# VPX3010 Series

Performance Rugged Conduction Cooled
3U VPX Intel® Xeon® Processor D-1500
Processor Blade

**User's Manual**


**Manual Rev.:** 1.0

**Revision Date:** October 4, 2019

**Part No:** 50-15107-2000


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# Revision History

| Revision | Release Date | Description of Change(s) |
|---|---|---|
| 1.0 | 2019/10/04 | Initial release |

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# Preface



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In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

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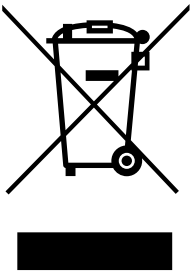

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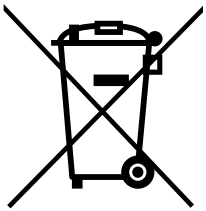



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### Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

### Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.


Additional information, aids, and tips that help users perform tasks.


Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.


Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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# 1 Introduction

## 1.1 Overview

The VPX3010 Series is a 3U VPX processor blade based on the Intel® Xeon® Processor D-1500 Family on 14nm silicon technology and integrating the CPU and chipset in a single system-on-chip (SoC). The VPX3010 is available with three different eTMP processors: D-1559 (12 cores, 1.5GHz, TDP 45W), D-1539 (8 cores, 1.6GHz, TDP 35W) and D-1519 (4 cores, 1.5GHz, TDP 25W). The VPX3010 Series supports DDR4-2133 ECC soldered memory up to 16GB. For storage, the VPX3010 provides a high endurance soldered SLC SSD up to 64GB. The VPX3010 is compliant with the VITA48 and VITA 65 specifications.

The VPX3010 Series with Intel® server grade processor brings extreme computing power with low power consumption. The VPX3010 supports two Ethernet interface options: 2x 10G-KR and 2x 1000BASE-T or 1x 1000BASE-T and 2x 1000BASE-BX (by BOM option). The VPX3010 provides one PCI Express x8 Gen3 signal to rear and one PCI Express x8 Gen3 XMC.3 site with VITA 46.9 rear IO, or one PCI Express x16 Gen3 and one PCI Express x1 Gen3 (by BOM option). Display support is provided by a Silicon Motion SM750 2D graphics chip with VGA to P2. I/O features include 1x SATA 6Gb/s to P1 or 1x SATA 6Gb/s to P1 and 1x SATA 6Gb/s to P2 (by BOM option), 2x USB 3.0 to P1 and P2, 1x USB 2.0 to P1, one RS-232 to P1 and one RS-232/422/485 to P2.

The ADLINK VPX3010 provides an Atmel TPM 1.2 chip for system security, dual BIOS functionality, as well as an ADLINK ABSDiag self-diagnosis tool. These features bring additional value by ensuring high reliability.

All components on the VPX3010 Series are soldered on the PCB board to ensure product reliability and quality, and enable compliance with MIL-STD-810G shock and vibration. The VPX3010 supports a wide operating temperature range from -40°C to +75°C (optionally up to +85°C).

A VPX-R3010 Rear Transition Module is available to access rear I/O signals for users to validate VPX3010 functionality.

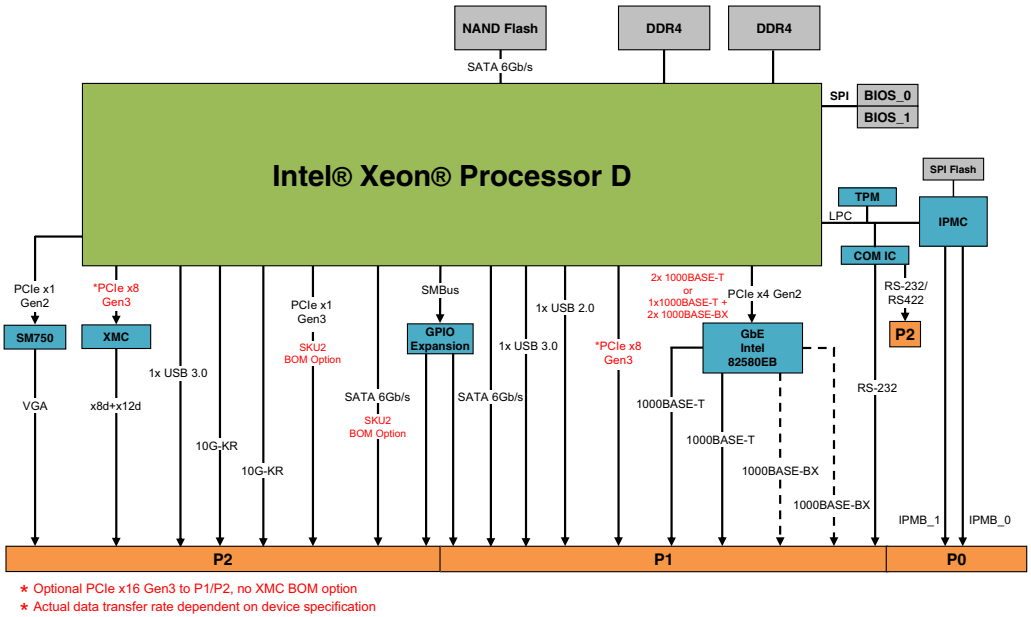
The VPX3010 Series is available in a rugged conduction cooled version with conformal coating and an air cooled version to meet different application needs. The rugged conduction cooled version is ideal for mission critical applications in radar; intelligence, surveillance and reconnaissance (ISR); and UAV/UGV platforms. The air cooled version is suited for use in defense control centers.

## 1.2 Features

- 3U VPX VITA 46, OpenVPX VITA 65, VPX REDI 48
- 1" rugged conduction cooled and air cooled 3U VPX blade with conformal coating
- 14nm uFC-BGA Intel® Xeon® Processor D-1500 family
  - Intel® Xeon® processor D-1559, 12-core, 18M Cache, 1.50/1.8 GHz, 45W TDP, -40°C to 85°C
  - Intel® Xeon® processor D-1539, 8-core, 12M Cache, 1.60/1.9 GHz, 35W TDP, -40°C to 85°C
  - Intel® Xeon® processor D-1519, 4-core, 6M Cache, 1.50/1.8GHz, 35W TDP, -40°C to 85°C
- Dual channel DDR4-2133 SDRAM with ECC soldered onboard, up to 16GB
- Onboard SLC SATA Solid State Drive up to 64GB
- Silicon Motion SM750 2D graphics chip with VGA output to P2
- Onboard PCI Express x8 Gen3 XMC site with VITA 46.9 rear I/O
- Dual 10G-KR to rear
- Data Plane: VITA 46.4 PCI Express x8 Gen3, or 2x PCI Express x4 Gen3 to P1, supports NTB function
- Control Plane: VITA 46.6 2x 1000BASE-T or 1x 1000BASE-T and 2x 1000BASE-BX (BOM option)
- Rear I/O:
  - P1: 1x PCI Express x8, 2x1000BASE-T(or 1x1000BASE-T and 2x 1000BASE-BX), 1x SATA 6 Gb/s, 1x RS-232, 1x USB 3.0 and 1x USB 2.0
  - P2: 2x 10G-KR, 1x VGA, 1x RS-232/422/485, 1x USB 3.0, XMC to rear IO x8d+x12d
  - P2 (BOM option): 2x 10G-KR, 1x VGA, 1x USB 3.0, 1x RS-232/422/485, 1x PCI Express x8 Gen3, 1x PCI Express x1, 1x SATA 6Gb/s,
- uEFI BIOS 64Mb SPI flash
- ADLINK Dual BIOS mechanism

- ABSDiag self-diagnosis tool
- MOD3-PAY-2F2T-16.2.5-3 or MOD3-PAY-2F2U-16.2.3-3 (BOM option)
- Slot Profile: SLT3-PAY-2F2U-14.2.5 or SLT3-PAY-2F2U-14.2.3 (BOM option)

## 1.3 Block Diagrams




* Optional PCIe x16 Gen3 to P1/P2, no XMC BOM option
* Actual data transfer rate dependent on device specification

**Figure 1-1: VPX3010 Functional Block Diagram**

## 1.4 Model Number Decoder - Processor Blade

**VPX3010/1559/M16/S32/XMC-R2**

**(A) (B) (C) (D) (E)**

**(A) CPU Code**

- **D-1559** = Intel® processor D-1559, 12 cores, TDP 45W, 1.5GHz
- **D-1539** = Intel® processor D-1539, 8 cores, TDP 35W, 1.6GHz
- **D-1519** = Intel® processor D-1519, 4 cores, TDP 25W, 1.5GHz

**(B) Memory Size Code**

- **M8** = 8GB DDR4-2133 ECC soldered SDRAM
- **M16** = 16GB DDR4-2133 ECC soldered SDRAM

**(C) SATA NAND Flash Size Code**

- **S32** = Soldered SLC NAND flash 32GB
- **S64** = Soldered SLC NAND flash 64GB

**(D) PCI Express interface code**

- XMC = XMC interface
- P16 = PCI Express x16 Gen3 (BOM option)

**(E) Ruggedized Level Code**

- R0 = Conduction Cooled version supporting 0°C to +50°C at card edge
- R1 = Conduction Cooled version supporting -40°C to +75°C at card edge
- R2 = Conduction Cooled version supporting -40°C to +85°C at card edge
- A0 = Air Cooled version supporting 0°C to +50°C
- A1 = Air Cooled version supporting -40°C to +75°C

## VPX3010 SKU Table

| | XMC Version | "No XMC" BOM Option |
|---|---|---|
| **Item** | **Description** | **Description** |
| **XMC** | PCIe x8 Gen3 with Rear IO to P2w7-X8d+X12d | N/A |
| **Ethernet** | 2x 1000BASE-T to P1 | 1x 1000BASE-T + 2x 1000BASE-BX to P1 |
| | 2x 10GBASE-KR to P2 | 2x 10GBASE-KR to P2 |
| **PCI Express** | PCIe x8 Gen3 to P1 (or 2 x4 or 1 x8) to P1 with NTB-LAN 0 to LAN 3 | PCIe x8 Gen3 to P1 (or 2 x4 or 1 x8) to P1 with NTB-LAN 0 to LAN 3 |
| | N/A | PCIe x8 Gen3 to P2 (or PCIe x16 if combined with P1 PCIe x8) |
| | | 1x PCIe x1 Gen3 to P2 |
| **SATA 6Gbps** | SATA 6 GB/S port 0 to P1 | 1x SATA 6 GB/S port 0 to P1,<br>1x SATA 6 GB/S port 2 to P2 |
| | SATA 6 GB/S port 1 to SATA 3 GB/s NAND SLC flash, minimum 32GB, 64GB is optional | SATA 6 GB/S port 1 to SATA 3 GB/s NAND SLC flash, minimum 32GB, 64GB is optional |
| **GPIO** | N/A | 5V tolerance GPIO 0-7 from IPMC |
| **Serial** | 1x RS-232 to P1 (full COM) | 1x RS-232 to P1 (Tx/Rx only) |
| | 1x RS-232/422/485 to P2<br>(full RS-232/422/485) | 1x RS-232/422/485 to P2<br>(full RS-422/485, RS-232 Tx/Rx only) |

**Table 1-1: VPX3010 SKU Table**

**Note:** Items in red differ between SKU options.

## 1.5 Package Contents

The VPX3010 is packaged with the following components. If any of the items on the contents list are missing or damaged, retain the shipping carton and packing material and contact the dealer for inspection. Please obtain authorization before returning any product to ADLINK. The packing contents of the VPX3010 are non-standard configurations and may vary depending on customer requests.

**Processor Blade**

- VPX3010
  - CPU and memory specifications will differ depending on options selected
  - Thermal module is assembled on the board

**Rear Transition Module** (optional)

- VPX-R3010 Layer 1 on RTM
- VPX-R3010L2 Layer 2 on RTM
- VPX-R3010L2-1 Layer 2 on RTM

**Test Backplane** (optional)

- tBP-VPX3000 test backplane

**Test Frame** (optional)

- 3U VPX conduction cooled chassis, up to 9 slots

NOTE:

The contents of non-standard VPX3010 configurations may vary depending on the customer requirements.

CAUTION:

This product must be protected from static discharge and physical shock. Never remove any of the components except at a static-free workstation. Use the anti-static bag shipped with the product when putting the board on a surface. Wear an anti-static wrist strap properly grounded on one of the system's ESD ground jacks when installing or servicing system components.

# 2 Specifications

## 2.1 VPX3010 Blade Specifications

| | |
|---|---|
| **VITA Standards** | • VITA 46.0 VPX Base Standard<br>• VITA 46.4 PCI Express on VPX Fabric Connector<br>• VITA 46.6 Gigabit Ethernet Control Plane on VPX<br>• VITA 46.9 PMC/XMC/Ethernet Signal Mapping to 3U/6U VPX<br>• VITA 48.0 Ruggedized Enhanced Design Implementation Mechanical Base Specification<br>• VITA 65 OpenVPX Architecture Framework for VPX |
| **Mechanical** | • 3U VPX 0.8”<br>• Dimensions: 100mm x 160mm |
| **Processor** | 14nm FC-BGA Intel Xeon D series SoC<br>• Xeon D-1559 12C@ 45W<br>• Xeon D-1539 8C@ 35W<br>• Xeon D-1519 4C@ 25W<br>1.5Mb per core LLC<br>Passive heatsink |
| **Chipset** | • Integrated in processor |
| **Memory** | • Dual channel 1.2V DDR4 2133MT/s SDRAM with ECC, 8Gb density support<br>• Channel A: soldered on board, up to 8GB<br>• Channel B: soldered on board, up to 8GB |
| **USB** | • 1x USB 3.0 to P1 and 1x USB 3.0 to P2<br>• 1x USB 2.0 to P1 |
| **XMC** | • PCIe x8 Gen3 with rear IO to P2 X8d+X12d |
| **Gigabit Ethernet** | • 2x 10/100/1000BASE-T to P1<br>• 1x 10/100/1000BASE-T + 2x 10/100/1000BASE-BX to P1 (SKU2 by BOM option)<br>• 2x 10GBASE-KR to P2 |
| **PCI Express** | • PCIe x8 Gen3 to P1 (or 2 PCIe x4, 1 PCIe x8) with NTB-Lane 0 to lane 3<br>**plus** (“no XMC” BOM option only)<br>• PCIe x8 Gen3 to P2 (when combined with PCIe x8 to P1, configurable as PCIe x16 Gen3, 2 PCIe x8 or 4 PCIe x4)<br>• PCIe x1 Gen3 to P2 |

**Table 2-1: VPX3010 Blade Specifications**

| | |
|---|---|
| **SATA** | • SATA 6Gb/s port 0 to P1<br>• SATA 6Gb/s port 1 to SATA 3Gb/s NAND SLC flash, 32GB (64GB optional)<br>• SATA 6Gb/s port 2 to P2 (“no XMC” BOM option only) |
| **Graphics** | • Silicon Motion SM750 2D graphics chip via PCIe x1 with VGA output to P2 |
| **IPMC** | • SmartFusion A2F200M3F-CSG288, compliant to VITA 46.11<br>• Local event log (SEL) in a non-versatile 32k EEPROM<br>• FRU data in a 32k EEPROM<br>• Sensor data record, including CPU, system voltage and temperature<br>• Serial over LAN<br>• IPMI over LAN (via Intel® 82580)<br>• IPMC WDT<br>• OVT/UVT warning<br>• Dual BIOS<br>• Extended SPI flash |
| **GPIO** | • 5V tolerance GPIO 0-7 from IPMC<br>• Build option with COM1/2 |
| **Serial** | • 1x RS-232 to P1<br>• 1x RS-232/422/485 to P2 (COM mode by BIOS setting)<br>**Note:** RS-232 supports Tx/Rx only on “no XMC” BOM option version |
| **RTC** | • To P1 |
| **TPM** | • Atmel AT97SC3204 industrial grade<br>• Version 1.2 |
| **Front Panel I/O** | • XMC front I/O on convection cooled version |
| **LEDs** | • Power (green, on when power is on, off when powered down)<br>• SATA (yellow, blinking when storage is active)<br>• Reset (red, when system is reset, the LED will light for 2 seconds)<br>• Dual BIOS LED (green: boot from BIOS1; orange: boot from BIOS2; off: BIOS1 and BIOS2 fail) |
| **Reset Button** | • On front panel |
| **Profile** | • SLT3-PAY-2F2T-14.2.5<br>• MOD3-PAY-2F2T-16.2.5-3 |

**Table 2-1: VPX3010 Blade Specifications**

| | |
|---|---|
| **Environmental** | • Operating Temperature<br>Conduction Cooled:<br>R0: 0°C to +50°C at card edge<br>R1: -40°C to +75°C at card edge<br>R2: -40°C to +85°C at card edge<br>Air Cooled:<br>A0: 0°C to +50°C at card edge<br>A1: -40°C to +75°C at card edge<br>• Storage Temperature: -50°C to 100°C<br>• Humidity: 95%, non-condensing<br>• Shock<br>Conduction Cooled:<br>Sawtooth 40G, 11ms, each axis, operating<br>Air Cooled:<br>20g peak, 11ms<br>• Vibration<br>Conduction Cooled:<br>15Hz-2KHz, 12Grms, random, each axis, operating<br>Air Cooled:<br>Random: 0.002g2/Hz from 10 to 2000Hz<br>Sine: 2G, 5 to 500Hz<br>• Altitude: 60,000 feet, operating (conduction cooled version) |
| **EMI** | • CE EN55022<br>• FCC Class A |

**Table 2-1: VPX3010 Blade Specifications**

**Note:** Specifications are subject to change without prior notice.

## 2.2 VPX-R3010 RTM Specifications

| | |
|---|---|
| **Ethernet** | • 2x 1000BASE-BX via RP1 (Molex 74703-0017)<br>• 2x 1000BASE-T via RP1 (Standard RJ-45 connector)<br>• 2x SFP+ connector via RP1 |
| **Graphics** | • 1x VGA signal via RP2 (Standard DB15 connector) |
| **SATA** | • 2x SATA via RP2 (7 pin vertical SATA connector) |
| **USB** | • 1x USB 2.0 and 1x USB 3.0 via RP1 (2x 5 pin header x1, includes USB 2.0 x2 and USB 3.0 standard connector) |
| **Serial** | • 1x RS-232 via RP0 (2x5 pin header)<br>• 1x RS-232/RS422/485 via RP0 & RP1 (2x5 pin header) |
| **GPIO** | • 2-bit GPIO signal via RP0<br>• 6-bit GPIO signal via RP1<br>• (2x5 pin header and 8 LED indications) |
| **PCIe** | • PCIe x8 lanes 0-7 via RP0, PCIe x8 lanes 8-15 via RP1 (standard PCIe x16 connector)<br>• PCIe x1 via RP2 (standard PCIe x1 connector) |
| **JTAG** | • JTAG via RP0 (2x5 pin header) |
| **Reset** | • Reset via RP0 (push button) with red LED |
| **SMBus** | • SMBus signal via RP0 (1x5 pin header include SMBus x2) |
| **Power** | • Power terminal for +12V, +5V, +3.3V, GND |

**Table 2-2: VPX-R3010 RTM Specifications**

**Note:** Specifications are subject to change without prior notice.

## 2.3 Power Consumption

This section provides information on the power consumption of the VPX3010 Series when using Intel® D-1559/D-1539/D-1519 processors with Dual Channel 16GB DDR4-2133 soldered memory and soldered onboard SATA SSD. The VPX3010 is powered by 12V, 5V and 3.3V. Windows 7 Typical power consumption was measured running BurnInTest at 100% loading. Windows 7 Max Loading power consumption was measured running Intel TAT test at 100% loading.

