AXIOMTEK

NANO100/101

AMD Embedded G-Series Processor Nano-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

NANO100

NANO101

The NANO100/101, a Nano-ITX board, supports AMD G-Series APU T56N/T40E/T40R. The board integrates the Fusion Controller Hub A50M and delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions.

There is one 204-pin unbuffered SO-DIMM socket for single channel DDR3-1066/1333MHz memory (only T56N can be up to DDR3-1333MHz), maximum memory capacity up to 4GB. It also features two Gigabit/Fast Ethernet ports, one serial ATA channel for total one Serial ATA hard drive at maximum transfer rate up to 600MB/sec, six 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 2 serial ports and Nano-ITX form factor that applies an extensive array of PC peripherals.

1.1 Features

- AMD G-Series APU dual core T56N (1.65GHz), T40E (1.0GHz) and single core T40R (1.0GHz)
- AMD Fusion Controller Hub A50M chipset
- 1 DDR3 SO-DIMM supports up to 4GB memory capacity
- 6 USB 2.0 ports
- 2 COM ports
- +12V only DC-in supported
- DirectX®11 support

1.2 Specifications

- **CPU**
  - AMD G-Series APU dual core T56N 1.65GHz.
  - AMD G-Series APU dual core T40E 1.0GHz.
  - AMD G-Series APU single core T40R 1.0GHz.

- **System Chipset**
  - AMD Fusion controller hub 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 to 4GB DDR3 1066MHz memory for T40E/T40R.
  - Maximum to 4GB DDR3 1333MHz memory for T56N.

- **Onboard Multi I/O**
  - Controller: Nuvoton W83627DHG.
  - Serial Ports: One port for RS-232/422/485 and one port for RS-232.

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

- **CFast™ Socket**
  - One CFast™ Socket.

- **USB Interface**
  - Six USB ports with fuse protection and complies with USB Spec. Rev. 2.0.

- **Display**
  - A high rise 15-pin D-Sub connector as VGA connector
  - One 40-pin connector for 18/24-bit single/dual channel LVDS and one 8-pin inverter connector.
  - One Display Port (NANO100 only).

- **Watchdog Timer**
  - 1~255 seconds or minutes; up to 255 levels.

- **Ethernet**
  - Two ports with Realtek RTL8111E for Gigabit/Fast Ethernet.

- **Audio**
  - HD audio compliant (with line-out and MIC-in) with Realtek ALC662.
  - Line-out and MIC-in audio jack.

- **Expansion Interface**
  - One PCI-Express Mini Card socket which complies with PCI-Express Mini Card Spec. V1.2.

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

- **Form Factor**
  - Nano-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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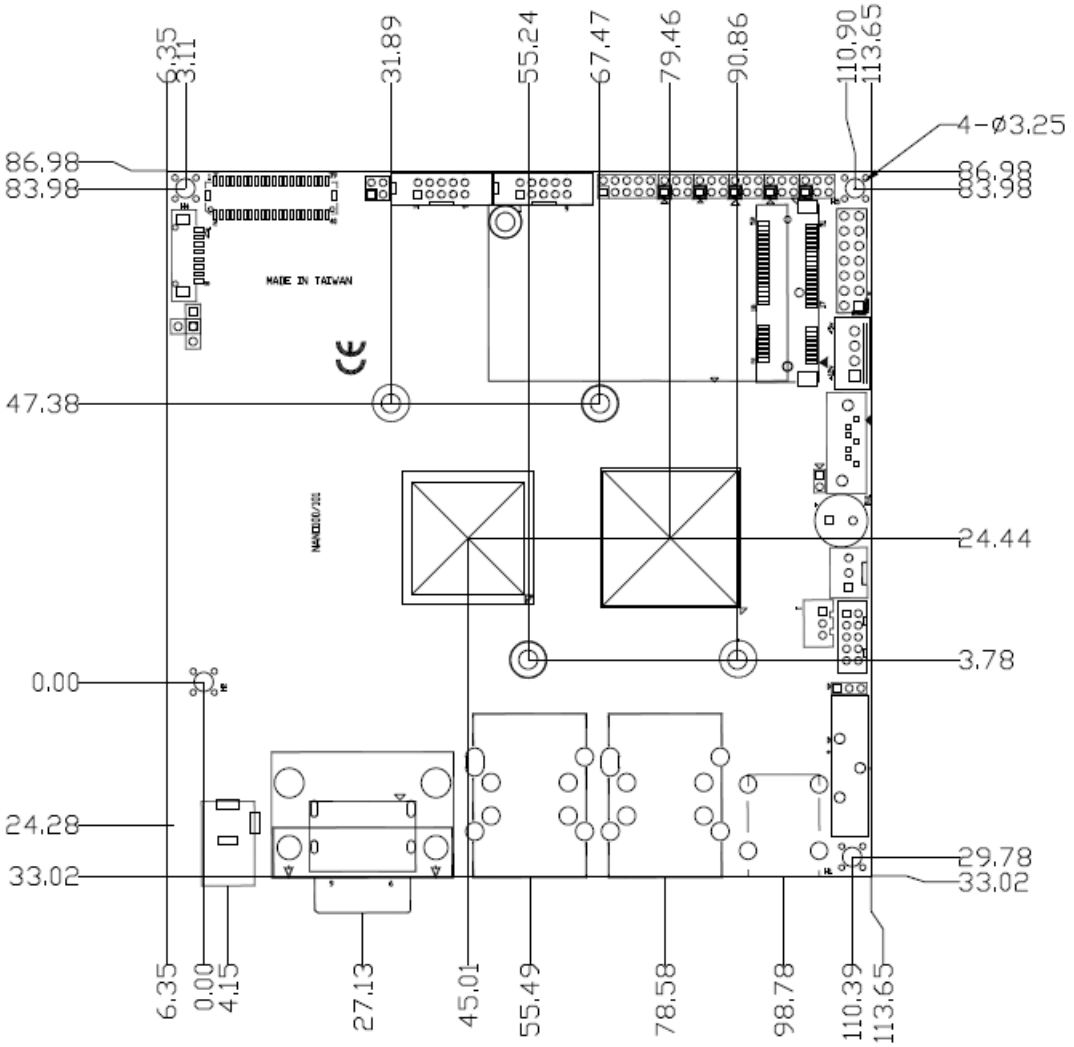
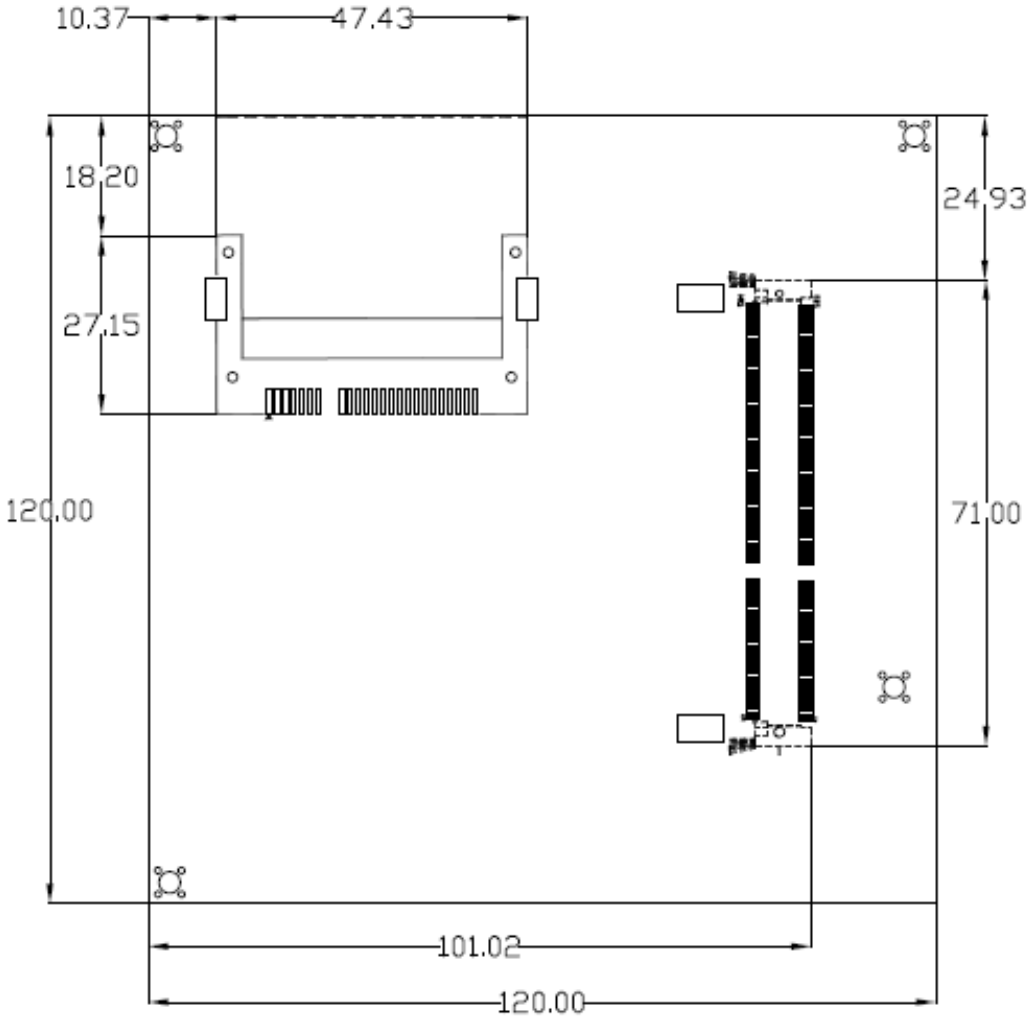
Chapter 2
Board and Pin Assignments

2.1 Board Dimensions and Fixing Holes

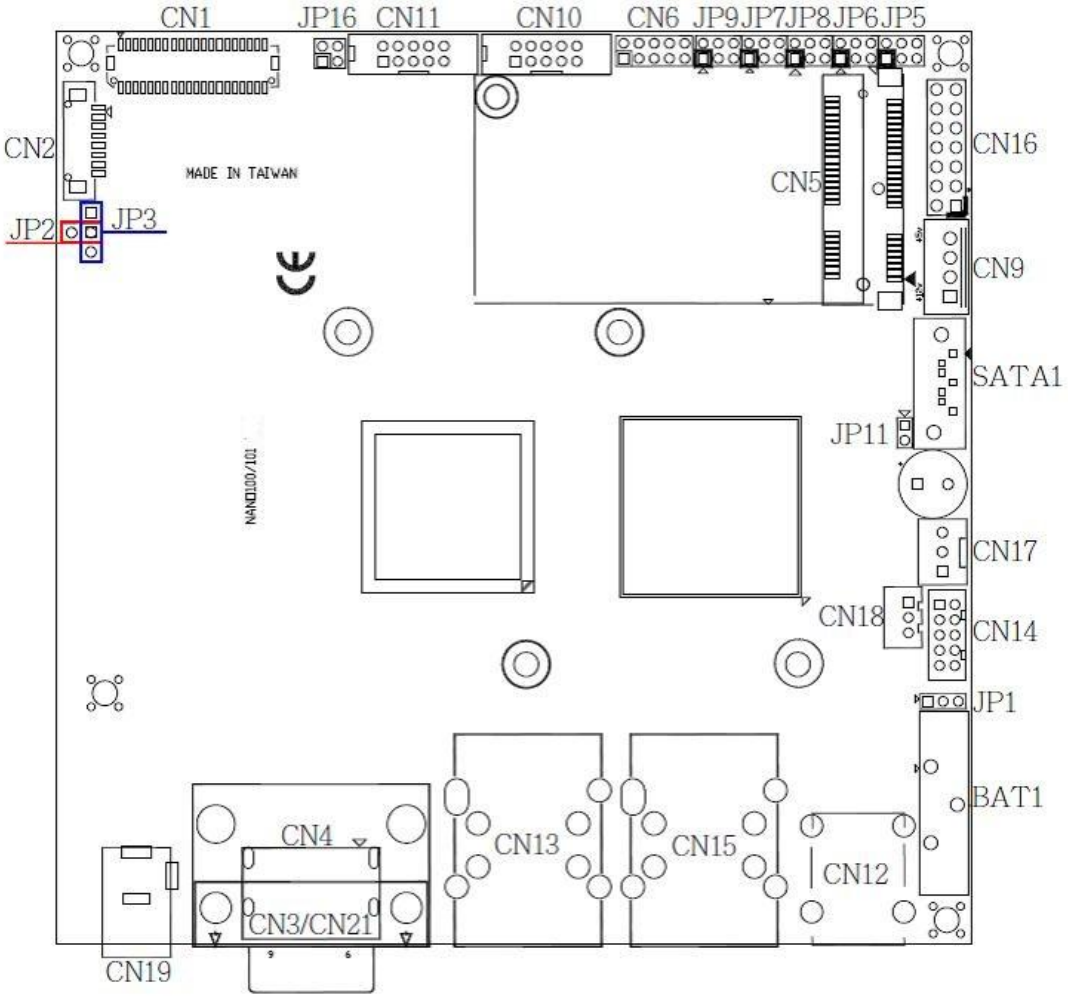


Top Side



Bottom Side

2.2 Board Layout



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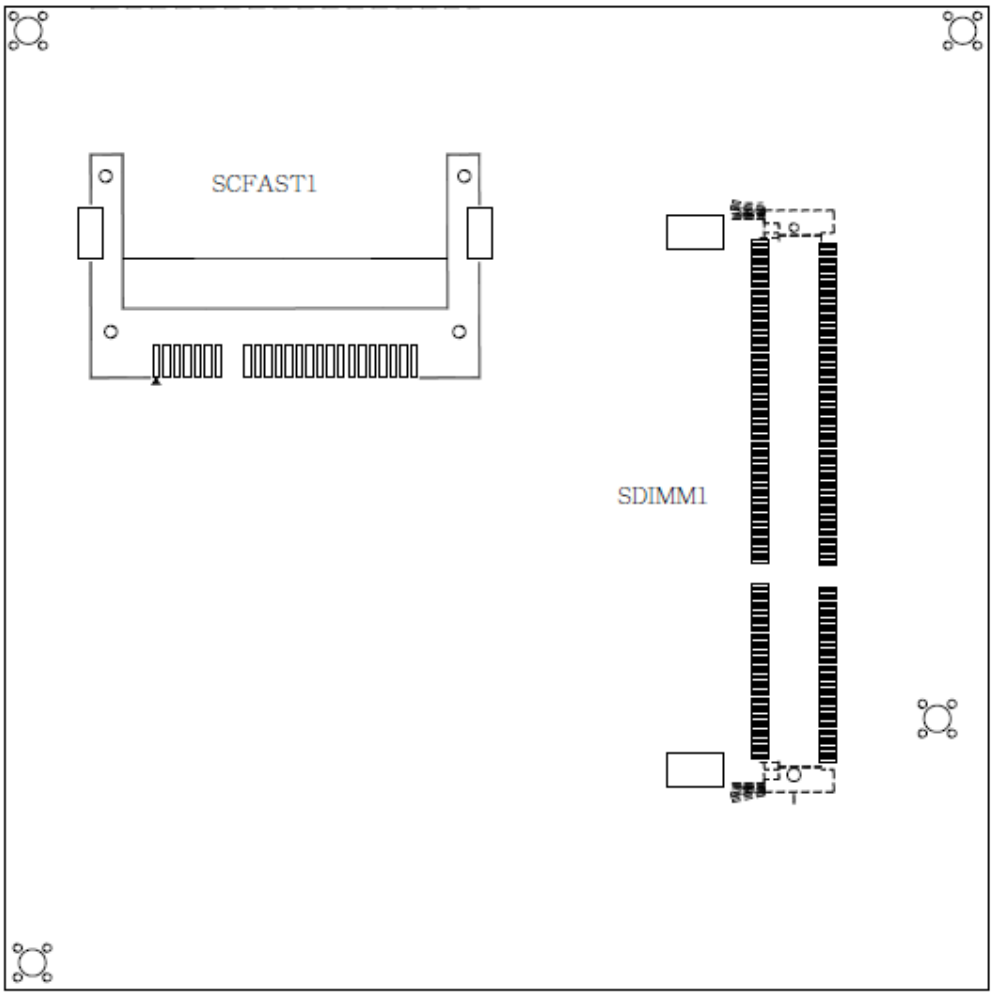
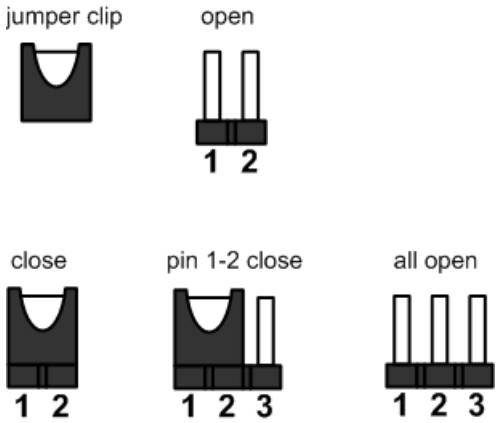


Bottom Side

2.3 Jumper Settings

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



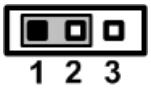
Properly configure jumper settings on the NANO100/101 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.

