10	EMB_HPD
11	N/C	12	N/C
13	GND	14	EDP_TXN3C
15	EDP_TXP3_C	16	GND
17	EDP_TXN2_C	18	EDP_TXP2_C
19	GND	20	EDP_TXN1_C
21	EDP_TXP1_C	22	GND
23	EDP_TXN0_C	24	EDP_TXP0_C
25	GND	26	EMB_AUXP
27	EMB_AUXN	28	VSS_EDP_AMOLED
29	+3.3V	30	N/C
31	VCC_EDP_BKLT	32	VSS_EDP_AMOLED
33	GND	34	+5V
35	N/C	36	EDP_BKLTCTL
37	EDP_BKLTEN	38	VCC_EDP_BKLT
39	+3.3V	40	GND
41	ISH_I2C0_SCL_R	42	ISH_I2C0_SDA_R
43	+3.3V	44	N/C



**Note**

- **CN19 is co-layout with LVDS signal header (CN9); they can't be accessed simultaneously.**
- **eDP connector P/N: Aces Electronics 50203-40.**

<sup>[1]</sup>: Panel power VDD is 3.3V by default, 5V or 12V is selectable by jumper JP7, see section 2.3.5.

## 2.4.17 CMOS Battery Connector (BAT1)

This connector is for CMOS battery interface.

Pin	Signal
1	GND
2	+3.3V



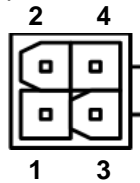
### 2.4.18 Power Input Connectors (ATX1 and ATX2)

Steady and sufficient power can be supplied to all components on the board by connecting power connector. Please make sure all components and devices are properly installed before connecting the power connector.

External power supply plug fits into this connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

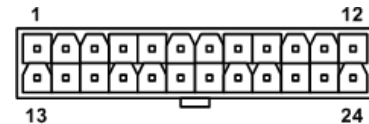
ATX1 is a 4-pin connector for DC +12V power input.

Pin	Signal
1	GND
2	GND
3	+ 12V IN
4	+ 12V IN



ATX2 is a 24-pin connector for DC power input.

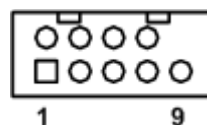
Pin	Signal	Pin	Signal
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	GND



### 2.4.19 COM Headers (COM3~COM6)

The motherboard comes with 5x2-pin p=2.00mm headers for COM3~COM6 serial port interfaces.

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

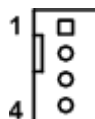


### 2.4.20 Fan Connectors (CPU\_FAN1 and SYS\_FAN1)

This motherboard has two fan connectors. Find fan speed option(s) of CPU\_FAN1 at BIOS Setup Utility: Advanced\HW Monitor\PC Health Status.

CPU\_FAN1 (4x1-pin p=2.54mm):

Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control



SYS\_FAN1 (3x1-pin p=2.54mm):

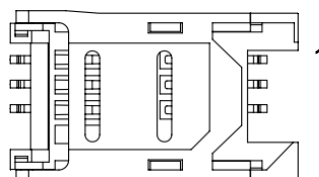
Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection



### 2.4.21 SIM Card Slot (SIM1)

The SIM1 is for inserting SIM Card. It is mainly used in 3G wireless network application. In order to work properly, the SIM Card must be used together with 3G module which is inserted to CN11.

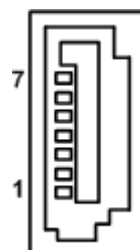
Pin	Signal	Pin	Signal
1	UIM_PWR	7	UIM_VPP
2	UIM_REST	8	GND
3	UIM_CLK	9	GND
4	N/C	10	GND
5	N/C	11	GND
6	UIM_DAT	12	GND



### 2.4.22 SATA 3.0 Connectors (SATA1~SATA3)

This Serial Advanced Technology Attachment (Serial ATA or SATA) connector is for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to devices such as hard disk drive.

Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



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# Chapter 3

## Hardware Description

### 3.1 Microprocessors

The MANO500 Series supports 6<sup>th</sup>/7<sup>th</sup> Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® 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 your installed microprocessor to prevent the CPU from damages.

### 3.2 BIOS

The MANO500 Series uses AMI Plug and Play BIOS with a single SPI Flash.

### 3.3 System Memory

The MANO500 supports two 288-pin DDR4 LONG-DIMM sockets for maximum memory capacity up to 32GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB and 16GB.

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# 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 <Del> during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, 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 JP1 (see section 2.3.1).*

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.



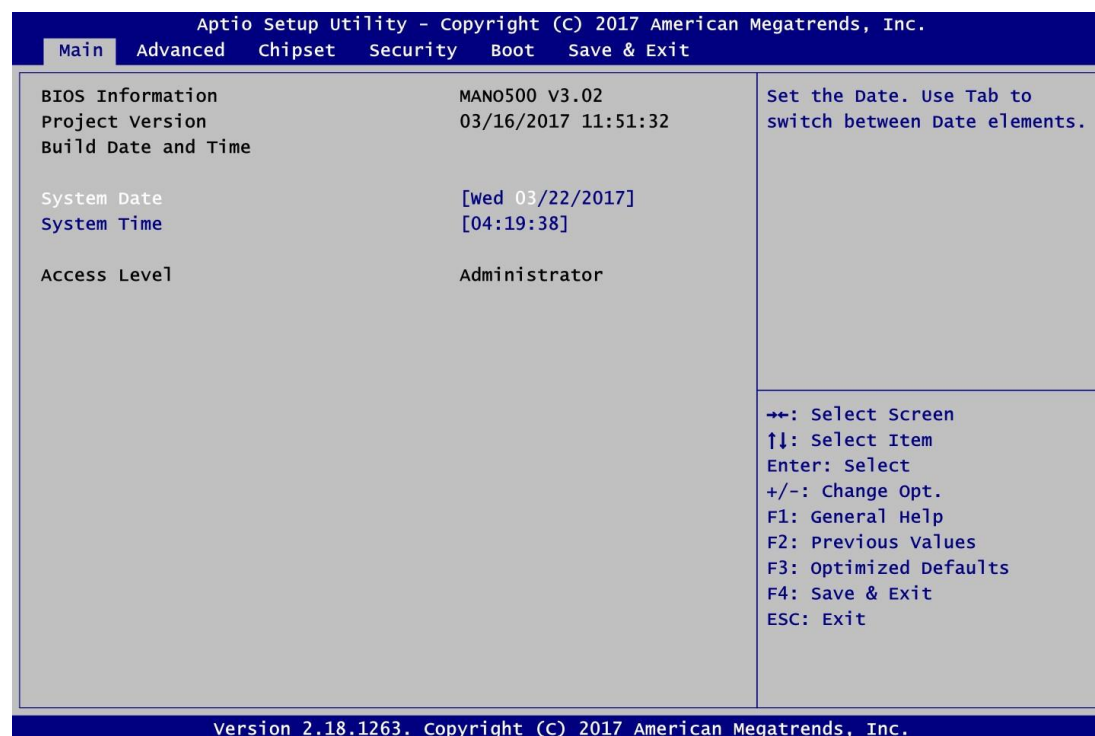
**Note**

*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.
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.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
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.

## 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 the BIOS 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

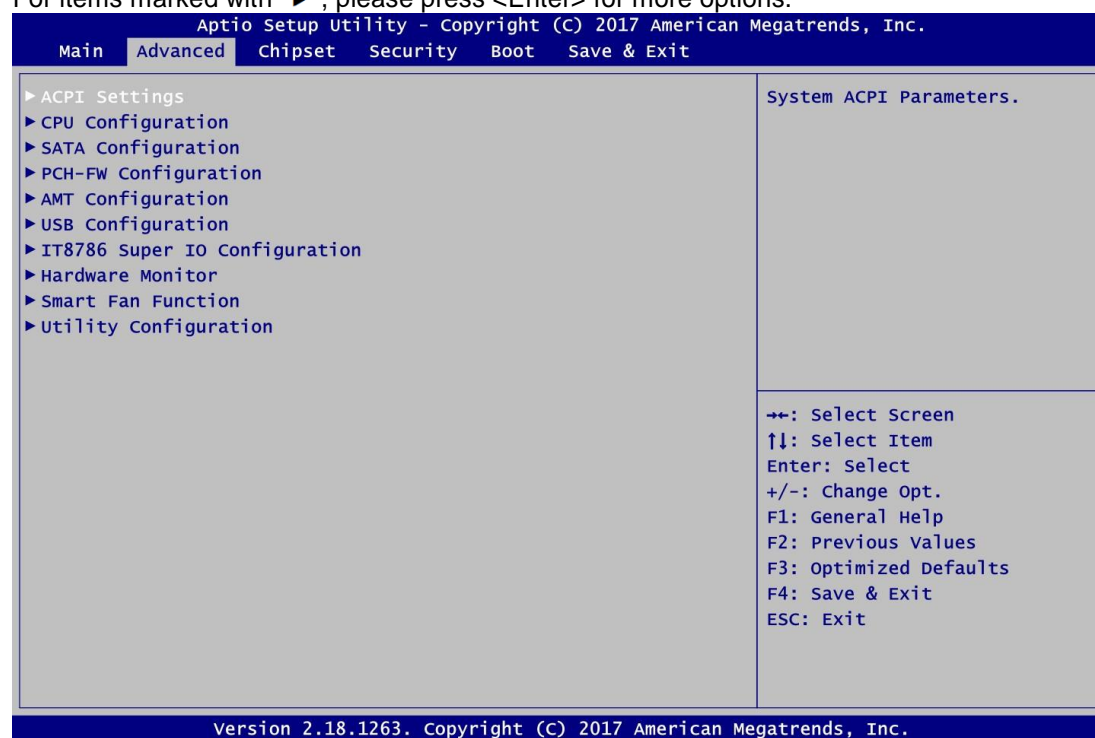
Display the access level of current user.

