CT-30 Series

3U Rugged Conduction-Cooled CompactPCI SBC with
Intel® Core™2 Duo, Core™ Duo, Celeron® M Processor

User's Manual



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Revision History

Revision	Release Date	Description of Change(s)
2.00	2010/10/05	Initial Release

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Preface

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Using this Manual

Audience and Scope

The CT-30 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating industrial grade CompactPCI modules.

Manual Organization

This manual is organized as follows:

Chapter 1, Overview: Introduces the CT-30, its features, block diagrams, and package contents.

Chapter 2, Specifications: Presents detailed specification information, power consumption, and technical drawings.

Chapter 3, Functional Description: Describes the CT-30 main functions and board interfaces.

Chapter 4, Getting Started: Describes the installation instructions of the CT-30.

Chapter 5, Driver Installation: Describes the driver installation procedures.

Chapter 6, Watchdog Timer: Describes the Watchdog Timer functionality.

Chapter 7, BIOS Setup Utility: Describes the AMIBIOS®8 BIOS setup utility.

Important Safety Instructions: Presents safety instructions all users must follow for the proper setup, installation and usage of equipment and/or software.

Getting Service: Contact information for ADLINK's worldwide offices.

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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 Overview

1.1 Introduction

The CT-30 is a highly integrated 3U Rugged Conduction Cooled CompactPCI SBC in single slot (4HP) width form factor. It has been designed to support Intel® lower power Core™ 2 Duo, Core™ Duo and Celeron® M processors in FC-BGA package with a range of 1.0GHz to 1.5GHz at FSB 533MHz to 667MHz. They deliver optimized power-efficient computing and outstanding dual core performance with lower power consumption.

The CT-30 is based on the server-class Intel® 3100 chipset (Whitmore Lake) which combines Memory Controller Hub and I/O Controller Hubs into a single component, significantly conserving board real estate and power consumption. The Intel® 3100 chipset is the first Integrated Intel® chipset optimized for embedded, communications, and storage applications.

The CT-30 supports registered ECC type, single channel DDR2 400MHz soldered onboard memory with a maximum capacity of up to 2GB. The board supports one 32-bit/33MHz CompactPCI interface acting as system master CPU only. A Rear Transition Module (RTM) is also available and provides two USB 2.0 ports, two COM ports, and two Gigabit Ethernet ports.

Storage features of the CT-30 include a pin header and mounting space for an onboard USB NAND flash module and three 7-pin Serial ATA interfaces are available on the RTM for additional storage expansion.

Designed for stability and packaged in a rugged conduction-cooled format, the CT-30 is suitable for long life applications situated in extreme environments, including I/O intensive applications where only one slot is available for the CPU. It can withstand extreme termperatures, shock, and vibration under operation, and its components have been selected from embedded technology programs to offer long-term availability.

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1.2 Features

- 3U Rugged Conduction-Cooled CompactPCI SBC in 4HP or 8HP width form factor
- Low power Intel® Core™2 Duo 1.5GHz (L7400), Core™ Duo 1.2GHz (U2500), Celeron® M 1.0GHz (423) processors
- Intel® 3100 chipset (Memory and I/O Hub integrated chip)
- Single channel soldered onboard registered and ECC DDR2 memory at 400MHz, up to 2GB
- Two PCI-Express Gigabit Ethernet ports on RTM
- Supports USB 2.0 NAND flash module, up to 8GB
- Two USB 2.0 and RS-232 serial ports (TTL level) on RTM
- Maximum up to five USB ports and four serial ports
- 4x PCI-Express x1 or 1x PCI-Express x4 on RTM

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1.3 Block Diagram

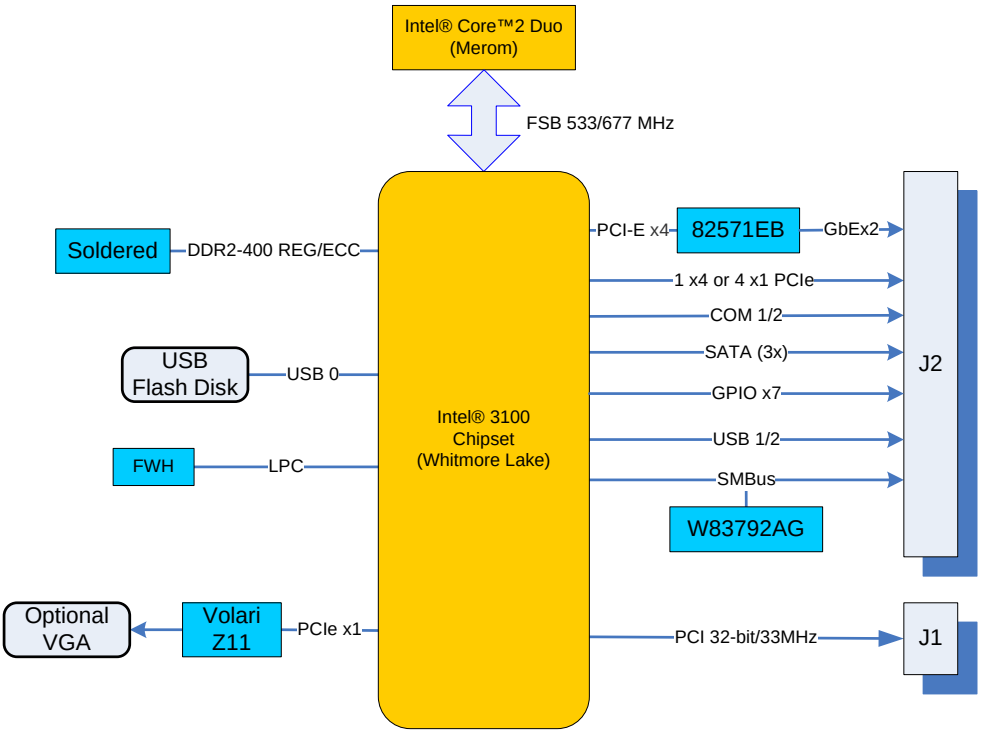


Figure 1-1: CT-30 Block Diagram

1.4 Product List

Products included in the CT-30 Series include:

SBC

- CT-30: single-slot (4HP) width 3U Rugged Conduction-Cooled CompactPCI SBC featuring Intel® LV Core 2™Duo 1.5GHz, Core™ Duo 1.2GHz or ULV Celeron® 1.0GHz processors; 512MB, 1GB or 2GB onboard memory; optional USB flash disk module

Rear Transition Module

- cPCI-R3920T: 80mm depth Rear Transition Module for CT-30 SBC with 2x USB, 2x RS-232, 2x GbE, 3x SATA ports

Accessories

- USB flash disk module, optional 2GB, 4GB or 8GB

Contact your ADLINK representative to purchase accessories.

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1.5 Package Contents

The CT-30 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 CT-30 Series are non-standard configurations and may vary depending on customer requests.

CPU module

- The CT-30 Series CPU Module (CPU and RAM specifications will differ depending on options selected)
- ADLINK All-in-One CD
- User's manual
- VGA connector adapter

Rear Transition Module

- cPCI-R3920T


NOTE:

The contents of non-standard CT-30 configurations may vary depending on the customer's 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 CPU, memory, and chipset

Processor	uFC-BGA Intel® Core™2 Duo LV (L7400) 1.5 GHz, FSB 667MHz, 4 MB L2 cache
	uFC-BGA Intel Intel® Core™ Duo ULV (U2500) 1.2 GHz, FSB 533MHz, 2 MB L2 cache
	uFC-BGA Intel Intel® Celeron® M ULV (423) 1.06 GHz, FSB 533MHz, 1 MB L2 cache
Chipset	Intel® 3100 chipset
Memory	Single channel soldered onboard registered ECC DDR2 SDRAM at 400MHz up to 2GB

2.2 Interfaces

CompactPCI Standard	PICMG® 2.0 R3.0 PICMG® 2.1 R2.0
CompactPCI Bus	32-bit/33MHz PCI bus
Display*	XGI Volari Z11 PCI-Express x1 Graphics Controller 32MB DDR2-400 SDRAM memory Up to 1600x1200@70Hz 24bit color *Optional VGA connector adapter; VGA function limited below -10°C - use serial console redirection for operation over full temperature range
Ethernet	PCI-Express x4 Intel® 82571EB dual port Ethernet controller Two GbE egress ports are routed to RTM via J2 connector
USB	Channel 0 is for 9 pin header, space reserved for USB flash disk module
	Channels 1& 2 are routed to the RTM
Serial Port	Two RS-232 ports TTL level (Tx, Rx signals only) are routed to RTM with one DB-9 port on rear panel and one 10-pin connector onboard
Serial ATA	Three SATA channels are routed to RTM with 7-pin connectors onboard

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Front panel I/O	**CT-30 main board**
	Socket for optional VGA connector adapter
	Power LED (green) WDT (yellow) CPU over-temperature LED (red): connected to the CPU signal PROCHOT
Board I/O Interfaces	**CT-30 main board**
	1x pin header for USB flash disk module
	cPCI-R3920T Rear Transition Module
	3x SATA ports (7-pin)
	1x 10-pin RS-232 port
Rear panel I/O	2x USB 2.0 ports
	2x GbE ports
	1x RS-232 port

2.3 Software

BIOS	AMI 16Mbit FWH
Supported OS	Microsoft® Windows® XP Professional
	Microsoft® Windows® Server 2003
	Microsoft® Windows® Vista Enterprise, 32-bit version
	RedHat Fedora 8, 9, 10
	VxWorks 6.6
	Contact ADLINK for other OS availability

2.4 Mechanical

Form factor	CT-30: 3U 4HP CompactPCI compliant form factor
	cPCI-R3920T: 3U 4HP CompactPCI compliant form factor
Dimensions	CT-30: 100mmx 160mm (LxW)
	cPCI-R3920T: 100mmx 80mm (LxW)

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2.5 Environmental

Cooling Method	Conduction
Operating Temperature(1)	-40 to +85°C for processors U2500, 425
	-40 to +80°C for processor L7400(2)
Storage Temperature	-40°C to 85°C
Humidity	95% non-condensing
Shock	40g peak acceleration, 11ms shock duration (half sine), operating
Vibration	2g acceleration (sine) over 22-2,000 Hz frequency range, operating
Altitude	-1,640 to 50,000 ft., operating
Compliance	CE, FCC Class A


NOTE:

(1) Processors can operate at full load in these temperature ranges. Temperatures are measured at the card edge.
(2) The operating range of the CT-30 with L7400 processor is limited to 80°C max. due to the following:

- fails at 5V -3% (4.85V) above 80°C
- enters throttling mode beyond 82°C, frequency decreases to 1GHz at 85°C

Workaround: The CT-30 with L400 processor can support 85°C when the CPU clock is fixed at 1333MHz in the BIOS settings (see “Intel® SpeedStep™ Techology” on page 61)

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2.6 I/O Connectivity Table

	CT-30		cPCI-R3920T	
	Faceplate	**Board**	**Faceplate**	**Board**
GbE	--	--	Yx2	--
USB	--	Y (9-pin)	Yx2	--
VGA	Y (opt.)	--	--	--
COM	--	--	Y (DB-9)	Y (10-pin)
SATA	--	--	--	Y x3 (7-pin)
PS/2 KB/MS	--	--	--	--
LEDs	Y x3	--	--	--

Table 2-1: I/O Connectivity

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2.7 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. An ATX power supply unit should be able to provide at least three times as much power as the entire system requires.

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			

Table 2-2: CompactPCI input voltage characteristics

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Power Consumption

The following tables provide information on the power consumption of CT-30.

Processor: Intel® Core™2 Duo LV (L7400) 1.5GHz, FSB 667MHz, 4MB L2 cache

Function	Configuration		
Memory	DDR2 400 1GB		
SATA Hard Drive	External 3.5”HDD		
Backplane	ADLINK cBP-3208R Rev.B2		
Power Supply	ZIPPY HG2-6350P 350W		
DOS			
Power requirement	+3.3V	+5V	Total
Current (A)	1.53	4.41	
Watts (W)	5.05	22.05	27.10
Linux, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.63	3.53	
Watts (W)	5.38	17.65	23.03
Windows® XP, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.62	4.63	
Watts (W)	5.35	23.15	28.50
Windows® XP, CPU 100% Usage			
Power requirement	+3.3V	+5V	Total
Current (A)	1.61	6.02	
Watts (W)	5.31	30.10	35.41

Table 2-3: Power consumption of Core™2 Duo LV (L7400)

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Processor: Intel® Core™ Duo (U2500) 1.2GHz, FSB 533MHz, 2MB L2 cache

Function	Configuration		
Memory	DDR2 400 1GB		
SATA Hard Drive	External 3.5”HDD		
Backplane	ADLINK cBP-3208R Rev.B2		
Power Supply	ZIPPY HG2-6350P 350W		
DOS			
Power requirement	+3.3V	+5V	Total
Current (A)	1.54	3.50	
Watts (W)	5.08	17.50	22.58
Linux, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.64	3.30	
Watts (W)	5.41	16.50	21.91
Windows® XP, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.68	3.71	
Watts (W)	5.38	18.55	23.93
Windows® XP, CPU 100% Usage			
Power requirement	+3.3V	+5V	Total
Current (A)	1.63	4.30	
Watts (W)	5.38	21.50	26.88

Table 2-4: Power consumption of Core™ Duo LV (U2500)

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Processor: Intel® Celeron M LV(423) 1.07GHz, FSB 533MHz, 1MB L2 cache

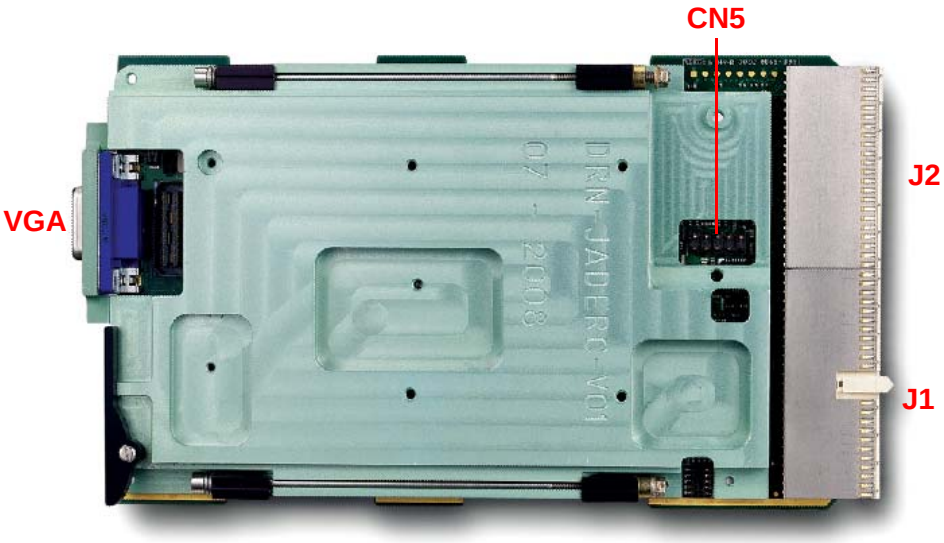
Function	Configuration		
Memory	DDR2 400 1GB		
SATA Hard Drive	External 3.5”HDD		
Backplane	ADLINK cBP-3208R Rev.B2		
Power Supply	ZIPPY HG2-6350P 350W		
DOS			
Power requirement	+3.3V	+5V	Total
Current (A)	1.51	3.27	
Watts (W)	4.98	16.35	21.33
Linux, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.60	3.12	
Watts (W)	5.28	15.60	20.88
Windows® XP, Idle			
Power requirement	+3.3V	+5V	Total
Current (A)	1.59	3.36	
Watts (W)	5.25	16.80	22.05
Windows® XP, CPU 100% Usage			
Power requirement	+3.3V	+5V	Total
Current (A)	1.59	3.64	
Watts (W)	5.25	18.20	23.45

