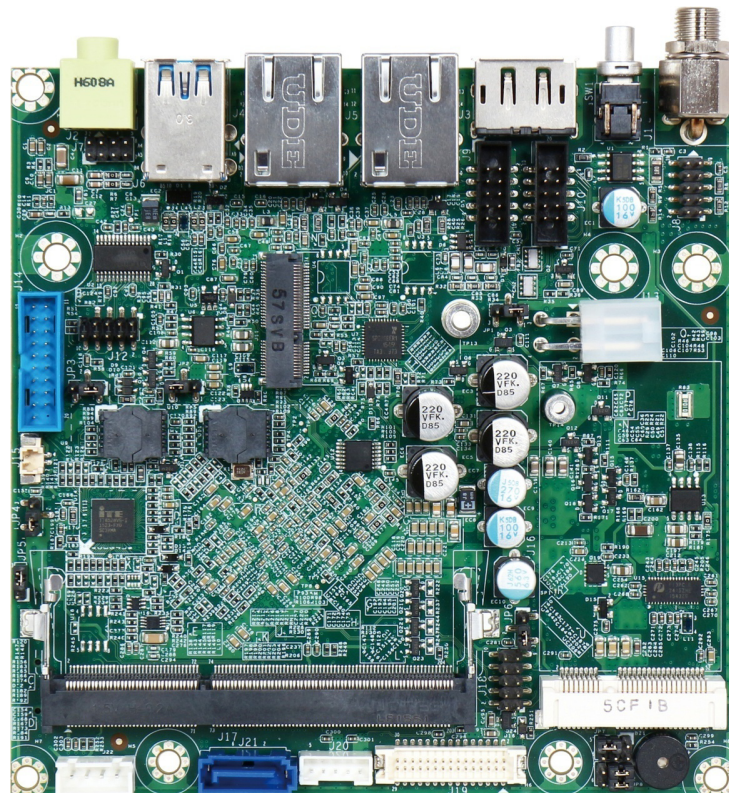


ITX-N-3900

Industrial Intel Atom® E3900 Series
(Intel Atom® Processor X Series)
NANO-ITX Single Board Computer (SBC)

Product Manual



Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	7/2018	Initial release

Copyright and Trademarks

Copyright 2018, 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, the Intel logo, Intel Atom, are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

Table of Contents

1	Before You Begin	1
1.1	Warnings	1
2	Introduction	1
3	Functionality	1
4	Features	2
5	General Operation	5
5.1	System Block Diagram	5
6	Specifications	6
7	Setup	7
7.1	Installation and Connections	7
7.2	Power Up	7
7.3	Driver Installation	7
7.3.1	Chipset Component Driver	7
7.3.2	Intel HD Graphics 50X	8
7.3.3	Intel LAN I210-IT Gigabit Ethernet Controller	8
7.3.4	Realtek HD Audio Controller	8
7.4	Watchdog Timer (WDT)	8
7.4.1	Example code for WDT	9
7.5	General Purpose Input-Output (GPIO)	9
7.6	Reset CMOS BIOS Configuration	9
8	Configuration	10
8.1	Component Layout	10
8.1.1	Edge Connections and Switch Locations	10
8.1.2	Top View Components	10
8.3	Power	12
8.4	Connectors	12
8.4.1	DC Jack (J1)	12
8.4.2	Audio Jack (Line_out) (J2)	12
8.4.3	DisplayPort (J3)	13
8.4.4	RJ45 Connector (J4/J5)	14
8.4.5	USB3 Connector (J6)	15

8.4.6	External Audio Pin Header (J7)	15
8.4.7	Front Panel Pin Header (J8)	16
8.4.8	VGA Pin Header (J9)	16
8.4.9	RS232/422/485 Pin Header (J10)	17
8.4.10	M.2 key E Socket (J11)	17
8.4.11	80 Port Connector (J12)	18
8.4.12	ATX 4 Pin Connector (J13)	18
8.4.13	External USB3 Connector (J14)	18
8.4.14	Battery Connector (J15)	19
8.4.15	mSATA/MiniPCIe socket (J16)	19
8.4.16	DDR3 SODIMM Socket (J17)	20
8.4.17	General Purpose I/O Pin Header (J18)	20
8.4.18	LVDS Connector (J19)	20
8.4.19	Backlight Connector (J20)	21
8.4.20	SATA GEN2 Connector (J21)	22
8.4.21	SATA Power Connector (J22)	22
8.4.22	Micro SD Card Socket (J23)	22
8.5	Jumpers and Switches	23
8.5.1	BKLTCTRL Signal Level Selection (JP1)	23
8.5.2	BKLTCTRL Signal Source Selection (JP2)	23
8.5.3	CMOS Clear (JP3)	23
8.5.4	Power On Mode Selection (JP5)	24
8.5.5	GPIO4 through GPIO7 Voltage Level Selection (JP6)	24
8.5.6	Panel Voltage Selection (JP7)	24
8.5.7	Backlight Power (JP8)	25
8.5.8	Power Button (SW1)	25
9	BIOS Settings	26
9.1	General Information	26
9.2	Entering Setup	26
9.3	Navigation of the Menus	27
9.4	BIOS Screens	27
10	Troubleshooting	54
10.1	BIOS Settings	54
10.1.1	Loading the Default Optimal Settings	54
10.1.2	Reset CMOS BIOS Configuration	54
10.1.3	Update BIOS	55
11	Cables and Software Drivers	55
	Appendix A. Best Practices	56

Appendix B. Mechanical Drawing	58
Appendix C. Warranty Information	59

1. Before You Begin

Review the warnings (in this section) and the best practice recommendations (see “Best Practices” on page 56) when using and handling the WinSystems ITX-N-3900. Adherence to these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the ITX-N-3900 before proceeding.



FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE ITX-N-3900 AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the ITX-N-3900. While observing the 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 will void the warranty and damage the board.

2. Introduction

This manual provides configuration and usage information for the 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 for other accessories (including cable drawings and pinouts) that can be used with your ITX-N-3900.

3. Functionality

The ITX-N-3900 is an industrial embedded single board computer (SBC). 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 a E3900 series Intel Atom® processor, integrated into the ITX-N-3900. The ITX-N-3900 can provide the low power consumption for low profile fanless applications such as point of sale (POS), Print Imaging, ATM, Kiosk, Medical, Panel PC, Digital Security,

and Digital Signage. Information to configure and operate the ITX-N-3900 for most applications is included in this Product Manual or on our website at 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 contact information in the Introduction section on page 1).

4. Features

This section describes the features of the ITX-N-3900.

Package Contents

- One ITX-N-3900 NANO-ITX Main Board
- One passive heat spreader
- One SATA cable
- One SATA power cable

Embedded Single Board Computer (SBC)

- Single Board Computer
- E3900 series Intel Atom® processor:

	ITX-N-3930-1-0	ITX-N-3940-1-0	ITX-N-3950-1-0
Processor	Intel Atom x5-E3930	Intel Atom x5-E3940	Intel Atom x7-E3950
Core Speed	up to 1.80 GHz	up to 1.80 GHz	up to 2.00 GHz
Number of Cores	2	4	4
L2 Cache	2 MB	2 MB	2 MB

Operating Systems (compatibility)

The 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 Operating Systems 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) Marshmallow PV April 17, Android O ETA target Q2 `18 Intel ISV Partners
- RTOS Wind River VxWorks* 7

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, x5-E3930: Intel® HD Graphics 500 (controller)
- Supports multiple displays
- DP (rear I/O)
- VGA (on-board connector)
- LVDS (dual-channel 24-bit)

Ethernet

- Supports **Wake on LAN** function
- Intel® I210-IT Gigabit Ethernet (1 gigabit per second, GbE) controllers
- ITX-N-3940 and ITX-N-3950: Support two GbE
- ITX-N-3930: Supports one GbE

Storage (Bootable)

- One SATA port (SATA 6 Gb/s)
- One mSATA socket (Switch mSATA or Mini-PCIe by BIOS)

Serial Interface

- One serial port (RS-232/422/485, BIOS configurable)
- Supports four USB 3.0 (Universal Serial Bus) ports:
 - Two ports on rear I/O
 - Two ports on the board (header)

General Purpose Input-Output (GPIO)

- On-board programmable 8-bit General Purpose Input Output I/O interface

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
- On board pin header for Line Out, Line In, Microphone

Power

DC 12 V (J1) connector and 4-pin power connector (J13) cannot be used at the same time.

- DC 12 V input (rear I/O, J1)
- ATX 4 Pin Connector (+12 V Input, J13)
- Model specific power specifications:
 - ITX-N-3930: +12 V DC input (6 W typical)
 - ITX-N-3840: +12 V DC input (9 W typical)
 - ITX-N-3850: +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: -40 °C to +85 °C (-40 °F to +185 °F)¹, 10% to 90% relative humidity
- Storage temperature: -40 °C to +85 °C (-40 °F to +185 °F), 5% to 90% relative humidity

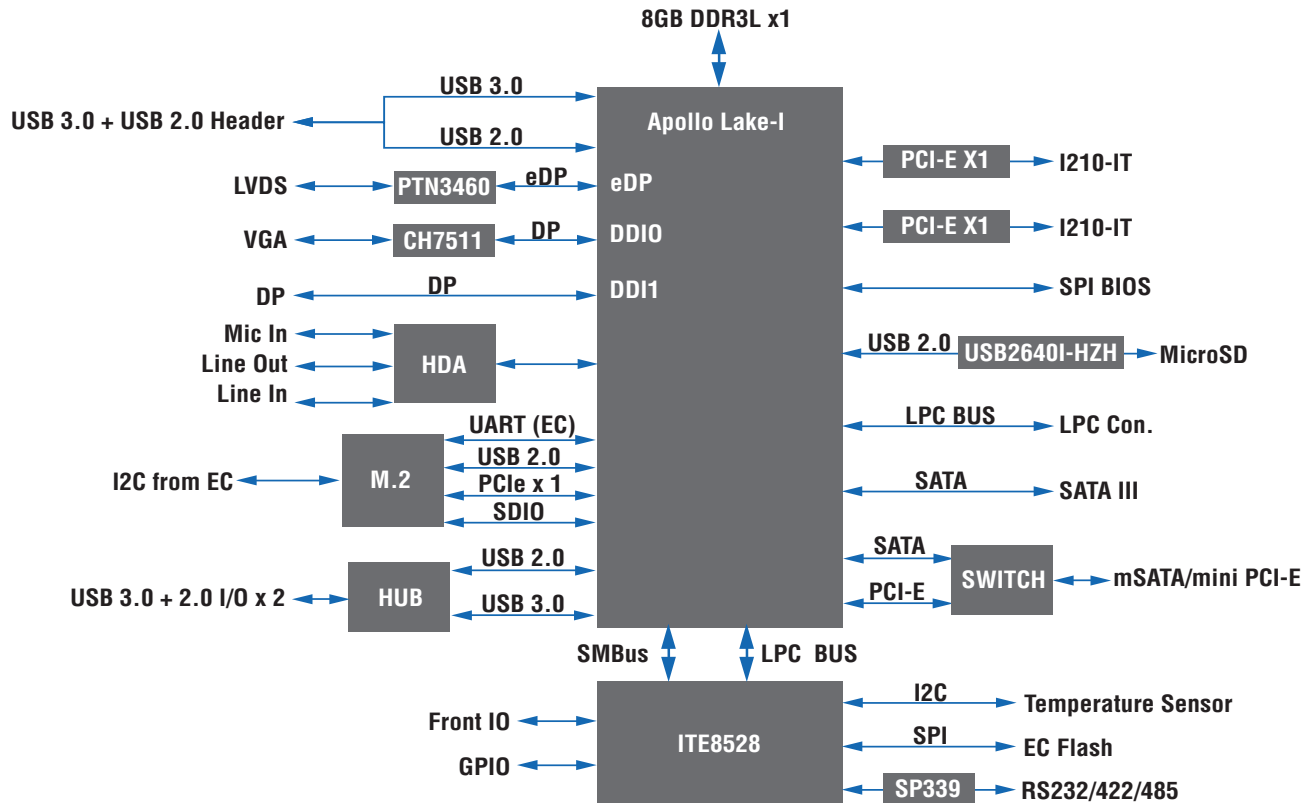
1. Requires airflow and high temperature grade DRAM.

5. General Operation

5.1 System Block Diagram

The ITX-N-3900 is an embedded single board computer (SBC). It is a full-featured embedded system with a variety of on-board I/O options. The following figure is a simplified system block of the ITX-N-3900:

Figure 5–1: Simplified Block Diagram



6. Specifications

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

Electrical	
V _{CC}	12 V DC ±5%, 15 Watts (maximum)
MTBF	14.5 Years
Battery: CR-2032	Chemical System: Li/MnO ₂ Nominal Voltage: 3 V Rated Capacity: 225 mAh
Mechanical	
Mechanical Dimensions	4.72 x 4.72 inches (120 x 120 mm)
Weight	295.74 g
Environmental	
Temperature	Operating: -40 °C to +85 °C (-40 °F to +185 °F) ¹
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 2.	
Chipsets and Drivers	
CPU Type	Intel Atom® CPU E3930: up to 1.8 GHz L2 Cache 2048 KB (2 MB) E3940: up to 1.8 GHz L2 Cache 2048 KB (2 MB) E3950: up to 2.0 GHz L2 Cache 2048 KB (2 MB)
SBC 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

1. Requires airflow and high temperature grade DRAM.

7. Setup

Use the information in this section to install the ITX-N-3900. Refer to “Configuration” on page 10 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), the DisplayPort output (J3), or the LVDS Connector (J19) and Backlight connector (J20), depending on your preference and capabilities.

NOTE If you are using a flat panel display, make sure the jumpers for Backlight Power at JP1, JP2, and JP8 are installed as required. See “Backlight Power (JP8)” on page 25 for specific requirements. See BKLCTRL Signal Level Selection (JP1) and BKLCTRL Signal Source Selection (JP2) for configuration.