Jumper	Description		Jumper Setting
JP1	Restore BIOS Optimal Defaults Default: Normal Operation		1-2 close
JP2 (Optional)	LVDS Voltage Selection Default: +12V		1-2 close
JP3	LVDS Voltage Selection Default: +3.3V		1-2 close
JP5	COM1 Data/Power Selection Default: RS-232 Data	CN10 Pin 1: DCD	3-5 close
		CN10 Pin 8: RI	4-6 close
JP6	COM2 Data/Power Selection (NANO100) Default: RS-232 Data	CN11 Pin 1: DCD	3-5 close
		CN11 Pin 8: RI	4-6 close
	COM2 Data/Power Selection (NANO101) Default: RS-232 Data	CN21 Pin 1: DCD	3-5 close
		CN21 Pin 9: RI	4-6 close
JP7	COM1 RS-232/422/485 Mode Setting Default: RS-232		1-2 close
JP8			3-5, 4-6 close
JP9			3-5, 4-6 close
JP11	Auto Power On Default: Disable		1-2 close
JP16	LVDS Brightness Control Mode Setting Default: Voltage Mode		3-4 close

2.3.1 Restore BIOS Optimal Defaults (JP1)

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

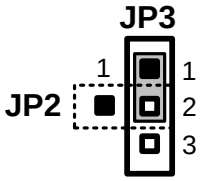


2.3.2 LVDS Voltage Selection (JP2 and JP3)

The board supports voltage selection for flat panel displays. JP3 is used to set LVDS connector (CN1) pin 1~6 VCCM to +3.3V or +5V voltage level. JP2 (optional) is used to set LVDS connector (CN1) pin 1~6 VCCM to +12V voltage level.

Function	JP3 Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close

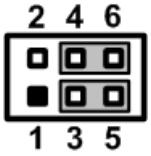
Function	JP2 Setting
+12V level (Optional)	1-2 close



2.3.3 COM1 Data/Power Selection (JP5)

The COM1 port has +5V level power capability on DCD and +12V level on RI by setting this jumper. When COM1 is set to +5V or +12V level, please make sure the communication mode is RS-232 (see section 2.3.5).

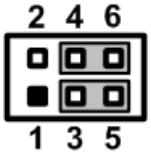
Function	Setting
Power: Set CN10 pin 1 to +5V level	1-3 close
Data: Set CN10 pin 1 to DCD (Default)	3-5 close
Power: Set CN10 pin 8 to +12V level	2-4 close
Data: Set CN10 pin 8 to RI (Default)	4-6 close



2.3.4 COM2 Data/Power Selection (JP6)

The COM2 port has +5V level power capability on DCD and +12V level on RI by setting this jumper.

Function	Setting
Power: Set CN11 pin 1/CN21 pin 1 to +5V level	1-3 close
Data: Set CN11 pin 1/ CN21 pin 1 to DCD (Default)	3-5 close
Power: Set CN11 pin 8/CN21 pin 9 to +12V level	2-4 close
Data: Set CN11 pin 8/ CN21 pin 9 to RI (Default)	4-6 close

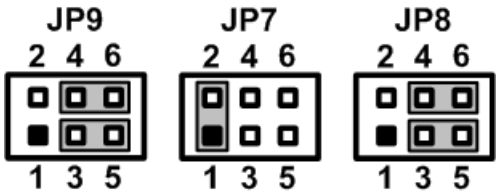


Note: ***The CN11 is connector on NANO100 while CN21 is connector on NANO101.***

2.3.5 COM1 RS-232/422/485 Mode Setting (JP7, JP8, JP9)

Use these jumpers to set COM1 port to operate as RS-232, RS-422 or RS-485 communication mode. When these jumpers are set to operate as RS-422 or RS485, please make sure COM1 is on data mode (see section 2.3.3)

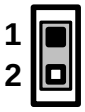
Function	Setting
RS-232 mode (Default)	JP7 1-2 close JP8 3-5, 4-6 close JP9 3-5, 4-6 close
RS-422 mode	JP7 3-4 close JP8 1-3, 2-4 close JP9 1-3, 2-4 close
RS-485 mode	JP7 5-6 close JP8 1-3, 2-4 close JP9 1-3, 2-4 close



2.3.6 Auto Power On (JP11)

If JP11 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP11 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

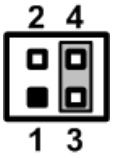


Note: ***This function is similar to the feature of power on after power failure, which is controlled by hardware circuitry instead of BIOS.***

2.3.7 LVDS Brightness Control Mode Setting (JP16)

The JP16 is enabled to select PWM or voltage control mode for inverter connector (CN2) pin 8. These two control modes are for adjusting LVDS brightness.

Function	Setting
PWM mode	1-2 close
Voltage mode (Default)	3-4 close



2.4 Connectors

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

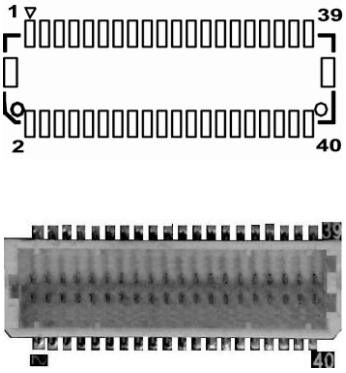
Connector	Description
CN1	LVDS Connector
CN2	Inverter Connector
CN3	Display Port Connector (NANO100)
CN4	VGA Connector
CN5	PCI-Express Mini Card Connector
CN6	Digital I/O Port Connector
CN9	Power Output Connector
CN10	COM1 Connector
CN11	COM2 Connector (NANO100)
CN12	Audio Jack
CN13	Ethernet Port 1, USB Port 0 and USB Port 1 Stack
CN14	USB Port 4 and 5 Connector
CN15	Ethernet Port 2, USB Port 2 and USB Port 3 Stack
CN16	Front Panel Connector
CN17	CPU Fan Connector
CN18	SMBus Connector
CN19	DC Jack Power Connector
CN21	COM2 Connector (NANO101)
SATA1	Serial ATA Connector
SCFAST1	CFast™ Socket
SDIMM1	DDRIII SO-DIMM Connector

2.4.1 LVDS Connector (CN1)

This board has a 40-pin connector CN1 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 LVDS voltage selection jumper (see section 2.3.2).

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



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 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

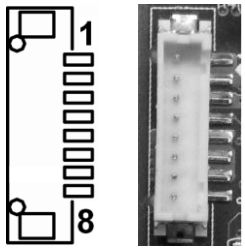
24-bit dual channel

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

2.4.2 Inverter Connector (CN2)

The CN2 is a 8-pin connector for inverter. We strongly recommend you to use the matching DF13-8S-1.25C connector to avoid malfunction. If JP16 is set in voltage control mode for LVDS brightness adjustment (see section 2.3.7), the valid voltage range on pin 8 is 0~5V.

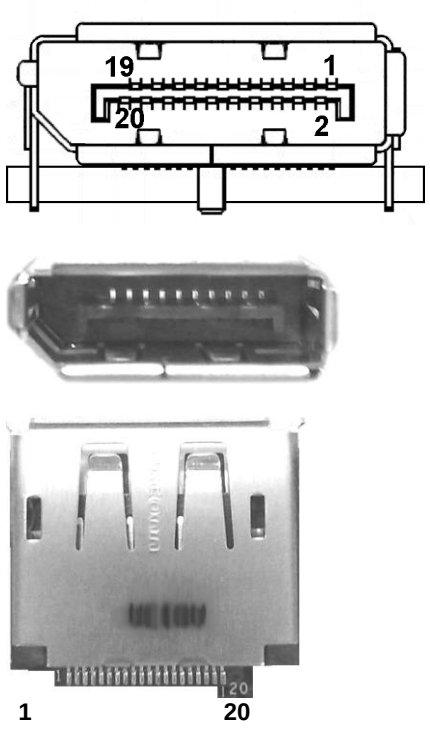
Pin	Signal
1	VBL1 (+12V level)
2	VBL1 (+12V level)
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND
8	VBL Brightness Control



2.4.3 Display Port Connector (CN3)

The Display Port interface is available through connector CN3 which is also co-layout with a standard DB-9 connector (CN21).

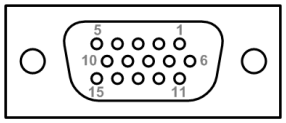
Pin	Signal
1	DPB_LANE0
2	GND
3	DPB_LANE0#
4	DPB_LANE1
5	GND
6	DPB_LANE1#
7	DPB_LANE2
8	GND
9	DPB_LANE2#
10	DPB_LANE3
11	GND
12	DPB_LANE3#
13	Detect Pin
14	GND
15	DPB_AUX
16	GND
17	DPB_AUX#
18	DPB_HPDE
19	GND
20	+3.3V

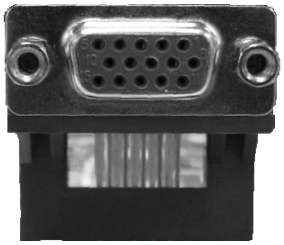


2.4.4 VGA Connector (CN4)

The CN4 is a high rise standard 15-pin D-Sub connector. 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		

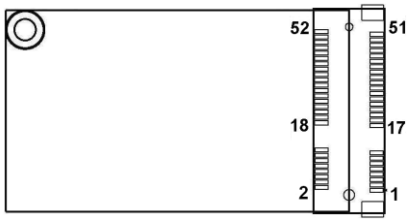




2.4.5 PCI-Express Mini Card Connector (CN5)

CN5 is a PCI-Express Mini Card connector which supports a PCI-Express x1 link and a USB 2.0 link. A PCI-Express Mini Card can be applied to either PCI-Express or USB 2.0. It complies with PCI-Express Mini Card Spec. V1.2.

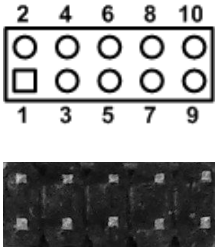
Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3	24	+3.3VSB
25	PE_RXP3	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3	32	SMB_DATA
33	PE_TXP3	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
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



2.4.6 Digital I/O Port Connector (CN6)

The board is equipped with an 8-channel (3 inputs and 5 outputs) digital I/O connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals. The software application method is provided in Appendix B.

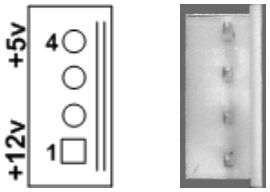
Pin	Signal	Pin	Signal
1	Digital Input 1	2	Digital Output 1
3	Digital Input 2	4	Digital Output 2
5	Digital Input 3	6	Digital Output 3
7	GND	8	Digital Output 4
9	GND	10	Digital Output 5



2.4.7 Power Output Connector (CN9)

Use CN9 for interfacing to SATA 2.5" HDD power supply.

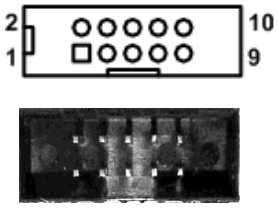
Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level



2.4.8 COM1 Connector (CN10)

The CN10 is a 2x5 pin box header. This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP5 (see section 2.3.3).

Pin	Signal	Pin	Signal
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1
7	DTR1	8	RI1
9	GND	10	N.C.



The pin assignment of RS-232/RS-422/RS-485 is listed on the following table. If you need COM1 port to support RS-422 or RS-485 mode, please refer to section 2.3.5.

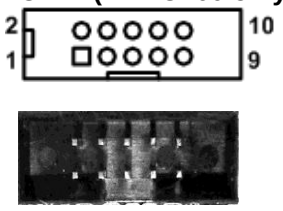
Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	N.C
4	DTR	RX-	N.C.
5	GND	No use	No use
6	DSR	No use	No use
7	RTS	No use	No use
8	CTS	No use	No use
9	RI	No use	No use
10	No use	No use	No use

2.4.9 COM2 Connector (CN11 or CN21)

The CN11 is a 2x5 pin box header (NANO100 only). This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP6 (see section 2.3.4).

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

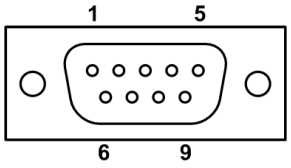
CN11 (NANO100 only)



The CN21 is a standard DB-9 connector on rear IO (NANO101 only). This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP6 (see section 2.3.4).

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

CN21 (NANO101 only)



2.4.10 Audio Jack (CN12)

Install onboard audio driver, then connect speaker to line-out jack and microphone to MIC-in jack.

Pin Color	Signal
Green	Line_OUT
Pink	Mic_IN

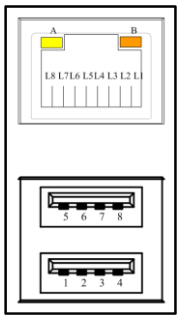
2.4.11 Ethernet Port and USB Port Stacks (CN13 and CN15)

Ethernet ports are RJ-45 connectors. Connection can be established by plugging one end of the ethernet cable into this receptacle and the other end (phone jack) to a 1000/100/10-Base-T hub.

The board features Universal Serial Bus (USB) connectors, compliant with USB 2.0 (480Mbps) that can be adapted to any USB peripheral, such as monitor, keyboard and mouse.

The CN13 carries ethernet port 1, USB port 0 and USB port 1, while the CN15 carries ethernet port 2, USB port 2 and USB port 3.

