ReadyBoard™ 910
Single Board Computer
Reference Manual

P/N 50-1Z115-1020

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Notice Page

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REVISION HISTORY

Revision	Reason for Change	Date
1000	Initial Release	Apr/12
1010	Added 3rd Generation Core i and Celeron B810 CPUs; revised spec links in Ch 1; revised VBAT voltage to 3.0; revised cooling requirements; added battery life expectancy note to Table 3-11; removed grounding bracket from P/S2 connector in all board illustrations	Aug/13
3.0	Added PCIe Mini Specification, 1.1 to Ch 1; removed functionality of SW1 switch from Table 2-2 and replaced with reference to Oops! Jumper section; added note to "Video Interfaces" "Video Interfaces" in Ch 3 that DVI support is only for DVI-D signals; added note to "Oops! Jumper (BIOS Recovery)" that this function only supports COM0; changed revision of this document from 1010 to 3.0	Nov/14

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Audience

This manual provides reference only for computer design engineers, including but not limited to hardware and software designers and applications engineers. ADLINK Technology, Inc. assumes you are qualified to design and implement prototype computer equipment.

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Chapter 1 About This Manual

Purpose of this Manual

This manual is for designers of systems based on the ReadyBoard 910 Single Board Computer (SBC). The information in this manual helps designers create embedded systems based on specific design requirements.

Information provided in this reference manual includes:

- ReadyBoard 910 Specifications
- Environmental requirements
- Major integrated circuits (chips) and features implemented
- ReadyBoard 910 connector/pin numbers and definitions
- BIOS Setup information

Information not provided in this reference manual includes:

- Detailed chip specifications
- Internal component operation
- Industry-standard interface pin-out tables
- Internal registers or signal operations
- Bus or signal timing for industry standard busses and signals

References

The following list of references may help you successfully complete your design.

Industry Standard Specifications:

- EPIC Specification Revision 2.0, January 2005

  Web site: http://www.pc104.org/specifications.php
- Intel® High Definition Audio (HDA) Specification 1.0a

  Web site: http://www.intel.com/content/www/us/en/search.html?keyword=audio+specification
- PCI-104 Specification

  Web site: http://www.pc104.org/pci_104_specs.php
- PCI 2.3 Compliant Specifications

  For latest revision of the PCI specifications, contact the PCI Special Interest Group Office at:

  Web site: http://www.pcisig.com
- PCIe Mini Card Specification, 1.1

  Specification: http://read.pudn.com/downloads122/doc/project/518585/PCI_Express_Mini_CEM_11_16Jul04RD.pdf
- USB Specification Version 2.0 and 3.0

  Web site: http://www.usb.org/developers
- SATA Specification Version 3.1

  Web site: http://www.sata-io.org/
- LPC Specification Version 1.1

  Web site: http://www.intel.com/design/chipsets/industry/lpc.htm

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- SMBus Specification Version 2.0

  Specification: http://smbus.org/specs/

- AMI BIOS Aptio TSE User's Guide

  Datasheet: http://www.ami.com/support/doc/AMI_TSE_User_Manual_PUB.pdf

Chip specifications:

- Intel Corporation and the Mobile 2nd and 3rd Generation Core™i or Celeron© B810 CPUs

  Web site: http://ark.intel.com/

- Intel Corporation and the BD82HM65, 6 Series Express chipset, featured as the Platform Controller Hub (PCH)

  Datasheet: http://www.intel.com/Assets/PDF/datasheet/324645.pdf

- Intel Corporation and the 82574IT chip (2), used for the Gigabit Ethernet controller.

  Web site: http://download.intel.com/design/network/datashts/82574.pdf

- Greenliant and the GLS85LS1004A Solid State Drive (SSD)

  Web site: http://www.greenliant.com/products/?inode=47717

- Linear Technology and the LTC1334CG, RS-232/422/485 Serial Port transceiver

  Web site: http://www.linear.com/products/rs485%7C422_transceivers

- Analog devices and the ADM213EARSZ, RS-232 Serial Port transceiver

  Web site: http://www.analog.com/en/interface/rs-232/adm213e/products/product.html

- Pericom Semiconductor and the PCIe-to-PCI bridge, PI7C9X110BNBE

  Web site: http://www.pericom.com/products/pcie-pci-bridges/?part=PI7C9X110

- Realtek and the ALC262 chip, used for the Audio CODEC.

  Web site: http://www.realtek.com.tw/search/default.aspx?keyword=alc262

- Standard Microsystems Corp and the SCH3114I-NU chip, used for the Super I/O controller.

  Web site: http://www.smsc.com/main/catalog/sch311x.html

NOTE	If you are unable to locate the datasheets using the links provided, search the internet to find the manufacturer's web site and locate the documents you need.

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Chapter 2 Product Overview

This overview presents general information about the EPIC form factor and the ReadyBoard 910 Single Board Computer (SBC). After reading this chapter you should understand:

- EPIC architecture
- Product Description
- ReadyBoard 910 features
- Major components
- Connectors
- Specifications

EPIC Architecture

In 2004, five companies collaborated to fill the void between the EBX size and the PC/104 size with a new industry standard form factor (115mm x 165mm, or 4.5" x 6.5") called “Embedded Platform for Industrial Computing™ (EPIC).” The EPIC standard principally defines physical size, mounting hole pattern, and power connector locations. It does not specify processor type or electrical characteristics. There are recommended connector placements for I/O, graphics, and memory expansion. This embedded SBC standard ensures that embedded system OEMs can standardize their designs and that full featured embedded computing solutions can be designed into even more space constrained environments than ever before.

The EPIC standard boasts the same highly flexible and adaptable system expansion as EBX, allowing easy and modular addition of functions such as Firewire or wireless networking not usually contained in standard product offerings. The EBX system expansion is based on popular existing industry standards, PC/104™, PC/104-Plus™, and PCI-104™. PC/104 places the ISA bus on compact 3.6" x 3.8" modules with self-stacking capability. PC/104-Plus adds the power of a PCI bus to PC/104 while retaining the basic form factor, but PCI-104 expansion cards only provide the PCI Bus to the PC/104 form factor. Using PC/104 expansion cards, an EPIC board can be easily adapted to meet a variety of embedded applications. See Figures 2-1 and 2-2.

The EPIC standard also brings stability to the mid-sized embedded board market and offers OEMs assurance that a wide range of products will be available from multiple sources – now and in the future. The EPIC specification is freely available to all interested companies, and may be used without licenses or royalties. For further technical information on the EPIC standard, visit the web site at: http://www.pc104.org/epic_specs.php.

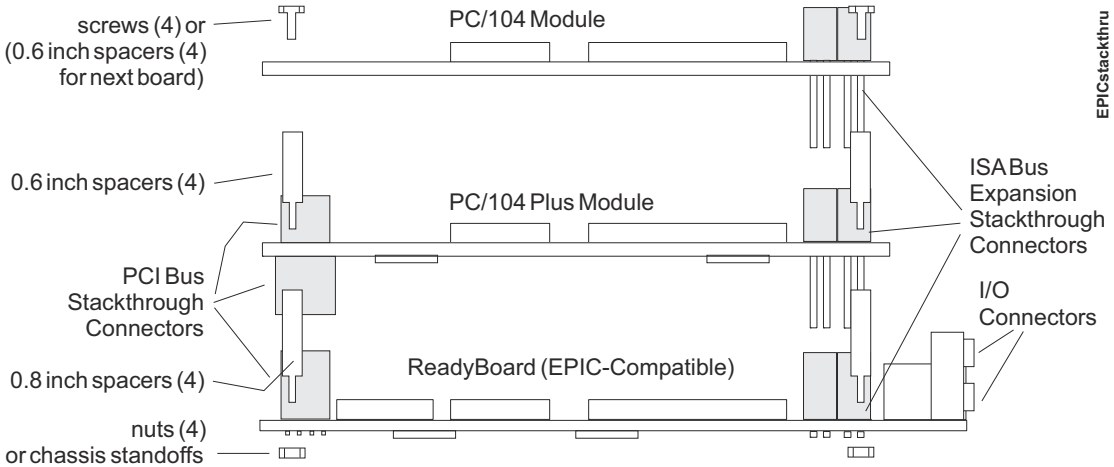


Figure 2-1. Typical ReadyBoard and PC/104 Module Stack

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Product Description

The ReadyBoard 910 is a mid-sized, EPIC-compatible, high quality single-board system, which contains all the component subsystems of a PC/AT PCI motherboard plus the equivalent of up to 4 PCI expansion boards. The ReadyBoard 910 is based on the high-performance, high-integration, Intel® Core™ i3, i5 i7, and lower-cost Celeron® CPUs, which incorporate multi cores with integrated Northbridge Graphics and Memory Hubs (GMHs), providing high-performance processor cores, memory controllers for up to 16GB of standard DDR3 SODIMM memory, and graphics controllers for VGA, LVDS, and DVI signals driven by the chipset. One of these processors combined with the matching chipset provide the designer a complete integration solution based on the EPIC form factor and Revision 2.0 of the EPIC standard.

Each ReadyBoard 910 incorporates an Intel BD82HM65 chipset for the Platform Controller Hub (PCH) function featuring two USB 2.0 ports, two USB 3.0 ports, two SATA 3.0 ports, one SATA 2.0 port dedicated for the SSD, six PCIe x1 ports, one SMBus port, one GPIO port, and one HD audio port. The SMSC Super I/O controller, SCH3114IU-NU, adds legacy I/O functions for PS/2 keyboard and mouse interfaces and two serial port interfaces. The ReadyBoard 910 also supports two independent Gigabit Ethernet interfaces through PCIe x1 Ports 3 and 4, one PCI-104 interface through PCIe x1 Port 2, and one PCIe Mini Card interface through PCIe x1 Port 6.

The ReadyBoard 910 can be expanded through the PCI-104 expansion bus to accept PCI-104 cards that offer compact, self-stacking, modular expandability for additional system functions. The PCI-104 bus only implements the signal set for the PCI bus and is available on the 120-pin (4 rows of 30 pins) expansion bus connector. The PCI bus operates at 33 MHz clock speed. See Figure 2-2.

Among the many embedded enhancements on the ReadyBoard 910 that ensure embedded system operation and application versatility are a Watchdog Timer, serial console support, battery-free boot, optional customizable logo screen (see Sales Representative), on-board PCIe Mini Card socket, and ACPI support for sleep states.

The ReadyBoard 910 is particularly well suited to embedded applications by meeting the size, power consumption, temperature range, quality, and reliability demands of embedded system applications. It can be stacked with ADLINK MiniModules™ or other PCI-104 compliant expansion boards, or it can be used as a powerful computing engine. The ReadyBoard 910 requires only a +5V power supply, however, certain functions such PCI-104, LVDS, fans, and PCIe Mini Card require +12V.

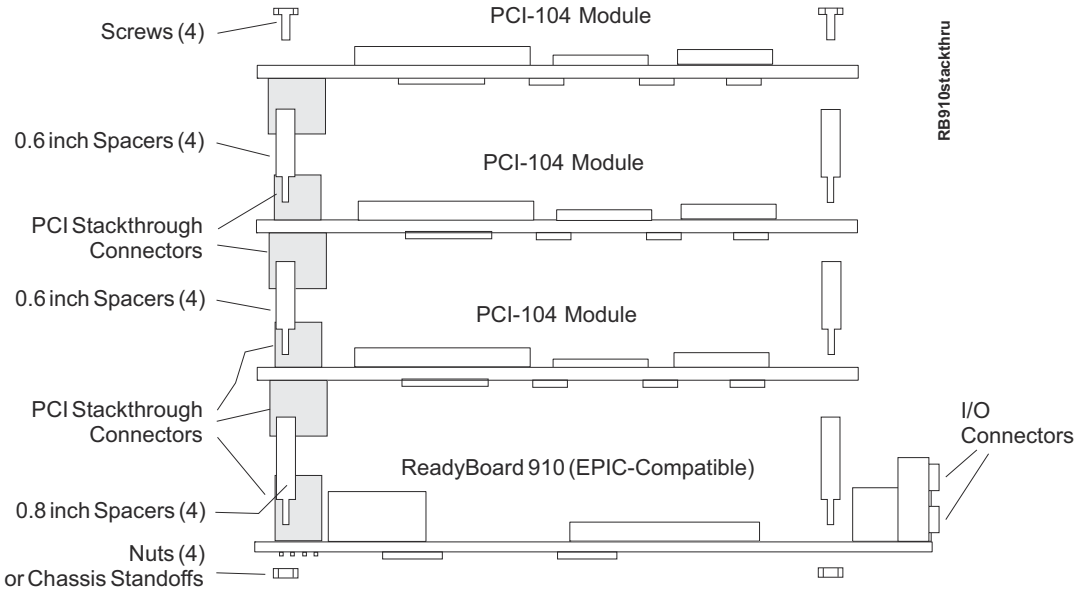


Figure 2-2. PCI-104 Modules Stacked on a ReadyBoard 910

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Board Features

- CPU
  - Supports Intel 35W Celeron and 35W and 45W 2nd and 3rd Generation Core i processors
  - Provides DMI (Direct Media Interface) with 2GB/s of maximum theoretical bandwidth in each direction
  - Provides FDI (Flexible Display Interface) for carrying display traffic to the PCH
  - Supports internal 256KB L2 cache for each execution core
  - Supports up to 8MB L3 cache shared among all cores
  - Supports Enhanced Intel SpeedStep® Technology (EIST)
  - Supports rPGA988B socket package
- Memory
  - Provides dual standard 204-pin DDR3 SODIMM sockets
  - Supports +1.5V DDR3, 1067/1333 MHz SDRAM up to 16GB total
  - Supports unregistered/unbuffered, non-ECC SDRAM
- PCI-104 Bus Interface
  - Supports PCI 2.3 standard
  - Supports 33 MHz PCI Bus speed
  - Supports up to four PCI devices
  - Provides 120-pin, 16.5mm height connector
- Serial ATA Interface (SATA)
  - Provides two standard 7-pin SATA 3.0 connectors
  - Supports up to 6Gb/second data transfer rate
  - Support independent DMA operation
  - Supports Native Command Queuing
  - Provides Auto Activate for DMA
  - Supports Hot Plug features
- USB Ports
  - Provide two root USB 2.0 hubs
  - Provide two USB 2.0 ports through a 10-pin header
  - Provide dual standard USB 3.0 stacked connector through the PCIe x1 Port1
  - Support USB bootable devices
  - Support USB 2.0 and legacy USB v1.1
  - Support USB 3.0 for SuperSpeed, High-Speed, and Full-Speed signals
  - Provide over-current fuses on board
- Serial Ports
  - Provide two buffered serial ports with full handshaking
  - Provide one 10-pin header for one serial port
  - Provide one 9-pin standard DB9 connector for one serial port
  - Provide 16550-equivalent controllers, each with a built-in 16-byte FIFO buffer

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- Support RS232 capability on both ports
- Support full modem capability on both ports
- Support RS485 or RS422 operation on both ports
- Support programmable word length, stop bits, and parity
- Support 16-bit programmable baud-rate generator and an interrupt generator

- Keyboard/Mouse Interface
  - Provides PS/2 keyboard interface (shared with mouse)
  - Provides PS/2 mouse interface (shared with keyboard)
  - Provides shared over-current fuse
  - Provides four dedicated open-drain outputs
- Audio Interface (HDA)
  - Provides detection for up to four jacks
  - Supports stereo low voltage (1.5V~3.3V) I/O
  - Supports stereo digital microphone input
  - Provides S/PDIF digital audio interface
- Ethernet Interface
  - Includes two fully independent RJ45 Gigabit Ethernet ports
  - Integrated LEDs on each port (Link/Activity and Speed)
  - Provides two Intel 8257IT controller chips
  - Supports IEEE 802.3 10BaseT/100BaseTX and 10/100/1000BaseT compatible physical layer
  - Supports Auto-negotiation for speed, duplex mode, and flow control
  - Supports full duplex or half-duplex mode
    - Full-duplex mode supports transmit and receive frames simultaneously
    - Supports IEEE 802.3x Flow control in full duplex mode
    - Half-duplex mode supports enhanced proprietary collision reduction mode
- Video Interfaces (VGA/DVI/LVDS)
  - Support an integrated graphics controller
  - Support analog a VGA DAC interface
  - Support VGA resolutions up to 2048x1536 with 32-bit color at 75Hz
  - Support DVI outputs (allow capacity to bring out TMDS signals to a DVI connector)
  - Support DVI resolutions up to 1920x1200 at 60Hz
  - Support LVDS 24bpp outputs (1 or 2 channel, four differential signals: 3-bits + clock)
  - Support LVDS resolutions up to 1920x1080 at 60Hz
- Miscellaneous
  - Provides real-time clock (RTC) with replaceable battery
  - Supports battery-free boot
  - Provides external battery connection for RTC operation
  - Provides user GPIO interface header
  - Provides thermal and voltage monitoring

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- Provides SMBus data and clock headers
- Provides headers for optional CPU and System fans (+12 volt power supply required)
- Supports a customizable Logo (Splash) Screen (contact Sales Representative)
- Supports Serial Console
- Provides Watchdog Timer
- SSD (Solid State Drive)
- Provides EXT header for optional CAN and Telecom modules

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Block Diagram

Figure 2-3 illustrates the functional components of the ReadyBoard 910.