Table 2-5: Power consumption of Celeron M LV(423)

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2.8 Board Layout

CT-30 Board Layout

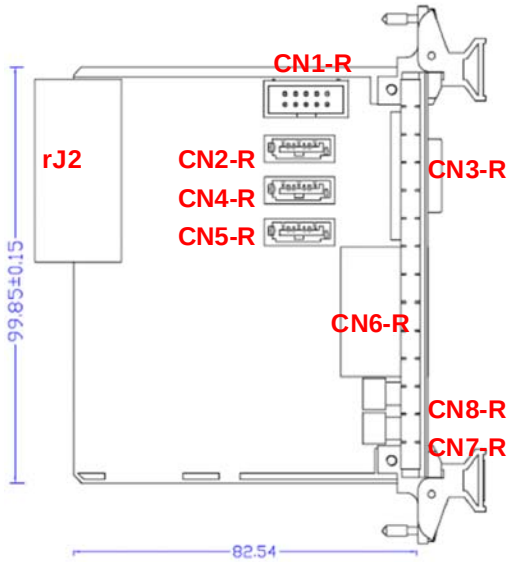


VGA	VGA connector adapter	**CN5**	USB pin header
J1	CompactPCI J1 connector	**J2**	CompactPCI J2 connector

Figure 2-1: CT-30 Board Layout

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cPCI-R3920T Board Layout



CN1-R	10 pin RS-232 port	**CN5-R**	SATA port
CN2-R	SATA port	**CN6-R**	Dual Ethernet ports
CN3-R	RS-232 port	**CN7-R**	USB port
CN4-R	SATA port	**CN8-R**	USB port

cPCI-R3920T Rear Panel

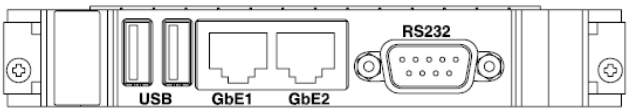


Figure 2-2: cPCI-R3920T Board Layout and Rear Panel

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3 Functional Description

The following sections describe the CT-30 main functions and board interfaces.

3.1 CPU, Memory and Chipset

CPU: Intel® Core™ Duo and Intel® Core™2 Duo

The CT-30 supports the latest Intel® Core™ Duo and Intel® Core™2 Duo processor family up to speeds of 1.5 GHz with up to 667 MHz FSB. The Intel® Core™ Duo consists of two cores and up to 2 MB L2 cache shared by both cores. The Intel® Core™2 Duo consists of two cores, up to 4 MB L2 cache shared by both cores, Intel Extended Memory 64 Technology (Intel EM64T), and enhanced address range for up to 64 GB memory. The Intel® Core™ Duo and the Intel® Core™2 Duo processors deliver optimized power-efficient computing and outstanding dual-core performance with low power consumption.

The Intel® Core™ Duo and the Intel® Core™2 Duo support the latest Intel's Virtualization Technology (VT), which allows a platform to run multiple operating systems and applications in independent partitions, such as performing system upgrades and maintenance without interrupting the system or the application, keeping software loads and virus attacks separate, combining multiple servers in one system, etc. With processor and I/O enhancements to Intel's various platforms, Intel Virtualization Technology improves the performance and robustness of today's software-only virtual machine solutions.

Furthermore, the Intel® Core™ Duo and the Intel® Core™2 Duo also support the Intel SpeedStep technology which enables real-time dynamic switching of the voltage and frequency between several modes. This is achieved by switching the bus ratios, core operating voltage, and core processor speeds without resetting the system.

The following list sets out some of the key features of the Intel® Core™ Duo and the Intel® Core™2 Duo processors:

- Two mobile execution cores in one single processor

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- Support of Intel's Virtualization Technology (Vanderpool)
- Support of Intel Architecture with Dynamic Execution
- Outstanding dual-core performance with low power consumption
- On die, primary 32 KB instruction cache and 32KB write-back data cache
- On die, L1 and L2 cache with Advanced Transfer Cache Architecture
  - Intel® Core™ Duo processor (ULV), 1.2 GHz, 533 MHz FSB, 2 MB L2 cache
  - Intel® Core™2 Duo processor (LV), 1.5 GHz, 667 MHz FSB, 4 MB L2 cache
- Advanced Branch Prediction and Data Prefetch Logic
- Streaming SIMD Extensions 3 (SSE3)
- Up to 667 MHz, Source-Synchronous Front Side Bus (FSB)
- Advanced Power Management features including Enhanced Intel SpeedStep technology
- Intel Extended Memory 64 Technology for 64-bit computing (only with the Intel® Core™2 Duo)
- Enhanced address range for up to 64 GB memory (only with the Intel® Core™ Duo)

Intel® Celeron® M

The CT-30 supports the low power 1.07 GHz Intel® Celeron® M processor with 533 MHz FSB. The Intel® Celeron® M consists of one core and 1 MB L2 cache.

The following list sets out some of the key features of the Intel® Celeron® M processor:

- Supports Intel architecture with dynamic execution
- High-performance, low-power core featuring architectural innovations like micro-ops fusion and advanced stack management that reduce the number of micro-ops handled by the processor.
- On-die, primary 32-kB instruction cache and 32-kB, write-back, data cache

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- On-die, 1 MB second level cache with Advanced Transfer Cache architecture
- Advanced branch prediction and data prefetch logic
- Streaming SIMD extensions 2 (SSE2) that enables break-through levels of performance in multimedia applications including 3D graphics, video decoding/encoding, and speech recognition.
- 533-MHz, source-synchronous front side bus (FSB)
- Advanced power management features
- Maintained support for MMX_ technology (technology designed to accelerate multimedia and communications software)
- Compatible with IA-32 software

Supported Processors, Maximum Power Dissipation

The following tables indicate the processors supported on the CT-30 and their maximum power dissipation.

Speed	Intel® Celeron® M 1.07 GHz ($ULV_{(2)}$)	Intel® Core Duo 1.2GHz ($ULV_{(2)}$)	Intel® Core 2 Duo 1.5GHz ($LV_{(1)}$)
Package	µFCBGA	µFCBGA	µFCBGA
L2 Cache	1MB	2MB	4MB
FSB	533 MHz	533 MHz	667 MHz

(1) LV: Low Voltage
(2) ULV: Ultra low Voltage

Frequency Mode	Intel® Celeron® M 1.07 GHz (ULV) 1MB L2 Cache	Intel® Core Duo 1.2GHz (ULV) 2MB L2 Cache	Intel® Core 2 Duo 1.5GHz (LV) 4MB L2 Cache
Maximum Power $HFM_{(3)}$	5.5W	9W	17W

(3) HFM: High Frequency Mode (maximum frequency of the CPU)

Table 3-1: Supported Processors, Power Dissipation

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Memory

The CT-30 supports single channel soldered DDR2 memory with Error Checking and Correcting (ECC) running at 400 MHz The available memory module configurations are 1 GB and 2 GB.

NOTE: Memory configuration changes can only be performed at the factory. Failure to comply with the above may result in damage to your board or improper operation.

Intel® 3100 Chipset Overview

The Intel® 3100 Chipset is a single integrated chip that contains the functionality of a Memory Controller Hub and an I/O Controller Hub. In this document the Memory Controller Hub unit and I/O Controller Hub unit in the Intel® 3100 Chipset are referenced as IMCH (Integrated Memory Controller Hub) and IICH (Integrated I/O Controller Hub) respectively.

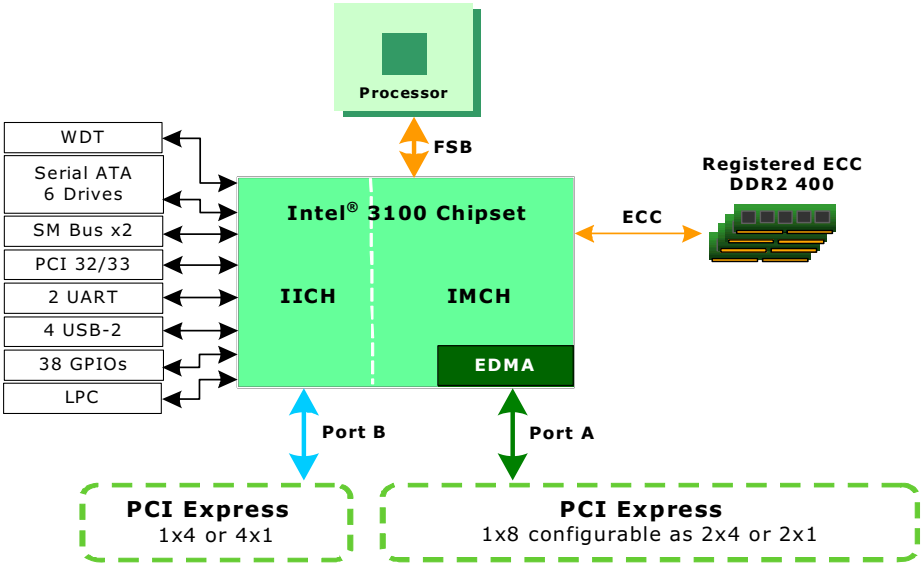


Figure 3-1: Intel® 3100 Chipset Block Diagram

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PCI Express

The Intel 3100 Chipset provides one configurable x8 PCI Express interface with a maximum theoretical bandwidth of 4 GByte/s. The x8 PCI Express interface may alternatively be configured as two independent x4 PCI Express interfaces with a maximum theoretical bandwidth of 2 GBytes/s each. The Intel® 3100 Chipset also supports an additional x4 PCI Express interface with a maximum theoretical bandwidth of 2 GBytes/s which may alternatively be configured as four independent x1 PCI Express interfaces.

IICH

I/O Controller Hub (IICH) functions are integrated into the Intel® 3100 Chipset, eliminating the requirement for a legacy I/O bridge.

I/O Controller Hub Feature set comprises:

- PCI Express Interface
- Low Pin Count (LPC) Interface
- Firmware Hub (FWH) Interface
- Integrated Serial ATA (SATA) Host Controllers:
  - Independent DMA operation on six ports
    - Four ports in SATA 1.0a and AHCI mode
    - Six ports in AHCI mode only
  - Data transfer rates up to 150 Mbyte/s
- Two controllers with up to four USB 2.0 ports:
  - One EHCI USB 2.0 Host Controller to support a total of four ports (shared with the UHCI ports)
  - Two UHCI Host Controllers to support a total of four ports (shared with the EHCI ports)
- Interrupt Controller
- Power Management Logic
- DMA Controller
- Timers Based on 82C54
- High Precision Event Timers (HPET)
- Real Time Clock with 256-byte CMOS RAM

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- System TCO Reduction Circuits
- SMBus
- Watchdog Timers
- PCI 2.3 Interface
- Two fully functional serial ports
- 38 General Purpose I/Os (GPIO)

IMCH

The Intel® 3100 Chipset provides an integrated memory controller for direct-connection to one channel of DDR2-400 (unstacked) registered memory devices with ECC. Peak theoretical memory data bandwidth using DDR2-400 is 3.2 GByte/s

Volari™ Z11 Graphics Controller

Volari™ Z11 GPU is the extreme programmable GPU of the XGI 2D GPU family. The Volari™ Z11 integrates a PCI-Express 1x controller and a 64-bit 2D graphics engine. It offers a flexible 16-bit DDR-II memory interface. The Z11 also incorporates a configurable 3.3V DVO digital interface to support a third party LVDS/TMDS transmitter. It can achieve high 2D performance with a memory interface supporting a bandwidth of up to 1 GB/s (DDR-II @250MHz).

Volari™ Z11 GPU main features:

- PCI-Express 1x Bus Interface
  - Supports PCI-E local bus standard Revision 1.1 compliant
- High Performance 2D Accelerator
  - Built-in hardware command queue
  - Built-in Direct Draw Accelerator
  - Built-in GDI 2000 Accelerator
  - Built-in an 1T pipelined 64-bit BITBLT graphics engine
  - Supports memory-mapped, zero wait-state, burst engine write
  - Built-in 64x64x2 bit-mapped mono hardware cursor
- High Efficient BroadBahn™ Memory Architecture

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- Supports DDR-II SDRAM memory
- 32 MB memory configuration
- Supports VGA BIOS auto memory size detection

- High Performance Flat Panel Display Interface
  - Supports graphics mode up to 1600x1200@70Hz 16M colors
- High Integration
  - Built-in CRT FIFO to support ultra high resolution graphics modes and reduce CPU wait-state
  - Built-in programmable 24-bit true-color RAMDAC with 230 MHz pixel clock
- Resolution, Color & Frame Rate
  - Supports 230 MHz pixel clock
  - Supports VESA standard super high resolution graphics modes
    4:3 resolution up to 1600x1200 256/32K/64K/16M colors 70Hz
    Wide Screen resolution modes
    Low resolution modes
  - Supports virtual screen up to 4096x4096
- Power Management
  - Supports power management for VGA monitor
- Multimedia Application
  - Supports DDC1, DDC2B and DDC 3.0 specifications
  - Supports RAMDAC snoop fir multimedai applications
- Miscellaneous
  - Lead-free package
  - RoHS compliance


NOTE:

The Z11 doesn't support the Linux X11 performance bench test, which changes display mode frequently during every screen page. The display flickers when performing the X11 performance bench test under Linux.

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3.2 Peripherals

The following standard peripherals are available on the CT-30 board:

Timer

The CT-30 is equipped with the following timers:

Real-Time Clock

The real-time clock performs timekeeping functions and includes 256 bytes of general purpose CMOS RAM. Features include an alarm function, programmable periodic interrupt and a 100-year calendar. All CMOS RAM data remains stored in an additional EEPROM to prevent data loss.

Counter/Timer

Three 8254-style counter/timers are included on the CT-30 as defined for the PC/AT (System Timer, Refresh Request, Speaker Tone Output).

In addition to the three 8254-style counters, the IICH includes three High Precision Event Timers (HPET) that may be used by the operating system. They are implemented as a single counter each with its own comparator and value register. They support One-shot and periodic interrupts.

Watchdog Timer

The CT-30 provides a Watchdog Timer that is programmable for a timeout period ranging from 1 ms to 1050 sec. Failure to trigger the Watchdog Timer in time results in a system reset, an interrupt, or NMI. In the dual-stage mode, a combination of both NMI, and reset if the Watchdog is not serviced. A hardware status flag will be provided to determine if the Watchdog Timer generated the reset.

