

MI945PA

Intel® Core™ 2 Duo/GM45
Mini-ITX Motherboard

USER'S MANUAL

Version 1.0

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Remarks: The IDE connector on board does not support OS installation in hard drive. A system hard drive connected to this IDE cannot be booted up to OS.

Introduction

Product Description

The MI945PA Mini ITX board incorporates the Mobile Intel® GM45 Express Chipset for Embedded Computing, consisting of the Intel® GM45 Graphic Memory Controller Hub (GMCH) and Intel® I/O Controller Hub (ICH9-M), an optimized integrated graphics solution with a 1066MHz and 800MHz front-side bus. Dimensions of the board are 170mm x 170mm.

The integrated powerful 3D graphics engine, based on Intel® Graphics Media Accelerator X3500 (Intel® GMA X3500) architecture, operates at core speeds of up to 533 MHz. It features a low-power design, is validated with the Intel® Core 2 Duo processors on 45nm process. With dual channel DDR2 800MHz two SoDIMM sockets on board, the board supports up to 4GB of DDR2 system memory.

Intel® Graphics supports a unique intelligent memory management scheme called Dynamic Video Memory Technology (DVMT). DVMT handles diverse applications by providing the maximum (384MB) availability of system memory for general computer usage, while supplying additional graphics memory when a 3D-intensive application requests it. The Intel GMA X3500 graphics architecture also takes advantage of the high-performance Intel processor. Intel GMA X3500 graphics supports Dual Independent Display technology.

The main features of the board are:

- Supports Intel® Core™ 2 Duo (Penryn 1066MHz)
- Supports up to 2.53GHz, 1066MHz/800MHz FSB
- Two DDR2 SoDIMM, Max. 4GB memory
- Onboard Gigabit PHY and Intel PCI-Express Gigabit LAN
- Intel® GM45 Express VGA for CRT / LVDS
- 4x SATA, 8x USB 2.0, 4x COM, Watchdog timer
- 1x PCI-E(x16) slot, 1x PCI slot

Checklist

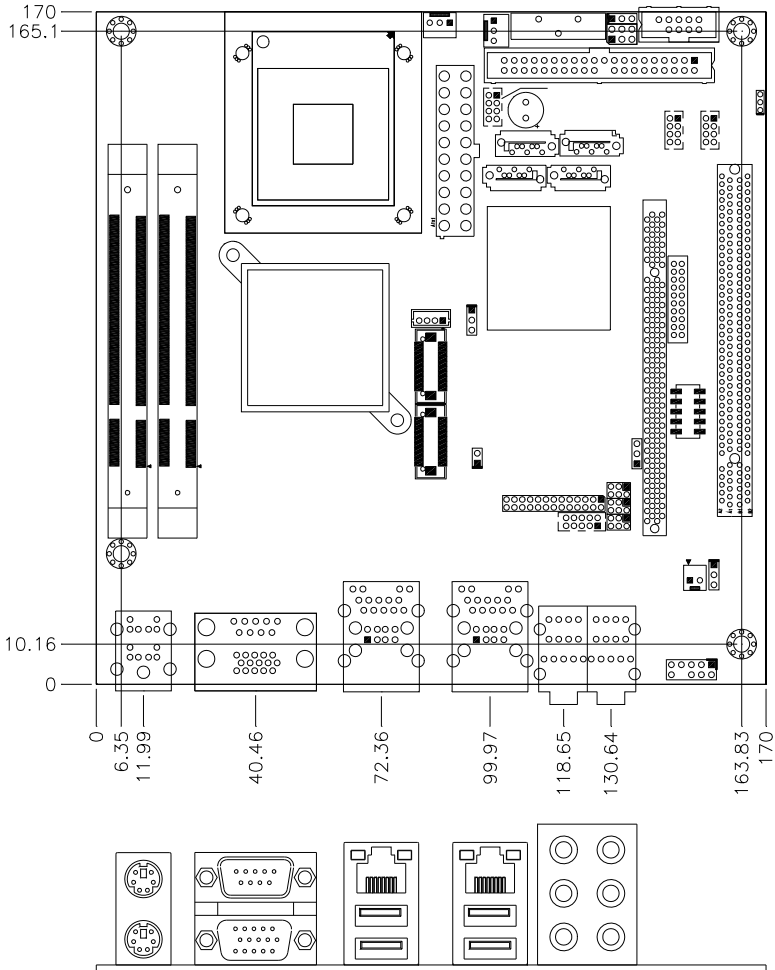
Your MI945PA package should include the items listed below.

- The MI945PA Mini-ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Cable kit (IDE, Serial port, Serial ATA)

MI945PA Specifications

Form Factor	Mini ITX
CPU Type	Intel® Mobile Core™2 Duo/Core™2 Quad Processor (Penryn) Intel® Celeron 5x5 Series
CPU Speed	Up to 2.93GHz
CPU FSB	667/800/1066MHz FSB
L2 Cache	3MB or 6MB (P8000-series or P9000-series, T9000-series)
Green /APM	APM1.2
CPU Socket	Socket 478 "Type P" (Socket P) or micro-FCBGA on board
Chipset	Intel® GM45 (Cantiga) chipset - GMCH: AC82GM45 1329-pin FCBGA - ICH9M: AF82801IM 676-pin mBGA
BIOS	AMI BIOS, support ACPI Function
Memory	DDRII 667/800 - SoDIMM x2 <u>Dual-Channel</u> (w/o ECC), Max. 4GB
VGA & LVDS	Intel® GM45 built-in Intel gen.5.0 Graphics Media Accelerator (533MHz 1.05V), supports DirectX10 for CRT & LVDS (single/dual channel 18-bit/ 24-bit)
SDVO (DUAL CH)	None
Backlight control (LVDS)	- GMCH built-in control by PWM
LAN	1. Intel® ICH9M 10/100/gigabit MAC + PHY: • Intel 82567LM 10/100/1000 2. Intel 82574L PCI-e Gigabit LAN controller x1
USB	ICH9M built-in USB 2.0 host controller, supports 8 ports
Serial ATA	ICH9M built-in SATA controller, supports 4 ports
Parallel IDE	JMicron JM368 (PCI-e to PATA) x1 for 1 PATA channel for IDE
Audio	Intel® ICH9M built-in High Definition Audio controller ALC888 with 7.1 channels
LPC I/O	Winbond® W83627DHG-P: COM1 (RS232), COM2 (RS232/422/485), LPT, Hardware monitor (3 thermal inputs, 4 voltage monitor inputs, VID0-4 & 2 fan headers) - Fintek 81216AD for COM3/COM4 (RS232),
Digital IO	4 in & 4 out
KB/Mouse Connector	Supports PS/2 Keyboard/Mouse
Expansion Slots	PCIe(x16) x1 (Inner) and PCI x 1
Edge Connector	- PS/2 KB/Mouse connector - Gigabit LAN RJ45 + dual USB stack connector - Gigabit LAN RJ45 + dual USB stack connector - DB9 + DB15 stack connector x1 for COM 1 & VGA - HD Audio (Phone jack 3 x 2)
Onboard Header/Connector	- 40-pin box-header x1 for IDE1 - DF13 connector x2 for LVDS - 10-pin header x1 for Digital I/O - 10-pin header x1 for COM2 - 20-pin header x1 for COM3/COM4 - 8-pin header x 2 for USB 5/6/7/8 - SATA connector x4 for 4 SATA ports - 26-pin header x1 for LPT
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec/min)
System Voltage	+5V, +3.3V, +12V, -12V, 5VSB (2A)
Other	LAN Wakeup
Board Size	170mm x 170mm

