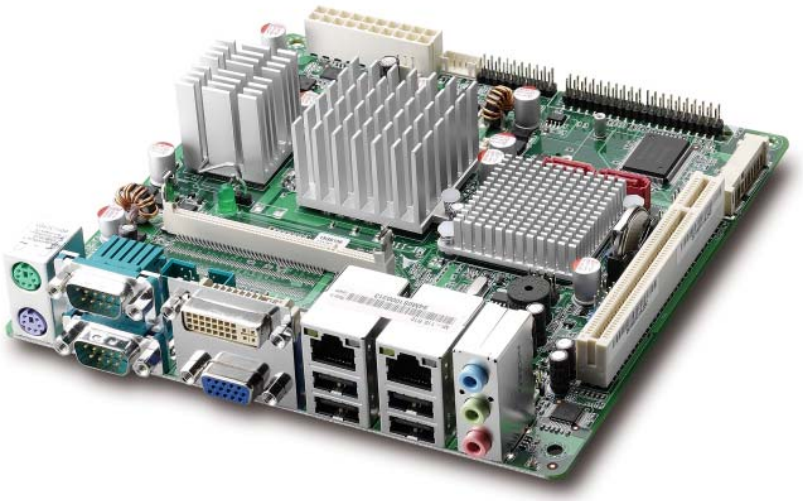
MI-110

Mini-ITX Embedded Motherboard with Intel® Atom™ Processor N270 and Intel® 945GSE/ICH7M Chipset

User's Manual



Manual Rev.: 2.00

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Revision History

Revision	Release Date	Description of Change(s)
2.00	2009/10/02	Initial Release

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Preface

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Using this Manual

Audience and Scope

The MI-110 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating industrial grade computers.

Manual Organization

This manual is organized as follows:

Preface: Presents copyright notifications, disclaimers, trademarks, and associated information on the proper usage of this document and its associated product(s).

Chapter 1, Introduction: Introduces the MI-110, its features, applications, and specifications, including functional descriptions and board layout.

Chapter 2, Connectors & Jumpers: Provides technical information on connectors, jumpers and pin assignments for configuring the MI-110.

Chapter 3, Getting Started: Describes how to install components and drivers on the MI-110.

Chapter 4, BIOS Setup: Presents information and illustrations to help understand and configure the system BIOS.

Appendix A, Watchdog Timer: Presents information on understanding and configuring the watchdog timer.

Appendix B, System Resources: Presents information on I/O mapping, IRQ routing, and resource allocation.

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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Table of Contents

Revision History ii

Preface iii

Table of Contents vii

List of Figures ix

List of Tables xi

1 Introduction 1

1.1 Package Contents 1
1.2 Overview 2
1.3 Features 2
1.4 Specifications 3
1.5 Block Diagram 5
1.6 Functional Description 6
1.7 Power Consumption 9
1.8 Board Layout 10
1.9 Mechanical Dimensions 12

2 Connectors & Jumpers 15

2.1 Rear I/O Connectors 15
2.2 Onboard Connectors 19
2.3 Jumper Settings 27

3 Getting Started 31

3.1 System Memory 31
3.2 Driver Installation 32

4 BIOS Setup 33

4.1 Starting the BIOS 33

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4.2 Standard CMOS Features 35
4.3 Advanced BIOS Features 37
4.4 Advanced Chipset Features..... 42
4.5 Integrated Peripherals..... 44
4.6 Power Management Setup 51
4.7 PnP/PCI Configurations..... 54
4.8 PC Health Status 56
4.9 Frequency/Voltage Control 57
4.10 Load Optimized Defaults..... 58
4.11 Set Supervisor & User Password..... 59
4.12 Save & Exit Setup..... 60
4.13 Exit Without Saving..... 61

A Appendix: Watchdog Timer 63
A.1 WDT Programming Instructions..... 63

B Appendix: System Resources 65
B.1 System Memory Map..... 65
B.2 Direct Memory Access Channels..... 66
B.3 Fixed I/O Map 67
B.4 Variable I/O Map..... 68
B.5 Interrupt Request (IRQ) Lines..... 69
B.6 PCI Configuration Space Map 71
B.7 PCI Interrupt Routing Map..... 72

Important Safety Instructions..... 73

Getting Service 75

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List of Figures

Figure 1-1: MI-110 Block Diagram 5
Figure 1-2: MI-110 Board Layout 10
Figure 1-3: MI-110 Rear I/O Layout 11
Figure 1-4: MI-110 Board Dimensions 12
Figure 1-5: Rear I/O Faceplate Dimensions..... 13

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List of Tables

Table 1-1: MI-110 General Specifications 4
Table 1-2: Intel® Atom™ N270 processor Power Consumption 9
Table 1-3: MI-110 Board Layout Legend 11
Table B-1: System Memory Map 65
Table B-2: Direct Memory Access Channels 66
Table B-3: Fixed I/O Map 67
Table B-4: Variable I/O Map 68
Table B-5: IRQ Lines PIC Mode 69
Table B-6: IRQ Lines APIC Mode 70
Table B-7: PCI Configuration Space Map 71
Table B-8: PCI Interrupt Routing Map 72

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1 Introduction

This chapter will introduce the MI-110, its features, specifications, functional description, and mechanical layout.

1.1 Package Contents

Please check that your package contains the items below. If you discover damaged or missing items, please contact your vendor.

- MI-110 Mini-ITX Embedded Motherboard
- I/O shield
- 1x IDE cable
- 2x SATA cable
- 2x SATA power cable
- 2x COM port cable with bracket
- Driver CD
- User's Manual



DO NOT install or apply power to equipment that is damaged or if there is missing/incomplete equipment. Retain the shipping carton and packing materials for inspection. Please contact your ADLINK dealer/vendor immediately for assistance. Obtain authorization from your dealer before returning any product to ADLINK.

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1.2 Overview

The ADLINK MI-110 is a Mini-ITX embedded motherboard based on the Intel® Atom™ processor N270 built on 45-nm process technology in Micro-FCBGA8 package and the Mobile Intel® 945GSE + ICH7M Express Chipset. The MI-110 is ideal for embedded applications requiring fanless operation and ultra-low power consumption in a standard small form factor motherboard with a complete set of I/O functions and high-bandwidth network connectivity. These features, combined with an SO-DIMM socket supporting DDR2-533 SDRAM up to 2 GB, IDE/SATA/CF storage interfaces, PCI and Mini PCIe expansion slots, VGA, DVI-I, dual-channel 18-bit LVDS, and audio interfaces make the MI-110 suitable for medical, transportation, and other applications requiring a low noise/power, space-saving, multiple display platform.

1.3 Features

- Mini-ITX form factor (170 mm x 170 mm)
- Intel® Atom™ processor N270:
  - 1.6 GHz core frequency
  - 533MHz FSB
  - 512KB L2 cache
  - Micro-FCBGA8 package
- DDR2-533 up to 2GB max. (1x 200-pin SODIMM socket)
- Intel® GMA950 integrated in 945GSE supporting dual independent display
  - Dsub-15 connector up to 2048x1536 @ 75Hz (QXGA)
  - DVI-I via Chrontel 7307C, up to 1600x1200 (UXGA)
  - Dual-channel 18-bit LVDS up to 1600x1200 (UXGA)
- PCI and Mini PCIe expansion slots
- 2x SATA ports 1.5Gb/s, 4x RS-232 serial ports
- 2x GbE, 6x USB 2.0 (4 ext., 2 int.)
- 2x Mini-DIN for PS/2 keyboard/mouse
- RoHS compliant

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1.4 Specifications

System	
CPU	Intel® Atom™ processor N270 • 1.6 GHz core frequency • 512KB L2 cache • Micro-FCBGA8 package
FSB	• 533 MHz
Chipset	• Mobile Intel® 945GSE + ICH7M Express Chipset
Memory	• DDR2 533 SDRAM (2GB max.) • 1x 200-pin SO-DIMM slot
BIOS	• Award BIOS with 16 Mb Flash ROM
TPM	• TPM 1.2 via Infineon SLB 9635 TT 1.2
Audio	• Realtek ALC888 HD Audio • Line-in, line-out and mic-in
Watchdog Timer	• 1-255 second/minute programmable
Hardware Monitor	• CPU/System temperature, fan speed and onboard DC voltage
Operating System	• Microsoft® Windows® XP/Vista
I/O Interfaces	
Serial ATA	• 2x Serial ATA ports with 1.5 Gb/s data transfer
Parallel ATA	• 1x 40-pin ATA-66/100 IDE port
CompactFlash	• 1x Type-II CF socket, shared with IDE port
Onboard I/O	• 6x USB 2.0 (4x external, 2x by pin header) • 4x RS-232 serial ports (2x external, 2x by pin header)
Rear I/O	• 2x RJ-45 LAN ports • 4x USB 2.0 ports • 2x RS-232 serial ports • 1x D-Sub VGA connector • 1x DVI-I connector • 2x PS2 keyboard/mouse ports • 3x audio jacks (line-in, line-out and mic-in)
Expansion Slots	• 1x Mini PCIe slot • 1x PCI slot

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Display	
Graphics Processor	• Intel® GMA950 integrated in 945GSE supporting dual independent display
VRAM	• Shared system memory up to 224 MB
CRT	• Dsub-15 connector up to 2048x1536 @ 75Hz (QXGA)
DVI	• DVI-I via Chrontel 7307C, up to 1600x1200 (UXGA)
LVDS	• Dual-channel 18-bit LVDS up to 1600x1200 (UXGA)
Ethernet	
Controller	• Realtek 8111C GbE controller
Ports	• 2x RJ-45 Ethernet port
Mechanical and Environment	
Form Factor	• Mini-ITX Embedded Motherboard
Dimensions	• 170 mm x 170 mm (L x W)
Operating Temp.	• 0°C to 60°C
Storage Temp.	• -40ºC to 80ºC
Rel. Humidity	• 10 - 90% RH
Safety	• CE, FCC Class A

Table 1-1: MI-110 General Specifications

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1.5 Block Diagram

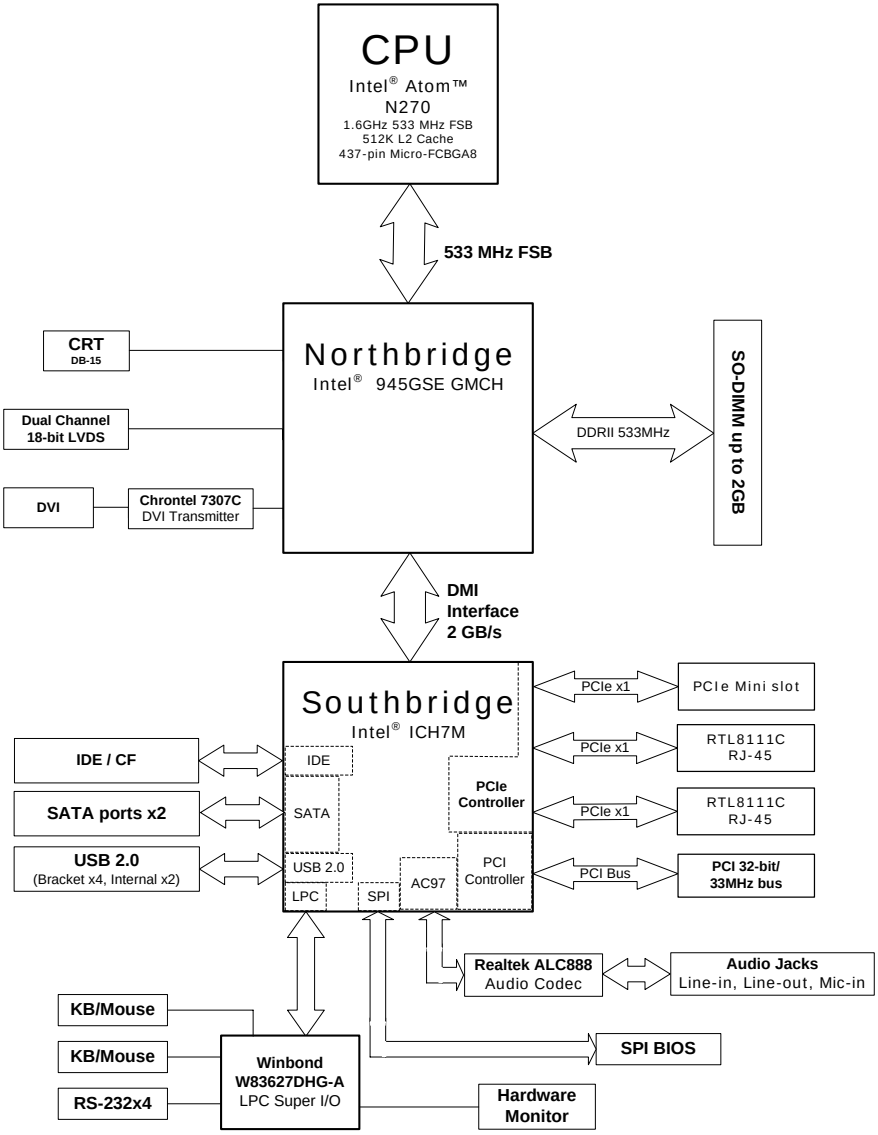


Figure 1-1: MI-110 Block Diagram

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1.6 Functional Description

Processor Support

The MI-110 embedded motherboard is equpped with the Intel® Atom™ N270 processor in Micro-FCBGA8 package. Implemented in 45nm process technology, the Intel® Atom™ N270 is power-optimized to deliver robust performance per watt for cost-effective embedded applications. Features include:

- 1.6 GHz core speed with 533 MHz FSB and 2.5 watts TDP
- Hyper-Threading Technology
- Enhanced Intel SpeedStep® Technology
- Enhanced low-power sleep states (C1E, C2E, C4E)
- Dynamic L2 cache sizing

Mobile Intel® 945GSE Express Chipset

The MI-110 is based on the Mobile Intel® 945GSE Express Chipset, consisting of the Intel® 82945GSE Graphics Memory Controller Hub and Intel® I/O Controller Hub 7-M. The chipset features power-efficient graphics with an integrated 32-bit 3D graphics engine based on Intel® Graphics Media Accelerator 950 architecture with SDVO, LVDS, and CRT display ports. It provides rich I/O capabilities and flexibility via high-bandwidth interfaces such as PCI Express, PCI, Serial ATA, and Hi-Speed USB 2.0 connectivity. It also includes a single channel for 400/533 MHz DDR2 system memory, and Intel® High Definition Audio interface.