## 4.4 Advanced Menu

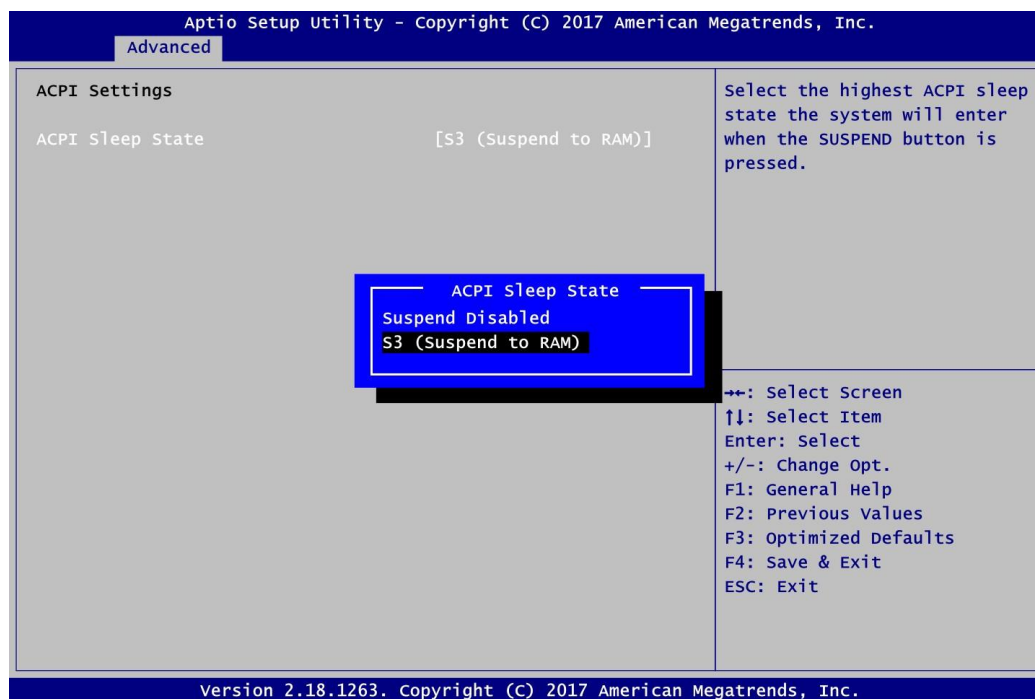
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ ACPI Settings
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration(for Chipset Q170 only)
- ▶ USB Configuration
- ▶ IT8786 Super IO Configuration
- ▶ Hardware Monitor
- ▶ Smart Fan Function
- ▶ Utility Configuration

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



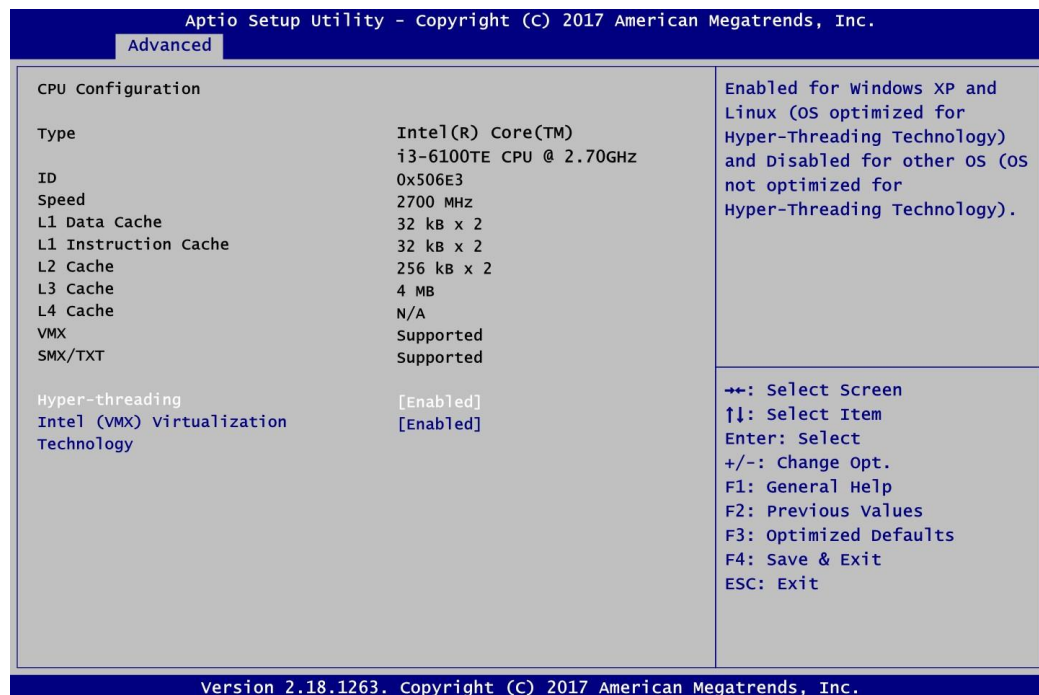
- **ACPI Settings**

**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.

- **CPU Configuration**

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

**Hyper-threading**

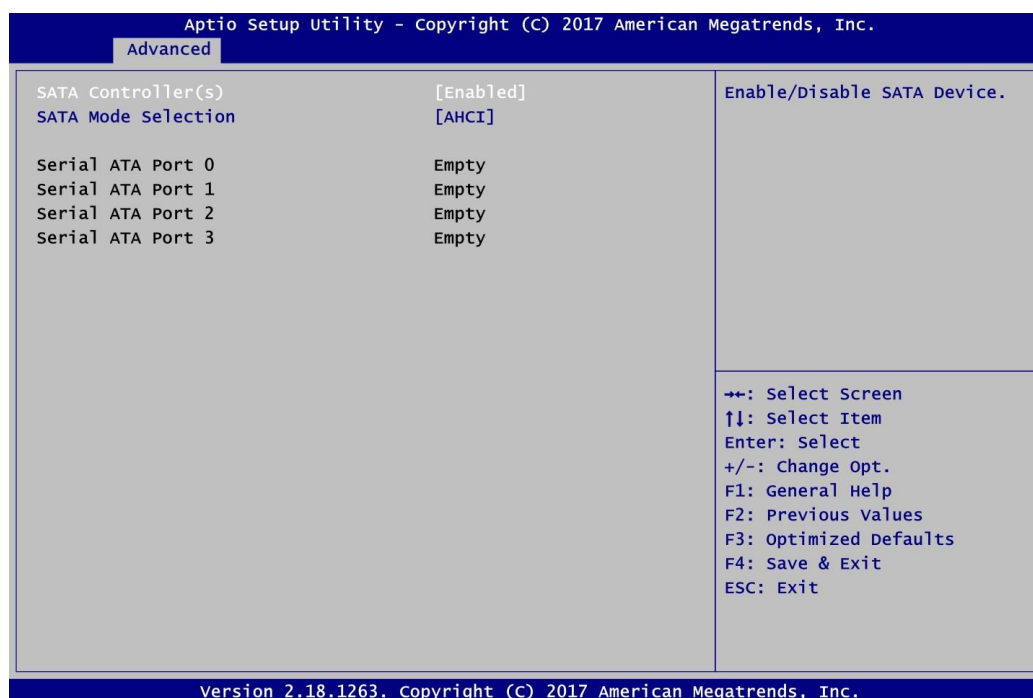
Enable or disable Hyper-threading Technology, which allows a single physical processor to multitask as multiple logical processors. When disabled, only one thread per enabled core is enabled.

**Intel (VMX) Virtualization Technology**

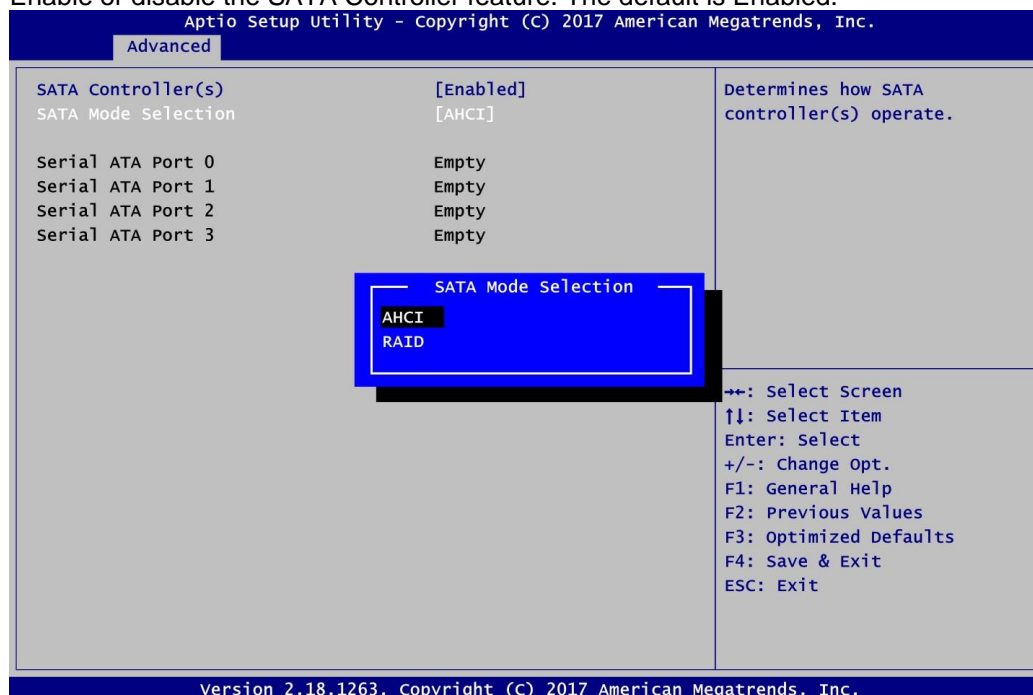
Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

- **SATA Configuration**

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

**SATA Controller(s)**

Enable or disable the SATA Controller feature. The default is Enabled.



