cPCI-6525

6U CompactPCI® 3rd Generation
Intel® Core™ i7 Processor Blade

User's Manual



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Revision History

Revision	Release Date	Description of Change(s)
1.0	07/05/2018	Initial release

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Preface

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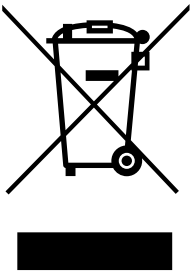
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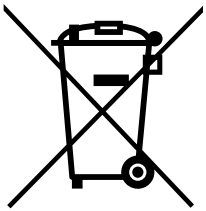
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Battery Labels (for products with battery)









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California Proposition 65 Warning

WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov**.**

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Conventions

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

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

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

WARNING: 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 cPCI-6525 is a 6U CompactPCI® processor blade in single-slot (4HP) width form factor featuring a single 22nm FC-BGA 3rd generation Intel® Core™ i7 Processor with quad-cores mated with the Mobile Intel® QM77 Express Chipset. The cPCI-6525 supports dual channel DDR3-1333/1600 ECC SDRAM with one channel in a SO-CDIMM socket and one channel of soldered onboard memory (total memory capacity up to 16GB). Graphics is integrated in the Intel processor with one DVI-I port on the front panel and VGA switchable to rear IO. The cPCI-6525 has two GbE controllers (Intel® 82574IT) providing two GbE ports on the front panel (switchable to rear) and two Intel® 82574IT GbE controllers providing two ports to rear IO. For expansion flexibility, the cPCI-6525 routes one PCIe x16 Gen2 (convertible to two PCIe x8 Gen2 by switch setting) and one PCIe x4 to rear IO.

Additional IO functionality of the cPCI-6525 includes three USB 3.0 ports and one RS-232/422/485 serial port via RJ-45 connector on the front panel. Onboard storage capabilities include a SATA 6 Gb/s direct connector for a 2.5" drive and CFast slot via adapter board. The cPCI-6525 is also equipped with an Atmel AT97SC3204 Trusted Platform Module (TPM) to meet security requirements.

Rear I/O functionality includes two GbE ports via two Intel® 82574IT GbE controllers for PICMG 2.16 support, two GbE ports (switchable from front panel), six USB 2.0, PS/2 keyboard/mouse, three serial ports, two DVI interfaces, and HD Audio. Available rear I/O for storage includes three SATA ports (dependent on selected RTM) and eight SAS ports supporting hardware RAID via two mini-SAS x4 connectors when mated with the cPCI-R66S0 RTM. By selecting cPCI-R66G0 or cPCI-R66N0 RTM, the cPCI-6525 can utilize an MXM PCIe x16 graphics card to perform high speed calculations.

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The cPCI-6525 supports operation in both a system slot and in a peripheral slot as a standalone blade. The cPCI-6525 is compliant with the PICMG 2.9 specification and supports system management functions based on the Intelligent Platform Management Interface (IPMI) as well as hardware monitoring of physical characteristics such as CPU and system temperature, DC voltages and power status.

The cPCI-6525 is ideal for demanding applications, providing system integrators in military, communications and other critical applications a best-performance-per-watt, high I/O throughput solution with a reliable, smooth path for scalability and expansion.



The J4 pin-out is assigned for PCIe x16. The J4 PCIe x16 pin assignment is not compatible with the PICMG 2.5 R1.0 Computer Telephony Specification. Therefore, do not insert the cPCI-6525 into the peripheral slot of a PICMG 2.5 H.110 compliant backplane in order to avoid causing serious damage to the cPCI-6525.

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1.2 Features

- 6U CompactPCI® processor blade in 4HP width form factor
- 3rd Generation Intel® Core™ in FCBGA package
  - Quad-core Intel® Core™ i7-3615QE 2.3GHz, 6MB L3 Cache, 45W TDP
  - Quad-core Intel® Core™ i7-3612QE, 2.1GHz, 6MB L3 Cache, 35W TDP
  - Dual-core Intel® Core™ i5-3610ME, 2.7GHz, 3MB L3 Cache, 35W TDP
- Mobile Intel® QM77 Express Chipset (Intel® BD82QM77 PCH)
- Dual channel DDR3-1066/1333 ECC SDRAM up to 16GB, one channel soldered up to 8GB, one channel SO-CDIMM up to 8GB
- 32/64-bit, 33/66MHz CompactPCI® Interface based on PCI specifications, universal V(I/O)
- Supports Satellite Mode operation as a standalone blade in peripheral slots
- Three USB 3.0 ports from PCH
- SATA 6 Gb/s direct connector for onboard 2.5" drive
- CFast slot via adapter board
- 8x general purpose user programmable LEDs on front panel (default: Port 80h status)
- One DVI-I on front panel with RGB signal switchable to rear and two additional DVI routed to rear
- Two GbE ports on front panel via Intel® 82574IT, switchable to rear
- Two Gigabit Ethernet ports to rear via Intel® 82574IT controllers
- Compliant with PICMG 2.0, 2.1, 2.9, 2.16 standards
- Atmel AT97SC3204 TPM support (optional)
- Eight SAS/SATA ports supported by LSISAS3008 when mated with cPCI-R66S0 RTM
- MXM PCIe x16 graphics when mated with cPCI-R66G0 and cPCI-R66N0

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1.3 Block Diagram

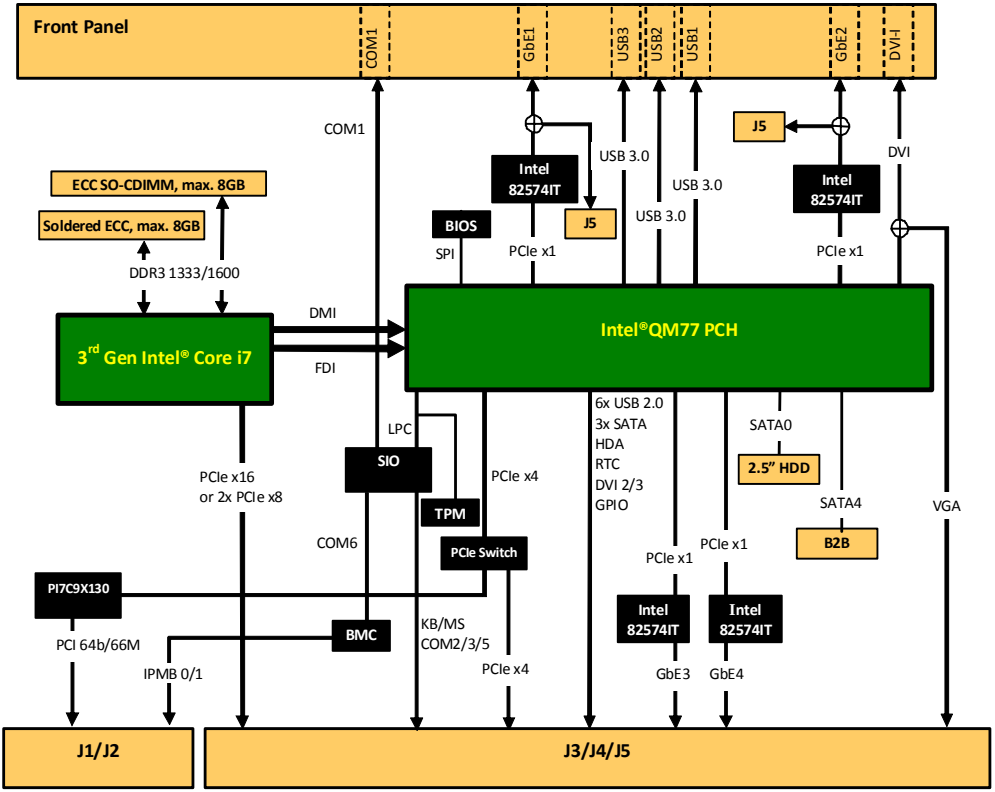


Figure 1-1: cPCI-6525 Functional Block Diagram

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1.4 Product List

Processor Blade

- **cPCI-6525:** 4HP width (single-slot) 6U CompactPCI Processor Blade

Rear Transition Module

- cPCI-R66S0: 6U 8HP width RTM with DVI-D, 1x COM, 3x USB, 4x GbE, 4x eSAS/SATA, 4x iSAS/SATA, PS/2 KB/MS and Line-in/out
- cPCI-R66N0: 6U 8HP width RTM with DVI-I, DVI-D, 1x COM, and 1x USB, 2x GbE (RJ-45); onboard MXM slot; 2x GbE, audio, KB/MS via M12 connector
- cPCI-R66G0: 6U 8HP width RTM with 3x DVI-D, 1x DVI-I, 1x USB, 1x PS/2 KB/MS, audio, onboard MXM slot

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1.5 Package Contents

The cPCI-6525 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 cPCI-6525 are non-standard configurations and may vary depending on customer requests.

Processor Blade

- cPCI-6525
  - CPU and memory specifications will differ depending on options selected
  - Thermal module is assembled on the board
- RJ-45 to DB-9 cable for RJ-45 COM port
- 2.5" SATA drive mounting kit, including bracket and screws for 2.5" SATA drive (P/N: 58-99097-0010) and DB-LSATA adapter card (P/N: 59-37571-0010)

Accessories

- CFast Socket Kit, includes:
  - DB-CFAST: CFast adapter board (PN: 59-37572-0010)
  - CFast mounting kit: mounting bracket and screws (PN: 58-99300-0010)


NOTE:

The contents of non-standard cPCI-6525 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.

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2 Specifications

2.1 cPCI-6525 Blade Specifications

CompactPCI® Standards	• PICMG® 2.0 CompactPCI® Rev. 3.0 • PICMG® 2.1 Hot Swap Specification Rev.2.0 • PICMG® 2.9 System Management Bus Rev. 1.0 • PCIMG® 2.16 Packet Switching Backplane Rev.1.0
Mechanical	• Standard 6U CompactPCI® • Board size: 233.35mm x 160mm • Single-slot width (4HP, 20.32mm) • CompactPCI® connectors with J1, J2, J3, J4 and J5 • UHM connector at J4 for PCIe x16 high speed transmission (optional)
Processor	22nm FCBGA Intel® Core™ i7 Processor • 4-core Intel® Core i7-3615QE Processor, 2.3 GHz, 6MB L3 cache, TDP 45W • 4-core Intel® Core i7-3612QE Processor, 2.1 GHz, 6MB L3 cache, TDP 35W • 2-core Intel® Core™ i5-3610ME Processor, 2.7GHz, 3MB SmartCache, TDP 35W • Passive heatsink
Chipset	• Intel® BD82QM77 Platform Controller Hub (PCH)
Memory	• Dual channel DDR3-1333/1600 SDRAM with ECC, total up to 16GB • One channel in SODIMM sockets up to 8GB • One channel soldered onboard up to 8GB (dependent on availability of memory modules and chips)
CompactPCI Bus	• PCI 32/64-bit, 33/66MHz; 3.3V, 5V universal V(I/O) • Supports operation in system slot as master or in peripheral slot as standalone blade without connectivity to CompactPCI bus (Satellite mode)
Graphics	• Integrated in processor • One DVI-I on front panel with VGA signal switchable to rear J3 • Two DVI to J5 routed to rear
BIOS	• AMI EFI BIOS, 64Mbit SPI flash memory

Table 2-1: cPCI-6525 Blade Specifications

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Gigabit Ethernet	• Two front panel GbE ports from Intel® 82574IT, switchable to rear • Two rear IO GbE 10/100/1000BASE-T ports by Intel 82574IT GbE controller (PICMG 2.16 support)
Serial Ports	Four 16C550 serial ports • One DB-9 RS-232/422/485 serial port on front panel • Three serial ports routed to rear I/O through J3 (1x RS-232, 2x TX/RX only)
PCI Express	• PCIe x16 Gen2 to J4 • PCIe x4 Gen2 to J5
USB 2.0	• Six USB 2.0 ports routed to J3
USB 3.0	• Three USB 3.0 ports on front panel
KB/MS	• PS/2 Keyboard/Mouse port to J3
Audio	• High Definition Audio signals routed to J3
TPM	Atmel AT97SC3204 TPM (upon request) • Over/Under voltage detection • Low/High frequency sensor/filter • Reset filter • Memory Encryption/Decryption
Storage Interfaces[1]	• One SATA 6 Gb/s direct connector for 2.5" onboard drive (removable)[1] • One SATA 6 Gb/s CFast slot by adapter board • Three SATA 3Gb/s to rear IO
Faceplate I/O	• 2x 10/100/1000BASE-T Ethernet ports • 1x DVI-I (RGB switchable to rear) • 3x USB 3.0 ports • 1x RJ-45 RS-232/422/485 port
OS Compatibility	• Microsoft Windows 7 32/64-bit • Red Hat Enterprise Linux 6.2 x86 64-bit • Fedora 16 x86 64-bit • Wind River VxWorks 6.9 BSP • Other OS support on request

Table 2-1: cPCI-6525 Blade Specifications

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Environmental	• Operating Temperature[2]: Standard: 0 to 60°C with forced air flow ETT: -20°C to 70°C with forced air flow (cPCI-ET6525) EX: -40°C to 85°C with forced air flow (Core™ i5-3610ME only) • Storage Temperature: -40°C to 85°C • Humidity: 95% non-condensing • Shock: 15G peak-to-peak, 11ms duration, non-operating • Vibration[3]: Operating 2 Grms, 5-500Hz, each axis w/o hard drive
EMI	• CE EN55022 • FCC Class A

Table 2-1: cPCI-6525 Blade Specifications

Notes:

1. The storage device limits the operational vibration. When application requires higher specification for anti-vibration, it is recommended to use a flash storage device.
2. ADLINK-certified thermal design. The thermal performance is dependent on the chassis cooling design. Sufficient forced airflow is required (see 2.4 "Thermal Requirements"). Temperature limit of optional mass storage devices may affect the thermal specification.

