PICO316/317

Intel® Pentium® N4200/ Celeron® N3350/ Atom® x5-E3940 Processor Pico-ITX Board

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 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.

Trademarks Acknowledgments

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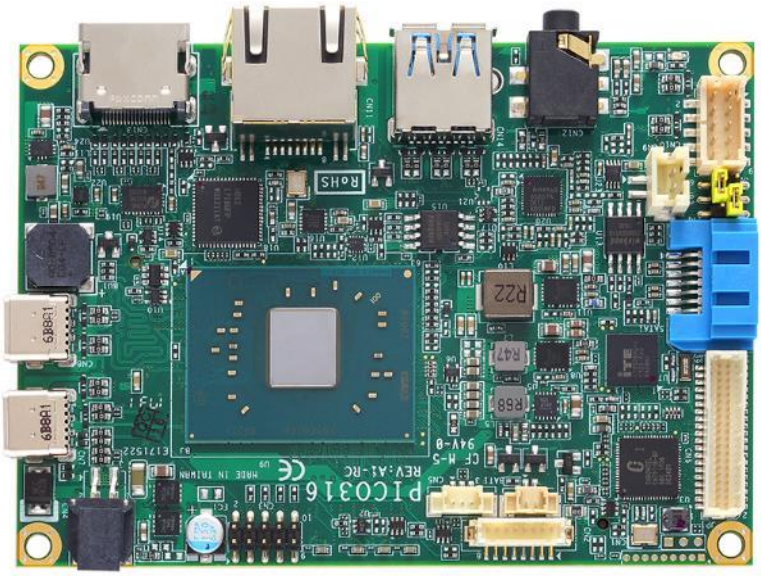
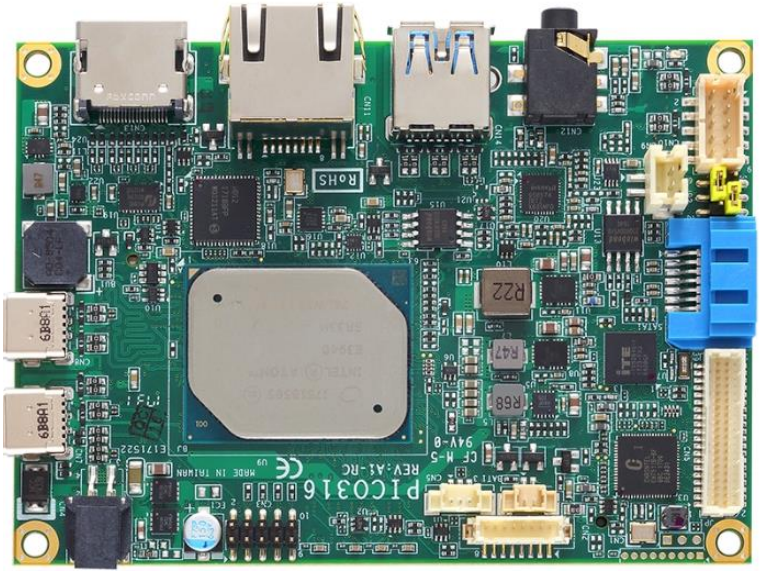
Chapter 1
Introduction



PICO316



PICO317

The PICO316 is a Pico-ITX board with Intel® Pentium® N4200/ Celeron® N3350 processor and the PICO317 is with Intel® Atom® x5-E3940 that deliver outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions.

The board has one 204-pin unbuffered SO-DIMM socket for single channel DDR3L 1600MHz memory with maximum memory capacity up to 8GB. There is one Gigabit/Fast Ethernet port, one SATA port with transfer rate up to 6Gb/s, three USB 3.0 and two USB 2.0 high speed compliant, and built-in HD audio codec that can achieve the best stability and reliability for industrial applications. Additionally, it provides you with unique embedded features, such as two serial ports (RS-232) and 2.5” form factor that applies an extensive array of PC peripherals.

1.1 Features

- PICO316 - Intel® Pentium® quad core N4200 (1.1~2.5GHz) and Celeron® dual core N3350 (1.1~2.4GHz)
- PICO317 - Intel® Atom® quad core x5-E3940 processor (1.6GHz)
- 1 DDR3L SO-DIMM supports up to 8GB memory capacity
- 3 USB 3.0 ports and 2 USB 2.0 ports
- 2 COM ports
- 1 PCI-Express Mini Card with mSATA supported
- +5V only DC-in adapter supported

1.2 Specifications

- **CPU**
  - PICO316
    - Intel® Pentium® quad core N4200 1.1~2.5GHz.
    - Intel® Celeron® dual core N3350 1.1~2.4GHz.
  - PICO317
    - Intel® ATOM® quad core x5-E3940 1.6GHz.

- **Thermal Solution**
  - Passive.

- **Operating Temperature**
  - PICO316: -20°C~+60°C.
  - PICO317: -40°C~+70°C.

- **BIOS**
  - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
  - 64Mbit SPI Flash, DMI, Plug and Play.
  - PXE Ethernet Boot ROM.

- **System Memory**
  - One 204-pin unbuffered DDR3L SO-DIMM socket.
  - Maximum up to 8GB DDR3L 1600MHz memory.

- **Onboard Multi I/O**
  - Controller: ITE8528.
  - Serial Ports: Two RS-232 ports.

- **Serial ATA**
  - One SATA-600 connector.
  - mSATA supported.

- **USB Interface**
  - One USB 3.0 port in type A on the rear I/O.
  - Two USB 3.0 ports in type C.
  - Two USB 2.0 ports in 2x5-pin internal wafer connector.

- **Display**
  - One 2x20-pin connector for 18/24-bit single/dual channel LVDS and one 8-pin inverter connector. LVDS resolution is up to 1920x1200 in 24-bit dual channels.
  - One HDMI on the rear I/O with resolution up to 3840x2160 @30Hz.

- **Watchdog Timer**
  - Timeout value range is 1~65535 seconds.

- **Ethernet**
  - One RJ-45 LAN port by Intel® I211-AT (co-layout with I210) supports 1000/100/10Mbps Gigabit/Fast Ethernet with Wake-on-LAN and PXE Boot ROM.

- **Audio**
  - HD audio compliant with Realtek ALC888S.
  - Line-out in 3.5 phone jack on the rear I/O.

- **Expansion Interface**
  - One full-size PCI-Express Mini Card socket with PCI-Express and USB support and complies with PCI-Express Mini Card Spec. V1.2.

- **Power Input**
  - One 2x2-pin connector.
  - +5V DC-in adapter only.
  - Auto power on function supported.

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

- **Form Factor**
  - Pico-ITX form factor.

Note

All specifications and images are subject to change without notice.

1.3 Utilities

- Chipset and graphics driver
- Ethernet driver
- Audio driver
- Trusted Execution Engine

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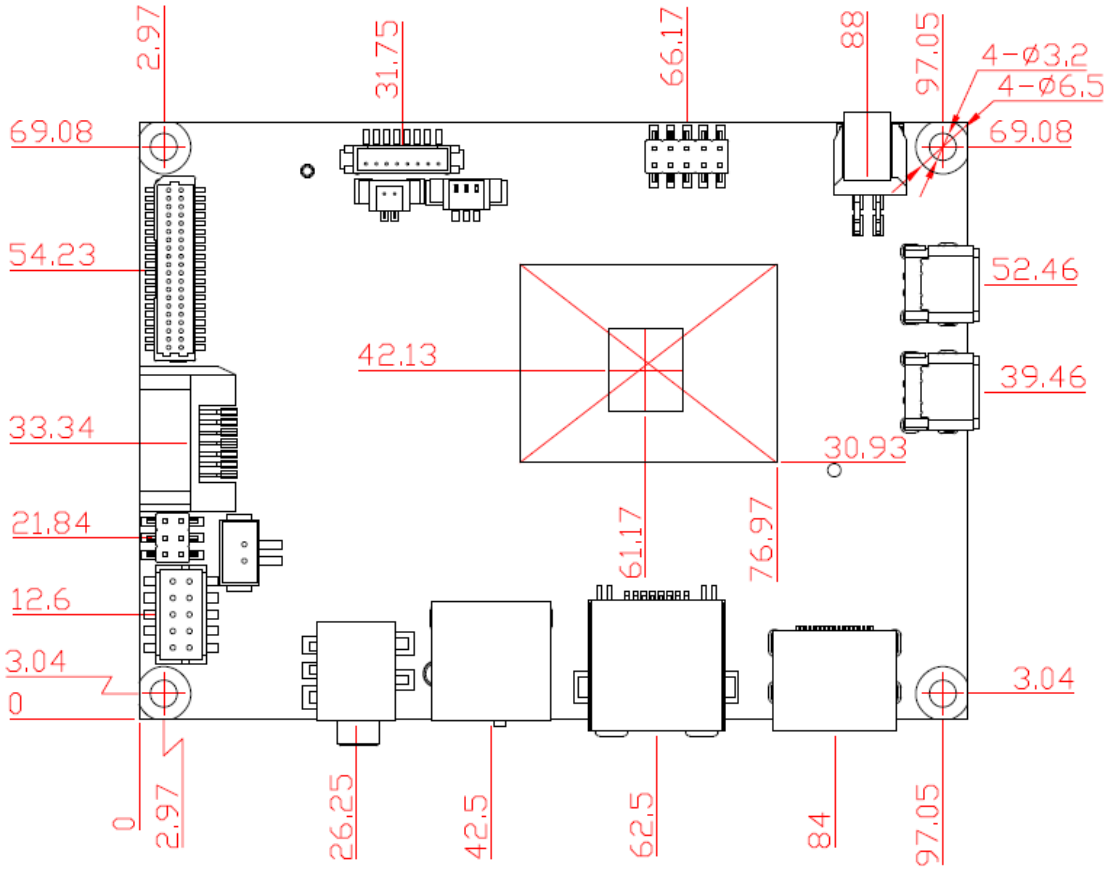
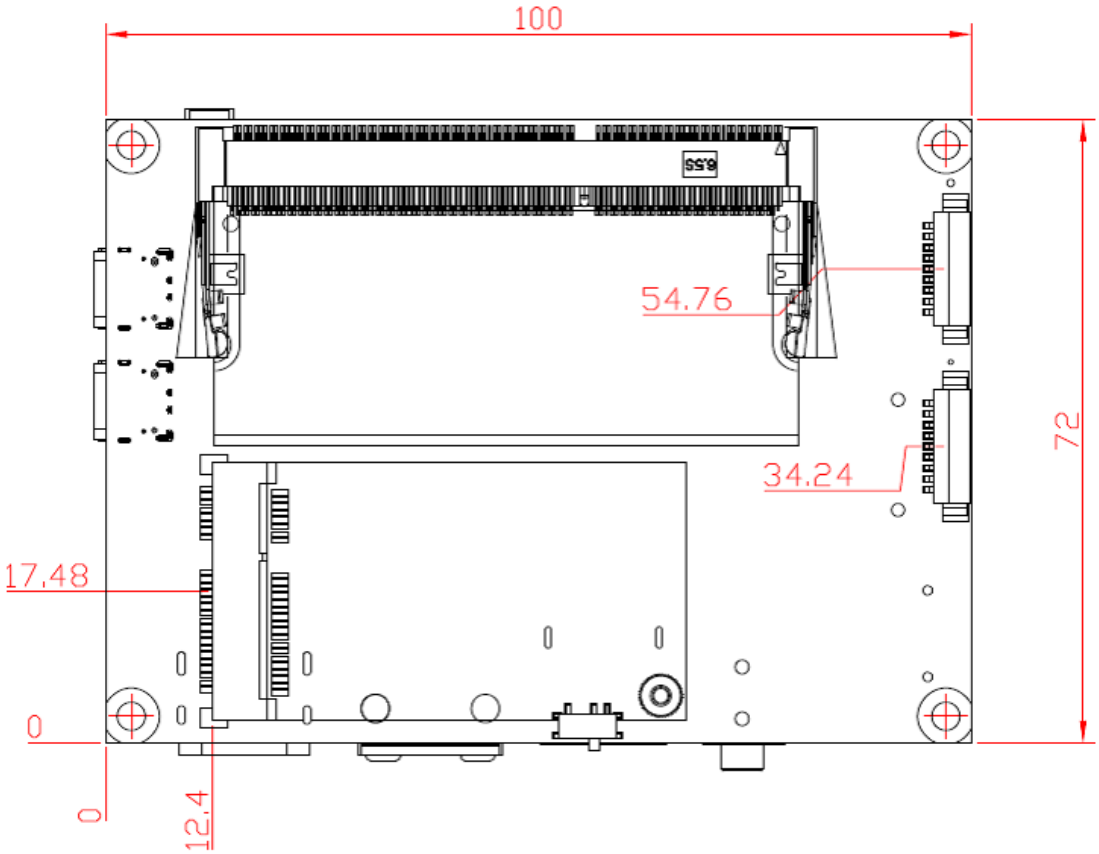
Chapter 2
Board and Pin Assignments

