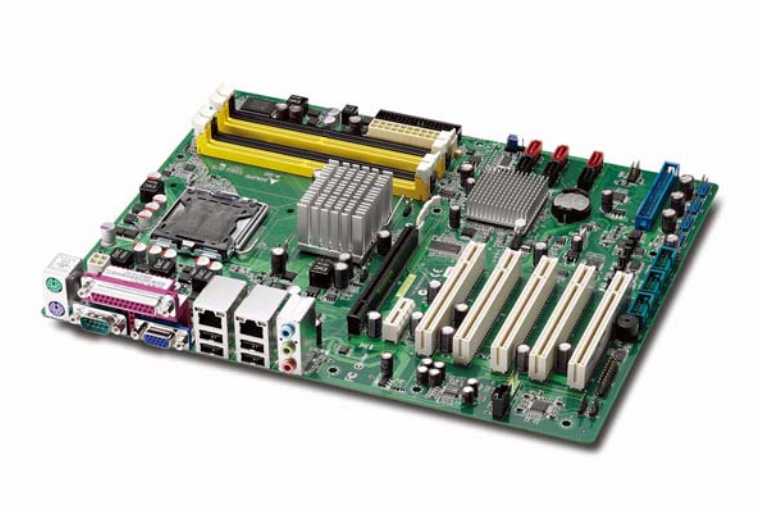
M-322

ATX Industrial Motherboard with
Intel® Q35 Chipset

User's Manual



Manual Rev.: 2.02

Revision Date: Mar 23, 2011

Part No: 50-1Z052-1020

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Revision History

Revision	Release Date	Description of Change(s)
2.00	2010/06/23	Initial Release
2.01	2010/09/27	Correct System Panel Pin Header drawing
2.02	2011/05/23	Correct misc. typos; update addresses

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Preface

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Using this Manual

Audience and Scope

The M-322 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 M-322, 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 M-322.

Chapter 3, Getting Started: Describes how to install components and drivers on the M-322.

Chapter 4, BIOS Setup: Presents information aid in configuring 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

List of Figures xi

List of Tables xiii

1 Introduction 1

1.1 Package Contents 1
1.2 Overview 2
1.3 Features 2
1.4 Specifications 3
1.5 Power Consumption 5
1.6 Block Diagram 6
1.7 Functional Description 7
1.8 Board Layout 9
1.9 Mechanical Drawings 11

2 Connectors & Jumpers 13

2.1 Rear I/O Connectors 13
2.2 Onboard Connectors 17
2.3 Jumpers 24

3 Getting Started 27

3.1 Installing the CPU 27
3.2 Installing the CPU Fan and Heatsink 31
3.3 System Memory 32
3.4 Driver Installation 34

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4 BIOS Setup 37
4.1 Starting the BIOS 37
4.2 Main Setup 41
4.3 Advanced Setings 45
4.3.1 USB Configuration 46
4.3.2 Trusted Computing 48
4.3.3 Intel TXT (LT) Configuration 49
4.3.4 Intel VT-d Configuration 49
4.3.5 CPU Configuration 50
4.3.6 Chipset Settings 52
4.3.7 Onboard Device Configuration 54
4.3.8 PCI/PnP Settings 55
4.4 Power Settings 56
4.4.1 APM Configuration 58
4.4.2 Hardware Health Configuration 59
4.5 Boot Settings 60
4.5.1 Boot Device Priority 60
4.5.2 Boot Device Groups 60
4.5.3 Boot Settings Configuration 61
4.5.4 Security 62
4.6 Exit Menu 63

A Appendix: Watchdog Timer 65
A.1 Sample Code 65

B Appendix: System Resources 67
B.1 System Memory Map 67
B.2 Direct Memory Access Channels 68
B.3 Fixed I/O Map 69
B.4 Variable I/O Map 71
B.5 Interrupt Request (IRQ) Lines 72
B.6 PCI Configuration Space Map 75
B.7 PCI Interrupt Routing Map 76

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Important Safety Instructions 77

Getting Service 79

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List of Figures

Figure 1-1: M-322 Block Diagram 6
Figure 1-2: M-322 Board Layout 9
Figure 1-3: M-322 Rear I/O Layout 10
Figure 1-4: M-322 Board Dimensions 11
Figure 1-5: M-322 I/O Shield Dimensions 12

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List of Tables

Table 1-1: M-322 General Specifications 4
Table 1-2: M-322 Board Layout Legend 10
Table 2-1: COM Serial Port Connector Pin Definition 14
Table B-1: System Memory Map 67
Table B-2: Direct Memory Access Channels 68
Table B-3: Fixed I/O Map 70
Table B-4: Variable I/O Map 71
Table B-5: IRQ Lines PIC Mode 72
Table B-6: IRQ Lines APIC Mode 74
Table B-7: PCI Configuration Space Map 75
Table B-8: PCI Interrupt Routing Map 76

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1 Introduction

This chapter will introduce the M-322, 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.

- M-322 Industrial ATX Motherboard
- I/O shield
- 2x SATA data cables
- 2x SATA power cables
- 1x single COM port cable with bracket
- 1x dual COM port cable with bracket
- Driver DVD
- 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 M-322 is an ATX industrial motherboard supporting the next-generation Intel® Core™2 Quad/Duo, Pentium® Dual Core and Celeron® processors in the LGA775 package to deliver a high performance platform for a wide array of industrial applications. The M-322 supports processing speeds up to 3.00GHz and 1333 MHz Front Side Bus (FSB). Dual channel DDR2 667/800 MHz memory is supported up to a maximum of 8GB in four DIMM slots. The M-322 supports a broad range of processor frequencies, high-speed data transfer rates, diverse I/O functions, and high-bandwidth network connectivity.

These advanced features, coupled with integrated graphics, one PCI Express® x16 slot, one PCI Express® x1 slot, five PCI slots, and audio interfaces make the M-322 suitable for automation control, medical, test & measurement, and telecom applications requiring an easy-to-deploy and reliable mainboard.

1.3 Features

- ATX form factor (305 mm x 244 mm)
- Supports Intel® Core™2 Quad/Duo, Pentium® Dual Core and Celeron® processors in LGA775 package
- Dual 10/100/1000Mbps Ethernet
- 12x USB 2.0 ports (4x faceplate, 8x onboard pin header)
- 6x SATA 3 Gbps ports support RAID 0/1/5/10
- Integrated graphic supports VGA up to 2048 x 1536 @ 75Hz
- One PCIe x16 slot, one PCIe x1 slot, five PCI slots
- Watchdog Timer, Hardware Monitor
- Realtek ALC888 HD audio codec
- TPM hardware security chip
- RoHS compliant

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1.4 Specifications

System	
CPU/Cache	• IIntel® Core™2 Quad Q9400, 2.66GHz, 1333MHz FSB, 6MB L2 Cache, 45nm, 95W TDP • Intel® Core™2 Duo E8400, 3.0GHz, 1333MHz FSB, 6MB L2 Cache, 45nm, 65W TDP • Intel® Core™2 Duo E7400, 2.8GHz, 1066MHz FSB, 3MB L2 Cache, 45nm, 65W TDP • Intel® Core™2 Duo E6400, 2.13GHz, 1066MHz FSB, 2MB L2 Cache, 65nm, 65W TDP • Intel® Core™2 Duo E4300, 1.8GHz, 800MHz FSB, 2MB L2 Cache, 65nm, 65W TDP • Intel® Pentium® Dual Core E5300, 2.6GHz, 800MHz FSB, 2MB L2 Cache, 45nm, 65W TDP • Intel® Pentium® Dual Core E2160, 1.8GHz, 800MHz FSB, 1MB L2 Cache, 65nm, 65W TDP • Intel® Celeron® 440, 2.0GHz, 800MHz FSB, 512KB L2 Cache, 65nm, 35W TDP
FSB	• 800/1066/1333 MHz
Chipset	• Intel® Q35 + ICH9DO
Memory	• Four 240-pin DIMM sockets • Dual-Channel DDR2 667/800MHz, up to 8GB
BIOS	• AMI BIOS with 32 Mb Flash ROM
TPM	• Infineon SLB 9635 TT 1.2
Audio	• Realtek ALC888 HD codec • Supports line-in, line-out and mic-in
Watchdog Timer	• 1-255 second/minute programmable
Hardware Monitor	• CPU/System temperature, fan speed and onboard DC voltages
Operating System	• Windows XP 32/64-bit edition • Windows Vista 32-bit edition • Windows Server 2008 32-bit edition • Windows 7 32/64-bit edition • Fedora 12

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I/O Interfaces	
Serial ATA	• 6x Serial ATA ports with 300 MB/s data transfer • Supports RAID 0/1/5/10
Onboard I/O	• 4x USB 2.0 pin headers (8 ports) • 2x RS-232 serial port pin headers (COM2-3) • 1x RS-232/422/485 serial port (COM4) • 1x printer port • 1x floppy port • 1x front panel pin header
Rear I/O	• 2x RJ-45 LAN port • 4x USB 2.0 ports • 1x D-Sub VGA connector • 1x DB-9 RS-232 (COM1) • 2x PS2 keyboard/mouse ports • 3x audio jacks (line-in, line-out and mic-in)
Expansion Slots	• 1x PCIe x16 slot • 1x PCIe x1 slot • 5x PCI slots
Display	
Graphics	• GMA 3100 integrated in Q35 GMCH
VRAM	• Shared system memory up to 256 MB
VGA	• Dsub-15 connector, up to 2048x1536 @ 75 Hz
Ethernet	
Controller	• Dual Realtek® RTL8111C PCIe network controllers • 10/100/1000Base-T dual-Gigabit Ethernet • Wake on LAN, PXE supported
Ports	• 2x RJ-45 Ethernet port
Mechanical and Environment	
Form Factor	• ATX Industrial Motherboard
Dimensions	• 305 mm x 244 mm (L x W)
Operating Temp.	• 0°C to 60°C
Storage Temp.	• -20ºC to 80ºC
Rel. Humidity	• 10 - 90% non-condensing
Safety	• CE, FCC Class A

Table 1-1: M-322 General Specifications

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1.5 Power Consumption

Intel® Core™2 Duo Processor E6400

Test Configuration	
CPU	Intel® Core™2 Duo Processor E6400 2.13 GHz
Memory	ADATA DDR2 667 1G (AD2667001GOU) x1
Graphics	Intel ® Q35 Graphics Memory Controller Hub
Hard Drive	Seagate Barracuda 7200.10 160GB ST3160815AS
Power Supply	Delta 400W, GPS-400AB C Rev. 00F

Power On Boot Sequence					
Power Req.	+5V	+3.3V	+12V	5VSB	Total
Current	2.12 A	2.14 A	2.84 A	0.62 A	—
Power	—	—	—	—	54.84 W
Windows XP, Idle					
Power Req.	+5V	+3.3V	+12V	5VSB	Total
Current	1.64 A	2.08 A	1.16 A	0.59 A	—
Power	—	—	—	—	31.93 W
Windows XP, Maxpower 100% + 3DMark 2006					
Power Req.	+5V	+3.3V	+12V	5VSB	Total
Current	2.04 A	2.10 A	2.88 A	0.59 A	—
Power	—	—	—	—	54.64 W