| Processor | Xeon® D-1559 (18M Cache, 1.50 GHz) | Xeon® D-1539 (12M Cache, 1.60 GHz) | Intel® D-1519 (6M Cache, 1.50GHz) |
|---|---|---|---|
| **Windows Idle mode, EIST Enabled** | | | |
| 3.3V (A) | 1.11 | 1.12 | 1.09 |
| 5V (A) | 0.8 | 0.82 | 0.78 |
| 12V (A) | 0.99 | 0.88 | 0.88 |
| Power Cons. (W) | 19.54 | 18.35 | 18.05 |
| **Windows Idle mode, EIST Disabled** | | | |
| 3.3V (A) | 1.1 | 1.13 | 1.09 |
| 5V (A) | 0.81 | 0.83 | 0.79 |
| 12V (A) | 1 | 0.9 | 0.9 |
| Power Cons. (W) | 19.68 | 18.67 | 18.34 |
| **Windows Typical mode, EIST Enabled** | | | |
| 3.3V (A) | 1.3 | 1.29 | 1.26 |
| 5V (A) | 0.84 | 0.85 | 0.81 |
| 12V (A) | 4.25 | 3.17 | 2.53 |
| Power Cons. (W) | 59.49 | 46.547 | 38.568 |
| **Windows Typical mode, EIST Disabled** | | | |
| 3.3V (A) | 1.3 | 1.31 | 1.28 |
| 5V (A) | 0.83 | 0.86 | 0.81 |
| 12V (A) | 3.7 | 2.69 | 2.03 |
| Power Cons. (W) | 52.84 | 40.903 | 32.634 |

| Processor | Xeon® D-1559 (18M Cache, 1.50 GHz) | Xeon® D-1539 (12M Cache, 1.60 GHz) | Intel® D-1519 (6M Cache, 1.50GHz) |
|---|---|---|---|
| **Windows Max Loading mode, EIST Enabled** | | | |
| Package Power reading (TAT) | 44.87W | 33.92W | 24.52W |
| Package Temperature reading (TAT) | 90°C | 82°C | 74°C |
| CPU DTS reading (TAT) | 14 | 22 | 30 |
| CPU frequency reading (TAT) | 1602MHz | 1904MHz | 1772MHz |
| 3.3V (A) | 1.3 | 1.3 | 1.28 |
| 5V (A) | 0.93 | 0.91 | 0.89 |
| 12V (A) | 4.95 | 3.7 | 2.9 |
| Power Cons. (W) | 68.34 | 53.24 | 43.474 |
| **Windows Max Loading mode, EIST Disabled** | | | |
| Package Power reading (TAT) | 44.4W | 28.56W | 22.89W |
| Package Temperature reading (TAT) | 88°C | 71°C | 68°C |
| CPU DTS reading (TAT) | 16 | 33 | 36 |
| CPU frequency reading (TAT) | 1501MHz | 1591MHz | 1496MHz |
| 3.3V (A) | 1.3 | 1.3 | 1.28 |
| 5V (A) | 0.91 | 0.93 | 0.88 |
| 12V (A) | 4.7 | 3.42 | 2.67 |
| Power Cons. (W) | 65.24 | 49.98 | 40.664 |

# 3 Functional Description

The following sections describe the VPX3010 features and functions.

## 3.1 Processors

The Intel® Xeon® Processor D-1500 family is the first Intel® Xeon® SoC based on 14nm silicon technology and addresses a broad range of low-power, high-density application needs. The SoC has an integrated platform controller hub (PCH), integrated I/O, two integrated 10 Gigabit Intel® Ethernet ports, and a wide ranging thermal design power (TDP). The Intel® Xeon® Processor D-1500 family provides excellent performance and software compatibility in a low-power SoC that is ideal as a micro-server in mission critical VPX platforms.

| Features | D-1559 | D-1539 | D-1519 |
|---|---|---|---|
| Clock | 1.5 GHz | 1.6 GHz | 1.5GHz |
| Max. Single Core Turbo Freq. | 2.1 GHz | 2.2 GHz | 2.1GHz |
| Last Level Cache | 18MB | 12MB | 6MB |
| No. of Cores/Threads | 12/24 | 8/16 | 4/8 |
| Maximum Power (TDP[1]) | 45 W | 35 W | 25W |
| $T_{case,MAX}$ [2] | 91°C | 92°C | 93°C |
| Operating Temperature | -40°C to 85°C | -40°C to 85°C | -40°C to 85°C |

**Notes:**

1. The highest expected sustainable power while running known power intensive applications. TDP is not the maximum power that the processor can dissipate.
2. The maximum supported operating temperature.

### Supported Technologies

- Intel® Virtualization Technology for Directed I/O (Intel® VT-d)
- Intel® Virtualization Technology (Intel® VT-x)
- Intel® VT-x with Extended Page Tables (EPT)
- Intel® Hyper-Threading Technology
- Intel® 64 Architecture
- Execute Disable Bit
- Intel® Turbo Boost Technology 2.0
- Intel® TSX-NI
- Enhanced Intel SpeedStep® Technology
- Thermal Monitoring Technologies

### Features

- 1.5MB L3 cache per core in BGA packages
- 4 8 or 12 execution cores.
- ICU and DCU (instruction and data cache): 32 KB each (64 KB total)
- MLC per core: 256 KB (instructions and data)
- LLC per socket: Up to 1.5 MB per Cbo (instructions and data)
- Two channel of DDR4 memory with ECC function.
- Memory DDR4 (1.2V) data transfer rates of 1600,1867,2133 and 2400MT/s.
- Memory support 64-bit wide channels.
- The Integrated 10 GbE Controller contains two independent 10 GbE Media Access Control (MACs) that support an XGMII interface link to the KR Physical Layer (PHY) device interfaces.

## Interfaces

- Dual channel DDR4 memory with two channel of soldered SDRAM
- Memory DDR4 data transfer rates of 2133 MT/s
- 64-bit wide channels plus 8-bits of ECC support for each channel
- System Memory Interface I/O Voltage of 1.2V
- 8-Gb DDR4 DRAM technologies supported
- The PCI Express lanes are fully-compliant with the PCI Express Base Specification, Revision 3.0, including support for 8.0 GT/s transfer speeds.

## 3.2 Intel® Turbo Boost Technology

Intel Turbo Boost Technology is a feature that allows the processor to opportunistically and automatically run faster than its rated operating core and/or render clock frequency when there is sufficient power headroom, and the product is within specified temperature and current limits. The Intel Turbo Boost Technology feature is designed to increase performance of both multi-threaded and single-threaded workloads. The processor supports a Turbo mode where the processor can use the thermal capacity associated with package and run at power levels higher than TDP power for short durations. This improves the system responsiveness for short, bursty usage conditions.

Turbo Mode availability is independent of the number of active cores; however, the Turbo Mode frequency is dynamic and dependent on the instantaneous application power load, the number of active cores, user configurable settings, operating environment, and system design. If the power, current, or thermal limit is reached, the processor will automatically reduce the frequency to stay with its TDP limit.

### Intel® Hyper Threading Technology

The processor supports Intel® Hyper-Threading Technology (Intel® HT Technology), that allows an execution core to function as two logical processors. While some execution resources (such as caches, execution units, and buses) are shared, each logical processor has its own architectural state with its own set of general-purpose registers and control registers. This feature must be enabled using the BIOS and requires operating system support.

### PCH (integrated in processor)

- PCI Express Base Specification, Revision 2.0 support for up to eight ports with transfers up to 5GT/s.
- Enhanced DMA controller, interrupt controller and timer functions
- Integrated Serial ATA host controller with independent DMA operation on up to three ports.
- xHCI USB controller provides support for up to 3 USB ports, of which four can be configured as USB 3.0 ports (2x USB 3.0 and 1x USB 2.0 implemented on VPX3010)
- EHCI USB controller provides a USB debug port.
- Integrated 10/100/1000 Gigabit Ethernet MAC with System Defense
- System Management Bus (SMBus) Specification, Version 2.0 with additional support for I2C devices
- Low Pin Count (LPC) interface
- Supports Intel® Virtualization Technology for Directed I/O (Intel® VT-d)
- Supports Intel® Trusted Execution Technology (Intel® TXT)
- Integrated Clock Controller
- Serial Peripheral Interface (SPI) support and JTAG Boundary Scan support

## 3.3 USB

The VPX3010 provides one USB 3.0 port to the P1 connector and one USB 3.0 port to the P2 connector supporting data transfers up to 5Gb/s, and one USB 2.0 port to the P1 connector supporting data transfers up to 480 Mb/s.

## 3.4 SPI BIOS

The VPX3010 implements a dual BIOS feature. Each SPI flash has a capacity of 64Mb. When the main BIOS crashes, the backup BIOS will be used to boot the device.

## 3.5 System Management Bus

The PCH provides a System Management Bus (SMBus) Specification Version 2.0 compliant Host Controller as well as an SMBus Slave Interface. The PCH provides a mechanism for the processor to initiate communications with SMBus peripherals (slaves) as well as I2C compatible devices.

## 3.6 Real Time Clock

The PCH contains a real-time clock with 256 bytes of battery-backed RAM. The internal RTC module provides two key functions: keeping the time of day and storing system data, even when the system is powered down. The RTC operates on a 32.768 KHz crystal.

## 3.7 Serial ATA Controller

The VPX3010 has up to three SATA 6Gb/s ports capable of independent DMA operation. The SATA controller supports two modes of operation: 1. A legacy mode using I/O space. 2. AHCI mode using memory space.

## 3.8 PCI Express Interface

All PCIe Gen3 interfaces (x4, x8, x16) can operate as a standard PCI Express Root Port (RP). The processor supports Gen1 (2.5 Gb/s), Gen2 (5 Gb/s) and Gen3 (8Gb/s) PCI Express speeds. These speeds are supported on all the lanes. The Integrated PCH Logic implements 8 lanes of PCIe Gen2.

## 3.9 Intel ® 82580EB Gigibit Ethernet Controller

The Intel® 82580EB Quad GbE Controller is a single compact, low power component that supports quad port gigabit Ethernet designs. The device offers four SGMII/SerDes ports that can be connected to an external PHY and two port 1000BASE-T or one port 1000BASE-T and two ports 1000BASE-BX implementations using integrated PHYs.

## 3.10 Graphics

The SM750 is designed to complement needs for the embedded industry and provides video and 2D capability.

## 3.11 GPIO Expander PCA9554

The PCA9554 is16-pin CMOS devices that provide 8 bits of General Purpose parallel input/output (GPIO) expansion for I2C/SMBus applications

## 3.12 UART NCT5104

The NCT5104 is a LPC to UART IC, which supports 4 high-speed serial communication ports (UART). Each UART includes a 128-byte send/receive FIFO, a programmable baud rate generator, complete modem-control capability, and a processor interrupt system. The UART supports legacy speeds up to 115.2K bps as well as even higher baud rates of 230K, 460K, or 921K bps to support higher speed modems.

In addition to UART, the NCT5104D provides flexible I/O control functions through a set of general purpose I/O (GPIO) ports. These GPIO ports may serve as simple I/O ports or may be individually configured to provide alternative functions. The NCT5104D supports port 80 decode on the LPC bus and could output the signal via SOUTC. It also supports LED control.

## 3.13 TPM AT97SC3204

The Atmel AT97SC3204 is a fully integrated security module.It implements version 1.2 of the Trusted Computing Group (TCG) specification for Trusted Platform Modules (TPM). The TPM includes a cryptographic accelerator capable of computing a 2048-bit RSA signature in 200ms and a 1024-bit .RSA signature in 40ms. Performance of the SHA-1 accelerator is 20µs per 64-byte block.

## 3.14 XMC Site

The VPX3010 Series supports one XMC site for rear I/O expansion. The XMC site provides a x8 PCI Express Gen 3.0 lane. Jn2 rear XMC I/O connector is compliant to VITA 46.9, X8d+X12d.

# 4 VPX3010 Board Interfaces

This chapter illustrates the board layout, connector pin assignments, and jumper settings to familiarize users with the VPX3010.

## 4.1 VPX3010 Board Layout

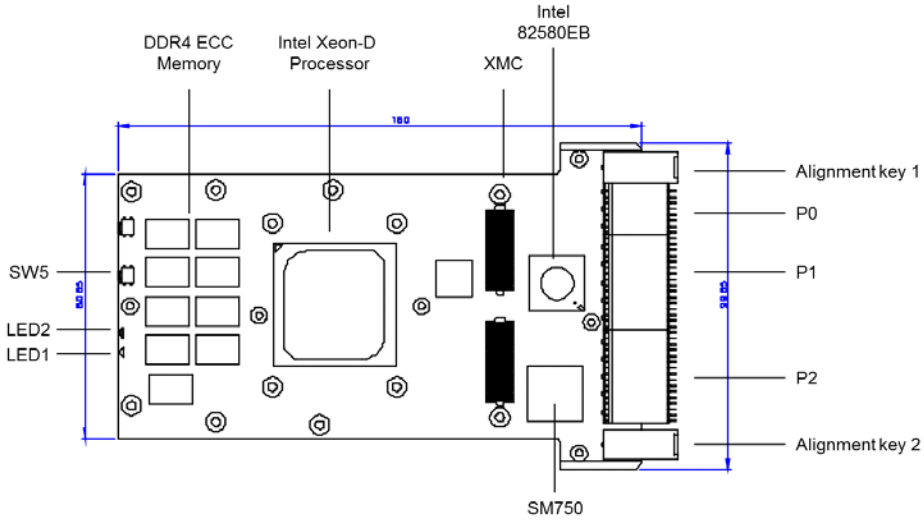



**Figure 4-1: VPX3010 Component Side Layout**

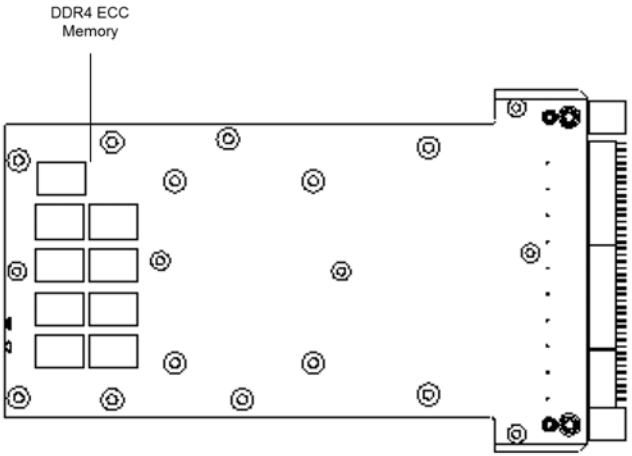
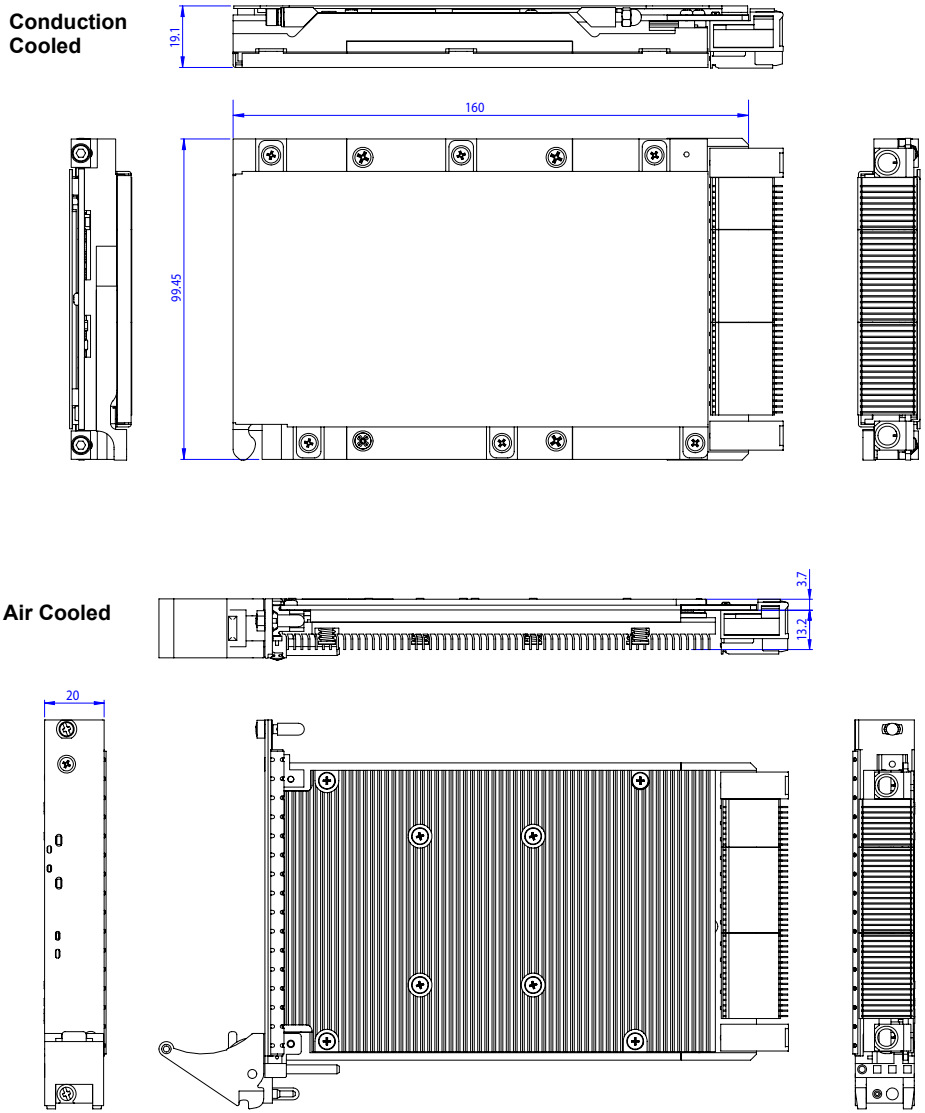



**Figure 4-2: VPX3010 Component Side Layout**

## 4.2 VPX3010 Mechanical Drawing

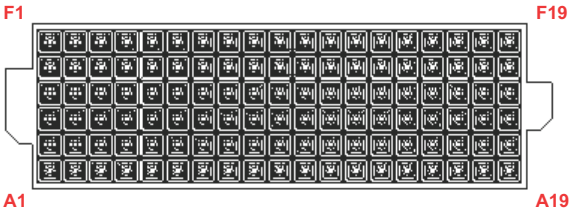



Dimensions in mm

**Figure 4-3: VPX3010 Mechanical Dimensions**

## 4.3 VPX3010 Connector Pin Assignments

### XMC Connectors




### JN1 Connector

| Pin | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | PCIE_RX8_P | PCIE_RX8_N | 3.3V | PCIE_RX9_P | PCIE_RX9_N | VPWR |
| 2 | GND | GND | NC(PU to 3.3V) | GND | GND | MRSTI# |
| 3 | PCIE_RX10_P | PCIE_RX10_N | 3.3V | PCIE_RX11_P | PCIE_RX11_N | VPWR |
| 4 | GND | GND | NC(PD to GND) | GND | GND | MRSTO# |
| 5 | PCIE_RX12_P | PCIE_RX12_N | 3.3V | PCIE_RX13_P | PCIE_RX13_N | VPWR |
| 6 | GND | GND | NC(PU to 3.3V) | GND | GND | 12V_AUX |
| 7 | PCIE_RX14_P | PCIE_RX14_N | 3.3V | PCIE_RX15_P | PCIE_RX15_N | VPWR |
| 8 | GND | GND | NC(PD to GND) | GND | GND | -12V_AUX |
| 9 | NC | NC | NC | NC | NC | VPWR |
| 10 | GND | GND | NC | GND | GND | GA0 (PD to GND) |
| 11 | PCIE_TX8_P | PCIE_TX8_N | NC | PCIE_TX9_P | PCIE_TX9_N | VPWR |
| 12 | GND | GND | GA1 (PD to GND) | GND | GND | MPRESENT# |
| 13 | PCIE_TX10_P | PCIE_TX10_N | 3.3V_AUX | PCIE_TX11_P | PCIE_TX11_N | VPWR |
| 14 | GND | GND | GA2 (PU to 3.3V) | GND | GND | MSDA |
| 15 | PCIE_TX12_P | PCIE_TX12_N | NC | PCIE_TX13_P | PCIE_TX13_N | VPWR |
| 16 | GND | GND | MNVMRO | GND | GND | MSCL |
| 17 | PCIE_TX14_P | PCIE_TX14_N | NC | PCIE_TX15_P | PCIE_TX15_N | NC |
| 18 | GND | GND | NC | GND | GND | NC |
| 19 | PCIE_CLK _P | PCIE_CLK_N | NC | NC(PU to 3.3V) | NC(PU to 3.3V) | NC |