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2.2 I/O Connectivity

	cPCI-6525		RTM[1]
	Faceplate	Onboard	J3/4/5
COM	Y	—	Y x3
VGA	—	—	Y[2]
DVI	Y	—	Y x2
GbE	Y x2	—	Y x2
USB 3.0	Y x3	—	—
USB 2.0	—	—	Y x6
PCIe x16	—	—	Y
2.5” SATA Drive	—	Y	—
CFast	—	Y	—
SATA	—	—	Yx3
User LEDs	Yx4	—	—
General Purpose LEDs	Yx8	—	—
Reset button	Y	—	—

Table 2-2: cPCI-6525 I/O Connectivity

Notes:

1. Signals are passed through to the RTM. Available functions are dependent on the specific RTM selected.
2. Switched from faceplate DVI-I.

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2.3 Power Requirements

In order to guarantee a stable functionality of the system, it is recommended to provide more power than the system requires. **An industrial power supply unit should be able to provide at least twice as much power as the entire system requires of each voltage**. An ATX power supply unit should be able to provide at least three times as much power as the entire system requires of each voltage.

The tolerance of the voltage lines described in the CompactPCI specification (PICMG 2.0 R3.0) is +5%/-3% for 5, 3.3 V and ±5% for ±12V. This specification is for power delivered to each slot and it includes both the power supply and the backplane tolerance.

Voltage	Nominal Value	Tolerance	Max. Ripple (P - P)
5V	+5.0 VDC	+5% / -3%	50 mV
3.3V	+3.3 VDC	+5% / -3%	50 mV
+12V	+12 VDC	+5% / -5%	240 mV
-12V	-12 VDC	+5% / -5%	240 mV
V I/O (PCI I/O Buffer Voltage)	+3.3 VDC or +5 VDC	+5% / -3%	50 mV
GND			

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Power Consumption

This section provides information on the power consumption of the cPCI-6525 when using Intel® Core™ i7 processors with 4GB DDR3-1333 soldered memory and onboard ADLINK ASD25 64GB SATA SSD. Power consumption at 100% CPU usage was measured by running Intel Thermal Analysis Tool 4.3.

Quad-Core Intel® Core™ i7-3615QE, 2.3GHz, TDP 45W

OS / Mode	5V Current (A)	3.3V Current (A)	12V Current (A)	Total Power (W)
DOS / idle	4.48	2.80	0.19	33.9
Win7 / idle	3.34	2.62	0.20	27.7
Win7 / 100% CPU	13.04	2.8	0.21	77.0

Quad-Core Intel® Core™ i7-3612QE, 2.1GHz, TDP 35W

OS / Mode	5V Current (A)	3.3V Current (A)	12V Current (A)	Total Power (W)
DOS / idle	4.30	2.79	0.18	32.9
Win7 / idle	3.30	2.55	0.19	27.2
Win7 / 100% CPU	10.21	2.77	0.20	62.6

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3 Functional Description

The following sections describe the cPCI-6525 features and functions.

3.1 Processors

The 3rd Generation Intel® Core™ i7 Processor is the next generation of 64-bit, multi-core mobile processors built on 22-nanometer process technology. Based on a new micro-architecture, the processor is designed for a two-chip platform. The two-chip platform consists of a processor and Platform Controller Hub (PCH). The platform enables higher performance, lower cost, easier validation, and improved x-y footprint. The processor includes an integrated display engine, processor graphics, integrated memory controller, and integrated I/O on a single silicon die.

Features	Core™ i7-3615QE	Core™ i7-3612QE	Core™ i5-3610ME
Clock	2.3 GHz	2.1 GHz	2.7 GHz
Max. Single Core Turbo Freq.	3.3 GHz	3.1 GHz	3.3 GHz
Last Level Cache	6 MB	6 MB	3 MB
No. of Cores/Threads	4/8	4/8	2/4
Maximum Power (TDP[1])	45 W	35 W	35 W
$T_{junction,MAX}$ [2]	105°C	105°C	105°C
Memory Type	DDR3-1333/1600	DDR3-1333/1600	DDR3-1333/1600

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.

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Supported Technologies

- Intel® Virtualization Technology for Directed I/O (Intel® VT-d)
- Intel® Virtualization Technology (Intel® VT-x)
- Intel® vPro Technology (Intel® VT)
- Intel® Trusted Execution Technology (Intel® TXT)
- Intel® Hyper-Threading Technology
- Intel® 64 Architecture
- Intel® Turbo Boost Technology 2.0
- AES New Instructions
- Intel® My WiFi Technology
- Enhanced Intel SpeedStep® Technology
- Thermal Monitoring Technologies
- Intel® Fast Memory Access
- Execute Disable Bit
- Intel® VT-x with Extended Page Tables (EPT)

Interfaces

- Dual channel DDR3 memory with one channel of unbuffered SODIMM and one channel of soldered SDRAM
- Memory DDR3 data transfer rates of 1333 MT/s and 1600 MT/s
- 64-bit wide channels plus 8-bits of ECC support for each channel
- 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.

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3.2 Chipset

The cPCI-6525 incorporates the Intel® QM77 Platform Controller Hub (PCH).

Intel® QM77 Platform Controller Hub

- PCI Express Base Specification, Revision 2.0 support for up to eight ports with transfer rate up to 5 GT/s
- Supports dual display
- ACPI Power Management Logic Support, Revision 4.0a
- Enhanced DMA controller, interrupt controller, and timer functions
- Integrated Serial ATA host controllers with independent DMA operation on up to six ports and SATA 6.0 Gb/s up to two ports
- Supports USB 2.0, USB 3.0
- USB host interface with two EHCI high-speed USB 2.0 Host controllers and two rate matching hubs provide support for up to fourteen USB 2.0 ports
- Integrated 10/100/1000 Gigabit Ethernet MAC with System Defense
- System Management Bus (SMBus) Specification, Version 2.0 with additional support for I2C devices
- Supports Intel Trusted Execution Technology
- Support vPro Technology
- Support Active Management Technology
- Support AMT Version
- Support Anti-Theft Technology
- Supports Intel® High Definition Audio
- Supports Intel® Rapid Storage Technology
- Supports Intel® Virtualization Technology for Directed I/O
- Low Pin Count (LPC) interface
- Serial Peripheral Interface (SPI) support

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3.3 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.

3.4 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.

3.5 Intel® Active Management Technology

Intel® Active Management Technology (Intel® AMT) is a hardware based technology for remotely managing and securing PCs out-of-band. Intel® AMT includes hardware-based remote management, security, power-management, and remote-configuration features. Intel® AMT allows remote access to a system when traditional techniques and methods are not available.

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3.6 TPM

The cPCI-6525 is equipped with the Infineon ATMEL AT97SC3204 Trusted Platform Module (TPM), a security controller with cryptographic functionality that provides users a secure environment in e-commerce transactions and Internet communications. The key features provided by the TPM are:

- Hardware hash accelerator for SHA-1 algorithm
- Advanced Crypto Engine (ACE) for asymmetric key operations (up to 2048-bit key length) to make hardware protection.
- Tick counter to extend the time required to decipher the key
- Over/Under-voltage detection to monitor the system stability. If the voltage fluctuates dramatically, this function can block the data transfer and lock the chip.
- Low/High frequency sensor to detect the IC clock frequency. If the frequency fluctuates dramatically, this function can block the data transfer and lock the chip.
- Reset filter to filter reset signal in order to break the time set by tick counter is received
- Memory encryption to protect memory
- Physical shield in the IC to protect the die from intruding or hacking by matching the data transferred on the 2 layer metal shield on the IC. If the data is not matched, the IC may be blocked.

3.7 Battery

The cPCI-6525 is provided with a 3.0V “coin cell” lithium battery for the Real Time Clock (RTC). The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

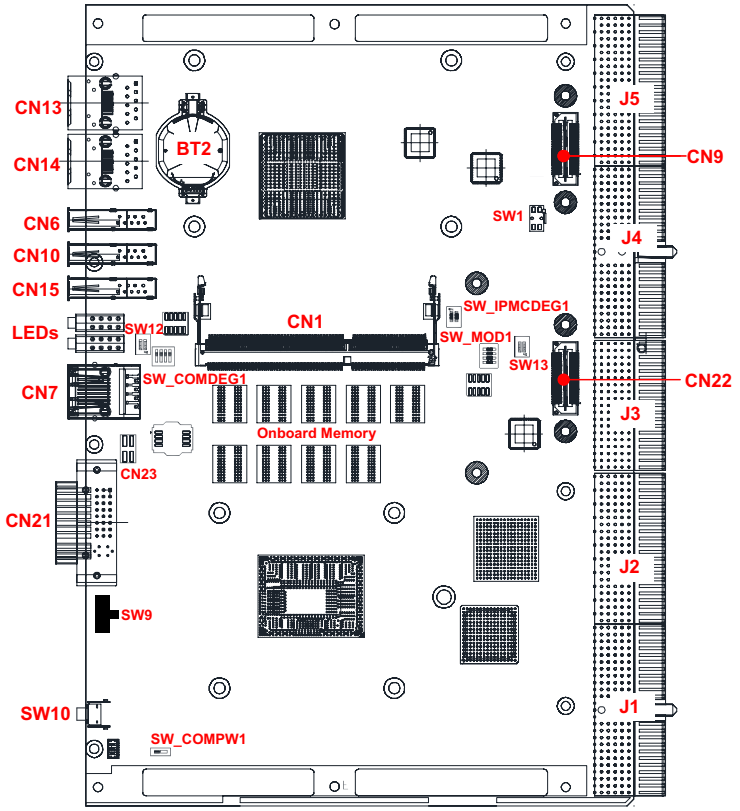
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4 Board Interfaces

4.1 Board Layout - Front



BT2	Battery	**J1-J5**	CompactPCI connectors
CN1	SODIMM Socket	**SW1**	BIOS default button
CN21	DVI-I connector	**SW9**	PCIe x16/x8 jumper
CN7	RS-232/422/485 (COM1)	**SW10**	System reset
CN6/10/15	USB 3.0 ports	**SW12**	COM1 port mode select
CN9	SATA drive connector	**SW13**	COM2 port mode select
CN13/CN14	GbE ports	**SW_COMDEG1**	Reserved for debug
CN21	DVI connector	**SW_IPMCDEG1**	Reserved for debug
CN22	CFast adapter connector	**SW_MOD1**	IPMC mode switch
CN23	BIOS write protect	**SW_COMPW1**	Reserved for debug

Figure 4-1: cPCI-6525 Board Layout - Front

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4.2 Board Layout - Back

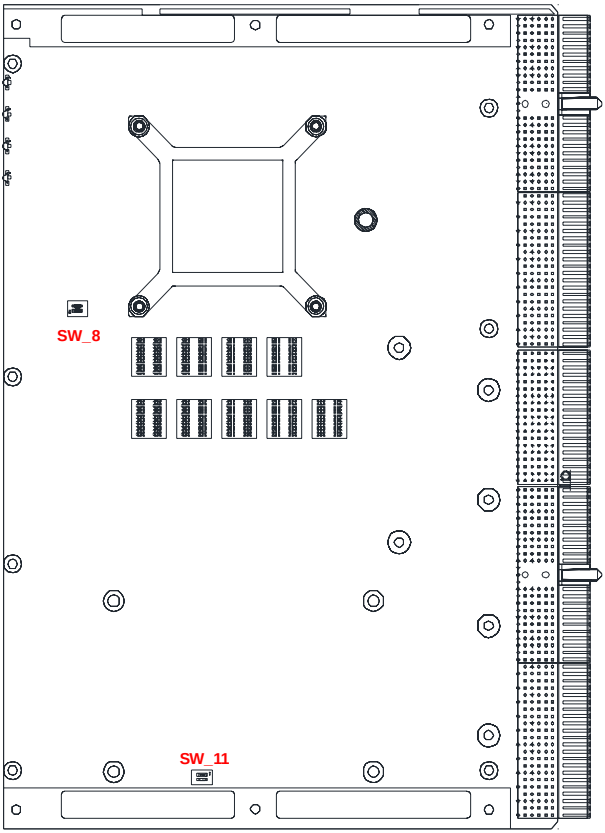


Figure 4-2: cPCI-6525 Board Layout - Back

SW8	VGA to front/rear switch	**SW11**	GbE to front/rear switch

4.3 cPCI-6525 Front Panel

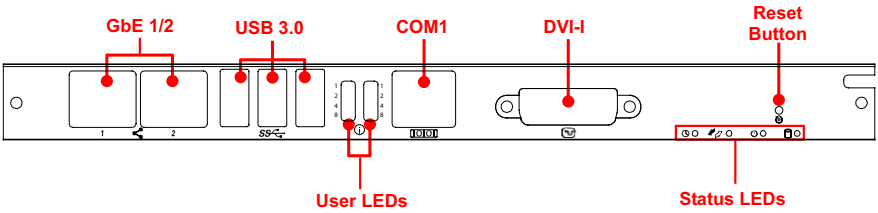


Figure 4-3: cPCI-6525 Front Panel

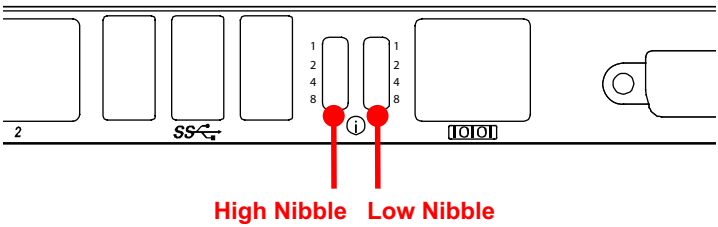
Status LEDs

LED	Color	Condition	Indication
Power	Green	OFF	System is off
		ON	System is on
		Blink	Fail to power on (payload power failure)
HotSwap	Blue	OFF	Handles closed, System is on
		Fast Blink	Preparing to shut down system (LED: 0.1s on, 0.9s off.)
		ON	Handles open and blade ready to be removed
		Slow Blink	Voltages out of tolerance: 3.3V, 5V, 12V, 1.5V over ±5% (LED 2s on, 1s off)
WDT	Red	OFF	No Watchdog event
		ON	Watchdog event alert
HDD	Amber	OFF	No drive activity
		Blink	SATA, CF data read/write in process

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User LEDs

In default mode, these eight LEDs display the POST codes output to Port 80h during system bootup. The table below shows the mapping of the LED display to Port 80h code (see “Checkpoints & Beep Codes” on page 85).



