Intel® Desktop Board D510MO Product Guide

Order Number: E74518-001

Revision History

Revision	Revision History	Date
-001	First release of the Intel® Desktop Board D510MO Product Guide	September 2009

If an FCC declaration of conformity marking is present on the board, the following statement applies:

FCC Declaration of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation, 5200 N.E. Elam Young Parkway, Hillsboro, OR 97124, 1-800-628-8686

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications to the equipment not expressly approved by Intel Corporation could void the user's authority to operate the equipment.

Tested to comply with FCC standards for home or office use.

Canadian Department of Communications Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numerique német pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le broullage radioélectrique édicté par le ministére des Communications du Canada.

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Intel Desktop Board D510MO may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained from Intel Corporation by going to the World Wide Web site at: http://www.intel.com/ or by calling 1-800-548-4725.

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Preface

This Product Guide gives information about board layout, component installation, and regulatory requirements for Intel® Desktop Board D510MO.

Intended Audience

The Product Guide is intended for technically qualified personnel. It is not intended for general audiences.

Intended Uses

All Intel® Desktop Boards are evaluated as Information Technology Equipment (I.T.E.) for use in personal computers (PC) for installation in homes, offices, schools, computer rooms, and similar locations. The suitability of this product for other PC or embedded non-PC applications or other environments, such as medical, industrial, alarm systems, test equipment, etc. may not be supported without further evaluation by Intel.

Document Organization

The chapters in this Product Guide are arranged as follows:

1   Desktop Board Features: a summary of product features
2   Installing and Replacing Desktop Board Components: instructions on how to install the Desktop Board and other hardware components
3   Updating the BIOS: a description of how to update the BIOS
A   BIOS Error Messages: information about BIOS error messages and beep codes
B   Regulatory Compliance: safety and EMC regulations and product certifications

Conventions

The following conventions are used in this manual:

⚠ **CAUTION**

Cautions warn the user about how to prevent damage to hardware or loss of data.

📝 **NOTE**

Notes call attention to important information.

Terminology

The table below gives descriptions to some common terms used in the product guide.

Term	Description
GB	Gigabyte (1,073,741,824 bytes)
GHz	Gigahertz (one billion hertz)
KB	Kilobyte (1024 bytes)
MB	Megabyte (1,048,576 bytes)
Mbit	Megabit (1,048,576 bits)
MHz	Megahertz (one million hertz)

Contents

Figures

Tables

1 Desktop Board Features

This chapter briefly describes the main features of Intel® Desktop Board D510MO. Table 1 summarizes the features of the Desktop Board.

Table 1. Feature Summary

Form Factor	Mini-ITX ([170 millimeters [6.7 inches] x 170 millimeters [6.7 inches])
Processor	Passively-cooled, soldered-down dual-core Intel® Atom™ processor with integrated graphics and memory controllers.
Main Memory	• Two 240-pin Double Data Rate 2 (DDR2) Dual Inline Memory Module (DIMM) sockets with gold-plated contacts • Support for DDR2 800 MHz and DDR2 667 MHz DIMMs • Support for up to 4 GB total system memory (2 GB per DIMM socket)
Chipset	Intel® NM10 Express Chipset
Integrated Graphics	Intel® Graphics Media Accelerator 3150 (Intel® GMA 3150) integrated graphics subsystem with support for analog displays (VGA)
Audio	RealTek* ALC662 audio codec for 5.1 (6-channel) Intel® High Definition Audio (Intel® HD Audio) and AC '97 Audio. Included are: • Back panel connectors • Front panel microphone/headphone header with support for Intel® HD Audio or AC '97 Audio • S/PDIF digital audio header
Expansion Capabilities	One PCI* bus add-in card connector One PCI Express* Full-Mini Card slot
Peripheral Interfaces	• Seven USB 2.0 ports: — Four back panel ports — Three front panel ports (via two internal headers; one header supports an Intel® Z-U130 USB Solid-State Drive (or compatible device) • Two Serial ATA (SATA) 3.0 Gb/s connectors (supporting IDE and ACHI)
Legacy I/O Control	Winbond* W83627TGH-I legacy I/O controller: • Two serial port headers • One parallel port header • PS/2 keyboard and mouse connectors
Hardware Monitor Subsystem	Hardware monitoring through the Winbond legacy I/O controller, including: • Remote thermal sensor • One 3-pin chassis fan header with speed control
LAN Support	10/100/1000 Mb/s (Gigabit) Ethernet LAN Subsystem using a RealTek* 8111DL Gigabit Ethernet Controller

BIOS	• Intel® BIOS
	• Support for Advanced Configuration and Power Interface (ACPI), Plug and Play, and SMBIOS
Instantly Available PC Technology	• Support for PCI Local Bus Specification, Revision 2.3
	• Support for Advanced Configuration and Power Interface (ACPI)
	• Wake on USB, PCI, PCI Express, PS/2, LAN, serial, and front panel

For more information on Intel Desktop Board D510MO consult the following online resources:

To find information about...	Visit this World Wide Web site:
Intel Desktop Board D510MO	http://www.intel.com/products/motherboard/D510MO/index.htm
Desktop Board Support	http://support.intel.com/support/motherboards/desktop
Available configurations for Intel Desktop Board D510MO	http://www.intel.com/products/motherboard/D510MO/index.htm
Chipset information	http://www.intel.com/products/desktop/chipsets/index.htm
BIOS and driver updates	http://downloadcenter.intel.com/
Integration information	http://www.intel.com/support/go/buildit

10

Desktop Board Components

Figure 1 shows the location of the major components on Intel Desktop Board D510MO.
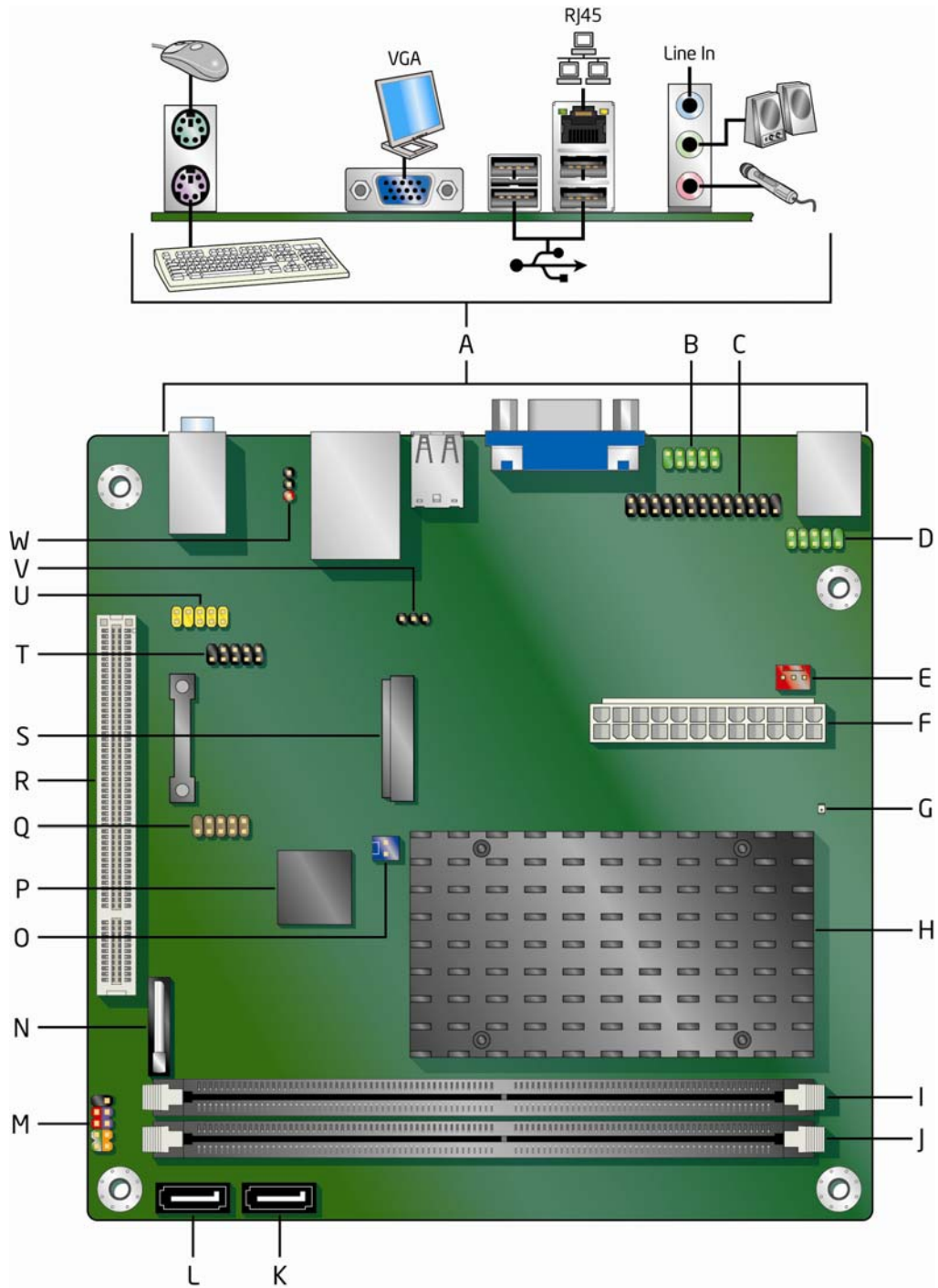
Figure 1. Intel Desktop Board D510MO Components

Table 2. Intel Desktop Board D510MO Components

Label	Description
A	Back panel connectors
B	Serial header (COM1)
C	Parallel port header
D	Serial port (COM 2)
E	Chassis fan header
F	Main power connector
G	Standby power indicator
H	Processor
I	Channel A DIMM 0
J	Channel A DIMM 1
K	SATA 1
L	SATA 0
M	Front panel header
N	Battery
O	Front panel wireless activity LED header
P	Intel NM10 Express Chipset
Q	USB front panel header with Intel Z-U130 USB Solid-State Drive (or compatible device) support
R	PCI bus connector
S	PCI Express Mini Card connector
T	USB front panel header
U	Front panel audio header
V	BIOS configuration jumper block
W	S/PDIF header

Processor

Intel Desktop Board D510MO includes a passively-cooled, dual-core Intel Atom processor with integrated graphics and memory controller. The processor is soldered to the Desktop Board and is not customer upgradeable.

NOTE

The board is designed to be passively cooled in a properly ventilated chassis. Chassis venting locations are recommended above the processor heatsink area for maximum heat dissipation effectiveness.

System Memory

NOTE

To be fully compliant with all applicable Intel® SDRAM memory specifications, the board should be populated with DIMMs that support the Serial Presence Detect (SPD) data structure. If your memory modules do not support SPD, you will see a notification to this effect on the screen at power up. The BIOS will attempt to configure the memory controller for normal operation.

The Desktop Board has two 240-pin DDR2 DIMM connectors with gold-plated contacts. It supports:

- DDR2 800 MHz or DDR2 667 MHz unbuffered, non-registered DIMMs
- Serial Presence Detect (SPD) memory only
- Non-ECC memory
- Up to 4 GB of memory

Integrated Graphics Subsystem

The integrated Intel GMA 3150 graphics controller features the following:

- 400 MHz core frequency
- High quality texture engine
  - DX9.0c* and OpenGL* 1.4 compliant
  - Hardware Pixel Shader 2.0
  - Vertex Shader Model 2.0
- 3D Graphics Rendering enhancements
  - 1.6 dual texture GigaPixel/s max fill rate
  - 16-bit and 32-bit color
  - Vertex cache
- Video
  - Software DVD at 30 fps full screen
  - DVMT support up to 256 MB
- Supports analog displays up to 2048 x 1536 at 75 Hz refresh (QXGA)

Intel® NM10 Express Chipset

The Intel NM10 Express Chipset is a centralized controller for the board's I/O paths. For more information about the Intel NM10 Express Chipset, go to http://www.intel.com/products/chipsets/index.htm?iid=prod+prod_chipset.