### JN2 Connector

| Pin | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | JN6-A1 | JN6-B1 | NC | JN6-D1 | JN6-E1 | NC |
| 2 | GND | GND | NC | GND | GND | NC |
| 3 | JN6-A3 | JN6-B3 | NC | JN6-D3 | JN6-E3 | NC |
| 4 | GND | GND | NC | GND | GND | NC |
| 5 | JN6-A5 | JN6-B5 | NC | JN6-D5 | JN6-E5 | NC |
| 6 | GND | GND | NC | GND | GND | NC |
| 7 | JN6-A7 | JN6-B7 | NC | JN6-D7 | JN6-E7 | NC |
| 8 | GND | GND | NC | GND | GND | NC |
| 9 | JN6-A9 | JN6-B9 | NC | JN6-D9 | JN6-E9 | NC |
| 10 | GND | GND | NC | GND | GND | NC |
| 11 | JN6-A11 | JN6-B11 | NC | JN6-D11 | JN6-E11 | NC |
| 12 | GND | GND | NC | GND | GND | NC |
| 13 | JN6-A13 | JN6-B13 | NC | JN6-D13 | JN6-E13 | NC |
| 14 | GND | GND | NC | GND | GND | NC |
| 15 | JN6-A15 | JN6-B15 | NC | JN6-D15 | JN6-E15 | NC |
| 16 | GND | GND | NC | GND | GND | NC |
| 17 | JN6-A17 | JN6-B17 | NC | JN6-D17 | JN6-E17 | NC |
| 18 | GND | GND | NC | GND | GND | NC |
| 19 | JN6-A19 | JN6-B19 | NC | JN6-D19 | JN6-E19 | NC |

## VPX Connectors

### P0 Connector

| Pin | G | F | E | D | C | B | A |
|---|---|---|---|---|---|---|---|
| 1 | 12V | 12V | 12V | N/A | 3.3V | 3.3V | 3.3V |
| 2 | 12V | 12V | 12V | N/A | 3.3V | 3.3V | 3.3V |
| 3 | 5V | 5V | 5V | NC | 5V | 5V | 5V |
| 4 | IPM1_CLK | IPM1_DAT | GND | N12V_AUX | GND | SYSRESET# | NVMRO |
| 5 | GAP | GA4 | GND | 3.3V_AUX | GND | IPM2_CLK | IPM2_DAT |
| 6 | GA3 | GA2 | GND | P12V_AUX | GND | GA1 | GA0 |
| 7 | IPMB_ JTCK | GND | IPMB_ JTDO | IPMB_ JTDI | GND | IPMB_ JTMS | IPMB_ JTRST-L |
| 8 | GND | REF_CLK- | REF_CLK+ | GND | H_CLK_P0_ 100M_N/ RES_BUS+ | H_CLK_P0_ 100M_P/ RES_BUS+ | GND |

### P1 Connector

| Pin | G | F | E | D | C | B | A | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | COM1_RTS#/ GPIO0 | GND | L0-TX- | L0-TX+ | GND | L0-RX- | L0-RX+ | 1 |
| 2 | GND | L1-TX- | L1-TX+ | GND | L1-RX- | L1-RX+ | GND | |
| 3 | P1_VBAT | GND | L2-TX- | L2-TX+ | GND | L2-RX- | L2-RX+ | |
| 4 | GND | L3-TX- | L3-TX+ | GND | L3-RX- | L3-RX+ | GND | |
| 5 | SYSCON# | GND | L4-TX- | L4-TX+ | GND | L4-RX- | L4-RX+ | |
| 6 | GND | L5-TX- | L5-TX+ | GND | L5-RX- | L5-RX+ | GND | |
| 7 | COM1_CTS#/ GPIO1 | GND | L6-TX- | L6-TX+ | GND | L6-RX- | L6-RX+ | |
| 8 | GND | L7-TX- | L7-TX+ | GND | L7-RX- | L7-RX+ | GND | |
| 9 | COM1_TXD | GND | SATA0-TX- | SATA0_TX+ | GND | SATA0_RX- | SATA0_RX+ | 2 |
| 10 | GND | COM1_DTR# | COM1_ DCD# | GND | COM1_DSR#/ GPIO3 | COM1_RI# / GPIO2 | GND | 3 |
| 11 | COM1_RXD | GND | USB3_RX- | USB3_RX+ | GND | USB3_TX- | USB3_TX+ | 4 |
| 12 | GND | USB2_1- | USB2_1+ | GND | USB2_0- | USB2_0+ | GND | 5 |
| 13 | COM2_CTS#/ GPIO5 | GND | ETH-T01B- | ETH-T01B+ | GND | ETH-T01A- | ETH-T01A+ | 6 |
| 14 | GND | ETH-T01D- | ETH-T01D+ | GND | ETH-T-01C- | ETH-T01C+ | GND | |
| 15 | MASKABLE RESET | GND | ETH-T00B-/ BX-TX1- | ETH-T00B / BX-TX1+ | GND | ETH-T00A- / BX-RX1- | ETH-T00A+ / BX-RX1+ | 7 |
| 16 | GND | ETH-T00D- /BX-TX0- | ETH-T00D+ /BX-TX0+ | GND | ETH-T-00C-/ BX-RX0- | ETH-T00C+/ BX-RX0+ | GND | |

**Type:**

1. PCIe x8
2. SATA 0
3. COM (GPIO on “no XMC” BOM option version)
4. 1x USB 3.0
5. 1x USB 2.0
6. 1000BASE-T
7. 2x 1000BASE-BX (1x 1000BASE-T on “no XMC” BOM option version)

### P2 Connector (XMC version)

| Pin | G | F | E | D | C | B | A | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | COM2_RTS#/ GPIO4 | GND | 10GKR_TX0 _L0- | 10GKR_TX0 _L0+ | GND | 10GKR_RX0 _L0- | 10GKR_RX0 _L0+ | 1 |
| 2 | GND | 10GKR_TX0 _L1- | 10GKR_TX0 _L1+ | GND | 10GKR_ RX0_L1- | 10GKR_RX0 _L1+ | GND | |
| 3 | DDC_DATA | GND | USB3_RX- | USB3_RX+ | GND | USB3_TX- | USB3_TX+ | 2 |
| 4 | GND | +5V_USB_2 | +5V_USB_2 | GND | USB2_0 - | USB2_0+ | GND | |
| 5 | DDC_CLK | GND | COM2_DCD (RS422_TX-) (RS485_TX/ RX-) | COM2_RXD (RS422_TX+) (RS485_TX/ RX+) | GND | COM2_DTR# (RS422_RX-) | COM2_TXD (RS422_RX+) | 3 |
| 6 | GND | COM2_DSR# / GPIO7 | COM2_RI#/ GPIO6 | GND | +5V_US B_1 | +5V_USB_0 | GND | |
| 7 | VGA_HSYNC | GND | J16-A1 | J16-B1 | GND | J16-D1 | J16-E1 | 4 |
| 8 | GND | J16-A3 | J16-B3 | GND | J16-D3 | J16-E3 | GND | |
| 9 | VGA_VSYNC | GND | J16-A11 | J16-B11 | GND | J16-D11 | J16-E11 | |
| 10 | GND | J16-A13 | J16-B13 | GND | J16-D13 | J16-E13 | GND | |
| 11 | VGA_RED | GND | J16-A5 | J16-B5 | GND | J16-D5 | J16-E5 | 5 |
| 12 | GND | J16-A7 | J16-B7 | GND | J16-D7 | J16-E7 | GND | |
| 13 | VGA_BLUE | GND | J16-A9 | J16-B9 | GND | J16-D9 | J16-E9 | |
| 14 | GND | J16-A15 | J16-B15 | GND | J16-D15 | J16-E15 | GND | |
| 15 | VGA_GREEN | GND | J16-A17 | J16-B17 | GND | J16-D17 | J16-E17 | |
| 16 | GND | J16-A19 | J16-B19 | GND | J16-D19 | J16-E19 | GND | |

**Type:**

1. Dual 10G-KR
2. 1x USB 3.0
3. COM 232/422
4. XMC x8d
5. XMC x12d

## P2 Connector (“no XMC” BOM options version)

| Pin | G | F | E | D | C | B | A | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | COM2_RTS#/ GPIO4 | GND | 10GKR_TX0 _L0- | 10GKR_TX0 _L0+ | GND | 10GKR_RX 0_L0- | 10GKR_RX0 _L0+ | 1 |
| 2 | GND | 10GKR_TX0_ L1- | 10GKR_TX0 _L1+ | GND | 10GKR_ RX0_L1- | 10GKR_RX 0_L1+ | GND | |
| 3 | DDC_DATA | GND | USB3_RX- | USB3_RX+ | GND | USB3_TX- | USB3_TX+ | 2 |
| 4 | GND | +5V_USB_2 | +5V_USB_2 | GND | USB2_0 - | USB2_0+ | GND | |
| 5 | DDC_CLK | GND | COM2_DCD (RS422_TX-) (RS485_TX/ RX-) | COM2_RXD (RS422_TX+) (RS485_TX/ RX+) | GND | COM2_DTR# (RS422_RX-) | COM2_TXD (RS422_RX+) | 3 |
| 6 | GND | COM2_DSR#/ GPIO7 | COM2_RI#/ GPIO6 | GND | +5V_US B_1 | +5V_USB_0 | GND | |
| 7 | VGA_HSYNC | GND | PCIex1_TX- | PCIex1_TX+ | GND | PCIex1_RX- | PCIex1_RX+ | 4 |
| 8 | GND | SATA1-TX- | SATA1_TX+ | GND | SATA1_ RX- | SATA1_RX+ | GND | 5 |
| 9 | VGA_ VSYNC | GND | L8-TX- | L8-TX+ | GND | L8-RX- | L8-RX+ | 6 |
| 10 | GND | L9-TX- | L9-TX+ | GND | L9-RX- | L9-RX+ | GND | |
| 11 | VGA_RED | GND | L10-TX- | L10-TX+ | GND | L10-RX- | L10-RX+ | |
| 12 | GND | L11-TX- | L11-TX+ | GND | L11-RX- | L11-RX+ | GND | |
| 13 | VGA_ BLUE | GND | L12-TX- | L12-TX+ | GND | L12-RX- | L12-RX+ | |
| 14 | GND | L13-TX- | L13-TX+ | GND | L13-RX- | L13-RX+ | GND | |
| 15 | VGA_ GREEN | GND | L14-TX- | L14-TX+ | GND | L14-RX- | L14-RX+ | |
| 16 | GND | 15-TX- | L15-TX+ | GND | L15-RX- | L15-RX+ | GND | |

**Type:**

1. Dual 10G-KR
2. 1x USB 3.0
3. COM
4. PCIex1
5. SATA_2
6. PCIe x8

## 4.4 Switches and LEDs

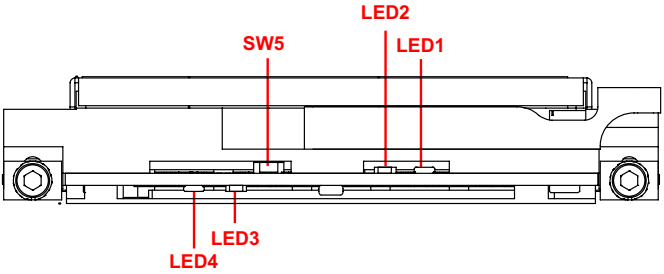



**Figure 4-4: VPX3010 Front View**

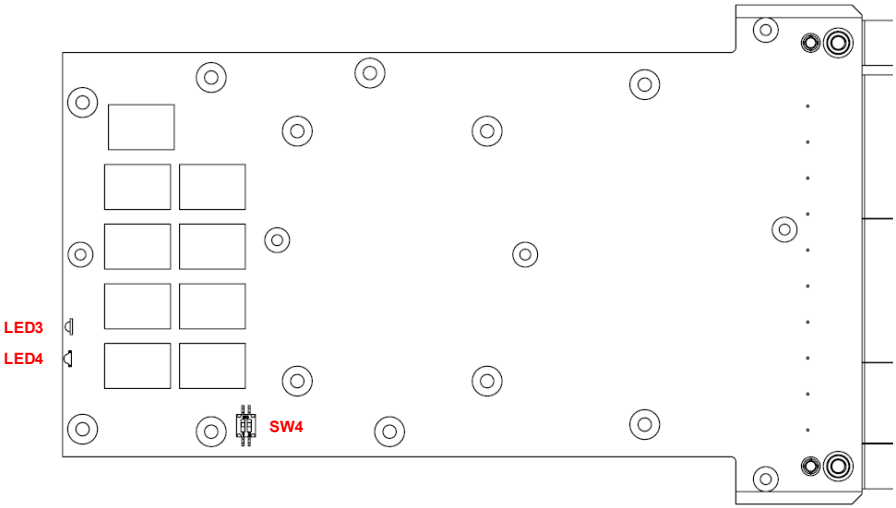



**Figure 4-5: VPX3010 Switches and LEDs solder side.**

| | | | |
|---|---|---|---|
| **SW4** | ME mode switch | **SW5** | Reset button |
| **LED1** | Power LED | **LED3** | Reset LED |
| **LED2** | SATA LED | **LED4** | BIOS Selection LED |

### ME Mode Switch (SW4)

| ME Mode | Pin 1 (MFG_MODE_STRAP) | Pin 2 (Reserved) |
|---|---|---|
| Manufacture Mode | ON | NA |
| Normal Mode | OFF | NA |

### Reset Button (SW5)

Press this button to perform a hard system reset.

### LEDs

| LED | Description | Indication |
|---|---|---|
| LED1 | Power LED | On when blade is receiving power |
| LED2 | SATA LED | Blinks when SATA is active |
| LED3 | Reset LED | Lights for 2 seconds after system reset |
| LED4 | BIOS Status LED | Green: BIOS1 working properly |
| | | Orange: BIOS2 working properly |
| | | Off: BIOS1 and BIOS2 failure |

# 5 VPX-R3010 RTM

This chapter illustrates the board layout, connector pin assignments, and jumper settings to familiarize users with the VPX-R3010 RTM.

## 5.1 Connector Allocation

### VPX-R3010

| Function | Rear I/O | RPx | Top Side | RPx | Connector Type |
|---|---|---|---|---|---|
| VGA | 1 | RP2 | — | — | VGA standard connector; DB15 |
| SerDes-1000BASE-BX | 2 | RP1 | — | — | Molex 74703-0017 |
| 1000BASE-T | — | — | 2 | RP1 | Vertical RJ45 connector |
| SATA | — | — | 2 | RP1/ RP2 | 7 Pin SATA connector |
| USB 3.0/2.0 (Front) | 1 | | | RP2 | Type-A connector |
| USB 3.0/2.0 (Top) | — | — | 1 | RP1 | 2x5 pin header |
| COM0 (RS232) | — | — | 1 | RP1 | 2x5 pin header |
| COM1 (RS-232)<br>COM1 (RS-232/422/485) | — | — | 1 | RP2 | |
| GPIO, 8bit | — | — | 1 | RP1/ RP2 | 2x5 pin header |
| LED for GPIO | — | — | 8 | RP1 | 8x LED (Yellow) |
| LED for Power, HDD, Reset | — | — | 3 | RP0 | Power-> Green<br>HDD-> Yellow<br>Reset-> Red |
| JTAG | — | — | 1 | RP0 | 2x5 pin header |
| Reset button | — | — | 1 | RP0 | Push button |
| SMBus | — | — | 1 | RP0 | Follows ADLINK standard |
| Power Terminals | — | — | 4 | RP0 | 12V, 5V, 3.3V, GND |

## VPX-R3010L2

| Function | Rear I/O | RPx | Top Side | RPx | Connector Type |
|---|---|---|---|---|---|
| PCIe x16 | 1 | RP1/ RP2 | — | — | Standard PCIe x16 slot |
| PCIe x1 | — | — | 1 | RP2 | Standard PCIe x1 slot |

## VPX-R3010L2-1

| Function | Rear I/O | RPx | Top Side | RPx | Connector Type |
|---|---|---|---|---|---|
| 10G-KR | 2 | RP1 | — | — | Standard SFP+ connector |