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1.6 Block Diagram

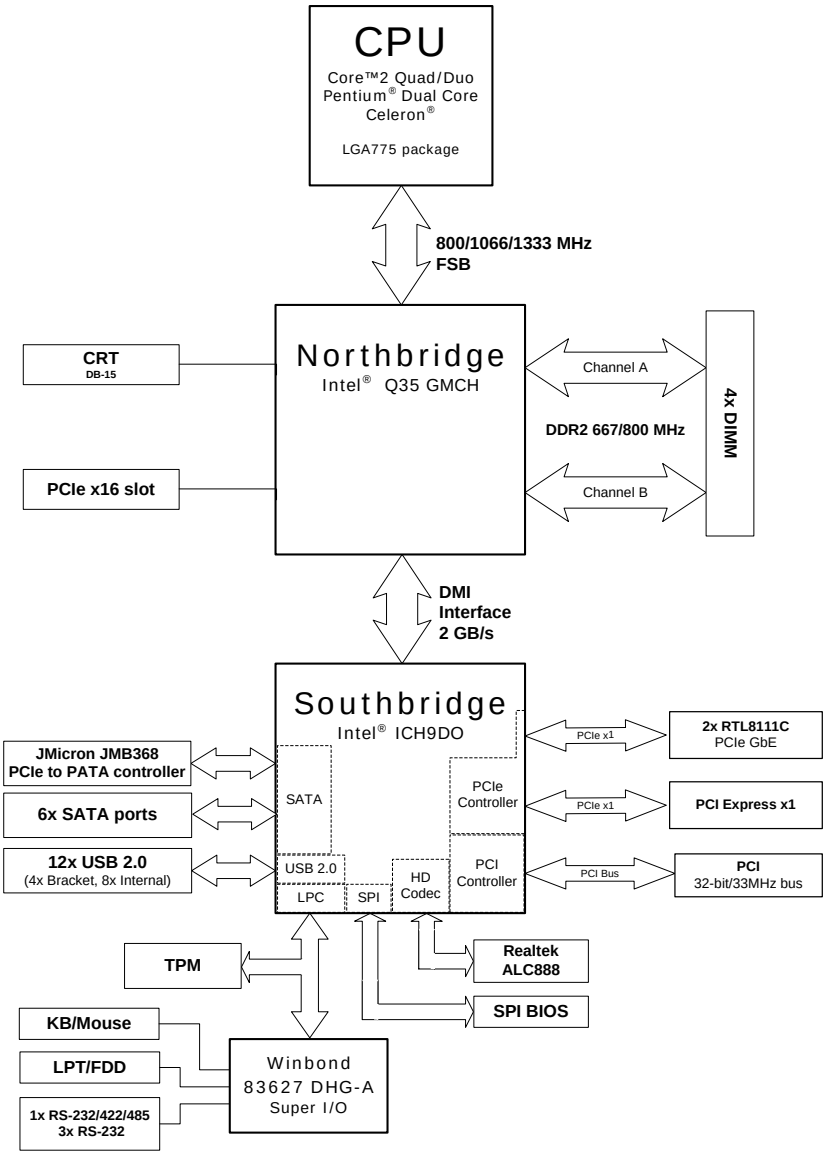


Figure 1-1: M-322 Block Diagram

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1.7 Functional Description

Processor Support

The M-322 is designed for Intel Yorkfield/Wolfdale/Conroe quad, dual and single core processors in LGA775 socket with core frequencies from 1.8 GHz up to 3.0 GHz. The CPU connects with the Intel® Q35 GMCH through a 2 GB/s DMI interface.

Intel® Q35 Express Chipset

The Intel® Q35 Express chipset (Q35 GMHC + ICH9DO) provides the vital interfaces for the SHB. The Intel® Q35 comes with purpose-built capabilities designed specifically to address the key needs of the industrial computing environment, delivers improved system performance and comes with the integrated Intel® Graphics Media Accelerator 3100 engine for cost-effective system building. The chipset also supports high-bandwidth interfaces including PCI Express, Serial ATA, and USB 2.0, as well as dual-channel DDR2 system memory.

Intel® Graphics Media Accelerator 3100

The Intel® Graphics Media Accelerator (GMA) 3100 revolutionizes integrated graphics with new capabilities that provide significant increase in graphics performance. With support for DirectX 9 hardware acceleration, core frequency of 400 MHz, and up to 256 MB of video memory, the Intel GMA 3100 provides a cost-effective and high-performance graphics solution.

Dual-Channel DDR2 Memory

To meet the requirements of memory-intensive applications, the M-322 has a dual-channel memory architecture supporting DDR2 667/800 MHz DIMMs. 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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Gigabit Ethernet

The M-322 uses two Realtek RTL8111C Gigabit Ethernet controllers connected to the PCI-E x1 bus of the ICH9DO. Operation at data rates of 10/100/1000 Mbps, Wake on LAN are supported.

Serial ATA

Storage is efficient and secure with the Serial ATA interface. Utilizing the Intel® ICH9DO, the M-322 supports up to six Serial ATA devices capable of reading/writing data at up to 3 Gbps. Intel® Matrix Storage Technology provides support for RAID 0/1/5/10.

Hardware Monitoring

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

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.

Trusted Platform Module

The M-322 supports TPM ver. 1.2 (Trusted Platform Module) for secure storage of keys, passwords and digital certificates. Systems supporting TPM offer improved hardware-based security in numerous applications, such as file and folder encryption, local password management, S-MIME e-mail, VPN and PKI authentication and wireless authentication for 802.1x and LEAP.

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1.8 Board Layout

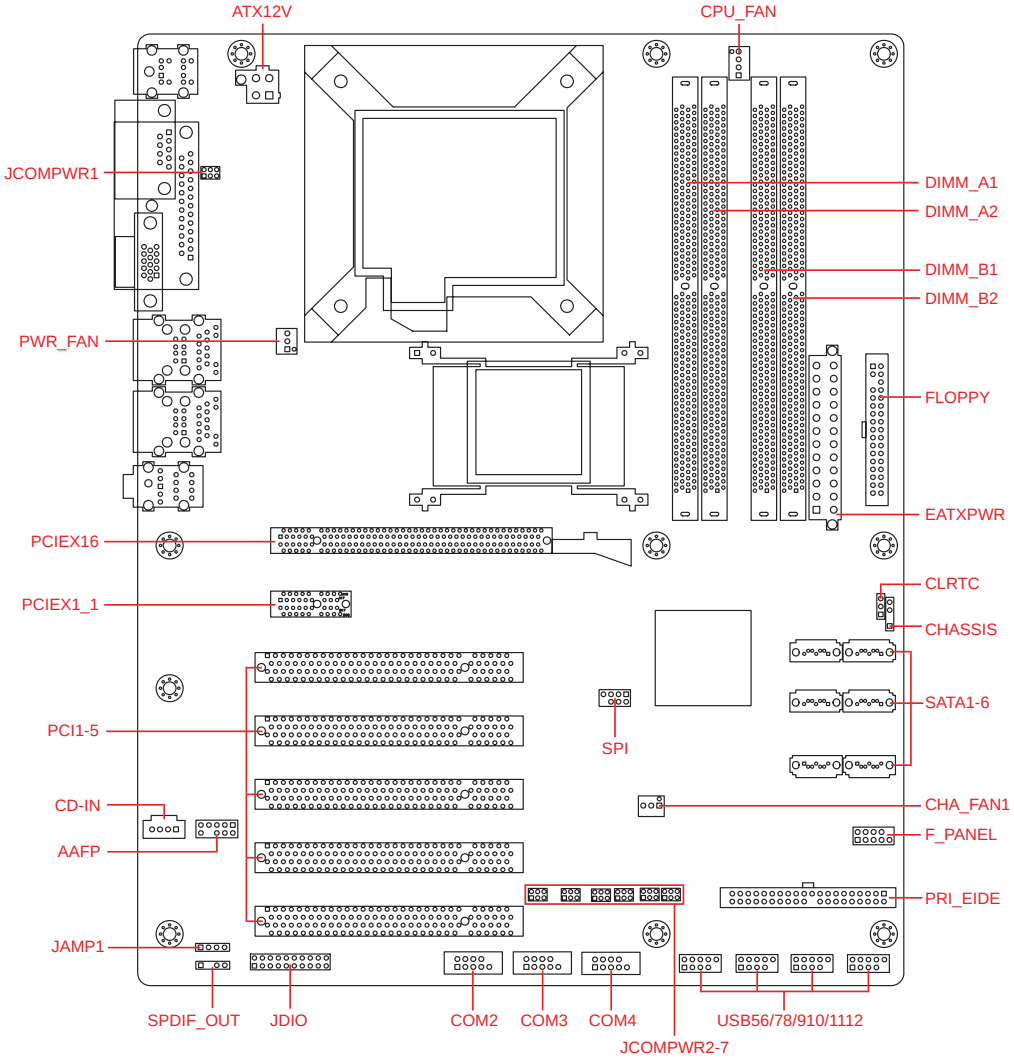


Figure 1-2: M-322 Board Layout

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AAFP	Front Panel Audio Connector
ATX12V	ATX Power Connector
CD-IN	Optical Drive Audio Connector
CHA_FAN1	Chassis Fan Connector
CHASSIS	Chassis Intrusion Connector
CLRTC	Clear CMOS Jumper
COM2-4	Serial Port Connector 2-4
CPU_FAN	CPU Fan Connector
EATXPWR	ATX Power Connector
FLOPPY	Floppy Disk Drive Connector
F_PANEL	System Panel Pin Header
JAMP1	Amplified Audio Pin Header
JCOMPWR1-4	COM1-4 RI, +12V and +5V Select Jumpers
JCOMPWR5-7	COM4 RS-232/422/485 Select Jumpers
JDIO	Digital IO Pin Header
PRI_EIDE	IDE Connector
PWR_FAN	Power Fan Connector
SATA1-6	Serial ATA Connectors 1-6
SPDIF_OUT	S/PDIF Pin Header
SPI	SPI Pin Header
USB56/78/910/1112	USB 2.0 Pin Headers
DIMM_A1/A2	240-pin DIMM slots (Channel A)
DIMM_B1/B2	240-pin DIMM slots (Channel B)
PCIEX1_1	PCI express x1 slot
PCIEX16	PCI express x16 slot
PCI1-5	PCI slots

Table 1-2: M-322 Board Layout Legend

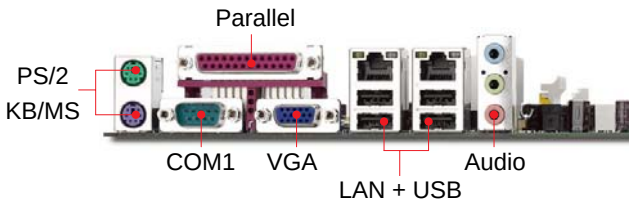
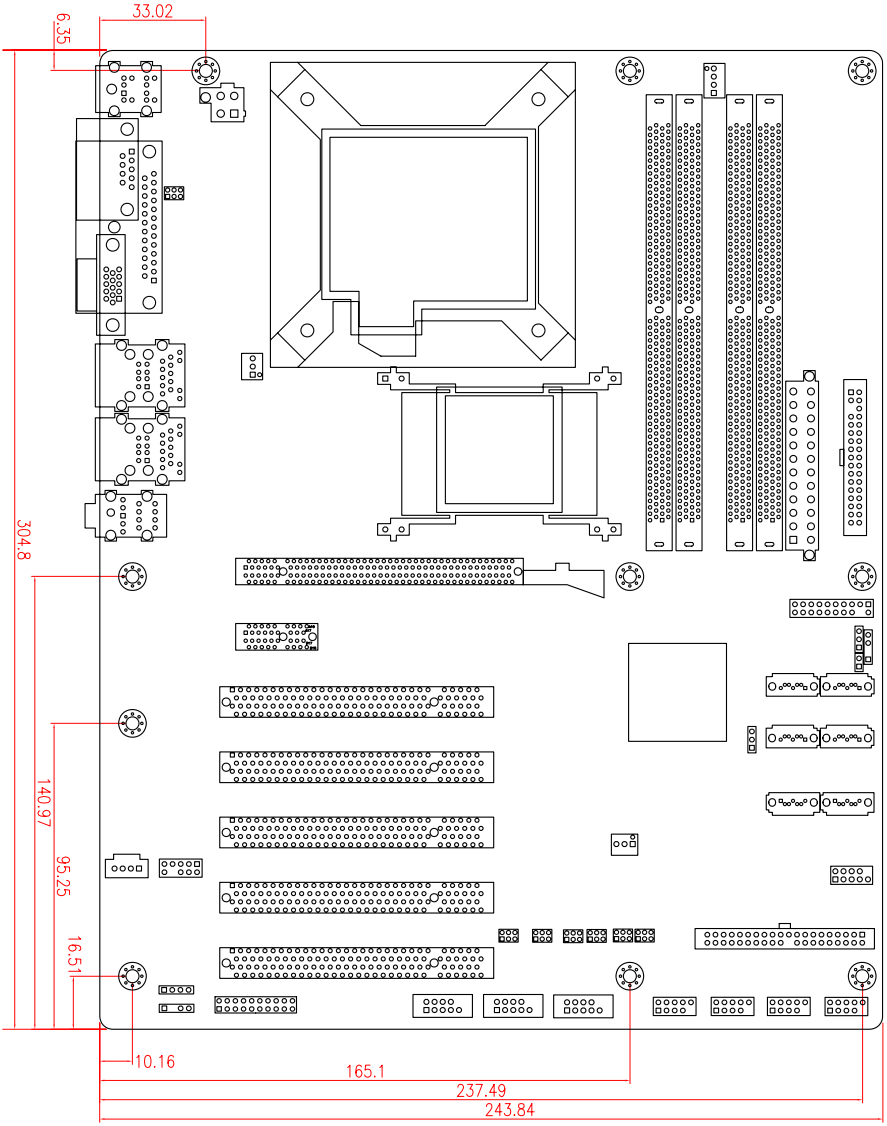