Board Dimensions



Installations

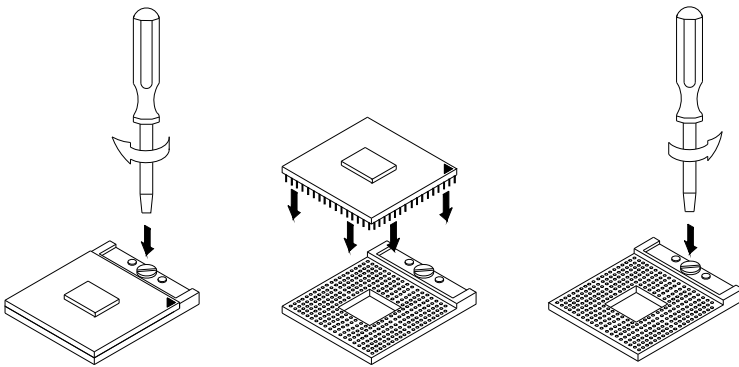
This section provides information on how to use the jumpers and connectors on the MI945PA in order to set up a workable system. The topics covered are:

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Installing the CPU

The MI945PA board supports a Socket P processor socket for Intel® Core™ 2 Duo, Intel® Celeron mobile processors.

The processor socket comes with a screw to secure the processor. As shown in the left picture below, loosen the screw first before inserting the processor. Place the processor into the socket by making sure the notch on the corner of the CPU corresponds with the notch on the inside of the socket. Once the processor has slide into the socket, fasten the screw. Refer to the figures below.



NOTE: *Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.*

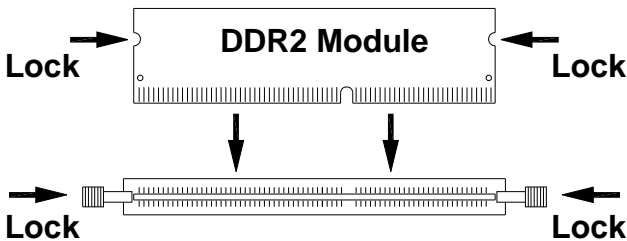
Installing the Memory

The MI945PA board supports two DDR2 memory socket for a maximum total memory of 4GB in DDR2 memory type.

Installing and Removing Memory Modules

To install the DDR2 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR2 module so that the key of the DDR2 module aligned with that on the memory slot.
2. Gently push the DDR2 module in an upright position until the clips of the slot close to hold the DDR2 module in place when the DDR2 module touches the bottom of the slot.
3. To remove the DDR2 module, press the clips with both hands.

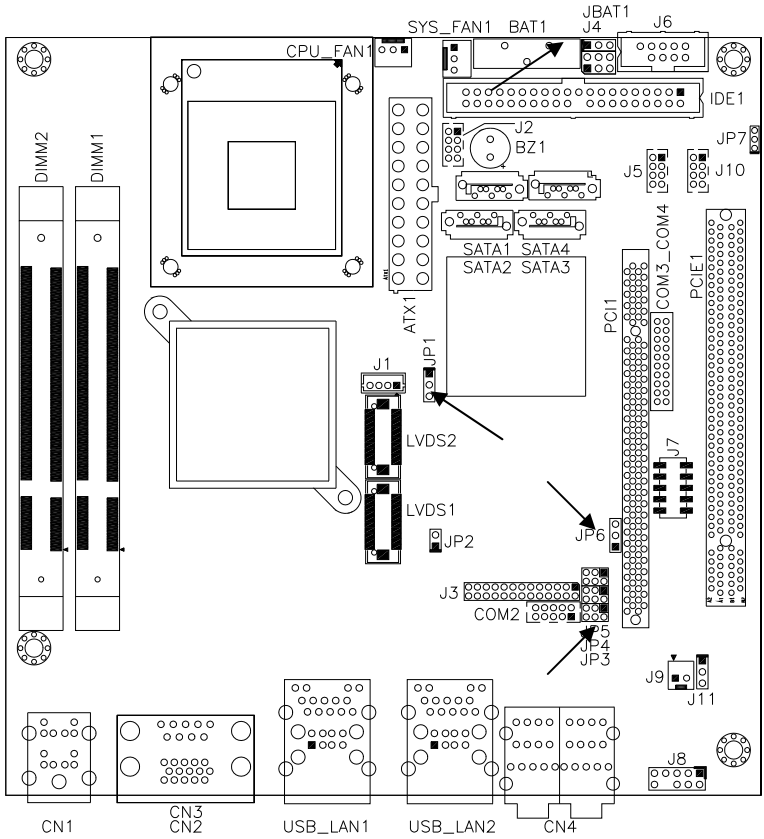


Setting the Jumpers

Jumpers are used on MI945PA to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on MI945PA and their respective functions.



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Jumper Locations on MI945PA





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JBAT1: Clear CMOS Setting

JBAT1	Setting
	Normal
	Clear CMOS

JP1: LCD Panel Power Selection

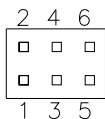
JP1	LCD Panel Power
	3.3V
	5V

JP3, JP4, JP5: RS232/422/485 (COM2) Selection

COM1/COM3/COM4 are fixed for RS-232 use only.

COM2 is selectable for RS232, RS-422 and RS-485.

The following table describes the jumper settings for COM2 selection.





COM2 Function	RS-232	RS-422	RS-485
Jumper Setting (Pin closed)	JP5: 1-2	JP5: 3-4	JP5: 5-6
	JP3: 3-5 & 4-6	JP3: 1-3 & 2-4	JP3: 1-3 & 2-4
	JP4: 3-5 & 4-6	JP4: 1-3 & 2-4	JP4: 1-3 & 2-4

COM2 is jumper selectable for RS-232, RS-422 and RS-485.

Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	RTS-	NC
7	RTS	RTS+	NC
8	CTS	CTS+	NC
9	RI	CTS-	NC
10	NC	NC	NC

