NANO-6040/6040L Series

NANO-ITX Board

User's Manual

Version 1.2

Table of Contents

How to Use This Manual

How to Use This Manual

The manual describes how to configure your NANO-6040 system board to meet various operating requirements. It is divided into five chapters, with each chapter addressing a basic concept and operation of Single Host Board.

Chapter 1: System Overview. Presents what you have in the box and give you an overview of the product specifications and basic system architecture for this series model of single host board.

Chapter 2: Hardware Configuration. Show the definitions and locations of Jumpers and Connectors that you can easily configure your system.

Chapter 3: System Installation. Describes how to properly mount the CPU, main memory and Compact Flash to get a safe installation and provides a programming guide of Watch Dog Timer function.

Chapter 4: BIOS Setup Information. Specifies the meaning of each setup parameters, how to get advanced BIOS performance and update new BIOS. In addition, POST checkpoint list will give users some guidelines of trouble-shooting.

Chapter 5: Troubleshooting. Provide various of useful tips to quickly get NANO-6040 running with success. As basic hardware installation has been addressed in Chapter 3, this chapter will basically focus on system integration issues, in terms of backplane setup, BIOS setting, and OS diagnostics.

The content of this manual is subject to change without prior notice. These changes will be incorporated in new editions of the document. The vendor may make supplement or change in the products described in this document at any time.

Chapter 1
System Overview

1.1 Introduction

Portwell Inc., a world-leading innovator in the Industrial PC (IPC) market and a member of the Intel® Communications Alliance, has launched its new NANO-6040 wide-temperature product for embedded system board (ESB) that combines a smaller footprint, lower power consumption, robust computing power and with longevity support.

The NANO-6040 is specifically designed to operate at very low power consumption and low heat, so it can be a truly fanless configuration and battery operated. Base on Intel® System Controller Hub EG20T, the NANO-6040 supports 1GB or 2GB on board memory and comes with two SATA, one Mini-PCIe socket, dual independent display by VGA and 18/24-bit LVDS, one gigabit Ethernet, and five USB port (two ports are on rear IO). It also built with DC 12V input.

Base on leading Intel® Atom solution, NANO-6040 is a compact and ultra low power dissipation board for Digital Signage, Digital Security Surveillance (**DSS**) and vehicle applications…etc.

1.2 Check List

The NANO-6040 package should cover the following basic items

- ✓ One NANO-6040 NANO-ITX Main Board
- ✓ One 2-in-1 Heatsink
- ✓ One Installation Resources CD-Title
- ✓ One SATA cable

If any of these items is damaged or missing, please contact your vendor and keep all packing materials for future replacement and maintain.

1.3 Product Specification

- **Main Processor**
  - On board Intel® ATOMTM E6x0T series processor
- **Chipset**
  - Intel® System Controller Hub EG20T

- **System BIOS**
  - AMI uEFI BIOS
- **Main Memory**
  - 1GB or 2GB DDR2 memory on board
- **Power input**
  - DC 12V input on rear I/O
  - 4pin +12V power connector on board
  - (DC 12V Jack and 4pin power connector can't be used at the same time)
- **Serial Port**
  - Support one RS232/422/485 port on rear I/O for NANO-6040 series (adjust by bios)
  - Support one RS232/422/485 port by on board connector for NANO-6040L series (adjust by bios)
- **USB Interface**
  - Support five USB (Universal Serial Bus) ports, two on rear I/O and three on board header for internal devices.
- **SATA Interface**
  - Support two SATA II ports
- **SD interface**
  - Support one SD socket
  - Support boot from SD card
- **Audio Interface**
  - Rear I/O Audio Jack for Mic-In and Line-Out (NANO-6040 series)
  - Rear I/O Audio Jack for Line-Out (NANO-6040L series)
  - On-Board pin header for Mic-In and Line-Out
- **Watch Dog Timer**
  - Support WDT function through software programming for enable/disable and interval setting
  - General system reset
- **Display**
  - Support dual independent display by VGA and 18/24-bit LVDS
- **On-board Ethernet LAN**
  - One Gigabit Ethernet (10/100/1000 Mbits/sec) LAN ports using Intel 82574IT PCI-Expressx1 interface GbE Controller
  - Support Wake on LAN function
- **High Drive GPIO**
  - On-board programmable 8-bit Digital I/O interface
- **Cooling Fans**
  - Support one 3-pin power connector for system fan

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- **System Monitoring Feature**
  - Monitor system temperature and major power sources.
- **Outline Dimension (L x W)**
  - 120mm(4.72'') x 120mm(4.72'')
- **Power Requirements**
- **Configuration**

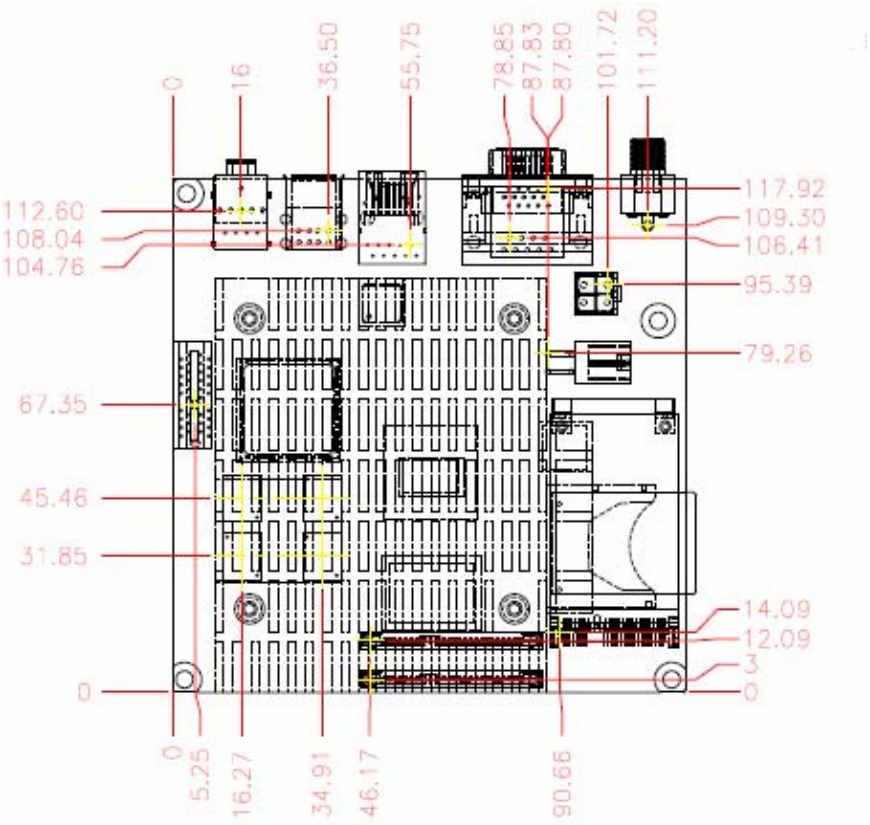
1.4 System Configuration

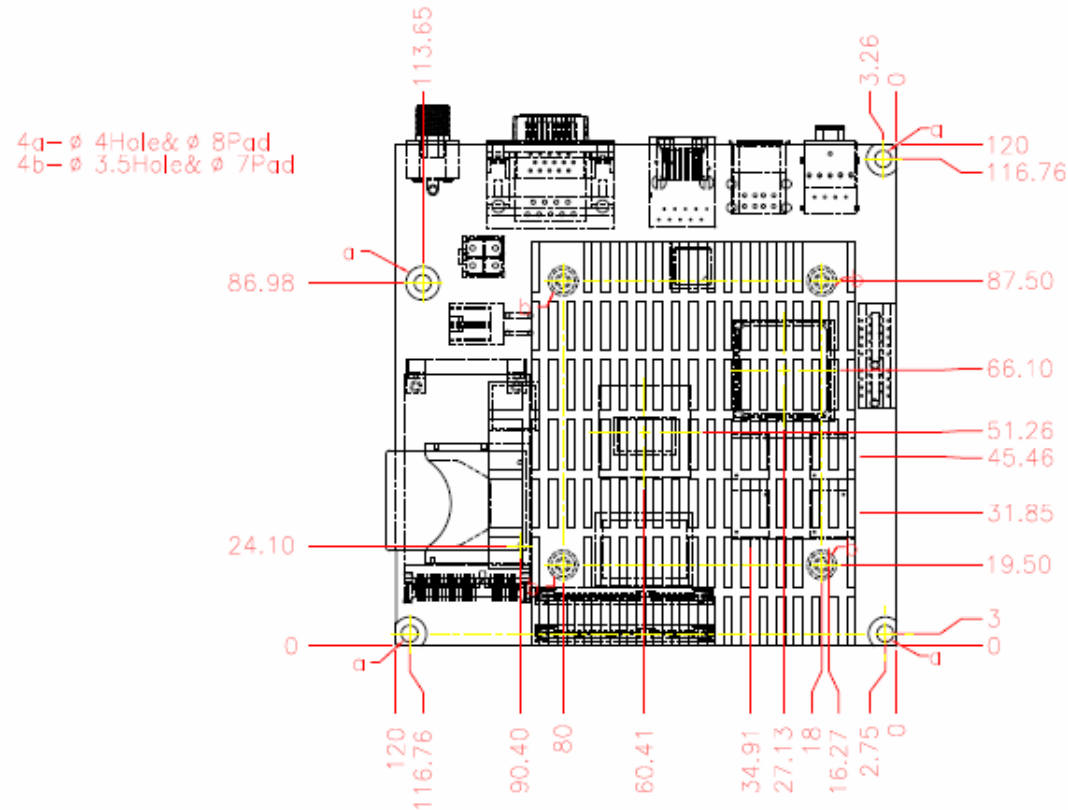
CPU Type	Intel® Atom™ CPU E680T @ 1.6GHz FSB:399.1MHz L2:512KB
SBC BIOS	Portwell, Inc. NANO-6040 TEST BIOS(11124TOO)
Memory	onboard DDR2 800 1G (SEC K4T1G084QF)
VGA Card	onboard Intel® Corporation Atom E680T Embedded Media and Graphics
VGA Driver	Intel® Corporation Atom E680T Embedded Media and Graphics Driver Version: 1.5.2.1816
LAN Card	onboard Intel® 82574IT Gigabit Network Connection
LAN Driver	Intel® 82574L Gigabit Network Connection Driver Version:11.1.6.0
Audio Card	onboard Realtek ALC892 High Definition Audio
Audio Driver	Realtek High Definition Audio Driver Version: 5.10.0.6000
Chip Driver	Intel® Chipset Device Software Driver Version: 9.1.2.1013
USB 2.0 Driver	Intel® Platform Controller Hub EG20T USB OHCI Controller Driver Version: 9.1.2.1012
SATA HDD	Seagate ST3160813AS 160GB
FDD	SMARTDiSK FDUSB-TM
CDROM	Pioneer DVR-S19LBK
Power Supply	Seasonic SSA-0651-1 60W

CPU	Memory	DC	Power ON	Full Loading 10Min	Full Loading 30Min
1.6G	**1G**	**Power**	3.40	1.84	1.83
1.6G	**1G**	**Adapter**	3.27	1.79	1.81
1.6G	**2G**	**Power**	3.13	1.90	1.91
1.6G	**2G**	**Adapter**	2.95	1.75	1.81

- **Operating Temperature**
  -40 °C ~ 80°C
- **Storage temperature**
  -20 ~ 85 °C
- **Relative Humidity**
  0% ~ 95%, non-condensing

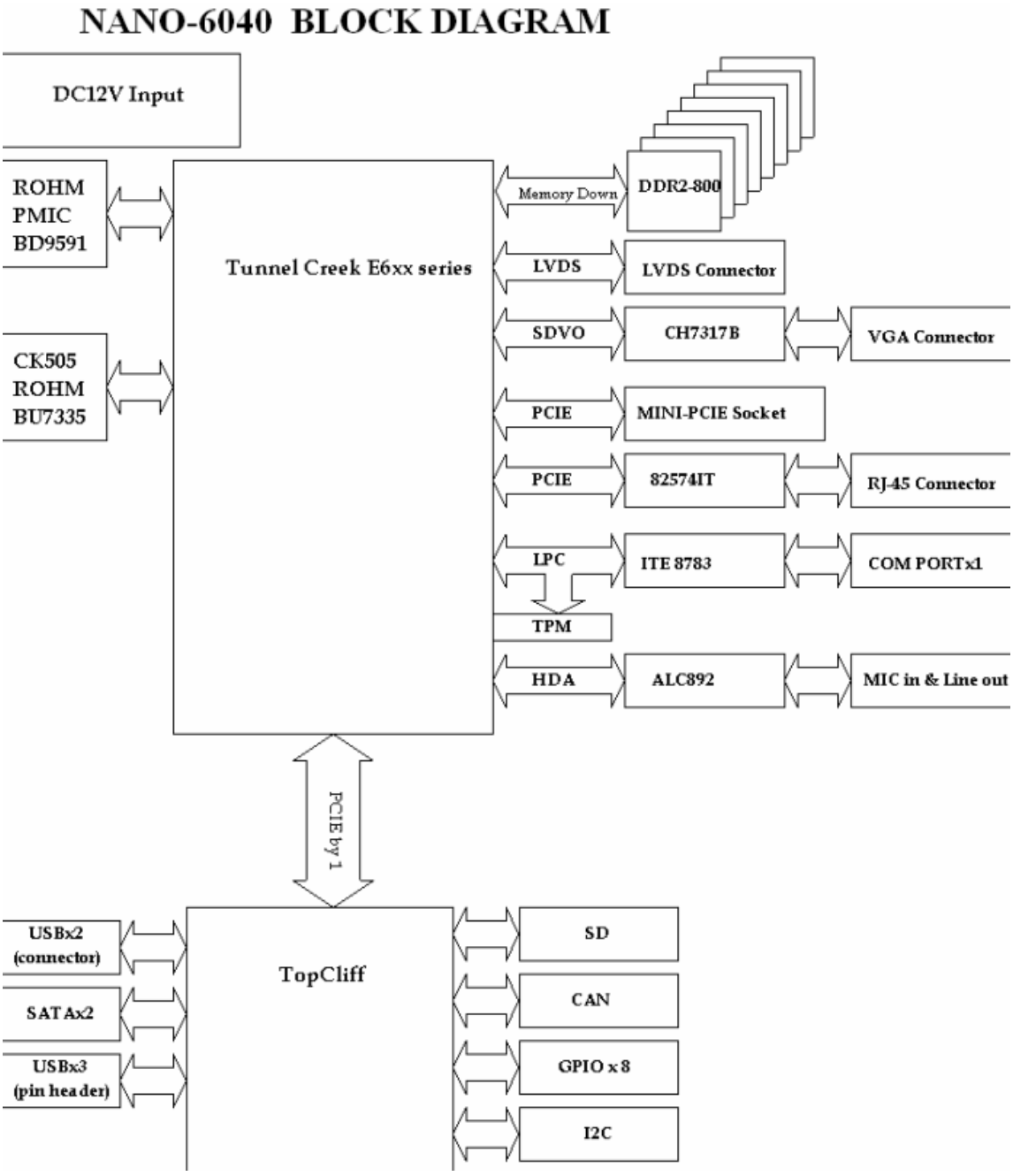
1.4.1 Mechanical Drawing





1.5 System Architecture

All of details operating relations are shown in NANO-6040 series System Block Diagram.



NANO-6040/NANO-6040L System Block Diagram

Chapter 2
Hardware Configuration

This chapter gives the definitions and shows the positions of jumpers, headers and connector. All of the configuration jumpers on NANO-6040 series are in the proper position. The default settings are indicated with a star sign (★).

2.1 Jumper Setting

In the following sections, **Short** means covering a jumper cap over jumper pins; **Open** or **N/C** (Not Connected) means removing a jumper cap from jumper pins. Users can refer to Figure 2-1 for the Jumper allocations.

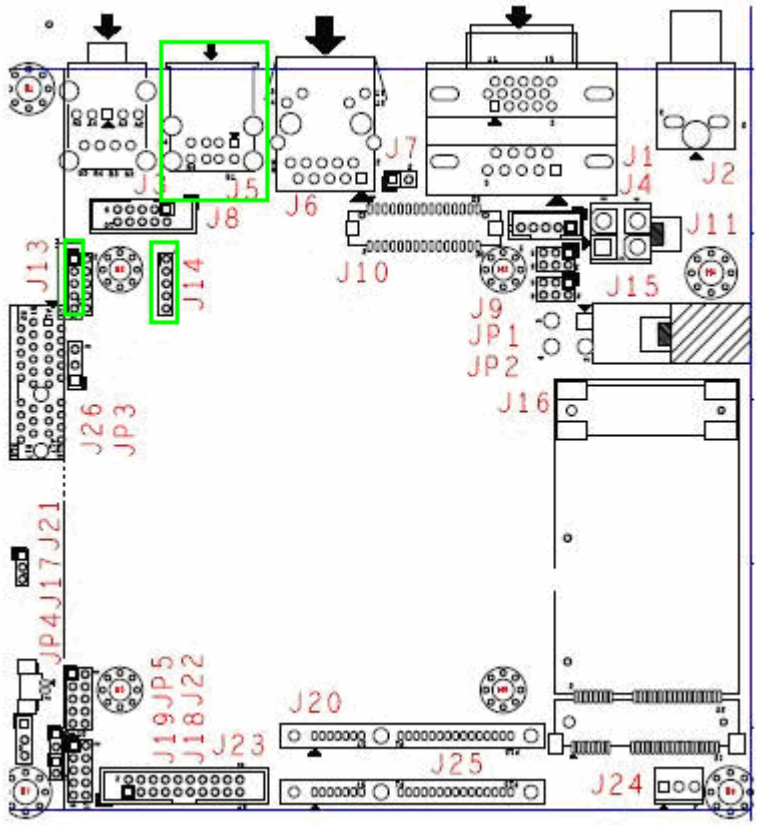


Figure 2-1 NANO-6040 Jumper and Connector Locations (Top)

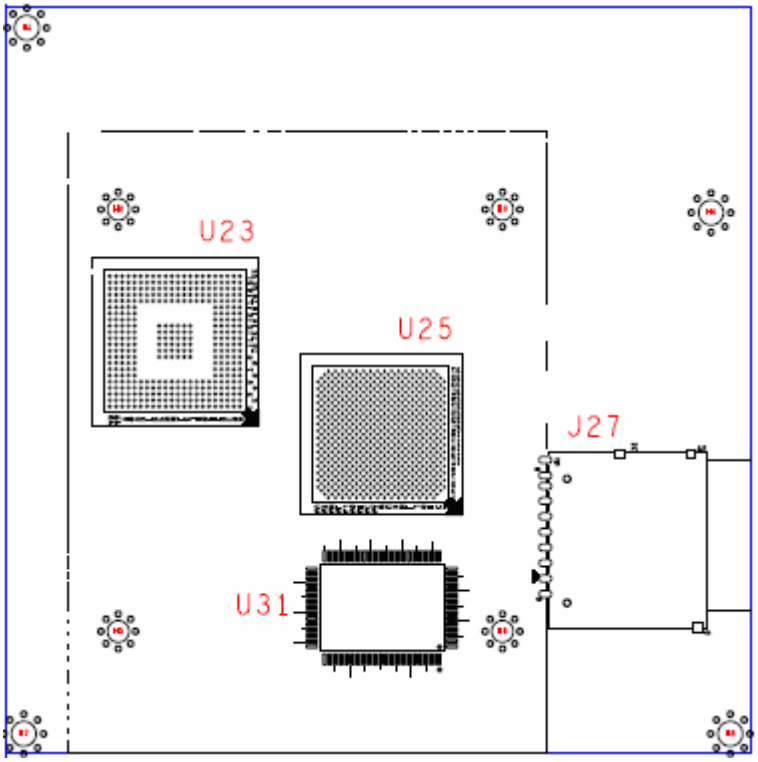


Figure 2-2 NANO-6040 Jumper and Connector Locations (Bottom)