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



LAN

USB

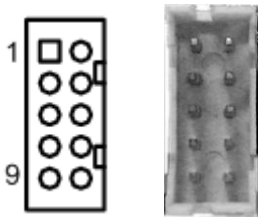
Pin	USB Port 0	Pin	USB Port 1
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #1_D-
3	USB #0_D+	7	USB #1_D+
4	GND	8	GND

Pin	USB Port 2	Pin	USB Port 3
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #2_D-	6	USB #3_D-
3	USB #2_D+	7	USB #3_D+
4	GND	8	GND

2.4.12 USB Connector (CN14)

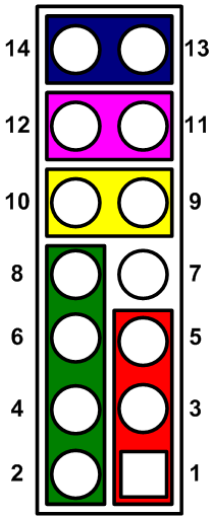
The 2x5 pin wafer (CN14) is Universal Serial Bus (USB) connector which carries USB port 4 and USB port 5. It is for installing versatile USB interface peripherals. The CN14 is designed with +5V level standby power which can provide power when system is in suspend mode.

Pin	USB Port 4	Pin	USB Port 5
1	USB VCC (+5V level standby power)	2	USB VCC (+5V level standby power)
3	USB #4_D-	4	USB #5_D-
5	USB #4_D+	6	USB #5_D+
7	GND	8	GND
9	GND	10	GND



2.4.13 Front Panel Connector (CN16)

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 board 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 board, which allows users to turn on or off power supply.

System Reset Switch

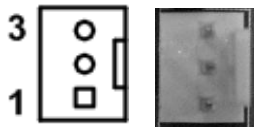
Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

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(+).

2.4.14 CPU Fan Connector (CN17)

The CN17 is a CPU fan interface. You can find fan speed on BIOS Setup Utility if CPU fan is installed. For further information, see BIOS Setup Utility: Advanced\H/W Monitor\PC Health Status (refer to section 4.4).

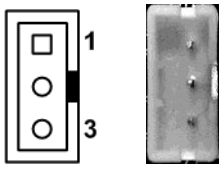
Pin	Signal
1	GND
2	+12V level
3	Fan speed feedback



2.4.15 SMBus Connector (CN18)

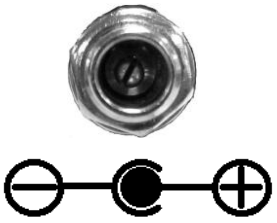
This connector is for SMBus interface support. The SMBus (System Management Bus) is a simple 2-wire bus for the purpose of lightweight communication. Most commonly it is used for communication with the power source related applications such as on/off instructions.

Pin	Signal
1	CLK
2	DATA
3	GND



2.4.16 DC Jack Power Connector (CN19)

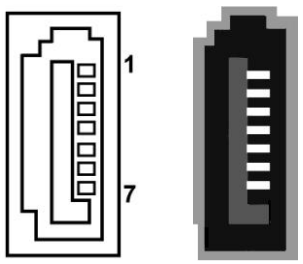
The CN19 is a DC power jack with lock. Firmly insert at least 60W adapter into this connector. Loose connection may cause system instability and make sure all components/devices are properly installed before connecting the power connector.



2.4.17 Serial ATA Connector (SATA1)

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

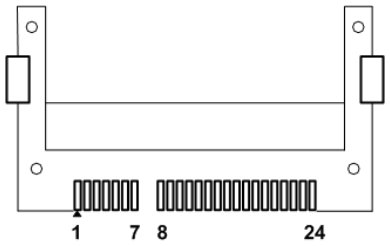
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.4.18 CFast™ Socket (SCFAST1)

The board is equipped with a CFast™ socket on the bottom side to support a CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of the CFast™ card. When installing or removing the CFast™ card, please make sure the system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

Pin	Signal	Pin	Signal
1	GND	13	N.C
2	SATA_TX+	14	GND
3	SATA_TX-	15	N.C
4	GND	16	CFAST_LED#
5	SATA_RX-	17	N.C
6	SATA_RX+	18	N.C
7	GND	19	N.C
8	N.C	20	+3.3V Level
9	GND	21	+3.3V Level
10	N.C	22	GND
11	N.C	23	GND
12	N.C	24	N.C



Chapter 3
Hardware Description

3.1 APU (Accelerated Processing Unit)

The NANO100/101 supports AMD G-Series APU (Accelerated Processing Unit) T56N/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

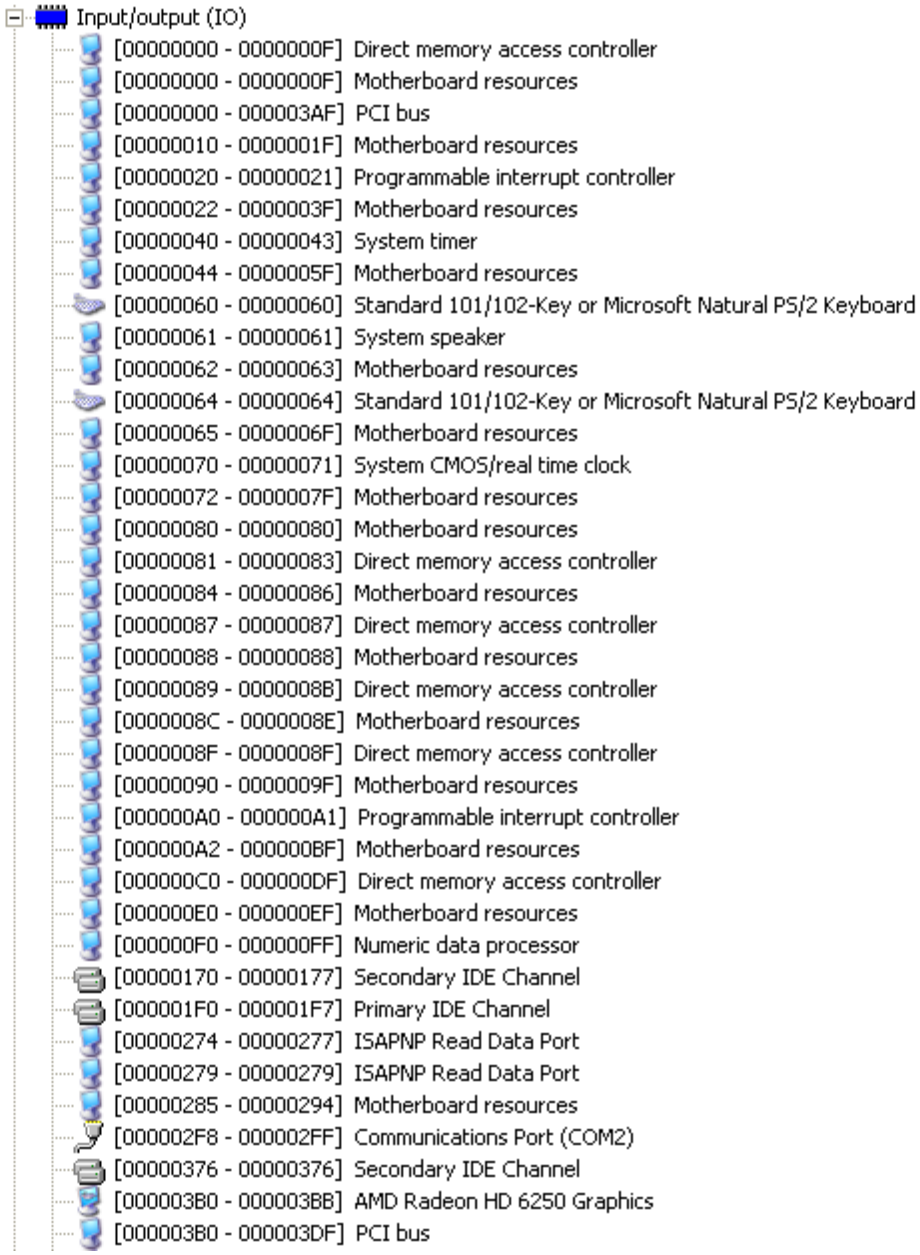
The NANO100/101 uses AMI Plug and Play BIOS with a single 16Mbit SPI Flash.

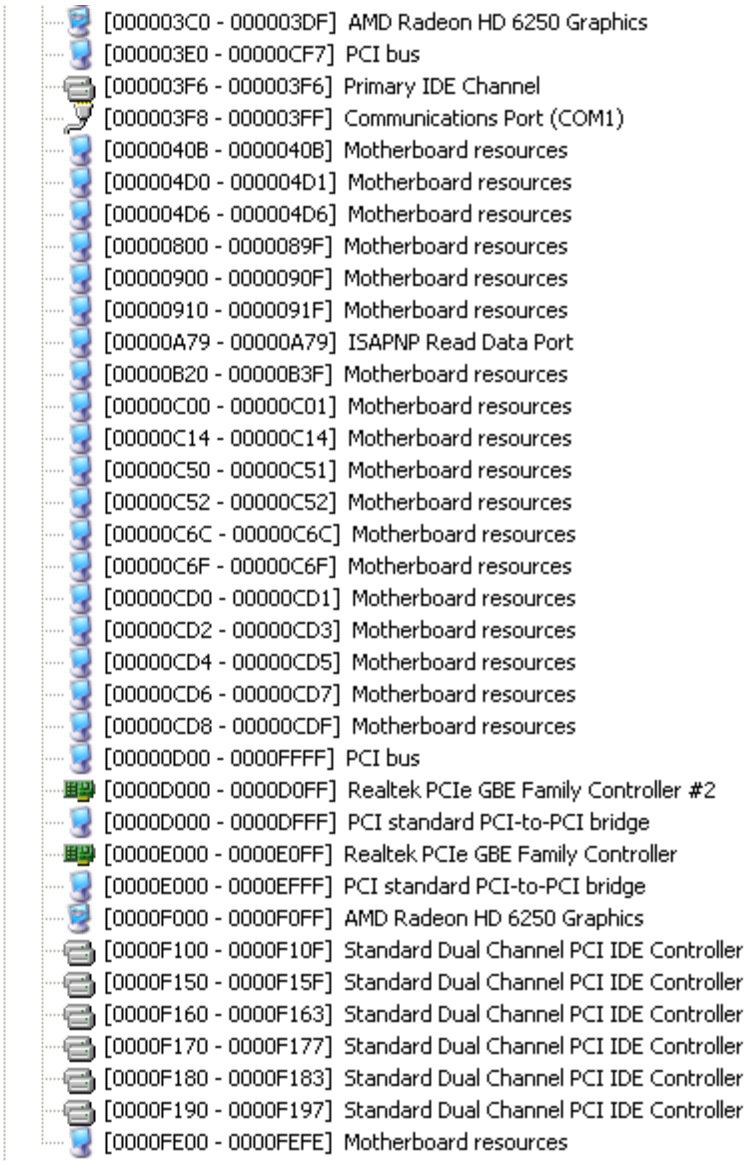
3.3 System Memory

The NANO100/101 supports one 204-pin DDR3 SO-DIMM sockets for a maximum memory of 4GB DDR3 SDRAMs. The memory module comes in sizes of 1GB, 2GB and 4GB.

3.4 I/O Port Address Map

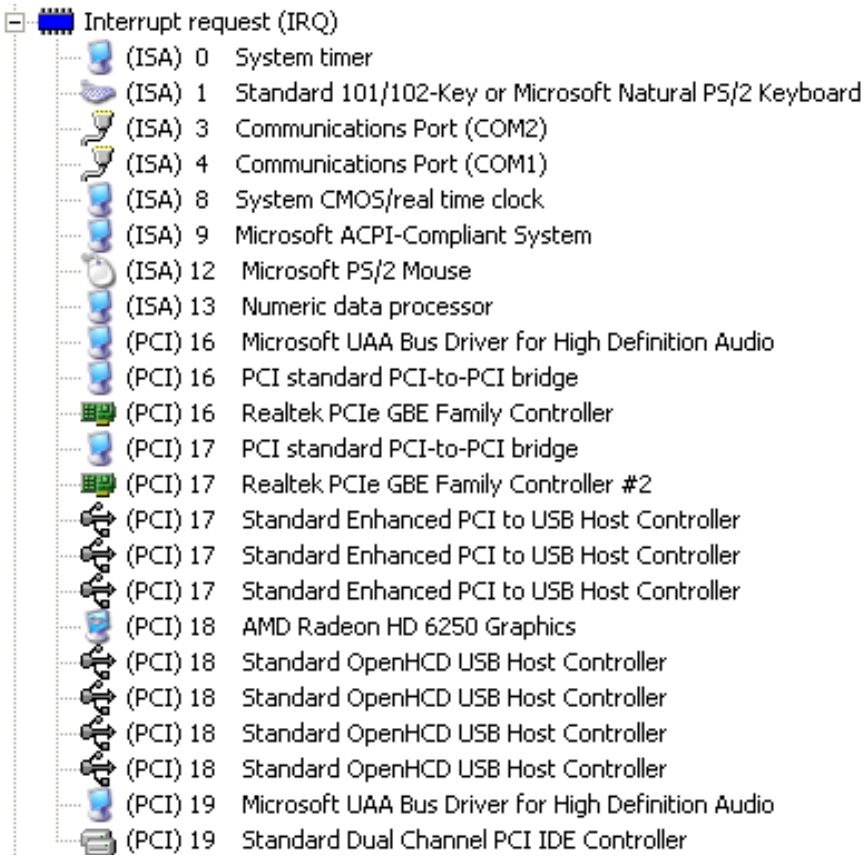
The AMD G-Series APU communicates via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.