Figure 1-3: M-322 Rear I/O Layout

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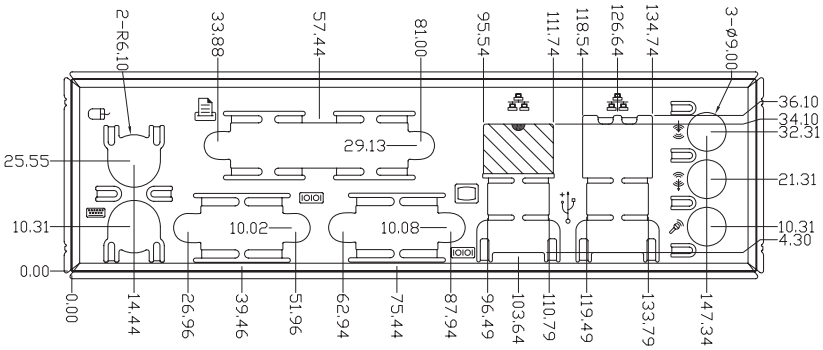
1.9 Mechanical Drawings



Dimensions in mm

Figure 1-4: M-322 Board Dimensions

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Dimensions in mm

Figure 1-5: M-322 I/O Shield Dimensions

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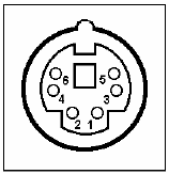
2 Connectors & Jumpers

The connectors and jumpers on the M-322 allow you to connect and configure external devices. The following specify the pin assignments for connectors and jumper on the M-322. Refer to **Figure 1-2: M-322 Board Layout** and **Figure 1-3: M-322 Rear I/O Layout** for connector and jumper locations.

2.1 Rear I/O Connectors

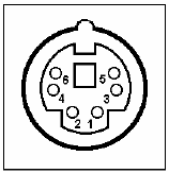
PS/2 Mouse Port (green)

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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COM DB-9 Serial Port Connector

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, Ring indicator

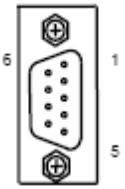
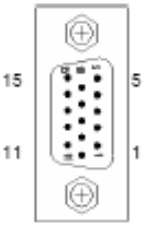


Table 2-1: COM Serial Port Connector Pin Definition

VGA Connector.

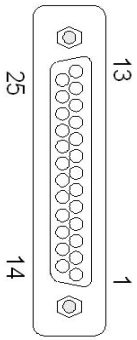
Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	VCC pull-up
GND	5	6	GND
GND	7	8	GND
VCC	9	10	GND
VCC pull-up	11	12	DDC2B DATA
HSYNC	13	14	VSYNC
DDC2B CLK	15		



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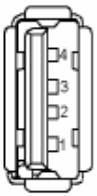
Parallel Port.

Pin #	Signal Name	Pin #	Signal Name
1	STROBE	14	AUTO FEED
2	DATA0	15	ERROR
3	DATA1	16	INIT
4	DATA2	17	SELECT IN
5	DATA3	18	GND
6	DATA4	19	GND
7	DATA5	20	GND
8	DATA6	21	GND
9	DATA7	22	GND
10	ACKNOWLEDGE	23	GND
11	BUSY	24	GND
12	PAPER EMPTY	25	GND
13	SELECT		



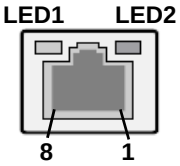
USB Connectors

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



LAN (RJ-45) Ports

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-



Refer to the table below for the LAN port LED definitions.

LED1 (ACT/Link)		LED2 (Speed)	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10 Mb/s
Orange	Linked	Orange	100 Mb/s
Blinking	Data Activity	Green	1 Gb/s

Audio Jacks

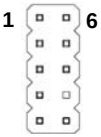
The three-jack audio I/O supports Line-In, Line-Out, and Mic-In functions. The blue Line-In jack connects to an audio source such as a CD player. The green Line-Out port connects to a speaker or headphone, while the pink Mic-In jack connects to a microphone.

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2.2 Onboard Connectors

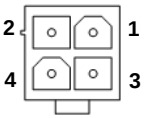
Front Panel Audio Pin Header (AAFP)

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



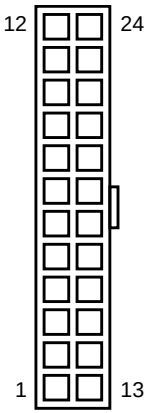
ATX 12V Power Connector (ATX12V)

Pin #	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC



ATX Power Connector (EATXPWR)

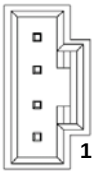
Pin #	Signal	Pin #	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWRGD	20	NC
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND



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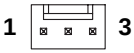
CD-in Connector (CD)

Pin #	Signal
1	Left Audio Channel
2	CD_GND
3	CD_GND
4	Right Audio Channel



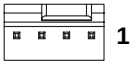
System Fan Connector (CHA_FAN1)

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



CPU Fan Connector (CPU_FAN)

Pin #	Signal
1	GND
2	Fan Power (+12V)
3	Fan Sense
4	Fan Speed Control



Chassis Intrusion Connector (CHASSIS)

Pin #	Signal
1	+5Vsb
2	–
3	Chassis Signal
4	GND

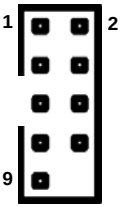


Note: Short pins 3 and 4 if not connected to chassis.

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Serial Port Connectors RS-232 (COM2-4)

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, Ring indicator



Serial Port Connectors RS-422/485 (COM4)

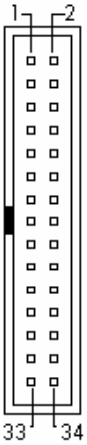
Pin #	RS-422	RS-485
1	TXD-	TXD-
2	TXD+	TXD+
3	RXD-	NC
4	RXD+	NC
5	NC	NC
6	NC	NC
7	NC	NC
8	NC	NC
9	NC	NC

See “COM4 RS-232/422/485 Select (JCOMPWR5, 6, 7)” on page 25 for RS-232/422/485 mode jumper settings.

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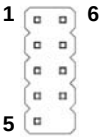
Floppy Disk Drive Connector (FLOPPY)

Pin #	Signal	Pin #	Signal
1	GND	2	Extended Density
3	GND	4	NC
5	NC	6	NC
7	GND	8	Index
9	GND	10	Motor A Select
11	GND	12	NC
13	GND	14	Drive A Select
15	GND	16	NC
17	GND	18	Step Direction
19	GND	20	Step Pulse
21	GND	22	Write Data
23	GND	24	Write Gate
25	GND	26	Track 0
27	GND	28	Write Protect
29	GND	30	Read Data
31	GND	32	Head Select
33	GND	34	Disk Change



System Panel Pin Header (F_PANEL)

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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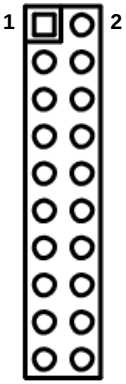
Amplifier Audio Pin Header (JAMP1)

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



Digital IO Pin Header (JDIO)

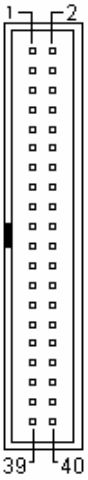
Pin #	Signal	Pin #	Signal
1	DIO GP20	2	DIO GP10
3	DIO GP21	4	DIO GP11
5	DIO GP22	6	DIO GP12
7	DIO GP23	8	DIO GP13
9	DIO GP24	10	DIO GP14
11	DIO GP25	12	DIO GP15
13	DIO GP26	14	DIO GP16
15	DIO GP27	16	DIO GP17
17	SMLINK0	18	SMLINK1
19	Ground	20	+5V



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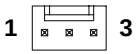
IDE Connector (PRI_EIDE)

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



Power Fan Connector (PWR_FAN)

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



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SATA Connectors (SATA1-6)

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



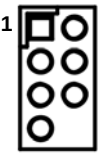
S/PDIF Pin Header (SPDIF_OUT)

Pin #	Signal
1	+5V
2	–
3	SPDIF0
4	GND



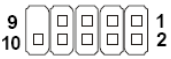
SPI Pin Header (SPI)

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	NC	8	–



USB Pin Headers (USB56/78/910/1112)

Pin #	Signal	Pin #	Signal
1	+5V	2	+5V
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key	10	–



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2.3 Jumpers

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:

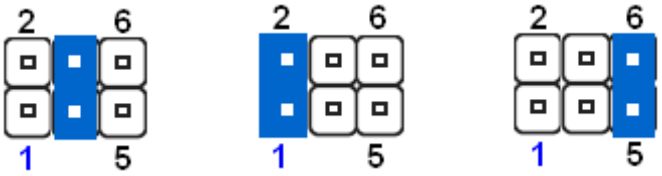
1. Disconnect power from the M-322
2. Short the CLRTC pins 2-3
3. Turn the power on. After power on, remove the jumper cap from pins 2-3 and reinstall it to pins 1-2.



Normal (default) **Clear CMOS**

COM1-4 RI, +12V and +5V Select (JCOMPWR1-4)

These jumpers allows you to select RI, +5V and +12V power settings for COM1-4. Jumper JCOMPWR1 corresponds to COM1, JCOMPWR2 corresponds to COM2, and so on, respectively.

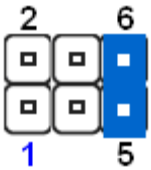
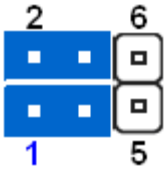
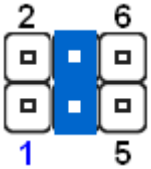
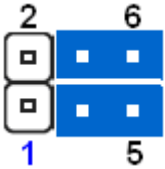
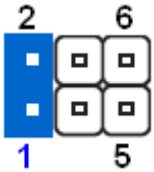
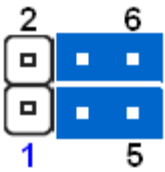


RI (default) **+12V** **+5V**

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COM4 RS-232/422/485 Select (JCOMPWR5, 6, 7)

Short the jumper pins according to the following settings to set COM4 to RS-232/422/485 mode.

	JCOMPWR5	JCOMPWR6/7
RS-232		
RS-422		
RS-485		

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3 Getting Started

This chapter provides information on how to install components to the M-322 motherboard.

3.1 Installing the CPU

The M-322 Supports the Intel® Core™2 Duo/Quad, Intel® Pentium® Dual-Core, and Intel® Celeron® processors via the surface mount LGA775 socket (Socket T).

WARNING:

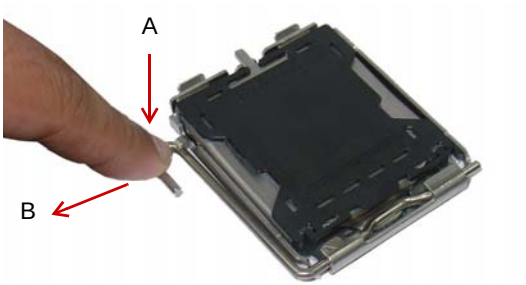
Disconnect all power supply to the board before installing a CPU to prevent damaging the board and CPU.

Do not touch socket contacts. Damaging the contacts voids the product warranty. Follow the installation instructions carefully to avoid damaging motherboard components.



To install the CPU:

1. Press the load lever (A), then disengage it from the retention tab (B).



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2. Lift and rotate the load lever to a 135° angle



3. Lift the load plate to a 100° angle using your thumb and forefinger

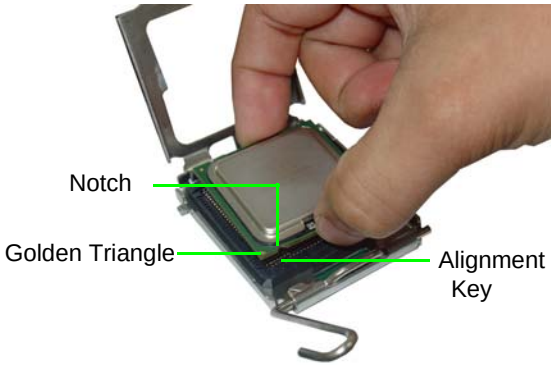


4. Use your thumb to push and remove the protective socket cover (plastic) from the load plate



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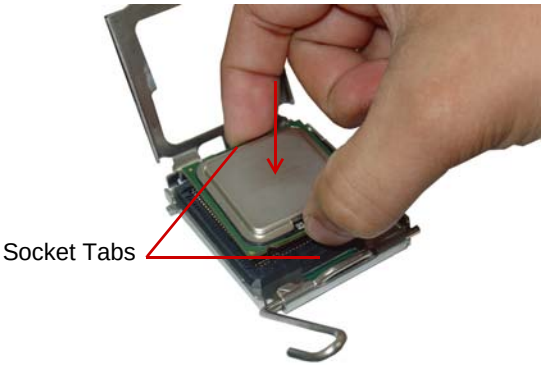
5. Position the CPU over the socket, then match the notches on the CPU side with the alignment keys on the socket. The golden triangle on the CPU must be positioned on the bottom-left corner of the socket .