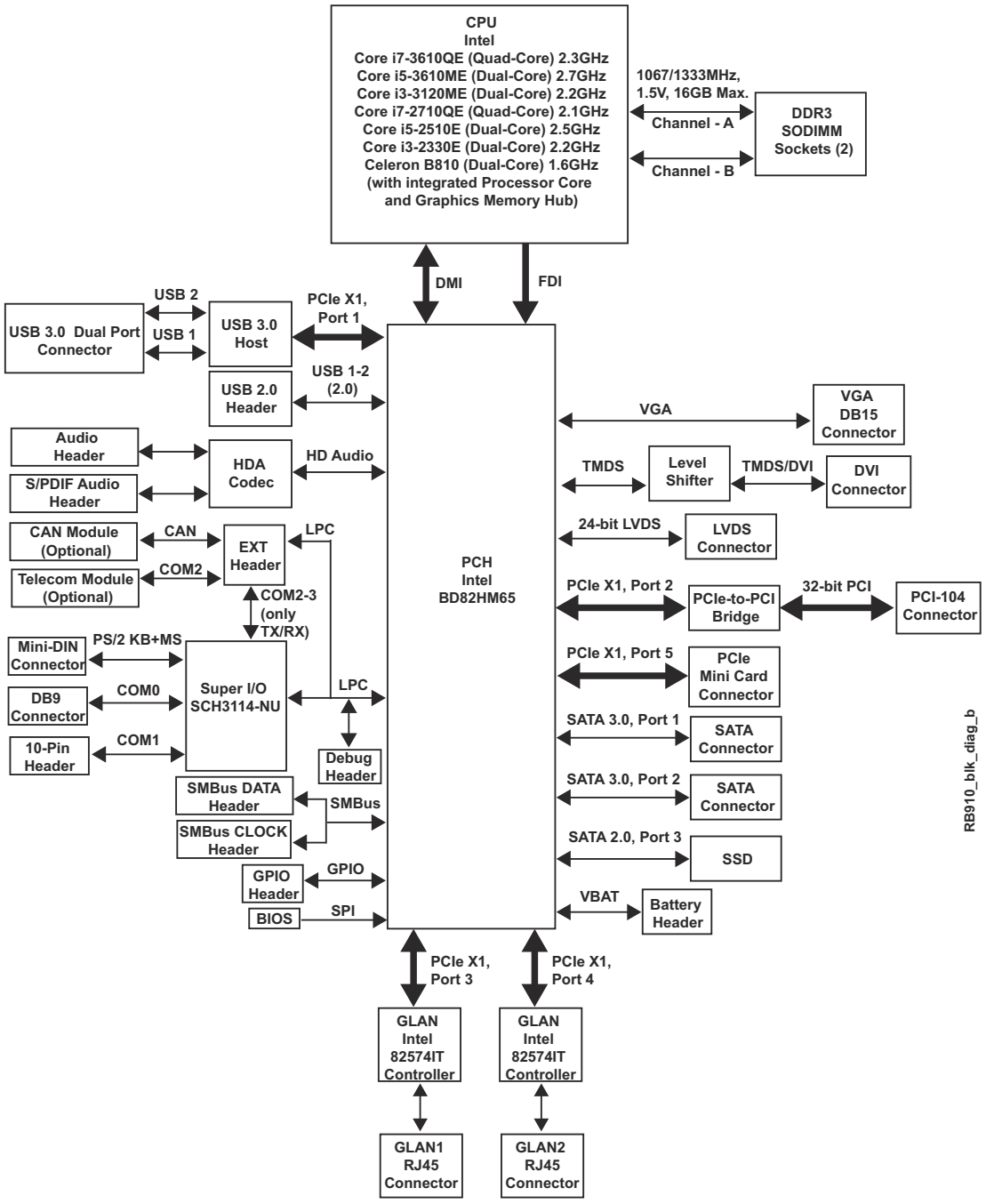


Figure 2-3. Functional Block Diagram

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Major Components (ICs)

Table 2-1 lists the major Integrated Circuits (ICs) on the ReadyBoard 910, including a brief description of each IC. Figure 2-4 shows the locations of the major ICs.

Table 2-1. Major Component Descriptions and Functions

Chip Type	Mfg.	Model	Description	Function
PCIe-to-PCI Bridge (U5)	Pericom Semiconductor	PI7C9X110BNBE	PCIe-to-PCI interface	Migrates legacy PCI interfaces
PCH (Platform Controller Hub [U15])	Intel	BD82HM65	I/O Hub for common user interfaces	Provides Southbridge interfaces and off loads some Northbridge functions from CPU
TMDS Level Shifter (U18)	ASMEDIA Technology	ASM1442	TMDS level-shift IC for DVI video	Converts PCIe differential input from the PCH to DVI differential output
RS-485/422 Transceiver (U22)	Linear Technology	LTC1334CG#PBF	RS-485/422 Transceiver for COM0 and COM1	Transmits and receives RS-485/ 422 signals for COM0 and COM1
Super I/O Hub (U24)	SMSC	SCH3114I-NU	Super I/O controller	Provides complete legacy Super I/O functionality
Solid State Drive [SSD] - SATA (U25)	Greenliant	GLS85LS1004A	Industrial-grade soldered, solid-state storage module	Provides solid-state storage through SATA (2.0) port 1
HD Audio CODEC (U26)	Realtek	ALC262-VC2-GR	Encoder and decoder of audio data for transmission, storage, encryption, playback, or editing	Provides four channels of ADC conversion and six channels of DAC display
CPU (U30)	Intel	Core i3-3120ME, 2.4GHz, 35W; Core i5-3610ME, 2.7GHz, 35W; Core i7-3610QE, 2.3GHz, 45W Celeron B810, 1.6GHz, 35W; Core i3-2330E, 2.2GHz, 35W; Core i5-2510E, 2.5GHz, 35W; Core i7-2710QE, 2.1GHz, 45W	Central Processing Unit with 2 or 4 execution cores and up to 8MB L3 cache in an rPGA988B socket package	Integrates Processor Core and Graphics Memory Controller Hub

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Table 2-1. Major Component Descriptions and Functions (Continued)

Gigabit Ethernet Controller (U33)	Intel	82574IT	Gigabit Ethernet controller for GLAN1	Generates PCIe 10T/100TX/1000T Ethernet signals
Gigabit Ethernet Controller (U34)	Intel	82574IT	Gigabit Ethernet controller for GLAN2	Generates PCIe 10T/100TX/1000T Ethernet signals
Ethernet EEPROM (U38 [and U63 on bottom side])	PCT	PCT25VF010A	Four-Wire Serial EEPROM for Gigabit Ethernet Controller (U38 for GLAN1; U63 for GLAN2)	Provides storage for MAC addresses, serial numbers, and pre-boot configuration data
RS-232 Transceiver (U46)	Analog Devices	ADM213EARSZ	RS-232 Transceiver for COM0 and COM1	Transmits and receives RS-232 signals for COM0 and COM1

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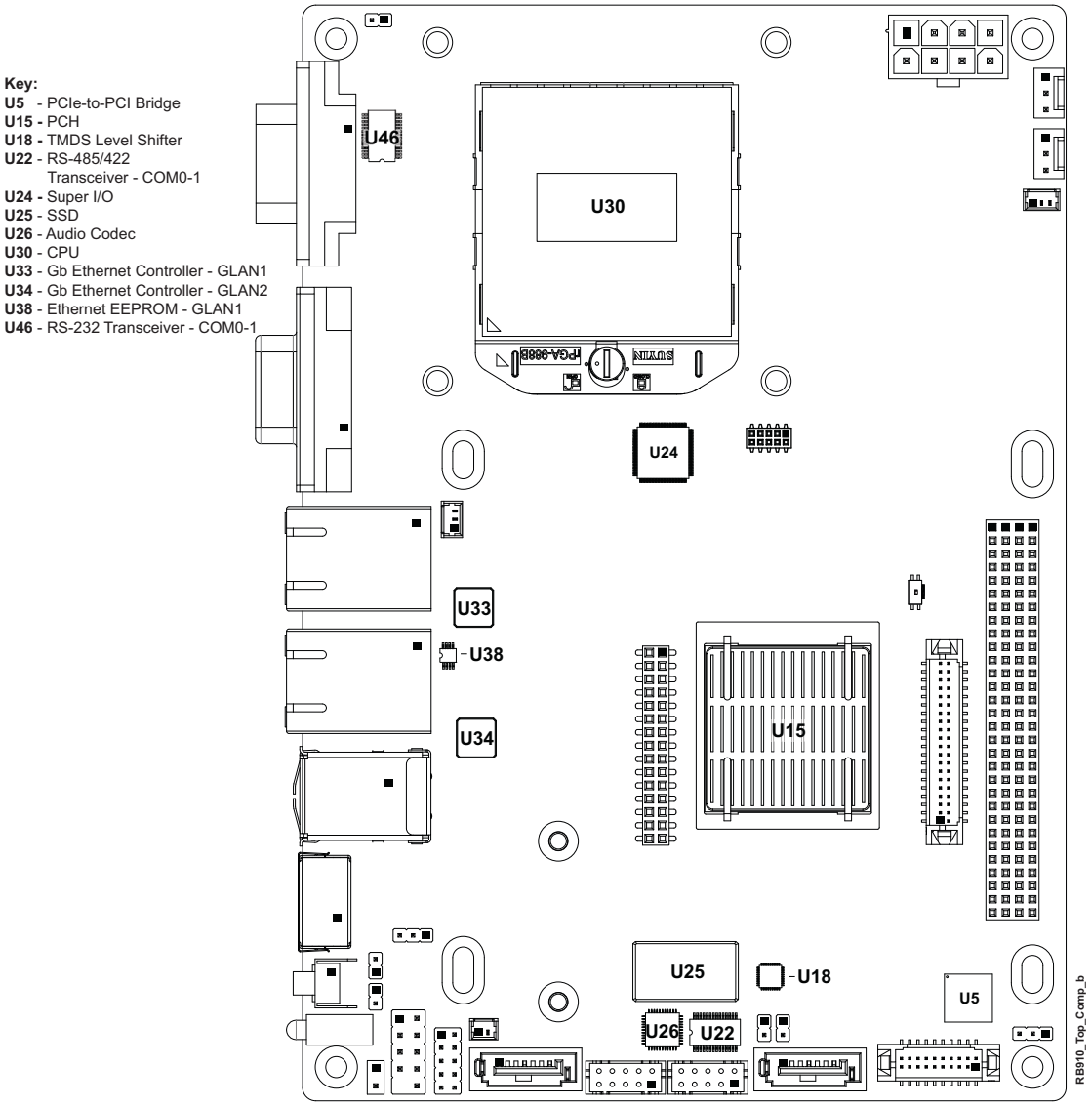


Figure 2-4. Component Locations

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Header, Connector, and Socket Definitions

Table 2-2 describes the headers, connectors, and sockets shown in Figure 2-6.

Table 2-2. Header, Connector, and Socket Descriptions

Header #	Board Access	Description
CN1 – Power On	Top	3-pin, 0.049" (1.25mm) shrouded header for Power On and +5V standby voltages
CNX1 – Digital Audio S/PDIF I/O	Top	3-pin, 0.049" (1.25mm) shrouded header for incoming and outgoing digital audio signals
CN2 – PCI-104	Top	120-pin, 0.079" (2mm) standard connector for the PCI bus
CN3 – Power In	Top	8-pin, 0.165" (4.2mm), 12 Volt, connector for incoming external power
CN4 – DVI	Top	22-pin, 0.049" (1.25mm), miniature crimping connector (Hirose, DF13-20DP) for Digital Visual Interface (DVI) output
CN5 – LVDS	Top	42-pin, 0.049" (1.25mm) miniature crimping connector (Hirose, DF13-40DP) for LVDS output
CN6 – SATA1	Top	7-pin, 0.050" (1.27mm) standard connector for SATA 3.0 devices
CN7 – LPC	Top	10-pin, 0.050" (1.27mm) female header for factory debug functions
CN8 – Serial 2	Top	10-pin, 0.079" (2mm) shrouded header for COM1 signals
CN9 – EXT	Top	30-pin, 0.079" (2mm) female header for external utility I/O signals
CN10 – Audio	Top	10-pin, 0.079" (2mm) shrouded header for Audio signals
CN11 – SATA2	Top	7-pin, 0.050" (1.27mm) standard connector for SATA 3.0 devices
CN12 – Battery	Top	2-pin, 0.049" (1.25mm) shrouded header for power from external battery
CN13 – GPIO	Top	10-pin, 0.079" (2mm) header for General Purpose I/O signals
CN14 – USB 2.0 (2 Ports)	Top	10-pin, 0.100" (2.54mm) header for USB 2.0 signals
CN15 – USB 3.0 (2 Ports)	Top	18-pin standard, dual-receptacle, stacked connector for USB 3.0 signals
CN16 – PS/2	Top	6-pin, 0.079" (2mm) standard, Mini-DIN PS/2 keyboard/mouse connector (for dual output cable)
CN17 – Serial 1	Top	9-pin, 0.109" (2.77mm) standard, DB9 male connector for COM0 signals
CN18 – VGA	Top	15-pin standard, DB15 connector for VGA signals
CN19 – GLAN1	Top	8-pin standard, RJ45 connector for Gigabit Ethernet port signals
CN20 – GLAN2	Top	8-pin standard, RJ45 connector for Gigabit Ethernet port signals
CN21 – PCIe Mini Card (on bottom side)	Bottom	52-pin, 0.012" (0.30mm) standard socket for PCI Express Mini Card signals (Revision 1.1)
CN22 – DDR3 SODIMM2 (on bottom side)	Bottom	204-pin, standard socket for non-ECC, unbuffered DDR3 SODIMM

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Table 2-2. Header, Connector, and Socket Descriptions (Continued)

CN23 – DDR3 SODIMM1 (on bottom side)	Bottom	204-pin, standard socket for non-ECC, unbuffered DDR3 SODIMM
FN1 – CPU Fan	Top	3-pin, 0.100" (2.54 mm) header, providing +12V, tach, and ground signals to CPU fan
FN2 – System Fan	Top	3-pin, 0.100" (2.54mm) header, providing +12V, tach, and ground signals to System fan
JP5 – Beeper/Buzzer	Top	2-pin, 0.079" (2mm) header for 5V buzzer or beeper output
JP6 – Power Button	Top	2-pin, 0.100" (2.54mm) header for external power button
JP7 – SMBus Data	Top	2-pin, 0.079" (2mm) header for SMBus data output
JP8 – SMBus Clock	Top	2-pin, 0.079" (2mm) header for SMBus clock output
LED – Power and SATA Activity	Top	4-pin LED array with yellow diode indicating HDD activity and green diode indicating power
SW1 – Clear CMOS	Top	Non-Operational (Use "Oops! Jumper (BIOS Recovery)" on page 34 to clear CMOS)
SW2 – System Reset	Top	4-pin, push-button switch for hard reset

NOTE The pinout tables in Chapter 3 of this manual identify pin sequence using the following method: A 10-pin header with two rows of pins, using odd/even numbering, where pin 2 is directly across from pin 1, is noted as 10-pin, 2 rows, odd/even (1, 2).Alternately, a 10-pin connector using consecutive numbering, where pin 6 is directly across from pin 1, is noted in this way: 10-pin, 2 rows, consecutive (1, 6). The second number in the parenthesis is always directly across from pin-1. See Figure 2-5.