High Nibble (left column)	LED 1	Port 80h bit 4
	LED 2	Port 80h bit 5
	LED 4	Port 80h bit 6
	LED 8	Port 80h bit 7
Low Nibble (right column)	LED 1	Port 80h bit 0
	LED 2	Port 80h bit 1
	LED 4	Port 80h bit 2
	LED 8	Port 80h bit 3

The 2-digit hex value of the Port 80h code can be calculated by adding the numbers of the LEDs that are on for the high and low nibble respectively. For example if LEDs 1 and 2 are on in the left column and LEDs 1 and 8 are on in the right column, the hex value is:

High Nibble = 1 + 2 = 3

Low Nibble = 1 + 8 = 9

Port 80h code = 39h

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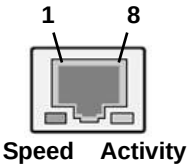
4.4 Connector Pin Assignments

See “Board Layout - Front” on page 19 for connector locations.

Front Panel Connectors

Gigabit Ethernet Connectors (CN13/CN14, RJ-45)

Pin #	GbE Signal
1	LAN_TX0+
2	LAN_TX0-
3	LAN_TX1+
4	LAN_TX2+
5	LAN_TX2-
6	LAN_TX1-
7	LAN_TX3+
8	LAN_TX3+

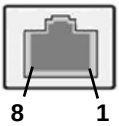


Status		Speed LED (Green/Amber)	Activity LED (Amber)
Network link is not established or system powered off		OFF	OFF
10 Mbps	Link	OFF	ON
	Active	OFF	Blinking
100 Mbps	Link	Green	ON
	Active	Green	Blinking
1000 Mbps	Link	Amber	ON
	Active	Amber	Blinking

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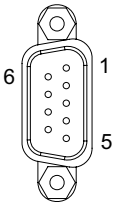
COM1 (CN7, RJ-45)

Pin #	RS-232	RS-422	RS-485
1	DCD#	TX-	Data-
2	RTS#	—	—
3	DSR#	—	—
4	TXD	RX+	—
5	RXD	TX+	Data+
6	GND	—	—
7	CTS#	—	—
8	DTR#L	RX-	—



COM1 RJ-45 to DB-9 Cable

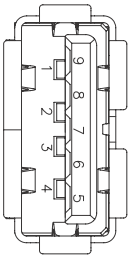
Pin #	RS-232	RS-422	RS-485
1	DCD#	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	—
4	DTR#L	RX-	—
5	GND	—	—
6	DSR#	—	—
7	RTS#	—	—
8	CTS#	—	—
9	—	—	—



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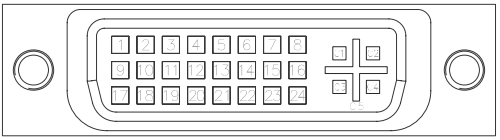
USB 3.0 Connectors (CN6, CN10, CN15)

Pin #	Signal Name
1	VCC
2	Data-
3	Data+
4	GND
5	RX_N
6	RX_P
7	GND
8	TX_N
9	TX_P



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DVI-I Connector (CN21)



Pin #	Signal	Pin #	Signal
1	TMDS Data2-	16	Hot Plug Detect
2	TMDS Data2+	17	TMDS Data0-
3	GND	18	TMDSData0+
4	NC	19	GND
5	NC	20	NC
6	DDC Clock [SCL]*	21	NC
7	DDC Data [SDA]*	22	GND
8	Analog vertical sync*	23	TMDS Clock +
9	TMDS Data1-	24	TMDS Clock -
10	TMDS Data1+	C1	Analog Red*
11	GND	C2	Analog Green*
12	NC	C3	Analog Blue*
13	NC	C4	Analog Horizontal Sync*
14	+5 V Power	C5	Analog GND Return*
15	GND		

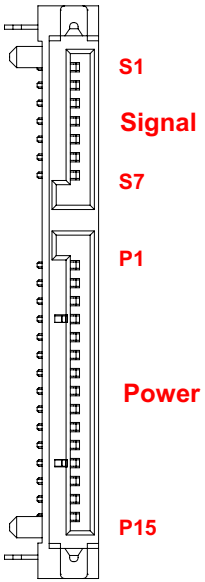
NOTE:

*When VGA is switched to RTM, the VGA signals are not connected (NC).

Onboard Connectors

SATA Connector on DB-LSATA

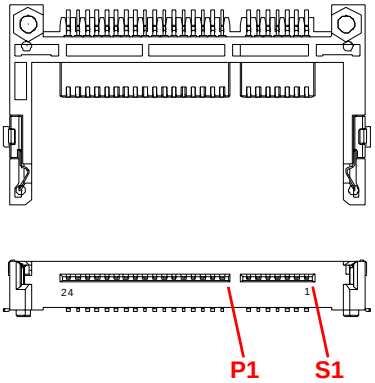
Pin #	Signal
S1	GND
S2	TX+
S3	TX-
S4	GND
S5	RX-
S6	RX+
S7	GND
P1	NC
P2	NC
P3	NC
P4	GND
P5	GND
P6	GND
P7	5V
P8	5V
P9	5V
P10	GND
P11	Reserved
P12	GND
P13~P15	12V



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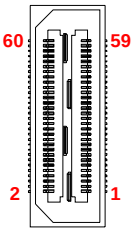
CFast Socket (on DB-CFAST)

Pin #	Signal Name
Ground	S1
SATA_TX-P	S2
SATA_TX-N	S3
Ground	S4
SATA_RX-N	S5
SATA_RX-P	S6
Ground	S7
CFast_CDI	P1
Ground	P2
NC	P3
NC	P4
NC	P5
NC	P6
Ground	P7
CFast_LED1	P8
CFast_LED2	P9
NC	P10
NC	P11
NC	P12
P3V3	P13
P3V3	P14
Ground	P15
Ground	P16
CFast_CDO	P17



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DB-LSATA/DB-CFAST Connector (CN9, CN22)



Signal Name	Pin #	Pin #	Signal Name
GND	1	2	GND
GND	3	4	GND
GND	5	6	GND
GND	7	8	GND
GND	9	10	GND
GND	11	12	GND
GND	13	14	GND
GND	15	16	GND
GND	17	18	GND
GND	19	20	GND
GND	21	22	GND
GND	23	24	GND
GND	25	26	GND
GND	27	28	GND
GND	29	30	GND
P3V3	31	32	P5V
P3V3	33	34	P5V
P3V3	35	36	P5V
P3V3	37	38	P5V
NC	39	40	P12V
CFAST_CDI	41	42	P12V
CFAST_CDO	43	44	P12V
GND	45	46	GND
GND	47	48	SATA_TXN0
GND	49	50	SATA_TXP0
SATA_RXN0	51	52	GND
SATA_RXP0	53	54	GND
GND	55	56	NC
GND	57	58	GND
GND	59	60	GND

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CompactPCI J1 Connector Pin Assignment

Pin	Z	A	B	C	D	E	F
25	GND	+5V	REQ64#	ENUM#	+3.3V	+5V	GND
24	GND	AD1	+5V	V(I/O)	AD0	ACK64#	GND
23	GND	P3V3	CPCI_AD4	CPCI_AD3	P5V	CPCI_AD2	GND
22	GND	CPCI_AD7	GND	P3V3	CPCI_AD6	CPCI_AD5	GND
21	GND	P3V3	CPCI_AD9	CPCI_AD8	CPCI_M66EN	CPCI_CBE-L0	GND
20	GND	CPCI_AD12	GND	VIO	CPCI_AD11	CPCI_AD10	GND
19	GND	P3V3	CPCI_AD15	CPCI_AD14	GND	CPCI_AD13	GND
18	GND	CPCI_SERR-L	GND	P3V3	CPCI_PAR	CPCI_CBE-L1	GND
17	GND	P3V3	IPMB_CLK	IPMB_DAT	GND	CPCI_PERR-L	GND
16	GND	CPCI_DEVSEL-L	GND	VIO	CPCI_STOP-L	CPCI_LOCK-L	GND
15	GND	P3V3	CPCI_FRAME-L	CPCI_IRDY-L	NC	CPCI_TRDY-L	GND
12-14	GND	Key Area					Key
11	GND	CPCI_AD18	CPCI_AD17	CPCI_AD16	GND	CPCI_CBE-L2	GND
10	GND	CPCI_AD21	GND	P3V3	CPCI_AD20	CPCI_AD19	GND
9	GND	CPCI_CBE-L3	NC	CPCI_AD23	GND	I CPCI_AD22	GND
8	GND	CPCI_AD26	GND	VIO	CPCI_AD25	CPCI_AD24	GND
7	GND	CPCI_AD30	CPCI_AD29	CPCI_AD28	GND	CPCI_AD27	GND
6	GND	CPCI_REQ-L0	GND	P3V3	CPCI_CLK0	CPCI_AD31	GND
5	GND	NC	NC	CPCI_RESET-L	GND	CPCI_GNT-L0	GND
4	GND	P5V_IPMB	CPCI_HEALTHY-L	VIO	NC	NC	GND
3	GND	CPCI_IRQA-L	CPCI_IRQB-L	CPCI_IRQC-L	P5V	CPCI_IRQD-L	GND
2	GND	cPCI_TCK-L	P5V	cPCI_TMS-L	NC	cPCI_TDI-L	GND
1	GND	P5V	N12V	cPCI_TRST-L	P12V	P5V	GND

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CompactPCI J2 Connector Pin Assignment

Pin	Z	A	B	C	D	E	F
22	GND	GA4	GA3	GA2	GA1	GA0	GND
21	GND	CLK6	GND	NC	NC	NC	GND
20	GND	CLK5	GND	NC	GND	NC	GND
19	GND	GND	GND	IPMB_DAT	IPMB_CLK	NC	GND
18	GND	NC	NC	NC	GND	NC	GND
17	GND	NC	GND	RSTBTN#	REQ6#	GNT6#	GND
16	GND	NC	NC	DEG#	GND	NC	GND
15	GND	NC	GND	FAL#	REQ5#	GNT5#	GND
14	GND	AD35	AD34	AD33	GND	AD32	GND
13	GND	AD38	GND	V(I/O)	AD37	AD36	GND
12	GND	AD42	AD41	AD40	GND	AD39	GND
11	GND	AD45	GND	V(I/O)	AD44	AD43	GND
10	GND	AD49	AD48	AD47	GND	AD46	GND
9	GND	AD52	GND	V(I/O)	AD51	AD50	GND
8	GND	AD56	AD55	AD54	GND	AD53	GND
7	GND	AD59	GND	V(I/O)	AD58	AD57	GND
6	GND	AD63	AD62	AD61	GND	AD60	GND
5	GND	CBE5#	DEV64#	V(I/O)	CBE4#	PAR64	GND
4	GND	V(I/O)	NC	CBE7#	GND	CBE6#	GND
3	GND	CLK4	GND	GNT3#	REQ4#	GNT4#	GND
2	GND	CLK2	CLK3	SYSEN#	GNT2#	REQ3#	GND
1	GND	CLK1	GND	REQ1#	GNT1#	REQ2#	GND

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CompactPCI J3 Pin Assignment

Pin	Z	A	B	C	D	E	F
19	GND	P5V	P5V	P12V	P5V	P5V	GND
18	GND	LAN4_TXD1+	LAN4_TXD0-	GND	LAN4_TXD2+	LAN4_TXD2-	GND
17	GND	LAN4_TXD1+	LAN4_TXD1-	GND	LAN4_TXD3+	LAN4_TXD3-	GND
16	GND	LAN3_TXD0+	LAN3_TXD0-	GND	LAN3_TXD2+	LAN3_TXD2-	GND
15	GND	LAN3_TXD1+	LAN3_TXD1-	GND	LAN3_TXD3+	LAN3_TXD3-	GND
14	GND	USB-OC45#	USB-OC67#	USB-OC67#	USB-OC89#	USB-OC89#	GND
13	GND	USB8-P	USB8-N	GND	USB9-P	USB9-N	GND
12	GND	USB6-P	USB6-N	GND	USB7-P	USB7-N	GND
11	GND	USB4P	USB4-N-	GND	USB5-P	USB5-N	GND
10	GND	USB-OC45#	RGB-DDCCLK*	RGB-DDCDAT*	RGB-HSYNC*	RGB-VSYNC*	GND
9	GND	COM2-CTS#	COM2-RI#	RGB-BLUE*	RGB-RED*	RGB-GREEN*	GND
8	GND	COM2-RX	COM2-TX	COM2-DTR#	COM2-DSR#	COM2-RTS#	GND
7	GND	SATALED-L	PWRLED-L	COM2-DCD#	IPMB_CLK	IPMB_DAT	GND
6	GND	SATA-RX1+	SATA-RX1-	GND	SATA-RX0+	SATA-RX0-	GND
5	GND	GND	GND	NC	GND	GND	GND
4	GND	SATA-TX1+	SATA-TX1-	GND	SATA-TX0+	SATA-TX0-	GND
3	GND	KBDATA	KBCLK	NC	MSDATA	MSCLK	GND
2	GND	HDA_SDIN1	HDA_SDIN2	NC	HDA_DOCK_EN#	HAD_DOCK_RST#	GND
1	GND	HDA_RST#	HDA_SYNC	HDA_BIT_CLK	HDA_SDOUT	HDA_SDIN0	GND

NOTE:

*****VGA (“RGB”) signals are only available when switched to RTM and are not connected (NC) when VGA is routed to the front panel. See “VGA to Front/Rear Switch (SW8)” on page 37.