DDR2 memory

To meet the requirements of memory-intensive applications, the MI-110 has a single-channel memory architecture supporting a DDR2 400/533 MHz SO-DIMM. The high-bandwidth memory specification, meets the requirements of the latest 3D graphics, multimedia, and network application, and boosts system performance by eliminating bottlenecks.

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Intel® Graphics Media Accelerator GMA 950

The Intel® Graphics Media Accelerator (GMA) 950 provides an integrated 3D graphics engine delivering sophisticated graphics for large display applications. With support for DirectX 9 hardware acceleration, 400 MHz display clock, and up to 224 MB of video memory, the Intel GMA 950 provides a cost-effective and high-performance graphics solution. The MI-110 supports dual independent display technology, enabling different content to be displayed on two separate display terminals or a single workspace to be stretched across two display devices.

Gigabit Ethernet

The MI-110 is equipped with the PCI Express Realtek 8111C GbE controller.

Serial ATA

Storage is efficient and secure with the Serial ATA interface. Utilizing the Intel® ICH7M, the MI-110 supports two Serial ATA devices capable of reading/writing data at up to 1.5 Gb/s. The SATA specification improves chassis airflow via thinner and more flexible cables with lower pin count.

USB 2.0

The MI-110 incorporates the Universal Serial Bus (USB) 2.0 specification that increases peripheral connection speed from 12 Mbps (USB 1.1) to 480 Mbps. USB 2.0 is backward compatible with USB 1.1.

Hardware Monitoring

A built-in, proactive hardware monitoring system monitors the CPU temperature, system fan speeds, and voltage levels to prevent overheating and/or component damage, effect timely failure detection, and ensure stable supply of current for critical motherboard components.

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Watchdog Timer

The watchdog timer (WDT) monitors system operations based on user-defined configurations. The WDT can be programmed for different time-out periods, such as from 1 to 255 seconds or from 1 to 255 minutes. The WDT generates a reset signal, then a reset request, after failure to strobe it within the programmed time period. A register bit may be enabled to indicate if the watchdog timer caused the reset event. The WDT register is cleared during the power-on sequence to enable the operating system to take appropriate action when the watchdog generates a reboot.

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1.7 Power Consumption

Intel® Atom™ N270 processor, 1.6GHz, 512KB L2 cache, 533MHz FSB

Test Configuration	
Memory	Elpida DDR2 667MHz, 2GB
Graphics	Intel® Graphics Media Accelerator 950
SATA HD	WD Caviar SE, WD1600JS-60NCB1, 160GB
Power Supply	Sunpower SPX-5600P1 500W

DOS (idle)			
Power Req.	+5VSB	+12V	Total
Current (mA)	–	719.4	–
Watts (W)	–	–	8.633
Windows XP, Idle			
Power Req.	+5V	+12V	Total
Current (mA)	–	695.8	–
Watts (W)	–	–	8.350
Windows XP, CPU Stress (Kpower)			
Power Req.	+5V	+12V	Total
Current (mA)	–	890.0	–
Watts (W)	–	–	10.68
Windows XP, Total System Stress (Burnin)			
Power Req.	+5V	+12V	Total
Current (mA)	–	860.5	–
Watts (W)	–	–	10.326
S4 Mode (Windows hibernate)			
Power Req.	+5V	+12V	Total
Current (mA)	162.8	–	–
Watts (W)	–	–	0.814
S3 Mode			
Power Req.	+5V	+12V	Total
Current (mA)	252.2	–	–
Watts (W)	–	–	1.261

Table 1-2: Intel® Atom™ N270 processor Power Consumption

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1.8 Board Layout

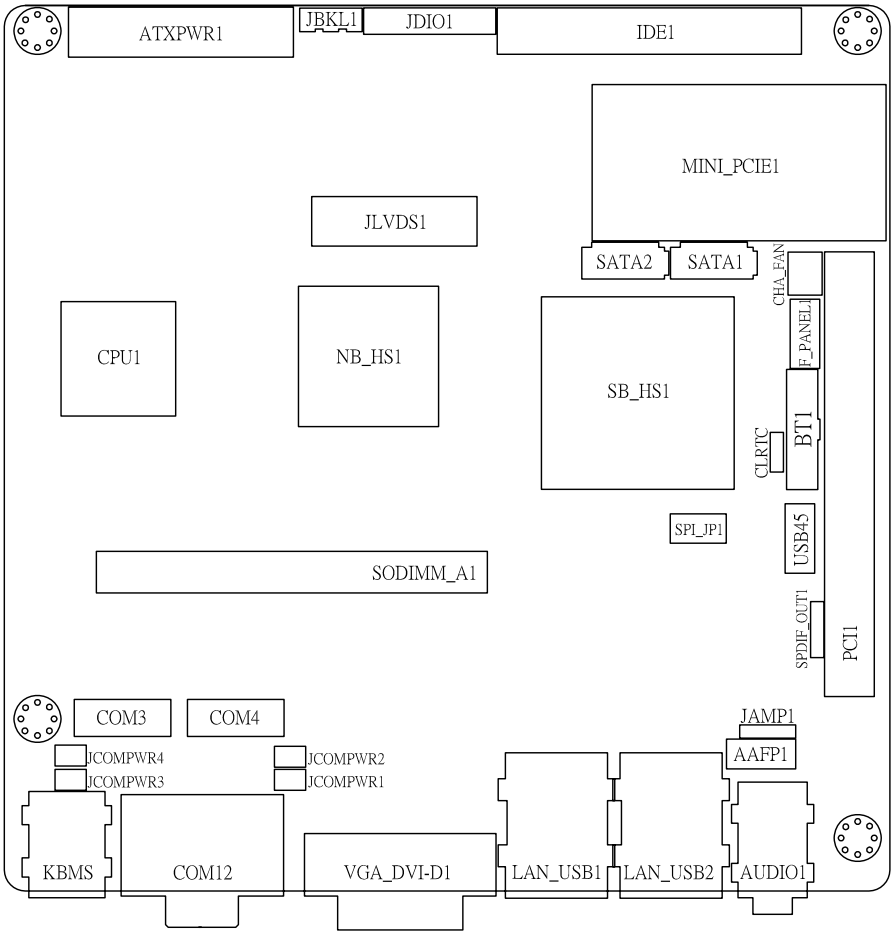


Figure 1-2: MI-110 Board Layout

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AAFP1	Front Panel Audio pin header	**JCOMPWR1/2**	COM1/2 RI, +12V and +5V power select jumper
ATXPWR1	ATX Power connector	**JCOMPWR3/4**	COM3/4 RI, +12V and +5V power select jumper
CHA_FAN	System Fan connector	**JDIO**	Digital IO pin header
CLRTC	Clear CMOS jumper	**JLVDS1**	LVDS connector
COM3/4	Serial Port pin headers	**SATA1/2**	SATA1/2 connectors
F_PANEL1	System Panel pin header	**SODIMMA1**	SO-DIMM socket
IDE1	IDE connector	**SPDIF_OUT**	S/PDIF pin header
JAMP1	Audio Amplifier connector	**SPI_JP1**	SPI pin header
JBLK1	LCD Inverter pin header	**USB45**	USB4/5 pin header

Table 1-3: MI-110 Board Layout Legend

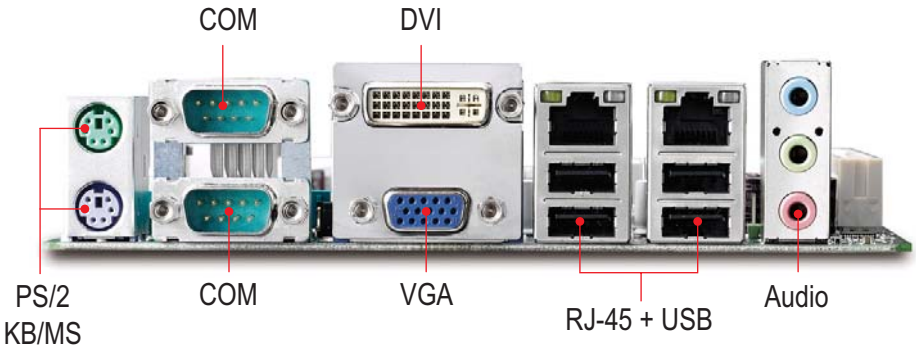
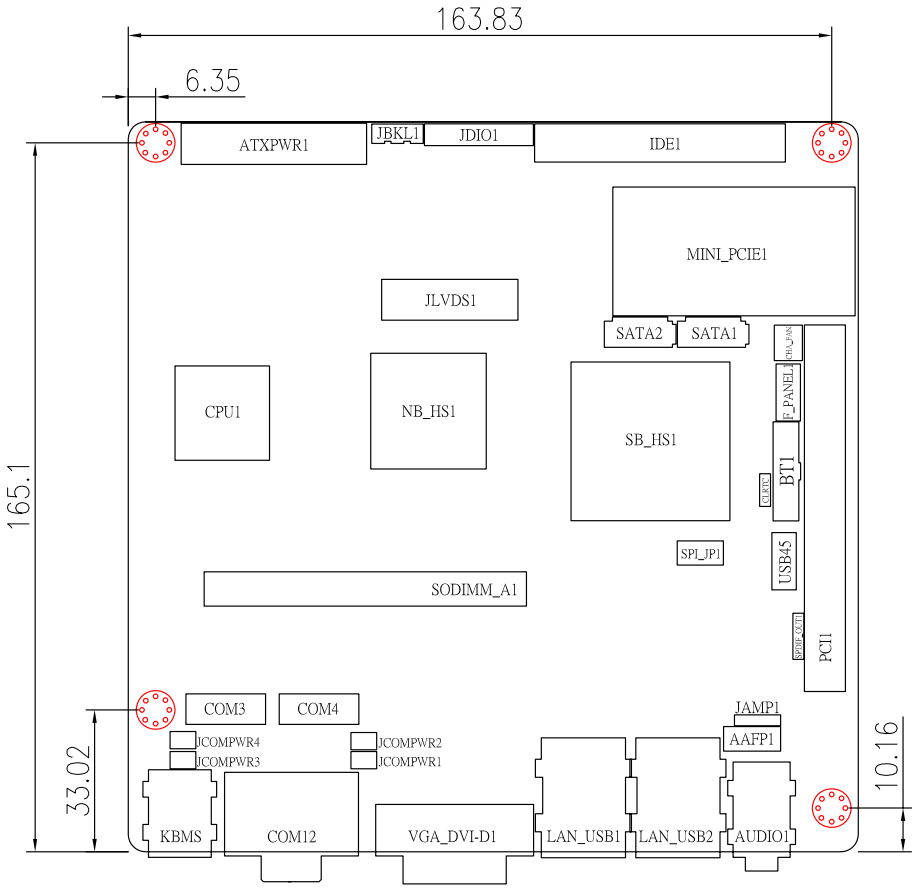


Figure 1-3: MI-110 Rear I/O Layout

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1.9 Mechanical Dimensions



Dimensions in mm

Figure 1-4: MI-110 Board Dimensions

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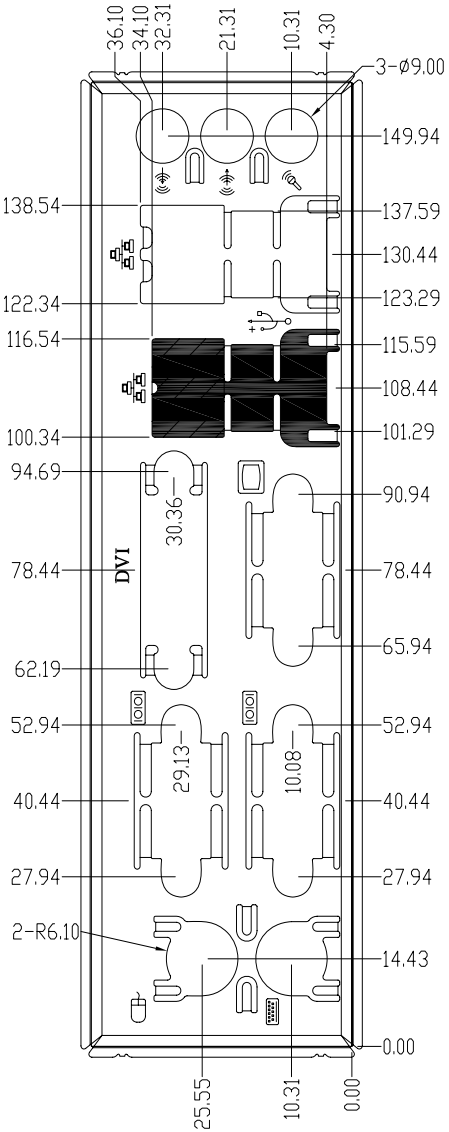


Figure 1-5: Rear I/O Faceplate Dimensions

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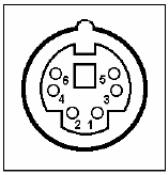
2 Connectors & Jumpers

The connectors and jumpers on the MI-110 allow you to connect and configure external devices. The following specify the pin assignments for connectors and jumper on the MI-110. Refer to **Figure 1-2: MI-110 Board Layout** and **Figure 1-3: MI-110 Rear I/O Layout** for connector and jumper locations.