NOTE If you are using a flat panel display, configure LVDS and color depth in BIOS, and “Panel Voltage Selection (JP7)” on page 24. For more information on the connector, see “LVDS Connector (J19)” on page 20.

2. Connect a USB keyboard to any of the USB ports at J6 or J14.
3. Plug in the boot media of your preference. The options are:
 - SATA (J21/J22)
 - USB (J6 or J14)
4. If using a battery, connect the battery to J23.
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 or J13 (see “Specifications” on page 6 for details). The first time power is applied, the ITX-N-3900 will boot automatically bypassing the power button. After initial startup, briefly press the power button to turn the 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 ITX-N-3900. To obtain drivers, refer to “Cables and Software Drivers” on page 55.

7.3.1 Chipset Component Driver

The ITX-N-3900 uses the Intel[®] Apollo Lake-I SOC. An older operating system 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.

7.3.2 Intel HD Graphics 50X

The ITX-N-3900 uses integrated Intel® HD Graphics 50X as follows:

- ITX-N-3950: Intel HD Graphics 505
- ITX-N-3940 and ITX-N-3930: Intel HD Graphics 500

Processor Graphics integrates graphics processing circuitry into the processor, providing the graphics, compute, media, and display capabilities. Intel HD Graphics delivers enhanced media conversion, fast frame rates, and 4K Ultra HD (UHD) video. The ITX-N-3900 supports LVDS, DP, and VGA.

7.3.3 Intel LAN I210-IT Gigabit Ethernet Controller

The LAN controller is an Intel I210-IT Gigabit Ethernet (1 gigabit per second, GbE) controller and provides connection on the rear I/O panel:

- Supports **Wake on LAN** function
- E3950 and E3940 (only): Dual Intel I210-IT Gigabit Ethernet controller and two RJ45 connectors
- E3930: Single Intel I210-IT Gigabit Ethernet controller and one RJ45 connector
- Driver supports Windows 10

7.3.4 Realtek HD Audio Controller

- Uses Realtek High Definition Audio driver

7.4 Watchdog Timer (WDT)

The 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 program the WDT.

7.4.1 Example code for WDT

The ITX-N-3900 features a programmable watchdog timer (WDT). The following watchdog timer 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).

```
#Define WDTCFG 0x06// WDT Timer Control 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 General Purpose Input-Output (GPIO)

The ITX-N-3900 features a programmable General Purpose Input-Output (GPIO) containing a mixture of General Purpose Input and Output signals present on connector J18. The signals GPIO[0..3] are configurable as either inputs or outputs. The signals GPIO[4..7] are output only signals.

Use of the ITX-N-3900 GPIO signals is supported in the WinSystems, Inc. System Management Libraries and Example Applications. The System Management Libraries contain support for setting the direction of GPIO[0..3] and provides also allows the application code to set the state of the output pins and report the state of the input pins.

The System Management Libraries and Example Applications are available upon request from WinSystems (see contact information in the Introduction section on page 1).

7.6 Reset CMOS BIOS Configuration

Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable/disable the Clear CMOS Function hardware circuit, by placing or removing the jumper from JP3 as needed. See “Reset CMOS BIOS Configuration” on page 54 for usage.

8. Configuration

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

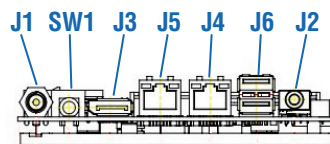
8.1 Component Layout

The ITX-N-3900 provides components on the edge and top of the board. Edge connections provide common external connections.

8.1.1 Edge Connections and Switch Locations

Edge connections provide common external connections.

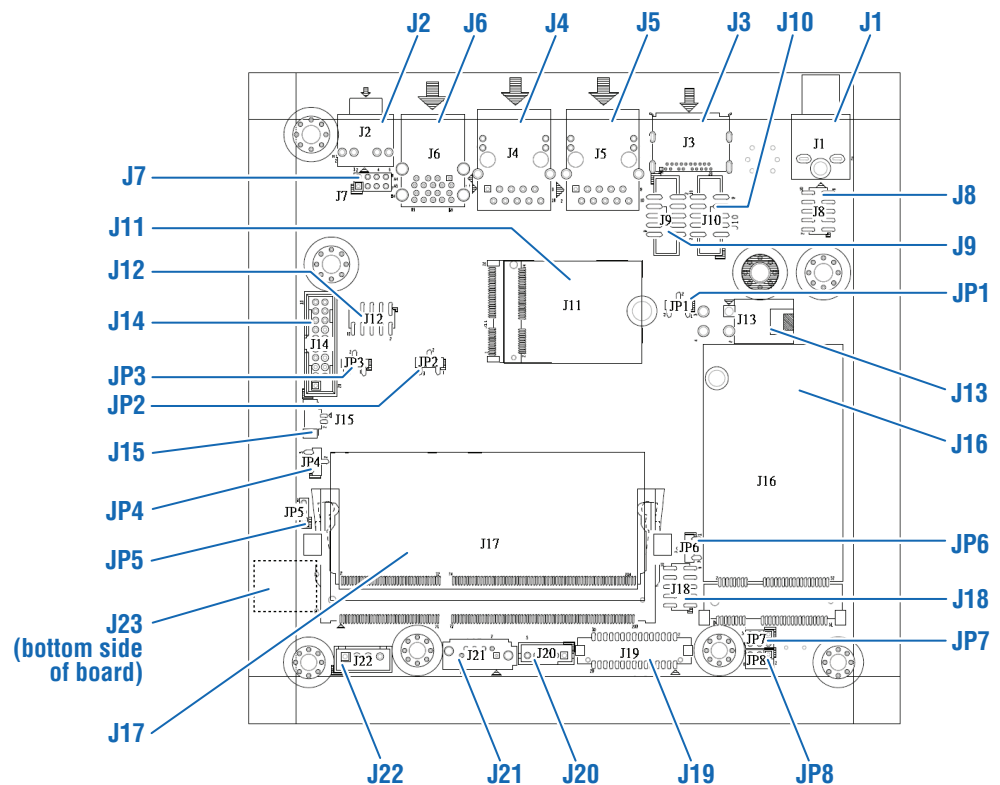
Figure 8–1: Edge Connections



8.1.2 Top View Components

The following figure illustrates the location of each connector, jumper, and switch on the top of the ITX-N-3900.

Figure 8–2: Top View Components



Connectors

The following table provides connector descriptions and references (see Figure 8–2 Top View Components on page 10).

Item	Description	Reference
J1	DC Jack (J1)	page 12
J2	Audio Jack (Line_out) (J2)	page 12
J3	DisplayPort (J3)	page 13
J4/5	RJ45 Connector (J4/J5)	page 14
J6	USB3 Connector (J6)	page 15
J7	External Audio Pin Header (J7)	page 15
J8	Front Panel Pin Header (J8)	page 16
J9	VGA Pin Header (J9)	page 16
J10	RS232/422/485 Pin Header (J10)	page 17
J11	M.2 key E Socket (J11)	page 17
J12	80 Port Connector (J12)	page 18
J13	ATX 4 Pin Connector (J13)	page 18
J14	External USB3 Connector (J14)	page 18
J15	Battery Connector (J15)	page 19
J16	mSATA/MiniPCIe socket (J16)	page 19
J17	DDR3 SODIMM Socket (J17)	page 20
J18	General Purpose I/O Pin Header (J18)	page 20
J19	LVDS Connector (J19)	page 20
J20	Backlight Connector (J20)	page 21
J21	SATA GEN2 Connector (J21)	page 22
J22	SATA Power Connector (J22)	page 22
J23	Micro SD Card Socket (J23)	page 22

Jumpers

The following table provides jumper descriptions and references (see Figure 8–2 Top View Components on page 10).

Item	Description	Reference
JP1	BKLTCTRL Signal Level Selection (JP1)	page 23
JP2	BKLTCTRL Signal Source Selection (JP2)	page 23
JP3	CMOS Clear (JP3)	page 23
JP5	Power On Mode Selection (JP5)	page 24
JP6	GPIO4 through GPIO7 Voltage Level Selection (JP6)	page 24
JP7	Panel Voltage Selection (JP7)	page 24
JP8	Backlight Power (JP8)	page 25

Switches

The following table provides a switch description and a reference (see Figure 8–1 Edge Connections on page 10 for location).

Item	Description	Reference
SW1	Power Button (SW1)	page 25

8.3 Power

The main power supply to the board is +12 V DC. The ITX-N-3900 draws power through the J1 connector or the J13 connector. See “DC Jack (J1)” on page 12 and “ATX 4 Pin Connector (J13)” on page 18.

8.4 Connectors

8.4.1 DC Jack (J1)

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



Caution

Either connect a power supply to this connector (J1) or to the ATX 4-pin connector (J13), but not both.

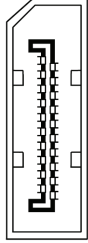
8.4.2 Audio Jack (Line_out) (J2)

This connector provides an audio line out (Line_out) signal.

8.4.3 DisplayPort (J3)

The Display Port 1.1 connector supplies both video and high definition (HD) audio. See “Audio Jack (Line_out) (J2)” on page 12 and “External Audio Pin Header (J7)” on page 15 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)

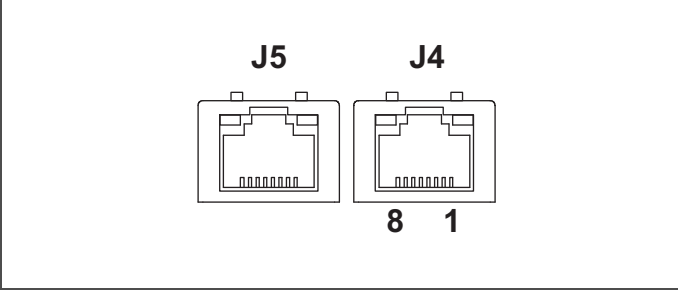
8.4.4 RJ45 Connector (J4/J5)

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 multi-speed, full, and half-duplex operation.

The pinout below describes the standard RJ45 Ethernet connectors.

NOTE Model ITX-N-3930 has one interface and one RJ45 connector (J4 only).

Layout and Pin Reference:



Pin	Function	Description
1	TX_D1+	Transceiver Data+
2	TX_D1-	Transceiver 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-

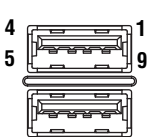
On-board Ethernet activity LEDs are built into the connectors at J4 and J5. There is one green LED (left) and one bi-color green/yellow LED (right).

