



AXIOMTEK

PICO100

**AMD G-Series APU
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.

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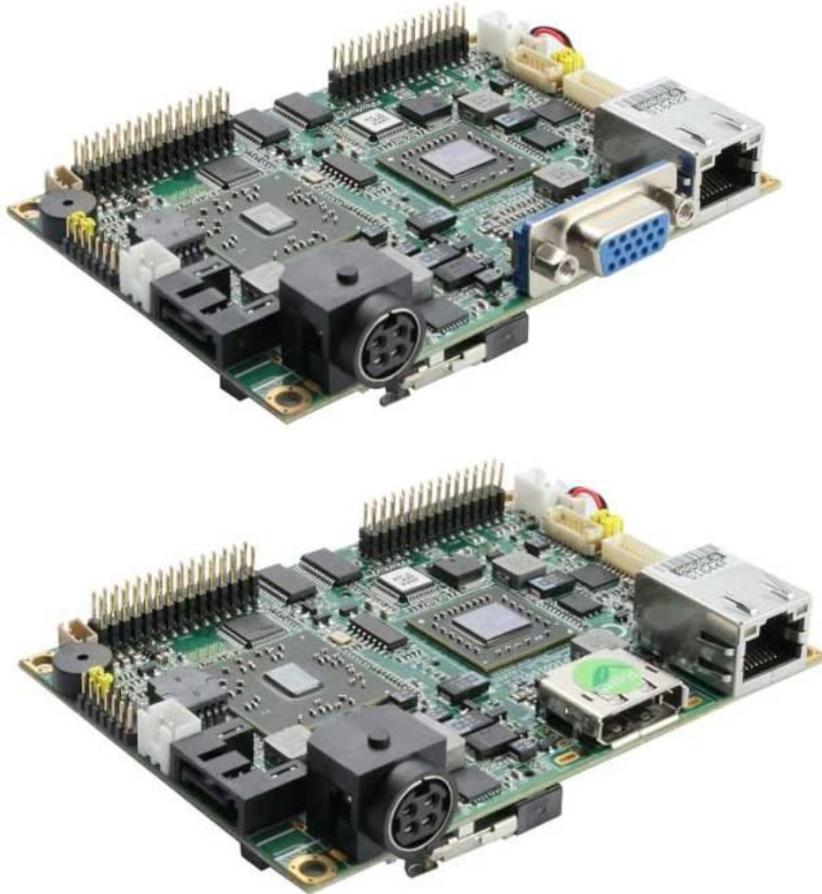
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Chapter 1

Introduction



The PICO100 is a Pico-ITX board with AMD G-Series APU T40E/T40R and Fusion Controller Hub A50M that delivers 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 DDR3 1066MHz SO-DIMM memory, maximum memory capacity up to 4GB. It also features one Gigabit/Fast Ethernet, one serial ATA port with transfer rates up to 6Gb/s, four USB 2.0 high speed compliant, and built-in high definition 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 (2x RS-232) and Pico-ITX form factor that applies an extensive array of PC peripherals. The board can be enhanced by its built-in watchdog timer function, a special industrial feature not commonly seen on other motherboards.

1.1 Features

- AMD G-Series APU T40E (1.0GHz)/T40R (1.0GHz)
- AMD Fusion Controller Hub A50M chipset
- 1 DDR3 SO-DIMM supports up to 4GB memory capacity
- 4 USB 2.0 ports
- 2 COM ports
- +5V only DC-in supported

1.2 Specifications

- **CPU**
 - AMD G-Series APU dual core T40E 1.0 GHz.
 - AMD G-Series APU single core T40R 1.0 GHz.
- **Thermal Solution**
 - With AMD G-Series APU dual core T40E 1.0GHz is with fan
 - With AMD G-Series APU single core T40R 1.0GHz is fanless
- **System Chipset**
 - AMD FCH A50M.
- **BIOS**
 - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS
 - 16Mbit SPI Flash, DMI, Plug and Play
 - RPL/PXE Ethernet Boot ROM
- **System Memory**
 - One 204-pin unbuffered DDR3 SO-DIMM socket.
 - Maximum up to 4GB DDR3 1066MHz memory.
- **Onboard Multi I/O**
 - Controller: Fintek F81801.
 - Serial Ports: Two ports for RS-232 in pin header.
 - PS/2 for keyboard and mouse in pin header.
- **SATA**
 - One SATA-600 connector.
- **CompactFlash™ Socket**
 - One CompactFlash™ Type II low profile slot.
- **USB Interface**
 - Four USB ports with fuse protection and complies with USB Spec. Rev. 2.0 in pin header.
- **Display**
 - One standard 15-pin D-Sub connector which co-layout with a DisplayPort connector.
 - One 2x20 LVDS connector for 18-bit single channel LVDS and one 7-pin wafer connector for inverter control. LVDS resolution is up to 1440x900 or 1400x1050 in 18-bit single channel.
- **Watchdog Timer**
 - 1~255 seconds; up to 255 levels.
- **Ethernet**
 - One port with Realtek RTL8111E for Gigabit/Fast Ethernet.
 - One RJ-45 connector.
- **Audio**
 - HD audio compliant with Realtek ALC662.
 - MIC-in and line-out in pin header.
- **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 Supported

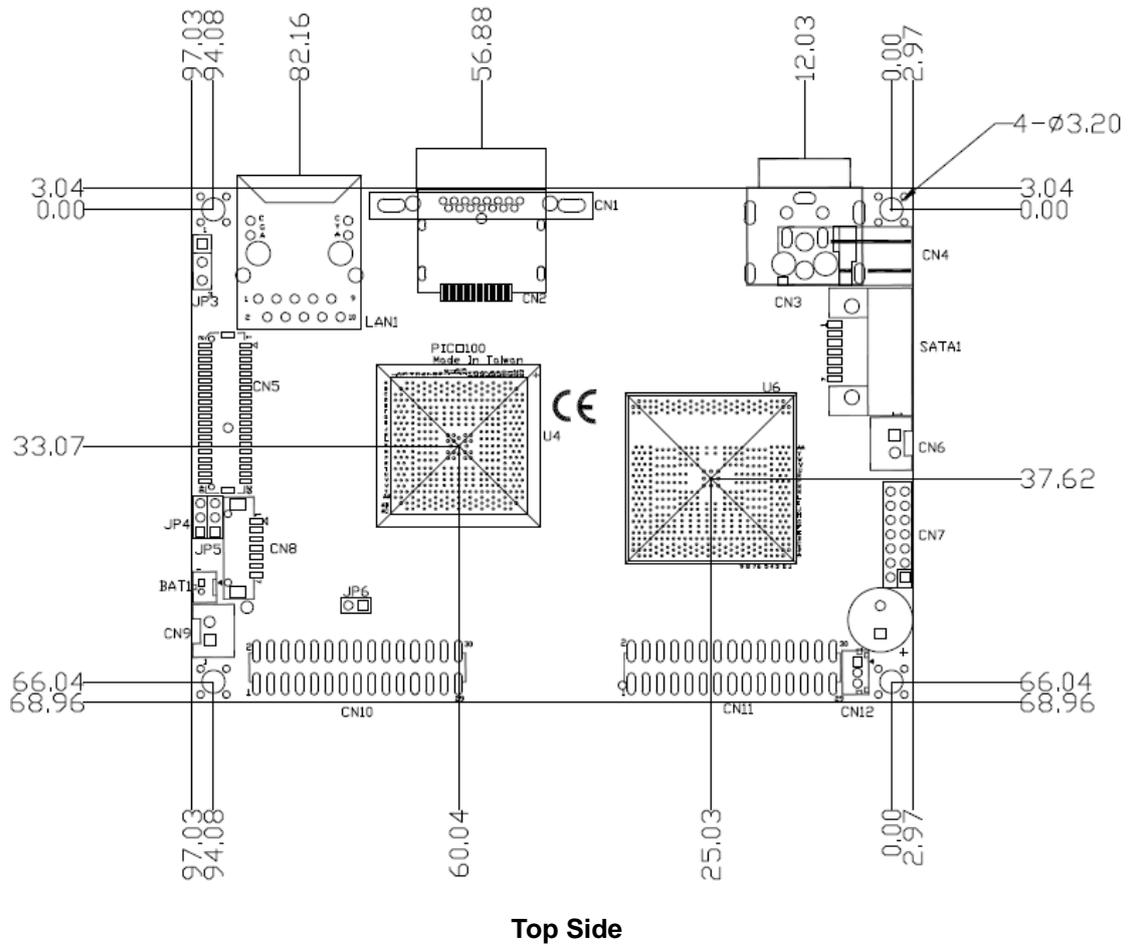
- Chipset and graphic driver
- Ethernet driver (RTL8111E)
- Audio driver
- AHCI driver

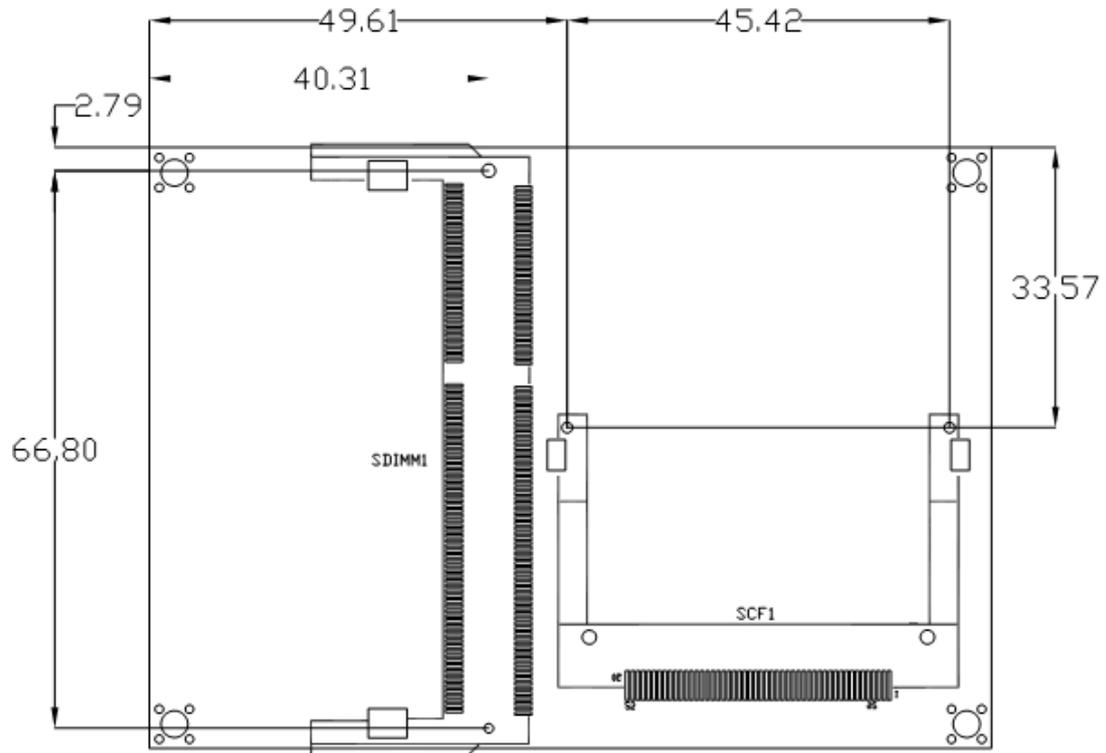
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Chapter 2