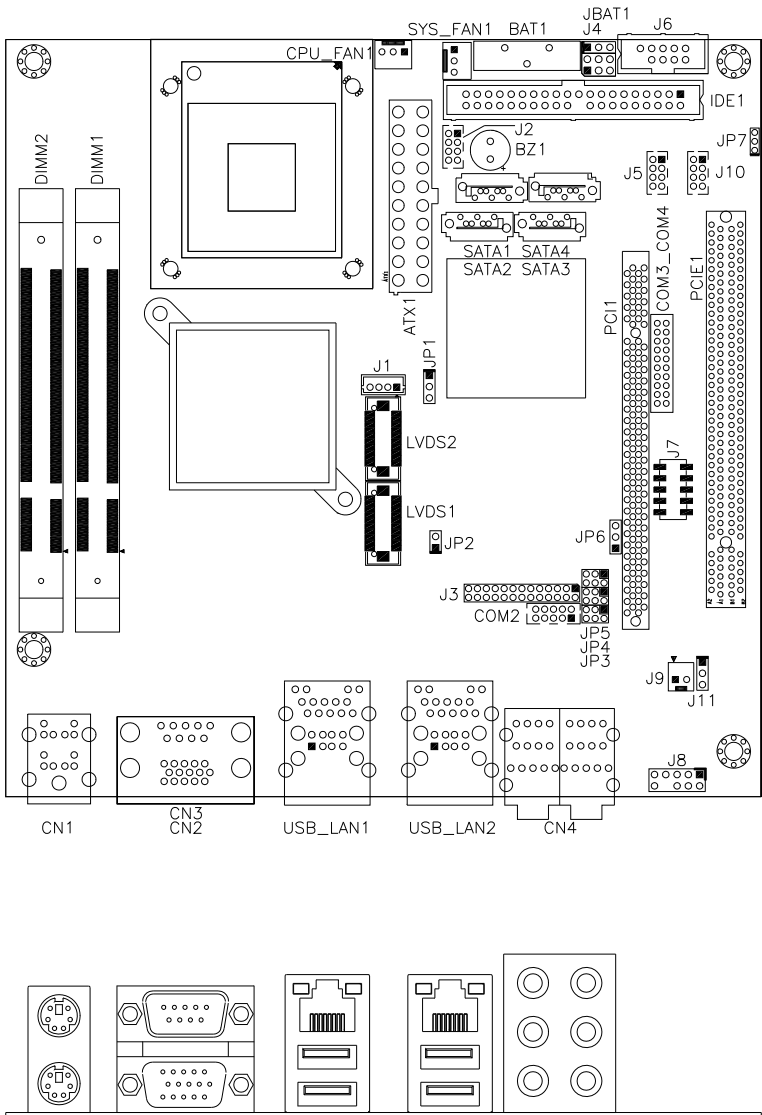
JP6: PCI Riser Card Selection

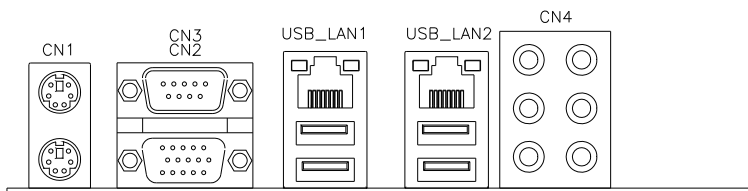
JP6	Riser Card
	IP390 Riser Card Install
	IP151, IP240 Riser Card Install

Connectors on MI945PA

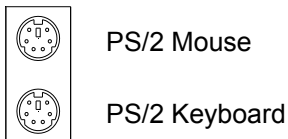
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Connector Locations on MI945PA



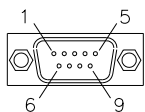


CN1: PS/2 Keyboard and PS/2 Mouse Connectors

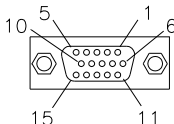


Signal Name	Keyboard	Mouse	Signal Name
Keyboard data	1	1	Mouse data
N.C.	2	2	N.C.
GND	3	3	GND
5V	4	4	5V
Keyboard clock	5	5	Mouse clock
N.C.	6	6	N.C.

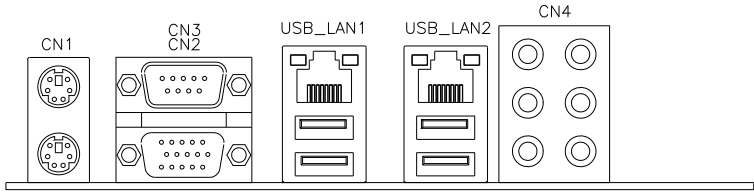
CN2, CN3: COM1 and VGA Connector



Signal Name	Pin #	Pin #	Signal Name
DCD	1	6	DSR
RXD	2	7	RTS
TXD	3	8	CTS
DTR	4	9	RI
GND	5	10	Not Used



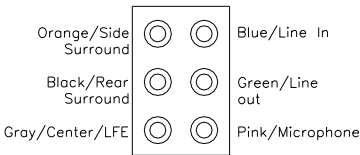
Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
N.C.	11	12	N.C.
HSYNC	13	14	VSYNC
NC	15		



USB_LAN1: Gigabit LAN RJ-45 and USB6/7 Ports

USB_LAN2: Gigabit LAN RJ-45 and USB0/1 Ports

CN4: Audio Connector



SYS_FAN1: System Fan Power Connector

This is a 3-pin header for system fans. The fan must be a 12V fan.



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

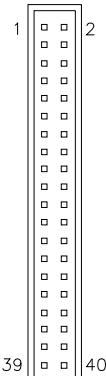
CPU_FAN1: CPU Fan Power Connector

This is a 3-pin header for the CPU fan. The fan must be a 12V fan.



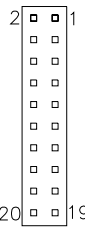
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

IDE1: IDE Connector



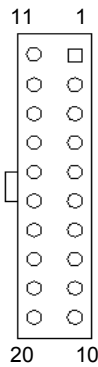
Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	Protect pin
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK0	29	30	Ground
IRQ14	31	32	No connect
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

COM3_COM4: COM3, COM4 Serial Port



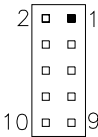
Signal Name	Pin #	Pin #	Signal Name
DSR3	2	1	DCD3
RTS3	4	3	RXD3
CTS3	6	5	TXD3
RI3	8	7	DTR3
NA	10	9	Ground
DSR4	12	11	DCD4
RTS4	14	13	RXD4
CTS4	16	15	TXD4
RI4	18	17	DTR4
NA	20	19	Ground

ATX1: ATX Power Supply Connector



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

COM2: COM2 Serial Port



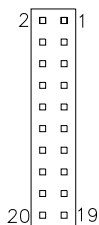
Signal Name	Pin	Pin	Signal Name
DCD2	1	2	RXD2
TXD2	3	4	DTR2
GND	5	6	DSR2
RTS2	7	8	CTS2
RI2	9	10	Not Used

COM2 is jumper selectable for RS-232, RS-422 and RS-485.

Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	RTS-	NC
7	RTS	RTS+	NC
8	CTS	CTS+	NC
9	RI	CTS-	NC
10	NC	NC	NC

LVDS1, LVDS2: LVDS Connectors (1st channel, 2nd channel)

The LVDS connectors on board consist of the first channel (LVDS1) and second channel (LVDS2).



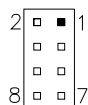
Signal Name	Pin #	Pin #	Signal Name
TX0-	2	1	TX0+
Ground	4	3	Ground
TX1-	6	5	TX1+
5V/3.3V	8	7	Ground
TX3-	10	9	TX3+
TX2-	12	11	TX2+
Ground	14	13	Ground
TXC-	16	15	TXC+
5V/3.3V	18	17	ENABKL
+12V	20	19	+12V

J1: LCD Backlight Connector



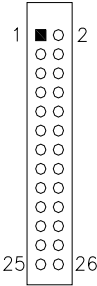
Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

J2: TV-out Connector



Signal Name	Pin #	Pin #	Signal Name
NC	2	1	NC
GND	4	3	TV_Y
GND	6	5	TV_C/Pr
GND	8	7	TV_CVBS/Pb

J3: Parallel Port Connector



Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	2	AutoFeed
PD0, parallel data 0	3	4	Error
PD1, parallel data 1	5	6	Initialize
PD2, parallel data 2	7	8	Select
PD3, parallel data 3	9	10	Ground
PD4, parallel data 4	11	12	Ground
PD5, parallel data 5	13	14	Ground
PD6, parallel data 6	15	16	Ground
PD7, parallel data 7	17	18	Ground
ACK, acknowledge	19	20	Ground
Busy	21	22	Ground
Paper empty	23	24	Ground
Select	25	26	N/A

J4: System Function Connector



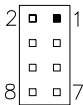
Signal Name	Pin	Pin	Signal Name
3VDUAL	1	2	PS_ON
+3.3V	3	4	HDD Active
Ground	5	6	Reset

