

# SYS-ITX-N-3900

Industrial NANO-ITX  
Embedded Computer with  
Intel Atom® E3900 Processor

## Product Manual



## Revision History

| Document Version | Last Updated Date | Brief Description of Change                                   |
|------------------|-------------------|---------------------------------------------------------------|
| v2.2             | 1/26/24           | Initial release                                               |
| v2.3             | 9/3/25            | Updated conformal coating, warranty and web links information |

## Copyright and Trademarks

Copyright 2019, WINSYSTEMS, Inc.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of WINSYSTEMS, Inc. The information in the document is subject to change without notice. The information furnished by WINSYSTEMS, Inc. in this publication is believed to be accurate and reliable. However, WINSYSTEMS, Inc. makes no warranty, express, statutory, implied or by description, regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. WINSYSTEMS, Inc. makes no warranty of merchantability or fitness for any purpose. WINSYSTEMS, Inc. assumes no responsibility for any errors that may appear in this document.

### Trademark Acknowledgments

WINSYSTEMS is a registered trademark of WINSYSTEMS, Inc.

Intel, Intel Atom, and Speedstep are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

DisplayPort, the DisplayPort logo, and VESA are trademarks owned by the Video Electronics Standards Association (VESA) in the United States and other countries.

All other marks are the property of their respective companies.

# Table of Contents

|          |                                     |           |
|----------|-------------------------------------|-----------|
| <b>1</b> | <b>Before You Begin.....</b>        | <b>5</b>  |
| 1.1      | Warnings .....                      | 5         |
| <b>2</b> | <b>Introduction .....</b>           | <b>5</b>  |
| <b>3</b> | <b>Functionality .....</b>          | <b>5</b>  |
| <b>4</b> | <b>Features .....</b>               | <b>6</b>  |
| <b>5</b> | <b>General Operation.....</b>       | <b>8</b>  |
| 5.1      | System Block Diagram.....           | 8         |
| <b>6</b> | <b>Specifications .....</b>         | <b>9</b>  |
| <b>7</b> | <b>Setup .....</b>                  | <b>10</b> |
| 7.1      | Installation and Connections.....   | 10        |
| 7.2      | Power Up.....                       | 10        |
| 7.3      | Driver Installation.....            | 10        |
| 7.3.1    | Chipset Component Driver.....       | 10        |
| 7.4      | Watchdog Timer (WDT).....           | 11        |
| 7.4.1    | Example Code for WDT.....           | 11        |
| 7.5      | Reset CMOS BIOS Configuration ..... | 12        |
| <b>8</b> | <b>Configuration .....</b>          | <b>12</b> |
| 8.1      | Component Layout .....              | 12        |
| 8.1.1    | Rear Panel Connectors .....         | 12        |
| 8.1.2    | Top View Connectors.....            | 13        |
| 8.2      | Power .....                         | 14        |
| 8.3      | Connectors .....                    | 14        |
| 8.3.1    | DC Jack (J1).....                   | 14        |
| 8.3.2    | Audio Jack (Line_out) (J2).....     | 14        |
| 8.3.3    | DisplayPort (J3) .....              | 14        |
| 8.3.4    | RJ45 Connector (J4/J5) .....        | 14        |
| 8.3.5    | USB 3.1 Gen 1 Connector (J6).....   | 15        |
| 8.3.6    | VGA Connector (J8).....             | 16        |

|            |                                             |           |
|------------|---------------------------------------------|-----------|
| 8.3.7      | RS232/422/485 Connector (J10) .....         | 16        |
| 8.3.8      | M.2 key E Socket (J11) .....                | 16        |
| 8.3.9      | Battery Connector (J15) .....               | 16        |
| 8.3.10     | mSATA/Mini PCIe Socket (J16) .....          | 17        |
| 8.3.11     | DDR3 SODIMM Socket (J17) .....              | 17        |
| 8.3.12     | 2.5-inch SATA HDD/SSD Connector (J21) ..... | 17        |
| 8.3.13     | SATA Power Header (J22) .....               | 18        |
| 8.3.14     | MicroSD Card Socket (J23).....              | 18        |
| <b>8.4</b> | <b>Jumpers and Switches .....</b>           | <b>18</b> |
| 8.4.1      | CMOS Clear (JP3) .....                      | 18        |
| 8.4.2      | Power Button (SW1).....                     | 18        |
| <b>9</b>   | <b>BIOS Settings .....</b>                  | <b>19</b> |
| 9.1        | General Information .....                   | 19        |
| 9.2        | Entering Setup .....                        | 19        |
| 9.3        | Navigating the Menus .....                  | 20        |
| 9.4        | BIOS Screens .....                          | 20        |
| <b>10</b>  | <b>Troubleshooting .....</b>                | <b>48</b> |
| 10.1       | BIOS settings .....                         | 48        |
| 10.1.1     | Loading the Default Optimal Setting.....    | 48        |
| 10.1.2     | Reset CMOS BIOS Configuration .....         | 48        |
| 10.1.3     | Update BIOS .....                           | 49        |
| <b>11</b>  | <b>Cables and Software Drivers .....</b>    | <b>49</b> |
| <b>A</b>   | <b>Best Practices .....</b>                 | <b>50</b> |
| <b>B</b>   | <b>Warranty Information .....</b>           | <b>53</b> |

# 1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 50) when using and handling the WINSYSTEMS SYS-ITX-N-3900 embedded computer. Adherence to these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SYS-ITX-N-3900 before proceeding.



APPLYING CONFORMAL COATING AFTER PURCHASE WILL VOID YOUR WARRANTY. FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE PRODUCT AND VOID YOUR WARRANTY.

## 1.1 Warnings

Only qualified personnel should configure and install the SYS-ITX-N-3900. While observing best practices, pay particular attention to the following:



### Avoid Electrostatic Discharge (ESD)

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.



### Warning

Do not reverse the positive and negative terminals when you connect power to the unit. This voids the warranty and damages the embedded computer.

# 2. Introduction

This manual provides configuration and usage information for the SYS-ITX-N-3900. If you still have questions, contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

Refer to the WINSYSTEMS website at <https://www.winsystems.com/> for other accessories (including cable drawings and pinouts) that can be used with your SYS-ITX-N-3900.

# 3. Functionality

The SYS-ITX-N-3900 is an industrial NANO-ITX embedded computer. Its compact design and low power dissipation board is ideal for digital signage, digital security surveillance (DSS), medical, and industrial IoT applications. The processor for the unit is an Intel® E3900 series Atom™,

integrated into the SYS-ITX-N-3900. The low-profile thermal solution provides a rugged platform base that protects the PCB assembly and offers convenient mounting. Information to configure and operate the SYS-ITX-N-3900 for most applications is included in this Product Manual or on our website at <https://www.winsystems.com/>.

NOTE WINSYSTEMS can provide custom configurations for original equipment manufacturer (OEM) clients. For details, please contact an Application Engineer through Technical Support (see “Introduction” on page 5 for contact information).

## 4. Features

This section describes the features of the SYS-ITX-N-3900 embedded computer.

### Package Contents

- One SYS-ITX-N-3900 NANO-ITX embedded computer
- One external AC/DC power supply
- One SATA cable and SATA power cable
- SSD mounting hardware

### Embedded Computer

- E3900 series Intel Atom processor

| Feature         | ITX-N-3940-1-0      | ITX-N-3950-1-0      |
|-----------------|---------------------|---------------------|
| Processor       | Intel Atom x5-E3940 | Intel Atom x7-E3950 |
| Core speed      | Up to 1.60 GHz      | Up to 1.6GHz        |
| Number of cores | 4                   | 4                   |
| L2 cache        | 2 MB                | 2 MB                |

### Operating Systems (compatibility)

The SYS-ITX-N-3900 uses the Intel Apollo Lake system on a chip (SOC). Older operating systems might not recognize this chip. For compatibility issues with older Windows OS such as Windows 8, install the Apollo Lake chipset component driver (INF) before any other driver. The INF driver can be found on our ITX-N-3900 product web page.

- Microsoft Windows 10 Enterprise (64-bit), IoT Core (32/64-bit)
- Linux Wind River 8 Linux distribution (64-bit), Yocto Project BSP tool-based embedded Linux distribution (64-bit)
- Android (64-bit)
- RTOS Wind River VxWorks

Please contact a WINSYSTEMS Sales Engineer for OS BSP availability.

**Memory**

- Up to 8 GB DDR3L (one socketed 1866/1600 MHz 204-pin SODIMM)

**BIOS**

- AMI uEFI BIOS

**Video Interfaces**

- x7-E3950: Intel HD Graphics 505 (controller)
- x5-E3940: Intel HD Graphics 500 (controller)
- Supports multiple displays
- DP
- VGA

**Ethernet**

- Supports Wake-on-LAN function
- Two Intel I210 Gigabit Ethernet (1 gigabit per second, GbE) controllers

**Storage (Bootable)**

- One SATA port for 2.5-inch SATA HDD/SSD
- One mSATA socket (Switch mSATA or Mini-PCIe by BIOS)

**Serial Interface**

- One serial port (RS232/422/485, BIOS configurable)

**USB**

- Two USB 3.1 Gen 1 ports

**SD Interface**

- One micro SD socket

**Expansion Interface**

- One M.2 E key socket for wireless application

**Audio**

- Line out audio Jack on rear I/O

**Power**

- DC 12 V input (rear I/O)
- Model specific power specifications:
  - ITX-N-3940: +12 V DC input (9 W typical)
  - ITX-N-3950: +12 V DC input (12 W typical)

### Additional Features

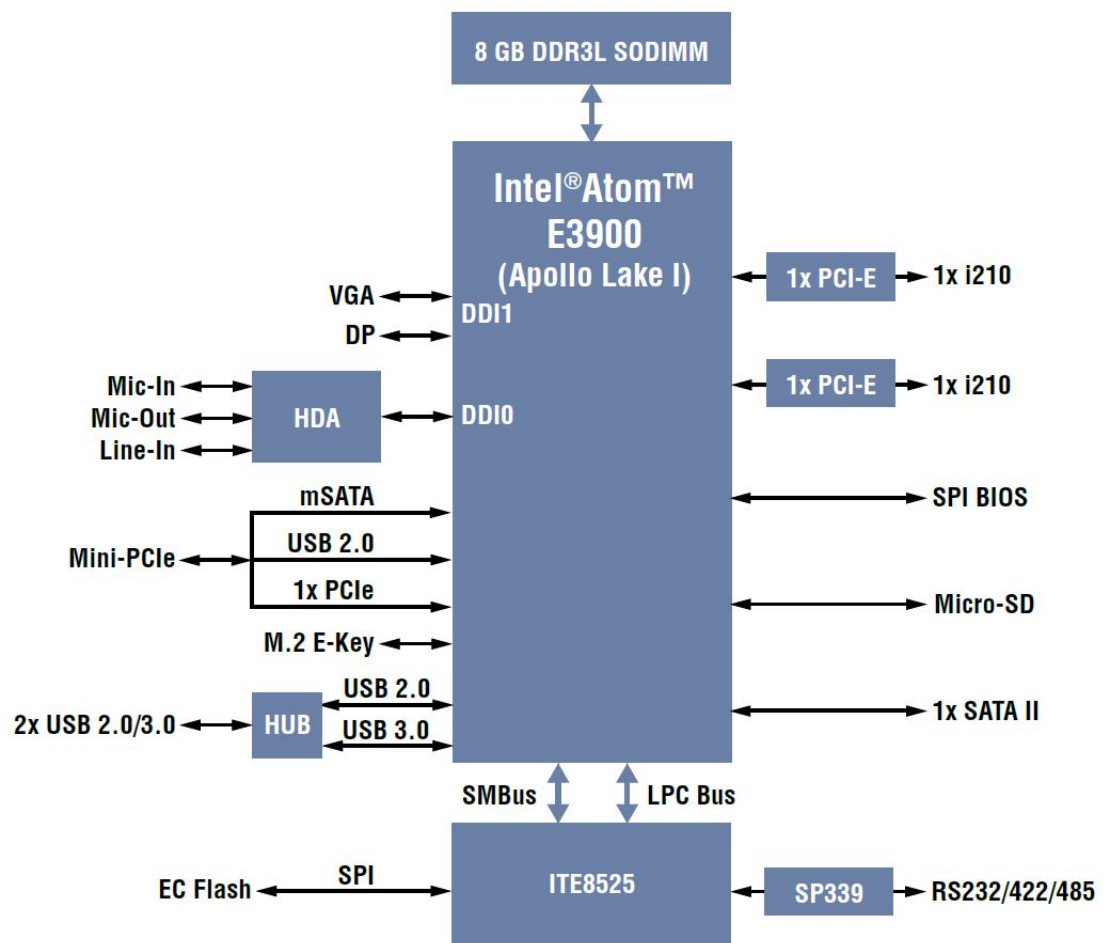
- Watchdog timer (WDT). Supports WDT function through software programming for enable/disable and interval setting, and a general system reset.

### Temperature

- Operating temperature: -20°C to +60°C (-4°F to +140°F), requires air-flow and high temperature grade DRAM; 10% to 90% relative humidity
- Storage temperature: -40°C to +85°C (-40°F to +185°F), 5% to 90% relative humidity

## 5. General Operation

### 5.1 System Block Diagram



## 6. Specifications

The SYS-ITX-N-3900 adheres to the following specifications and requirements.

| Electrical                                                                                                                                                  |                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| V <sub>CC</sub>                                                                                                                                             | 12 V DC ±5%, 15 watts (maximum)                                                                                                     |
| MTBF                                                                                                                                                        | 14.5 years                                                                                                                          |
| Battery: CR-2032                                                                                                                                            | Chemical System: Li/MnO <sub>2</sub><br>Nominal Voltage: 3 V<br>Rated Capacity: 225 mAh                                             |
| Mechanical                                                                                                                                                  |                                                                                                                                     |
| Mechanical Dimensions                                                                                                                                       | 5.9 x 5.9 x 2.1 in. (150 x 150 x 53 mm)                                                                                             |
| Weight                                                                                                                                                      | 2.9 lb. (1.3 kg)                                                                                                                    |
| Environmental                                                                                                                                               |                                                                                                                                     |
| Temperature                                                                                                                                                 | Operating: -20°C to +60°C (-4°F to +140°F)<br>Requires airflow and high temperature grade DRAM.                                     |
| Humidity (RH)                                                                                                                                               | Operating: 10% to 95% non-condensing                                                                                                |
| RoHS Compliant                                                                                                                                              | Yes                                                                                                                                 |
| Operating Systems                                                                                                                                           |                                                                                                                                     |
| Runs 64-bit Windows, Linux, and other x86-compatible operating systems. For a complete list, see Operating Systems (compatibility) in “Features” on page 6. |                                                                                                                                     |
| Chipsets and Drivers                                                                                                                                        |                                                                                                                                     |
| CPU Type                                                                                                                                                    | <b>Intel Atom CPU</b><br><b>E3950:</b> Up to 1.6 GHz L2 cache 2048 KB (2 MB)<br><b>E3940:</b> Up to 1.6 GHz L2 cache 2048 KB (2 MB) |
| BIOS                                                                                                                                                        | AMI BIOS ITX-N-3900                                                                                                                 |
| Memory                                                                                                                                                      | Up to 8 GB DDR3L (one socketed 1866/1600 MHz 204-pin SODIMM)                                                                        |
| VGA Card                                                                                                                                                    | On-board Intel HD graphics                                                                                                          |
| LAN Card                                                                                                                                                    | On-board Intel I210-IT gigabit network connection                                                                                   |
| LAN Card                                                                                                                                                    | On-board Intel I210-IT gigabit network connection #2                                                                                |
| Audio Card                                                                                                                                                  | On-board Realtek high definition audio                                                                                              |

## 7. Setup

Use the information in this section to install the SYS-ITX-N-3900. Refer to “Configuration” on page 12 to locate and identify the connectors outlined in this section.