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Reset

A reset will be generated by the following conditions:

- Watchdog overflow
- CompactPCI backplane PRST# input (CompactPCI connector J2, pin C17)

SMBus Devices

The CT-30 provides a System Management Bus (SMBus) for access to several system monitoring and configuration functions. The SMBus consists of a two-wire I2C bus interface.

The following table describes the function and address of every onboard SMBus device.

Device	SMBus Address
Clock Buffer	DCh
Clock Generator	D2h
SPD	A0h
EEPROM (Board VPD)	AEh

Table 3-2: SMBus Devices and Addresses

Thermal Management / System Monitoring

The W83792AG can be used to monitor several critical hardware parameters of the system, including power supply voltages and temperatures, all of which are very important for the proper operation and stability of a high-end computer system.

The voltages +12 V, +5 V, +3.3 V, and Vcore are supervised. The temperature sensors monitor the CPU temperature and the ambient temperature to ensure that the system is operating at a safe temperature level. If the CPU temperature is too high, the sensor automatically reduces the CPU clock frequency, depending on the mode chosen in the BIOS settings.

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FWH Flash Memory

For simple BIOS updating a standard onboard 16 Mbit Firmware Hub device is used. The FWH stores both the system BIOS and graphics BIOS. It can be updated as new versions of the BIOS become available.

LED Functions

There are three LEDs on the front panel, below table shows the function of LEDs.

Name	Color	Status	Function description
HOT	Red	BLINK	CPU reaches or exceeds max. operating temperature
		OFF	CPU below max. operating temperature
WDT	Yellow	ON	WDT function enable
		OFF	WDT function disable
PWR	Green	ON	Power on
		OFF	Power off

Table 3-3: CT-30 LED Function Descriptions

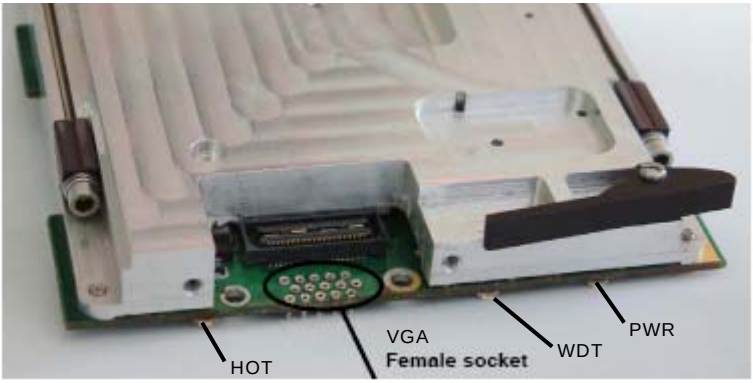


Figure 3-2: CT-30 LED Locations

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3.3 Board Interfaces

USB Interfaces

The CT-30 supports three USB 2.0 ports:

- one onboard to connect a Flash disk
- two on the Rear Transition Module.

For details on the USB 2.0 Rear I/O ports, see “Board Interfaces on RTM” on page 34.

Onboard USB Pin Header (CN5)

The onboard USB device (CN5 pin header, 2.54mm pitch) is used to connect a USB Flash Disk.

The following figure and table provide pinout information for the onboard USB pin header CN5:

Pin	Signal	Function	I/O
1	Vcc	VCC	--
2	Uv0-	Differential USB-	I/O
3	Uv0+	Differential USB+	I/O
4	GND	GND	--
5	--	Not connected	--
6	--	Not used	--
7	GND	GND	--
8	--	Not used	--
9	--	Not used	--
10	--	Not used	--

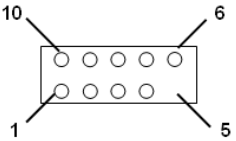


Table 3-4: Onboard USB Connector Pin Definition

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USB Flash Disk Mechanical Layout

- Maximum space reserved for USB flash disk is 50mm x 30mm (LxW)
- The distance between the centers of connector and screw hole is 27.3mm~27.9mm
- Maximum allowable connector height is 9.78mm (under 4HP)

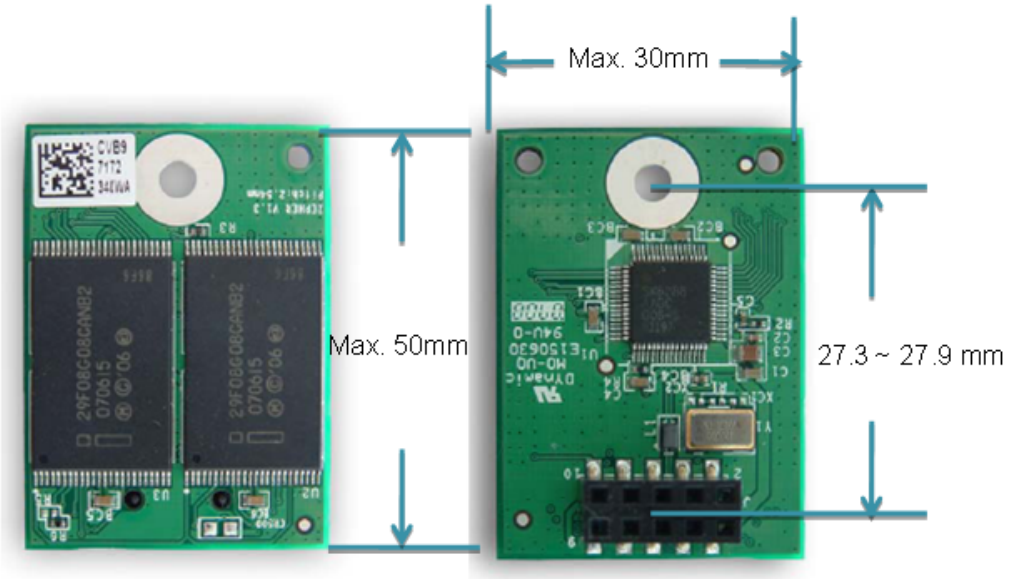
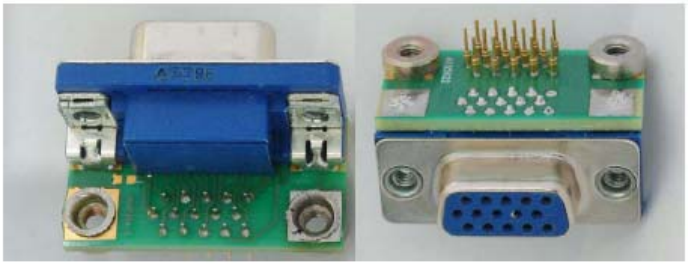


Figure 3-3: USB Flash Disk Mechanical Layout

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VGA Analog Interface and Connector

The CT-30 has no VGA connector available on the front panel and is fitted with a female socket to accept a removable VGA connector adapter card (Order Code: ADAP-VGA). This VGA connector adapter may be used mainly for BIOS maintenance/debug purposes.



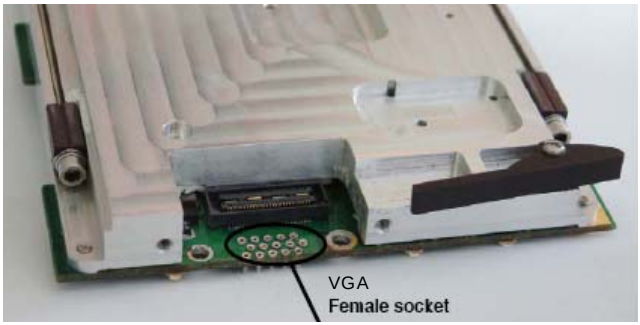


Figure 3-4: CT-30 VGA Connector Adapter and Socket

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		

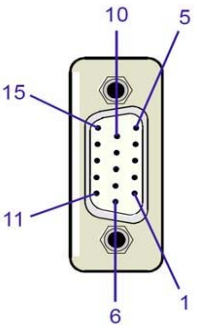


Table 3-5: VGA Connector Pin Definition

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CompactPCI Bus Interfaces

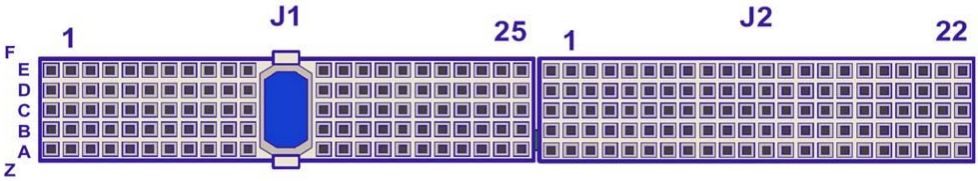
The complete CompactPCI connector configuration comprises two connectors named J1 and J2. Their function is as follows:

- J1: 32-bit CompactPCI interface with PCI bus signals, arbitration, clock and power
- J2: has optional Rear I/O interface functionality or 64-bit termination

The board is capable of driving up to seven CompactPCI slots, with individual arbitration and clock signals. The CT-30 is not hot-swappable but supports the addition or removal of other boards whilst in a powered-up state.

The CT-30 is designed for a CompactPCI bus architecture. The CompactPCI standard is electrically identical to the PCI local bus. However, these systems are enhanced to operate in rugged industrial environments and to support multiple slots.

CompactPCI Connectors J1/J2



NOTE: Pin rows F and Z are GND pins.

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CompactPCI J1 Pin Assignment

Pin	Z	A	B	C	D	E	F
25	GND	+5V	REQ64#	ENUM#	+3.3V	+5V	GND
24	GND	AD[1]	+5V	V(I/O)	AD[0]	ACK64#	GND
23	GND	+3.3V	AD[4]	AD[3]	+5V	AD[2]	GND
22	GND	AD[7]	GND	+3.3V	AD[6]	AD[5]	GND
21	GND	+3.3V	AD[9]	AD[8]	M66EN(2)	C/ BE[0]#	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	+3.3V	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR#	GND	+3.3V	PAR	C/ BE[1]#	GND
17	GND	+3.3V	N.C.	N.C.	GND	PERR#	GND
16	GND	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND
15	GND	+3.3V	FRAME#	IRDY#	GND	TRDY#	GND
12-14	GND	Key					GND
11	GND	AD[18]	AD[17]	AD[16]	GND	C/ BE[2]#	GND
10	GND	AD[21]	GND	+3.3V	AD[20]	AD[19]	GND
9	GND	C/BE[3]#	GND	AD[23]	GND	AD[22]	GND
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	GND	REQ0#	GND	+3.3V	CLK0	AD[31]	GND
5	GND	N.C.	N.C.	PCIRST#	GND	GNT[0]#	GND
4	GND	IPMB_PWR	GND	V(I/O)	INTP(1)	INTS	GND
3	GND	INTA#	INTB#	INTC#	+5V	INTD#	GND
2	GND	TCK	+5V	TMS	TDO	TDI	GND
1	GND	+5V	-12V	TRST#(3)	+12V	+5V	GND
	Z	A	B	C	D	E	F

Table 3-6: CompactPCI J1 Pin Assignment

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CompactPCI J2 Pin Assignment

The CT-30 board provides Rear I/O connectivity for special compact systems. Some standard PC interfaces are implemented and assigned to the front panel and to the rear connector J2.

When the Rear I/O module is used, of some the signals of the main board are routed to the Rear I/O module interface. Thus the Rear I/O module makes it much easier to remove the CPU in the rack as there is practically no cabling on the CPU board.

For the system Rear I/O feature a special backplane is necessary. The CT-30 with Rear I/O is compatible with all standard CompactPCI passive backplanes with Rear I/O support on the system slot.

The CT-30 Rear I/O provides the following interfaces:

- 32-bit/33 MHz CompactPCI (J1) and Rear I/O (J2)
- Two USB 2.0 ports
- Two Gigabit Ethernet ports without LED signals
- Three SATA ports
- Two COM ports
- Seven GPIOs



NOTE:

To support the Rear I/O feature a special backplane is necessary. Do not plug a Rear I/O configured board in a non-system slot Rear I/O backplane. Failure to comply with the above will result in damage to your board.

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Legend for J2 Pin Assignment

USB*x*	USB interface and power
ETH*x*	Gigabit Ethernet port
SATA*x*	Serial ATA port
COM*x*	COM port
GPIO*x*	GPIO
PEX_RX0L*x*	
PEX_TX0L*x*	x4 or 4 x1 PCI-Express

Pin	Z	A	B	C	D	E	F
22	N.C.	GA[4]	GA[3]	GA[2]	GA[1]	GA[0]	GND
21	N.C.	CLK[6]	GND	COM1_RXD	COM2_RXD	GPIO7	GND
20	N.C.	CLK[5]	GND	COM1_TXD	COM2_TXD	GPIO6	GND
19	N.C.	GND/CLK100+	GND/CLK100+	SMB_SDA	SMB_SCL	SMB_ALERT	GND
18	N.C.	SATA3_TX+	SATA3_TX-	GND	SATA3_RX+	SATA3_RX-	GND
17	N.C.	USB4_D+	USB4_D	RST_BP#	N.C.	GNT[6]#pull	GND
16	N.C.	USB4_PWR	USB5_PWR	DEGXB	GND	GPIO5	GND
15	N.C.	USB5_D+	USB5_D	FALXB	N.C.	GNT[5]#pull	GND
14	N.C.	SATA2_TX+	SATA2_TX-	GND	SATA2_RX+	SATA2_RX-	GND
13	N.C.	SATA1_TX+	SATA1_TX-	GND	SATA1_RX+	SATA1_RX-	GND
12	N.C.	PEX_RX0L0+	PEX_RX0L0-	GND	PEX_TX0L0+	PEX_TX0L0-	GND
11	N.C.	PEX_RX0L1+	PEX_RX0L1-	GND	PEX_TX0L1+	PEX_TX0L1-	GND
10	N.C.	PEX_RX0L2+	PEX_RX0L2-	GND	PEX_TX0L2+	PEX_TX0L2-	GND
9	N.C.	PEX_RX0L3+	PEX_RX0L3-	GND	PEX_TX0L3+	PEX_TX0L3-	GND
8	N.C.	ETH0_DA+	ETH0_DA-	GND	ETH0_DC+	ETH0_DC-	GND
7	N.C.	ETH0_DB+	ETH0_DB-	GND	ETH0_DD+	ETH0_DD-	GND
6	N.C.	ETH1_DA+	ETH1_DA-	GND	ETH1_DC+	ETH1_DC-	GND
5	N.C.	ETH1_DB+	ETH1_DB-	GND	ETH1_DD+	ETH1_DD-	GND
4	N.C.	V(I/O)	GPIO1	GPIO2	GPIO3	GPIO4	GND
3	N.C.	CLK[4]	GND	GNT[3]#	N.C.	GNT[4]#pull	GND
2	N.C.	CLK[2]	CLK[3]	SYSEN#	GNT[2]#	REQ[3]#	GND
1	N.C.	CLK[1]	GND	REQ[1]#	GNT[1]#	REQ[2]#	GND

Table 3-7: CompactPCI J2 Pin Assignment

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3.4 Board Interfaces on RTM

USB Interfaces

There are two identical USB interfaces on the cPCI-R3920T RTM, each with a maximum transfer rate of 480 Mb/s provided for connecting USB devices. One USB peripheral may be connected to each port. To connect more USB devices than there are available ports, an external hub is required.