ATX power on switch: Pins 1-2

HDD LED: Pins 3-4

Reset switch: Pins 5-6

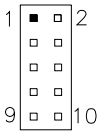
J5: USB2/USB3 Connector



Signal Name	Pin	Pin	Signal Name
Ground	2	1	Vcc
D3+	4	3	D2-
D3-	6	5	D2+
Vcc	8	7	Ground

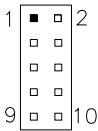
J6: SPI Flash Connector (factory use only)

J7: Digital I/O



Signal Name	Pin	Pin	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

J8: Front Audio Connector

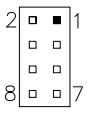


Signal Name	Pin #	Pin #	Signal Name
MIC2_L	1	2	Ground
MIC2_R	3	4	Presence#
Line2_R	5	6	MIC2_ID
Sense	7	8	NC
Line2_L	9	10	Line2_ID

J9: SPDIF Out Connector


Pin #	Signal Name
1	SPDIF out
2	Ground

J10: USB4/USB5 Connector



Signal Name	Pin	Pin	Signal Name
Ground	2	1	Vcc
D5+	4	3	D4-
D5-	6	5	D4+
Vcc	8	7	Ground

J11: Power LED Connector



Pin #	Signal Name
1	Vcc
2	NC
3	PLED

SATA1, SATA2, SATA3, SATA4: SATA Connectors

PCI1: PCI Slot (supports 2 Master)

PCIE1: PCI-E(x16) Slot

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BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

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BIOS Introduction

The BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also adds virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the key immediately allows you to enter the Setup utility. If you are a little bit late pressing the key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Main BIOS Setup

This setup allows you to record some basic hardware configurations in your computer system and set the system clock.

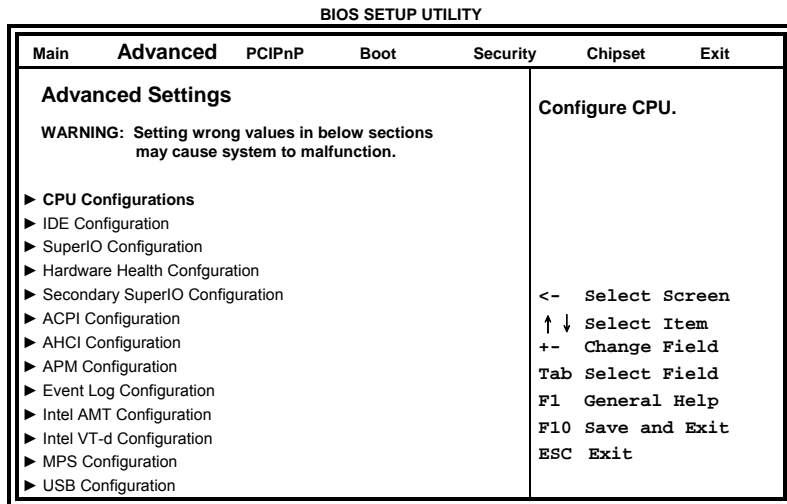
BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Processor Intel(R) Core(TM)2 Duo CPU Speed : 2533MHz Count : 1				T9400 @ 2.53GHz		Use[ENTER], [TAB] or [SHIFT-TAB] to select a field.
System Memory Size : 3995MB						Use [+] or [-] to configure system Time.
System Time System Date				[02:29:50] [Fri 01/02/2009]		<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit

Note: If the system cannot boot after making and saving system changes with Setup, the AMI BIOS supports an override to the CMOS settings that resets your system to its default.

Warning: It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.

Advanced Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



The Advanced BIOS Settings contains the following sections:

- ▶ CPU Configurations
- ▶ IDE Configuration
- ▶ SuperIO Configuration
- ▶ Hardware Health Configuration
- ▶ Secondary SuperIO Configuration
- ▶ ACPI Configuration
- ▶ AHCI Configuration
- ▶ APM Configuration
- ▶ Event Log Configuration
- ▶ Intel AMT Configuration
- ▶ Intel VT-d Configuration
- ▶ MPS Configuration
- ▶ USB Configuration

The fields in each section are shown in the following pages, as seen in the computer screen. Please note that setting the wrong values may cause the system to malfunction. If unsure, please contact technical support of your supplier.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Configure advanced CPU settings				Configure CPU.		
Module Version: 3F.15						
Manufacturer: Intel						
Intel® Core(TM)2 Duo CPU				T9400 @ 2.53GHz		
Frequency : 2.53GHz						
FSB Speed : 1066MHz						
Cache L1 : 64KB						
Cache L2 : 6144KB						
Ratio Actual Value: 9.5						
Max CPUID Value Limit				Disabled		
Intel(R) Virtualization Tech				Enabled		
Execute-Disable Bit Capability				Enabled		
Core Multi-Processing				Enabled		
Intel(R) SpeedStep(tm) tech				Enabled		
				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

The CPU Configuration menu shows the following CPU details:

Manufacturer: the name of the CPU manufacturer

Brand String: the brand name of the CPU being used

Frequency: the CPU processing speed

FSB Speed: the FSB speed

Cache L1: the CPU L1 cache size

Cache L2: the CPU L2 cache

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
IDE Configuration						
Mirrored IDER Configuration			[Enabled]		Options: Disabled Compatible Enhanced <- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	
SATA#1 Configuration			[Compatible]			
Configure SATA#1 as			[IDE]			
SATA#2 Configuration						
▶ Primary IDE Master			: [Not Detected]			
▶ Primary Slave Master			: [Not Detected]			
▶ Secondary IDE Master			: [Hitachi HDS72]			
▶ Secondary IDE Slave			: [Not Detected]			
▶ Third IDE Master			: [Not Detected]			
▶ Fourth IDE Master			: [Not Detected]			
▶ Primary IDE Master			: [Not Detected]			
▶ Fifth IDE Master			: [Not Detected]			
▶ Fifth IDE Slave			: [Not Detected]			
IDE Detect Time Out (Sec)			[35]			
ATA(PI) 80Pin Cable Detection			[Host & Device]			

The IDE Configuration menu is used to change and/or set the configuration of the IDE devices installed in the system. *SATA#1 can be configured as IDE, Raid or AHCI.*

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Hardware Health Configuration						
System Temperature			:45°C/113°F		<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	
CPU Temperature			:45°C/113°F			
Chassis Temperature			:33°C/102°F			
SYSTEM Speed			:0 RPM			
CPUFAN Speed			:5400 RPM			
Vcore(V)			:1.160 V			
AVCC			:3.392 V			
3VCC			:3.392 V			
12V			:12.196 V			
1.8V			:1.856 V			
5V			:5.273V			
VSB			:3.392V			
VBAT (V)			:3.21 V			
ACPI Shut down Temperature			95°C/203°F			

The Hardware Health Configuration menu is used to show the operating temperature, fan speeds and system voltages.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Configure Win627DHG Super IO Chipset						
Serial Port1 Address			[3F8/IRQ4]			
Serial Port2 Address			[Disabled]			
Configure SATA#1 as			[Disabled]			
Parallel Port Address			[Disabled]			
Restore on AC Power Loss			[Power Off]			
Power On Function			[None]			
						<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Serial Port3 Address			[Disabled]			
Serial Port4 Address			[Disabled]			
						<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit

Onboard Serial Port/Parallel Port

These fields allow you to select the onboard serial ports and their addresses. The default values for these ports are:

Serial Port 1	3F8/IRQ4
Serial Port 2	2F8/IRQ3
Serial Port 3	230/IRQ5
Serial Port 4	238/IRQ11
Parallel Port	378/IRQ7

Parallel Port Mode

This field allows you to determine parallel port mode function.