2.1 Rear I/O Connectors

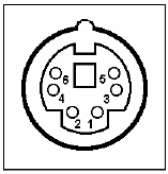
PS/2 Mouse Port (green)

Pin #	Signal	Function
1	MSDATA	Mouse Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



PS/2 Keyboard Port (purple)

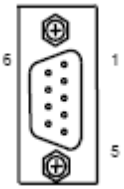
Pin #	Signal	Function
1	KBDATA	Keyboard Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



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Serial Port Connectors (COM1/2)

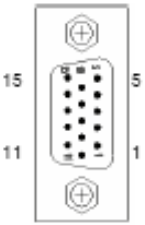
Pin #	RS-232
1	DCD, Data Carrier Detect
2	RXD, Receive Data
3	TXD, Transmit Data
4	DTR, Data Terminal Ready
5	GND, ground
6	DSR, Data Set Ready
7	RTS, Request to Send
8	CTS, Clear to Send
9	RI_Power, Ring Indicator / Power*



***Note:** See “Jumper Settings” on page 27 for RI/+5V/+12V selection.

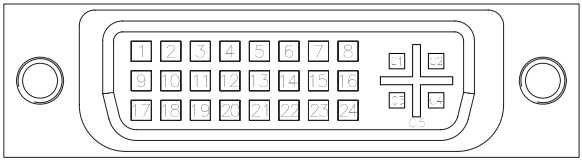
VGA Connector.

Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	VCC pull-up
GND	5	6	GND
GND	7	8	GND
VCC	9	10	GND
VCC pull-up	11	12	DDC2B DATA
HSYNC	13	14	VSYNC
DDC2B CLK	15		



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DVI-I Connector (CN2)



Pin #	Signal	Pin #	Signal
1	TMDS Data2-	16	Hot Plug Detect
2	TMDS Data2+	17	TMDS Data0-
3	TMDS Data2/4 Shield	18	TMDS Data0+
4	TMDS Data4-	19	TMDS Data0/5 Shield
5	TMDS Data4+	20	TMDS Data5-
6	DDC Clock	21	TMDS Data5+
7	DDC Data	22	TMDS Clock Shield
8	Analog Vertical Sync	23	TMDS Clock +
9	TMDS Data1-	24	TMDS Clock -
10	TMDS Data1+	C1	Analog Red
11	TMDS Data1/3 Shield	C2	Analog Green
12	TMDS Data3-	C3	Analog Blue
13	TMDS Data3+	C4	Analog Horizontal Sync
14	+5 V Power	C5	Analog GND Return
15	GND		

USB Connectors

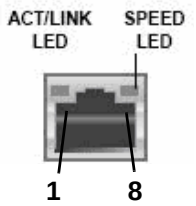
Pin #	Signal Name
1	Vcc
2	USB-
3	USB+
4	GND



LAN Port (RJ-45)

This port allows gigabit connection to a Local Area Network (LAN) using a network hub. The LAN port comes with two LEDs to indicate link, activity and speed. Refer to the tables below for the LAN port pin and LED definitions ..

Pin #	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	BI_DA+
2	TX-	BI_DA-
3	RX+	BI_DB+
4	--	BI_DC+
5	--	BI_DC-
6	RX-	BI_DB-
7	--	BI_DD+
8	--	BI_DD-



ACT/LINK		SPEED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10 Mb connection
Orange	Linked	Orange	100 Mb connection
Blinking	Data Activity	Green	1 Gb connection

Audio I/O port

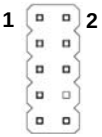
The three-jack audio I/O supports Line-In, Line-Out, and Mic-In functions. The blue Line-In jack onnects to an audio source such as a CD player. The green Line-Out port connects to a speaker or headphone, while the pink Mic-In jack connects to a microphone.

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2.2 Onboard Connectors

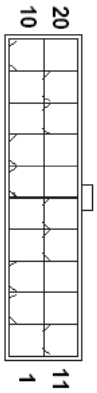
Front Panel Audio Pin Header (AAFP1)

Pin #	Signal	Pin #	Signal
1	MIC2_L	6	AGND
2	MIC2_R	7	FP_PRES#
3	MIC2_R	8	SRTN1
4	SENSE A	9	Key
5	LIN2_L	10	SRTN2



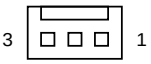
ATX Power Connector (ATXPWR1)

Pin #	Signal	Pin #	Signal
1	+3.3V	11	+3.3V
2	+3.3V	12	-12V
3	GND	13	GND
4	+5V	14	PS-ON#
5	GND	15	GND
6	+5V	16	GND
7	GND	17	GND
8	PWRGD	18	NC
9	+5VSB	19	+5V
10	+12V	20	+5V



System Fan Connector (CHA_FAN)

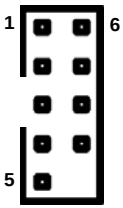
Pin #	Signal
1	GND
2	Fan Power (+12V)
3	Fan Tachometer



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Serial Port Connectors (COM3/4)

Pin #	Signal	Functions
1	DCD	Data Carrier Detect
2	TXD	Transmit Data
3	GND	Ground
4	RTS	Request to Send
5	RI_Power	Ring Indicate, Power *
6	RXD	Receive Data
7	DTR	Data Terminal Ready
8	DSR	Data Set Ready
9	CTS	Clear to Send
10	NC	Key

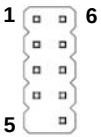


***Note:** See “Jumper Settings” on page 27 for RI/+5V/+12V selection.

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System Panel Connector (F_PANEL1)

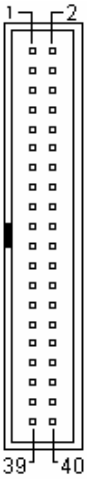
Pin #	Signal	Pin Group
1	HD_LED+	Hard Disk LED
2	HD_LED-	
3	GND	Reset Button
4	RESET	
5	NC	
6	PWR_LED+	Power LED
7	PWR_LED-	
8	PWR	Power Switch
9	GND	
10	NC	



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IDE Connector (IDE1)

Pin #	Signal	Pin #	Signal
1	Reset	2	Ground
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Ground	20	-
21	Request	22	Ground
23	I/O Write	24	Ground
25	I/O Read	26	Ground
27	I/O Ready	28	Cable Select
29	DMA Ack	30	Ground
31	Interrupt Request	32	No Connect
33	Device Address 1	34	ATA 66/100 Detect
35	Device Address 0	36	Device Address 2
37	Chip Select 1	38	Chip Select 3
39	Device Active	40	Ground



Audio Amplifier connector (JAMP1)

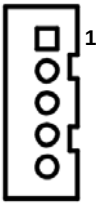
Pin #	Signal
1	AMP_L-
2	AMP_L+
3	AMP_R-
4	AMP_R+



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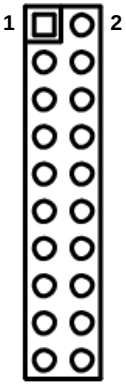
LCD Inverter pin header (JBLK1)

Pin #	Signal
1	+12V
2	GND
3	ENBKL
4	VR
5	+5V



Digital IO pin header (JDIO)

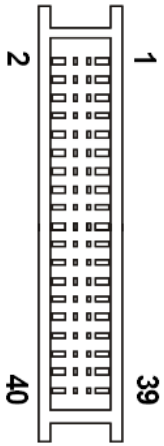
Pin #	Signal	Pin #	Signal
1	DIO GP20	2	DIO GP10
3	DIO GP21	4	DIO GP11
5	DIO GP22	6	DIO GP12
7	DIO GP23	8	DIO GP13
9	DIO GP24	10	DIO GP14
11	DIO GP25	12	DIO GP15
13	DIO GP26	14	DIO GP16
15	DIO GP27	16	DIO GP17
17	SMBCLK	18	SMBDATA
19	Ground	20	VCC



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LVDS Flat Panel Connector (JLVDS1)

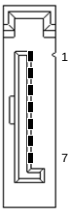
Pin #	Signal	Pin #	Signal
2	+5V	1	+3.3V
4	+5V	3	+3.3V
6	SD_DDC	5	SC_DDC
8	GND	7	GND
10	LVDS0_P0	9	LVDS0_P1
12	LVDS0_N0	11	LVDS0_N1
14	GND	13	GND
16	LVDS0_P2	15	LVDS0_P3
18	LVDS0_N2	17	LVDS0_N3
20	GND	19	GND
22	LVDS1_P0	21	LVDS1_P1
24	LVDS1_N0	23	LVDS1_N1
26	GND	25	GND
28	LVDS1_P2	27	LVDS1_P3
30	LVDS1_N2	29	LVDS1_N3
32	GND	31	GND
34	LVDS0_CLKP	33	LVDS1_CLKP
36	LVDS0_CLKN	35	LVDS1_CLKN
38	GND	37	GND
40	+12V	39	+12V



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SATA Connectors (SATA1-6)

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



S/PDIF Pin Header (SPDIF_OUT)

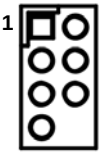
Pin #	Signal
1	+5V
2	NC
3	SPDIF0
4	GND



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SPI pin header (SPI_JP1)

Pin #	Signal	Pin #	Signal
1	+3V ROM	2	GND
3	F_SPI_CS#	4	F_SPI_CLK
5	F_SPI_MISO	6	F_SPI_MOSI
7	SPI_HOLD#	8	NC



USB 2.0 Connector (USB45)

Pin #	Signal	Pin #	Signal
1	+5V	2	+5V
3	USB4-	4	USB5-
5	USB4+	6	USB5+
7	GND	8	GND
9	Key	10	NC



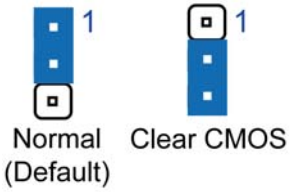
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2.3 Jumper Settings

Clear CMOS Jumper (CLRTC)

The CMOS RAM data contains the date / time and BIOS setting information. CMOS is powered by the onboard button cell battery. To erase the CMOS RAM data:

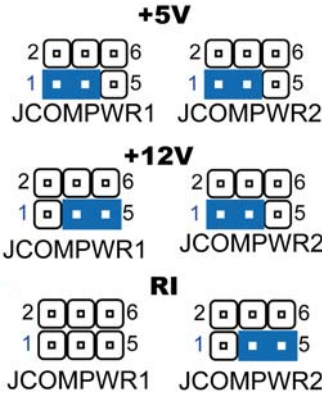
1. Unplug the MI-110.
2. Short the CLRTC pins 2-3.
3. Remove the jumper cap from pins 2-3 and reinstall it to pins 1-2. Power up the system.



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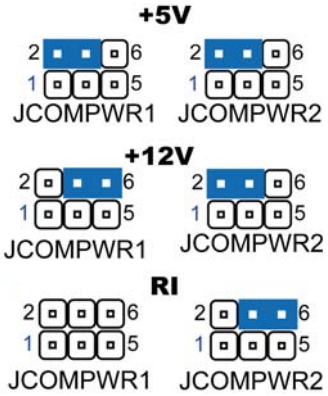
COM1 RI, +12V and +5V Function Select (JCOMPWR1/2)

These jumpers allows you to select COM1 RI, +5V and +12V functions. Set JCOMPWR1 to pins 1-3 and JCOMPWR2 to pins 1-3 to select +5V power. Set JCOMPWR1 to pins 3-5 and JCOMPWR2 to pins 1-3 to select +12V power. Set JCOMPWR2 to pins 3-5 and JCOMPWR1 to open for RI selection.