USB Connectors CN7-R and CN8-R

Pin #	Signal Name
1	Vcc
2	UV0-
3	UV0+
4	GND

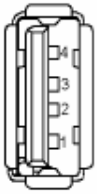


Table 3-8: RTM USB Connector Pin Definitions

NOTE: The RTM supports the USB 1.1 and USB 2.0 standards. For USB 2.0 it is strongly recommended to use a cable length not exceeding 3 meters.

Dual Gigabit Ethernet

The CT-30 board provides two 10Base-T/100Base-TX/1000Base-T Ethernet ports via the cPCI-R3920T RTM, based on the Dual Gigabit Ethernet controller, which is connected to the x4 PCI Express interface of the Intel® 3100.

The Intel® 82571EB Dual Gigabit Ethernet Controller's architecture is optimized to deliver high performance with the lowest power consumption. The controller's architecture includes independent transmit and receive queues and a PCI Express interface that maximizes the use of bursts for efficient bus usage.

The Boot from LAN feature is supported.

NOTE: The Ethernet transmission can operate effectively using a CAT5 cable or higher specifications.

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Gigabit Connector RJ-45 Pin Definitions (CN6-R)

The CN6-R connector on the RTM supplies the 10Base-T, 100Base-TX and 1000Base-T interfaces to the Ethernet controller (no LED indications are provided).

10BASE--T		100BASE--TX		1000BASE--T		PIN
I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL	
O	TX+	O	TX+	I/O	BI_DA+	1
O	TX-	O	TX-	I/O	BI_DA-	2
I	RX+	I	RX+	I/O	BI_DB+	3
--	--	--	--	I/O	BI_DC+	4
--	--	--	--	I/O	BI_DC-	5
I	TX–	I	RX--	I/O	BI_DB-	6
--	--	--	--	I/O	BI_DD+	7
--	--	--	--	I/O	BI_DD-	8

Table 3-9: RTM GbE Connector Pin Definitions

COM1 and COM2 Interfaces

The cPCI-R3920T provides two COM ports from the Intel® 3100 chipset for connecting RS-232 devices to the cPCI-R3920T.

The following tables provide pinout information for the 9-pin D-Sub COM connector CN3-R located on the face plate and the onboard COM connector CN1-R.

COM1 DB-9 Serial Port Connector (CN3-R)

Pin #	RS-232
1	not used
2	RXD, Receive data
3	TXD, Transmit data
4	not used
5	GND, Ground
6	not used
7	not used
8	not used
9	not used

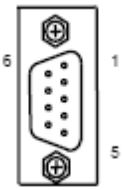


Table 3-10: COM1 Serial Port Connector Pin Definition

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COM2 Onboard Serial Port Connector (CN1-R)

Pin #	RS-232
1	not used
2	RXD, Receive data
3	TXD, Transmit data
4	not used
5	GND, Ground
6	not used
7	not used
8	not used
9	not used
10	NC

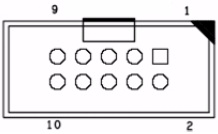


Table 3-11: COM2 Serial Port Connector Pin Definition

NOTE:

The serial ports of Intel® 3100 Chipset are not 100 percent compatible with other 16550 standard devices. If any system or software designer assumes that they are compatible with other 16550 standard devices and does not follow the specifications for the Serial I/O Unit in the **Intel® 3100 Chipset Datasheet**, errors or undesired behaviors may be observed.

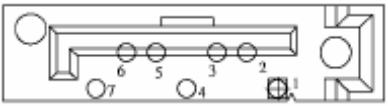
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Serial ATA Interfaces

The onboard Serial ATA connectors CN2-R, CN4-R and CN5-R allow the connection of standard HDDs and other Serial ATA devices to the cPCI-R3920T Rear Transition Module.

The following figure and table provide pinout information for the SATA connectors CN2-R, CN4-R and CN5-R.

SATA1-3 Connectors CN2-R, CN4-R and CN5-R



Pin #	Signal	Pin #	Signal
1	GND	5	RX-
2	TX+	6	RX+
3	TX-	7	GND
4	GND		

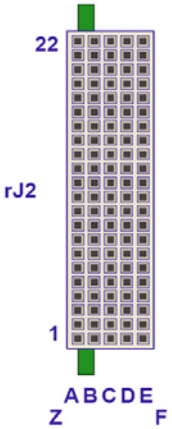
Table 3-12: SATA1-3 Connectors Pin Definition

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Rear I/O Interfaces on CompactPCI Connector rJ2

The cPCI-R3920T Rear Transition Module conducts a wide range of I/O signals through the connector rJ2. To support these I/O features a special backplane is necessary. Do not plug a Rear I/O configured board in a non-system slot Rear I/O backplane. Failure to comply with the above may result in damage to your board.

CompactPCI Connector rJ2



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CompactPCI rJ2 Pin Assignment

Legend for rJ2 Pin Assignment

USB*x*	USB interface and power
ETH*x*	Gigabit Ethernet port
SATA*x*	Serial ATA port
COM*x*	COM port

Pin	Z	A	B	C	D	E	F
22	N.C.	GA[4]	GA[3]	GA[2]	GA[1]	GA[0]	GND
21	N.C.	CLK[6]	GND	COM1_RXD	COM2_RXD	N.C.	GND
20	N.C.	CLK[5]	GND	COM1_TXD	COM2_TXD	N.C.	GND
19	N.C.	GND/CLK100	GND/CLK100	SMB_SDA	SMB_SCL	SMB_ALERT	GND
18	N.C.	SATA3_TX+	SATA3_TX-	GND	SATA3_RX+	SATA3_RX-	GND
17	N.C.	USB4_D+	USB4_D	RST_BP#	N.C.	GNT[6]#pull	GND
16	N.C.	USB4_PWR	USB5_PWR	DEGXB	GND	GPIO5	GND
15	N.C.	USB5_D+	USB5_D	FALXB	N.C.	GNT[5]#pull	GND
14	N.C.	SATA2_TX+	SATA2_TX-	GND	SATA2_RX+	SATA2_RX-	GND
13	N.C.	SATA1_TX+	SATA1_TX-	GND	SATA1_RX+	SATA1_RX-	GND
12	N.C.	N.C.	N.C.	GND	N.C.	N.C.	GND
11	N.C.	N.C.	N.C.	GND	N.C.	N.C.	GND
10	N.C.	N.C.	N.C.	GND	N.C.	N.C.	GND
9	N.C.	N.C.	N.C.	GND	N.C.	N.C.	GND
8	N.C.	ETH0_DA+	ETH0_DA-	GND	ETH0_DC+	ETH0_DC-	GND
7	N.C.	ETH0_DB+	ETH0_DB-	GND	ETH0_DD+	ETH0_DD-	GND
6	N.C.	ETH1_DA+	ETH1_DA-	GND	ETH1_DC+	ETH1_DC-	GND
5	N.C.	ETH1_DB+	ETH1_DB-	GND	ETH1_DD+	ETH1_DD-	GND
4	N.C.	V(I/O)	N.C.	N.C.	N.C.	N.C.	GND
3	N.C.	CLK[4]	GND	GNT[3]#	N.C.	GNT[4]#pull	GND
2	N.C.	CLK[2]	CLK[3]	SYSEN#	GNT[2]#	REQ[3]#	GND
1	N.C.	CLK[1]	GND	REQ[1]#	GNT[1]#	REQ[2]#	GND

Table 3-13: CompactPCI rJ2 Pin Assignment

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4 Getting Started

The CT-30 has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board, other system components, or injury to personnel.

4.1 Safety Requirements

The following safety precautions must be observed when installing or operating the CT-30. ADLINK assumes no responsibility for any damage resulting from failure to comply with these requirements.

Exercised due care when handling the board as the heat sink can get very hot. Do not touch the heat sink when installing or removing the board. The board should not be placed on any surface or in any form of storage container until the board and heat sink have cooled down to room temperature.

If your board type is not specifically qualified as being hot swap capable, switch off the CompactPCI system power before installing the board in a free CompactPCI slot. Failure to do so could endanger your life or health and may damage your board or system.

Certain CompactPCI boards require bus master and/or Rear I/O capability. If you are in doubt whether such features are required for the board you intend to install, please check your specific board and/or system documentation to make sure that your system is provided with an appropriate free slot in which to insert the board.

This CompactPCI board contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

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4.2 Installing the USB Flash Disk

The CT-30 supports an onboard USB Flash Disk module via the CN5 pin header. To install a USB Flash Disk, follow the procedure below.

1. Secure the standoff to the underside of the module with the screw provided.
2. Align the module with the CN5 pin header and mounting hole.
3. Insert the module onto the pin header and secure with the screw provided from the back side of the CT-30.

4.3 RTM (cPCI-R3920T) Installation

Follow the typical cPCI board installation and removal procedures for the RTM. However, be careful when when inserting or removing RTMs to the chassis as these are shorter than front boards.

Refer to previous sections when connecting or installing peripherals to the RTM. Make sure that the RTM you are installing are compatible with the CT-30.


NOTE:

You must install the correct RTM to enable some functionalities (I/O interfaces) on the rear panel. Installation of non-compatible RTMs may damage the system board and/or other RTMs.

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4.4 Switching to Remote Serial Console

The default graphics output setting of the CT-30 is the onboard VGA. To switch from onboard graphics to Remote Serial Console via COM1 on the RTM, perform the following steps.

1. Mount the VGA connector adapter card (ADAP-VGA) to the CT-30 to use the onboard graphics as console (see “VGA Analog Interface and Connector” on page 29).
2. Power on the system.
3. Press <DEL> to enter the AMIBIOS® Setup menu.
4. Configure the BIOS settings as outlined below.

Menu Sub-menu	Field	Value
Advanced > Remote Access Configuration	Remote Access	Enabled
	Serial port number	COM1
Chipset	On Board VGA	Disabled
Exit	Save Changes and Exit	Select

5. Power off the system and remove the VGA connector adapter card.
6. Reboot the system and use COM1 on the RTM as console.

4.5 Hot Swap Procedures

The CT-30 is not designed for hot swap operation. Do not attempt to hot swap this board. However, the CT-30 supports the addition or removal of other boards whilst in a powered-up state.

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5 Driver Installation

The CT-30 drivers are available from the ADLINK All-In-One CD at **X:\cPCI\cPCI-3920**, or from the ADLINK website (**http://www.adlinktech.com**). The following describes the driver installation procedures for Windows® XP or Windows® Server 2003:

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 running the program **...\Chipset\InfInst_AUTOL.exe**.
3. Install the VGA driver and utilities by running the program **...\VGA\R1.09.05_WHQL_Windows\XGIRun.exe**.
4. Install the LAN drivers by running the program **...\LAN\PRO2KXP.exe**.

We recommend using the chipset, VGA, and LAN drivers provided on the ADLINK All-in-One CD or downloaded from the ADLINK website to ensure compatibility. Contact ADLINK to get support for Linux and VxWorks BSP drivers.

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6 Watchdog Timer

6.1 WDT Overview

This section explains the operation of the CT-30's Watchdog Timer (WDT). The primary function of the WDT is to monitor the CT-30 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:

- enabled and disabled
- reloading timeout value

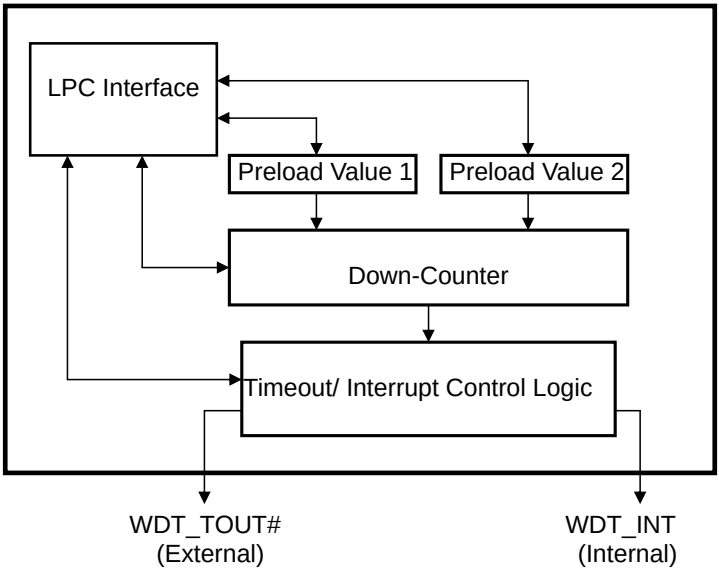


Figure 6-1: CT-30 Watchdog Timer Architecture

The CT-30 implements the internal WDT unit of the Intel 3100 chipset and its LPC interface. It contains registers of device6 at

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the internal IO to control the WDT and retrieve its status. The basic functions of the WDT include:

- Setting the watchdog timeout interval
- Starting the timer countdown
- Selecting 1 step or 2 step WDT
- Enabling or disabling WDT
- Reloading the timeout value to keep the watchdog from timing out
- Setting the range of the timeout period from 1 μs to 1 second, or from 1 ms to 1050 seconds

When the watchdog times out, it will send a RESET signal to the system.

6.2 Using the Watchdog Timer in an Application

The following section describes 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 WDT unit of the Intel 3100 chipset .

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 registers zero.