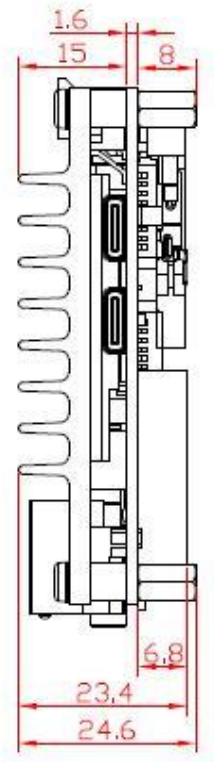
2.1 Board Dimensions and Fixing Holes

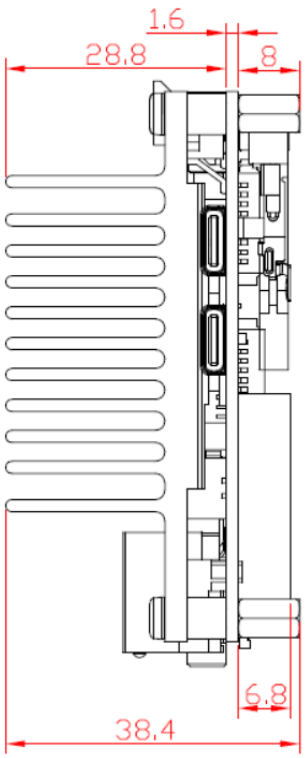


Top View



Bottom View

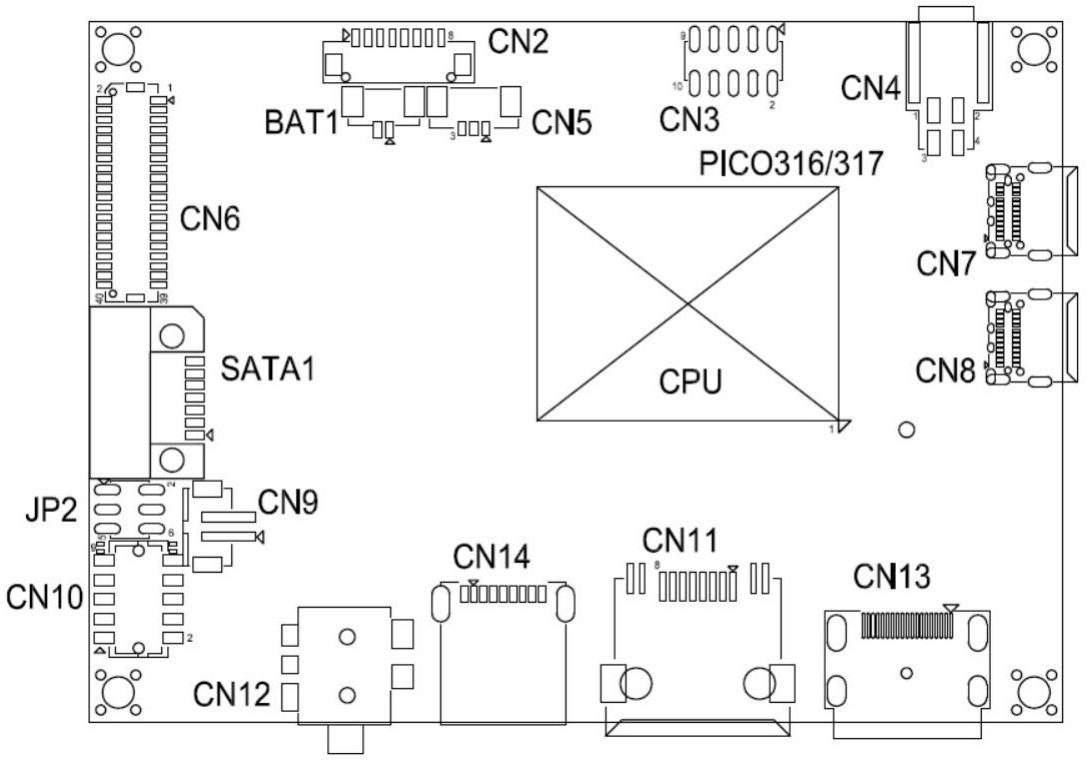




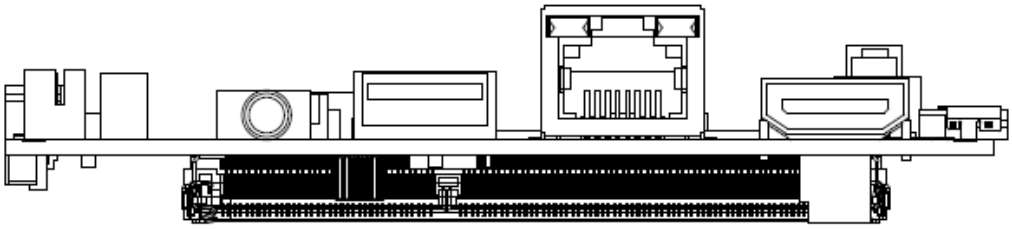
PICO316 **PICO317**

Side View

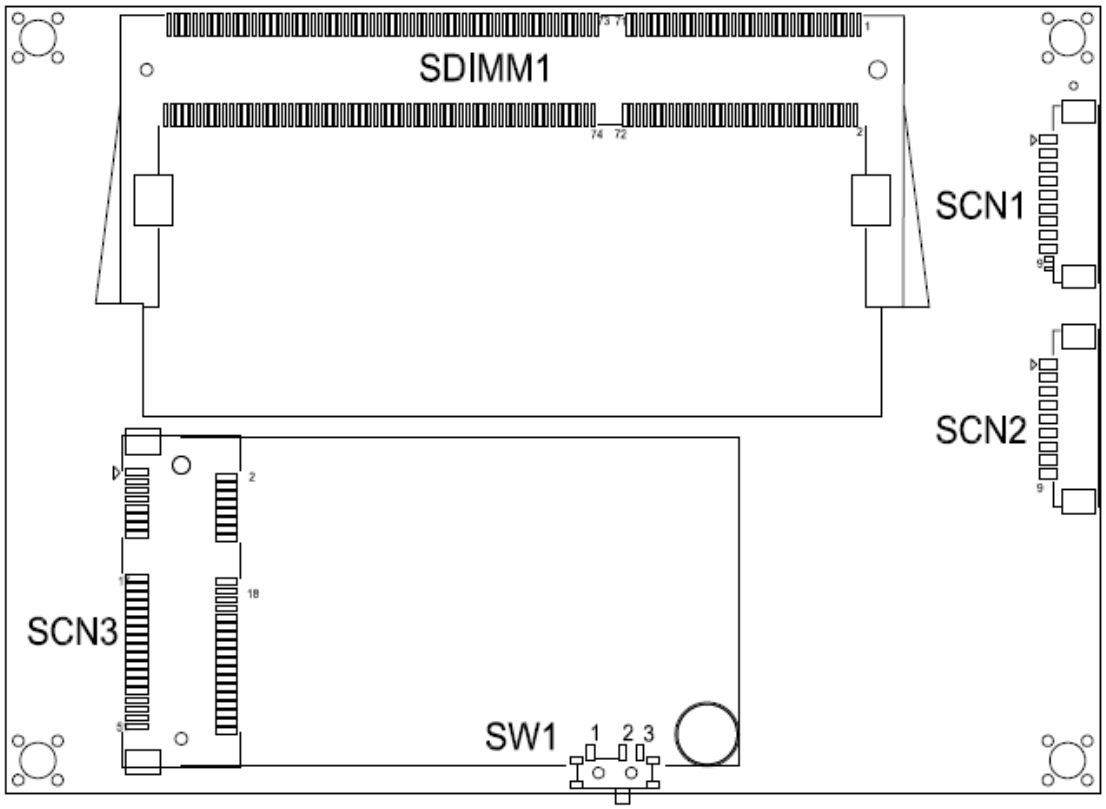
2.2 Board Layout



Top View



Side View

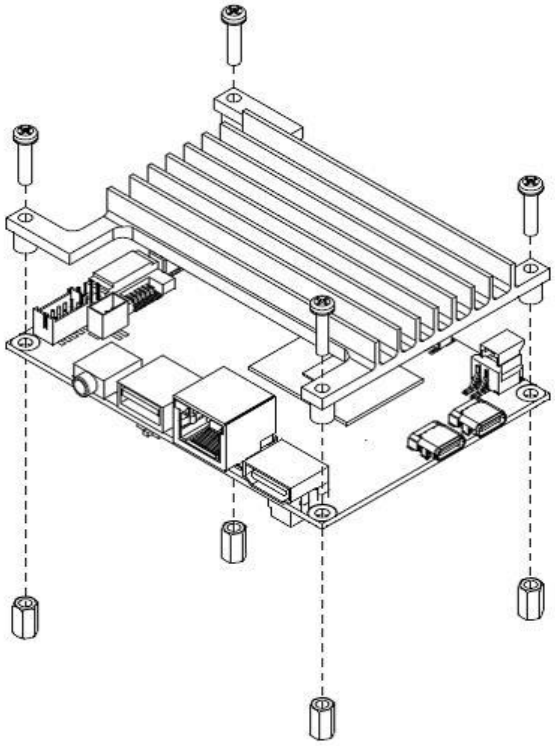


Bottom View

2.3 Assembly Drawing

2.3.1 Installing Heatsink (Optional)

For thermal dissipation, a thermal solution enables the PICO316 and PICO317 components to dissipate heat efficiently. All heat generating components are thermally conducted to the plate in order to avoid hot spots. Images below illustrate how to install heatsink on PICO316 or PICO317.



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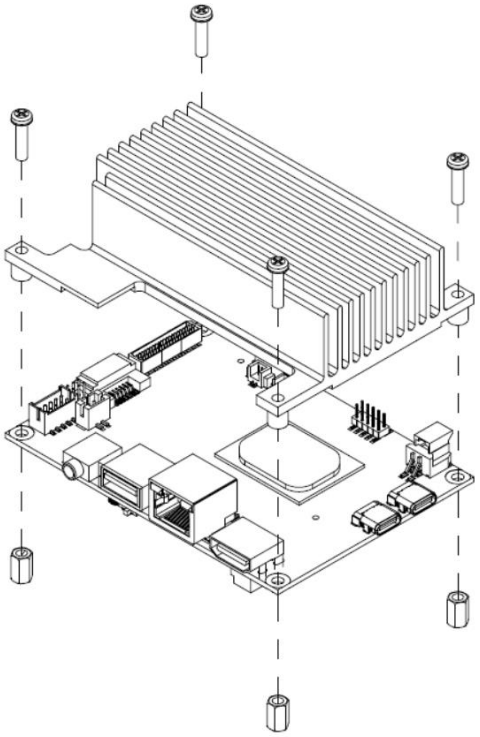
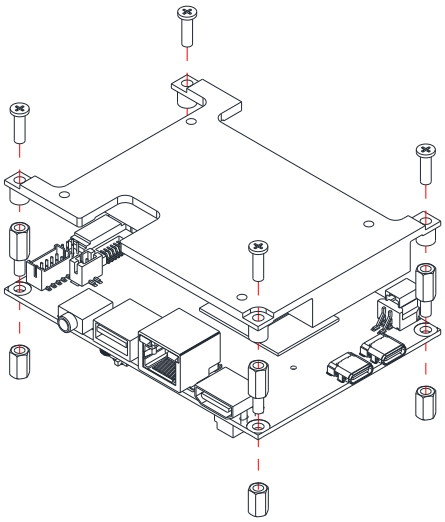
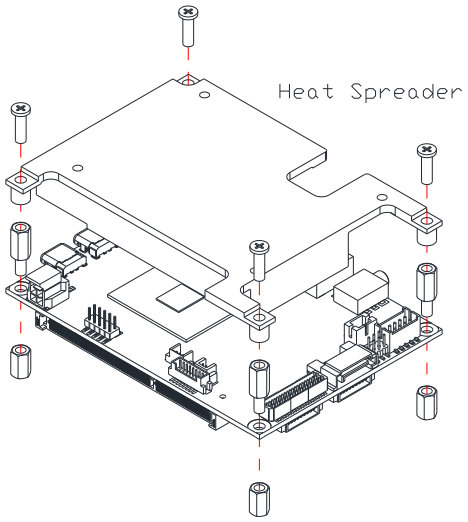


PICO317

2.3.2 Installing Heatspreader (Optional)

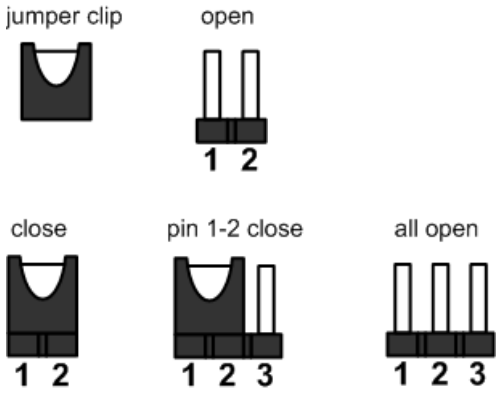
The heatspreader acts as a thermal coupling device that all heat generating components are thermally conducted to the heatspreader in order to avoid hot spots. Heat dissipation devices such as a heatsink with fan or without fan may need to be connected to the heatspreader. Images below illustrate how to install the heatspreader on PICO316 or PICO317. And there is a protective plastic covering on the thermal pads. This must be removed before the heatspreader can be mounted.





2.4 Jumper and Switch Settings

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



Properly configure jumper and switch settings on the PICO316/317 to meet your application purpose. Below you can find a summary table of jumpers, switch and onboard default settings.

Note

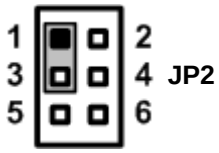
Once the default jumper or switch setting needs to be changed, please do it under power-off condition.

Jumper and Switch	Description	Setting
JP2	LVDS +3.3V/+5V Voltage Selection Default: +3.3V	1-3 Close
	Restore BIOS Optimal Defaults Default: Normal Operation	4-6 Close
SW1	Auto Power On Default: Enable	2-3 Close

2.4.1 LVDS +3.3V/+5V Voltage Selection (JP2)

This is a 2x3-pin (pitch=2.0mm) jumper. The board supports voltage selection for flat panel displays. Use these jumpers to set LVDS connector (CN6) pin 1~6 VCCM to +3.3V, or +5V. To prevent hardware damage, before connecting please make sure that the input voltage of flat panel is correct.

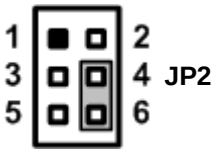
Function	JP2 Setting
+3.3V level (Default)	1-3 close
+5V level	3-5 close



2.4.2 Restore BIOS Optimal Defaults (JP2)

This is a 2x3-pin (pitch=2.0mm) jumper. Put jumper clip to pin 2-4 for a few seconds then move it back to pin 4-6. Doing this procedure can restore BIOS optimal defaults.