Operating System Support

The following Microsoft* operating systems are fully supported by the Desktop Board:

- Microsoft Windows Vista* Home Basic, SP 1
- Microsoft Windows* XP Home, SP 3
- Microsoft Windows* 7 Home Basic and Starter

Onboard Audio Subsystem

The Intel Desktop Board D510MO 6-channel (5.1) onboard audio subsystem supports both Intel HD Audio and AC '97 Audio. The subsystem is based on the following components:

- Intel NM10 Express Chipset
- RealTek ALC662 audio codec

The subsystem includes the following headers and connectors:

- Front panel audio header (supports both Intel HD Audio and AC '97) , including functionality for:
  - Line out (headphones/speaker)
  - Microphone in
- Three back panel analog audio jacks
- Onboard S/PDIF output header (3 pin)

14

The front/back panel audio connectors are configurable through the audio device drivers. Table 3 lists the supported functions of the front panel and back panel jacks.

Table 3. Audio Jack Support

Audio Jack	Line In	Line/ Front Out	Rear Out	Center/ LFE	Microphone	Headphones
Front panel – Green	No	Yes	No	No	No	Yes
Front panel – Pink	No	No	No	No	Yes	No
Back panel – Blue	Yes	No	Yes	No	No	No
Back panel – Green	No	Yes	No	No	No	Yes
Back panel – Pink	No	No	No	Yes	Yes	No

Figure 2 shows the default assignment of the back panel audio connectors.
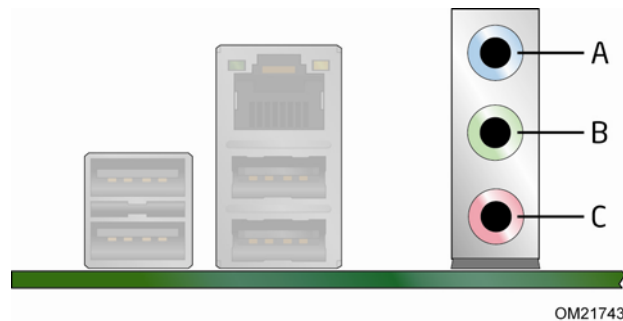
Item	Description
A	Line In
B	Line Out
C	Mic In

Figure 2. Back Panel Audio Connectors

NOTE

The back panel audio line out connector is designed to power headphones or amplified speakers only. Poor audio quality occurs if passive (non-amplified) speakers are connected to this output.

Legacy Input/Output (I/O) Controller

The legacy I/O controller provides the following:

- Two serial ports (via onboard headers)
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support via an onboard headers
- Serial IRQ interface compatible with serialized IRQ support for PCI systems
- PS/2-style keyboard and mouse ports
- Intelligent power management, including a programmable wake up event interface
- PCI power management support

The BIOS Setup program provides configuration options for the legacy I/O controller.

LAN Subsystem

The LAN subsystem consists of the following:

- Intel NM10 Express Chipset
- Realtek 8111DL Gigabit Ethernet Controller for 10/100/1000 Mbits/s Ethernet LAN connectivity
- RJ-45 LAN connector with integrated status LEDs

Additional features of the LAN subsystem include:

- CSMA/CD protocol engine
- LAN connect interface that supports the ethernet controller
- PCI bus power management
  — Supports ACPI technology
  — Supports LAN wake capabilities

LAN drivers are available from Intel's World Wide Web site at http://downloadcenter.intel.com/.

Two LEDs are built into the RJ-45 LAN connector located on the back panel (see Figure 3). These LEDs indicate the operating states of the LAN.
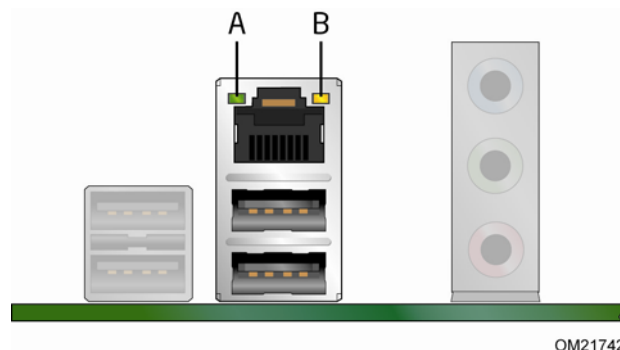
Figure 3. LAN Status LEDs

16

Table 4 describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 4.   LAN Status LEDs

LED	LED Color	LED State	Indicates
Activity (A)	Green	Blinking	LAN activity is occurring.
Speed (B)	N/A	Off	10 Mbits/s data rate is selected.
	Green	On	100 Mbits/s data rate is selected.
	Yellow	On	1000 Mbits/s data rate is selected.

USB 2.0 Support

The Desktop Board supports up to seven USB 2.0 ports (four ports routed to the back panel and three ports routed to two front panel USB 2.0 headers). One of the front panel USB headers supports an Intel Z-U130 USB Solid-State Drive (or compatible device). The USB 2.0 ports are compatible with USB 1.1 devices. USB 1.1 devices will function normally at USB 1.1 speeds.

USB 2.0 support requires both an operating system and drivers that fully support USB 2.0 transfer rates. Disabling High-Speed USB in the BIOS reverts all USB 2.0 ports to USB 1.1 operation. This may be required to accommodate operating systems that do not support USB 2.0.

NOTE

Computer systems that have an unshielded cable attached to a USB port might not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use a shielded cable that meets the requirements for a full-speed USB device.

SATA Interface

The Desktop Board supports two SATA channels (3.0 Gb/s) that support one device per channel. The SATA controller supports IDE and ACHI configuration and can operate in both legacy and native modes.

Expandability

The Desktop Board provides the following expansion capability:

- One PCI connector. The connector can support either a single PCI add-in card or a single- or dual-slot PCI riser card.
- One PCI Express Full-Mini Card slot.

BIOS

The BIOS provides the Power-On Self-Test (POST), the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the video BIOS.

PCI/PCI Express Auto Configuration

If you install a PCI/PCI Express add-in card in your computer, the PCI/PCI Express auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in card. You do not need to run the BIOS Setup program after you install a PCI/PCI Express add-in card.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the BIOS Setup and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all Setup options. If only the supervisor password is set, pressing <Enter> at the password prompt of Setup gives the user restricted access to Setup.
- If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup. Setup options are then available for viewing and changing depending on whether the supervisor or user password was entered.
- Setting a user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

For instructions on resetting the password, see .

Power Management Features

Power management is implemented at several levels, including:

- Software support through the Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  — Power connector
  — Fan header
  — +5 V standby power indicator LED
  — LAN Wake capabilities
  — Instantly Available PC technology
  — Wake from USB
  — Wake from PS/2 devices
  — PME# wakeup support
  — WAKE# signal wakeup support
  — Wake from serial port

ACPI

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. The use of ACPI with the Desktop Board requires an operating system that provides full ACPI support.

Hardware Support

Fan Header

The Desktop Board has a 3-pin chassis fan header. See Figure 13 on page 39 for the location of the chassis fan header.

+5 V Standby Power Indicator

⚠️ **CAUTION**

If the AC power has been switched off and the standby power indicator is still lit, disconnect the power cord before installing or removing any devices connected to the board. Failure to do so could damage the board and any attached devices.

The Desktop Board's standby power indicator, shown in Figure 4, is lit when there is standby power to the system. This includes the DIMM socket and the PCI bus connector, even though the computer appears to be off.
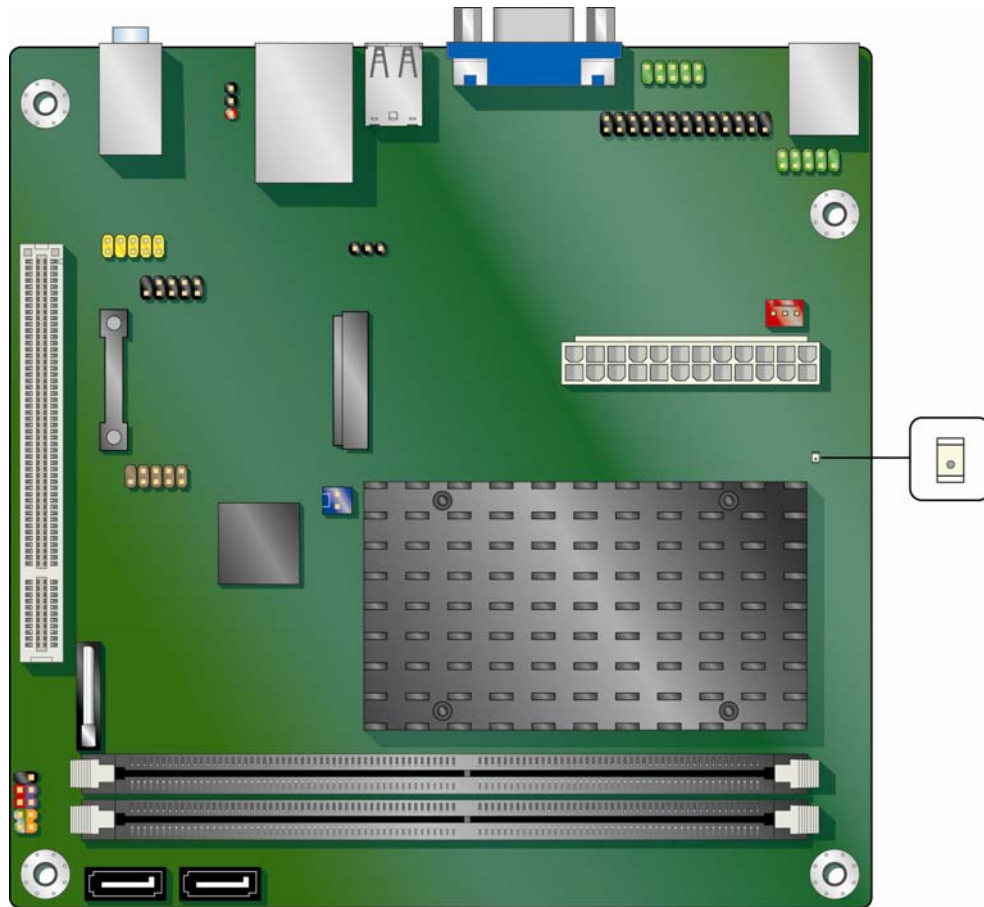
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Figure 4. Location of the Standby Power Indicator

For more information on standby current requirements for the Desktop Board, refer to the Technical Product Specification on the Intel Desktop D510MO web page at http://www.intel.com/products/motherboard/D510MO/index.htm.

Instantly Available PC Technology

Instantly Available PC technology enables the board to enter the ACPI S3 (Suspend-to-RAM) sleep-state. While in the ACPI S3 sleep-state, the computer will appear to be off (the hard drive(s) and fan will power off, the front panel power LED will blink). When signaled by a wake-up device or event, the system quickly returns to its last known state.