A detailed programming sample is provided below:

```
#include<dos.h>
#include<conio.h>
#include<stdio.h>
#include<stdlib.h>

#defineconfig_port_index0x4E
#defineconfig_port_data0x4F

/* Pre-declaration */
/* access configuration registers routines */
void enter_config_mode();
void exit_config_mode();
```

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```
void write_config_data_byte(unsigned
     char,unsigned char);
unsigned char read_config_data_byte(unsigned
     char);
unsigned int read_wdt_io_base();
/* access wdt I/O registers routines */
void write_preload_val2_reg(unsigned long int);
void clear_preload_val1_reg();
void unlocking_reg();

/* Global parameter */
unsigned int wdt_io_base;

void main(void)
{
//   unsigned int wdt_io_base;
     unsigned long int time_out_val=0;

     wdt_io_base=read_wdt_io_base();

     printf("Intel 3100 Chipset Watch-Dog Timer
     test utility.\n");
     printf("Intel 3100 WDT IO Base Address ==
     0x%x\n",wdt_io_base);

     while(1)//
     (time_out_val==0)||(time_out_val>1050))
     {
//3sec     printf("Please input the time to count
     down (1-1050 sec): ");
//3sec     scanf("%d",&time_out_val);
     }


//3sectime_out_val=time_out_val*1000;//transfer
     to msec unit.
     time_out_val=time_out_val+3000;   //3sec
     clear_preload_val1_reg();//we don't need
     preload_val1 caused internal interrupt.

     write_preload_val2_reg(time_out_val);//
     write preload_val2 ,it will cause external
     interrupt.(WDT_TOUT#)
```

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```
        outportb(wdt_io_base+0x18,2);//watchdog
        timer enable!!

        printf("\nPlease waiting for Watch-Dog Timer
        time-out!!");
}
/***********************************/
unsigned int read_wdt_io_base()
{
        unsigned char_wdt_io_base[2];
        int   *p_wdt_io_base;
        p_wdt_io_base=&_wdt_io_base;

        enter_config_mode();

        write_config_data_byte(0x07,6);//select
        logic 6 - WDT


        _wdt_io_base[1]=read_config_data_byte(0x60)
        ;

        _wdt_io_base[0]=read_config_data_byte(0x61)
        ;

        exit_config_mode();

        return (*p_wdt_io_base);
}
/***********************************/
void enter_config_mode()
{
        outportb(config_port_index,0x80);

        outportb(0xeb,00); //io delay

        outportb(config_port_index,0x86);
}
/***********************************/
void exit_config_mode()
{
        outportb(config_port_index,0x68);
```

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```
      outportb(0xeb,00); //io delay

      outportb(config_port_index,0x08);
}
/***********************************/
unsigned char read_config_data_byte(unsigned char
      _index)
{
      unsigned char r_data;

      outportb(config_port_index,_index);

      outportb(0xeb,00); //io delay

      r_data=inportb(config_port_data);

      return(r_data);
}
/***********************************/
void write_config_data_byte(unsigned char
      _index,unsigned char _data)
{
      outportb(config_port_index,_index);

      outportb(0xeb,00); //io delay

      outportb(config_port_data,_data);
}
/***********************************/
void write_preload_val2_reg(unsigned long int
      _time_out_val)
{
      unsigned char *p_data;
//    "unsigned char" declaration --> p_data++ =
      addr. BYTE increased.
      p_data=&_time_out_val;
//    printf("%x\n",*p_data);

      unlocking_reg();
      outportb(wdt_io_base+4,*p_data);
      p_data++;
//    printf("%x\n",*p_data);
```

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```
        unlocking_reg();
        outportb(wdt_io_base+5,*p_data);
        p_data++;
//      printf("%x\n",*p_data);

        unlocking_reg();
        outportb(wdt_io_base+6,*p_data);
}
/***********************************/
void clear_preload_val1_reg()
{
        unlocking_reg();
        outportb(wdt_io_base,0x00);

        unlocking_reg();
        outportb(wdt_io_base+1,0x00);

        unlocking_reg();
        outportb(wdt_io_base+2,0x00);

}
/***********************************/
void unlocking_reg()
{
        outportb(wdt_io_base+12,0x80);

        outportb(0xeb,00); //io delay

        outportb(wdt_io_base+12,0x86);
```

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7 BIOS Setup Utility

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

7.1 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 >, and so on.

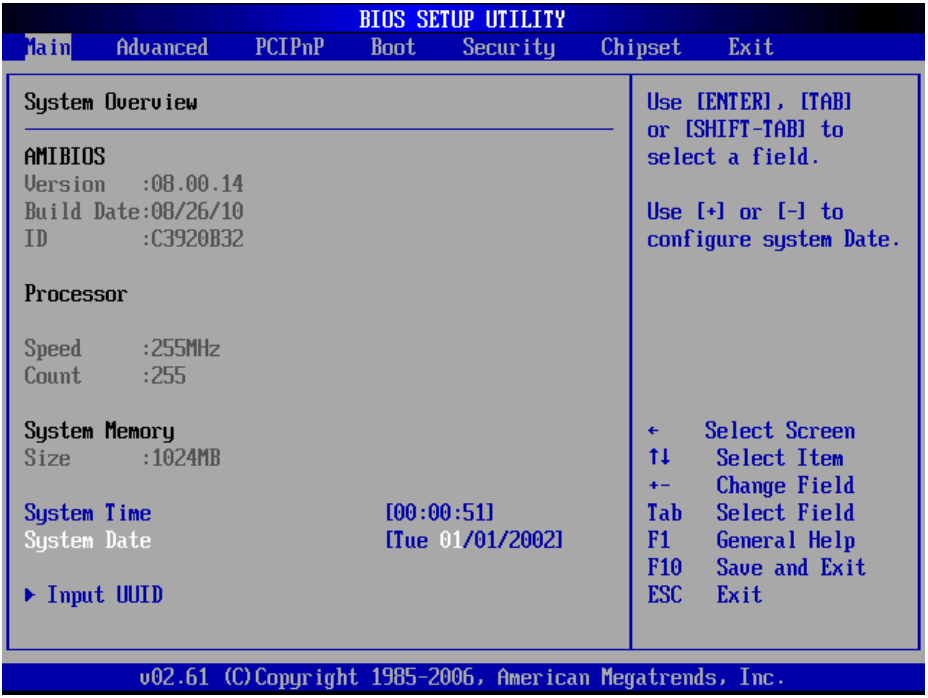
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Setup Menu

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.

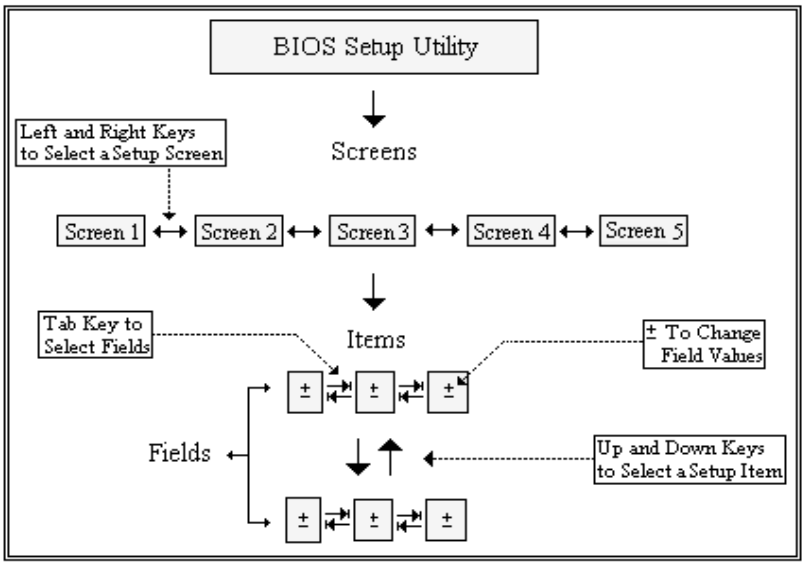


Navigation

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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These keys include < F1 >, < F10 >, < Enter >, < ESC >, < Arrow > keys, and so on. .



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

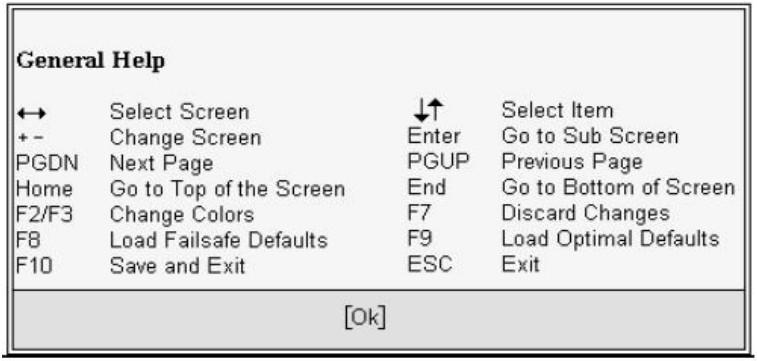
The < F8 > key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the < F8 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

Hotkey Descriptions

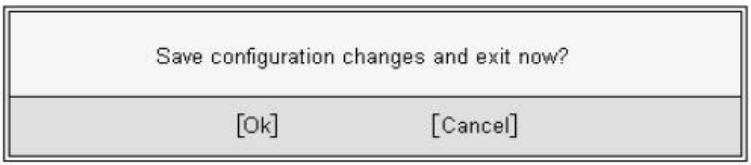
F1 The < F1 > key allows you to display the General Help screen.

Press the < F1 > key to open the General Help screen.

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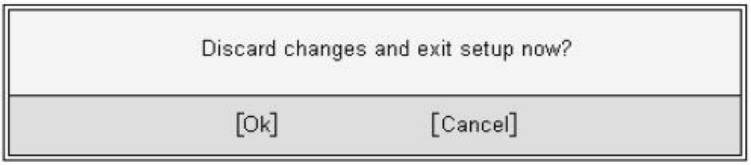


F10 The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:



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:



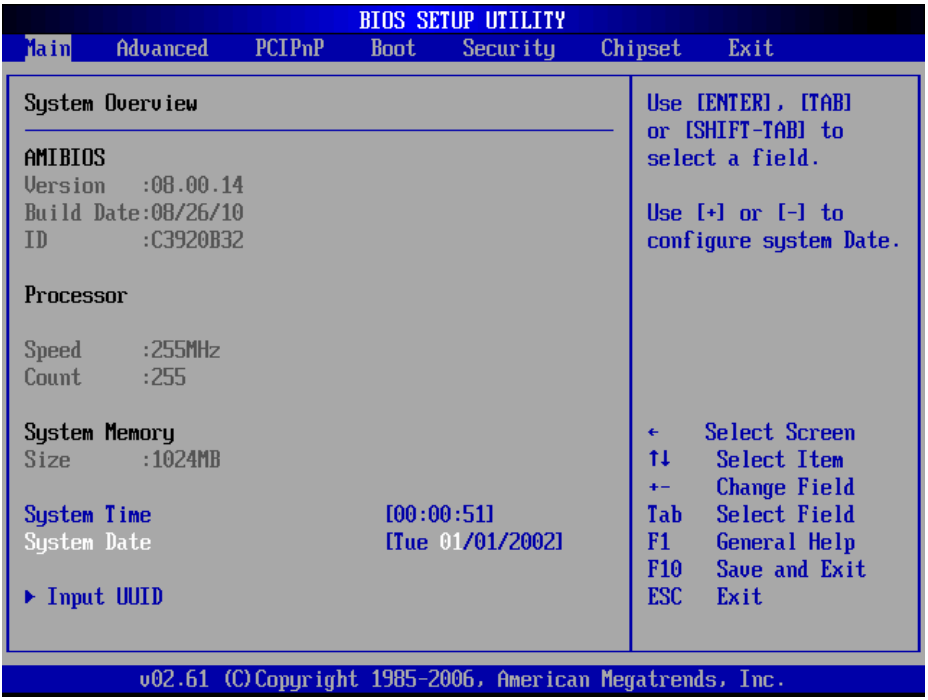
Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

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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7.2 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 Time/System Date

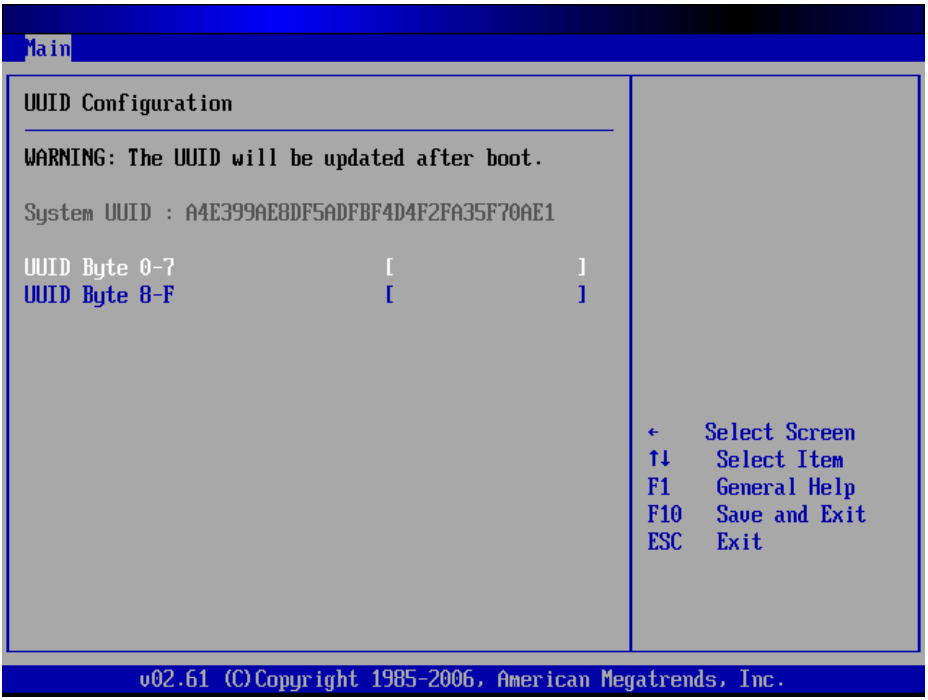
Use this option to change the system time and date. Highlight System Time or System Date using the < Arrow > keys. Enter new values using the keyboard. Press the < Tab > key or the < Arrow > keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

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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Input UUID

Use this function to set a unique Universally Unique Identifier (UUID) for the system.



UUID Byte 0-7

This field sets bytes 0-7 of the UUID.

UUID Byte 8-F

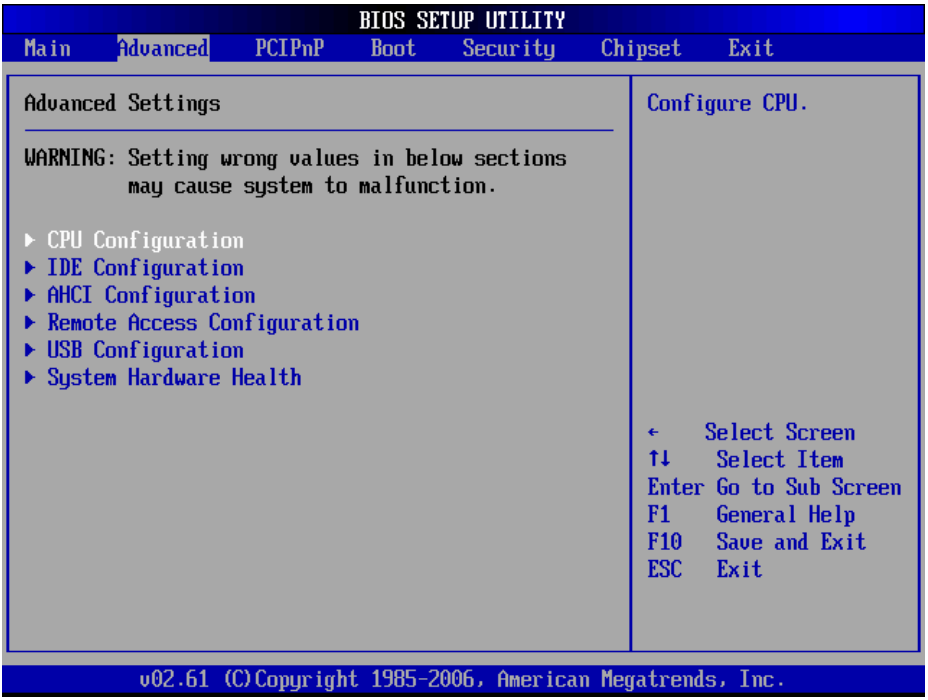
This field sets bytes 8-F of the UUID.

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7.3 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 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.