WARNING:

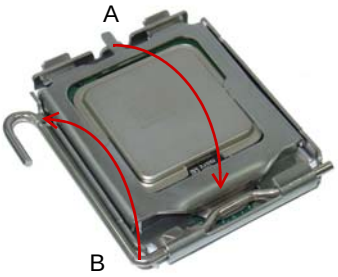
The CPU fits the socket in only one orientation. DO NOT force it into the socket to avoid damaging it.

6. Carefully place the CPU on the socket in a vertical motion. The socket has tabs that accommodate your fingers during installation .



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7. Close the load plate (A), then fasten the load lever on the retention tab (B) .



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3.2 Installing the CPU Fan and Heatsink

CAUTION:

The CPU requires a chassis with an airflow inlet and maximum internal ambient temperature of 60° C. A specially-designed CPU fan and heatsink must be installed before using the motherboard. Failure to install a CPU fan and heatsink may damage the motherboard and/or the CPU.

The following CPU fan and heatsink assembly is recommended for use with the M-322:



Copper-Core Cooler
Dimensions: 115 x 115 x 61.4 mm
Heatsink: Aluminum extrusion+copper core
Fan speed: 4500 RPM
Fan airflow: 76.9 CFM
Noise level: 49 dBA
Part number: 32-20086-0000

When the CPU fan installation procedures presented here are inconsistent with the installation procedures you obtained from the CPU fan and heatsink package, follow the latter.

To install the CPU fan:

1. Apply thermal grease evenly on top of the installed CPU.
2. Lower the CPU fan to the CPU, then secure it using the provided attachments or screws.

Connect the CPU fan cable to the CPU fan connector on the motherboard labeled CPU_FAN (see Figure 1-2 on page 9).

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3.3 System Memory

The M-322 supports up to 8 GB of DDR2 667/800 MHz memory modules in four DIMM sockets. DDR2 modules are notched to facilitate correct installation in the DIMM sockets. See Figure 1-2 on page 9 for DIMM socket locations.

Memory Configurations

Dual channel configuration is supported by the M-322 as follows:

Channel A: DIMM_A1 and DIMM_A2
Channel B: DIMM_B1 and DIMM_B2

Unbuffered non-ECC DDR2 DIMMs with capacities of 256 MB, 512 MB, 1 GB and 2GB can be installed into the DIMM sockets as follows:

- Memory modules of varying sizes may be installed in Channel A and Channel B. The system maps the total size of the channel with the lowest capacity for dual-channel configuration. Any excess memory from the channel with higher capacity is then mapped for single-channel operation.
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.
- Due to chipset resource allocation, the system may detect less than 4 GB system memory when four 1 GB DDR2 memory modules are installed. This limitation occurs in Windows® XP 32-bit operation system, which does not support Physical Address Extension (PAE).
- The M-302 does not support memory modules with 128 Mb chips or double-sided x16 memory modules.

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 .

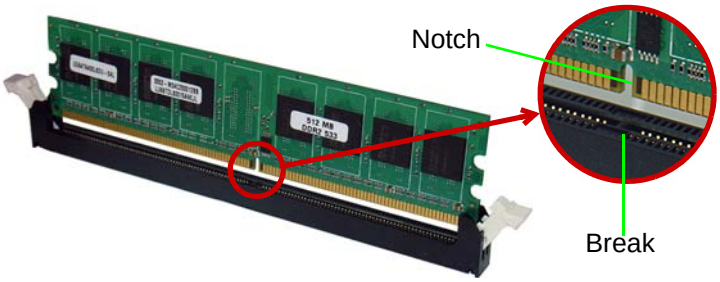
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To install a memory module:

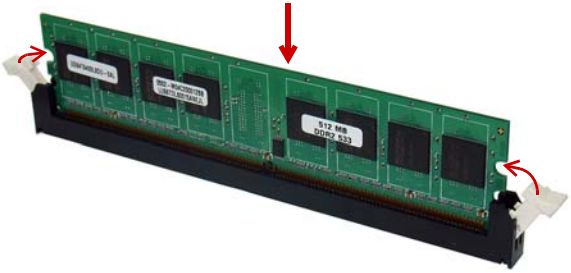
1. Locate the DIMM slots on the motherboard.
2. Press the socket's retaining clips outward to unlock.



3. Align the memory module on the socket making sure that the notch matches the break on the socket.



4. Insert the module firmly into the slot until the retaining clips snap back inwards and the module is securely seated.



3.4 Driver Installation

This section provides information on how to install the M-322 device drivers under Windows XP. The device drivers are located in the following directories on the driver CD, or can be downloaded from the ADLINK website (**http://www.adlinktech.com**):

Chipset	\Drv_Chipset_Q35\
Display	\Drv_VGA_GMA3100\
Ethernet	\Drv_Lan_RTL8111C\
Audio	\Drv_Audio_ALC888\
TPM	\TPM\
Matrix Technology	\Intel Matrix Storage Manager\

Install the Windows operating system before installing any driver. Most standard I/O device drivers are installed during Windows installation.



In order to enable RAID or AHCI mode, you must pre-install the Intel® Matrix Storage Technology driver during the Windows* installation process. using the F6 installation method.
*Not required for Windows Vista and Windows 7.

Intel® Matrix Storage Technology Driver

1. Create a floppy image as described in the F6Readme.txt file contained in **X:\Intel Matrix Storage Manager\Floppy_32**.
2. During Windows installation, press **F6** when you see the message "*Press F6 if you need to install a third party SCSI or RAID driver.*" Then press **S** to *Specify Additional Device*.
3. Insert the floppy disk and follow the remaining instructions. Leave the disk in until the system has rebooted and copied the necessary files, then remove the disk.

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Intel® Q35 Express Chipset Driver

This section describes the installation of the Intel® Q35 Express chipset driver.

1. Locate the directory **X:\Drv_Chipset_Q35**.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

Display Driver

Follow these instructions to install the display driver:

1. Locate the directory **X:\Drv_VGA_GMA3100** on the driver CD and select the correct operating system.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

Ethernet Driver

Follow these instructions to install the Ethernet driver.

1. Locate the directory **X:\Drv_Lan_RTL8111C\Windows** on the driver CD and select the correct operating system.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

Audio Driver

Follow these instructions to install the audio driver.

1. Locate the audio driver from the directory **X:\Drv_Audio_ALC888\Windows** on the driver CD and select the correct operating system.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

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Intel® Matrix Storage Manager

Follow these instructions to install the Intel® Matrix Storage Manager utility.

1. Locate the directory **X:\Intel Matrix Storage Manager** on the driver CD.
2. Run the program **iata78_enu.exe** and follow the onscreen instructions. Restart the system if prompted.

TPM Driver

Follow these instructions to install the TPM driver.

1. Locate the directory **X:\TPM** on the driver CD.
2. Run the program **setup.exe** and follow the onscreen instructions. Restart the system if prompted.

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4 BIOS Setup

The following chapter describes basic navigation for the AMIBIOS®8 BIOS 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 when you see the following text prompt:
   < Press DEL to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as Chipset and Power menus.



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

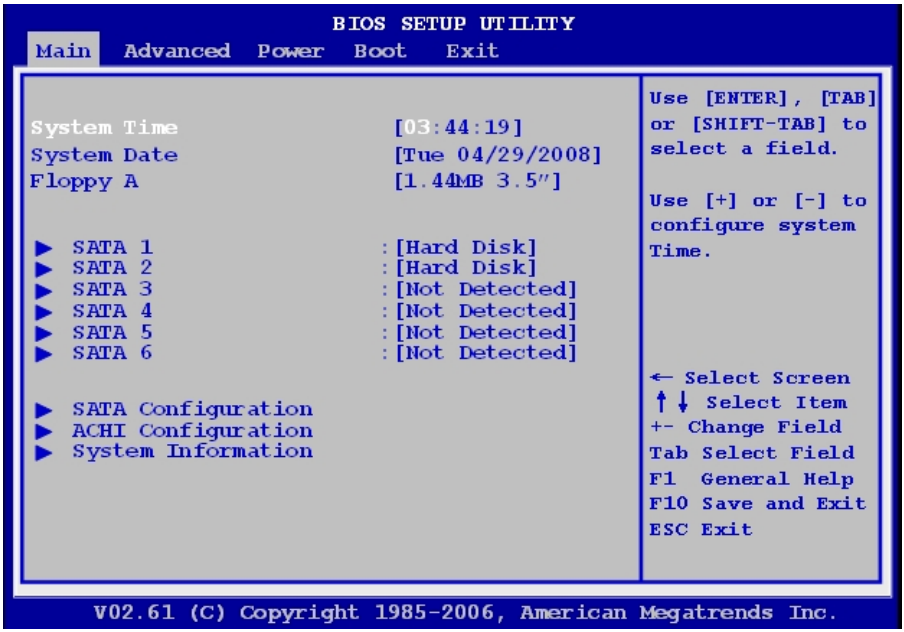
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Setup Menu

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

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

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

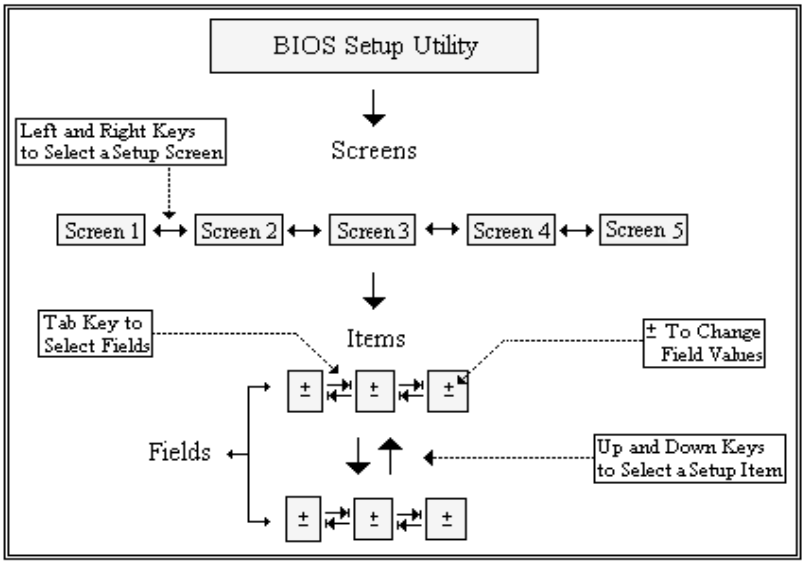


Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.

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

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

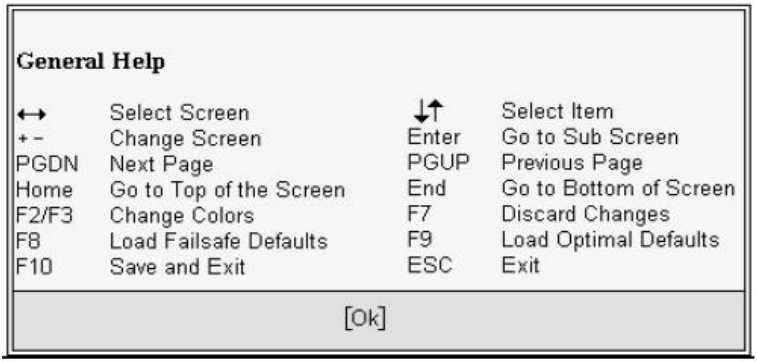
The < F8 > key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the < F8 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up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

Hotkey Descriptions

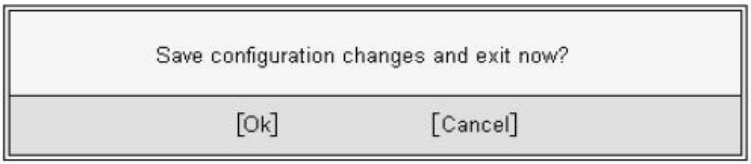
F1 The < F1 > key allows you to display the General Help screen.