### 7.1 Installation and Connections

1. Connect a compatible monitor to the VGA output (J9), or the DisplayPort output (J3).
2. Connect a USB keyboard to either of the two USB ports at J6.
3. Plug in the boot media of your preference. The options are:
  - SATA (J21)
  - mSATA (J16)
  - USB (J6)
4. If using a battery, connect the battery to J15.
5. Connect an Ethernet cable to a port at J4/J5 (as available).

### 7.2 Power Up

Plug in a compatible +12 V DC power source at J1. The first time power is applied, the SYS-ITX-N-3900 boots automatically, bypassing the power button (SW1). After initial startup, briefly press the power button to turn the SYS-ITX-N-3900 on and off or press and hold it to reset.

### 7.3 Driver Installation

The information in this section helps you to configure an operating system's driver for use with the on-board PCI devices of the SYS-ITX-N-3900. Drivers and documentation are available on the WINSYSTEMS website at <https://www.winsystems.com/> or by contacting a Application Engineer at +1-817-274-7553.

#### 7.3.1 Chipset Component Driver

The SYS-ITX-N-3900 uses the Intel Apollo Lake-I SOC. Older operating systems might not be able to recognize this chip. For compatibility issues with older Windows Operating Systems such as Windows 8, make sure to install the Apollo Lake-I SOC chipset component driver (INF) before any other driver.

## 7.4 Watchdog Timer (WDT)

The SYS-ITX-N-3900 features an advanced watchdog timer (WDT) that can be used to guard against software lockups. The timer is programmable from 1 second to 255 minutes (15,300 seconds).

**NOTE** Use a long timeout if the watchdog timer is enabled and booting to an operating system.

Use the following example as a guide to programming the WDT.

### 7.4.1 Example Code for WDT

The ITX-N-3900 features a programmable WDT. The following WDT code example is written in C. Use this example as a guide to program the WDT. Example C/C++ applications are available in the WDT System Management package.

**NOTE** The WDT System Management package is available upon request from WINSYSTEMS (see contact information in the Introduction section on page 1).

The SYS-ITX-N-3900 features a programmable WDT. The following WDT code example is written in C++. Use this example as a guide to program the WDT.

```

#define WDTCFG 0x06// WDT Timer Counter Register
#define WDTMIN 0x07// WDT Timer Counter Register (Minute)
#define WDTSEC 0x08// WDT Timer Counter Register (Second)
#define EC_IOPort 0xE300// Default, reference to BIOS configuration

VOID Write_EC_SRAM(UINT8 Offset,UINT8 Value){

IoWrite8(EC_IOPort+Offset,Value);
}

Byte Read_EC_SRAM(UINT8 Offset){ IoRead8(EC_IOPort+offset,Value);
return Value;
}

void WDT()

{
// Enable WDT 30sec Write_EC_SRAM(WDTSEC,30);
Write_EC_SRAM(WDTCFG,0x01);//Bit0: WDT Enable, BIT1: 0:Second Mode

// Enable WDT 5min Write_EC_SRAM(WDTSEC,5);
Write_EC_SRAM(WDTCFG,0x03);//Bit0: WDT Enable, BIT1: 1:Minute Mode

// Enable WDT 10min, 20sec Write_EC_SRAM(WDTSEC,20);
Write_EC_SRAM(WDTSEC,10);
Write_EC_SRAM(WDTCFG,0x03);//Bit0: WDT Enable, BIT1: 1:Minute Mode
}

```

## 7.5 Reset CMOS BIOS Configuration

Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable or disable the Clear CMOS Function hardware circuit, by placing or removing the jumper from JP3 as needed. See “Reset CMOS BIOS Configuration” on page 48 for usage.

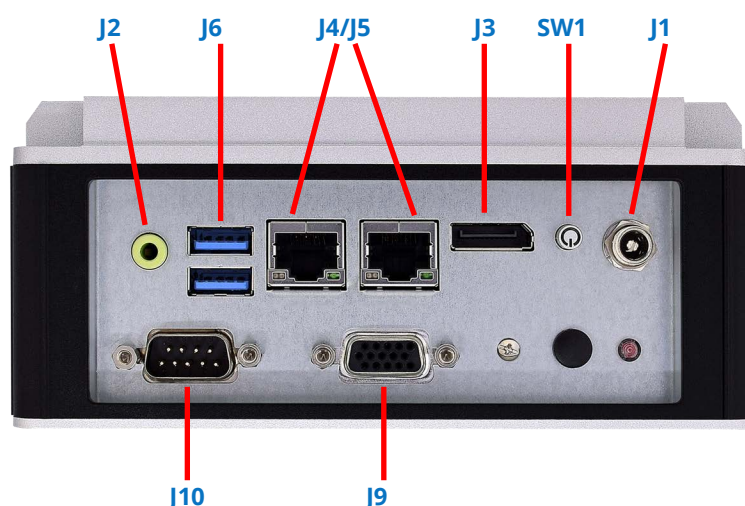
# 8. Configuration

This section describes the SYS-ITX-N-3900 components and configuration.

## 8.1 Component Layout

### 8.1.1 Rear Panel Connectors

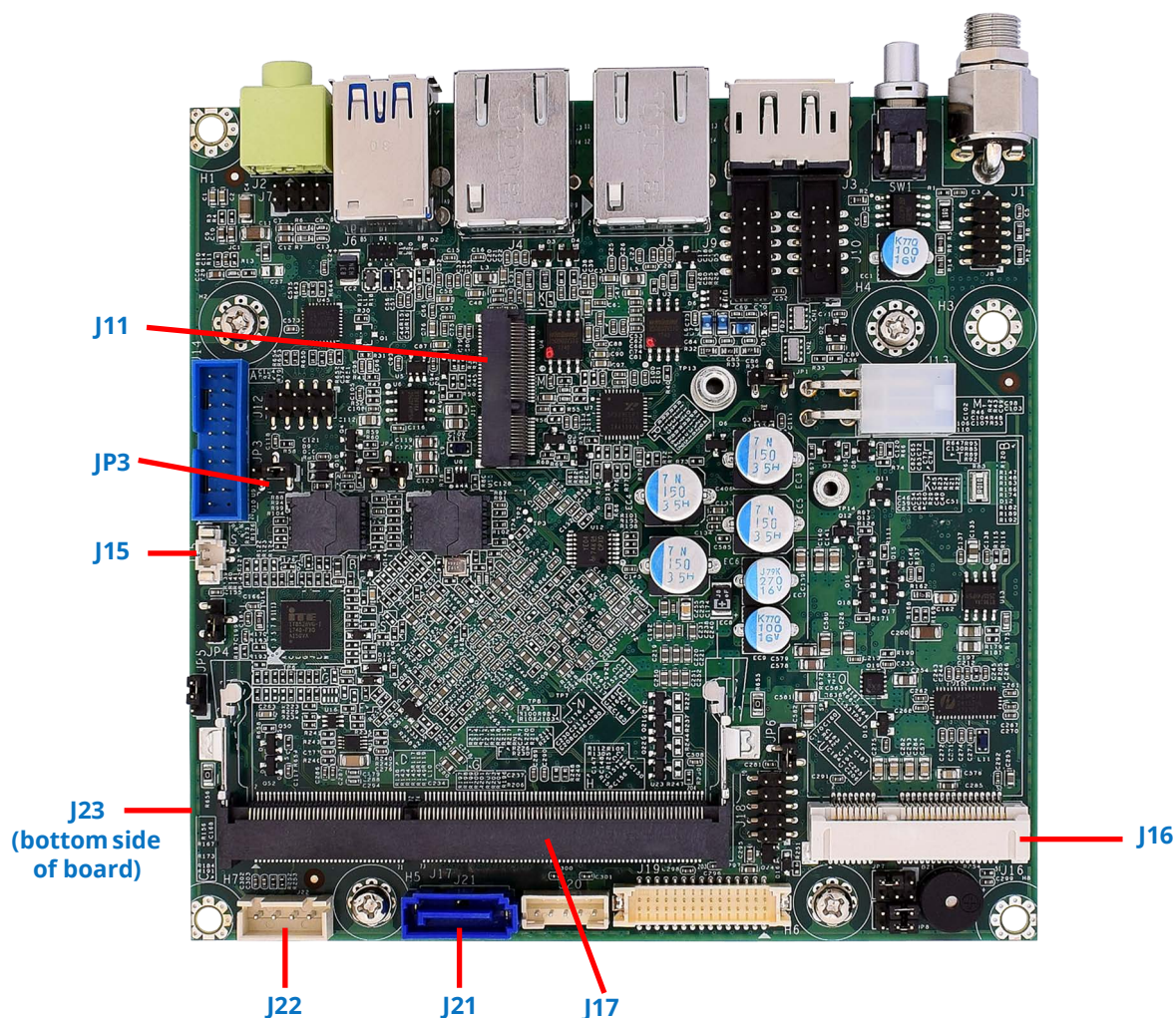
Rear panel connectors provide common external connections.



The following table provides connector descriptions and references for the rear panel, illustrated in the figure above.

| Item  | Type      | Description             | Reference               |
|-------|-----------|-------------------------|-------------------------|
| J1    | Connector | DC Jack                 | <a href="#">page 14</a> |
| J2    | Connector | Audio Jack (Line_out)   | <a href="#">page 14</a> |
| J3    | Connector | DisplayPort             | <a href="#">page 14</a> |
| J4/J5 | Connector | RJ45 Connector          | <a href="#">page 14</a> |
| J6    | Connector | USB 3.1 Gen 1 Connector | <a href="#">page 15</a> |
| J9    | Connector | VGA Connector           | <a href="#">page 16</a> |
| J10   | Connector | RS232/422/485 Connector | <a href="#">page 15</a> |
| SW1   | Switch    | Power Switch            | <a href="#">page 16</a> |

## 8.1.2 Top View Connectors



The following table provides connector descriptions and references for the top of the board, illustrated in the figure above.

| Item | Type      | Description                     | Reference               |
|------|-----------|---------------------------------|-------------------------|
| J11  | Connector | M.2 key E Socket                | <a href="#">page 16</a> |
| J15  | Connector | Battery Connector               | <a href="#">page 16</a> |
| J16  | Connector | mSATA/Mini PCIe Socket          | <a href="#">page 17</a> |
| J17  | Connector | DDR3 SODIMM Socket              | <a href="#">page 17</a> |
| J21  | Connector | 2.5-inch SATA HDD/SSD Connector | <a href="#">page 17</a> |
| J22  | Connector | SATA Power Header               | <a href="#">page 18</a> |
| J23  | Connector | Micro SD Card Socket            | <a href="#">page 18</a> |
| JP3  | Jumper    | CMOS Clear                      | <a href="#">page 18</a> |

## 8.2 Power

The main power supply to the embedded computer is +12 V DC. The SYS-ITX-N-3900 draws power through the J1 connector. See “DC Jack (J1)” on page 14.

## 8.3 Connectors

### 8.3.1 DC Jack (J1)

This connector provides for a +12 V DC input from a power adapter.

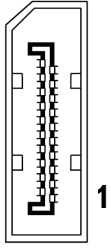
### 8.3.2 Audio Jack (Line\_out) (J2)

This connector provides an audio line out (Line\_out) signal.

### 8.3.3 DisplayPort (J3)

The DisplayPort™ 1.1 connector supplies both video and high-definition (HD) audio. See the “Audio Jack (Line\_out) (J2)” on page 14 for other audio options.

#### Layout and Pin Reference

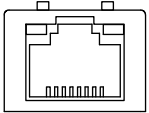
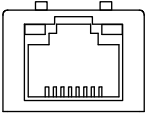
|                                                                                     | Pin | Name          | Description                  | Pin | Name          | Description                        |
|-------------------------------------------------------------------------------------|-----|---------------|------------------------------|-----|---------------|------------------------------------|
|  | 1   | ML_Lane 0 (p) | Lane 0 (positive)            | 2   | GND           | Ground                             |
|                                                                                     | 3   | ML_Lane 0 (n) | Lane 0 (negative)            | 4   | ML_Lane 1 (p) | Lane 1 (positive)                  |
|                                                                                     | 5   | GND           | Ground                       | 6   | ML_Lane 1 (n) | Lane 1 (negative)                  |
|                                                                                     | 7   | ML_Lane 2 (p) | Lane 2 (positive)            | 8   | GND           | Ground                             |
|                                                                                     | 9   | ML_Lane 2 (n) | Lane 2 (negative)            | 10  | ML_Lane 3 (p) | Lane 3 (positive)                  |
|                                                                                     | 11  | GND           | Ground                       | 12  | ML_Lane 3 (n) | Lane 3 (negative)                  |
|                                                                                     | 13  | CONFIG1       | CONFIG1                      | 14  | CONFIG2       | CONFIG2                            |
|                                                                                     | 15  | AUX_CH (p)    | Auxiliary Channel (positive) | 16  | GND           | Ground                             |
|                                                                                     | 17  | AUX_CH (n)    | Auxiliary Channel (negative) | 18  | Hot Plug      | Hot Plug Detect                    |
|                                                                                     | 19  | RETURN        | Return for Power             | 20  | DP_PWR        | Power for connector (3.3 V 500 mA) |

### 8.3.4 RJ45 Connector (J4/J5)

Two Intel I210-IT Gigabit Ethernet controllers provide standard IEEE 1588 and 802.1AS protocol time-stamping. Each Ethernet interface includes 10/100/1000 MP/s multispeed, full, and half-duplex operation.

The pinout below describes the standard RJ45 Ethernet connectors.