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CompactPCI J4 Connector Pin Assignment

Pin	Z	A	B	C	D	E	F
25	GND	NC	PCIE_TXP15	GND	PLTRST _PCIEX16	PCIE_WAKE-L	GND
24	GND	GND	PCIE_TXN15	PCIE_RXP13	NC	GND	GND
23	GND	PCIE_TXP13	GND	PCIE_RXN13	GND	PCIE_RXP15	GND
22	GND	PCIE_TXN13	PCIE_TXP14	GND	PCIE_RXP14	PCIE_RXN15	GND
21	GND	GND	PCIE_TXN14	PCIE_TXP12	PCIE_RXN14	GND	GND
20	GND	PCIE_TXP10	GND	PCIE_TXN12	GND	PCIE_RXP12	GND
19	GND	PCIE_TXN10	PCIE_TXP11	GND	PCIE_RXP10	PCIE_RXN12	GND
18	GND	GND	PCIE_TXN11	PCIE_RXP8	PCIE_RXN10	GND	GND
17	GND	PCIE_TXP8	GND	PCIE_RXN8	GND	PCIE_RXP11	GND
16	GND	PCIE_TXN8	PCIE_TXP9	GND	PCIE_RXP9	PCIE_RXN11	GND
15	GND	GND	PCIE_TXN9	GND	PCIE_CPU _RXN9	GND	GND
12-14	GND	Key Area					Key
11	GND	SMB_CLK_PCH	PCIE_CPU _TXP7	GND	PCIE_CPU _RXP7	SMB_DATA _PCH	GND
10	GND	GND	PCIE_TXN7	CLK_PCIE-P	PCIE_RXN7	GND	GND
9	GND	PCIE_TXP5	GND	CLK_CPIE-N	GND	PCIE_RXP6	GND
8	GND	PCIE_TXN5	PCIE_TXP6	GND	PCIE_RXP5	PCIE_RXN6	GND
7	GND	GND	PCIE_TXN6	PCIE_RXP4	PCIE_RXN5	GND	GND
6	GND	PCIE_TXP2	GND	PCIE_RXN4	GND	PCIE_RXP3	GND
5	GND	PCIE_TXN2	PCIE_TXP3	NC	PCIE_RXP2	PCIE_RXN3	GND
4	GND	GND	PCIE_TXN3	PCIE_TXP4	PCIE_RXN2	GND	GND
3	GND	PCIE_RXP1	GND	PCIE_TXN4	GND	PCIE_TXP0	GND
2	GND	PCIE_RXN1	PCIE_RXP0	GND	PCIE_TXP1	PCIE_TXN0	GND
1	GND	GND	PCIE_RXN0	GND	PCIE_TXN1	GND	GND



The J4 pin-out is assigned for PCIe x16. The J4 PCIe x16 pin assignment is not compatible with the PICMG 2.5 R1.0 Computer Telephony Specification. Therefore, do not insert the cPCI-6525 into the peripheral slot of a PICMG 2.5 H.110 compliant backplane in order to avoid causing serious damage to the cPCI-6525.

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CompactPCI J5 Pin Assignment

Pin	Z	A	B	C	D	E	F
22	GND	LAN2_TXDP0	LAN2_TXDN0	GND	LAN2_TXDP2	LAN2_TXDN2	GND
21	GND	LAN2_TXDP1	LAN2_TXDN1	GND	LAN2_TXDP3	LAN2_TXDN3	GND
20	GND	LAN1_TXDP0	LAN1_TXDN0	GND	LAN1_TXDP2	LAN1_TXDN2	GND
19	GND	LAN1_TXDP1	LAN1_TXDN1	GND	LAN1_TXDP3	LAN1_TXDN3-	GND
18	GND	TMDSD_CLK+	TMDSD_CLK-	GND	GND	GND	GND
17	GND	TMDSD_DATA1+	TMDSD_DATA1-	GND	COM5_TX	COM5_RX	GND
16	GND	DVI_SDA_D	DVI_SCL_D	DVI_HPD_D	GND	GND	GND
15	GND	TMDSD_DATA2+	TMDSD_DATA2-	GND	SATA-RX2+	SATA-RX2-	GND
14	GND	TMDSD_DATA0+	TMDSD_DATA0-	GND	SATA-TX2+	SATA-TX2-	GND
13	GND	LAN3_LED_100L	LAN4_LED_100-L	NC	LAN4_LED__1G-L	LAN3_LED_1G-L	GND
12	GND	DVI_DATA	DVI_CLK	DVI_HTPLG	BLUELED_CN	WDTLED-L	GND
11	GND	TMDSB_DATA2+	TMDSB_DATA2-	GND	TMDSB_CLK+	TMDSB_CLK-	GND
10	GND	TMDSB_DATA0+	TMDSB_DATA0-	GND	TMDSB_DATA1+	TMDSB_DATA1-	GND
9	GND	GPIO1	GPIO2	GPIO3	GPIO4	GPIO5	GND
8	GND	LAN3_LED_ACT-L	P1V9_LAN3	LAN4_LED_ACT-L	P1V9_LAN4	COM3_RX	GND
7	GND	GND	GND	RTC	GND	GND	GND
6	GND	PCIE-CLK+	PCIE-CLK-	GND	RESET#	COM3_TX	GND
5	GND	GND	GND	GND	GND	GND	GND
4	GND	PCIE-TX8+	PCIE-TX8-	GND	PCIE-RX8+	PCIE-RX8-	GND
3	GND	PCIE-TX7+	PCIE-TX7-	GND	PCIE-RX7+	PCIE-RX7-	GND
2	GND	PCIE-TX6+	PCIE-TX6-	GND	PCIE-RX6+	PCIE-RX6-	GND
1	GND	PCIE-TX5+	PCIE-TX5-	GND	PCIE-RX5+	PCIE-RX5-	GND

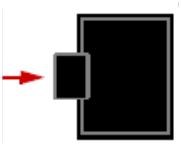
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4.5 Buttons, Switches and Jumpers

See “cPCI-6525 Front Panel” on page 21 and “Board Layout - Front” on page 19 for switch locations.

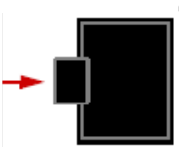
System Reset Button

The cPCI-6525 has a system reset button on the front panel. See “cPCI-6525 Front Panel” on page 21 for the button location.



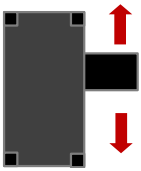
Load BIOS Default Button (SW1)

Press switch SW1 to load the default BIOS settings.



PCIe x16/x8 Selection Switch (SW9)

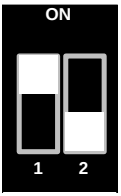
Switch SW9 sets the PCI Express signals on J4 to PCIe x16 (UP, default) or 2x PCIe x8 (DOWN).



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COM1 Mode Switch (SW12)

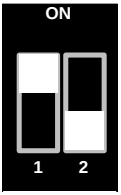
Switch SW12 sets the mode of the COM1 port on the front panel.



Mode	1	2
RS-232 (default)	ON	OFF
RS-422	ON	ON
RS-485	OFF	ON

COM2 Mode Switch (SW13)

Switch SW13 sets the mode of the COM2 port routed to rear J3.

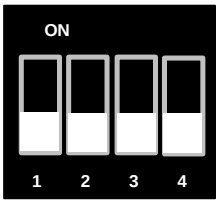


Mode	1	2
RS-232 (default)	ON	OFF
RS-422	ON	ON
RS-485	OFF	ON

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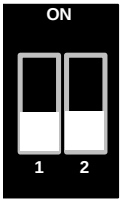
IPMC Mode Switch (SW_MOD1)

Switch SW_MOD1 is a multi purpose switch that allows users to define the blade operating mode. All are set to OFF by default.



Pin#	Status	Description
1	OFF	Reserved (leave set to OFF)
2	OFF	When the system does not include a Chassis Management Module (CMM), set this pin to OFF to allow IPMI to run in "without CMM mode" (default).
	ON	When the system includes a CMM, set this pin to ON to allow IPMI to run in "with CMM mode".
3	OFF	Reserved (leave set to OFF)
4	OFF	The power on/off is state is controlled by the ejector handle state. Do not change the default setting (OFF).
	ON	Force the ejector handle state to "closed".

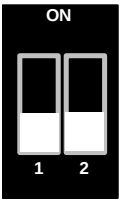
VGA to Front/Rear Switch (SW8)



Pin#	Status	Description
1	OFF	RGB to front (default)
	ON	RGB to rear
2	OFF	Normal (default)
	ON	Debug

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GbE to Front/Rear Switch (SW11)



Pin#	Status	Description
1	OFF	GbE1 to rear
	ON	GbE1 to front (default)
2	OFF	GbE2 to rear
	ON	GbE2 to front (default)

Reserved Switches

Switches SW_COMDEG1 and SW_IPMCDEG1 are reserved and their settings should not be altered unless instructed by ADLINK. The default settings are as follows:

SW_COMDEG1: 1, 2 ON; 3, 4 OFF

SW_IPMCDEG1: All OFF

SW_COMPW1: ON (short 2-3)

BIOS Write Protection Jumper (CN23)

Mode	Jumper Setting
No BIOS protection	Pins 1-2 shorted
BIOS protections	Pins 3-4 shorted

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5 Getting Started

This chapter describes the installation of the following components to the cPCI-6525 and rear transition modules:

- 2.5” SATA drive
- CFast card

5.1 CPU and Heatsink

The cPCI-6525 comes with CPU(s) and heatsink pre-installed. Removal of heatsink/CPU by users is not recommended. Please contact your ADLINK service representative for assistance.

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5.2 SATA Drive Installation

The cPCI-6525 provides space to install a slim type 2.5” SATA drive.

Installing a SATA Drive - cPCI-6525

1. Locate the LB-LSATA daughter board in the package and connect it to slim type 2.5"drive.



2. Find the drive bracket in the package and orient the drive and bracket as shown below.



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3. Secure the drive to the bracket by fastening the four screws provided in the package in the locations marked below.

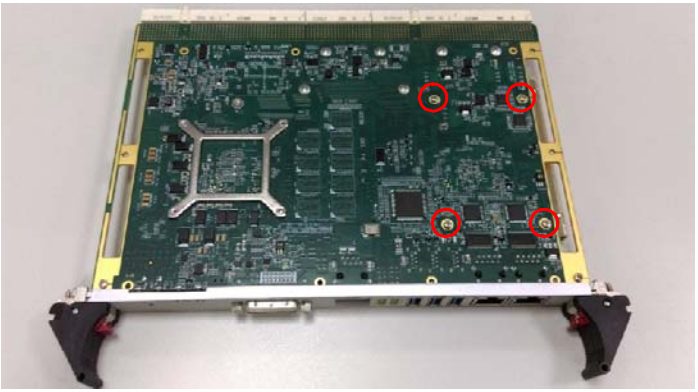


4. Align and assemble the connector on the DB-LSATA to onboard SATA connector (CN9) by fastening two screws marked as below.



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5. Turn the blade over and secure four screws marked as below.



6. The SATA drive installation is now complete.

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5.3 CFast Card installation

The cPCI-6525 provides space to install a CFast card. The installation instructions are as follows.

1. Prepare a CFast adapter board included with the cPCI-6525 and insert a CFast card into the socket.



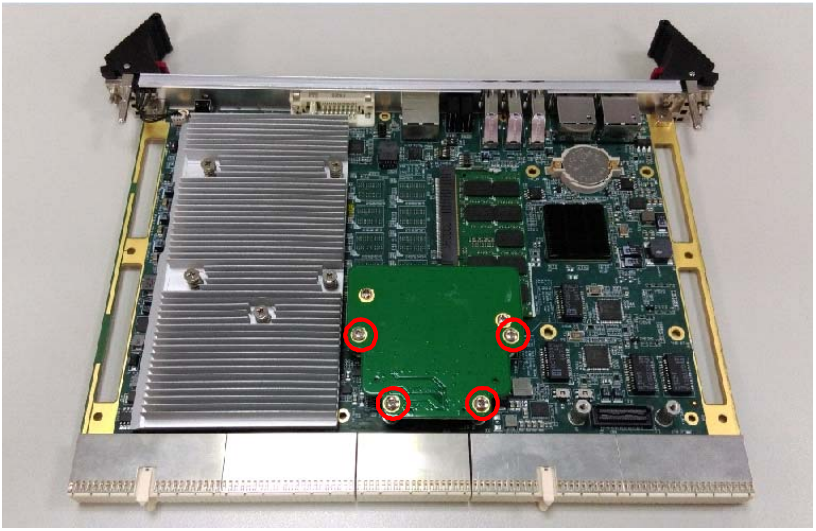
2. Align and insert the CFast card into the CFast adapter board.





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3. Turn the CFast adapter assembly over so that the card is face down. Align the CFast adapter to the onboard connector (CN22) and press down until it is properly seated. Secure the CFast adapter with four screws as shown below.



4. The CFast card installation is now complete.

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6 Driver Installation

The cPCI-6525 drivers are available from the ADLINK website (**http://www.adlinktech.com**). ADLINK provides validated drivers for Windows XP Professional and Windows 7. We recommend using these drivers to ensure compatibility. The VxWorks BSP can also be downloaded from the cPCI-6525 product page on the ADLINK website.

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 Device Software_AllOS_ 9.3.0.1020.zip**.
3. Install the Microsoft .Net Framework by extracting and running the program in **Microsoft_Net_Framework_ All_WinOS_4.0.rar**.
4. Install the graphics driver and utilities by extracting and running the program in **Intel_HD_Graphics_Family_ WIN7_64_ 15.26.9.64.2712.zip**.
5. Install the LAN driver by extracting and running the program in **Intel_82574L_Gigabit Network_Connection_ Win7_64_12.7.27.0.exe**.
6. Install the Rapid Storage Technology Interface by extracting and running the program in **Intel_Rapid Storage Technology_All_WinOS_v8.7.0.1007.zip**.
7. Install the USB 3.0 driver by extracting and running the program in **Intel_USB 3.0 eXtensible Host Controller Driver 1.0.4.225.zip**.
8. Install the AHCI/RAID driver by extracting and running the program in **Intel_RST Driver Files_F6 Install_ 64bit_10.1.0.1006.zip**.
9. Install the audio drivers and utility by extracting and running the program in **Realtek_High Definition Audio_ Win7_32_6.0.1.6602.rar**.

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10. Install the Intel Management Engine Interface driver for iAMT support by extracting and running the program in **Intel_Management Engine Interface_AllOS__ 8.0.10.1464.zip**.

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7 Utilities

7.1 Watchdog Timer

This section describes the operation of the cPCI-6525's watchdog timer (WDT). The primary function of the WDT is to monitor the cPCI-6525'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
- reloading timeout value

The cPCI-6525 custom WDT circuit is implemented using the internal IO of the Nuvoton Super I/O NCT6106D which is at 2Eh of LPC. The basic functions of the WDT include:

- Starting the timer countdown
- Enabling or disabling WDT
- Enabling or disabling WDT countdown LED ON
- Reloading the timeout value to keep the watchdog from timing out
- Setting the range of the timeout period from 1 to 15300 seconds
- Sending a RESET signal to the system when the watchdog times out

Using the Watchdog in an Application

The following section describes using the WDT functions in an application. The WDT reset function is explained in the previous section. This can be controlled through the registers in the cPCI-6525's SuperIO.