The board supports the *PCI Bus Power Management Interface Specification*. Add-in boards that also support this specification can participate in power management and can be used to wake the computer.

The use of Instantly Available PC technology requires operating system support and PCI 2.3 compliant add-in cards and drivers.

20

LAN Wake Capabilities

The board's LAN wake capabilities enable remote wake-up of the computer through a network. The LAN subsystem network adapter monitors network traffic at the Media Independent Interface. The board supports LAN wake capabilities with ACPI in the following ways:

- By Ping
- By Magic Packet

Upon detecting the configured wake packet type, the LAN subsystem asserts a wake-up signal that powers up the computer.

Wake from USB

USB bus activity wakes the computer from an ACPI S1 or S3 state.

NOTE

Wake from USB requires the use of a USB peripheral that supports wake from USB.

Wake from PS/2 Device

PS/2 keyboard activity wakes the computer from an ACPI S1, S3, S4, or S5 state. However, when the computer is in an ACPI S4 or S5 state, the only PS/2 activity that will wake the computer is the Alt + Print Screen key combination or the Power key available only on some keyboards.

PME# Wakeup Support

When the PME# signal is asserted on the PCI bus, the computer wakes from an ACPI S1, S3, S4, or S5 state.

WAKE# Signal Wakeup Support

When the WAKE# signal is asserted on the PCI Express bus, the computer wakes from an ACPI S1, S3, S4, or S5 state.

Wake from Serial Port

Serial port activity wakes the computer from an ACPI S1 or S3 state.

ENERGY STAR*, e-Standby, and ErP Compliance

Intel Desktop Board D510MO meets the ENERGY STAR requirements listed in Table 5 when used in corresponding system configurations.

Table 5. ENERGY STAR Requirements

ENERGY STAR Specification	Computer Type	Required States	Capability Adjustments	Typical Electricity Consumption (TEC) Criteria
v4.0	Desktop Computer	Idle State (Cat A) Sleep Mode Standby Level	With and without Wake On LAN (Sleep, Standby)	N/A
v4.0	Integrated Computer			
v5.0	Desktop Computer	Off Mode Sleep Mode Idle State Active State	With and without additional internal storage	Cat A under "desktop conventional" and "desktop proxying" operational mode weightings
v5.0	Integrated Desktop Computer			
v5.0	Thin Client	Off Mode Sleep Mode Idle State (Cat B)	With and without Wake On LAN (Sleep, Standby)	N/A

For information about ENERGY STAR requirements and recommended configurations, go to http://www.intel.com/go/energystar.

The Desktop Board also meets the following international requirements:

- Republic of Korea e-Standby program
- European Union Energy using Products (EuP) directive

Battery

A coin-cell battery on the Desktop Board keeps the values in CMOS RAM and the clock current when the computer is turned off. Go to page 43 for instructions on how to replace the battery.

Real-Time Clock

The Desktop Board includes a time-of-day clock and a 100-year calendar. The coin-cell battery keeps the clock current when the computer is turned off.

2 Installing and Replacing Desktop Board Components

This chapter tells you how to:

- Install the I/O shield
- Install and remove the Desktop Board
- Install and remove system memory
- Connect SATA drives
- Install a Wireless LAN card
- Install an Intel Z-U130 USB Solid-State Drive (or compatible device)
- Connect to internal headers
- Connect chassis fan and power supply cables
- Set the BIOS configuration jumper
- Clear passwords
- Replace the battery

Before You Begin

⚠ **CAUTION**

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer or perform any procedures can result in personal injury or equipment damage. Some circuitry on the board can continue to operate even though the front panel power button is off.

Follow these guidelines before you begin installing the Desktop Board:

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.
- Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an antistatic wrist strap and a conductive foam pad. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

23

⚠ **CAUTION**

Failure to ensure appropriate airflow may result in reduced performance of both the processor and/or voltage regulator or, in some instances, damage to the board.

All responsibility for determining the adequacy of any thermal or system design remains solely with the reader. Intel makes no warranties or representations that merely following the instructions presented in this document will result in a system with adequate thermal performance.

⚠ **CAUTION**

Ensure that the ambient temperature does not exceed the board's maximum operating temperature. Failure to do so could cause components to exceed their maximum case temperature and malfunction. For information about the maximum operating temperature, see the environmental specifications in the Intel Desktop Board Technical Product Specification.

⚠ **CAUTION**

The board is designed to be passively cooled on a properly ventilated chassis. Chassis venting locations are recommended over the processor, voltage regulator, and system memory areas for maximum heat dissipation effectiveness.

Ensure that proper airflow is maintained around the processor, processor voltage regulator circuit, and the DIMM. Failure to do so may result in damage to these components.

⚠ **CAUTION**

A thermal rating of 85 ^{o}C is required for the DIMMs used on this board.

24

Installation Precautions

When you install and test the Intel Desktop Board, observe all warnings and cautions in the installation instructions.

To avoid injury, be careful of:

- Sharp pins on connectors or headers
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (such as voltage regulators and heat sinks)
- Damage to wires that could cause a short circuit

Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.

Prevent Power Supply Overload

Do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current loads of all the modules within the computer is less than the output current rating of the power supply.

Observe Safety and Regulatory Requirements

Read and adhere to the instructions in this section and the instructions supplied with the chassis and associated modules. If you do not follow these instructions and the instructions provided by chassis and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

Refer to Appendix B for safety and regulatory requirements.

Installing the I/O Shield

The Desktop Board comes with an I/O shield. When installed in the chassis, the shield blocks radio frequency transmissions, protects internal components from dust and foreign objects, and promotes correct airflow within the chassis.

Install the I/O shield before installing the Desktop Board in the chassis. Place the shield inside the chassis as shown in Figure 5. Press the shield into place so that it fits tightly and securely. If the shield does not fit, obtain a properly-sized shield from the chassis supplier.
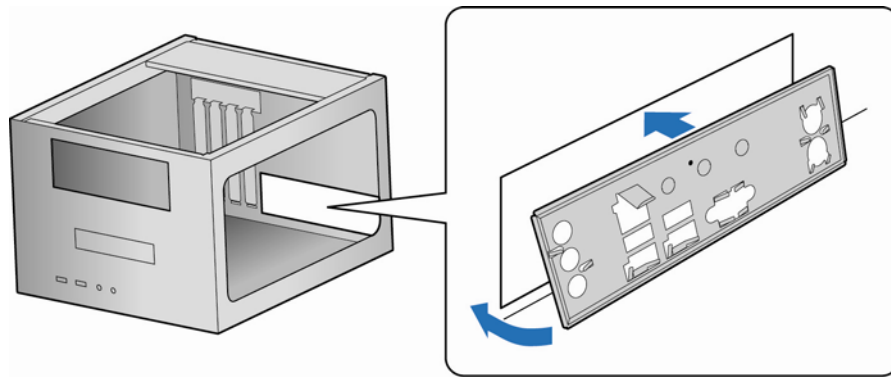
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Figure 5. Installing the I/O Shield

26

Installing and Removing the Desktop Board

⚠️ **CAUTION**

Only qualified technical personnel should do this procedure. Disconnect the computer from its power source before performing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.

Refer to your chassis manual for instructions on installing and removing the Desktop Board.

Figure 6 shows the location of the mounting screw holes for Intel Desktop Board D510MO.

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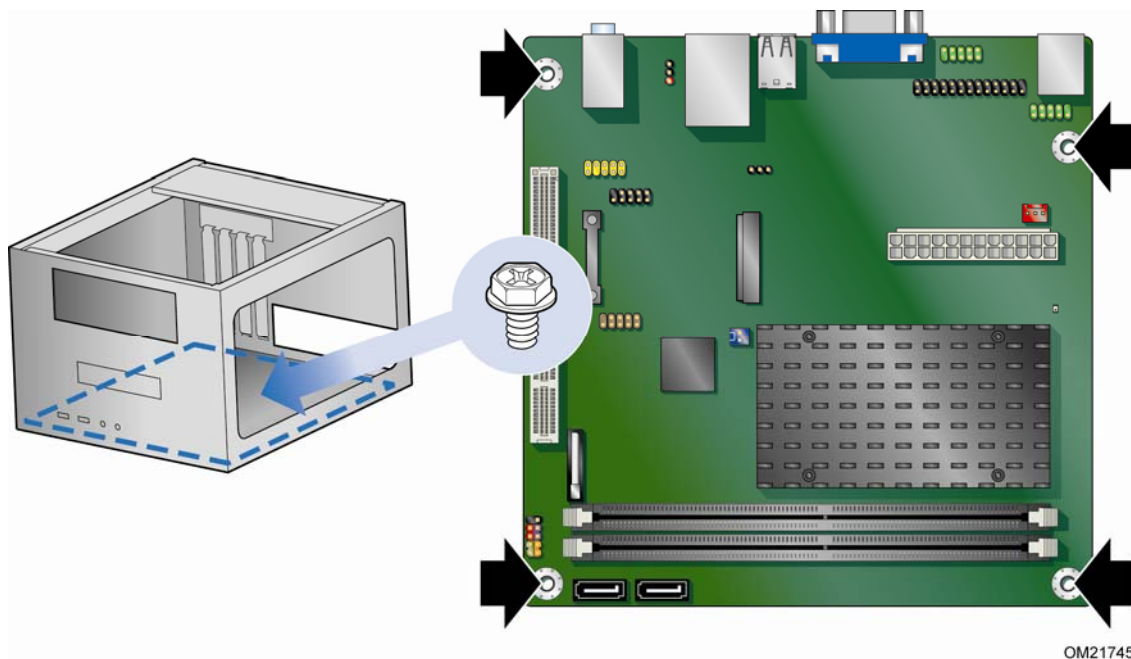
Figure 6. Intel Desktop Board D510MO Mounting Screw Holes

Installing and Removing Memory

📝 **NOTE**

To be fully compliant with all applicable Intel SDRAM memory specifications, the boards require DIMMs that support the Serial Presence Detect (SPD) data structure.

The Desktop Board has two 240-pin DDR2 DIMM sockets.