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

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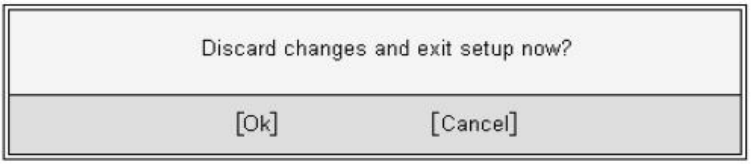


F10 The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:



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

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



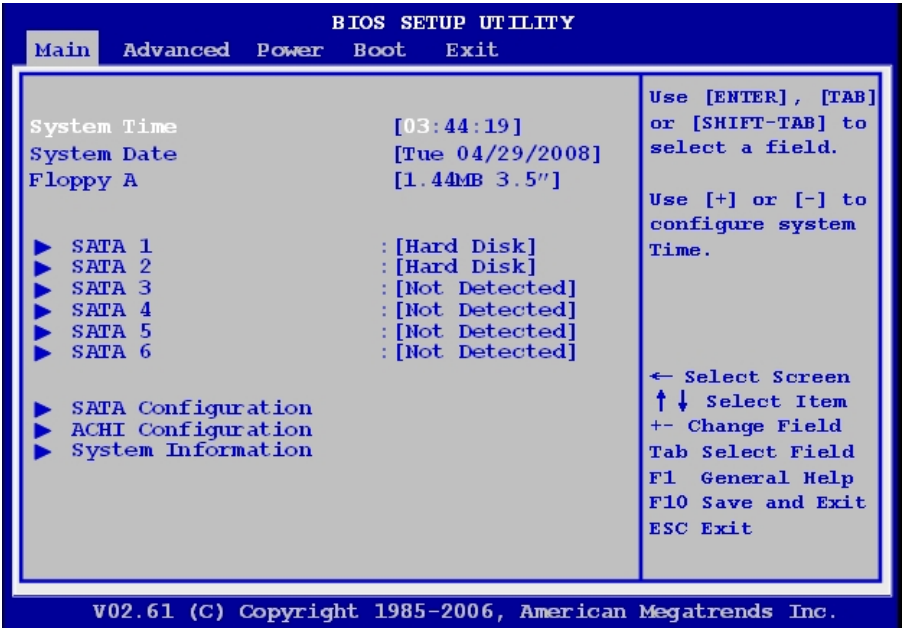
Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

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

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4.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



System Time/System Date

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

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

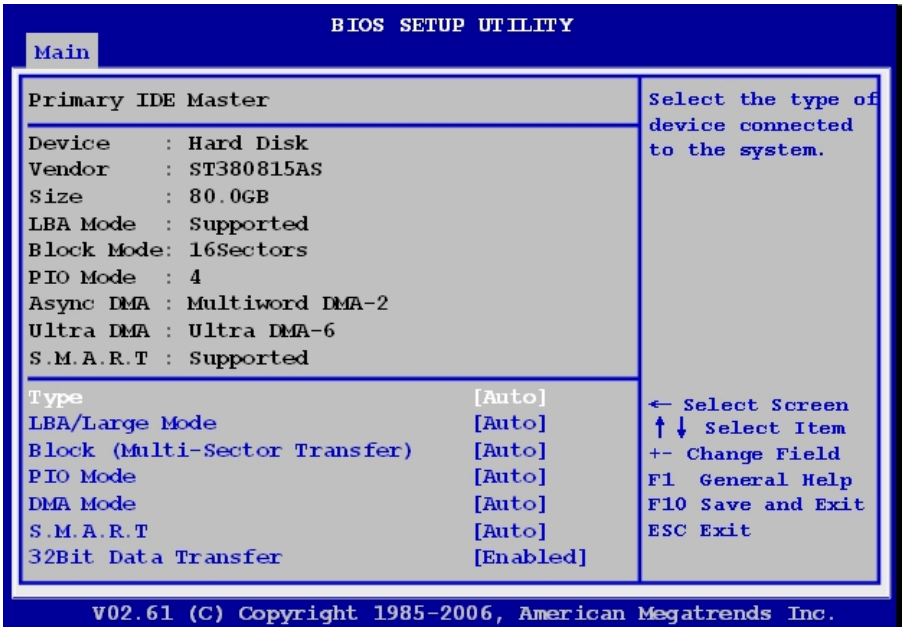
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Floppy A

Sets the type of floppy drive installed.
Options: [Disabled], [360KB, 5 1/4], [1.2MB, 5 1/4], [720KB, 5 1/4], [1.44MB, 5 1/4], [2.88MB, 3 1/2]

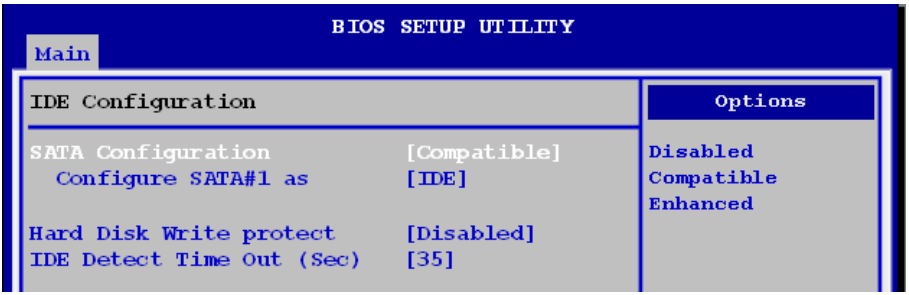
SATA 1~6

The BIOS automatically detects the presence of SATA devices. There is a separate sub-menu for each IDE device. Select a device item then press <Enter> to display the SATA device information and adjust user configurable parameters.



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SATA Configuration



SATA Configuration

Allows you to disable or enable SATA Configuration function.
Options: [Disabled], [Compatible], [Enhanced]

Configure SATA as

Configures the Serial ATA connectors supported by the South-bridge chip. The AHCI allows the onboard storage drive to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands. If you want to create a RAID 0, RAID 1, RAID 5, RAID 10, or the Intel® Matrix Storage Technology configuration from the Serial ATA hard disk drives, set this item to [RAID].

Hard Disk Write Protect

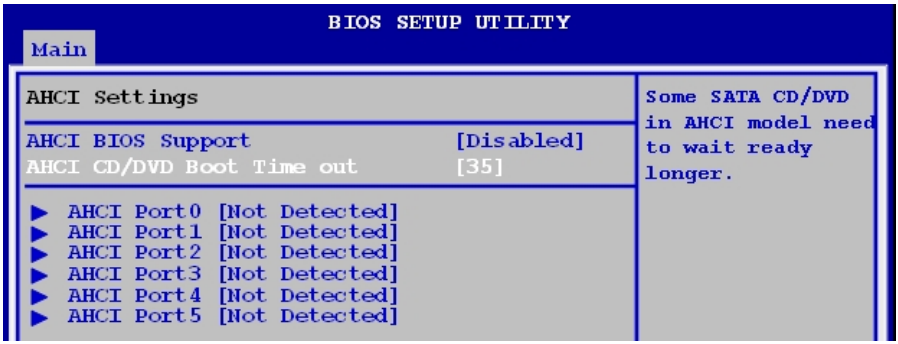
Allows you to enable or disable the hard disk write protect.
Options: [Disabled], [Enabled]

IDE Detect Time Out

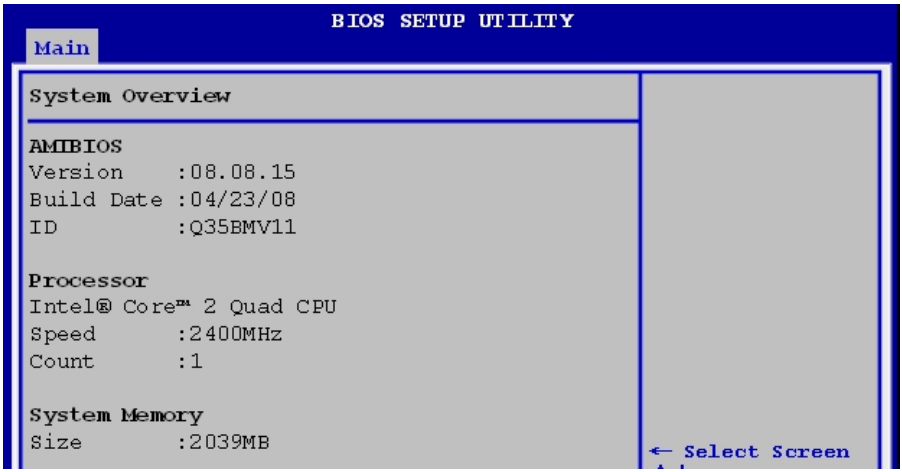
Sets SATA detect time out.
Options: [0], [5], [10], [15], [20], [25], [30], [35]

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AHCI Settings



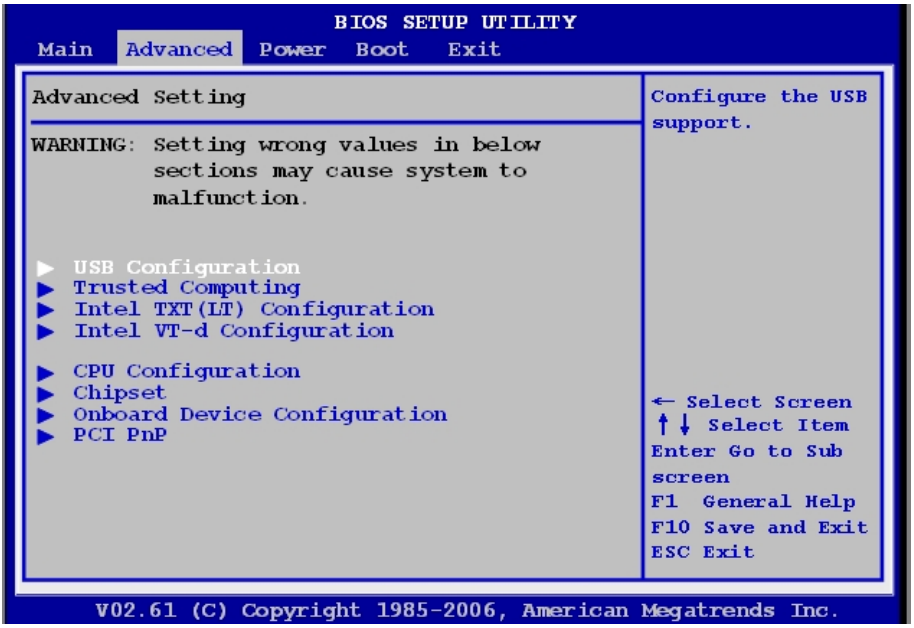
System Information



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4.3 Advanced Setings

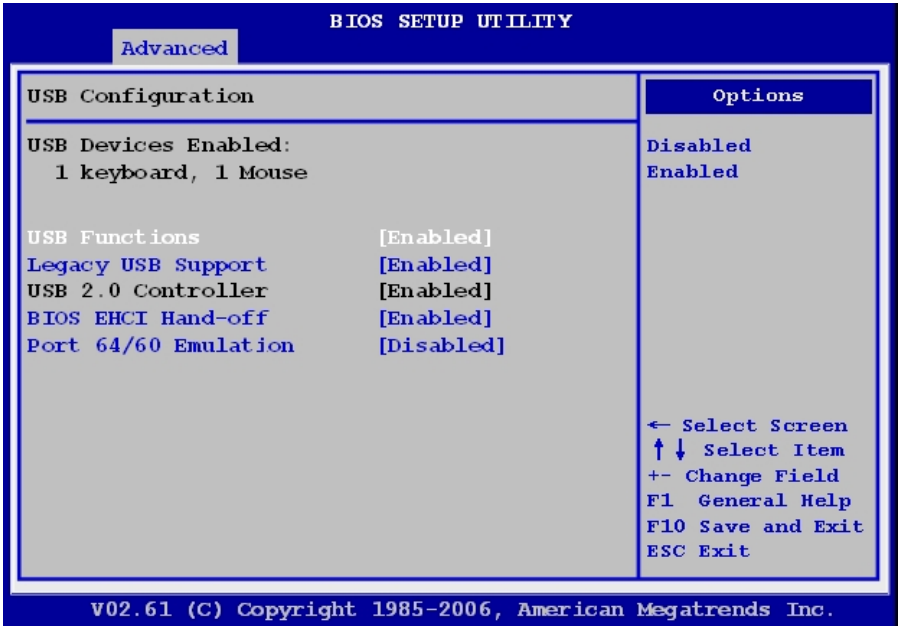
Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen to go to the sub menu for that item. The sub menus are described on the following pages.