Specification

JP1: LVDS Power Level (Default 1-3)
JP2: LVDS Back-light Power Level(Default 1-3,2-4)
JP5: Auto Power Button Selection(Default close)

JP1 : LVDS Power Level

JP1	Process Selection
1-3	3.3V ★
3-4	12V
3-5	5V

JP2 : LVDS Back-light Power Level

JP2	Process Selection
1-3,2-4	5V, Active High★
1-3,4-6	12V, Active High
3-5,2-4	5V, Active Low
3-5,4-6	12V, Active Low

JP5 : Auto Power Button Selection

JP5	Function
Close	ON★
Open	OFF

2.2 Connector Allocation

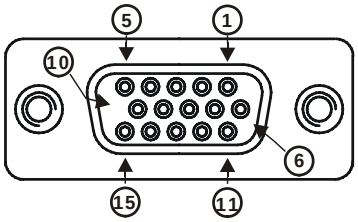
I/O peripheral devices are connected to the interface connectors

Connector Function List

Connector	Function	Remark
J1	VGA Connector	
J2	DC Jack	
J3	Audio Jack	
J4	COM Port	
J5	Dual Port USB Connector	
J6	Signal Port RJ45 Connector	
J8	Audio Header	
J9	LVDS Backlight Inverter Connector	
J10	LVDS Connector	
J11/J15	12V Connector	
J13/J14	USB Header	
J16	Mini-PCI E Connector	
J17	RTC Battery Connector	
J18	Front Panel Control Header	
J19	I2C Header	
J20	SATA Connector	
J21	CAN Bus Header	
J22	GPIO Header	
J23	TPM BOX Header	
J24	3P FAN Power Connector	
J26	PCI-E x1 Slot	
J27	SD Slot	

Pin Assignments of Connectors

J1: D-SUB15 VGA Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	RED	2	GREEN
3	BLUE	4	ID0
5	Ground	6	Ground
7	Ground	8	Ground
9	NC	10	Ground
11	ID1	12	DDCDATA
13	HSYNC	14	VSYNC
15	DDCCLK		

J2: DC Jack

PIN No.	Signal Description
1	12V
2	GND
3	GND

J3: Audio Jack

PIN No.	Signal Description	PIN No.	Signal Description
A01	AC_GND	B01	AC_GND
A02	FRONT_T	B02	GND
A03	AC_GND	B03	AC_GND
A04	FRONT_JD	B04	MIC_IN_JD
A05	FRONT_B	B05	MIC_B

J4 : COM Port

PIN No.	Signal Description	PIN No.	Signal Description
1	Data Carrier Detect (DCD)	2	Receive Data (RXD)
3	Transmit Data (TXD)	4	Data Terminal Ready (DTR)
5	GND	6	Data Set Ready (DSR)
7	Request to Send (RTS)	8	Clear to Send (CTS)
9	Ring Indicator (RI)		

Note: NANO-6040L series support COM port by on board connector.

J5: Dual Port USB

PIN No.	Signal Description	PIN No.	Signal Description
A1	+5V	B1	+5V
A2	USBD0-1N	B2	USBD0-1N
A3	USBD0-1P	B3	USBD0-1P
A4	Ground	B4	Ground

J6: Signal Port RJ45 Port

PIN No.	Signal Description
1	L1_MDIP0
2	L1_MDIN0
3	L1_MDIP1
4	L1_MDIN1
5	VCTREF_GBE0_CT
6	NC
7	L1_MDIP2
8	L1_MDIN2
9	L1_MDIP3
10	L1_MDIN3
11	VSB3
12	LAN1_ACT-
13	LAN1_1000#
14	LAN1_100#

J8: Audio Header

PIN No.	Signal Description	PIN No.	Signal Description
1	MIC_T	2	MIC_B
3	NC	4	AC_GND
5	NC	6	AC_GND
7	FRN_T	8	AC_GND
9	FRN_B	10	AC_GND

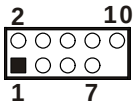
J9: LVDS Backlight Inverter Connector

PIN No.	Signal Description
1	BACKLIGH_EN
2	GND
3	VCC12
4	L_BKLTCTL
5	VCC

J10: LVDS Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	VDD_LVDS	2	VDD_LVDS
3	LVDSA_DATA0	4	LVDSA_DATA#0
5	LVDSA_DATA1	6	LVDSA_DATA#1
7	LVDSA_DATA2	8	LVDSA_DATA#2
9	LVDSA_DATA3	10	LVDSA_DATA#3
11	LVDSA_CLK	12	LVDSA_CLK#
13	NC	14	NC
15	GND	16	GND
17	NC	18	NC
19	NC	20	NC
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	GND	30	GND

J13: USB Header (5Px2)



PIN No.	Signal Description	PIN No.	Signal Description
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	NC	10	NC

J14 : USB Header (5Px1)

PIN No.	Signal Description
1	+5V
3	USBD-
5	USBD+
7	GND
9	NC

J15 : 12V Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	12V	4	12V

J16: Mini-PCIE Slot

PIN No.	Signal Description	PIN No.	Signal Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	VCC1_5
7	CLKREQ#	8	N/C
9	GND	10	N/C
11	DF_CLK_PCIE#	12	N/C
13	DF_CLK_PCIE	14	N/C
15	GND	16	N/C
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	RST#
23	DF_PCIE_RXN3	24	3.3VAUX
25	DF_PCIE_RXP3	26	GND
27	GND	28	VCC1_5
29	GND	30	SMB_CLK
31	DF_PCIE_TXN3	32	SMB_DAT
33	DF_PCIE_TXP3	34	GND
35	GND	36	DF_USB_PN5
37	N/C	38	DF_USB_PP5
39	N/C	40	GND
41	N/C	42	N/C
43	N/C	44	N/C
45	N/C	46	N/C
47	N/C	48	VCC1_5
49	N/C	50	GND
51	N/C	52	VCC3

J17 : RTC Battery Connector

PIN No.	Signal Description
1	Positive
2	Negative

J18: Front Panel Control Header

PIN No.	Signal Description	PIN No.	Signal Description
1	PWR_LED-	2	PWR_LED+
3	SUS_LED-	4	SUS_LED+
5	HDD_LED+	6	HDD_LED-
7	RST_BTN	8	GND
9	GND	10	PWR_BTN

J19: I2C Header

PIN No.	Signal Description
1	I2C_CLK
2	I2C_DATA

J20/J25: SATA Connector

PIN No.	Signal Description	PIN No.	Signal Description
S1	GND	P1	VCC3
S2	DF_SATA_TX+0	P2	VCC3
S3	DF_SATA_TX-0	P3	VCC3
S4	GND	P4	GND
S5	DF_SATA_RX-0	P5	GND
S6	DF_SATA_RX+0	P6	GND
S7	GND	P7	VCC
		P8	VCC
		P9	VCC
		P10	GND
		P11	GND
		P12	GND
		P13	VCC12
		P14	VCC12
		P15	VCC12

J21: CAN Bus Header

PIN No.	Signal Description
1	CAN_H
2	GND
3	CAN_L

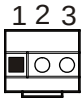
J22: GPIO Header

PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	GND	10	VCC

J23: TPM BOX Header

PIN No.	Signal Description	PIN No.	Signal Description
1	PCI_CLK	2	GND
3	LFRAME#	4	NC
5	PLT_RST#	6	VCC
7	LAD3	8	LAD2
9	VCC3	10	LAD1
11	LAD0	12	GND
13	SMB_CLK	14	SMB_DAT
15	VCC3	16	SERIRQ
17	GND	18	NC
19	NC	20	NC

J24: 3P FAN Power Connector



PIN No.	Signal Description
1	Ground
2	+12V
3	Fan Speed Detecting signal

J26: PCI-Express x1 Connector

PIN No.	Signal Description	PIN No.	Signal Description
A01	NC	B01	12V
A02	12V	B02	12V
A03	12V	B03	12V
A04	GND	B04	GND
A05	NC	B05	SMB_CLK
A06	NC	B06	SMB_DATA
A07	NC	B07	GND
A08	NC	B08	3.3V
A09	3.3V	B09	NC
A10	3.3V	B10	VSB3
A11	PLT_RST#	B11	PCIE_WAKE#
A12	GND	B12	NC
A13	DF_CLK_PCIEx1_P	B13	GND
A14	DF_CLK_PCIEx1_N	B14	DF_PCIE2_TX_P
A15	GND	B15	DF_PCIE2_TX_N
A16	DF_PCIE2_RX_P	B16	GND
A17	DF_PCIE2_RX_N	B17	PRSNT#
A18	GND	B18	Ground

J27: SD Card Slot

PIN No.	Signal Description
1	DAT3
2	CMD_RSP
3	GND
4	VCC
5	CLK
6	GND
7	DAT0
8	DAT1
9	DAT2
Sa	WP#
Sb	CD#
Sc	CD#_COM

Chapter 3
System Installation

This chapter provides the instructions to set up the system. The additional information is enclosed to help you set up onboard devices

3.1 Atom™ Ultra low power CPU (E620T/E640T/E660T/E680T)

NANO-6040 equips Intel® ATOM E620T/ E640T/E660T/E680T CPU, it's an ultra low power consumption CPU. Alone with module type board and wide-temperature capability, it is suitable for various kind of applications.
It's an All-In-One CPU solution which also includes the function of Intel® Integrated Graphic and PCI-Express signals.

3.2 Intel® Platform Controller Hub EG20T

NANO-6040 uses EG20T as IOH. It supports SATA II, USB,SD (Boot form SD capability), I2C BUS and CAN BUS, which is default supported by EG20T without adding any add-on card.

3.3 Main Memory

NANO-6040 has on-board soldered memory chip. It's DDR2 667 (E620T/E640T) or 800 MHz (E660T/E680T) with 2GB Memory.

3.4 Installing the NANO-6040

To install your NANO-6040 into standard chassis or proprietary environment, please perform the following:

Step 1: Check all jumpers setting on proper position.
Step 2: Place NANO-6040 into the dedicated position in the system.
Step 3: Attach cables to existing peripheral devices and secure it.

Note:
Please refer to section 3.4.1 to 3.4.4 to install INF/VGA/LAN/Audio drivers

3.4.1 Chipset Component Driver.

NANO-6040 uses state-of-art Intel® EG20T PCH chipset. It's a new chipset that some old operating systems might not be able to recognize. To overcome this compatibility issue, for previous Windows Operating Systems such as Windows XP, please install its INF before any of other Drivers are installed. You can find very easily this chipset component driver in NANO-6040 CD-title.
Moreover, if using some old OS, the driver may not be supported anymore. We recommend changing the different OS to comply with this new chipset.

3.4.2 Intel® Integrated Graphics.

With latest ATOM series structure, NANO-6040 has integrated graphic built-in CPU. Therefore Intel® Integrated Graphic supports sharing on board physical memories. NANO-6040 has internal 24bit 1ch LVDS & SDVO signal via Chrontel CH7317A Transmitter to transform VGA output. This combination makes NANO-6040 an excellent piece of multimedia hardware.
With no additional video adaptor, this onboard video will usually be the system display output. By adjusting the BIOS setting to disable on-board VGA, an add-on PCI-Express x1 Graphic card can take over the system display.

Drivers Support

Please find all the drivers in the NANO-6040 CD-title. Drivers support, Windows XP/Win7.

3.4.3 Intel® PROSet Gigabit Ethernet Controller

Drivers Support

Please find Intel® WG82574IT driver in /Ethernet directory of NANO-6040 CD-title. The drivers support Windows XP/Win7.

3.4.4 Audio Controller

Please find Realtek ALC888 High Definition Audio driver form NANO-6040 CD-title. The drivers support Windows XP/Win7.

3.5 WDT Function

The Watchdog Timer of motherboard consists of 8-bit programmable time-out counter and a control and status register. Reference Intel E6XX Spec chapter 10.0 LPC Interface (D31:F0), You can get the WDT base address from 84-87h (WDTBA). In addition, you modify these I/O port, you must use the unlock() function.

WDT Control Command Example

```
// WDT_BAR: WDT Base address

#define  PV1                    0x00  // Preload Value 1
#define  PV2                    0x04  // Preload Value 2
#define  RR0            0x0C  // Reload Register 0
#define  RR1            0x0D  // Reload Register 1
#define  WDTCR          0x10  // WDT Configuration Register
#define  WDTLR          0x18  // WDT Lock Register

static void unlock_registers ()
{
        outb (0x80, WDT_BAR + RR0);
        delay (2);
        outb (0x86, WDT_BAR + RR0);
        delay (2);
}
```

Below are some example codes, which demonstrate the use of WDT.

```
        unsigned short preload;
        unsigned long clock;

        // Setting PCI clock
        clock = 33000000;               // 33 MHz
        preload = (5 * (clock >> 15)) - 1;      // 5 seconds

        // WDT Timeout Output Enable and WDT Reset Enable
        unlock_registers ();
        outb (18, WDT_BAR + WDTCR);
        delay (2);
```

```
// Setting timer
unlock_registers ();
outb (0, WDT_BAR + PV1);
delay (2);
unlock_registers ();
outl (preload, WDT_BAR + PV2);
delay (2);

// Trigger WDT.  If you want to disable WDT, you can key 0x00.
unlock_registers ();
outb (0x02, WDT_BAR + WDTLR);
delay (2);
```

3.6 GPIO

The motherboard provides 8 input / output ports that can be individually configured to perform a simple basic I/O function.

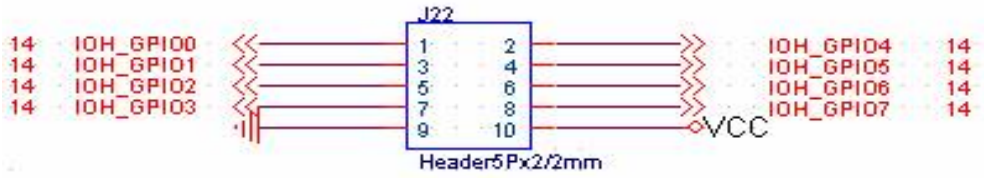
GPIO Pin Assignment

The NANO-6040 provides 8 input/output ports that can be individually configured to perform a simple basic I/O function. Users can configure each individual port to become an input or output port by programming register bit of I/O Selection. To invert port value, the setting of Inversion Register has to be made. Port values can be set to read or write through Data Register.

The GPIO port is located on J22 shown as follows.

WARNING

Do not short the pin 9 and 10 of J22!



J22: GPIO Header

PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	GND	10	VCC

Reference Intel Topcliff IOH Spec page 58. The GPIO memory base address from PCI[D0:F2] register 14-17h.

GPIO Control Command Example

```
// GPIO_BAR: GPIO Base address

#define  GPIO_OUTPUT   0x18
#define  GPIO_INPUT    0x1C
#define  GPIO_MODE     0x20
```

The basic function :

a. GPIO_BAR + GPIO_OUTPUT -> GPIO port output register
b. GPIO_BAR + GPIO_INPUT -> GPIO port input register
c. GPIO_BAR + GPIO_MODE -> GPIO port mode register

The GPIO pin define

GPIO1 (J22 PIN 1) ---- GPIO5 (J22 PIN 2)
GPIO2 (J22 PIN 3) ---- GPIO6 (J22 PIN 4)
GPIO3 (J22 PIN 5) ---- GPIO7 (J22 PIN 6)
GPIO4 (J22 PIN 7) ---- GPIO8 (J22 PIN 8)
GND xxxx VCC

Below are some example codes, which demonstrate the use of GPIO.

```
// 1 -> out, 0 -> in
// Set GPIO 1~8 are input mode
writeb (0x00, GPIO_BAR + GPIO_MODE);
// Set GPIO 1~8 are output mode
writeb (0xFF, GPIO_BAR + GPIO_MODE);

unsigned char data;
// Store input state
```

Chapter 4
BIOS Setup Information

NANO-6040 uses AMI BIOS structure stored in Flash ROM. These BIOS has a built-in Setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it is retained during power-off periods. When system is turned on, NANO-6040 communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. If any error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the SETUP program. Some errors are significant enough to abort the start up

4.1 Entering Setup -- Launch System Setup

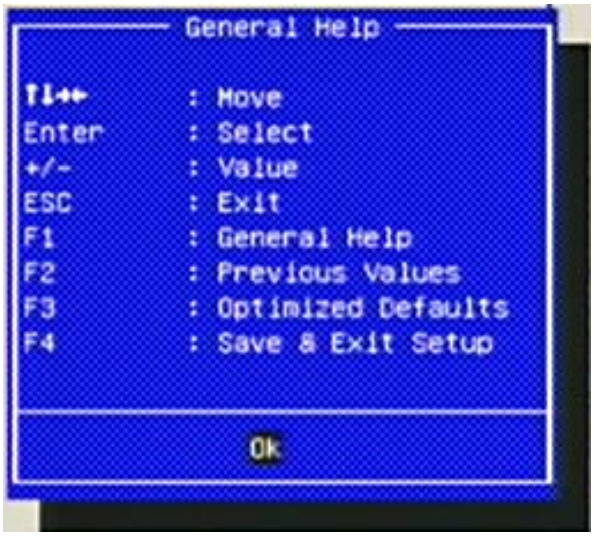
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del> key will enter BIOS setup screen.

Press <Del> to enter SETUP

If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On or pressing the RESET button. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

Press <F1> to Run SETUP or Resume

The BIOS setup program provides a General Help screen. The menu can be easily called up from any menu by pressing <F1>. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press <Esc> to exit the Help screen.