An application using the reset feature enables the watchdog function, sets the count-down period, and reloads 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.

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Sample Code

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

```
#include<stdio.h>
#include<stdlib.h>
#include<dos.h>
#include<conio.h>//input output function

#define NCT6106D_CONFIG_MODE_ENTER_VALUE 0x87
#define NCT6106D_LDN_SEL_REGISTER 0x07
#define NCT6106D_LDN_GPIO_WDT 0x08
#define NCT6106D_ACTIVATE_REGISTER 0x30
#define NCT6106D_LDN_GPIO 0x07


int main(int argc, char *argv[])
{
    int registerValue;
    int tempCount;
    int countValue = atol(argv[1]);
    int ID;
    int NCT6106D_CONFIG_INDEX = 0x4E;
    int NCT6106D_CONFIG_DATA =  0x4F;

    if(argc > 2)
    {
        printf("Please enter only one value in
     seconds!!\n");
        return 0;
    }
    if(countValue < 1)
    {
        printf("Please enter value > 0 in seconds!!\n");
        return 0;
    }
    //Enter NCT6106D

     outp(NCT6106D_CONFIG_INDEX,NCT6106D_CONFIG_MODE_ENT
     ER_VALUE);
```

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```
 outp(NCT6106D_CONFIG_INDEX,NCT6106D_CONFIG_MODE_ENT
 ER_VALUE);

outp(NCT6106D_CONFIG_INDEX,0x20);
ID=inp(NCT6106D_CONFIG_DATA);

if(ID==0xFF)
{
    NCT6106D_CONFIG_INDEX = 0x4E;
    NCT6106D_CONFIG_DATA = 0x4F;

    //Enter NCT6106D again with 4E

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_CONFIG_MODE_ENT
 ER_VALUE);

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_CONFIG_MODE_ENT
 ER_VALUE);

    outp(NCT6106D_CONFIG_INDEX,0x20);
    ID=inp(NCT6106D_CONFIG_DATA);

    if(ID==0xFF)
    {
        printf("Not found NCT6106D!.\n", tempCount);
        return 0;
    }

}

//Select WDT

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_LDN_SEL_REGISTE
 R);
outp(NCT6106D_CONFIG_DATA,NCT6106D_LDN_GPIO_WDT);

//Activate WDT

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_ACTIVATE_REGIST
 ER);
outp(NCT6106D_CONFIG_DATA,0x01);
```

```
if (countValue > 255)
{

    //WDT Minute Mode
    outp(NCT6106D_CONFIG_INDEX,0xF0);
    outp(NCT6106D_CONFIG_DATA,0x08);

    tempCount = countValue / 60;
    if((countValue %60) > 30)
        tempCount++;
    if(tempCount > 255)
        tempCount = 255;

   printf("WDT timeout in %d minutes.\n", tempCount);
    outp(NCT6106D_CONFIG_INDEX,0xF1);
    outp(NCT6106D_CONFIG_DATA,tempCount);
}
else
{
    //WDT Second Mode

    outp(NCT6106D_CONFIG_INDEX,0xF0);
    outp(NCT6106D_CONFIG_DATA,0x00);

    printf("WDT timeout in %d seconds.\n",
 countValue);
    outp(NCT6106D_CONFIG_INDEX,0xF1);
    outp(NCT6106D_CONFIG_DATA,countValue);
}

       //WatchDog LED on/off program
       //select GPIO port

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_LDN_SEL_REGISTE
 R);
outp(NCT6106D_CONFIG_DATA,NCT6106D_LDN_GPIO);

//Activate GPIO port 4

 outp(NCT6106D_CONFIG_INDEX,NCT6106D_ACTIVATE_REGIST
 ER);
registerValue = (inp(NCT6106D_CONFIG_DATA) | 0x10);
```

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```
     outp(NCT6106D_CONFIG_INDEX,NCT6106D_ACTIVATE_REGIST
     ER);
    outp(NCT6106D_CONFIG_DATA,registerValue);

    //set GPIO46 to GPO
          outp(NCT6106D_CONFIG_INDEX,0xF0);
    registerValue = (inp(NCT6106D_CONFIG_DATA) & 0xBF);
    outp(NCT6106D_CONFIG_INDEX,0xF0);
    outp(NCT6106D_CONFIG_DATA,registerValue);

    //output as low to GPO46
    outp(NCT6106D_CONFIG_INDEX,0xF1);
    registerValue = (inp(NCT6106D_CONFIG_DATA) & 0xBF);
    outp(NCT6106D_CONFIG_INDEX,0xF1);
    outp(NCT6106D_CONFIG_DATA,registerValue);
}
```

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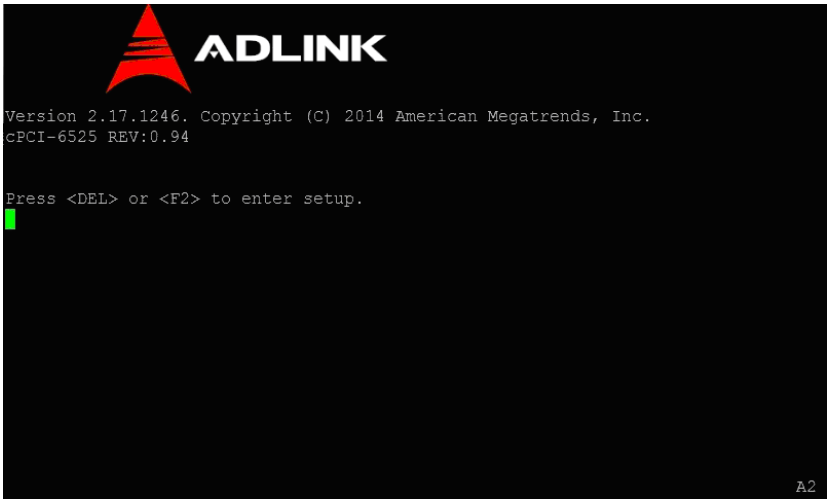
8 BIOS Setup

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, such as Chipset and Power menus.



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 >. Press the < F7 > key for the BBS POP up Menu.

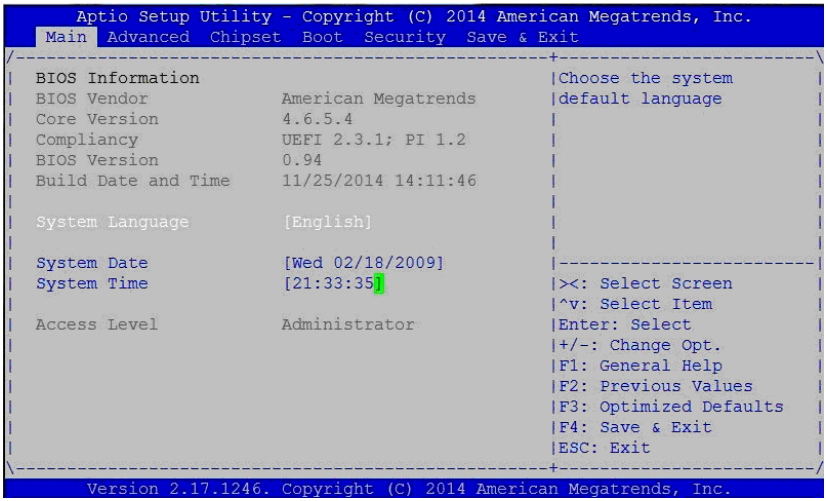
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Setup Menu

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.

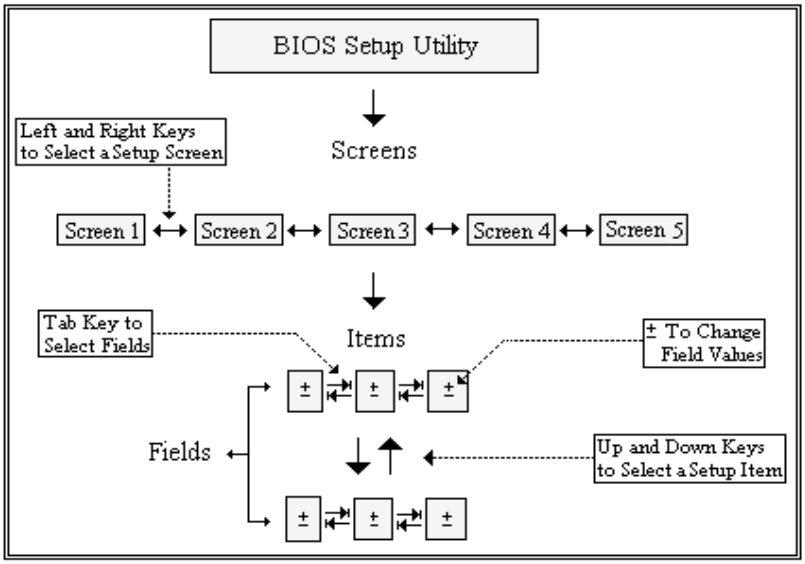
The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.



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.

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

Keyboard Commands

Enter Selects the highlighted option or submenu.

< > The *Left* and *Right* "Arrow" keys allow you to select a setup screen.

^ v The *Up* and *Down* "Arrow" keys allow you to select a setup screen.

+ - The *Plus* and *Minus* keys allow you to change the field value of a particular setup item.

Tab Moves the cursor to the next configurable item or to the next field.

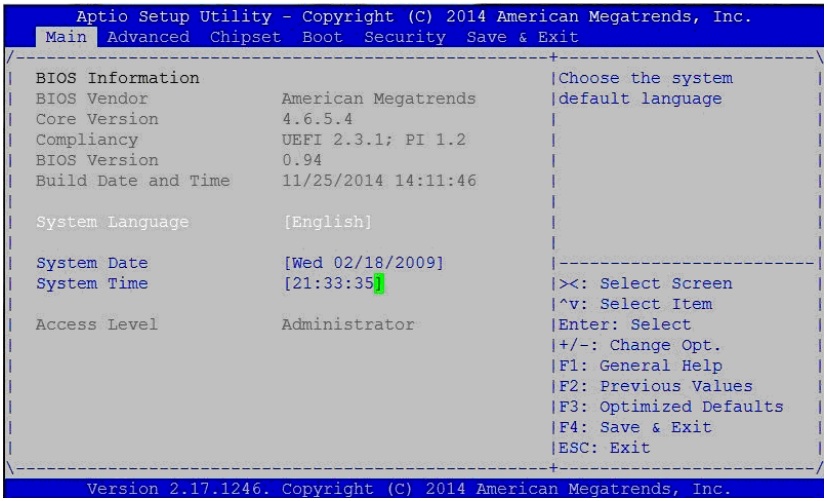
Esc The *Esc* key allows you to discard any changes you have made and exit the Setup menu. Press the *Esc* key to exit the Setup menu without saving your changes. Press the *Enter* key to discard changes and exit. You can also use the "Arrow" keys to select Cancel and then press the *Enter* key to abort this function and return to the previous screen.

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

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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. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



System Language

Choose the system default 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.

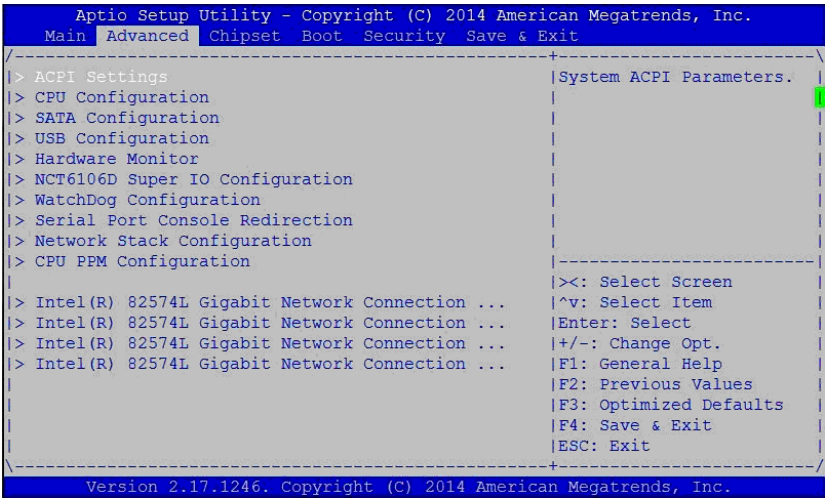
NOTE: The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

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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.

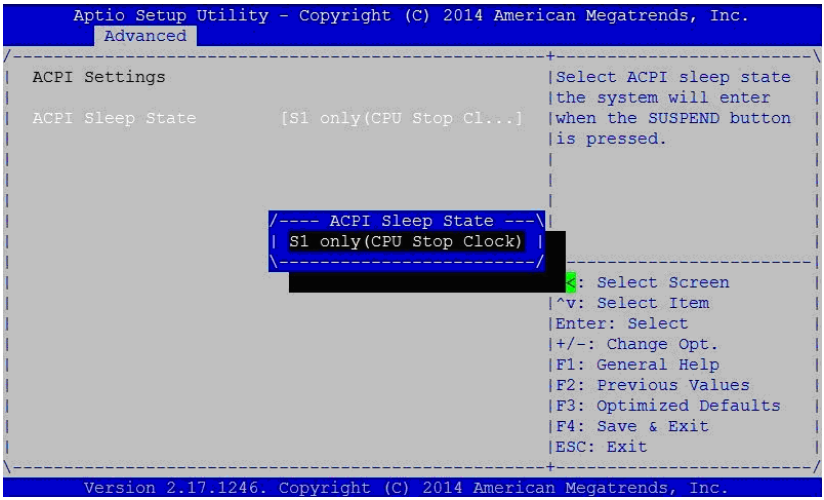
The sub menus are described on the following pages.



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8.3.1 ACPI Settings

You can use this screen to select options for the ACPI Advanced Configuration 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 this page. The screen is shown below.