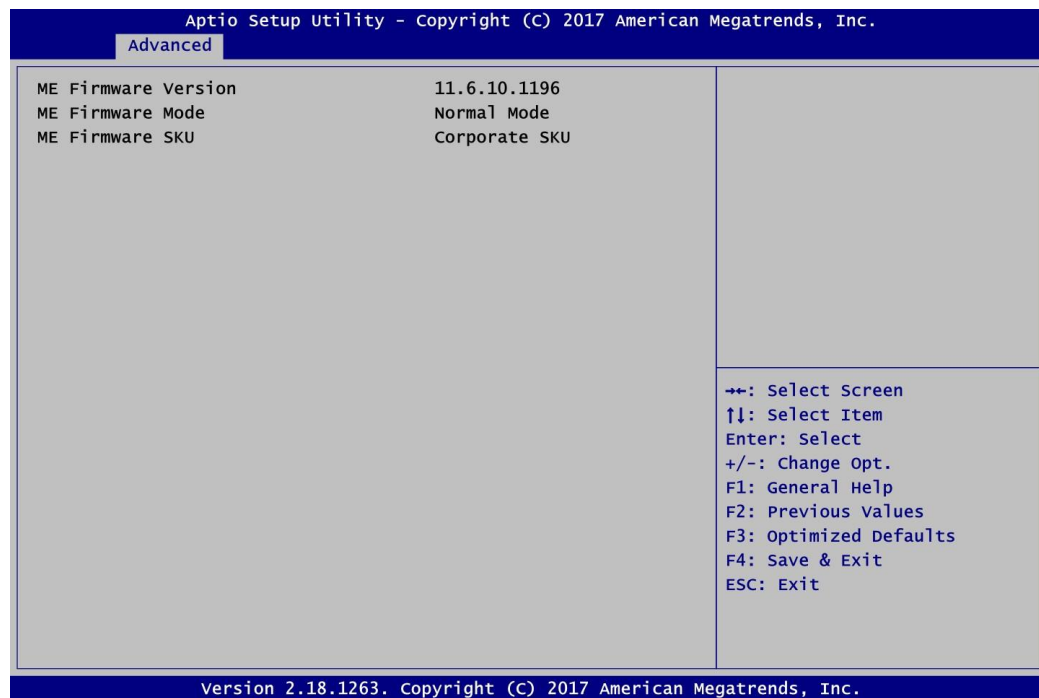
**SATA Mode Selection**

Determine how SATA controller(s) operate. Operation mode options are:

- AHCI (Advanced Host Controller Interface)
- RAID (for Chipset Q170 only)

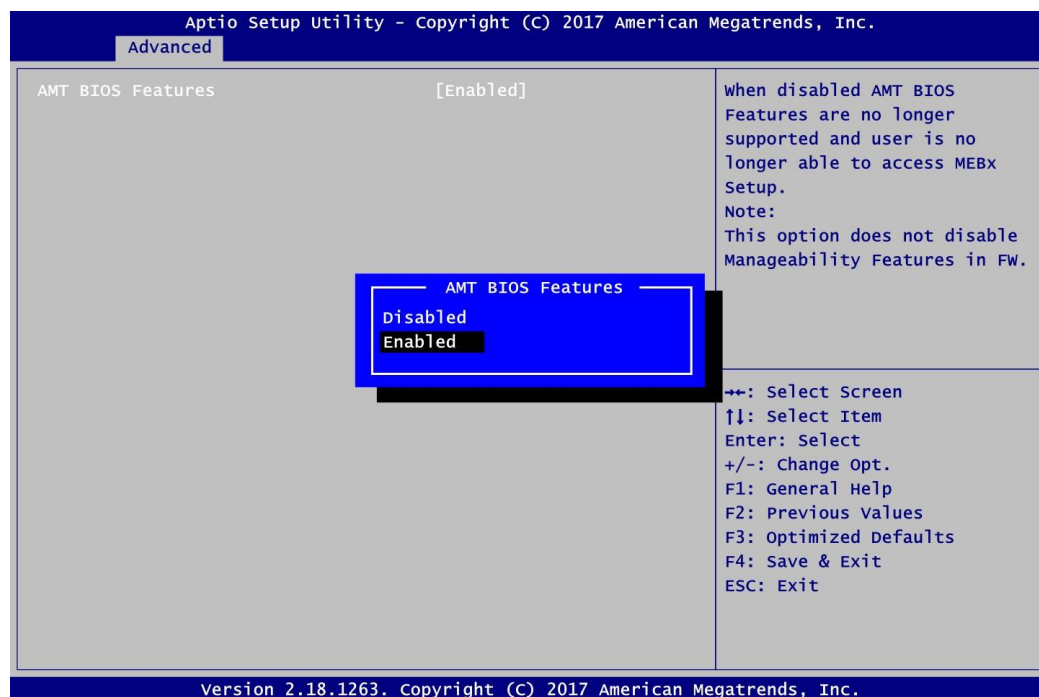
- **PCH-FW Configuration**

This screen displays ME Firmware information.



- **AMT Configuration (for Chipset Q170 only)**

Use this screen to configure AMT parameters.

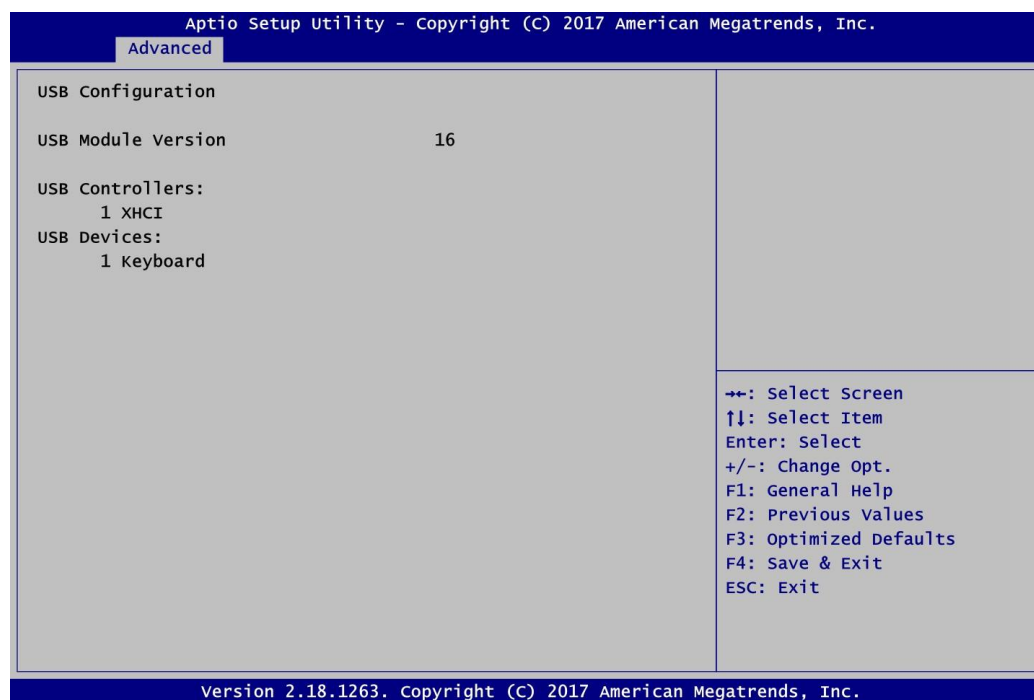




**AMT BIOS Features**

Enable or disable Active Management Technology BIOS features. The default is Enabled.

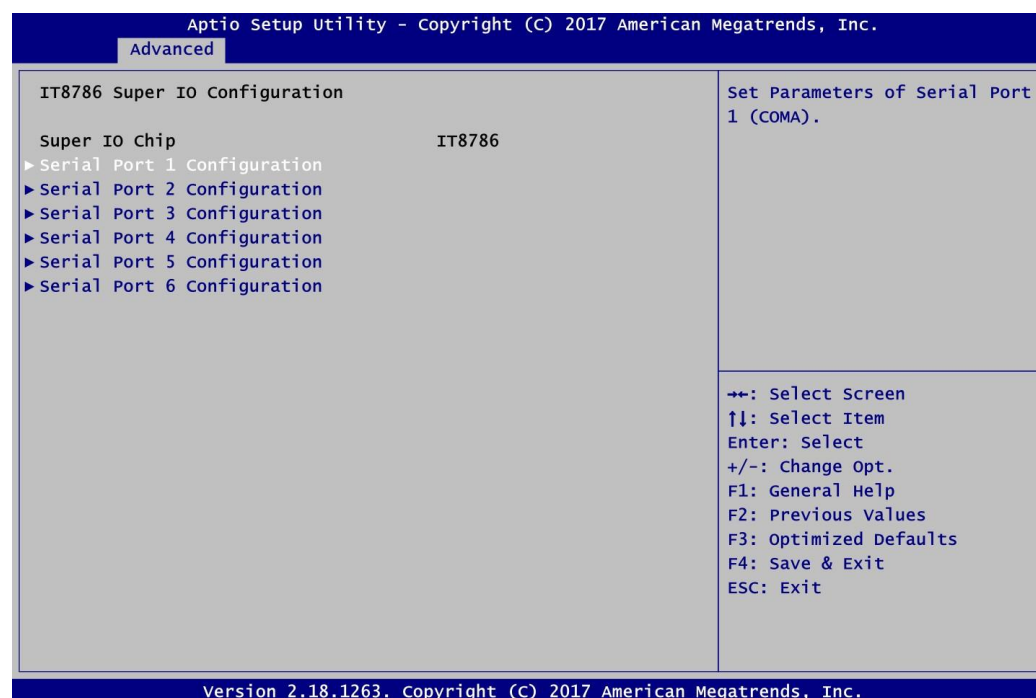
- **USB Configuration**

**USB Devices**

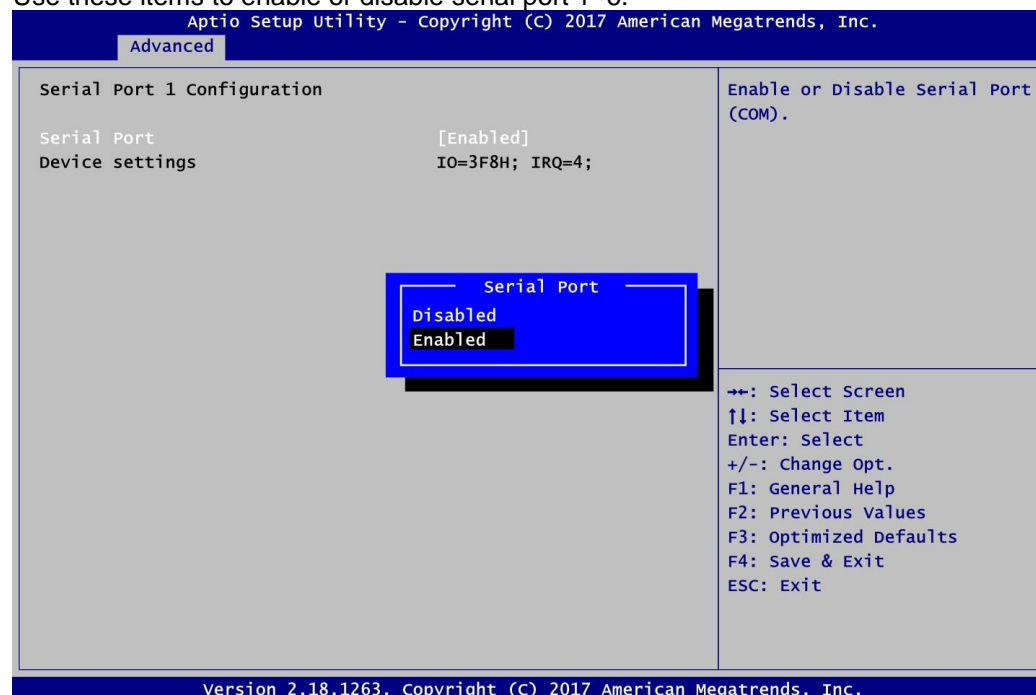
Display all detected USB devices.