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

8.4.5 USB Connector (J6)

J6 provides two USB 3.0 connectors.

Pin Reference:

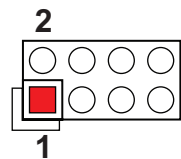


Pin	USB 3.0
1	USBVCC
2	D-
3	D+
4	GND
5	RX-
6	RX+
7	GND
8	TX-
9	TX+

8.4.6 External Audio Pin Header (J7)

This 4x2-pin header provides pins for Mic + Line_in + Line_out.

Layout and Pin Reference:

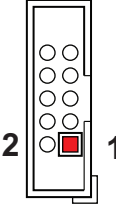


Pin	Name	Pin	Name
1	MIC_L	2	Line_in_L
3	Ground	4	Line_in_R
5	Line_out_L	6	Ground
7	Line_out_R	8	MIC_R

8.4.7 Front Panel Pin Header (J8)

This 5x2-pin header provides pins for front panel connections.

Layout and Pin Reference:

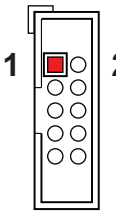


Pin	Name	Pin	Name
1	Ground	2	N/C
3	External Power LED (+)	4	External Power LED (-)
5	HDD LED (+)	6	HDD LED (-)
7	Reset (+)	8	Power On (-)
9	Reset (-)	10	Power On (+)

8.4.8 VGA Pin Header (J9)

This 5x2-pin header provides pins for VGA connections.

Layout and Pin Reference:

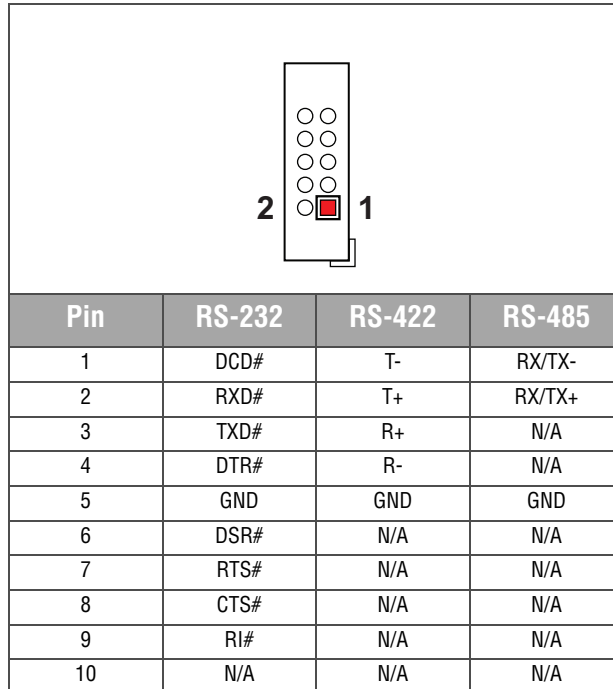


Pin	Name	Pin	Name
1	RED	2	SCL
3	GREEN	4	GND (Ground)
5	BLUE	6	SDA
7	VSYNC	8	GND (Ground)
9	HSYNC	10	+5 V

8.4.9 RS232/422/485 Pin Header (J10)

This 5x2-pin header provides access to the ITX-N-3900 serial port (RS-232/422/485) at J10. This header provides a serial port connection and is switched by BIOS.

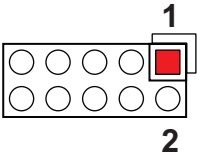
Layout and Pin Reference:



8.4.10 M.2 key E Socket (J11)

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

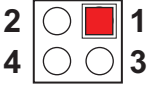
8.4.11 80 Port Connector (J12)



Pin	Name
1	LAD0
2	3.3 V
3	LAD1
4	PLTRST
5	LAD2
6	LFRAME
7	LAD3
8	LPC_CLK
9	N/A
10	GND

8.4.12 ATX 4 Pin Connector (J13)

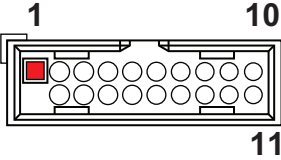
Also see “DC Jack (J1)” on page 12.



Pin	Name
1	+12 V DC
2	+12 V DC
3	Ground
4	Ground

8.4.13 External USB3 Connector (J14)

Voltage (5 V DC) through pin 1 and pin 19 is always available. It is supplied by the 5 V V_{CC} power source (in normal operation mode) or by the 5 V standby power source (in standby mode).

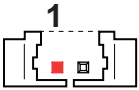
Layout and Pin Reference:


Pin	Name	Pin	Name
1	5 V	11	USB2_DP_#3
2	USB3_RXM_#1	12	USB_DM_#3
3	USB3_RXP_#1	13	Ground
4	Ground	14	USB3_TXP_#3
5	USB3_TXM_#1	15	USB3_TXM_#3
6	USB3_TXP_#1	16	Ground
7	Ground	17	USB3_RXP_#3
8	USB2_DM_#1	18	USB3_RXM_#3
9	USB2_DP_#1	19	5 V
10	Ground	20	Key (no pin)

8.4.14 Battery Connector (J15)

An optional external battery, connected to J15, supplies the 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

8.4.15 mSATA/MiniPCle socket (J16)

The ITX-N-3900 provides a Mini-PCle 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-PCle in the BIOS to support your specific expansion device.

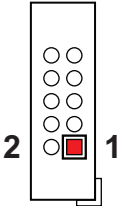
8.4.16 DDR3 SODIMM Socket (J17)

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

8.4.17 General Purpose I/O Pin Header (J18)

This 5x2-pin header provides access to eight GPIO connections (GPIO0 through GPIO7).

Layout and Pin Reference:

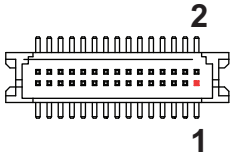


Pin	Name	Pin	Name
1	GPIO0	2	GPIO4 (Output Only)
3	GPIO1	4	GPIO5 (Output Only)
5	GPIO2	6	GPIO6 (Output Only)
7	GPIO3	8	GPIO7 (Output Only)
9	Ground	10	+5 V

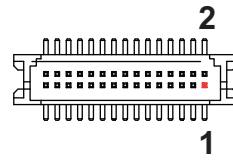
8.4.18 LVDS Connector (J19)

The ITX-N-3900 supports LVDS flat panel displays.

Layout and Pin Reference:



Pin	Name	Pin	Name
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_CLKP	12	LVDSA_CLKN

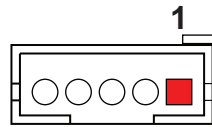


Pin	Name	Pin	Name
13	DDC_SCL	14	DDC_SDA
15	Ground	16	Ground
17	LVDSB_DATA0	18	LVDSB_DATA#0
19	LVDSB_DATA1	20	LVDSB_DATA#1
21	LVDSB_DATA2	22	LVDSB_DATA#2
23	LVDSB_DATA3	24	LVDSB_DATA#3
25	LVDSB_CLKP	26	LVDSB_CLKN
27	N/C	28	N/C
29	Ground	30	Ground

8.4.19 Backlight Connector (J20)

Power and control is supplied through the Backlight connector at J20.

Layout and Pin Reference:

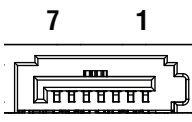


Pin	Name
1	+5 V
2	BL_CTRL
3	+12 V
4	Ground
5	BL_Enable

8.4.20 SATA GEN2 Connector (J21)

The bootable SATA (3.0) 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

8.4.21 SATA Power Connector (J22)

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

Layout and Pin Reference:

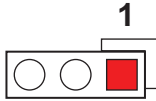
Pin	Name
1	+12 V
2	Ground
3	Ground
4	+5 V

8.4.22 Micro SD Card Socket (J23)

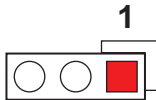
The ITX-N-3900 provides a MicroSD card socket for storage only. The MicroSD cannot be used as a bootable device for Windows.

8.5 Jumpers and Switches

8.5.1 BKLCTRL Signal Level Selection (JP1)

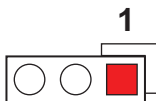
	
JP7/JP8	Function
1-2 Short	+3.3 V (Default)
2-3 Short	+5 V

8.5.2 BKLCTRL Signal Source Selection (JP2)

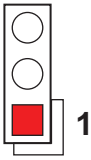
	
JP7/JP8	Function
1-2 Short	EC (Embedded Controller)
2-3 Short	SOC (System on a Chip)(Default)

8.5.3 CMOS Clear (JP3)

Clear CMOS using this jumper (JP3). See “Reset CMOS BIOS Configuration” on page 54 for usage of this jumper.

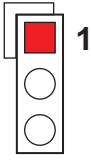
	
JP7/JP8	Function
1-2 Short	Normal Operation (Default)
2-3 Short	Clear CMOS Contents

8.5.4 Power On Mode Selection (JP5)

	
JP1	Function
1-2 Short	AT
2-3 Short	ATX (Default)

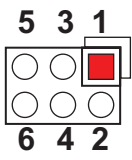
8.5.5 GPIO4 through GPIO7 Voltage Level Selection (JP6)

This jumper configures the on-board programmable 8-bit Digital I/O interface.

	
JP1	Function
1-2 Short	5 V
2-3 Short	3.3 V (Default)

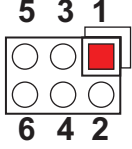
8.5.6 Panel Voltage Selection (JP7)

Select the appropriate V_{CC} setting using this jumper (JP7).

	
JP5	Function
1-3 Short	V_{CC} 3.3 V
3-5 Short	V_{CC} 5 V (Default)
3-4 Short	+12 V

8.5.7 Backlight Power (JP8)

Select the appropriate backlight enable and power settings for the backlight using this jumper (JP8).

	
Pin Number	Signal Description
1-3, 2-4	Backlight Enable: 5 V, Active High (Default)
1-3, 4-6	Backlight Enable: 12 V, Active High
3-5, 2-4	Backlight Enable: 5 V, Active Low
3-5, 4-6	Backlight Enable: 12 V, Active Low

8.5.8 Power Button (SW1)

The Power Button (SW1), located next to J1, controls power to the ITX-N-3900. The first time you connect power to J1 or J13, the power button is bypassed and the board powers up automatically. See “Edge Connections and Switch Locations” on page 10 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 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 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

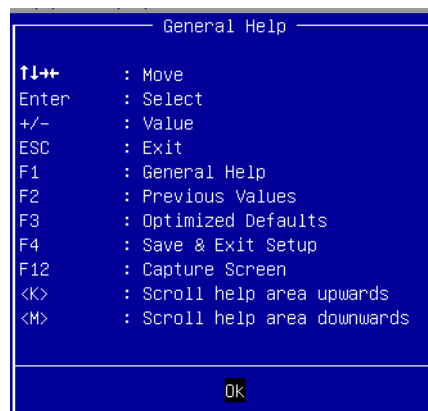
To enter setup, apply power to the computer and then press the **DELETE** key or the **ESC** key. Either of these keys must be pressed when either the splash screen is displayed (during the system power-on self test, POST) or when the following prompt message is displayed. It may take a few seconds before 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 Navigation of 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 27 for available options.

9.4 BIOS Screens

The following BIOS screens contain the options and sample settings for the 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 Menu