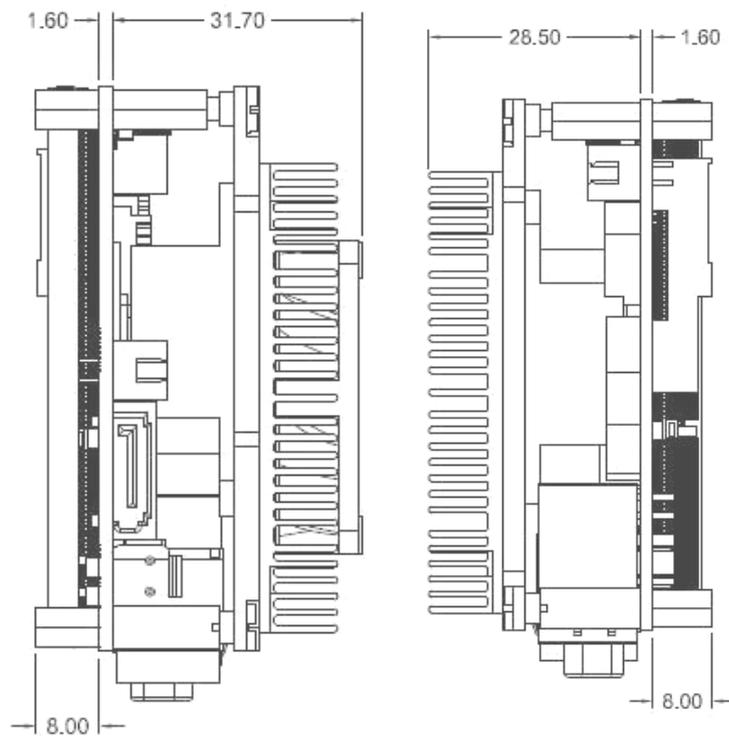
Board and Pin Assignments

2.1 Board Dimensions and Fixing Holes



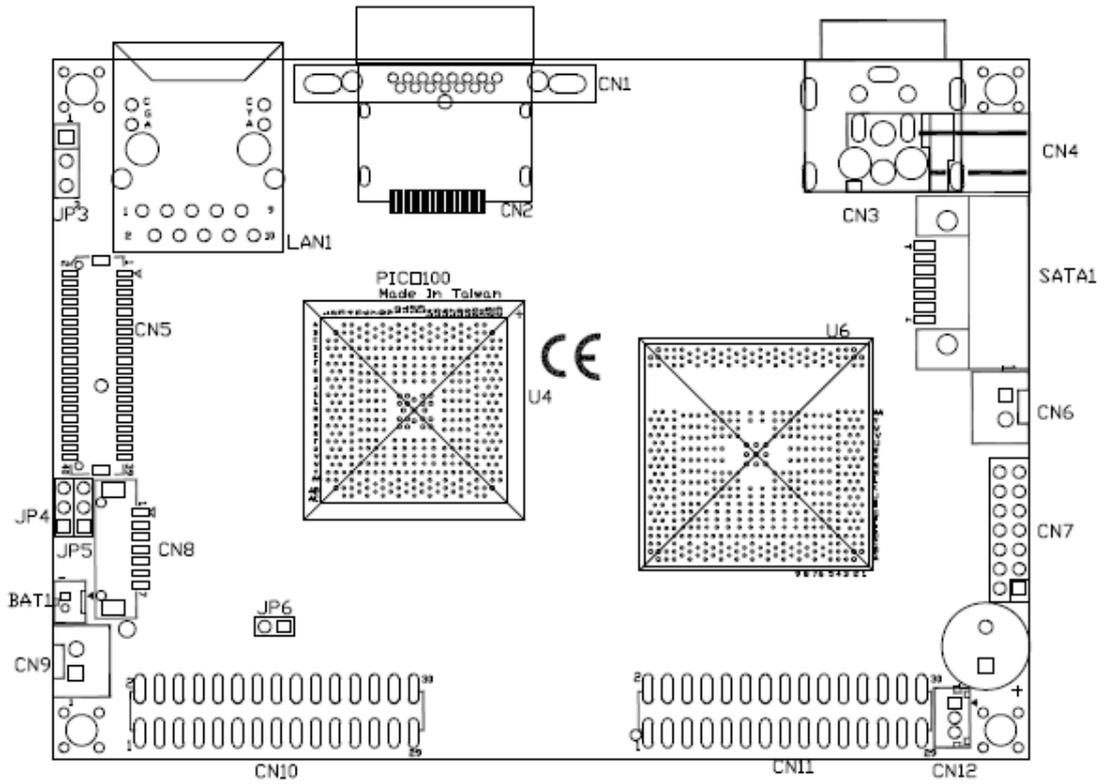


Bottom Side

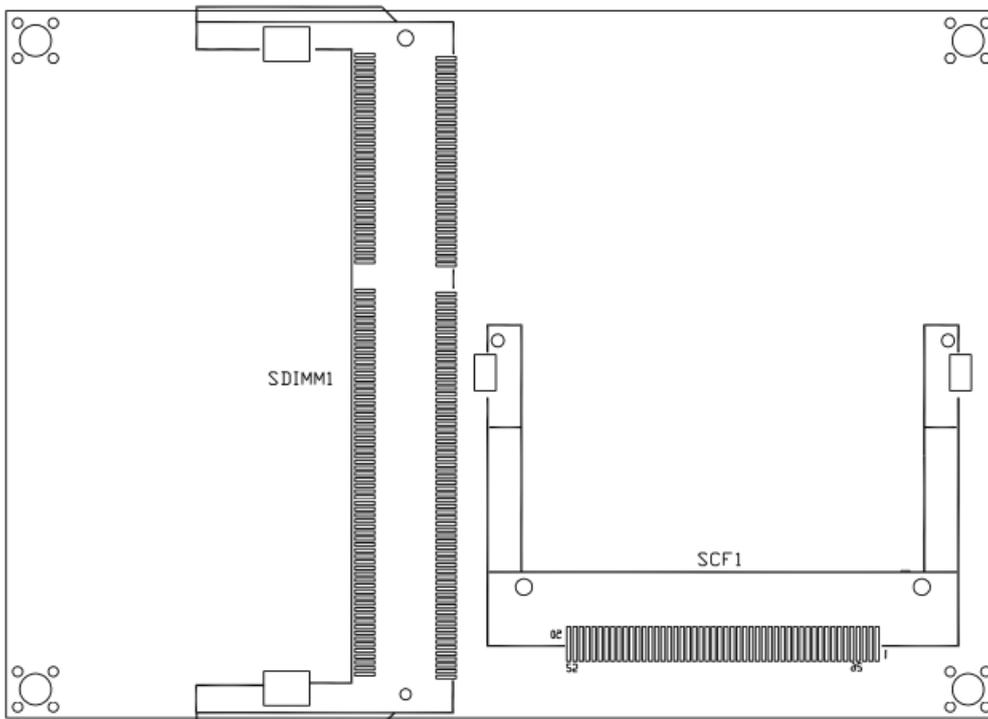


Sideview

2.2 Board Layout



Top Side

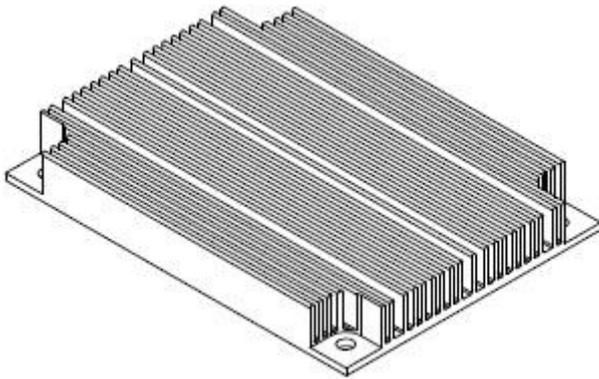


Bottom Side

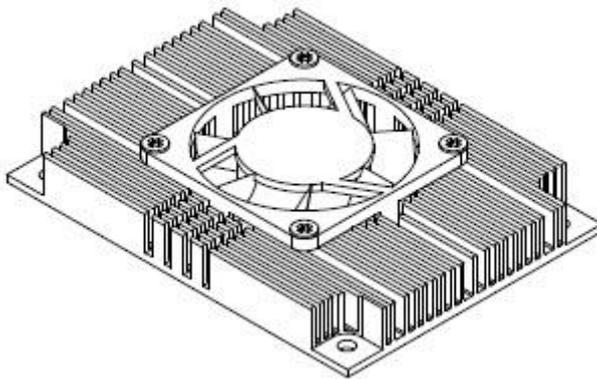
2.3 Assembly Drawing

There are two kinds of heatsinks for PICO100

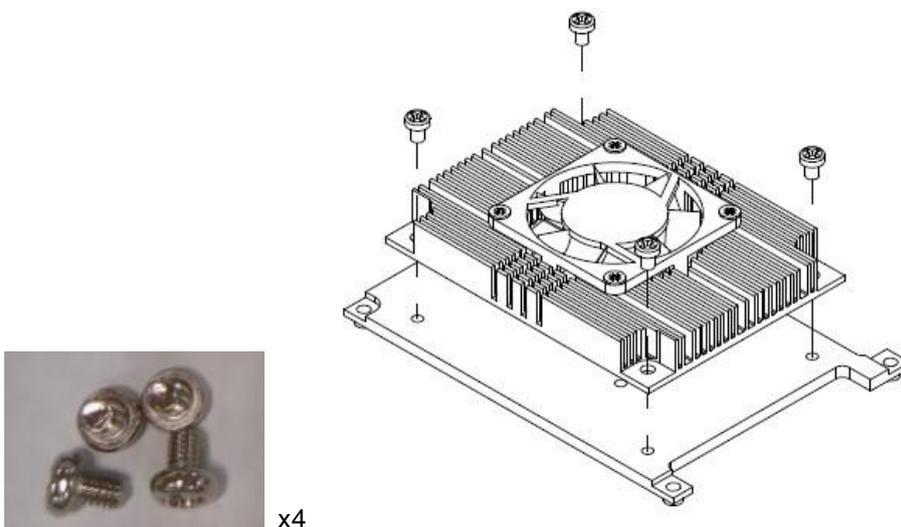
- Heatsink for PICO100 with APU T40R



- Heatsink with fan called cooler for PICO100 with APU T40E

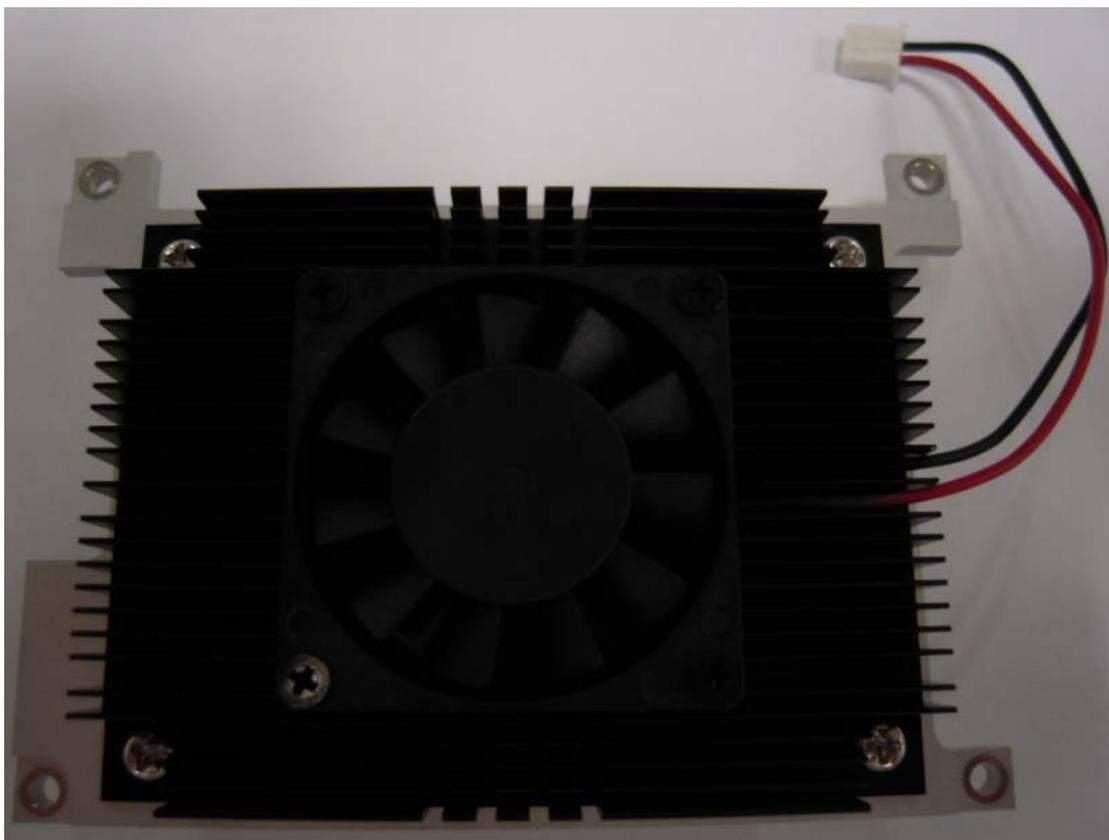


First of all, screw heatsink or cooler into heatspreader.



x4

Please pay attention to that fan cable is on the right side as the below photo.

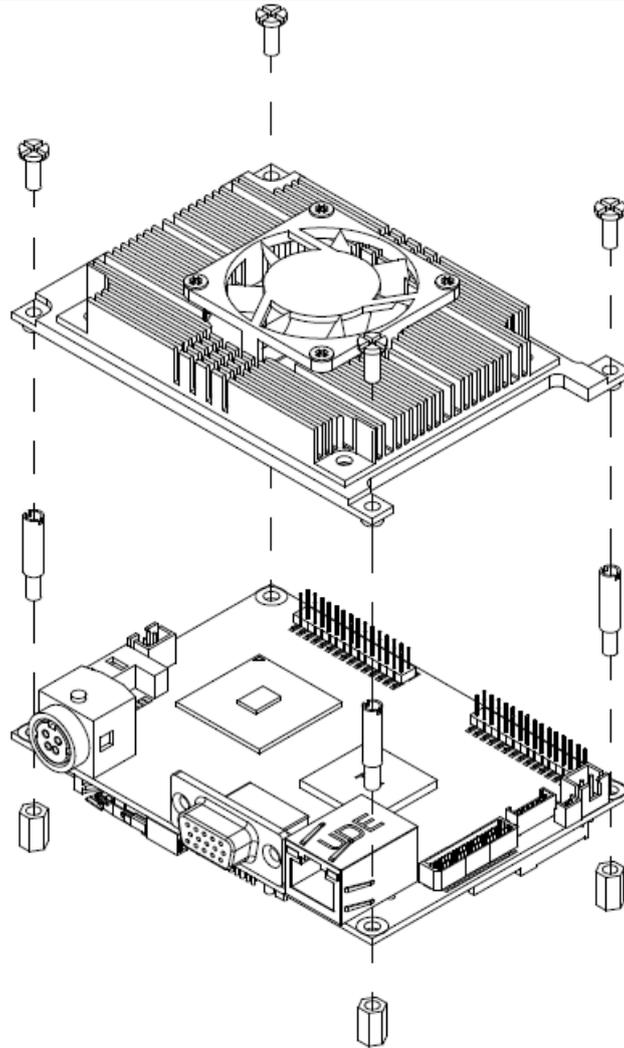


For thermal dissipation, a heatspreader enables the PICO100's components to dissipate heat efficiently. Below images illustrate how to install the heat spreader.