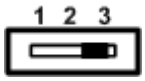
Function	JP2 Setting
Normal (Default)	4-6 close
Restore BIOS optimal defaults	2-4 close



2.4.3 Auto Power On (SW1)

If SW1 is enabled for power input, the system will be automatically power on without pressing soft power button. If SW1 is disabled for power input, it is necessary to manually press soft power button to power on the system.

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



2.5 Connectors

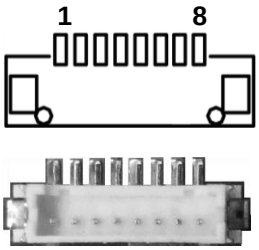
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table of connectors on the hardware.

Connector	Description
CN2	Inverter Connector
CN3	Front Panel Connector
CN4	Power Connector
CN5	SMBus Connector
CN6	LVDS Connector
CN7~CN8	USB 3.0 Type C Connectors
CN9	SATA Power Connector (+5V Only)
CN10	USB 2.0 Wafer Connector
CN11	Ethernet Port
CN12	Audio Line-out Jack
CN13	HDMI Connector
CN14	USB 3.0 Type A Connector
BAT1	CMOS Battery Connector
SATA1	SATA Connector
SCN1	COM2 Connectors
SCN2	COM1 Connectors
SCN3	Full-size PCI-Express Mini Card or mSATA Connector
SDIMM1	DDR3L SO-DIMM Connector

2.5.1 Inverter Connector (CN2)

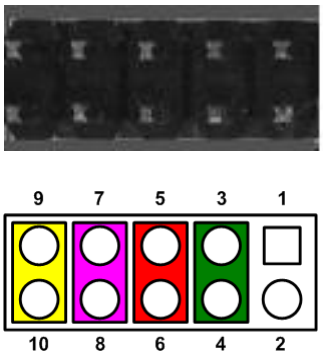
This is a 8-pin (pitch=1.25mm) connector which is compliant with Hirose DF13-8P-1.25V for inverter. We strongly recommend you to use the matching connector, DF13-8S-1.25C, to avoid malfunction.

Pin	Signal
1	NC
2	NC
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND
8	VBL Brightness Control



2.5.2 Front Panel Connector (CN3)

Pin	Signal	Pin	Signal
1	PWR-	2	PWR+
3	PWRLED-	4	PWRLED+
5	PWRSW-	6	PWRSW+
7	HW RST-	8	HW RST+
9	HDDLED-	10	HDDLED+



Power Status
Pin 1 and pin 2 are for power status button; letting user know the power status of this board.

Power LED
Pin 4 connects anode (+) of LED and pin 3 connects cathode(-) of LED. The power LED lights up when the system is powered on.

Power On/Off Button
Pin 5 and 6 connect the power button on front panel to CPU board, which allows users to turn on or off power supply.

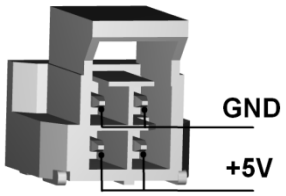
System Reset Switch
Pin 7 and 8 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

HDD Activity LED
This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 9 and 10 connect the hard disk drive to the front panel HDD LED, pin 9 is assigned as cathode(-) and pin 10 is assigned as anode(+).

2.5.3 Power Connector (CN4)

This is a 2x2pin (pitch=2.5mm) connector which is compliant with Molex 1054051104.

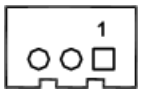
Pin	Signal
1	GND
2	GND
3	+5V
4	+5V



2.5.4 SMBus Connector (CN5)

This is a 3-pin (pitch=1.25mm) for SMBus interface which is compatible with I^2C.

Pin	Signal
1	CLK_SBY
2	DAT_SBY
3	GND



2.5.5 LVDS Connector (CN6)

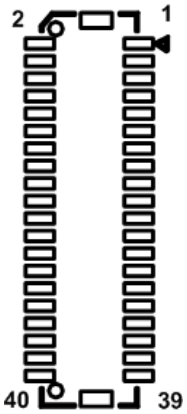
It is a 2x20-pin (pitch=1mm) connector which is compliant with JST SM40B-SRDS-G-TF for LVDS LCD interface. It is strongly recommended to connect it with matching connector, SHDR-40VS-B. Pin 1~6 VCCM can be set to +3.3V or +5V by setting JP2 (see section 2.4.1).

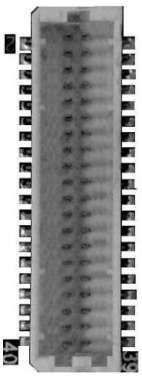
Note

[*]: When making LVDS cable, pin 2 of JST SHDR-40VS-B connector should match pin 1 of CN6.

18-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C	8	N.C
9	GND	10	GND
11	N.C	12	N.C
13	N.C	14	N.C
15	GND	16	GND
17	N.C	18	N.C
19	N.C	20	N.C
21	GND	22	GND
23	Channel A D0-	24	N.C
25	Channel A D0+	26	N.C
27	GND	28	GND
29	Channel A D1-	30	N.C
31	Channel A D1+	32	N.C
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND





24-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C	8	N.C
9	GND	10	GND
11	N.C	12	N.C
13	N.C	14	N.C
15	GND	16	GND
17	N.C	18	N.C
19	N.C	20	N.C
21	GND	22	GND
23	Channel A D0-	24	N.C
25	Channel A D0+	26	N.C
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

18-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C	8	N.C
9	GND	10	GND
11	N.C	12	Channel B D0-
13	N.C	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	N.C
31	Channel A D1+	32	N.C
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

24-bit dual channel

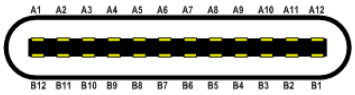
Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C	8	N.C
9	GND	10	GND
11	Channel B D3-	12	Channel B D0-
13	Channel B D3+	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

2.5.6 USB 3.0 Type C Connectors (CN7 and CN8)

The board comes with two Universal Serial Bus (compliant with USB 3.0 (5Gb/s)) type C connectors for installing USB peripherals such as keyboard, mouse, scanner, etc.

CN7:

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	SSTX2+	B2	SSTX1+
A3	SSTX2-	B3	SSTX1-
A4	USB_VCC (+5_SBY)	B4	USB_VCC (+5_SBY)
A5	N.C	B5	N.C
A6	USB #1_D+	B6	USB #1_D+
A7	USB #1_D-	B7	USB #1_D-
A8	N.C	B8	N.C
A9	USB_VCC (+5_SBY)	B9	USB_VCC (+5_SBY)
A10	SSRX1-	B10	SSRX2-
A11	SSRX1+	B11	SSRX2+
A12	GND	B12	GND



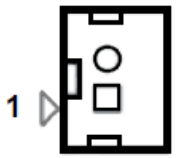
CN8:

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	SSTX4+	B2	SSTX3+
A3	SSTX4-	B3	SSTX3-
A4	USB_VCC (+5_SBY)	B4	USB_VCC (+5_SBY)
A5	No use	B5	No use
A6	USB #3_D+	B6	USB #3_D+
A7	USB #3_D-	B7	USB #3_D-
A8	N.C	B8	N.C
A9	USB_VCC (+5_SBY)	B9	USB_VCC (+5_SBY)
A10	SSRX3-	B10	SSRX4-
A11	SSRX3+	B11	SSRX4+
A12	GND	B12	GND

2.5.7 SATA Power Connector (CN9)

The CN9 is a 2-pin (pitch=2mm) wafer connector, which is compliant with JST-S2B-PH-K-S, for SATA power interface.

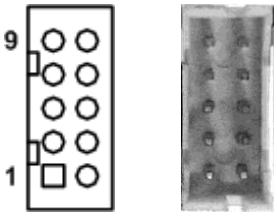
Pin	Signal
1	+5V
2	GND



2.5.8 USB 2.0 Wafer Connector (CN10)

This 2x5-pin (pitch=2mm) wafer connector is compliant with Hirose DF11-10DP-2DSA and a Universal Serial Bus (USB) connector for installing versatile USB 2.0 compliant interface peripherals.

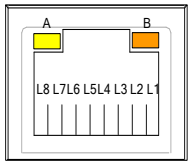
Pin	Signal	Pin	Signal
1	USB VCC (+5V_SBY)	2	USB VCC (+5V_SBY)
3	USB #7_D-	4	USB #5_D-
5	USB #7_D+	6	USB #5_D+
7	GND	8	GND
9	GND	10	GND

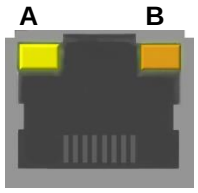


2.5.9 Ethernet Port (CN11)

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

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





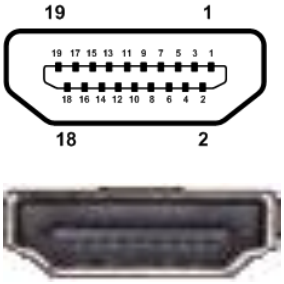
2.5.10 Audio Jack (CN12)

This is audio jack for audio out with HD audio support. Install audio driver, and then attach audio device to CN12.

2.5.11 HDMI Connector (CN13)

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. Its interface is available through connector CN13.

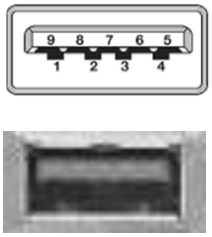
Pin	Signal	Pin	Signal
1	HDMI DATA2+	2	GND
3	HDMI DATA2-	4	HDMI DATA1+
5	GND	6	HDMI DATA1-
7	HDMI DATA0+	8	GND
9	HDMI DATA0-	10	HDMI Clock+
11	GND	12	HDMI Clock-
13	N.C.	14	N.C.
15	HDMI SCL	16	HDMI SDA
17	GND	18	+5V
19	HDMI_HTPLG		



2.5.12 USB 3.0 Type A Connector (CN14)

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

Pin	Signal
1	USB_VCC (+5V_SBY)
2	USB #0_D-
3	USB #0_D+
4	GND
5	SSRX0-
6	SSRX0+
7	GND
8	SSTX0-
9	SSTX0+



2.5.13 CMOS Battery Connector (BAT1)

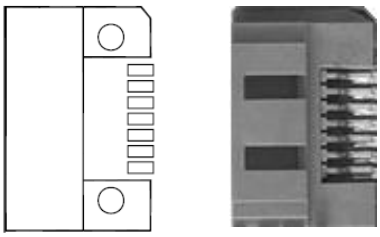
This is a 2-pin (pitch=1.25mm) wafer connector for CMOS battery interface.

Pin	Signal
1	VBAT(+3V level)
2	GND

2.5.14 SATA Connector (SATA1)

This Serial Advanced Technology Attachment (Serial ATA or SATA) connector is for high-speed SATA interface. It is a computer bus interface for connecting to devices such as hard disk drive.

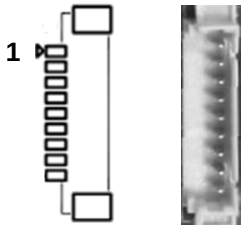
Pin	Signal
1	GND
2	SATA_TXP0
3	SATA_TXN0
4	GND
5	SATA_RXN0
6	SATA_RXP0
7	GND



2.5.15 COM Connectors (SCN1 and SCN2)

This is a 9-pin (pitch=1.25mm) connector which is compliant with Molex 53047-0910.
The SCN1 is for COM2 interface.
The SCN2 is for COM1 interface.

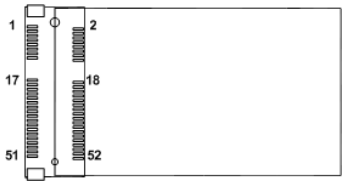
Pin	Signal	Pin	Signal
1	GND	2	RI
3	DTR	4	CTS
5	TXD	6	RTS
7	RXD	8	DSR
9	DCD		



2.5.16 Full-size PCI-Express Mini Card or mSATA Connector (SCN3)

This is a full-size PCI-Express Mini Card connector on the bottom side complying with PCI-Express Mini Card Spec. V1.2. It supports either PCI-Express, USB 2.0 or SATA (mSATA). Since the default setting is PCI-Express Mini Card, if mSATA is needed to insert, please refer to section 4.4 to change the setting.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN2/SATA1_RXP	24	+3.3VSB
25	PE_RXP2/SATA1_RXN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN2/SATA1_TXN	32	SMB_DATA
33	PE_TXP2/SATA1_TXP	34	GND
35	GND	36	USB_D6-
37	GND	38	USB_D6+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB



Chapter 3
Hardware Description

3.1 Microprocessors

The PICO316 supports Intel® Pentium® N4200 and Celeron® N3350 processors and the PICO319 supports Intel® Atom® x5-E3940 which enable your system to operate under Windows® 10 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.