27

Installing DIMMs

To make sure you have the correct DIMM, place it on the illustration in Figure 7 showing the DDR2 DIMM. All the notches should match the DDR2 DIMM.
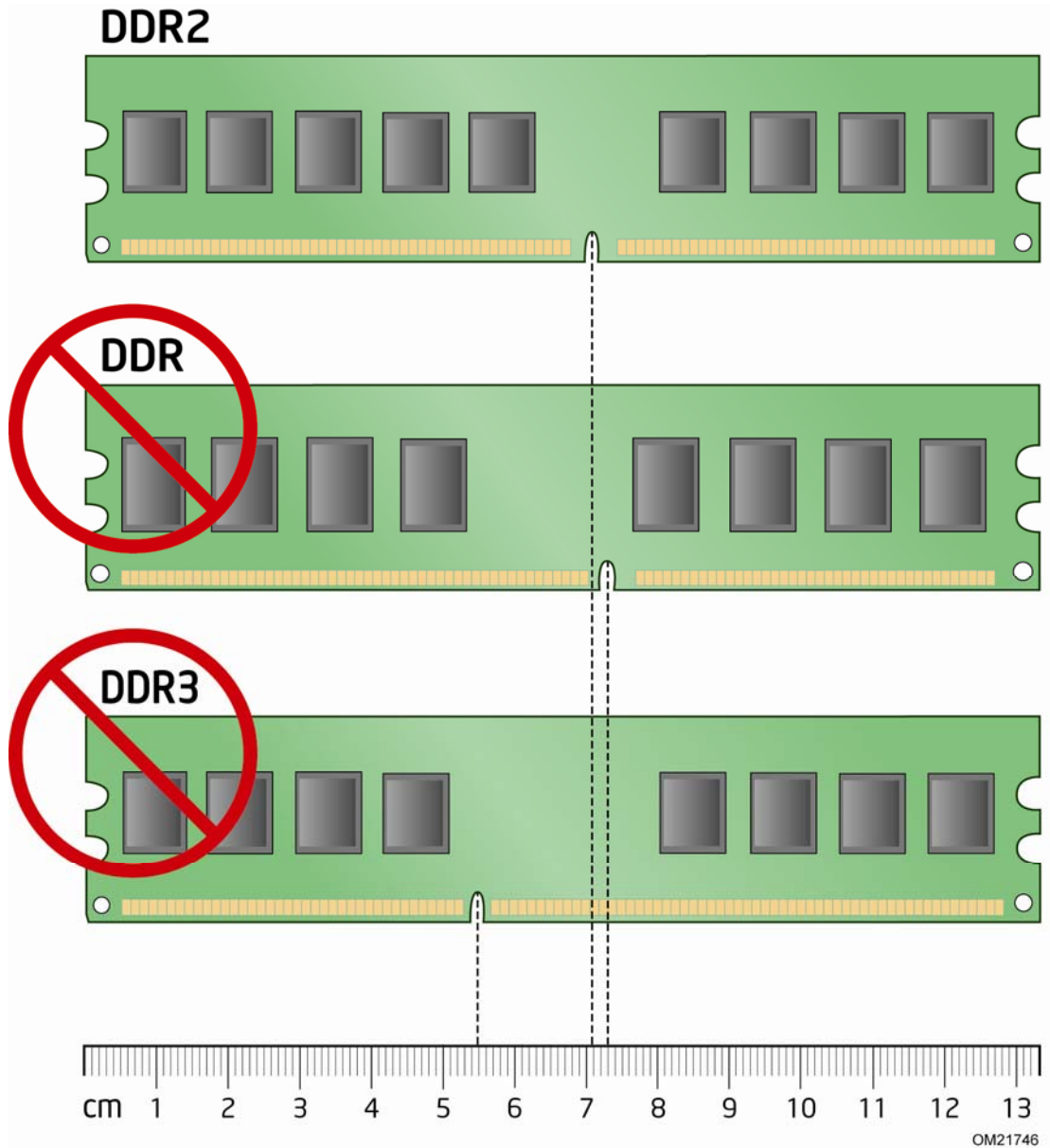
Figure 7. Use DDR2 DIMMs

1. Observe the precautions in "Before You Begin" on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer and disconnect the AC power cord.
3. Remove the computer's cover and locate the DIMM socket (see Figure 8).
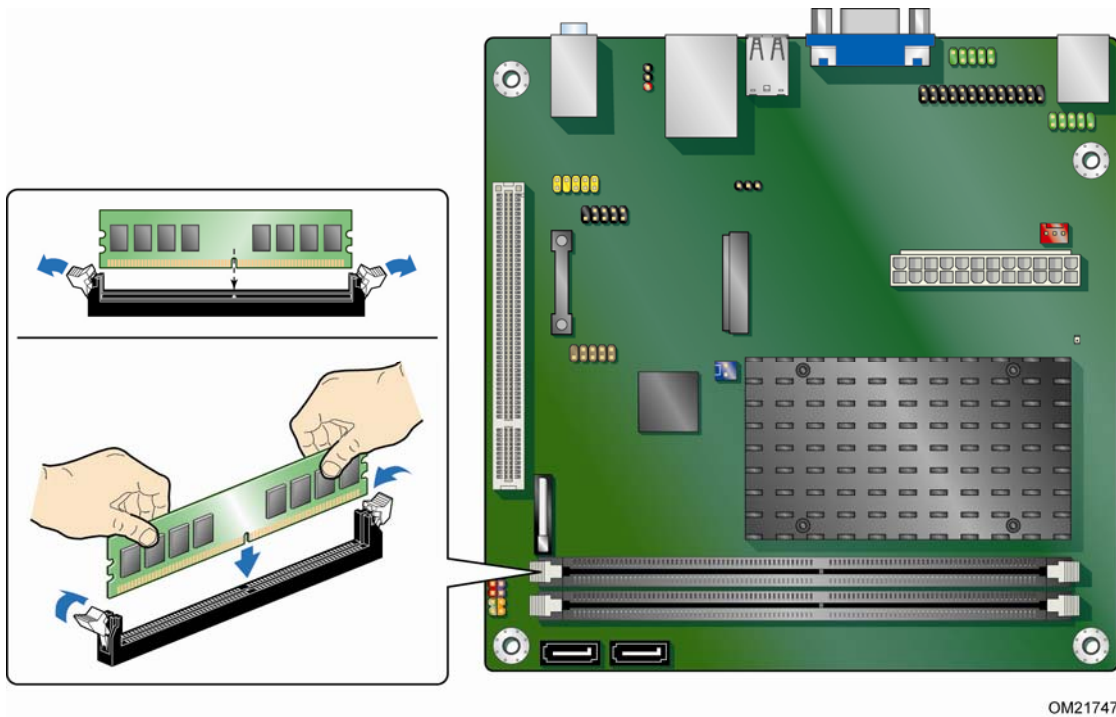
Figure 8. Installing a DIMM

4. Make sure the clips at either end of the DIMM socket are pushed outward to the open position.
5. Position the DIMM above the socket. Align the small notch at the bottom edge of the DIMM with the key in the socket (see Figure 8).
6. Insert the bottom edge of the DIMM into the socket.
7. When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place. Make sure the clips are firmly in place.
8. Replace the computer's cover and reconnect the AC power cord.

29

Removing DIMMs

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the AC power cord from the computer.
4. Remove the computer's cover.
5. Gently spread the retaining clips at each end of the DIMM socket. The DIMM pops out of the socket.
6. Hold the DIMM by the edges, lift it away from the socket, and store it in an anti-static package.
7. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.
8. Replace the computer's cover and reconnect the AC power cord.

Connecting SATA Drives

The board has two SATA connectors each supporting one SATA drive. The included SATA cables support the Serial ATA protocol. For correct cable and drive function:

1. Observe the precautions in "Before You Begin" on page 23.
2. Attach the locking cable end to the connector on the board (Figure 9, A).
3. Attach the cable end without the lock to the drive (Figure 9, B).
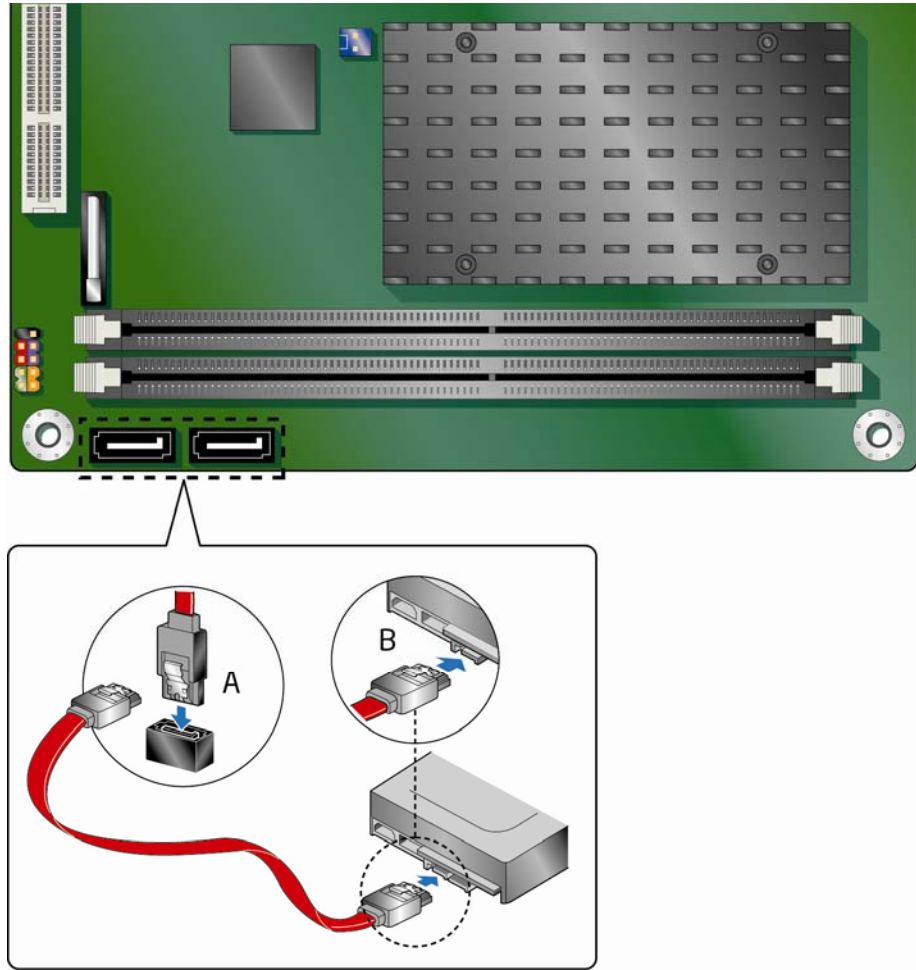
Figure 9. Connecting the Serial ATA Cable

Installing a Wireless LAN Card in the PCI Express Full-Mini Card Slot

A wireless LAN card can be installed in the Desktop Board's PCI Express Full-Mini Card slot.

To install a wireless LAN card on the Desktop Board, see Figure 10 and follow these steps:

1. Observe the precautions in "Before You Begin" on page 23.
2. Locate the PCI Express Full-Mini Card slot.
3. Insert the wireless LAN card into the PCI Express Mini Card connector (Figure 10, A) at a slightly upward angle.
4. Align the mounting holes (Figure 10, B) and snap the card in place.
5. Attach your system's antenna wires to the connectors (Figure 10, C) on the wireless LAN card as shown.