Installing Heatspreader

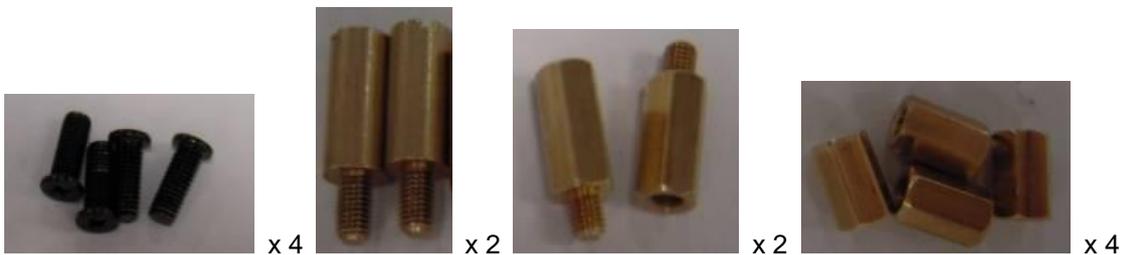
The PICO100 has four assembly holes for installing heatspreader plate. Align both of them and use the four screws to firmly secure the heatspreader plate to the PICO100. Be careful not to over-tighten the screws.

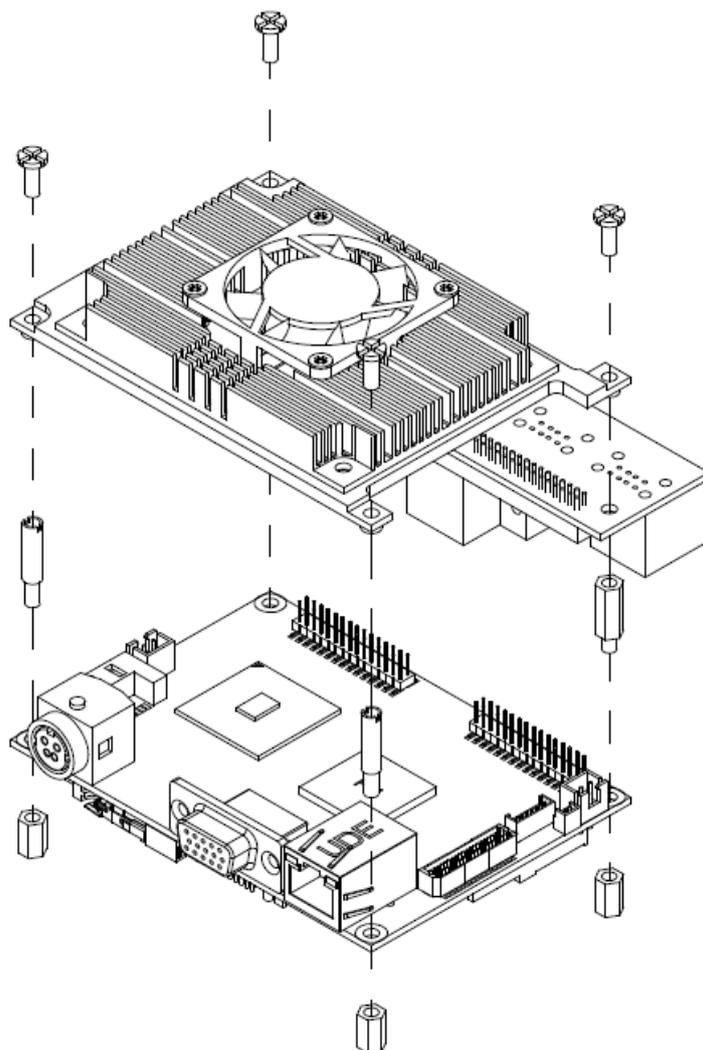




Installing Heatspreader and I/O Board

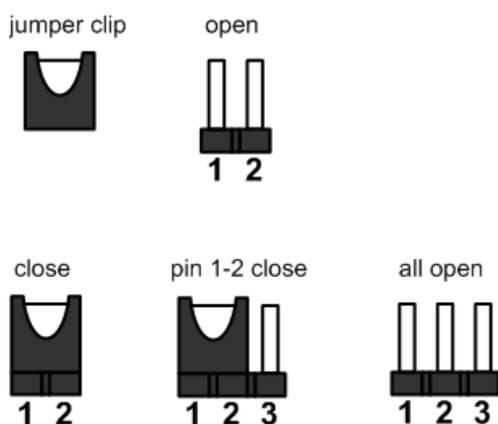
Gently insert I/O Board into CN10 and CN11. Align four assembly holes and use the four screws to firmly secure the heatspreader plate and I/O board to the PICO100. Be careful not to over-tighten the screws.





2.4 Jumper Settings

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



Properly configure jumper settings on the PICO100 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.



Note: Once the default jumper setting needs to be changed, it is suggested to be set under power-off.

Jumper	Description	Default Setting
JP3	LVDS Voltage Selection Default: +3.3V	1-2 close
JP4	CompactFlash™ Voltage Selection Default: +3.3V	1-2 close
JP5	Restore BIOS Optimal Defaults Default: Normal Operation	1-2 close
JP6	Auto Power On Default: Disable	1-2 close

2.4.1 LVDS Voltage Selection (JP3)

The board supports voltage selection for LVDS (flat panel) displays. The JP3 is used to set LVDS connector (CN5) pin 1~6 VCCM to +3.3V or +5V voltage level.

Function	Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close



2.4.2 CompactFlash™ Voltage Selection (JP4)

This jumper is for CompactFlash™ voltage level selection. Use it to set CompactFlash™ connector (SCF1) pin 13 (VCC) and pin 38 (VCC) to +3.3.V or +5V.

Function	Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close



2.4.3 Restore BIOS Optimal Defaults (JP5)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal (Default)	1-2 close
Restore BIOS optimal defaults	2-3 close



2.4.4 Auto Power On (JP6)

If JP6 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP6 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 (Default)	1-2 close
Enable auto power on	1-2 open



Note: This function is similar to the feature of power on after power failure, which is controlled by hardware circuitry instead of BIOS.

2.5 Connectors

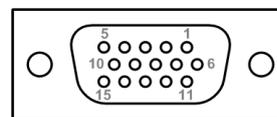
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	VGA Connector
CN2	DisplayPort Connector
CN3	DC Power Jack Connector (5V)
CN4	DC Power Connector (Optional)
CN5	LVDS Connector
CN6	Serial ATA Power Connector (5V)
CN7	Front Panel Connector
CN8	Inverter Connector
CN9	CPU Fan Connector (5V)
CN10	Thru Front I/O Connector 1
CN11	Thru Front I/O Connector 2
CN12	SMBus Connector
SATA1	Serial ATA Connector
LAN1	Ethernet Port
SDIMM1	DDRIII SO-DIMM Connector
SCF1	CompactFlash™ Socket

2.5.1 VGA Connector (CN1)

The CN1 is a standard 15-pin D-Sub connector which is commonly used for CRT VGA monitor. This VGA interface configuration can be configured via software utility.

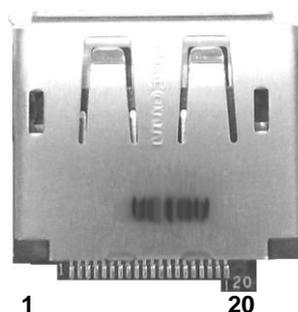
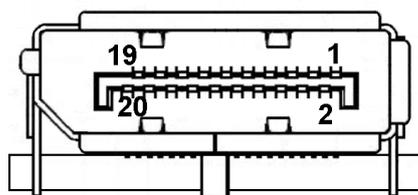
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	N.C.
5	GND	6	DETECT
7	GND	8	GND
9	VCC	10	GND
11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.5.2 Display Port Connector (CN2)

The Display Port interface is available through connector CN2 which is also co-layout with VGA connector (CN1).

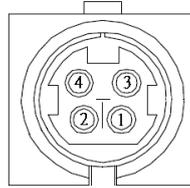
Pin	Signal
1	DPB_LANE0
2	GND
3	DPB_LANE0#
4	DPB_LANE1
5	GND
6	DPB_LANE1#
7	DPB_LANE2
8	GND
9	DPB_LANE2#
10	DPB_LANE3
11	GND
12	DPB_LANE3#
13	GND
14	GND
15	DPB_AUX
16	GND
17	DPB_AUX#
18	DPB_HPDE
19	N.C.
20	+3.3V



2.5.3 DC Power Jack Connector (CN3)

The CN3 is a DC power jack connector for DC +5V input.

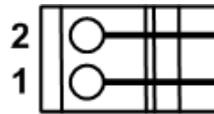
Pin	Signal
1	GND
2	GND
3	+5V
4	+5V



2.5.4 DC Power Connector (CN4) (Optional)

The CN4 (co-layout with CN3) is a 3.96mm pitch wafer DC power connector for DC +5V input.

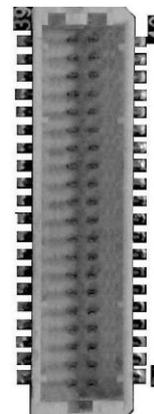
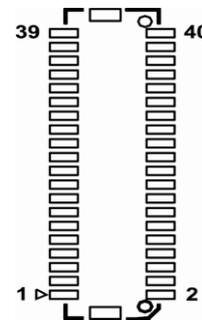
Pin	Signal
1	+5V
2	GND



2.5.5 LVDS Connector (CN5)

This board has a 40-pin connector (CN5) for LVDS LCD interface. It is strongly recommended to use the matching JST SHDR-40VS-B 40-pin connector for LVDS interface. Pin 1~6 VCCM can be set to +3.3V level or +5V level by jumper JP3 (see section 2.4.1).

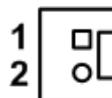
Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	N.C.
31	Channel A D1+	32	N.C.
33	GND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



2.5.6 Serial ATA Power Connector (CN6)

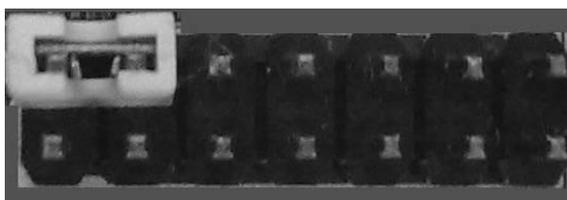
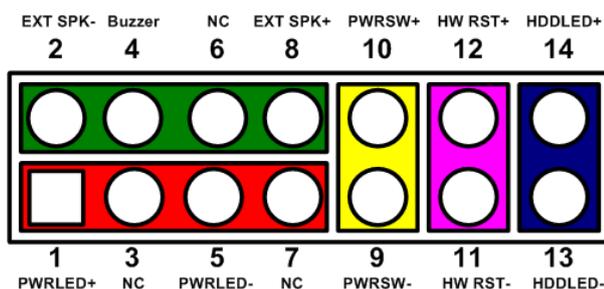
The CN6 is a 2.5mm pitch wafer connector for serial ATA (SATA) power interface.

Pin	Signal
1	+5V
2	GND



2.5.7 Front Panel Connector (CN7)

Pin	Signal
1	PWRLED+
2	EXT SPK-
3	N.C.
4	Buzzer
5	PWRLED-
6	N.C.
7	N.C.
8	EXT SPK+
9	PWRSW-
10	PWRSW+
11	HW RST-
12	HW RST+
13	HDDLED-
14	HDDLED+



Power LED

Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on.

External Speaker and Internal Buzzer

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU card to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button

Pin 9 and 10 connect the power button on front panel to the CPU card, which allows users to turn on or off power supply.

System Reset Switch

Pin 11 and 12 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.

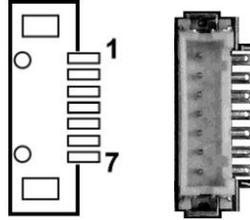
HDD Activity LED

This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.5.8 Inverter Connector (CN8)

The CN8 is a DF13-7P-1.25C 7-pin connector for inverter. We strongly recommend you to use the matching DF13-7S-1.25V connector to avoid malfunction.

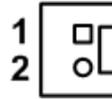
Pin	Signal
1	+5V
2	+5V
3	ENABLE +5V
4	ENABLE +3.3V
5	GND
6	GND
7	GND



2.5.9 CPU Fan Connector (CN9)

The CN9 is a 2.5mm pitch wafer connector for fan power interface.

Pin	Signal
1	+5V
2	GND



2.5.10 Thru Front I/O Connector 1 (CN10)

The pin assignments of CN10 are given as follows. Please insert carefully the I/O board into CN10 and CN11.

Pin	Signal	Pin	Signal
1	+5V SBY	2	+5V SBY
3	USB D0-	4	USB D1-
5	USB D0+	6	USB D1+
7	GND	8	GND
9	GND	10	GND
11	+5V SBY	12	+5V SBY
13	USB D2-	14	USB D3-
15	USB D2+	16	USB D3+
17	GND	18	GND
19	GND	20	GND
21	KB_VCC	22	K/B Data
23	K/B CLK	24	GND
25	KB_VCC	26	KB_VCC
27	M/S Data	28	M/S CLK
29	GND	30	+5V



2.5.11 Thru Front I/O Connector 2 (CN11)

The pin assignments of CN11 are given as follows. Please insert carefully the I/O board into CN10 and CN11.