## 5.2 VPX-R3010 Block Diagram

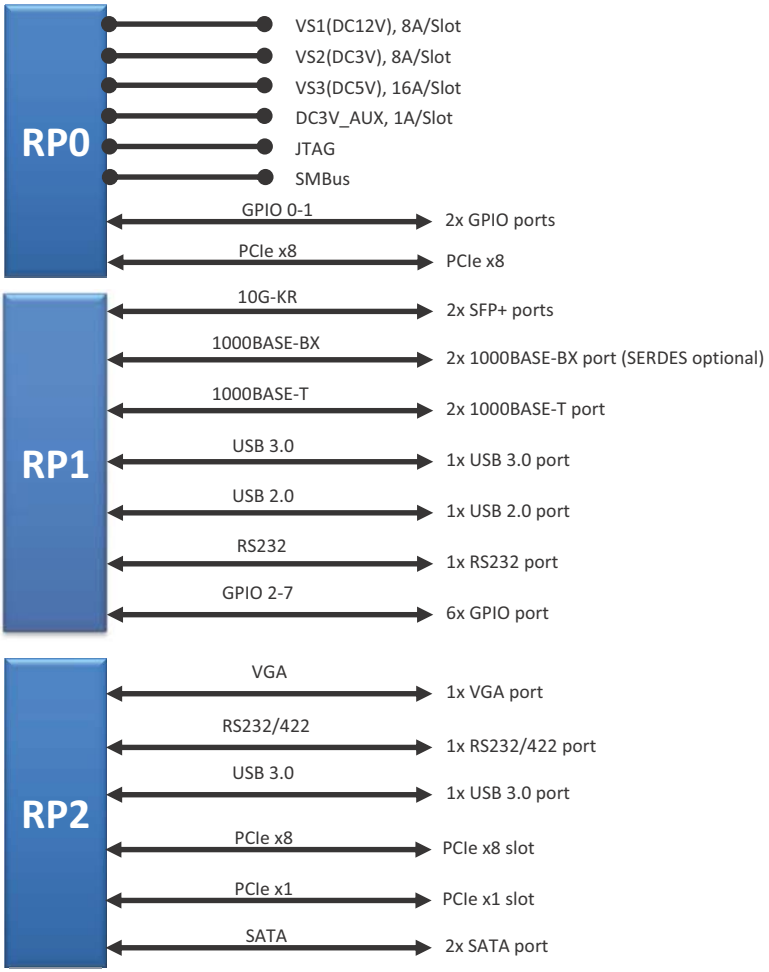
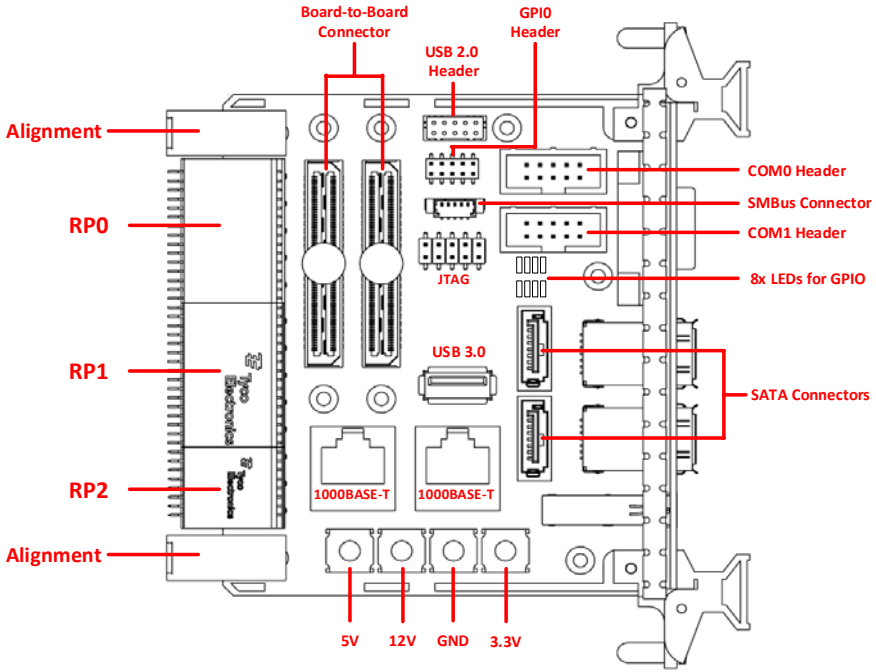
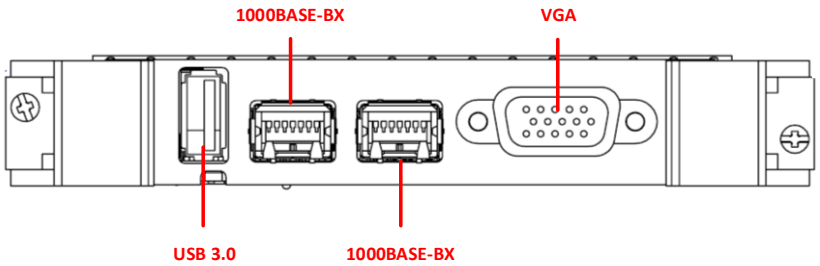



**Figure 5-1: VPX-R3010 RTM Functional Block Diagram**

## 5.3 VPX-R3010 RTM Board Layout

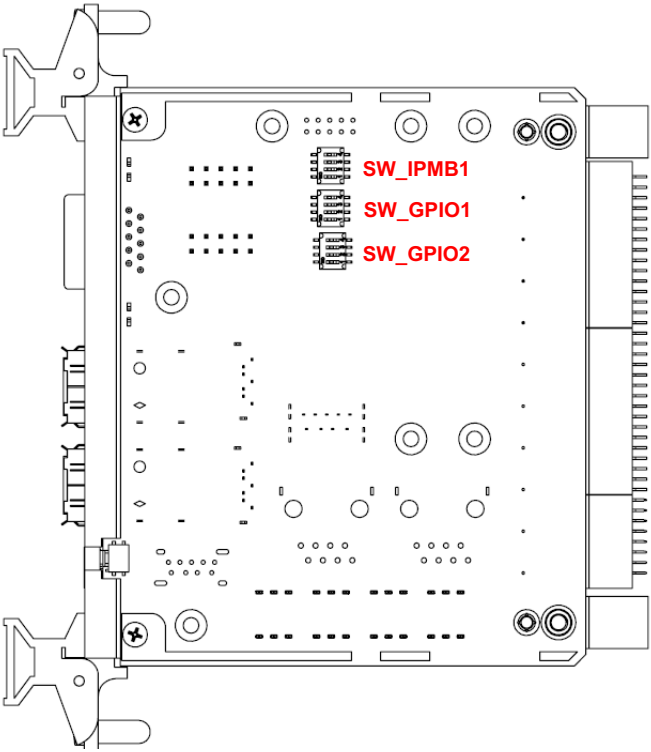



Top View




Rear View

**Figure 5-2: VPX-R3010 RTM Board Layout**




**Solder Side View**

**Figure 5-3: VPX-R3010 Solder Side Layout**

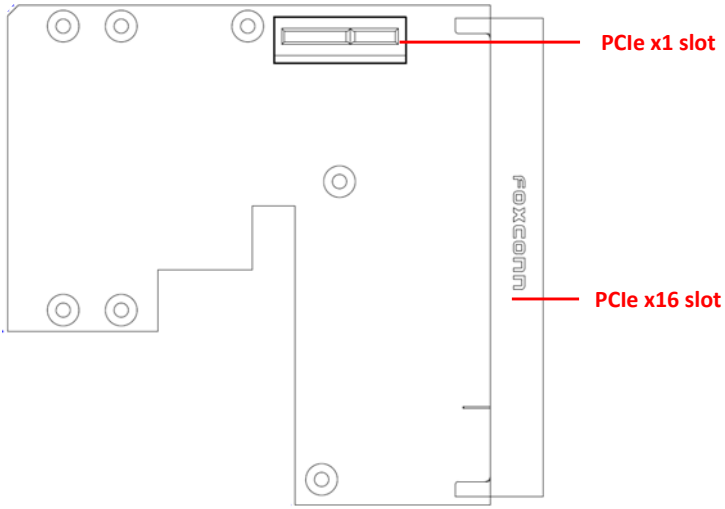



**Figure 5-4: VPX-R3010-L2 Board Layout**

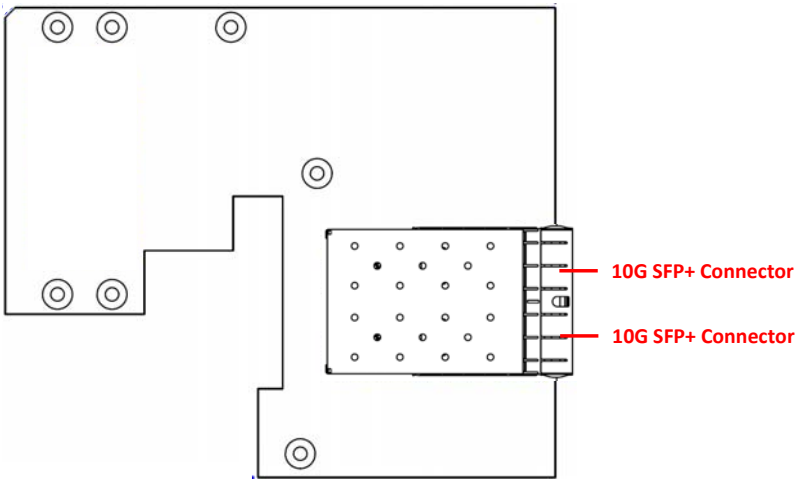


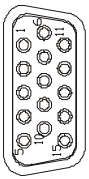

**Figure 5-5: VPX-R3010-L2-1 Board Layout**

## 5.4 VPX-R3010 RTM Connector Pin Assignments

### Rear I/O Connectors

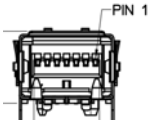
#### VGA Connector

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| Red | 1 | 2 | Green |
| Blue | 3 | 4 | N.C. |
| GND | 5 | 6 | GND |
| GND | 7 | 8 | GND |
| +5V. | 9 | 10 | GND |
| N.C. | 11 | 12 | CRTDATA |
| HSYNC | 13 | 14 | VSYNC |
| CRTCLK | 15 | | |



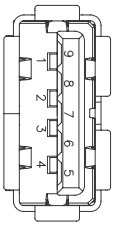
#### 1000BASE-BX Connectors

| Pin # | GbE Signal |
|---|---|
| 1 | GND1 |
| 2 | TP2_R |
| 3 | TN2_R |
| 4 | GND2 |
| 5 | RN2_R |
| 6 | RP2_R |
| 7 | GND3 |



### USB 3.0 Connectors

| Pin # | Signal Name |
|---|---|
| 1 | USB3.0_P5VA |
| 2 | USB2_CMAN |
| 3 | USB2_CMAP |
| 4 | GND |
| 5 | USB3A_CMRXN |
| 6 | USB3A_CMRXP |
| 7 | GND |
| 8 | USB3A_CMTXN |
| 9 | USB3A_CMTXP |



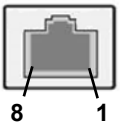
## SFP+ 10Gigabit Ethernet Connector (VPX-R3010-L2-1)

| Pin # | 1000BASE-T |
|---|---|
| 1 | GND |
| 2 | SFP_TX_FAULT |
| 3 | SFP_TX_DISABLE |
| 4 | SFP_SDA |
| 5 | SFP_SCL |
| 6 | SFP_MOD_ABS |
| 7 | GND |
| 8 | SFP_RX_LOS |
| 9 | GND |
| 10 | GND |
| 11 | GND |
| 12 | SRDS_RX-N |
| 13 | SRDS_RX-P |
| 14 | GND |
| 15 | SFP_V3P3_R |
| 16 | SFP_V3P3_T |
| 17 | GND |
| 18 | SRDS_TX-P |
| 19 | SRDS_TX-N |
| 20 | GND |

## Onboard Connectors

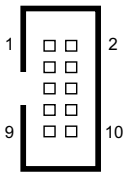
### 1000BASE-T (RJ-45)

| Pin # | Signal |
|---|---|
| 1 | MX0+ |
| 2 | MX0- |
| 3 | MX1+ |
| 4 | MX2+ |
| 5 | MX2- |
| 6 | MX1- |
| 7 | MX3+ |
| 8 | MX3- |




### RS-232 Header (COM0/COM1)

| Pin # | RS-232 | RS-422/485 full duplex (COM1 only) | RS-485 half duplex (COM1 only) |
|---|---|---|---|
| 1 | DCD# | TXD- | TX/RX+ |
| 2 | DSR# | NC | NC |
| 3 | RX | TXD+ | TX/RX- |
| 4 | RTS | NC | NC+ |
| 5 | TX | RXD+ | NC |
| 6 | CTS | NC | NC |
| 7 | DTR | RXD- | NC |
| 8 | RI# | NC | NC |
| 9 | GND | GND | GND |
| 10 | NC | NC | NC |




NOTE:

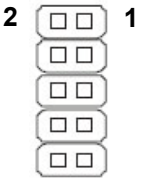
COM1 mode by BIOS setting.

NOTE:

RS-232 supports Tx/Rx only on “no XMC” BOM option version.

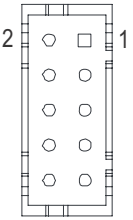
### JTAG Header

| Pin # | Signal |
|---|---|
| 1 | GND |
| 2 | TCK |
| 3 | NC |
| 4 | TDO |
| 5 | +3.3V |
| 6 | TMS |
| 7 | TRST |
| 8 | +3.3V |
| 9 | GND |
| 10 | TDI |



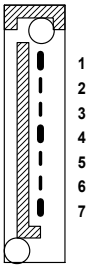

### USB 2.0 Connector

| Pin # | Signal |
|---|---|
| 1 | 5V |
| 2 | NC |
| 3 | D- |
| 4 | NC |
| 5 | D+ |
| 6 | NC |
| 7 | GND |
| 8 | GND |
| 9 | GND |
| 10 | GND |



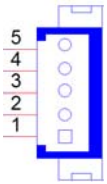
### SATA Connectors

| Pin # | Signal |
|---|---|
| 1 | GND |
| 2 | TXP |
| 3 | TXN |
| 4 | GND |
| 5 | RXN |
| 6 | RXP |
| 7 | GND |



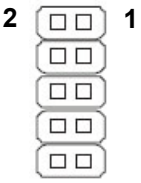

### SMBus (SM1)

| Pin # | Signal |
|---|---|
| 1 | IPMB_SDA |
| 2 | GND |
| 3 | IPMB_SCL |
| 4 | +5V |
| 5 | +5V |




### GPIO Header (GPIO1)

| Pin # | Signal |
|---|---|
| 1 | GPI4 |
| 2 | GPI0 |
| 3 | GPI5 |
| 4 | GPI1 |
| 5 | GPI6 |
| 6 | GPI2 |
| 7 | GPI7 |
| 8 | GPI03 |



### GPIO LEDs

| LED # | Signal |
|---|---|
| LED1 | GPIO0 |
| LED2 | GPIO1 |
| LED3 | GPIO2 |
| LED4 | GPIO3 |
| LED5 | GPIO4 |
| LED6 | GPIO5 |
| LED7 | GPIO6 |
| LED8 | GPIO7 |

## 5.5 VPX-R3010 Switches

### IPMB Switch (SW_IPMB1)

| Pin Settings | Function |
|---|---|
| All ON | Enable IPMI |
| All OFF | Disable IPMI |

### GPIO/COM Switches (SW_GPIO1, SW_GPIO2)

These switches route the signals from the VPX3010 processor blade to the correct onboard connectors depending on which version is being used. Make sure the switch settings correspond to those below for the VPX3010 version you are using (XMC version or “no XMC” BOM option).

| Pin Settings | Function |
|---|---|
| All ON | XMC version (enable GPIO) |
| All OFF | “No XMC” BOM option version (enable full RS-232 on COM0/1) |

# 6 Getting Started

This chapter describes the installation of the following components to the VPX3010 and rear transition modules:

- VPX Blade installation to chassis
- RTM installation to chassis

## 6.1 Installing the VPX3010 to the Chassis

These instructions are for reference only. Refer to the user guide that comes with the chassis for more information.

1. Be sure to select the system slot to install the blade. The system power may now be powered on or off.
2. Align the module's top and bottom edges to the chassis card guides, and then carefully slide the module into the chassis. A slight resistance may be felt when inserting the module. If the resistance it too strong, check if there are wedge lock screwed or if the board's connector pins are not properly aligned with connectors on the back-plane. Then push the board until it is completely flush with the chassis.
3. Ensure the module in place, and then screw the wedge lock on the module

## 6.2 Installing the VPX-R3010 to the Chassis

The installation and removal procedures for a RTM are the same as those for VPX boards. Because they are shorter than front boards, pay careful attention when inserting or removing RTMs.

Refer to previous sections for peripheral connectivity of all I/O ports on the RTM. When installing the VPX3010 Series and related RTMs, make sure the RTM is the correct matching model.

## 6.3 Driver Installation

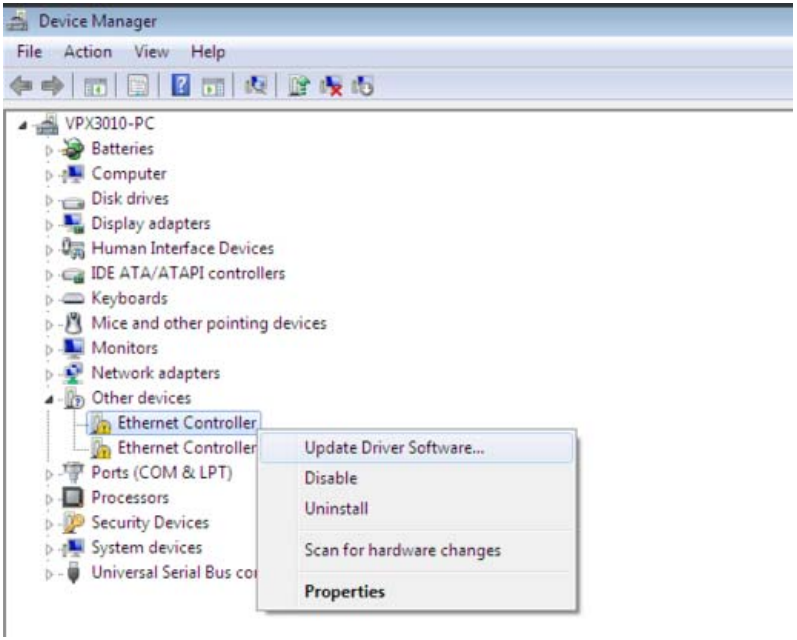
The VPX3010 drivers are available from the ADLINK website (**www.adlinktech.com**). ADLINK provides validated drivers for Windows 7. We recommend using the drivers provided on the ADLINK website to ensure compatibility. VxWorks BSPs can also be downloaded from the VPX3010 product page.

Follow the steps below to install the drivers for Windows 7 64-bit.

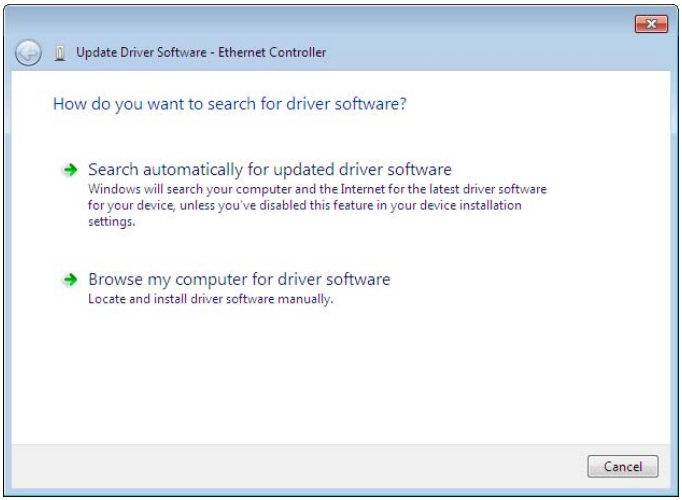
1. Install the **Windows operating system** before installing any driver. Most standard I/O device drivers are installed during Windows installation.
2. Install the **chipset driver** by extracting and running the program in **Intel_chipset_Win7x64_v10.1.2.80.zip**
3. Install the **1G Ethernet controller driver** by extracting and running the program in **Intel_Network_Adapter_Win7x64_v21.0.zip**
4. Install the **graphics driver** by extracting and running the program in **Silicon_Graphics_Win7x64_v8.14.1.105.zip**
5. Install the **USB 3.0 driver** by extracting and running the program in **Intel_USB3_Win7x64_v4.0.5.55.zip**

To install the **10G Ethernet controller drivers**, extract the contents of **Intel_Network_10G_Adapter_X552_Win7x64_v3.11.78.0.zip** and perform the following steps.

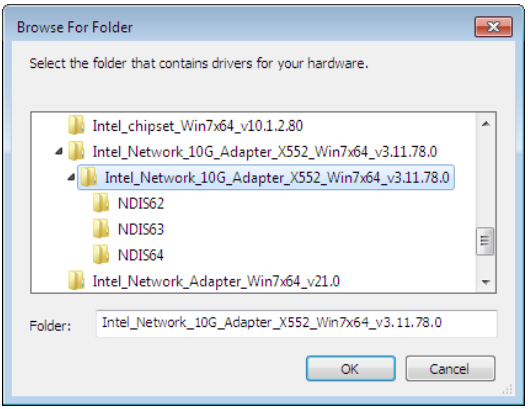
1. Open the *Device Manager* and go to *Other Devices.* R-click on *Ethernet Controller* and choose "Update Driver Software…".




2. Click “Browse my computer for driver software”.



3. Navigate to the folder where you extracted the contents of the zip file and click “OK”. Click “Next” to install the driver.




4. Repeat for the second 10G Ethernet Controller.

# 7 Utilities

## 7.1 Watchdog Timer

This section describes the operation of the VPX3010's watchdog timer (WDT). The primary function of the WDT is to monitor the VPX3010's operation and to reset the system if a software application fails to function as programmed. The following WDT functions may be controlled using a software application:

- enabling and disabling
- set and get current configuration
- reloading timeout value

The VPX3010 custom WDT circuit is implemented using the IPMC and operated by IPMI commands.