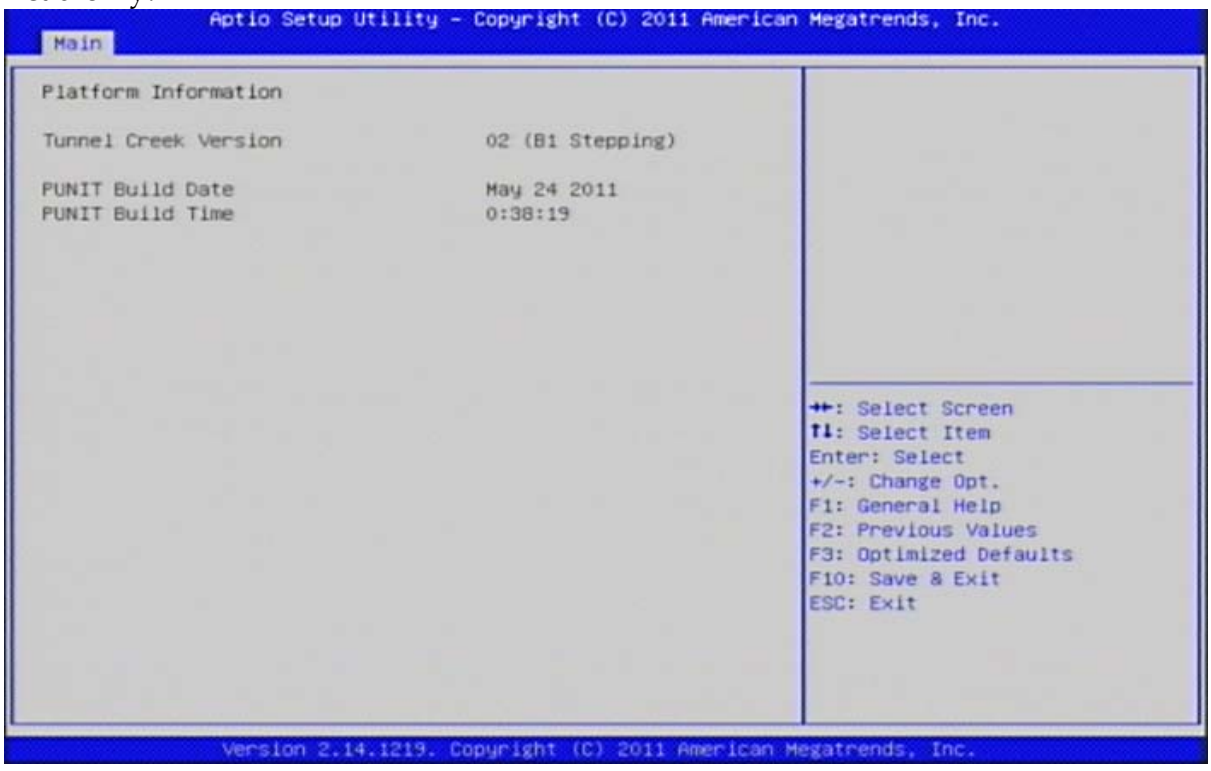


4.2 Main

Use this menu for basic system configurations, such as time, date etc.

Platform Information

These items show the Tunnel Creek Version and PUNIT Build Date and Time. Read only.



System Language
Choose the system default language

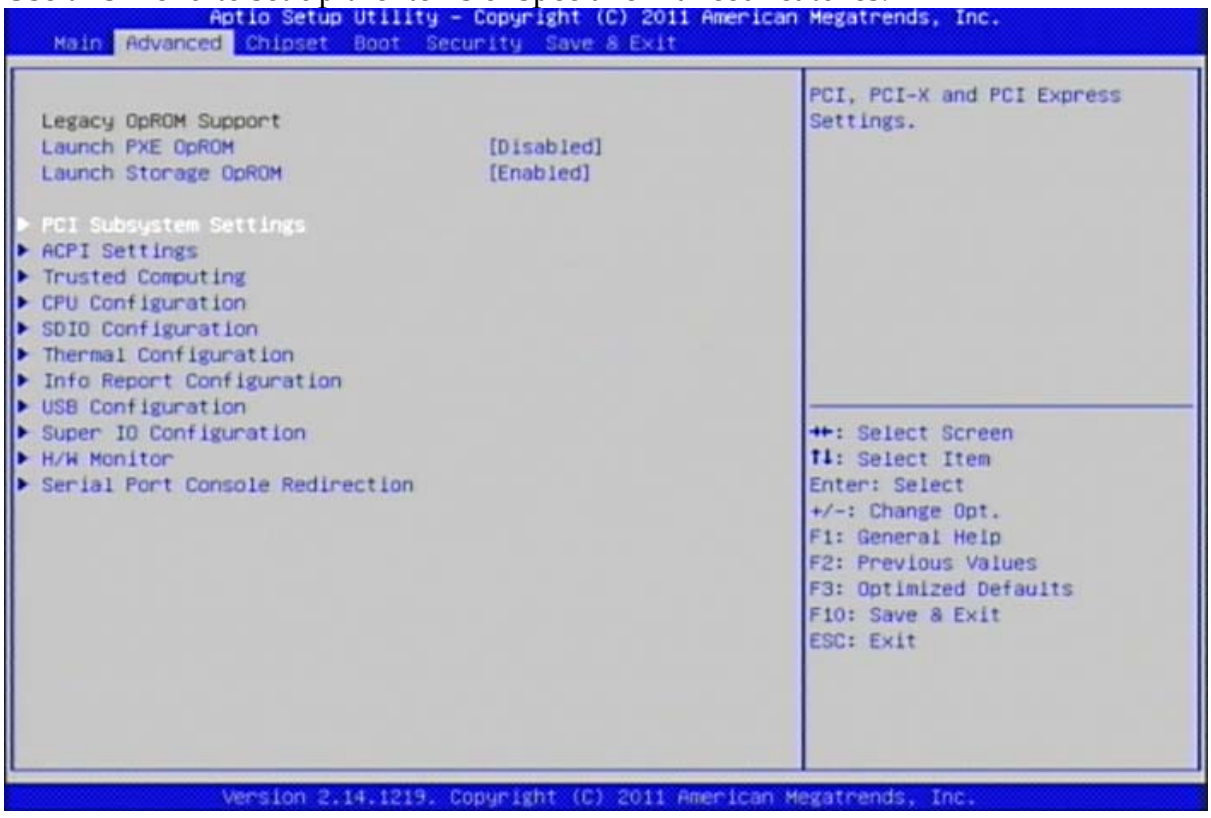
Choices: English.

System Time
The time format is <Hour> <Minute> <Second>. Use [+] or [−] to configure system Time.

System Date
The date format is <Day>, <Month> <Date> <Year>. Use [+] or [−] to configure system Date.

4.3 Advanced

Use this menu to set up the items of special enhanced features.



Launch PXE OpROM
Enable or Disable Boot Option for Legacy Network Devices

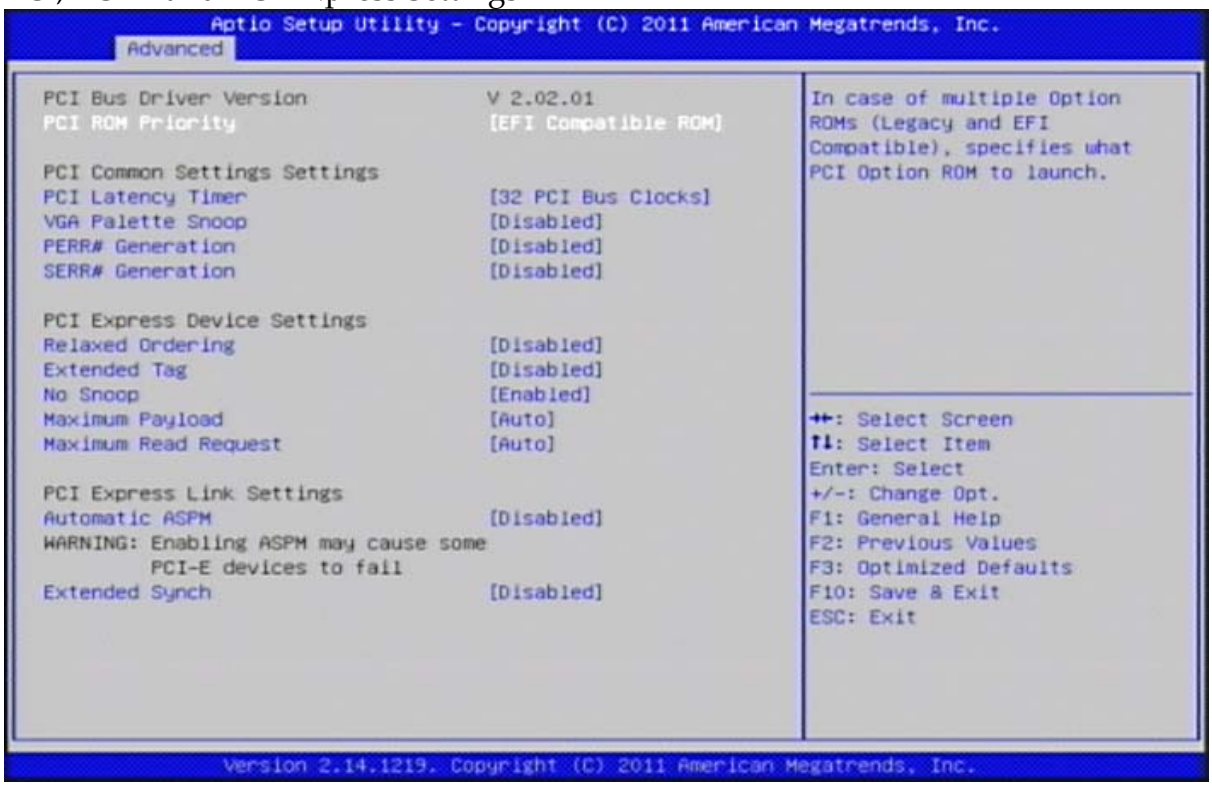
Choices: Disabled, Enabled.

Launch Storage OpROM
Enable of Disable Boot Option for Legacy Mass Storage devices with Option ROM

Choices: Disabled, Enabled.

PCI Subsystems Settings

PCI, PCI-X and PCI Express Settings



PCI BUS Driver Version

Read only

PCI ROM Priority

In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch

Choices: Legacy ROM, EFI Compatible ROM.

PCI Latency Timer

Value to be programmed into PCI Latency Timer Register

Choices: 32 PCI, 64 PCI, 96 PCI, 128 PCI, 160 PCI, 192 PCI, 224 PCI, 248 PCI Bus Clocks.

VGA Palette Snoop

Enables or Disables VGA Palette Registers Snooping

Choices: Disabled, Enabled.

PERR# Generation

Enables or Disables PCI Device to Generate PERR#

Choices: Disabled, Enabled.

SERR# Generation
Enables or Disables PCI Device to Generate SERR#

Relaxed Ordering
Enables or Disables PCI Express Device Relaxed Ordering

Choices: Disabled, Enabled.

Extended Tag
If ENABLED allows Device to use 8-bit Tag field as a requester

Choices: Disabled, Enabled.

No Snoop
Enables or Disables PCI Express Device No Snoop option

Choices: Disabled, Enabled.

Maximum Payload
Set Maximum Payload of PCI Express Device or allow System BIOS to select the value

Choices: Auto, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, 4096 Bytes.

Maximum Read Request
Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value

Choices: Auto, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, 4096 Bytes.

Automatic ASPM
Automatically enable ASPM based on reported capabilities and known issues

Choices: Disabled. Auto, Force L0.

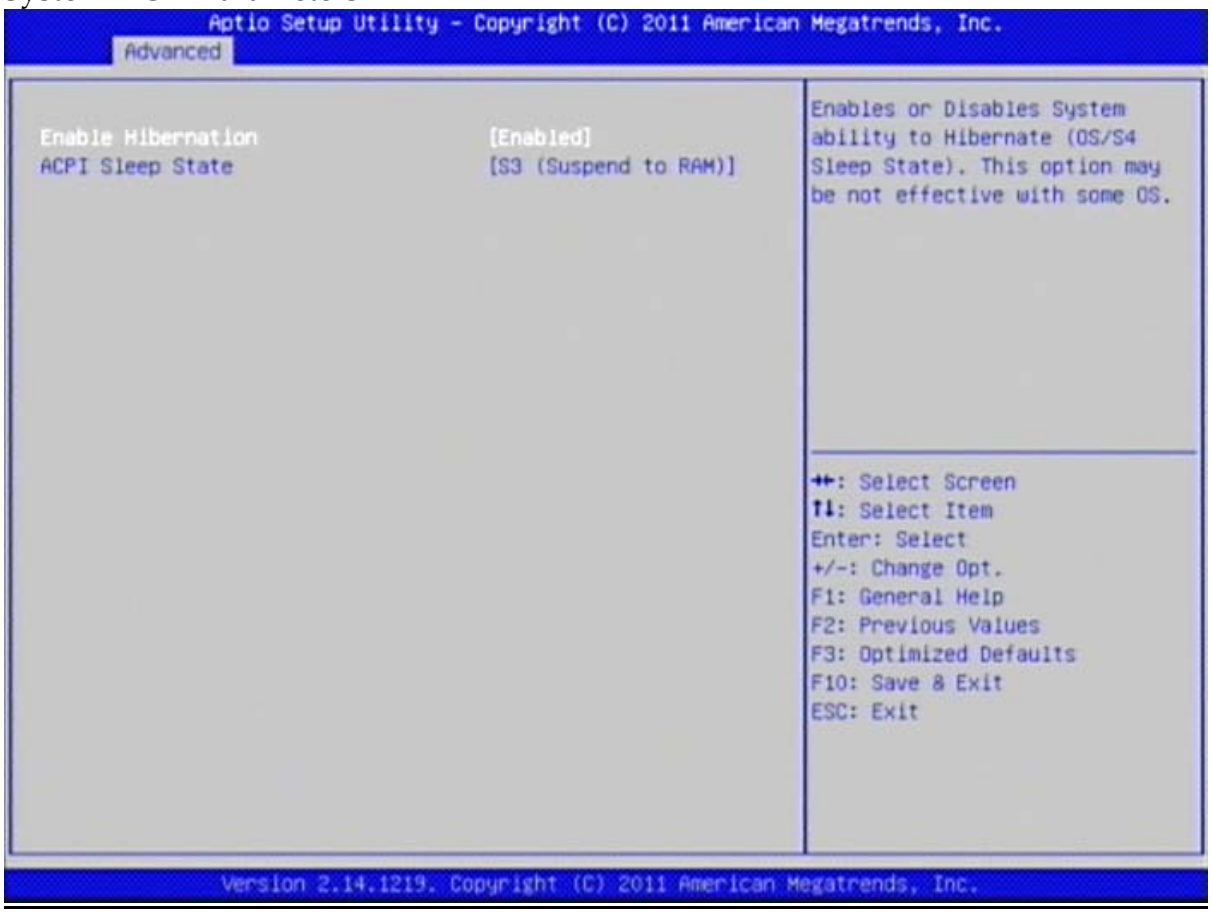
Warming: Enabling ASPM may cause some PCI-E devices to fail

Extended Synch
If ENABLED allows generation of Extend Synchronization patterns

Choices: Disabled, Enabled.

ACPI Settings

System ACPI Parameters



Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS

Choices: Enabled, Disabled.

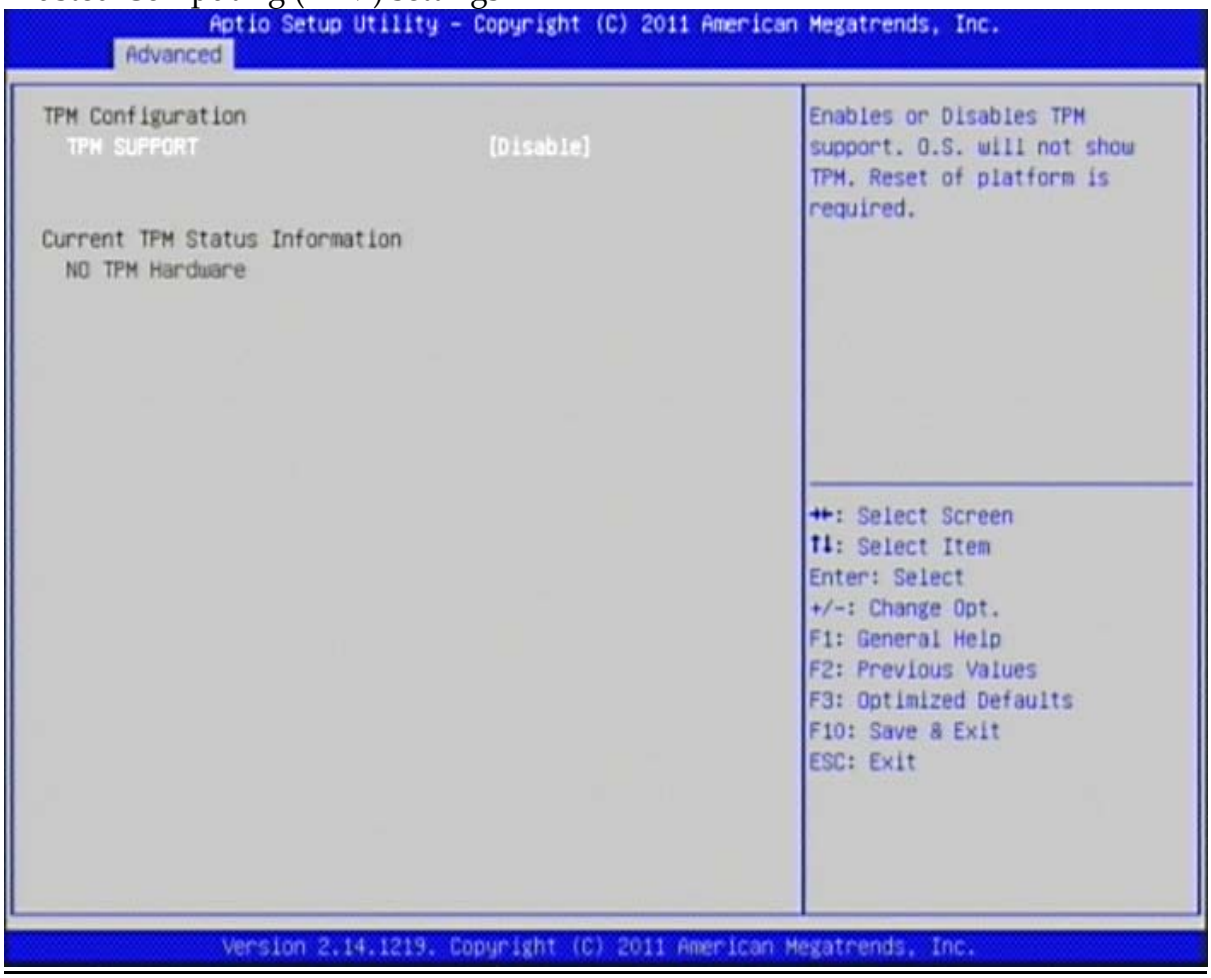
ACPI Sleep State

Select the highest ACPI sleep state the system will enter, when the SUSPEND button is pressed

Choices: Suspend Disabled, S3 (Suspend to RAM).