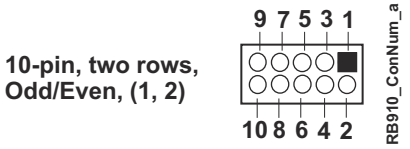


Figure 2-5. Header and Connector Pin Sequence

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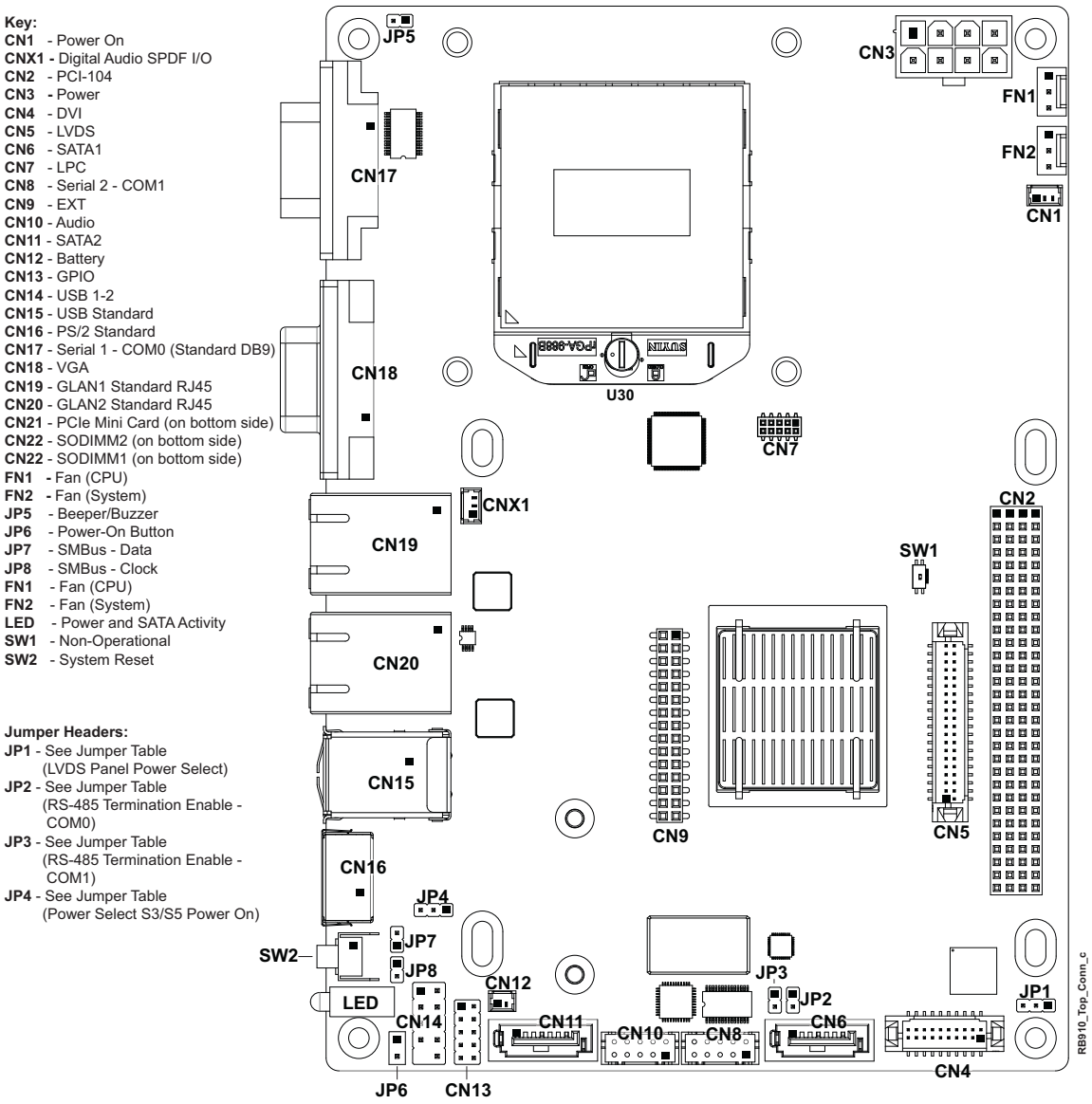


Figure 2-6. Header, Connector, and Socket Locations

NOTE	Pin 1 is shown as a black pin (square or round) on all connectors and headers in all illustrations.

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Jumper Header Definitions

Table 2-3 describes the jumper headers shown in Figure 2-6 on page 14. All jumper headers provide 0.079" (2mm) pitch.

Table 2-3. Jumper Settings

Jumper Header	Installed	Removed/Moved
JP1 – LVDS Panel-Voltage Selection	Enable +3.3V (Pins 1-2) **[Default]**	Enable +5V (Pins 2-3)
JP2 – Serial 1 RS-485 Termination	Enable Termination (Pins 1-2) **[Default]**	Disable Termination (Removed)
JP3 – Serial 2 RS-485 Termination	Enable Termination (Pins 1-2) **[Default]**	Disable Termination (Removed)
JP4 – Power On Selection	Power On S3 (Pins 1-2) **[Default]**	Power On S5 (Pins 2-3)

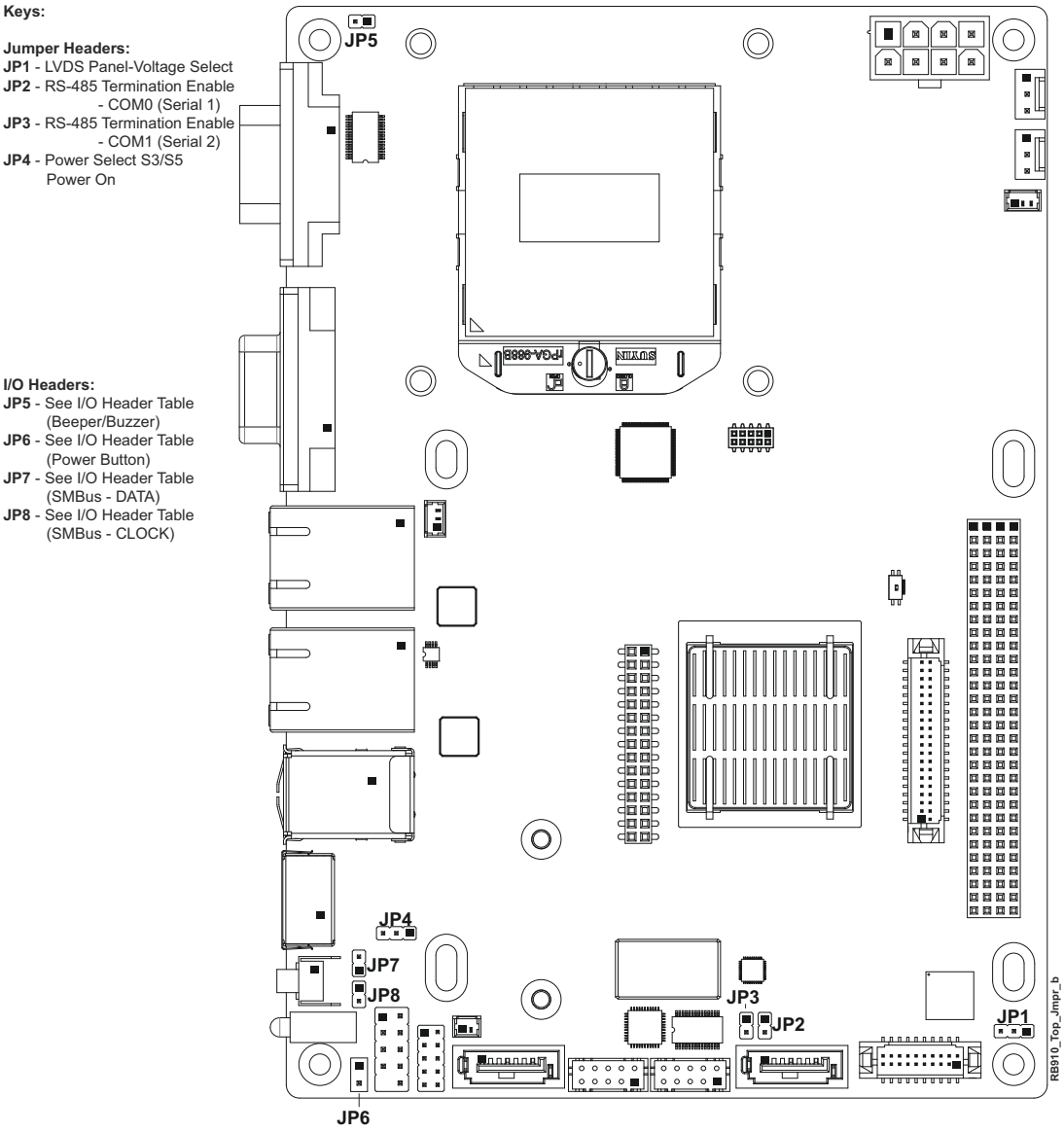


Figure 2-7. Jumper Header Locations (Top Side)

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Specifications

Power Specifications

Table 2-4 lists the power requirements for the ReadyBoard 910.

Table 2-4. Power Supply Requirements

Parameter	2.3GHz Intel Core i7-3610QE Characteristics	2.7GHz Intel Core i5-3610ME Characteristics	2.4GHz Intel Core i3-3120ME Characteristics	2.1GHz Intel Core i7-2710QE Characteristics	2.5GHz Intel Core i5-2510E Characteristics	2.2GHz Intel Core i3-2330E Characteristics	1.6GHz Intel Celeron B810 Characteristics
Input Type	Regulated DC voltages	Regulated DC voltages	Regulated DC voltages	Regulated DC voltages	Regulated DC voltages	Regulated DC voltages	Regulated DC voltages
In-Rush Peak Current and Duration	See Figure 2-8	See Figure 2-8	See Figure 2-8	See Figure 2-8	See Figure 2-8	See Figure 2-8	See Figure 2-8
Idle Current	1.02A (12.26W)	1.00A (12.06W)	1.02A (12.27W)	1.02A (12.21W)	0.88A (10.60W)	1.00A (11.94W)	0.97A (11.64W)
BIT Current	2.64A (31.65W)	2.22A (26.67W)	2.13A (25.62W)	3.19A (38.34W)	2.93A (35.22W)	2.43A (29.19W)	2.01A (24.12W)

Operating configurations:

- In-rush operating configuration includes video, 2GB DDR3 memory, 4GB on-board SSD, and power.
- Idle operating configuration includes the in-rush configuration as well as one SATA hard drive, one PS/2 keyboard, and one PS/2 mouse.
- BIT (Burn-In-Test) operating configuration includes idle configuration as well as second SATA hard drive, two serial port loop backs, two USB thumb drives, and two Ethernet port connections.

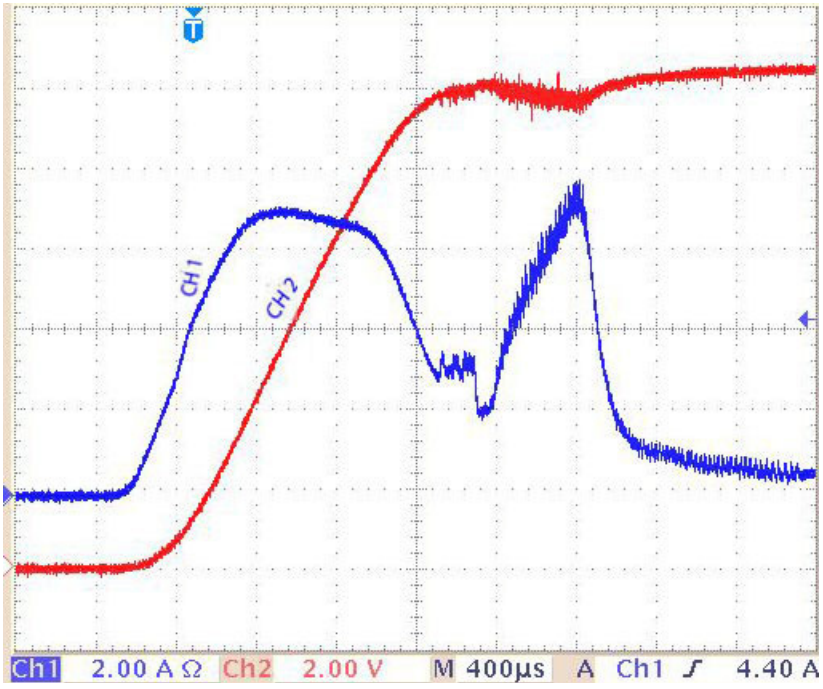


Figure 2-8. Typical Peak In-Rush Current and Duration

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Environmental Specifications

Table 2-5 provides the most efficient operating and storage temperature ranges required for this board.

Table 2-5. Environmental Requirements

Parameter	Conditions
Temperature	
Operating	–20°C to +70°C (–4°F to +158°F)
Extended (Optional)	–40°C to +85°C (–40°F to +185°F)
Storage	–55°C to +85°C (–67°F to +185°F)
Humidity	
Operating	5% to 90% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Thermal/Cooling Requirements

The ReadyBoard 910 is designed to operate at its maximum CPU speed and requires a thermal solution to cool the CPU, PCH, and voltage regulators. ADLINK offers two optional cooling solutions. (See Table 2-6 for descriptions of cooling options.)

> **NOTE** The overall system design must keep the ICs within their operating temperature specifications.

Table 2-6. ADLINK Optional Cooling Solutions

Cooling Solution	Description
Passive Heatsink (without fan)	Qualified to maintain optimal performance up to +70°C. (**Note**: Except for the 3610QE and 2710QE CPUs, which require a fan.)
Active Heatsink (with fan)	Qualified to maintain optimal performance up to +80°C. (**Note**: The 3610QE and 2710QE CPUs require a fan and are qualified only for +70°C.)

Physical Specifications

Table 2-7 lists the physical dimensions of the board, and Figures 2-9 and 2-10 show the dimensions of the I/O panel and top-side views of the board.

Table 2-7. Weight and Footprint Dimensions

Item	Dimension
Weight	0.29kg. (0.65lbs. [without DIMMs or heatsink])
Height (overall)	16.51mm (0.65")
Width	115mm (4.5")
Length	165mm (6.5")
Thickness	2.36mm (0.093")

> **NOTE** Overall height is measured from the upper board surface to the highest permanent component (PCI-104 connector, CN2) on the upper board surface. This measurement does not include the cooling solutions available for this board. The height of the active heatsink (with fan) is 2.06" (52.30mm) from the top surface of the board. The height of the passive heatsink (without fan) is 1.08" (27.43mm) from the top surface of the board.

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Mechanical Specifications

Figures 2-9 and 2-10 provide the I/O panel and mounting hole dimensions of the ReadyBoard 910.

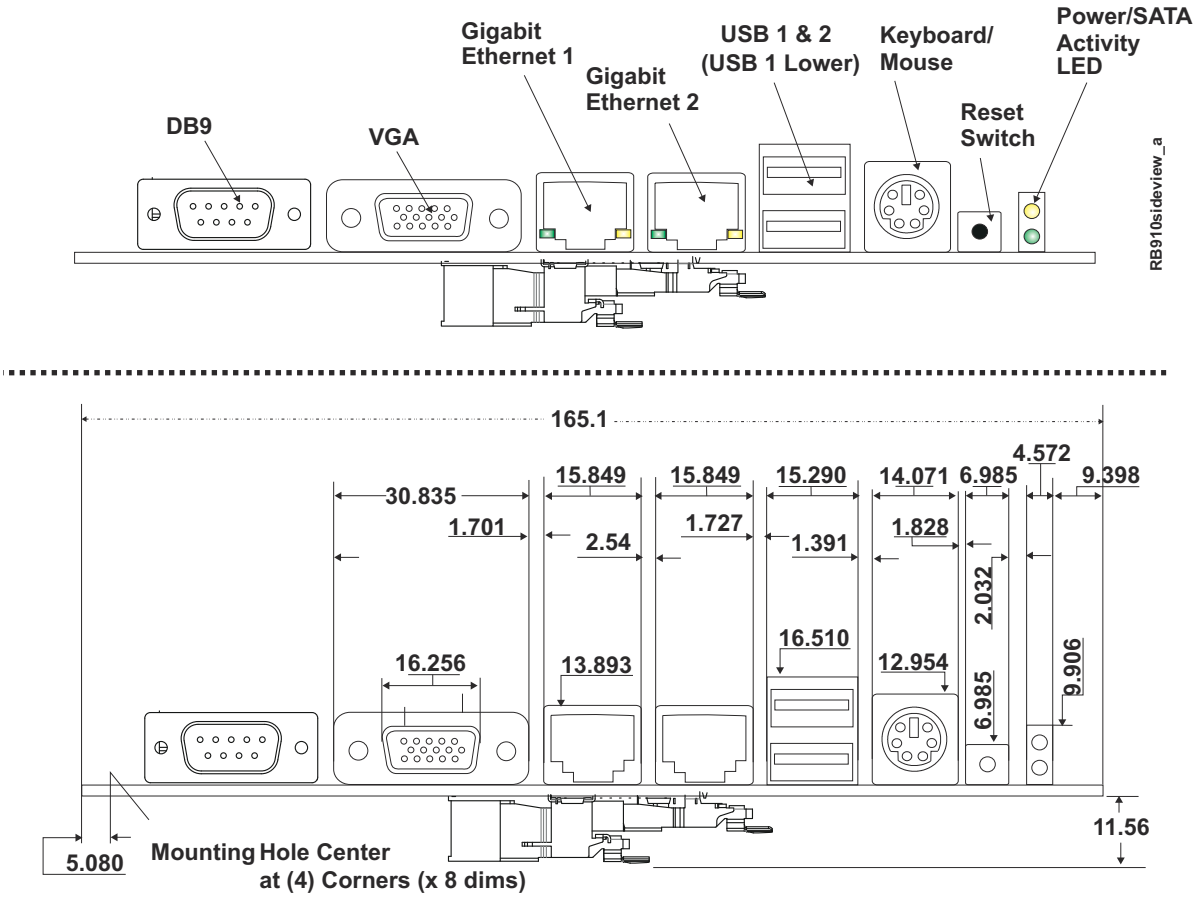


Figure 2-9. Mechanical Overview (IO Panel)