### Watchdog Timer IPMI Commands

The following section describes the IPMI commands for controlling watchdog timer (WDT) functions. For more details about IPMI commands, please refer to the IPMI specification: "*Intelligent Platform Management Interface Specification Second Generation v2.0*" .

**WDT Command Table**

| Command | NetFn Code | Cmd Code |
|---|---|---|
| Reset Watchdog Timer | App (06h) | 22h |
| Set Watchdog Timer | App (06h) | 24h |
| Get Watchdog Timer | App (06h) | 25h |

The WDT IPMI commands allow the user to set the countdown period and reload the timeout value periodically to keep it from resetting the system. If the timer countdown value is not reloaded, the watchdog resets the system hardware after its counter reaches zero.

### Reset Watchdog Timer

This command is used to reload the WDT.

| Action | Byte | Value | Description |
|---|---|---|---|
| Request | 0 | 18h | NetFn/LUN |
| | 1 | 22h | Defined command |
| Response | 0 | Complete Code | 00h means OK |

### Set Watchdog Timer:

This command is used to set the parameters of the WDT.

| Action | Byte | Value | Description |
|---|---|---|---|
| Request | 0 | 18h | NetFn/LUN |
| | 1 | 24h | Defined command |
| | 2 | [7] - 1b = don't log<br>[6] - 1b = don't stop timer<br>[5:3] - reserved<br>[2:0] - timer use<br>000b = reserved<br>001b = BIOS FRB2<br>010b = BIOS/POST<br>011b = OS Load<br>100b = SMS/OS<br>101b = OEM<br>110b -111b = reserved | Timer Use |
| | 3 | [7] - reserved<br>[6:4] - pre-timeout interrupt<br>000b = none<br>001b = SMI (optional)<br>010b = NMI / Diagnostic Interrupt (optional)<br>011b = Messaging Interrupt<br>100b,111b = reserved<br>[3] - reserved<br>[2:0] - timeout action<br>000b = no action<br>001b = Hard Reset<br>010b = Power Down<br>011b = Power Cycle<br>100b,111b = reserved | Timer Actions |

| Action | Byte | Value | Description |
|---|---|---|---|
| Request | 4 | 1h~ffh (‘1h’ based.) | Pre-timeout interval in seconds. |
| | 5 | [7] - reserved<br>[6] - reserved<br>[5] - OEM<br>[4] - SMS/OS<br>[3] - OS Load<br>[2] - BIOS/POST<br>[1] - BIOS FRB2<br>[0] - reserved<br>0b = leave alone<br>1b = clear timer use expiration bit | Timer Use Expiration flags clear |
| | 6 | 00h~ffh, LS byte (100 ms/count) | Initial countdown value |
| | 7 | 00h~ffh, MS byte (100 ms/count) | Initial countdown value |
| Response | 0 | Complete Code | 00h means OK |

### Get Watchdog Timer

This command is used to get the current configuration in WDT.

| Action | Byte | Value | Description |
|---|---|---|---|
| Request | 0 | 18h | NetFn/LUN |
| | 1 | 25h | Defined command |
| Response | 0 | Complete Code | 00h means OK |
| | 1 | [7] - 1b = don’t log<br>[6] - 1b = don’t stop timer<br>[5:3] - reserved<br>[2:0] - timer use<br>000b = reserved<br>001b = BIOS FRB2<br>010b = BIOS/POST<br>011b = OS Load<br>100b = SMS/OS<br>101b = OEM<br>110b -111b = reserved | Timer Use |

| Action | Byte | Value | Description |
|---|---|---|---|
| Response | 2 | [7] - reserved<br>[6:4] - pre-timeout interrupt<br>000b = none<br>001b = SMI (optional)<br>010b = NMI / Diagnostic Interrupt (optional)<br>011b = Messaging Interrupt<br>100b,111b = reserved<br>[3] - reserved<br>[2:0] - timeout action<br>000b = no action<br>001b = Hard Reset<br>010b = Power Down<br>011b = Power Cycle<br>100b,111b = reserved | Timer Actions |
| | 3 | 1h~ffh ( '1h' based.) | Pre-timeout interval in seconds. |
| | 4 | [7] - reserved<br>[6] - reserved<br>[5] - OEM<br>[4] - SMS/OS<br>[3] - OS Load<br>[2] - BIOS/POST<br>[1] - BIOS FRB2<br>[0] - reserved<br>0b = leave alone<br>1b = clear timer use expiration bit | Timer Use Expiration flags clear |
| | 5 | 00h~ffh, LS byte (100 ms/count) | Initial countdown value |
| | 6 | 00h~ffh, MS byte (100 ms/count) | Initial countdown value |
| | 7 | 00h~ffh, LS byte (100 ms/count) | Present countdown value |
| | 8 | 00h~ffh, MS byte (100 ms/count) | Present countdown value |

## Example of WDT Process

The sample program written in C shown below offers an interactive way to test the Watchdog Timer under DOS.

### Configure WDT Parameters

```
0x40 : Don't stop timer.
0x01 : Hard Reset.
0x01 : Pre-timeout interval in 1 second.
0x08 : Timer Use Expiration flags clear by OS Load.
0x50 : 80 count. 100ms * 80 = 8000ms = 8 seconds.

[18 00 24 40 01 01 08 50 00]
```

### Reset WDT

```
[18 00 22]
```

NOTE:

After setting a new configuration, the Reset WDT command must be sent. Then the WDT will be activated.

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# 8 BIOS Setup

The following chapter describes basic navigation for the AMIBIOS®8 BIOS setup utility.

## 8.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:
   < Press DEL to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu

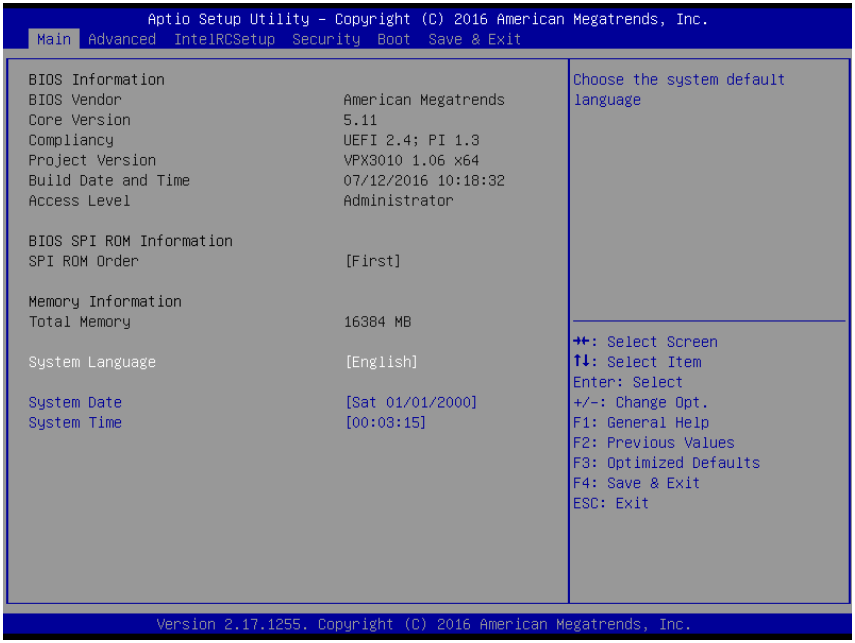

**Note:** In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

## Setup Menu

The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

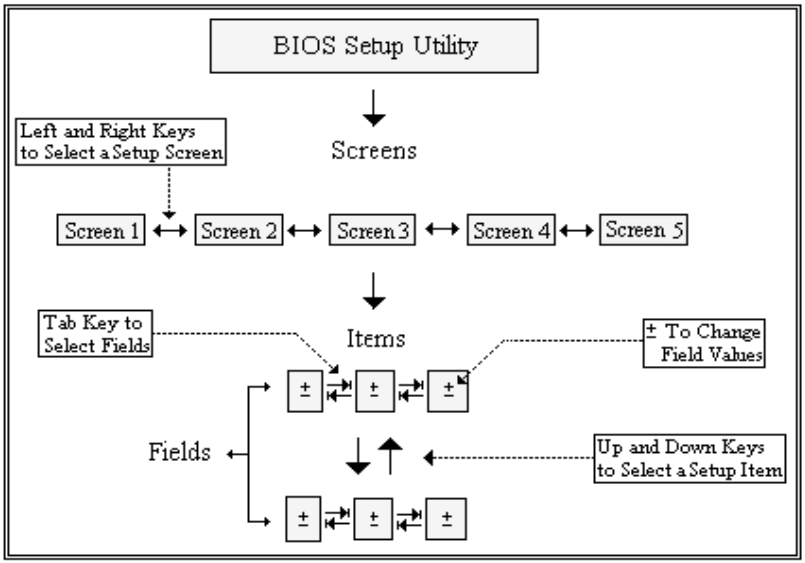
The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.



## Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include < F1 >, < F4 >, < Enter >, < ESC >, < Arrow > keys, and so on.



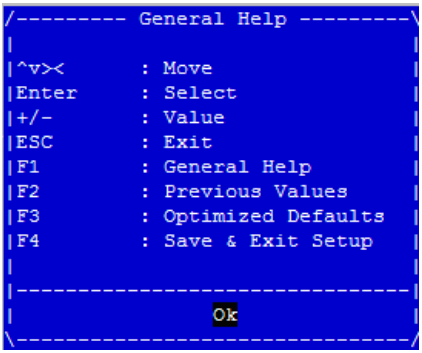

NOTE: There is a hot key legend located in the right frame on most setup screens.

| | |
|---|---|
| →← | Left/Right. The Left and Right < Arrow > keys allow you to select a setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on. |
| ↑↓ | Up/Down The Up and Down < Arrow > keys allow you to select a setup item or sub-screen. |
| **+-** | Plus/Minus The Plus and Minus < Arrow > keys allow you to change the field value of a particular setup item. For example: Date and Time. |
| **Tab** | The < Tab > key allows you to select setup fields. |

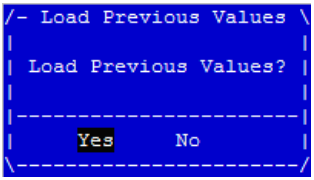
## Hotkey Descriptions

**Enter** The < Enter > key allows you to display or change the setup option listed for a particular setup item. The < Enter > key can also allow you to display the setup sub-screens.

**F1** The < F1 > key allows you to display the General Help screen. Press the < F1 > key to open the General Help screen.

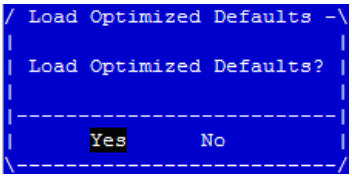



**F2** The < F2 > key on your keyboard is the previous values key. It is not displayed on the key legend by default. To set the previous values settings of the BIOS, press the < F2 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The previous values settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

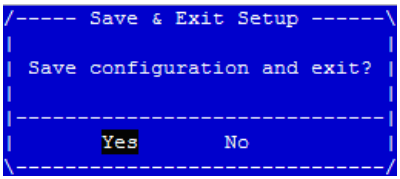



**F3** The < F3 > key on your keyboard is the optimized defaults key. To set the optimized defaults settings of the BIOS, press the < F3 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The optimized defaults settings allow the motherboard to boot up with the optimized defaults of options set. This can lessen the probability of

conflicting settings.

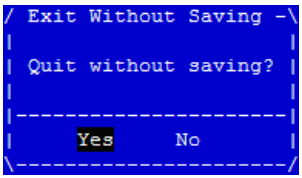



**F4** The < F4 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:




Press the < Enter > key to save the configuration and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

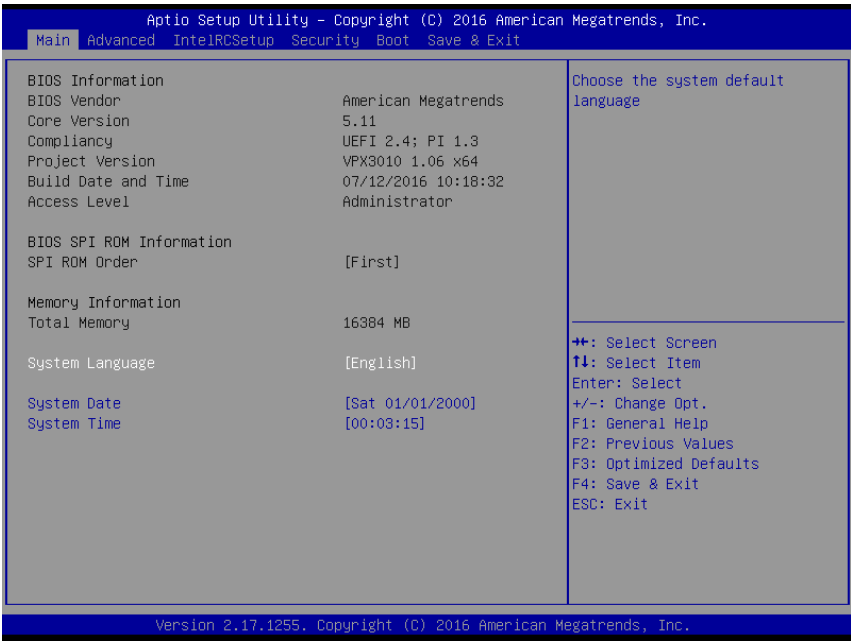
**ESC** The < Esc > key allows you to discard any changes you have made and exit the Setup. Press the < Esc > key to exit the setup without saving your changes. The following screen will appear:




Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

## 8.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. The Main BIOS Setup screen is shown below.




### System & Board Info

#### BIOS Vendor

Display the BIOS vendor.

#### Core Version

Display the BIOS core version.

#### Compliancy Version

Display the current UEFI Specification version.

#### Project Version

Display the current BIOS version.

### Build Data and Time

Displays the BIOS build data and time.

### Access Level

Displays the user permissions.

### BIOS SPI ROM Information

Displays currently use the first BIOS ROM or second BIOS ROM

### Memory Information

Displays total memory size

## System Language

Choose the default system language.

## System Time/System Date

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

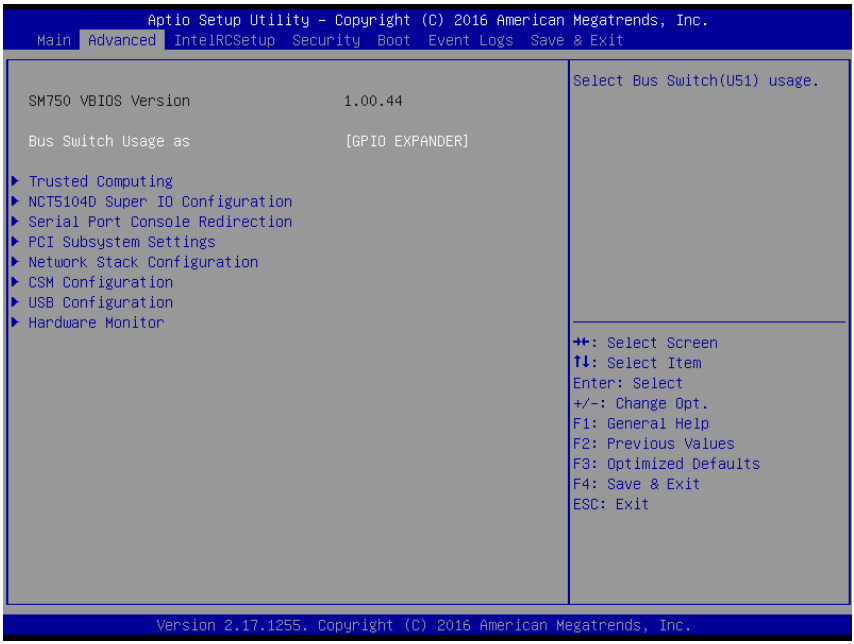

NOTE:

The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

## 8.3 Advanced BIOS Setup

Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the < Arrow > keys. The Advanced BIOS Setup screen is shown below.

The sub menus are described on the following pages.



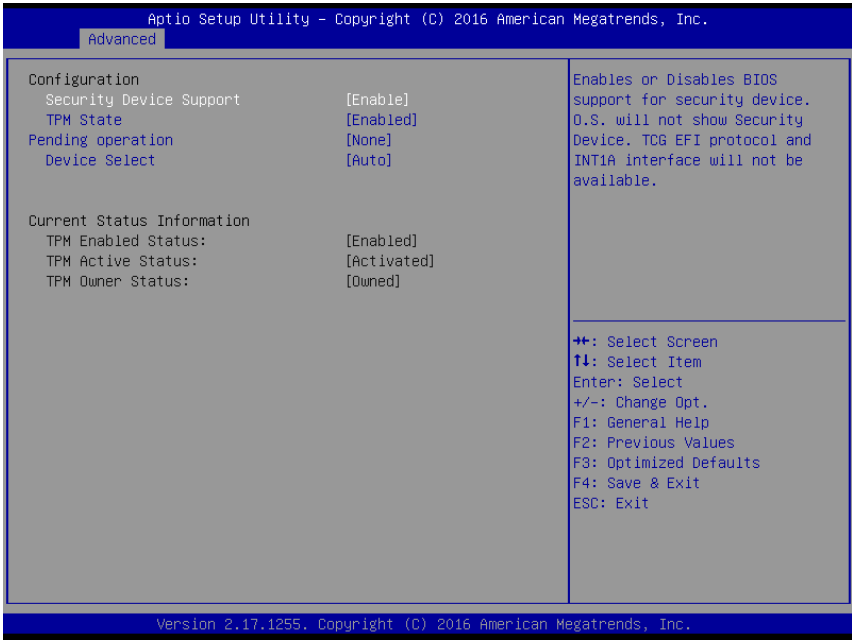

### Bus Switch Usage as

Select Bus Switch (U51) usage. Set this value to **GPIO EXPANDER, COM4**.

### 8.3.1 Trusted Computing

You can use this screen to select options for the Trusted Computing Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the

right side of the screen. The settings are described on the following pages.




## Security Device Support

Enable/Disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will be available.

## TPM State

Enable/Disable Security Device. Note: Your computer will reboot during restart in order to change the state of the Security Device.

## Pending Operation

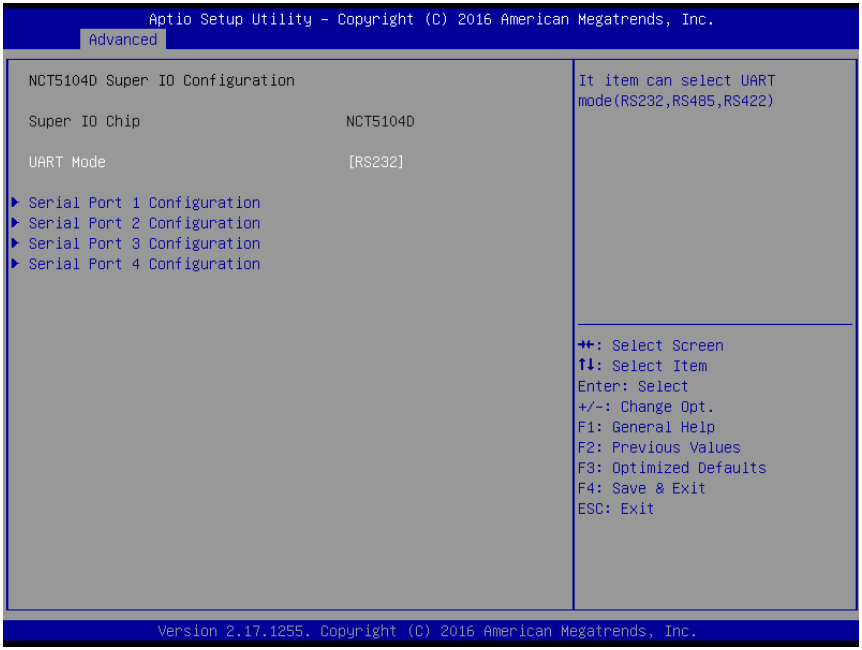
Schedule an operation for the Security Device. Note: Your computer will reboot during restart in order to change the state of the Security Device.