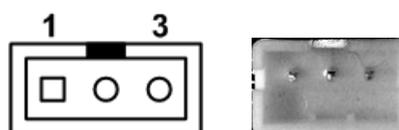
Pin	Signal	Pin	Signal
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1
7	DSR1	8	RI1
9	GND	10	N.C.
11	DCD2	12	DSR2
13	RXD2	14	RTS2
15	TXD2	16	CTS2
17	DSR2	18	RI2
19	GND	20	N.C.
21	MIC_IN	22	GND
23	LINE_IN_L	24	GND
25	LINE_IN_R	26	GND
27	AUDIO_OUT_L	28	GND
29	AUDIO_OUT_R	30	GND



2.5.12 SMBus Connector (CN12)

This connector is for SMBus interface support. The SMBus (System Management Bus) is a simple 2-wire bus for the purpose of lightweight communication. Most commonly it is used for communication with the power source related applications such as on/off instructions.

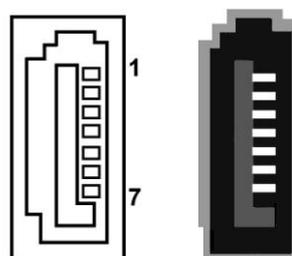
Pin	Signal
1	CLK
2	DATA
3	GND



2.5.13 Serial ATA Connector (SATA1)

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

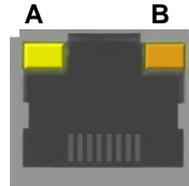
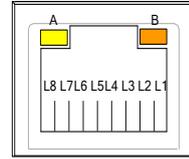
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.5.14 Ethernet Port (LAN1)

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

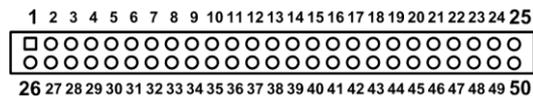
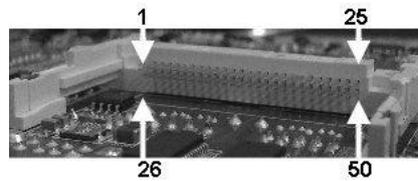
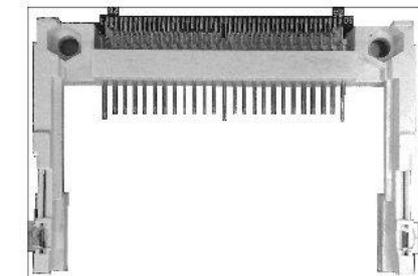
Pin	Signal	Pin	Signal
L1	MDI0+	L5	MDI2-
L2	MDI0-	L6	MDI1-
L3	MDI1+	L7	MDI3+
L4	MDI2+	L8	MDI3-
A	Active LED (Yellow)		
B	100 LAN LED (Green) / 1000 LAN LED (Orange)		



2.5.15 CompactFlash™ Socket (SCF1)

The board is equipped with a CompactFlash™ disk type-II socket on the bottom side to support an IDE interface CompactFlash™ disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CompactFlash™ disk card. When installing or removing the CompactFlash™ disk card, please make sure the system power is off. Pin 13 and pin 38 power voltage can be configured by setting jumper JP4 (see section 2.4.2).

Pin	Signal	Pin	Signal
1	GND	26	CD1-
2	Data 3	27	Data 11
3	Data 4	28	Data 12
4	Data 5	29	Data 13
5	Data 6	30	Data 14
6	Data 7	31	Data 15
7	CS0#	32	CS1#
8	Address 10	33	VS1#
9	ATASEL	34	IORD#
10	Address 9	35	IOWR#
11	Address 8	36	WE#
12	Address 7	37	INTR
13	VCC	38	VCC
14	Address 6	39	CSEL#
15	Address 5	40	VS2#
16	Address 4	41	RESET#
17	Address 3	42	IORDY#
18	Address 2	43	DMAREQ
19	Address 1	44	DMAACK-
20	Address 0	45	DASP#
21	Data 0	46	PDIAG#
22	Data 1	47	Data 8
23	Data 2	48	Data 9
24	IOCS16#	49	Data 10
25	CD2#	50	GND



Chapter 3

Hardware Description

3.1 APU (Accelerated Processing Unit)

The PICO100 supports AMD G-Series APU (Accelerated Processing Unit) T40E/T40R, which enables your system to operate under Windows[®] XP, Windows[®] 7 and Linux environments. The system performance depends on the APU.

3.2 BIOS

The PICO100 uses AMI Plug and Play BIOS with a single 16Mbit SPI Flash.

3.3 System Memory

The PICO100 supports one 204-pin DDR3 SO-DIMM sockets for maximum memory of 4GB DDR3 SDRAMs. The memory module comes in sizes of 1GB, 2GB and 4GB.

3.4 I/O Port Address Map

The AMD G-Series APU communicates via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.

Input/output (IO)	
[00000000 - 0000000F]	Direct memory access controller
[00000000 - 0000000F]	Motherboard resources
[00000000 - 000003AF]	PCI bus
[00000010 - 0000001F]	Motherboard resources
[00000020 - 00000021]	Programmable interrupt controller
[00000022 - 0000003F]	Motherboard resources
[00000040 - 00000043]	System timer
[00000044 - 0000005F]	Motherboard resources
[00000060 - 00000060]	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000061 - 00000061]	System speaker
[00000062 - 00000063]	Motherboard resources
[00000064 - 00000064]	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000065 - 0000006F]	Motherboard resources
[00000070 - 00000071]	System CMOS/real time clock
[00000072 - 0000007F]	Motherboard resources
[00000080 - 00000080]	Motherboard resources
[00000081 - 00000083]	Direct memory access controller
[00000084 - 00000086]	Motherboard resources
[00000087 - 00000087]	Direct memory access controller
[00000088 - 00000088]	Motherboard resources
[00000089 - 0000008B]	Direct memory access controller
[0000008C - 0000008E]	Motherboard resources
[0000008F - 0000008F]	Direct memory access controller
[00000090 - 0000009F]	Motherboard resources
[000000A0 - 000000A1]	Programmable interrupt controller
[000000A2 - 000000BF]	Motherboard resources
[000000C0 - 000000DF]	Direct memory access controller
[000000E0 - 000000EF]	Motherboard resources
[000000F0 - 000000FF]	Numeric data processor
[00000274 - 00000277]	ISAPNP Read Data Port
[00000279 - 00000279]	ISAPNP Read Data Port
[00000285 - 00000294]	Motherboard resources
[000002F8 - 000002FF]	Communications Port (COM2)
[000003B0 - 000003BB]	AMD Radeon HD 6250 Graphics
[000003B0 - 000003DF]	PCI bus
[000003C0 - 000003DF]	AMD Radeon HD 6250 Graphics

[000003E0 - 00000CF7]	PCI bus
[000003F8 - 000003FF]	Communications Port (COM1)
[0000040B - 0000040B]	Motherboard resources
[000004D0 - 000004D1]	Motherboard resources
[000004D6 - 000004D6]	Motherboard resources
[00000800 - 0000089F]	Motherboard resources
[00000900 - 0000090F]	Motherboard resources
[00000910 - 0000091F]	Motherboard resources
[00000A00 - 00000A0F]	Motherboard resources
[00000A79 - 00000A79]	ISAPNP Read Data Port
[00000B20 - 00000B3F]	Motherboard resources
[00000C00 - 00000C01]	Motherboard resources
[00000C14 - 00000C14]	Motherboard resources
[00000C50 - 00000C51]	Motherboard resources
[00000C52 - 00000C52]	Motherboard resources
[00000C6C - 00000C6C]	Motherboard resources
[00000C6F - 00000C6F]	Motherboard resources
[00000CD0 - 00000CD1]	Motherboard resources
[00000CD2 - 00000CD3]	Motherboard resources
[00000CD4 - 00000CD5]	Motherboard resources
[00000CD6 - 00000CD7]	Motherboard resources
[00000CD8 - 00000CDF]	Motherboard resources
[00000D00 - 0000FFFF]	PCI bus
[0000D000 - 0000D00F]	Standard Dual Channel PCI IDE Controller
[0000D000 - 0000DFFF]	PCI standard PCI-to-PCI bridge
[0000D010 - 0000D013]	Standard Dual Channel PCI IDE Controller
[0000D020 - 0000D027]	Standard Dual Channel PCI IDE Controller
[0000D030 - 0000D033]	Standard Dual Channel PCI IDE Controller
[0000D040 - 0000D047]	Standard Dual Channel PCI IDE Controller
[0000E000 - 0000E0FF]	Realtek PCIe GBE Family Controller
[0000E000 - 0000EFFF]	PCI standard PCI-to-PCI bridge
[0000F000 - 0000F0FF]	AMD Radeon HD 6250 Graphics
[0000F100 - 0000F10F]	Standard Dual Channel PCI IDE Controller
[0000F110 - 0000F113]	Standard Dual Channel PCI IDE Controller
[0000F120 - 0000F127]	Standard Dual Channel PCI IDE Controller
[0000F130 - 0000F133]	Standard Dual Channel PCI IDE Controller
[0000F140 - 0000F147]	Standard Dual Channel PCI IDE Controller
[0000FE00 - 0000FEFE]	Motherboard resources

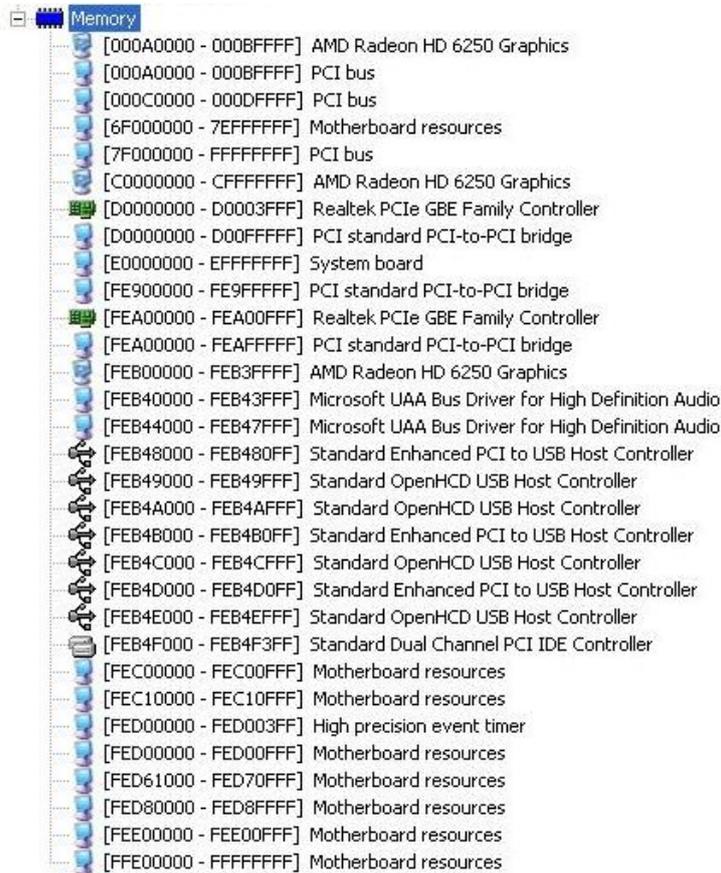
3.5 Interrupt Controller (IRQ) Map

The PICO100 is 100% PC compatible control board which consists of 20 interrupt request lines. Four out of 20 can be programmable. The mapping list of the 20 interrupt request lines is shown as follows.