Trusted Computing

Trusted Computing (TPM) settings



TPM SUPPORT

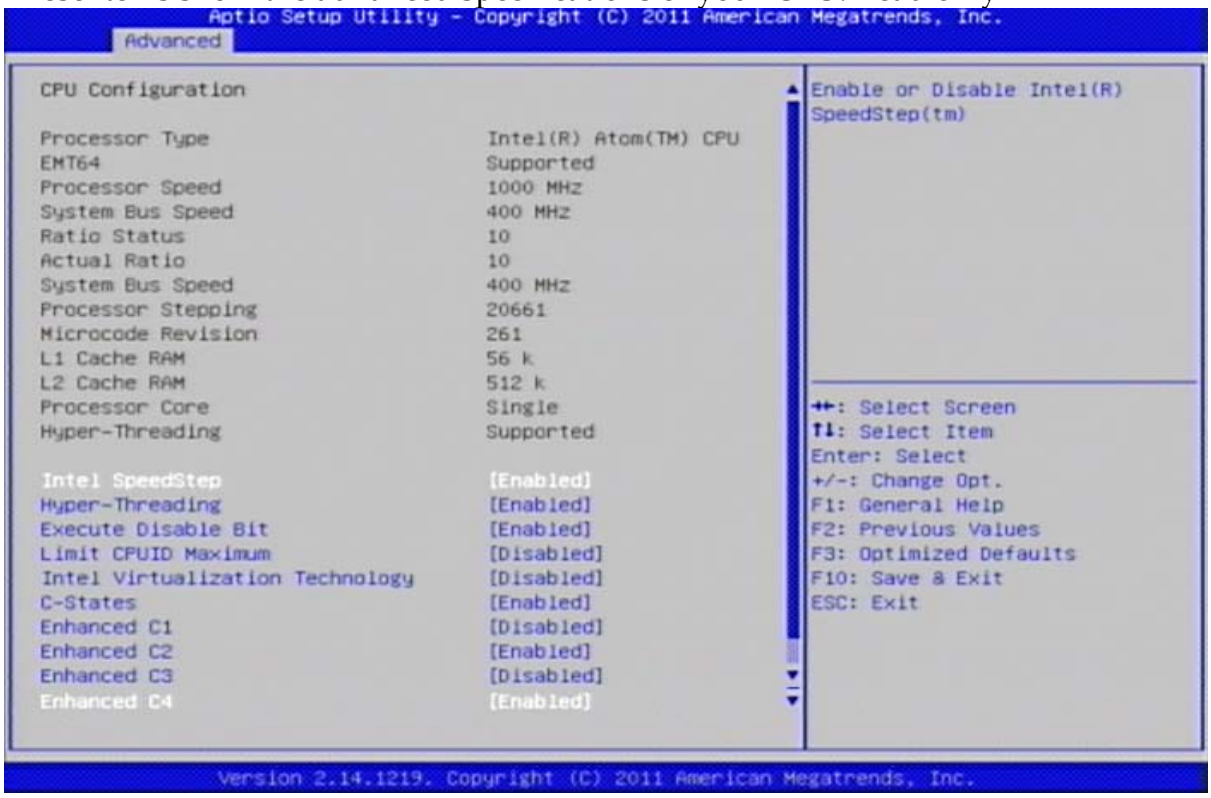
Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required

Choices: Enabled, Disabled.

CPU Configuration

CPU Configuration Parameters

These items show the advanced specifications of your CPU. Read only



Intel SpeedStep

Enable or Disable Intel ® SpeedStep™

Choices: Disabled, Enabled.

Hyper-Threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).

Choices: Disabled, Enabled.

Execute Disable Bit

XP can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.).

Choices: Disabled, Enabled.

Limit CPUID Maximum

Disabled for Windows XP

Choices: Disabled, Enabled.

Intel Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology

Choices: Disabled, Enabled.

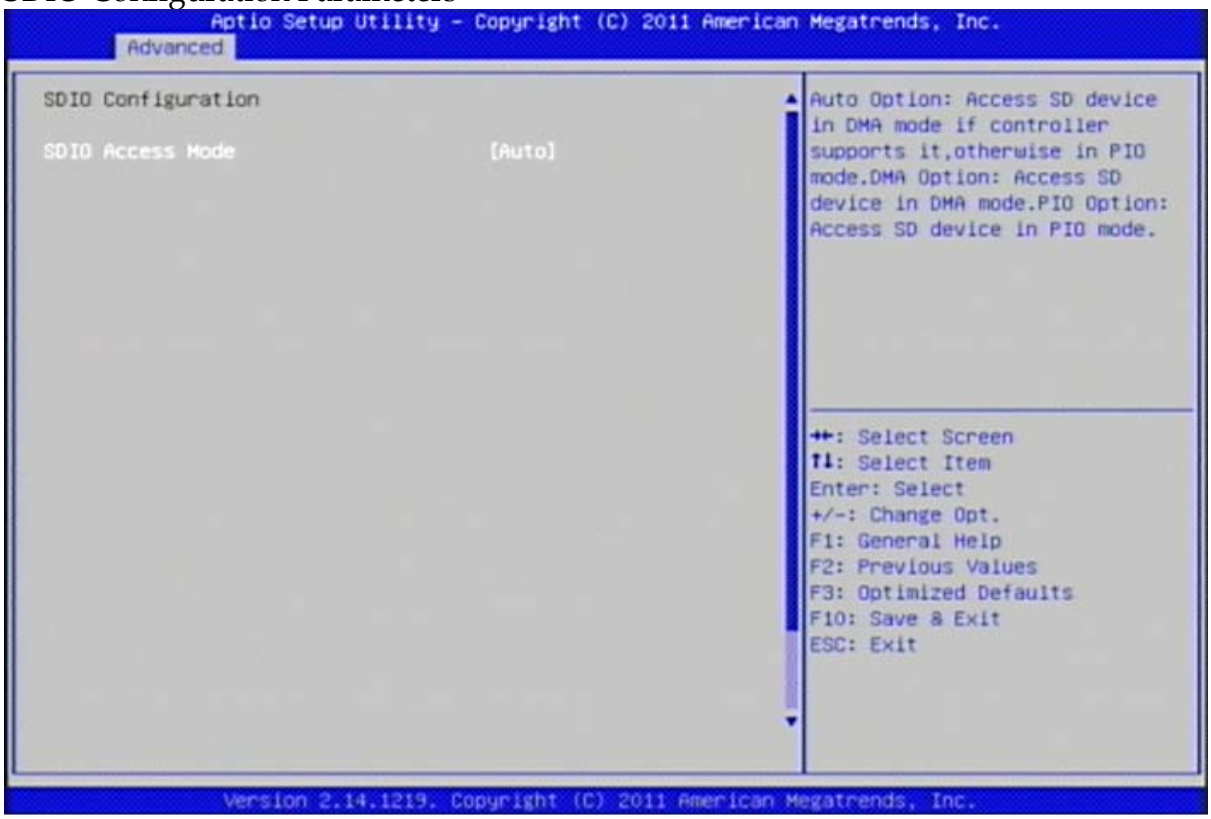
C-States
Enable or Disable C2 and above

Choices: Disabled, Enabled.

Enhanced C1-C4
Enable or Disable Enhanced C1-C4 and State.

Choices: Disabled, Enabled.

SDIO Configuration
SDIO Configuration Parameters

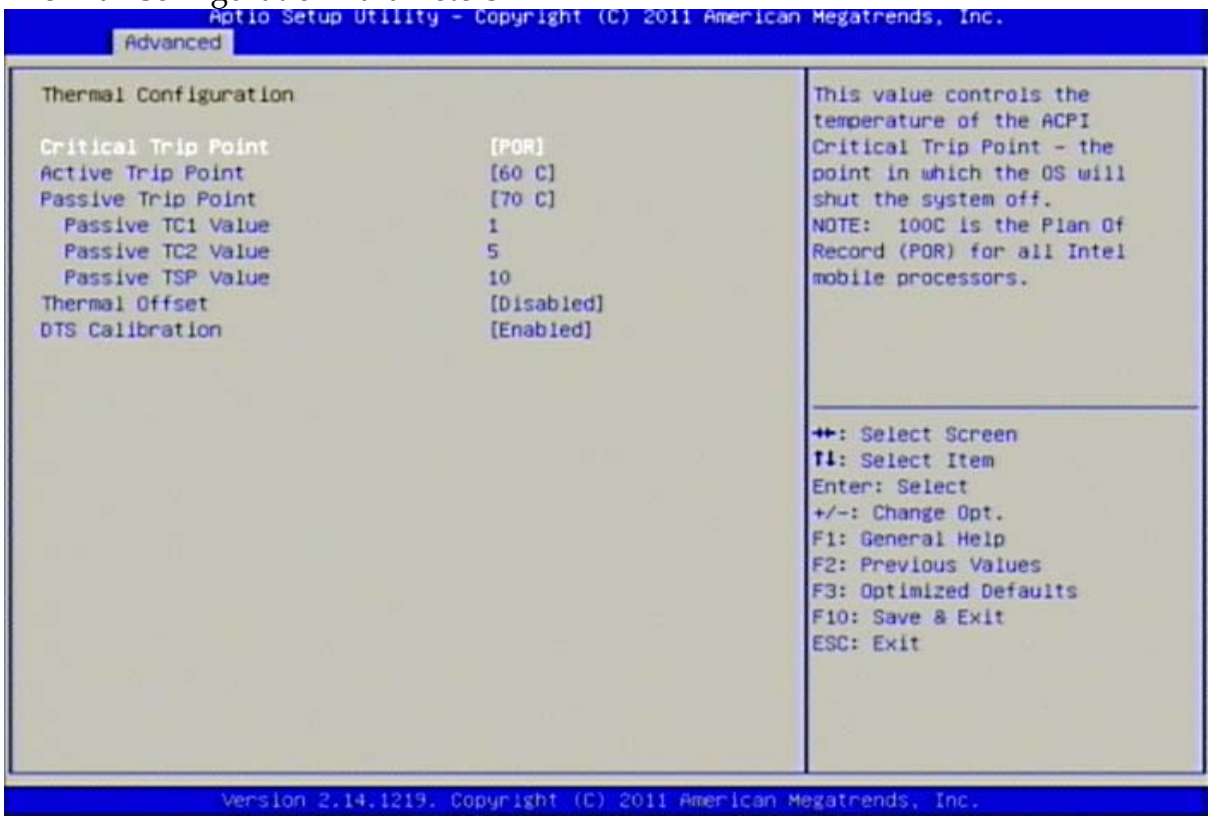


SDIO Access Mode
Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode. PIO Option: Access SD device in PIO mode.

Choices: Auto, DMA, PIO.

Thermal Configuration

Thermal Configuration Parameters



Critical Trip Point

This value controls the temperature of the ACPI Critical Trip Point – the point in which the OS will shut the system off.
NOTE: 100C is the Plan of Record (PDR) for all Intel mobile processors.

Choices: POR, 30C, 40C , 50C ,60C , 70C ,80C ,90C , 95C.

Active Trip Point

This value controls the temperature of the ACPI Active Trip Point – the point in which the OS will turn the processor fan on

Choices: Disabled, 30C, 40C, 50C, 60C, 70C, 80C, 90C, 95C, 100C.

Passive Trip Point

This value controls the temperature of the ACPI Passive Trip Point – the point in which the OS will begin throttling the processor.

Choices: Disabled, 30C, 40C, 50C, 60C, 70C, 80C, 90C, 95C, 100C.

Passive TC1 Value
This value sets the TC1 value for the ACPI Passive Cooling Formula. Range 1 – 16

Choices: 1-16

Passive TC2 Value
This value sets the TC2 value for the ACPI Passive Cooling Formula. Range 1 – 16

Choices: 1-16

Passive TSP Value
This item sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenths of a second how often the OS will read the temperature when passive cooling is enabled. Range 2 – 32

Choices: 2-32

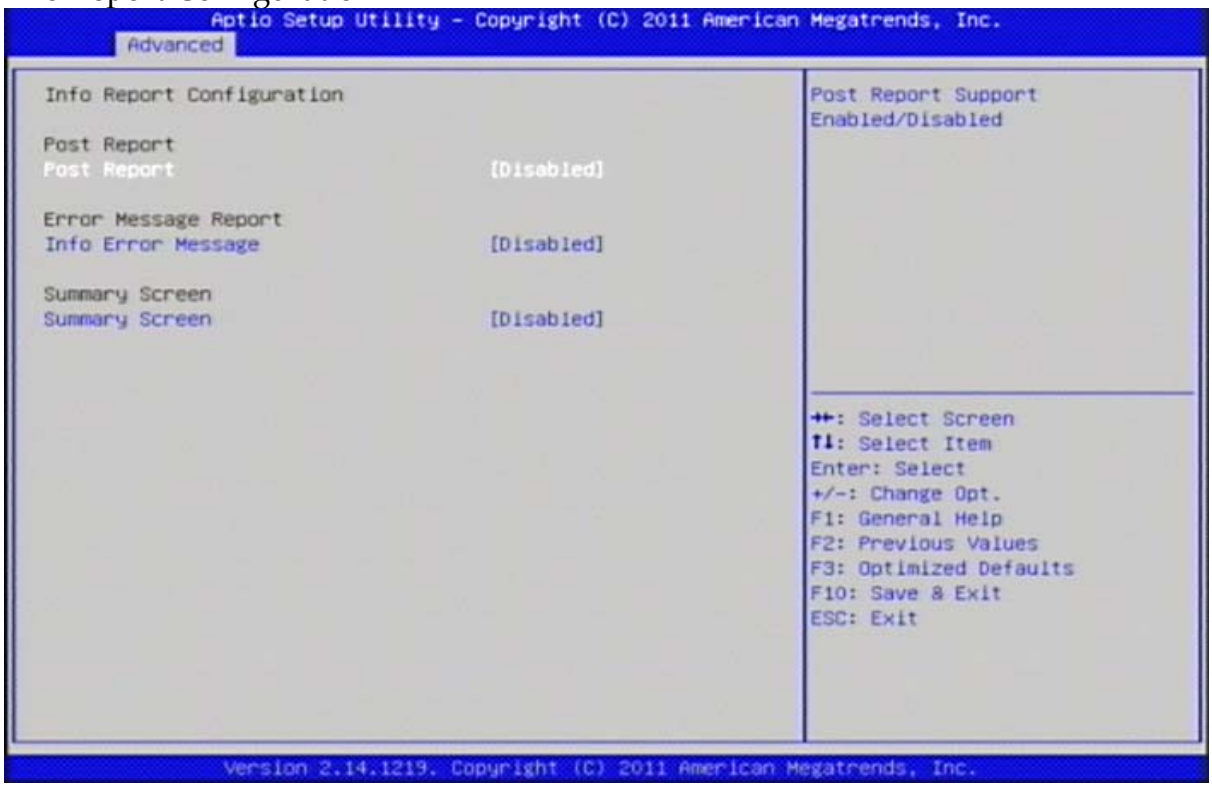
Thermal Offset
Whether Thermal Offset (read from CPU MSR 03Fh) is used by the KSC to adjust thermal management

Choices: Disabled, Enabled.

DTS Calibration
Enable/Disable DTS Calibration

Choices: Disabled, Enabled.

Info Report Configuration
Info Report Configuration



Post Report
Post Report Support Enabled/Disabled

Choices: Disabled, Enabled.

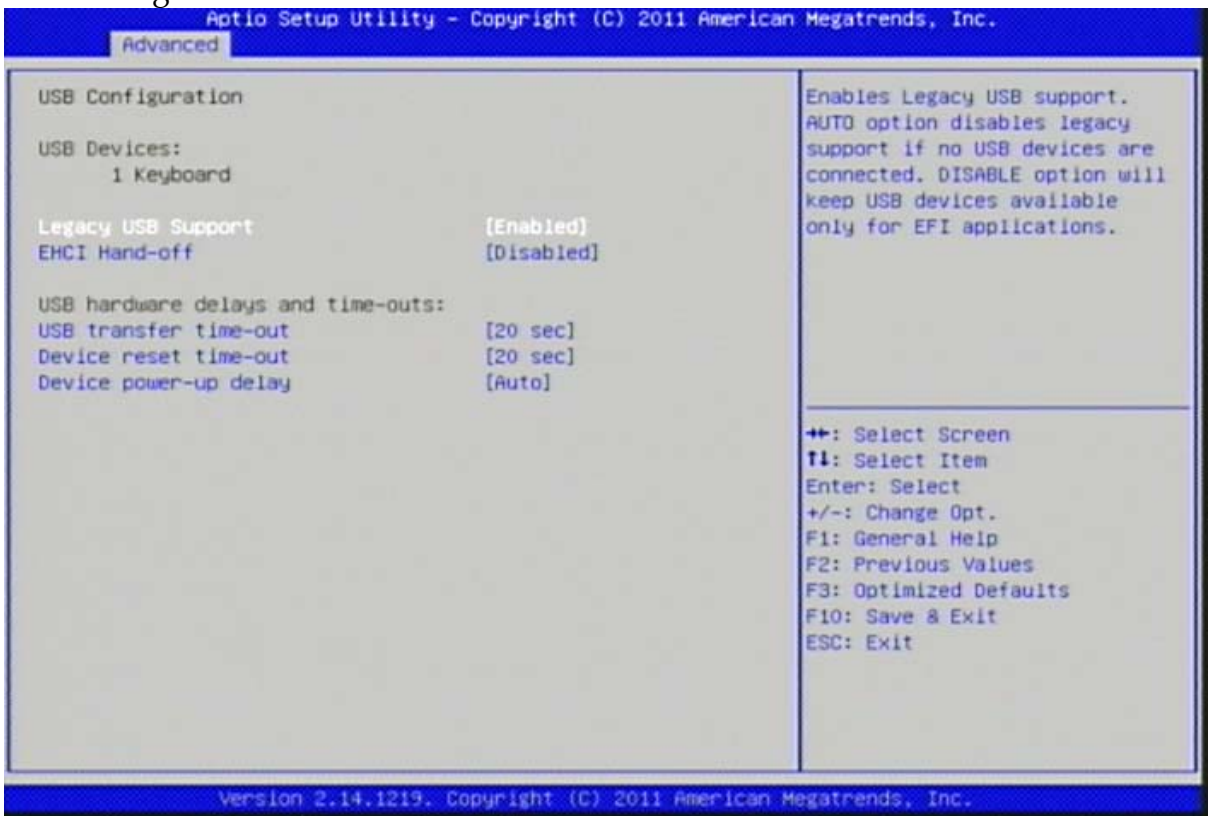
Info Error Message
Info Error Message Support Enabled/Disabled

Choices: Disabled, Enabled.

Summary Screen
Summary Screen Support Enabled/Disabled

Choices: Disabled, Enabled.

USB Configuration
USB Configuration Parameters



Legacy USB Support
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

Choices: Disabled, Enabled, Auto.

EHCI Hand-Off

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

Choices: Disabled, Enabled.

USB transfer time-out

The Time-out value for Control, Bulk, and Interrupt transfers.

Choices: 1 sec, 5 sec, 10 sec, 20 sec.

Device Reset time-out

USB mass storage device Start Unit command time-out

Choices: 10 sec, 20 sec, 30 sec, 40 sec.