```

Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
Main Configuration Security Boot Save & Exit

Project Name                ITX-N-3900
BIOS Version & Build Date   70518T00 (05/18/2017 21:31:10)
EC Version & Build Date    70223T00 (02/23/2017)
Access Level                Administrator

Processor information
Brand String                Intel(R) Atom(TM) Processor E3950 @ 1.60GHz

Platform firmware Information
BXT SOC                    B1
TXE FW                     3.0.10.1129
GDP                        10.0.1030
CPU Flavor                  BXT Notebook/Desktop (1)

Memory Information
Total Memory                4096 MB
Memory Slot0                4096 MB (DDR3L)
Memory Speed                1333 MHz

System Date                 [Fri 05/19/2017]
System Time                 [10:28:53]

Version 2.18.1263, Copyright (C) 2017 American Megatrends, Inc.

```

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 the Enter key 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.

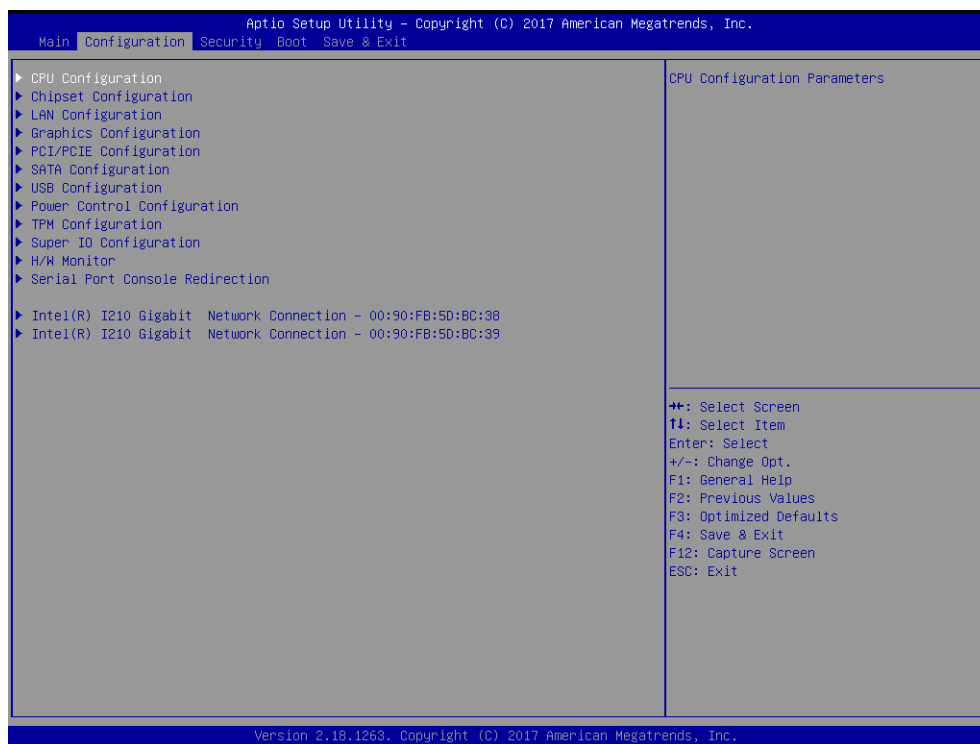
System Time

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 the Enter key until the desired value is highlighted with a square block. Use the +/- keys to change the highlighted value.

System Information

System Information parameters provide information and vary with BIOS version and the specific modules used.

Configuration

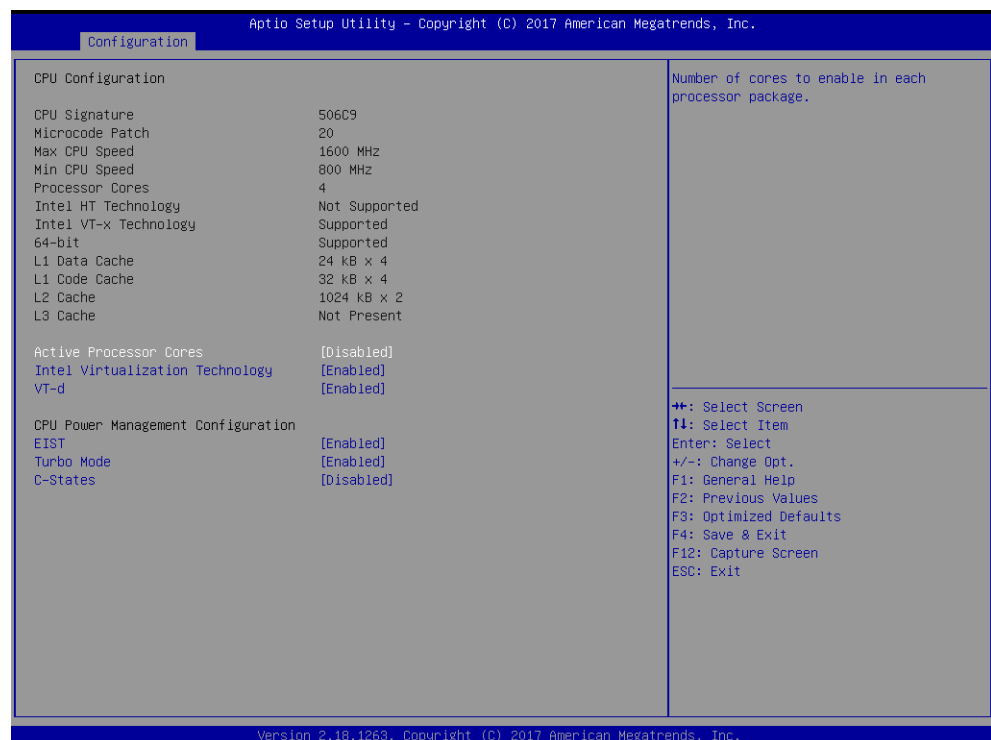


Use this screen to set enhanced configuration features (see the following references for specifics):

- “CPU Configuration” on page 29
- “Chipset Configuration” on page 30
- “LAN Configuration” on page 31
- “Graphics Configuration” on page 33
- “PCI/PCIE Configuration” on page 35
- “SATA Configuration” on page 38
- “USB Configuration” on page 39

- “Power Control Configuration” on page 40
- “TPM Configuration” on page 41
- “Super IO Configuration” on page 42
- “H/W Monitor Configuration (Display only)” on page 43
- “Serial Port Console Redirection” on page 44
- “Intel(R) I210-IT Gigabit Network Connection-00:90:FB:5D:BC:38” on page 46
- “Intel(R) I210-IT Gigabit Network Connection-00:90:FB:5D:BC:39” on page 48 (if applicable)

CPU Configuration



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

Active Processor Cores

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 utilize 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]

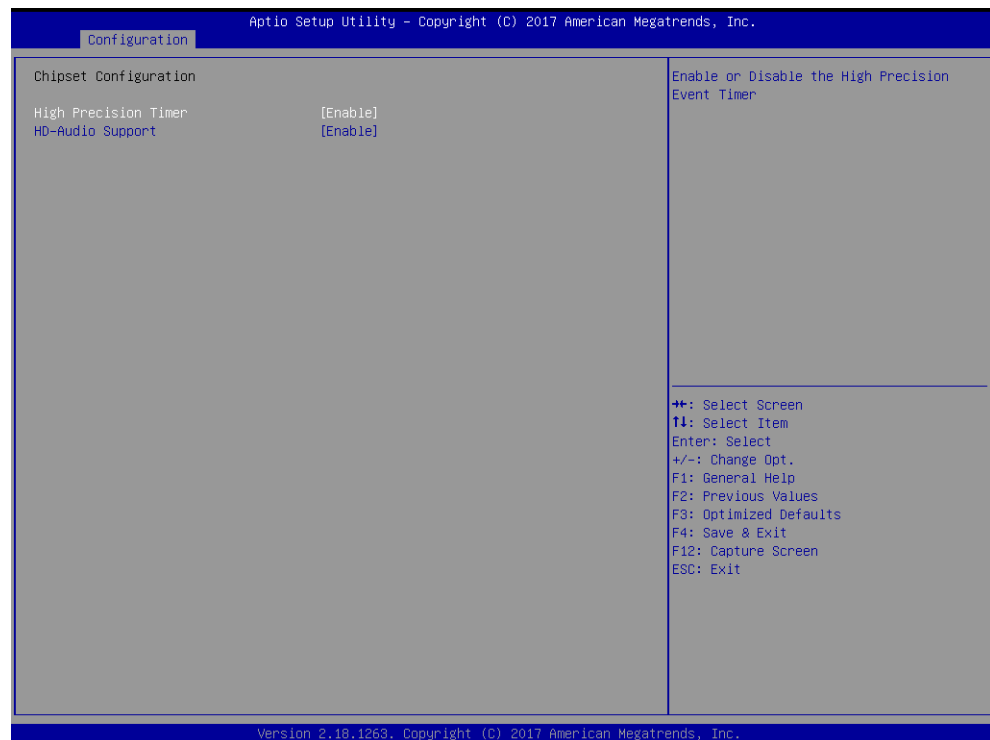
Turbo Mode: Turbo Mode. Choices: Enabled (Default), Disabled

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

CPU C-states [Enabled]

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

Chipset Configuration

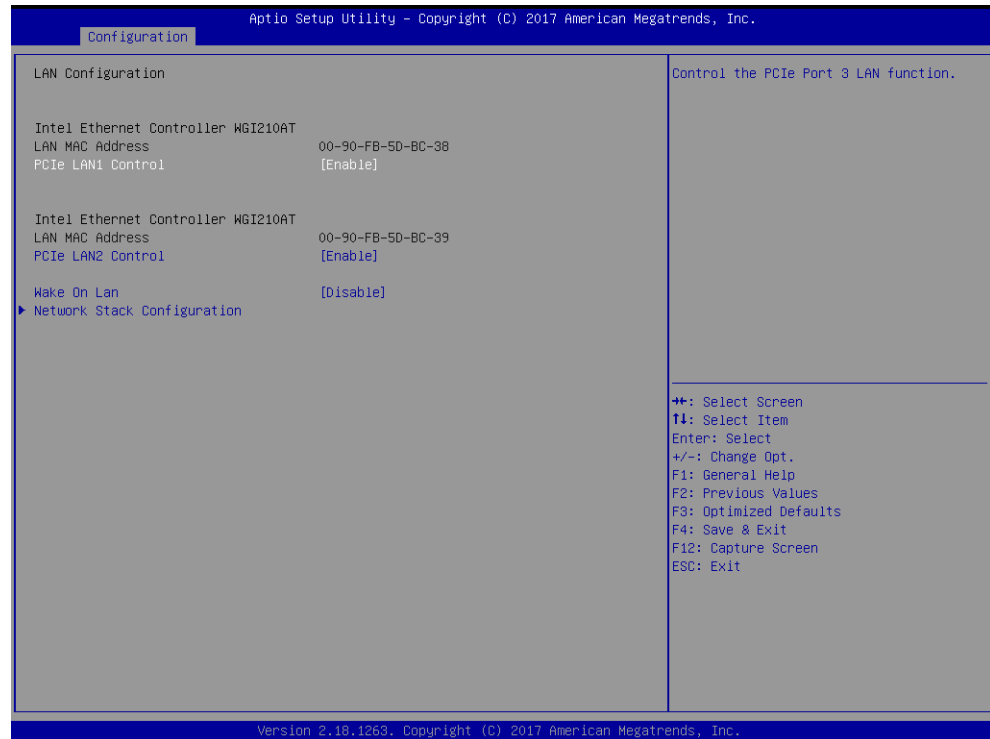


Use this screen to configure the following features.

High Precision Timer: Enable or Disable the High Precision Event Timer. Choices: Enabled (Default), Disabled

HD-Audio Support: Enable or Disable HD-Audio Support. Choices: Enabled (Default), Disabled

LAN Configuration



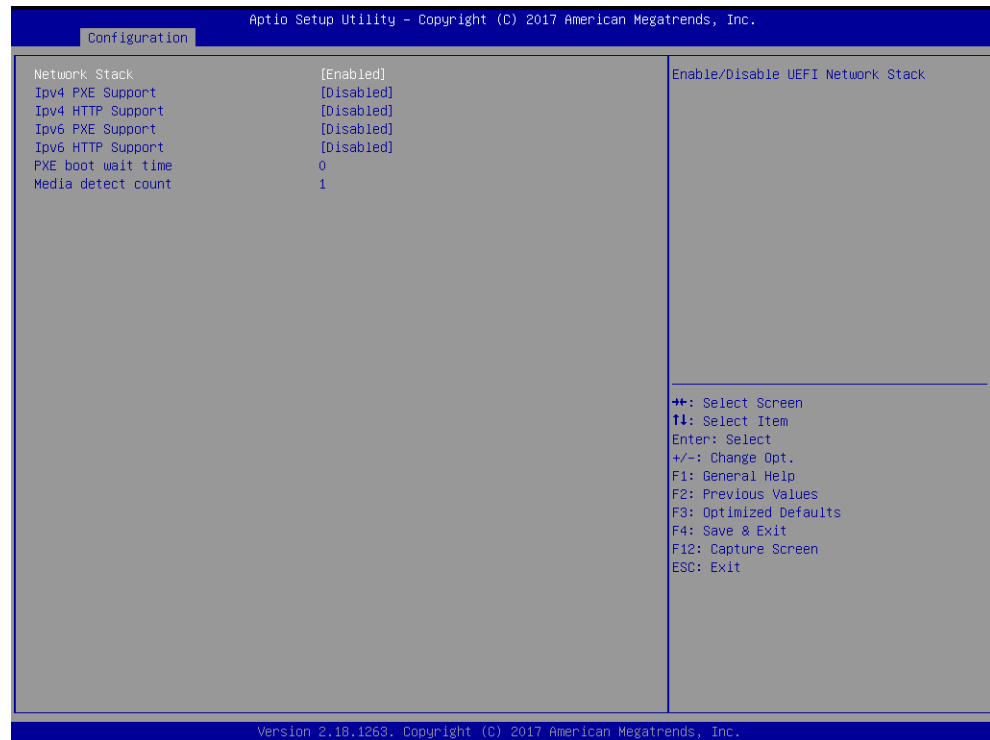
Use this screen to configure the following onboard LAN features.

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

Network Stack Configuration



Use this screen to configure the following network features.

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 will not be created. Choices: Disabled (Default), Enabled

Ipv4 HTTP Support: Enable Ipv4 HTTP Boot Support. If disabled Ipv4 HTTP Boot Option will not be created. Choices: Disabled (Default), Enabled

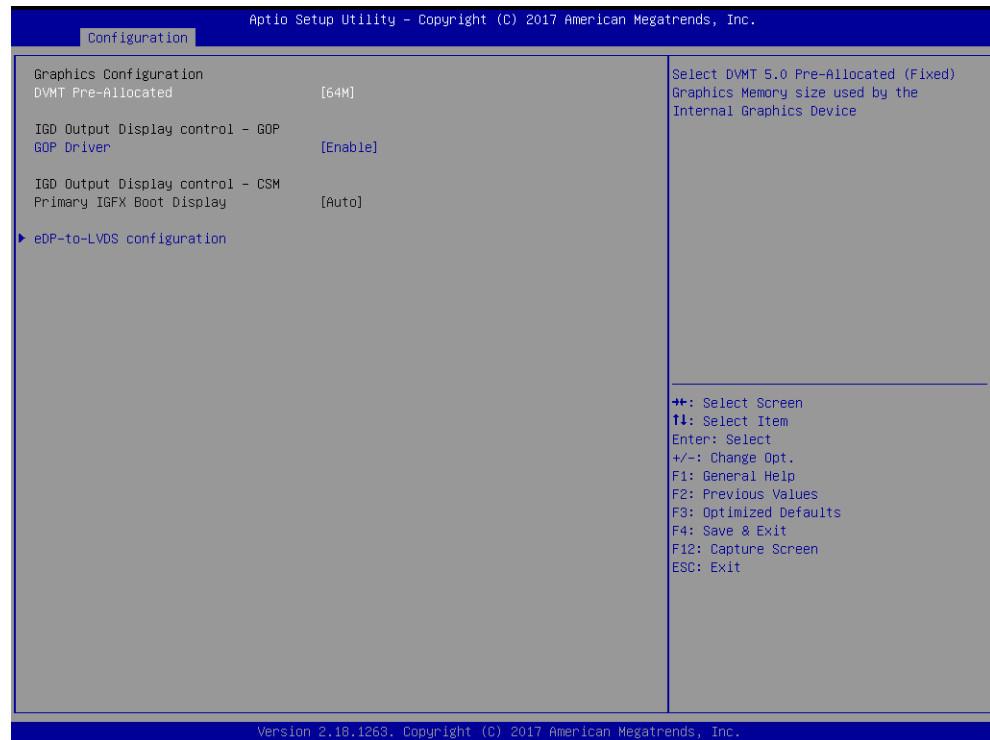
Ipv6 PXE Support: Enable Ipv6 PXE Boot Support. If disabled Ipv6 PXE Boot Option will not be created. Choices: Disabled (Default), Enabled

Ipv6 HTTP Support: Enable Ipv6 HTTP Boot Support. If disabled Ipv6 HTTP Boot Option will not be created. Choices: Disabled (Default), Enabled

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

Media detect count: Number of times presence of media will be checked. Choices: 1 (Default), maximum 50

Graphics Configuration



Use this screen to configure the following 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

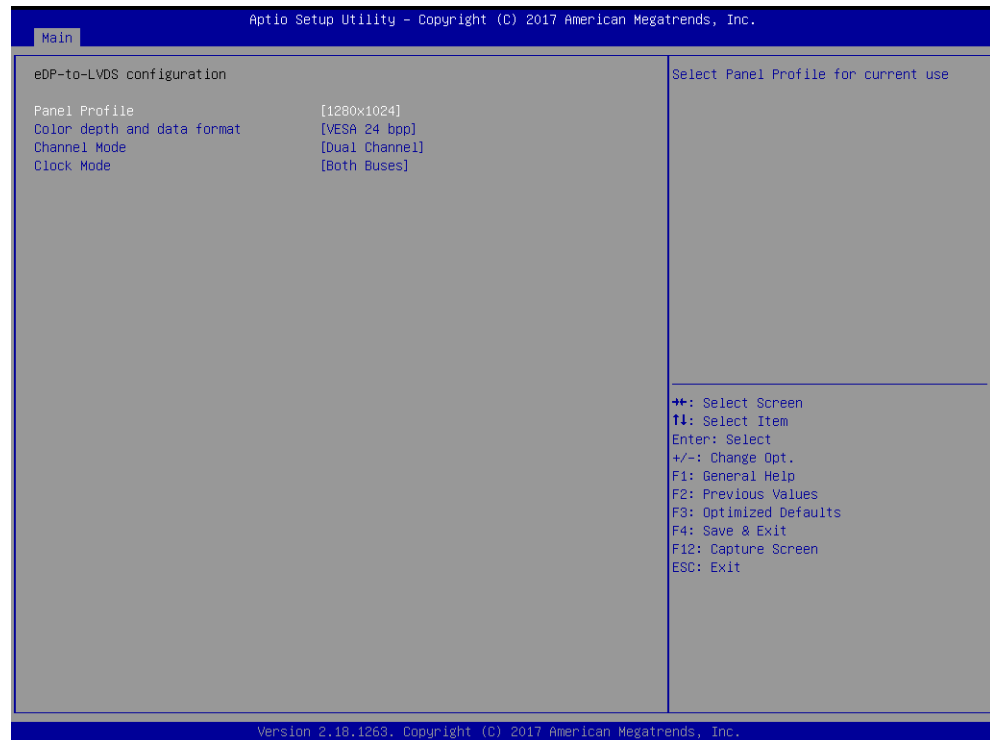