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4.3.1 USB Configuration

You can use this screen to select options for the USB Configuration. Select an item then press <Enter> to display the configuration options.



USB Functions

Allows you to enable or disable USB functions.
Options: [Disabled], [Enabled]

Legacy USB Support [Enabled]

Allows you to enable or disable support for USB devices on legacy operating systems (OS). Setting to Auto allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.
Options: [Disabled], [Enabled], [Auto]

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USB 2.0 Controller

Allows you to enable or disable the USB 2.0 controller.
Options: [Enabled], [Disabled].

BIOS EHCI Hand-Off

Allow you to enable support for operating systems without an EHCI hand-off feature.
Options: [Disabled], [Enabled].

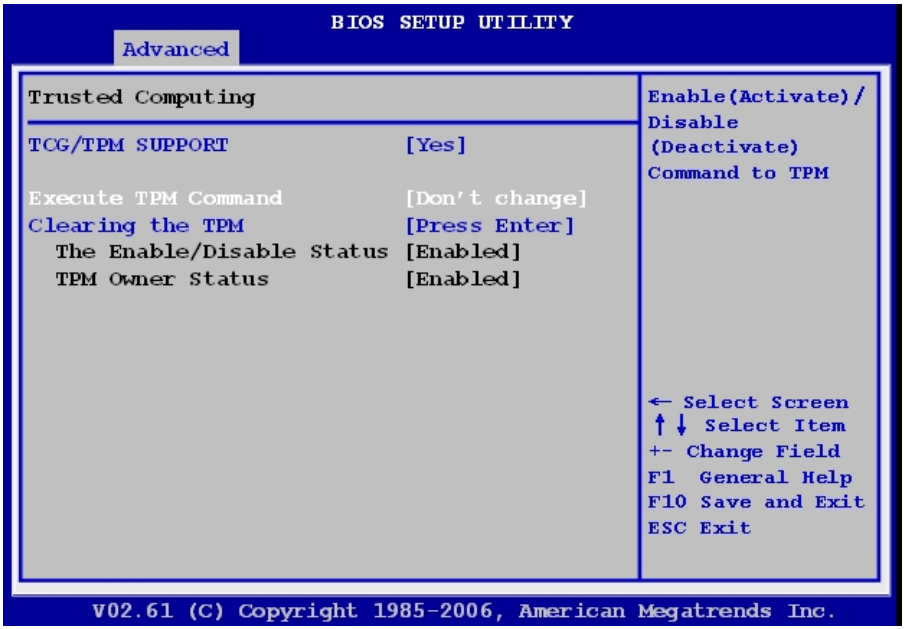
Port 64/60 Emulation

Allows you to disable or enable the I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OS.
Options: [Disabled], [Enabled]

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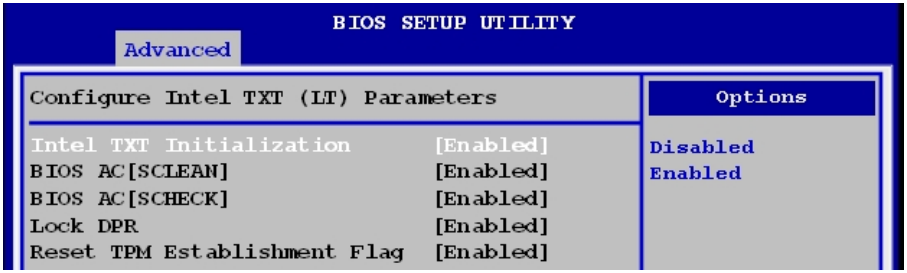
4.3.2 Trusted Computing

Trusted computing is an industry standard to make personal computers more secure through a dedicated hardware chip, called a Trusted Platform Module (TPM). This option enables or disables the TPM support.



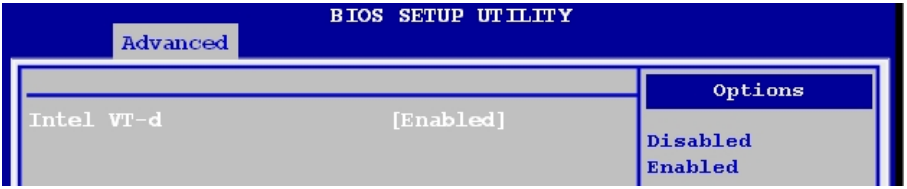
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4.3.3 Intel TXT Configuration



Allows you to enable or disable Intel® Trusted Execution Technology initialization.
Options: [Disabled], [Enabled]

4.3.4 Intel VT-d Configuration

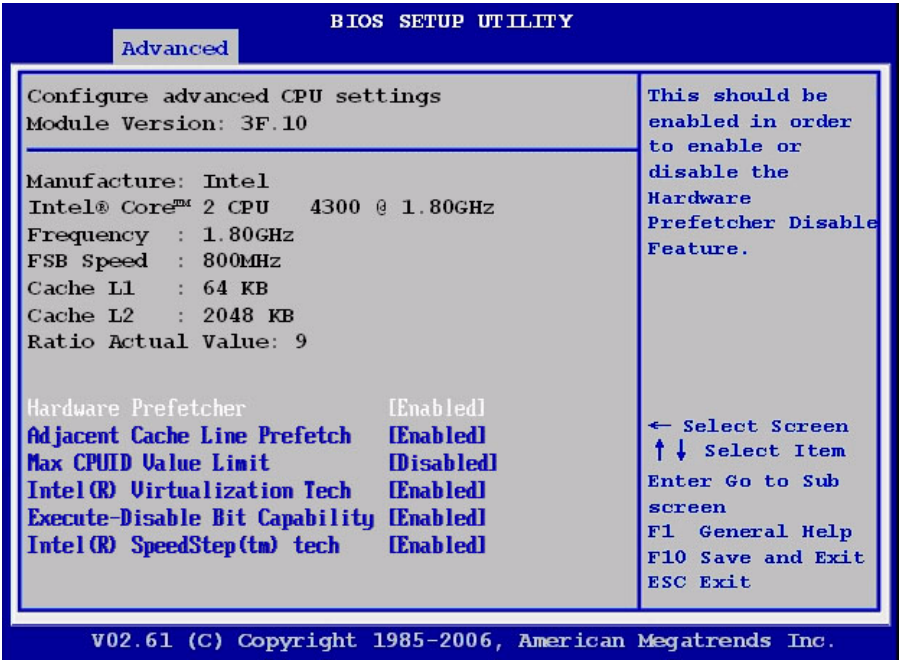


Allows you to enable or disable Intel® Virtualization Technology.
Options: [Disabled], [Enabled]

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4.3.5 CPU Configuration

You can use this screen to select options for the CPU Configuration Settings.



Hardware Prefetcher

Options: [Enabled], [Disabled].

Adjacent Cache Line Prefetch

Options: [Enabled], [Disabled].

Max CPUID Value Limit

Setting this item to [Enabled] allows legacy operating systems without support for CPUs with extended CPUID functions to boot.
Options: [Disabled], [Enabled].

Intel Virtualization Tech

Options: [Enabled], [Disabled].

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Execute Disable Bit

Allows you to enable or disable the No-Execution Page Protection Technology. Setting this item to [Disabled] forces the XD feature flag to always return a zero (0).
Options: [Enabled], [Disabled].

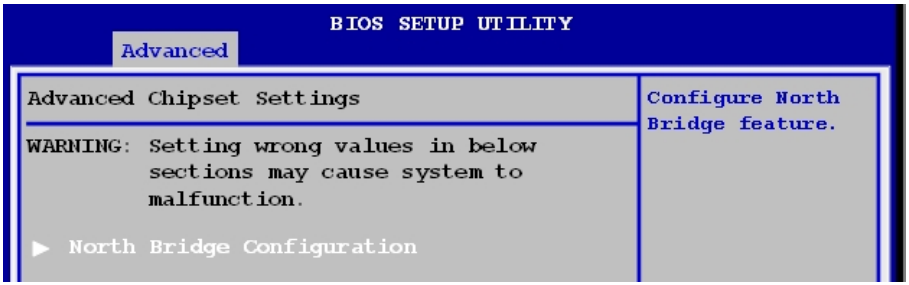
Intel SpeedStep Tech

Options: [Enabled], [Disabled].

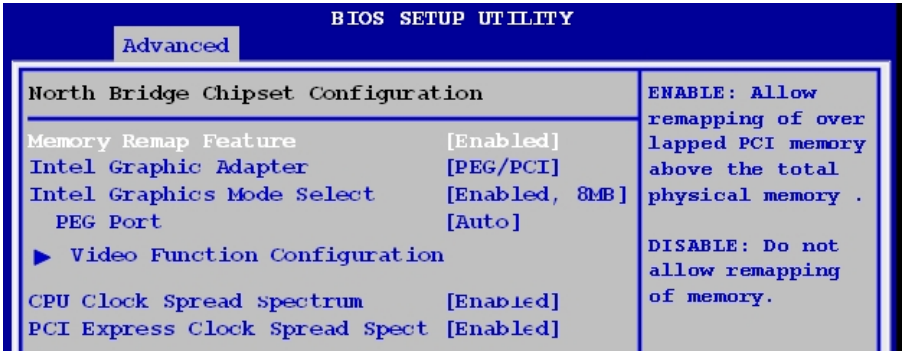
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4.3.6 Chipset Settings

The Chipset menu allows you to change the advanced chipset settings. Select an item then press <Enter> to display the sub-menu.



North Bridge Configuration



Memory Remap Feature

Allows you to enable or disable the remapping of the overlapped PCI memory above the total physical memory. Enable this option only when you install a 64-bit operating system.
Options: [Disabled], [Enabled].

Initial Graphic Adapter

Allows you to select which graphics controller to use as the primary boot device.
Options: [IGD], [PCI/IGD], [PCI/PEG], [PEG/IGD], [PEG/PCI]

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Internal Graphic Mode Select

Allows you to select the amount of system memory used by the Internal Graphics Device.
Options: [Disabled], [Enabled,1MB], [Enabled, 8MB]

PEG Port Control

Allows you to disable or enable PEG port control.
Options: [Auto], [Disabled]

Video Function Configuration

DVMT Mode Select, Options: [Fixed Mode], [DVMT Mode]
DVMT/FIXED Memory, Options: [128MB], [258MB], [Maximum DTMT]
Spread Spectrum Clock, Options: [Disabled], [Enabled]

CPU Clock Spread Spectrum

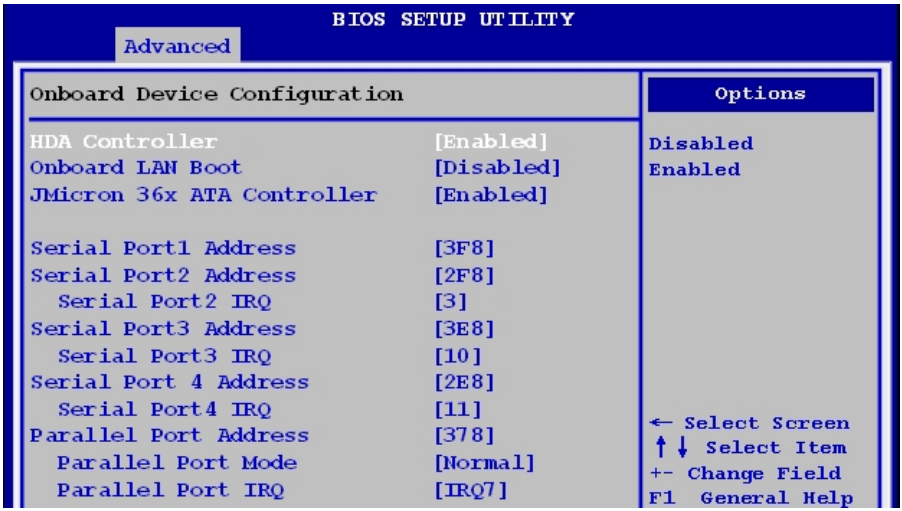
Options: [Disabled], [Enabled].

PCI Express Clock Spread Spectrum

Options: [Disabled], [Enabled].