### Device Select

Auto will support both TPM1.2 and TPM2.0 with default set to TPM2.0 devices. If not found, TPM1.2 devices will be enumerated. Note: Your computer will reboot during restart in order to change the state of the Security Device.

## 8.3.2 NCT5104D Super IO Configuration

You can use this screen to select options for the NCT5104D Super IO Configuration.

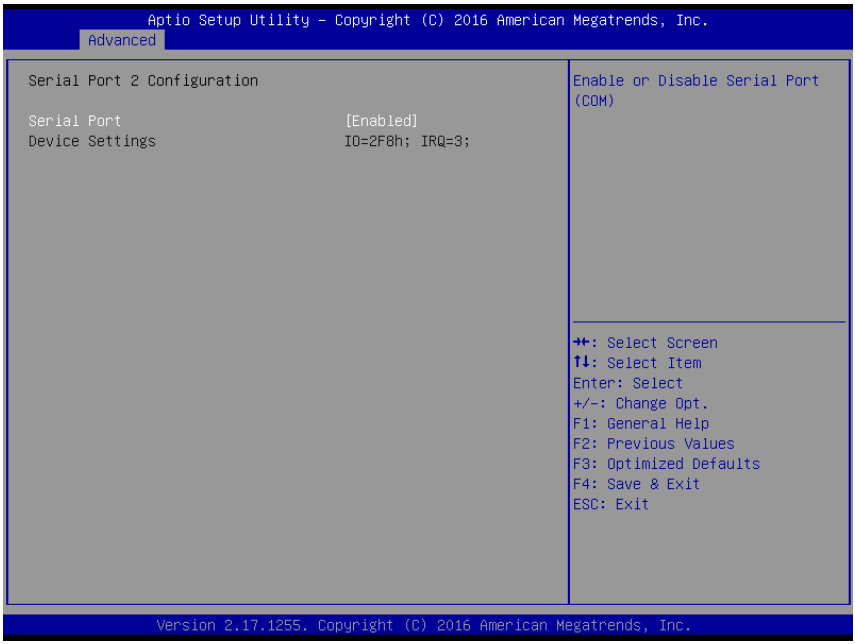



### UART Mode

Select RS232 , RS485 or RS422. (only available on XMC SKUs).

## Serial Port 1-4 Configuration

Set Parameters of Serial Port 1-4 (COMA-D). The screen is shown below




### Serial Port

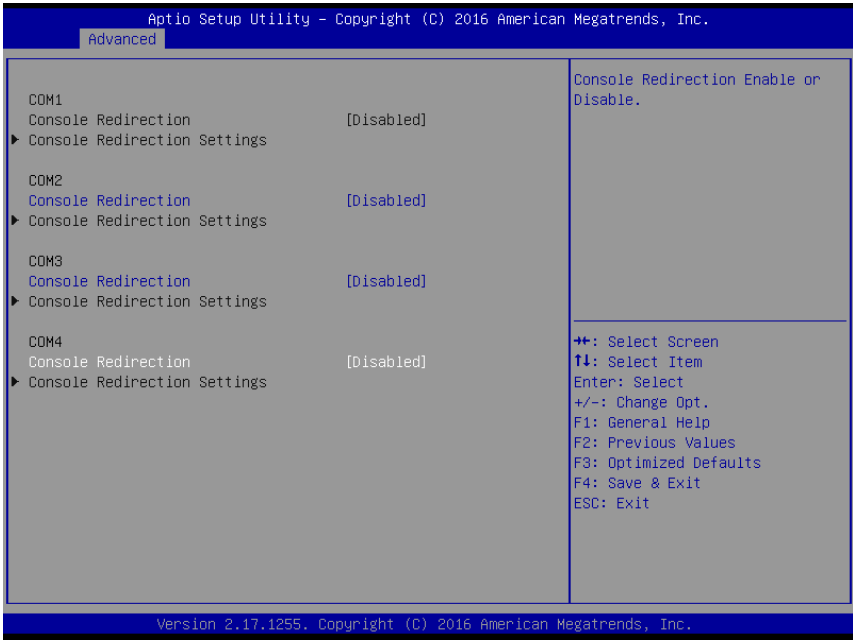
Enable or Disable the Serial Port (COM).

### Device Settings

Display the serial port current resource settings.

### 8.3.3 Serial Port Console Redirection

You can use this screen to select options for the Serial Port Console Redirection settings (COM1 is unavailable for console redirection because it for IPMC use). Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on the following pages. An example of the Serial Port Console Redirection screen is shown below.

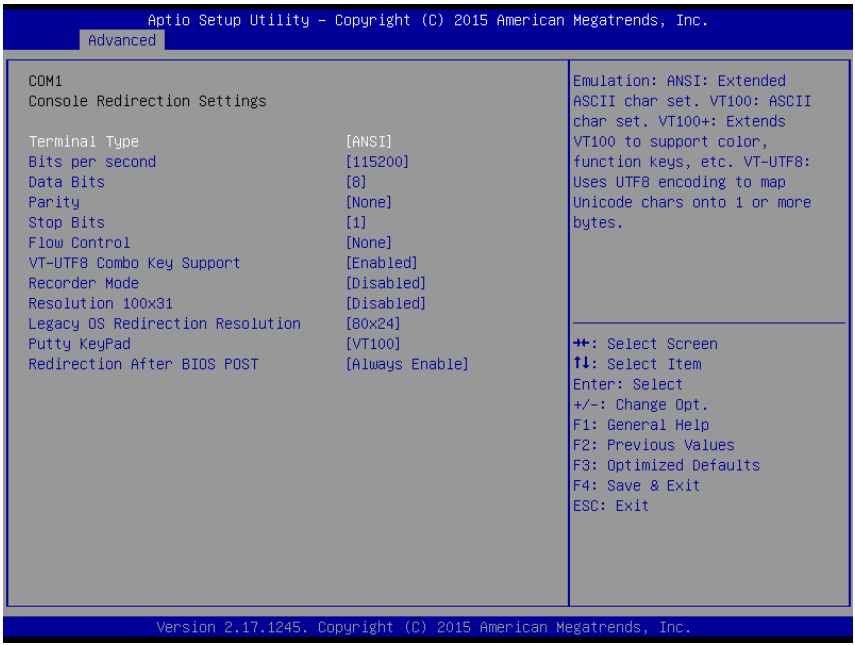



#### Console Redirection

Enable/Disable the Console Redirection feature.

#### Console Redirection Settings

These settings specify how the host computer and the remote computer exchange data. Both computers should have the same or compatible settings. The screen is shown below.




### Terminal Type

VT100+ is the preferred terminal type for out-of-band management. Configuration options: VT100, VT100+, VT-UTF8, ANSI.

### Bits per second

Select the bits per second you want the serial port to use for console redirection. The options are 115200, 57600, 38400, 19200, 9600.

### Data Bits

Select the data bits you want the serial port to use for console redirection. Set this value to 7, 8.

### Parity

Set this option to select Parity for console redirection. The settings for this value are None, Even, Odd, Mark, Space.

### Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit. Set this value to 1 and 2.

### Flow Control

Set this option to select Flow Control for console redirection. The settings for this value are None, Hardware RTS/CTS.

### VT-UTF8 Combo Key Support

Enables VT-UTF8 combination key support for ANSI/VT100 terminals.Set this value to Enabled/Disabled.

### Recorder Mode

When this mode is enabled, only text will be sent. This is to capture terminal data. Set this value to Enabled/Disabled.

### Resolution 100x31

Set this option to extended terminal resolution. Set this value to Enabled/Disabled.

### Legacy OS Redirection

On legacy OS, the number of rows and columns supported for redirection. Set this value to 80x24, 80x25.

### Putty Key Pad

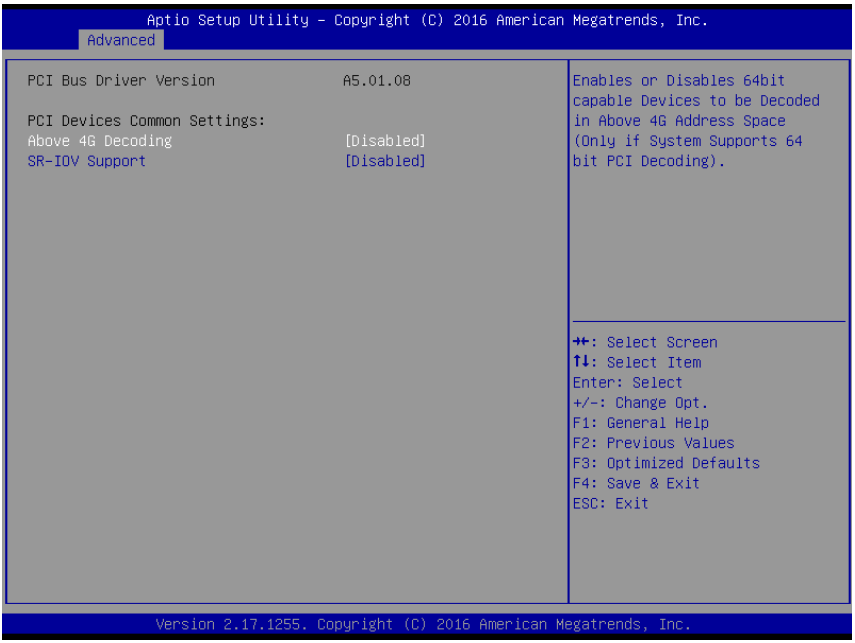
Select FunctionKey and KeyPad on Putty. Set this value to VT100, LINUX, XTERMR6, SCO, ESCN, VT400.

### Redirection After BIOS POST

The settings specify if BootLoader is selected than legacy console redirection is disabled before booting to legacy O.S. Default value is Always Enable which means legacy console redirection is enabled for legacy O.S. Set this value to Always Enable, BootLoader.

### 8.3.4 PCI Subsystem Settings

You can use this screen to select options for the PCI Subsystem Settings. Use the up and down < Arrow > keys to select an item. The screen is shown below.




#### Above 4G Decoding

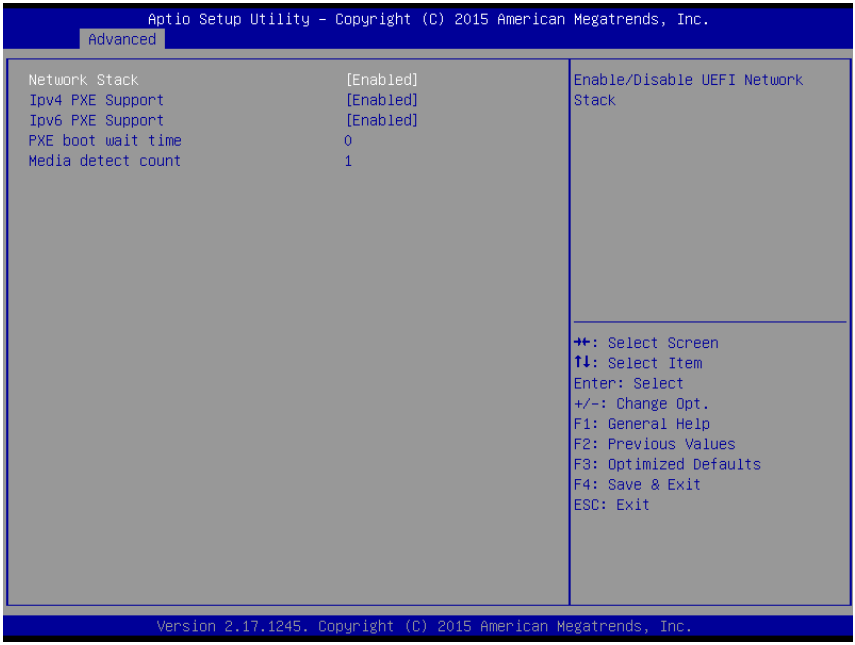
Allow 64-bit capable device to be decoded above the 4G address space. Set this value to Enabled, Disabled.

#### SR-IOV Support

If the system has SR-IOV capable PCIe devices, this option enables or disables Single Root IO Virtualization Support. Set this value to Enabled, Disabled.

### 8.3.5 Network Stack Configuration

You can use this screen to select options for the Network Stack Configuration.




#### Network Stack

Enable/Disable UEFI Network Stack. Set this value to Enabled, Disabled.

#### IPv4 PXE Support

Enable/Disable IPv4 PXE boot support. If disabled IPv4 PXE boot option will not be created.

#### IPv6 PXE Support

Enable/Disable IPv6 PXE boot support. If disabled IPv6 PXE boot option will not be created.

### PXE Boot Wait Time

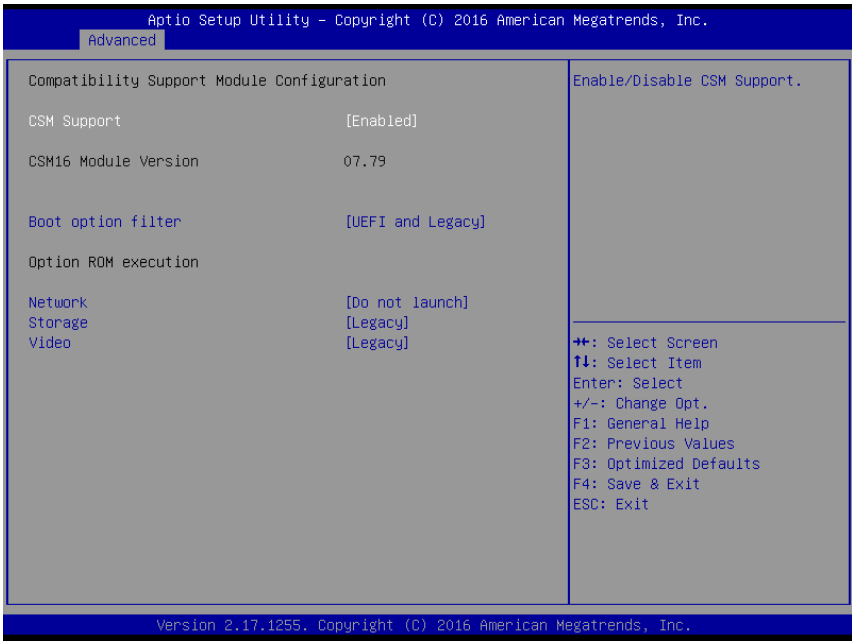
Wait time to press ESC key to abort the PXE boot. Set this value to integer.

### Media Detect Count

Number of times presence of media will be checked. Set this value to integer.

## 8.3.6 CSM Configuration

You can use this screen to select options for the CSM Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option.




### CSM Support

Enable/Disable CSM Support.

### Boot Option Filter

This option controls whether to hide Legacy/UEFI boot options. Set this value to UEFI and Legacy, Legacy only, UEFI only.

### Network

Controls the execution of UEFI and Legacy PXE OpROM. Set this value to Do not launch, UEFI, Legacy.

### Storage

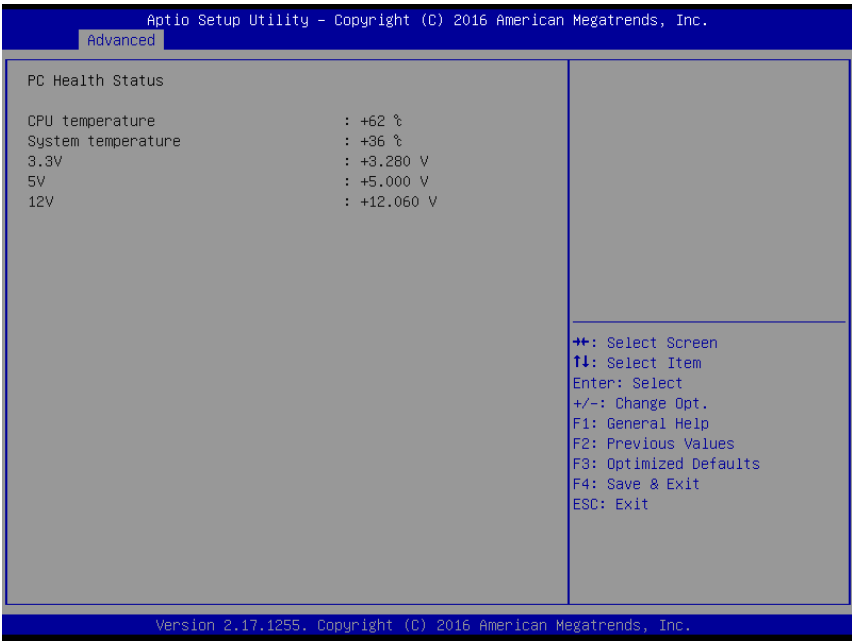
Controls the execution of UEFI and Legacy PXE OpROM. Set this value to Do not launch, UEFI, Legacy

### Video

Controls the execution of UEFI and Legacy Video OpROM. Set this value to Do not launch, UEFI, Legacy

### 8.3.7 Hardware Monitor

You can use this screen to select options for the Hardware Monitor. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on this page. The screen is shown below.




#### CPU Temperature

Display current CPU temperature.

#### System Temperature

Display current system temperature.

#### 3.3V

Display current system 3.3V voltage.

### 5V

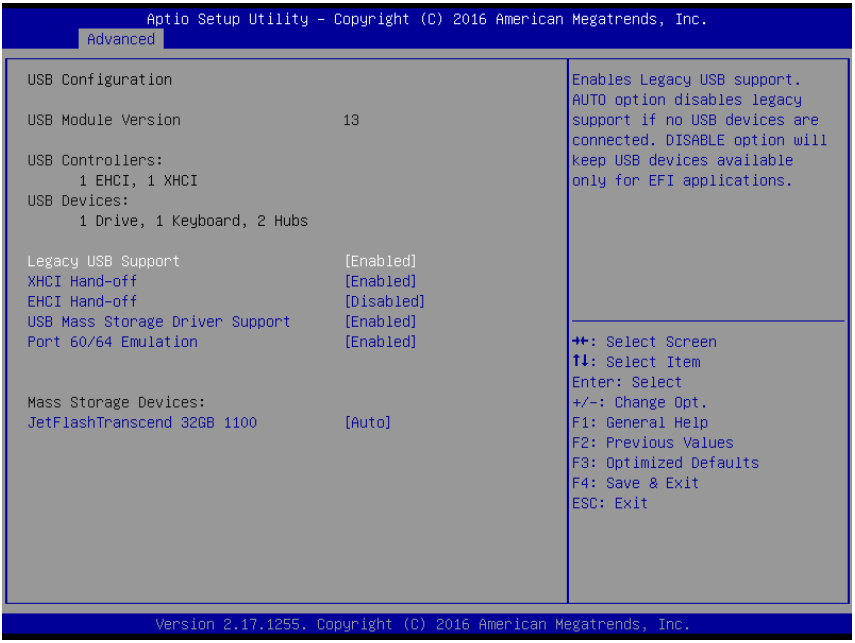
Display current system 5V voltage.

### 12V

Display current system 12V voltage.

## 8.3.8 USB Configuration

You can use this screen to select options for the USB Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The screen is shown below.