COM2 RI, +12V and +5V Function Select (JCOMPWR1/2)

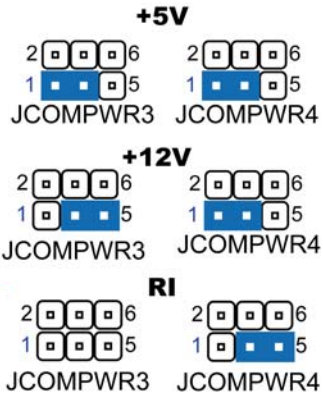
These jumpers allow you to select COM2 RI, +5V and +12V power. Set JCOMPWR1 to pins 2-4 and JCOMPWR2 to pins 2-4 to select +5V power. Set JCOMPWR1 to pins 4-6 and JCOMPWR2 to pins 2-4 to select +12V power. Set JCOMPWR2 to pins 4-6 and JCOMPWR1 to open for RI selection.



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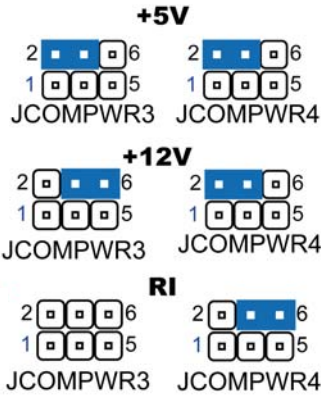
COM3 RI, +12V and +5V Function Select (JCOMPWR3/4)

These jumpers allow you to select COM3 RI, +5V and +12V power. Set JCOMPWR3 to pins 1-3 and JCOMPWR4 to pins 1-3 to select +5V power. Set JCOMPWR3 to pins 3-5 and JCOMPWR4 to pins 1-3 to select +12V power. Set JCOMPWR4 to pins 3-5 and JCOMPWR3 to open for RI selection.



COM4 RI, +12V and +5V Function Select (JCOMPWR3/4)

These jumpers allow you to select COM4 RI, +5V and +12V power. Set JCOMPWR3 to pins 2-4 and JCOMPWR4 to pins 2-4 to select +5V power. Set JCOMPWR3 to pins 4-6 and JCOMPWR4 to pins 2-4 to select +12V power. Set JCOMPWR4 to pins 4-6 and JCOMPWR3 to open for RI selection.



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3 Getting Started

This chapter provides information on how to install components to the MI-110 SBC.

3.1 System Memory

The MI-110 supports up to 2 GB of DDR2 400/533 SDRAM in one 200-pin SO-DIMM socket. See Figure 1-2 on page 10 for the SO-DIMM socket location.

Memory Module Installation

The DDR2 memory modules are notched to facilitate correct installation in the DIMM sockets.



Disconnect all power supply to the board before installing a memory module to prevent damaging the board and memory module .

To install a memory module:

1. Locate the SO-DIMM slot on the motherboard.
2. Align the memory module on the socket, making sure that the notch matches the break on the socket.
3. Insert the module firmly into the slot until the retaining clips snap back inwards and the module is securely seated.

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3.2 Driver Installation

The MI-110 drivers for **Windows XP 32-bit** are located in the following directories on the Driver CD, or can be downloaded from the ADLINK website (**http://www.adlinktech.com**):

Chipset	X:\MI-110\CHIP\setup.exe
Display	X:\MI-110\VGA\Win2KXP\win2k_xp14311.exe
LAN	X:\MI-110\LAN\Win2KXP\setup.exe
Audio	X:\MI-110\Audio\Windows 32_64\WDM_R182.exe
TPM	X:\MI-110\TPM\setup.exe

Follow the instructions below to install the required MI-110 drivers:

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 **X:\MI-110\CHIP\setup.exe**. Follow the instructions given and reboot when instructed.
3. Install the **Display driver** and utilities by running the program **X:\MI-110\VGA\Win2KXP\win2k_xp14311.exe**. Follow the instructions given and reboot when instructed.
4. Install the **LAN driver** by running the program **X:\MI-110\LAN\Win2KXP\setup.exe**. Follow the instructions given and reboot if required.
5. Install the Audio driver by running the program **X:\MI-110\Audio\Windows 32_64\WDM_R182.exe**. Follow the instructions given and reboot if required.
6. Install the TPM driver by running the program **X:\MI-110\TPM\setup.exe**. Follow the instructions given and reboot if required.

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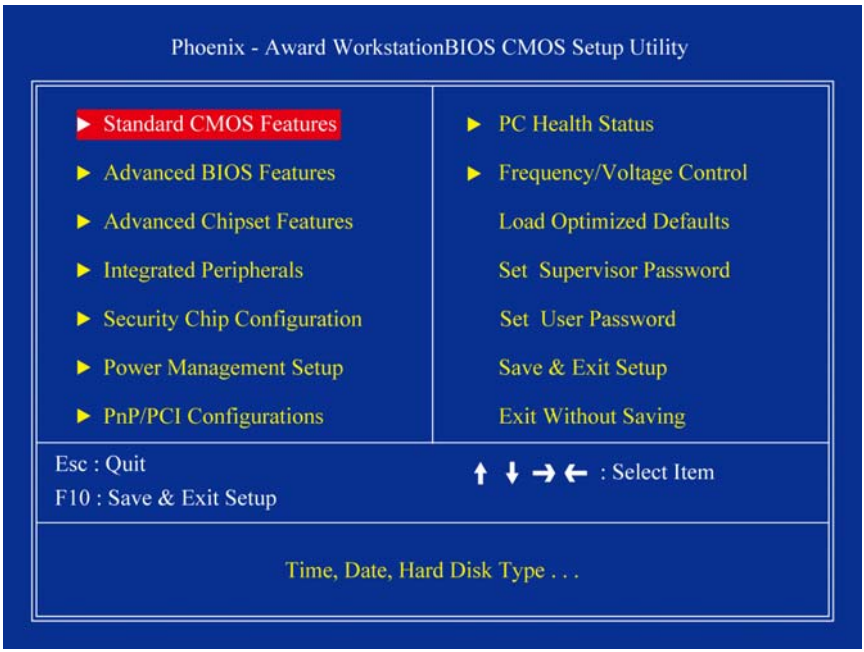
4 BIOS Setup

The following chapter describes basic navigation for the Phoenix AwardBIOS Setup Utility.

4.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the <Delete> key on your keyboard during the Power-On-Self-Test (POST) to enter the Setup utility.
3. After you press the < Delete > key, the main BIOS Setup Menu will be displayed.



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Navigation

Use the keys described below to navigate through the BIOS Setup Utility

Key(s)	Function Description
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
Esc	Return to the main menu from a sub-menu or prompts you to quit the setup program.
← , →	Move to the item on the left or right
↑ , ↓	Move to previous or next item
Enter	Brings up a selection menu for the highlighted field.
+ or PgUp	Moves the cursor to the first field
- or PgDn	Moves the cursor to the last field
F5	Loads the previous values
F6, F7	Loads the fail-safe / optimized defaults
F10	Saves changes and exits Setup

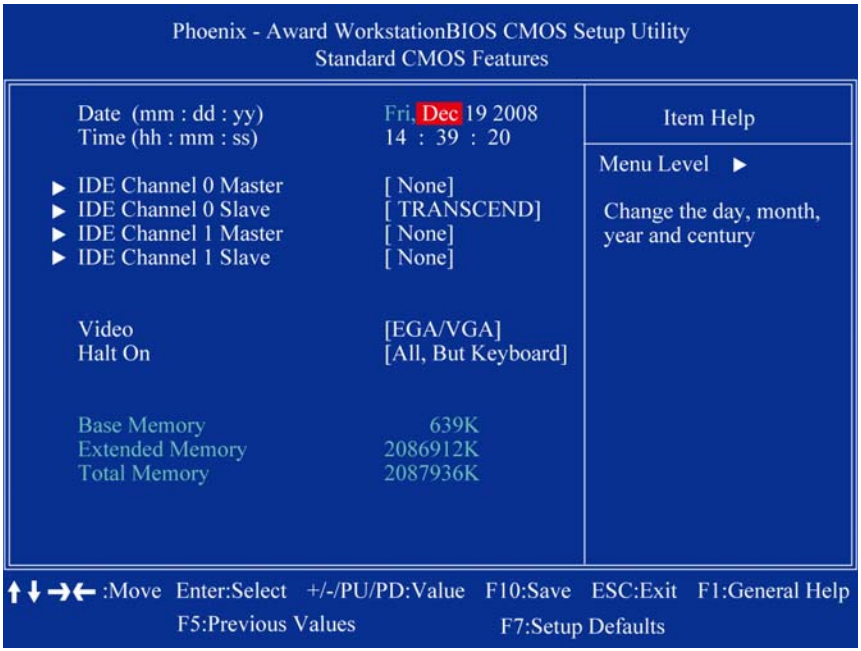
Submenus

Note that a right pointer symbol (▶) appears to the left of certain fields. This pointer indicates that you can display a submenu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. The sub-menu appears. Use the legend keys to enter values and move from field to field within a sub-menu as you would within a menu. Use the <Esc> key to return to the main menu.

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4.2 Standard CMOS Features

The main menu includes the following setup categories. Recall that some systems may not include all entries.



Date/Time

Use this option to change the system time and date. 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.

IDE Channel 0/1 Master/Slave

This selection brings up the configuration submenu of the designated device.

IDE HDD Auto-detection: Press Enter to auto-detect the HDD on the selected channel.

IDE Device Setup: None/Auto/Manual. Selecting 'manual' allows the user to set the remaining fields on the submenu.

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Capacity: Auto display disk size Disk drive capacity (approximated).

Access Mode: CHS/LBA/Large/Auto Selects the access mode for a hard disk The following options are selectable only if the 'IDE Primary Master' item is set to 'Manual'

Cylinder: Min = 0 Max = 65535 Sets the number of cylinders for a hard disk.

Head: Min = 0 Max = 255 Sets the number of read/write heads

Precomp: Min = 0 Max = 65535

Landing zone: Min = 0 Max = 65535

Sector: Min = 0 Max = 255 Number of sectors per track

Video

This category detects the type of adapter used for the primary monitor that matches your video display card and monitor.

- EGA / VGA: Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SVGA, or PGA monitor adapters
- CGA 40: Color Graphics Adapter, power up in 40 column mode
- CGA 80: Color Graphics Adapter, power up in 80 column mode
- MONO: Monochrome adapter, includes high resolution monochrome adapters

Halt On

Sets the system to halt on errors according to the system functions specified in each option. Configuration options: [All Errors] [No Errors] [All, But Keyboard]

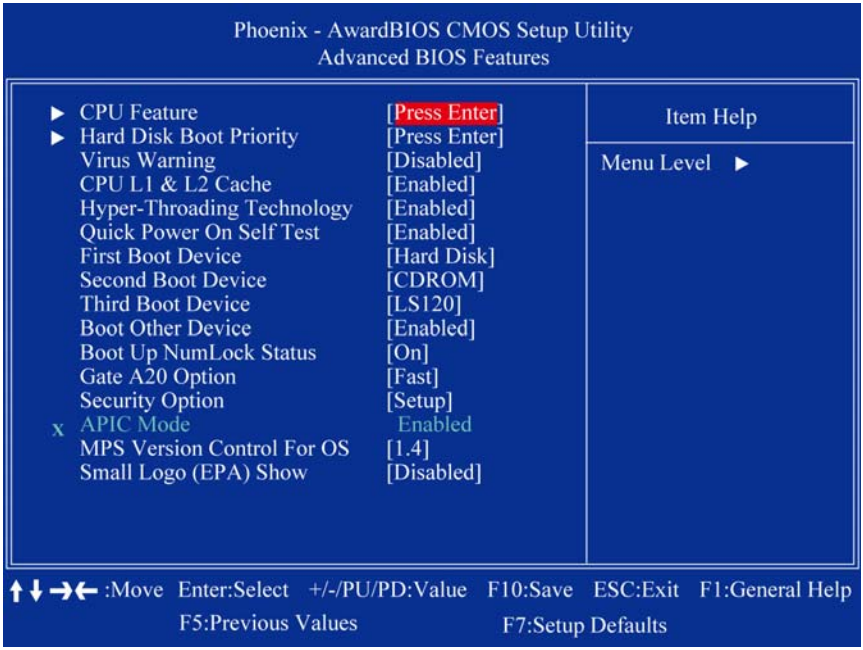
Memory

This category displays base memory, extended memory, and total memory detected during POST (Power On Self Test).