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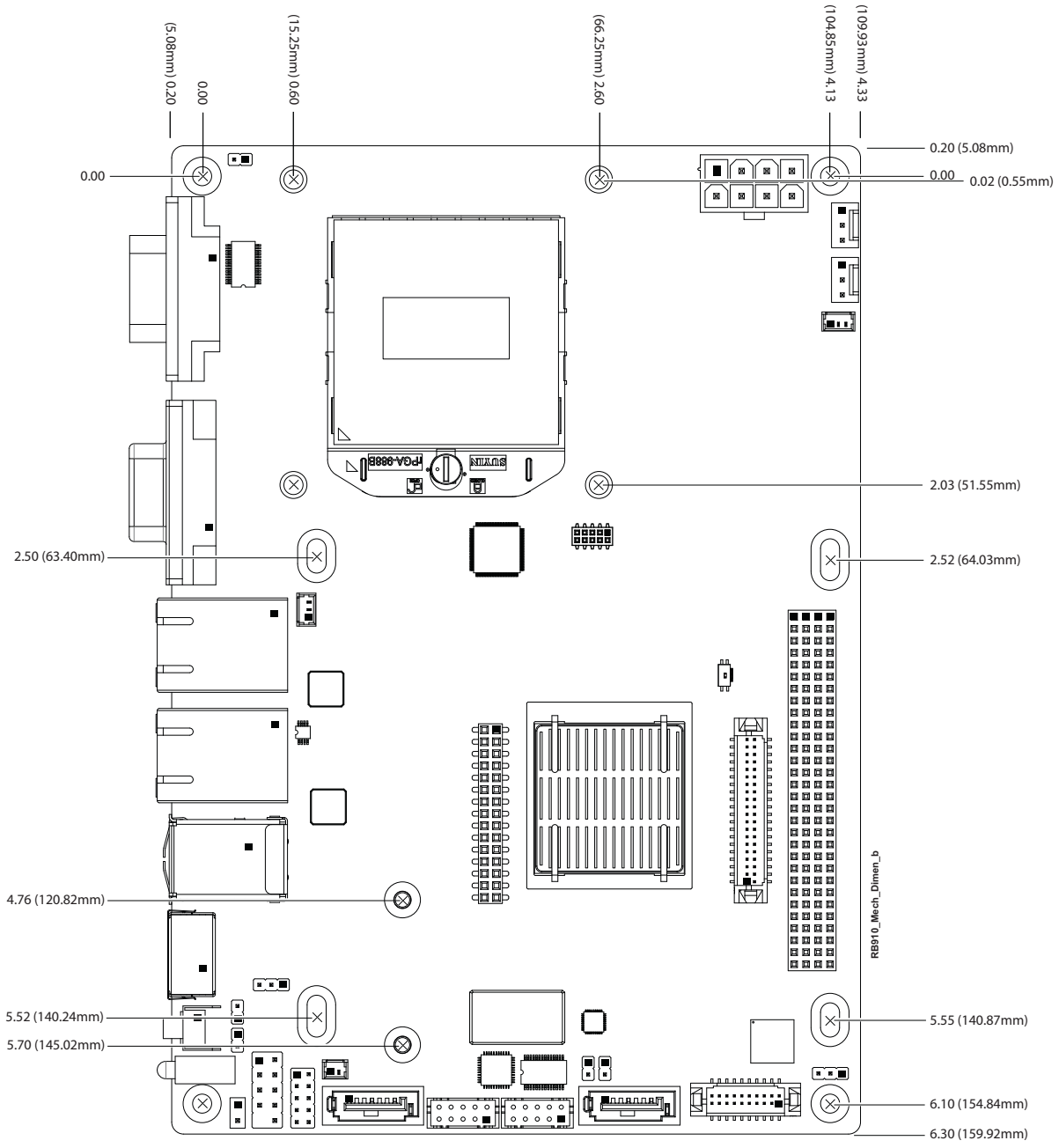


Figure 2-10. Mechanical Overview (Top Side)

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Chapter 3 Hardware

Overview

This chapter discusses custom features of the ReadyBoard 910 in the following order:

- Interrupt Channel Assignments
- Memory Map
- I/O Address Map
- Serial Interfaces
- USB Interfaces
  - USB 3.0 Support (2 ports)
  - USB 2.0 Support (2 ports)
  - Legacy USB Support
- Audio Interfaces
  - Digital Audio
  - S/PDIF Audio
- EXT Interface (LPC)
  - CAN Bus (optional)
  - Serial Telecom (optional)
- Video Interfaces
  - VGA
  - DVI
  - LVDS
- Miscellaneous
  - SSD (Solid State Drive)
  - Real Time Clock (RTC)
  - External Battery
  - Beeper/Buzzer
  - Reset Switches
  - Temperature Monitoring
  - User GPIO Signals
  - Oops! Jumper
  - Serial Console
  - System Management Bus (SMBus)
  - Watchdog Timer
- Power Interface
  - Power In
  - Power On
  - Power-On Button

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- Fan Interfaces

- Power and Sleep States
  - Sleep States (ACPI)
  - Wake-Up Activities

> **NOTE** ADLINK Technology, Inc. supports only the features/options tested and listed in this manual. The main integrated circuits (chips) used in the ReadyBoard 910 may provide more features or options than are listed for the ReadyBoard 910, but some of these chip features/options are not supported on the board and may not function as specified in the chip documentation.
>
> This chapter does not include pinout tables for standard headers and connectors such as PCI-104, Ethernet RJ45, SATA, USB, DB9 Serial, DB15 VGA, PS/2 Keyboard and Mouse, and PCIe Mini Card. See Chapter 1 for hyperlinks to specifications of these standard interfaces.

CPU

The ReadyBoard 910 supports six versions of the Intel® Core™ i CPU—the 2nd Generation i3-2330E, i5-2510E, and i7-2710QE, and 3rd Generation i3-3120ME, i5-3610ME, and i7-3610QE—operating at 2.2GHz, 2.5GHz, 2.1GHz, 2.4GHz, 2.7GHz, and 2.3GHz, respectively. The 3rd Generation Celeron B810, 1.6GHz is also supported as a lower-cost model version. These CPUs integrate high-performance, 64-bit, x86 multi Processor Cores with Memory Controllers and 3D Graphics Engines. This single chip is based on 32-nm process technology for the 2nd Generation version and 22-nm for the 3rd Generation version and provides an Intel Flexible Display Interface and a Direct Media Interface for high-speed connectivity to the PCH. The CPUs also support Intel Hyper-Threading Technology (up to 4 cores, 8 threads) [except for the Celeron] and up to 16 GB of DDR3 memory at 1066/1333 MHz for high overall performance.

Graphics

The 3rd Generation Core i CPUs provide a refresh of the seventh generation graphics core, which features a substantial gain in performance and a decrease in power consumption. The next generation Intel Clear Video HD Technology includes a collection of video playback and enhancement features that improve the end user's viewing experience including Encode/Transcode HD content, HD content playback, and superior image quality. Other graphics features of the Core CPUs include support for DirectX 10.1, OpenGL3.0, DirectX Video Acceleration (DXAV), Advanced Scheduler 2.0, 1.0, and XPDM.

Memory

The ReadyBoard 910 features dual-stacked SODIMM sockets for up to 16 GB of DDR3 memory. The CPU provides an Integrated Memory Controller (IMC) with DDR3 protocols and two independent, 64-bit wide channels each supporting one unbuffered, non-ECC SODIMM, employing up to two device ranks per channel.

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Interrupt Channel Assignments

The interrupt channel assignments are shown in Table 3-1.

Table 3-1. Interrupt Channel Assignments

Device vs IRQ No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Timer	X															
PS/2 Keyboard		X														
Secondary Cascade			X													
COM1				O	D											
COM2				D	O											
RTC									X							
Math Coprocessor														X		
PS/2 Mouse													X			
SATA Primary															X	
SATA Secondary																X
Audio Controller	Automatically Assigned															
PCI INTA	Automatically Assigned															
PCI INTB	Automatically Assigned															
PCI INTC	Automatically Assigned															
PCI INTD	Automatically Assigned															
USB	Automatically Assigned															
Video	Automatically Assigned															
Ethernet	Automatically Assigned															

Legend: D = Default, O = Optional, X = Fixed

NOTE The IRQs for the Ethernet, Video, and USB are automatically assigned by the BIOS Plug and Play logic. Local IRQs assigned during initialization can not be used by external devices.

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Memory Map

The following table provides the common PC/AT memory allocations. These are DOS-level addresses. The OS typically hides these physical addresses by way of memory management. Memory below 000500h is used by the BIOS.

Table 3-2. Memory Map

Base Address			Function
00000000h	-	0009FFFFh	Conventional Memory
000A0000h	-	000AFFFFh	Graphics Memory
000B0000h	-	000B7FFFh	Mono Text Memory
000B8000h	-	000BFFFFh	Color Text Memory
000C0000h	-	000CFFFFh	Standard Video BIOS
000D0000h	-	000DFFFFh	Reserved for Extended BIOS
000E0000h	-	000EFFFFh	Extended System BIOS Area
000F0000h	-	000FFFFFh	System BIOS Area (Storage and RAM Shadowing)
Top 32, 64, or 128MB of Physical Memory			Shared memory of Integrated Graphics enabled
FFF80000h	-	FFFFFFFFh	System Flash

I/O Address Map

Table 3-3 shows the I/O address map. These are DOS-level addresses. The OS typically hides these physical addresses by way of memory management.

Table 3-3. I/O Address Map

Address (hex)	Subsystem
0000-000F	Primary DMA Controller
0020-0021	Master Interrupt Controller
0040-0043	Programmable Interrupt Timer (Clock/Timer)
0060	Keyboard Controller
0061	NMI, Speaker control
0063	NMI Controller
0064	Keyboard Controller
0065	NMI Controller
0067	NMI Controller
0070-007F	CMOS RAM, NMI Mask Reg, RT Clock
0080	System reserved
0081-0083	DMA Page Registers
0084-0086	System reserved
0087	DMA Page Register
0088	System reserved
0089-008B	DMA Page Registers
008C-008E	System reserved
008F	DMA Page Register

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Table 3-3. I/O Address Map (Continued)

0090-0091	System reserved
0092	Fast A20 gate and CPU reset
0093-009F	System reserved
00A0-00A1	Slave Interrupt Controller
00A2-00BF	System reserved
00C0-00DF	Slave DMA Controller #2
00E0-00EF	System reserved
00F0-00FF	Math Coprocessor
01F0-01F7	SATA Controller
02F8-02FF	Serial Port 2 (COM2)
03B0-03BB	Video (monochrome)
03C0-03DF	Video (VGA)
03F8-03FF	Serial Port 1 (COM1)
04D0-04D1	Edge/Level Trigger PIC
0CF9	Reset Control Register

Serial Interfaces

The Super I/O (SCH3114I-NU) chip provides the circuitry for the two serial ports. The Super I/O chip provides serial port 1 through a standard DB9 connector (CN17) and serial port 2 through a 10-pin header (CN8). The two serial ports support the following features:

- Four individual 16550-compatible UARTs
- Programmable word length, stop bits and parity
- 16-bit programmable baud rate generator
- Interrupt generator
- Loop-back mode
- Four individual 16-bit FIFOs
- Serial Interface
  - Serial Port 1 (COM0) supports RS-232/RS-485/RS-422 and full modem support
  - Serial Port 2 (COM1) supports RS-232/RS-485/RS-422 and full modem support

NOTE The RS-232/RS-485/RS-422 modes are selected in BIOS Setup under the *Advanced/Super I/O Configuration* menu However, the RS-232 mode is the default (Standard) for any serial port.

RS-485 mode termination is selected with jumper header JP2 (COM0), and JP3 (COM1), when the RS-485 mode is selected in BIOS Setup.

To implement the two-wire RS-485 mode on serial ports 1 or 2, you must tie the equivalent pins together for the selected port.

For example, on Serial Port 2, tie pin 3 to 5 and pin 4 to 6 on the Serial 2 (COM1) interface header as shown in Figure 3-1. As an alternate, tie pin 2 to 3 and pin 7 to 8 on the DB9 connector for serial port 1 (COM0) as shown in Figure 3-1. Refer to Table 3-4 for the specific pin signals of serial port 2. The corresponding pins on the DB9 serial 1 connector are also available in Table 3-4.

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The RS-422 mode uses a four-wire interface and does not need any pins tied together, but you must select RS-485 mode in BIOS Setup.

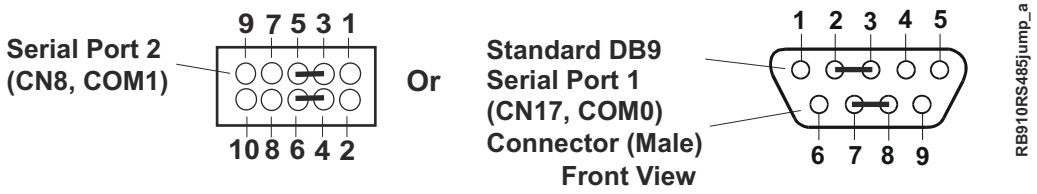


Figure 3-1. RS-485 Serial Port Implementation

Table 3-4 provides the signals for the corresponding pins of the serial 2 interface (CN8). The serial 2 interfaces provides a 10-pin, header with 2 rows, odd/even sequence (1, 2), and 0.079" (2mm) pitch.

Table 3-4. Serial Port 2 (CN8) Interface Pin Signals

Pin #	Signal	DB9 #	Description
1	DCD*	1	Data Carrier Detect – Indicates external serial device is detecting a carrier signal (i.e., a communication channel is currently open). In direct connect environments, this input is driven by DTR as part of the DTR/ DSR handshake.
2	DSR*	6	Data Set Ready – Indicates external serial device is powered, initialized, and ready. Used as hardware handshake with DTR for overall readiness.
3	RXD Rx Data –	2	Receive Data – Serial port receive data input is typically held at a logic 1 (mark) when no data is being transmitted, and is held “Off” for a brief interval after an “On” to “Off” transition on the RTS line to allow the transmission to complete. Serial Port 1 or 2 – If in RS-485 mode, this pin is Rx Data Negative.
4	RTS* Tx Data +	7	Request To Send – Indicates serial port is ready to transmit data. Used as hardware handshake with CTS for low level flow control. Serial Port 1 or 2 – If in RS-485 mode, this pin is Tx Data Positive.
5	TXD Tx Data –	3	Transmit Data – Serial port transmit data output is typically held to a logic 1 when no data is being sent. Typically, a logic 0 (On) must be present on RTS, CTS, DSR, and DTR before data can be transmitted on this line. Serial Port 1 or 2 – If in RS-485 mode, this pin is Tx Data Negative.
6	CTS* Rx Data +	8	Clear To Send – Indicates external serial device is ready to receive data. Used as hardware handshake with RTS for low level flow control. Serial Port 1 or 2 – If in RS-485 mode, this pin is Rx Data Positive.
7	DTR*	4	Data Terminal Ready – Indicates serial port is powered, initialized, and ready. Used as hardware handshake with DSR for overall readiness.
8	RI*	9	Ring Indicator – Indicates external serial device is detecting a ring condition. Used by software to initiate operations to answer and open the communications channel.
9	GND	5	Ground
10	Key/NC	NC	Key Pin/Not connected

Note: The shaded table cells denote power or ground. Signals appear in the second column as RS-232 followed by RS-485/RS-422. The * symbol indicates the signal is Active Low.

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USB Interfaces

The ReadyBoard 910 offers state-of-the-art USB 3.0 support through the PCH using PCIe x1 Port 1 and a USB 3.0 xHCI host controller module. Features of the USB 3.0 interface include up to two downstream ports (each independently enabled or disabled), SuperSpeed, High-Speed, and Full-Speed signals, and support for input frequencies between 20MHz and 50MHz. An 18-pin, standard dual-port connector (CN15) delivers the signals for two USB 3.0 ports, ideal for HDTV, set-top box, and gaming console applications.

The PCH (BD82HM65) provides a USB solution for legacy UHCI controller and EHCI controller (USB 2.0) support. The PCH contains port-routing logic that determines which controller (UHCI or EHCI) handles the USB data signals. A 10-pin header (CN14) delivers the signals for two USB 2.0 ports.

Table 3-5 describes the pin signals for the USB 2.0 interface, which provides a 10-pin, 2-row, header with odd/even (1, 2) pin sequence and 0.100" (2.54mm) pitch. The USB 3.0 interface provides a standard interface and those signals are not provided in this manual. See Chapter 1 for a hyperlink to the USB 3.0 specification and the USB 3.0 pin signals.