### Legacy USB Support

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

### XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

### EHCI Hand-off

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

### USB Mass Storage Driver Support

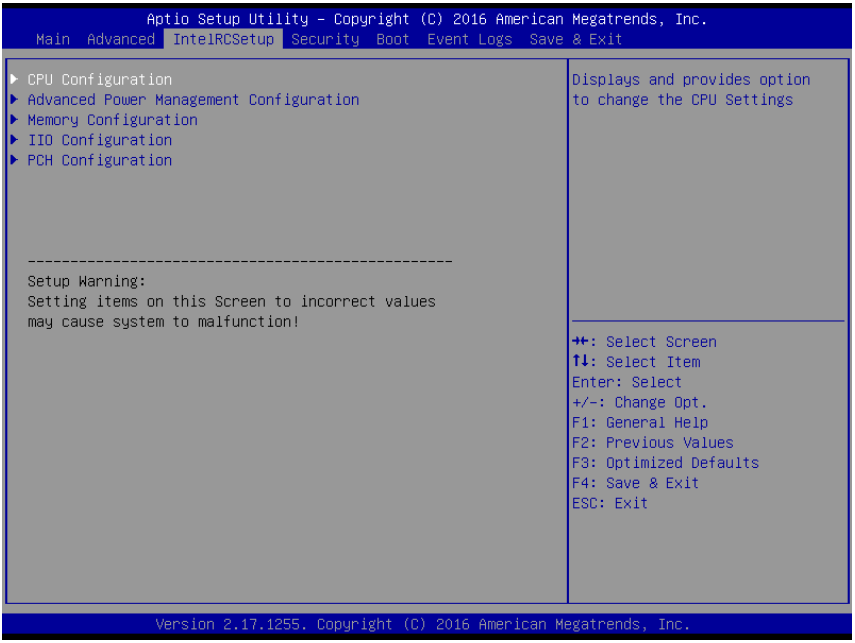
Enable/Disable USB mass storage driver support.

### Port 60/64 Emulation

Enable I/O port 60h/64h emulation support. This should be enabled for complete USB keyboard legacy support for non-USB aware OSes.

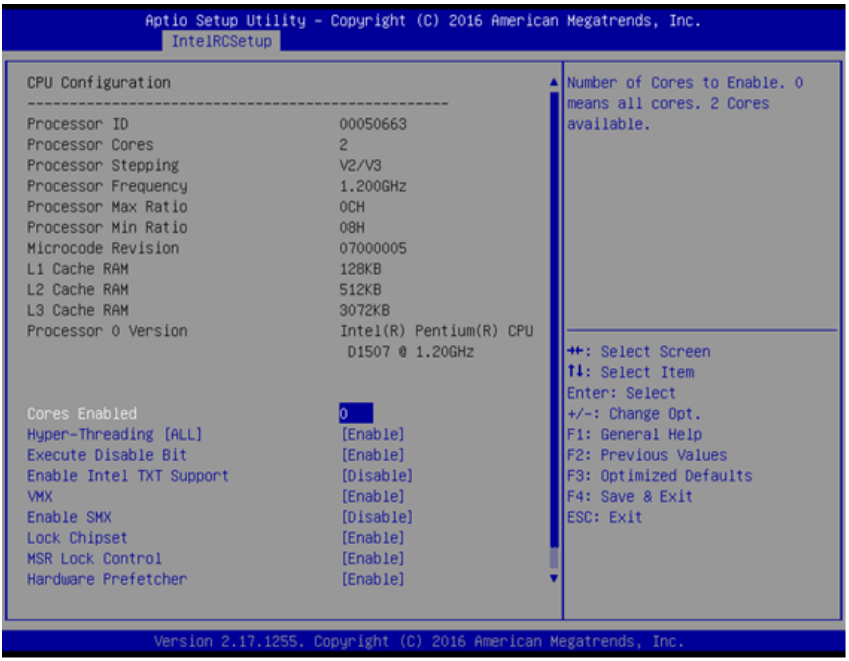
## 8.4 IntelRCSetup

Select the IntelRCSetup tab from the setup screen to enter the IntelRCSetup screen. You can select any of IntelRCSetup options by highlighting it using the < Arrow > keys. The IntelRCSetup screen is shown below.



### 8.4.1 CPU Configuration

You can use this screen to select options for the CPU Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The screen is shown below.




#### Cores Enabled

Number of CPU cores to be enabled. 0 means all cores.

#### Hyper-Threading [ALL]

Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads). Set this value to Enabled, Disabled.

#### Enable Intel TXT Support

Enables Intel Trusted Execution Technology Configuration. Set this value to Enabled, Disabled.

### VMX

Enables the Vanderpool Technology, takes effect after reboot. Set this value to Enabled, Disabled.

### Enable SMX

Enables safer mode extensions. Set this value to Enabled, Disabled.

### Lock Chipset

Lock or unlock chipset. Set this value to Enabled, Disabled.

### MSR Lock Control

MSR 2Ah, MSR 0E2h and CSR 80h will be lock when enabled. Set this value to Enabled, Disabled.

### Hardware Prefetcher

MLC streamer pre-fetcher. Set this value to Enabled, Disabled.

### Adjacent Cache Prefetcher

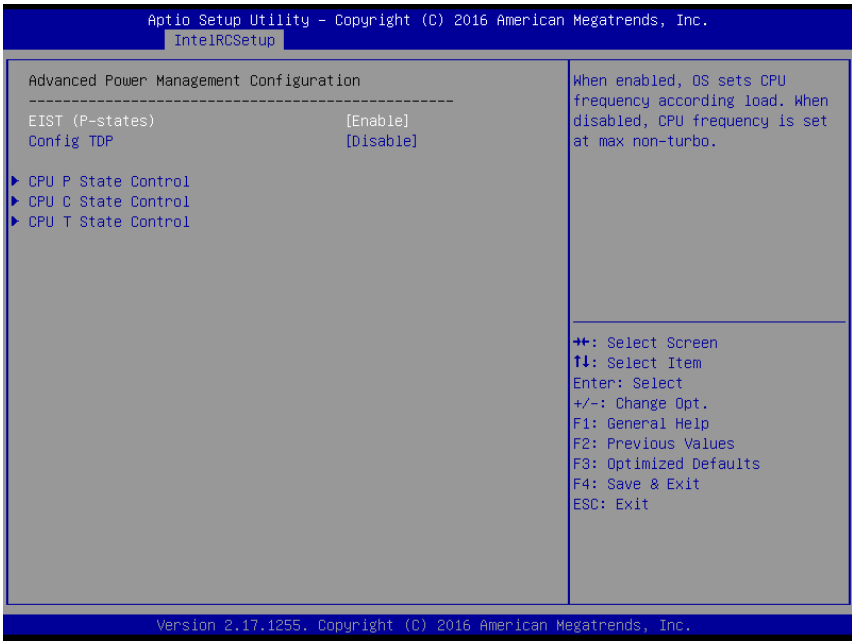
MLC spatial pre-fetcher. Set this value to Enabled, Disabled.

### X2APIC

Enable or disable extended APIC support. Set this value to Enabled, Disabled.

### 8.4.2 Advanced Power Management Configuration

You can use this screen to select options for the Advanced Power Management Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The screen is shown below.




#### EIST (P-states)

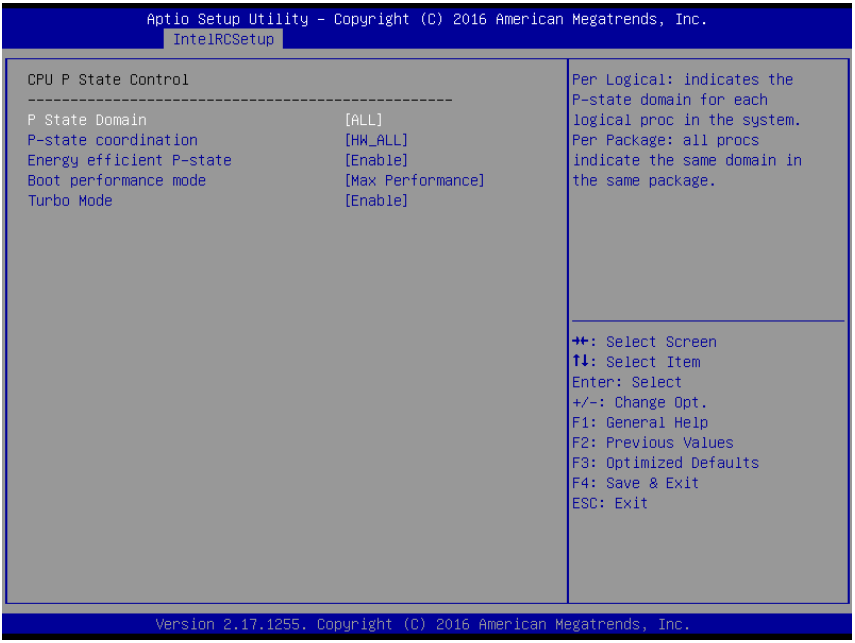
When enabled, OS sets CPU frequency according load. When disabled, CPU frequency is set at max non-turbo. Set this value to Enable/Disable.

#### Config TDP

Option to disable/enable Config TDP. Set this value to Enable/Disable.

## CPU P State Control

The screen is shown below




### P State Domain

Select the P-state domain for each logical processor in system by logical. When by package all processor indicate the same domain in the same package. Set this value to ALL, ONE.

### P-State Coordination

Select P-state coordination. HW_ALL coordination is recommended over SW_ALL and SW_ANY. Set this value to HW_ALL, SW_ALL, SW_ANY.

### Energy Efficient P-state

Select the Energy Ffficient P-state feature. Set this value to Enable/Disable.

### Boot Performance Mode

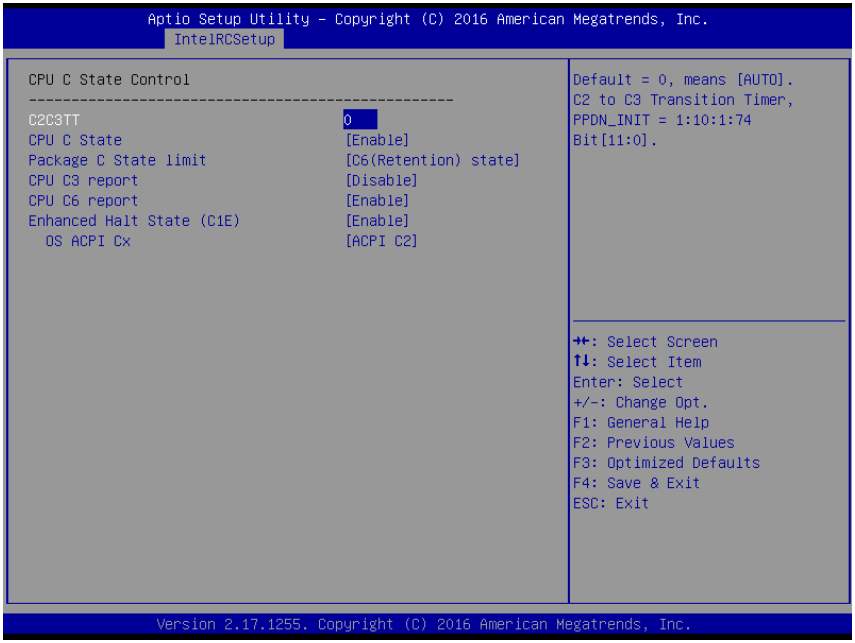
Select the performance state that BIOS will set before handoff to OS. Set this value to Max Performance, Max Efficient.

### Turbo Mode

Select CPU Turbo mode. Set this value to Enable/Disable.

## CPU C State Control

The screen is shown below




### C2C3TT

Select C2 to C3 transition timer. Default 0 means Auto.

### CPU C State

Select CPU Enhanced Cx state. Set this value to Enable/Disable.

### Package C State Limit

Select CP package C state limit. Set this value to C0, C1state, C2state, C6(non Retention) state, C6(Retention) state, No Limit.

### CPU C3 Report

Select CPU C3(APCI C2) report to OS recommended to be disabled. Set this value to Enable/Disable.

### CPU C6 Report

Select CPU C6(APCI C2) report to OS recommended to be enabled. Set this value to Enable/Disable.

### Enhance Halt State (C1E)

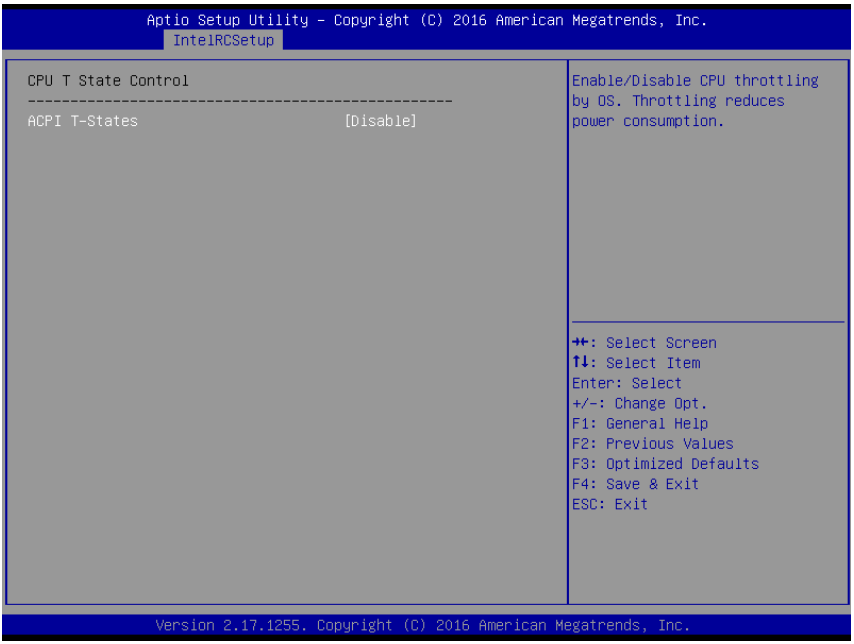
Select the CPU enhanced C1E state. It takes effect after reboot. Set this value to Enable/Disable.

### OS APCI Cx

Select the CC3/CC6 report to OS ACPI C2 or ACPI C3. Set this value to ACPI C2, APCI C3.

## CPU T State Control

The screen is shown below

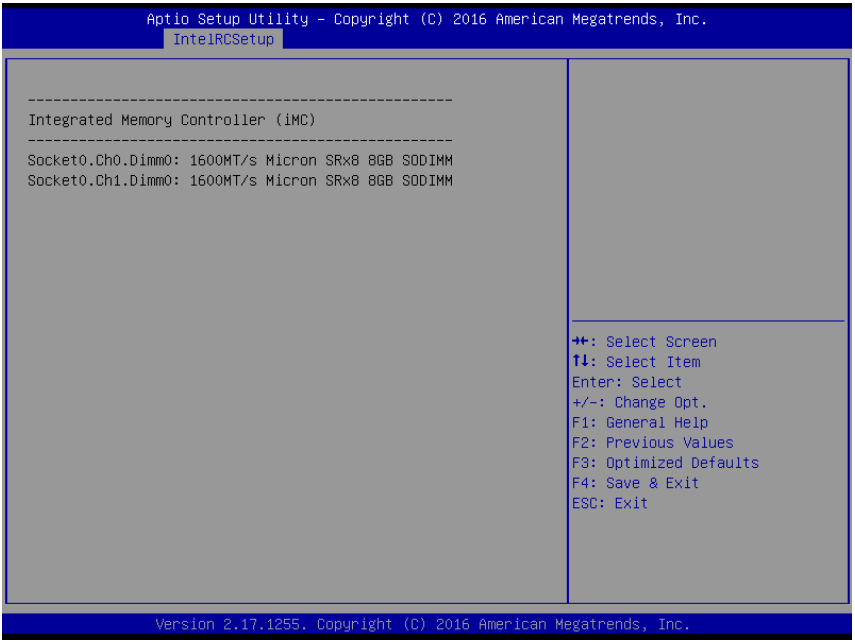



### ACPI T-States

Enable/Disable CPU throttling by OS. Throttling reduces power consumption. Set this value to Enable/Disable.

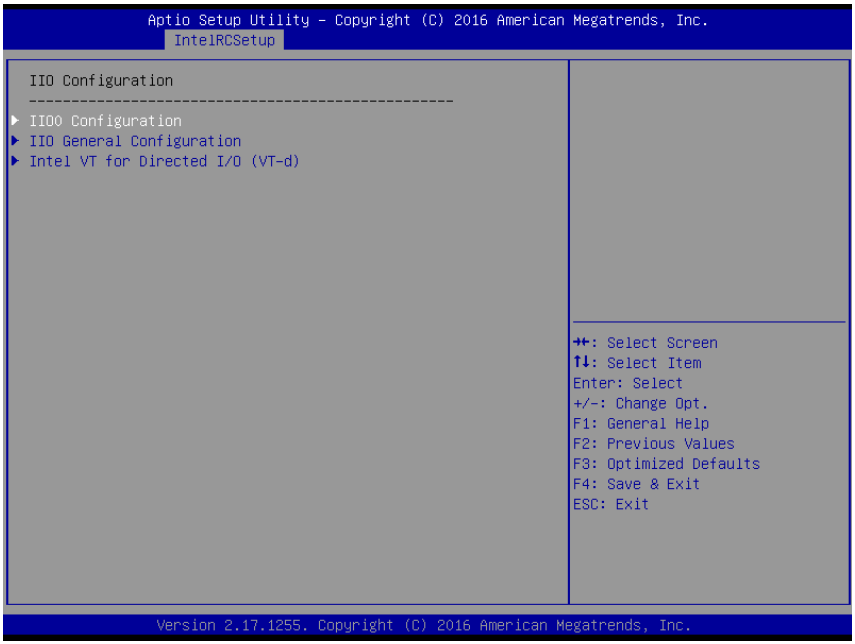
### 8.4.3 Memory Configuration

This screen displays the Memory Configuration of the system.



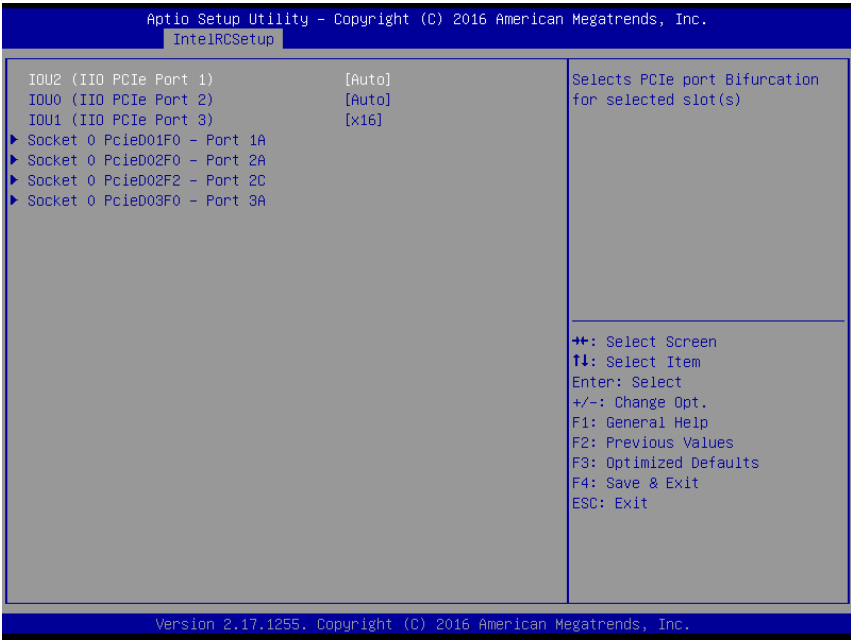
### 8.4.4 IIO Configuration

You can use this screen to select options for the IIO Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The screen is shown below.