- **IT8786 Super IO Configuration**

You can use this screen to select options for the Super IO 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.

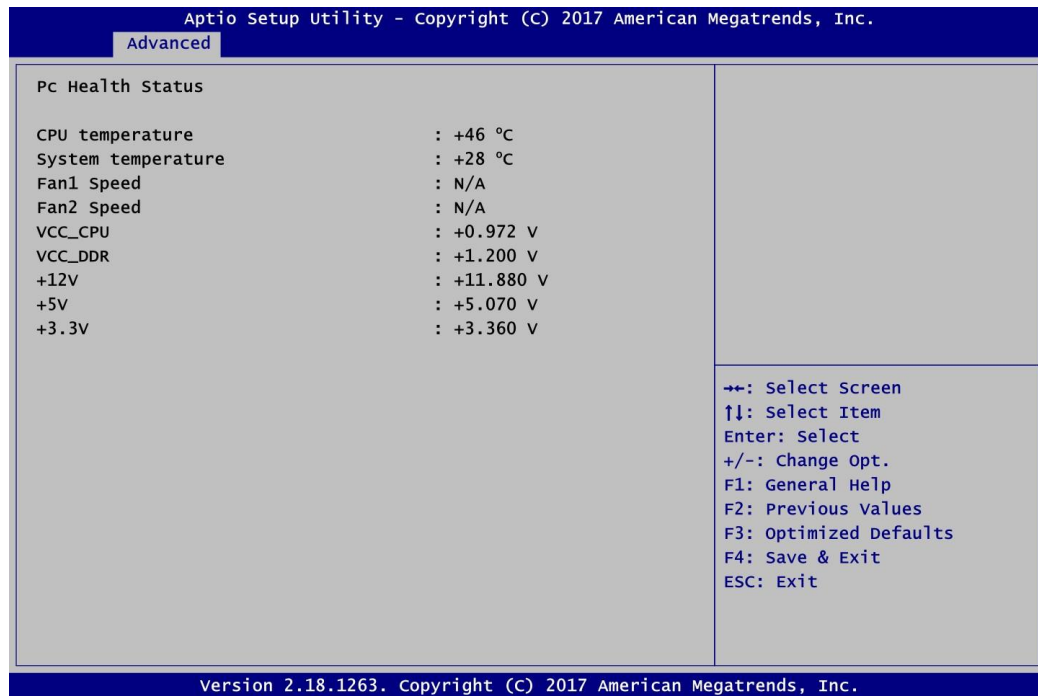
**Serial Port 1~6 Configuration**

Use these items to enable or disable serial port 1~6.



- **Hardware Monitor**

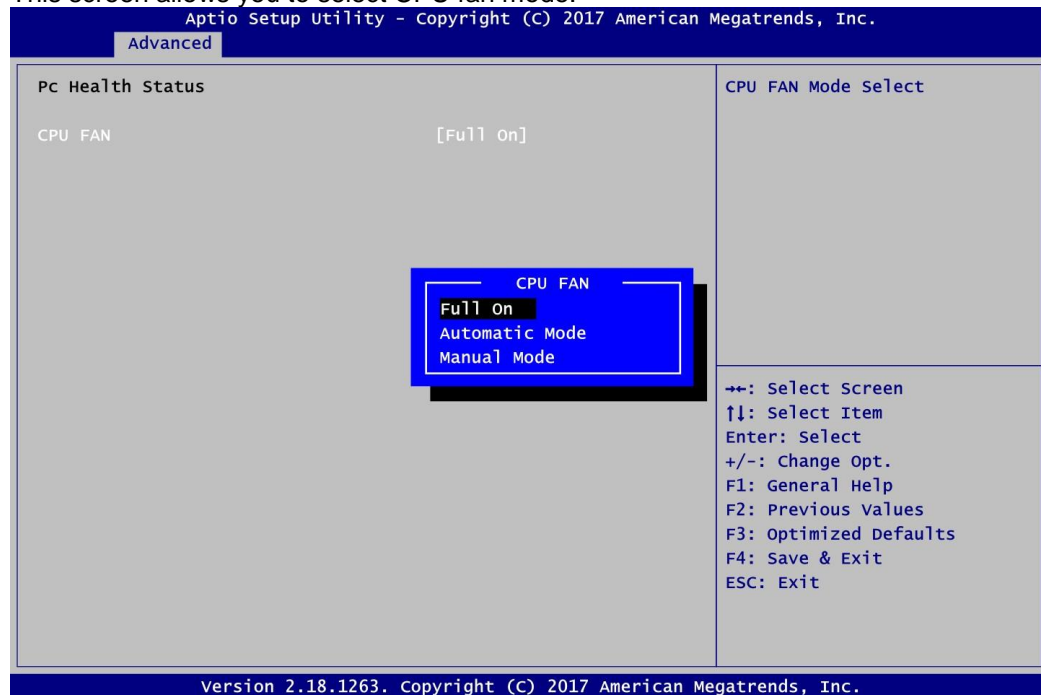
This screen monitors hardware health status.



This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCC\_CPU, VCC\_DDR, +12V, +5V and +3.3V).

- **Smart Fan Function**

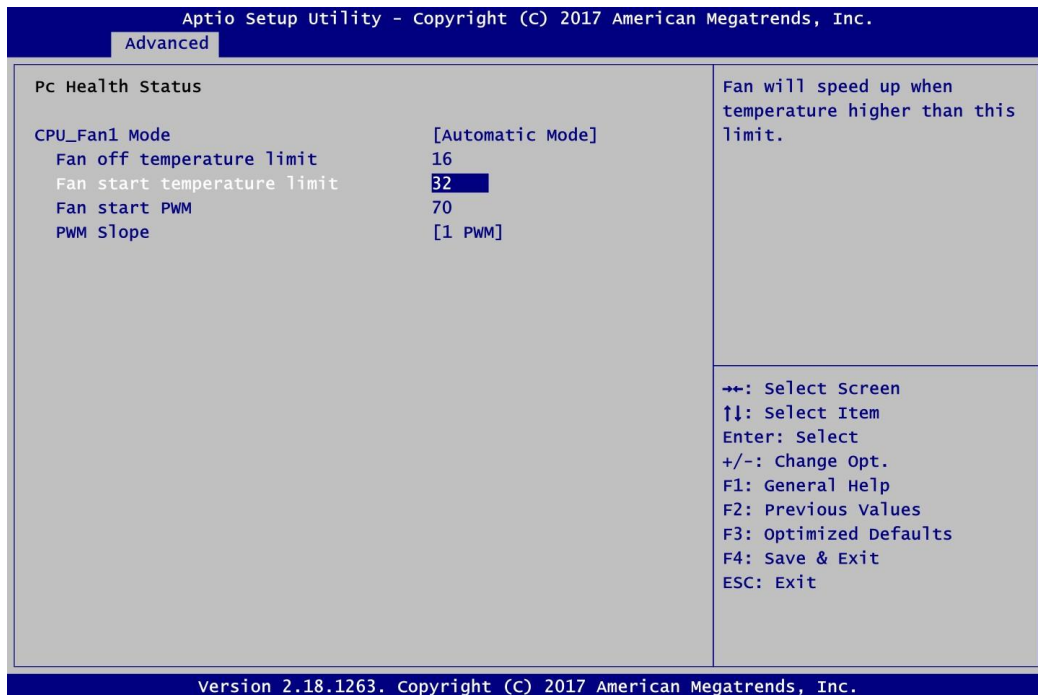
This screen allows you to select CPU fan mode.



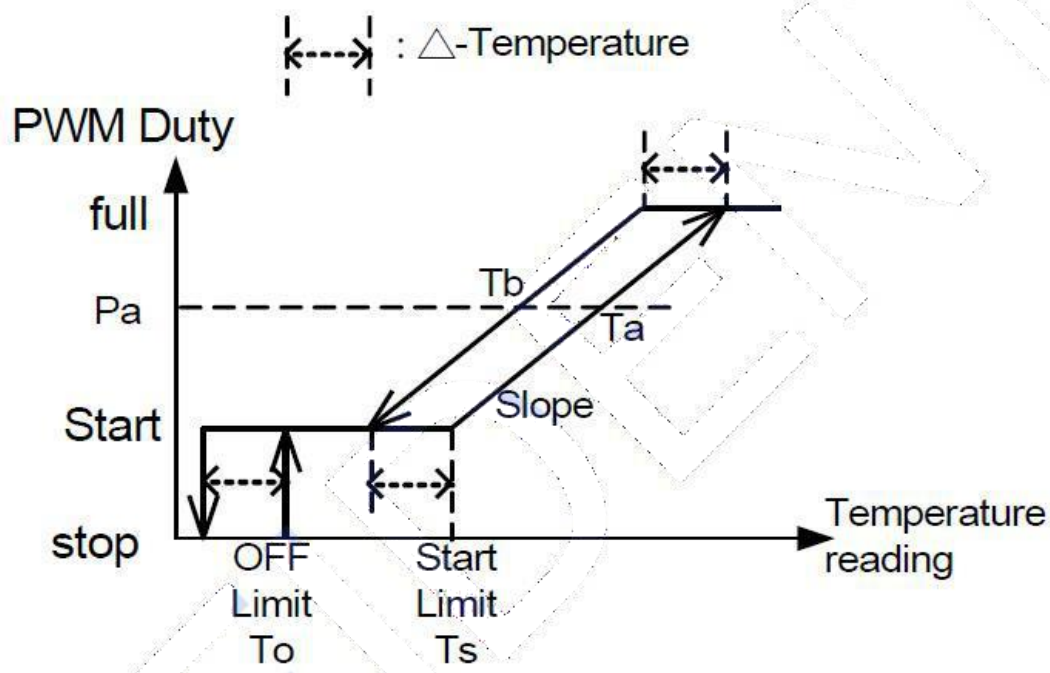
### **CPU FAN**

This item allows you to select the fan speed option(s) of CPU\_FAN1 (See Section 2.4.20) which can be set to Full on, Automatic mode and Manual Mode.

## Automatic mode



Follow super I/O IT8786 integrated automatic mode as the below to adjust the fan speed.