[000003C0 - 000003DF] AMD Radeon HD 6250 Graphics
[000003E0 - 00000CF7] PCI bus
[000003F6 - 000003F6] Primary IDE Channel
[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
[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 - 0000D0FF] Realtek PCIe GBE Family Controller #2
[0000D000 - 0000DFFF] PCI standard PCI-to-PCI bridge
[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
[0000F150 - 0000F15F] Standard Dual Channel PCI IDE Controller
[0000F160 - 0000F163] Standard Dual Channel PCI IDE Controller
[0000F170 - 0000F177] Standard Dual Channel PCI IDE Controller
[0000F180 - 0000F183] Standard Dual Channel PCI IDE Controller
[0000F190 - 0000F197] Standard Dual Channel PCI IDE Controller
[0000FE00 - 0000FEFE] Motherboard resources

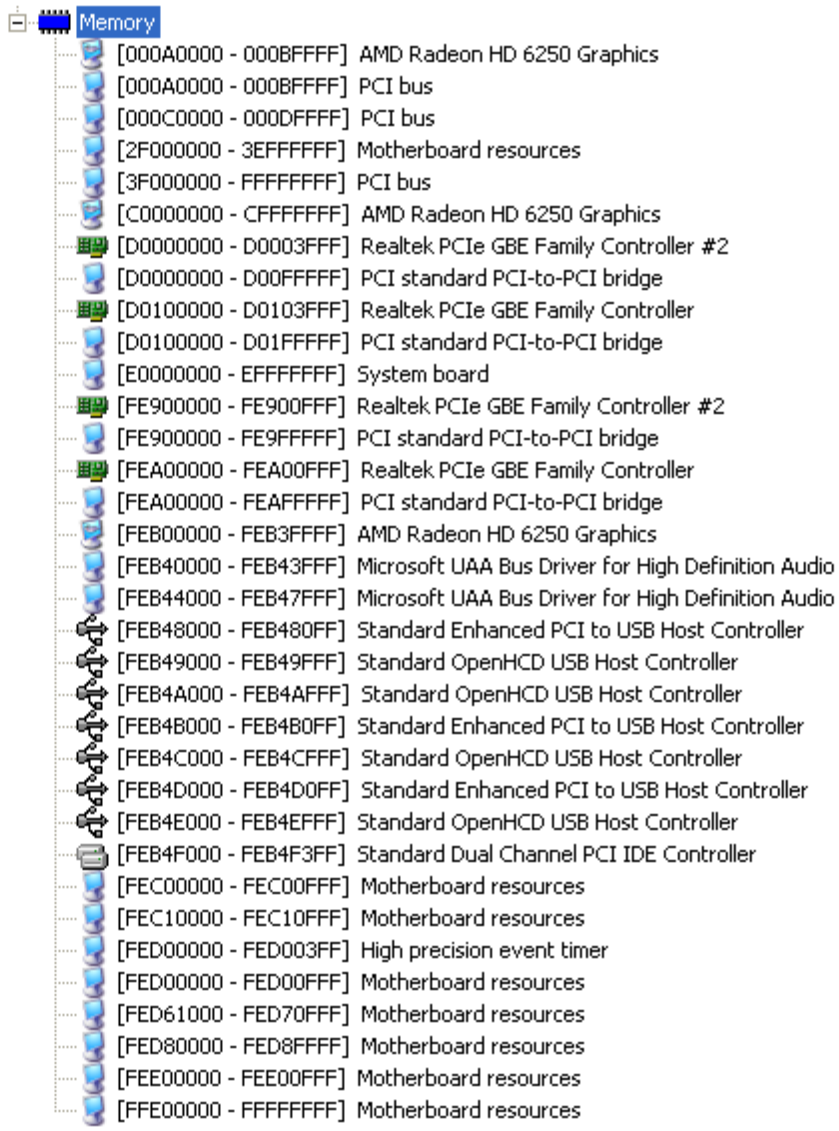
3.5 Interrupt Controller (IRQ) Map

The NANO100/101 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 the following table.



3.6 Memory Map

The memory mapping list is shown as follows:



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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 <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 can not boot after making and saving system changes with Setup, you can restore BIOS optimal defaults by setting JP1 (see section 2.3.1) .***

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

4.2 Navigation Keys

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

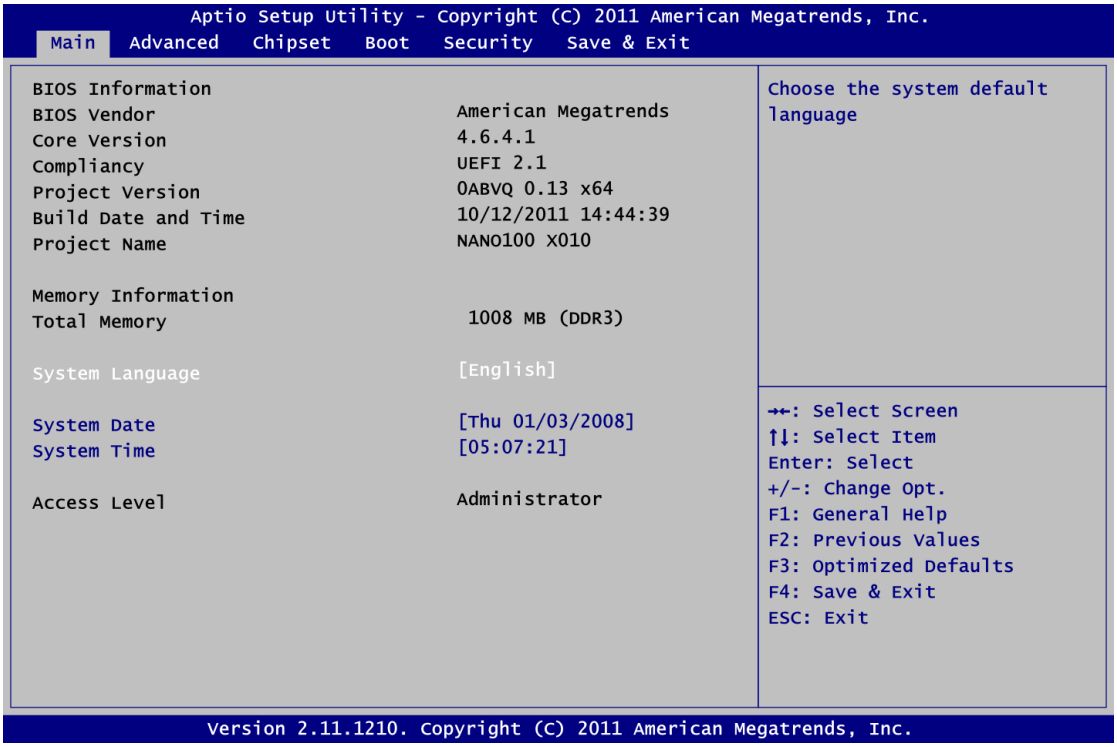
Note: ***Some of the navigation keys differ from one screen to another.***

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– 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.

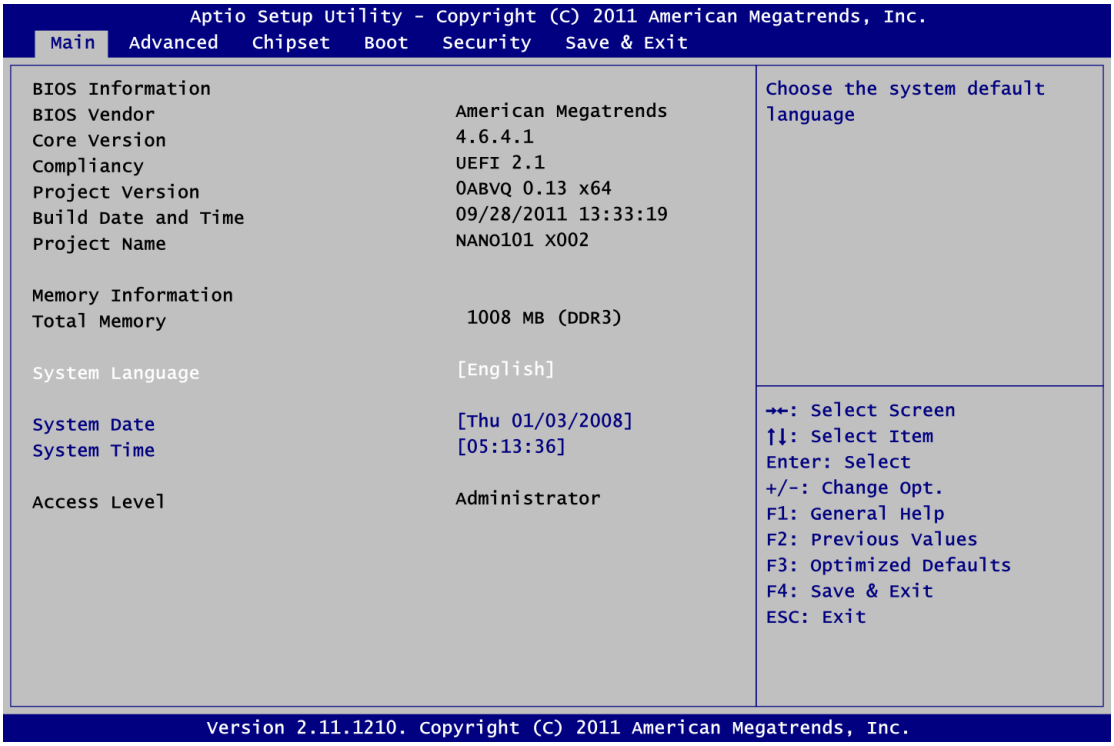
4.3 Main Menu

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.

For NANO100:



For NANO101:



- **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.

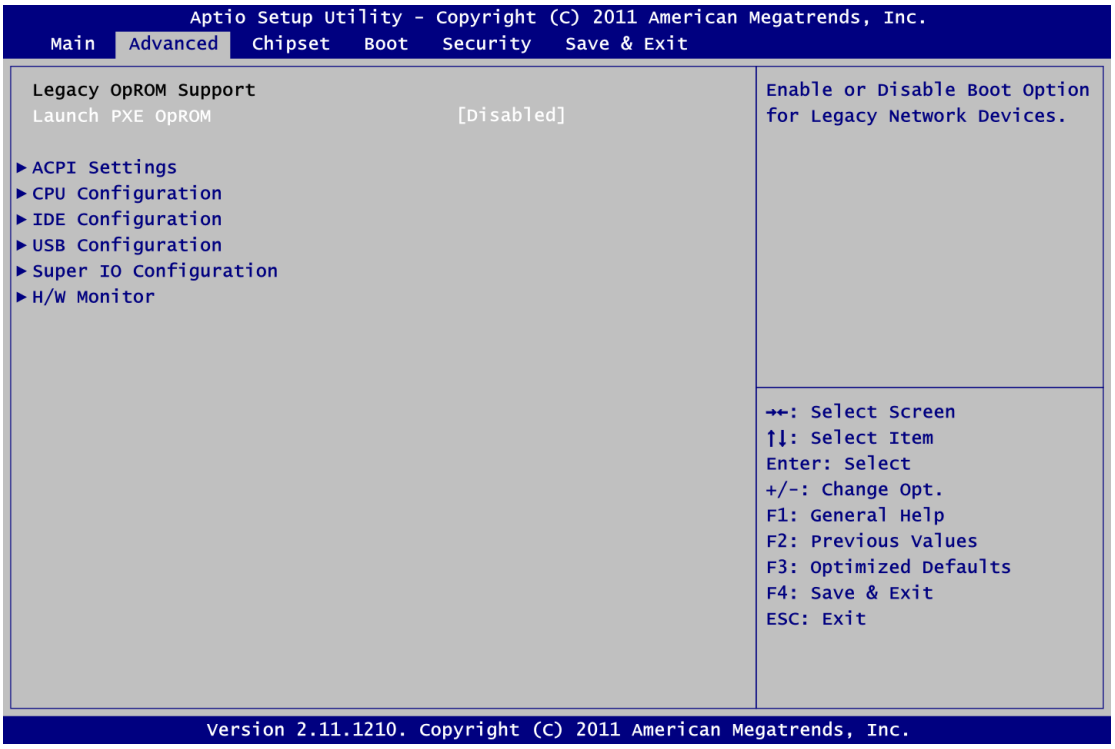
4.4 Advanced Menu

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

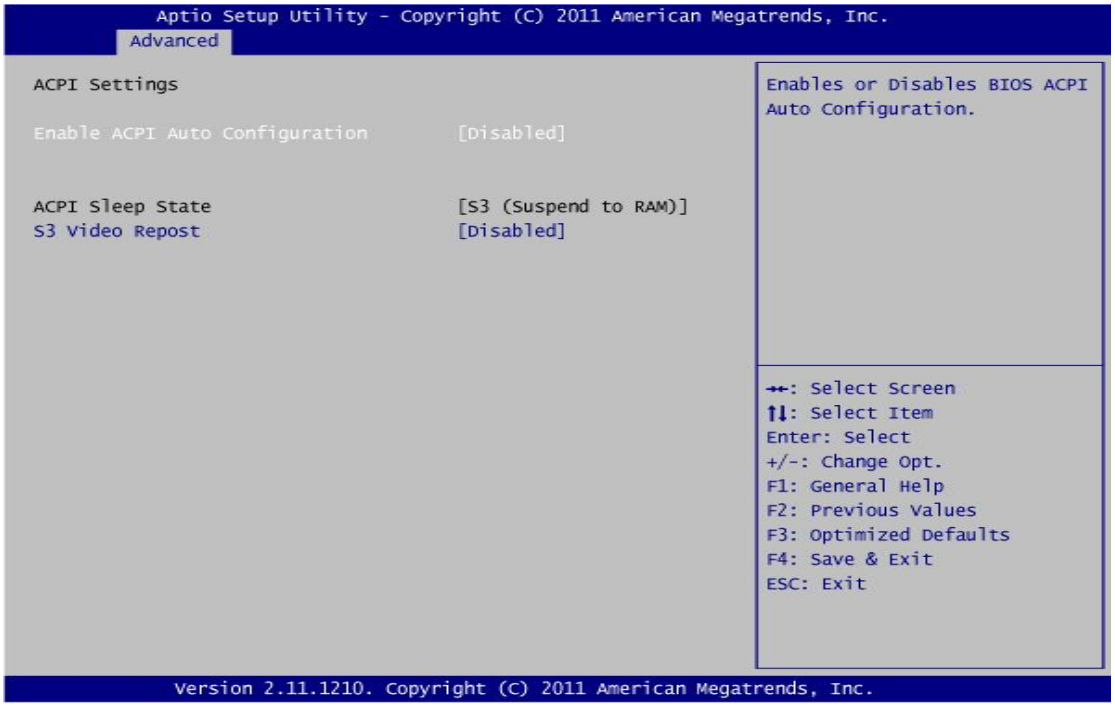
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► ACPI Settings
- ► CPU Configuration
- ► IDE Configuration
- ► USB Configuration
- ► Super IO Configuration
- ► 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.

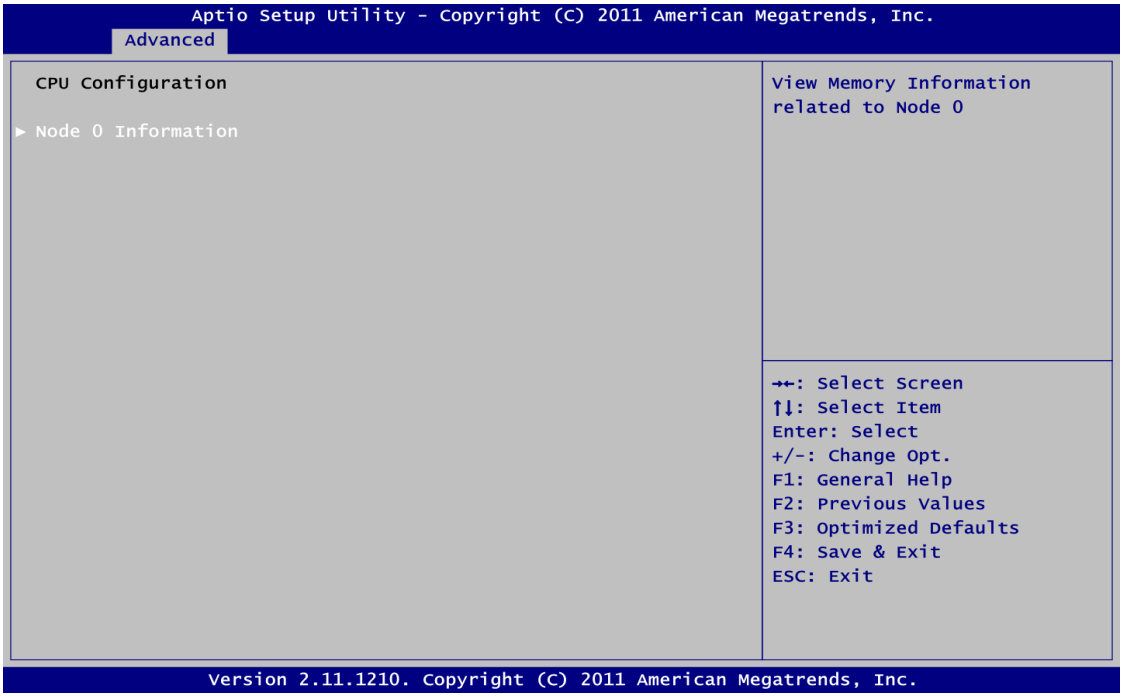


Enable ACPI Auto Configuration
Use this item to enable or disable BIOS ACPI auto configuration.