Bus Type	IRQ	Device Name
(ISA)	0	System timer
(ISA)	1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
(ISA)	3	Communications Port (COM2)
(ISA)	4	Communications Port (COM1)
(ISA)	8	System CMOS/real time clock
(ISA)	9	Microsoft ACPI-Compliant System
(ISA)	12	Microsoft PS/2 Mouse
(ISA)	13	Numeric data processor
(PCI)	16	Microsoft UAA Bus Driver for High Definition Audio
(PCI)	16	PCI standard PCI-to-PCI bridge
(PCI)	16	PCI standard PCI-to-PCI bridge
(PCI)	16	Realtek PCIe GBE Family Controller
(PCI)	16	Standard Dual Channel PCI IDE Controller
(PCI)	17	Standard Enhanced PCI to USB Host Controller
(PCI)	17	Standard Enhanced PCI to USB Host Controller
(PCI)	17	Standard Enhanced PCI to USB Host Controller
(PCI)	18	AMD Radeon HD 6250 Graphics
(PCI)	18	Standard OpenHCD USB Host Controller
(PCI)	18	Standard OpenHCD USB Host Controller
(PCI)	18	Standard OpenHCD USB Host Controller
(PCI)	18	Standard OpenHCD USB Host Controller
(PCI)	19	Microsoft UAA Bus Driver for High Definition Audio
(PCI)	19	Standard Dual Channel PCI IDE Controller

3.6 Memory Map

The memory mapping list is shown as follows:



Address Range	Device Name
[000A0000 - 000BFFFF]	AMD Radeon HD 6250 Graphics
[000A0000 - 000BFFFF]	PCI bus
[000C0000 - 000DFFFF]	PCI bus
[6F000000 - 7EFFFFFF]	Motherboard resources
[7F000000 - FFFFFFFF]	PCI bus
[C0000000 - CFFFFFFF]	AMD Radeon HD 6250 Graphics
[D0000000 - D0003FFF]	Realtek PCIe GBE Family Controller
[D0000000 - D00FFFFF]	PCI standard PCI-to-PCI bridge
[E0000000 - EFFFFFFF]	System board
[FE900000 - FE9FFFFF]	PCI standard PCI-to-PCI bridge
[FEA00000 - FEA00FFF]	Realtek PCIe GBE Family Controller
[FEA00000 - FEAFFFFFFF]	PCI standard PCI-to-PCI bridge
[FEB00000 - FEB3FFFF]	AMD Radeon HD 6250 Graphics
[FEB40000 - FEB43FFF]	Microsoft UAA Bus Driver for High Definition Audio
[FEB44000 - FEB47FFF]	Microsoft UAA Bus Driver for High Definition Audio
[FEB48000 - FEB480FF]	Standard Enhanced PCI to USB Host Controller
[FEB49000 - FEB49FFF]	Standard OpenHCD USB Host Controller
[FEB4A000 - FEB4AFFF]	Standard OpenHCD USB Host Controller
[FEB4B000 - FEB4B0FF]	Standard Enhanced PCI to USB Host Controller
[FEB4C000 - FEB4CFFF]	Standard OpenHCD USB Host Controller
[FEB4D000 - FEB4D0FF]	Standard Enhanced PCI to USB Host Controller
[FEB4E000 - FEB4EFFF]	Standard OpenHCD USB Host Controller
[FEB4F000 - FEB4F3FF]	Standard Dual Channel PCI IDE Controller
[FEC00000 - FEC00FFF]	Motherboard resources
[FEC10000 - FEC10FFF]	Motherboard resources
[FED00000 - FED003FF]	High precision event timer
[FED00000 - FED00FFF]	Motherboard resources
[FED61000 - FED70FFF]	Motherboard resources
[FED80000 - FED8FFFF]	Motherboard resources
[FEE00000 - FEE00FFF]	Motherboard resources
[FFE00000 - FFFFFFFF]	Motherboard resources

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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 16MB 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 key immediately.
2. After you press the 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 can not boot after making and saving system changes with Setup, you can restore BIOS optimal defaults by setting JP5 (see section 2.4.3).*

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.

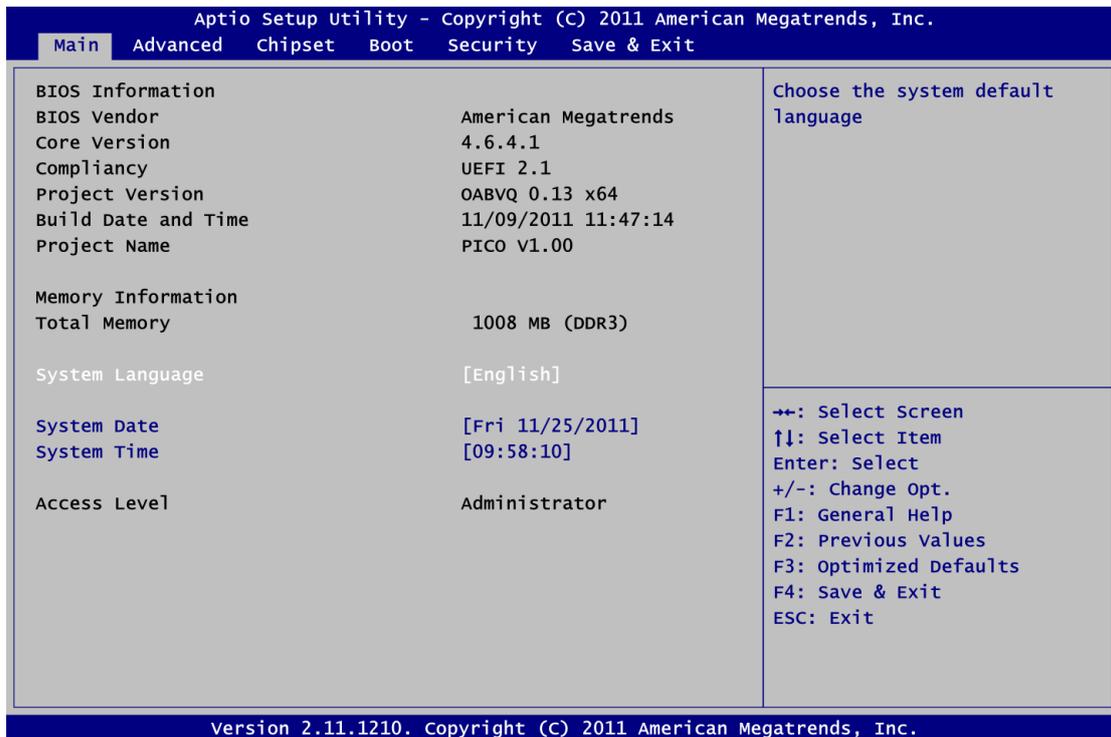


Note: *Some of the navigation keys differ from one screen to another.*

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.



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

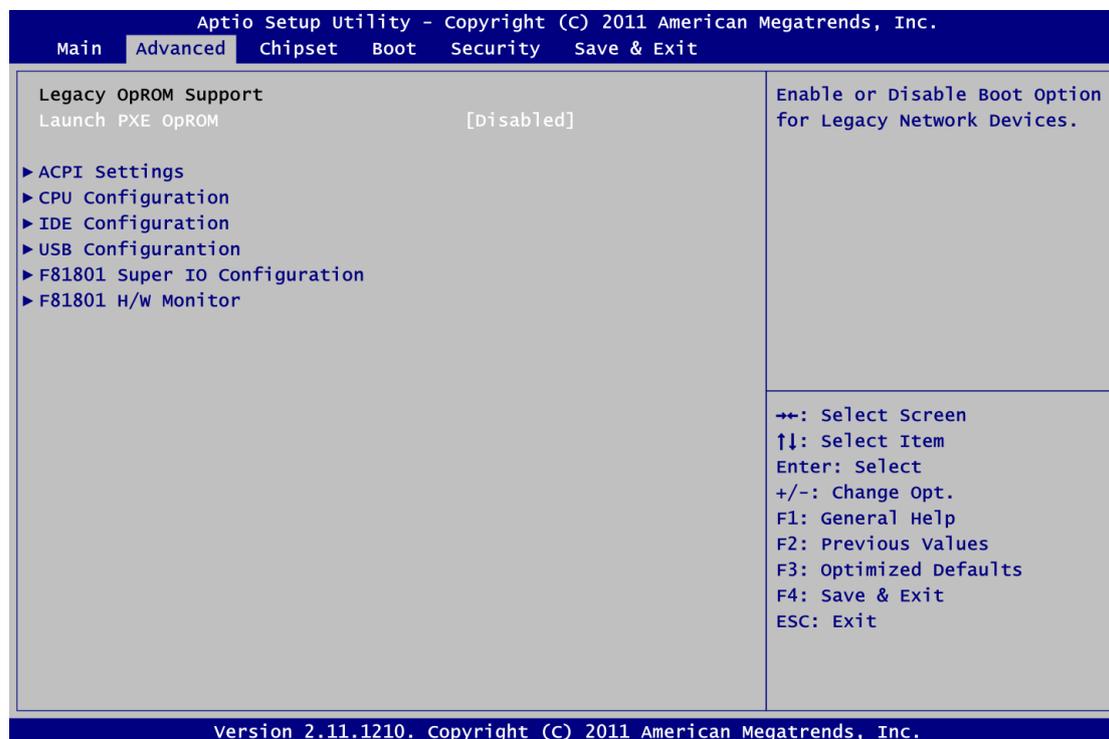
4.4 Advanced Menu

- **Launch PXE OpROM**
Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.

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:

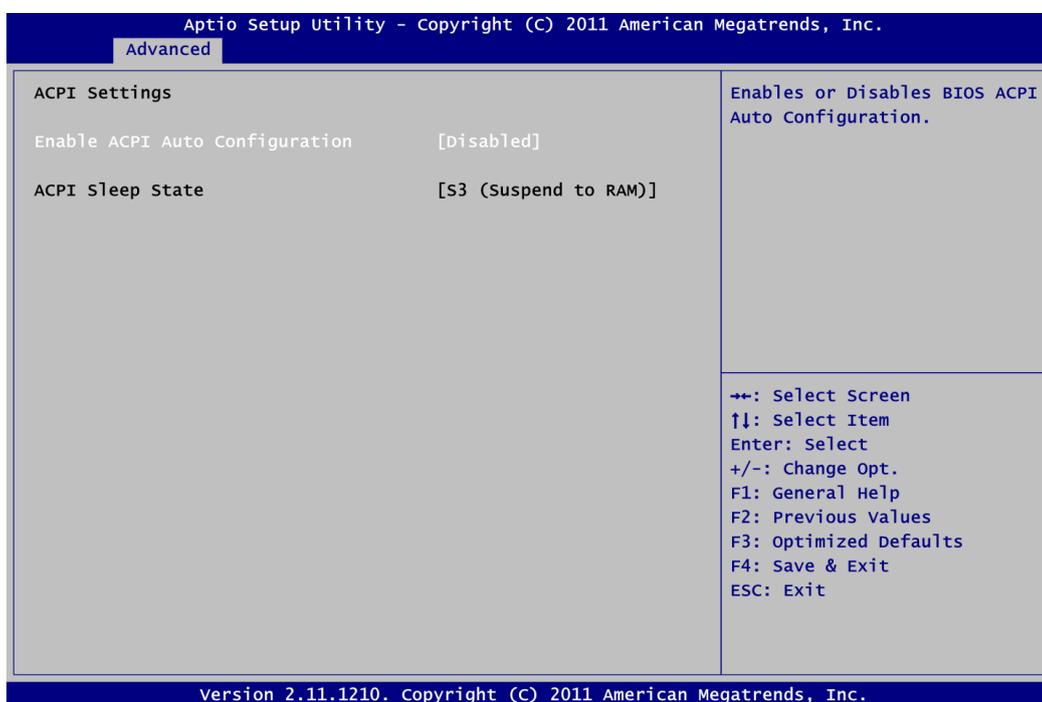
- ▶ ACPI Settings
- ▶ CPU Configuration
- ▶ IDE Configuration
- ▶ USB Configuration
- ▶ F81801 Super IO Configuration
- ▶ F81801 H/W Monitor

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



- **ACPI Settings**

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



Enable ACPI Auto Configuration

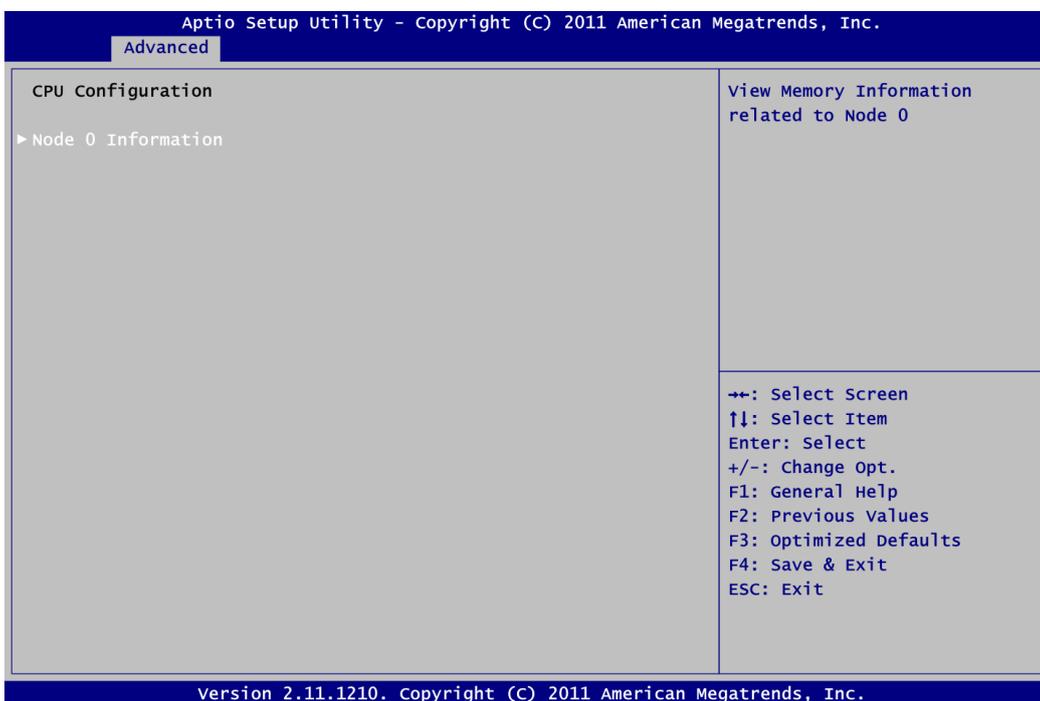
Use this item to enable or disable BIOS ACPI auto configuration.

ACPI Sleep State

Default the Advanced Configuration and Power Interface (ACPI) state to be S3 (Suspend to RAM).