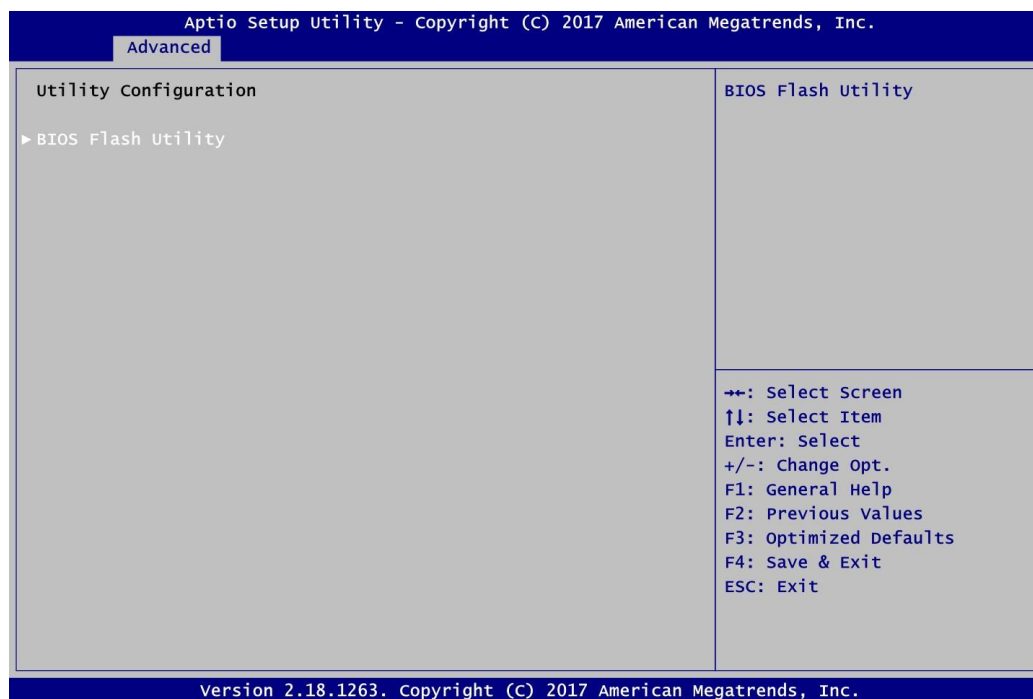


## Manual Mode

Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.	
Advanced	
<p>Pc Health Status</p> <p>CPU_Fan1 Mode [Manual Mode]</p> <p>Fan start PWM 70</p>	<p>Fan will start with this PWM.</p> <p>                     ++: Select Screen                      ↑↓: Select Item                      Enter: Select                      +/-: Change Opt.                      F1: General Help                      F2: Previous Values                      F3: Optimized Defaults                      F4: Save &amp; Exit                      ESC: Exit                 </p>
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.	

Input the Fan Start PWM to fix the fan speed.

- **Utility Configuration**

**BIOS Flash Utility**

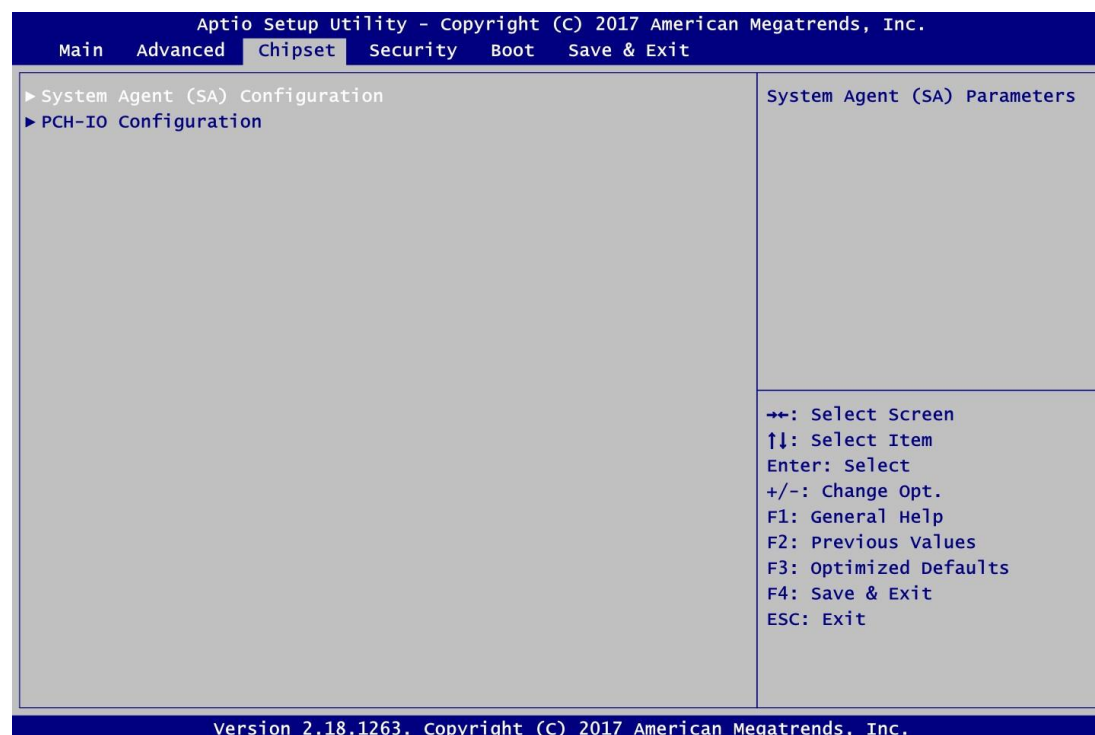
BIOS flash utility configuration. For more detailed information, please refer to Appendix B.

## 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:

- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration

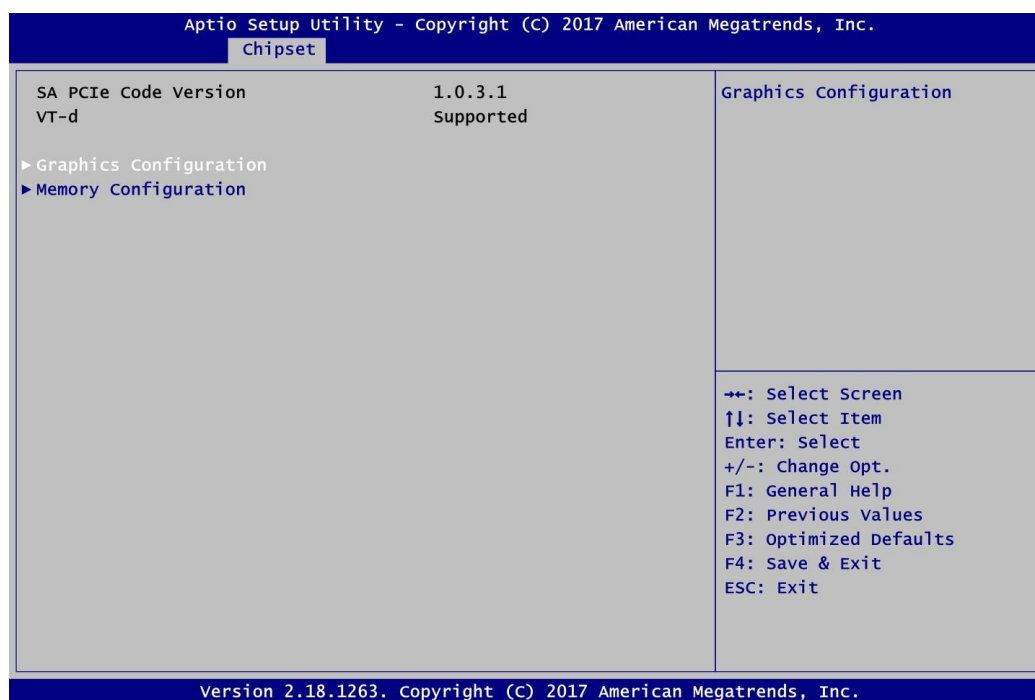
For items marked with “▶”, please press <Enter> for more options.





- **System Agent (SA) Configuration**

This screen allows users to configure System Agent (SA) parameters. For items marked with “▶”, please press <Enter> for more options.

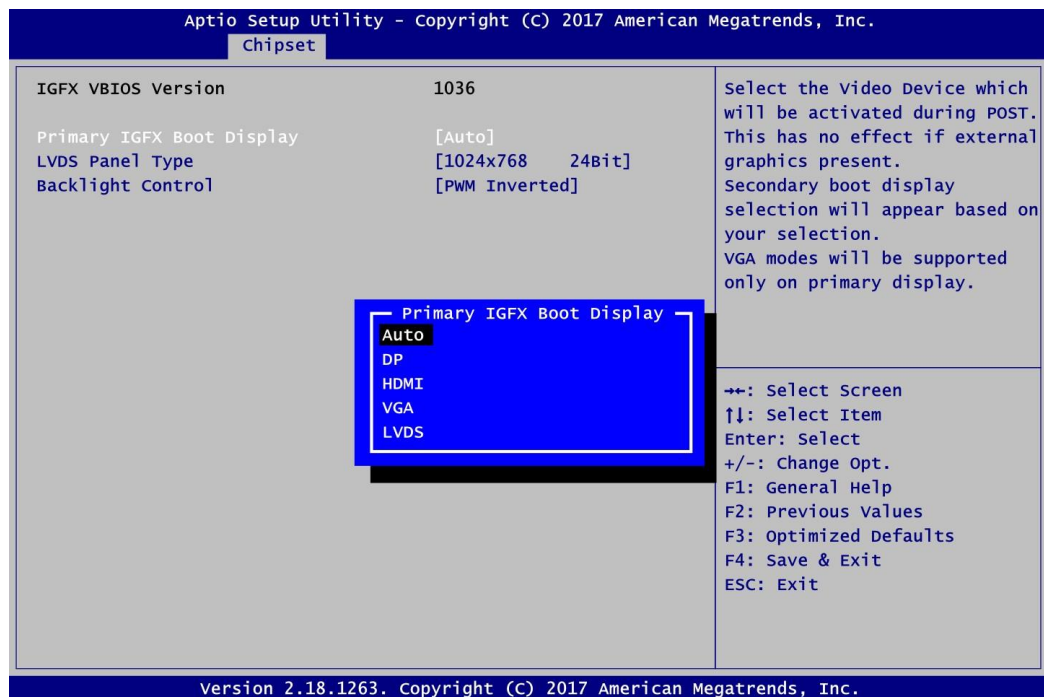
**Graphics Configuration**

Open sub menu for parameters related to graphics configuration.