ACPI Sleep State

Select the highest ACPI sleep state the system will enter, when the SUSPEND button is pressed. Set this value to S1 only, Suspend Disable.

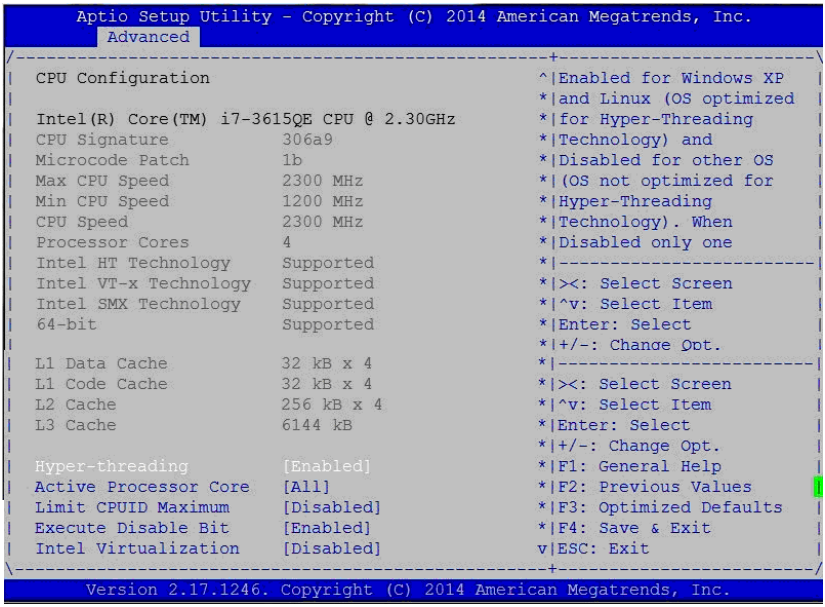
S1 only (CPU Stop Clock)

Power On Suspend - Under this setting the CPU is not executing instructions, all power resources that supply system level reference of S0 are off, system memory context is maintained, devices that reference power resources that are on are on, and devices that can wake-up the system can cause the CPU to continue to execute from where it left off.

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8.3.2 CPU Configuration

You can use this screen to select options for the CPU Configuration 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. An example of the CPU Configuration screen is shown below.



Hyper-Threading

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

Active Processor Cores

Number of cores to enable in each processor package. Options: All, 1, 2, 3, 4.

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Limit CPUID Maximum

Disable for Windows XP.

Execute-Disable Bit

Intel's Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system. Execute Disable Bit allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempt to insert code in the buffer, the processor disables code execution, preventing damage and worm propagation.

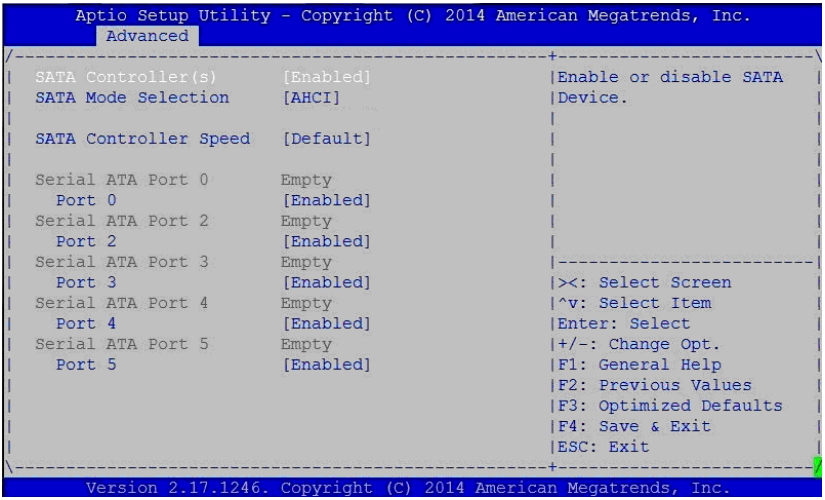
Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology. Set this value to Enabled/Disabled.

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8.3.3 SATA Configuration

You can use this screen to select options for the SATA Configuration Settings. An example of the SATA Configuration screen is shown below.



SATA Controller(s)

Enable or disable SATA device.

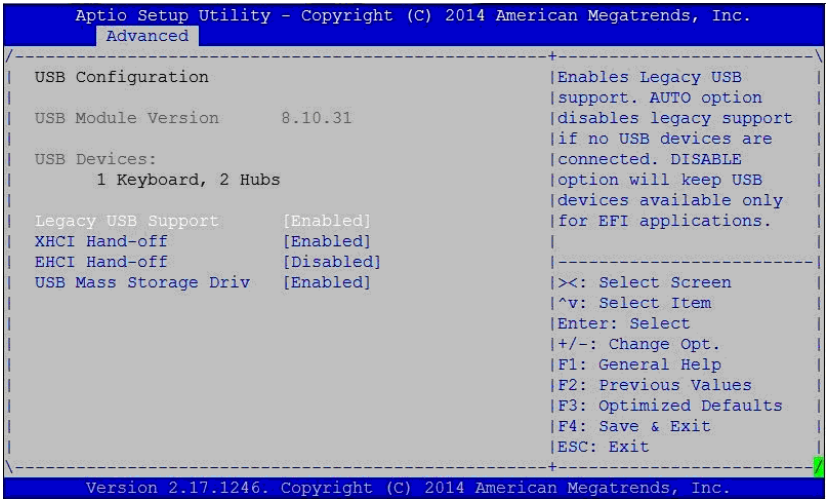
SATA Mode Selection

Configure the SATA mode.

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8.3.4 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. 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. Set this value to Enabled/Disabled/Auto.

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver. Set this value to Enabled/Disabled.

EHCI Hand-off

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by the EHCI driver. Set this value to Enabled/Disabled.

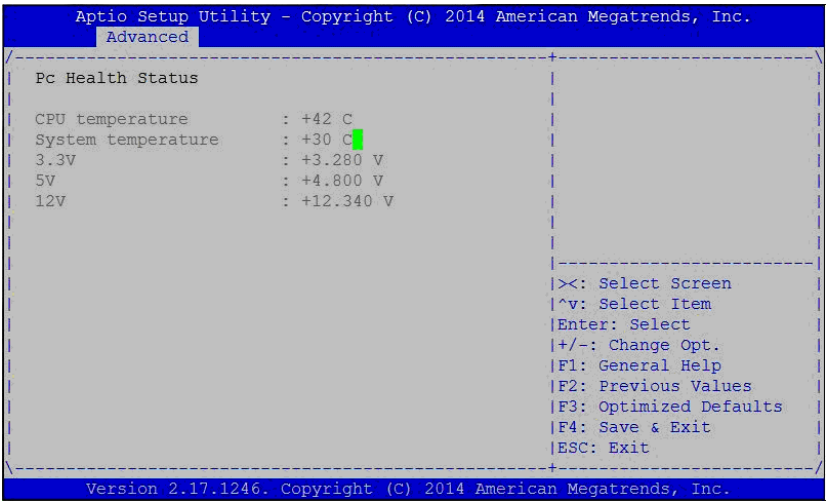
USB Mass Storage Driver Support

Enable/Disable USB mass storage driver support.

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8.3.5 Hardware Monitor

This option displays the current status of all of the monitored hardware devices/components such as voltages and temperatures.



CPU Temperature

Displays current CPU temperature.

System Temperature

Displays current system temperature.

3.3V

Displays current system 3.3V voltage.

5V

Displays current system 5V voltage.

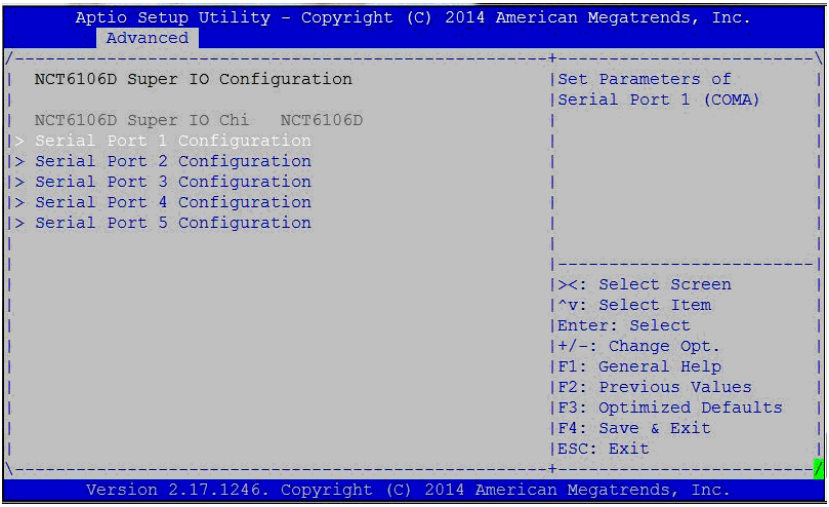
12V

Displays current system 12V voltage.

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8.3.6 Super IO Configuration

You can use this screen to select options for the Super IO settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



Serial Port 1, 2, 3, 4 Configuration

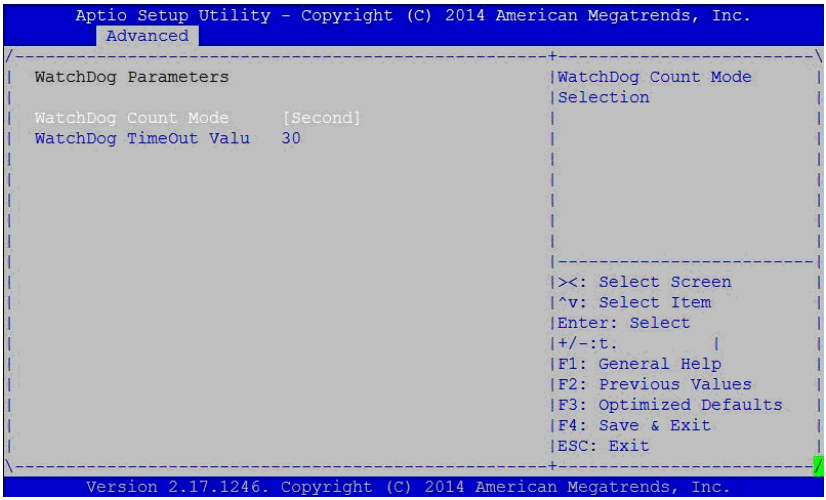
Sub-menus allow you to Enabled/Disabled and set the parameters of Serial Ports 1, 2, 3, 4.

- Serial Port 1 Configuration (Front Panel)
- Serial Port 2 Configuration (RTM)
- Serial Port 3 Configuration (RTM)
- Serial Port 4 Configuration (IPMI)

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8.3.7 WatchDog Configuration

Use this screen to set the system watchdog parameters.



WatchDog Count Mode

WatchDog Count Mode Selection: Seconds or Minutes.

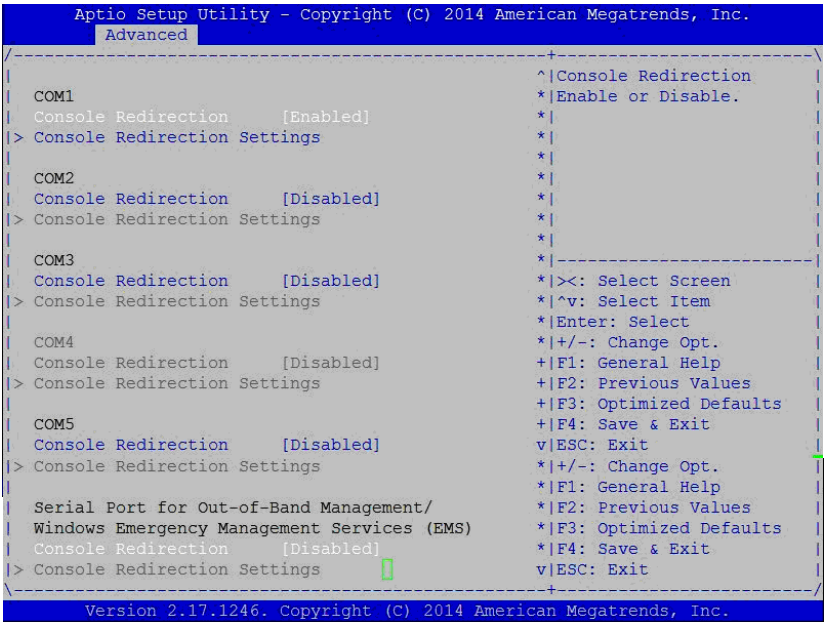
WatchDog TimeOut Value

WatchDog Timeout Value; 30 means disabled.

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8.3.8 Serial Port Console Redirection

You can use this screen to select options for the serial port console redirection 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. An example of the Serial Port Console Redirection screen is shown below.



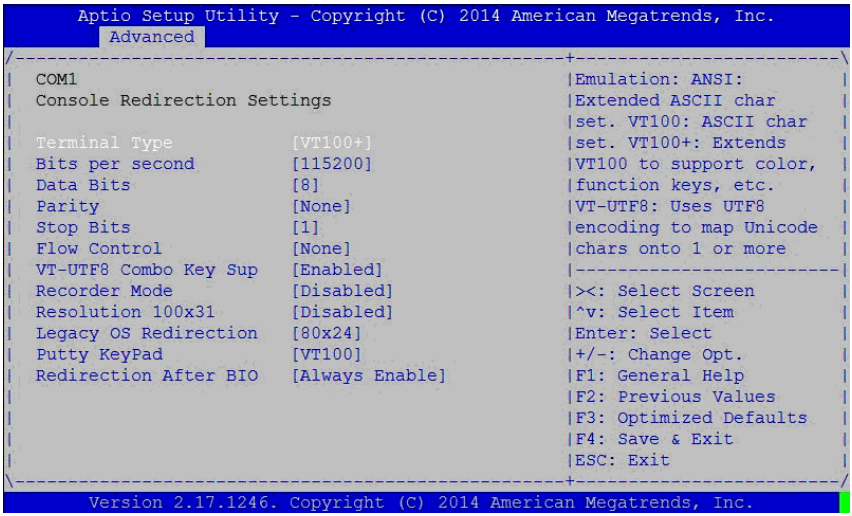
Console Redirection

Set this value to Enabled/Disabled.