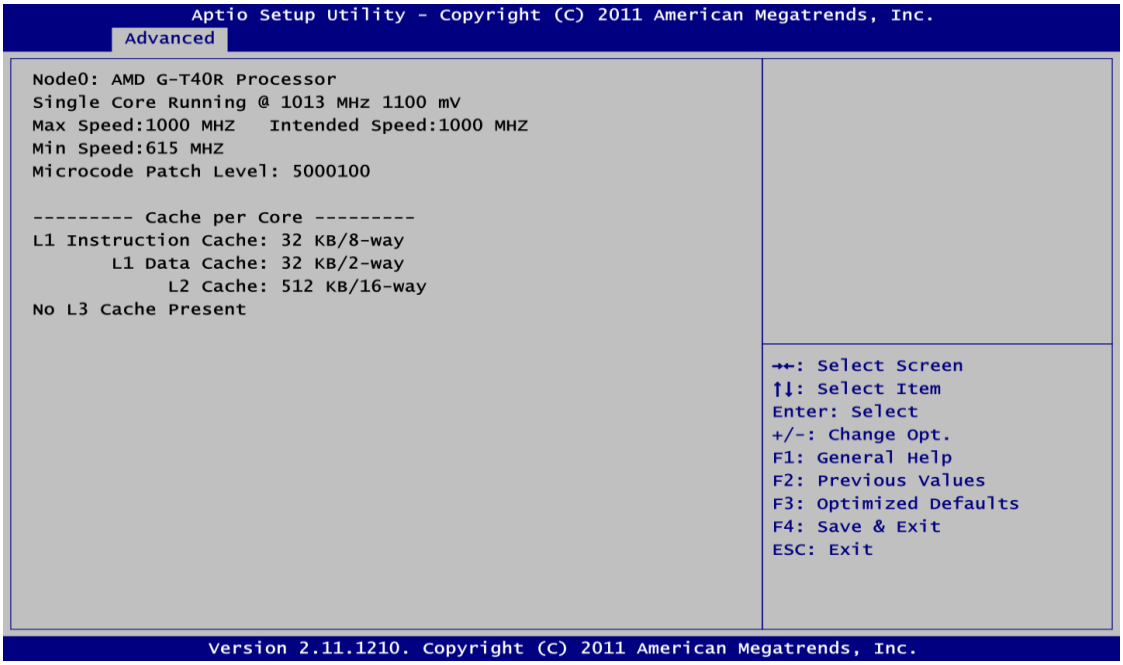
ACPI Sleep State
Default Advanced Configuration and Power Interface (ACPI) sleep state to be S3 (Suspend to RAM).

S3 Video Repost
Enable or disable S3 video repost.

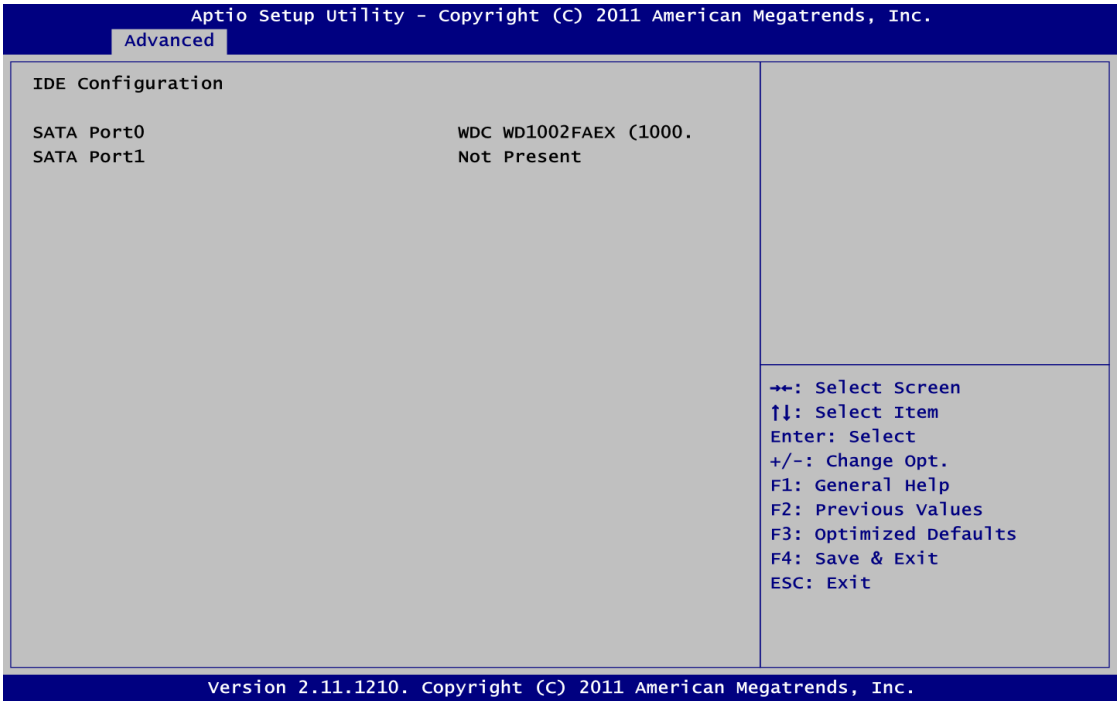
- **CPU Configuration**
  This screen shows the CPU Configuration.



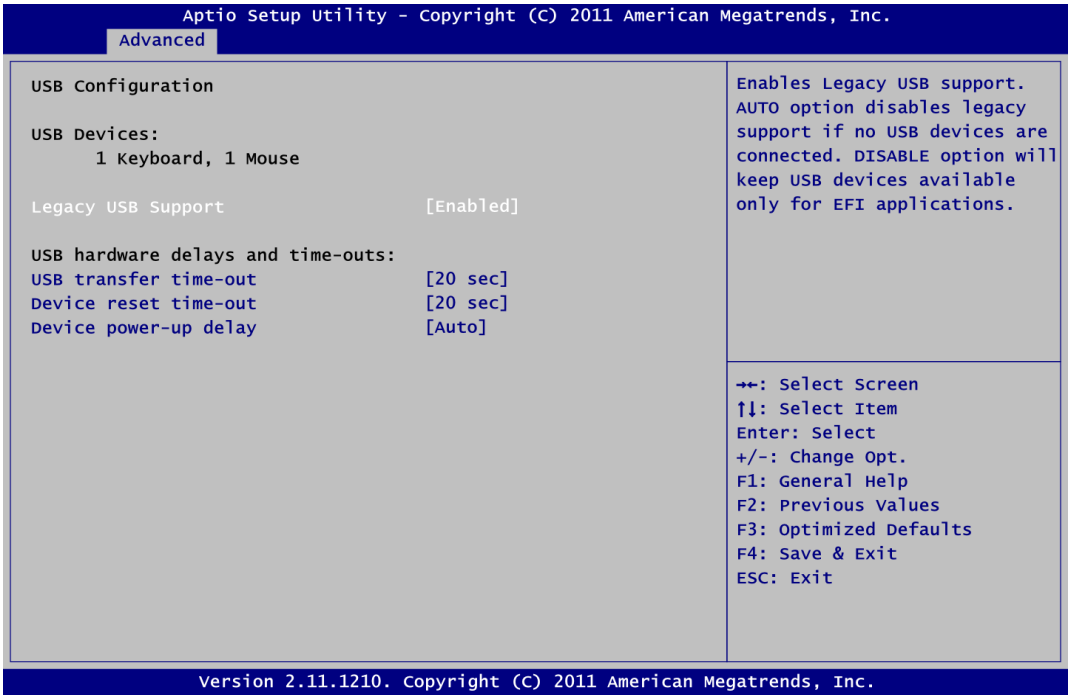
- **Node 0 Information**
  View memory information related to Node 0.



- **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.



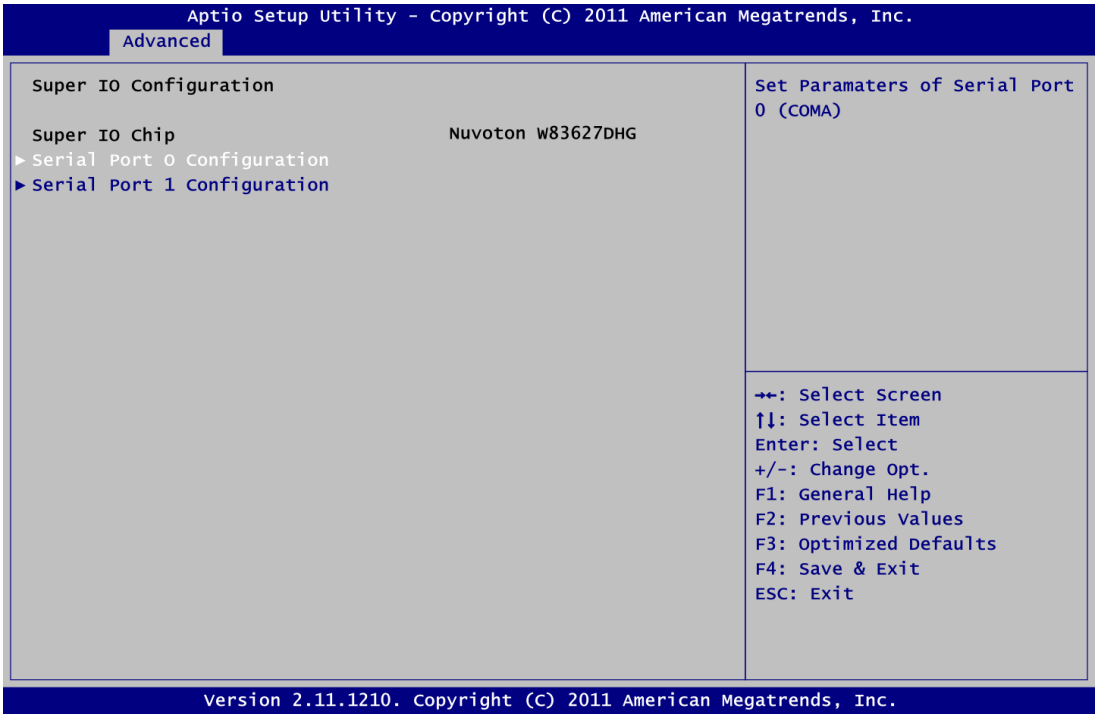
Legacy USB Support
Use this item to enable or disable support for USB device on legacy operating system. The default setting is Enabled. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.

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

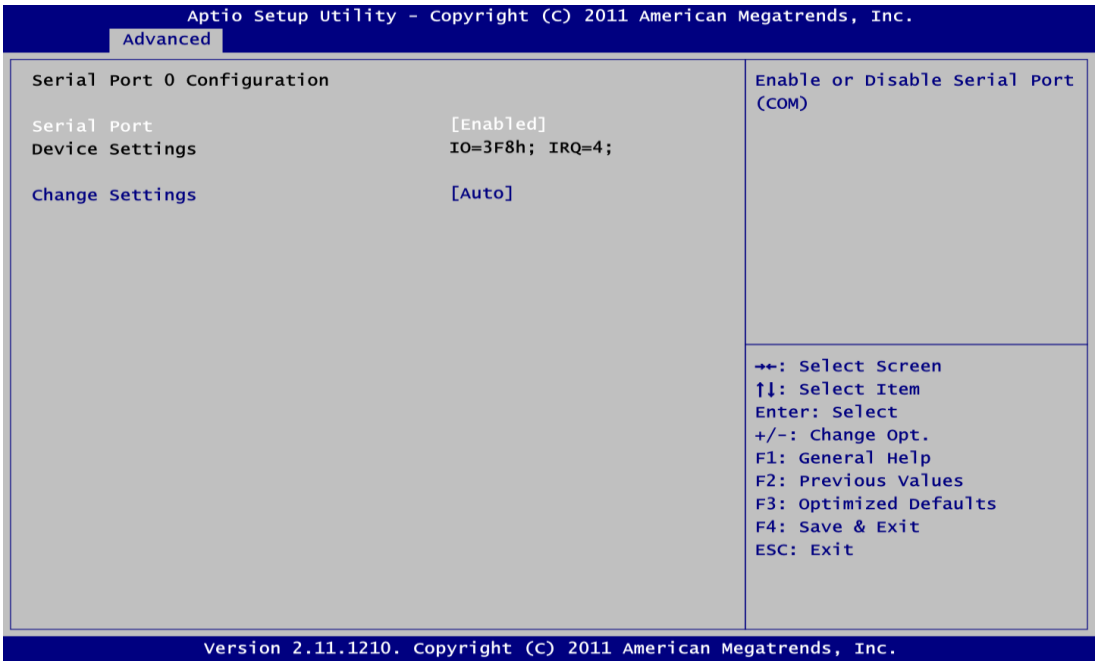
Device reset time-out
USB mass storage device start unit command time-out.