Table 3-5. USB 2.0 Pin Signal Descriptions (CN14)

Pin #	Signal	Description
1, 2	VCC	USB Voltage – +5V
3	USB1-N	Universal Serial Bus Port 1 Data Negative
4	USB2-N	Universal Serial Bus Port 2 Data Negative
5	USB1-P	Universal Serial Bus Port 1 Data Positive
6	USB2-P	Universal Serial Bus Port 2 Data Positive
7	GND	USB1 Ground
8	GND	USB2 Ground
9	NP	Not populated
10	NC	Not Connected

Note: The shaded table cells denote power or ground.

Audio Interface

The audio solution on the ReadyBoard 910 is provided by the PCH (BD82HM65) and the on-board Audio CODEC (ALC262). These two chips use the Intel HDA Link protocol to communicate between the two, complying with the Intel HDA Specification 1.0a. The audio interface uses the 10-pin audio header (CN10), and the audio signals are defined in Table 3-6. The ReadyBoard 910 also features an S/PDIF Digital Audio interface, and those signals are defined in Table 3-7.

Audio CODEC (ALC262) features:

- Comply with HDA Specification 1.0a
- Provide high-performance DACs with 100dB SNR
- Provide ADCs with 90dB SNR (A-weighting)
- Support 44.1/48/96/192kHz sample rate on all DACs
- Support 44.1/48/96/kHz sample rate on all ADCs
- Support 44.1/48/96/192kHz sample rate on 16/20/24-bit S/PDIF interface
- Support multiple channels of microphone input

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Table 3-6 lists the pin signals for the Digital Audio header, which provides 10 pins, two rows, odd/even pin sequence with 0.079" (2mm) pitch.

Table 3-6. Audio Pin Signal Descriptions (CN10)

Pin #	Signal	Description
1	GND_AUD	Ground
2	LINEOUT-L	Line Out signal left channel
3	LINEOUT-R	Line Out signal right channel
4	GND_AUD	Ground
5	GND_AUD	Ground
6	LINEIN-L	Line In signal left channel
7	LINEIN-R	Line In signal right channel
8	GND_AUD	Ground
9	GND_AUD	Ground
10	MIC	Stereo microphone In

Note: The shaded table cells denote ground.

Table 3-7 lists the pin signals for the S/PDIF Digital Audio header, which provides 3 pins, single row with 0.049" (1.25mm) pitch.

Table 3-7. S/PDIF Digital Audio Pin Signals (CNX1)

Pin #	Signal	Description
1	SPDIF_OUT	Digital Audio Out
2	GND	Ground
3	SPDIF_IN	Digital Audio In

Note: The shaded table cell denotes ground.

Video Interfaces

The PCH, BD82HM65 provides the video interfaces for traditional CRT monitors, DVI high-resolution displays, and LVDS flat panel displays. The Video Interface features are listed below.

VGA features:

- Provides a standard DB15 connector interface, which delivers RGB, HSYNC, VSYNC, and DDC signals
- Support for an integrated 340.4-MHz, 24-bit RAMDAC to drive a progressive scan analog monitor and outputs to three, 8-bit DACs that provide the R, G, and B signals to the monitor
- Support for resolutions up to 2048x1536 with 32-bit color at 75Hz refresh

NOTE The VGA connector is standard, and this manual does not provide signal descriptions for standard interfaces.

DVI features:

- Support DVI resolutions up to 1920x1200 at 60Hz refresh
- Provide Hot Plug detect for guaranteed “input LOW” when not connected
- Support lossless (digital) transmission of video signals
- Support display hardware independence

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- Provide plug and play capabilities (EDID and DDC2B)

> **NOTE** The ReadyBoard 910 DVI support is only for DVI-D signals. The cable kit for this product only provides a DVI-I cable, but the cable is compatible with DVI-D signals.

LVDS Flat Panel features:

- Support an integrated dual channel LFP Transmitter interface
- Support LVDS LCD panel resolutions up to 1920x1080 at 60Hz
- Support for a maximum pixel format of 18 bpp with SSC supported frequency range from 25 MHz to 112 MHz (single channel/dual channel)
- Support for 1 or 2 channel LVDS output
- Support the LVDS port independently or simultaneously with the Analog Display (CRT) port
- Support Spread Spectrum Clocking; center and down spread support utilizing an external SSC clock
- Support panel up-scaling (to fit a smaller source image onto a specific native panel size) as well as panning and centering CRT interface

DVI Interface

This header provides the capacity to bring out the TMDS signals to a DVI (Digital Visual Interface) connector. Table 3-8 lists the pin signals for the DVI header, which provides 22 pins, two rows, odd/even pin sequence with 0.049" (1.25mm) pitch.

Table 3-8. DVI Pin Signal Descriptions (CN4)

Pin #	Signal	Description
1	GND	Digital Ground
2	NC	Not Connected
3	TMDSDVI_DATA0_N	TMDS Data 0 Negative
4	VDD_+5V	+5 Volts Power
5	TMDSDVI_DATA0_P	TMDS Data 0 Positive
6	GND	Digital Ground
7	GND	Digital Ground
8	TMDSDVI_DATA1_P	TMDS Data 1 Positive
9	TMDSDVI_DATA2_P	TMDS Data 2 Positive
10	TMDSDVI_DATA1_N	TMDS Data 1 Negative
11	TMDSDVI_DAT2_N	TMDS Data 2 Negative
12	GND	Digital Ground
13	GND	Digital Ground
14	TMDSDVI_CLOCK_P	TMDS Clock Positive
15	DVI_SCL_CN	Serial Clock - DDC (I2C)
16	TMDSDVI_CLOCK_N	TMDS Clock Negative
17	DVI_SDA_CN	Serial Data - DDC (I2C)
18	GND	Digital Ground
19	DVI_HPD_CN	Hot Plug Detect - DDC (I2C)
20	GND	Digital Ground

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Table 3-8. DVI Pin Signal Descriptions (CN4) (Continued)

21	NC	Not Connected
22	NC	Not Connected

Note: The shaded table cells denote power or ground.

LVDS Interface

Table 3-9 lists the pin signals for the LVDS header, which provides 42 pins, two rows, odd/even (1,2) pin sequence with 0.049" (1.25mm) pitch.

Table 3-9. LVDS Interface Pin Signals (CN5)

Pin #	Signal	Description	Line	Channel
1	+12V	+12 volt input	NA	NA
2	+VCC (+3.3V/+5V)	JP1 determines voltage on pin		
3	GND	Ground		
4	+VCC (+3.3V/+5V)	JP1 determines voltage on pin		
5	LA_DATA0_P	Data Positive Output	0	Channel 1
6	GND	Ground		
7	LA_DATA0_N	Data Negative Output	0	
8	LA_DATA1_P	Data Positive Output	1	
9	GND	Ground		
10	LA_DATA1_N	Data Negative Output	1	
11	LA_DATA2_P	Data Positive Output	2	
12	GND	Ground		
13	LA_DATA2_N	Data Negative Output	2	
14	LA_DATA3_P	Data Positive Output	3	
15	GND	Ground		
16	LA_DATA3_N	Data Negative Output	3	
17	LB_CLOCK_P	Clock Positive Output	Clock	Channel 2
18	GND	Ground		
19	LB_CLOCK_N	Clock Negative Output	Clock	
20	LA_CLOCK_P	Clock Positive Output	Clock	Channel 1
21	GND	Ground		
22	LA_CLOCK_N	Clock Negative Output	Clock	

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Table 3-9. LVDS Interface Pin Signals (CN5) (Continued)

23	LB_DATA0_P	Data Positive Output	0	Channel 2
24	GND	Ground		
25	LB_DATA0_N	Data Negative Output	0	
26	LB_DATA1_P	Data Positive Output	1	
27	GND	Ground		
28	LB_DATA1_N	Data Negative Output	1	
29	LB_DATA2_P	Data Positive Output	2	
30	GND	Ground		
31	LB_DATA2_N	Data Negative Output	2	
32	LB_DATA3_P	Data Positive Output	3	
33	GND	Ground		
34	LB_DATA3_N	Data Negative Output	3	
35	LCD_BLON	Backlight Enable	NA	
36	GND	Ground		
37	GND	Ground		
38	LDDC_DATA	Display Data Channel Data	NA	NA
39	LCD_BLCTL	Control Panel Backlight	NA	NA
40	LDDC_CLOCK	Display Data Channel Clock	NA	NA
41	NC	Not Connected	NA	NA
42	NC	Not Connected	NA	NA

Note: The shaded table cells denote power or ground.

EXT Interface

The EXT header provides signals for optional CAN and Serial Telecom modules. Table 3-10 lists the pin signals for the EXT interface female header, which provides 30 pins in two rows with odd/even (1,2) sequence and 0.079" (2mm) pitch.

Table 3-10. EXT Interface Pin Signal Descriptions (CN9)

Pin #	Signal	Description
1	GND	
2	P3V3_S	+3.3 Volts Power Standby
3	LPC_AD3	Multiplexed Command, Address, and Data
4	LPC_FRAME	Indicates start of a new cycle or termination of broken cycle
5	LPC_AD2	Multiplexed Command, Address, and Data
6	CLK33_CANBUS	CAN Bus Clock Signal
7	LPC_AD1	Multiplexed Command, Address, and Data
8	CANBUS_RST-L	CAN Bus Reset Low
9	LPC_AD0	Multiplexed Command, Address, and Data
10	CANBUS_DISABLE-L	CAN Bus Disable Low
11	S2_RXD	Serial Receive Data
12	WL_ON_OFF	Power Good

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Table 3-10. EXT Interface Pin Signal Descriptions (CN9) (Continued)

Pin #	Signal	Description
13	S2_TXD	Serial Transmit Data
14	WL_RST-L	Power Reset Low
15	S2_RTS-L	Serial Request To Send Low
16	PCH_GPIO36	GPIO 3.3V Standby
17	S3_RXD	Serial Receive Data
18	PCH_GPIO37	GPIO 3.3V Standby
19	S3_TXD	Serial Transmit Data
20	PCH_GPIO38	GPIO 3.3V Standby
21	SIO_SERIRQ	Super IO Serial IRQ for Interrupt Support
22	PCH_GPIO39	GPIO 3.3V Standby
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	GND	Ground
27	P5V_S	+5 Volts Power Standby
28	P5V_S	+5 Volts Power Standby
29	P5V_S	+5 Volts Power Standby
30	P5V_S	+5 Volts Power Standby

Note: The shaded table cells denote power or ground.

Miscellaneous

SSD (Solid State Drive)

The ReadyBoard 910 provides a 4GB SSD, which is soldered directly onto the board. For more information refer to the SSD data sheet: http://www.greenliant.com/products/?inode=47717.

Real Time Clock (RTC)

The ReadyBoard 910 contains a Real Time Clock (RTC). The CMOS RAM is backed up with a Lithium Battery. If the battery is not present, a battery-free boot option in the BIOS completes the boot process and resets the clock to the default date and time.

External Battery

An external battery input connection is provided through the battery connector (CN12) for an external battery. The external battery is used to power the Real Time Clock. ADLINK provides a small 3.0 volt battery, adhered to the board and connected to the external battery header.

Table 3-11. External Battery Interface Pin Signal Descriptions (CN12)

Pin #	Signal	Description
1	PVBAT	+3.0 Volts Power
2	GND	Ground

Note: The shaded table cells denote power or ground. The RTC has an expected current draw of 6μA at room temperature. The battery is used only when power is not applied to the board.

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External Beeper/Buzzer Interface

The Beeper/Buzzer signals from the PCH are fed to Beeper/Buzzer header through an OR circuit in conjunction with +5V to drive an external PC speaker. The signal is also fed to the on-board Audio CODEC to provide a PC Beep/Buzz signal for the Line Out connections.

Table 3-12. External Beeper/Buzzer Interface Pin Signal Descriptions (JP5)

Pin #	Signal	Description
1	BUZZ_BEEP	Speaker Output – This signal drives an external PC Beeper/Buzzer speaker.
2	P5V_S	+5 Volt Standby

Note: The shaded table cell denotes power.

System Reset Switch

This momentary push-button switch (SW2) invokes a hard reset.

Temperature Monitoring

The Super I/O controller performs the temperature monitoring function. The board temperatures can be monitored from the Hardware Monitor feature in the Advanced BIOS setup screen.

NOTE The ReadyBoard 910 requires an active heatsink (with fan) for the CPU and a passive heatsink (without fan) for the PCH.

User GPIO Signals

The ReadyBoard 910 provides eight GPIO pins for custom use. The signals are routed to the CN13 header, and the enable and initialize values are set in the BIOS.

For more information about GPIO pin operation, refer to the Programming Manual for the Super I/O controller at: http://www.smsc.com/main/catalog/sch311x.html

Table 3-13 describes the pin signals of the GPIO interface, which provides a 10-pin header of two rows with odd/even (1,2) pin sequence and 0.079" (2mm) pitch.

Table 3-13. User GPIO Signals Pin/Signal Descriptions (CN13)

Pin #	Signal	Description
1	GPI0	User defined
2	GPO0	User defined
3	GPI1	User defined
4	GPO1	User defined
5	GPI2	User defined
6	GPO2	User defined
7	GPI3	User defined
8	GPO3	User defined
9	NC	Not Connected
10	NC	Not Connected

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Oops! Jumper (BIOS Recovery)

The Oops! jumper is provided in the event the BIOS settings you have selected prevent you from booting the system. By using the Oops! jumper you can prevent the current BIOS settings in Flash from being loaded, forcing the BIOS to use the default settings. Connect the DTR pin to the RI pin on Serial port 1 (COM0) prior to boot up to prevent the present BIOS settings from loading. After booting with the Oops! jumper in place, remove the Oops! jumper and go into BIOS Setup. Change the desired BIOS settings, or select the default settings, and save changes before rebooting the system.

To convert a standard DB9 connector to an Oops! jumper, short together the DTR (4) and RI (9) pins on the serial port DB9 connector at Serial Port 1, as shown in Figure 3-2.

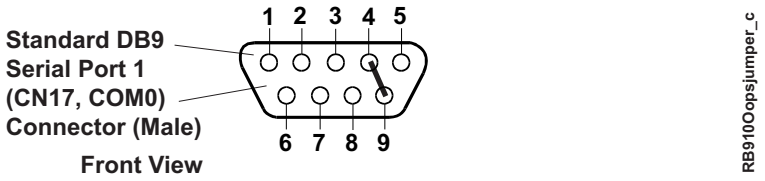


Figure 3-2. Oops! Jumper Connection

NOTE	The COM0 port is the only serial port on the board that supports the Oops! Jumper function.

Serial Console

The ReadyBoard 910 supports the serial console (or console redirection) feature. This I/O function is provided by an ANSI-compatible serial terminal, or the equivalent terminal emulation software running on another system. This can be very useful when setting up the BIOS on a production line for systems that are not connected to a keyboard and display.

Serial Console Setup

The serial console feature is implemented by connecting a standard null modem cable or a modified serial cable (or “Hot Cable”) between one of the serial ports, such as Serial 1, and the serial terminal or a PC with communications software. The BIOS Setup Utility controls the serial console settings on the ReadyBoard 910. Refer to Chapter 4, BIOS Setup for the settings of the serial console option, the serial terminal, or PC with communications software and the connection procedure.

Hot (Serial) Cable

To convert a standard serial cable to a Hot Cable, certain pins must be shorted together at the Serial port (DB9) connector. Short together pins 7 (RTS) and 9 (RI) on Serial port 1 (DB9) connector as shown in Figure 3-3.

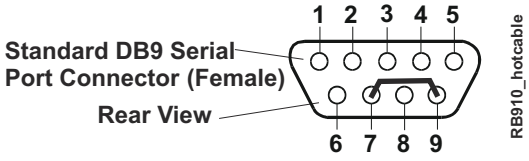


Figure 3-3. Hot Cable Jumper

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System Management Bus (SMBus)

The PCH contains both a host and slave SMBus ports; but the host cannot access the slave internally. The slave port allows an external master access to the PCH through headers JP7 and JP8. The master is used to communicate with the SODIMMs. Table 3-14 lists the slave device names and corresponding reserved binary addresses on the SMBus. Table 3-15 lists the pin signals for the SMBus DATA header, which provides 2 pins, 1 row, and 0.079" (2mm) pitch. Table 3-16 lists the pin signals for the SMBus CLOCK header, which provides 2 pins, 1 row, and 0.079" (2mm) pitch.

Table 3-14. SMBus Reserved Addresses

Component	Address (Hex)
SODIMM A	A0h
SODIMM B	A4h

Table 3-15. SMBus DATA Interface Pin Signal Descriptions (JP7)

Pin #	Signal	Description
1	SMBDATA	SMBus Data
2	+3.3V	+3.3V standby voltage

Table 3-16. SMBus CLOCK Interface Pin Signal Descriptions (JP8)

Pin #	Signal	Description
1	SMBCLOCK	SMBus Clock
2	GND	Ground

Note: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

Watchdog Timer

The Watchdog Timer (WDT) restarts the system if a mishap occurs. Possible problems include failure to boot properly, the application software's loss of control, unexpected conditions on the bus, or other hardware or software malfunctions.