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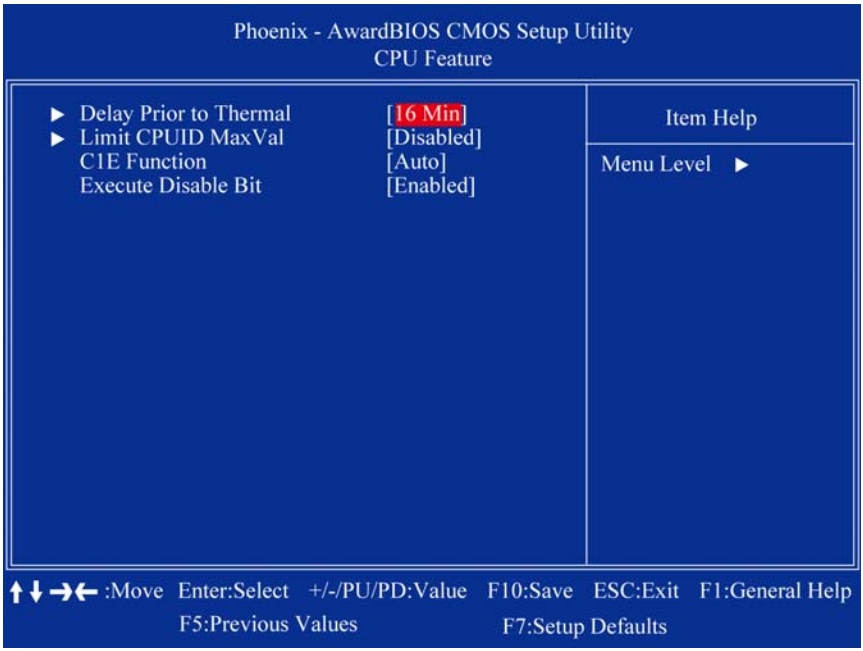
4.3 Advanced BIOS Features

This section allows users to configure the Advanced BIOS Features of the system.



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CPU Features



Delay Prior to Thermal

The Delay Prior To Thermal BIOS feature controls the activation of the Thermal Monitor's automatic mode. It allows you to determine when the Pentium 4's Thermal Monitor should be activated in automatic mode after the system boots. For example, with the default value of 16 Minutes, the BIOS activates the Thermal Monitor in automatic mode 16 minutes after the system starts booting up.

Limit CPUID MaxVal

Set Limit CPUID MaxVa1 to 3. This should be disabled for WinXP

C1E Function

CPU C1E function select

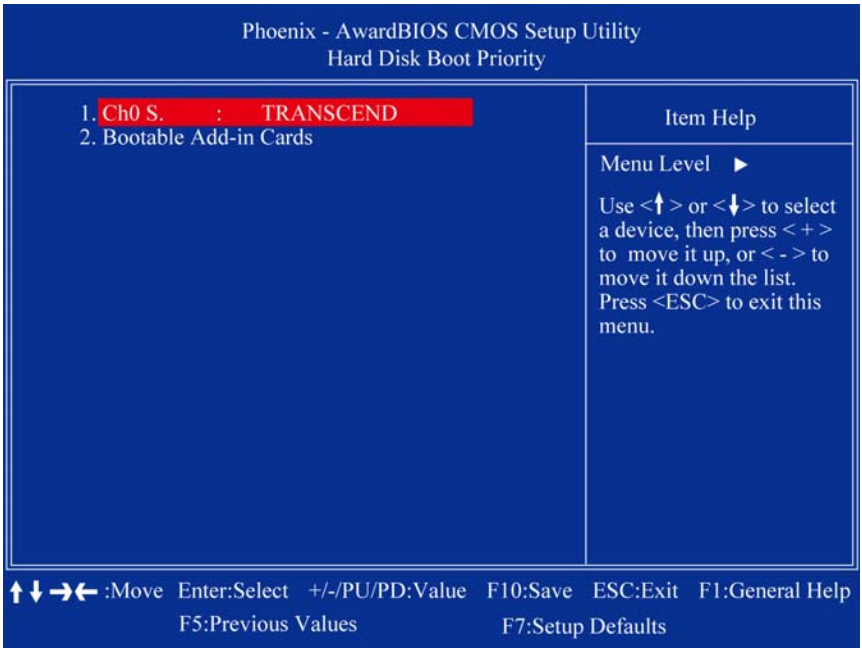
Execute Disable Bit

When disabled, forces the XD feature flag to always return 0

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Hard Disk Boot Priority

Sets hard disk boot device priority.



CH0 S.

Primary SATA channel with Master Device. It will show the device model / type when SATA HDD or CD ROM connected.

Bootable Add-in Cards

"Bootable add-in cards" is an item on the HDD boot priority list.

Virus Warning

Enables or disables the virus warning.

CPU L1 & L2 Cache

Enables or disables the CPU L1 & L2 Cache. Enabling this feature speeds up memory access.

Hyper-Threading Technology

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Enables or disables the Hyper-Threading function of the CPU.

Quick Power On Self Test

Speeds up the Power On Self Test (POST). If enabled, the BIOS will shorten the test time or skip some check items during POST.

First/Second/Third Boot Device

Pressing <Enter> displays the Boot Device Menu. The BIOS will attempt to load the operating system from the selected devices in sequence.

Boot Other Device

Enables the BIOS to boot from a second or third device if booting from the first device fails. When disabled the BIOS will not attempt to boot from alternative devices.

Boot-Up NumLock Status

Selects the power on state for system NumLock. Options: On/Off

Gate A20 Option

Gate A20 is a device used to address memory above 1 MB. The options are Fast and Normal. The Fast setting is controlled by a chipset specific method. Normal setting is controlled by keyboard controller or chipset hardware.

Security Option

Selects whether a password is required every time the system boots or only when setup is entered. Options include:

- **System:** The system will not boot without password access and access to Setup will be denied if an incorrect password is entered at the prompt.
- **Setup:** The system will boot, but access to Setup will be restricted without password access.

To disable security, select PASSWORD SETTINGS in the Main Menu. The user will then be prompted to enter a password. To disable security, DO NOT type anything, only press <Enter>. Once security is disabled, the system will boot and setup can be accessed.

APIC Mode

Enables or disables the APIC Mode.

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MPS Version Control for OS

This option is only valid for multiprocessor motherboards as it specifies the version of the Multiprocessor Specification (MPS) that the motherboard will use. The MPS is a specification by which PC manufacturers design and build Intel architecture systems with two or more processors.

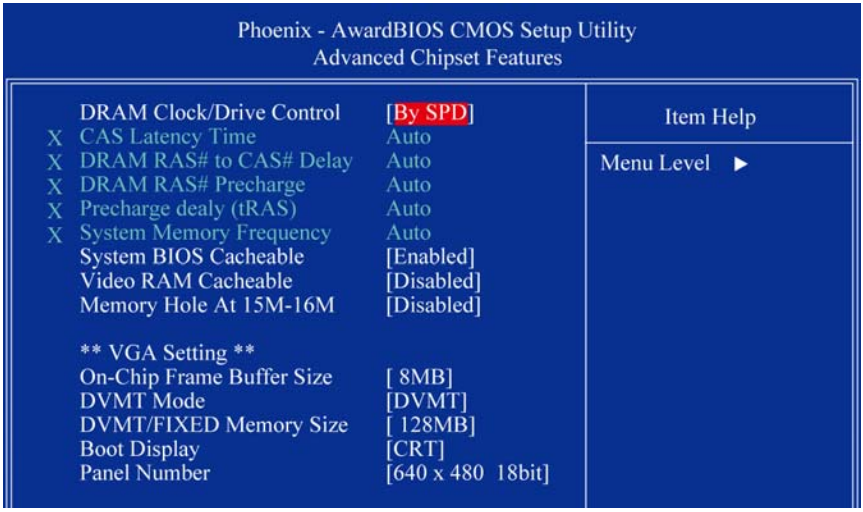
MPS 1.1 was the original specification. MPS version 1.4 adds extended configuration tables for improved support of multiple PCI bus configurations and greater expandability in the future. In addition, MPS 1.4 introduces support for a secondary PCI bus without requiring a PCI bridge.

Small Logo (EPA) Show

This item allows you enabled/disabled display of the small EPA logo during POST.

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4.4 Advanced Chipset Features



DRAM Clock/Drive Control

When set to “BySPD”, the DRAM timing parameters are set according to DRAM SPD (Serial Presence Detect). When disabled, one can manually set the DRAM timing parameters using the sub items below. Set to “BySPD” if not sure.

CAS Latency Time

Controls the latency between the SDRAM Read command and the time data actually becomes available.

DRAM RAS# to CAS# Delay

Controls the latency between the DDR SDRAM active command and the read/write command.

DRAM RAS# Precharge

Controls the idle clocks after issuing a precharge command to the DDR SDRAM.

Precharge delay (tRAS)

This setting controls the precharge delay, which determines the timing delay for DRAM precharge.

System Memory Frequency

Allow to choose different frequency of memory module.

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System BIOS Cacheable

Selecting “Enabled” allows caching of the system BIOS ROM at F0000h- FFFFFh, resulting in better system performance. However, if any pro-gram writes data to this memory area, a system error may occur.

Video BIOS Cacheable

Selecting Enabled allows caching of the video BIOS ROM at F0000h-FFFFFh, resulting in better video performance. However, if any program writes to this memory area, a system error may result.

Memory Hole At 15M-16M

Enabling this feature reserves 15 MB to 16 MB memory address space for ISA expansion cards that specifically require this setting. This makes memory from 15 MB and up unavailable to the system. Expansion cards can only access memory up to 16 MB. The default setting is “Disabled”.

On-Chip Frame Buffer Size

The On-Chip Frame Buffer Size can be set as 1MB or 8MB. This memory is shared with the system memory.

DVMT Mode

Use this field to select the memory to allocate for video memory. The choices are “Fixed”, “DVMT” and “BOTH”.

DVMT/FIXED Memory Size

Specify the size of DVMT/system memory to allocate for video memory.

Boot Display

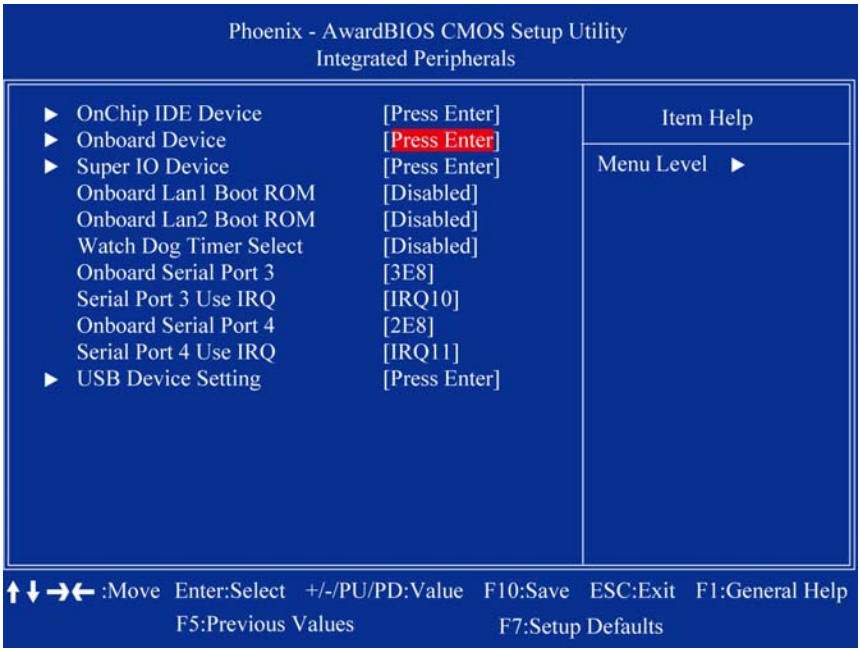
Options: VBIOS Default, CRT, LFP, CRT+LFP, EFP(DVI), CRT+EFP(DVI). (VBIOS Default: CRT, LFP: LVDS Flat Panel, EFP(DVI): DVI)

Panel Number (LVDS panel resolution)

Options: 640x480 18bit, 800x600 18bit, 1024x768 18bit, 1024x768 18bit/2 (dual channel).

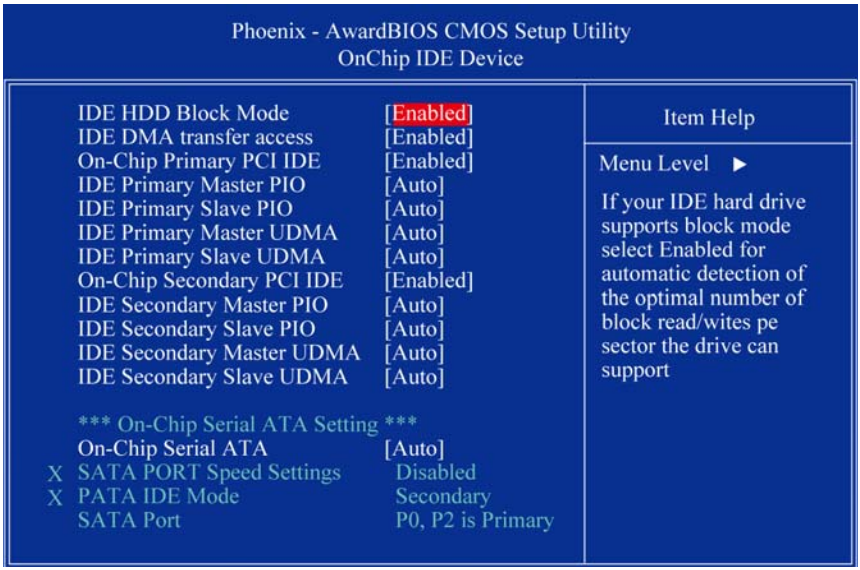
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4.5 Integrated Peripherals



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On Chip IDE Device



IDE HDD Block Mode

If your IDE hard drive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.