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

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

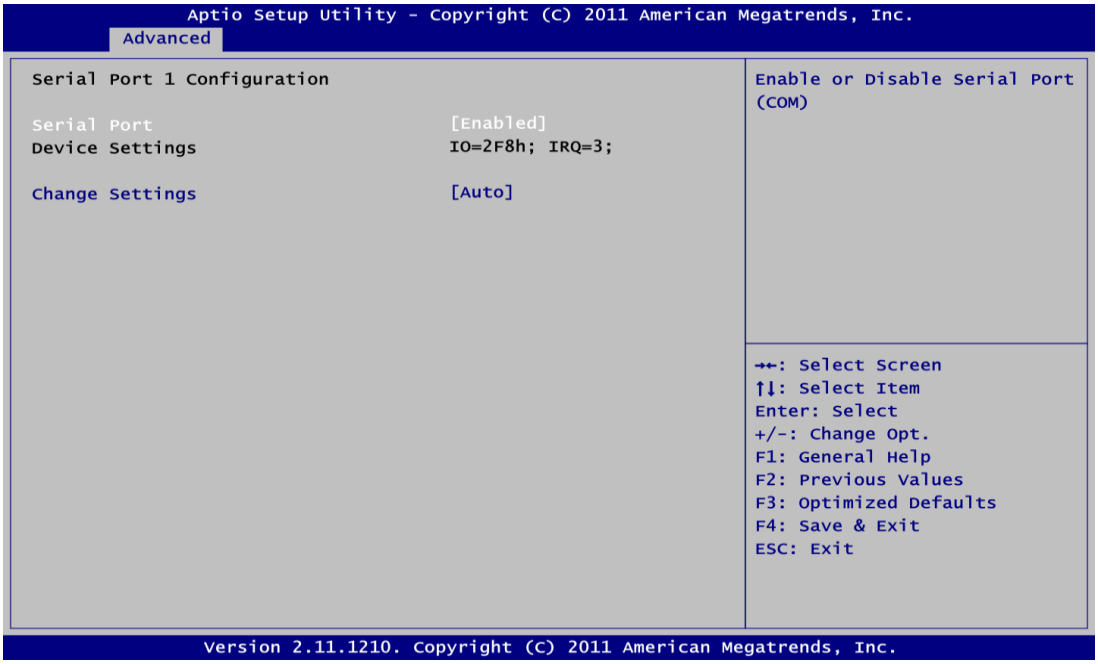


- **Serial Port 0 Configuration**



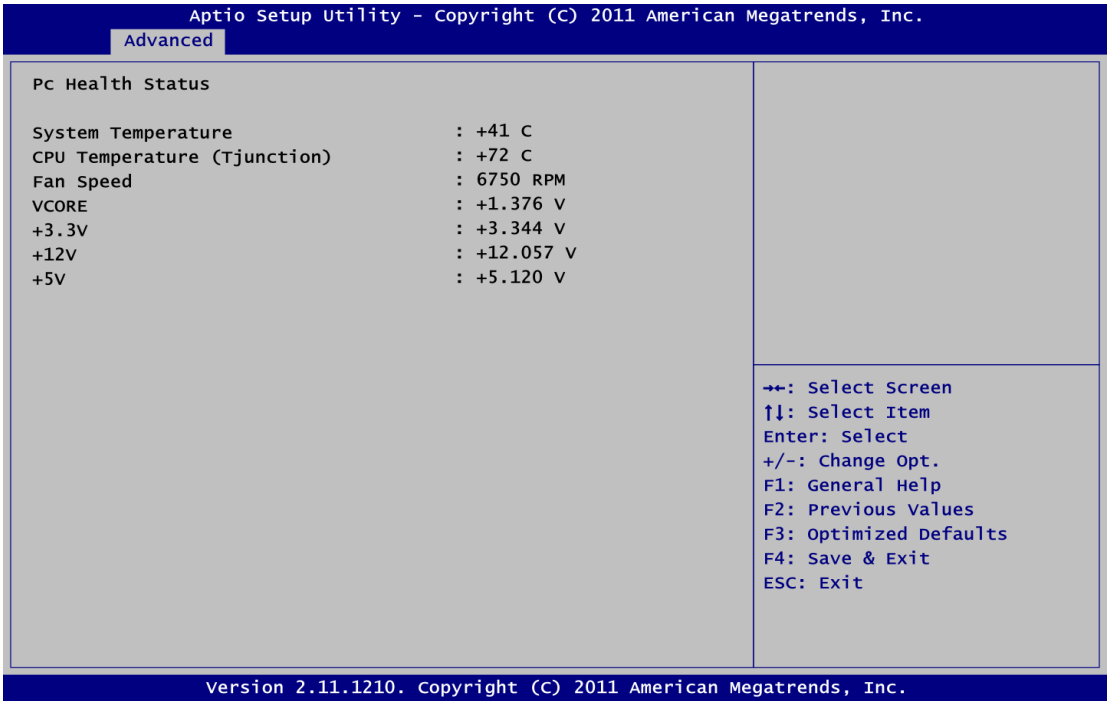
Serial Port
Use this item to enable or disable serial port 0. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

- **Serial Port 1 Configuration**



Serial Port
Use this item to enable or disable serial port 1. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

- **H/W Monitor**
  This screen monitors hardware health.



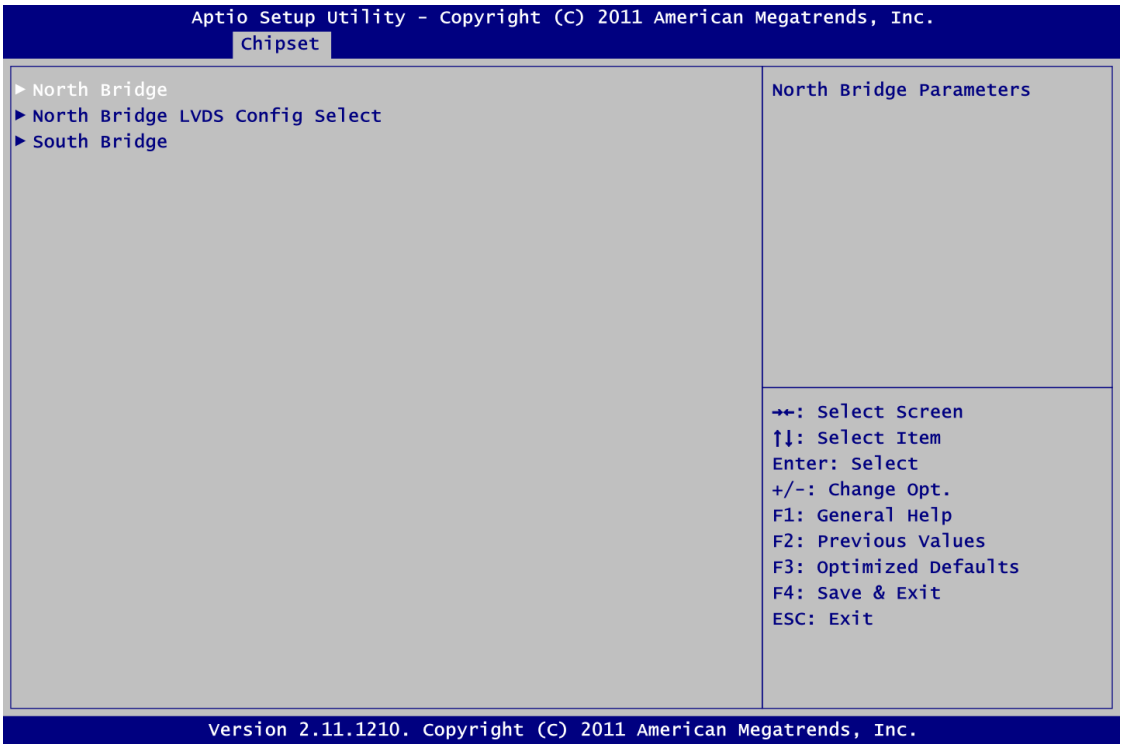
This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (VCORE, +3.3V, +12V and +5V).

4.5 Chipset Menu

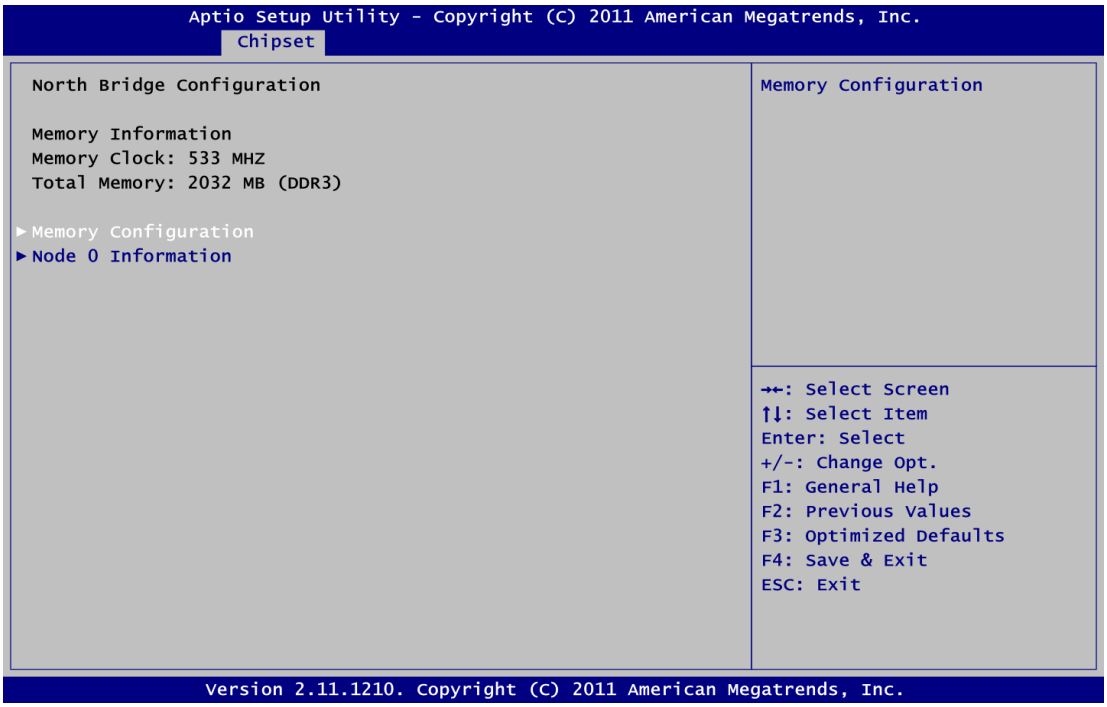
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► North Bridge
- ► North Bridge LVDS Config Select
- ► South Bridge

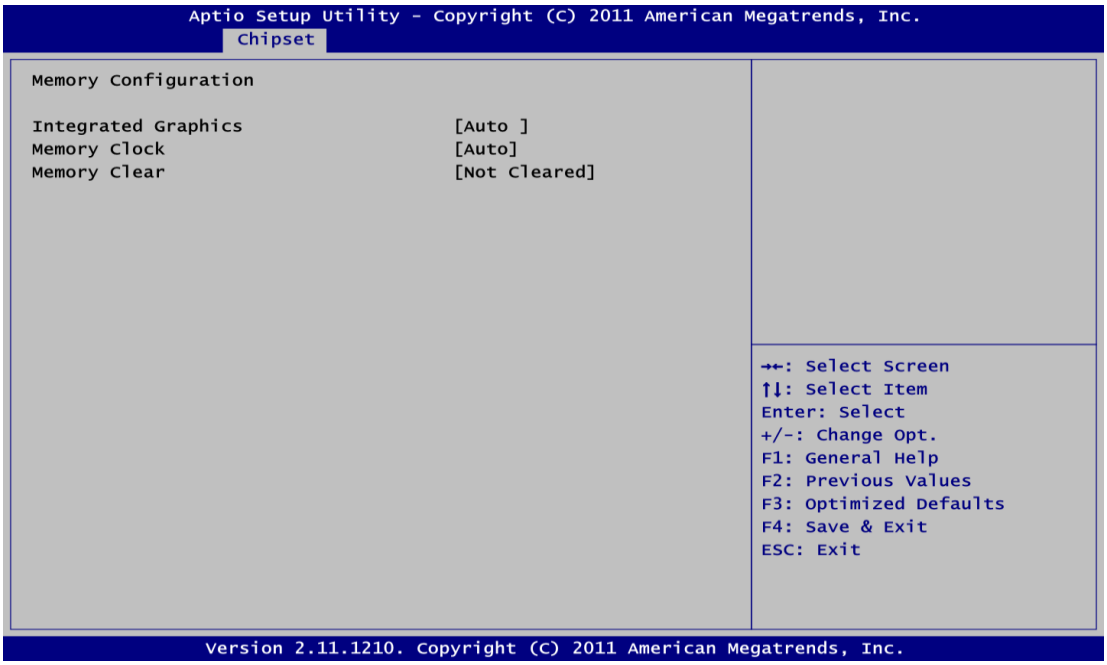
For items marked with "►", please press <Enter> for more options.



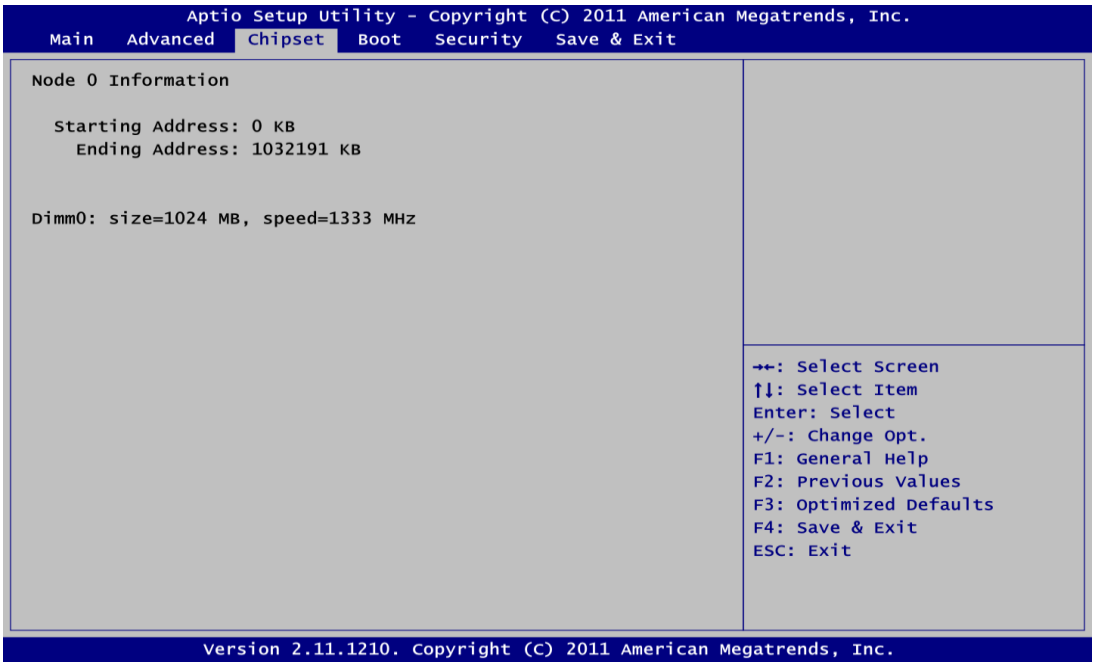
- **North Bridge Configuration**
  This screen allows users to configure parameters of North Bridge chipset.



- **Memory Configuration**
  All of options are set Auto as default.

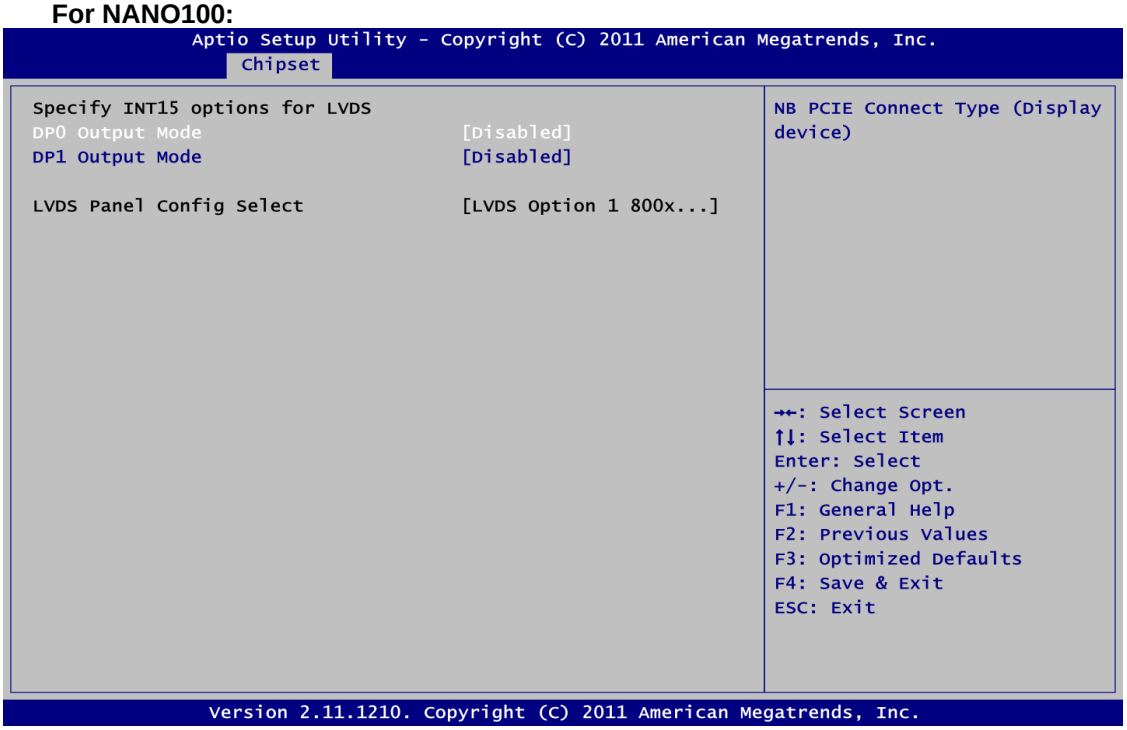


- **Node 0 Information**
  This item is to provide user with the information of current using DDR3 SDRAMs.