## Layout and Pin Reference

| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <b>J5</b><br/>  </div> <div style="text-align: center;"> <b>J4</b><br/> <br/> <b>8 1</b> </div> </div> |          |                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| Pin                                                                                                                                                                                                                                                                                                                                                                                         | Function | Description          |
| 1                                                                                                                                                                                                                                                                                                                                                                                           | TX_D1+   | Transceive Data+     |
| 2                                                                                                                                                                                                                                                                                                                                                                                           | TX_D1-   | Transceive Data-     |
| 3                                                                                                                                                                                                                                                                                                                                                                                           | RX_D2+   | Receive Data+        |
| 4                                                                                                                                                                                                                                                                                                                                                                                           | BI_D3+   | Bi-Directional Data+ |
| 5                                                                                                                                                                                                                                                                                                                                                                                           | BI_D3-   | Bi-Directional Data- |
| 6                                                                                                                                                                                                                                                                                                                                                                                           | RX_D2-   | Receive Data-        |
| 7                                                                                                                                                                                                                                                                                                                                                                                           | BI_D4+   | Bi-Directional Data+ |
| 8                                                                                                                                                                                                                                                                                                                                                                                           | BI_D4-   | Bi-Directional Data- |

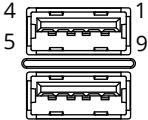
On-board Ethernet activity LEDs are built into the connectors at J4 and J5. There is one green LED (left) and one bi-color green/yellow LED (right).

| LED   | Activity         | Ethernet Status  |
|-------|------------------|------------------|
| Left  | Off              | No Link          |
|       | Flashing (green) | Linked           |
| Right | Off              | No Link          |
|       | Off              | Linked at 10 MB  |
|       | On (yellow)      | Linked at 100 MB |
|       | On (green)       | Linked at 1 GB   |

### 8.3.5 USB 3.1 Gen 1 Connector (J6)

J6 provides two USB 3.1 Gen 1 Type A connectors.

#### Pin Reference

| <div style="text-align: center;">  </div> |             |     |             |
|------------------------------------------------------------------------------------------------------------------------------|-------------|-----|-------------|
| Pin                                                                                                                          | Description | Pin | Description |
| 1                                                                                                                            | USBVCC      | 6   | RX+         |
| 2                                                                                                                            | D-          | 7   | GND         |
| 3                                                                                                                            | D+          | 8   | TX-         |
| 4                                                                                                                            | GND         | 9   | TX+         |
| 5                                                                                                                            | RX-         |     |             |

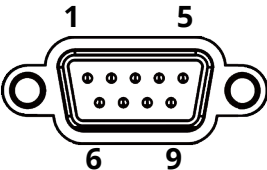
### 8.3.6 VGA Connector (J8)

Standard full size 15-pin VGA connector.

### 8.3.7 RS232/422/485 Connector (J10)

This DB9 connector provides access to the SYS-ITX-N-3900 serial port (RS232/422/485) at J10. This DB9 connector provides a serial port connection and is switched by BIOS.

#### Layout and Pin Reference

|  |       |       |        |
|-----------------------------------------------------------------------------------|-------|-------|--------|
| Pin                                                                               | RS232 | RS422 | RS485  |
| 1                                                                                 | DCD#  | T-    | RX/TX- |
| 2                                                                                 | RXD#  | T+    | RX/TX+ |
| 3                                                                                 | TXD#  | R+    | N/A    |
| 4                                                                                 | DTR#  | R-    | N/A    |
| 5                                                                                 | GND   | GND   | GND    |
| 6                                                                                 | DSR#  | N/A   | N/A    |
| 7                                                                                 | RTS#  | N/A   | N/A    |
| 8                                                                                 | CTS#  | N/A   | N/A    |
| 9                                                                                 | RI#   | N/A   | N/A    |
| 10                                                                                | N/A   | N/A   | N/A    |

### 8.3.8 M.2 key E Socket (J11)

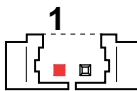
The SYS-ITX-N-3900 provides a 2230 M.2 key E Socket to support a variety of peripherals as available in this format.

### 8.3.9 Battery Connector (J15)

An optional external battery, connected to J15, supplies the SYS-ITX-N-3900 board with standby power for the real-time clock and CMOS setup RAM.

A power supervisory circuit contains the voltage sensing circuit and an internal power switch to route the battery or standby voltage to the circuits selected for backup. The battery automatically switches on when the  $V_{CC}$  of the systems drops below the battery voltage and off when  $V_{CC}$  returns to normal.

### Layout and Pin Reference

|  |                 |
|-----------------------------------------------------------------------------------|-----------------|
| Pin                                                                               | Name            |
| 1                                                                                 | Battery Voltage |
| 2                                                                                 | Ground          |

#### 8.3.10 mSATA/Mini PCIe Socket (J16)

The SYS-ITX-N-3900 provides a Mini-PCIe socket to support a variety of peripherals as available in this format. The socket alternatively supports a mSATA device in this socket. Select mSATA, or Mini-PCIe in the BIOS to support your specific expansion device.

#### 8.3.11 DDR3 SODIMM Socket (J17)

Connector J17 is a SODIMM 204-pin DDR3L compatible socket, accommodating a maximum of 8 GB RAM at 1333 MHz/1600 MHz/1866 MHz.

#### 8.3.12 2.5-inch SATA HDD/SSD Connector (J21)

The bootable SATA III (SATA 6 Gb/s) interface is located at J21. WINSYSTEMS offers CBL-SATA-701-20 for this connector.

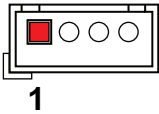
### Layout and Pin Reference

|  | Pin | Name |
|-------------------------------------------------------------------------------------|-----|------|
|                                                                                     | 1   | GND  |
|                                                                                     | 2   | RX1+ |
|                                                                                     | 3   | RX1- |
|                                                                                     | 4   | GND  |
|                                                                                     | 5   | TX1- |
|                                                                                     | 6   | TX1+ |
|                                                                                     | 7   | GND  |

### 8.3.13 SATA Power Header (J22)

Power is supplied to the SATA device via the connector at J22.

#### Layout and Pin Reference



| Pin | Name   |
|-----|--------|
| 1   | +12 V  |
| 2   | Ground |
| 3   | Ground |
| 4   | +5 V   |

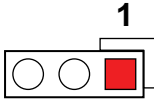
### 8.3.14 MicroSD Card Socket (J23)

The SYS-ITX-N-3900 provides a MicroSD card socket for storage only. The MicroSD cannot be used as a bootable device for Windows.

## 8.4 Jumpers and Switches

### 8.4.1 CMOS Clear (JP3)

Clear CMOS using this jumper (JP3). See “Reset CMOS BIOS Configuration” on page 48 for usage of this jumper.



| JP7/JP8   | Function                   |
|-----------|----------------------------|
| 1-2 Short | Normal Operation (Default) |
| 2-3 Short | Clear CMOS Contents        |

### 8.4.2 Power Button (SW1)

The power button (SW1), located next to J1, controls power to the SYS-ITX-N-3900. The first time you connect power to J1, the power button is bypassed and the embedded computer powers up automatically. See “Rear Panel Connectors” on page 12 for switch location.

After the initial power up, press **SW1** briefly to power the unit on or off, depending on the present state.

If the unit accidentally locks up and is unresponsive, press and hold **SW1** for four (4) seconds to perform a hard restart.

## 9. BIOS Settings

### 9.1 General Information

The SYS-ITX-N-3900 includes a BIOS from AMI stored in Flash ROM. Access setup information through the BIOS setup utility to modify basic system configuration. The configuration is stored in CMOS RAM (it is retained during power-off). When power is applied to the system, the SYS-ITX-N-3900 communicates with peripheral devices and checks hardware resources against the configuration information stored in the CMOS memory. If during startup an error is detected or the CMOS parameters need to be initially defined, the diagnostic program prompts the user to enter the SETUP program. Some errors are significant enough to cause the startup to fail.

### 9.2 Entering Setup

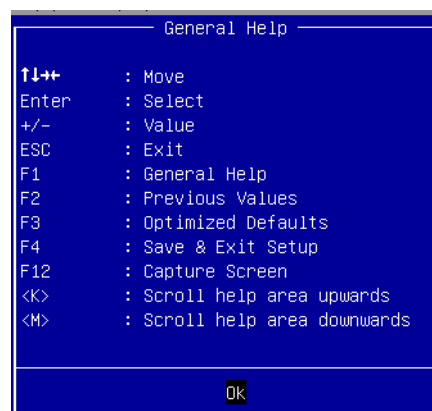
To enter setup, apply power to the computer and then press the **Delete** key or the **ESC** key. Either of these keys must be pressed when either the splash screen is displayed (during the system power-on self test, POST) or when the following prompt message is displayed. It may take a few seconds before the main setup menu screen is displayed.

**Prompt Message:** Press <Delete> or <ESC> to enter SETUP

If the above message disappears before you respond and you can still to enter Setup by pressing the **RESET** button to restart the system. Alternatively, you can restart the system by simultaneously pressing the **CTRL**, **ALT**, and **DELETE** keys on the keyboard.

**Prompt message:** Press <F1> to Run General Help or Resume

At the above prompt, the BIOS setup program can provide 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.



## 9.3 Navigating the Menus

Use the up and down arrow keys to move among the selections and press **Enter** when a selection is highlighted to enter a sub-menu or to see a list of choices. See “BIOS Screens” on page 20 for available options.

## 9.4 BIOS Screens

The following BIOS screens contain the options and sample settings for the SYS-ITX-N-3900. Your actual configuration may differ from the screens shown here.



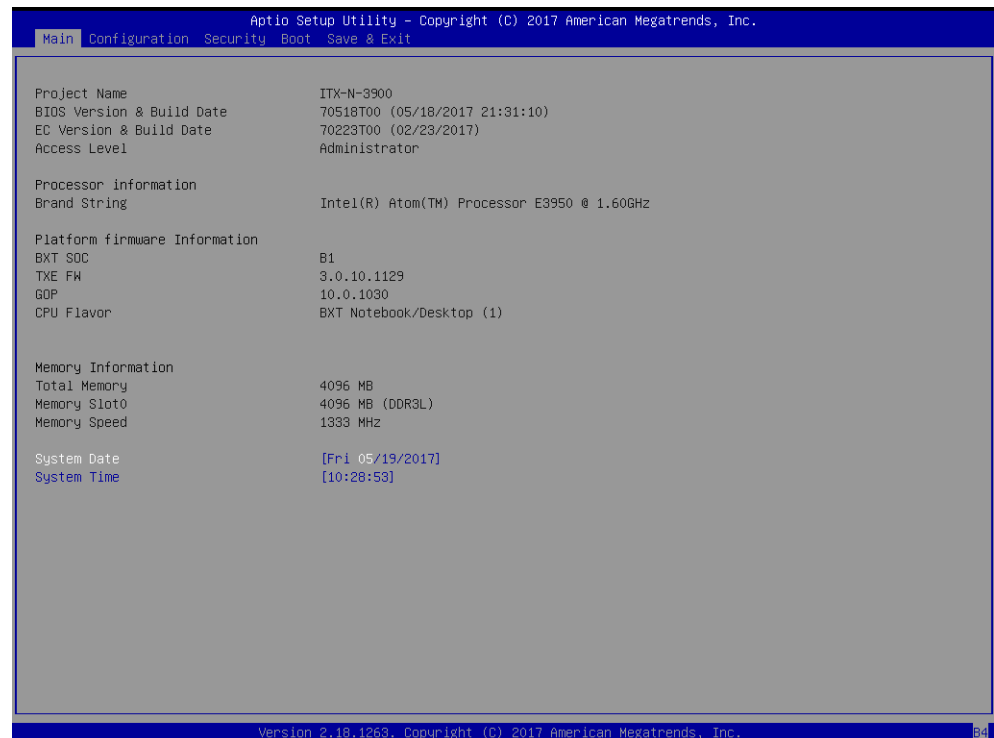
### Warning

Assigning incorrect values to items on the following screen menus may cause system malfunction.

**NOTE** Use care when modifying BIOS settings.

## Main

Use this screen to review basic system information and adjust system date and time.

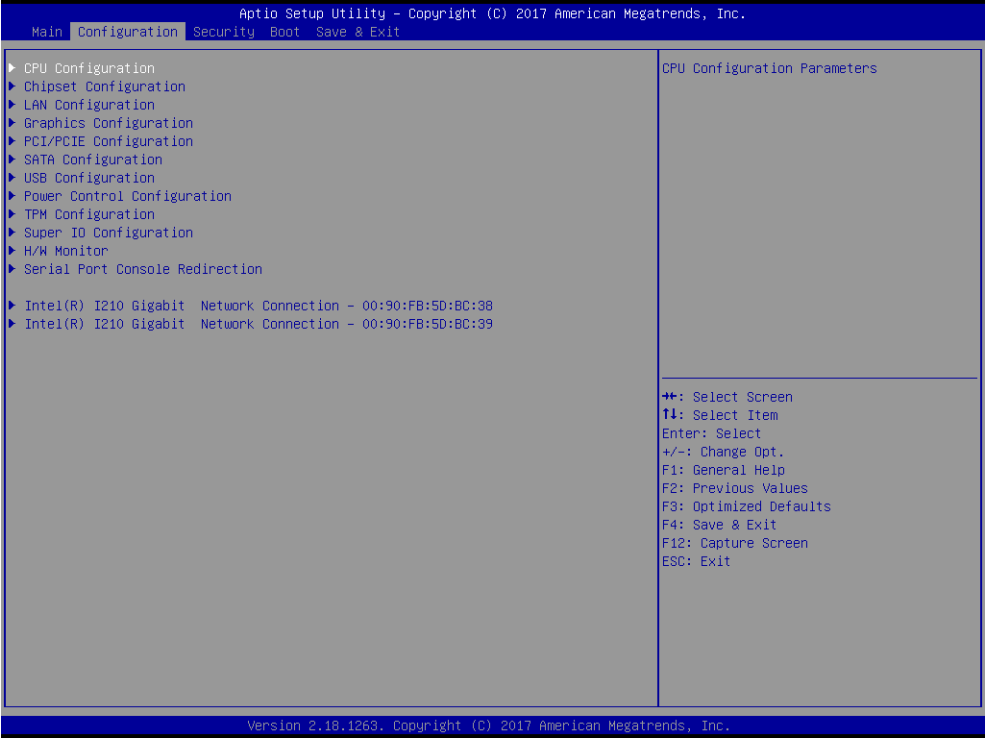


| Menu item          | Description                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Information | System information parameters provide information and vary with BIOS version and the specific modules used.                                                                                                                                                                                                                                       |
| System Date        | Displays the current date in MM/DD/YYYY format. To set or change the date, highlight the row using the up/down arrow keys, then highlight the month, day, or year by pressing <b>Enter</b> until the desired value is highlighted with a square block. Use the +/- keys to change the highlighted value, or enter the time using the number keys. |
| System Time        | Displays the current time in HH/MM/SS format. To set or change the time, highlight the row using the up/down arrow keys, then highlight the hour, minute, or second by pressing <b>Enter</b> until the desired value is highlighted with a square block. Use the +/- keys to change the highlighted value.                                        |