IDE DMA Transfer Access

Use this field to enable or disable IDE DMA transfer access.

OnChip Primary/Seondary PCI IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select Enabled to activate each channel separately.

IDE Primary/Secondary Master/Slave PIO/UDMA Mode

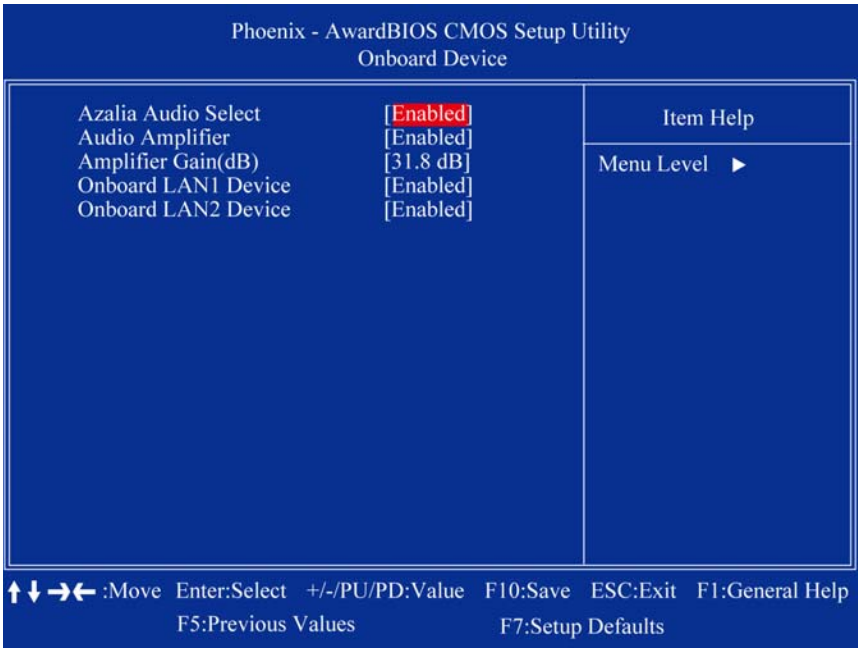
Two IDE devices may have a different Mode timing (0, 1, 2, 3, 4), which need to be independent. The default setting “Auto” will allow auto detection to ensure optimal performance.

On-Chip SerialATA

Options: Disabled, Auto, Combined Mode, Enhanced Mode, SATA only

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Onboard Device

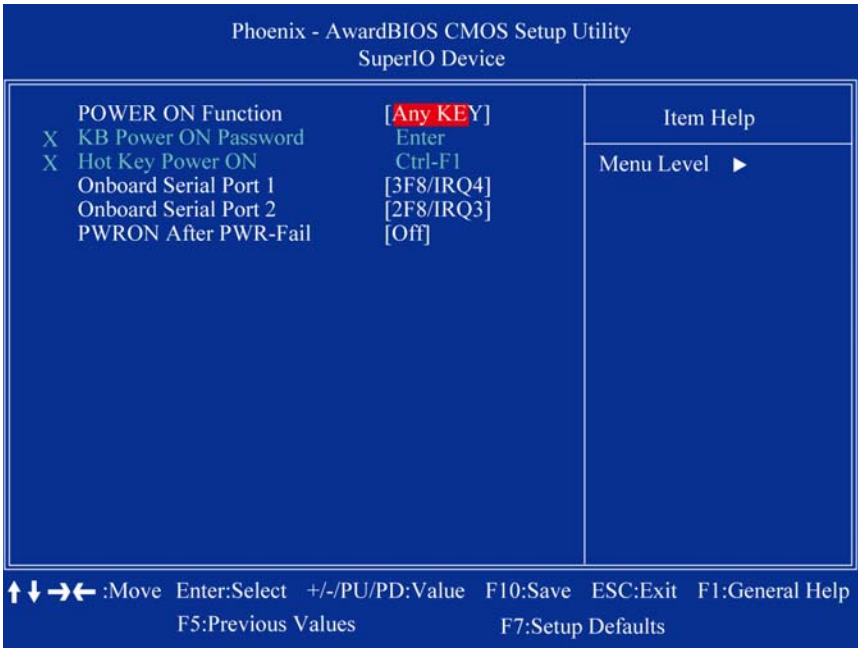


Azalia Audio Select

Select [Disabled] if you do not want to use Azalia audio. Configuration options: [Enabled] [Disabled]

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Super I/O Device



Power ON Function

This feature allows you to wake up the system using any of the listed options. The selections are “Hot KEY”, “Mouse Left”, “Mouse Right”, “Any KEY” and “BUTTON ONLY” (default).

KB Power ON Password

The system will ask for a password, after entering the correct password the keyboard can then be used.

Hot Key Power ON

Awaken the system by pressing the hot key button. The options are “Ctrl-F1”, “Ctrl-F2”, “Ctrl-F3” to “Ctrl-F8”.

Onboard Serial Port 1/2

The settings are “3F8/IRQ4”, “2F8/IRQ3”, “3E8/IRQ4”, “2E8/IRQ3”, and “Disabled” for the on-board serial connector.

Onboard Parallel Port

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This field sets the address of the on-board parallel port connector. You can select “378/IRQ7”, “278/IRQ5”, “3BC/IRQ7”, or “Disabled”. If you install an I/O card with a parallel port, make sure there is no conflict in the address assignments. The single board computer can support up to three parallel ports.

PWRON After PWR-Fail

Determines which state the computer enters when AC power is restored after a power loss. The options for this value are On, Off, and Former-Sts.

Onboard LAN1/2 Boot ROM

Options: Enable, Disable.

Watchdog Timer Select

This option will determine watch dog timer. Options: Disabled, 10, 20, 30, 40 Sec. 1, 2, 4 Min.

Onboard Serial Port 3/4

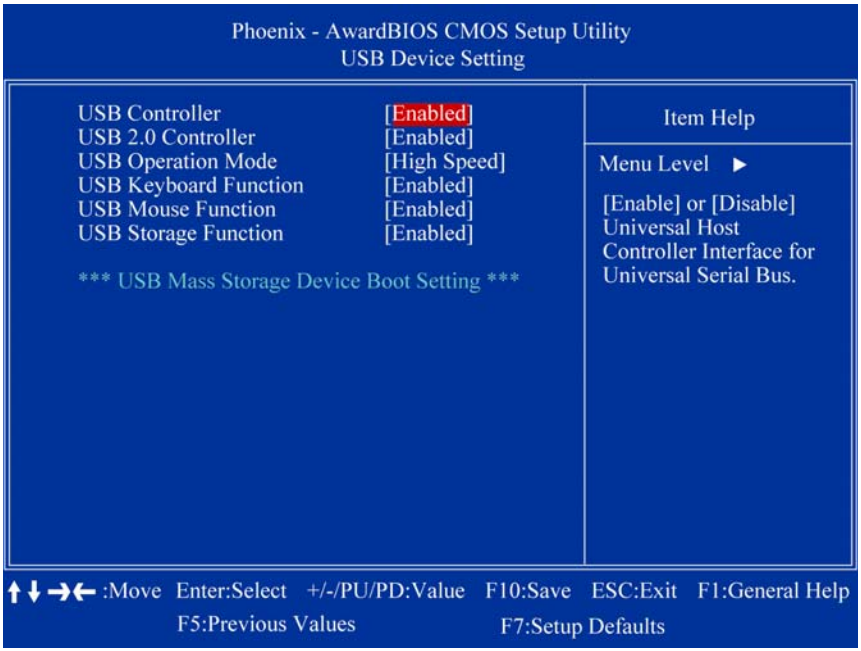
Options: Disable, 3F8, 2F8, 3E8, 2E8

Serial Port 3/4 Use IRQ

Options: IRQ3, IRQ4, IRQ10, IRQ11

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USB Device Setting



USB Controller

The options: Disabled, Enabled.

USB 2.0 Controller

The options: Disabled, Enabled.

USB Operation Mode

Allows you to configure the USB 2.0 controller in HiSpeed (480 Mbps) or Full Speed (12 Mbps). Configuration options: [Full/Low Speed] [HiSpeed]

USB Keyboard Function

The options: Disabled, Enabled.

USB Mouse Function

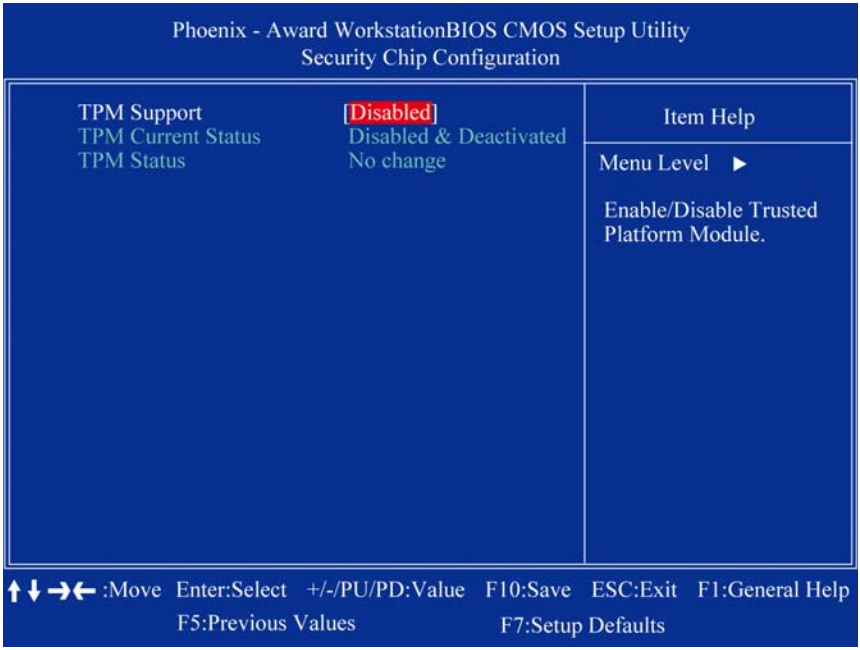
The options: Disabled, Enabled.

USB Storage Function

The options: Disabled, Enabled.

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Security Chip Configuration



TPM Support

The choices are “Enabled” and “Disabled”.

TPM Current Status

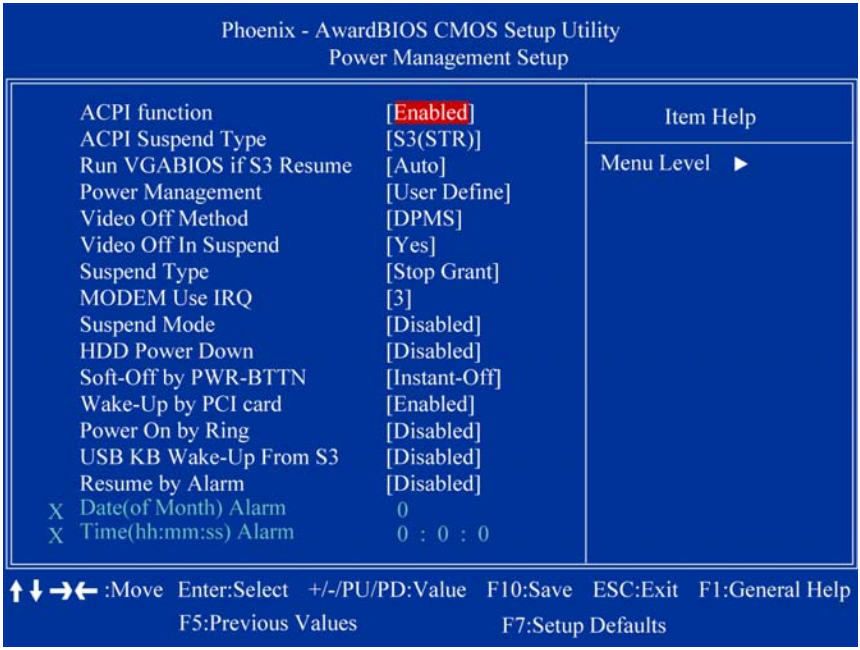
This item shows you the current TPM status.

TPM Status

The options are “No Change” / “Clear” / “Enable & Activate” / “Deactivate & Disable”.

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4.6 Power Management Setup



ACPI Function

The options are “Enabled” and “Disabled”.

ACPI Suspend Type

This item allows you to set ACPI suspend type to S1/POS (Power On Suspend) or S3/STR (Suspend To RAM).

Run VGABIOS if S3 Resume

Select “Auto” to run VGA BIOS if S3 resume automatically. The “Yes” enables running VGA BIOS if S3 resume. The “No” disables this function.

Power Management

There are three selections for Power Management, and each of them has fixed mode settings.

- ▶ Min. Power Saving: Minimum power management, HDD Power Down = 15 Min,

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- Max. Power Saving: Maximum power management, HDD Power Down =1 Min
- User Defined: Allows you to set each mode individually. When not disabled, each of the ranges are from 1 min. to 1 hr. except for HDD Power Down which ranges from 1 min. to 15 min. and disable.