IGD Output Display control – GOP (Boot item CSM Support [Disabled])

GOP Driver: Enable: GOP Driver will unload VBIOS; Disable: it will load VBIOS. Choices: Enabled (Default), Disabled

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

Primary IGFX Boot Display: Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA mode will be supported only on primary display. Choices: Auto (Default), VGA, LVDS, DP

eDP-to-LVDS Configuration



Use this screen to configure the following onboard graphics features.

Panel Profile

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

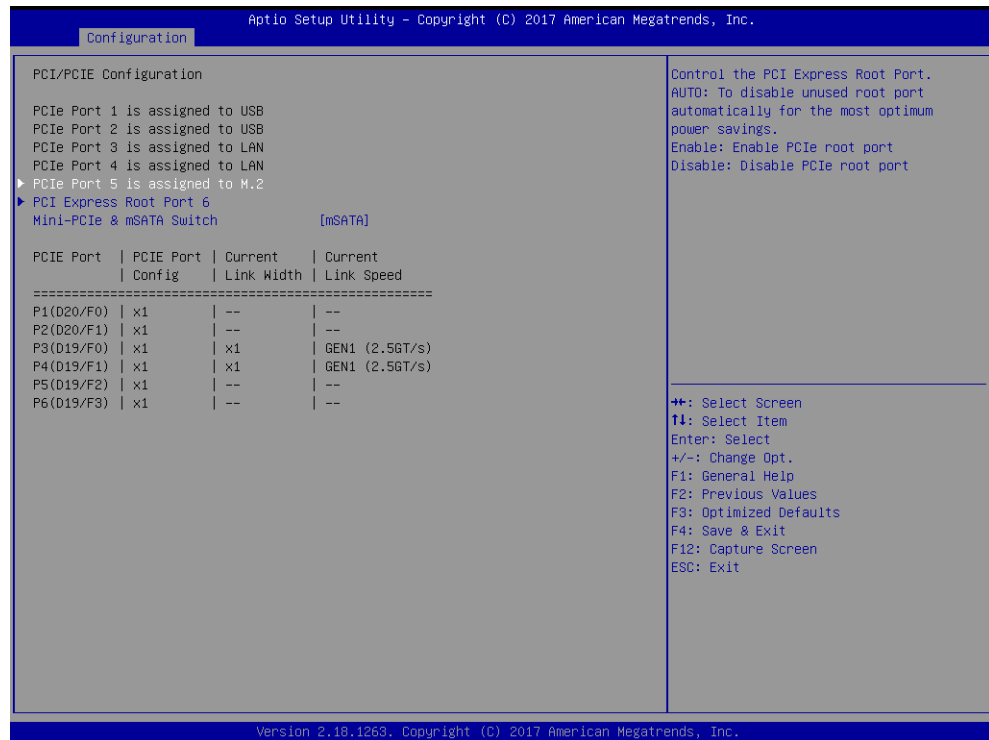
Color depth and data format

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

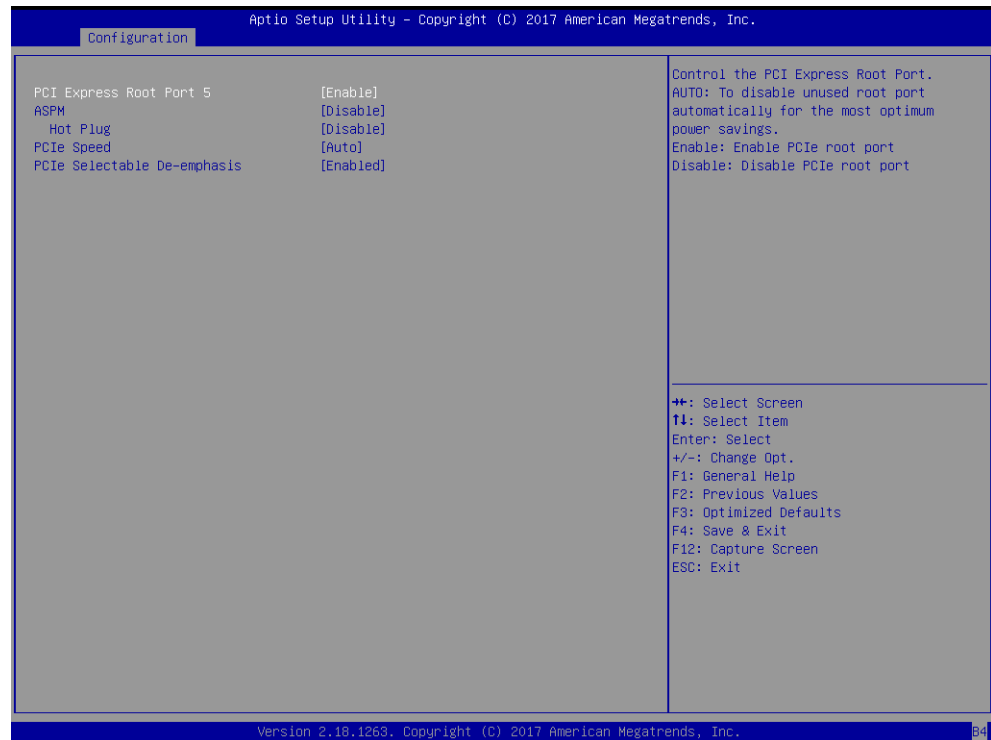
PCI/PCIE Configuration



Use this screen to select mSATA or Mini-PCIe.

Mini-PCIe & mSATA Switch: Choices: mSATA (Default), Mini-PCIe

PCIe Port 5 is assigned to M.2



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

PCI Express Root Port 5: 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)

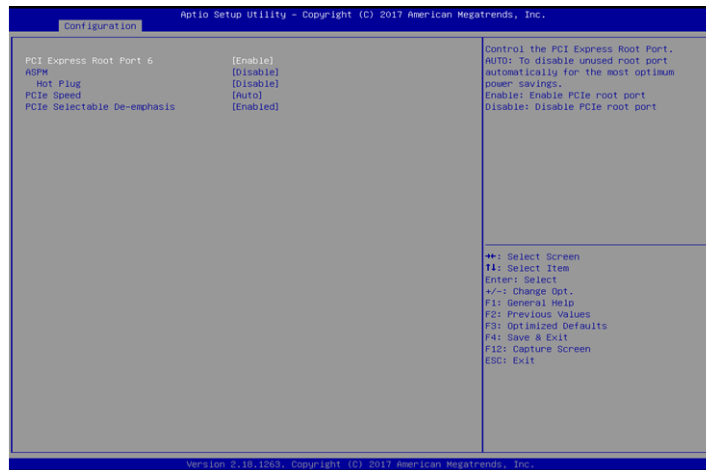
ASPM: PCI Express Active State Power Management settings. Choices: Disable (Default), L0s, L1, L0sL1, Auto

Hot Plug: PCI Express Hot Plug Enable/Disable. 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

PCI Express Root Port 6



Use this screen to configure to configure the following 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)

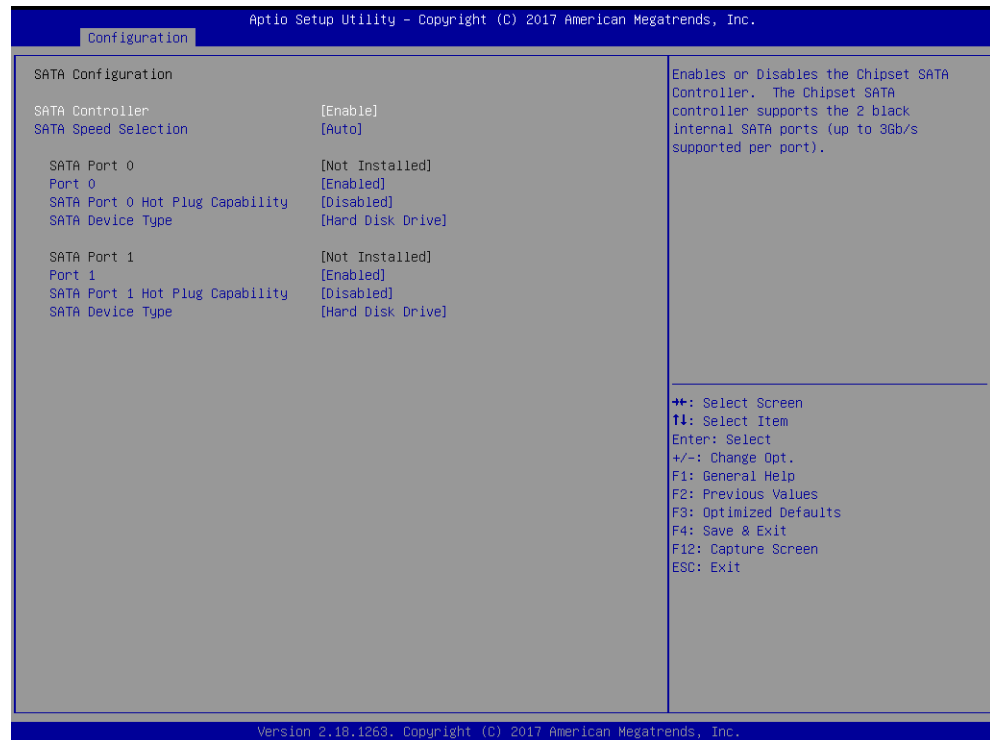
ASPM: PCI Express Active State Power Management settings. Choices: Disable (Default), L0s, L1, L0sL1, Auto

Hot Plug: PCI Express Hot Plug Enable/Disable. 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 following SATA Device Options Settings.

SATA Controller: Enable or disable the chipset SATA Controller. The Chipset controller supports the 2 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 or Disable SATA Port. Choices: Enabled (Default), Disabled

SATA Port 0 Hot Plug Capability: If enabled, SATA port will be 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

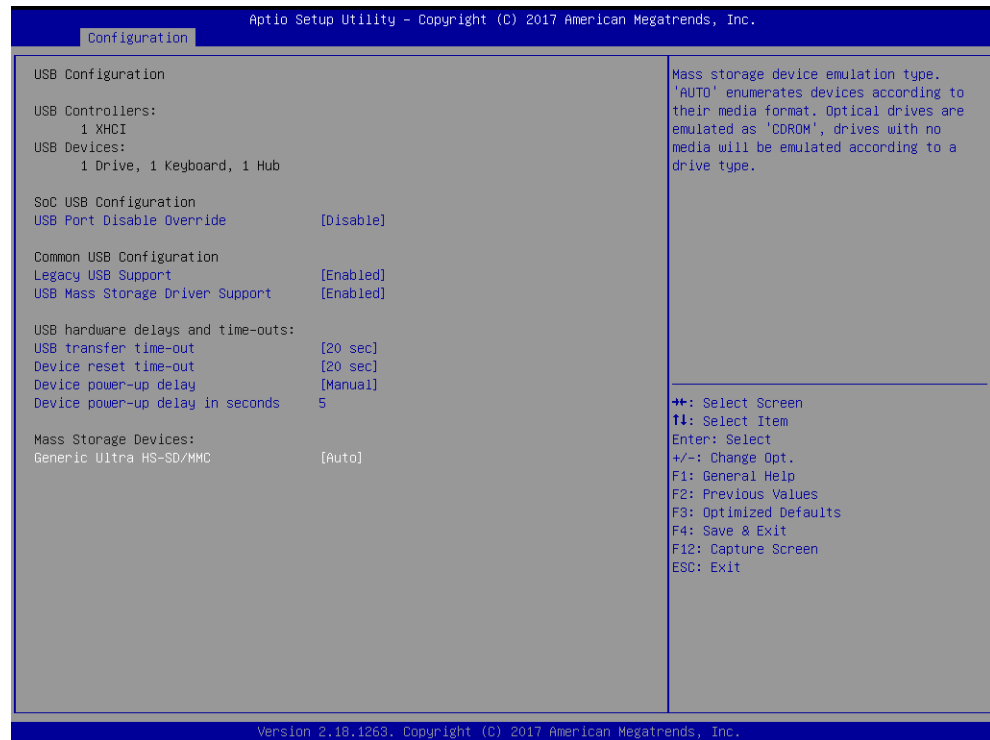
SATA Port 1

Port 1: Enable or Disable SATA Port. Choices: Enabled (Default), Disabled

SATA Port 1 Hot Plug Capability: If enabled, SATA port will be 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

USB Configuration



Use this screen to set the following 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 USB port. Once disabled, any USB devices plugged into the connector will not be detected by BIOS or OS. Choices: Enable (Default), Disabled

USB 3 Port #0-3: Enable/Disable USB port. Once disabled, any USB devices plugged into the connector will not be 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

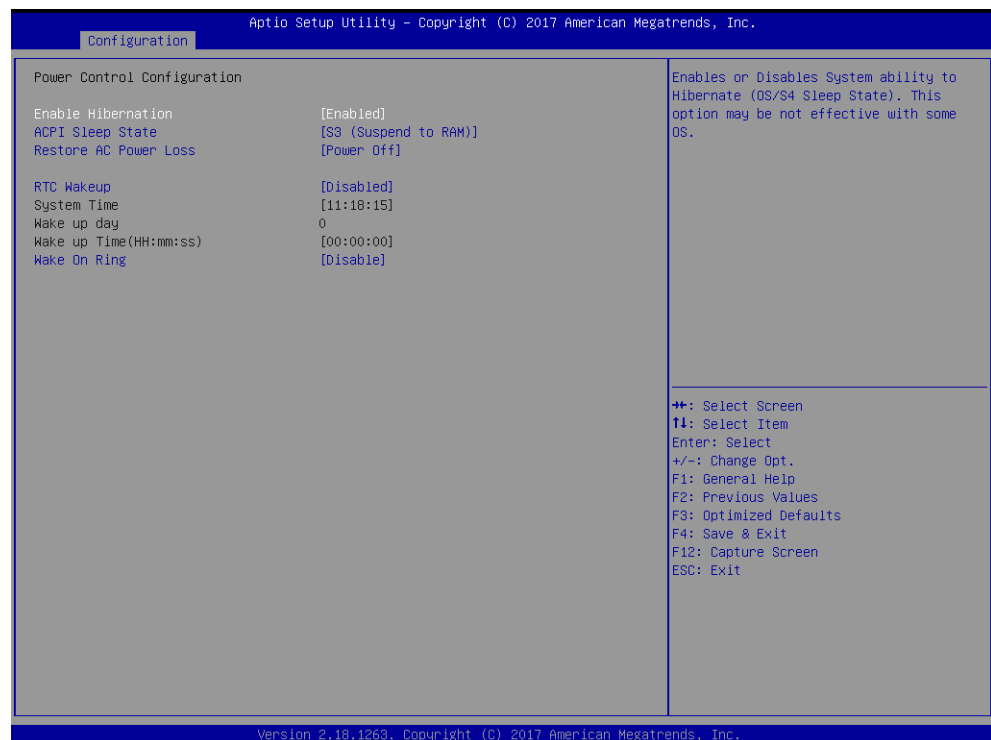
Device reset time-out: USB mass storage device Start Unit command time-out.
Choices: 20 sec (Default), 10 sec, 30 sec, 40 sec

Device power-up delay: Maximum time the device 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 (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 will be 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 following system power control configuration 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 (Default), Disabled

ACPI Sleep State: Select the highest ACPI sleep state the system will enter 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 will boot 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 or disable System wake on alarm event. Enabled: System will wake up at the Hour: Min: Sec specified. Disabled: Turn off RTC Wakeup. Choices: Disabled (Default), Enabled

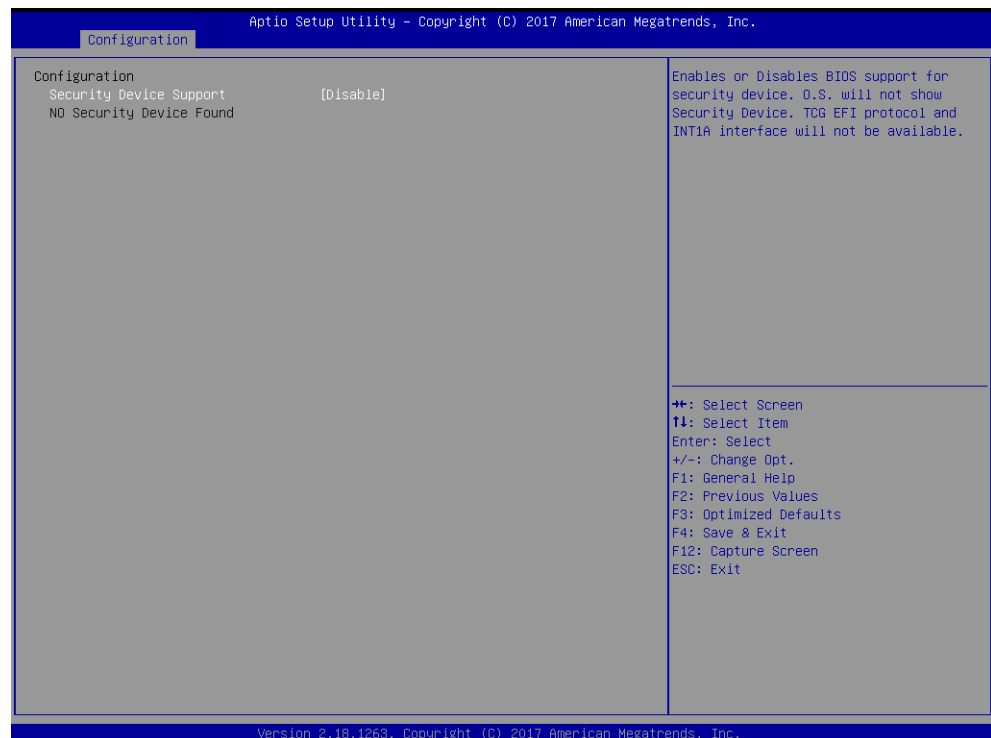
RTC Wake up [Enabled]

Wake up day: Select 0 for daily system wake up 1-31 for which day of the month that you would like 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 or Disable the Wake on Ring. Choices: Disable (Default), Enable

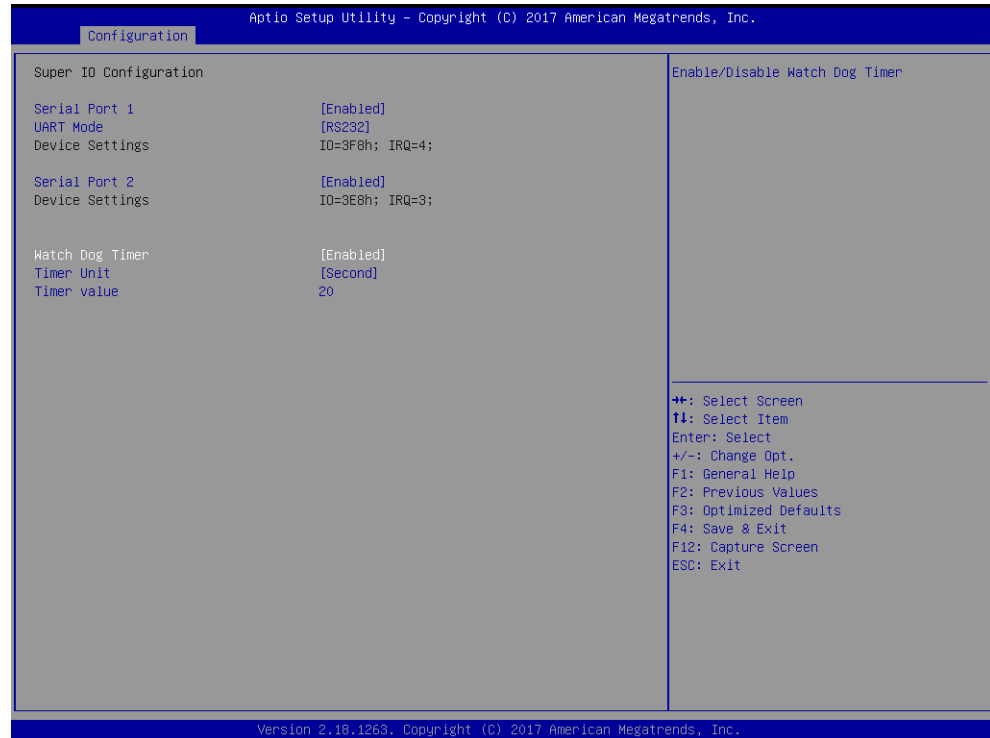
TPM Configuration



Use this screen to set the trusted computing setting parameter.