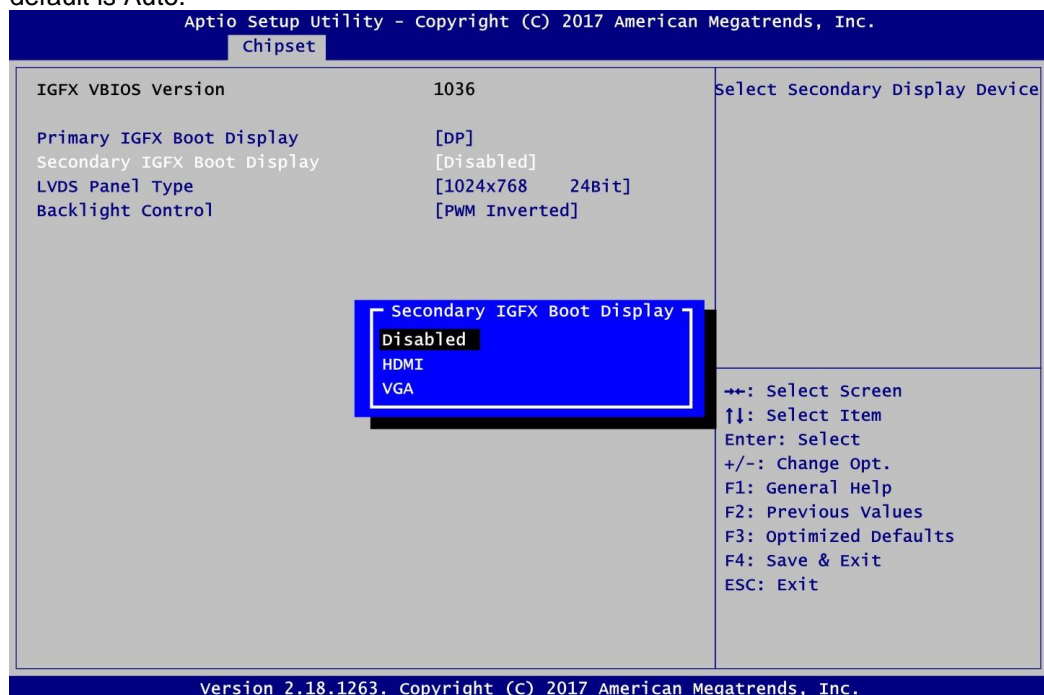
**Memory Configuration**

Open sub menu for information related to system memory.

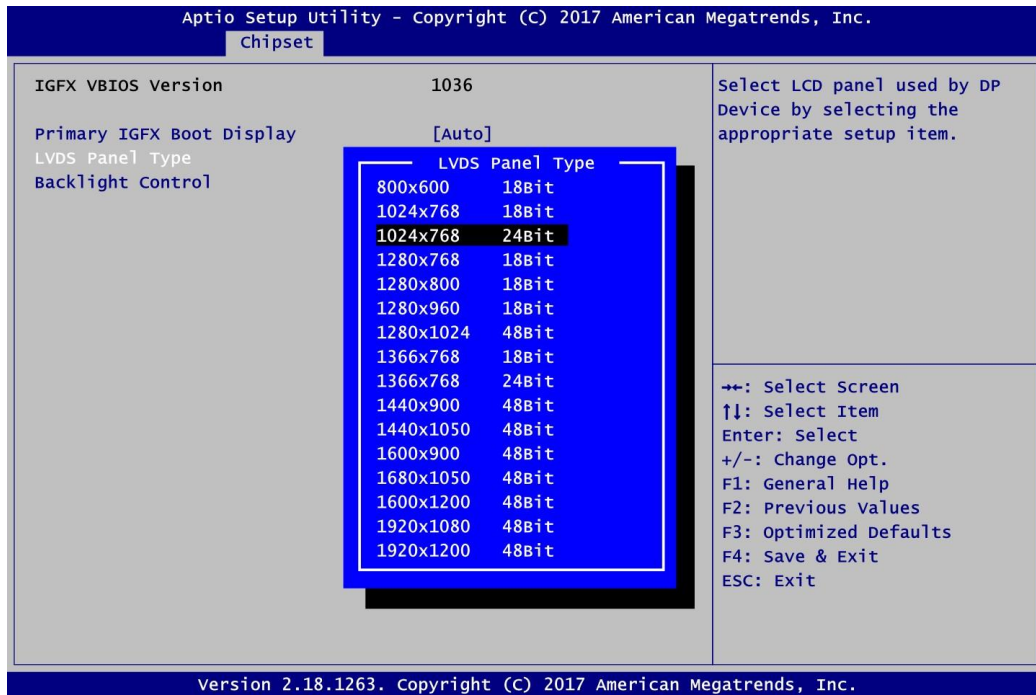
- Graphics Configuration

**Primary IGFX Boot Display**

Select the video device which will be activated during POST (Power-On Self Test). The default is Auto.

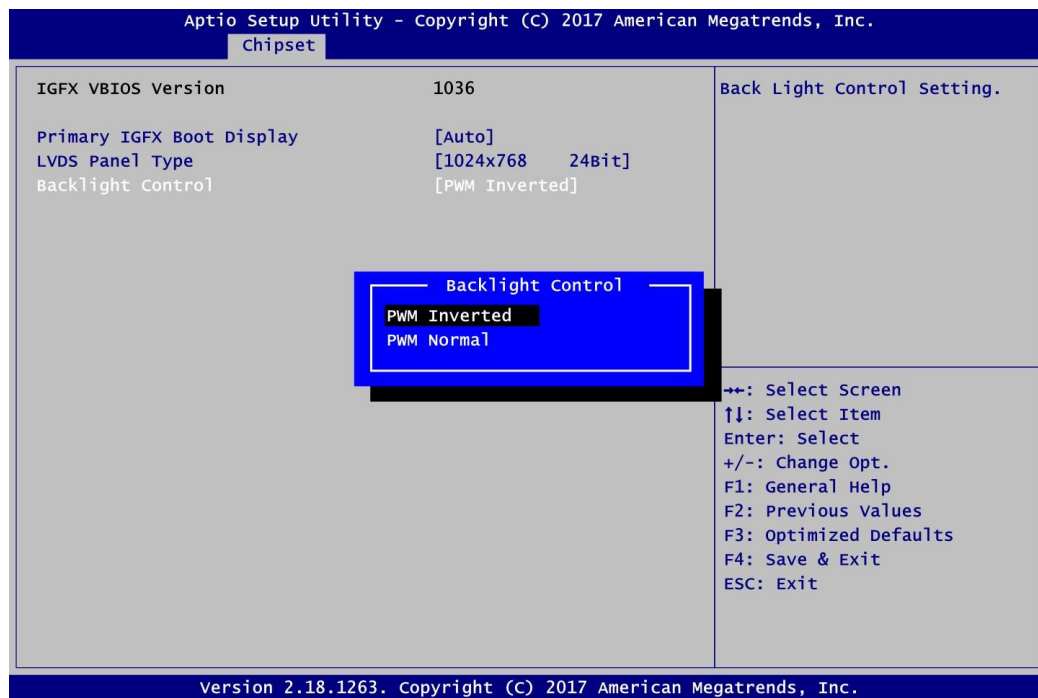
**Secondary IGFX Boot Display**

After selecting other than "auto" on "Primary IGFX Boot Display", the Secondary IGFX Boot Display will show up and the options are Disabled, HDMI and VGA.



### LVDS Panel Type

Select LVDS panel resolution.

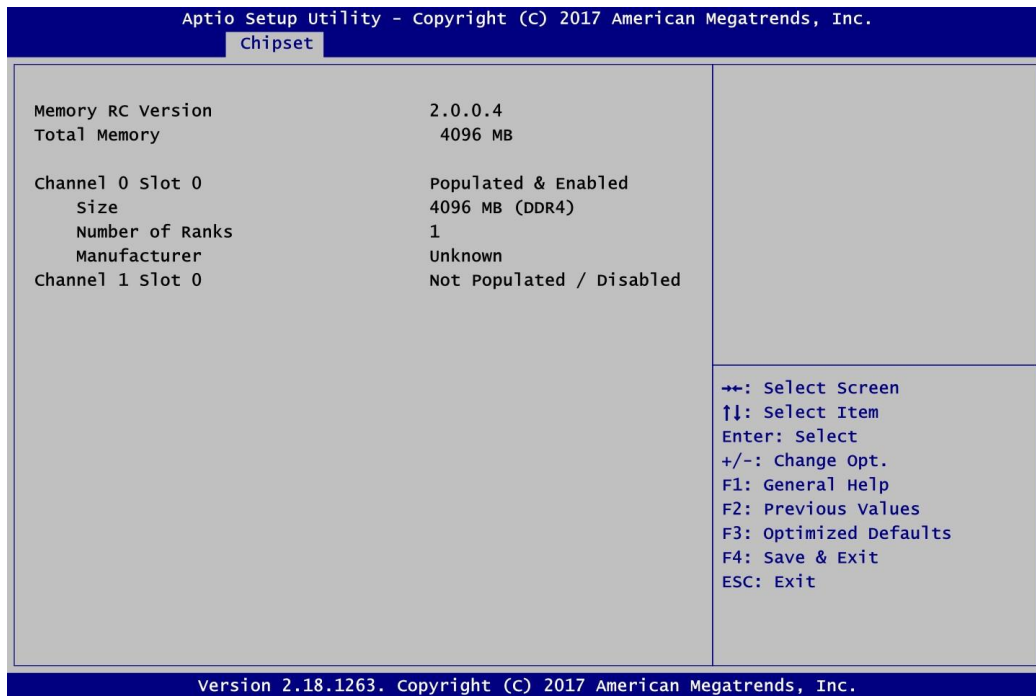
**Backlight Control**

This item is for backlight control setting. Selection options are PWM Inverted and PWM Normal.

If the LCD brightness regards 5V PWM signal as the brightest, PWM Inverted shall be selected.