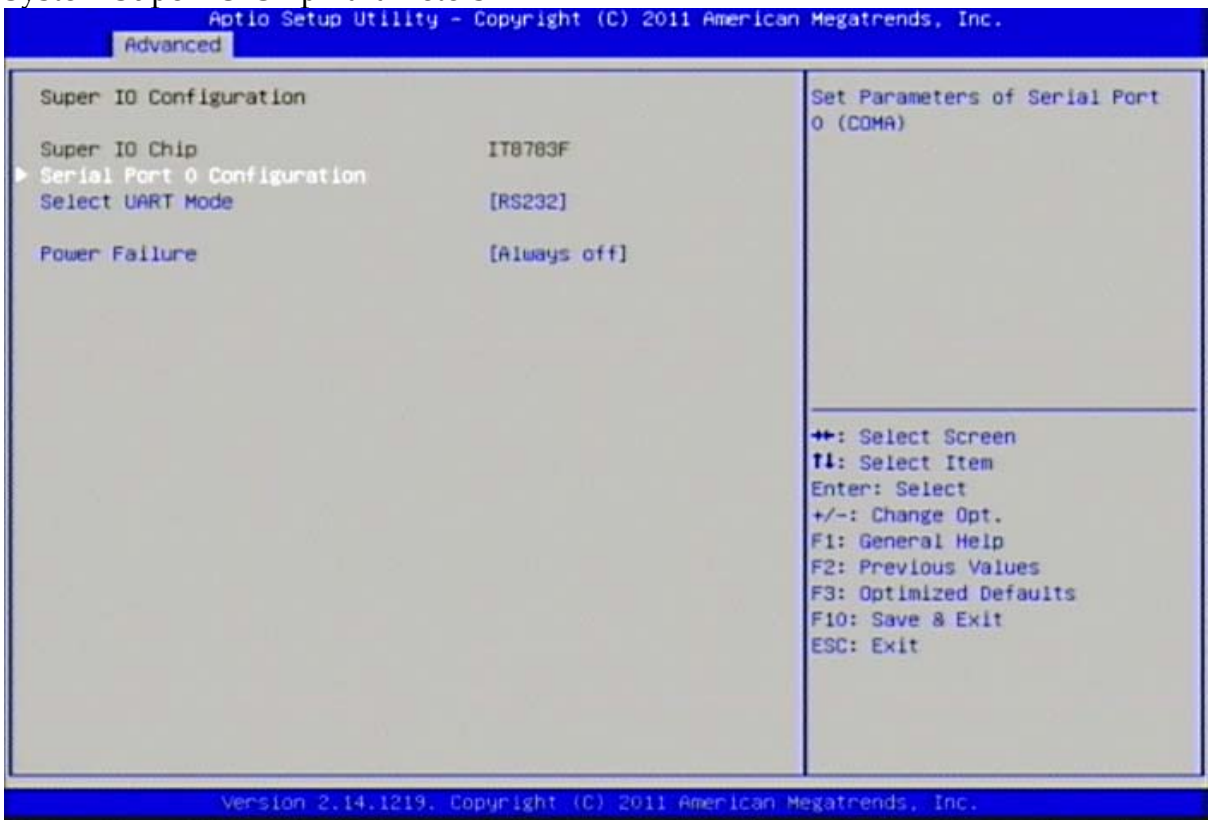
Device Power-up delay

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 100 ms , for a Hub port the delay is taken from Hub descriptor.

Choices: Auto, Manual.

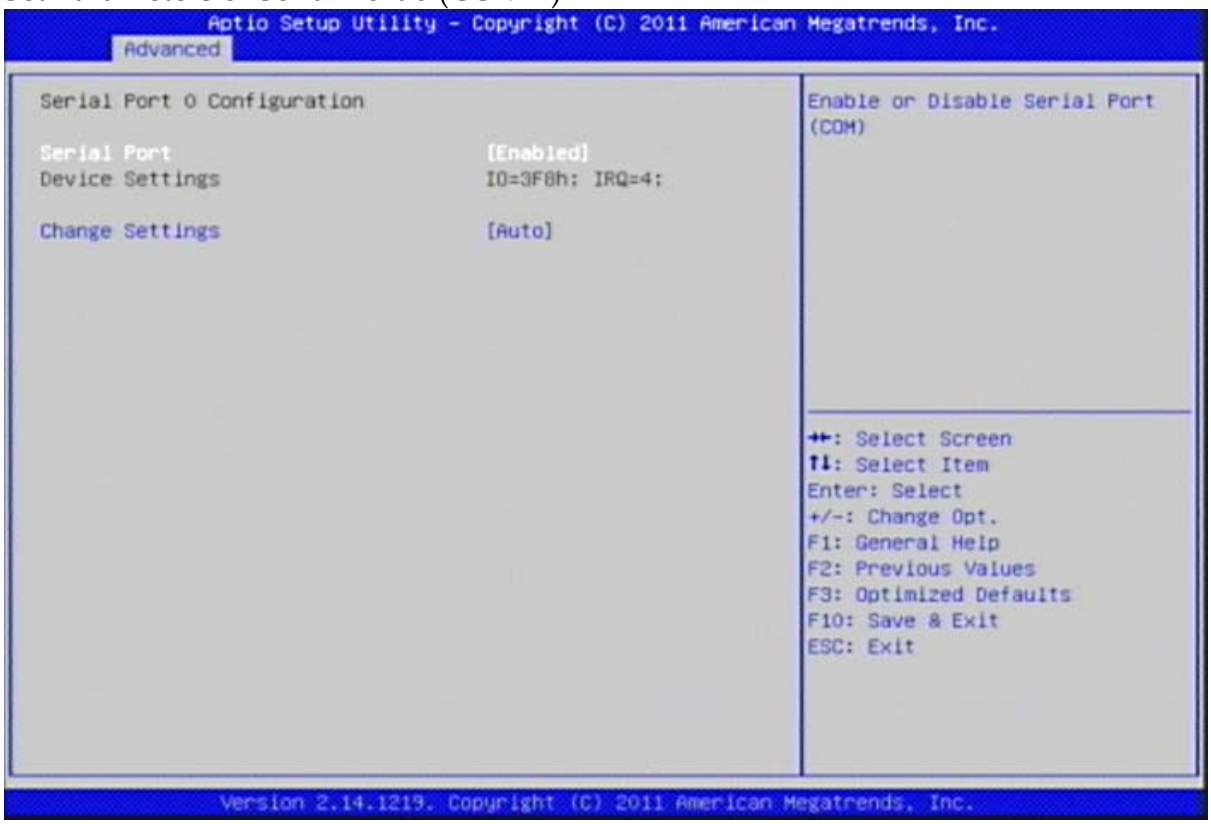
Super IO Configuration

System Super IO Chip Parameters



Serial Port 0 Configuration

Set Parameters of Serial Port 0 (COMA)



Serial Port

Choices: Disabled, Enabled.

Change Settings

Select an optimal setting for Super IO Device.

Choices: Auto. IO=3F8h; IRQ=4, IO=3F8h; IRQ=3,4,5,6,7,10,11,12, IO=2F8h; IRQ=3,4,5,6,7,10,11,12, IO=3E8h; IRQ=3,4,5,6,7,10,11,12, IO=2E8h; IRQ=3,4,5,6,7,10,11,12.

Select UART Mode

Select RS232/RS485/RS422

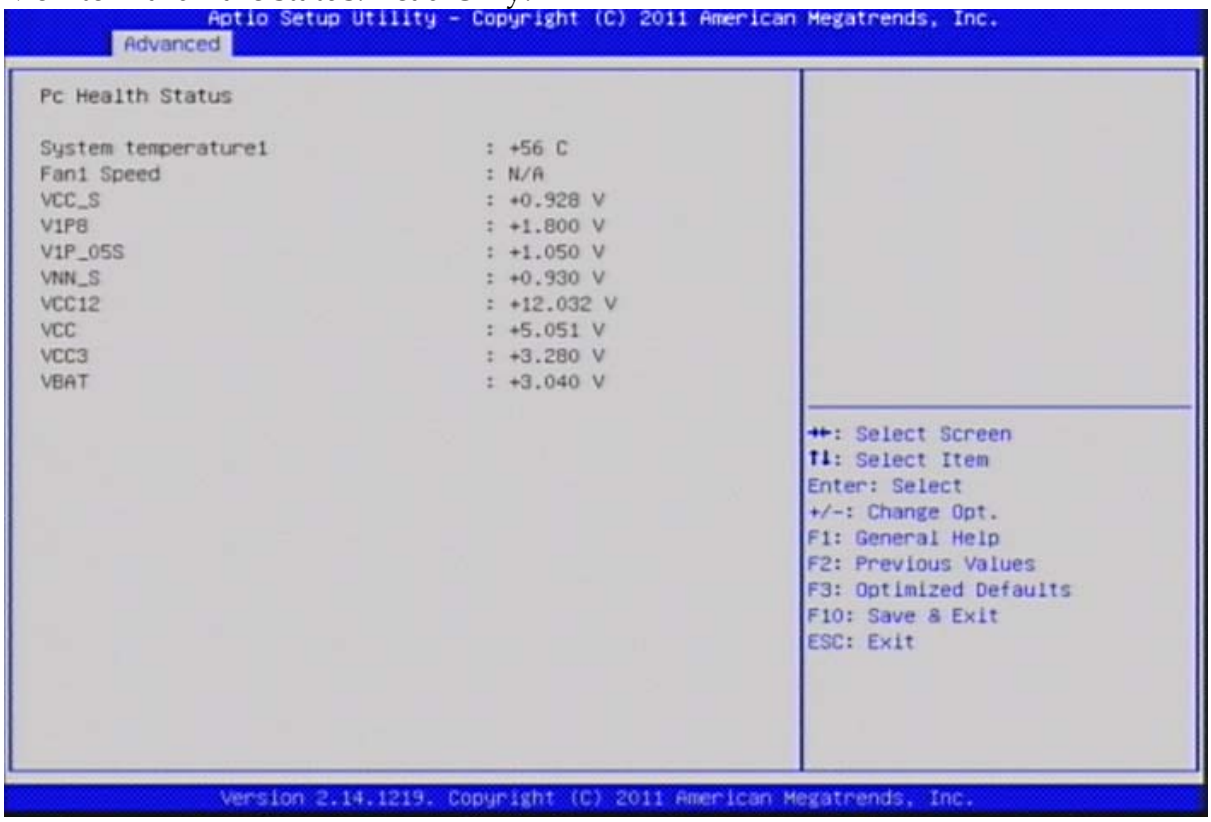
Choices: RS232, RS485, RS422.

Power Failure

Choices: Keep last state, Always on, Always off.

H/W Monitor

Monitor hardware status. Read Only.



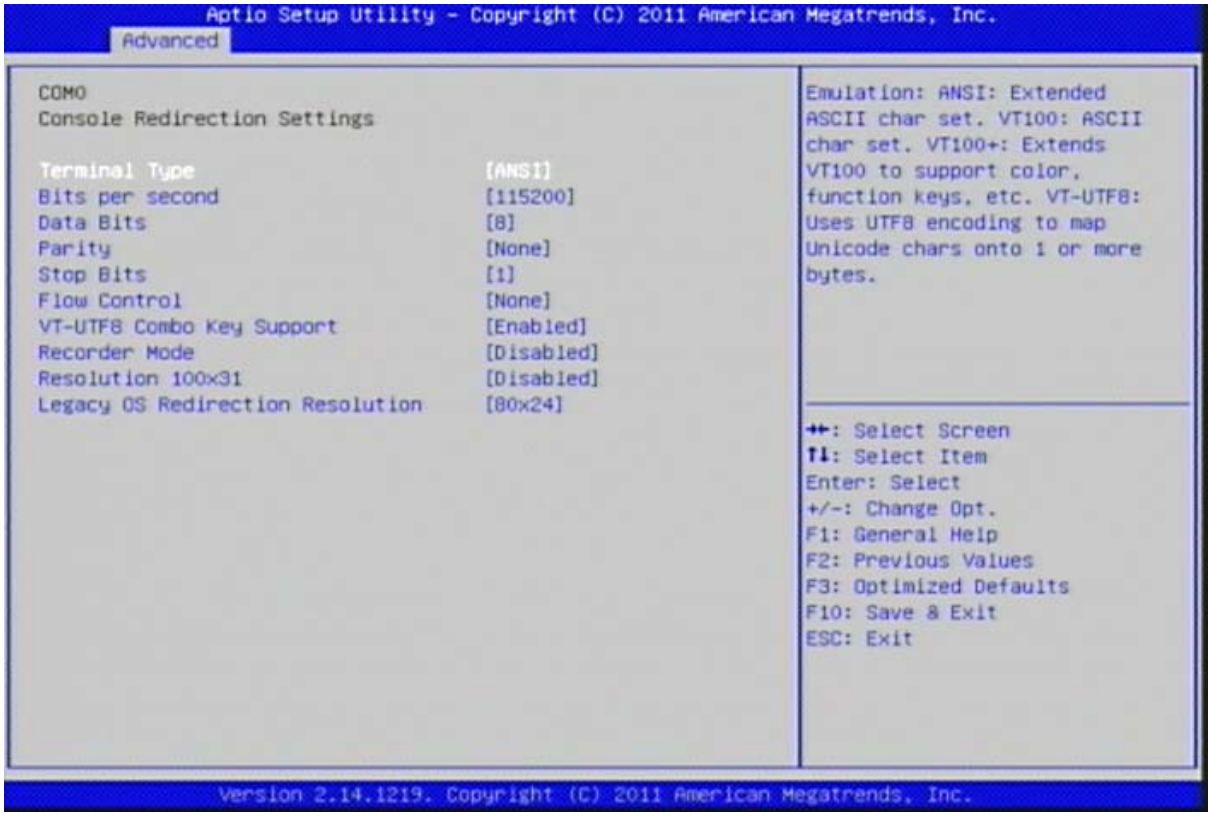
Serial Port Console Redirection

Serial Port Console Redirection

Console Redirection
Console Redirection Enable or Disable.

Choices: Disabled, Enabled.

Console Redirection Settings
The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.



Terminal Type
VT-UTF8 is the preferred terminal type for out-of-road management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.

Choices: VT100, VT100+, VT-UTF8, ANSI.

Bits per second
Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.

Choices: 9600, 19200, 38400, 57600, 115200.

Data Bits
Data Bits
Choices: 7, 8.

Parity
A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: parity bit is always 0. Mark and Space Parity do not allow for error detection.

Choices: None, Even, Odd, Mark, Space.

Stop Bits
Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

Choices: 1, 2.

Flow Control
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

Choices: None, Hardware RTS/CTS.

VT-UTF8 Combo Key Support
Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.

Choices: Disabled, Enabled.

Recorder Mode
With this mode enabled only test will be sent. This is to capture Terminal data.

Choices: Disabled, Enabled.

Resolution 100X31
Enables or disables extended terminal resolution.

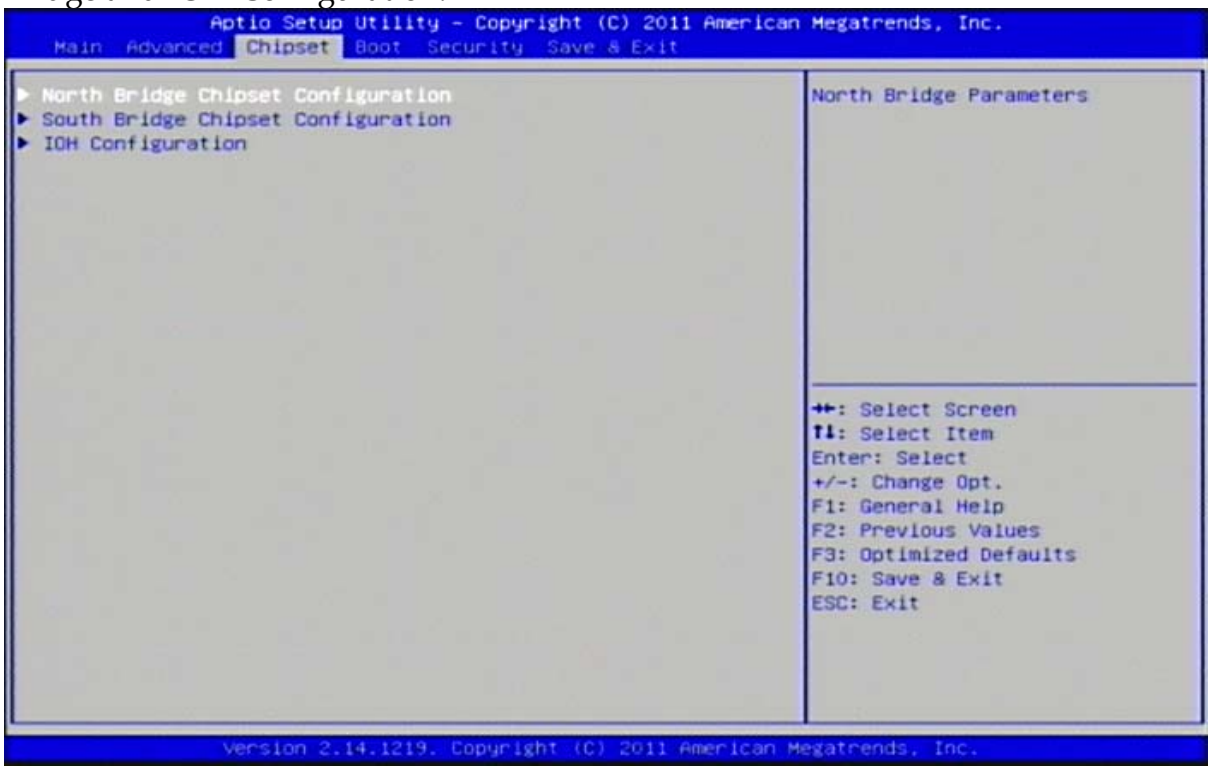
Choices: Disabled, Enabled.

Legacy OS Redirection Resolution
On Legacy OS, the number of Rows and Columns supported redirection.

Choices: 80x24, 80x25.