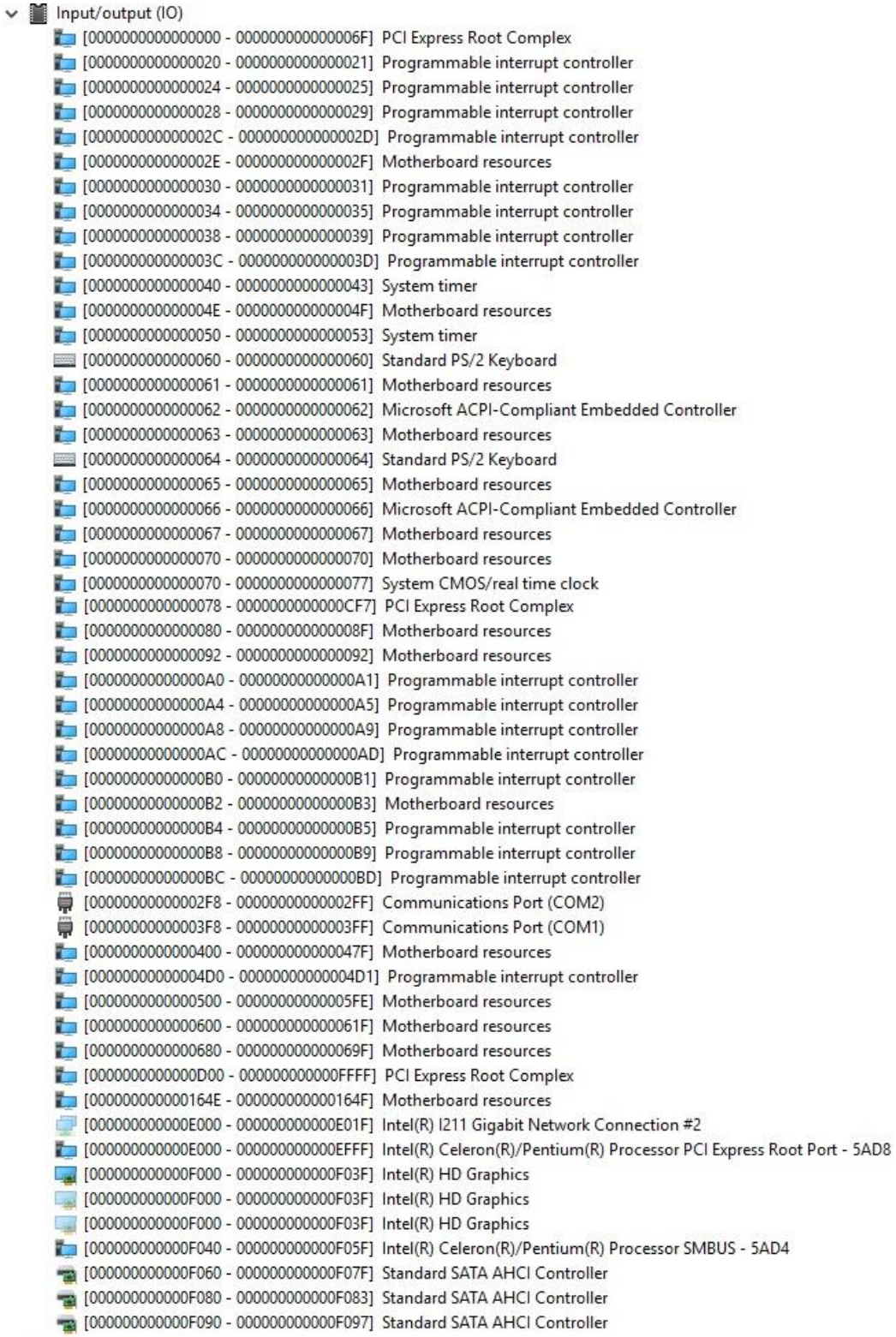
3.2 BIOS

The PICO316/317 use AMI Plug and Play BIOS with a single 64Mbit SPI Flash.

3.3 System Memory

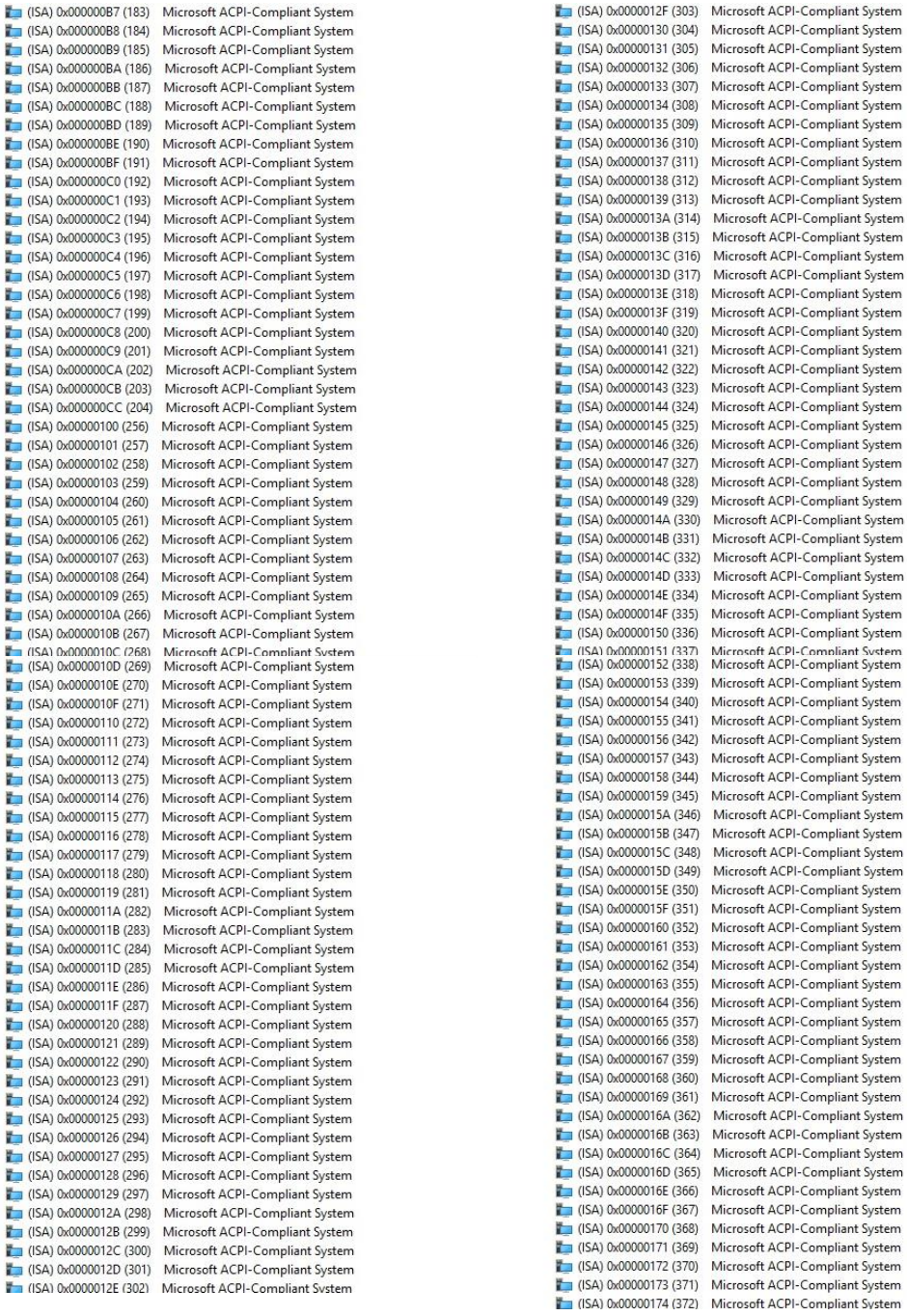
The PICO316/317 support one 204-pin DDR3L SO-DIMM socket for maximum memory capacity up to 8GB DDR3L SDRAMs. The memory module comes in sizes of 2GB, 4GB and 8GB.

3.4 I/O Port Address Map



3.5 Interrupt Controller (IRQ) Map

The interrupt controller (IRQ) mapping list is shown as follows: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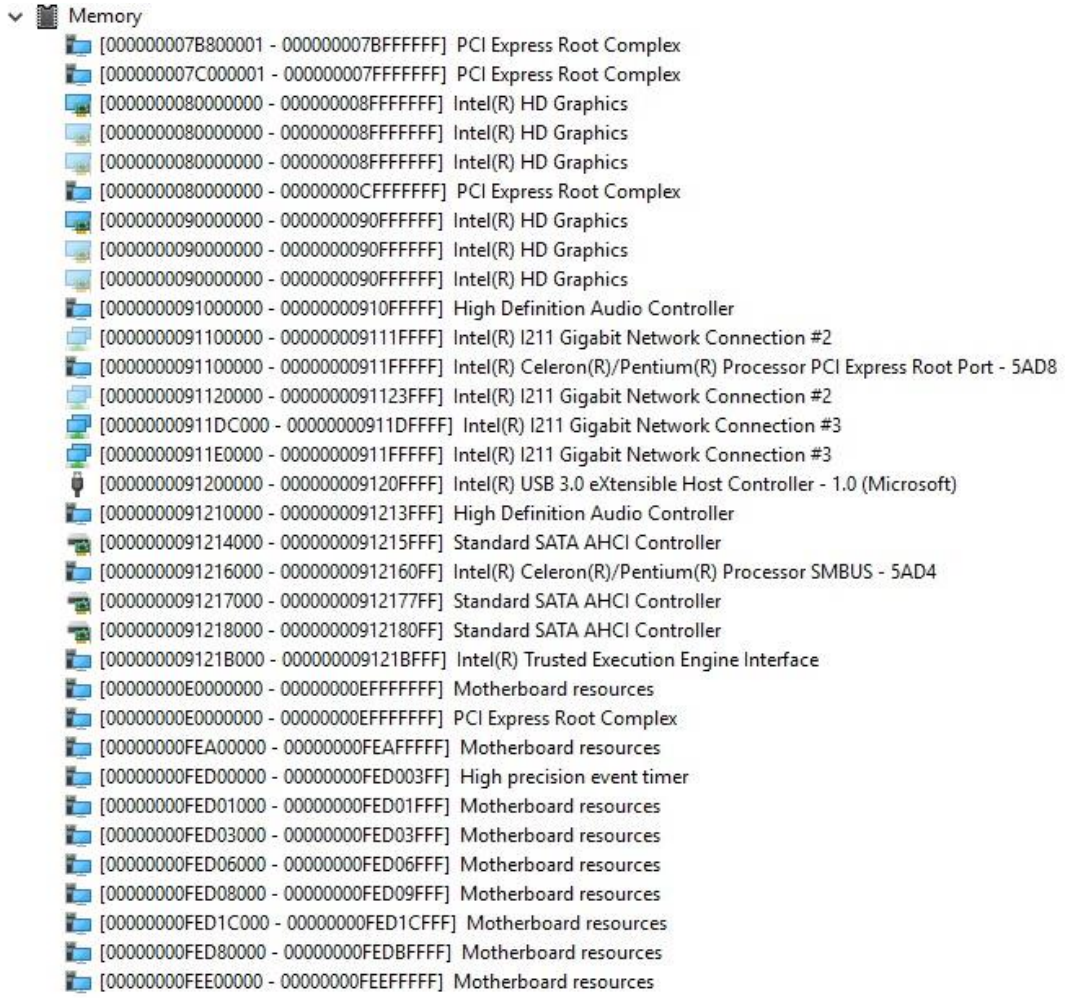
(ISA) 0x000001DE (478) Microsoft ACPI-Compliant System
(ISA) 0x000001DF (479) Microsoft ACPI-Compliant System
(ISA) 0x000001E0 (480) Microsoft ACPI-Compliant System
(ISA) 0x000001E1 (481) Microsoft ACPI-Compliant System
(ISA) 0x000001E2 (482) Microsoft ACPI-Compliant System
(ISA) 0x000001E3 (483) Microsoft 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) 0x00000019 (25) High Definition Audio Controller
(PCI) 0xFFFFFFF2 (-14) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF3 (-13) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF4 (-12) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF5 (-11) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF6 (-10) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF7 (-9) Intel(R) I211 Gigabit Network Connection #3
(PCI) 0xFFFFFFF8 (-8) Intel(R) Trusted Execution Engine Interface
(PCI) 0xFFFFFFF9 (-7) Intel(R) HD Graphics
(PCI) 0xFFFFFFFA (-6) Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
(PCI) 0xFFFFFFFB (-5) Standard SATA AHCI Controller
(PCI) 0xFFFFFFFC (-4) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADA
(PCI) 0xFFFFFFFD (-3) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
(PCI) 0xFFFFFFFE (-2) Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

3.6 Memory Map

The memory mapping list is shown as follows:



Chapter 4
AMI BIOS Setup Utility

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

4.1 Starting

To enter the setup screens, follow the steps below:

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

Note

If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP2 (see section 2.4.2).

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.

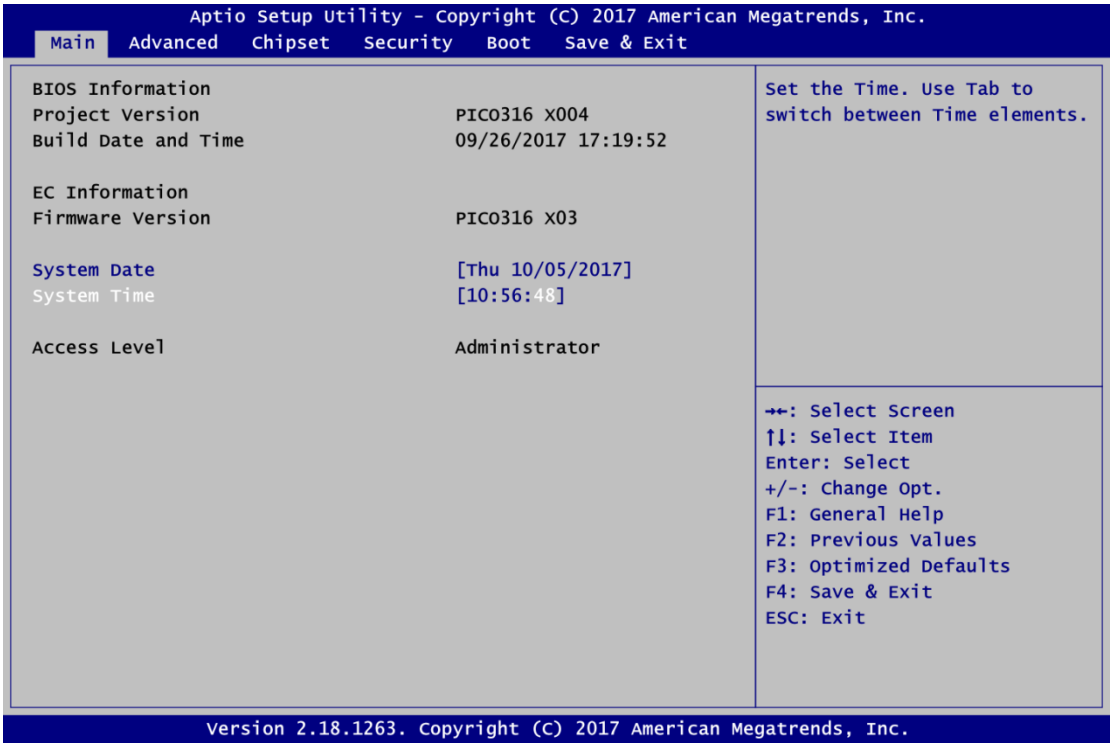
Note

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 and EC 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.