## IIO0 Configuration

The screen is shown below




### IOU2 (IIO PCIe Port 1)

Selects PCIe port Bifurcation for selected slot(s). Set this value to Auto, x8, x4x4.

### IOU0 (IIO PCIe Port 2)

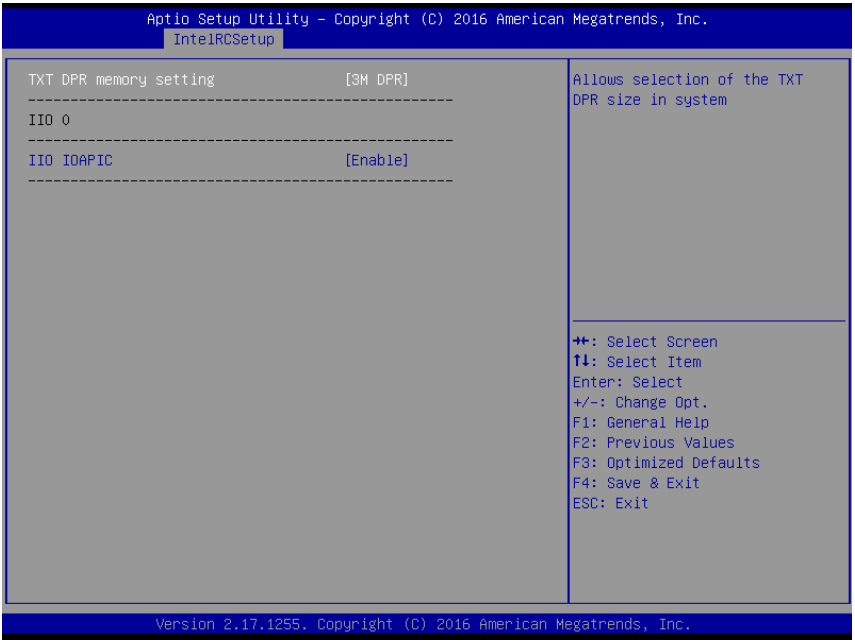
Selects PCIe port Bifurcation for selected slot(s). Set this value to Auto, x16, x8x8, x8x4x4, x4x4x8, x4x4x4x4.

### IOU1 (IIO PCIe Port 3)

Selects PCIe port Bifurcation for selected slot(s). Set this value to Auto, x16, x8x8, x8x4x4, x4x4x8, x4x4x4x4. (PS: If XMC SKU default is x8x8, PCIE SKU default is x16)

## IIO General Configuration

The screen is shown below




### TXT DPR Memory Setting

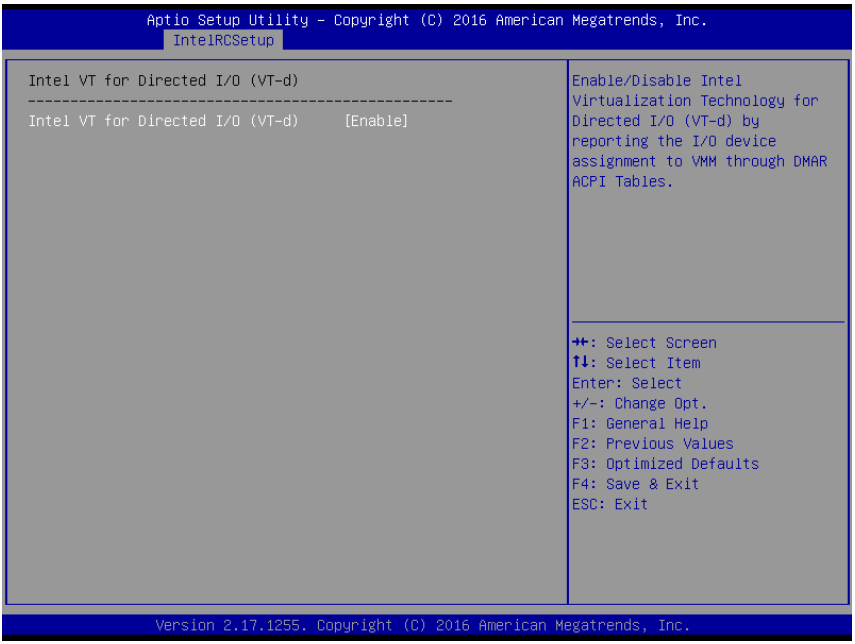
Select TXT DPR size in system. Set this value to 1M DPR, 3M DPR, 64M DPR, 128M DPR, 255M DPR.

### IIO IOAPIC

Enable or disable IIO IOAPIC. Set this value to Enabled/Disabled.

## Intel VT for Directed I/O (VT-d)

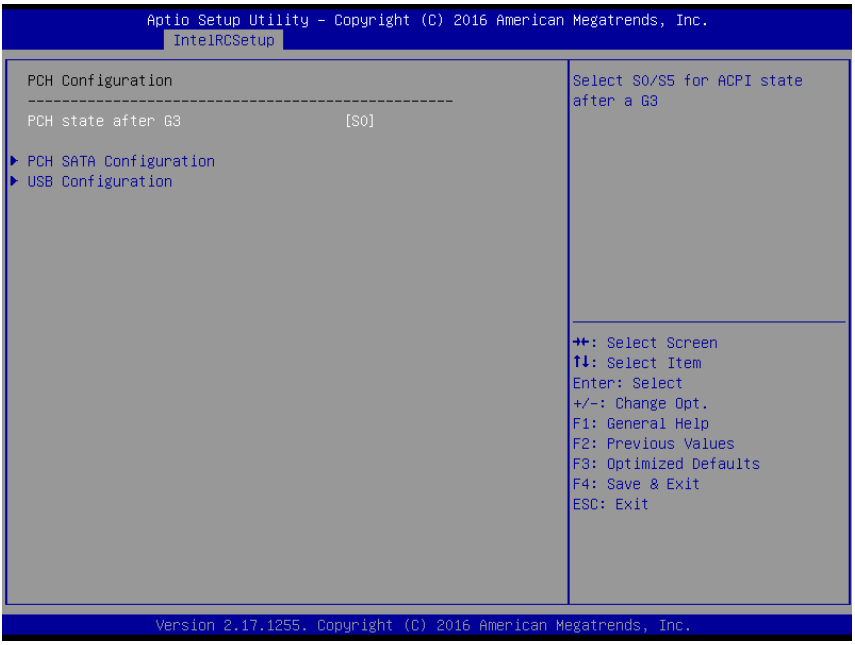
The screen is shown below




Enable or disable Intel Virtualization Technology for directed I/O(VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI tables. Set this value to Enabled/Disabled.

### 8.4.5 PCH Configuration

You can use this screen to select options for the PCH Configuration. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The screen is shown below.

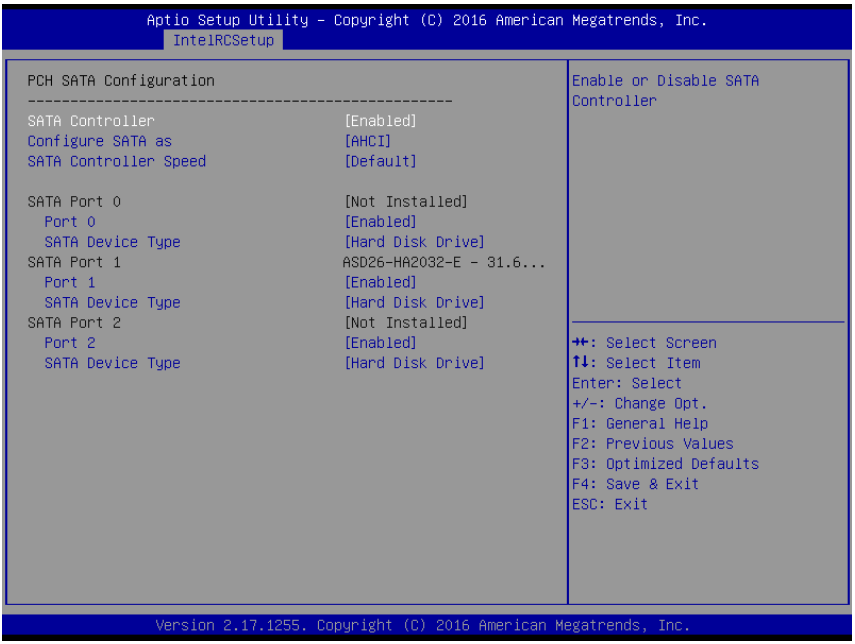



#### PCH State After G3

Select S0/S5 for ACPI state after system return from G3. Set this value to S0, S5.

## PCH SATA Configuration

The screen is shown below




### SATA Controller

Enable or disable SATA controller. Set this value to Enabled/ Disabled.

### Configure SATA as

This will configure SATA as IDE ,RAID or AHCI. Set this value to IDE, AHCI, RAID .

### SATA Controller Speed

Select SATA controller speed. Set this value to Default, Gen1, Gen2, Gen3.

### SATA Port 0-2

Allow enable or disable SATA ports. Set this value to Enabled/ Disabled.

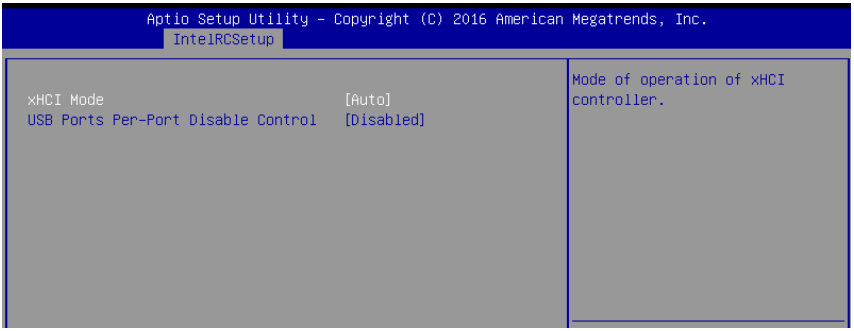
### SATA Device Type

Select SATA devices' type. Set this value to Hard Disk Drive, Solid State Drive.

NOTE: "SATA Port 2" only on PCIe SKU.

## USB Configuration

The screen is shown below



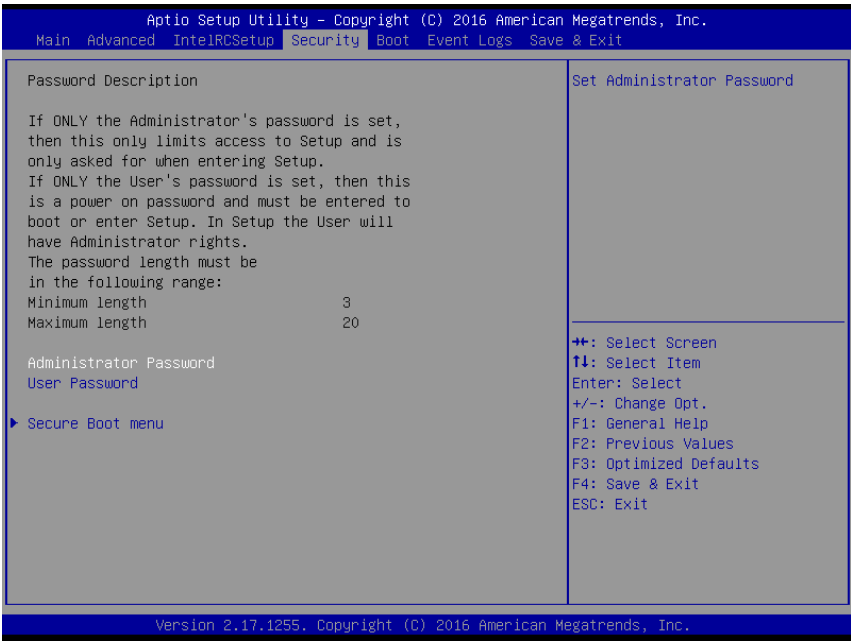

### xHCI Mode

Select xHCI controller operation modes. Set this value to Smart Auto, Auto, Enabled, Disabled.

### USB Per-Port Disable Control

Allow control disable and enable of the USB ports. Set this value to Enabled/Disabled.

## 8.5 Security Setup




### Administrator, User Password

If only the administrator's password is set, then this only limits access to setup and is only asked for when entering setup.

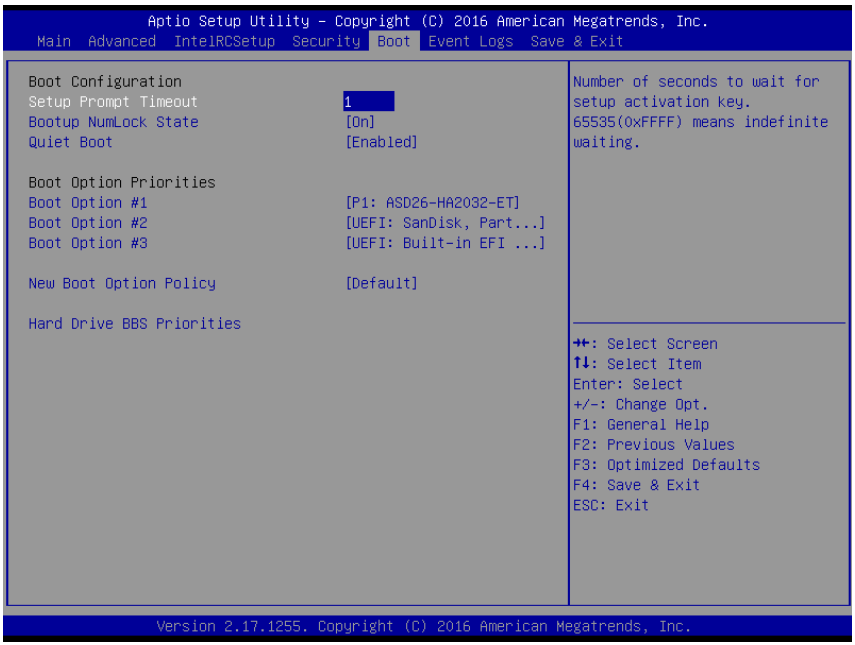
If only the user's password is set, then this is a power on password and must be entered to boot or enter setup. In setup the user will have administrator rights.

### Secure Boot Menu

Customization of Secure Boot settings.

## 8.6 Boot Settings

Select the Boot tab from the setup screen to enter the Boot BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display a Boot BIOS Setup option by highlighting it using the < Arrow > keys. The Boot Settings screen is shown below:




### Setup Prompt Timeout

Set number of seconds that system waiting for setup activation key. The number of 65535 (0xFFFF) means indefinite waiting.

### Bootup NumLock State

Select the keyboard NumLock state. Set this value to On, Off.

### Quiet Boot

- **Disabled** - Set this value to allow the computer system to display the POST messages.
- **Enabled** - Set this value to allow the computer system to display the OEM logo.

### Set Boot Priority

Set Boot Option #1 ~2 boot priority.

### New Boot Option Policy

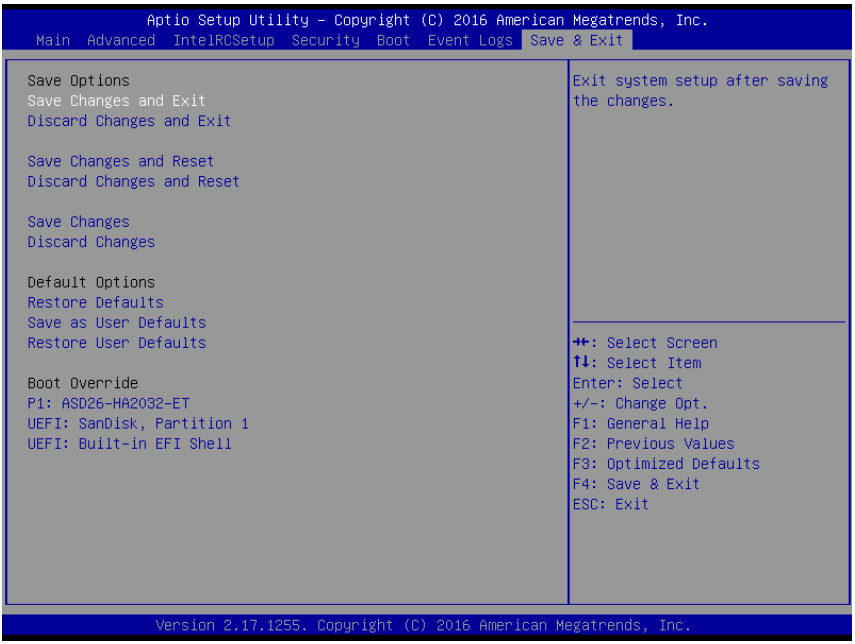
Select the placement of newly detected UEFI boot options. Set this value to Default, Place First, Place Last.

### Hard Drive BBS Priorities

Specifies the boot device priority sequence from available hard drives.

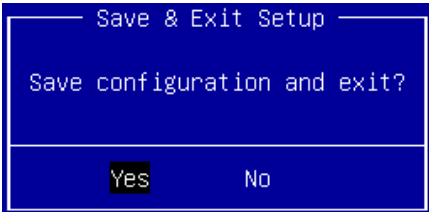
## 8.7 Save & Exit Menu

Select the Save & Exit tab from the setup screen to enter the Save & Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the < Arrow > keys. The Save & Exit BIOS Setup screen is shown below.



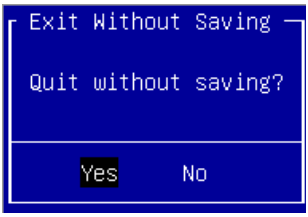

### Save Changes and Exit

Exit the system after saving the changes.



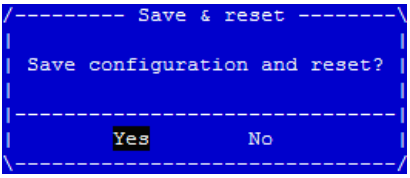
### Discard Changes and Exit

Exit system setup without saving any changes.



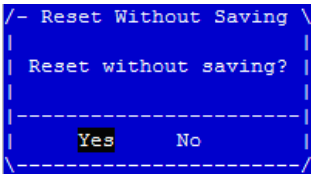

### Save Changes and Reset

Reset the system after saving the changes.



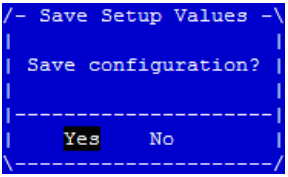

### Discard Changes and Reset

Reset system setup without saving any changes.



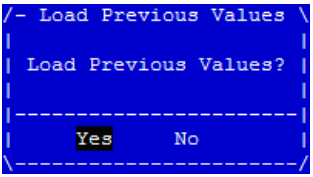

### Save Changes

Save changes done so far to any of the setup options.



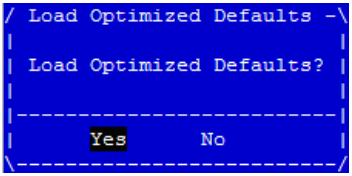
### Discard Changes

Discard changes done so far to any of the setup options.



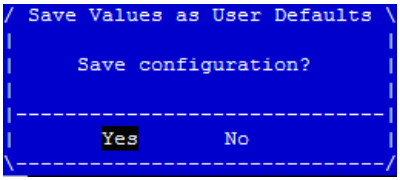

### Restore Changes

Restore/Load Defaults values for all the setup options.



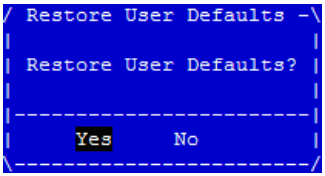

### Save as User Defaults

Save the changes done so far as user defaults..




### Restore User Defaults

Save changes done so far to any of the setup options.



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# Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

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Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries appropriately.

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- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

# Getting Service

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