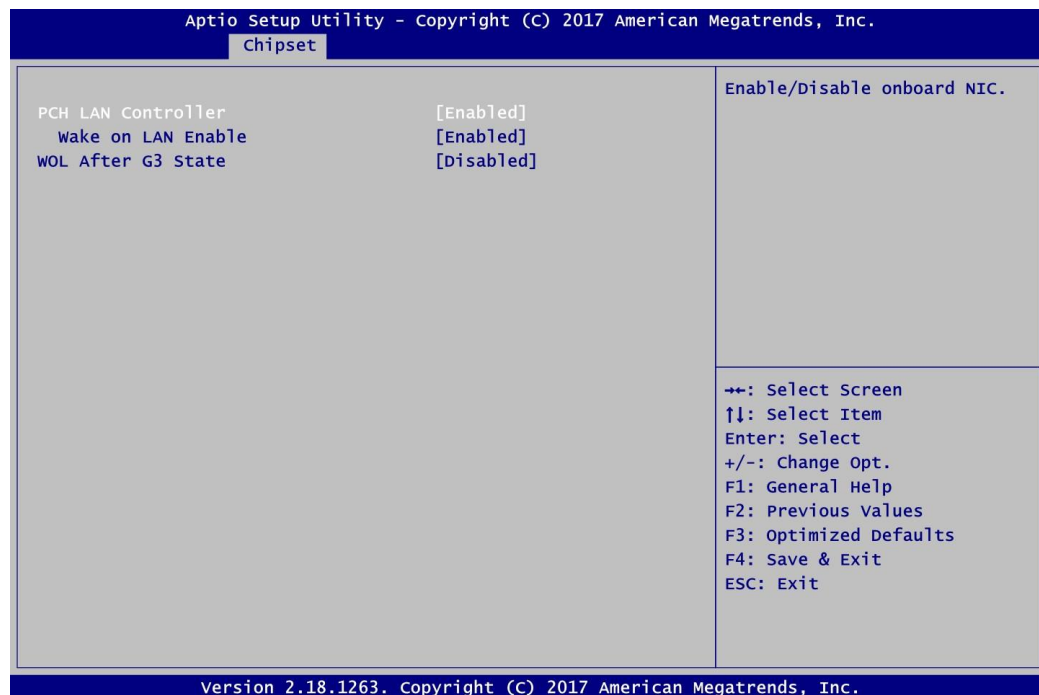
- **Memory Configuration**

This screen shows the system memory information.



- **PCH-IO Configuration**

This screen allows you to set PCH parameters.

**PCH LAN Controller**

Enable or disable onboard PCH LAN controller.

**Wake on LAN**

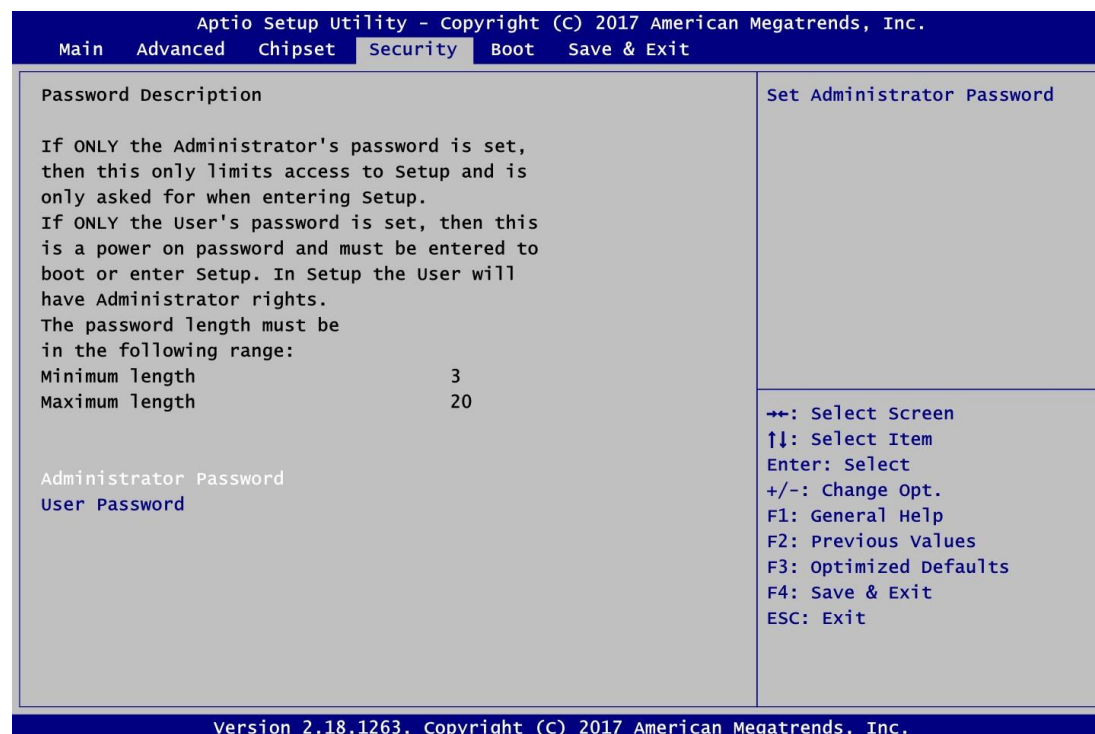
After enabling PCH LAN Controller, enabling or disabling integrated LAN to wake the system.

**WOL After G3 State**

Enable or disable Wake-on-LAN after Mechanical Off (System Power State G3).

## 4.6 Security Menu

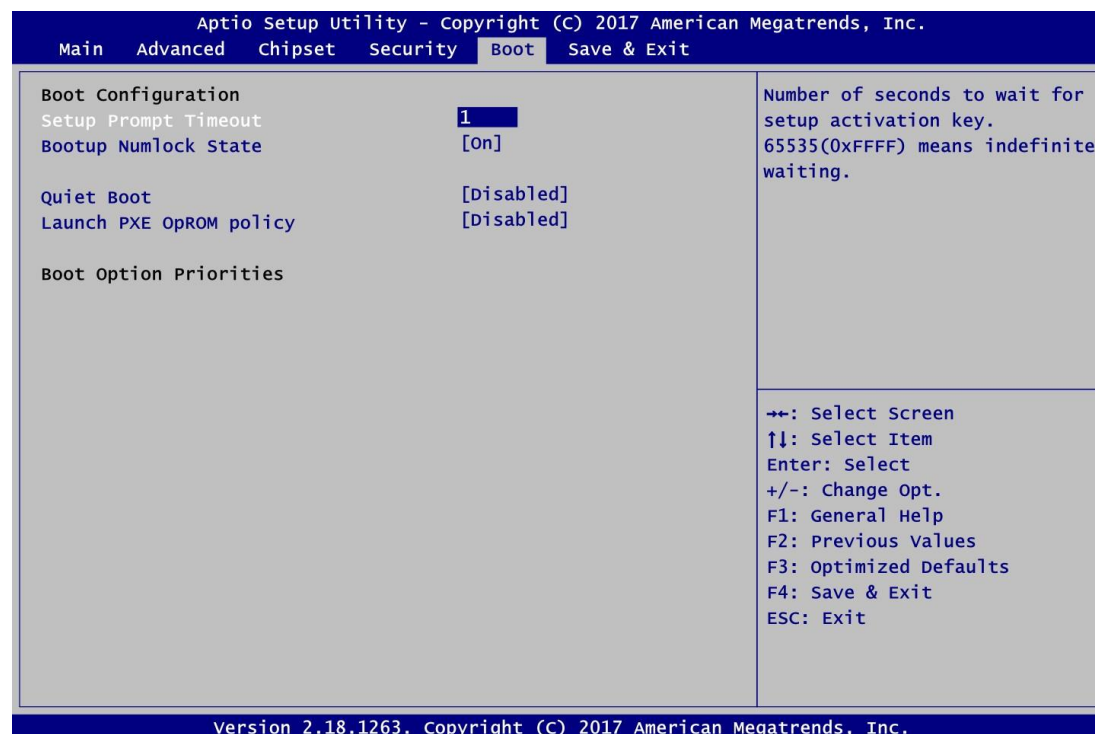
The Security menu allows users to change the security settings for the system.



- Administrator Password**  
 This item indicates whether an administrator password has been set (installed or uninstalled).
- User Password**  
 This item indicates whether a user password has been set (installed or uninstalled).

## 4.7 Boot Menu

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

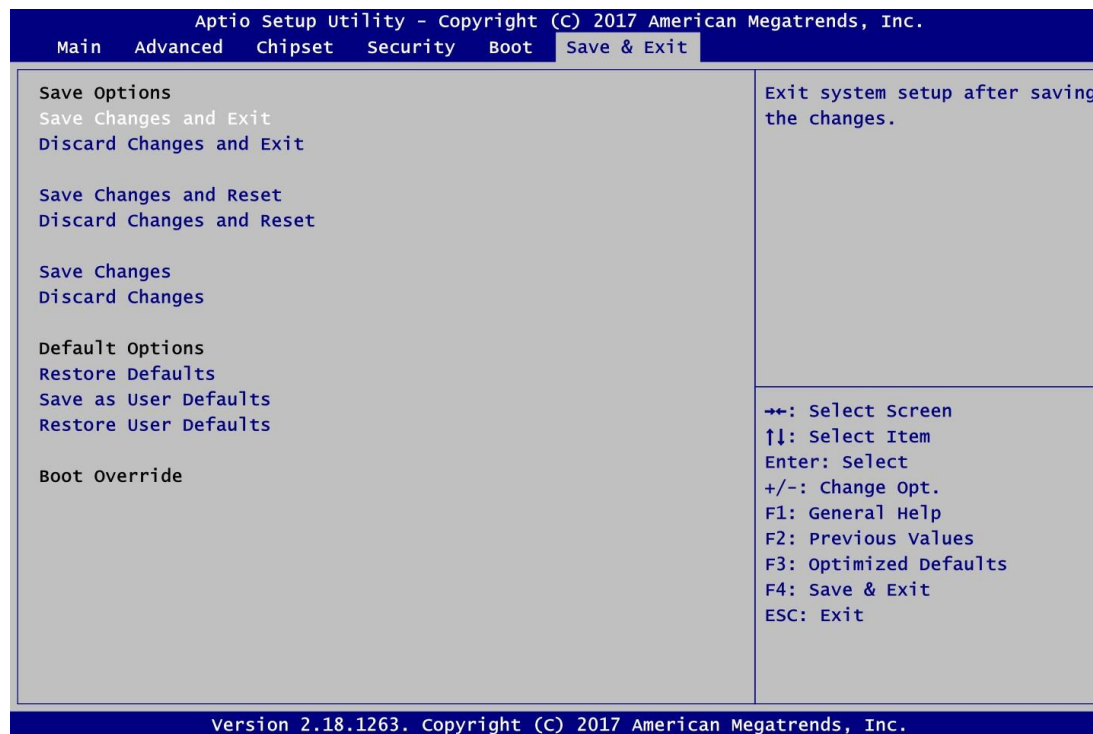


- **Setup Prompt Timeout**  
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- **Bootup NumLock State**  
Use this item to select the power-on state for the keyboard NumLock.
- **Quiet Boot**  
Select to display either POST output messages or a splash screen during boot-up.
- **Legacy PXE OpROM policy**  
Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.
- **Boot Option Priorities**  
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 return to Main Menu. 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 return to Main Menu. 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