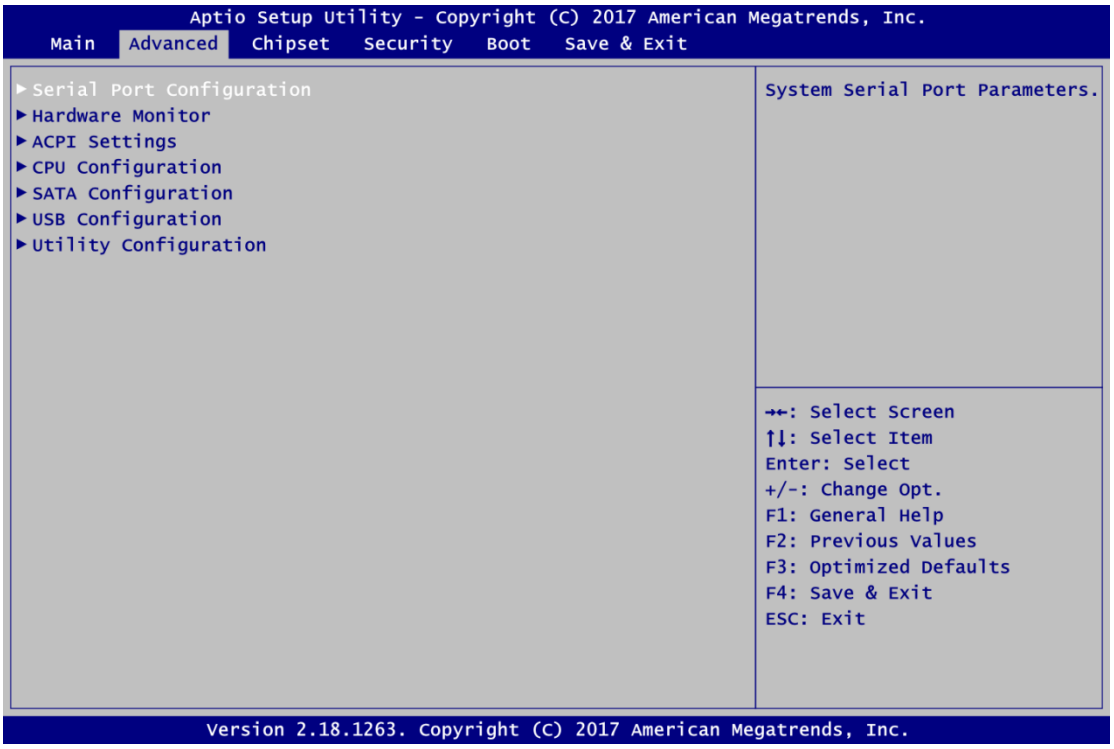
- **Access Level**
  Display the access level of current user.

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:

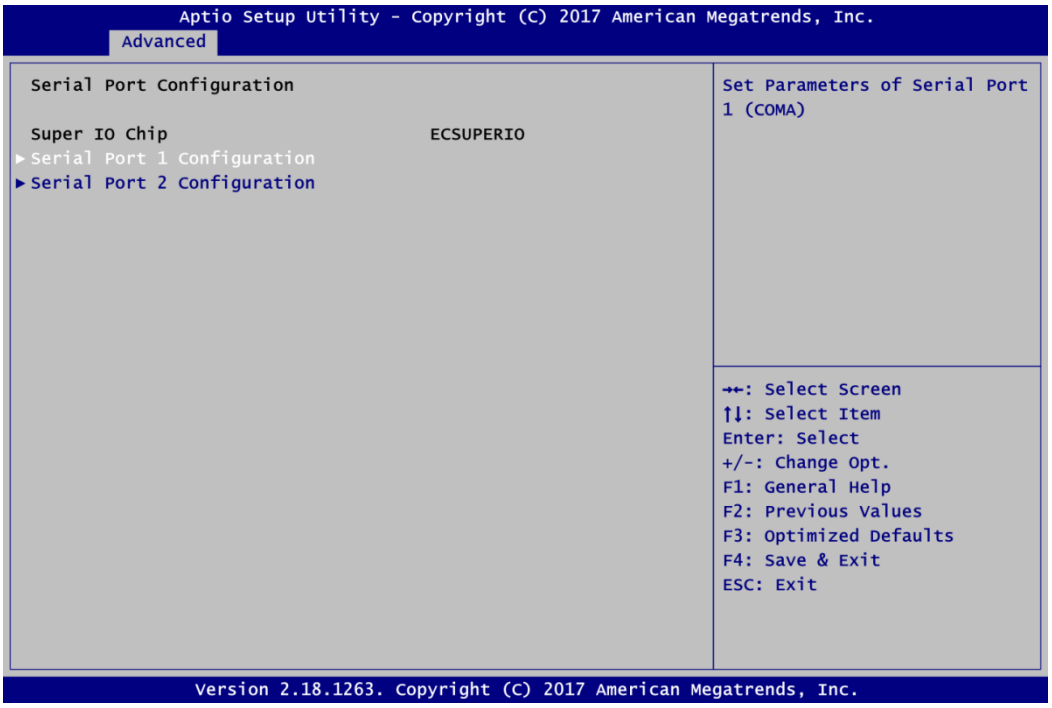
- ▶ Serial Port Configuration
- ▶ Hardware Monitor
- ▶ ACPI Settings
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ USB Configuration
- ▶ Utility Configuration

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



Serial Port Configuration

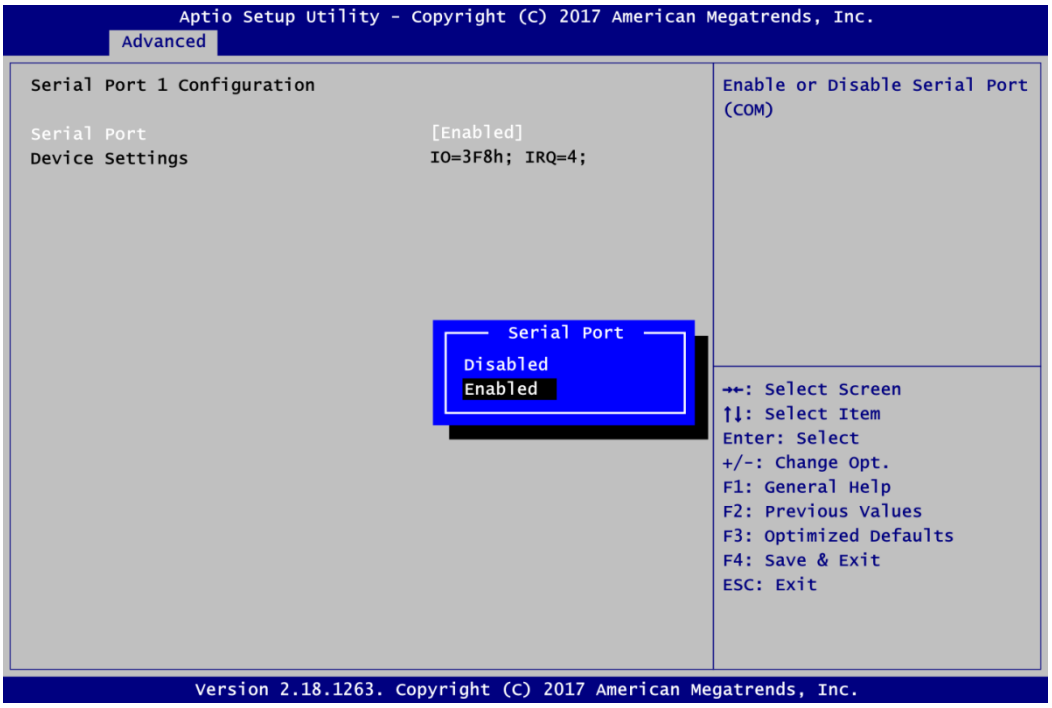
You can use this screen to select options for the Serial Port Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.



Serial Port 1~2 Configuration

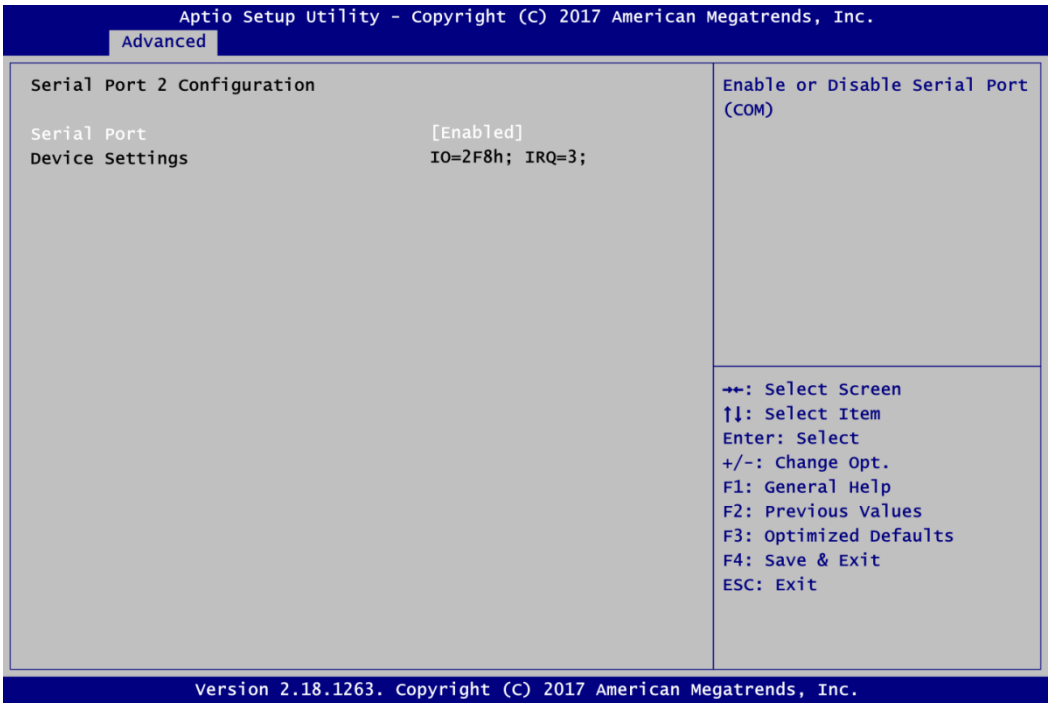
Use these items to set parameters related to serial port 1~2.

- **Serial Port 1 Configuration**



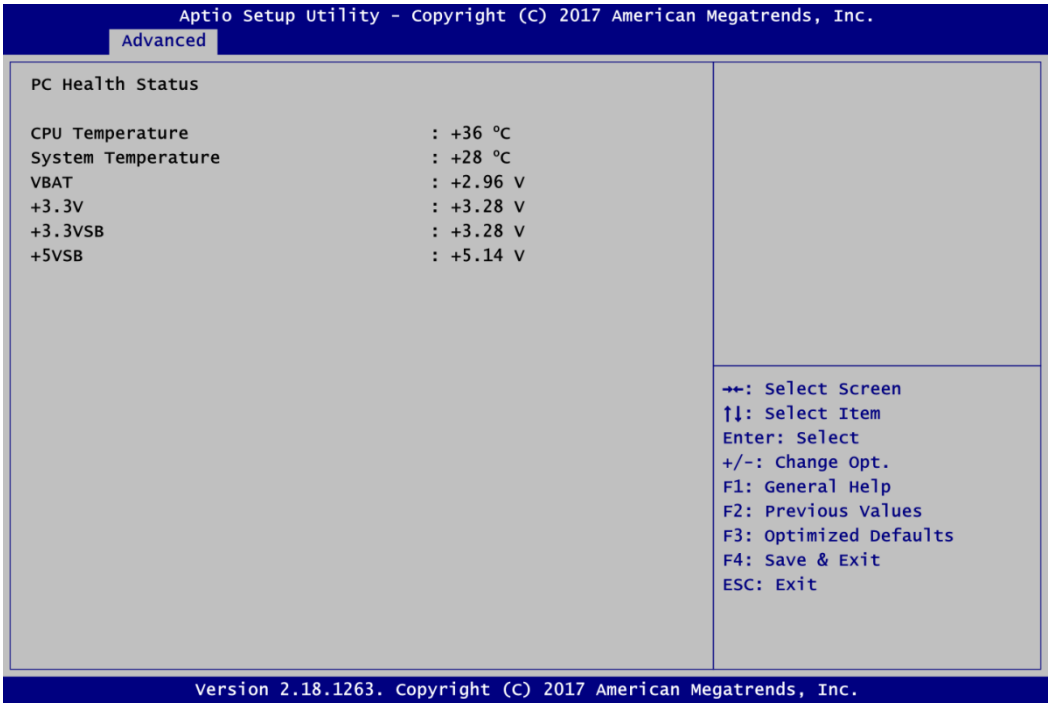
Serial Port
Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