The WDT (Watchdog Timer) can be used both during the boot process and during normal system operation.

- During the Boot process – If the operating system fails to boot in the time interval set in the BIOS, the system will reset.

  Enable the WDT in the Boot Settings of BIOS Setup. Set the WDT for a time-out interval in seconds, between 1 and 255, in one second increments. Ensure you allow enough time for the operating system (OS) to boot. The OS or application must tickle the WDT before the timer expires.

- During System Operation – An application can set up the WDT hardware through a BIOS call, or by accessing the hardware directly. Some ADLINK Board Support Packages provide an API interface to the WDT. The application must tickle the WDT before the timer expires or the system will be reset. The BIOS implements interrupt 15 function 0C3h to manipulate the WDT.

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Power Interfaces

The ReadyBoard 910 uses various voltages onboard and externally receives +12 volts through the external Power In (CN3) interface, which uses an 8-pin header with 0.165" (4.2 mm) pitch. The +12V is provided for the CPU Fan, System Fan, LVDS power, PCI-104 bus, and PCIe Mini Card power. All other onboard voltage requirements, including the CPU core voltages are met with +5 volts DC +/- 5%, derived from the externally supplied +12 volts.

Power In

Table 3-17 lists the pin signals for Power In header (CN3), which provides 8 pins in two rows with consecutive (1,6) pin sequence and 0.165" (4.2mm) pitch.

Table 3-17. Power In Pin Signal Descriptions (CN3)

Pin #	Signal	Description
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	+12V	This +12 voltage is primarily for the PCI-104 bus, PCIe Mini Card, CPU fan, System fan, and LVDS power (may also be backlight power).
6	+12V	This +12 voltage is primarily for the PCI-104 bus, PCIe Mini Card, CPU fan, System fan, and LVDS power (may also be backlight power).
7	+12V	This +12 voltage is primarily for the PCI-104 bus, PCIe Mini Card, CPU fan, System fan, and LVDS power (may also be backlight power).
8	+12V	This +12 voltage is primarily for the PCI-104 bus, PCIe Mini Card, CPU fan, System fan, and LVDS power (may also be backlight power).

Note: The shaded table cells denote power or ground.

Power On

The signals on this header allow the ATX power supply to be turned off (soft off) from the ReadyBoard 910 by operating system (OS) control. However, if you use a non-ATX power supply, then you will not have the soft off feature for sleep states normally provided by ATX power supplies. Use the JP4 jumper to select Power On options (S3/S5). Table 3-18 provides the pin signal names and descriptions of the Power On interface, which provides a 3-pin shrouded header with 0.049" (1.25mm) pitch

Table 3-18. Power On Header Pin Signal Descriptions (CN1)

Pin #	Signal	Description
1	VCC5	+5V Voltage – This voltage (refer to ATX Specification 2.2 or later for minimum requirement) is supplied from the ATX power supply and is required for normal operation and sleep states.
2	GND	Ground
3	PS_ON*	Power Supply On – This signal is sent to the ATX power supply from the ReadyBoard 910 to turn on the ATX power supply. This signal can also be used to turn off the ATX power supply or go into a suspended or standby state.

Note: The shaded table cells denote power or ground. The signals marked with * indicate the signal is Active Low.

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Power-On Button

The Power-On button turns the ReadyBoard 910 and its attached power supply to a fully on condition, if you are using an ATX power supply. Normally—if the operating system (OS) supports sleep states—the OS will turn off the ReadyBoard 910 and its power supply during the OS shut down process. If the OS supports sleep states, the Power-On button will also transition the ReadyBoard and its power supply between a fully Powered-On state, various sleep states depending on the OS control setting, and a fully Powered-Off state. If the OS does not support sleep states, then the Power-On button only turns on or off power to the ReadyBoard 910.

The sleep states are OS dependent and not available if your OS does not support power management based on the ACPI standard. An OS supporting ACPI will allow the Power-On button to be configured through a user interface.

The Power-On button is provided externally by connecting a momentary button to the Power-On button header (JP6). See Table 3-19.

Table 3-19. Power-On Button Interface Pin Signal Descriptions (JP6)

Pin #	Signal	Description
1	+3.3	+3.3 volts DC +/- 5%
2	GND	Ground

Fan Interfaces

The ReadyBoard 910 provides two headers for system and CPU fans, as required. Tables 3-20 and 3-21 define the pin signals for the CPU and System fan interfaces, which provide single-row, 3-pin headers with 0.100" (2.54 mm) pitch.

Table 3-20. CPU Fan Interface Pin Signal Descriptions (FN1)

Pin #	Signal	Description
1	FAN1_TACH	Fan Speed Detect – This is the fan speed tachometer signal.
2	+12	+12 volts DC +/- 5%
3	FN1_PWM	Modulation – This signal controls the fan speed.

Table 3-21. System Fan Interface Pin Signal Descriptions (FN2)

Pin #	Signal	Description
1	FAN2_TACH	Fan Speed Detect – This is the fan speed tachometer signal.
2	+12	+12 volts DC +/- 5%
3	FN2_PWM	Modulation – This signal controls the fan speed.

Note: The shaded table cells denote power or ground.

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Power and Sleep States

The following information applies to the ReadyBoard 910 only if an ATX power supply is used to provide power. If a non-ATX power supply is used, the ReadyBoard 910 is controlled only by the Power On/Off switch on the power supply and the various sleep states are not available.

Sleep States (ACPI)

The ReadyBoard 910 supports the ACPI (Advanced Configuration and Power Interface) standard, which is a key component of certain Operating Systems' power management. The supported features (sleep states) listed here are only available when an ACPI-compliant OS is used for the ReadyBoard, such as Windows 2000/XP. The term "sleep" state refers to a reduced power consumption state, which can be re-started (awakened), restoring full operation to the ReadyBoard 910.

In these various sleep states, the ReadyBoard 910 appears to be off, indicated by such things as no display on the attached monitor and no activity for the connected CD-ROM or hard drives. However, when the ReadyBoard 910 detects certain types of activity (i.e. power button, mouse, keyboard, or LAN activity), it returns to a fully operational state. The type of activity detected is based on those supported by the ReadyBoard 910.

The ReadyBoard 910 supports at least four ACPI power states, depending on the operating system used and its ability to manage sleep states. Typically, the Power On switch is used to wake up from a sleep state, or transition from one state to another, but this is dependent on the operating system.

- 1st state is normal Power-On (S0).
  - To go to a fully powered on state, the ReadyBoard 910 must either be powered Off (S5), or in a sleep state (S1 or S4), and then the Power On/Off switch is pressed for less than 4 seconds (default).
  - The ReadyBoard 910 can transition from this state (S0) to the various states described below, depending on the power management capability of the OS and how it is programmed.
- 2nd state is a standby state (S1).

  In this state, no internal operations take place except for the internal RTC (Real Time Clock) and the contents of RAM. This typically includes no activity for the CPU, CD-ROM, or hard disk drives. The CPU may be active, and the peripheral devices may power down if no signals occur or power to the device(s) is not provided. The ReadyBoard 910 appears to be off including the Power-On LED.
  - Normally, to enter this sleep state, the ReadyBoard 910 must be fully powered on (S0) while the OS transitions the ReadyBoard into this standby state (S1) under user control.
  - To exit this sleep state, typically the power button is used to wake up the ReadyBoard 910 to restore full operation, including the Power-On LED. Typically, pressing the power switch for less than 4 seconds (default) will restore full operation.
- 3rd state is Suspend to RAM or Standby [Windows] (S3).

  In this state, main memory (RAM) and the internal RTC (Real Time Clock) are the only devices where power is maintained. This state (Suspend to RAM) stores the state of the operating system prior to shutdown including all open applications and open documents, etc. in main memory. This allows users to resume their work exactly where they left off just prior to entering this state (S3) when the system restores power and the contents of main memory.

  This state takes longer to restore and uses less power than S1 or S2, but if AC power is completely lost, the contents of main memory (RAM), including any changes to documents or data stored in RAM during S3, is also lost.
  - To enter the Suspend to RAM (S3) or Standby state, the computer must be fully powered on and the OS transitions the computer into this sleep state under user control.
  - To exit this sleep state, typically pressing the Power On switch for less then 4 seconds (default) will restore full operation.

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- 4th state is a hibernate or suspend-to-disk state (S4).

  In this state, no internal operations take place, except for the internal RTC. This includes no activity for the CPU, CD-ROM, or hard disk drives. The ReadyBoard 910 appears to be off, including the external Power-On LED if connected. Your system will take longer to wake-up in this sleep state, however, since your data is saved to the disk, it is more secure and should not be lost in the event of a power failure.

  - To enter a hibernate or suspend-to-disk state, the ReadyBoard 910 must be fully powered on while the OS transitions the ReadyBoard 910 into this sleep state (S4) under user control.
  - To exit this sleep state, typically pressing the power switch for less than 4 seconds (default) will restore full operation.

- 5th state is the normal power off or shutdown (S5).

  All activity stops, except the internal clock, if there is a backup battery installed. Removing the power cord from the power source ensures all activity is stopped, except the internal clock.

  - To go to a fully powered down state, the ReadyBoard 910 must either be powered on, or in a sleep state, and then the Power On/Off switch is pressed for more than 4 seconds.
  - To go to a fully powered up state, press the power switch for less than 4 seconds (default) and full operation is restored.

The OS may provide additional programming features to change the activation time for each state, and to shutdown or transition the ReadyBoard 910 at certain times, depending on the way the OS interface is programmed. Refer to the OS vender's documentation for power management under the ACPI standard.

NOTE Some operating systems use the keyboard, mouse, Wake-on-Ring (serial port), and Wake-on-LAN (Ethernet port) as an activity to wake up the system from a sleep state. Refer to Table 3-22 for the wake up activity conditions supported by the ReadyBoard 910.

Wake Up Activities

The wake up events listed in Table 3-22 can be used to wake up the ReadyBoard 910 from any of the supported sleep states mentioned above.

Table 3-22. Wake Up Activities and Conditions

Signal/Device	Condition
Power-On Button	If the Power-On button is pressed, the system will wake up from any of the sleep states.
Ethernet Ports (2) (LAN Ports)	The system will wake from one of the sleep states through direct addressing or magic packets.
PS/2 Keyboard & Mouse	If you use a PS/2 keyboard or mouse, any activity from the keyboard or mouse could wake the system.
USB Devices	If you use a USB keyboard or mouse instead of a PS/2 device, the USB device could wake the system.
Serial Ports (2)	If Wake On Ring is [Enabled], then Serial Ports 1 and 2 can be used to wake the system.

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Chapter 4 BIOS Setup

Introduction

This section assumes the user is familiar with general BIOS Setup and does not attempt to describe the BIOS functions. Refer to "BIOS Setup Menus " on page 43 in this chapter for a map of the BIOS Setup settings. If ADLINK has added to or modified any of the standard BIOS functions, these functions will be described.

Entering BIOS Setup (Local Video Display)

To access BIOS Setup using a local video display for the ReadyBoard 910:

1. Turn on the display and the power supply to the ReadyBoard 910.
2. Start Setup by pressing the [Del] key when the following message appears on the boot screen.

   ```
   Press DEL to run Setup
   ```

3. Follow the instructions on the right side of the screen to navigate through the selections and modify any settings.

Entering BIOS Setup (Serial Port Console)

This section describes how to enable the Serial Port Console in VGA mode and enter the BIOS setup through a serial terminal or PC.

1. Turn on the power supply to the ReadyBoard 910 and enter the BIOS Setup Utility in VGA mode.
2. Set the BIOS feature *Serial Port Console* to [Enable] under the **Advanced** menu.
3. Accept the default options or make your own selections for the balance of the Serial Port Console fields and record your settings.
4. Ensure you select the type of remote serial terminal you will be using and record your selection.
5. Select *Save Changes and Exit* and then shut down the ReadyBoard 910.
6. Connect the remote serial terminal (or the PC with communications software) to the COM port you selected and recorded earlier in the BIOS Setup Utility.
7. Turn on the remote serial terminal or PC and set it to the settings you selected in the BIOS Setup Utility.

   The default settings for the ReadyBoard 910 are:

   - ANSI
   - 115200
   - 8 bits
   - 1 stop bit
   - no parity
   - no flow control
   - VT-UTF8 Combo Key Support [Enabled]
   - Recorder Modes [Disabled]
   - Resolution 100x31 [Disabled]
   - Legacy OS Redirection Resolution [80x24]
8. Restore power to the ReadyBoard 910 and press the F4 key after you see the following screen prompt.

   ```
   Press <space bar> to update BIOS
   ```


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9. Use the <Enter> key to select the screen menus listed in the Opening BIOS screen.

> **NOTE** The serial console port is not hardware protected. Diagnostic software that probes hardware addresses may cause a loss or failure of the serial console functions.

OEM Logo Screen (Splash)

The ReadyBoard 910 BIOS supports a graphical logo screen, which can be customized by the user and an ADLINK Sales Representative and displayed when enabled through the BIOS Setup Utility. The graphical image can be a company logo or any custom image the user wants to display during the boot process.

> **NOTE** The Quiet Boot feature must be set to Enabled in the Boot settings of BIOS Setup for the system to recognize the OEM Logo Screen.

Logo Image Requirements

Please contact your ADLINK Sales Representative for more information on OEM Logo Screen requirements.

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BIOS Setup Menus

This section provides illustrations of the six main setup screens in the ReadyBoard 910 BIOS Setup Utility. Below each illustration is a bullet list of the screen's submenus and setting selections. The setting selections are presented in brackets after each submenu or menu item, and the optimal default settings are presented in bold. For more detailed definitions of the BIOS settings, refer to the AMI Aptio TSE User Manual: http://www.ami.com/support/doc/AMI_TSE_User_Manual_PUB.pdf.

Table 4-1. BIOS Setup Menus

BIOS Setup Utility Menu	Item/Topic
Main	BIOS, Memory, and Board information, System Date and Time
Advanced	Launch PXE OpROM, ACPI, RTC Wake, CPU, USB, SATA, Super IO, Hardware Monitor, Serial Console, and Sandybridge PPM settings
Chipset	System Agent and PCH I/O settings
Boot	Boot Up, GateA20, Option ROM Messages, Interrupt 19 Capture, Boot Order, and Hard Drive BBS Priorities settings
Security	Setting or Changing Passwords
Save & Exit	Exiting, Saving, Resetting, Save Options, Boot Override settings

BIOS Main Setup Screen

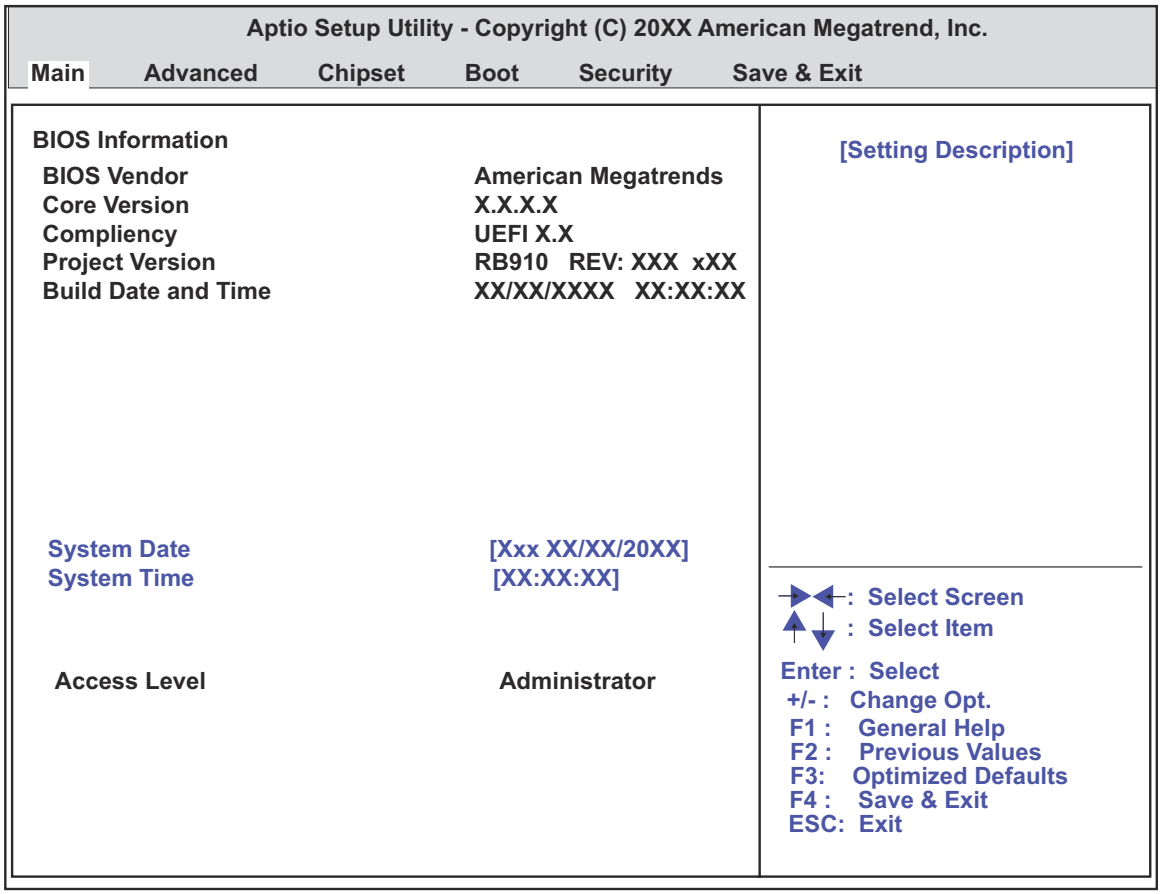


Figure 4-1. BIOS Main Setup Screen

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- **System Date & Time**
  - System Date (day of week, mm:dd:yyyy) – This field requires the alpha-numeric entry of the day of week, day of the month, calendar month, and all 4 digits of the year, indicating the century plus year (*Fri XX/XX/20XX*).
  - System Time (hh:mm:ss) – This is a 24-hour clock setting in hours, minutes, and seconds.