NOTE

External antennas can be connected through the I/O shield by removing any or all of the cut-outs above the back panel I/O section.
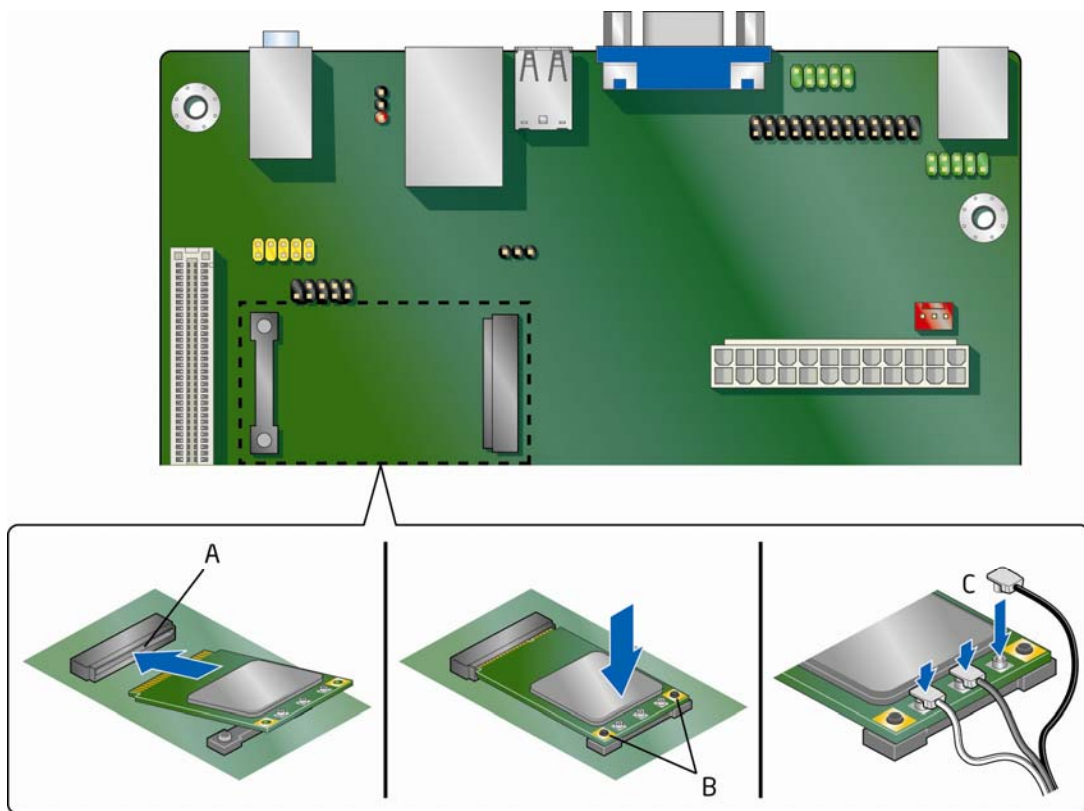
OM21752

Figure 10. Installing a Wireless LAN Card

Installing an Intel® Z-U130 USB Solid-State Drive (or Compatible Device)

An Intel Z-U130 USB Solid-State Drive (or compatible device) can be installed on the Desktop Board by using the onboard USB 2.0 header indicated in Figure 1, DD. This header provides support for the solid state drive.

To install an Intel Z-U130 USB Solid-State Drive (or compatible device) on the Desktop Board, follow these steps:

1. Observe the precautions in "Before You Begin" on page 23.
2. Align the connector (Figure 11, A) on the bottom of the solid state drive with the USB 2.0 header on the Desktop Board. The connectors are keyed and will mate correctly when the solid state drive is oriented as shown in Figure 11.

OM21748
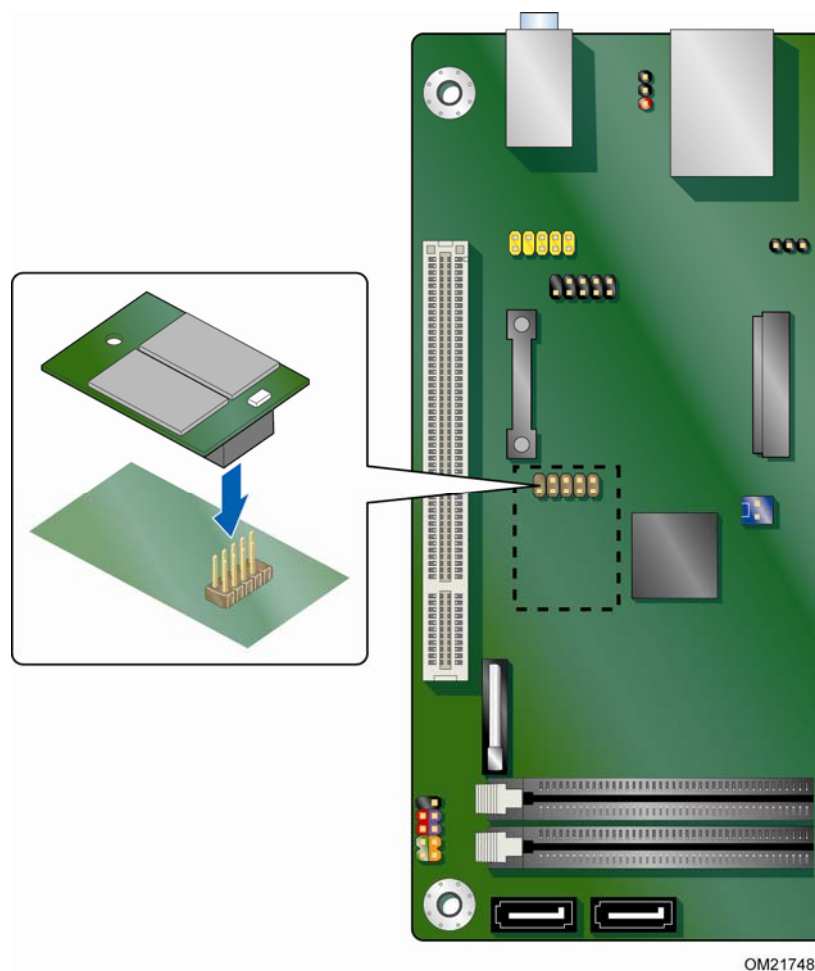
Figure 11. Installing an Intel Z-U130 USB Solid-State Drive (or Compatible Device)

33

Connecting to the Internal Headers

Before connecting cables to the internal headers, observe the precautions in "Before You Begin" on page 23. Figure 12 shows the location of the board's internal headers.
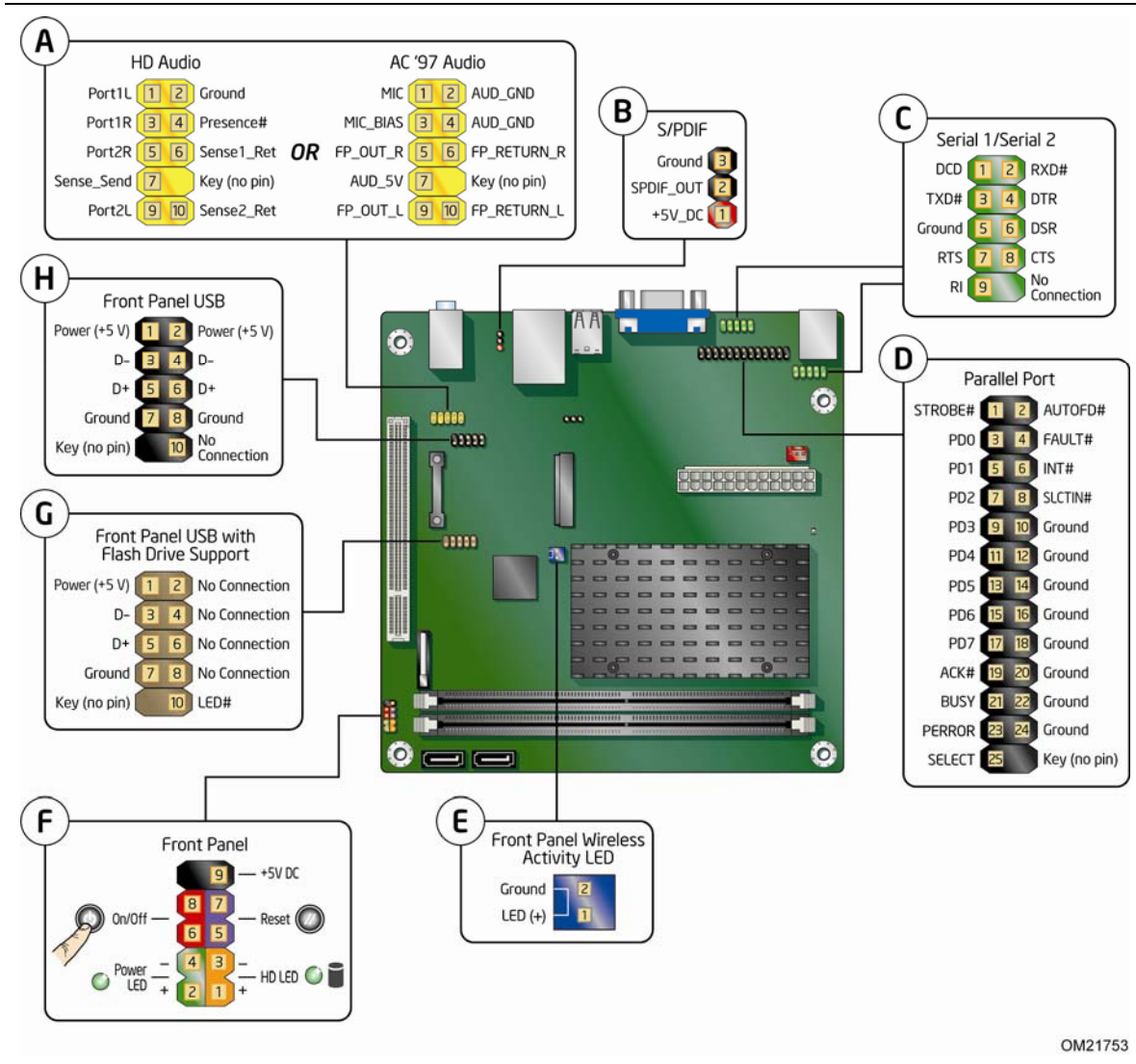
Figure 12. Internal Headers

Connecting the Front Panel Audio Header

Figure 12, A shows the location of the front panel audio header. The front panel audio header can be used for both Intel HD Audio and AC '97 Audio.

Table 6 shows the pin assignments for the Intel HD Audio and Table 7 shows the pin assignments for AC '97 Audio.

Table 6. Front Panel Audio Header for Intel HD Audio

Pin	Signal Name	Pin	Signal Name
1	[Port 1] Left channel	2	Ground
3	[Port 1] Right channel	4	PRESENCE# (Dongle present)
5	[Port 2] Right channel	6	[Port 1] SENSE_RETURN
7	SENSE_SEND (Jack detection)	8	Key (no pin)
9	[Port 2] Left channel	10	[Port 2] SENSE_RETURN

Table 7. Front Panel Audio Header for AC '97 Audio

Pin	Signal Name	Pin	Signal Name
1	MIC	2	AUD_GND
3	MIC_BIAS	4	AUD_GND
5	FP_OUT_R	6	FP_RETURN_R
7	AUD_5V	8	KEY (no pin)
9	FP_OUT_L	10	FP_RETURN_L

Connecting to the S/PDIF Header

Before connecting to the S/PDIF connector, observe the precautions in "Before You Begin" on page 23. See Figure 12, B on page 34 for the location of the S/PDIF header.

Table 8 shows the pin assignments for the S/PDIF header.

Table 8. S/PDIF Header

Pin	Signal Name
1	Ground
2	S/PDIF out
3	VCC (5V)

Connecting to the Serial Headers

Before connecting to the serial headers, observe the precautions in "Before You Begin" on page 23. See Figure 12, C on page 34 for the location of the serial headers.

Table 9 shows the pin assignments for the serial headers.

Table 9. Serial Port Headers (COM 1 and COM 2)

Pin	Signal Name	Pin	Signal Name
1	DCD (Data Carrier Detect)	2	RXD# (Receive Data)
3	TXD# (Transmit Data)	4	DTR (Data Terminal Ready)
5	Ground	6	DSR (Data Set Ready)
7	RTS (Request To Send)	8	CTS (Clear To Send)
9	RI (Ring Indicator)	10	Key (no pin)

Connecting to the Parallel Port Header

Before connecting to the parallel port header, observe the precautions in "Before You Begin" on page 23. See Figure 12, D on page 34 for the location of the parallel port header.

Table 10 shows the pin assignments for the parallel port header.