## Configuration

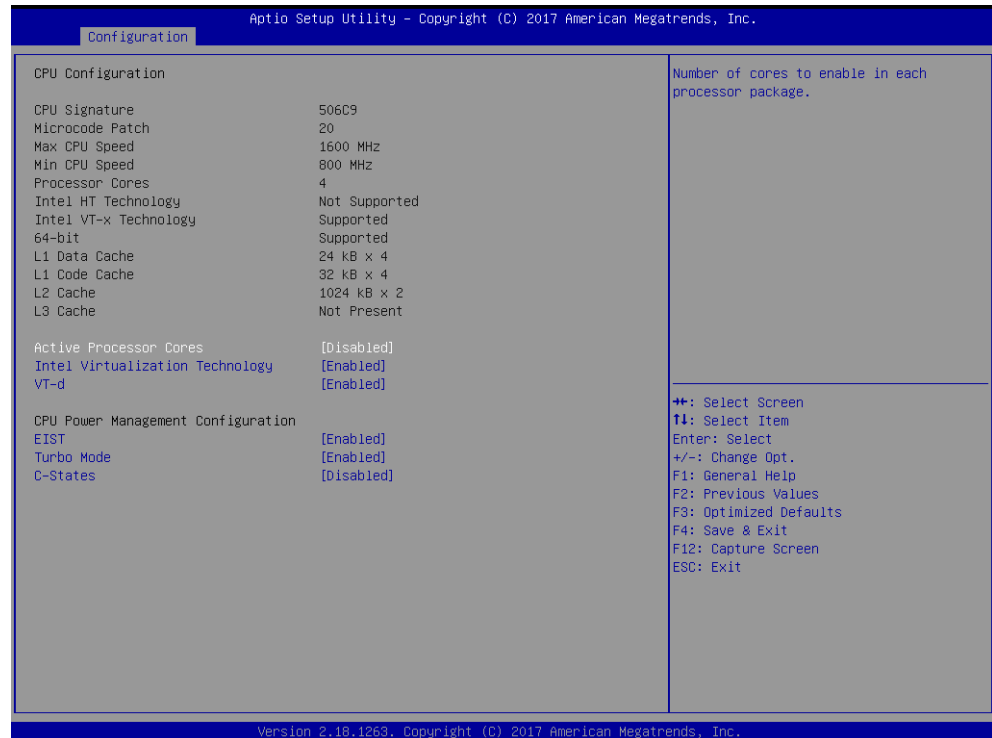
Use this screen to set enhanced configuration features (see the following sections for specifics):

- "CPU Configuration" on page 23
- "Chipset Configuration" on page 24
- "LAN Configuration" on page 25
- "Network Stack" on page 26
- "Graphics Configuration" on page 27
- "eDP-to-LVDS Configuration" on page 28
- "PCI/PCIE Configuration" on page 29
- "PCI Express Root Port 5" on page 30
- "PCI Express Root Port 6" on page 31
- "SATA Configuration" on page 32
- "USB Configuration" on page 33
- "Power Control Configuration" on page 35
- "TPM Configuration" on page 36
- "Super IO Configuration" on page 37
- "H/W Monitor Configuration" on page 38
- "Serial Port Console Redirection" on page 39
- "Console Redirection Settings (COM0)" on page 40
- "Intel I210-IT Gigabit Network Connections 1 and 2" on page 42
- "NIC Configuration" on page 43



## CPU Configuration

Use this screen to configure the specific active cores and advanced processor management technologies.



**Active Processor Cores:** The number of cores to enable in each processor package. Choices: Disabled (Default), Enabled

**Active Processor Cores [Enabled]:** Choices:

**Core 0:** Enabled (Default)

**Core 1:** Enabled (Default), Disabled

**Core 2:** Enabled (Default), Disabled

**Core 3:** Enabled (Default), Disabled

**Intel Virtualization Technology:** When enabled, a VMM can use the additional hardware capabilities provided by Vanderpool Technology. Choices: Enabled (Default), Disabled

**VT-d:** Enable/disable CPU VT-d. Choices: Enabled (Default), Disabled

**EIST:** Enable/disable Intel SpeedStep. Choices: Enabled (Default), Disabled

**EIST [Enabled]**

**Turbo Mode:** Enable/disable turbo mode. Choices: Enabled (Default), Disabled

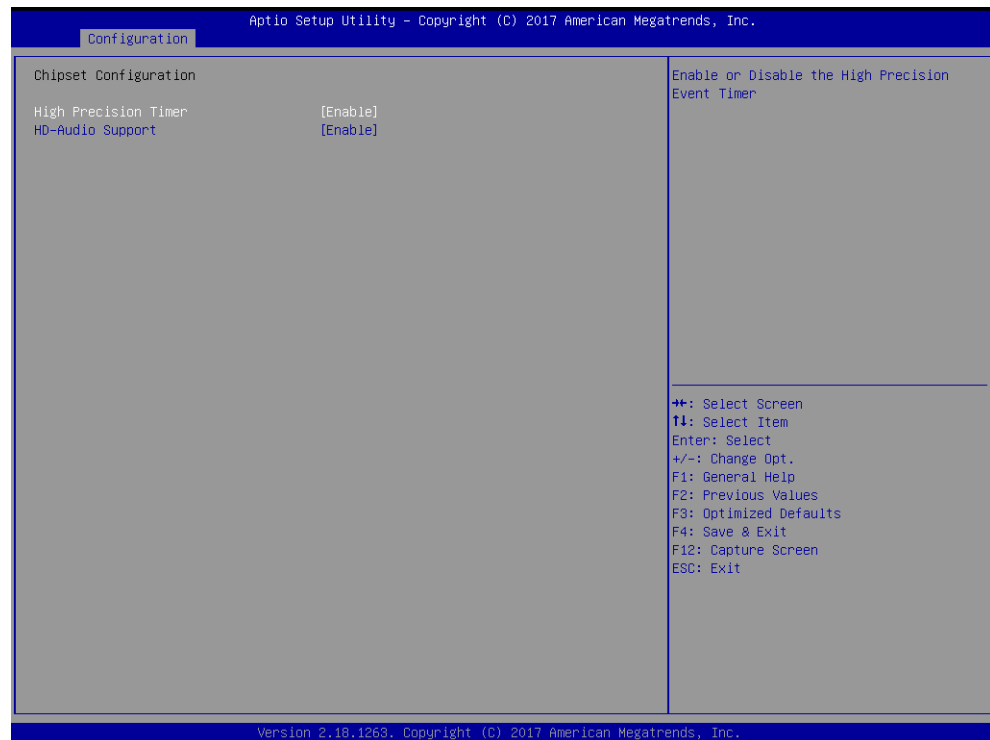
**CPU C-states:** Enable/disable CPU C states. Choices: Disabled (Default), Enabled

### **CPU C-states [Enabled]**

**Enhanced C-states:** Enable/disable C1E. When enabled, CPU switches to minimum speed when all cores enter C-State. Choices: Enabled (Default), Disabled

## **Chipset Configuration**

Use this screen to configure the timer and audio features.

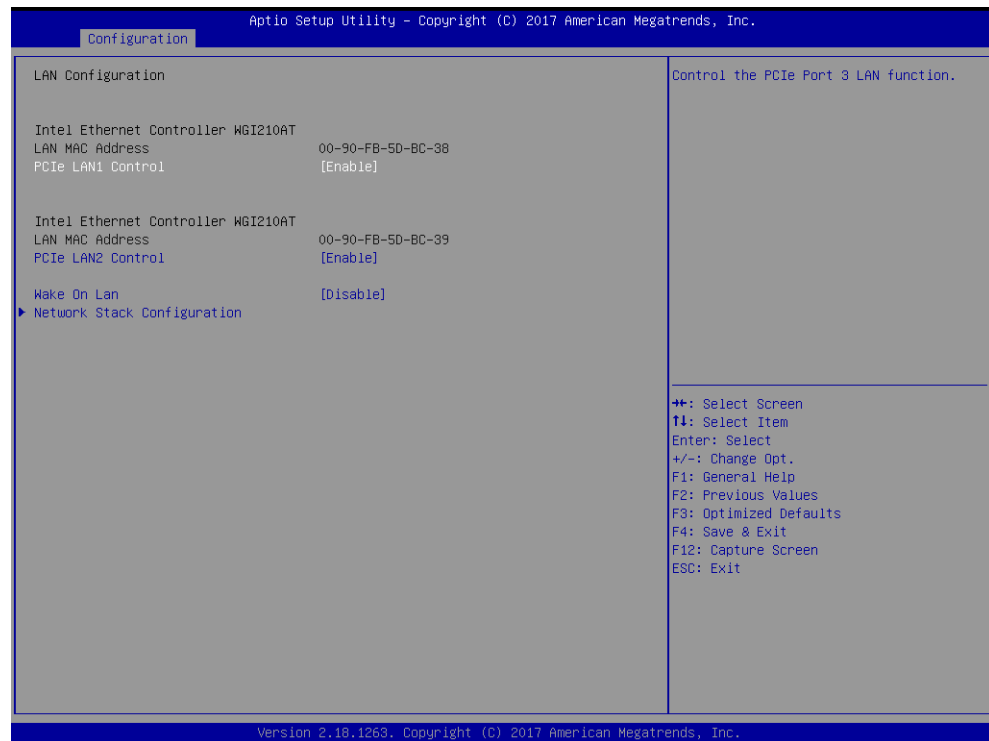


**High Precision Timer:** Enable/disable the high precision event timer. Choices: Enabled (Default), Disabled

**HD-Audio Support:** Enable/disable HD-Audio support. Choices: Enabled (Default), Disabled

## LAN Configuration

Use this screen to configure the onboard LAN.



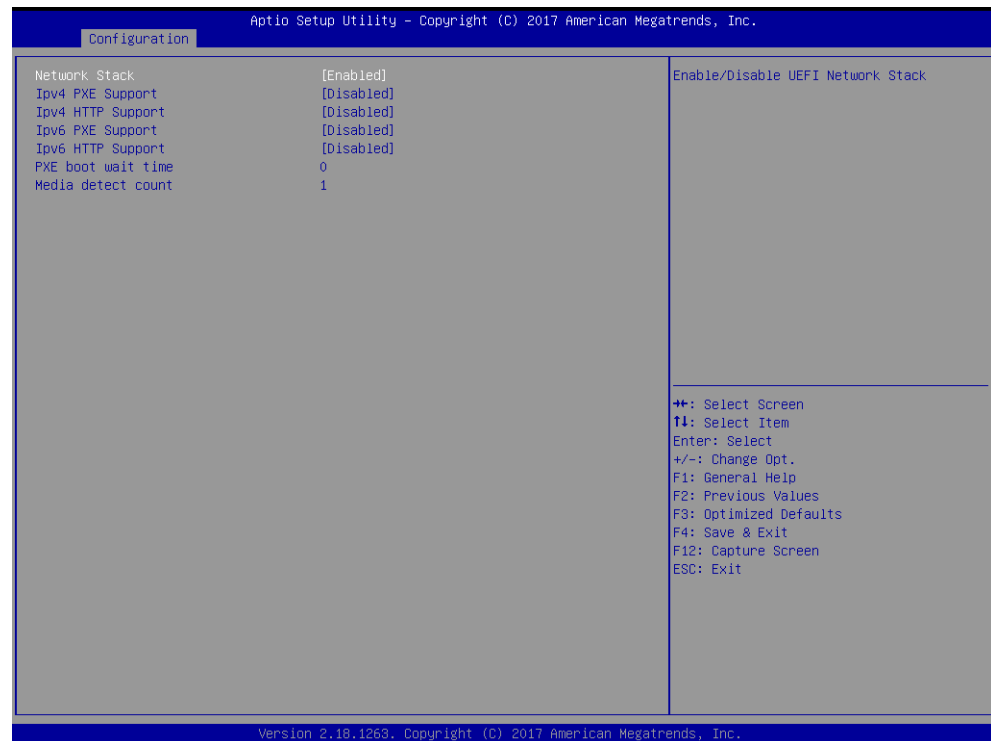
**PCIe LAN1 Control:** Control the PCIe Port 3 LAN function. Choices: Enabled (Default), Disabled

**PCIe LAN2 Control:** Control the PCIe Port 4 LAN function. Choices: Enabled (Default), Disabled

**Wake on LAN:** Enable/disable the Wake on LAN. Choices: Disabled (Default), Enable

## Network Stack

Use this screen to configure the network stack.



**Network Stack:** Enable/disable UEFI network stack. Choices: Disabled (Default), Enable

### Network Stack [Enable]

**Ipv4 PXE Support:** Enable Ipv4 PXE boot support. If disabled Ipv4 PXE boot option is not created. Choices: Disabled (Default), Enabled

**Ipv4 HTTP Support:** Enable Ipv4 HTTP boot support. If disabled Ipv4 HTTP boot option is not created. Choices: Disabled (Default), Enabled

**Ipv6 PXE Support:** Enable Ipv6 PXE boot support. If disabled Ipv6 PXE boot option is not created. Choices: Disabled (Default), Enabled

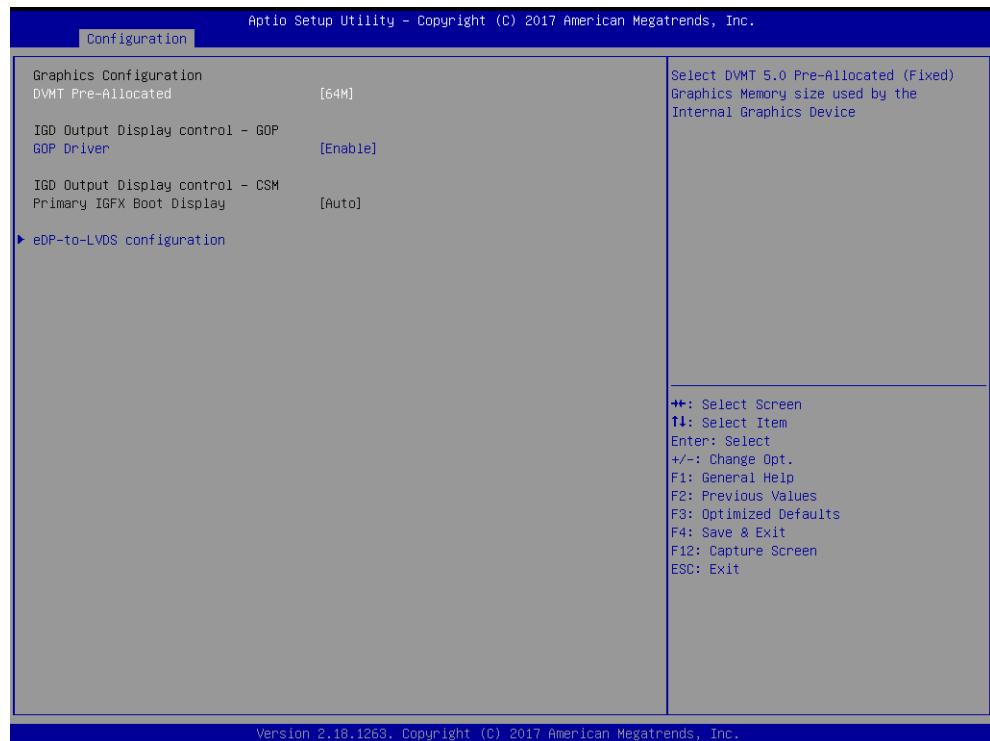
**Ipv6 HTTP Support:** Enable Ipv6 HTTP boot support. If disabled Ipv6 HTTP boot option is not created. Choices: Disabled (Default), Enabled

**PXE boot wait time:** Specify wait time to press ESC key to abort the PXE boot. Choices: 0 (Default), 1, 2, 3, 4, 5

**Media detect count:** Specify number of times presence of media is checked. Choices: 1 (Default), maximum 50

## Graphics Configuration

Use this screen to configure the onboard graphics features.



### DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the internal graphics device. Choices: 64M (Default), 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M

### IGD Output Display control – GOP (Boot item CSM Support [Disabled])

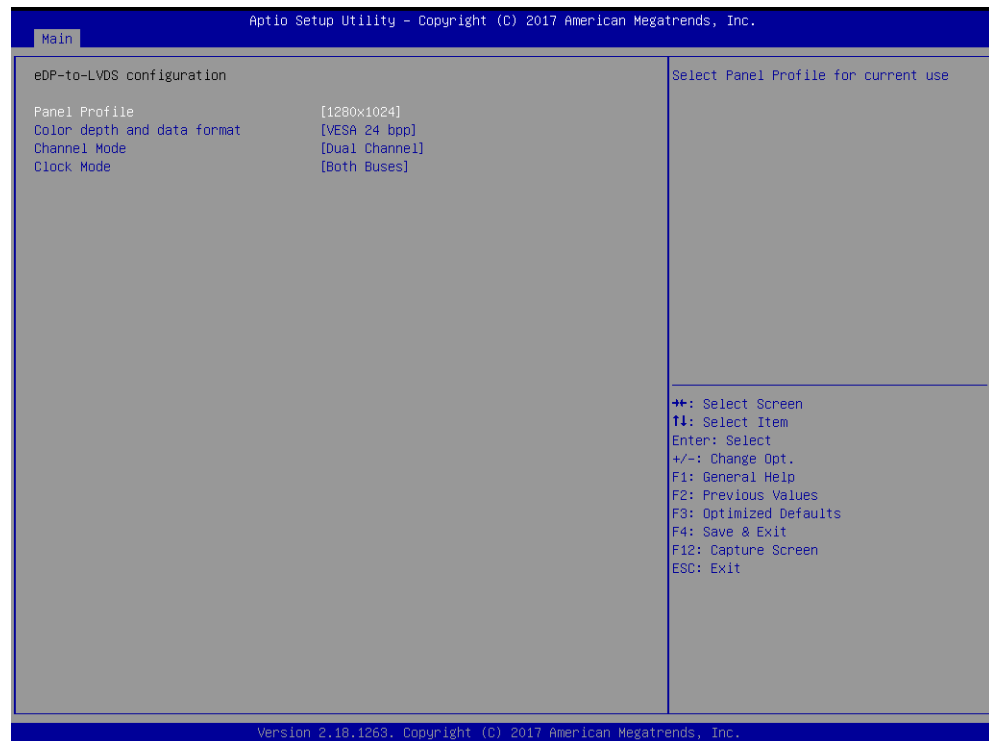
**GOP Driver:** Enable/disable GOP driver. Enable unloads VBIOS; disable loads VBIOS. Choices: Enabled (Default), Disabled

### IGD Output Display control – CSM (Boot item CSM Support [Enabled])

**Primary IGFX Boot Display:** Select the video device that is activated during POST. This has no effect if external graphics present. Secondary boot display selection appears based on your selection. VGA mode is supported only on the primary display. Choices: Auto (Default), VGA, LVDS, DP

## eDP-to-LVDS Configuration

Use this screen to configure the eDP-to-LVDS graphics.



**Panel Profile:** Select panel profile for current use. Choices: 1280x1024 (Default), 640x480, 800x480, 800x600, 1024x768, 1280x800, 1280x1024, 1366x768, 1440x900, 1920x1080, OEM Profile

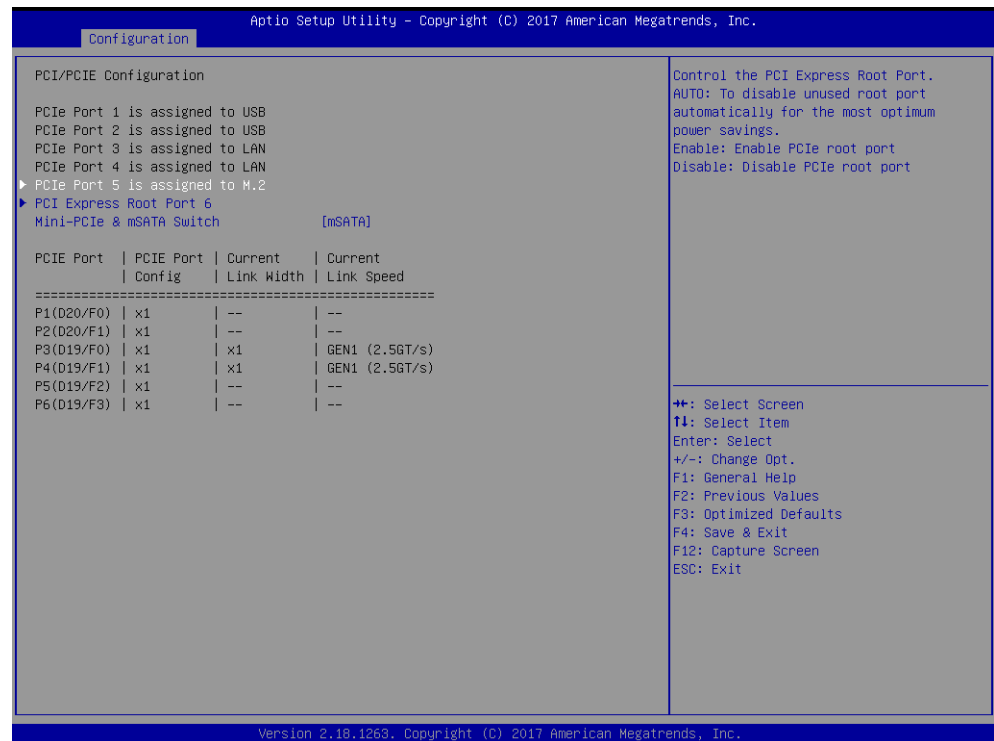
**Color depth and data format:** Select color depth and data format: Choices: VESA 24 bpp (Default), JEIDA 24 bpp, VESA and JEIDA 18 bpp,

**Channel Mode:** Select LVDS channel mode. Choices: Dual channel (Default), Single channel

**Clock Mode:** Select clock output for LVDS. Choices: Both Bus (Default), Even Bus, Odd Bus

## PCI/PCIE Configuration

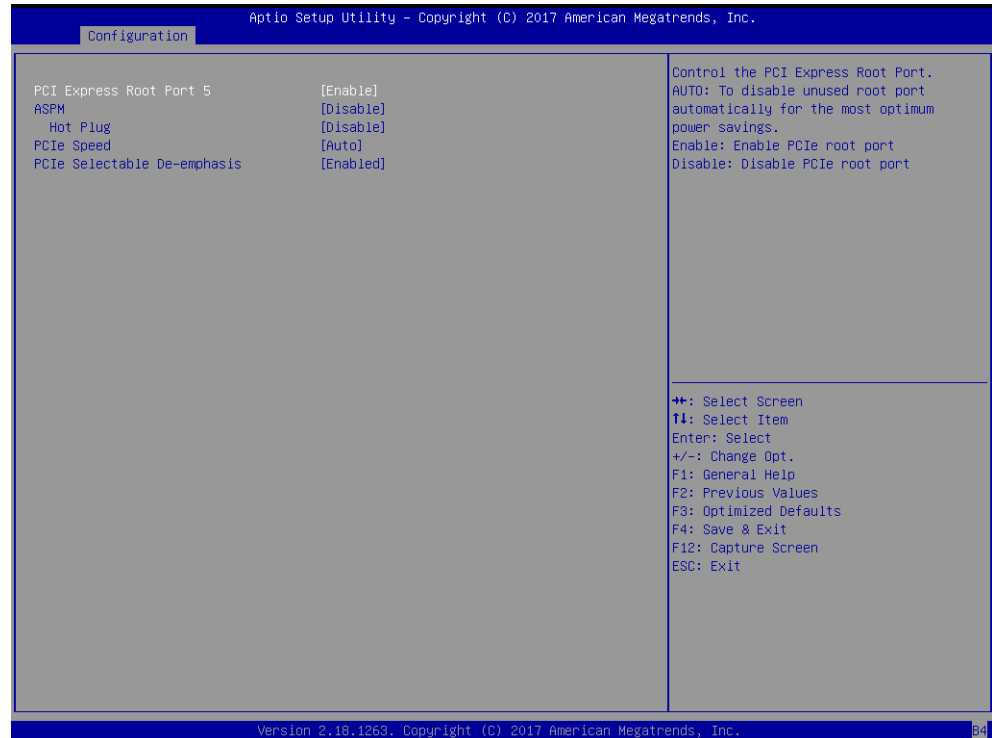
Use this screen to select mSATA or Mini-PCle.



**Mini-PCle & mSATA Switch:** Choices: mSATA (Default), Mini-PCle

## PCI Express Root Port 5

Use this screen to enable and configure the PCIe Port 5 assigned to M.2 parameters.



**PCI Express Root Port 5:** Controls the PCI express root port. AUTO: To disable unused root port automatically for the most optimum power savings. Choices: Enable (Default, Enable PCIe Root port), Disable (Disable PCIe root port)

**ASPM:** PCI express active state power management settings. Choices: Disable (Default), L0s, L1, L0sL1, Auto

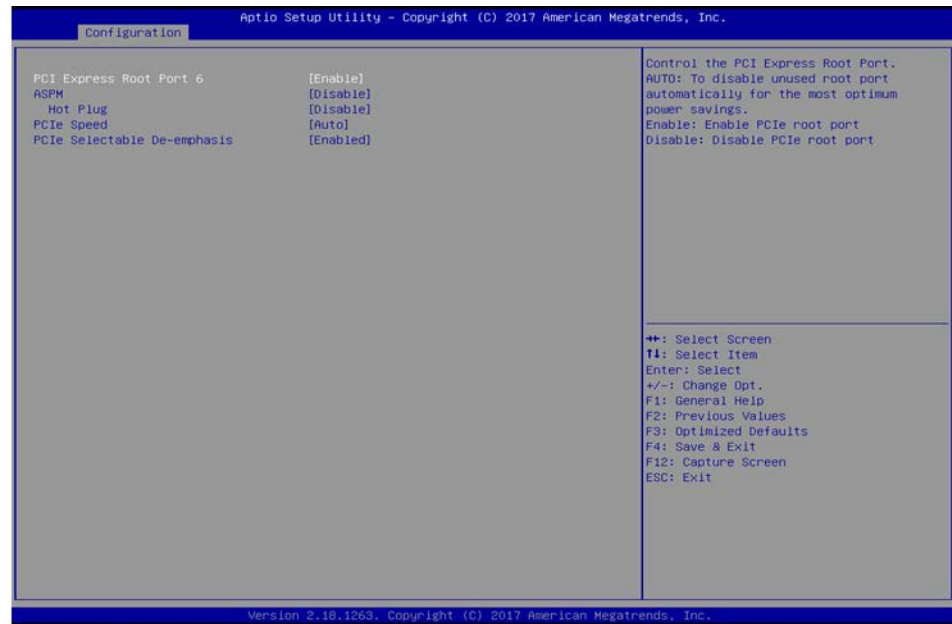
**Hot Plug: Enable/disable** PCI express hot plug. Choices: Disable (Default), Enable

**PCIe Speed:** Configure PCIe speed. Choices: Auto (Default), Gen1, Gen2

**PCIe Selectable De-emphasis:** When the link is operating at 5.0 GT/s, this bit selects the level of de-emphasis for an upstream component. 1b - 3.5 dB, 0b - 6 dB. Choices: Enabled (Default), Disabled

## PCI Express Root Port 6

Use this screen to configure PCI express root port 6.