SPP	Standard Printer Port
EPP	Enhanced Parallel Port
ECP	Extended Capabilities Port
ECP+EPP	Combination of ECP and EPP capabilities
Normal	Normal function

Restore on AC Power Loss

This field sets the system power status whether *on* or *off* when power returns to the system from a power failure situation.

Power On Function

This field is related to how the system is powered on . The options are *None*, *Mouse Left*, *Mouse Right*, and *Any Key*.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
ACPI Settings			General ACPI Configuration settings			
<ul style="list-style-type: none"> ▶ General ACPI Configuration ▶ Chipset ACPI Configuration 			<pre> <- Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit </pre>			

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
General ACPI Configuration			General ACPI Configuration settings			
Suspend mode [Auto] Repost Video on S3 Resume [No]			<pre> <- Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit </pre>			

Suspend Mode

The options of this field are *S1*, *S3* and *Auto*.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
South Bridge ACPI Configuration				General ACPI Configuration settings		
High Performance Event Timer		[Enabled]				
HPET Memory Address		[FED0000h]				
				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
AHCI Settings				General ACPI Configuration settings		
AHCI BIOS Support		[Enabled]				
▶ AHCI Port0 [Not Detected]						
▶ AHCI Port1 [Not Detected]						
▶ AHCI Port2 [Not Detected]						
▶ AHCI Port3 [Not Detected]						
▶ AHCI Port4 [Not Detected]						
▶ AHCI Port5 [Not Detected]						
				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
APM Configuration				Disable/Enable RI to generate a wake event.		
Resume On Ring		Disabled				
Resume On PME#		Disabled				
Resume On RTC Alarm		Disabled				
				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

Resume on Ring

This option is used to enable activity on the RI (ring in) modem line to wake up the system from a suspend or standby state. That is, the system will be awakened by an incoming call on a modem.

Resume on PME#

This option is used enable activity on the PCI PME (power managementevent) controller to wake up the system from a suspend or standby state

Resume On RTC Alarm

This option is used to specify the time the system should be awakened from a suspended state

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Event Logging details				View all unread events on the Event Log. CPU.		
View Event Log Mark all events as read Clear Event Log				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Configure Intel AMT Parameters				Options: Disabled Enabled		
Intel AMT Support [Disabled] Unconfigure AMT/ME [Disabled]				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

The Intel AMT Configuration configures the Intel Active Management Technology (AMT) options.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Intel VT-d					[Disabled]	
					Options: Disabled Enabled <- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	

VT-d

Virtualization solutions allow multiple operating systems and applications to run in independent partitions all on a single computer. Using virtualization capabilities, one physical computer system can function as multiple "virtual" systems.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
MPS Configuration						
MPS Revision VT-d				[1.4]		
				Select MPS Revision <- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

MPS Version Control for OS

This option is specifies the MPS (Multiprocessor Specification) version for your operating system. MPS version 1.4 added extended configuration tables to improve support for multiple PCI bus configurations and improve future expandability. The default setting is **1.4**.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
USB Configuration					Enables support for legacy USB. AUTO option disables legacy support if no USB devices are connected.	
Module Version – 2.24.3.13.4 USB Devices Enabled: 1 Drive Legacy USB Support [Enabled] BIOS EHCI Hand-Off [Enabled]						
▶ USB Mass Storage Device Configuration					<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	

The USB Configuration menu is used to read USB configuration information and configure the USB settings.

Legacy USB Support

This option is used to enable the USB mouse and USB keyboard support. This option is enabled by default.

USB Mass Storage Device Configuration

This option is used to configure USB mass storage class devices.

PCIPnP Settings

This option configures the PCI/PnP settings.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Advanced PCI/PnP Settings			Size of memory block to reserve for legacy ISA devices.			
WARNING: Setting wrong values in below sections may cause system to malfunction.						
Clear NVRAM			[No]			
Plug & Play O/S			[No]			
PCI Latency Timer			[64]			
Allocate IRQ to PCI VGA			[Yes]			
Palette Snooping			[Disabled]			
PCI IDE BusMaster			[Enabled]			
IRQ3			[Available]			
IRQ4			[Available]			
IRQ5			[Available]			
IRQ7			[Available]			
IRQ9			[Available]			
IRQ10			[Available]			
IRQ11			[Available]			
IRQ14			[Available]			
IRQ15			[Available]			
DMA Channel 0			[Available]	<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		
DMA Channel 1			[Available]			
DMA Channel 3			[Available]			
DMA Channel 5			[Available]			
DMA Channel 6			[Available]			
DMA Channel 7			[Available]			
Reserved Memory Size			[Disabled]			

Clear NVRAM

This item is used for clearing NVRAM during system boot.

Plug & Play O/S

This lets BIOS configure all devices in the system or lets the OS configure PnP devices not required for boot if your system has a Plug and Play OS.

PCI Latency Timer

This item sets value in units of PCI clocks for PCI device latency timer register. Options are: 32, 64, 96, 128, 160, 192, 224, 248.

Allocate IRQ to PCI VGA

This assigns IRQ to PCI VGA card if card requests IRQ or doesn't assign IRQ to PCI VGA card even if card requests an IRQ.

Palette Snooping

This informs the PCI devices that an ISA graphics device is installed in the system so the card will function correctly.

PCI IDE BusMaster

This uses PCI busmastering for BIOS reading / writing to IDE devices.

IRQ#

Use the IRQ# address to specify what IRQs can be assigned to a particular peripheral device.

Boot Settings

This option configures the settings during system boot including boot device priority and HDD/CD/DVD drives.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Boot Settings			Configure Settings during System Boot.			
▶ Boot Settings Configuration						
▶ Boot Device Priority						
▶ Hard Disk Drives						
▶ CD/DVD Drives						
			<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit			

Security Settings

This setting comes with 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 on the screen. Type the password 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.

To disable a password, just press the <Enter> key when you are prompted to enter the password. A message will confirm the password to be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Security Settings				Install or Change the Password.		
Supervisor Password : Not Installed				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		
User Password : Not Installed						
Change Supervisor Password						
Change User Password						
Boot Sector Virus Protection			[Disabled]			

Advanced Chipset Settings

This setting configures the north bridge, south bridge and the ME subsystem. **WARNING!** Setting the wrong values may cause the system to malfunction. -

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Advanced Chipset Settings					Configure North Bridge features.	
<p>WARNING: Setting wrong values in below sections may cause system to malfunction.</p> <ul style="list-style-type: none"> ▶ North Bridge Configuration ▶ South Bridge Configuration ▶ ME Subsystem Configuration 					<p><- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit</p>	

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
North Bridge Chipset Configuration					Disabled	
Memory Hole					15MB-16MB	
Boots Graphic Adapter Priority					[Disabled]	
Internal Graphics Mode Select					[PEG/PCI]	
Max TOLUD					[Enabled, 32MB]	
PEG Port Configuration					[3G Bytes]	
PEG Port					[Auto]	
▶ Video Function Configuration					<p><- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit</p>	

Memory Hole

This option is used to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly.

Boots Graphics Adapter Priority

This option is used to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller, a PCI express (PEG) controller or an IGD.

Internal Graphics Mode Select

This option is used to specify the amount of system memory that can be used by the Internal graphics device.