Table 10. Parallel Port Header

Pin	Standard Signal Name	ECP Signal Name	EPP Signal Name
1	STROBE#	STROBE#	WRITE#
2	AUTOFD#	AUTOFD#, HOSACK	DATASTB#
3	PD0	PD0	PD0
4	FAULT#	FAULT#, PERIPHREQST#	FAULT#
5	PD1	PD1	PD1
6	INT#	INT#, REVERSERQST#	RESET#
7	PD2	PD2	PD2
8	SLCTIN#	SLCTIN#	ADDRSTB#

Pin	Standard Signal Name	ECP Signal Name	EPP Signal Name
9	PD3	PD3	PD3
10	GROUND	GROUND	GROUND
11	PD4	PD4	PD4
12	GROUND	GROUND	GROUND
13	PD5	PD5	PD5
14	GROUND	GROUND	GROUND
15	PD6	PD6	PD6
16	GROUND	GROUND	GROUND
17	PD7	PD7	PD7
18	GROUND	GROUND	GROUND
19	ACK#	ACK#	INTR
20	GROUND	GROUND	GROUND
21	BUSY	BUSY#, PERIPHACK	WAIT#
22	GROUND	GROUND	GROUND
23	PERROR	PE, ACKREVERSE#	PE
24	GROUND	GROUND	GROUND
25	SELECT	SELECT	SELECT
26	KEY (no pin)	KEY (no pin)	KEY (no pin)

Connecting to the Front Panel Wireless Activity LED Header

Before connecting to the front panel wireless activity LED header, observe the precautions in "Before You Begin" on page 23. See Figure 12, E on page 34 for the location of the front panel wireless activity LED header.

Table 11 shows the pin assignments for the front panel wireless activity LED header.

Table 11. Front Panel Wireless Activity LED Header

Pin	Signal Name
1	LED (+)
2	Ground

Connecting to the Front Panel Header

Before connecting to the front panel header, observe the precautions in "Before You Begin" on page 23. See Figure 12, F on page 34 for the location of the front panel header.

Table 12 shows the pin assignments for the front panel header.

Table 12. Front Panel Header Signal Names

Pin	Signal	In/Out	Description	Pin	Signal	In/Out	Description
Hard Drive Activity LED				**Power LED**			
1	HD_PWR	Out	Hard disk LED pull-up (330 Ω) to +5 V	2	HDR_BLNK_GRN	Out	Front panel green LED
3	HDA#	Out	Hard disk active LED	4	HDR_BLNK_YEL	Out	Front panel yellow LED
Reset Switch				**On/Off Switch**			
5	Ground		Ground	6	SWITCH_ON#	In	Power switch
7	FP_RESET#	In	Reset switch	8	Ground		Ground
Power				**Not Connected**			
9	+5 V		Power	10	N/C		No pin

Connecting to the Front Panel USB 2.0 Headers

Before connecting to the USB 2.0 headers, observe the precautions in "Before You Begin" on page 23. See Figure 12, G and H on page 34 for the location of the USB 2.0 headers. Table 13 and Table 14 show the pin assignments for the headers.

The brown USB header (Figure 12, G) supports a single USB port while the black USB header (Figure 12, H) supports two USB ports. The single USB port header is designed to support a Flash Memory Drive such as the Intel Z-U130 USB Solid-State Drive (or compatible device). Refer to Installing an Intel® Z-U130 USB Solid-State Drive (or Compatible Device) on page 33 for more information.

Table 13. Front Panel USB Header

Pin	Signal Name	Pin	Signal Name
1	+5 VDC	2	+5 VDC
3	D-	4	D-
5	D+	6	D+
7	Ground	8	Ground
9	KEY (no pin)	10	No Connect

Table 14. Front Panel USB Header with Intel Z-U130 USB Solid-State Drive (or Compatible Device) Support

Pin	Signal Name	Pin	Signal Name
1	+5 VDC	2	No Connect
3	D-	4	No Connect
5	D+	6	No Connect
7	Ground	8	No Connect
9	KEY (no pin)	10	LED#

Connecting a Chassis Fan

Figure 13 shows the location of the chassis fan header. Connect the chassis fan cable to this header.
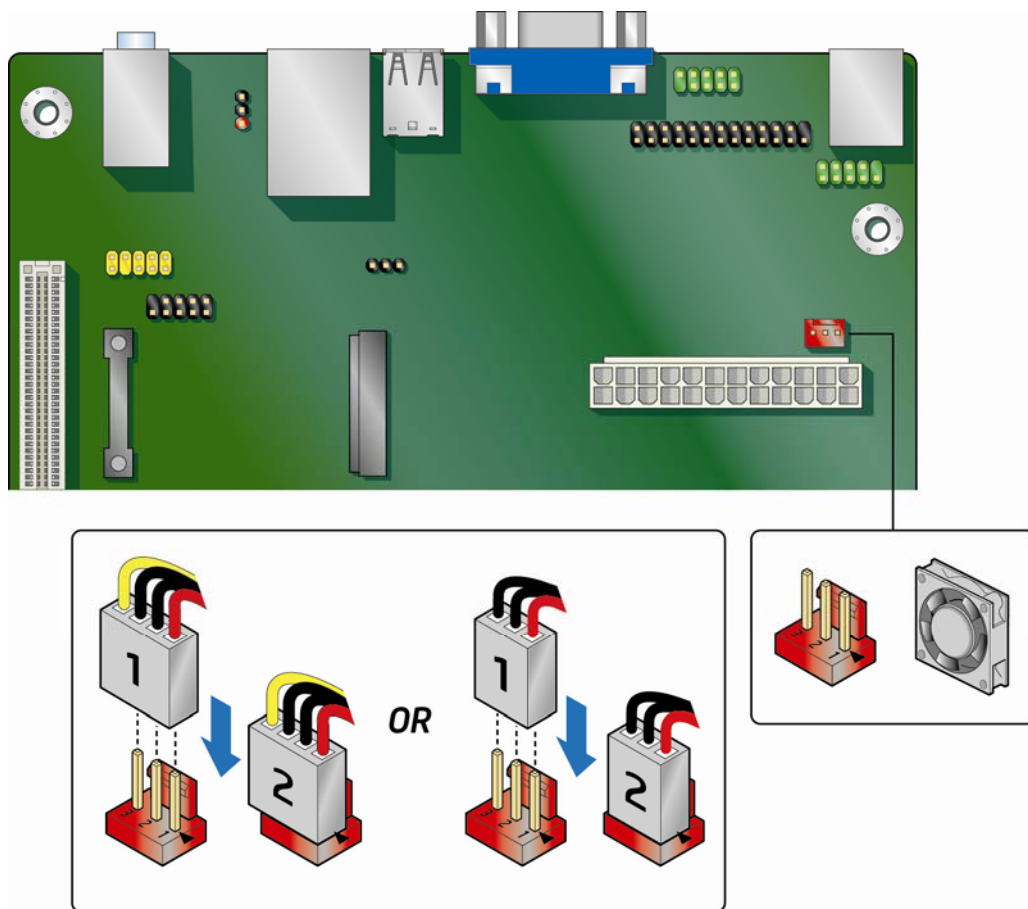
OM21750

Figure 13. Location of the Chassis Fan Header

Connecting the Power Supply Cable

⚠️ **CAUTION**

Failure to use an appropriate power supply to the Desktop Board may result in damage to the board or the system may not function properly.

Figure 14 shows the location of the power connector.
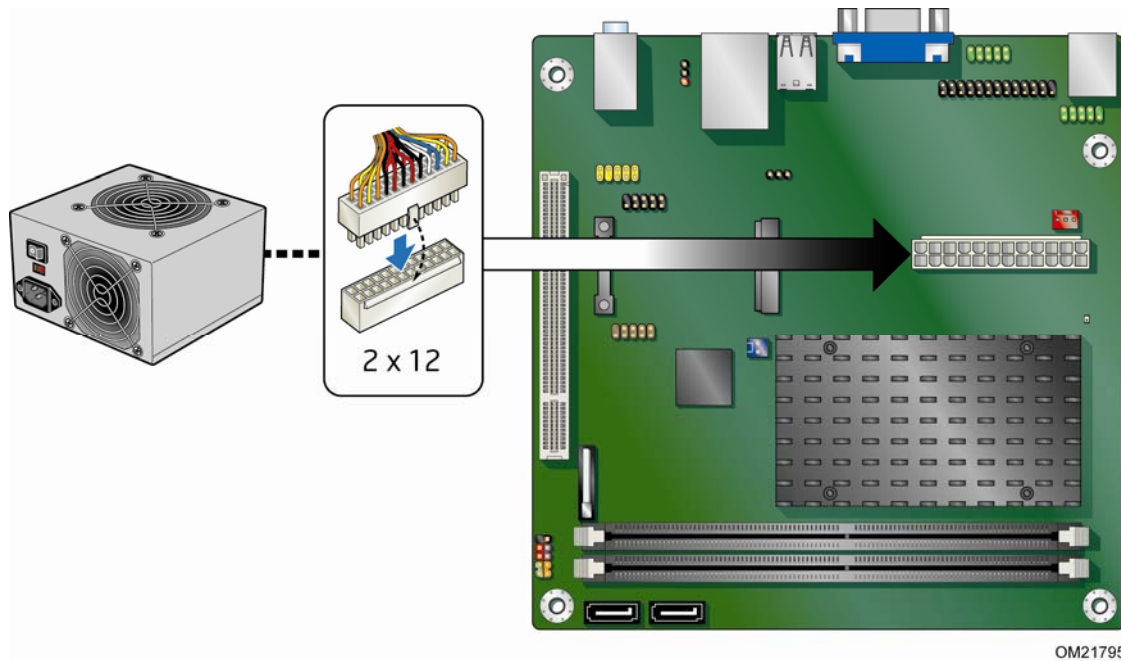
Figure 14. Connecting a Power Supply Cable

1. Observe the precautions in "Before You Begin" on page 23.
2. Connect the main power supply cable (2 x 12) to the 2 x 12 connector (Figure 14).

40

Setting the BIOS Configuration Jumper

NOTE

Always turn off the power and unplug the power cord from the computer before changing a jumper. Moving the jumper with the power on may result in unreliable computer operation.