Console Redirection Settings

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

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Terminal Type

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. Options: VT100, VT100+, VT-UTF8, ASNI (default).

Bits per second

Select the bits per second you want the serial port to use for console redirection. The options are 115200 (default), 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.

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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. 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. Software flow control uses start/stop ASCII chars, which slows down the data flow and can be problematic if binary data is being sent.

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.

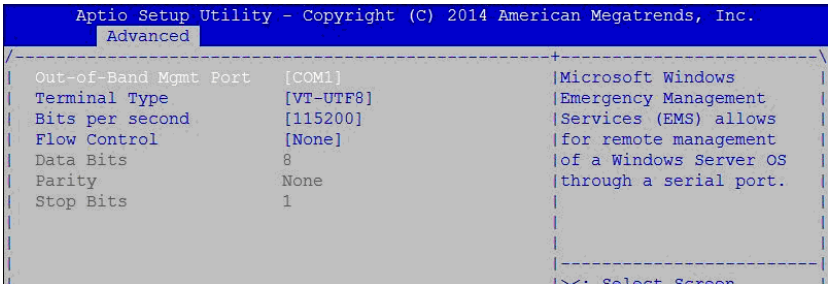
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Redirection After BIOS POST

The Settings specify if BootLoader is selected than Legacy console redirection is disabled before booting to Legacy OS. Default value is Always Enable which means Legaacy console Redirection is enabled for Legacy OS.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

The following functions control the presence and content of the ACPI serial port redirection table (SPCR). This table is mainly used by the Windows server variants to provide Windows Emergency Management Services (EMS). This functionality is totally independent from serial redirection of other console output. OoB Management or EMS makes it possible to control selected components of (Windows) servers, even when a server is not connected to the network or the network is not available. In short: EMS allows for remote management of a Windows Server OS through a serial port.



Out-of-Band Mgmt Port

Microsoft Windows emergency management services (EMS) allows for remote management of a Windows Server OS through a serial port. Set this value to COM0, COM1, COM2 (Disabled), COM3 (Disabled)

Terminal Type

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more

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Help with Terminal Type/Emulation. Configuration options: VT100, VT100+, VT-UTF8, ASNI.

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.

Flow Control

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

Data Bits

This is a display-only function providing information about the frame width for the Out-of-Band Management.

Parity

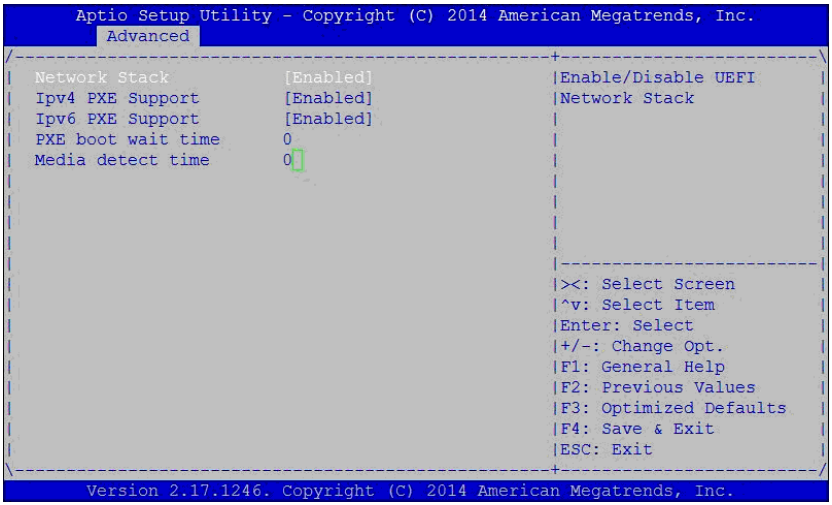
This is a display-only function providing information about the parity for Out-of-Band Management.

Stop Bits

This is a display-only function providing information about the number of stop bits for Out-of-Band Management.

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8.3.9 Network Stack Configuration



Network Stack

Enable/Disable UEFI Network Stack.

Ipv4 PXE Support

Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.

Ipv6 PXE Support

Enable 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.

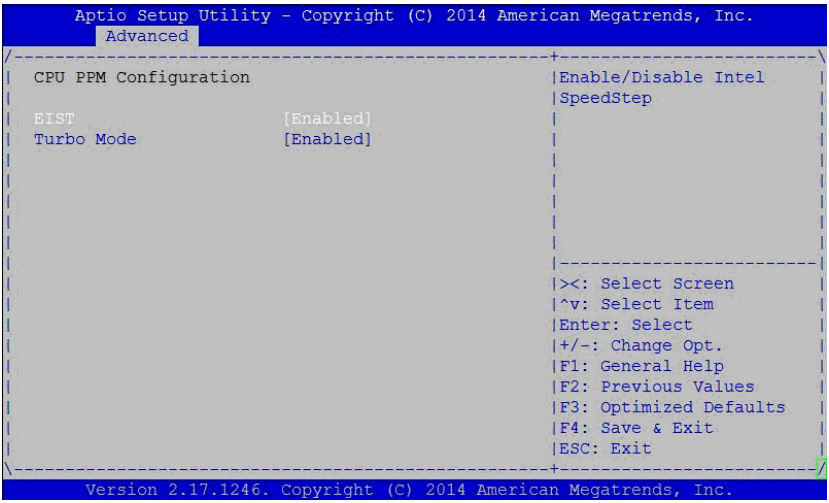
Media Detect Time

Wait time in sec to detect media.

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8.3.10 CPU PPM Configuration

Processor Power Module (PPM) configuration parameters.



EIST

Enable or disable Intel SpeedStep. Set this value to Enabled/ Disabled.

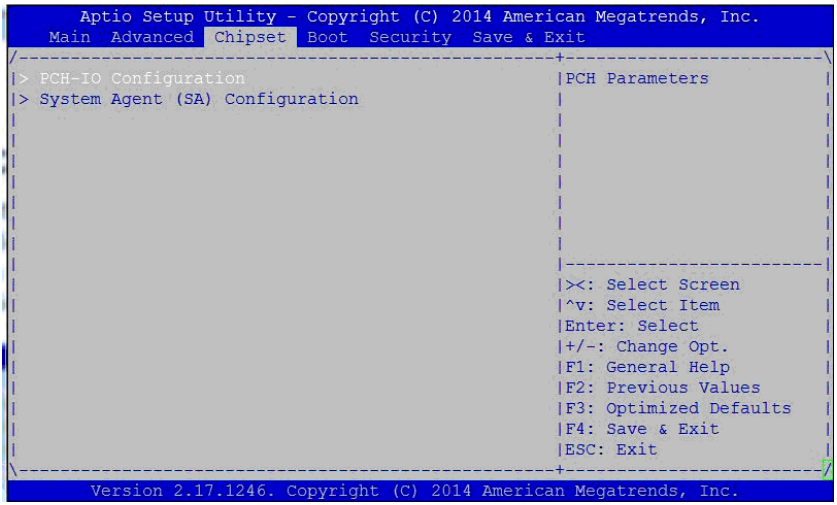
Turbo Mode

Set this option to enable or disable turbo mode . Set this value to CPU C7 Report.

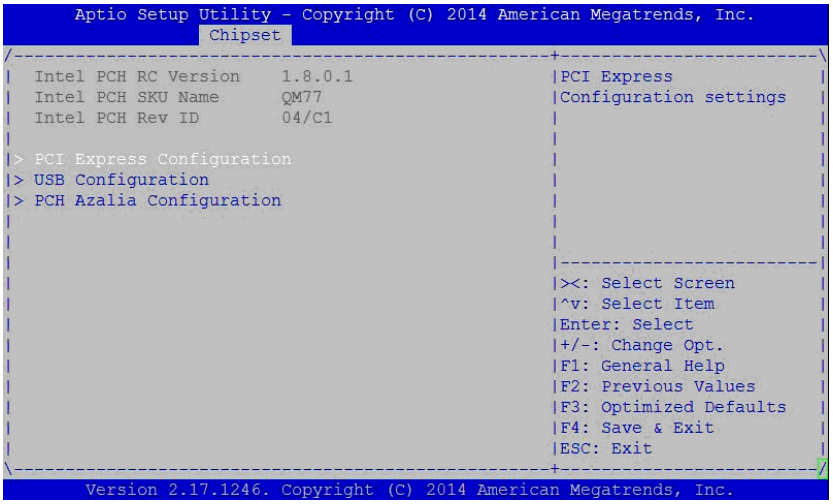
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8.4 Chipset Setup

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

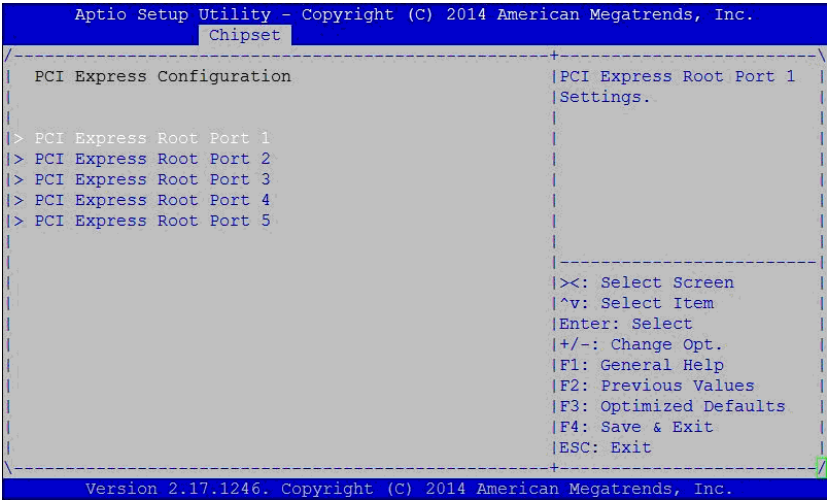


8.4.1 PCH-IO Configuration



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PCI Express Configuration



PCI Express Root Port 1 (LAN1)

PCI-e Root for LAN 82574

PCI Express Root Port 2 (LAN2)

PCI-e Root for LAN 82574

PCI Express Root Port 3 (LAN3)

PCI-e Root for LAN 82574

PCI Express Root Port 4 (LAN4)

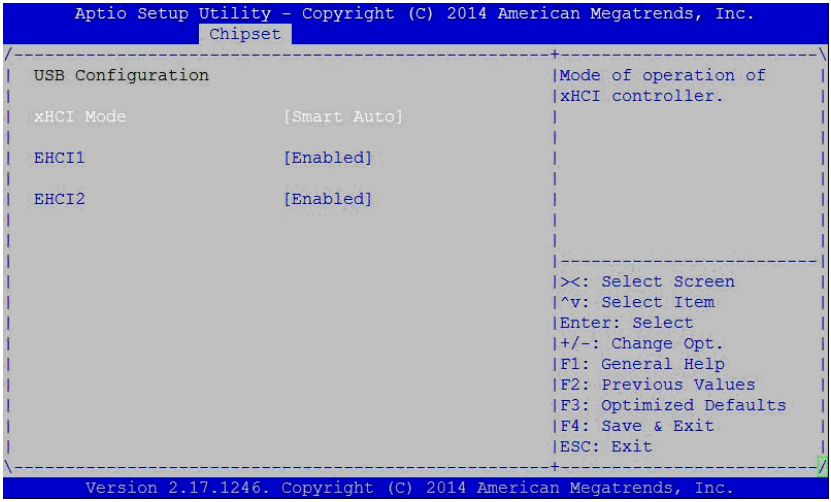
PCI-e Root for LAN 82574

PCI Express Root Port 5 (Bridge)

PCI-e Root for PCI-PCI bridge

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USB Configuration



XHCI Mode

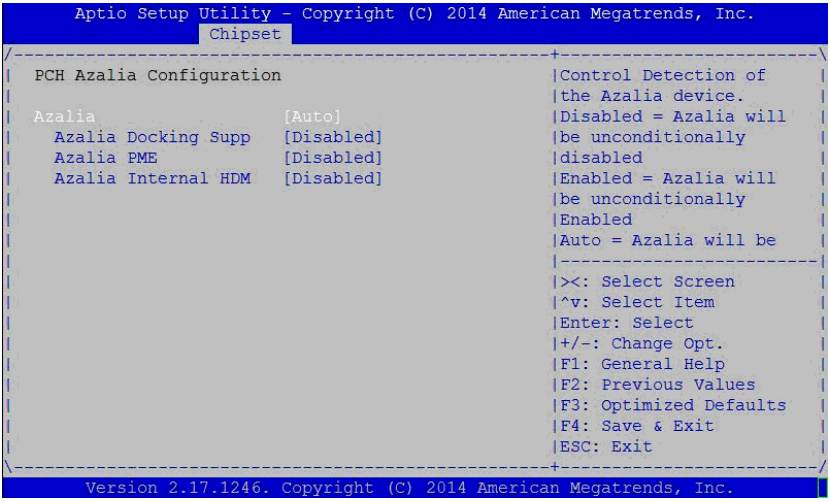
Mode of operation of xHCI controller. Set this value to Smart Auto, Auto, Enabled, Disabled.

EHCI1/2

Control the USB EHCI (USB 2.0) functions. One EHCI controller must always be enabled. Set this value to Enabled/Disabled.

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PCH Azalia Configuration



Azalia

Control Detection of the Azalia device. Set this value to Auto/ Enabled/Disabled.

Azalia Docking Support

Enable or disable Azalia Docking Support of Audio Controller.