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Video Function Configuration				DVMT Mode		
DVMT Mode Select		[DVMT Mode]				
DVMT/FIXED Memory		[256MB]				
Boot Display Device		[Enabled]		<- Select Screen		
Flat Panel Type		[1024 x 768]		↑ ↓ Select Item		
TV Standard		[Auto]		+- Change Field		
Active LVDS Device		[Integrated LVDS]		Tab Select Field		
Integrated LVDS Protocol		[18bit]		F1 General Help		
SDVO Device Setting		[None]		F10 Save and Exit		
				ESC Exit		

Video Function Configuration

This option is used to configure the video device connected to the system.

Boot Display Device

This option is used to select the display device used by the system when it boots.

Flat Panel Type

This option is used to select the type of flat panel connected to the system.

Options include: 640x480 18b / 800x600 18b / 1024x768 18b / 1024x768 24b / 1280x1024 48b / 1600x1200 48b

Active LVDS Device

This option is set to Integrated LVDS, by default.

BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
South Bridge Chipset Configuration					Enabled	
GbE LAN Boot			[Disabled]		Disabled	
GbE Wake Up From S5			[Disabled]			
HDA Controller			[Enabled]			
SLP_S4# Min. Assertion Width			[1 to 2 seconds]			
PCIE Port 0			[Auto]			
PCIE Port 1			[Auto]			
PCIE Port 2			[Auto]			<- Select Screen
PCIE Port 3			[Auto]			↑ ↓ Select Item
PCIE Port 4			[Auto]			+ - Change Field
PCIE High Priority Port						Tab Select Field
[Disabled]						F1 General Help
PCIE Port 0 IOxAPIC Enable			[Disabled]			F10 Save and Exit
PCIE Port 1 IOxAPIC Enable			[Disabled]			ESC Exit
PCIE Port 2 IOxAPIC Enable			[Disabled]			
PCIE Port 3 IOxAPIC Enable			[Disabled]			
PCIE Port 4 IOxAPIC Enable			[Disabled]			
PCIE Port 5 IOxAPIC Enable			[Disabled]			

GbE LAN Boot

This option is disabled by default. The system, then, will not boot using the Gigabit LAN interface.

GbE Wake Up From S5

This option is disabled by default.

HDA Controller

This option is used to enable the Southbridge high definition audio controller.

BIOS SETUP UTILITY

Main	Advanced	PCI/PnP	Boot	Security	Chipset	Exit
ME Subsystem Configuration					Disabled	
BootBlock HECI Message					Enabled	
HECI Message					[Enabled]	
End Of Post S5 HECI Message					[Enabled]	
ME HECI Configuration						
ME-HECI					[Enabled]	
ME-IDER					[Disabled]	
ME-KT					[Disabled]	
					<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	

BootBlock HECI Message

This option allows you to enable or disable HECI message when booting up the system..

HECI Message

This option allows you to enable or disable the HECI message.

End Of Post S5 HECI Message

This option allows you to enable or disable HECI message when the system is in the off (S5) state.

ME-HECI

This option is enabled by default and cannot be changed.

ME-IDER

This option is used to enable or disable the IDE-Redirection (IDE-R) function on an AMT-capable system.

ME-KT

This option is used to enable or disable the Keyboard and Text redirection (KT) function on an AMT-capable system. KT is also known as Serial-Over-Lan (SOL). When enabled, the KT function allows a management system to control an Intel® AMT clientsystem remotely. The keyboard interface of a managed client system, such as BIOS menu, is displayed through the management system.

Exit Setup

The exit setup has the following settings which are:

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
Exit Options				Exit system setup after saving the changes.		
Save Changes and Exit						
Discard Changes and Exit						
Discard Changes						
Load Optimal Defaults						
Load Failsafe Defaults						
				<- Select Screen ↑ ↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		

Save Changes and Exit

This option allows you to determine whether or not to accept the modifications and save all changes into the CMOS memory before exit.

Discard Changes and Exit

This option allows you to exit the Setup utility without saving the changes you have made in this session.

Discard Changes

This option allows you to discard all the changes that you have made in this session.

Load Optimal Defaults

This option allows you to load the default values to your system configuration. These default settings are optimal and enable all high performance features.

Load Failsafe Defaults

This option allows you to load the troubleshooting default values permanently stored in the BIOS ROM. These default settings are non-optimal and disable all high-performance features.

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Drivers Installation

This section describes the installation procedures for software and drivers under Windows XP. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

Intel Chipset Software Installation Utility	46
VGA Drivers Installation	48
Realtek Audio Driver Installation.....	50
LAN Drivers Installation	51
Intel® Management Engine Interface	53
Intel® AMT SOL Driver Installation	55

IMPORTANT NOTE:

After installing your Windows operating system (Windows XP), you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.

Intel Chipset Software Installation Utility

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) GM45 Chipset Drivers**.

2. Click **Intel(R) Chipset Software Installation Utility**.



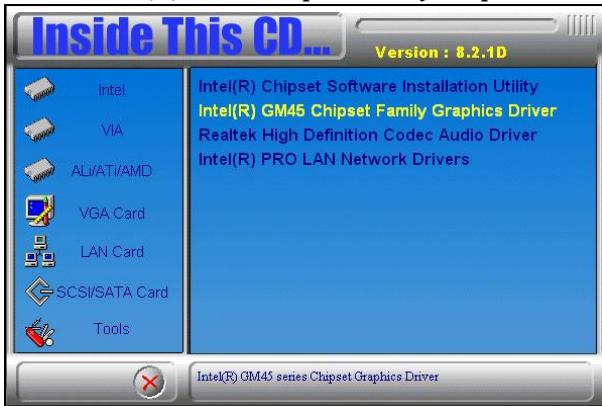
3. When the Welcome screen to the Intel® Chipset Device Software appears, click **Next** to continue.

4. Click ***Yes*** to accept the software license agreement and proceed with the installation process.
5. On the Readme File Information screen, click ***Next*** to continue the installation.
6. The Setup process is now complete. Click ***Finish*** to restart the computer and for changes to take effect.

VGA Drivers Installation

To install the VGA drivers, follow the steps below to proceed with the installation.

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) GM45 Chipset Drivers**.
2. Click **Intel(R) GM45 Chipset Family Graphics Driver**.



3. When the Welcome screen to the Setup Program appears, click **Next** to continue.



4. Click **Yes** to agree with the license agreement and continue the installation.
5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® Graphics Media Accelerator Driver.
6. On Setup Progress screen, click **Next** to continue.
7. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

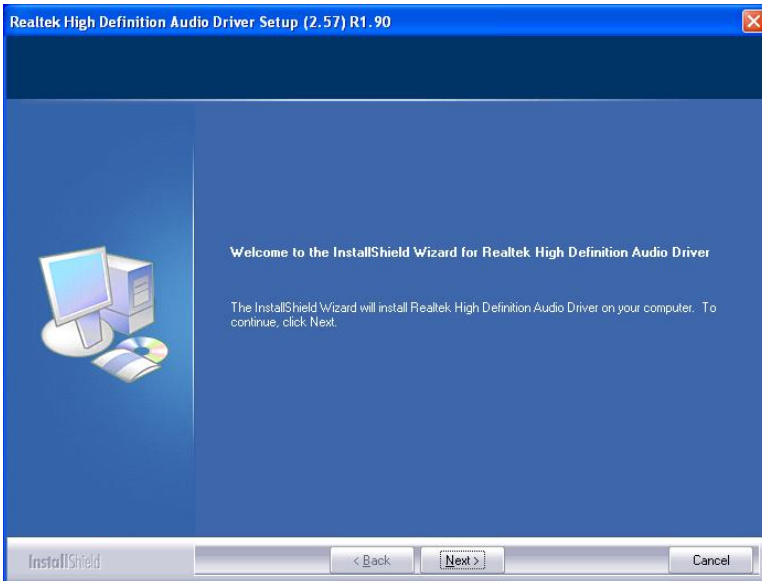


Realtek Audio Driver Installation

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) GM45 Chipset Drivers**.
2. Click **Realtek High Definition Audio Driver**.