Figure 15 shows the location of the Desktop Board's BIOS configuration jumper block.
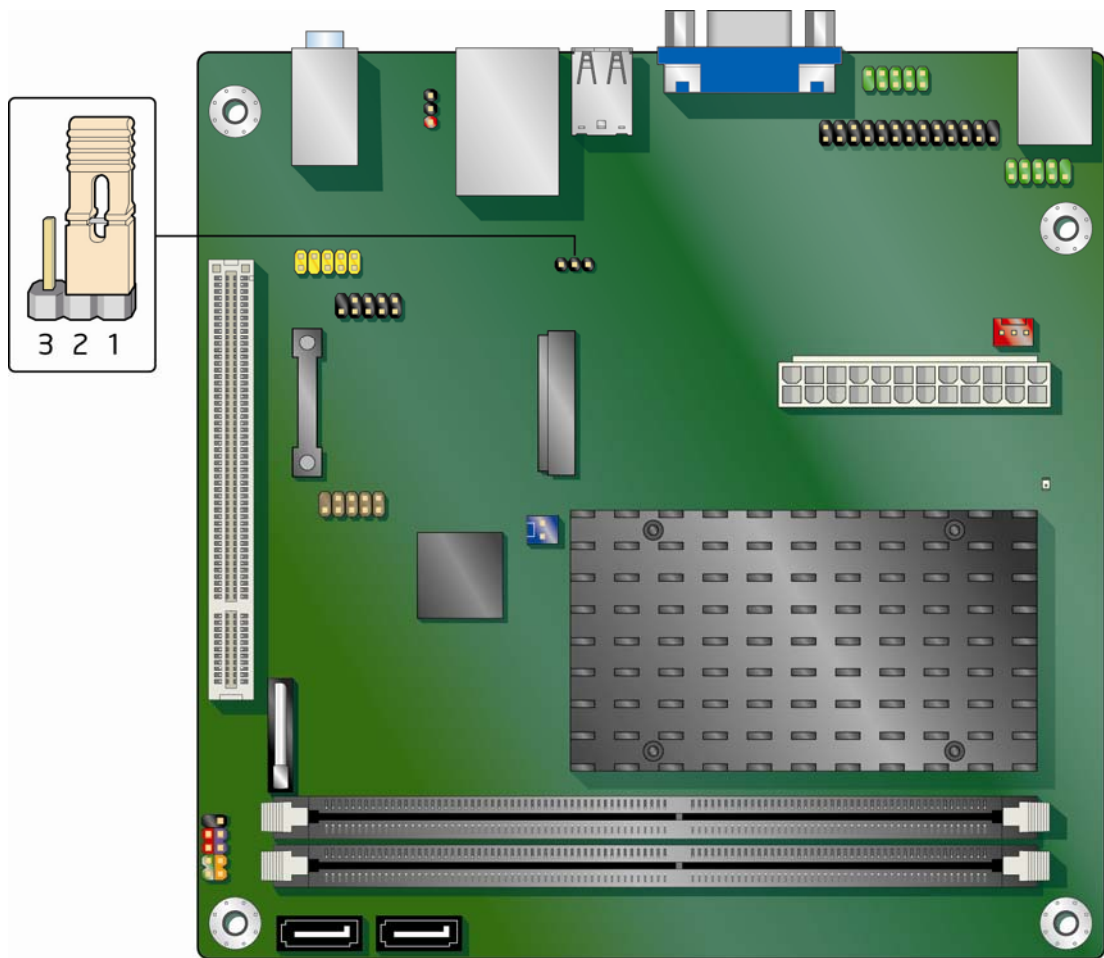
Figure 15. BIOS Configuration Jumper Block

The three-pin BIOS jumper block enables board operating modes. Table 15 shows the jumper settings for each of the available modes.

Figure 15 shows the location of the Desktop Board's BIOS configuration jumper block.

Table 15. Jumper Settings for the BIOS Setup Program Modes

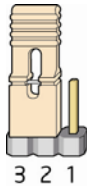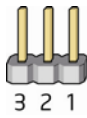| Jumper Setting	Mode	Description
	Normal (default) (1-2)	The BIOS uses the current configuration and passwords for booting.
	Configure (2-3)	After the Power-On Self-Test (POST) runs, the BIOS displays the Maintenance Menu. Use this menu to clear passwords.
	Recovery (None)	The BIOS recovers data from a recovery diskette in the event of a failed BIOS update.

Clearing Passwords

This procedure assumes that the board is installed in the computer and the configuration jumper is set to normal mode.

1. Observe the precautions in "Before You Begin" on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the computer's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 15, B).
5. Place the jumper on pins 2-3 as shown below.
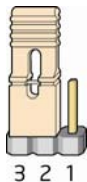
6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the maintenance menu again.
9. Press <F10> to save the current values and exit Setup.

10. Turn off the computer. Disconnect the computer's power cord from the AC power source.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.
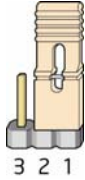
13. Replace the cover, plug in the computer, and turn on the computer.

Replacing the Battery

A coin-cell battery powers the Desktop Board's real-time clock and CMOS memory. When the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the standby current from the power supply extends the life of the battery. The clock is accurate to $\pm$ 13 minutes/year at 25 ºC with 3.3 VSB applied.

When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one. Figure 16 on page 47 shows the location of the battery.

⚠ CAUTION

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.

⚠ PRÉCAUTION

Risque d'explosion si la pile usagée est remplacée par une pile de type incorrect. Les piles usagées doivent être recyclées dans la mesure du possible. La mise au rebut des piles usagées doit respecter les réglementations locales en vigueur en matière de protection de l'environnement.

⚠ FORHOLDSREGEL

Eksplosionsfare, hvis batteriet erstattes med et batteri af en forkert type. Batterier bør om muligt genbruges. Bortskaffelse af brugte batterier bør foregå i overensstemmelse med gældende miljølovgivning.

⚠ OBS!

Det kan oppstå eksplosjonsfare hvis batteriet skiftes ut med feil type. Brukte batterier bør kastes i henhold til gjeldende miljølovgivning.

⚠ VIKTIGT!

Risk för explosion om batteriet ersätts med felaktig batterityp. Batterier ska kasseras enligt de lokala miljövårdsbestämmelserna.

⚠️ **VARO**

Räjähdysvaara, jos pariston tyyppi on väärä. Paristot on kierrätettävä, jos se on mahdollista. Käytetyt paristot on hävitettävä paikallisten ympäristömääräysten mukaisesti.

⚠️ **VORSICHT**

Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.

⚠️ **AVVERTIMENTO**

Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.

⚠️ **PRECAUCIÓN**

Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.

⚠️ **WAARSCHUWING**

Er bestaat ontploffingsgevaar als de batterij wordt vervangen door een onjuist type batterij. Batterijen moeten zoveel mogelijk worden gerecycled. Houd u bij het weggooien van gebruikte batterijen aan de plaatselijke milieuwetgeving.

⚠️ **ATENÇÃO**

Haverá risco de explosão se a bateria for substituída por um tipo de bateria incorreto. As baterias devem ser recicladas nos locais apropriados. A eliminação de baterias usadas deve ser feita de acordo com as regulamentações ambientais da região.

⚠️ **AŚCIAROŽZNAŚĆ**

Існуе рызыка выбуху, калі заменены акумулятар неправільнага тыпу. Акумулятары павінны, па магчымасці, перепрацоўвацца. Пазбаўляцца ад старых акумулятараў патрэбна згодна з мясцовым заканадаўствам па экалогіі.

⚠️ **UPOZORNÌNÍ**

V případě výměny baterie za nesprávný druh může dojít k výbuchu. Je-li to možné, baterie by měly být recyklovány. Baterie je třeba zlikvidovat v souladu s místními předpisy o životním prostředí.

⚠️ **Προσοχή**

Υπάρχει κίνδυνος για έκρηξη σε περίπτωση που η μπαταρία αντικατασταθεί από μία λανθασμένου τύπου. Οι μπαταρίες θα πρέπει να ανακυκλώνονται όταν κάτι τέτοιο είναι δυνατό. Η απόρριψη των χρησιμοποιημένων μπαταριών πρέπει να γίνεται σύμφωνα με τους κατά τόπο περιβαλλοντικούς κανονισμούς.

⚠ VIGYÁZAT

Ha a telepet nem a megfelelő típusú telepre cseréli, az felrobbanhat. A telepeket lehetőség szerint újra kell hasznosítani. A használt telepeket a helyi környezetvédelmi előírásoknak megfelelően kell kiselejtezni.

⚠ 注意

異なる種類の電池を使用すると、爆発の危険があります。リサイクル
が可能な地域であれば、電池をリサイクルしてください。使用後の電
池を破棄する際には、地域の環境規制に従ってください。

⚠ AWAS

Risiko letupan wujud jika bateri digantikan dengan jenis yang tidak betul. Bateri sepatutnya dikitar semula jika boleh. Pelupusan bateri terpakai mestilah mematuhi peraturan alam sekitar tempatan.

⚠ OSTRZEŻENIE

Istnieje niebezpieczeństwo wybuchu w przypadku zastosowania niewłaściwego typu baterii. Zużyte baterie należy w miarę możliwości utylizować zgodnie z odpowiednimi przepisami ochrony środowiska.

⚠ PRECAUŢIE

Risc de explozie, dacă bateria este înlocuită cu un tip de baterie necorespunzător. Bateriile trebuie reciclate, dacă este posibil. Depozitarea bateriilor uzate trebuie să respecte reglementările locale privind protecţia mediului.

⚠ ВНИМАНИЕ

При использовании батареи несоответствующего типа существует риск ее взрыва. Батареи должны быть утилизированы по возможности. Утилизация батарей должна проводится по правилам, соответствующим местным требованиям.

⚠ UPOZORNENIE

Ak batériu vymeníte za nesprávny typ, hrozí nebezpečenstvo jej výbuchu.
Batérie by sa mali podľa možnosti vždy recyklovať. Likvidácia použitých batérií sa musí vykonávať v súlade s miestnymi predpismi na ochranu životného prostredia.

⚠ POZOR

Zamenjava baterije z baterijo drugačnega tipa lahko povzroči eksplozijo.
Če je mogoče, baterije reciklirajte. Rabljene baterije zavrzite v skladu z lokalnimi okoljevarstvenimi predpisi.

⚠ คำเตือน

ระวังการระเบิดที่เกิดจากเปลี่ยนแบตเตอรี่ผิดประเภท หากเป็นไปได้ ควรนำแบตเตอรี่ไปรีไซเคิล การทิ้งแบตเตอรี่ใช้แล้วต้องเป็นไปตามกฎข้อบังคับด้านสิ่งแวดล้อมของท้องถิ่น.

⚠ UYARI

Yanlış türde pil takıldığında patlama riski vardır. Piller mümkün olduğunda geri dönüştürülmelidir. Kullanılmış piller, yerel çevre yasalarına uygun olarak atılmalıdır.

⚠️ **ОСТОРОГА**

Використовуйте батареї правильного типу, інакше існуватиме ризик вибуху.
Якщо можливо, використані батареї слід утилізувати. Утилізація використаних батарей має бути
виконана згідно місцевих норм, що регулюють охорону довкілля.

⚠️ UPOZORNĚNÍ

V případě výměny baterie za nesprávný druh může dojít k výbuchu. Je-li to možné, baterie
by měly být recyklovány. Baterie je třeba zlikvidovat v souladu s místními předpisy
o životním prostředí.

⚠️ **ETTEVAATUST**

Kui patarei asendatakse uue ebasobivat tüüpi patareiga, võib tekkida plahvatusoht.
Tühjad patareid tuleb võimaluse korral viia vastavasse kogumispunkti. Tühjade
patareide äraviskamisel tuleb järgida kohalikke keskkonnakaitse alaseid reegleid.

⚠️ FIGYELMEZTETÉS

Ha az elemet nem a megfelelő típusúra cseréli, felrobbanhat. Az elemeket lehetőség
szerint újra kell hasznosítani. A használt elemeket a helyi környezetvédelmi előírásoknak megfelelően
kell kiselejtezni.

⚠️ UZMANĪBU

Pastāv eksplozijas risks, ja baterijas tiek nomainītas ar nepareiza veida baterijām.
Ja iespējams, baterijas vajadzētu nodot attiecīgos pieņemšanas punktos. Bateriju izmešanai
atkritumos jānotiek saskaņā ar vietējiem vides aizsardzības noteikumiem.

⚠️ DĖMESIO

Naudojant netinkamo tipo baterijas įrenginys gali sprogti. Kai tik įmanoma, baterijas
reikia naudoti pakartotinai. Panaudotas baterijas išmesti būtina pagal vietinius aplinkos
apsaugos nuostatus.