BIOS Advanced Setup Screen

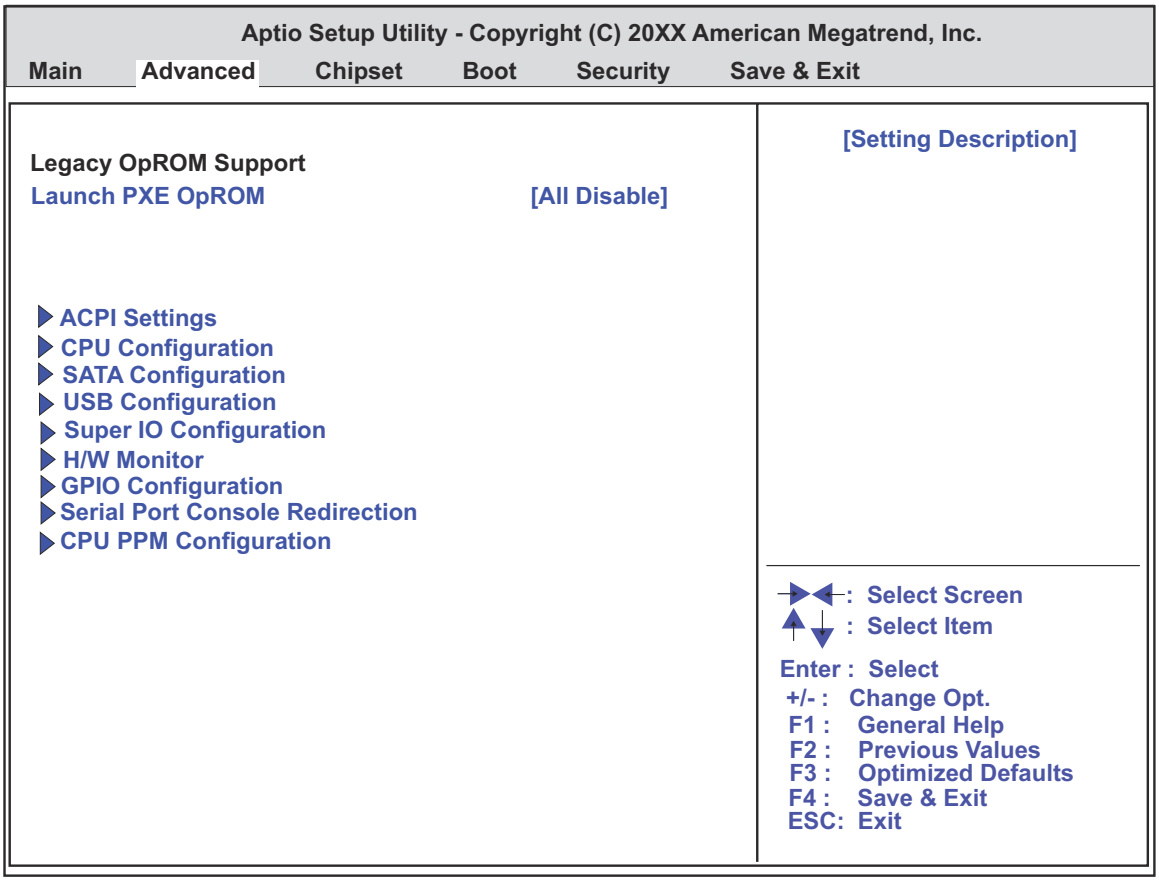


Figure 4-2. BIOS Advanced Setup Screen

- **Legacy OpROM Support**
  - Launch PXE OpROM [**All Disable**; LAN1; LAN2; All Enable]
- **ACPI Settings**
  - Enable ACPI Auto Configuration [**Disabled**; Enabled]
  - ACPI Sleep State [Suspend Disabled; S1 only (CPU Stop Clock); S3 only (Suspend to RAM); **Both S1 and S3 available for OS to choose from**]
  - Lock Legacy Resources [**Disabled**; Enabled]
- **CPU Configuration**
  - Intel(R) Core(TM) iX-XXXXLL CPU @ X.XXGHz
  - CPU Signature XXXxX
  - Microcode Patch XX

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- Max CPU Speed XXXX MHz
- Min CPU Speed XXX MHz
- Processor Speed XXXX MHz
- CPU Speed XXXX MHz
- Processor Cores X
- Intel HT Technology Supported
- EMT64 Supported

- Hyper-Threading [Disabled; **Enabled**]
- Active Processor Cores [**All**; 1; 2; 3]

- **SATA Configuration**
  - SATA Controller(s) [**Enabled**; Disabled]
  - SATA Mode Selection [**IDE**; AHCI]
  - Serial ATA Port 0 [Empty]
  - Serial ATA Port 1 [Empty]
  - Serial ATA Port 2 [SSD model]
- **USB Configuration**
  - USB Devices:
    - 2 Hubs
  - Legacy USB Support [**Enabled**; Disabled; Auto]
  - USB3.0 Support [**Enabled**; Disabled]
  - XHCI Hand-off [**Enabled**; Disabled]
  - EHCI Hand-Off [**Disabled**; Enabled]
- **Super IO Configuration** **SMSC SCH3114**
  - Serial Port 0 Configuration
    - Serial Port [Disabled; **Enabled**]
    - Device Settings IO=3F8h; IRQ=4
    - Serial Port Function [**RS232**; RS422/RS485]
  - Serial Port 1 Configuration
    - Serial Port [Disabled; **Enabled**]
    - Device Settings IO=2F8h; IRQ=3
    - Serial Port Function [**RS232**; RS422/RS485]
  - Serial Port 2 Configuration
    - Serial Port [**Disabled**; Enabled]
  - Serial Port 3 Configuration
    - Serial Port [**Disabled**; Enabled]

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- **H/W Monitor**
  - CPU Temperature : +XX Degree C
  - System Temperature : +XX Degree C
  - CPU Fan Speed : XXXX RPM
  - SYS Fan Speed: : XXXX RPM
  - Vcore : +X.XXX V
  - Vccp : +X.XX V
  - Vcc : +X.XX V
  - +5.0V : +X.XX V
  - +12V : +XX.XX V
  - VTR : +X.XX V
  - Vbat : +X.XX V
- **GPIO Configuration**
  - GPIO 1 Setting [**GP0**; GPI]
    - GPO 1 Level [High; **Low**]
  - GPIO 2 Setting [**GP0**; GPI]
    - GPO 2 Level [High; **Low**]
  - GPIO 3 Setting [**GP0**; GPI]
    - GPO 3 Level [High; **Low**]
  - GPIO 4 Setting [**GP0**; GPI]
    - GPO 4 Level [High; **Low**]
  - GPIO 5 Setting [GP0; **GPI**]
  - GPIO 6 Setting [GP0; **GPI**]
  - GPIO 7 Setting [GP0; **GPI**]
  - GPIO 8 Setting [GP0; **GPI**]
- **Serial Port Console Redirection**
  - COM0
    - Console Redirection [**Disabled**; Enabled]
    - Console Redirection Settings (When Console Redirection for this Port is Enabled)
      - Terminal Type [VT100; VT100+; VT-UTF8; **ANSI**]
      - Bits per second [9600; 19200; 38400; 57600; **115200**]
      - Data Bits [7; **8**]
      - Parity [**None**; Even; Odd; Mark; Space]
      - Stop Bits [**1**; 2]
      - Flow Control [**None**; Hardware RTS/CTS]
      - VT-UTF8 Combo Key Support [Disabled; **Enabled**]
      - Recorder Mode [**Disabled**; Enabled]
      - Resolution 100x31 [**Disabled**; Enabled]
      - Legacy OS Redirection Resolution [**80x24**; 80x25]
      - Putty KeyPad [**VT100**; LINUX; XTERMR6; SCO; ESCN; VT400]

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- COM1
  - Console Redirection [**Disabled**; Enabled]
  - Console Redirection Settings (When Console Redirection for this Port is Enabled)
    - Terminal Type [VT100; VT100+; VT-UTF8; **ANSI**]
    - Bits per second [9600; 19200; 38400; 57600; **115200**]
    - Data Bits [7; **8**]
    - Parity [**None**; Even; Odd; Mark; Space]
    - Stop Bits [**1**; 2]
    - Flow Control [**None**; Hardware RTS/CTS]
    - VT-UTF8 Combo Key Support [Disabled; **Enabled**]
    - Recorder Mode [**Disabled**; Enabled]
    - Resolution 100x31 [**Disabled**; Enabled]
    - Legacy OS Redirection Resolution [**80x24**; 80x25]
    - Putty KeyPad [**VT100**; LINUX; XTERMR6; SCO; ESCN; VT400]
- COM2 (Disabled)
  - Console Redirection [Port Is Disabled]
- COM3 (Disabled)
  - Console Redirection [Port Is Disabled]

- Serial Port for Out-of Band Management/
  Windows Emergency Management Services (EMS)
  - Console Redirection [**Disabled**; Enabled]
  - Console Redirection Settings (When Console Redirection for this Port is Enabled)
    - Out-of -Band Mgmt Port [**COM0**; COM1; COM2 (Disabled); COM3 (Disabled)]
    - Terminal Type [VT100; VT100+; VT-UTF8; **VT-UTF8**; ANSI]
    - Bits per second [9600; 19200; 57600; **115200**]
    - Flow Control [**None**; Hardware RTS/CTS; Software Xon/Xoff]
    - Data Bits [8]
    - Parity [None]
    - Stop Bits [1]

- **CPU PPM Configuration**
  - EIST (Intel SpeedStep) [Disabled; **Enabled**]
  - CPU C3 Report [Disabled; **Enabled**]
  - CPU C6 Report [Disabled; **Enabled**]
  - CPU C7 Report [Disabled; **Enabled**]

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BIOS Chipset Setup Screen

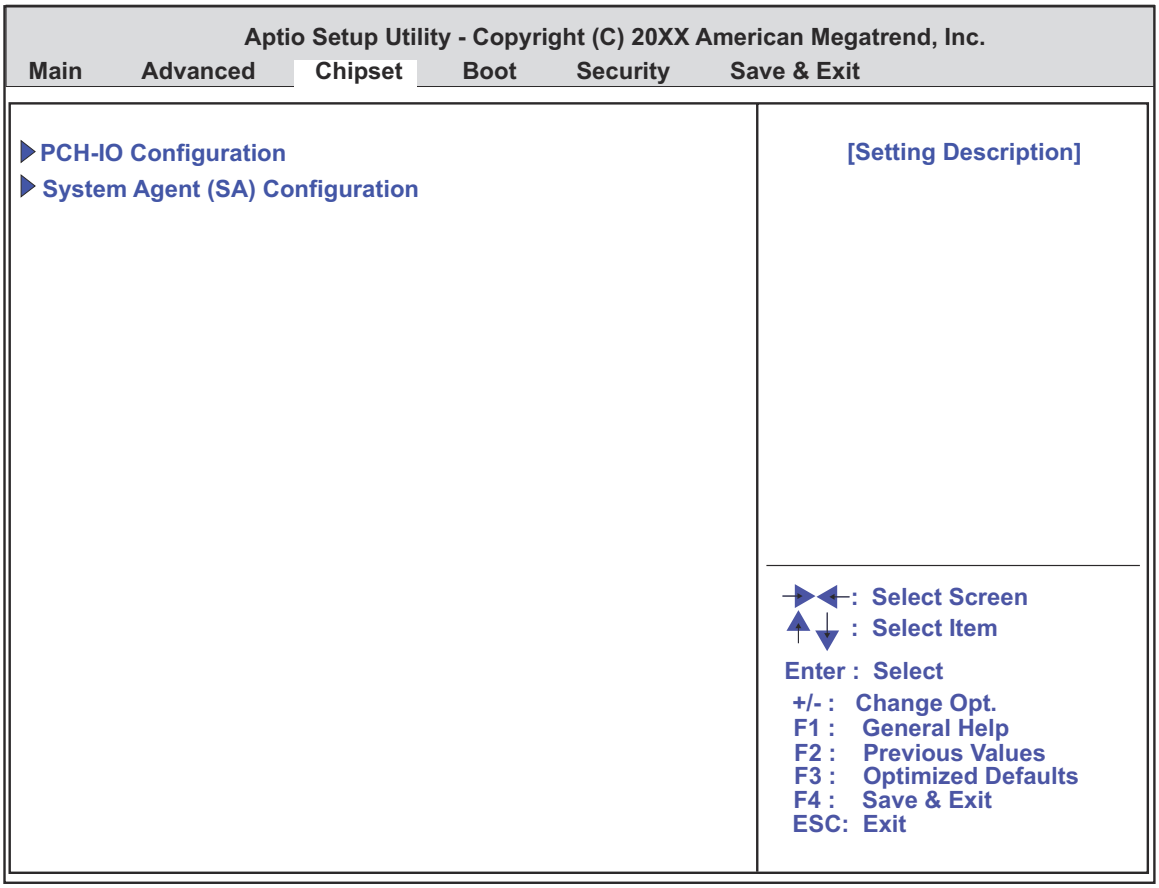


Figure 4-3. BIOS Chipset Setup Screen

- **PCH-IO Configuration**
  - Intel PCH RC Version X.X.X.X
  - Intel PCH SKU Name HM65
  - Intel PCH Rev ID XX/XX

  - Azalia [Enabled; Disabled; **Auto**]
  - 82574L LAN Controller 1 [Disabled; **Enabled**]
  - 82574L LAN Controller 2 [Disabled; **Enabled**]
  - USB 3.0 Controller [Disabled; **Enabled**]

  - Restore AC Power Loss [Power Off; **Power On**; Last State]

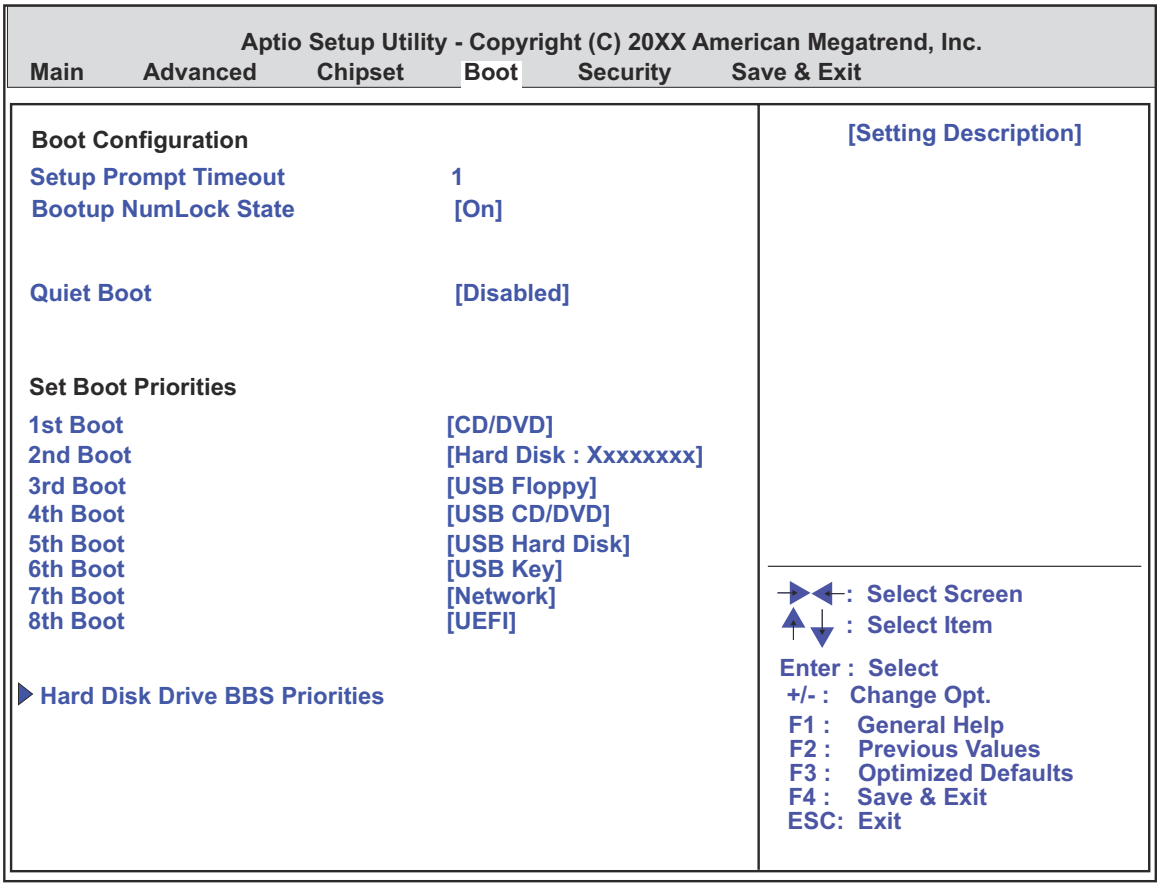
  - USB Configuration
    - EHCI1 [**Disabled**; Enabled]
    - USB Ports Per-Port Disable Control [**Disabled**; Enabled]