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4.3.7 Onboard Device Configuration



Onboard LAN Boot

Options: [Enabled], [Disabled]

JMicron 36X ATA Controller

Allows you to enable or disable the JMicron 36X ATA controller (PATA function).
Options: [Enabled], [Disabled].

Serial Port Address

Allow you to select the Serial Port base address.
Options: [Disabled], [3F8], [2F8], [3E8], [2E8]

Serial Port IRQ

Options: [3], [4], [10], [11]

Parallel Port Address

Allow you to select the Parallel Port base address.
Options: [Disabled], [378], [278], [3BC]

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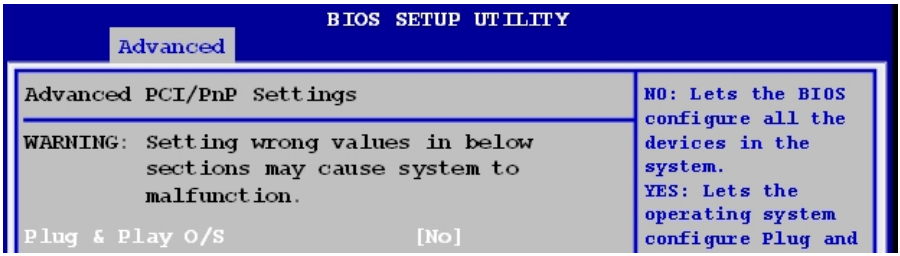
Parallel Port Mode

Allow you to select the Parallel Port mode.
Options: [Normal], [Bi-Directional], [ECP], [EPP], [ECP&EPP]

Parallel Port IRQ

Options: [IRQ5], [IRQ7]

4.3.8 PCI/PnP Settings

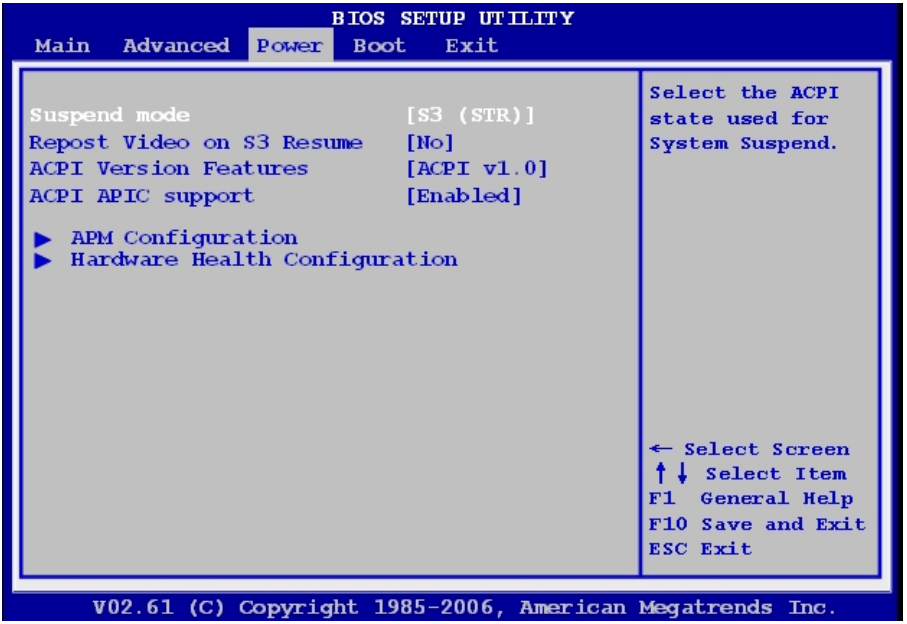


When set to [No], BIOS configures all the devices in the system. When set to [Yes] and if you install a Plug and Play operating system, the operating system configures the Plug and Play devices not required for boot.

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4.4 Power Settings

The Power menu items allow you to change the settings for the Power Management. Select an item then press <Enter> to display the configuration options.



Suspend Mode

Allows you to select the Advanced Configuration and Power Interface (ACPI) state to be used for system suspend.
Options: [S1 (POS)], [S3 (STR)], [Auto]

Repost Video on S3 Resume

Determine whether to invoke VGA BIOS post on S3/STR Resume.
Options: [Yes], [No]

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ACPI Version Features

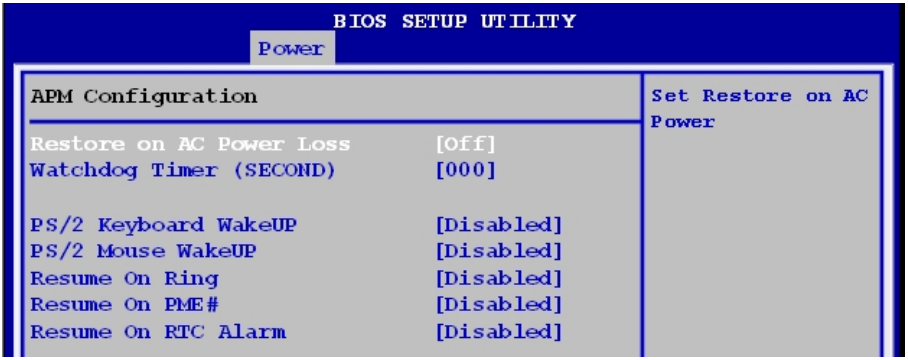
Allows you to add more tables for Advanced Configuration and Power Interface (ACPI) 2.0 specifications.
Options: [ACPI V1.0], [ACPI V2.0], [ACPI V3.0]

ACPI APIC Support [Enabled]

Allows you to enable or disable the Advanced Configuration and Power Interface (ACPI) support in the Application-Specific Integrated Circuit (ASIC). When set to Enabled, the ACPI APIC table pointer is included in the RSDT pointer list.
Options: [Disabled], [Enabled]

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4.4.1 APM Configuration



Restore on AC Power Loss

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

- **Power Off:** Set this value to always power off the system while AC power is restored.
- **Power On:** Set this value to always power on the system while AC power is restored.
- **Last State:** Set this value to power off/on the system depending on the last system power state while AC power is restored.

Watchdog Timer (seconds)

Allow you to set time-out of the Watchdog Timer.

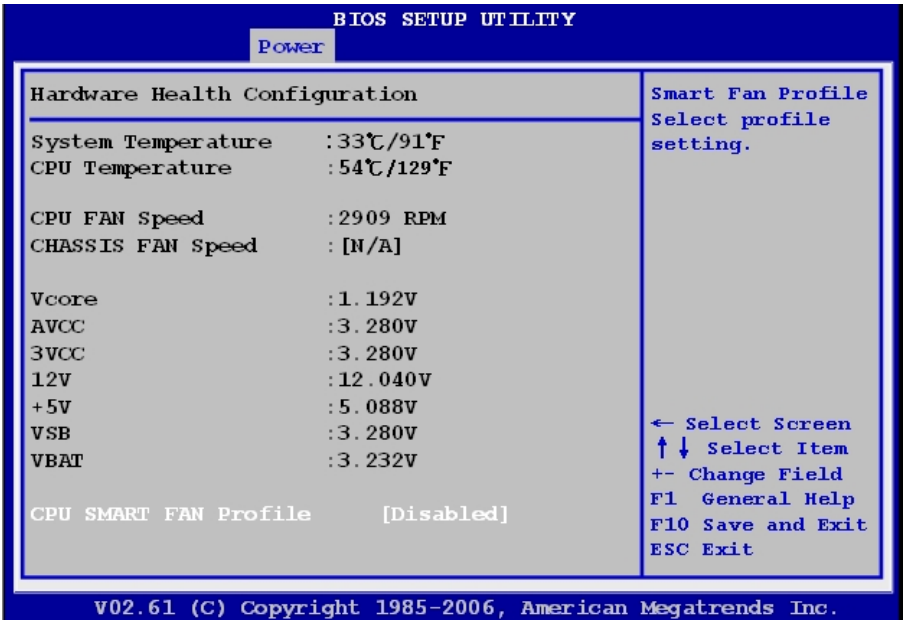
Resume On RTC Alarm

When [Enabled], your can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

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4.4.2 Hardware Health Configuration

This submenu displays system health information (temperatures, voltages, fan speeds) and allows CPU Smart Fan Profile configuration.



CPU Smart Fan Profile

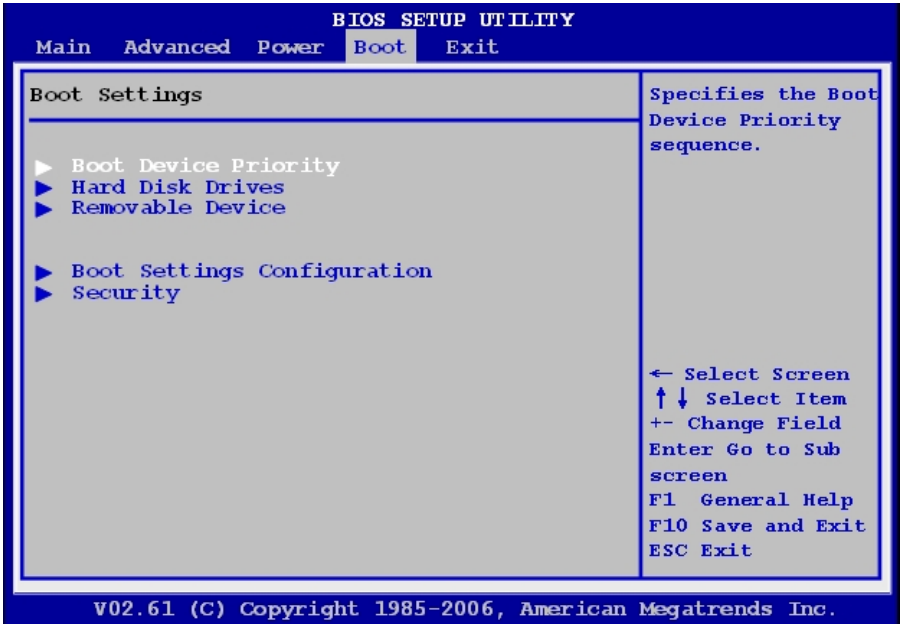
Allows you to select the CPU FAN profile mode.

- **Silent Mode:** Keeps system at quieter than Optimized Mode with lower fan speed.
- **Optimized Mode:** Keeps a balance between CPU temperature and fan speed.
- **Performance Mode:** Keeps CPU at a lower temperature than Optimized Mode with faster fan speed
- **Disabled**

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4.5 Boot Settings

The Boot Settings menu allows you to change the system boot options. Select an item and press <Enter> to display the submenu.



4.5.1 Boot Device Priority

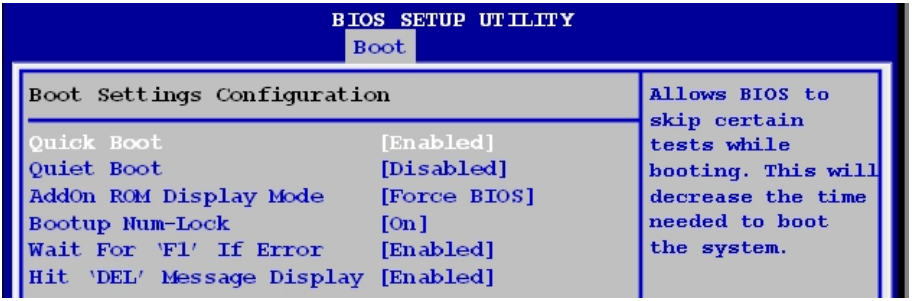
The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system. Use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list.

4.5.2 Boot Device Groups

The Boot devices are listed in groups by device type. Use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list. Only the first device in each device group will be available for selection in the Boot Device Priority option.

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4.5.3 Boot Settings Configuration



Quick Boot

Enabling this setting will cause the BIOS power-on self test routine to skip some of its tests during bootup for faster system boot.
Options: [Disabled], [Enabled]

Quiet Boot

When this feature is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.
Options: [Disabled], [Enabled]

Add On ROM Display Mode

Set the display mode for option ROM.
Options: [Force BIOS], [Keep Current].