### 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 Sample Program

1. Enter **ADU**, and press <F4> to select the **superior ITE**
2. **PORT** setting **002E**, **002F**
3. Address **07h** setting **07 GPIO**
4. Address **72h** to set the countdown, for example Sec: **C0**, Min: **40**
5. Address **73h** set the countdown time, for example 10sec: **0A**

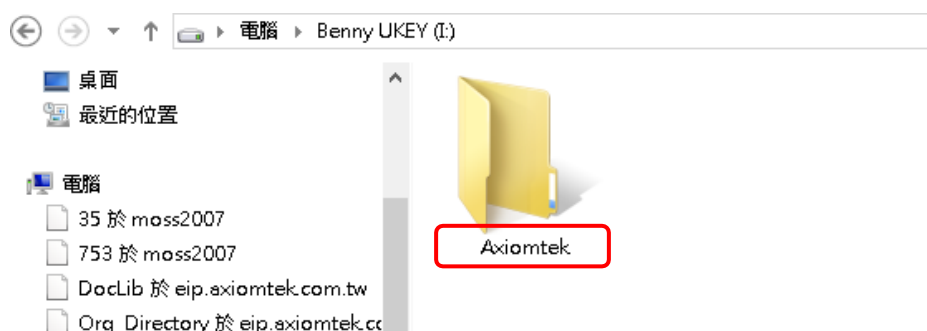
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## Appendix B

# 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.

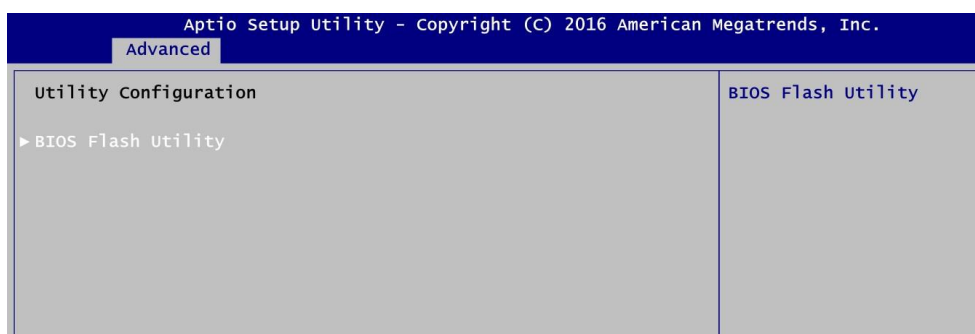
1. In your USB flash drive, create a new folder and name it “Axiomtek”, see figure below.



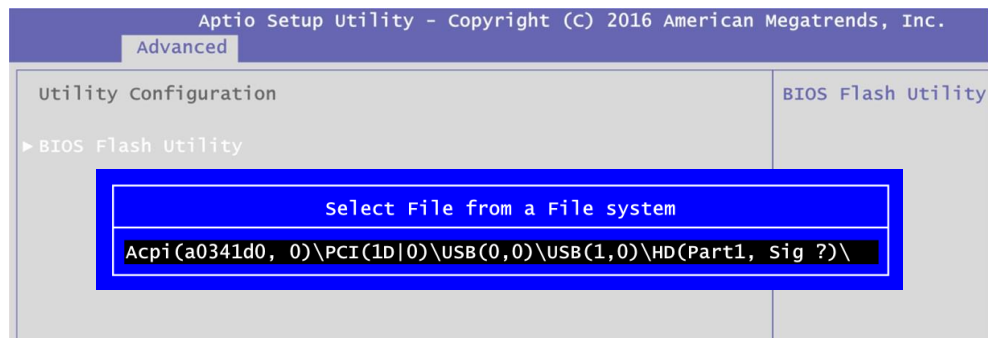
2. Copy BIOS ROM file (e.g. MANO500.005) to “Axiomtek” folder.



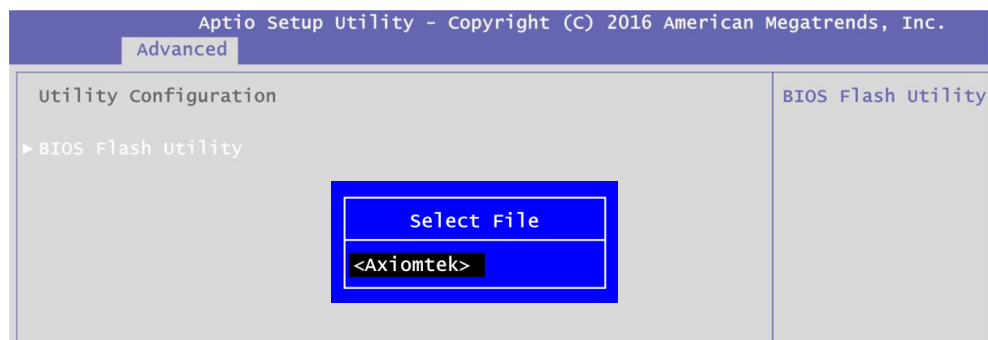
3. Insert the USB flash drive to your system.
4. Enter BIOS setup menu and go to Advanced\Utility Configuration. Select BIOS Flash Utility and press <Enter>.



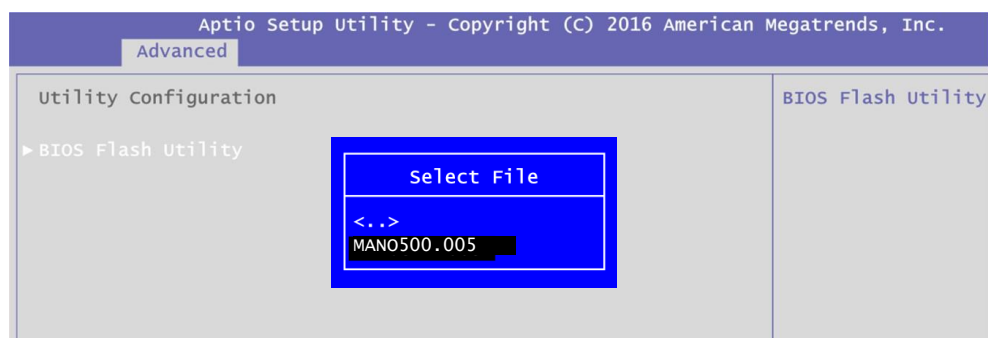
5. BIOS automatically detect all USB drive(s) attached to the system. In this example only one USB drive is attached to the system. That's why, you can see only one device is displayed in figure below.



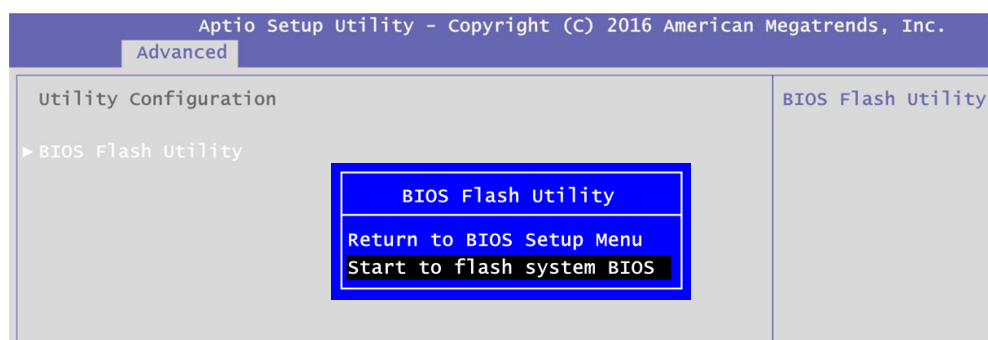
6. Select the USB drive containing BIOS ROM file you want to update using the <↑> or <↓> key. Then press <Enter> to get into "Axiomtek" folder.



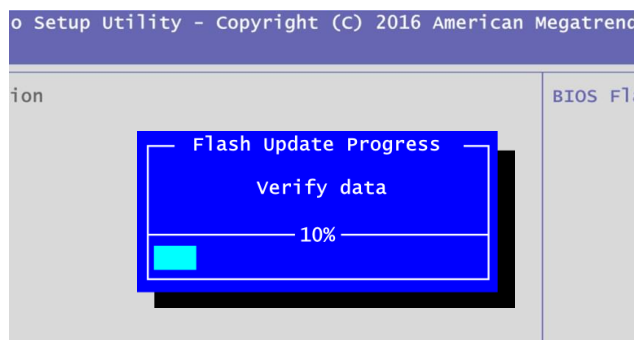
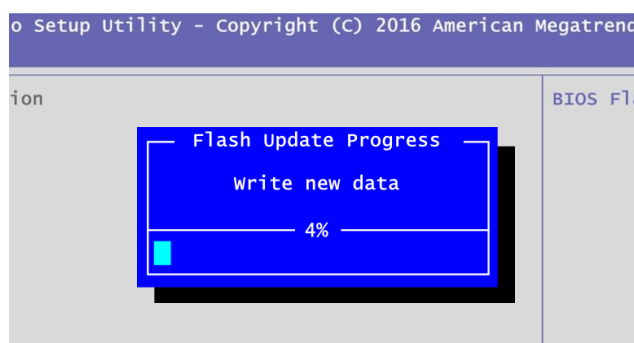
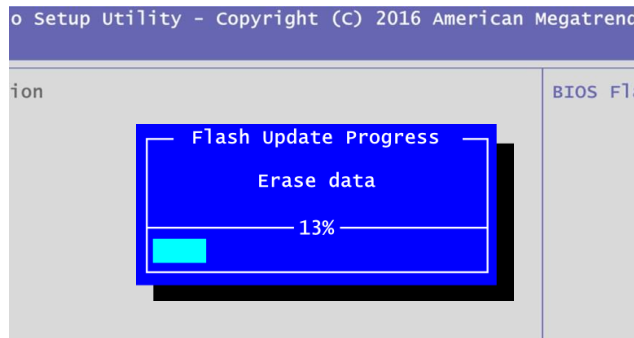
7. Now you can see the BIOS ROM file on the screen, press <Enter> to select.



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



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



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