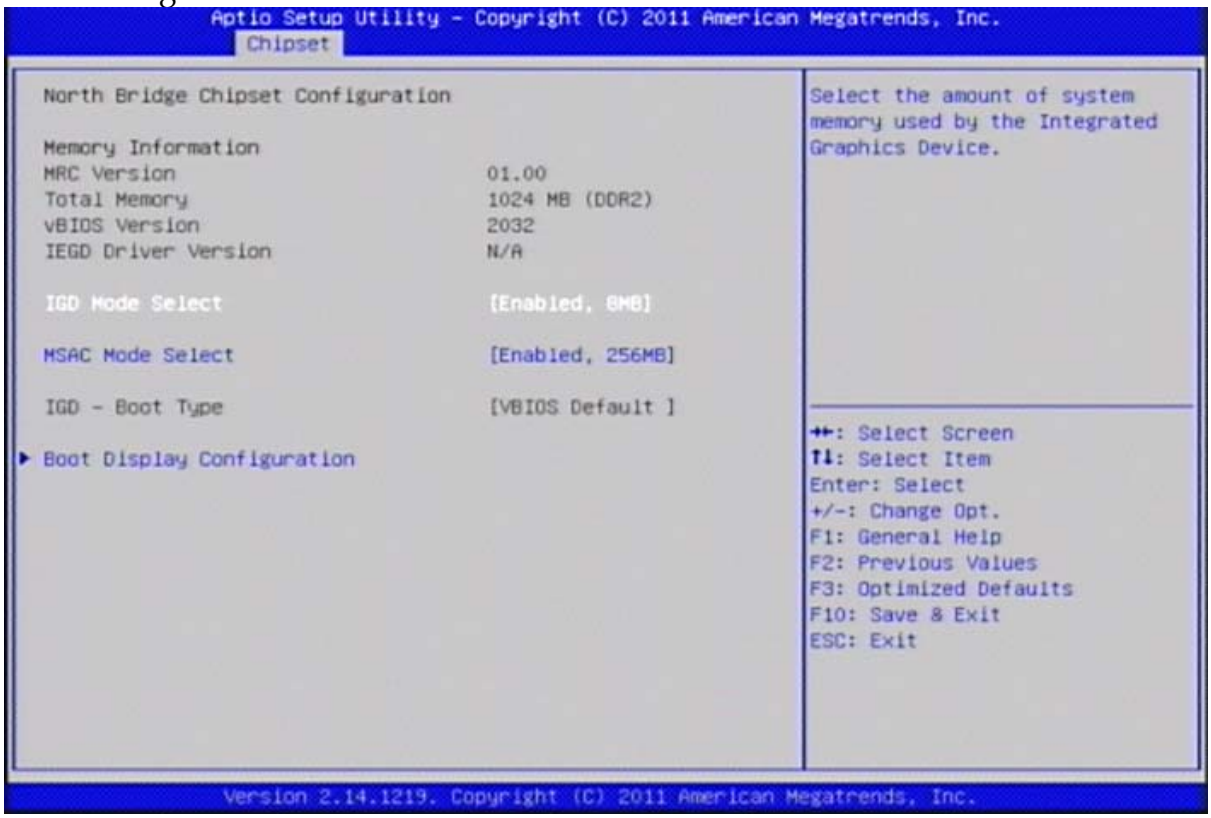
4.4 Chipset

This menu controls the advanced features of the onboard North Bridge and South Bridge and IOH Configuration.



North Bridge Chipset Configuration

North Bridge Parameters



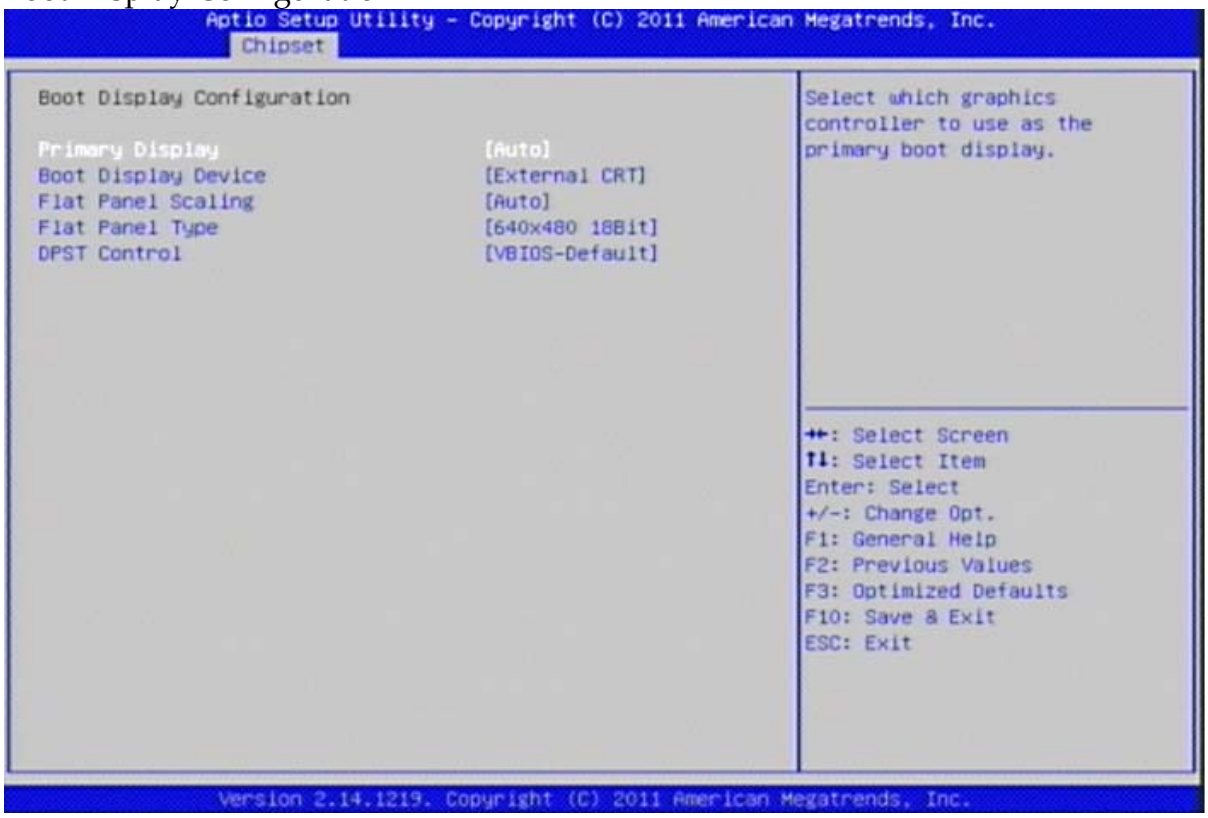
IGD Mode Select
Select the amount of system memory used by the Integrated Graphic Device.

Choices: Disabled, Enabled, 1MB, Enabled, 4MB, Enabled, 8MB, Enabled, 16MB, Enabled, 32MB, Enabled, 48MB, Enabled, 64MB.

MSAC Mode Select
Select the size of the graphics memory aperture and untrusted space. Used by the Integrated Graphic Device.

Choices: Enabled, 512MB, Enabled, 256MB, Enabled, 128MB.

Boot Display Configuration
Boot Display Configuration



Primary Display
Select which graphics controller to use as the primary boot display.

Choices: Auto, IGD, PEG.

Boot Display Device
Boot Display Device

Choices: Integrated LVDS, External CRT.

Flat Panel Scaling
Flat Panel Scaling

Choices: Auto, Forced, Disabled.

Flat Panel Type
Flat Panel Type

Choices: 640x480 18Bit, 800x600 18Bit, 1024x768 18Bit, 800x480 18Bit, 1024x768 24Bit.

DPST Control
DPST Control

Choices: VBIOS-Default, DPST Disabled, DPST Enabled L1, DPST Enabled L2, DPST Enabled L3, DPST Enabled L4, DPST Enabled L5.

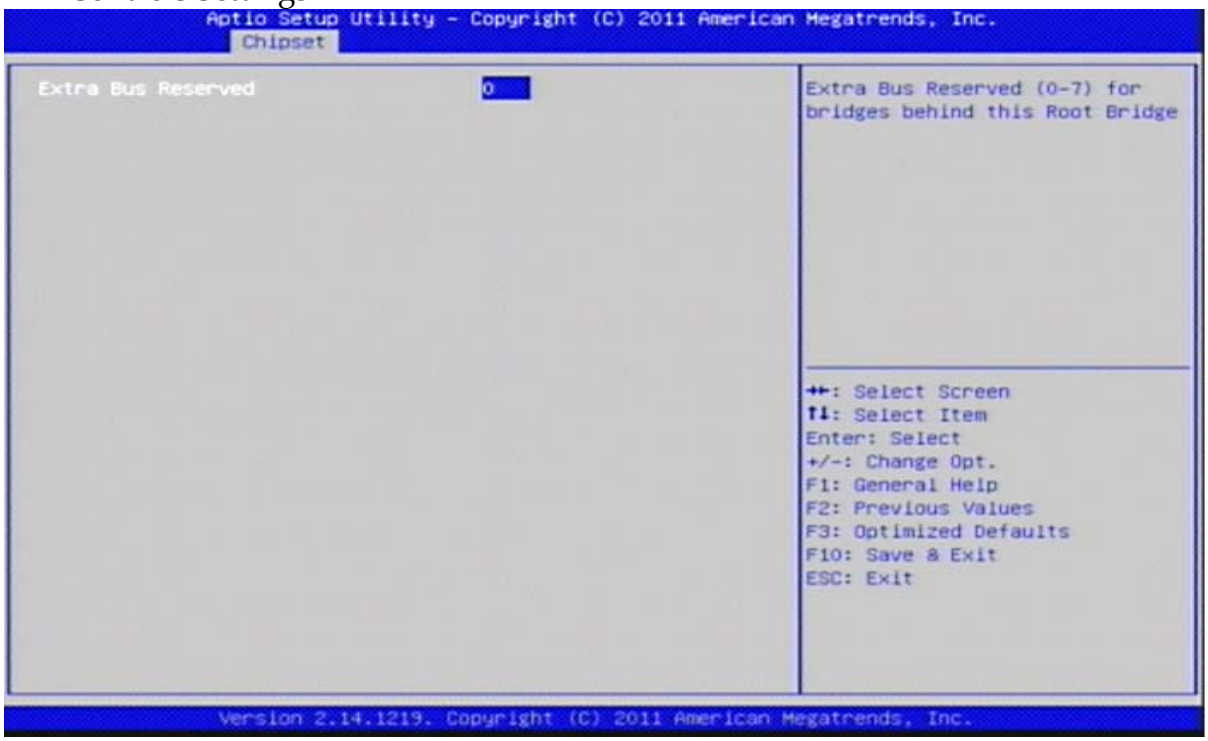
PCI Express Ports Configuration
Enable or Disable the PCI Express Ports in the Chipset

PCI Express Root Port 0-3
Control the PCI Express Root Port 0-3.

Choices: Disabled, Enabled.

PCI-to-PCI Bridge

P2P Controls Settings



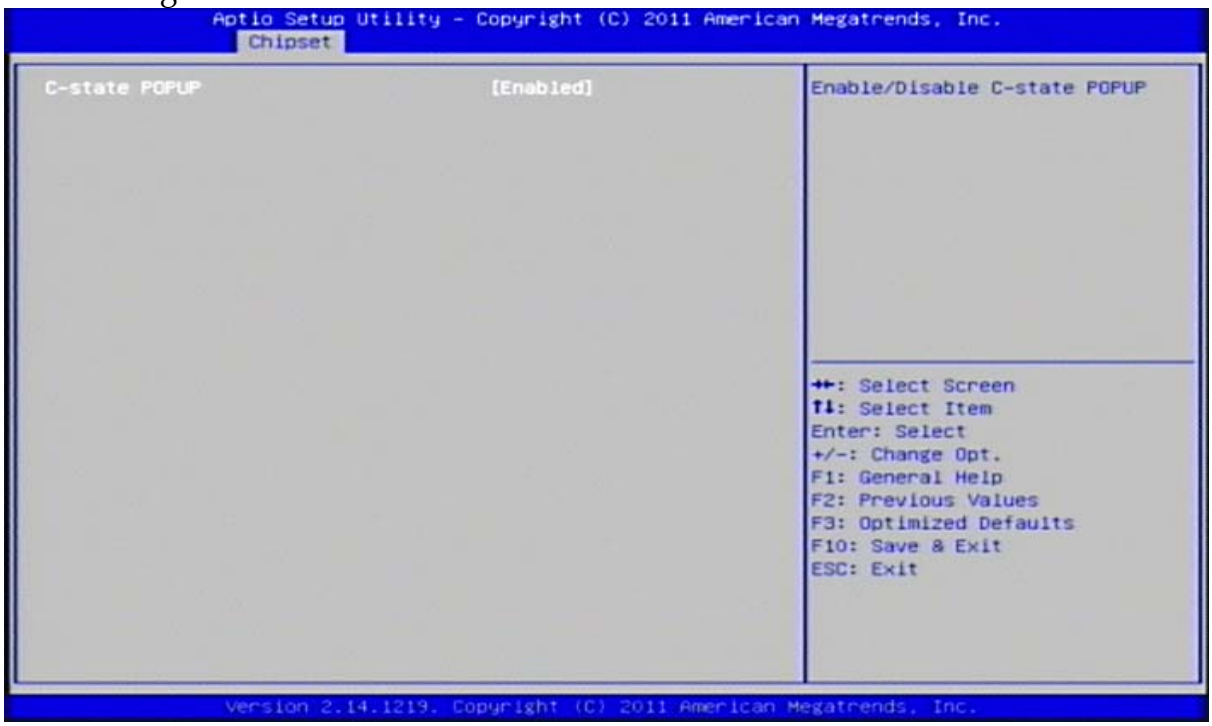
Extra Bus Reserved

Extra Bus Reserved (0-7) for bridges behind this Root Bridge

Choices: 0-7.

PPM Config

PPM Config



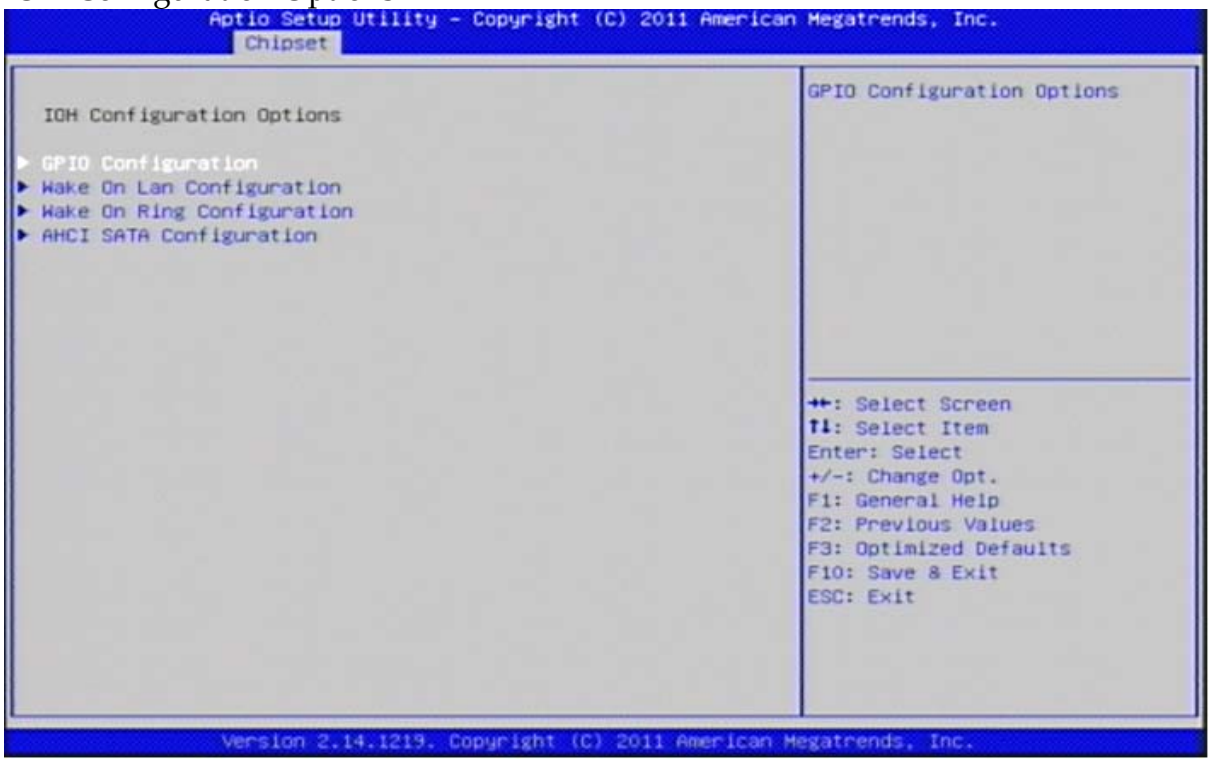
C-state POPUP

Enable/Disable C-state POPUP

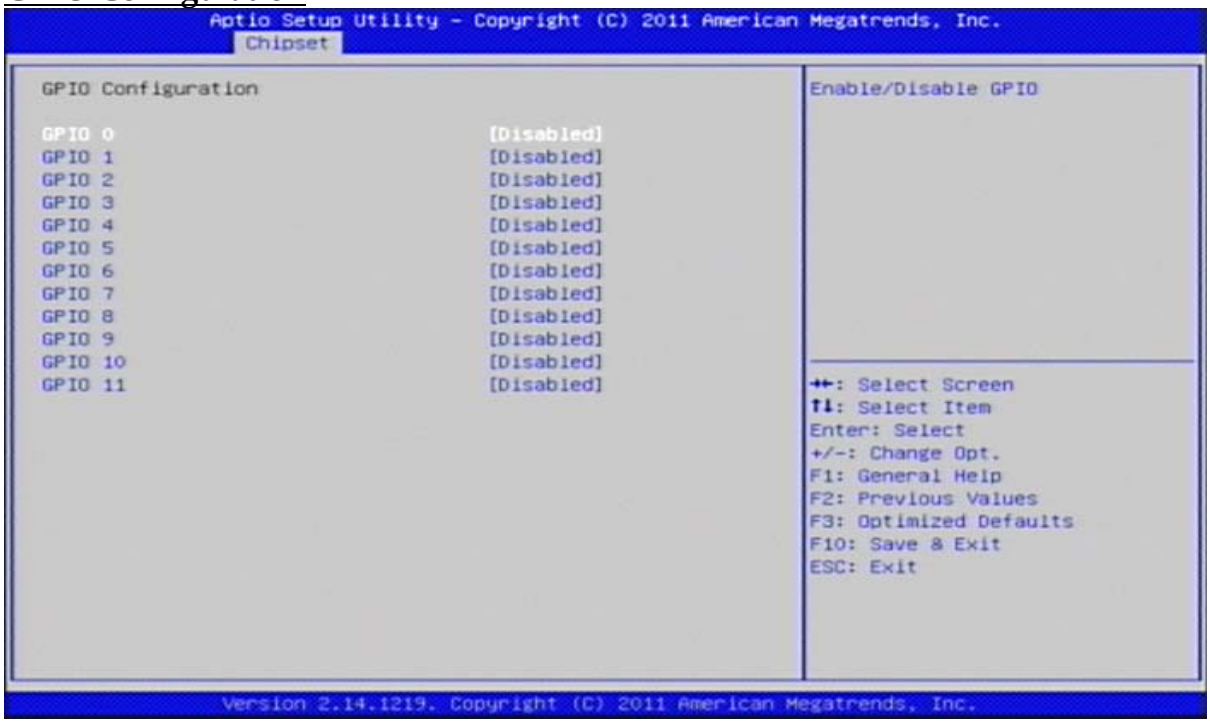
Choices: Disabled, Enabled.