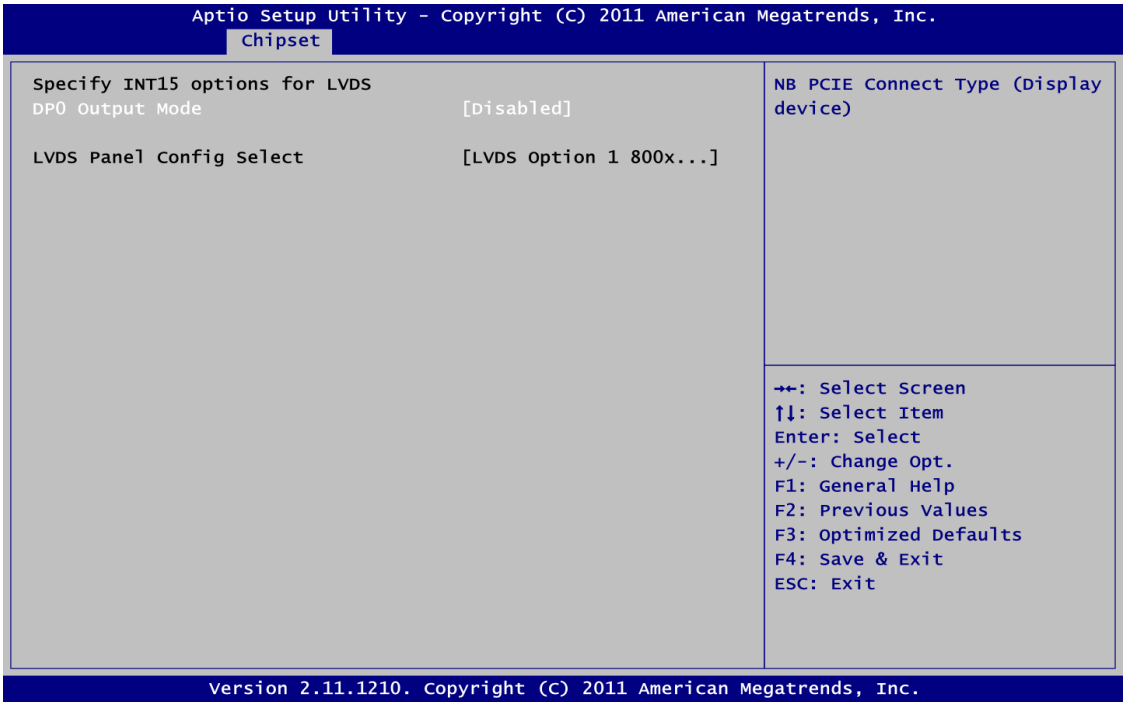


- **North Bridge LVDS Config Select**

For NANO100:



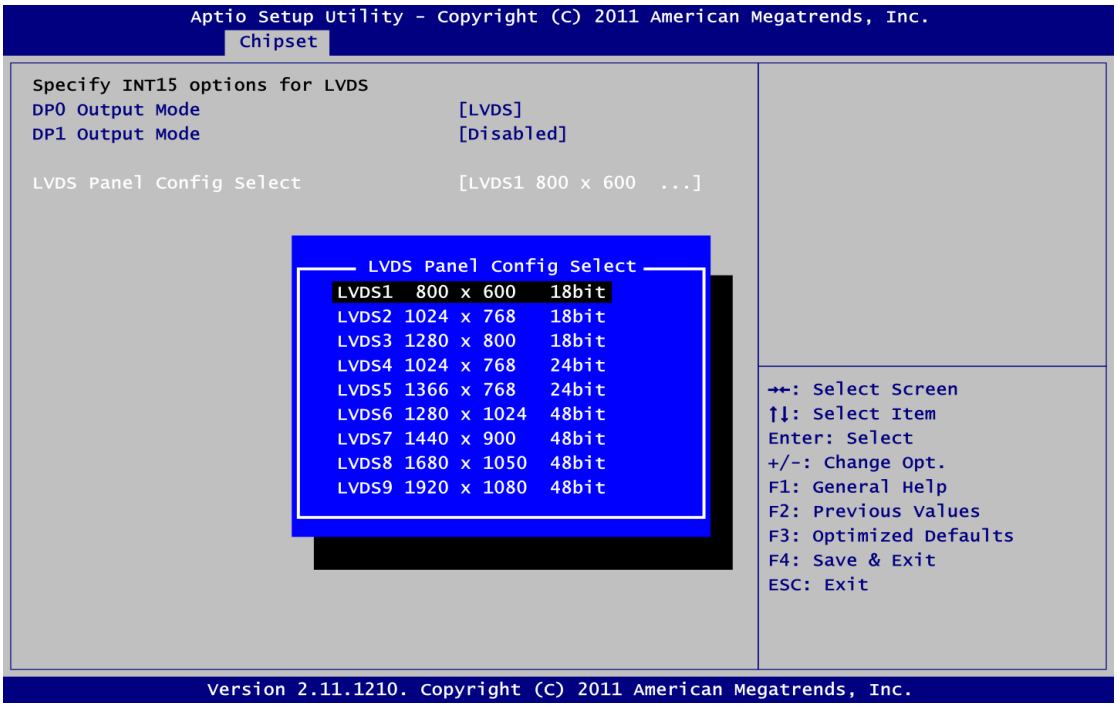
For NANO101:



DP0 Output Mode
Use this item to enable LVDS.

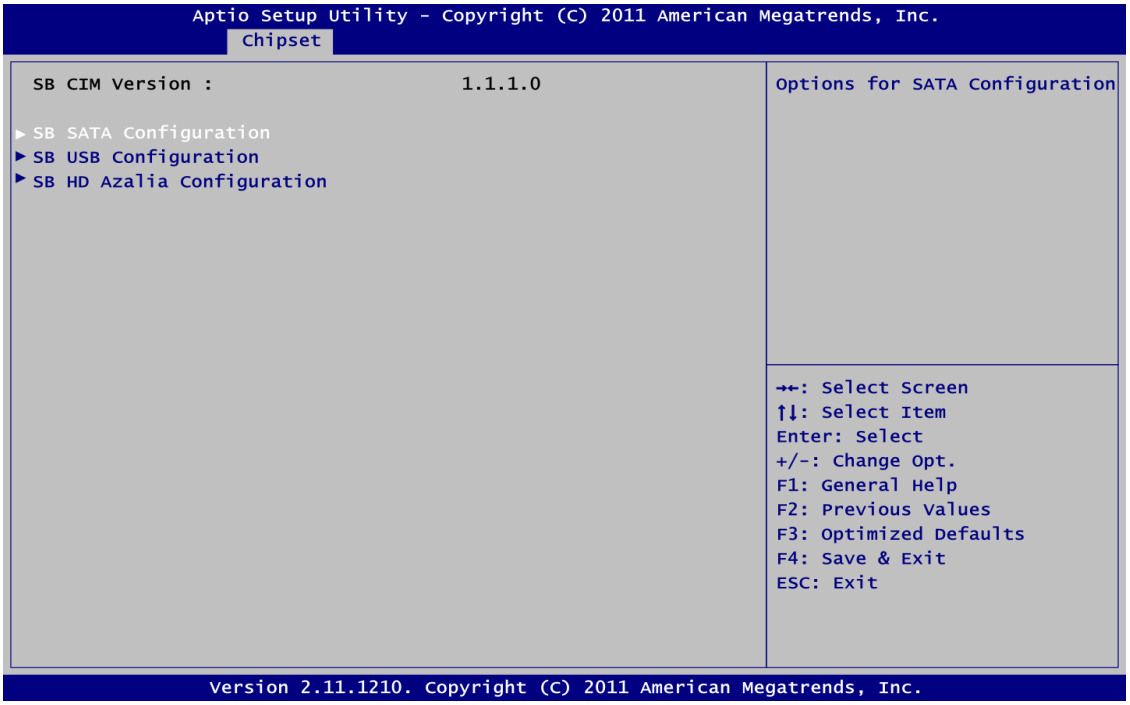
DP1 Output Mode
Use this item to choose DP1 output or disable mode. Note this item is only available for NANO100.

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

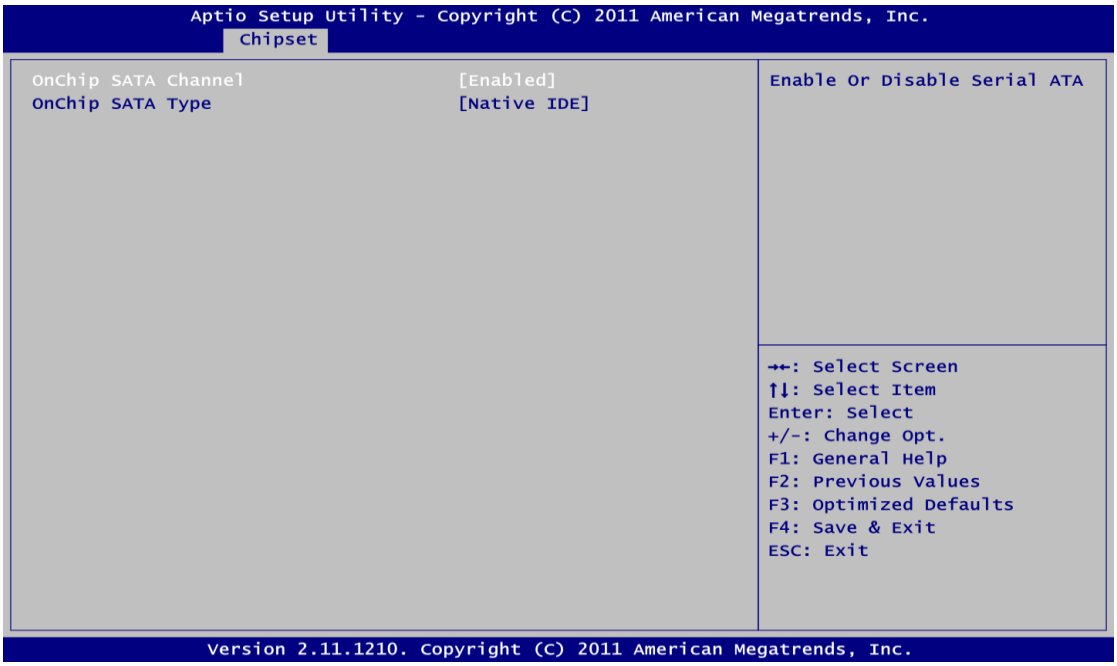


- **South Bridge**
  This screen allows users to configure South Bridge chipset. For items marked with "▶", please press <Enter> for more options.

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



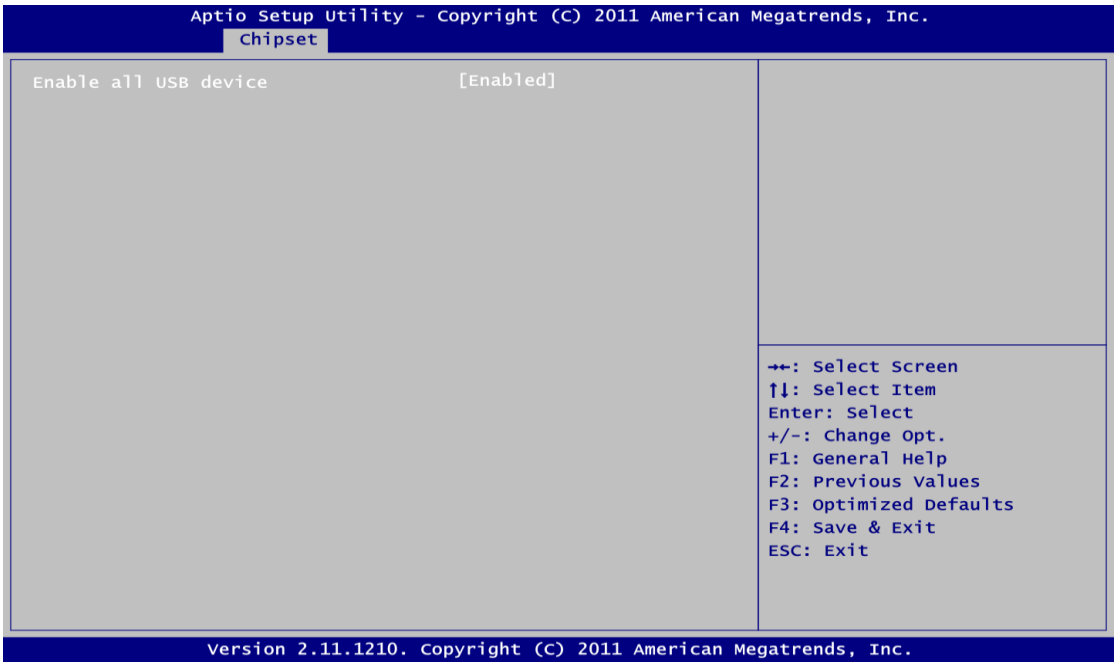
- **SB SATA Configuration**
  Use this item to select option for SATA configuration.