- **Serial Port 2 Configuration**



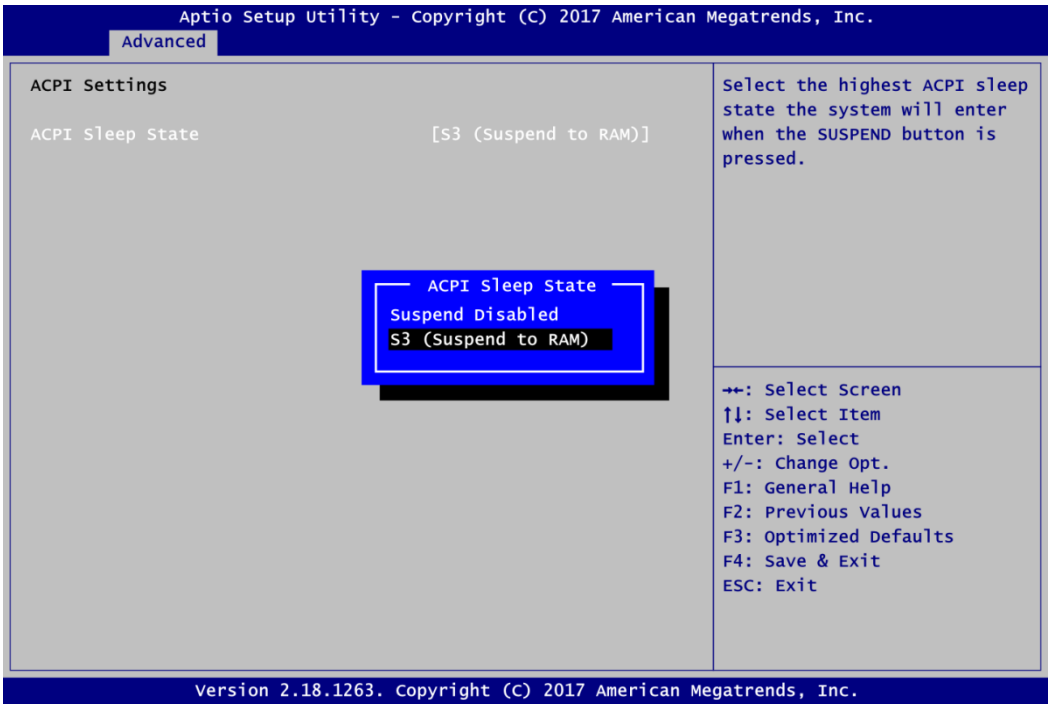
Serial Port
Enable or disable serial port 2. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

- **Hardware Monitor**
This screen monitors hardware health status.



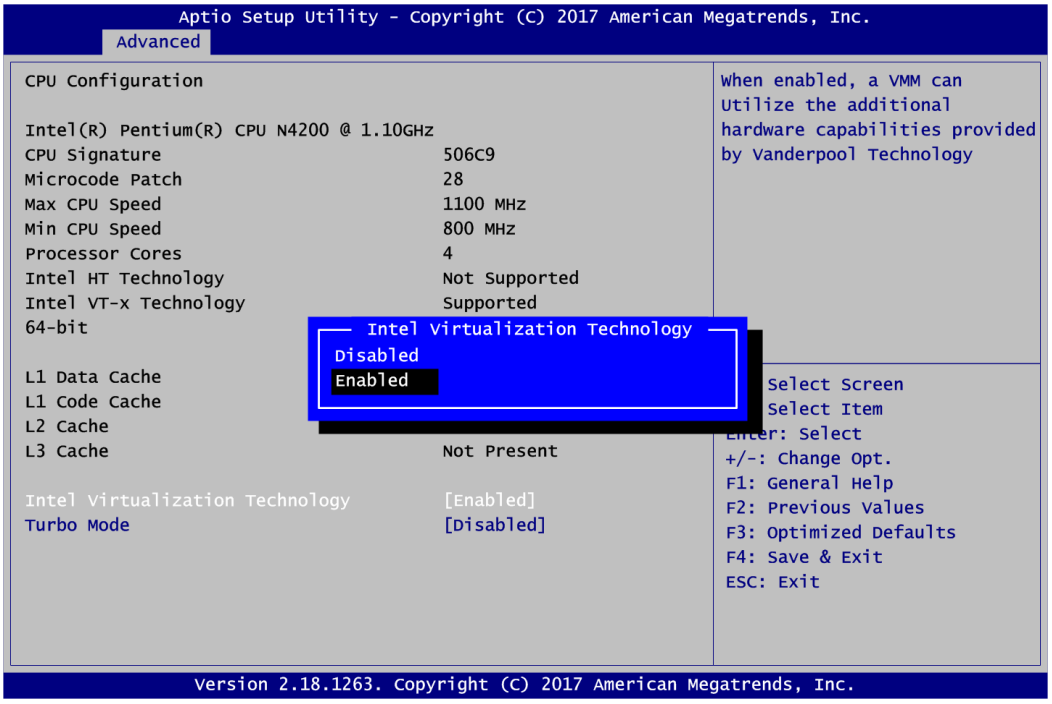
This screen displays the temperature of system and CPU and system voltages (VBAT, +3.3V, +3.3VSB and +5VSB).

- **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.

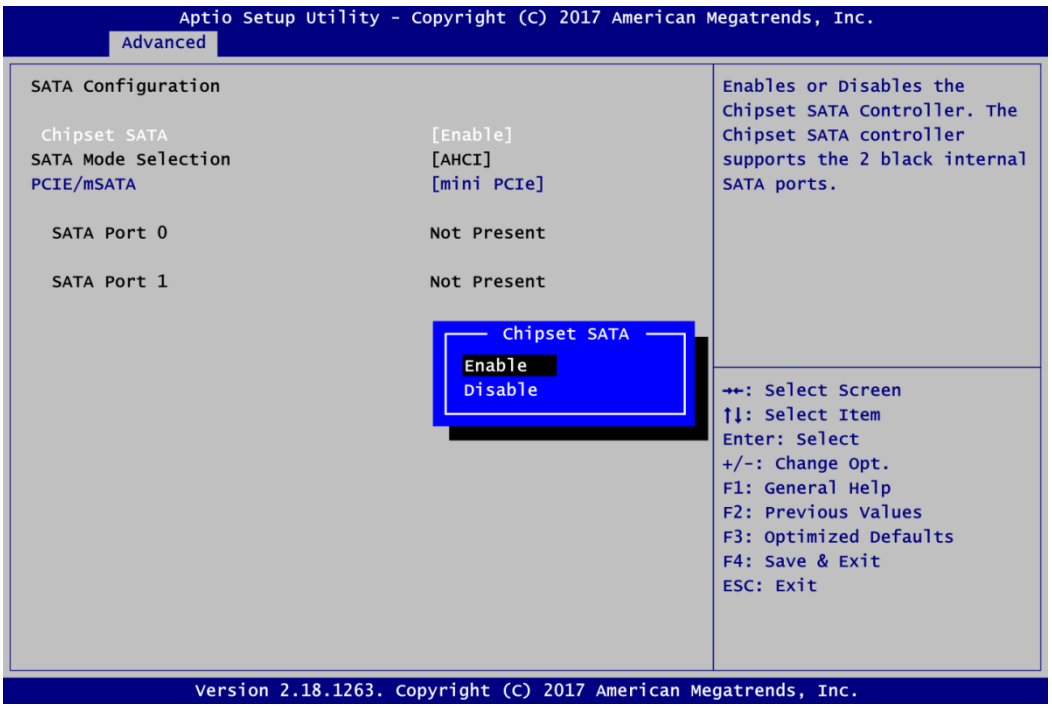
- **CPU Configuration**
  This screen shows the CPU Configuration.



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.

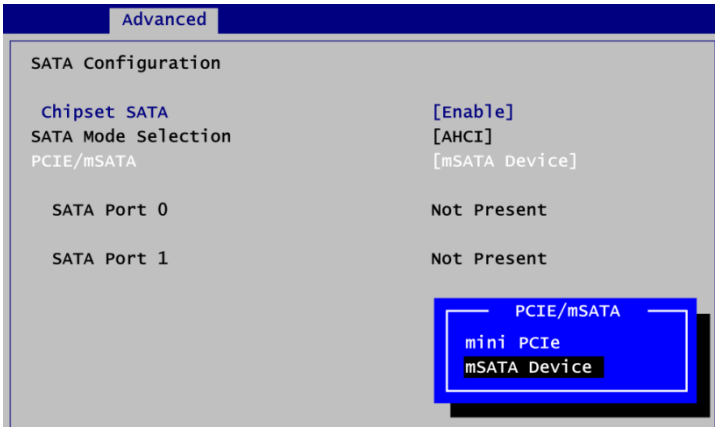
- **SATA Configuration**
  During system boot up, BIOS automatically detects the presence of SATA devices. In SATA Configuration menu, you can see the current installed hardware in SATA ports.



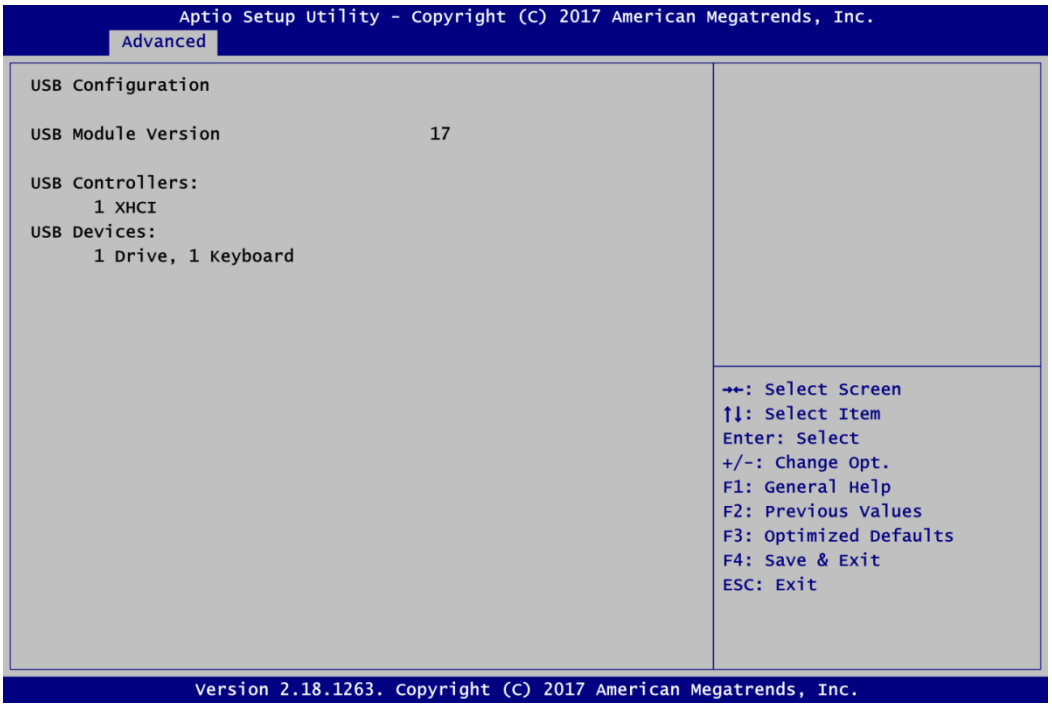
Chipset SATA
Enable or disable Chipset SATA Controller. The default is Enable.

SATA Mode Selection
The SATA mode is AHCI.

PCIE/mSATA
Choose PCIE or mSATA for PCI-Express Mini Card. The default is mini PCIe. If mSATA is needed to insert to SCN3 (see section 2.5.16), please change setting to mSATA Device (see image below).

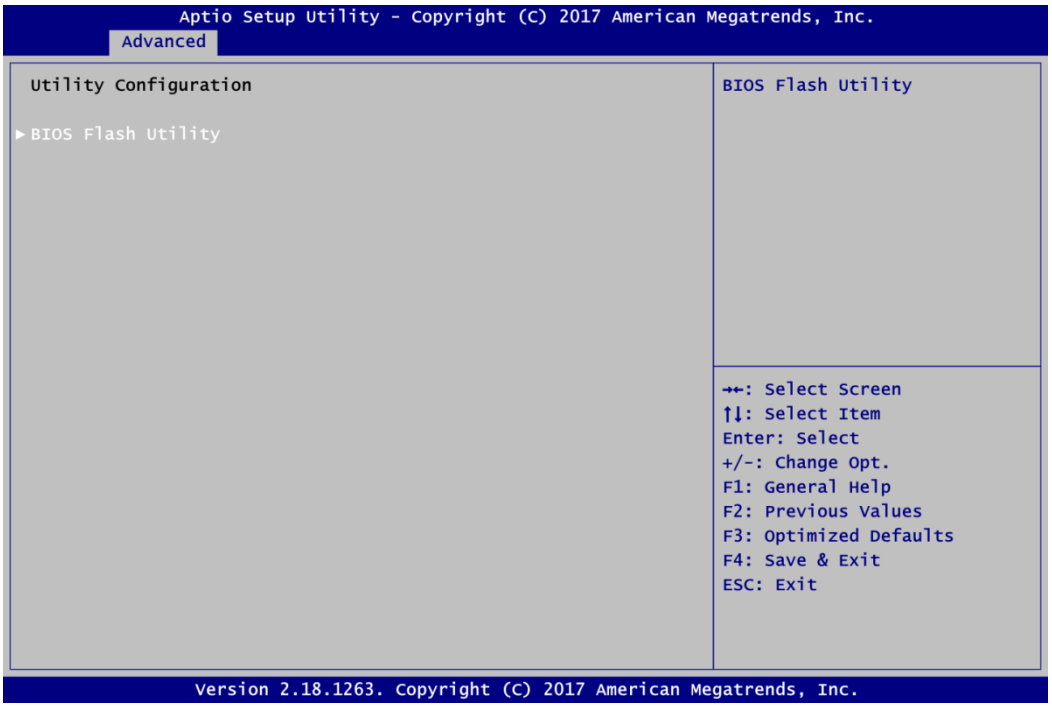


- **USB Configuration**



USB Devices
Display all detected USB devices.