IOH Configuration

IOH Configuration Options



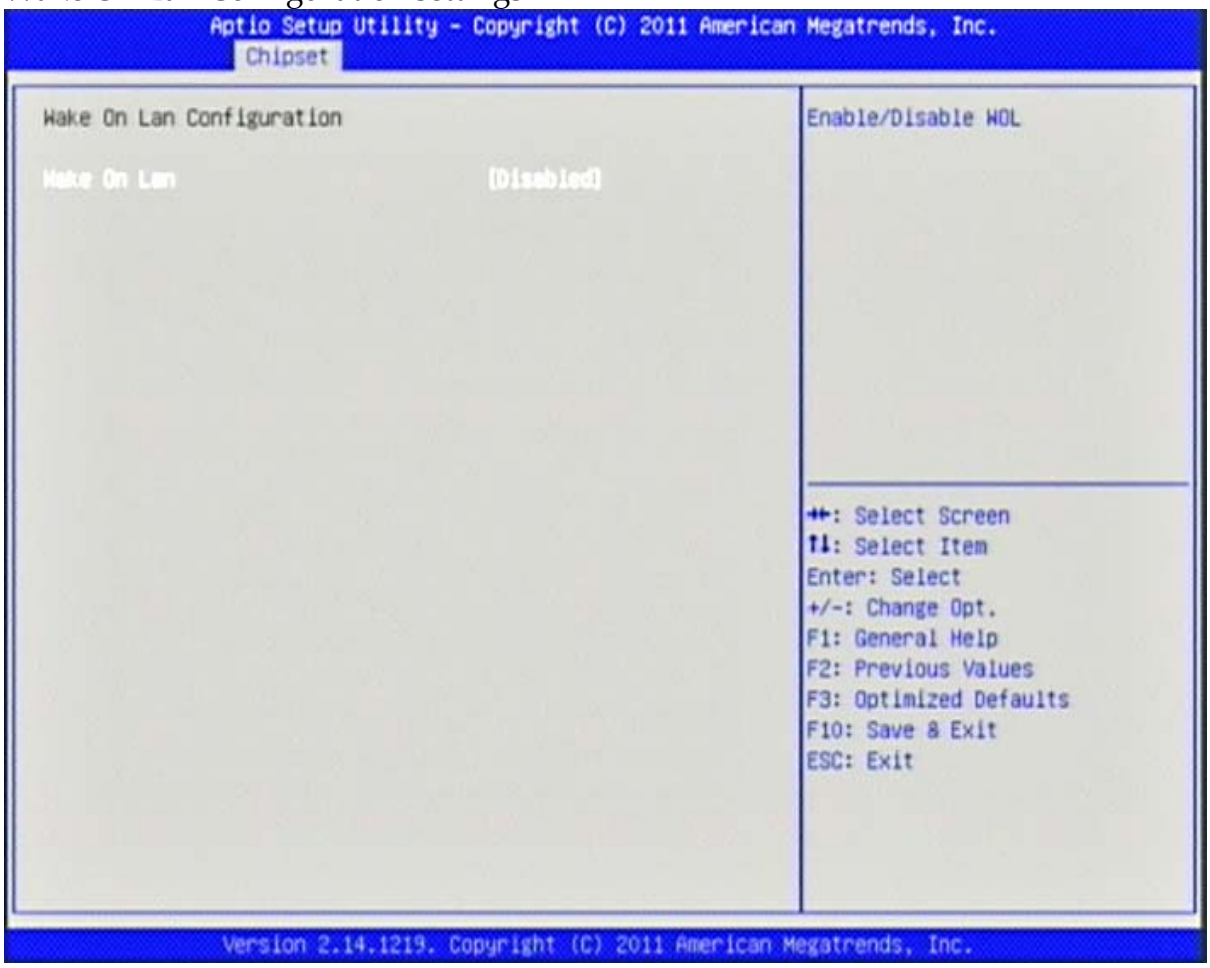
GPIO Configuration



GPIO 0-11
Enable/Disable GPIO

Choices: Disabled, Enabled.

Wake On Lan Configuration
Wake On Lan Configuration settings



Wake On Lan
Enable/Disable WOL

Choices: Disabled, Enabled, OS.

Wake On Ring Configuration

Wake On Ring Configuration settings

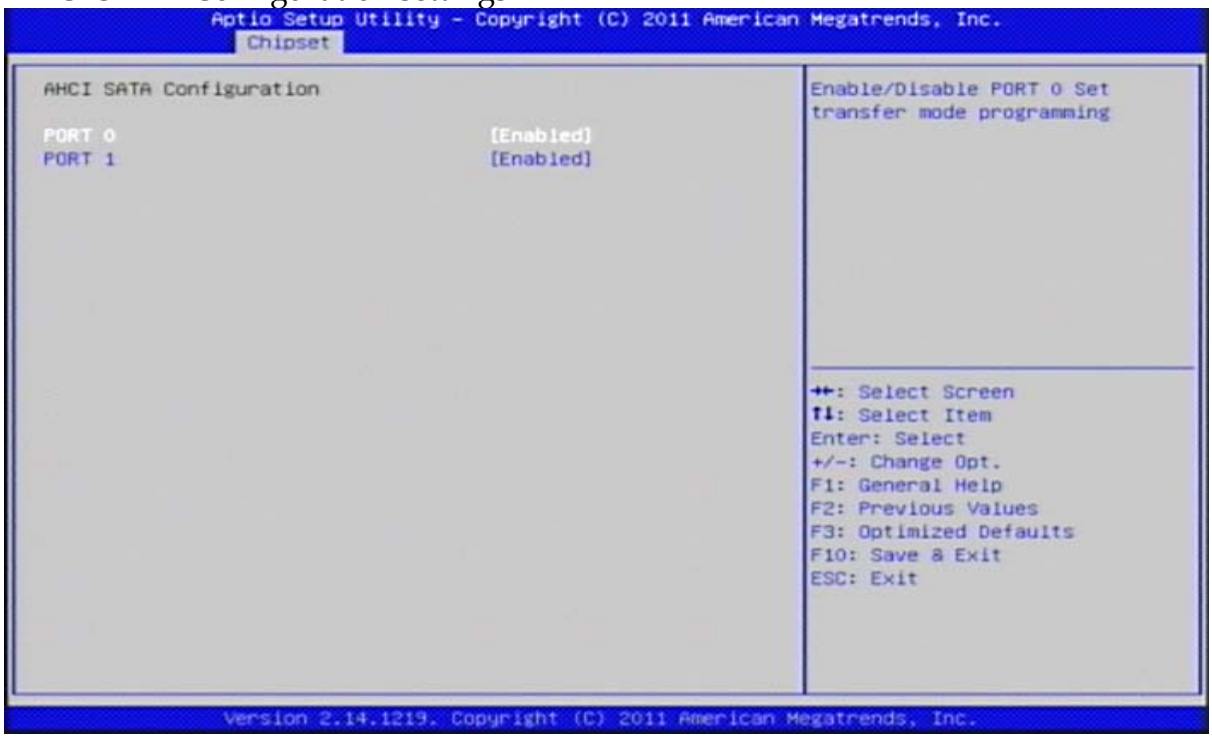
Wake On Ring

Enable/Disable WOR

Choices: Disabled, Enabled.

AHCI SATA Configuration

AHCI SATA Configuration settings

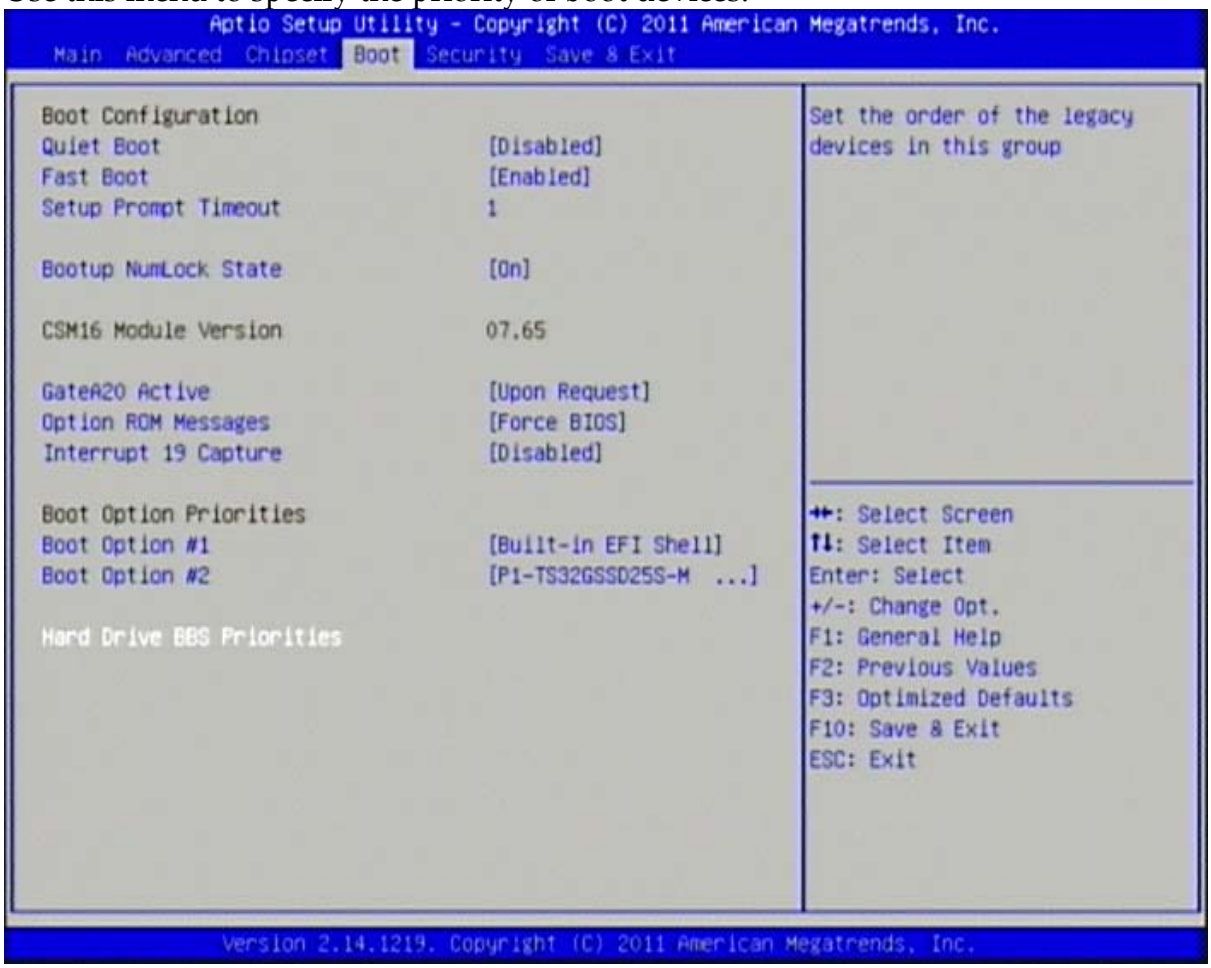


Port0-1
Enable/Disable PORT0-1 Set transfer mode programming

Choices: Disabled, Enabled.

4.5 Boots

Use this menu to specify the priority of boot devices.



Quiet Boot
Enables/Disables Quiet Boot option

Choices: Disabled, Enabled.

Fast Boot
Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

Choices: Disabled, Enabled.

Setup Prompt Timeout
Number of seconds to wait for setup activation key
65535(0Xffff) means indefinite waiting

Choices: 1-65535.

Bootup Num-Lock State
Select the keyboard Numlock state

Choices: On, Off.

GateA20 Active
UPON REQUEST – GA20 can be disabled using BIOS services. ALWAYS – do not allow disabling GA20 ; this option is useful when any RT code is executed above 1MB.
Choices: Upon Request, Always.

Option ROM Messages
Set display mode for Option ROM

Choices: Force BIOS, Keep Current.

Interrupt 19 Capture
Enabled: Allows Option ROMs to trap Int 19

Choices: Disabled, Enabled.

Boot Option #1-#2
Set the system boot order

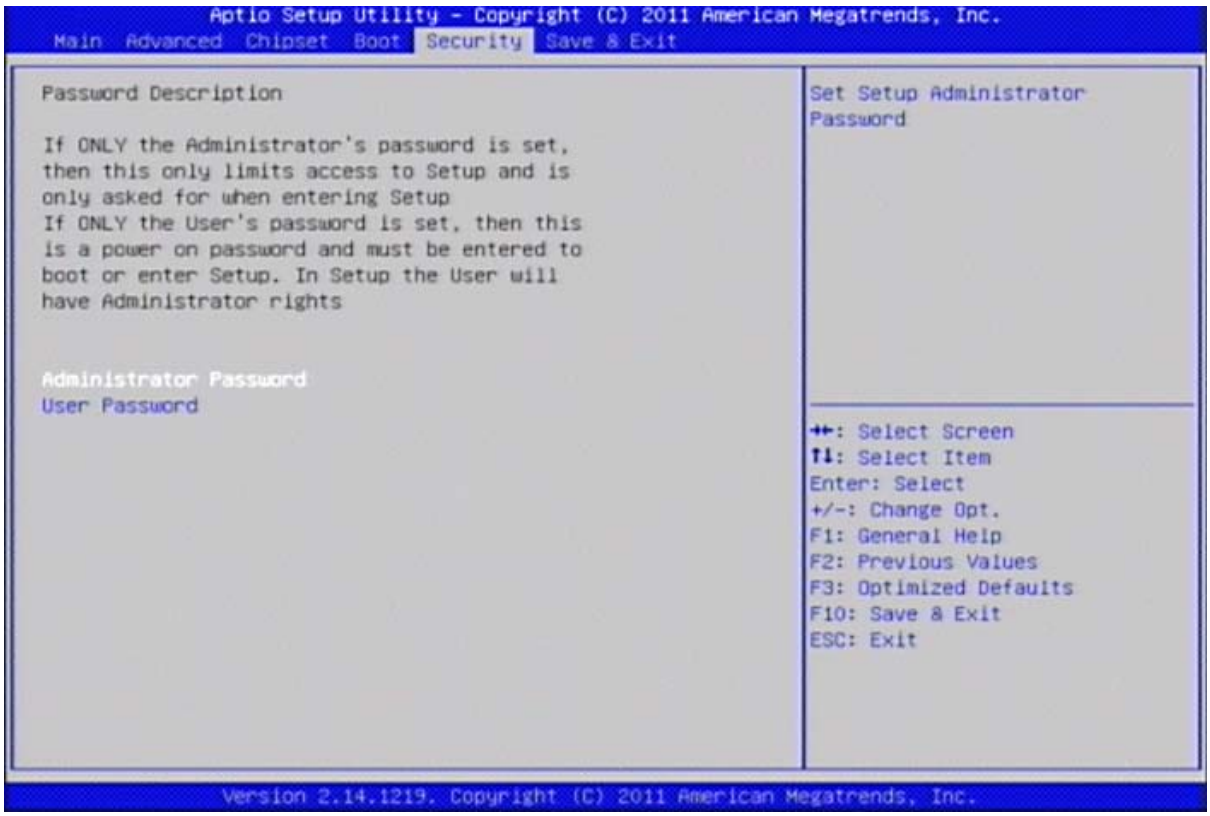
Hard Drive BBS Priorities

Set the order of the legacy devices in this group

Boot Option #1

Set the system boot order

4.6 Security

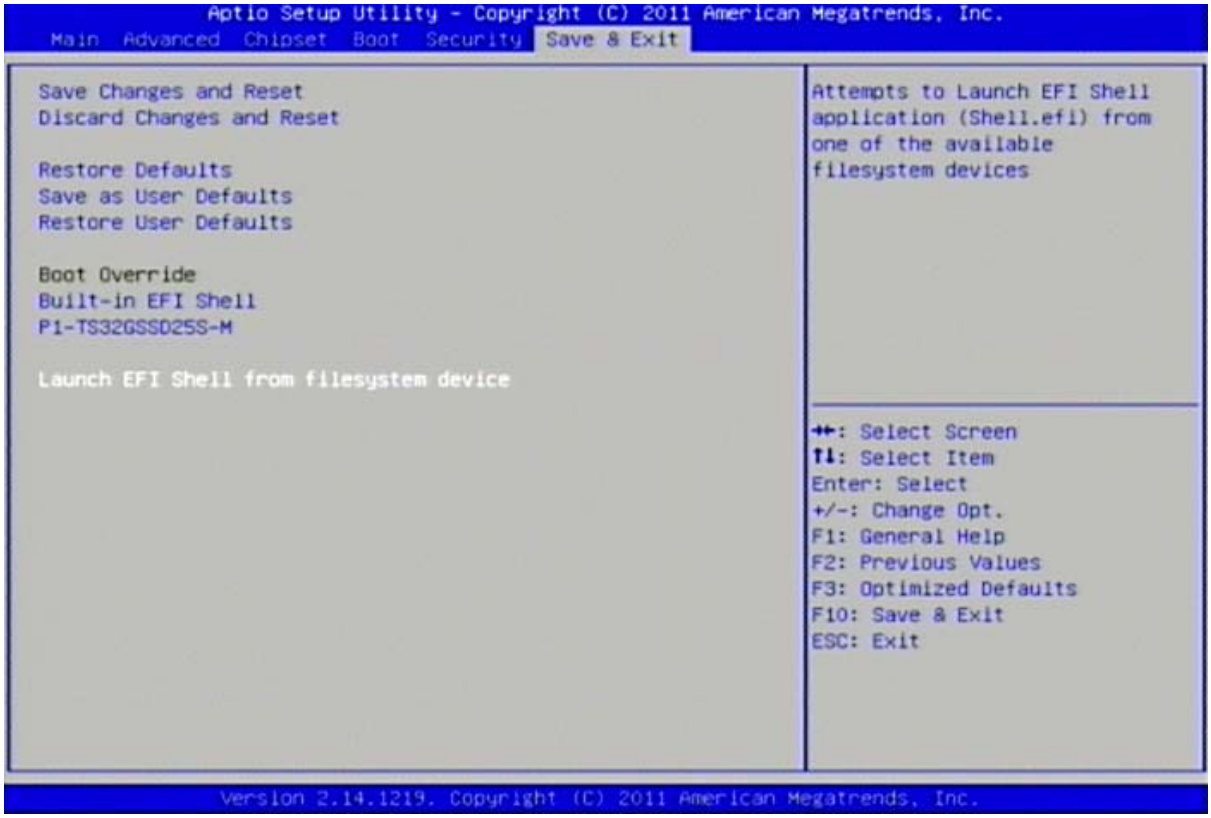


Administrator Password
Set Setup Administrator Password

User Password
Set user password.

4.7 Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.



Save Changes and Reset
Reset the system after saving the changes.

Discard Changes and Exit
Reset system setup without saving any changes

Restore Defaults
Restore/Load Defaults values for all the setup options.

Save as User Defaults
Save the changes done so far as User Defaults.

Restore User Defaults
Restore the User Defaults to all the setup options.

Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shell.efi) from one od the available filesystem devices.