Video Off Method

Use this to select the method to turn off the video. The options are “Blank Screen”, “V/H SYNC+ Blank”, and “DPMS”.

Video Off In Suspend

When the system is in suspend mode, the video will turn off. The options are “No” and “Yes”.

Suspend Type

Select the suspend type. The choice: Stop Grant, Pwron suspend.

MODEM Use IRQ

This determines the IRQ in which the MODEM can use. The options: NA, 3, 4, 5, 7, 9, 10, 11.

Suspend Mode

Enable/disable system suspend.

HDD Power Down

Select “1-15 mins” to enable HDD Power Down mode between 1 to 15 mins. Select “Disabled” to disable HDD Power Down function.

Soft-Off by PWR-BTTN: Configures the power button:

- Instant-Off: The power button functions as a normal power-on/-off button.
- Delay 4 Sec: The system is turned off if the power button is pressed for more than four seconds. Pressing the button momentarily (for less than 4 seconds) will switch the system to “suspend” mode.

Wake-Up by PCI card

The options are “Enabled” and “Disabled”.

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Power On by Ring

Select “Enabled” to power on the system from a soft off state by an input signal on the serial Ring Indicator (RI) line. The options are “Enabled” and “Disabled”.

USB KB Wake-Up from S3

When “Enabled”, enter any key to wake up the system from S3 state. The options are “Enabled” and “Disabled”.

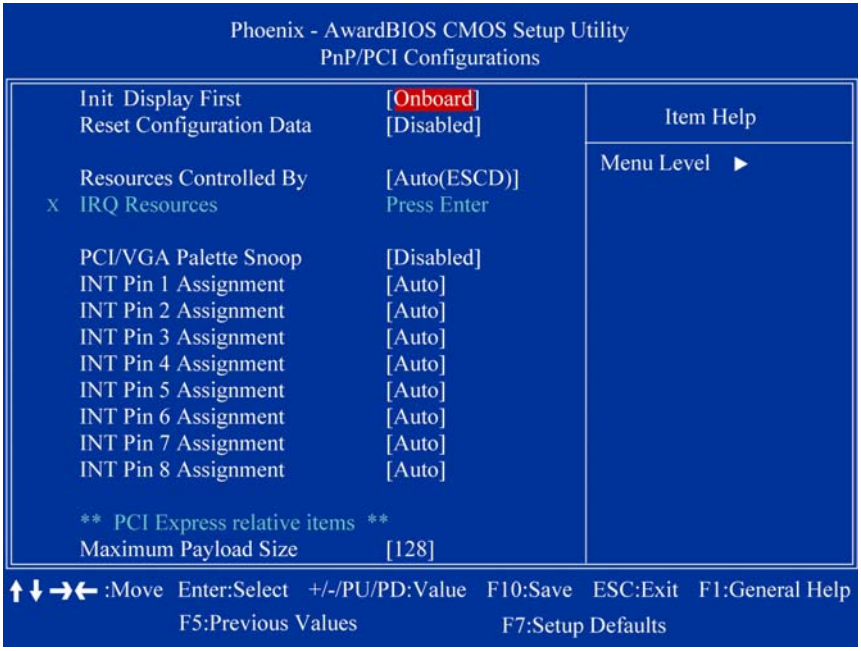
Resume by Alarm

When “Enabled”, set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode. The options are “Enabled” and “Disabled”.

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4.7 PnP/PCI Configurations

This section describes configuring the PCI (Personal Computer Interconnect) bus system. PCI is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own components.



Init Display First

This item allows you to choose the first display interface to initiate while booting. The choice is “PCI Slot” or “Onboard”.

Reset Configuration Data

The default is “Disabled”. Select Enabled to reset Extended System Configuration Data (ESCD) if you have installed a new add-on card, and system configuration is in such a state that the OS cannot boot.

Resource Controlled By

The commands here are “Auto (ESCD)” or “Manual”. Choosing “Manual” requires you to choose resources from the following submenu. “Auto(ESCD)” automatically configures all of the boot and Plug and Play devices, but you must be using Windows 95 or above.

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PCI/VGA Palette Snoop

This is set to “Disabled” by default.

INT Pin 1/2/3/4/5/6/7/8 Assignment

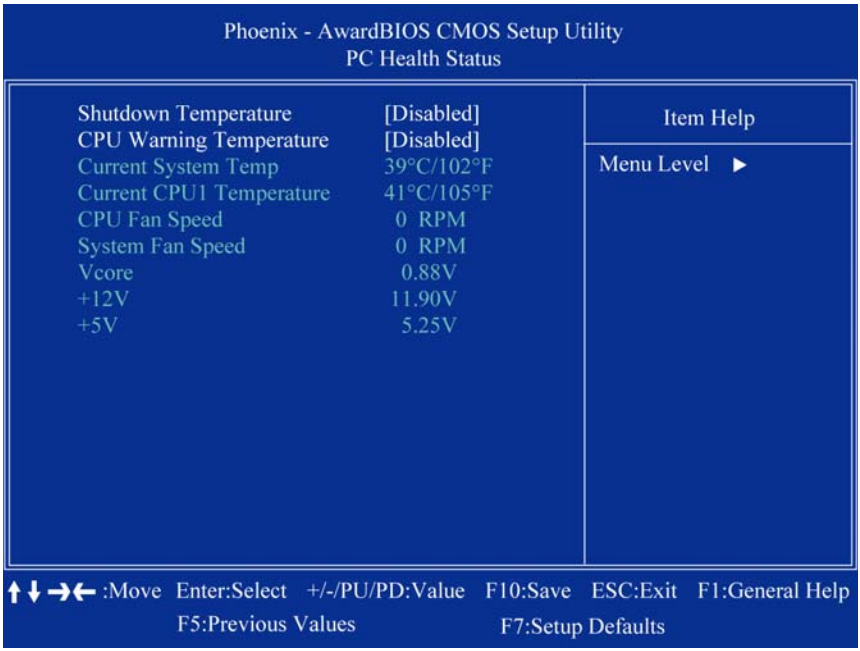
The options: Auto, 3, 4, 5, 7, 9, 10, 11

Maximum Payload Size

This allows you to set the maximum TLP payload size for PCI Express devices. The options are [128 bytes], [256 bytes], [512 bytes], [1024 bytes], [2048 bytes], and [4096 bytes].

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4.8 PC Health Status



Shutdown Temperature

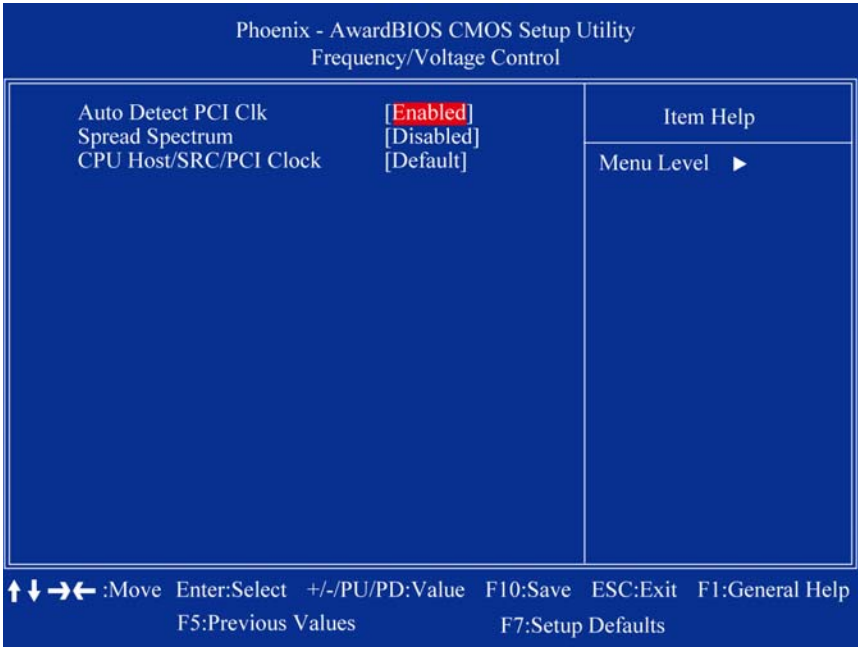
Options: 60 °C/140 °F, 65 °C/149 °F, 70 °C/158 °F, Disabled

CPU Warning Temperature

Options: Disabled, 50 °C/122 °F, 53 °C/127 °F, 56 °C/133 °F, 60 °C/140 °F, 63 °C/145 °F, 66 °C/151 °F, 70 °C/158 °F

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4.9 Frequency/Voltage Control



Auto Detect PCI Clk

This allows you to enable or disable auto detect PCI clock. Options: Enabled, Disabled.

Spread Spectrum

This setting allows you to reduce EMI by modulating the signals the CPU generates so that the spikes are reduced to flatter curves. This is achieved by varying the frequency slightly so that the signal does not use any particular frequency for more than a moment. Options: Enabled, Disabled.

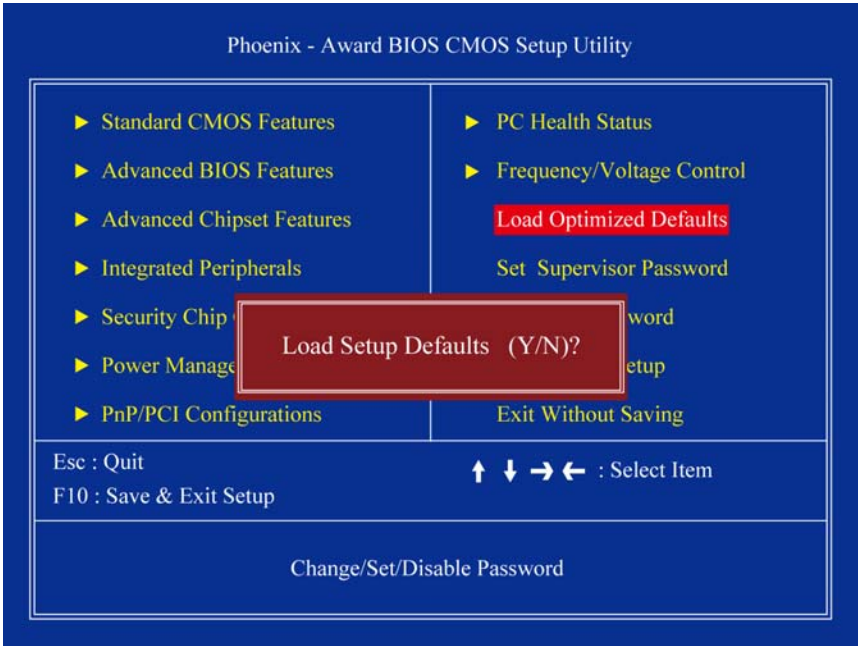
CPU/Host/SRC/PCI Clock

Options: Default, 133/100/33

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4.10 Load Optimized Defaults

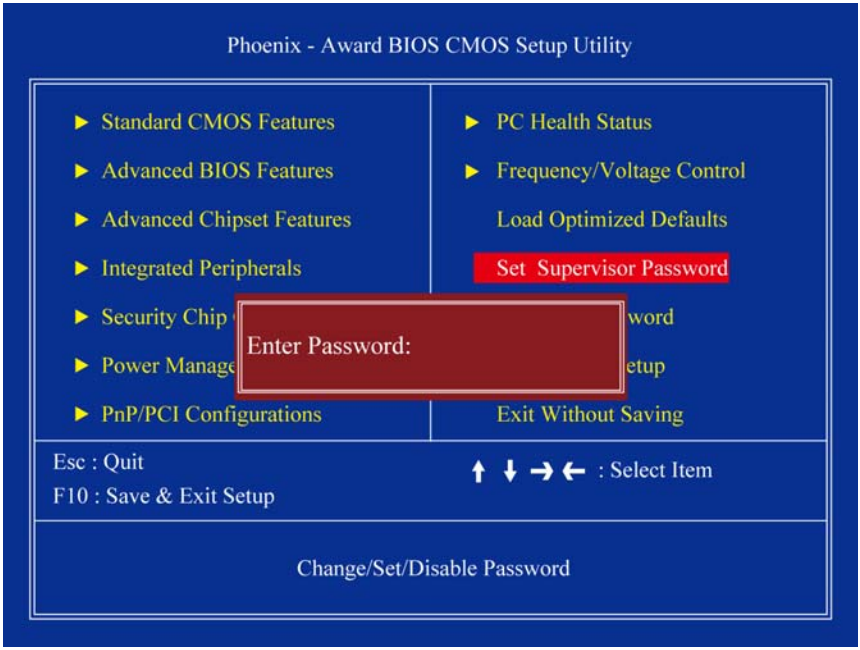
Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. Press “Y” to load the default values setting for optimal performance system operations.