- **Utility Configuration**



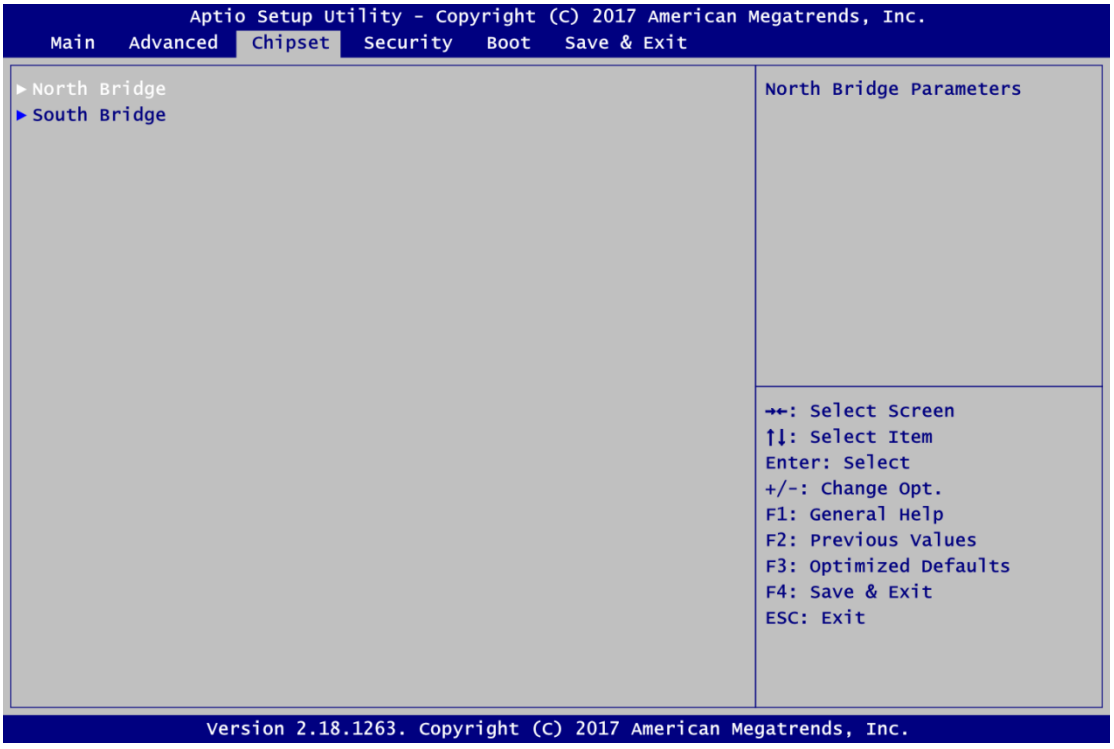
BIOS Flash Utility
BIOS flash utility configuration. For more detailed information, please refer to Appendix B.

4.5 Chipset Menu

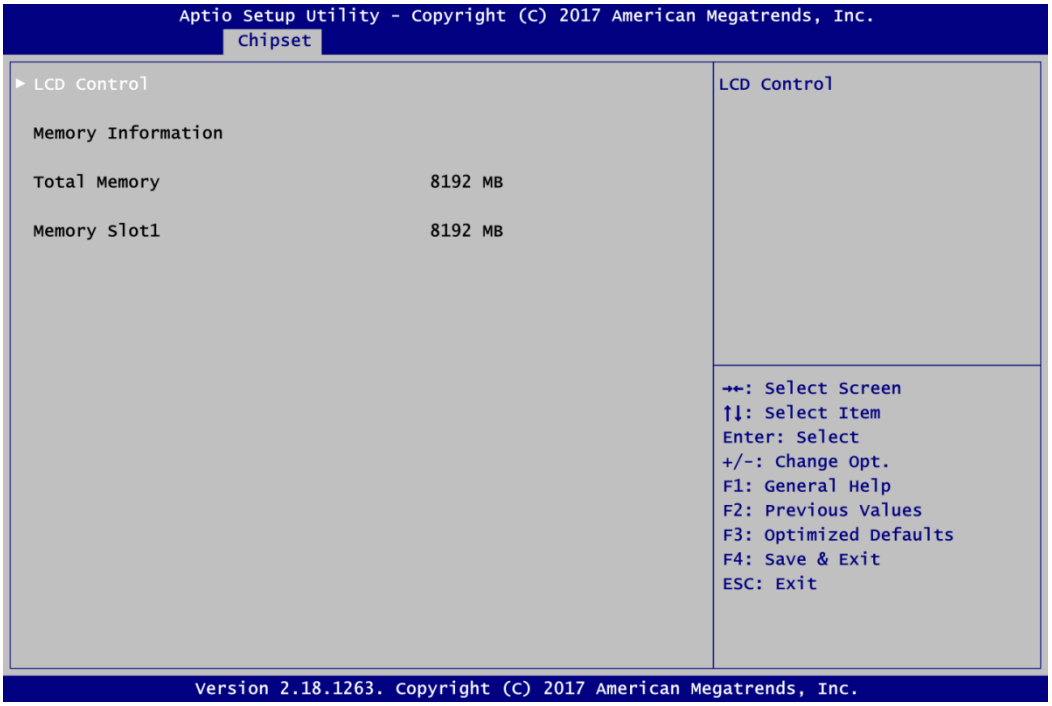
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► North Bridge
- ► South Bridge

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

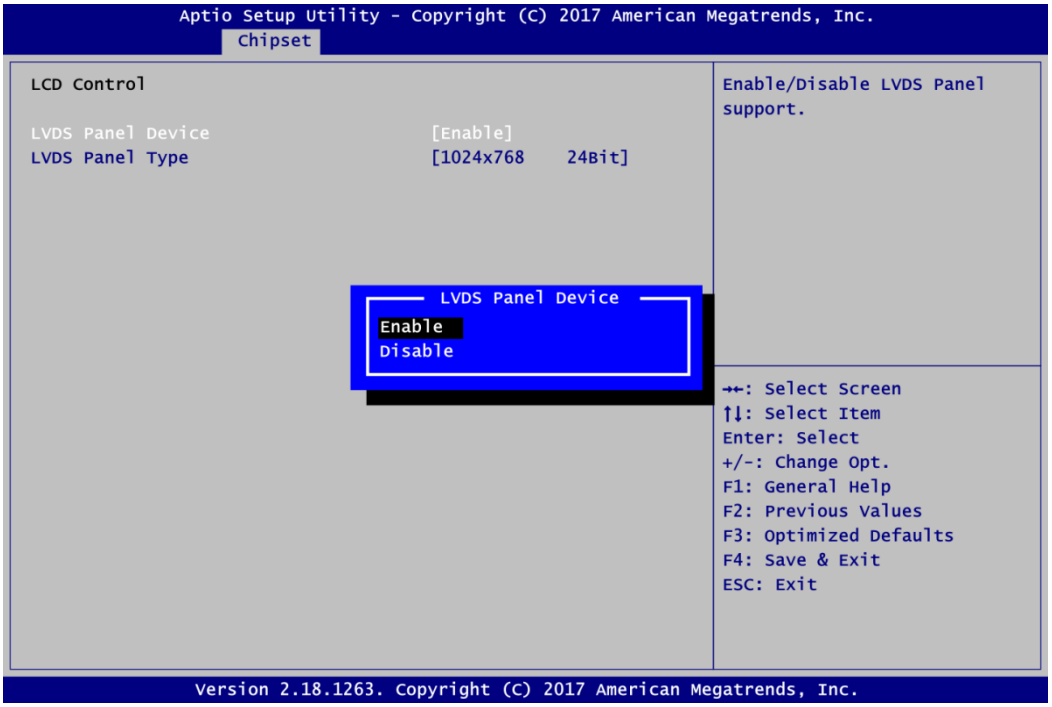


- **North Bridge**
  This screen allows users to configure parameters of North Bridge chipset.

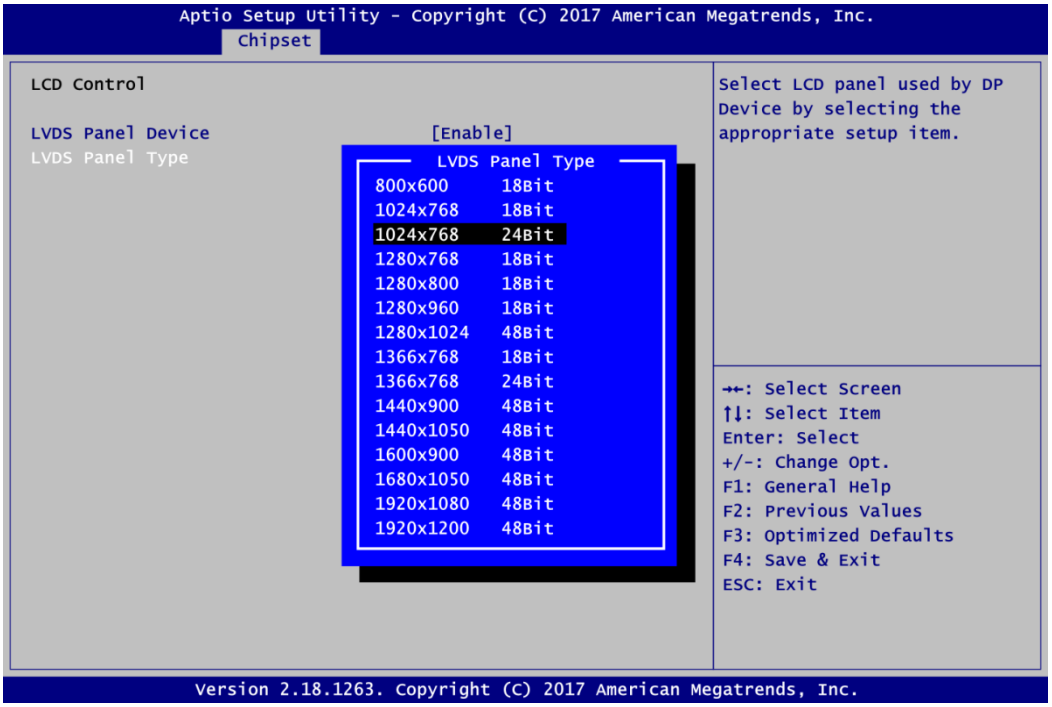


LCD Control
This item allows you to select LCD panel control options. Please press <Enter> to go to the sub menus.

Memory Information
Display system memory information.

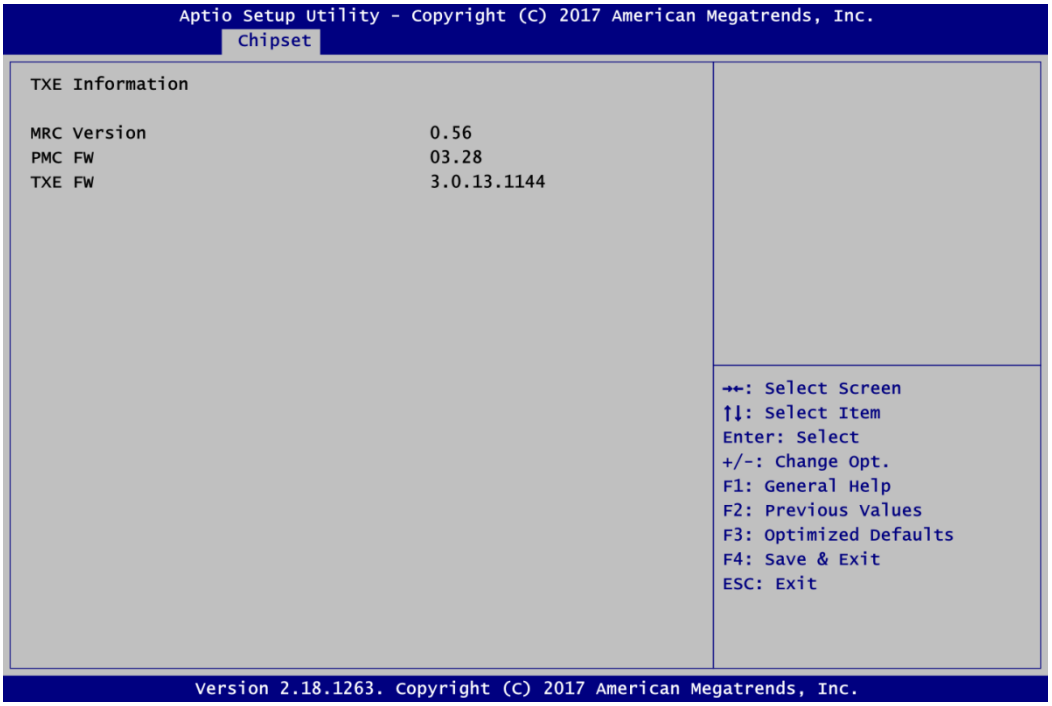


LVDS Panel Device
Enable or disable LVDS panel support.