3. On the Welcome to the InstallShield Wizard screen, click **Next**.

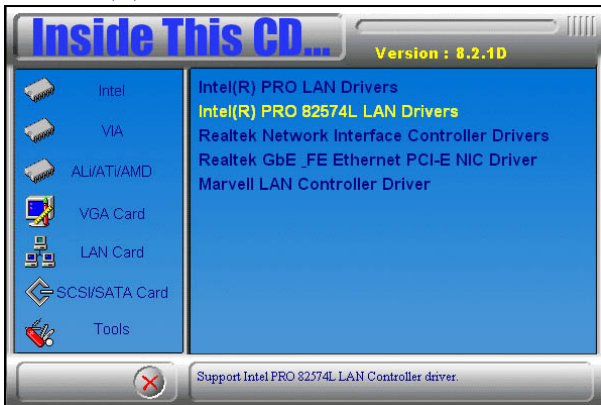


3. InstallShield Wizard is complete. Click **Finish** to restart the computer.

LAN Drivers Installation

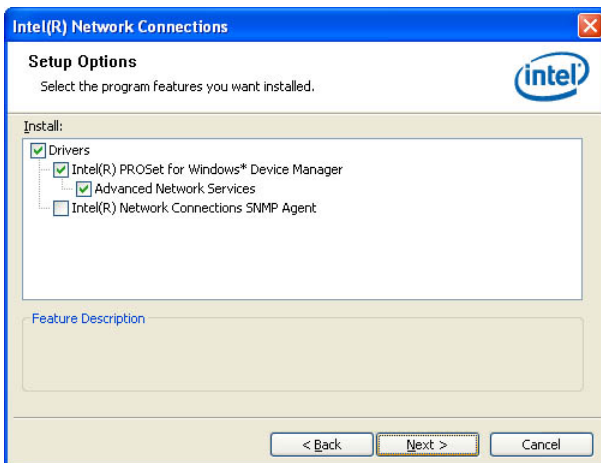
Follow the steps below to install the Intel LAN drivers. *This one installation will cover both 82574L and 82567LM LAN controllers.*

1. Insert the CD that comes with the motherboard. Click **LAN Card** and then **Intel(R) PRO 82574L LAN Drivers**.

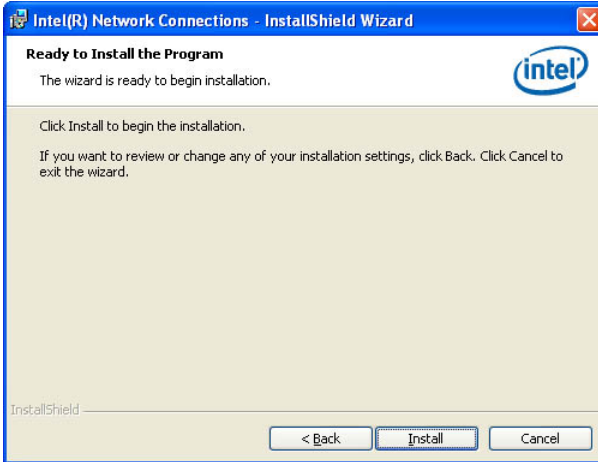


2. When the Welcome screen to the InstallShield Wizard for Intel® Network Connections appears, click **Next**. On the next screen, click **Yes** to to agree with the license agreement.

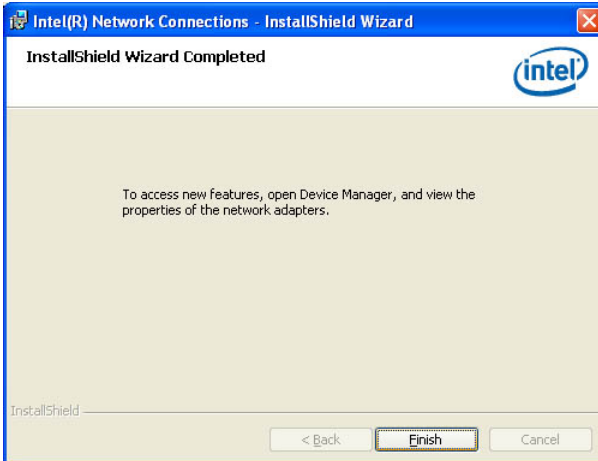
3. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.



4. The wizard is ready to begin installation. Click **Install** to begin the installation.



5. When InstallShield Wizard is complete, click **Finish**.



Remarks: This Intel® PRO 82574L LAN drivers support both Intel 82574L and 82567LM LAN controllers.

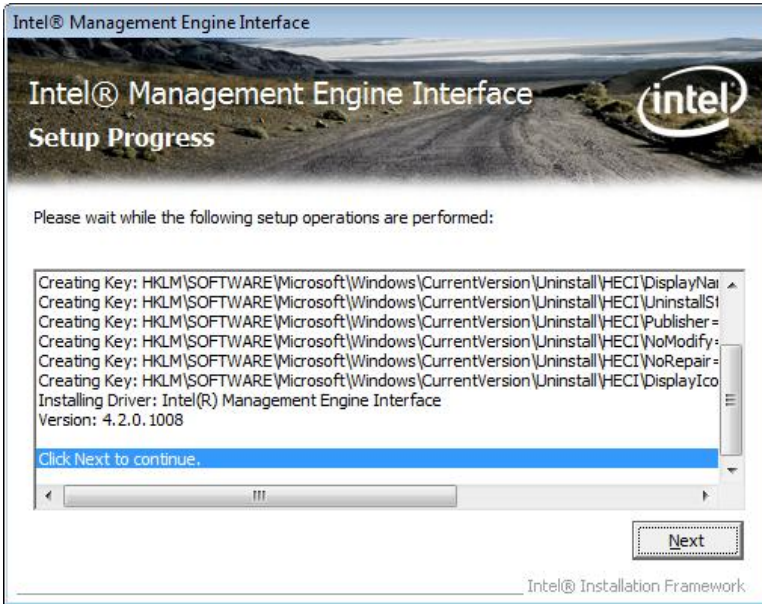
Intel® Management Engine Interface

Follow the steps below to install the Intel Management Engine.

1. Insert the drivers disc that comes with the motherboard. Click **Intel** and then **Intel(R) AMT 4.0 Drivers**, then **Intel(R) MEI Driver**.



2. When the Setup Progress screen appears, click **Next**. Then, click **Finish** when the setup progress has been successfully installed.