- **CPU Configuration**

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



- **Node 0 Information**

View memory information related to Node 0.

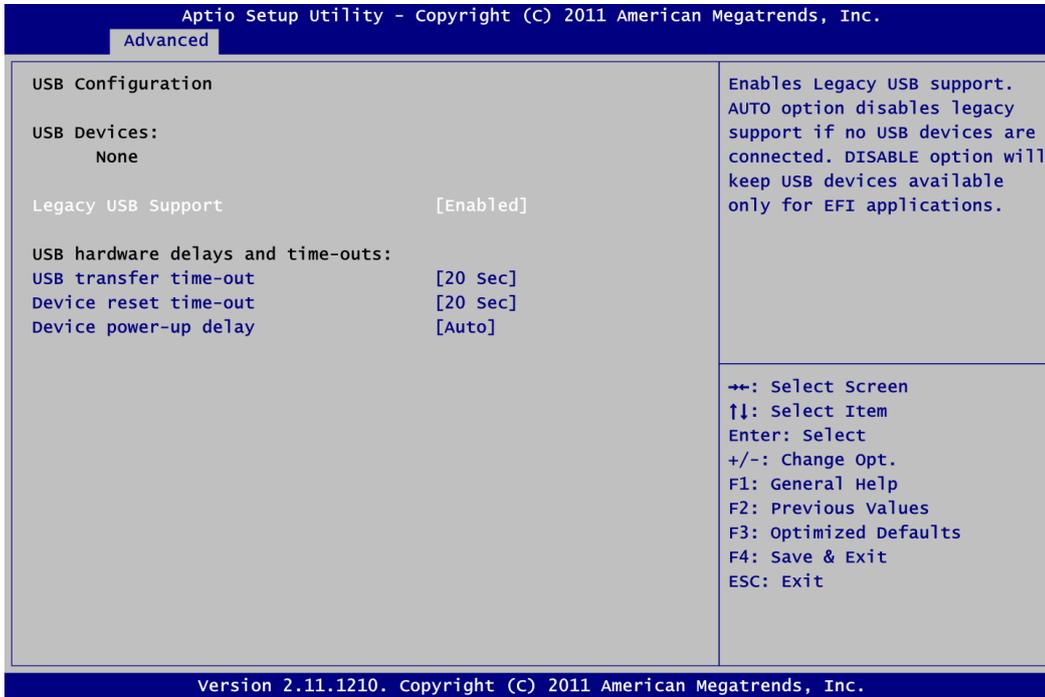
- **IDE Configuration**

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



● **USB Configuration**

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



Legacy USB Support

Use this item to enable or disable support for USB device on legacy operating system. The default setting is “Enabled”. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.

USB transfer time-out

The time-out value for control, bulk and interrupt transfers.

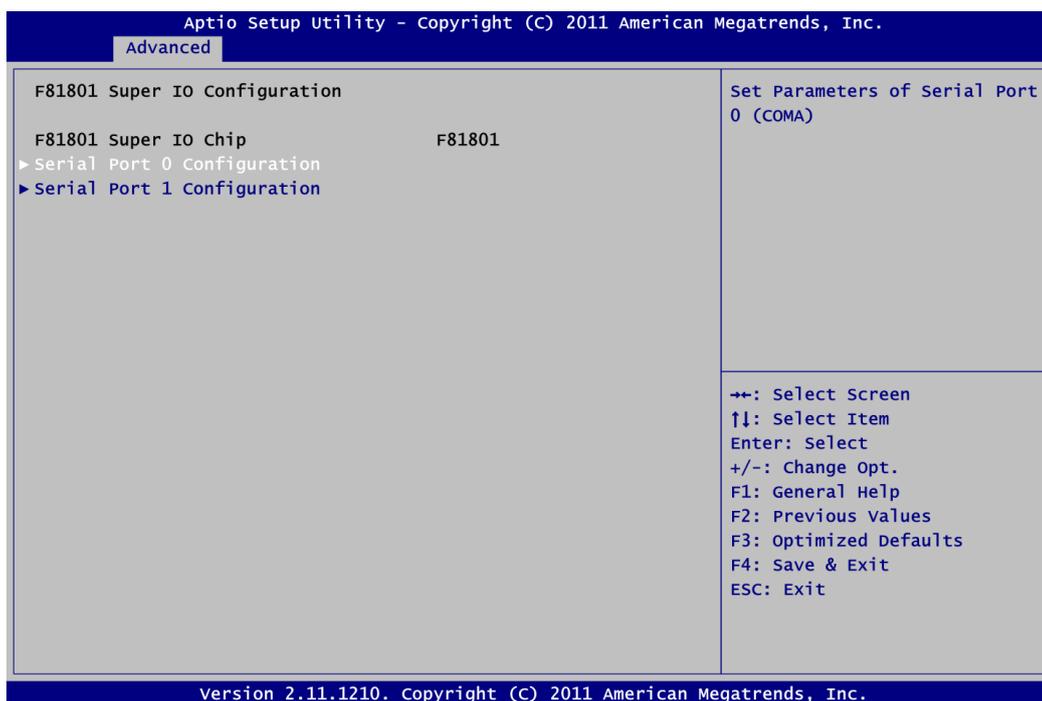
Device reset time-out

USB mass storage device start unit command time-out.

Device power-up delay

Maximum time the device will take before it properly reports itself to the host controller. “Auto” uses default value: for a root port it is 100ms, for a hub port the delay is taken from hub descriptor.

- **F81801 Super IO Configuration**

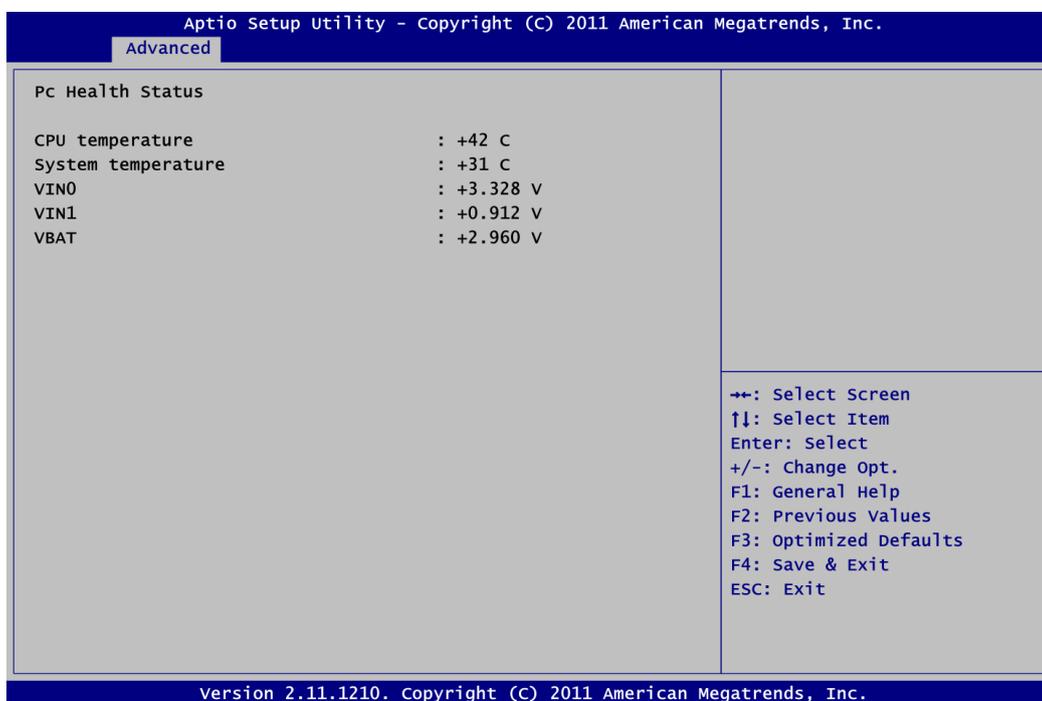


Serial Port Configuration

The configurations of serial port 0~1 are set “Enabled” as default.

- **F81801 H/W Monitor**

This screen monitors hardware health.



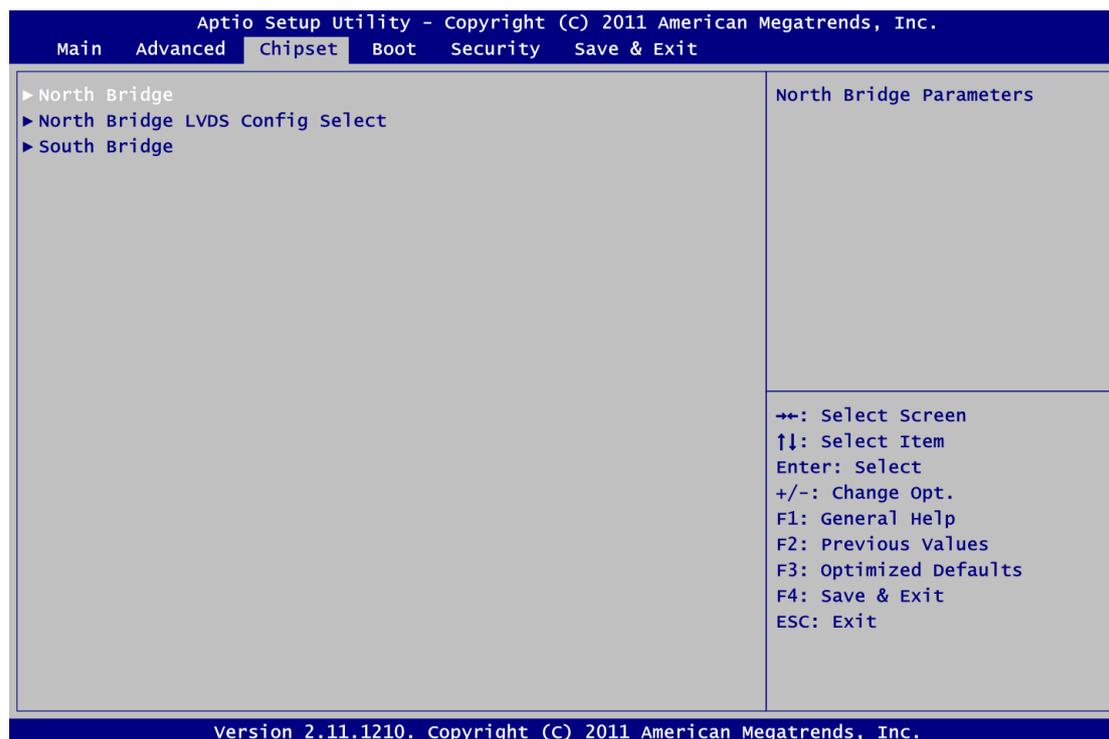
This screen displays the CPU temperature, system temperature and system voltages (VIN0, VIN1 and VBAT).

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:

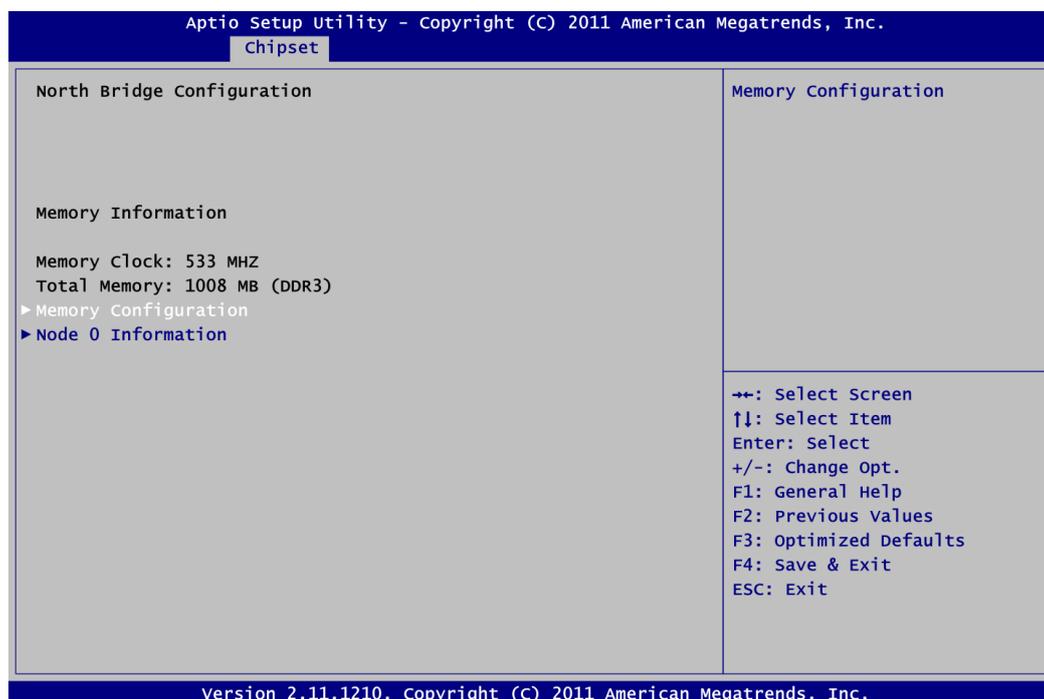
- ▶ North Bridge
- ▶ North Bridge LVDS Config Select
- ▶ South Bridge