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- **System Agent (SA) Configuration** **X.X.X.X**
  - Graphics Configuration
    - IGFX VBIOS Version XXXX
    - IGFX Frequency XXX MHz
    - Primary Display [Auto; **IGFX**; PCI]
    - Internal Graphics [Disabled; **Enabled**]
    - DVMT Pre-Allocated [0M; 32M; **64M**; 96M; 128M; 160M; 192M; 224M; 256M; 288M; 320M; 352M; 384M; 416M; 448M; 480M; 512M]
    - DVMT Total Gfx Mem [128M; **256M**; MAX]
    - LCD Control
      - Primary IGFX Boot Display [**CRT**; DVI; LVDS]
      - Secondary IGFX Boot Display [**Disabled**; CRT; DVI; LVDS]
      - LCD Panel Type [640x480; 800x600; **1024x768**; 1280x1024; 1600x1200; 1920x1200; 1920x1080]
      - Panel Scaling [**Auto**; Off; Force Scaling]
      - Panel Color Depth [**18 Bit**; 24 Bit]
  - Memory Configuration
    - Memory RC Version X.X.X.X
    - Memory Frequency XXXX Mhz
    - Total Memory XXXX MB (DDR3)
    - DIMM#0 XXXX MB (DDR3)
    - DIMM#1 Not Present
    - CAS Latency (tCL) X
    - Minimum delay time
      - -CAS to RAS (tRCDmin) X
      - -Row Precharge (tRRmin) X
      - -Active to Precharge (tRASmin) XX

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BIOS Boot Setup Screen



Version X.XX.XXXX. Copyright (C) 20XX American Megatrends, Inc.

Figure 4-4. BIOS Boot Setup Screen

- **Boot Configuration**
  - Setup Prompt Timeout 1
  - Bootup NumLock State [**On**; Off]
  - Quiet Boot [**Disabled**; Enabled]
- **Set Boot Priority**
  - 1st Boot [**CD/DVD**; Hard Disk : Xxxxxxx; USB Floppy; USB CD/DVD; USB Hard Disk; USB Key; Network; UEFI; Disabled]
  - 2nd Boot [CD/DVD; **Hard Disk : Xxxxxxx**; USB Floppy; USB CD/DVD; USB Hard Disk; USB Key; Network; UEFI; Disabled]
  - 3rd Boot [CD/DVD; Hard Disk : Xxxxxxx; **USB Floppy**; USB CD/DVD; USB Hard Disk; USB Key; Network; UEFI; Disabled]
  - 4th Boot [CD/DVD; Hard Disk : Xxxxxxx; USB Floppy; **USB CD/DVD**; USB Hard Disk; USB Key; Network; UEFI; Disabled]
  - 5th Boot [CD/DVD; Hard Disk : Xxxxxxx; USB Floppy; USB CD/DVD; **USB Hard Disk**; USB Key; Network; UEFI; Disabled]
  - 6th Boot [CD/DVD; Hard Disk : Xxxxxxx; USB Floppy; USB CD/DVD; USB Hard Disk; **USB Key**; Network; UEFI; Disabled]

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- 7th Boot [CD/DVD; Hard Disk : Xxxxxxx; USB Floppy; USB CD/DVD; USB Hard Disk; USB Key; **Network**; UEFI; Disabled]
- 8th Boot [CD/DVD; Hard Disk : Xxxxxxx; USB Floppy; USB CD/DVD; USB Hard Disk; USB Key; Network; **UEFI**; Disabled]
- Hard Disk BBS Priorities
  - [**SATA: Xxxxxxxx**; Disabled]

BIOS Security Setup Screen

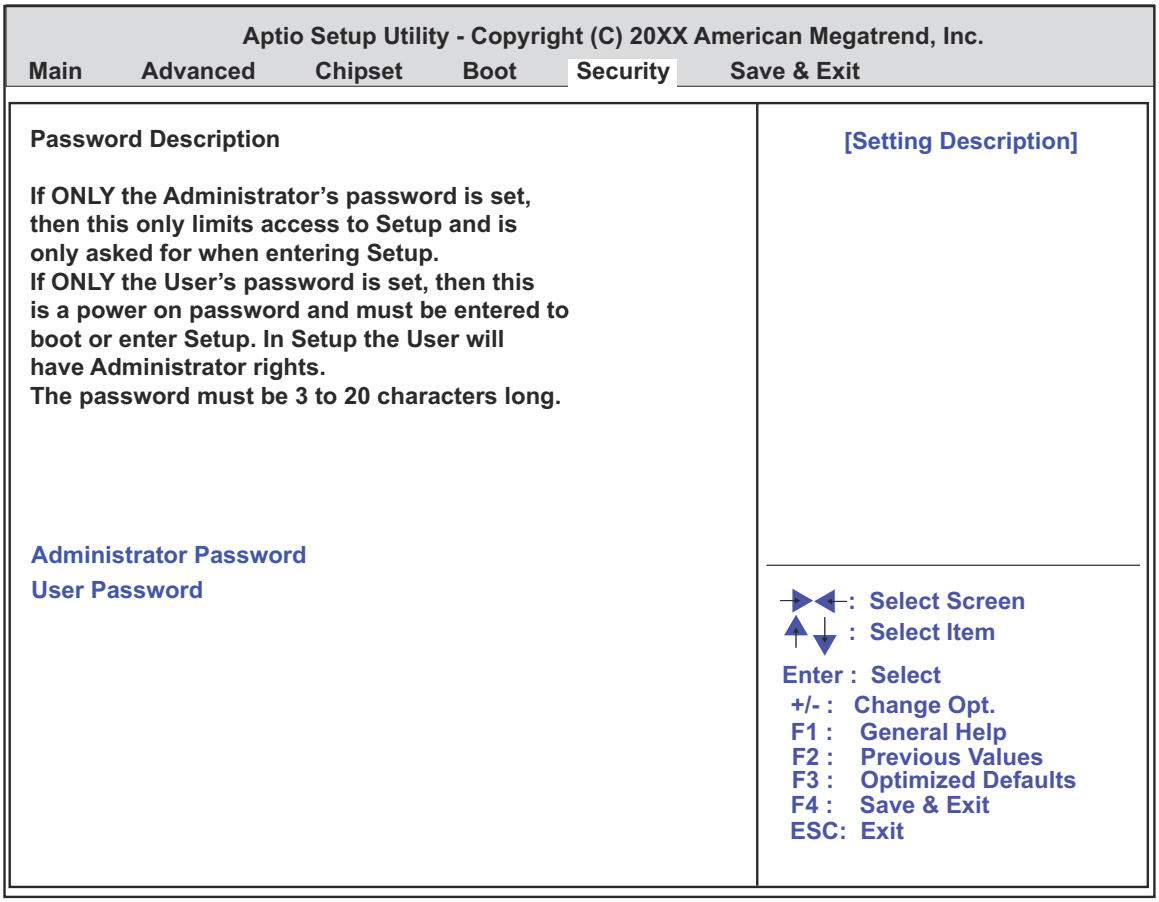


Figure 4-5. BIOS Security Setup Screen

- **Administrator Password** [Create New Password]
- **User Password** [Create New Password]

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BIOS Save & Exit Setup Screen

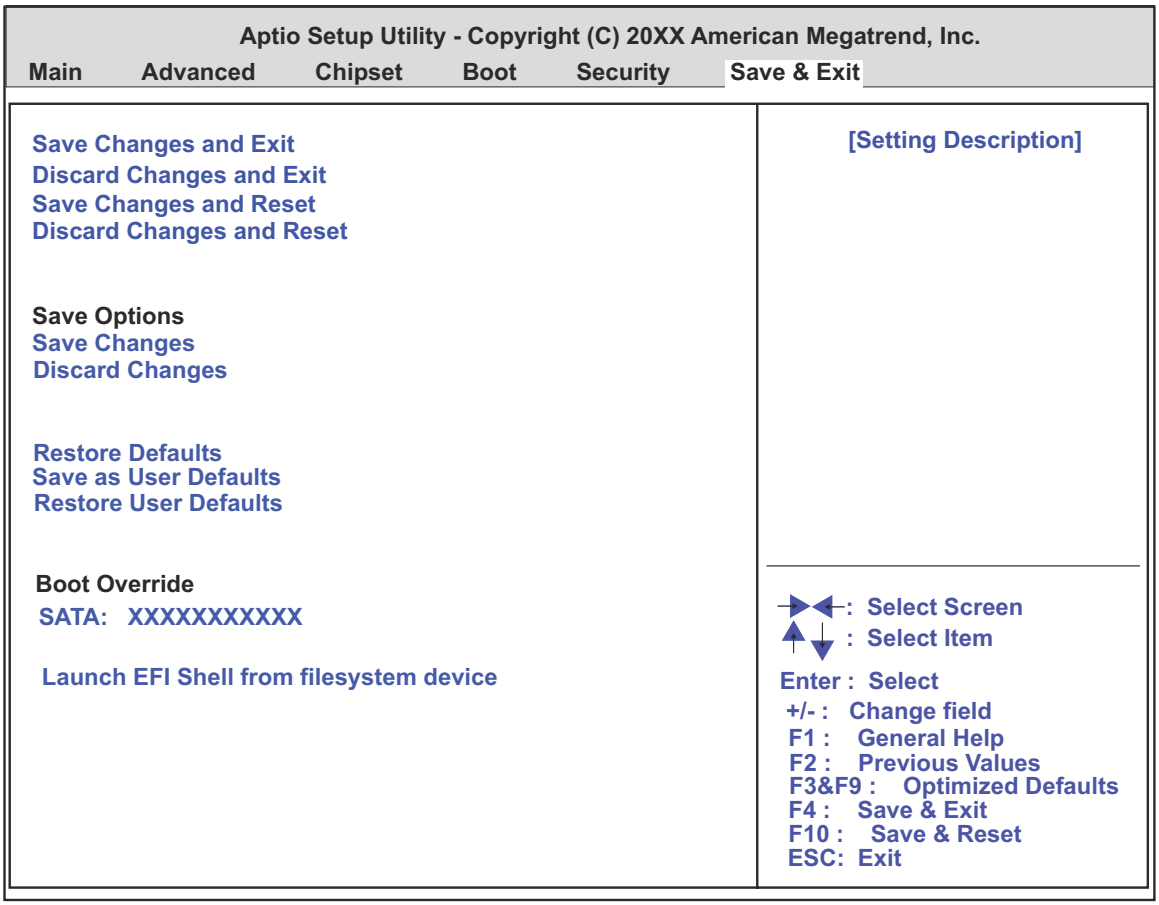


Figure 4-6. BIOS Save & Exit Setup Screen

- Save Changes and Exit
  - Save configuration and exit? [**Yes**; No]
- Discard Changes and Exit
  - Quit without saving? [**Yes**; No]
- Save Changes and Reset
  - Save configuration and reset? [**Yes**; No]
- Discard Changes and Reset
  - Reset without saving? [**Yes**; No]

- **Save Options**
  - Save Changes
    - Save configuration [**Yes**; No]
  - Discard Changes
    - Load Previous Values [**Yes**; No]
  - Restore Defaults
    - Load Optimized Defaults [**Yes**; No]

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- Save as User Defaults
  - Save configuration? [**Yes**; No]
- Restore User Defaults
  - Restore User Defaults? [**Yes**; No]

- **Boot Override**
  - SATA: XXXXXXXXXXX

  - Launch EFI Shell from file system device

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Appendix A Technical Support

ADLINK Technology, Inc. provides a number of methods for contacting Technical Support listed below in Table A-1. Requests for support through the Ask an Expert are given the highest priority, and usually will be addressed within one working day.

- ADLINK's Ask an Expert – This is a comprehensive support center designed to meet all your technical needs. This service is free and available 24 hours a day through the Ampro By ADLINK web page at http://www.adlinktech.com/AAE/. This includes a searchable database of Frequently Asked Questions, which will help you with the common information requested by most customers. This is a good source of information to look at first for your technical solutions. However, you must register online if you wish to use the Ask a Question feature.

  ADLINK strongly suggests that you register with the web site. By creating a profile on the ADLINK web site, you will have a portal page called "My ADLINK" unique to you with access to exclusive services and account information.

- Personal Assistance – You may also request personal assistance by creating an Ask an Expert account and then going to the Ask a Question feature. Requests can be submitted 24 hours a day, 7 days a week. You will receive immediate confirmation that your request has been entered. Once you have submitted your request, you must log in to go to My Stuff area where you can check status, update your request, and access other features.

- Download Service – This service is also free and available 24 hours a day at http://www.adlinktech.com. For certain downloads such as technical documents and software, you must register online before you can log in to this service.

Table A-1. Technical Support Contact Information

Method	Contact Information
Ask an Expert	http://www.adlinktech.com/AAE/
Web Site	http://www.adlinktech.com
Standard Mail	Contact us should you require any service or assistance. **ADLINK Technology, Inc.** Address: 9F, No.166 Jian Yi Road, Zhonghe District New Taipei City 235, Taiwan 新北市中和區建一路 166 號 9 樓 Tel: +886-2-8226-5877 Fax: +886-2-8226-5717 Email: service@adlinktech.com **Ampro ADLINK Technology, Inc.** Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA Tel: +1-408-360-0200 Toll Free: +1-800-966-5200 (USA only) Fax: +1-408-360-0222 Email: info@adlinktech.com **ADLINK Technology (China) Co., Ltd.** Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203) 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, 201203 China Tel: +86-21-5132-8988 Fax: +86-21-5132-3588 Email: market@adlinktech.com

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Table A-1. Technical Support Contact Information (Continued)

ADLINK Technology Beijing
Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室(100085)
Rm. 801, Power Creative E, No. 1 Shang Di East Rd.
Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8626
Email: market@adlinktech.com

ADLINK Technology Shenzhen
Address: 深圳市南山区科技园南区高新南七道 数字技术园
A1 栋 2 楼 C 区 (518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7
High-Tech Industrial Park S., Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

LiPPERT ADLINK Technology GmbH
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Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

ADLINK Technology, Inc. (French Liaison Office)
Address: 6 allée de Londres, Immeuble Ceylan
91940 Les Ulis, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology Japan Corporation
Address: 〒101-0045 東京都千代田区神田鍛冶町 3-7-4
神田 374 ビル 4F
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,
Chiyoda-ku, Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

ADLINK Technology, Inc. (Korean Liaison Office)
Address: 137-881 서울시 서초구 서초대로 326, 802 (서초동, 모인터빌딩)
802, Mointer B/D, 326 Seocho-daero, Seocho-Gu,
Seoul 137-881, Korea
Tel: +82-2-2057-0565
Fax: +82-2-2057-0563
Email: korea@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.
Address: 84 Genting Lane #07-02A, Cityneon Design Centre
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)
Address: #50-56, First Floor, Spearhead Towers
Margosa Main Road (between 16th/17th Cross)
Malleswaram, Bangalore - 560 055, India
Tel: +91-80-65605817, +91-80-42246107
Fax: +91-80-23464606
Email: india@adlinktech.com

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Table A-1. Technical Support Contact Information (Continued)

	ADLINK Technology, Inc. (Israeli Liaison Office) Address: 27 Maskit St., Corex Building PO Box 12777 Herzliya 4673300, Israel Tel: +972-54-632-5251 Fax: +972-77-208-0230 Email: israel@adlinktech.com **ADLINK Technology, Inc. (UK Liaison Office)** Tel: +44 774 010 59 65 Email: UK@adlinktech.com

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