Security Device Support: Enables or Disables BIOS support for security device. The operating system (OS) will not show Security Device. TCG EFI protocol and INT1A Interface will not be available. Choices: Disabled (Default), Enabled

Super IO Configuration



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

Serial Port 1: Enable or 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 or Disable Serial Port (COM). Choices: Enabled (Default), Disabled

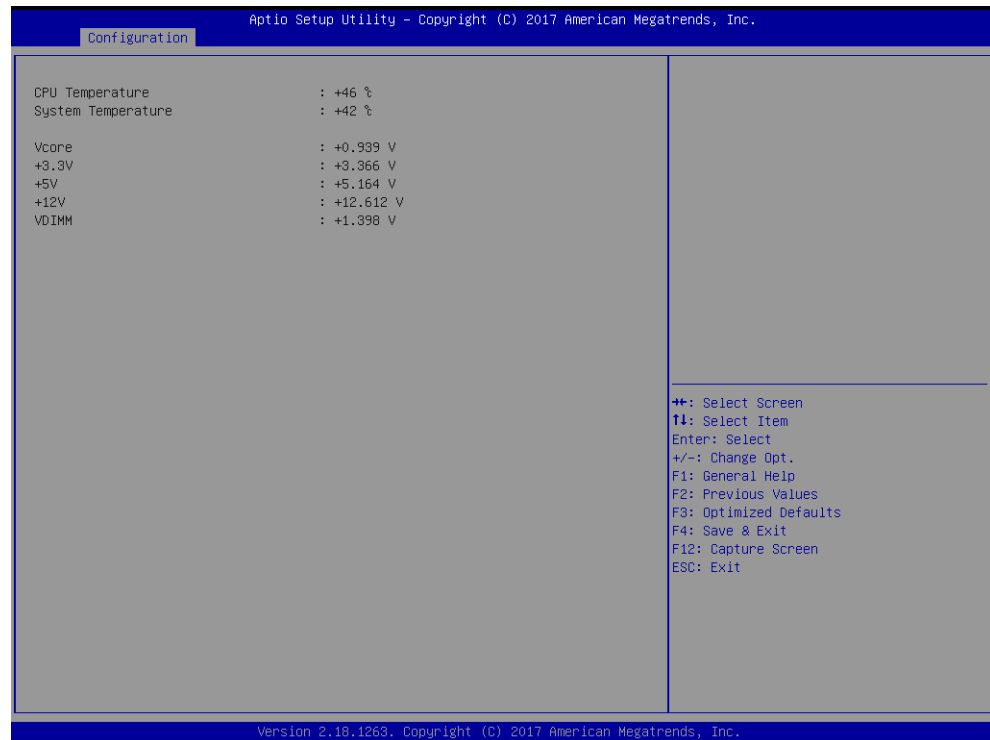
Watch Dog Timer: Enable/Disable Watch Dog Timer. Choices: Disabled (Default), Enabled

Watch Dog Timer [Enabled]

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

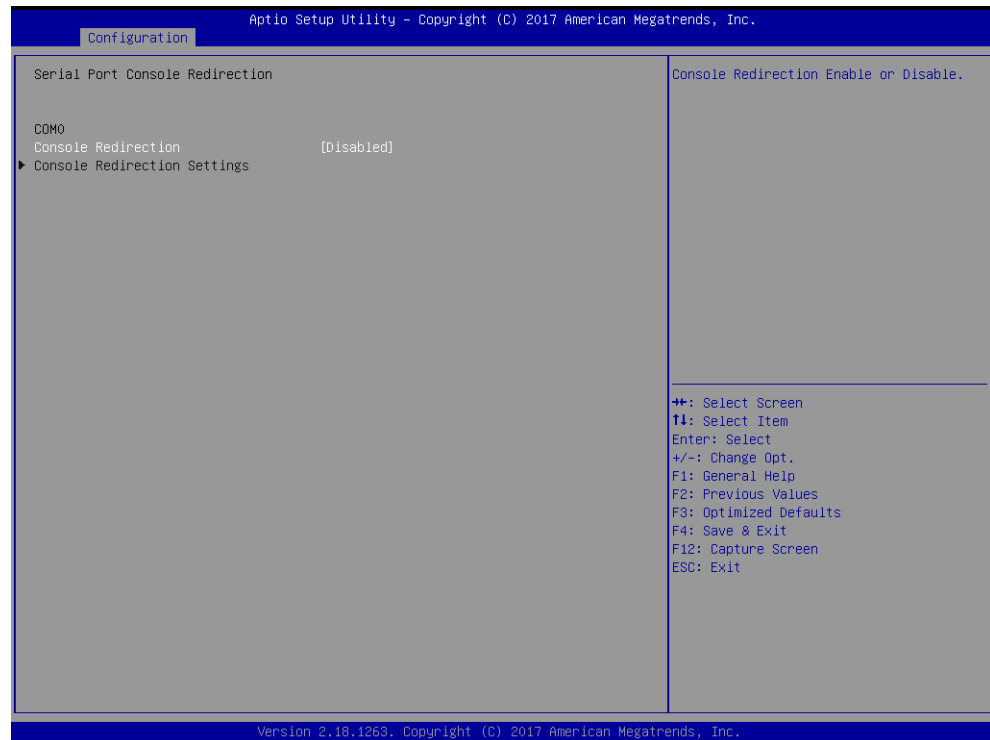
Timer value: Set WDT Timer value seconds/minutes. Choices: 20 (Default), 1-255 (Minute), 10-255 (Second)

H/W Monitor Configuration (Display only)



Use this screen to display the hardware status.

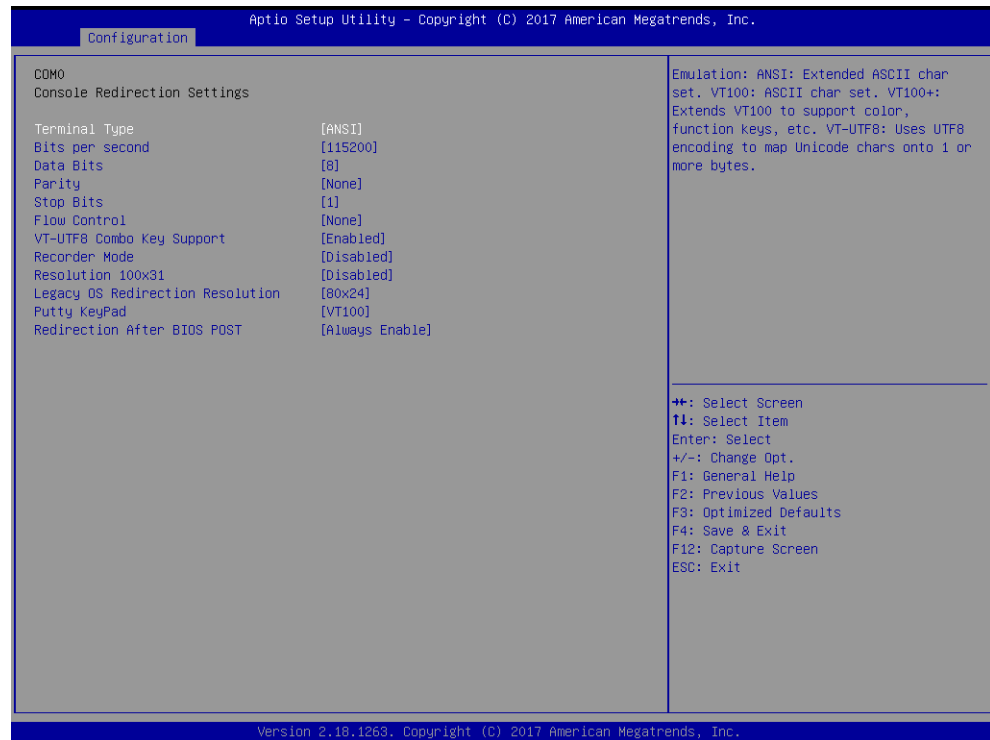
Serial Port Console Redirection



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

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) will 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: With this mode enabled only text will be sent. This is to capture Terminal data. Choices: Disabled (Default), Enabled

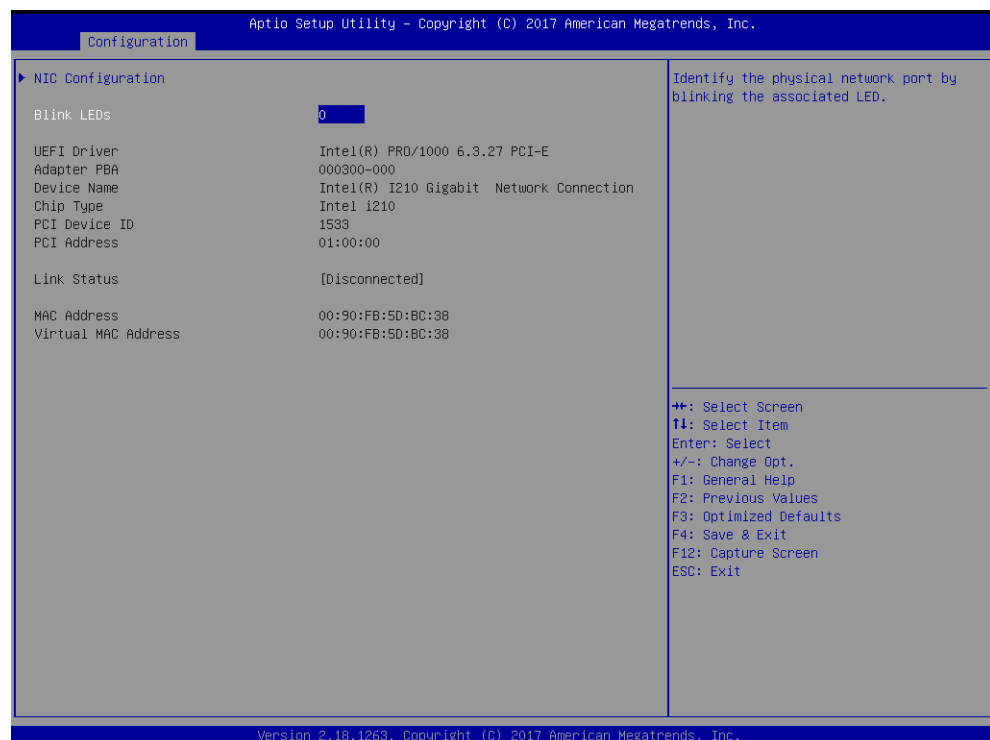
Resolution 100x31: Enables or disables extended terminal resolution. Choices: Disabled (Default), Enabled

Legacy OS Redirection Resolution: On Legacy OS, the Number of Rows and Columns supports redirection. Choices: 80x24 (Default), 80x25

Putty KeyPad: Select Function Key and Key Pad on Putty. Choices: VT100 (Default), LINUX, XTERMR6, SCO,ESCN,VT400

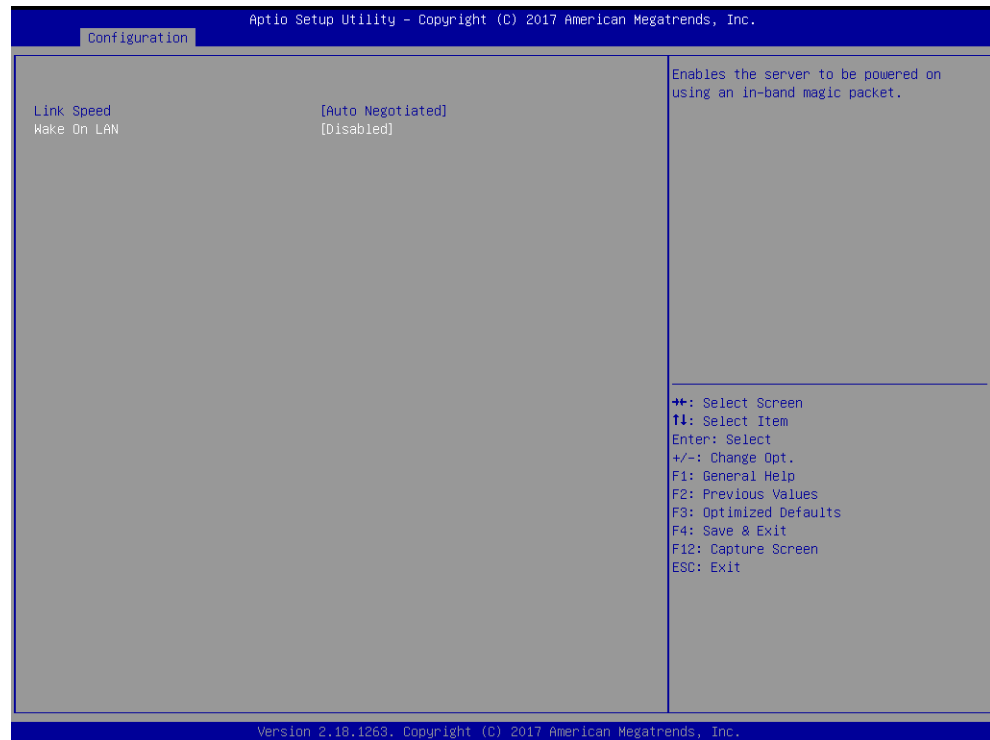
Redirection After BIOS POST: When BootLoader is selected, then Legacy console redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable. Choices: Always Enable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

Intel(R) I210-IT Gigabit Network Connection-00:90:FB:5D:BC:38



Use this screen to access the I210-IT Gigabit Network connection 00:90:FB:5D:BC:38 device parameters.

NIC Configuration



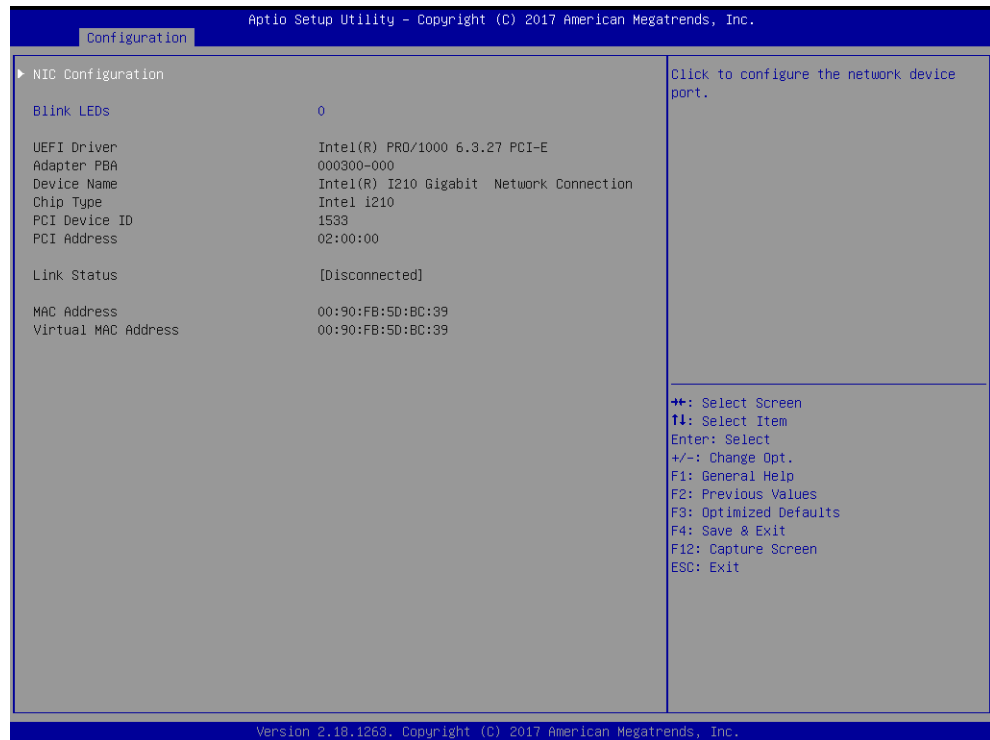
Use this screen to specify the port speed used for the selected boot protocol.

Link Speed: Specifies 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: Enables the server to be powered on using an in-band magic packet. Choices: Disabled (Default), Enabled

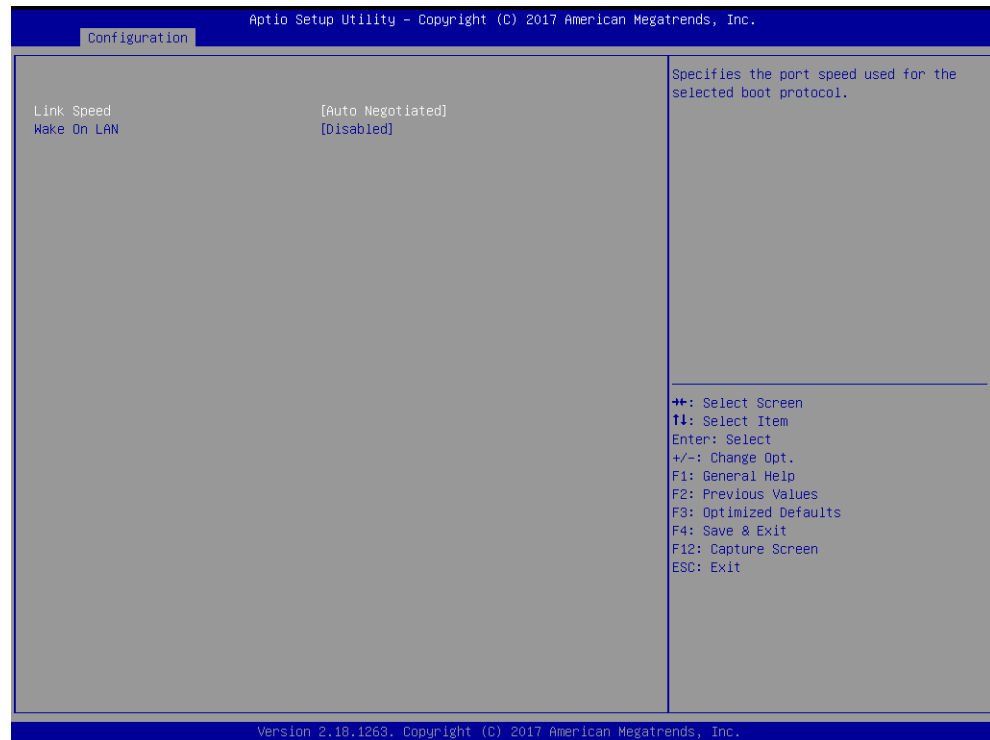
Blink LEDs: Identify the physical network port by blinking the associated LED. Choices: 0 (Default)

Intel(R) I210-IT Gigabit Network Connection-00:90:FB:5D:BC:39



Use this screen to access the I210-IT Gigabit Network connection 00:90:FB:5D:BC:38 device parameters (if present).

NIC Configuration



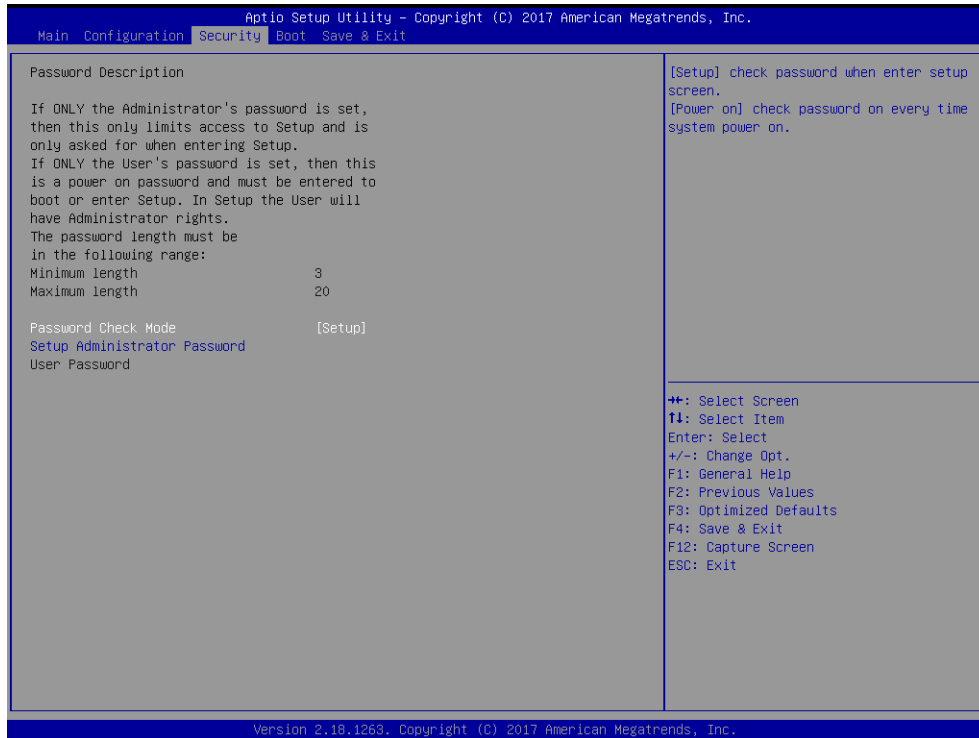
Use this screen to specify the port speed used for the selected boot protocol.

Link Speed: Specifies 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: Enables 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. Choices: 0 (Default)

Security

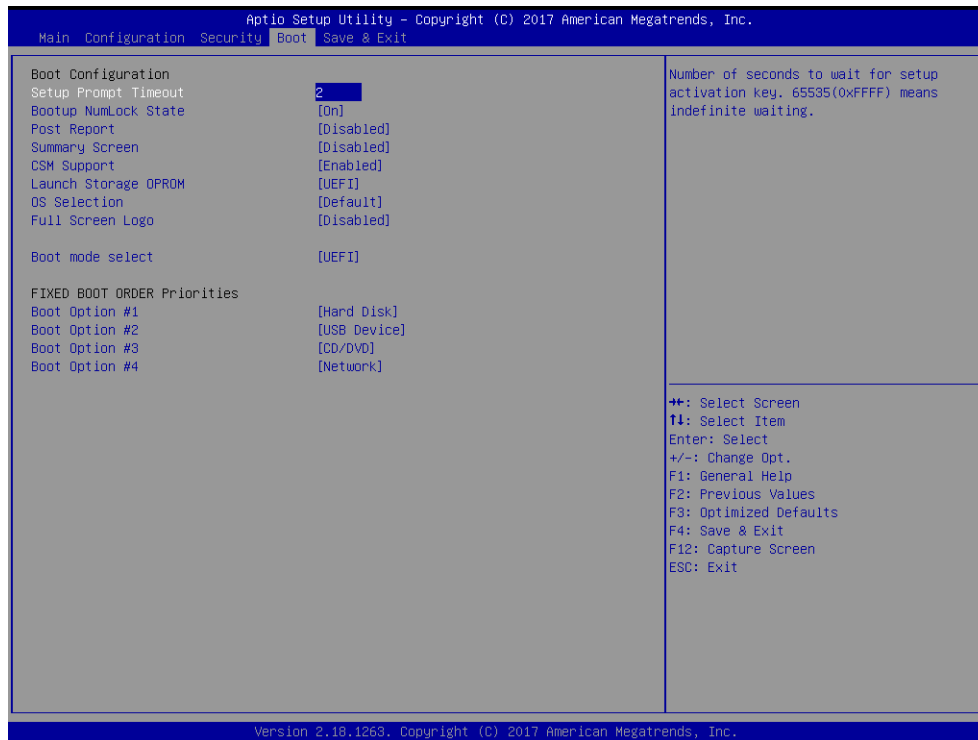


Use this screen to set security passwords to control system access at boot time or when entering the BIOS setup program.

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: Post Report Support Enabled/Disabled. Choices: Disabled (Default), Enabled

Summary Screen: Summary Screen Support Enabled/Disabled. Choices: Disabled (Default), Enabled

CSM Support: Enable/Disable CSM Support. Choices: Disabled (Default), Enabled

CSM Support [Enabled]

Launch Storage OPROM: Controls 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 & XHCI Hand-off item setting. Choices: Default (Win8/8.1/10), Others, Legacy System, Intel Linux

Full Screen Logo: Enables or disables 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

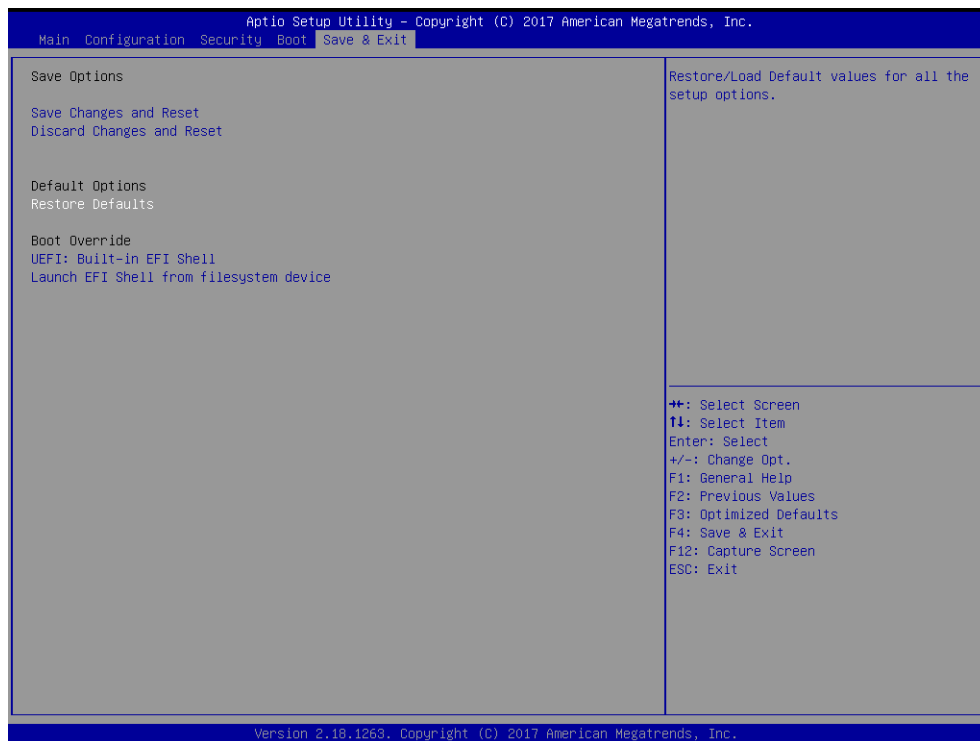
Boot Option #1: Sets the system boot order. Choices: Hard Disk (Default), USB Device, CD/DVD, Network, Disabled

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

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

Boot Option #4: Sets 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 the setup options.

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