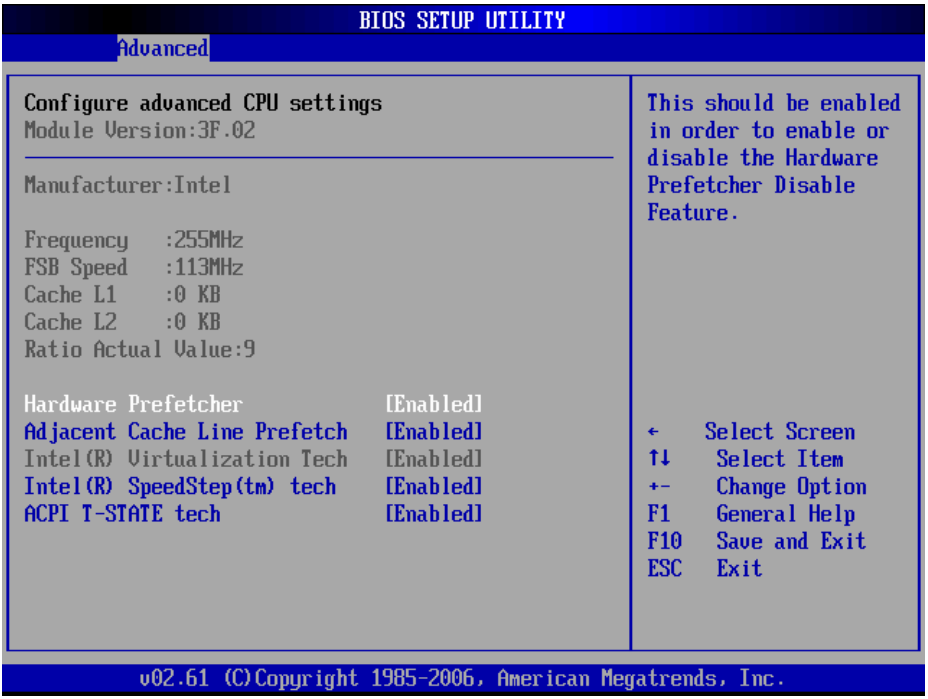


CPU Configuration

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. CPU Configuration screens for the available CPUs are shown below.

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Intel® Core™2 Duo L7400



Hardware Prefetcher

The processor has a hardware prefetcher that automatically analyzes its requirements and prefetches data and instructions from the memory into the Level 2 cache that are likely to be required in the near future. This reduces the latency associated with memory reads.

When **Enabled**, the processor's hardware prefetcher will be enabled and allowed to automatically prefetch data and code for the processor. When **Disabled**, the processor's hardware prefetcher will be disabled.

Adjacent Cache Line Prefetch

The processor has a hardware adjacent cache line prefetch mechanism that automatically fetches an extra 64-byte cache line whenever the processor requests for a 64-byte cache line.

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This reduces cache latency by making the next cache line immediately available if the processor requires it as well.

When **Enabled**, the processor will retrieve the currently requested cache line, as well as the subsequent cache line. When **Disabled**, the processor will only retrieve the currently requested cache line.

Intel® Virtualization Technology

This option is used to enable or disable the Intel® Virtualization Technology (IVT) extension, which is also known by the development code name of Vanderpool. It allows multiple operating systems to run simultaneously on the same system. It does this by creating virtual machines, each running its own x86 operating system. When **Enabled**, the IVT extensions will be enabled, allowing for hardware-assisted virtual machine management. When **Disabled**, the IVT extensions will be disabled. However, software virtual machine managers like VMware can still be used if virtualization is required.

Intel® SpeedStep™ Techology

Allows you to **Enable** or **Disable** Intel® SpeedStep™ Technology. If SpeedStep is disabled, the **CPU Frequency on XP/ Linux** option will become visible.



ACPI T-State Tech

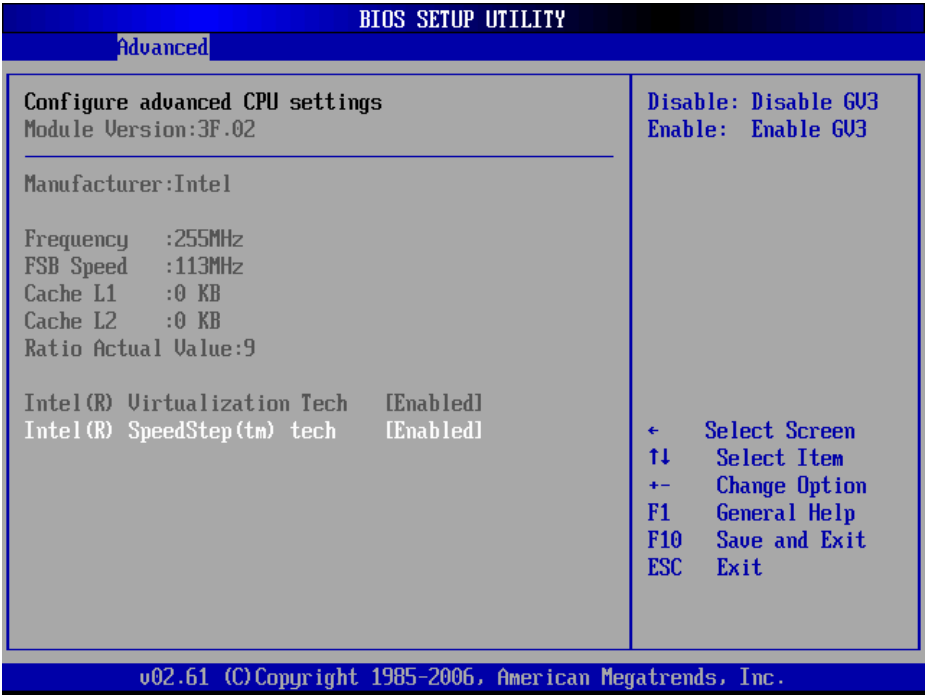
This option allows you to **Enable** or **Disable** ACPI throttling.

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CPU Frequency on XP/Linux

This option is used to manually set the CPU frequency on XP and Linux operating systems. The following options are available: 1500MHz, 1333MHz, 1166MHz, and 1000MHz.

Intel® Core™ Duo U2500



Intel® Virtualization Technology

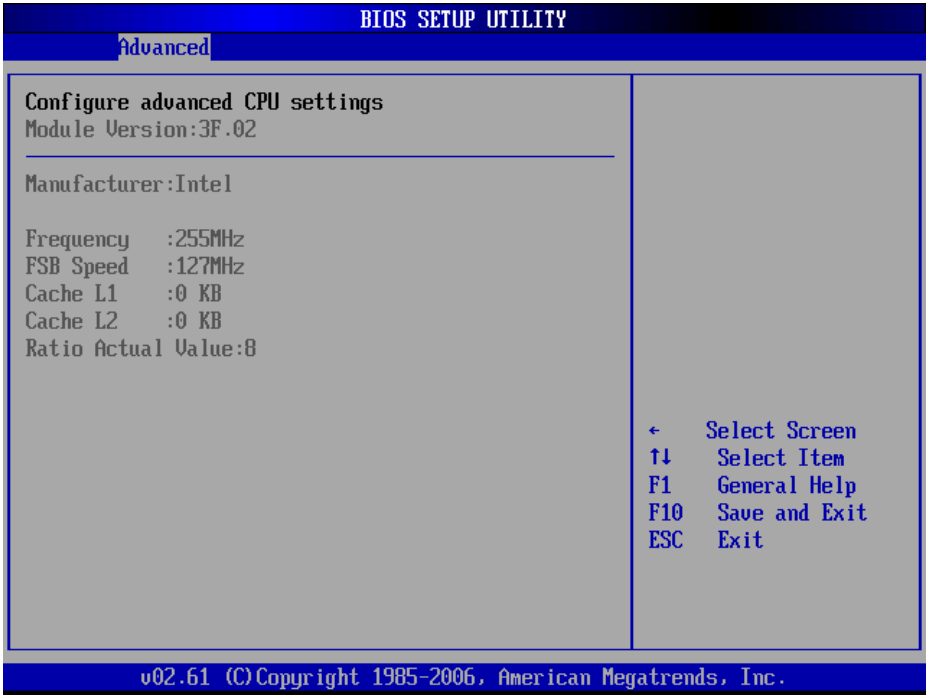
This is used to enable or disable the Intel® Virtualization Technology (IVT) extension, which is also known by the development code name of Vanderpool. It allows multiple operating systems to run simultaneously on the same system. It does this by creating virtual machines, each running its own x86 operating system. When **enabled**, the IVT extensions will be enabled, allowing for hardware-assisted virtual machine management. When **disabled**, the IVT extensions will be disabled. However, software virtual machine managers like VMware can still be used if virtualization is required.

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Intel® SpeedStep™ Techology

This allows you to **enable** or **disable** Intel® SpeedStep™ Technology.

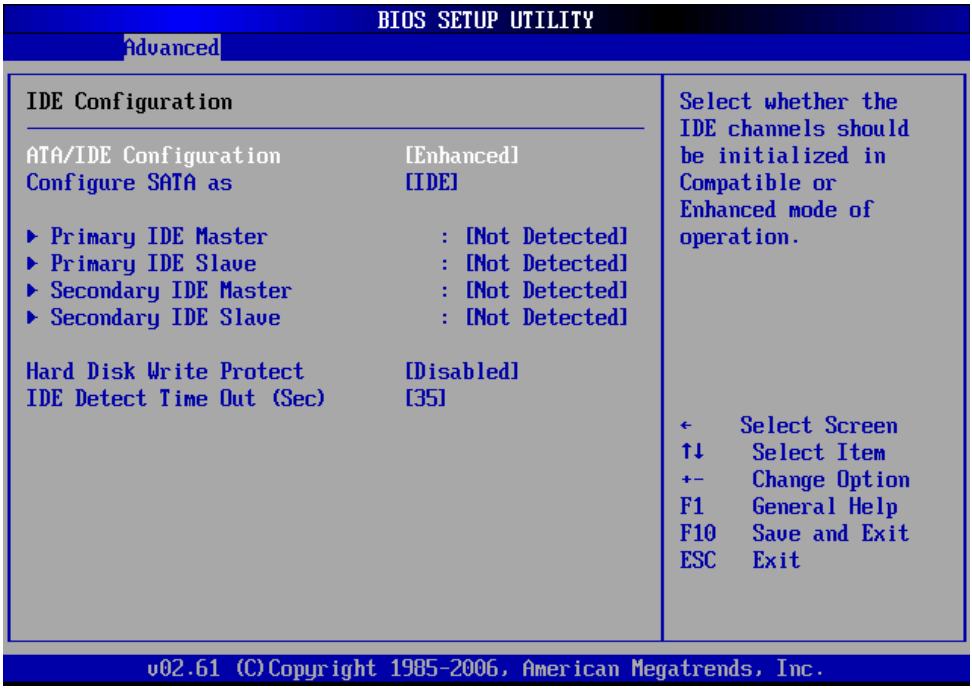
Intel® Celeron® M ULV 423



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IDE Configuration

You can use this screen to select options for the IDE 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 IDE Configuration screen is shown below.



ATA/IDE Configuration

This item specifies whether the IDE channels should be initialized in Compatible or Enhanced mode of operation. The settings are **Disabled**, **Compatible** and **Enhanced**.

Configure SATA as

This item specifies SATA channels transport to what kind of channels. The settings are **IDE mode** and **AHCI mode**.

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Primary IDE Master, Primary IDE Slave, Secondary IDE Master, Secondary IDE Slave

Select one of the hard disk drives to configure it. Press < Enter > to access its sub menu.

Hard Disk Write Protect

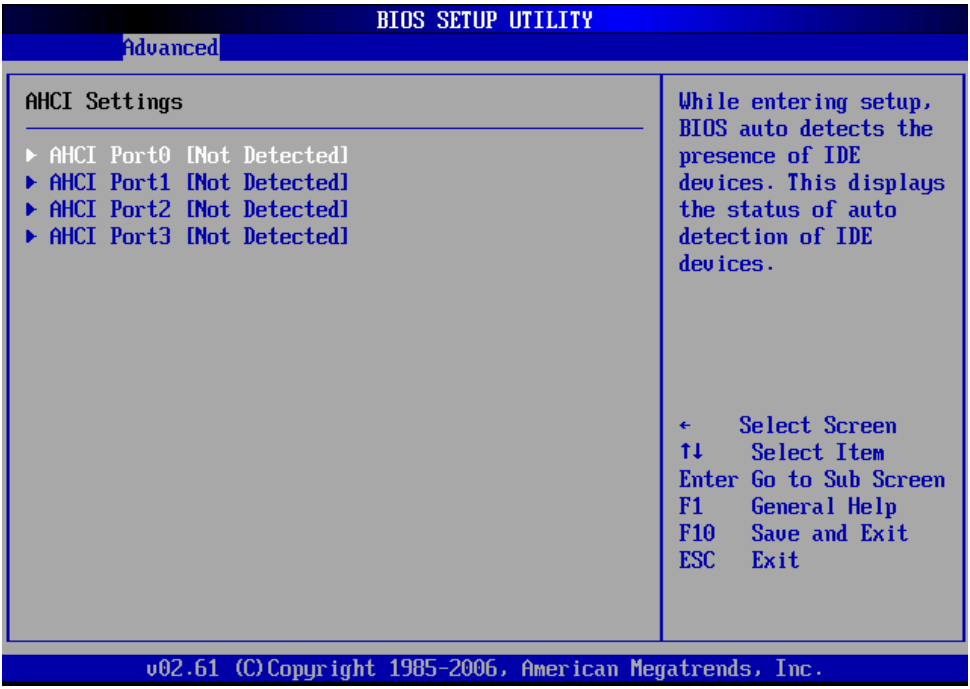
This will be affective only if device is accessed through BIOS. The settings are **Enabled** and **Disabled**.

IDE Detect Time Out (Sec)

Select the time out value for detecting ATA/ATAPI devices. The settings are **0 sec, 5 sec, 10 sec, 15 sec, 20 sec, 25sec, 30 sec,** and **35 sec**.

AHCI Configuration

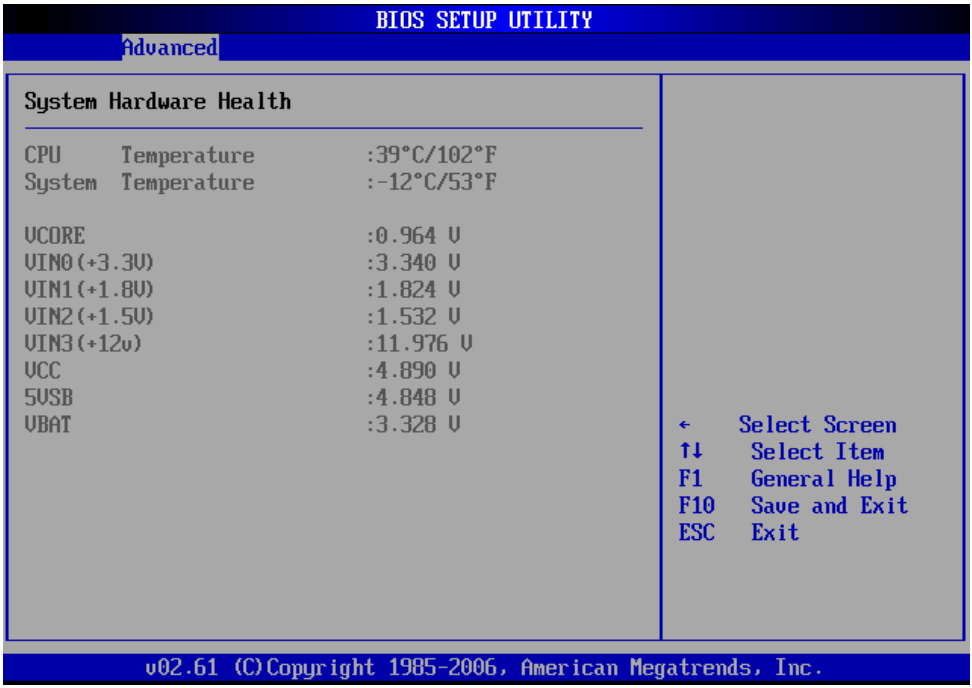
While entering setup BIOS auto detects the presence of IDE devices.