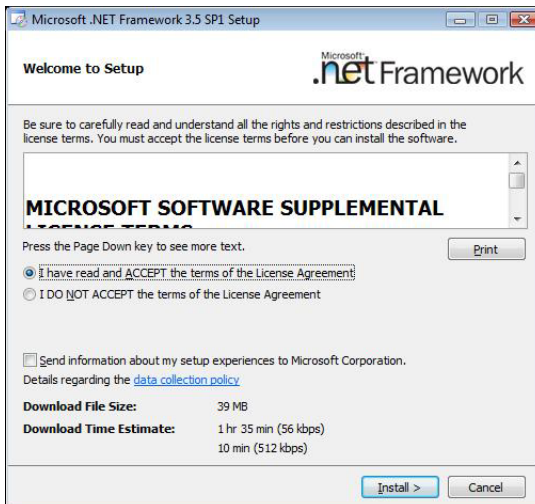
Intel® AMT SOL Driver Installation

Follow the steps below to install the Intel Management Engine.

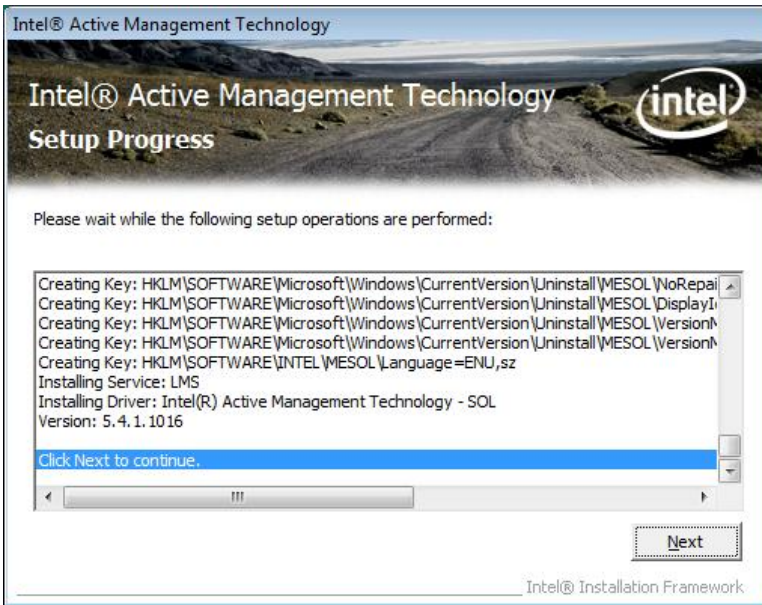
1. Insert the drivers disc that comes with the motherboard. Click *Intel* and then *Intel(R) AMT 4.0 Drivers*, then *Intel(R) LMS/SOL Driver*.



2. On the Setup screen for Microsoft .NET Framework 3.5 SP1, click *Install*. When Setup is complete, click *Exit*.



3. The next screen shows the Intel® Active Management Technology setup progress where the Intel AMT SOL driver is being installed. Click **Next**. Click **Finish** when setup process is complete.



Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Reserved
IRQ11	Reserved
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE

C. Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

SAMPLE CODE:

```

//=====
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====
#include <stdio.h>
#include <stdlib.h>
#include "W627DHG.H"
//=====
int main (int argc, char *argv[]);
void copyright(void);
void EnableWDT(int);
void DisableWDT(void);
//=====
int main (int argc, char *argv[])
{
    unsigned char bBuf;
    unsigned char bTime;
    char **endptr;

    copyright();

    if (argc != 2)
    {
        printf(" Parameter incorrect!!\n");
        return 1;
    }

    if (Init_W627DHG() == 0)
    {
        printf(" Winbond 83627HF is not detected, program abort.\n");
        return 1;
    }
    bTime = strtol (argv[1], endptr, 10);
    printf("System will reset after %d seconds\n", bTime);

    EnableWDT(bTime);

    return 0;
}
//=====

```

APPENDIX

```
void copyright(void)
{
    printf("\n===== Winbond 83627DHG Watch Timer Tester (AUTO DETECT) =====\n")
        "      Usage : W627E_WD reset_time\n"
        "      Ex : W627E_WD 3 => reset system after 3 second\n"
        "      W627E_WD 0 => disable watch dog timer\n";
}
//=====
void EnableWDT(int interval)
{
    unsigned char bBuf;

    bBuf = Get_W627DHG_Reg( 0x2D);
    bBuf &= (!0x01);
    Set_W627DHG_Reg( 0x2D, bBuf);
    //Enable WDTO

    Set_W627DHG_LD( 0x08);
    //switch to logic device 8
    Set_W627DHG_Reg( 0x30, 0x01);
    //enable timer

    bBuf = Get_W627DHG_Reg( 0xF5);
    bBuf &= (!0x08);
    Set_W627DHG_Reg( 0xF5, bBuf);
    //count mode is second

    Set_W627DHG_Reg( 0xF6, interval);                //set timer
}
//=====
void DisableWDT(void)
{
    Set_W627DHG_LD(0x08);
    //switch to logic device 8
    Set_W627DHG_Reg(0xF6, 0x00);                //clear

    watchdog timer    Set_W627DHG_Reg(0x30, 0x00);    //watchdog
    disabled
}
//=====
```

```

//=====
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====
#include "W627DHG.H"
#include <dos.h>
//=====
unsigned int W627DHG_BASE;
void Unlock_W627DHG (void);
void Lock_W627DHG (void);
//=====
unsigned int Init_W627DHG(void)
{
    unsigned int result;
    unsigned char ucDid;

    W627DHG_BASE = 0x2E;
    result = W627DHG_BASE;

    ucDid = Get_W627DHG_Reg(0x20);
    if (ucDid == 0x88)
    {
        goto Init_Finish; }

    W627DHG_BASE = 0x4E;
    result = W627DHG_BASE;
    ucDid = Get_W627DHG_Reg(0x20);
    if (ucDid == 0x88)
    {
        goto Init_Finish; }

    W627DHG_BASE = 0x00;
    result = W627DHG_BASE;

Init_Finish:
    return (result);
}
//=====
void Unlock_W627DHG (void)
{
    outportb(W627DHG_INDEX_PORT, W627DHG_UNLOCK);
    outportb(W627DHG_INDEX_PORT, W627DHG_UNLOCK);
}
//=====
void Lock_W627DHG (void)
{
    outportb(W627DHG_INDEX_PORT, W627DHG_LOCK);
}
//=====
void Set_W627DHG_LD( unsigned char LD)
{
    Unlock_W627DHG();
    outportb(W627DHG_INDEX_PORT, W627DHG_REG_LD);
    outportb(W627DHG_DATA_PORT, LD);
    Lock_W627DHG();
}

```

APPENDIX

```
//=====
void Set_W627DHG_Reg(unsigned char REG, unsigned char DATA)
{
    Unlock_W627DHG();
    outportb(W627DHG_INDEX_PORT, REG);
    outportb(W627DHG_DATA_PORT, DATA);
    Lock_W627DHG();
}
//=====
unsigned char Get_W627DHG_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_W627DHG();
    outportb(W627DHG_INDEX_PORT, REG);
    Result = inportb(W627DHG_DATA_PORT);
    Lock_W627DHG();
    return Result;
}
//=====

//=====
//
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====
#ifndef __W627DHG_H
#define __W627DHG_H 1
//=====
#define W627DHG_INDEX_PORT (W627DHG_BASE)
#define W627DHG_DATA_PORT (W627DHG_BASE+1)
//=====
#define W627DHG_REG_LD 0x07
//=====
#define W627DHG_UNLOCK 0x87
#define W627DHG_LOCK 0xAA
//=====
unsigned int Init_W627DHG(void);
void Set_W627DHG_LD(unsigned char);
void Set_W627DHG_Reg(unsigned char, unsigned char);
unsigned char Get_W627DHG_Reg(unsigned char);
//=====
#endif // __W627DHG_H
```

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