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

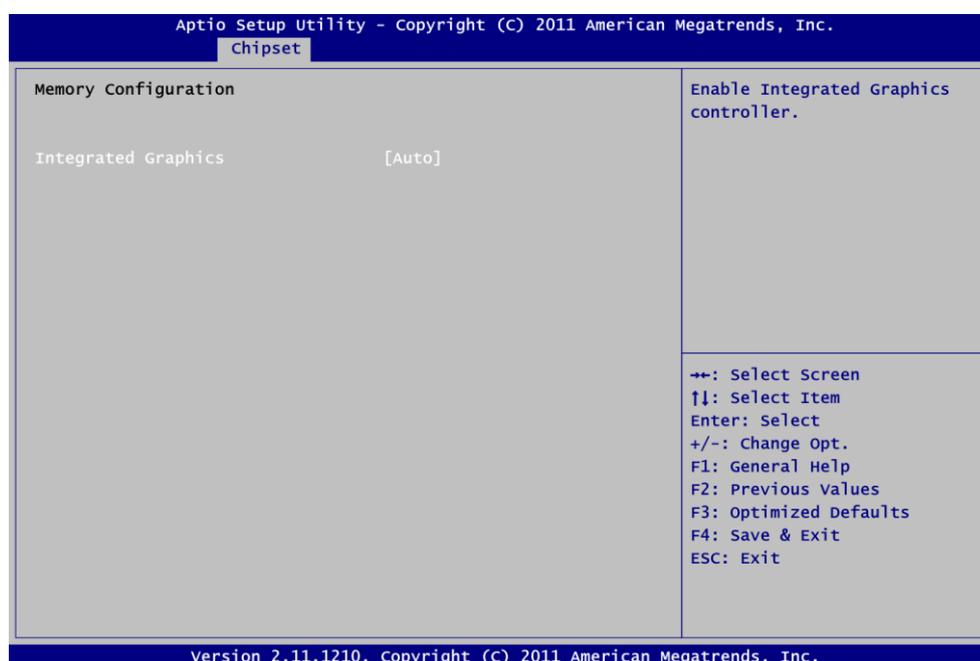


- **North Bridge Configuration**

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



- **Memory Configuration**



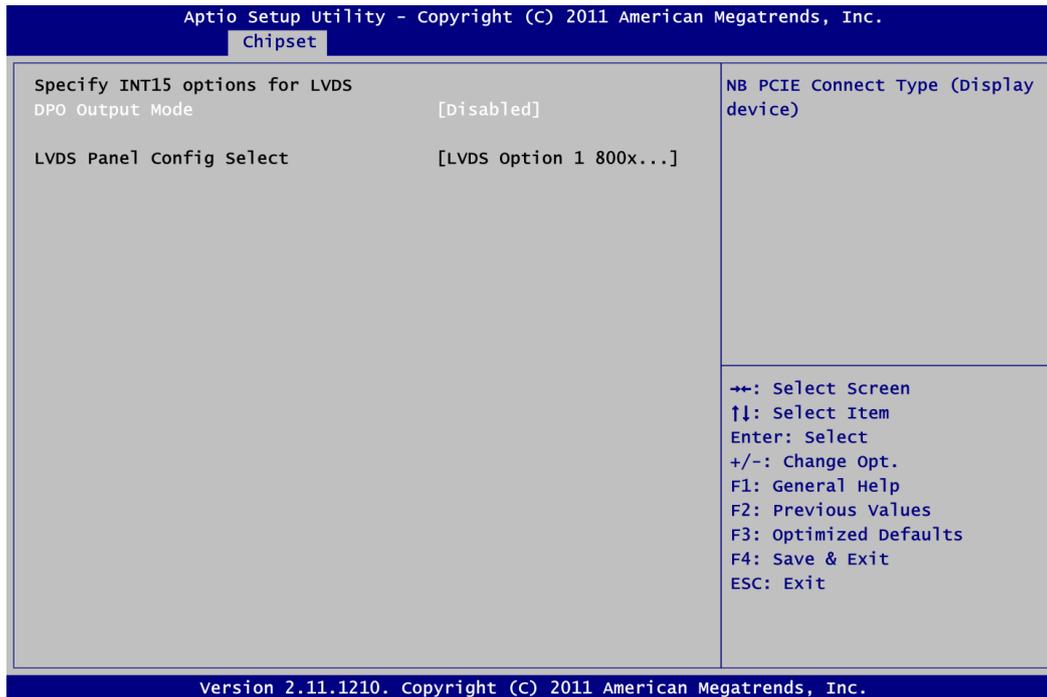
Integrated Graphics

The Integrated Graphics controller configuration is set to “Auto”.

- **Node 0 Information**

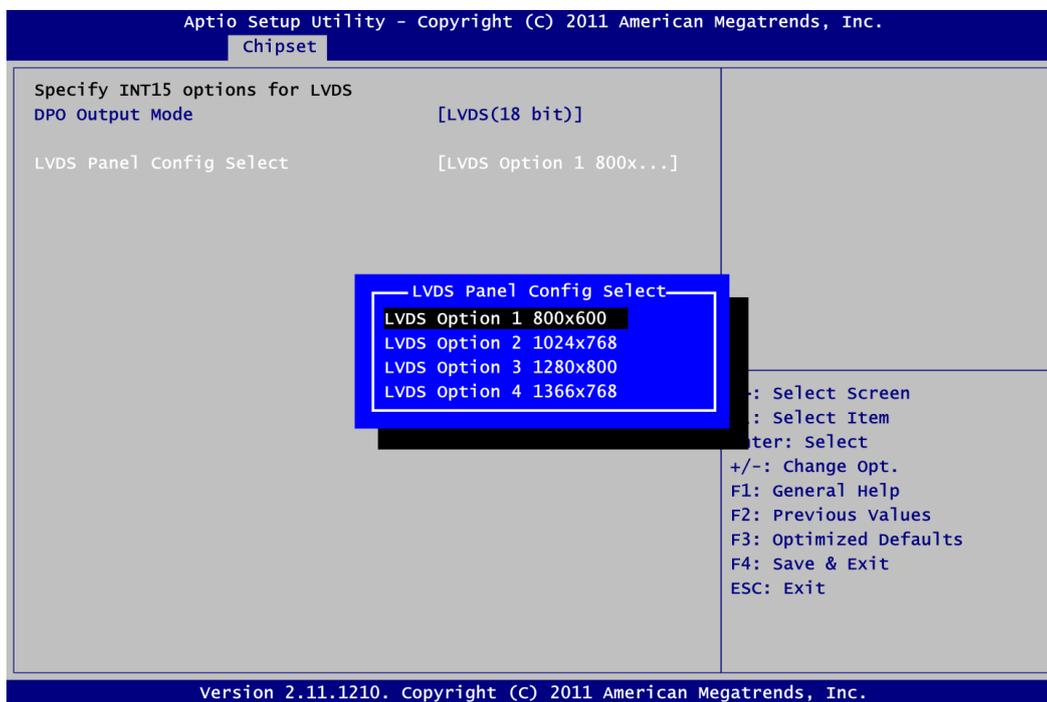
This item is to provide user with the information of current using DDR3 SDRAM.

- **North Bridge LVDS Config Select**



DP0 Output Mode

Use this item to enable or disable LVDS.



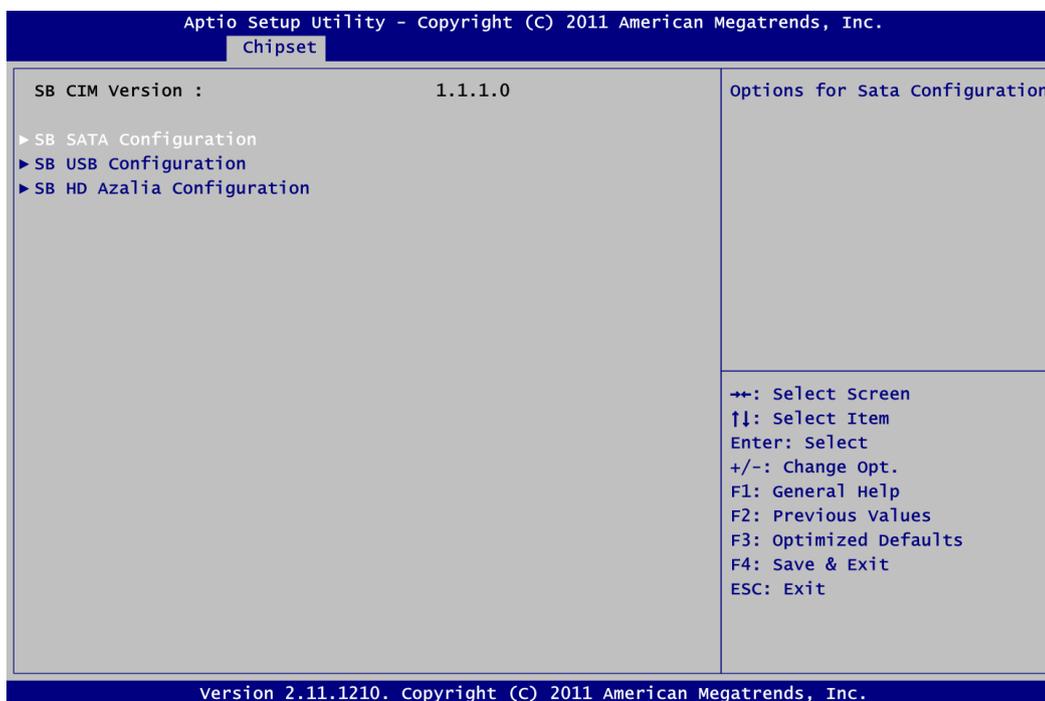
LVDS Panel Config Select

Use this item to select configuration for LVDS panel if DP0 Output Mode is enabled.

- **South Bridge**

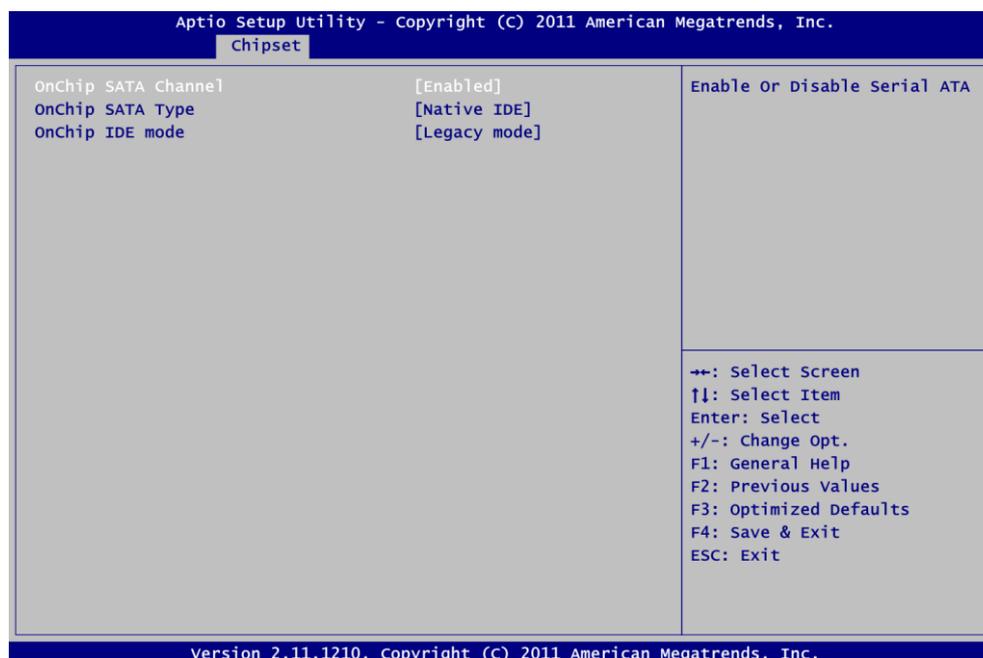
This screen allows users to configure South Bridge chipset. For items marked with "▶", please press <Enter> for more options.

- ▶ SB SATA Configuration
- ▶ SB USB Configuration
- ▶ SB HD Azalia Configuration



■ **SB SATA Configuration**

Use this item to select option for SATA configuration.



OnChip SATA Channel

Use this item to enable or disable SATA channel.

OnChip SATA Type

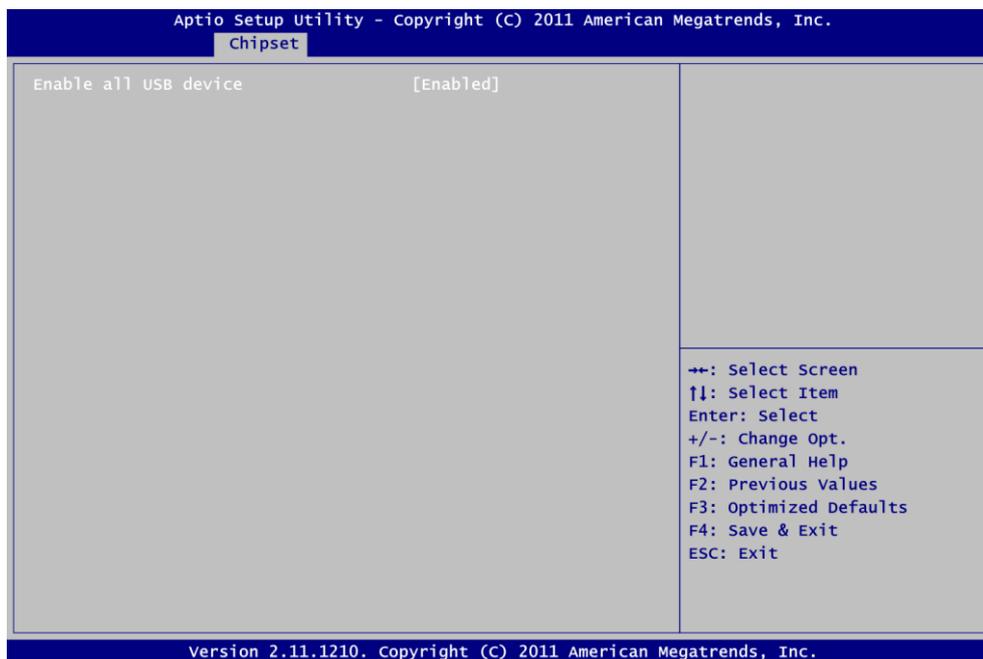
Here are the options: Native IDE and AHCI.