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Hardware Health Configuration

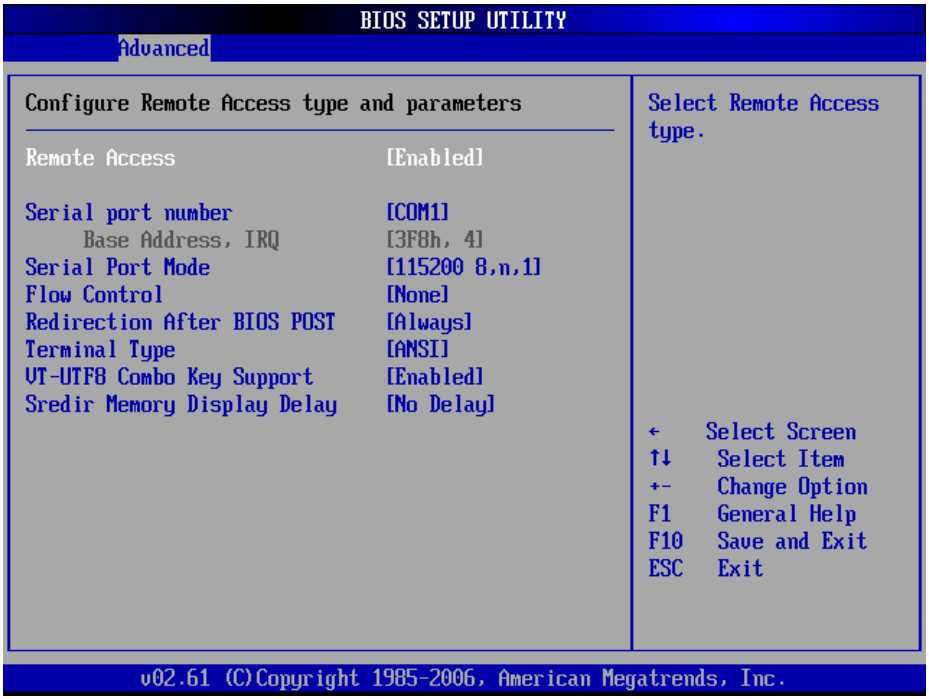
This option displays the current status of all of the monitored hardware devices / components such as voltages and temperatures.



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Remote Access Configuration

Remote Access Configuration provides the settings to allow remote access by another computer to get POST messages and send commands through serial port access.



Remote Access

Select this option to **Enabled** or **Disabled** the BIOS remote access feature.

Serial Port Number

Select the serial port you want to use for the remote access interface. You can set the value for this option to either **COM1** or **COM2**. The Base Address and IRQ of the selected serial port is displayed.

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Serial Port Mode

Select the baud rate you want the serial port to use for console redirection. The options are **115200 8,n,1; 57600 8,n,1; 19200 8,n,1; and 09600 8,n,1**.

Flow Control

Set this option to select Flow Control for console redirection. The settings for this value are **None**, **Hardware**, or **Software**.

Terminal Type

This option is used to select either VT100/VT-UTF8 or ANSI terminal type. The settings for this value are **ANSI**, **VT100**, or **VT-UTF8**.

VT-UTF8 Combo Key Support

This option enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals. The settings for this value are **Enabled** or **Disabled**.

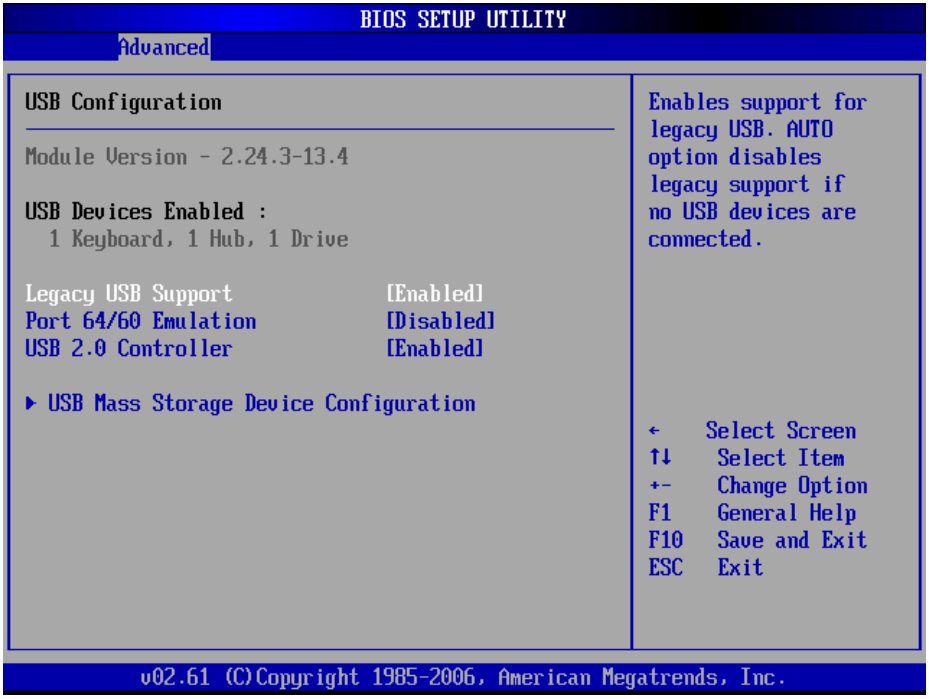
Sredir Memory Display Delay

This option gives the delay in seconds to display memory information. The options for this value are No Delay, Delay 1 Sec, Delay 2 Sec, or Delay 4 Sec.

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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. The settings are described on the following pages. The screen is shown below.



Legacy USB Support

Legacy USB Support refers to USB mouse and keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there are no USB drivers loaded on the system. Set this value to enable or disable Legacy USB Support.

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Disabled Set this value to prevent the use of any USB device in DOS or during system boot.

Enabled Set this value to allow the use of USB devices during boot and while using DOS.

Auto This option auto detects USB Keyboards or Mice and if found, allows them to be utilized during boot and while using DOS.

Port 64/60 Emulation

It uses USB to receive the IO port 64/60 trap to emulate the legacy keyboard controller.

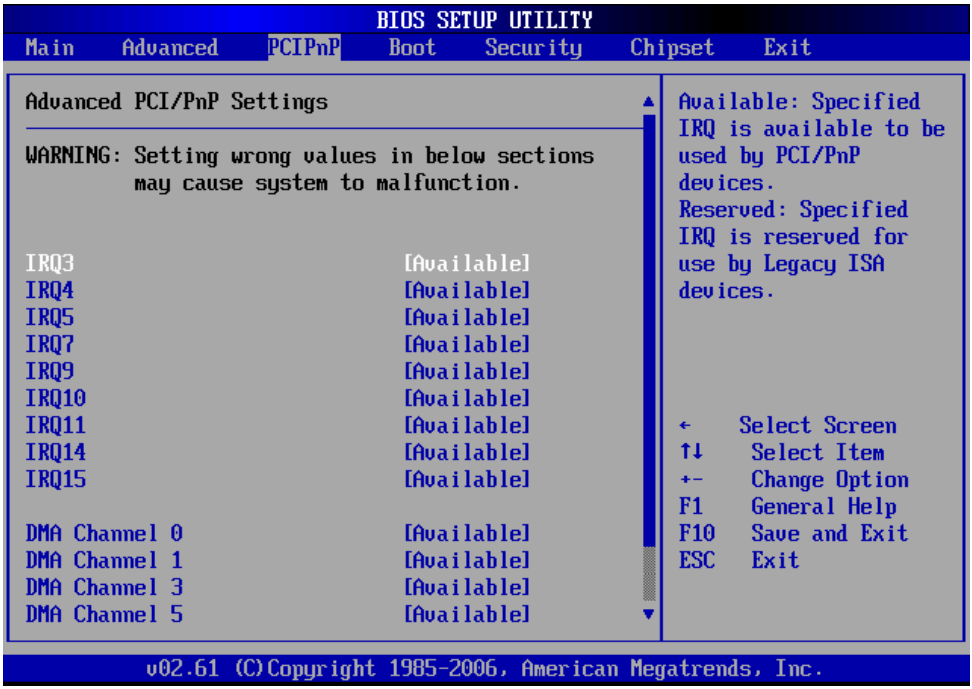
USB 2.0 Controller Mode

The USB 2.0 Controller Mode configures the data rate of the USB port. The options are **FullSpeed (12 Mbps)** and **HiSpeed (480 Mbps)**.

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7.4 PCI/PnP Setup

Select the PCI/PnP tab from the setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the < Arrow > keys. The Plug and Play BIOS Setup screen is shown below.



IRQ

Set this value to allow the IRQ settings to be modified. **Available** – This setting allows the specified IRQ to be used by a PCI/PnP device. **Reserved** – This setting allows the specified IRQ to be used by a legacy ISA device.

DMA Channel

Set this value to allow the MDA settings to be modified. **Available** – This setting allows the specified DMA to be used by a PCI/PnP

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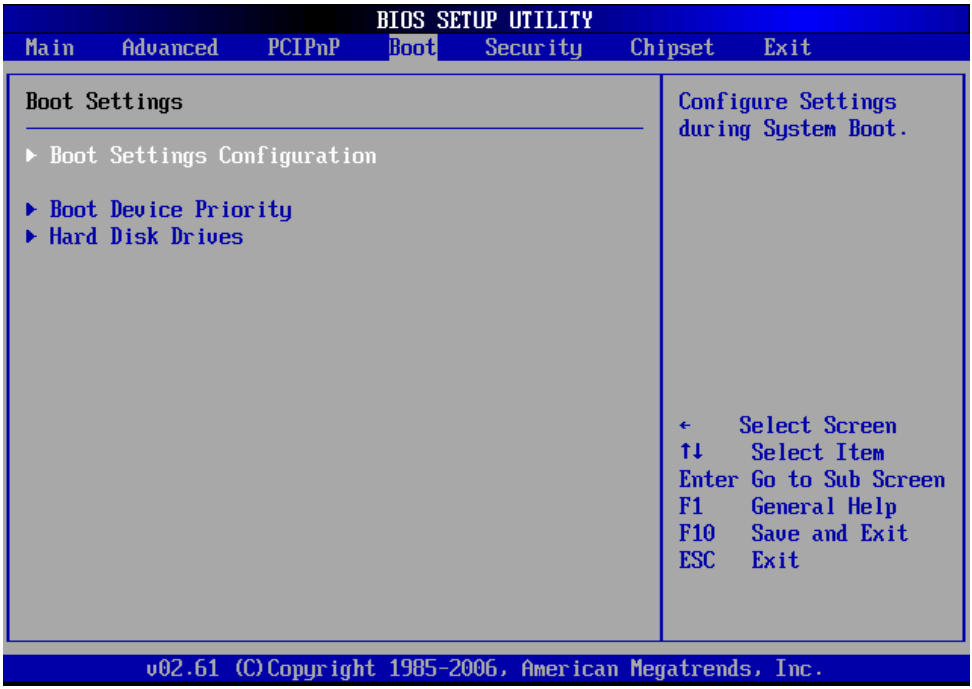
device. **Reserved** – This setting allows the specified DMA to be used by a legacy ISA device.

7.5 Boot Setup

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. Select an item on the Boot Setup screen to access the sub menu for:

- Boot Settings Configuration
- Boot Device Priority
- Removable Devices

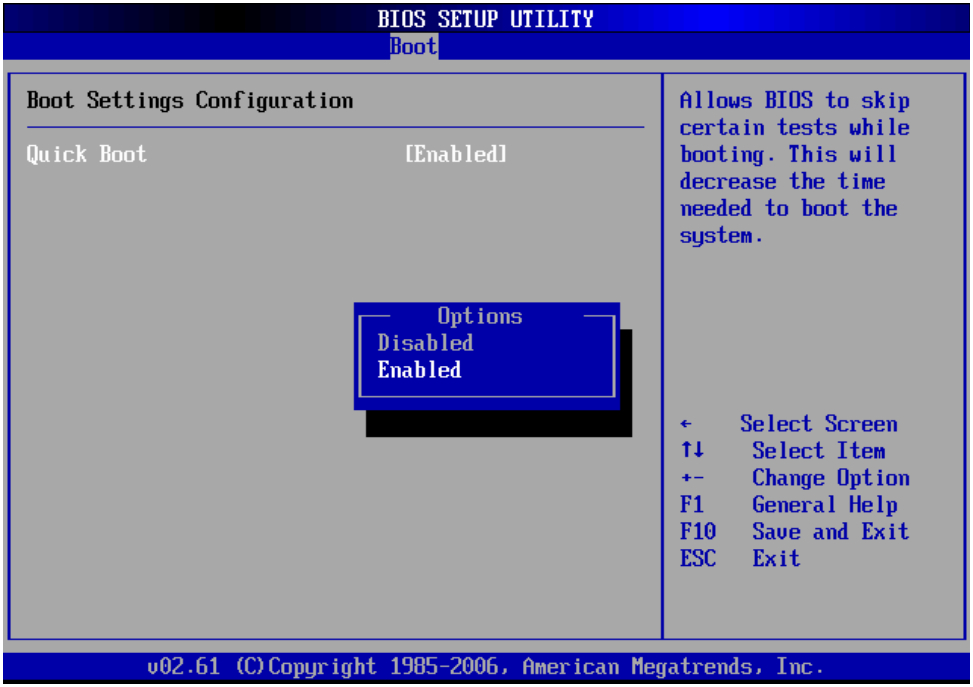
The Boot Settings screen is shown below:



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Boot Setting Configuration

Use this screen to select options for the Boot Settings Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.