Bootup Num-Lock

This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.
Options: [Off], [On]

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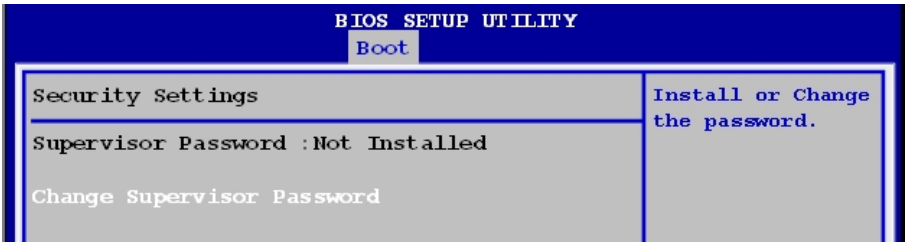
Wait for 'F1' If Error

When set to Enabled, the system waits for the F1 key to be pressed when an error occurs.
Options: [Disabled], [Enabled].

Hit 'DEL' Message Display

The system displays the message "Press DEL to run Setup" during POST when set to Enabled.
Options: [Disabled], [Enabled].

4.5.4 Security

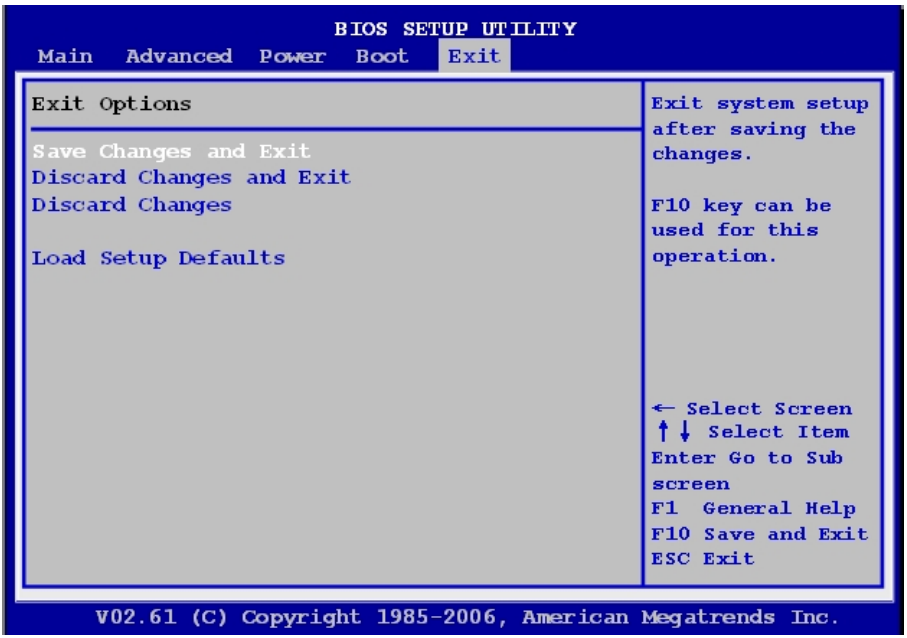


Use this submenu to set the Supervisor and User passwords.

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4.6 Exit Menu

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



Save Changes and Exit

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

Save Configuration Changes and Exit Now?

[Ok] [Cancel]

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

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Discard Changes and Exit

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

Discard Changes and Exit Setup Now?

[Ok] [Cancel]

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

Discard Changes

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

Select Ok to discard changes.

Load Setup Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. Select Load Optimal Defaults from the Exit menu and press < Enter >.

Select Ok to load optimal defaults.

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Appendix A - Watchdog Timer

The following is a sample program for configuring the M-322's watchdog timer.

A.1 Sample Code

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 – CB7FF: Onboard VGA BIOS CB800 – CC7FF: Realtek RTL8111C PXE option ROM when onboard LAN boot ROM is enabled. CC800 – CD7FF: Realtek RTL8111C PXE option ROM when onboard LAN boot ROM is enabled. CD800 – CE7FF: JMicron 368 option ROM when 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

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B.2 Direct Memory Access Channels

Channel Number	Data Width	System Resource
0	8-bits	Parallel port
1	8-bits	Parallel port
2	8-bits	Diskette drive
3	8-bits	Parallel port
4		Reserved - cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

Table B-2: Direct Memory Access Channels

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B.3 Fixed I/O Map

Hex Range	Device
00h-08h	DMA Controller
09h-0Eh	RESERVED
0Fh	DMA Controller
10h-18h	DMA Controller
19h-1Eh	RESERVED
1Fh	DMA Controller
20h-21h	Interrupt Controller
24h-25h	Interrupt Controller
28h-29h	Interrupt Controller
2Ch-2Dh	Interrupt Controller
2E-2F	LPC SIO
30h-31h	Interrupt Controller
34h-35h	Interrupt Controller
38h-39h	Interrupt Controller
3Ch-3Dh	Interrupt Controller
40h-42h	Timer/Counter
43h	RESERVED
4E-4F	LPC SIO
50h-52h	Timer/Counter
53h	RESERVED
60h	Microcontroller
61h	NMI Controller
62h	Microcontroller
64h	Microcontroller
66h	Microcontroller
70h	RESERVED
71h	RTC Controller
72h	RTC Controller
73h	RTC Controller
74h	RTC Controller
75h	RTC Controller

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Hex Range	Device
76h	RTC Controller
77h	RTC Controller
80h	DMA Controller and LPC or PCI
81h-83h	DMA Controller
84h-86h	DMA Controller
87h	DMA Controller
88h	DMA Controller
89h-8Bh	DMA Controller
8Ch-8Eh	DMA Controller
08Fh	DMA Controller
90h-91h	DMA Controller
92h	Reset Generator (Processor I/F)
93h-9Fh	DMA Controller
A0h-A1h	Interrupt Controller
A4h-A5h	Interrupt Controller
A8h-A9h	Interrupt Controller
ACh-ADh	Interrupt Controller
B0h-B1h	Interrupt Controller
B2h-B3h	Power Management
B4h-B5h	Interrupt Controller
B8h-B9h	Interrupt Controller
BCh-BDh	Interrupt Controller
C0h-D1h	DMA Controller
D2h-DDh	RESERVED
DEh-DFh	DMA Controller
F0h	PCI and Master Abort (Processor I/F)
170h-177h	SATA Controller or PCI
1F0h-1F7h	SATA Controller or PCI
376h	SATA Controller or PCI
3F6h	SATA Controller or PCI
4D0h-4D1h	Interrupt Controller
CF9h	Reset Generator (Processor I/F)

Table B-3: Fixed I/O Map

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B.4 Variable I/O Map

Hex Range	Device
Anywhere in 64 KB I/O Space	ACPI
Anywhere in 64 KB I/O Space	IDE Bus Master
Anywhere in 64 KB I/O Space	Native IDE Command
Anywhere in 64KB I/O Space	Native IDE Control
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
Anywhere in 64 KB I/O Space	USB UHCI Controller #6
Anywhere in 64 KB I/O Space	SMBus
96 Bytes above ACPI Base	TCO
Anywhere in 64 KB I/O Space	GPIO
3 Ranges in 64 KB I/O Space	Parallel Port
3F8/2F8/3E8/2E8	Serial Port 1 Serial Port 2
3E8/2E8	Serial Port 3, Serial Port 4
2 Ranges in 64 KB I/O Space	Floppy Controller
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
0	System timer	Internal Timer / Counter 0 output / HPET #0
3	Communications Port (COM2)	IRQ3 via SERIRQ, PIRQ#
4	Communications Port (COM1)	IRQ4 via SERIRQ, PIRQ#
6	Floppy Disk	IRQ6 via SERIRQ, PIRQ#
8	System CMOS/real time clock	Internal RTC / HPET #1
9	Microsoft ACPI-Compliant System	IRQ9 via SERIRQ, SCI, TCO, or PIRQ#
10	Communications Port (COM3)	IRQ10 via SERIRQ, SCI, TCO, or PIRQ#
11	Communications Port (COM4)	IRQ11 via SERIRQ, SCI, TCO, or PIRQ#, or HPET#2
13	Numeric data processor	State Machine output based on processor FERR#assertion. May optionally be used for SCI or TCO interrupt if FERR# not needed.
14	Primary IDE Channel	SATA Primary (legacy mode), or via SERIRQ or PIRQ#
15	Secondary IDE Channel	SATA Secondary (legacy mode) or via SERIRQ or PIRQ#

Table B-5: IRQ Lines PIC Mode

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IRQ Lines APIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin
0	System timer	Internal Timer / Counter 0 output / HPET #0
3	Communications Port (COM2)	IRQ3 via SERIRQ, PIRQ#
4	Communications Port (COM1)	IRQ4 via SERIRQ, PIRQ#
6	Floppy Disk	IRQ6 via SERIRQ, PIRQ#
8	System CMOS/real time clock	Internal RTC / HPET #1
9	Microsoft ACPI-Compliant System	IRQ9 via SERIRQ, SCI, TCO, or PIRQ#
10	Communications Port (COM3)	IRQ10 via SERIRQ, SCI, TCO, or PIRQ#
11	Communications Port (COM4)	IRQ11 via SERIRQ, SCI, TCO, or PIRQ#, or HPET#2
11	Intel ICH9 Family SMBus Controller - 2930	
13	Numeric data processor	State Machine output based on processor FERR#assertion. May optionally be used for SCI or TCO interrupt if FERR# not needed.
14	Primary IDE Channel	SATA Primary (legacy mode), or via SERIRQ or PIRQ#
15	Secondary IDE Channel	SATA Secondary (legacy mode) or via SERIRQ or PIRQ#
16	Intel ICH9 Family PCI Express Root Port 2 – 2942	
16	Intel ICH9 Family USB Universal Host Controller – 2937	
16	Intel Q35 Express Chipset Family	
16	Standard Dual Channel PCI IDE Controller	
17	Intel ICH9 Family PCI Express Root Port 1 – 2940	
17	Intel ICH9 Family PCI Express Root Port 5 – 2948	
17	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC #2	

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IRQ#	Typical Interrupt Resource	Connected to Pin
18	Intel ICH9 Family PCI Express Root Port 3 – 2944	
18	Intel ICH9 Family USB Universal Host Controller – 2936	
18	Intel ICH9 Family USB2 Enhanced Host Controller – 293C	
18	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC	
19	Intel ICH9 2 port Serial ATA Storage Controller 2 - 2926	
19	Intel ICH9 Family USB Universal Host Controller - 2939	
19	Intel ICH9 Family USB Universal Host Controller - 2935	
21	Intel ICH9 Family USB Universal Host Controller - 2938	
22	Microsoft UAA Bus Driver for High Definition Audio	
23	Intel ICH9 Family USB Universal Host Controller - 2934	
23	Intel ICH9 Family USB Universal Host Controller – 293A	

Table B-6: IRQ Lines APIC Mode

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B.6 PCI Configuration Space Map

Bus #	Device #	Function #	Routing	Description
00	00	00	X	Intel host bridge
00	02	00	Internal	Intel VGA controller
00	1A	00	Internal	Intel USB UHCI
00	1A	01	Internal	Intel USB UHCI
00	1A	02	Internal	Intel USB UHCI
00	1A	07	Internal	Intel USB UHCI
00	1B	00	Internal	Intel
00	1C	00	Internal	Intel PCI/PCI bridge
00	1C	01	Internal	Intel PCI/PCI bridge
00	1C	02	Internal	Intel PCI/PCI bridge
00	1C	04	Internal	Intel PCI/PCI bridge
00	1D	00	Internal	Intel USB UHCI
00	1D	01	Internal	Intel USB UHCI
00	1D	02	Internal	Intel USB UHCI
00	1D	07	Internal	Intel USB EHCI
00	1E	00	X	Intel decode PCI/PCI bridge
00	1F	00	X	Intel bridge
00	1F	02	Internal	Intel IDE
00	1F	03	Internal	Intel SMBus controller
00	1F	05	Internal	Intel IDE controller
02	00	00	Internal	Ethernet controller
03	00	00	Internal	Ethernet controller
04	00	00	Internal	IDE controller

Table B-7: PCI Configuration Space Map

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B.7 PCI Interrupt Routing Map

INT Line	INT0	INT1	INT2	INT3
Intel VGA controller	X			
Intel USB UHCI	X			
Intel USB UHCI		X		
Intel USB UHCI				X
Intel USB UHCI			X	
Intel unknow device	X			
Intel PCI/PCI bridge	X			
Intel PCI/PCI bridge		X		
Intel PCI/PCI bridge			X	
Intel PCI/PCI bridge	X			
Intel USB UHCI	X			
Intel USB UHCI		X		
Intel USB UHCI			X	
Intel USB EHCI	X			
Intel IDE		X		
Intel SMBus controller			X	
Intel IDE controller		X		
Ethernet controller	X			
Ethernet controller	X			
IDE 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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