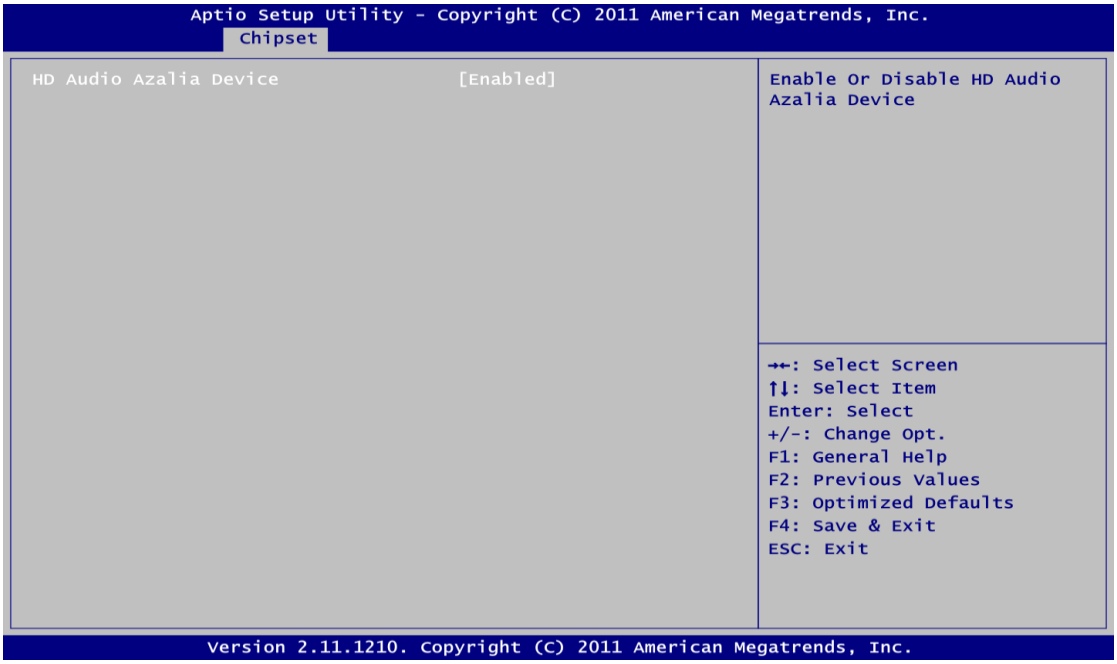
OnChip SATA Channel
Use this item to enable or disable SATA channel.

OnChip SATA Type
Here are the options: Native IDE and AHCI.

- **SB USB Configuration**
  Use this item to enable or disable all USB devices.

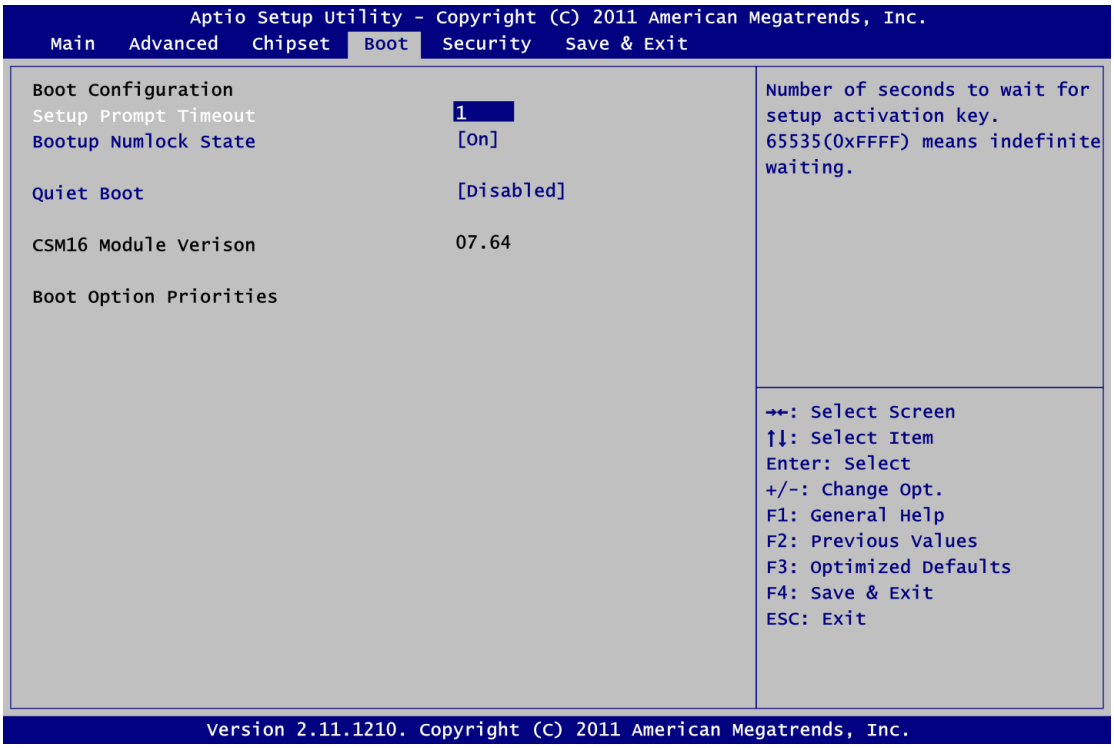


- **SB HD Azalia Configuration**
  This item allows you to enable or disable HD audio Azalia device.



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.

- **Boot Option Priorities**
  Set the system boot priority order.

4.7 Security Menu

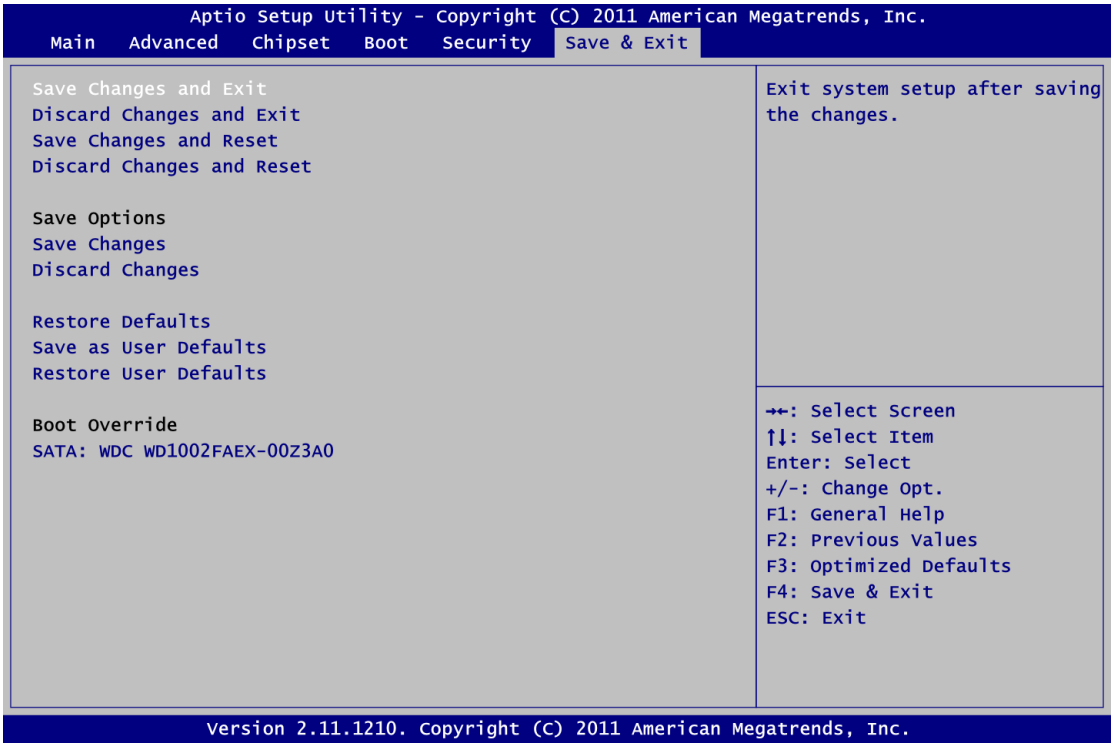
The Security menu allows users to change the security settings for the system.

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

- **User Password**
  This item indicates whether an 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>.

- **Boot Override**
  Press <Enter> causes system to enter the OS.

Appendix A
Watchdog Timer

About Watchdog Timer

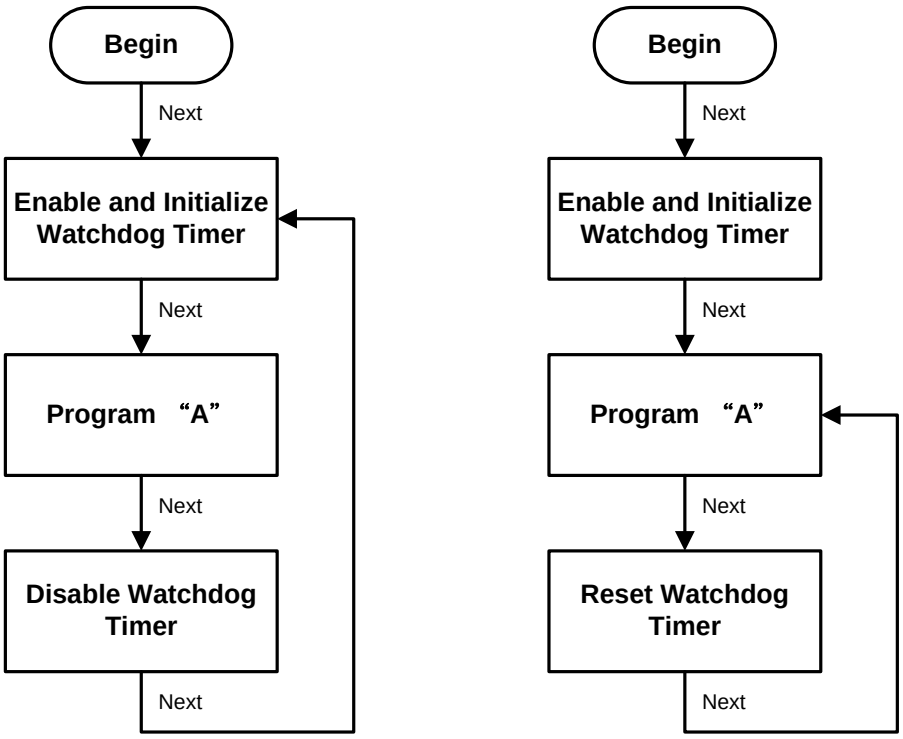
Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

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,08h
out     dx,al

;Activate WDT:
mov     dx,2Eh
mov     al,2Dh
out     dx,al
mov     dx,2Fh
mov     al,20h
out     dx,al

;Set Second or Minute :
mov     dx,2Eh
mov     al,0F5h
out     dx,al
mov     dx,2Fh
mov     al,Nh            ;N=00h or 08h(see below Note)
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)

;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**=00h, 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**=08h, 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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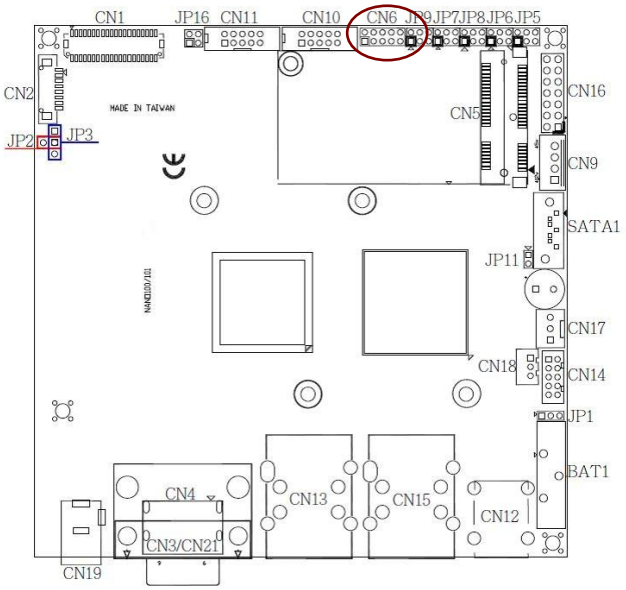
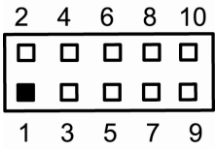
Appendix B
Digital I/O

About Digital I/O

The onboard digital I/O has 8 bits (DIO0~7). Each bit can be set to function as input or output by software programming. In default, all pins are pulled high with +5V level (according to main power). The BIOS default settings are 3 inputs and 5 outputs where all of these pins are set to 1.



CN6



Pin	Signal	Pin	Signal
1	DI1 (Bit0)	2	DO1 (Bit 3)
3	DI2 (Bit1)	4	DO2 (Bit 4)
5	DI3 (Bit2)	6	DO3 (Bit 5)
7	GND	8	DO4 (Bit 6)
9	GND	10	DO5 (Bit 7)

Digital I/O Programming

Assembly sample code :

Set functionality:

```
;Start set DIO program:
mov     dx,2Eh
mov     al,87h          ;Un-lock super I/O
out     dx,al
out     dx,al

mov     dx,2Eh
mov     al,07h
out     dx,al
mov     dx,2Fh
mov     al,09h           ;Select logic device 9
out     dx,al

mov     dx,2Eh
mov     al,30h
out     dx,al
```

```
mov     dx,2Fh
mov     al,02h
out     dx,al

;Programming DIO as in/out.
mov     dx,2Eh
mov     al,0F0h
out     dx,al
mov     dx,2Fh
mov     al,Nh           ;If N=07h, DIO is programmed as 3 inputs
out     dx,al           ;and 5 outputs (see below Note1)
```

Digital Input:

```
;Read digital input data.
mov     dx,2Eh
mov     al,0F1h
out     dx,al
mov     dx,2Fh          ;If N=07h, bit0~2 represent DIO0~2,
in      dx, al          ;bit0~2 are DIO pin 0~2 state (1 High, 0 Low)
                        ;(see below Note2)
```

Digital Output:

```
; Set DIO digital output pins value.
mov     dx,2Eh
mov     al,0F1h
out     dx,al
mov     dx,2Fh
mov     al,M            ;If N=07h, bit3~7 represent DIO3~7,
out     dx,al           ;set output value M
                        ;bit3~7 are DIO pin 3~7 state (1 High, 0 Low)
                        ;if M=FFh, all DIO pins are high
                        ;(see below Note3)
```

Note1:

*The **N** has 8 bits. Every bit's value is either 1 or 0.*
" 1" means that the bit is programmed to input.
" 0" means that the bit is programmed to output.

Ex:

*1. **N**=00h=00000000b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	Output	Output

*2. **N**=02h=0000000**1**0b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	**Input**	Output

*3. **N**=07h=00000**111**b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**Input**	**Input**	**Input**

*4. **N**=F2h=**1111**00**1**0b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Input	**Input**	**Input**	**Input**	Output	Output	**Input**	Output

Note2:

*If **N**=07h*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**Input**	**Input**	**Input**

1. When DIO0~2 are connected to external device, the device sets DIO0~2 to high

DIO7	*DIO6*	*DIO5*	*DIO4*	*DIO3*	*DIO2*	*DIO1*	*DIO0*
Output	*Output*	*Output*	*Output*	*Output*	***1***	***1***	***1***

2. When DIO0~2 are connected to external device, the device sets DIO0 to low and DIO1~2 to high

DIO7	*DIO6*	*DIO5*	*DIO4*	*DIO3*	*DIO2*	*DIO1*	*DIO0*
Output	*Output*	*Output*	*Output*	*Output*	***1***	***1***	*0*

Note3:

*If **N**=07h*

DIO7	*DIO6*	*DIO5*	*DIO4*	*DIO3*	*DIO2*	*DIO1*	*DIO0*
Output	*Output*	*Output*	*Output*	*Output*	***Input***	***Input***	***Input***

*1. When **M**=FFh*

DIO7	*DIO6*	*DIO5*	*DIO4*	*DIO3*	*DIO2*	*DIO1*	*DIO0*
1	*1*	*1*	*1*	*1*	*1*	*1*	*1*

*2. When **M**=D7h*

DIO7	*DIO6*	*DIO5*	*DIO4*	*DIO3*	*DIO2*	*DIO1*	*DIO0*
1	*1*	*0*	*1*	*0*	*1*	*1*	*1*