OnChip IDE mode

Here are the options: Legacy mode and Native mode.

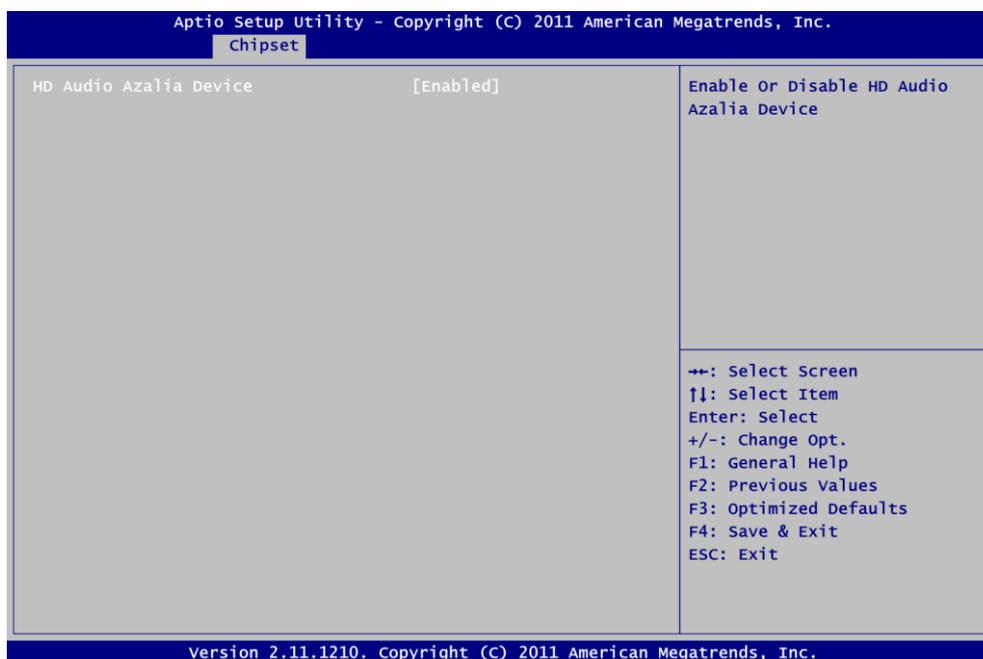
■ **SB USB Configuration**

Use this item to enable or disable all USB devices.



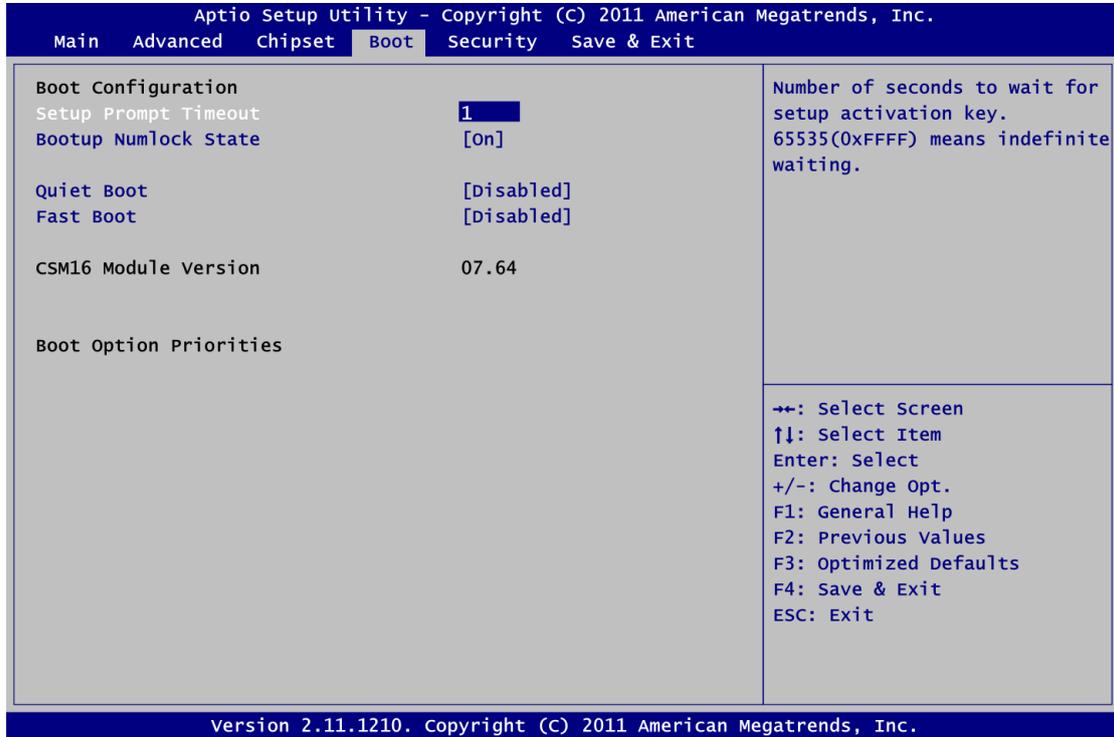
■ **SB HD Azalia Configuration**

This item allows you to enable or disable HD audio Azalia device.



4.6 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 NumLock.
- **Quiet Boot**
 Enable or disable Quiet Boot option.
- **Fast Boot**
 Use this item to enable or disable quick boot function. BIOS skips some certain procedures to decrease time needed for booting up.

4.7 Security Menu

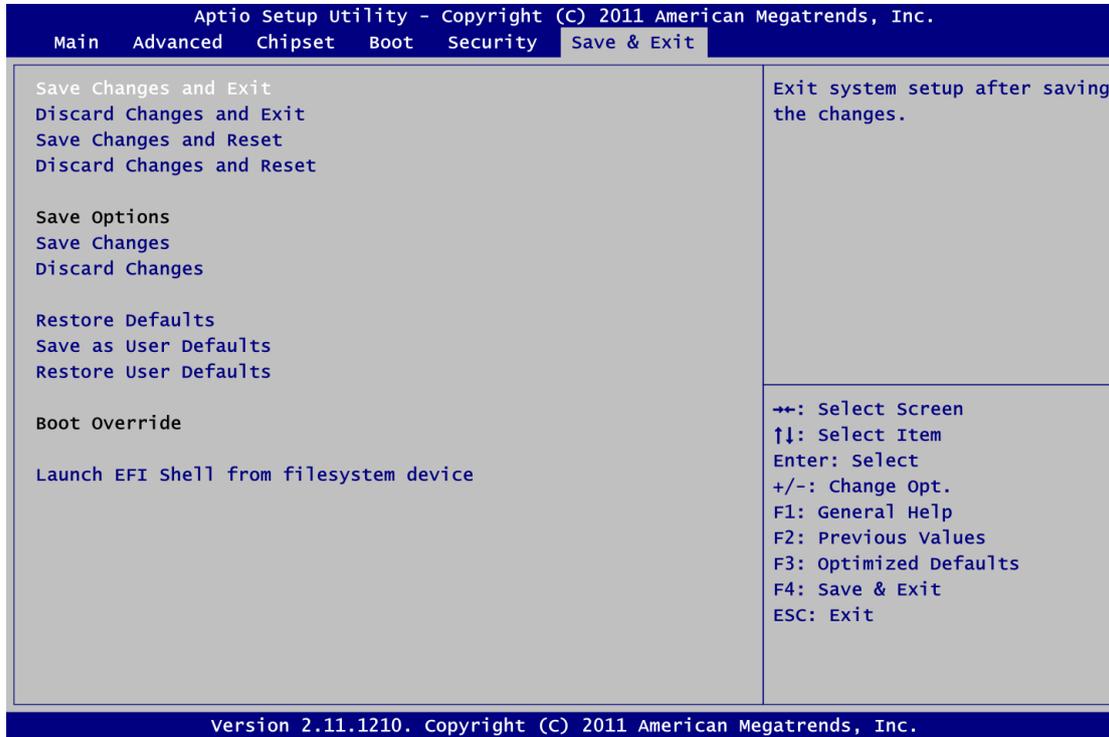
The Security menu allows users to change the security settings for the system.



- **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).

4.8 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>.
- **Launch EFI Shell from filesystem device**
Attempt to launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

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Appendix A

Watchdog Timer

About Watchdog Timer

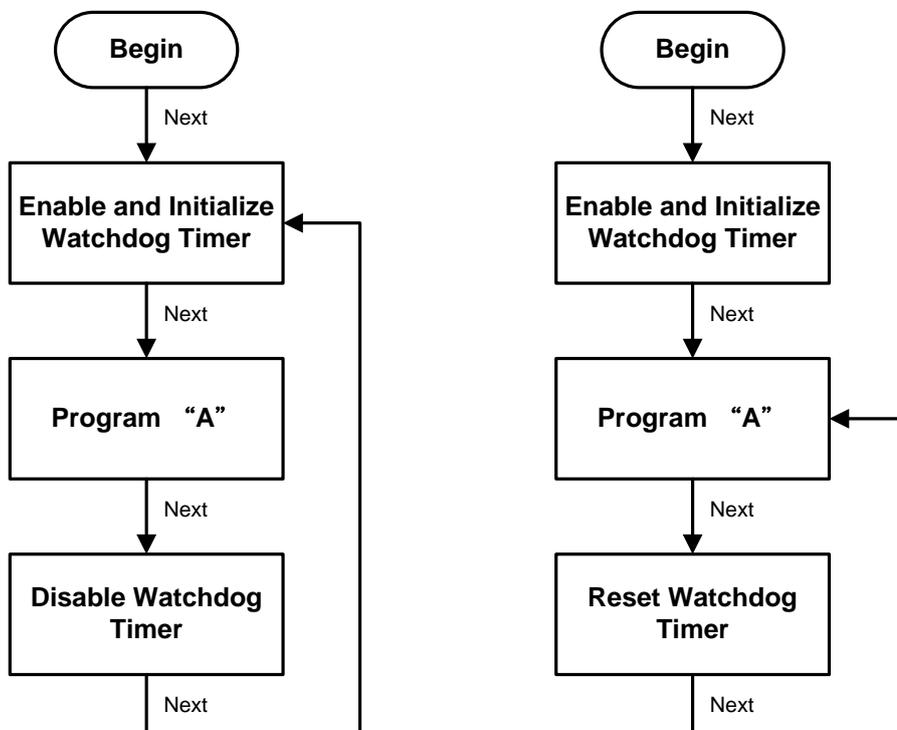
Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

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.

How to Use Watchdog Timer

The I/O port base addresses of watchdog timer are 2E (hex) and 2F (hex). The 2E (hex) and 2F (hex) are address and data port respectively.

Assume that program A is put in a loop that must execute at least once every 10ms. Initialize watchdog timer with a value bigger than 10ms. If the software has no problems; watchdog timer will never expire because software will always restart the counter before it reaches zero.



Sample Program

Assembly sample code :

```

;Enable WDT:
mov     dx,2Eh
mov     al,87             ;Un-lock super I/O
out     dx,al
out     dx,al

;Select Logic device:
mov     dx,2Eh
mov     al,07h
out     dx,al
mov     dx,2Fh
mov     al,07h
out     dx,al

;WDT Device Enable:
mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,01h
out     dx,al

;Activate WDT:
mov     dx,2Eh
mov     al,F0h
out     dx,al
mov     dx,2Fh
mov     al,80h
out     dx,al

;Set base timer :
mov     dx,2Eh
mov     al,0F6h
out     dx,al
mov     dx,2Fh
mov     al,Mh             ;M=00h,01h,...FFh (hex),value=0 to 255
out     dx,al             ;(see below  Note)

;Set Second or Minute :
mov     dx,2Eh
mov     al,0F5h
out     dx,al
mov     dx,2Fh
mov     al,Nh             ;N=71h or 79h(see below  Note)
out     dx,al

;Disable WDT:
mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,00h           ;Can be disabled at any time
out     dx,al

```

 **Note:**

If **N=71h**, the time base is set to second.

M = time value

00: Time-out disable

01: Time-out occurs after 1 second
02: Time-out occurs after 2 seconds
03: Time-out occurs after 3 seconds
.
.
FFh: Time-out occurs after 255 seconds

If **N**=79h, the time base is set to minute.

M = time value

00: Time-out disable
01: Time-out occurs after 1 minute
02: Time-out occurs after 2 minutes
03: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

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