**PCI Express Root Port 6:** Control the PCI express root port. AUTO: To disable unused root port automatically for the most optimum power savings. Choices: Enable (Default, Enable PCIe Root port), Disable (Disable PCIe root port)

**ASPM:** PCI express active state power management settings. Choices: Disable (Default), L0s, L1, L0sL1, Auto

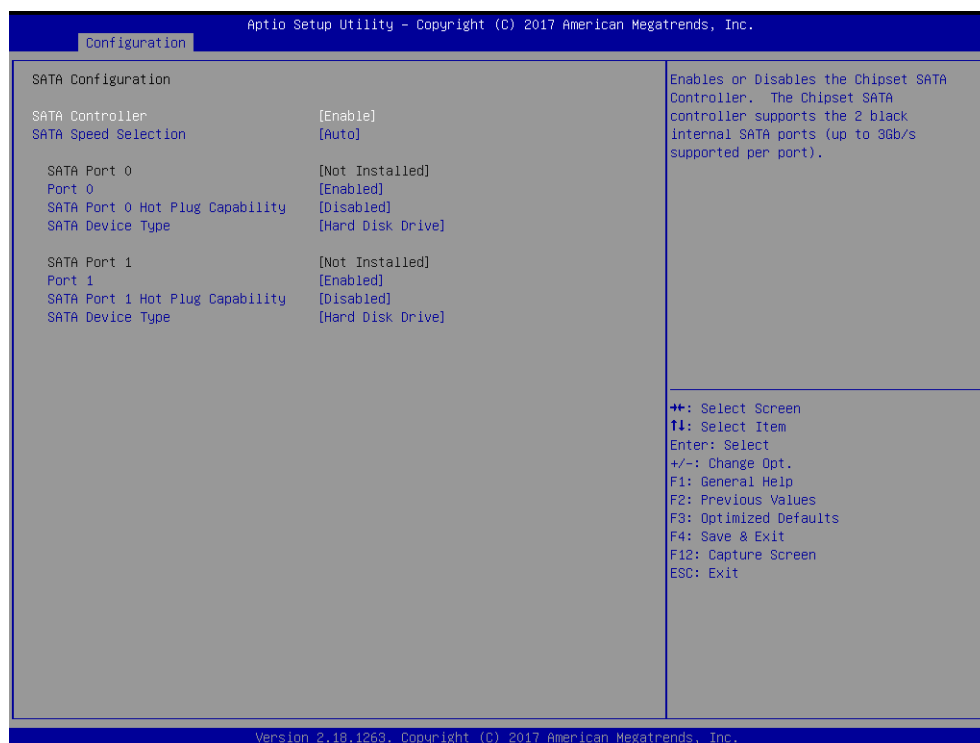
**Hot Plug:** Enable/disable the PCI express hot plug. Choices: Disable (Default), Enable

**PCIe Speed:** Configure PCIe speed. Choices: Auto (Default), Gen1, Gen2

**PCIe Selectable De-emphasis:** When the link is operating at 5.0 GT/s speed, this bit selects the level of de-emphasis for an upstream component. 1b -3.5 dB, 0b – 6 dB. Choices: Enabled (Default), Disabled

## SATA Configuration

Use this screen to configure the SATA device options settings.



**SATA Controller:** Enable/disable the chipset SATA controller. The chipset controller supports the two black internal SATA ports (up to 3 Gb/s supported per port). Choices: Enable (Default), Disable

**SATA Speed Selection:** Select SATA interface speed. Choices: Auto (Default), Gen1, Gen2, Gen3

### SATA Port 0

**Port 0:** Enable/disable SATA port. Choices: Enabled (Default), Disabled

**SATA Port 0 Hot Plug Capability:** Enable/disable SATA port 0 hot plug capability. If enabled, SATA port is reported as hot plug capable. Choices: Disabled (Default), Enabled

**SATA Device Type:** Identify whether the SATA port is connected to a solid state drive. Choices: Hard Disk Drive (Default), Solid State Drive

### SATA Port 1

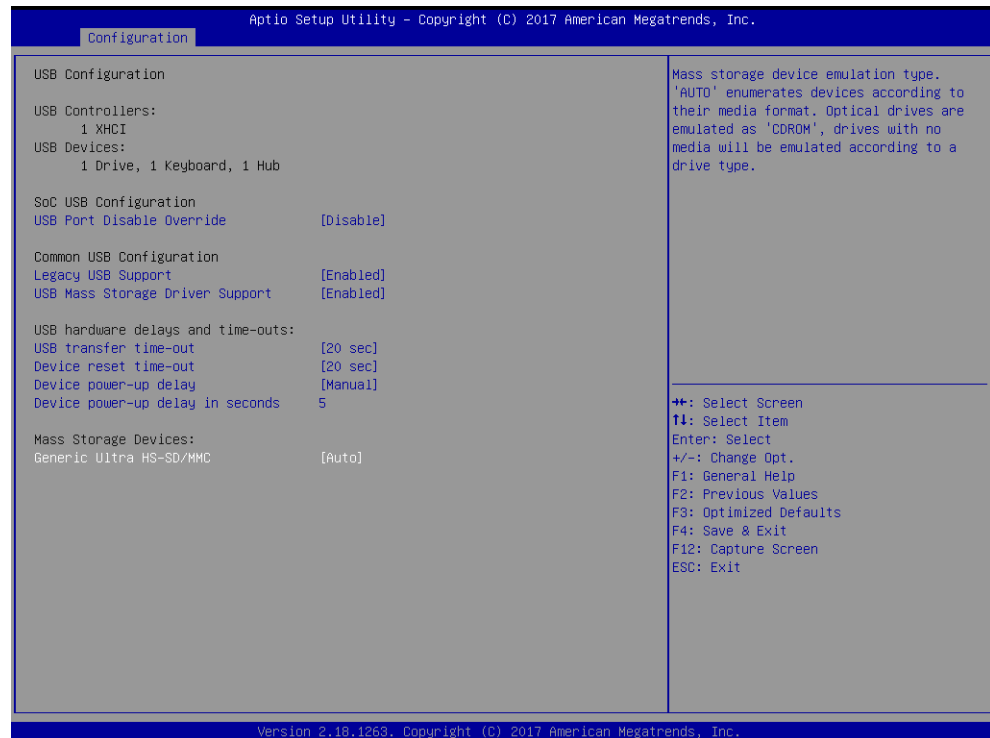
**Port 1:** Enable/disable SATA port. Choices: Enabled (Default), Disabled

**SATA Port 1 Hot Plug Capability:** If enabled, SATA port is reported as hot plug capable. Choices: Disabled (Default), Enabled

**SATA Device Type:** Identify whether the SATA port is connected to a hard disk drive or a solid state drive. Choices: Hard Disk Drive (Default), Solid State Drive

## USB Configuration

Use this screen to set the USB configuration parameters.



### SoC USB Configuration

**USB Port Disable Override:** Selectively enable/disable the corresponding USB port from reporting a device connection to the controller. Choices: Disable (Default), Enable

### USB Port Disable Override [Enable]

**USB Port #0-3:** Enable/disable the USB port. When disabled, any USB devices plugged into the connector is not detected by BIOS or OS. Choices: Enable (Default), Disabled

**USB 3 Port #0-3:** Enable/disable the USB port. When disabled, any USB devices plugged into the connector is not detected by BIOS or OS. Choices: Enable (Default), Disabled

### Common USB Configuration

**Legacy USB Support:** Enables legacy USB support. Auto: Disable legacy support if no USB devices are connected. Disable: Keep USB device

available only for EFI applications. Choices: Enabled (Default), Disabled, Auto

**USB Mass Storage Driver:** Enable/disable USB mass storage driver support. Choices: Enabled (Default), Disabled

### **USB Hardware delays and time-outs**

**USB transfer time-out:** The time-out value for control, bulk, and Interrupt transfers. Choices: 20 sec (Default), 1 sec, 5 sec, 10 sec

**Device reset time-out:** USB mass storage device start unit command time-out. Choices: 20 sec (Default), 10 sec, 30 sec, 40 sec

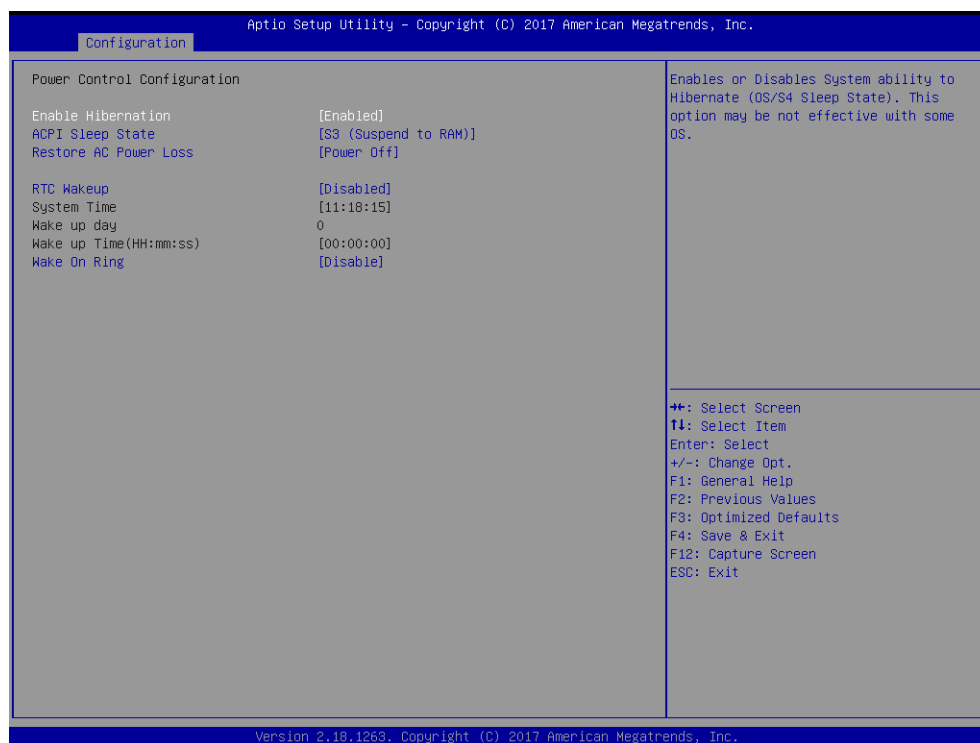
**Device power-up delay:** Maximum time the device takes before it properly reports itself to the host controller. Auto uses the default value: 100 ms for a root port; for a hub port the delay is taken from hub descriptor. Choices: Auto (Default), Manual

### **Mass Storage Devices**

**Generic Ultra HS-SD/MMC:** Mass storage device emulation type. AUTO enumerates devices according to their media format. Optical drives are emulated as CDROM, drives with no media are emulated according to a drive type. Choices: Auto (Default), Floppy, Forced FDD, Hard Disk, CD-ROM

## Power Control Configuration

Use this screen to set the system power control configuration parameters.



**Enable Hibernation:** Enable/disable the system's ability to hibernate (OS/S4 sleep state). This option may be not effective with some OSes. Choices: Enabled (Default), Disabled

**ACPI Sleep State:** Select the highest ACPI sleep state the system enters when the SUSPEND button is pressed. Choices: S3 (Suspend to RAM, Default), Suspend Disabled

**Restore AC Power Loss:** Specify what state to go to when power is re-applied after a power failure (G3 state). Power On: System boots as soon as power is applied. Power Off: System remains in power-off state until power button is pressed. Choices: Power Off (Default), Power On, Last State

**RTC Wake up:** Enable/disable system wake on alarm event. Enabled: System waked up at the Hour: Min: Sec specified. Disabled: Turn off RTC Wakeup. Choices: Disabled (Default), Enabled

### RTC Wake up [Enabled]

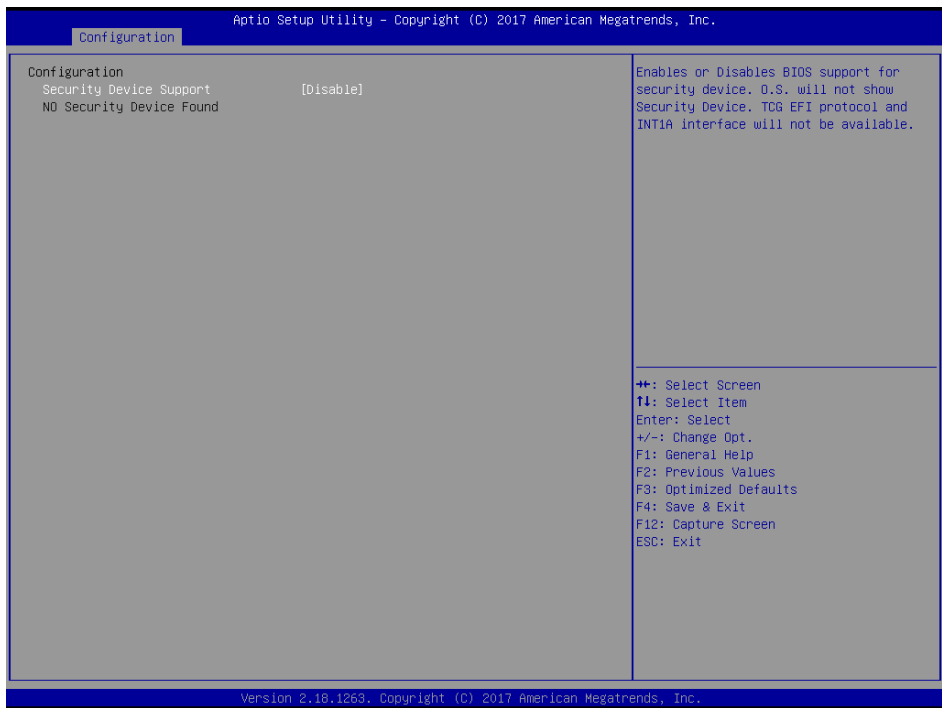
**Wake up day:** Select 0 for daily system wake up 1-31 for which day of the month that you want the system to wake up. Choices: 0 (Default), 0-31

**Wake up Time(HH: mm: ss):** Use [Enter], [TAB] to select field, HH: 0-23, mm: 0-59, ss: 0-59. Choices: HH: 0-23, mm: 0-59, ss: 0-59

**Wake On Ring:** Enable/disable wake on ring. Choices: Disable (Default), Enable

### TPM Configuration

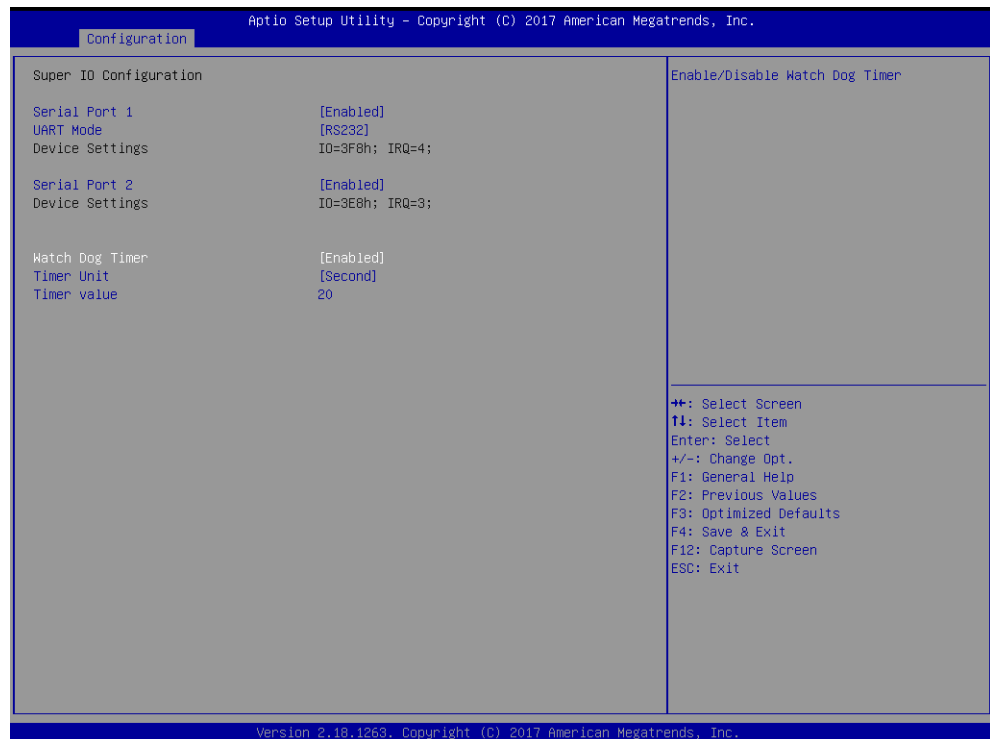
Use this screen to set the trusted computing setting parameter.