Launch EFI Shell from filesystem device: Attempts to Launch EFI Shell application (Shell.efi) from one of the available file system devices.

10. Troubleshooting

This section provides useful tips to get the ITX-N-3900 operating. For basic hardware installation and configuration, refer to “Installation and Connections” on page 7. 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 the 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 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 Settings

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

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

1. Apply power to an installed ITX-N-3900 and press the **DELETE** or **ESC** key 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 setting back to the initial factory configuration.

10.1.2 Reset CMOS BIOS Configuration

Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable/disable the Clear CMOS Function hardware circuit, by placing or removing the jumper from JP3 as needed (see “CMOS Clear (JP3)” on page 23).

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

1. Remove power from the 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 back on pins 1-2.

10.1.3 Update BIOS

1. Obtain the ROM file and flash utility. See “Cables and Software Drivers” on page 55.
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 USB port of the ITX-N-3900 and apply power to the board.
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 will be a 5-second pause and then the computer automatically restarts.
8. Press the **DELETE** or **ESC** key to open the BIOS setup menu and select **Restore Defaults**.
9. To finish the update, select the **Save & Exit** option.

11. Cables and Software Drivers

Go to www.winsystems.com for cable information and software drivers.

Appendix A. Best Practices

This section outlines the best practices for operating the 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 usually 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 single board computer's typical load is not lower than the power supply's minimum load. If the single board computer does not draw enough power to meet the power supply's minimum load, then the power supply will not regulate properly and can cause damage to the ITX-N-3900.



Use Proper Power Connections (Voltage)—When verifying the voltage, measure it at the power connector on the ITX-N-3900. Measuring it at the power supply does not account for voltage drop through the wire and connectors. Power the ITX-N-3900 using J1 (+12 V DC) or J12 (ATX 4-pin connector). Verify the power connections. Incorrect voltages can cause catastrophic damage.

Power Harness

Minimize the length of the power harness. This will reduce the amount of voltage drop between the power supply and the 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

Often 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 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

Applying conformal coating to a WinSystems product will not in itself void the product warranty, if it is properly removed prior to return. Coating may change thermal characteristics and impedes our ability to test, diagnose, and repair products. Any coated product sent to WinSystems for repair will be returned at customer expense and no service will be performed.

Operations/Product Manuals

Every single board computer has an Operations manual or Product manual.

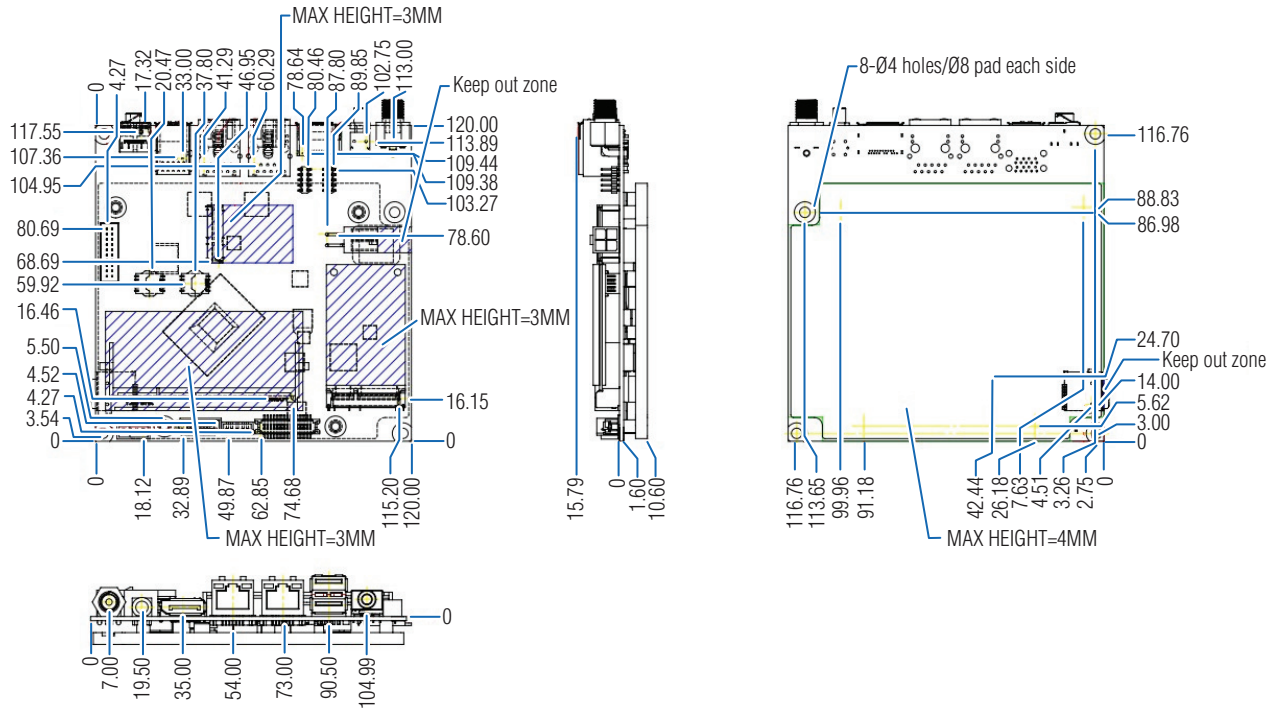
Periodic Updates—Operations/Product manuals are updated often. Periodically check the WinSystems website (<https://www.winsystems.com>) for revisions.

Check Pinouts—Always check the pinout and connector locations in the manual before plugging in a cable. Many I/O modules will 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. Mechanical Drawing

Figure B-1: ITX-N-3900 Dimensions



Appendix C. Warranty Information