Azalia PME

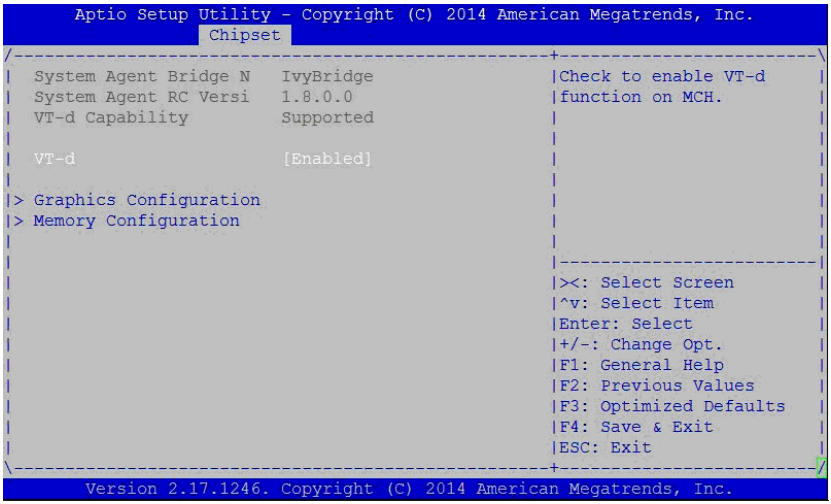
Enable or disable Power Management capability of Audio Controller.

Azalia Internal HDMI Codec

Enable or disable internal HDMI codec for Azalia.

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8.4.2 System Agent (SA) Configuration

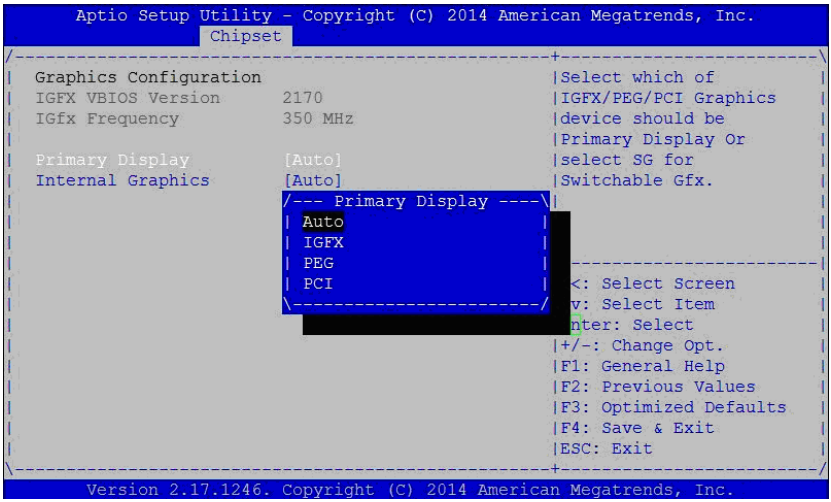


VT-d

The Intel Virtualization Technology for Directed I/O. Set this value to Enabled/Disabled.

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Graphics Configuration



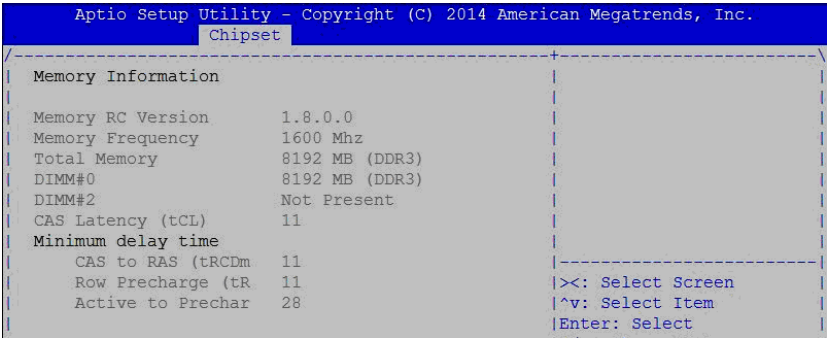
Primary Display

Allows user to select which graphics controller to use as the primary boot device. Configuration options: Auto, IGFX, PEG, PCI.

Internal Graphics

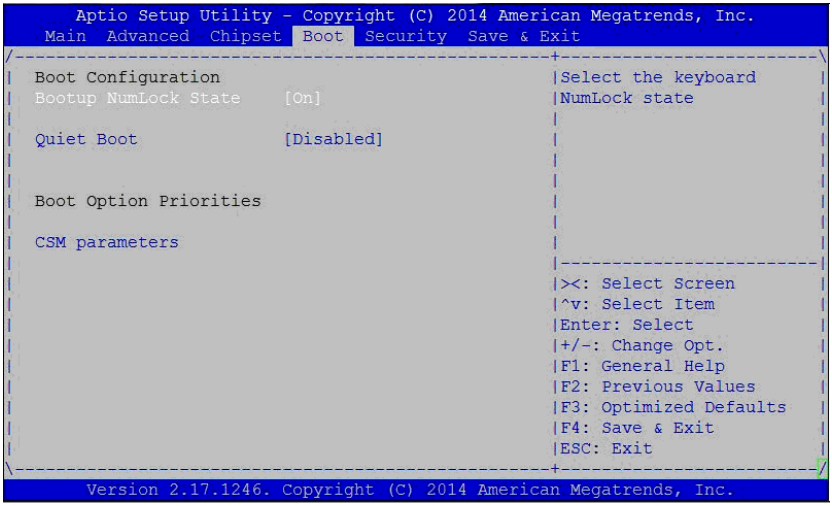
Allows user to select IGD Auto, Enabled or Disabled.

Memory Configuration



8.5 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:



Bootup NumLock State

Set this value to allow the Number Lock setting to be modified during boot up.

Off: This option does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard will light up when the Number Lock is engaged.

On: Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is boot up. This allows the immediate use of 10-keys numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard will be lit.

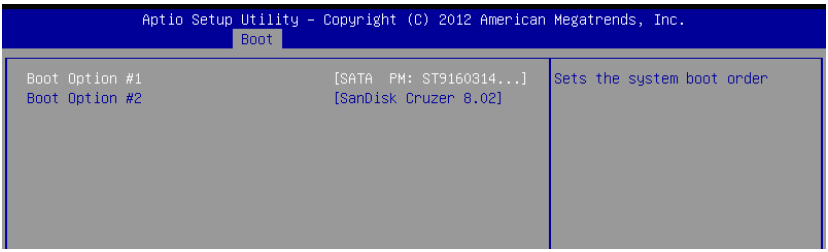
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Quiet Boot

- **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.

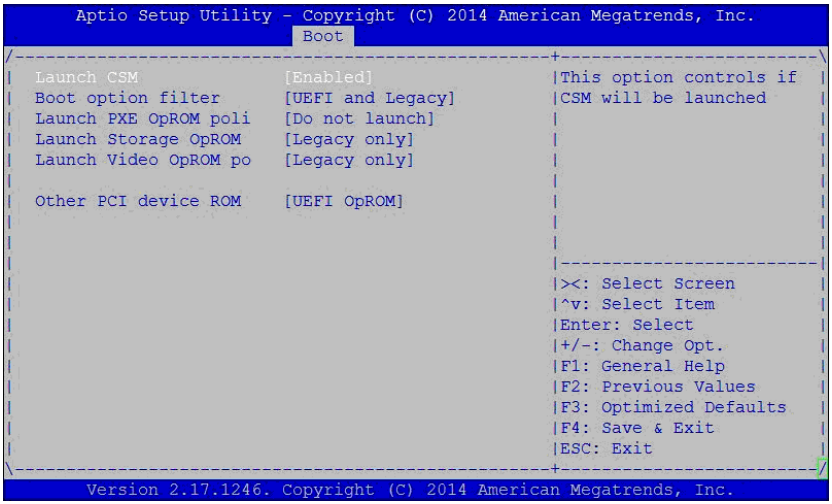
8.5.1 Hard Disk Drive BBS Priorities

Specifies the boot device priority sequence from available hard drives.



8.5.2 CSM Parameters

You can use this screen to configure CSM options.



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Launch CSM

This option controls if CSM will be launched. Set this value to Enabled/Disabled.

Boot option filter

This option controls what devices system can boot to. Set this value to UEFI and Legacy, Legacy only, UEFI only.

Launch PXE OpROM policy

This option controls the execution of UEFI and Legacy PXE OpROM. Set this value to Do not launch, Legacy only.

Launch Storage OpROM policy

This option controls the execution of UEFI and Legacy Storage OpROM. Set this value to Do not launch, UEFI only, Legacy only.

Launch Video OpROM policy

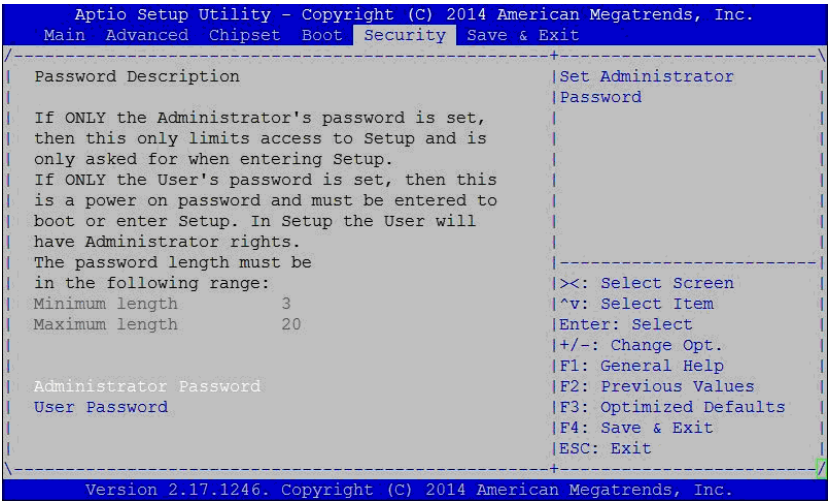
This option controls the execution of UEFI and Legacy Video OpROM. Set this value to Do not launch, UEFI only, Legacy only.

Other PCI device ROM priority

For PCI devices other than Network, Mass storage or Video defines which OpROM to launch. Set this value to UEFI OpROM, Legacy OpROM.

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8.6 Security Setup



Administrator, User Password

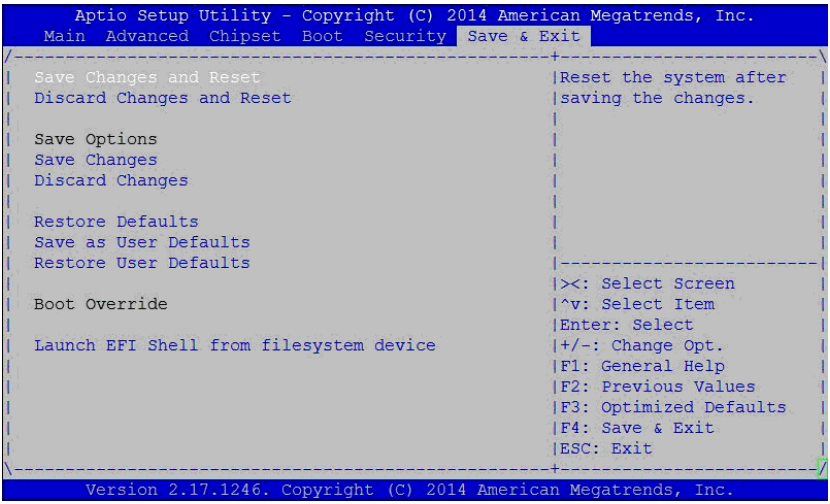
If only the administrator's password is set, then this only limits access to setup and is only asked for when entering setup.

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.

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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 Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset the system without saving any changes.

Save Changes

Save Change done so far to any of the setup option.

Discard Changes

Discard Changes done so far to any of the setup option.

Restore Defaults

Restore/Load Defaults values for all the setup options.

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Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

Restore the User Defaults to all the setup options.

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9 Checkpoints & Beep Codes

9.1 Checkpoint Ranges

Status Code Range	Description
0x01 – 0x0B	SEC execution
0x0C – 0x0F	SEC errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0x8F	DXE execution up to BDS
0x90 – 0xCF	BDS execution
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)
0xF0 – 0xF8	Recovery (PEI)
0xF9 – 0xFF	Recovery errors (PEI)

9.2 Standard Checkpoints

SEC Phase

Status Code	Description
0x00	Not used
Progress Codes	
0x01	Power on. Reset type detection (soft/hard).
0x02	AP initialization before microcode loading
0x03	North Bridge initialization before microcode loading
0x04	South Bridge initialization before microcode loading
0x05	OEM initialization before microcode loading
0x06	Microcode loading
0x07	AP initialization after microcode loading

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Status Code	Description
0x08	North Bridge initialization after microcode loading
0x09	South Bridge initialization after microcode loading
0x0A	OEM initialization after microcode loading
0x0B	Cache initialization
SEC Error Codes	
0x0C – 0x0D	Reserved for future AMI SEC error codes
0x0E	Microcode not found
0x0F	Microcode not loaded

SEC Beep Codes

None

PEI Phase

Status Code	Description
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started

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Status Code	Description
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed
0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)

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Status Code	Description
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F-0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started
PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C-0x5F	Reserved for future AMI error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4-0xE7	Reserved for future AMI progress codes

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Status Code	Description
S3 Resume Error Codes	
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AMI error codes
Recovery Progress Codes	
0xF0	Recovery condition triggered by firmware (Auto recovery)
0xF1	Recovery condition triggered by user (Forced recovery)
0xF2	Recovery process started
0xF3	Recovery firmware image is found
0xF4	Recovery firmware image is loaded
0xF5-0xF7	Reserved for future AMI progress codes
Recovery Error Codes	
0xF8	Recovery PPI is not available
0xF9	Recovery capsule is not found
0xFA	Invalid recovery capsule
0xFB – 0xFF	Reserved for future AMI error codes

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PEI Beep Codes

# of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXEIPL was not found
3	DXE Core Firmware Volume was not found
4	Recovery failed
4	S3 Resume failed
7	Reset PPI is not available

DXE Phase

Status Code	Description
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)

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Status Code	Description
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes

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Status Code	Description
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)
0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes
DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error

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Status Code	Description
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available

DXE Beep Codes

# of Beeps	Description
1	Invalid password
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met

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ACPI/ASL Checkpoints

Status Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

9.3 OEM-Reserved Checkpoint Ranges

Status Code	Description
0x05	OEM SEC initialization before microcode loading
0x0A	OEM SEC initialization after microcode loading
0x1D – 0x2A	OEM pre-memory initialization codes
0x3F – 0x4E	OEM PEI post memory initialization codes
0x80 – 0x8F	OEM DXE initialization codes
0xC0 – 0xCF	OEM BDS initialization codes

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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.

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- 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.



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

- 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.

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Getting Service

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