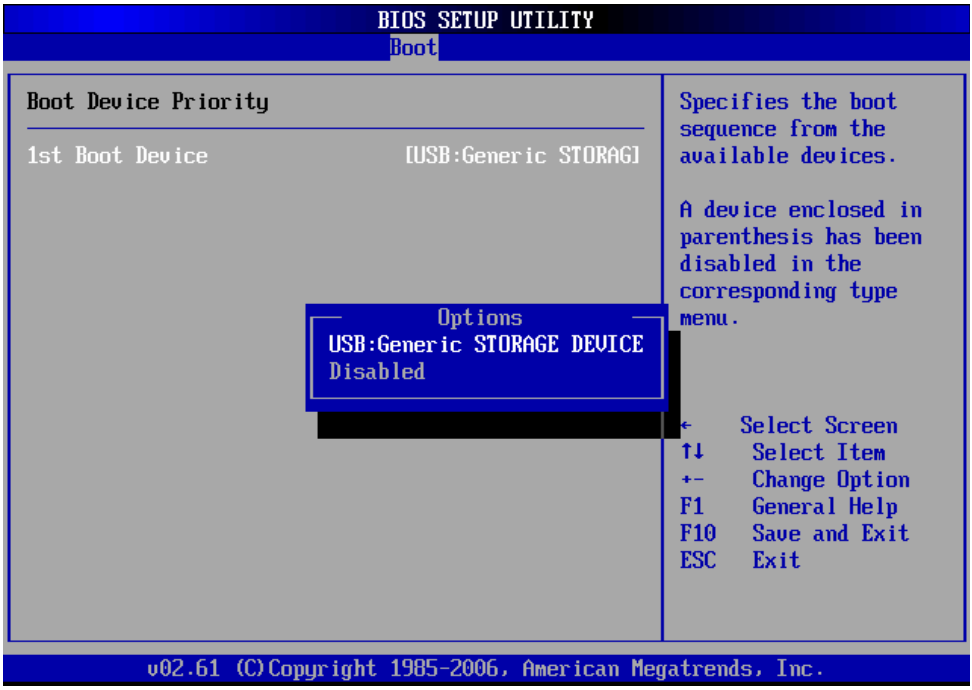


Quick Boot

Disabled – Set this value to allow the BIOS to perform all POST tests. **Enabled** – Set this value to allow the BIOS to skip certain POST tests to boot faster.

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Boot Device Priority

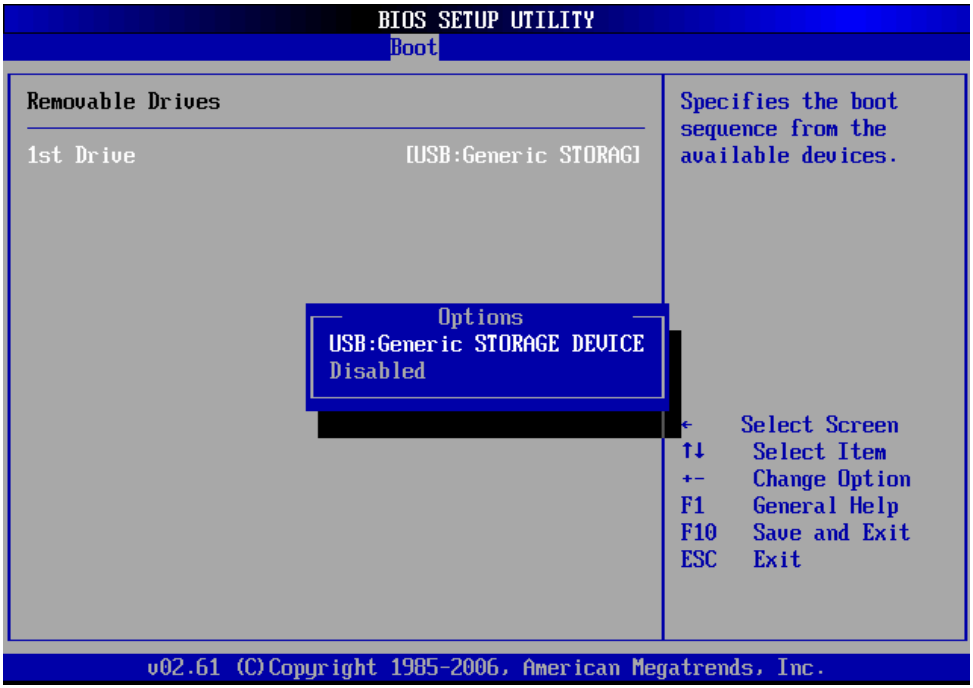


Boot Devices Priority

This specifies the boot sequence from the available devices. The 1st Boot Device is primary device.

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Removable Drives

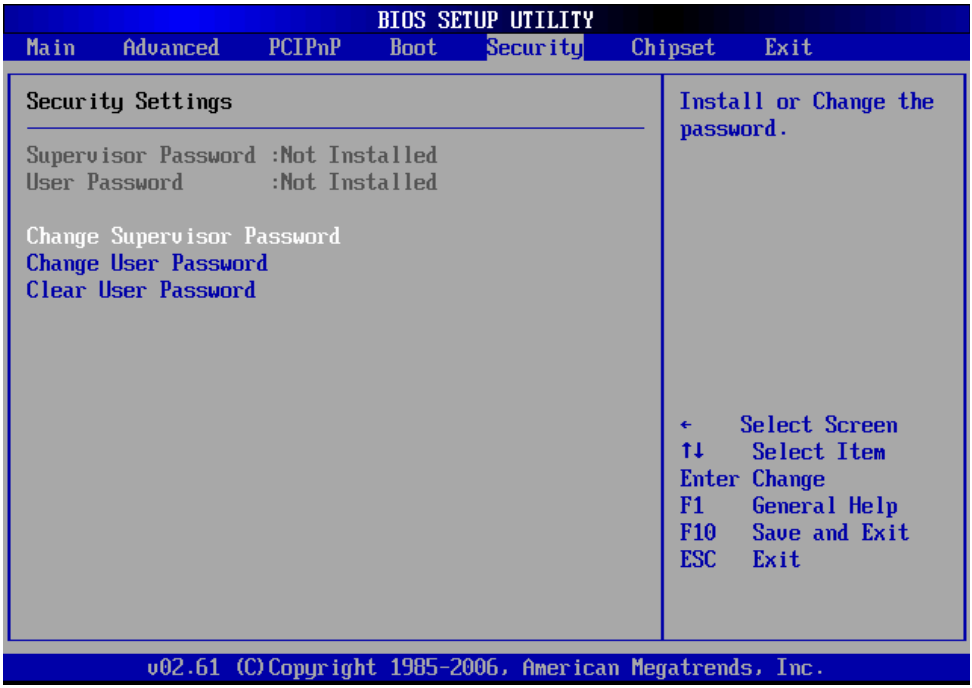


Removable Drives

This specifies the Boot Device Priority sequence from available Removable Drives. Disabled – Set this menu to allow the BIOS to remove device on Boot Device Priority. Device name – Set this menu to allow the BIOS to stay device on Boot Device Priority

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7.6 Security Setup



Password Support

Two Levels of Password Protection

Provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The system can be configured so that all users must enter a password every time the system boots or when Setup is executed, using either or either the Supervisor password or User password.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and re-configure.

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Remember the Password

Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM.

To access the sub menu for the following items, select the item and press < Enter >:

- Change Supervisor Password
- Change User Password
- Clear User Password

Supervisor Password

Indicates whether a supervisor password has been set.

User Password

Indicates whether a user password has been set.

Change Supervisor Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the supervisor password.

Change User Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the user password.

Clear User Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to clear the user password.

Change Supervisor Password

Select Change Supervisor Password from the Security Setup menu and press < Enter >.

Enter New Password:

Type the password and press < Enter >. The screen does not display the characters entered. Retype the password as prompted and press < Enter >. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

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Change User Password

Select Change User Password from the Security Setup menu and press < Enter >.

Enter New Password:

Type the password and press < Enter >. The screen does not display the characters entered. Retype the password as prompted and press < Enter >. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

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7.7 Chipset Setup

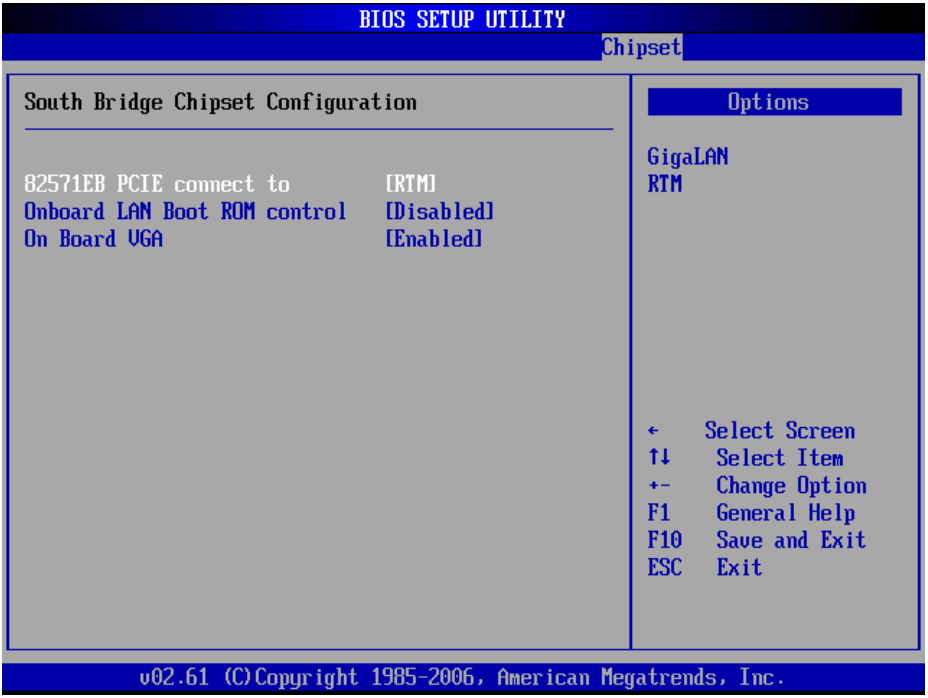
Select the Chipset tab from the setup screen to enter the Chipset BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display a Chipset BIOS Setup option by highlighting it using the < Arrow > keys.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



South Bridge Configuration

You can use this screen to select options for the South Bridge Configuration. South Bridge is a chipset on the motherboard that controls the basic I/O functions, USB ports, audio functions, modem functions, IDE channels, and PCI slots. Use the up and down < Arrow > keys to select an item. Use the < Plus > and < Minus > keys to change the value of the selected option.

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82571EB PCIE connect to

Set the onboard LAN to connect to either J2/RTM or Front I/O. The settings are **RTM** (J2) and **GigaLAN** (Front I/O).

Onboard LAN Boot ROM control

Set this value to enable/disable the LAN Controller PXE function. The PXE function allows system boot from a network environment.

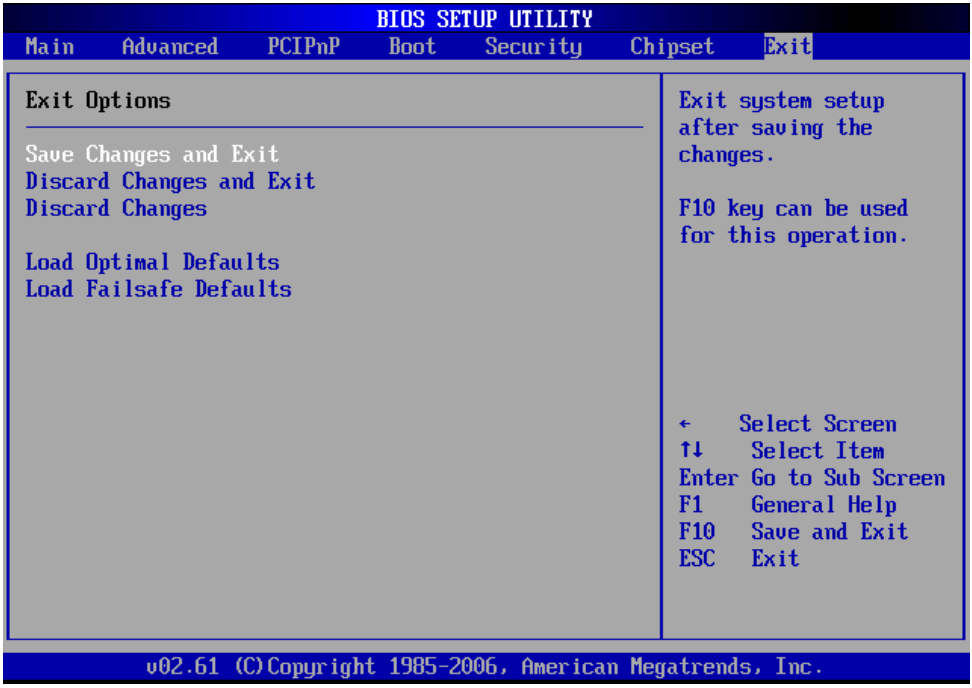
Onboard VGA

You can use this option to control the onboard VGA. The settings are **Enabled** and **Disabled**.

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7.8 Exit Menu

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



Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect.

Save Configuration Changes and Exit Now?

[Ok] [Cancel]

appears in the window. Select Ok to save changes and exit.

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Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

Discard Changes and Exit Setup Now?

[Ok] [Cancel]

appears in the window. Select Ok to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press < Enter >.

Select Ok to discard changes.

Load Optimal Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems.

This page intentionally left blank.

Select Load Optimal Defaults from the Exit menu and press < Enter >.

Select Ok to load optimal defaults.

Load Failsafe Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Failsafe settings are designed for maximum system stability, but not maximum performance. Select the FailSafe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press < Enter >.

Load FailSafe Defaults?

[Ok] [Cancel]

appears in the window. Select Ok to load FailSafe defaults.

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Important Safety Instructions

Please read and follow all instructions marked on the product and in the documentation before operating the system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User's Manual for future reference.
- The equipment should be operated within the recommended operating temperature.
- The equipment should be operated only from the type of power source indicated on the rating label. Make sure the voltage of the power source is correct when connecting the equipment to the power outlet.
- If the user's equipment has a voltage selector switch, make sure that the switch is set to the proper position for the area. The voltage selector switch is set at the factory to the correct voltage.
- For pluggable equipment, ensure they are installed near a socket-outlet that is easily accessible.
- Secure the power cord to prevent unnecessary accidents. Do not place anything over the power cord.
- If the equipment will not be in use for long periods of time, disconnect the equipment from mains to avoid being damaged by transient overvoltage.
- All cautions and warnings on the equipment should be noted.
- Please keep this equipment away from humidity.
- Do not use this equipment near water or a heat source.
- Place this equipment on a reliable surface when installing. A drop or fall could cause injury.
- Never pour any liquid into the opening, this could cause fire or electrical shock.

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- Openings in the case are provided for ventilation. Do not block or cover these openings. Make sure there is adequate space around the system for ventilation when setting up the work area. Never insert objects of any kind into the ventilation openings.
- To avoid electrical shock, always unplug all power and modem cables from the wall outlets before removing covers.
- The equipment should be checked by service personnel if one of the following situation arises:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - The equipment has been exposed to moisture.
  - The equipment is not functioning or does not function according to the user's manual.
  - The equipment has been dropped and damaged.
  - If the equipment has obvious sign of breakage.
- Never open the equipment. For safety reasons, the equipment should only be opened by qualified service personnel.

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Getting Service

Contact us should you require any service or assistance.

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