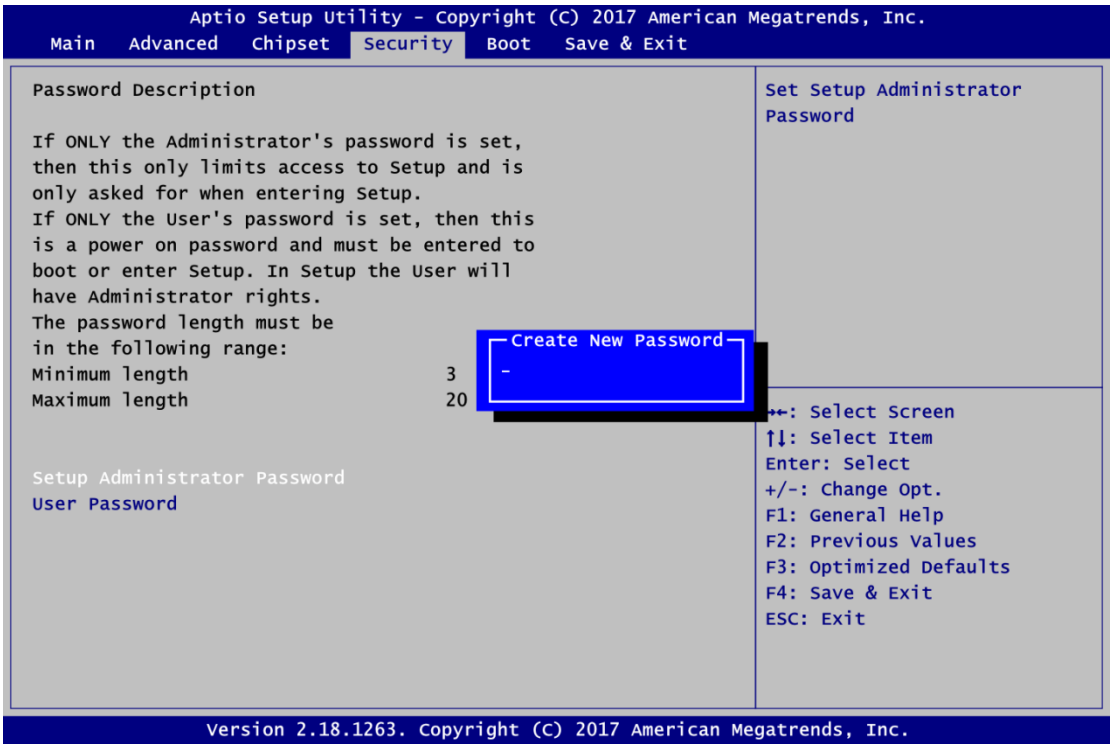
LVDS Panel Type
Select LVDS panel resolution for the display device by selecting the appropriate setup item.

- **South Bridge**
  This screen shows the information of South Bridge chipset.



4.6 Security Menu

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

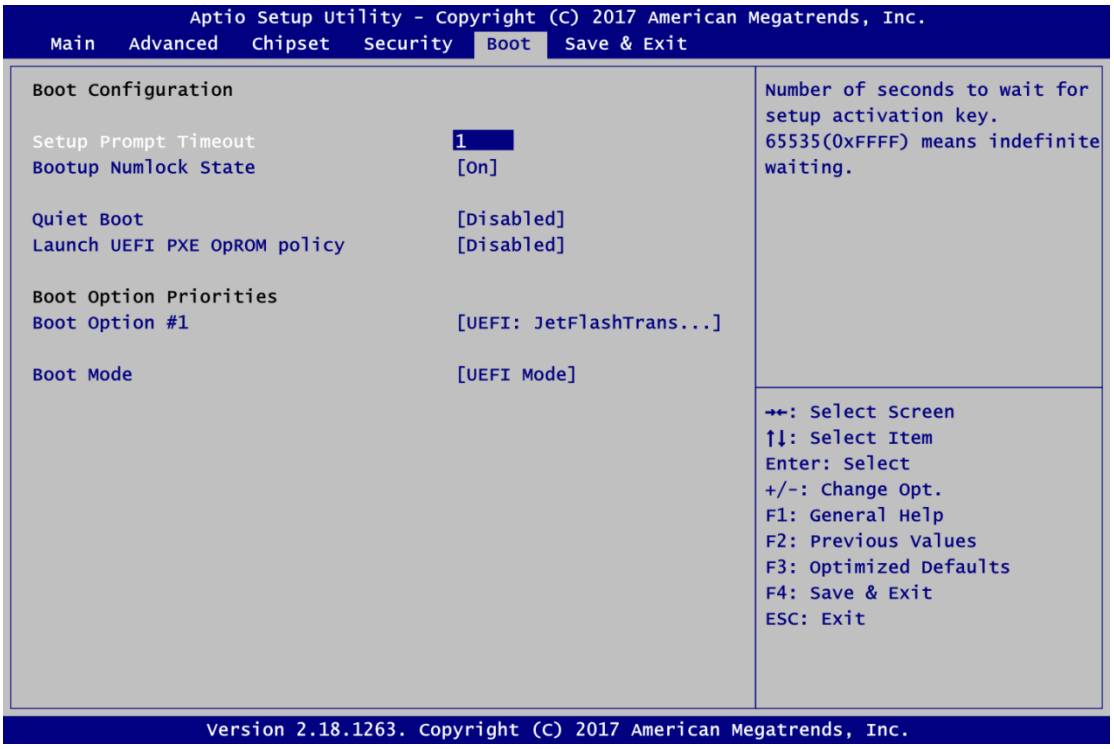


- **Setup Administrator Password**
  Set setup administrator password.

- **User Password**
  Set user password.

4.7 Boot Menu

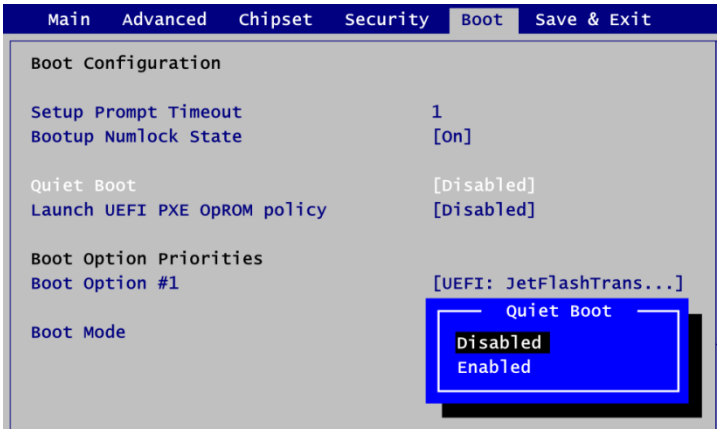
The Boot menu allows users to change boot options of the system.



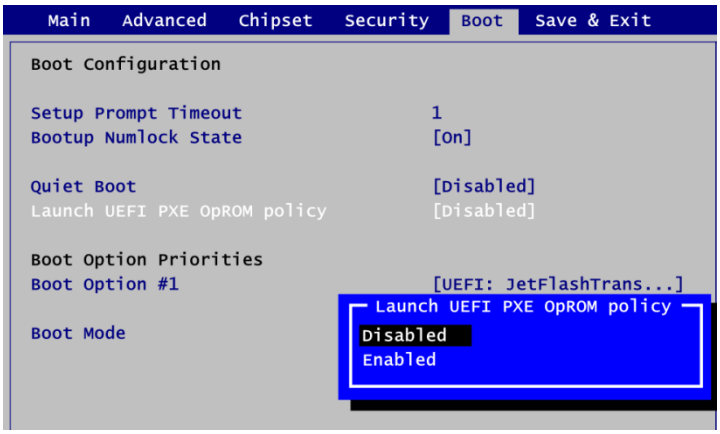
- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

- **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.

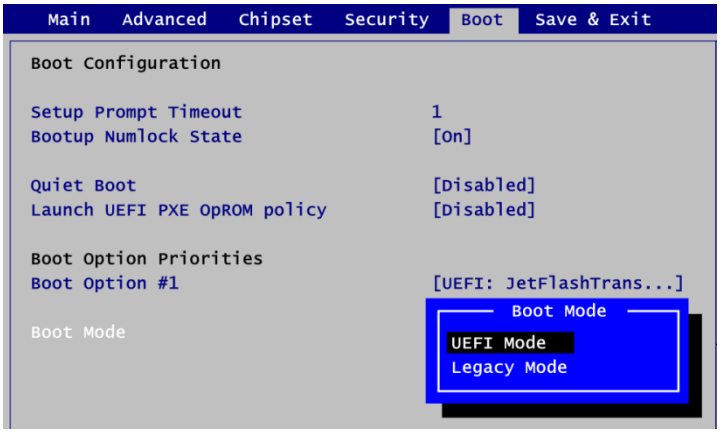


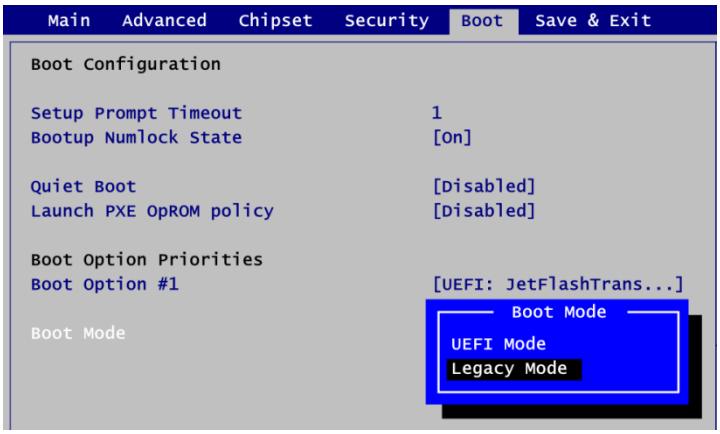
- **Launch UEFI PXE OpROM policy**
  Control the execution of UEFI PXE OpROM.



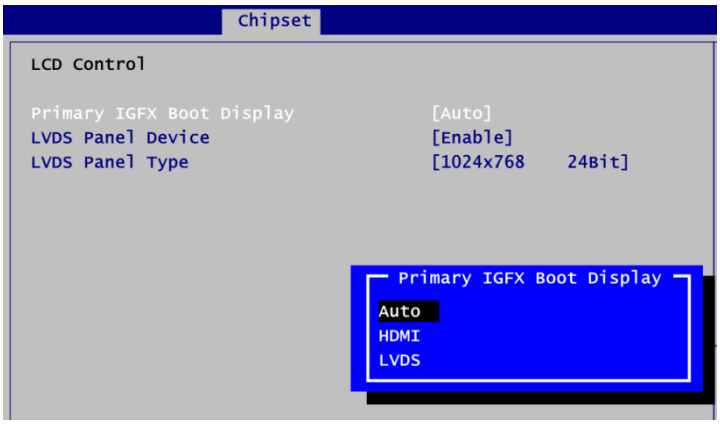
- **Boot Option Priorities**
  These are settings for boot priority. Specify the boot device priority sequence from the available devices.

- **Boot Mode**
  Use this option 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.

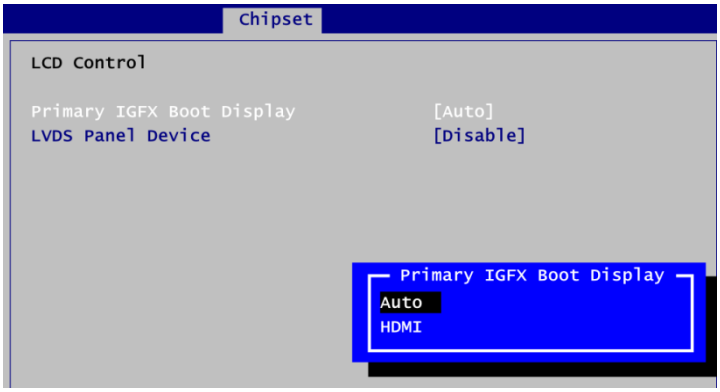




Note that the Primary IGFX Boot Display option appears only if Legacy Mode is selected, see image below.

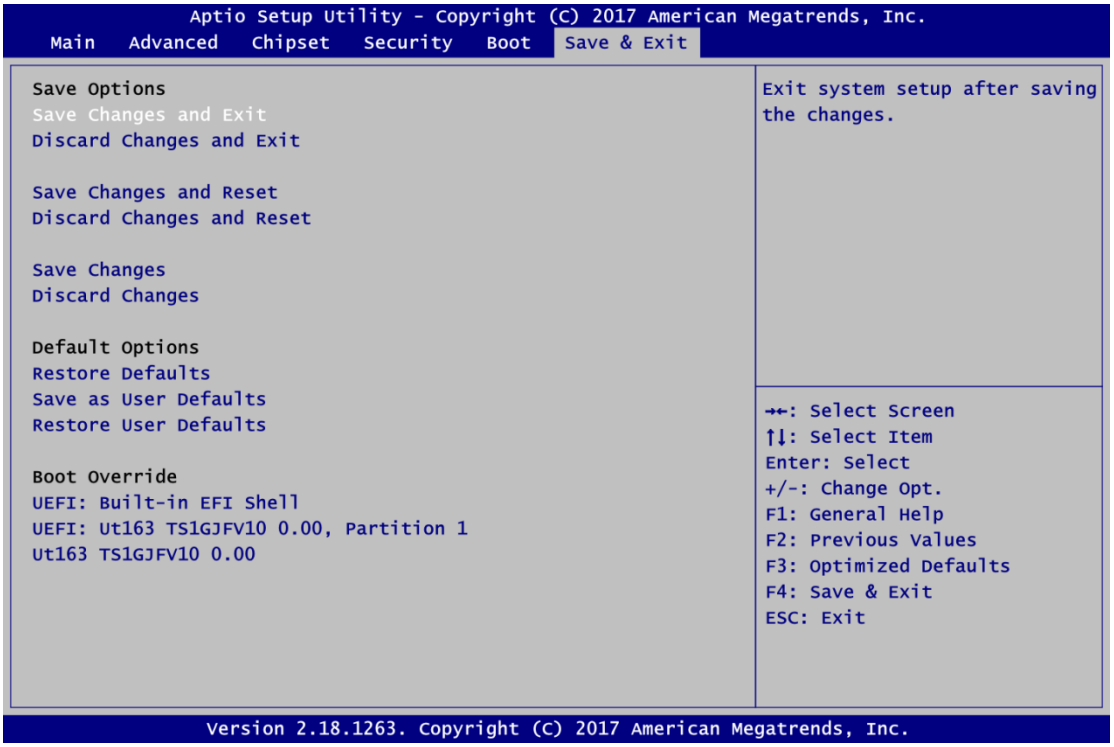


Primary IGFX Boot Display
Select the video device which will be activated during POST (Power-On Self Test). The following image shows the option list when LVDS Panel Device is disabled.



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.

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Appendix A
Watchdog Timer

A.1 About Watchdog Timer

After the system stops working for a while, it can be auto-reset by the watchdog timer. The integrated watchdog timer can be set up in the system reset mode by program.

A.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
```

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