Boot into the initial shell environment, it can debug and dump the PCI Resource or jump to next bootable device. If it doesn't have boot device, it will return to BIOS setup menu. If you want to know the shell command, you can visit the Intel official hyperlink as below.

http://software.intel.com/en-us/articles/uefi-shell/#Internal_EFI_Shell_Commands

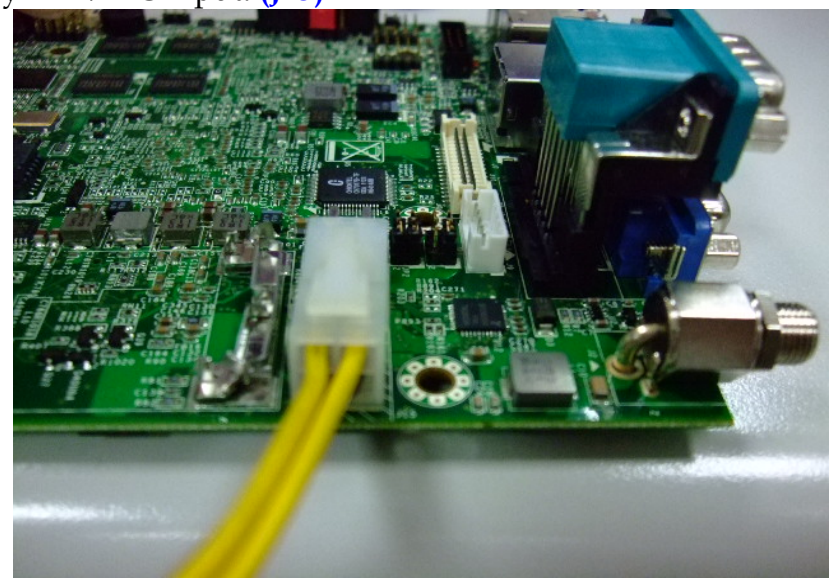
Chapter 5
Troubleshooting

This chapter provides a few useful tips to quickly get NANO-6040 running with success. As basic hardware installation has been addressed in Chapter 2, this chapter will primarily focus on system integration issues, in terms of BIOS setting, and OS

5.1 Hardware Quick Installation

There are two methods to power on NANO-6040 which are **4 Pins DC +12V connector or DC +12V IN Jack.**
DC +12V Jack connects to NANO-6040. **(J2)**

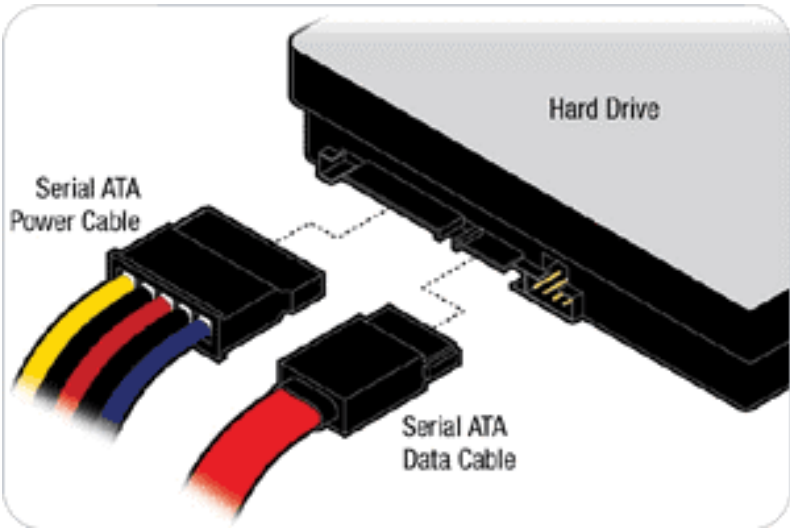
4 Pins directly +12V DC input**. (J15)**



Do NOT connect DC +12V (J2) Jack and 4pins DC +12V (J15) at the same time.

Serial ATA Hard Disk Setting for IDE

Serial ATA channel can only connect to one SATA hard disk at a time; there are total 2 connectors, **J20 & J25**. The installation of Serial ATA is simpler
and easier than IDE because of SATA hard disk doesn't require HDD priority setting jumper, which can reduce mistake of hardware installation. All you need to do is plugging in two cables and choose SATA mode needed in BIOS.



5.2 BIOS Setting

To make sure that you have a successful start with NANO-6040, it is recommended while going with the boot-up sequence. Hit the **"Del or F2**" key and enter the BIOS setup menu to load default setting then tune up a stable BIOS configuration according to your needs.

Restore the default optimal setting

When prompted with the main setup menu, please scroll down to "**Restore defaults",** press **"Enter"** and **"Y"** to load in default optimal BIOS setup. This will force your BIOS setting back to the initial factory configuration. It is recommended to do this so you can be sure the system is running with the BIOS setting that Portwell has highly endorsed. As a matter of fact, users can load the default BIOS setting any time when system appears to be unstable in boot up sequence.

Improper disable operation

There are too many occasions where users disable a certain device/feature in one application through BIOS setting. These variables may not be set back to the original values when needed. These devices/features will certainly fail to be detected.

When the above conditions happen, it is strongly recommended to check the BIOS settings. Make sure certain items are set as they should be. These include the COM1/COM2 ports, USB ports, external cache, on-board VGA and Ethernet.

It is also very common that users would like to disable a certain device/port to release IRQ resource. A few good examples are
Disable COM1 serial port to release IRQ #4
Disable COM2 serial port to release IRQ #3
Etc…

A quick review of the basic IRQ mapping is given below for your reference.

Interrupt Request Lines IRQ		
IRQ#	**Current Use**	**Default Use**
IRQ 0	**System ROM**	**System Timer**
IRQ 1	**System ROM**	**Keyboard Event**
IRQ 2	**【Unassigned】**	**Usable IRQ**
IRQ 3	**【Unassigned】**	**Usable IRQ**
IRQ 4	**System ROM**	**COM1**
IRQ 5	**【Unassigned】**	**Usable IRQ**
IRQ 6	**System ROM**	**Diskette Event**
IRQ 7	**【Unassigned】**	**Usable IRQ**
IRQ 8	**System ROM**	**Real-Time Clock**
IRQ 9	**【Unassigned】**	**Usable IRQ**
IRQ 10	**【Unassigned】**	**Usable IRQ**
IRQ 11	**【Unassigned】**	**Usable IRQ**
IRQ 12	**System ROM**	**IBM Mouse Event**
IRQ 13	**System ROM**	**Coprocessor Error**
IRQ 14	**System ROM**	**Hard Disk Event**
IRQ 15	**【Unassigned】**	**Usable IRQ**

It is then very easy to find out which IRQ resource is ready for additional peripherals. If IRQ resource is not enough, please disable some devices listed above to release further IRQ numbers.

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5.3 Q&A

Question: Don't find any Clear CMOS jumper.

Answer: There is no hardware implementation for clearing the CMOS in the Queens Bay platform.

Question: We find the Read/Write speed of the NANO-6040 USB port in Windows XP is slower than Win7.

Answer: The USB port read/write speed is only **98Mb/s** in Windows XP. It is a chipset limitation.

Question: We don't find any jump setting to switch COM port function (RS-232/422/485) in NANO-6040 board.

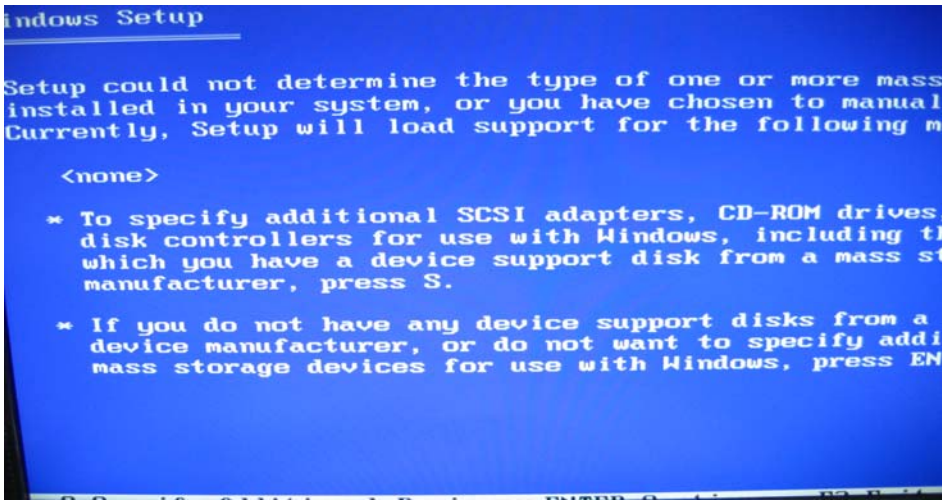
Answer: The COM port function can be selected in NANO-6040 BIOS. Please select **Advanced→ Super IO Configuration→ Select UART Mode** to select RS232/RS485/RS422 mode.

Question: How to install the Windows XP with USB devices in NANO-6040 board?

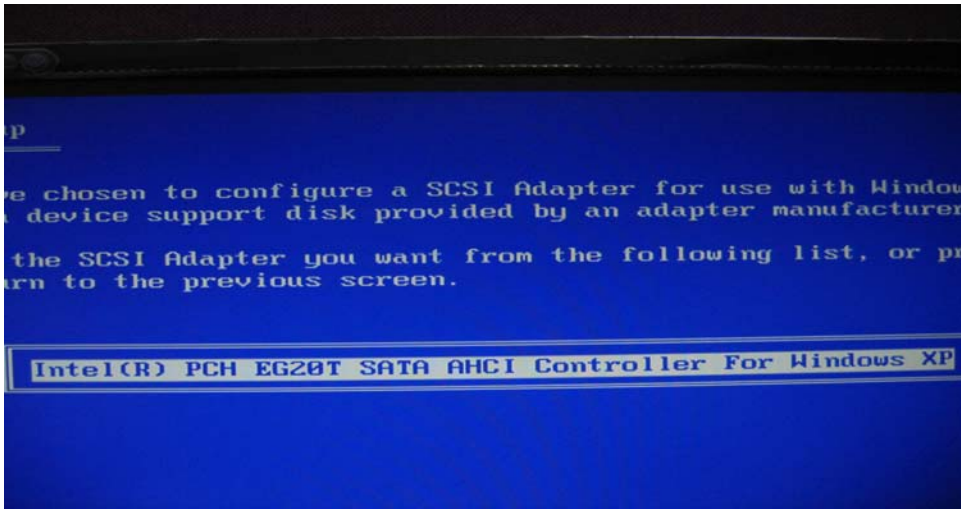
Answer: Please follow those steps as below.

1. Copy the files in 'FD_Inst_WinXP' in the SATA driver package to the root of a **floppy disk.** The SATA driver package can be obtained from
- iohsata.cat
- iohsata.inf
- iohsata.sys
- txtsetup.oem

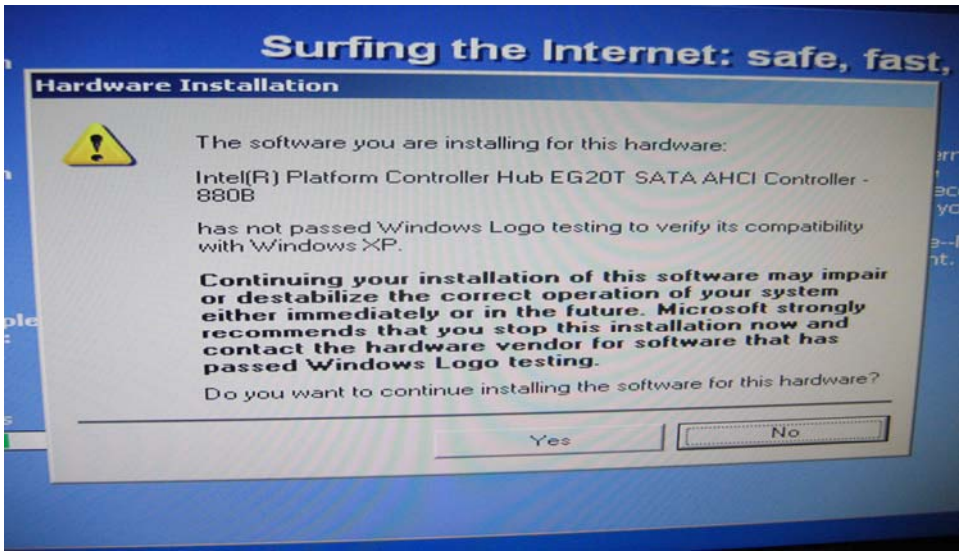
2. Make sure that the target computer has a compatible **floppy drive.**
3. Insert the floppy disk prepared in **step 1** into the floppy drive.
4. Insert the Windows XP SP3 installer into the CD-ROM and boot from the CD-ROM to start the Windows XP SP3 installation.
5. Press **<F6>** to add further SCSI/RAID drivers when prompted during the very early stage of the Windows installation.



6. Press **<S>** to add an additional SCSI device. Select the correct driver (Intel® PCH EG20T SATA AHCI Controller for Windows XP) and press <ENTER> to continue the installation. This will install the Intel® PCH EG20T SATA AHCI controller driver

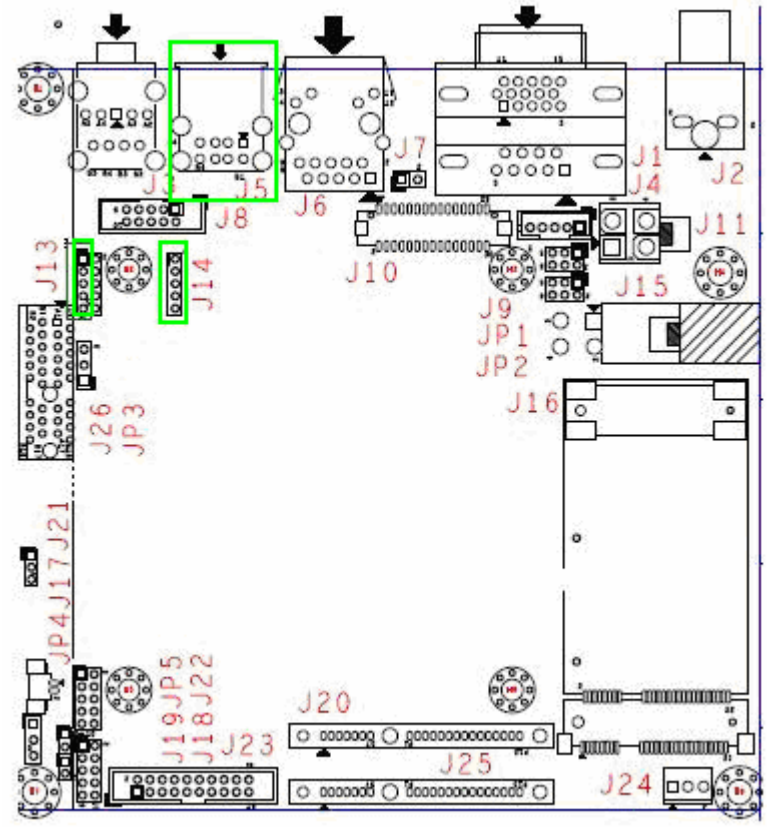


7. During the installation, the message box below may appear:
Press **<Yes>** to continue the installation.

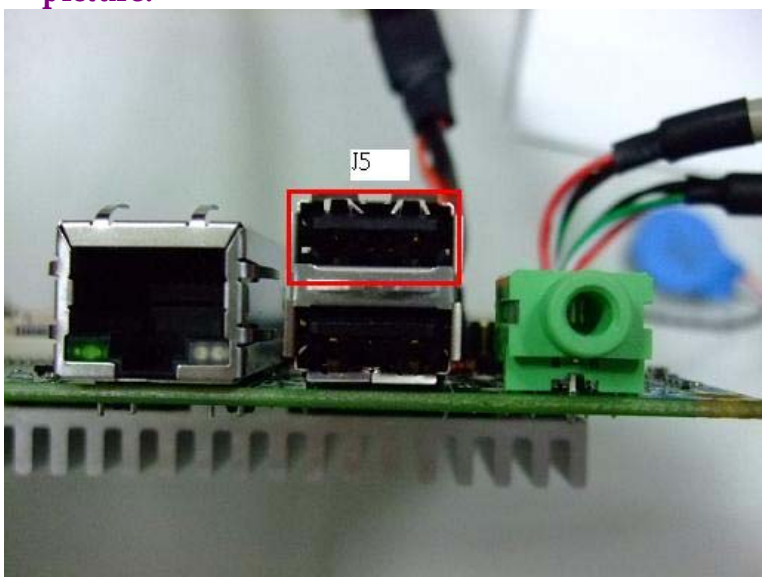


Please attention:

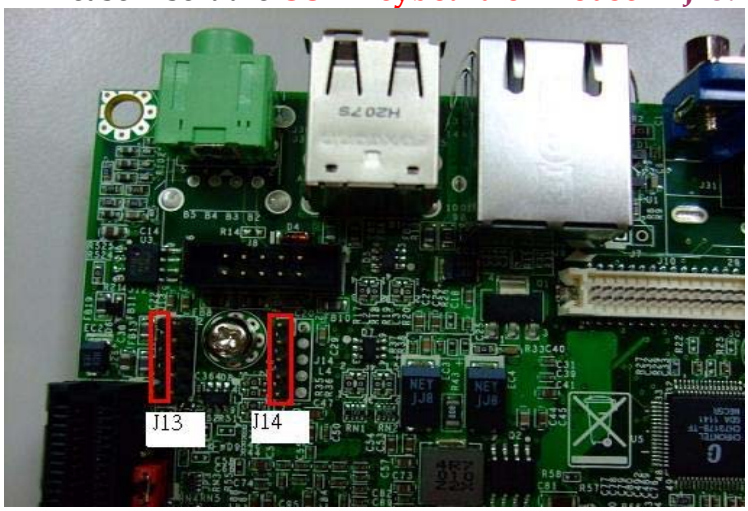
Intel suggests to install windows XP must detect USB device to **J13, J14 and the top USB port of the J5.**



1. Please insert your **USB Floppy disk in the top USB port of the J5 as below picture.**



2. Please insert the **USB Keyboard or mouse** in **J13.**



3. Please insert the **USB CD-ROM in J14.**

Note:

Please visit our technical web site at http://www.portwell.com.tw
For additional technical information, which is not covered in this manual, you can mail to tsd@mail.portwell.com.tw or you can also send mail to our sales, they will be very delighted to forward them to us.

System Memory Address Map

Each On-board device in the system is assigned a set of memory addresses, which also can be identical of the device. The following table lists the system memory address used.

Memory Area	Size	Description
0000-003F	1K	Interrupt Area
0040-004F	0.3K	BIOS Data Area
0050-006F	0.5K	System Data
0070-0E2E	54K	DOS
0E2F-1074	9.1K	Program Area
1075-9C3F	559K	【Available】
First Meg	-- Conventional memory end at 625K --	
9C40-9FFF	15K	Extended BIOS Area
A000-AFFF	64K	VGA Graphics
B000-B7FF	32K	Unused
B800-BFFF	32K	VGA Text
C000-D2DF	75K	ROM
D2E0-EFFF	116K	Unused
F000-FFFF	64K	System ROM
HMA	64K	First 64K Extended