**Security Device Support:** Enable/disable BIOS support for security device. The OS does not show the security device. TCG EFI protocol and INT1A Interface is not available. Choices: Disabled (Default), Enabled

## Super IO Configuration

Use this screen to set the system super I/O chip parameters.



**Serial Port 1:** Enable/disable serial port (COM). Choices: Enabled (Default), Disabled

**UART Mode:** Set current UART mode: RS232, RS485, RS485/422. Choices: RS-232 (Default), RS-485 HALF DUPLEX, RS-485/422 FULL DUPLEX

**Serial Port 2:** Enable/disable serial port (COM). Choices: Enabled (Default), Disabled

**Watch Dog Timer:** Enable/disable WDT. Choices: Disabled (Default), Enabled

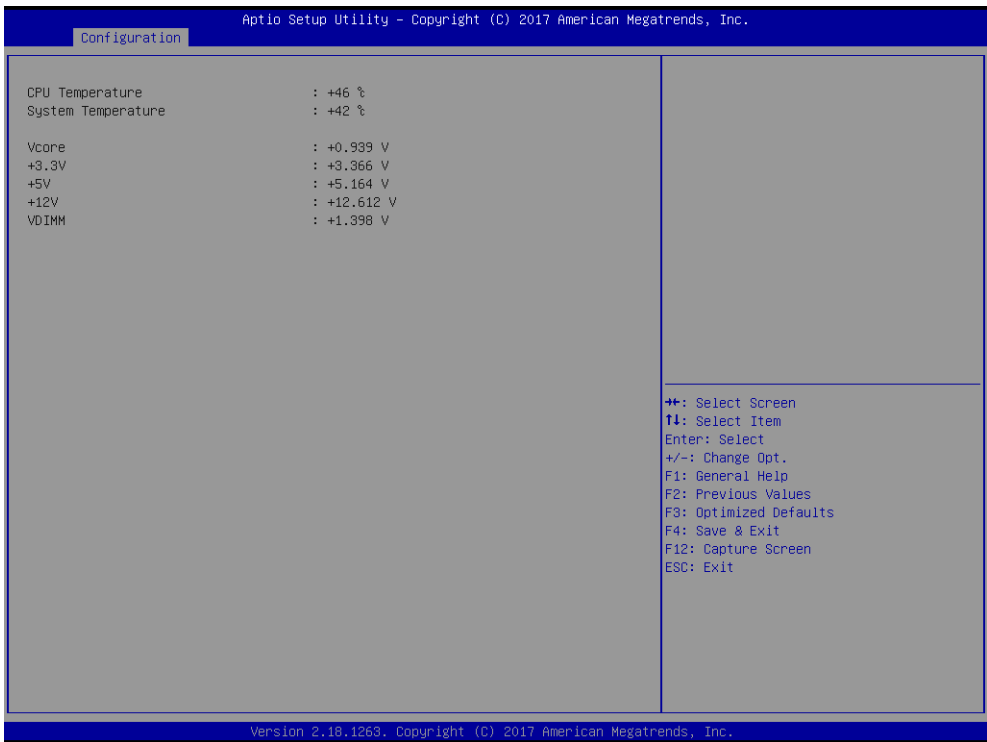
**Watch Dog Timer [Enabled]**

**Timer Unit:** Select timer count unit of WDT. Choices: Second (Default), Minute

**Timer value:** Set WDT timer value seconds/minutes. Choices: 20 (Default), 1-255 (Minute), 10-255 (Second)

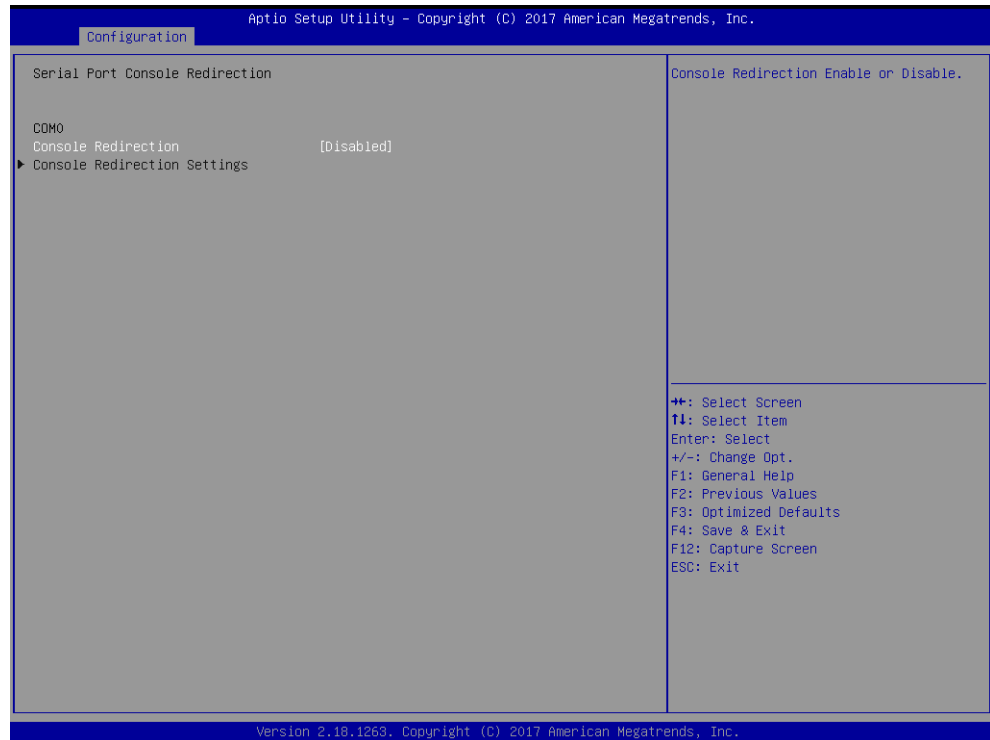
## H/W Monitor Configuration

Use this screen to display the hardware status. There are no editable settings on this screen.



## Serial Port Console Redirection

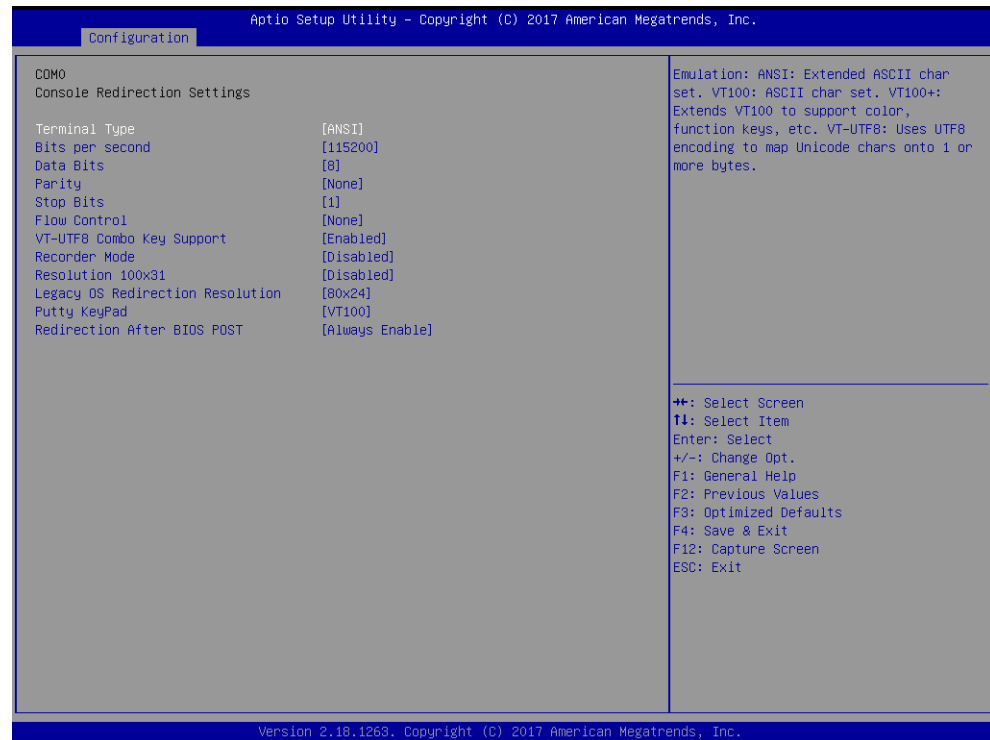
Use this screen to access and to enable/disable serial port console redirection settings.



**Console Redirection:** Enable/disable console redirection. Choices: Disabled (Default), Enabled

## Console Redirection Settings (COM0)

Use this screen to specify how the host computer and the remote computer (which the user is using) exchange data. Both computers should have the same or compatible settings.



**Terminal Type Emulation:** *ANSI*: Extended ASCII char set. *VT100*: ASCII char set. *VT100+*: Extends VT100 to support color, function keys, etc. *VT-UTF8*: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes. Choices: ANSI (Default), VT100, VT100+, VT-UTF8

**Bits per second:** Select serial port transmission speed. The speed must be matched on other side. Long or noisy lines may require lower speeds. Choices: 115200 (Default), 9600, 19200, 38400, 57600

**Data bits:** Set data bits. Choices: 8 (Default), 7

**Parity:** A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the number of 1's in the data bits is even. Odd: parity bit is 0 if the number 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. They can be used as an additional data bit. Choices: None (Default), 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 (Default), 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 (Default), Hardware RTS/CTS

**VT-UTF8 Combo Key Support:** Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals. Choices: Enabled (Default), Disabled

**Recorder Mode:** Enable/disable recorder mode. With this mode enabled only text is sent. This is to capture terminal data. Choices: Disabled (Default), Enabled

**Resolution 100x31:** Enable/disable extended terminal resolution. Choices: Disabled (Default), Enabled

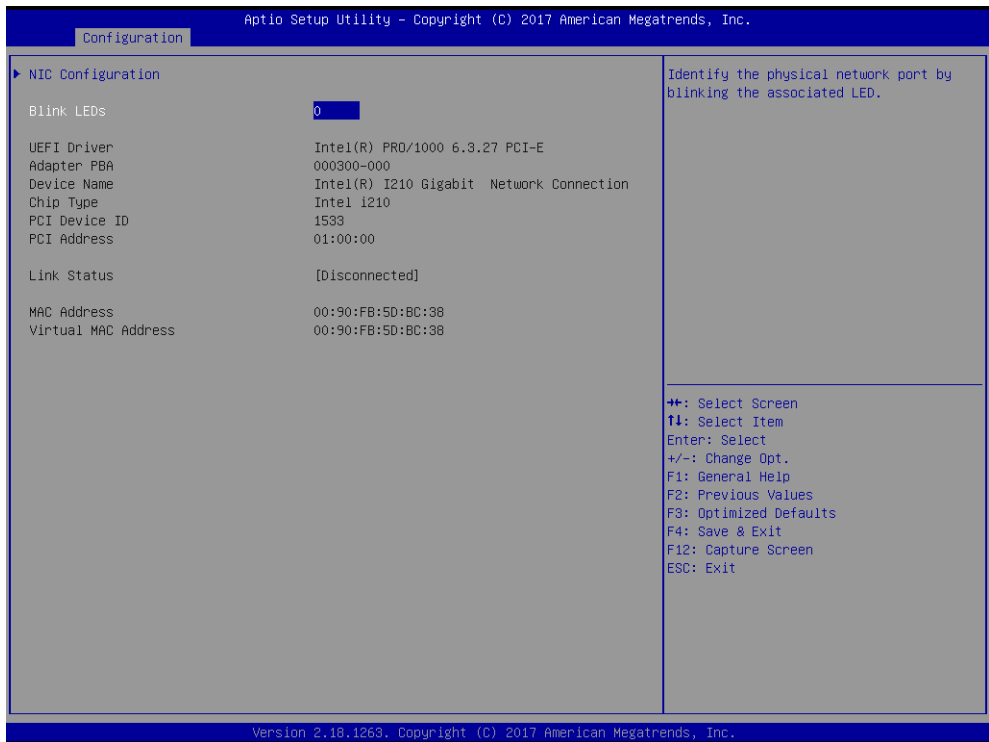
**Legacy OS Redirection Resolution:** On Legacy OS, the number of rows and columns that support redirection. Choices: 80x24 (Default), 80x25

**Putty KeyPad:** Select the function key and key pad on Putty. Choices: VT100 (Default), LINUX, XTERMR6, SCO, ESCN, VT400

**Redirection After BIOS POST:** When BootLoader is selected, then Legacy console redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable. Choices: Always Enable (Default), BootLoader

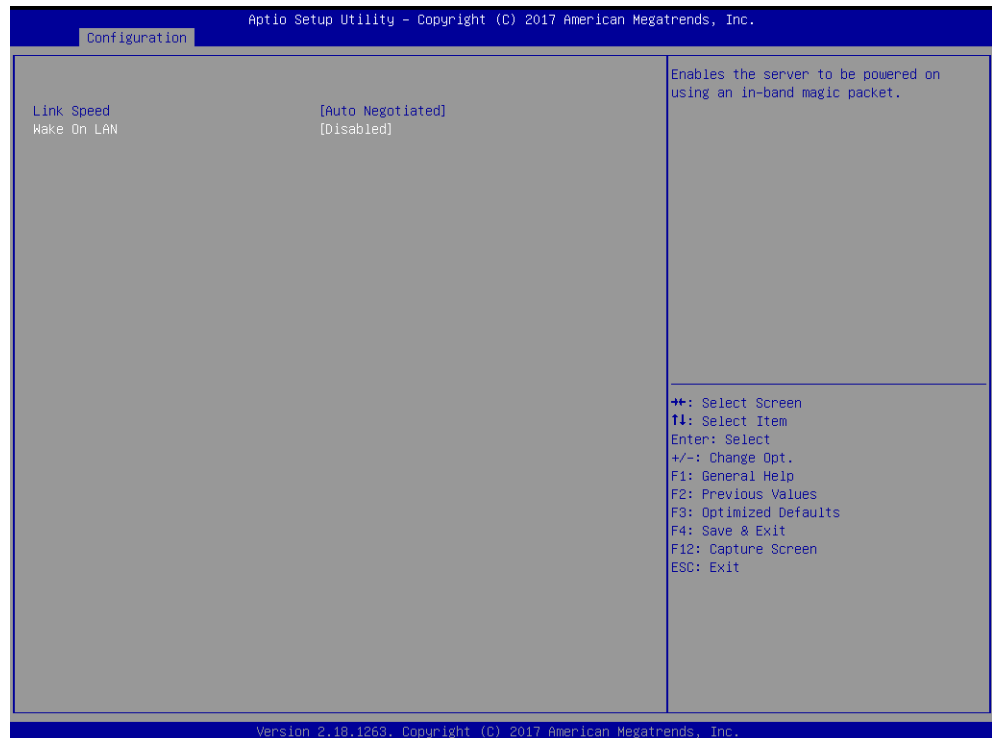
## Intel I210-IT Gigabit Network Connections 1 and 2

Use this screen to access the I210-IT Gigabit Network connection device parameters.