WinSystems warrants that for a period of two (2) years from the date of shipment, any Products and Software purchased or licensed hereunder which have been developed or manufactured by WinSystems shall be free of any defects and shall perform substantially in accordance with WinSystems' specifications therefor. With respect to any Products or Software purchased or licensed hereunder which have been developed or manufactured by others, WinSystems shall transfer and assign to Customer any warranty of such manufacturer or developer held by WinSystems, provided that the warranty, if any, may be assigned. The sole obligation of WinSystems for any breach of warranty contained herein shall be, at its option, either (i) to repair or replace at its expense any materially defective Products or Software, or (ii) to take back such Products and Software and refund the Customer the purchase price and any license fees paid for the same. Customer shall pay all freight, duty, broker's fees, insurance, charges and other fees and charges for the return of any Products or Software to WinSystems under this warranty. WinSystems shall pay freight and insurance charges for any repaired or replaced Products or Software thereafter delivered to Customer within the United States. All fees and costs for shipment outside of the United States shall be paid by Customer. The foregoing warranty shall not apply to any Products or Software which have been subject to abuse, misuse, vandalism, accident, alteration, neglect, unauthorized repair or improper installation.

THERE ARE NO WARRANTIES BY WINSYSTEMS EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WINSYSTEMS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES FOR LOSS OF DATA, PROFITS OR GOODWILL. WINSYSTEMS' MAXIMUM LIABILITY FOR ANY BREACH OF THIS AGREEMENT OR OTHER CLAIM RELATED TO ANY PRODUCTS, SOFTWARE, OR THE SUBJECT MATTER HEREOF, SHALL NOT EXCEED THE PURCHASE PRICE OR LICENSE FEE PAID BY CUSTOMER TO WINSYSTEMS FOR THE PRODUCTS OR SOFTWARE OR PORTION THEREOF TO WHICH SUCH BREACH OR CLAIM PERTAINS.

Title to the Products shall remain vested in WinSystems until complete payment is made by Customer. Title to any Software shall remain vested in WinSystems, or WinSystems' licensor from whom WinSystems has obtained marketing rights, both before, during and after the term of the License. Nonpayment when due of the purchase price for any Products or the License fees for any Software, or, if applicable, taxes and/or the cost of any freight and insurance for any Products and/or Software, shall entitle WinSystems to take possession of the Products and/or Software without notice to Customer or prejudice to WinSystems' rights under contract or any other legal remedy.

Until title to the Products pass in accordance with the provision set out above, except with the prior written approval of WinSystems, no Products shall be modified, altered, moved or in any way assigned, sublet, mortgaged or charged nor may Customer part with possession of all or part of the same.

There are no understandings, agreements or representations, express or implied, other than those set forth herein. This Order embodies the entire agreement between the parties and may be waived, amended or supplemented only by a written instrument executed jointly by WinSystems and Customer as evidenced only by the signature of duly authorized officers of each party. The foregoing terms and conditions of any order which may be issued by Customer for the purchase of Products or licensing of Software hereunder.

In the event this Order is placed in the hands of an attorney or collection agency by WinSystems to collect any sums due hereunder to WinSystems, Customer shall pay all reasonable attorney's fees, expenses, collection and court costs incurred by WinSystems.

THIS AGREEMENT SHALL BE GOVERNED AND CONSTRUED UNDER THE TEXAS UNIFORM COMMERCIAL CODE AND THE APPLICABLE LAWS OF THE STATE OF TEXAS. THE PARTIES ACKNOWLEDGE THAT ANY ACTION BROUGHT HEREUNDER SHALL ONLY BE BROUGHT IN A COURT OF COMPETENT JURISDICTION IN TARRANT COUNTY, TEXAS.

Warranty Service

1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WinSystems Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WinSystems is not responsible for damage to the product due to static electricity.