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4.11 Set Supervisor & User Password

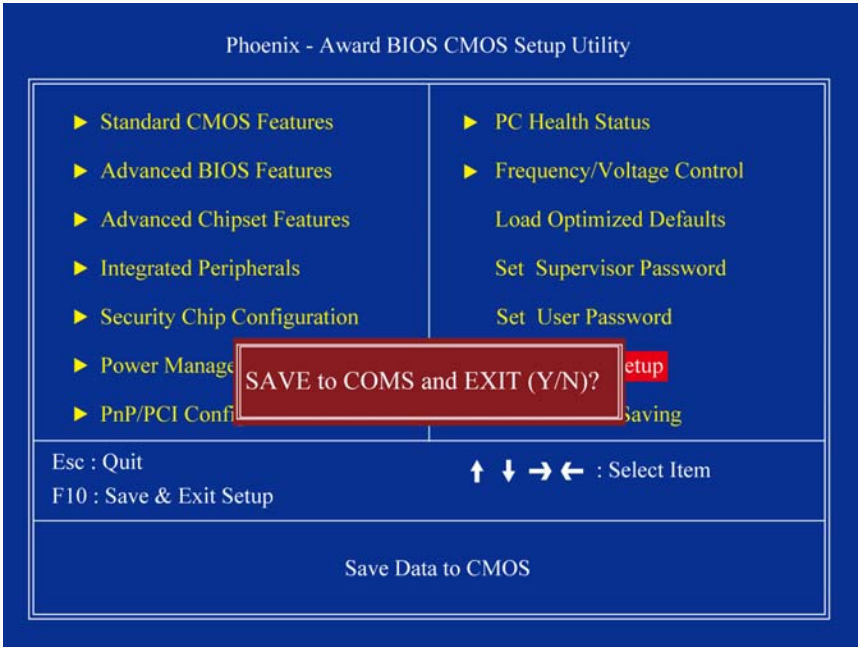
These two options set the system password. Supervisor Password sets a password that will be used to protect the system and Setup utility. User Password sets a password that will be used exclusively on the system. To specify a password, highlight the type you want and press < Enter >. The “Enter Password:” message prompts you on the screen. Type the password, up to eight characters in length, and press < Enter >. The system confirms your password by asking you to type it again. After setting a password, the screen automatically returns to the main screen.



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4.12 Save & Exit Setup

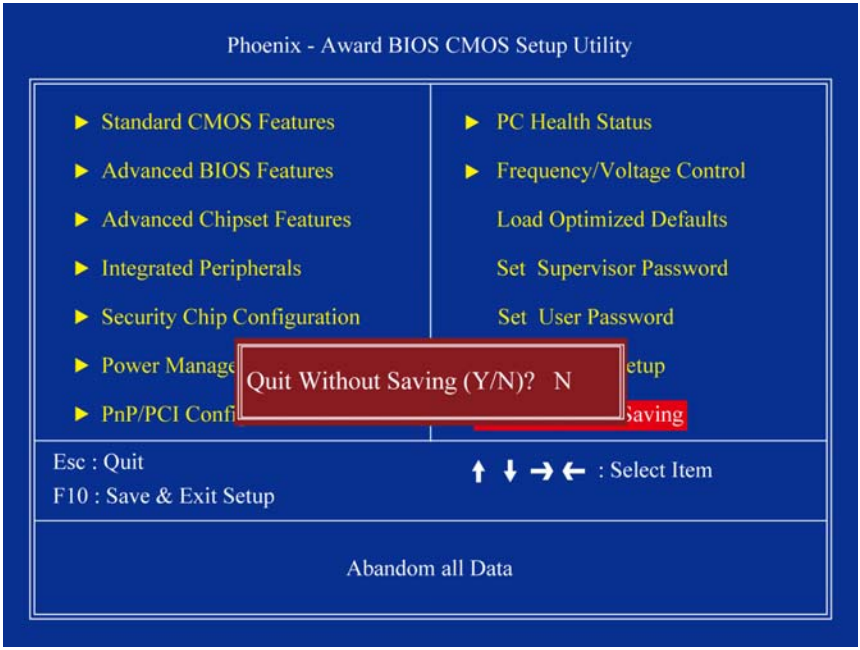
This option allows you to determine whether to accept any modifications or not. Typing Y will quit the setup utility and save all changes into the CMOS memory. Typing “N” will return to the Setup Utility Main Screen.



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4.13 Exit Without Saving

Select this option to exit the Setup utility without saving the changes you have made in this session. Typing “Y” will quit the Setup utility without saving any modifications. Typing “N” will return to the Setup utility.



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Appendix A - Watchdog Timer

The programming instructions for the MI-110's Watchdog Timer are as follows.

A.1 WDT Programming Instructions

Unlock W83627DHG-A:

```
outportb(0x2E, 0x87)    ;Unlock Super I/O
```

Select Logical Device:

```
outportb(0x2E, 0x07)    ;Select device number register
outportb(0x2F, 0x08)    ;Set to Logical Device 8
```

Activate WDT:

```
outportb(0x2E, 0x30)    ;Select WDTO# activate register
outportb(0x2F, 0x01)    ;Enable watchdog
```

Set Seconds or Minutes:

```
outportb(0x2E, 0xF5)    ;Select WDTO# control register
outportb(0x2F, mode)    ;where mode=0x00(Sec) or 0x08(Min)
```

Set base timer:

```
outportb(0x2E, 0xF6)    ;Select WDTO# counter register
outportb(0x2F, timeout) ;where timeout=0x00~0xFF
```

Reset timeout counter:

```
outportb(0x2E, 0xF6)    ;Select WDTO# counter register
outportb(0x2F, timeout) ;where timeout=0x00~0xFF}
```

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Appendix B - System Resources

B.1 System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
(4GB-2MB)	FFE00000 – FFFFFFFF	2 MB	High BIOS Area
(4GB-18MB) – (4GB-17MB-1)	FEE00000 – FEEFFFFF	1 MB	FSB Interrupt Memory Space
(4GB-20MB) – (4GB-19MB-1)	FEC00000 – FECFFFFF	1 MB	APIC Configuration Space
15MB – 16MB	F00000 – FFFFFF	1 MB	ISA Hole
960 K – 1024 K	F0000 – FFFFF	64 KB	System BIOS Area
896 K – 960 K	E0000 – EFFFF	64 KB	Extended System BIOS Area
768 K – 896 K	C0000 – DFFFF	128 KB	PCI expansion ROM area C0000 – CBFFF: Onboard VGA BIOS CC000 – CCFFF: Intel 82566DM PXE option ROM when onboard LAN boot ROM is enabled.
640 K – 768 K	A0000 – BFFFF	128 KB	Video Buffer & SMM space
0 K – 640 K	00000 – 9FFFF	640 KB	DOS Area

Table B-1: System Memory Map

Note: Whole D0000H segment except PXE occupied area can be forwarded to ISA bus.

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B.2 Direct Memory Access Channels

Channel Number	Data Width	System Resource
0	8-bits	
1	8-bits	Parallel port(1)
2	8-bits	Diskette drive(1)
3	8-bits	Parallel port(1)
4	8-bits	Direct memory access controller
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

Table B-2: Direct Memory Access Channels

Note(1): DMA channel 1/3 is selected when using parallel port. Floppy (Winbond default uses DMA 02) and parallel port cannot be used at the same time.

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B.3 Fixed I/O Map

Hex Range	Device
000-01F	DMA controller 1, 82C37 equivalent
020-02D and 030-03F	Interrupt controller 1, 8259 equivalent
02E-02F	LPC SIO (W83627) configuration index/data registers
040-042-043	Timer/Counter
4E-4F	N/A
061	NMI controller
60,62,64,66	N/A (MicroController)
070-077	Real Time Clock Controller
080-9F	DMA Controller, or LPC or PCI
0A0-0AD and 0B4-0BD	Interrupt controller
0B2 and 0B3	Power Management
0C0-0DF	DMA controller
0F0	Read PCI and Master Abord, Write FERR#/IGNNE#/ Interrupt Controller
0170-177	SATA Controller, or PCI
01F0-1F7	SATA Controller, or PCI
0376	SATA Controller, or PCI
03F6	SATA Controller, or PCI
04D0-4D1	Interupt Controller
0CF9	Reset Generator

Table B-3: Fixed I/O Map

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B.4 Variable I/O Map

Hex Range	Device
400	ACPI
Anywhere in 64KB I/O Space	USB UHCI Controller #1
Anywhere in 64KB I/O Space	USB UHCI Controller #2
Anywhere in 64KB I/O Space	USB UHCI Controller #3
Anywhere in 64KB I/O Space	USB UHCI Controller #4
Anywhere in 64KB I/O Space	USB UHCI Controller #5
500	SMBUS
460	TCO
480	GPIO
378-37F	Parallel Port
3F8/2F8/3E8/2E8	Serial Port 1 Serial Port 2
3E8/2E8	Serial Port 3, Serial Port 4
290	Hardware Monitor

Table B-4: Variable I/O Map

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B.5 Interrupt Request (IRQ) Lines

IRQ Lines PIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Note
0	System timer	N/A	No
3	Communications port (COM2)	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Communications port (COM1)	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	Intel® 82801G (ICH7) SMBus controller - 27DA		
8	System CMOS / Real-time clock		
9	Microsoft ACPI-compliant system		
10	Communications port (COM3)	IRQ10 via SERIRQ, IRQ10 at ISA bus	Note (1)
11	Communications port (COM4)	IRQ11 via SERIRQ, IRQ11 at ISA bus	Note (1)
13	Numeric data processor		
14	Primary IDE controller		

Table B-5: IRQ Lines PIC Mode

Note(1): These IRQs can be used for PCI devices when onboard device is disabled. If IRQ is from ISA, user must reserve IRQ for ISA in BIOS setup menu.

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IRQ Lines APIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Note
0	System Timer		
3	Communications port (COM2)	IRQ3 via SERIRQ, IRQ3 at ISA bus	Note (1)
4	Communications port (COM1)	IRQ4 via SERIRQ, IRQ4 at ISA bus	Note (1)
5	Intel® 82801G (ICH7) SMBus controller - 27DA		
8	System CMOS / Real-time clock		
9	Microsoft ACPI-compliant system		
10	Communications port (COM3)	IRQ10 via SERIRQ, IRQ10 at ISA bus	Note (1)
11	Communications port (COM4)	IRQ11 via SERIRQ, IRQ11 at ISA bus	Note (1)
13	Numeric data processor		
14	Primary IDE controller		
16	PCI standard PCI-to-PCI bridge		
16	Standard Universal PCI to USB Host Controller		
18	PCI standard PCI-to-PCI bridge		
18	Realtek RTL8168C/8111C PCI-E Gigabit Ethernet NIC		
18	Standard Universal PCI to USB Host Controller		
19	PCI standard PCI-to-PCI bridge		
19	Realtek RTL8168C/8111C PCI-E Gigabit Ethernet NIC #2		
19	Standard Universal PCI to USB Host Controller		
23	Standard Universal PCI to USB Host Controller		
23	Standard Universal PCI to USB Host Controller		

Table B-6: IRQ Lines APIC Mode

Note (1): These IRQs can be used for PCI devices when onboard device is disabled. If IRQ is from ISA, user must reserve IRQ for ISA in BIOS setup menu.

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B.6 PCI Configuration Space Map

Bus #	Device #	Function #	Routing	Description
00	00	00	Internal	Intel Host Bridge
00	02	00	Internal	Intel VGA-compatible Controller
00	02	01	Internal	Intel Other Display Controller
00	1B	00	Internal	Unknown Device
00	1C	00	Internal	Intel PCI-to-PCI Bridge
00	1C	02	Internal	Intel PCI-to-PCI Bridge
00	1C	03	Internal	Intel PCI-to-PCI Bridge
00	1D	00	Internal	Intel UHCI USB Controller
00	1D	01	Internal	Intel UHCI USB Controller
00	1D	02	Internal	Intel UHCI USB Controller
00	1D	03	Internal	Intel UHCI USB Controller
00	1D	07	Internal	Intel USB v2.0 Controller
00	1E	00	Internal	Intel Subtractive Decode P2P Bridge
00	1F	00	Internal	Intel ISA Bridge
00	1F	02	Internal	Intel IDE Controller
00	1F	03	Internal	Intel SMBus Device
02	00	00	Internal	Realtek Ethernet Controller
03	00	00	Internal	Realtek Ethernet Controller

Table B-7: PCI Configuration Space Map

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B.7 PCI Interrupt Routing Map

INT Line	INT1	INT2	INT3	INT4
Intel VGA compatible Controller	X			
Intel Multimedia device	X			
Intel PCI-to-PCI Bridge	X			
Intel PCI-to-PCI Bridge			X	
Intel PCI-to-PCI Bridge				X
Intel UHCI USB Controller	X			
Intel UHCI USB Controller		X		
Intel UHCI USB Controller			X	
Intel UHCI USB Controller				X
Intel USB v2.0 Controller	X			
Intel IDE Controller		X		
Intel SMBus Device		X		
Realtek Ethernet Controller	X			
Realtek Ethernet Controller	X			

Table B-8: PCI Interrupt Routing Map

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Important Safety Instructions

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

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

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

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



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

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

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Getting Service

Contact us should you require any service or assistance.

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