## NIC Configuration

Use this screen to specify the port speed used for the selected boot protocol.



**Link Speed:** Specify the port speed used for the selected boot protocol. Choices: Auto Negotiated (Default), 10 Mbps Half, 10 Mbps Full, 100 Mbps Half, 100 Mbps Full

**Wake On LAN:** Enable/disable the server to be powered on using an in-band magic packet. Choices: Disabled (Default), Enabled

**Blink LEDs:** Identify the physical network port by blinking the associated LED for n amount of seconds set. Choices: 0 - 10 (seconds), 0 (Default)

Security

Use this screen to set security passwords to control system access at boot time or when entering the BIOS setup program.

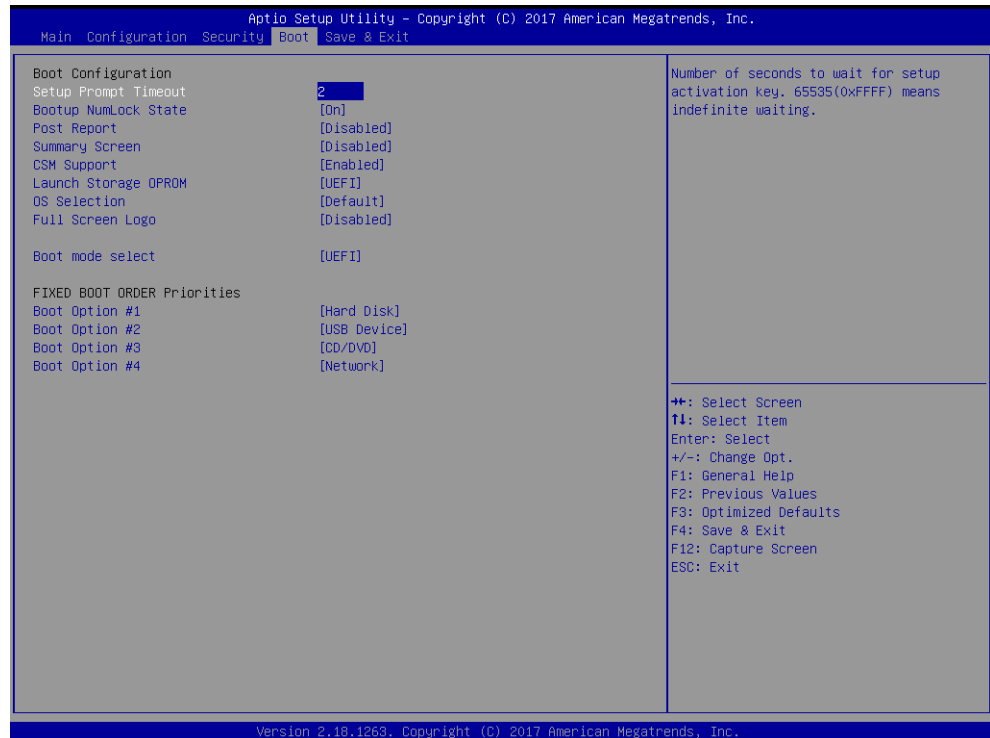


**Password Check Mode:** *Setup:* Check password when entering setup screen. *Power on:* Check password on every time system is powered on. Choices: Setup (Default), Power on

**Setup Administrator Password:** Set administrator password. No default setting.

## Boot

Use this screen to specify the priority of boot devices and to set other boot options.



**Setup Prompt Timeout:** Set the number of seconds to wait for setup activation key. 65535 (0xffff) means indefinite waiting. Choices: 2 (Default), 1-65535

**Bootup NumLock State:** Select the keyboard NumLock state. Choices: On (Default), Off

**Post Report:** Enable/disable post report support. Choices: Disabled (Default), Enabled

**Summary Screen:** Enable/disable Summary Screen support. Choices: Disabled (Default), Enabled

**CSM Support:** Enable/disable CSM support. Choices: Disabled (Default), Enabled

**CSM Support [Enabled]**

**Launch Storage OPROM:** Control the execution of UEFI and legacy storage OpROM. Choices: UEFI (Default), Do not launch, Legacy

**Warning**

The operating system (OS) may not boot if this setting is changed after the OS is installed.

**OS Selection:** [Default] To Win8/8.1/10; [Other] Android/Linux; [Legacy System] Win7/DOS; This item setting affects LPSS and XHCI hand-off item setting. Choices: Default (Win8/8.1/10), Others, Legacy System, Intel Linux

**Full Screen Logo:** Enable/disable Quiet Boot option and full-screen Logo. Choices: Disabled (Default), Enabled

**Boot mode select:** Select boot mode LEGACY/UEFI. Choices: UEFI (Default), Legacy

**FIXED BOOT ORDER Priorities**

**Boot Option #1:** Set the system boot order. Choices: Hard Disk (Default), USB Device, CD/DVD, Network, Disabled

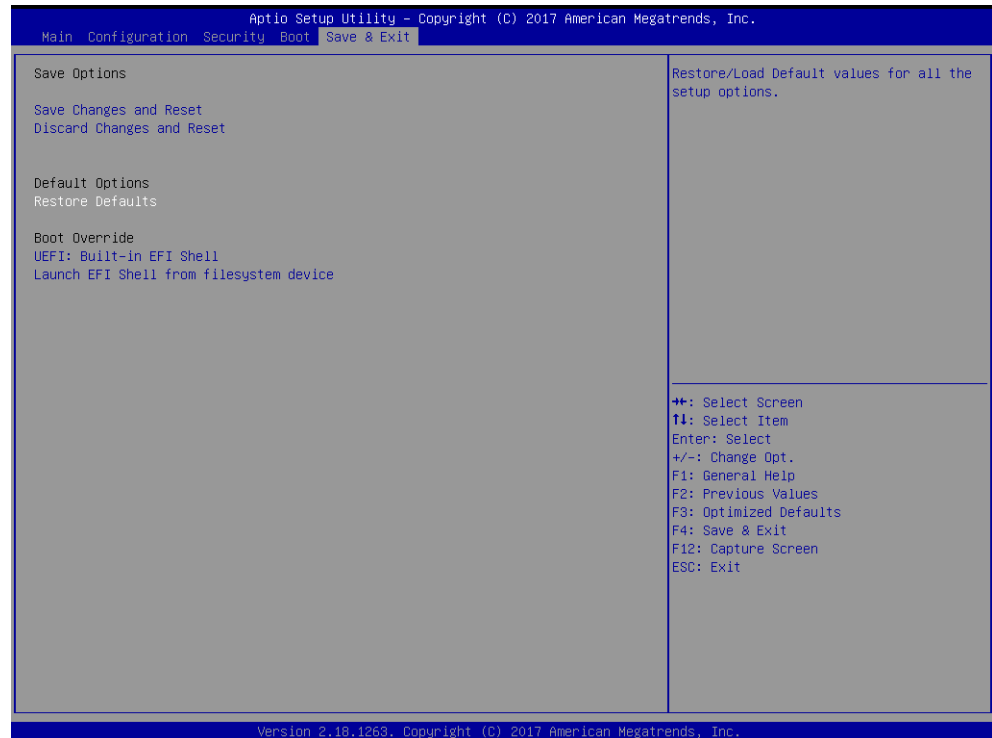
**Boot Option #2:** Set the system boot order. Choices: USB Device (Default), Hard Disk, CD/DVD, Network, Disabled

**Boot Option #3:** Set the system boot order. Choices: CD/DVD (Default), USB Device, Hard Disk, Network, Disabled

**Boot Option #4:** Set the system boot order. Choices: Network (Default), CD/DVD, USB Device, Hard Disk, Disabled

## Save & Exit

Use this screen to save or discard changes made to BIOS settings, or to restore the system to the default BIOS settings.



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

**Discard Changes and Reset:** Reset system setup without saving any changes.

**Restore Defaults:** Restore/load default values for all setup options.

**UEFI: Built-in EFI Shell:** Boot option filter (UEFI only). Resets the system after saving the changes.

**Launch EFI Shell from filesystem device:** Attempt to launch EFI shell application (Shell.efi) from one of the available filesystem devices.

## 10. Troubleshooting

This section provides useful tips to get the SYS-ITX-N-3900 operating. For basic hardware installation and configuration, refer to “Installation and Connections” on page 10. This section addresses system integration issues in terms of BIOS setting and OS diagnostics.

### 10.1 BIOS settings

This section assumes that you have correctly selected and connected all devices with the required cables before applying power. If this is in question, inspect the connection and application of each of the following components: 204-pin DDR3 memory, keyboard, mouse, SATA hard disk, VGA connector, power cable of the device, and all ATX accessories. Failure of any of these components can cause a system failure.

It is recommended that you press the **DELETE** or **ESC** key and enter the BIOS setup menu during the initial boot-up sequence to configure a stable BIOS configuration that can be woken.

#### 10.1.1 Loading the Default Optimal Setting

**NOTE** If the system appears to be unstable during startup, you can try loading the default BIOS configuration to see if this solves the issue.

When prompted in the main setup menu, load setup defaults:

1. Apply power to an installed SYS-ITX-N-3900 and press **DELETE** or **ESC** to enter the BIOS setup menu.
2. Select the **Save & Exit** menu and then scroll to **Restore Defaults**.
3. Press **Enter**.
4. To load the default optimal BIOS setup, select **Yes**. This forces the BIOS settings back to the initial factory configuration.

#### 10.1.2 Reset CMOS BIOS Configuration

You can use jumpers to reset the BIOS CMOS settings to the factory default. Enable or disable the Clear CMOS Function hardware circuit by placing or removing the jumper from JP3 as needed. See “CMOS Clear (JP3)” on page 18.

To reset the BIOS CMOS configuration to the factory default settings:

1. Remove power from the SYS-ITX-N-3900.
2. Find JP3.
3. Remove jumpers from pins 1-2.
4. Install jumpers on pins 2-3 and wait five seconds.

5. Replace jumpers on pins 1-2.

### 10.1.3 Update BIOS

1. Obtain the ROM file and flash utility. See “Cables and Software Drivers” on page 49.
2. Extract the files from the zip archive to the root directory of a bootable USB flash drive. The three required files are Shell Flash 32.efi, temp.bin, and Update.nsh.
3. Insert the USB flash drive in a USB port on the SYS-ITX-N-3900 and apply power to the embedded computer.
4. Boot to EFI-Shell mode.
5. At the prompt, enter the command `fs0:` to change to the root directory of the USB drive.
6. At the root directory of the USB drive, enter the command `update` to start the updating the BIOS.
7. When the update has completed, there is a 5-second pause and then the computer automatically restarts.
8. Press **DELETE** or **ESC** to open the BIOS setup menu and select **Restore Defaults**.
9. To finish the update, select **Save & Exit**.

## 11. Cables and Software Drivers

Go to <https://www.winsystems.com/> for cable information and software drivers.

## Appendix A. Best Practices

This section outlines the best practices for operating the SYS-ITX-N-3900 in a safe and effective manner that does not damage the board. Please read this section carefully.



### **Avoid Electrostatic Discharge (ESD)**

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

## Power Supply

### **Power Supply Budget**

Evaluate your power supply budget. It is good practice to budget twice the typical power requirement for all of your devices.

### **Zero-Load Power Supply**

Use a zero-load power supply whenever possible. A zero-load power supply does not require a minimum power load to regulate. If a zero-load power supply is not appropriate for your application, then verify that the embedded computer's typical load is not lower than the power supply's minimum load. If the embedded computer does not draw enough power to meet the power supply's minimum load, then the power supply does not regulate properly and can cause damage to the SYS-ITX-N-3900.



### **Use Proper Power Connections (Voltage)**

When verifying the voltage, measure it at the power connector on the SYS-ITX-N-3900. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

Power the SYS-ITX-N-3900 using J1 (+12 V DC). Verify the power connections. Incorrect voltages can cause catastrophic damage.

### **Power Harness**

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the SYS-ITX-N-3900.

### **Gauge Wire**

Use the largest gauge wire available for your application and connector. Most connector manufacturers have a maximum gauge wire they recommend for their pins.

### Contact Points

For maximum reliability, WINSYSTEMS boards typically use connectors with gold finish contacts. It is critical that the contact material in the mating connectors is matched properly (gold to gold and tin to tin). Contact areas made with dissimilar metals can cause oxidation/corrosion, resulting in unreliable connections.

### Pin Contacts

The pin contacts used in cabling are not given enough attention. The ideal choice for a pin contact uses a design similar to Molex's or Trifurcon's design that provides three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

## Power Down

Make sure that power has been removed from the system before making or breaking any connections.



**Power Supply OFF**—The power supply should always be off before it is connected to the I/O module. Do not hot-plug the SYS-ITX-N-3900 on a host platform that is already powered.

**I/O Connections OFF**—I/O connections should also be off before connecting them to the embedded computer modules or any I/O cards. Connecting hot signals can cause damage whether the embedded system is powered or not.

## Conformal Coating

Conformal coating by any source other than WINSYSTEMS voids the product warranty and will not be accepted for repair by WINSYSTEMS. If such a product is sent to WINSYSTEMS for repair, it will be returned at customer expense and no service will be performed. A WINSYSTEMS product conformally coated by WINSYSTEMS will be subject to regular WINSYSTEMS warranty terms and conditions.

## Operations/Product Manuals

Every embedded computer has an Operations manual or Product manual.

**Periodic Updates**—Operations/Product manuals are updated often. Periodically check the WINSYSTEMS website (<https://www.winsystems.com/>) for revisions.

**Check Pinouts**—Always check the pinout and connector locations in the manual before plugging in a cable. Many I/O modules have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

**Contact an Applications Engineer**—If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact a WINSYSTEMS Applications Engineer at: +1-817-274-7553.

## Appendix B. Warranty Information

Full warranty information is at <https://winsystems.com/company-policies/warranty/>.