⚠️ ATTENZJONI

Riskju ta' splużjoni jekk il-batterija tinbidel b'tip ta' batterija mhux korrett. Il-batteriji
għandhom jiġu riċiklati fejn hu possibbli. Ir-rimi ta' batteriji użati għandu jsir skond
ir-regolamenti ambjentali lokali.

⚠️ OSTRZEŻENIE

Ryzyko wybuchu w przypadku wymiany na baterie niewłaściwego typu. W miarę możliwości
baterie należy poddać recyklingowi. Zużytych baterii należy pozbywać się zgodnie z lokalnie
obowiązującymi przepisami w zakresie ochrony środowiska.

1. Observe the precautions in "Before You Begin" (see page 23).
2. Turn off all peripheral devices connected to the computer. Disconnect the computer's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Locate the battery on the board (see Figure 16).
5. Push the battery retention clip aside and remove the battery from the connector as shown in Figure 16. Note the orientation of the "+" and "-" on the battery.
6. Install the new battery in the connector, making sure to orient the "+" and "-" correctly.
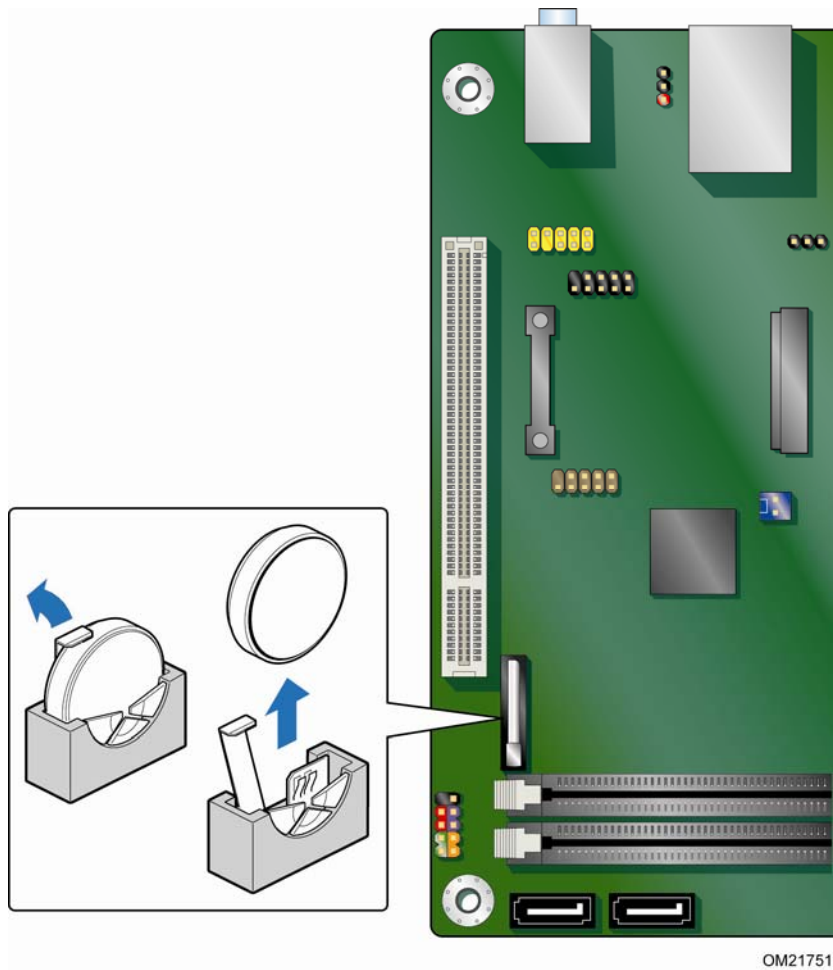7. Replace the computer cover.

OM21751

Figure 16. Removing the Battery

3 Updating the BIOS

The BIOS Setup program can be used to view and change the BIOS settings for the computer. You can access the BIOS Setup program by pressing the <F2> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins.

This chapter tells you how to update the BIOS by either using the Intel Express BIOS Update utility or the Iflash Memory Update utility, and how to recover the BIOS if an update fails.

Updating the BIOS with the Intel® Express BIOS Update Utility

With the Intel Express BIOS Update utility you can update the system BIOS while in the Windows environment. The BIOS file is included in an automated update utility that combines the functionality of the Intel® Flash Memory Update Utility and the ease of use of Windows-based installation wizards.

To update the BIOS with the Intel Express BIOS Update utility:

1. Go to http://support.intel.com/support/motherboards/desktop/.
2. Navigate to the Intel Desktop Board D510MO page, click "[view] Latest BIOS updates," and select the Express BIOS Update utility file.
3. Download the file to your hard drive. (You can also save this file to a removable USB device. This is useful if you are updating the BIOS for multiple identical systems.)
4. Close all other applications. This step is required. Your system will be rebooted at the last Express BIOS Update window.
5. Double-click the executable file from the location on your hard drive where it was saved. This runs the update program.
6. Follow the instructions provided in the dialog boxes to complete the BIOS update.

Updating the BIOS with the Iflash Memory Update Utility

You can use the information in this section to update the BIOS using the Iflash Memory Update Utility.

Obtaining the BIOS Update File

You can update to a new version of the BIOS by using the Iflash BIOS update file.

The Iflash BIOS update file is a compressed file that contains the files you need to update the BIOS. The Iflash BIOS update file contains:

- New BIOS file
- Intel Flash Memory Update Utility

You can obtain either of these files through your computer supplier or by navigating to the Intel Desktop Board D510MO page at
http://support.intel.com/support/motherboards/desktop.

Navigate to the Intel Desktop D510MO page, click "[view] Latest BIOS updates," and select the Iflash BIOS Update utility file.

⚠️ **CAUTION**

Do not interrupt the process or the system may not function properly.

Using the Iflash Memory Update Utility

With the Iflash Memory update utility you can update the system BIOS from a bootable USB flash drive or other bootable USB media. The Iflash BIOS update files can be extracted locally to your hard drive and copied to a bootable USB flash drive or other bootable USB media.

📝 **NOTE**

Review the instructions distributed with the update utility before attempting a BIOS update.

⚠️ **CAUTION**

Do not interrupt the process or the system may not function properly.

1. Uncompress the BIOS update file and copy the .BIO file and IFLASH.EXE to a bootable USB flash drive or other bootable USB media.
2. Configure the BIOS or use the F10 key option during POST to boot to the USB device.
3. Manually run the IFLASH.EXE file from the USB device and manually update the BIOS.

Recovering the BIOS

It is unlikely that anything will interrupt a BIOS update; however, if an interruption occurs, the BIOS could be damaged. Table 16 lists the drives and media types that can and cannot be used for BIOS recovery. The BIOS recovery media does not have to be bootable.

Table 16. Acceptable Drives/Media Types for BIOS Recovery

Media Type	Can be Used for BIOS Recovery?
CD-ROM drive connected to the SATA interface	Yes
USB removable drive (a USB Flash Drive, for example)	Yes
USB diskette drive (with a 1.44 MB diskette)	No
USB hard disk drive	No

NOTE

For more information about BIOS update and recovery, go to http://support.intel.com/support/motherboards/desktop/sb/CS-022312.htm.

A Board Status and Error Messages

This appendix describes status and error messages generated by the Desktop Board's BIOS. The BIOS indicates these error messages with front-panel Power LED blink codes, speaker beep codes, and by displaying text on the video monitor.

BIOS Beep Codes

The BIOS uses audible beep codes to signal status messages and error messages indicating recoverable errors that occur during the POST. The beep codes are listed in Table 17. These beep codes can be heard through a speaker attached to the board's line out audio jack (see Figure 2, B on page 15).

Table 17. BIOS Beep Codes

Type	Pattern	Frequency
F2 Setup/F10 Boot Menu Prompt	One 0.5-second beep when the BIOS is ready to accept keyboard input	932 Hz
Video error	On-off (1.0 second each) two times, then a 2.5-second pause (off); the entire pattern repeats (beeps and pause) once and the BIOS will continue to boot.	932 Hz When no VGA option ROM is found.
Memory error	On-off (1.0 second each) three times, then a 2.5-second pause (off); the entire pattern repeats (beeps and pause) until the system is powered off.	932 Hz
Thermal trip warning	Alternate high and low beeps (1.0 second each) for eight beeps, followed by system shut down.	High beep 2000 Hz Low beep 1500 Hz

53

BIOS Front-panel Power LED Blink Codes

The BIOS also blinks the front-panel power LED to signal status messages and error messages indicating certain recoverable errors that occur during the POST. The blink codes are listed in Table 18.

Table 18. BIOS Front-panel Power LED Blink Codes

Type	Pattern	Note
BIOS update in progress	Off when the update begins, then on for 0.5 second, and then off for 0.5 second. The pattern repeats until the BIOS update is complete.	
Video error	On-off (1.0 second each) two times, then a 2.5-second pause (off); the entire pattern repeats (blinks and pause) until the system is powered off.	When no VGA option ROM is found.
Memory error	On-off (1.0 second each) three times, then a 2.5-second pause (off); the entire pattern repeats (blinks and pause) until the system is powered off.	
Thermal trip warning	Each beep will be accompanied by the following blink pattern: 0.25 second on, 0.25 second off, 0.25 second on, 0.25 second off. This results in a total of 16 blinks followed by system shut down.	

POST Error Messages

The BIOS also displays error messages on the video monitor when certain recoverable errors occur during the POST. Table 19 lists the error messages with a brief description of each.

Table 19. POST Error Messages

Error Message	Explanation
CMOS Battery Low	The battery may be losing power.
CMOS Checksum Bad	The CMOS checksum is incorrect. The CMOS memory may have been corrupted. Run Setup to reset values.
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.

54

B Regulatory Compliance

This appendix contains the following regulatory compliance information for Intel Desktop Board D510MO:

- Safety standards
- European Union Declaration of Conformity statement
- Product Ecology statements
- Electromagnetic Compatibility (EMC) regulations
- Product certifications

Safety Standards

Intel Desktop Board D510MO complies with the safety standards stated in Table 20 when correctly installed in a compatible host system.

Table 20. Safety Standards

Regulation	Title
CSA/UL 60950-1, First Edition	Information Technology Equipment – Safety - Part 1: General Requirements (USA and Canada)
EN 60950-1:2006, Second Edition	Information Technology Equipment – Safety - Part 1: General Requirements (European Union)
IEC 60950-1:2005, Second Edition	Information Technology Equipment – Safety - Part 1: General Requirements (International)

Place Battery Marking

There is insufficient space on this Desktop Board to provide instructions for replacing and disposing of the Lithium ion coin cell battery. For system safety certification, the statement below or an equivalent statement is required to be permanently and legibly marked on the chassis near the battery.

⚠ **CAUTION**

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.

A suitable caution label is included with Intel Desktop Board D510MO.

European Union Declaration of Conformity Statement

We, Intel Corporation, declare under our sole responsibility that the product Intel® Desktop Board D510MO is in conformity with all applicable essential requirements necessary for CE marking, following the provisions of the European Council Directives 2004/108/EC (EMC Directive) and 2006/95/EC (Low Voltage Directive).

The product is properly CE marked demonstrating this conformity and is for distribution within all member states of the EU with no restrictions.

$$C\epsilon$$

This product follows the provisions of the European Directives 2004/108/EC and 2006/95/EC.

Čeština Tento výrobek odpovídá požadavkům evropských směrnic 2004/108/EC a 2006/95/EC.

Dansk Dette produkt er i overensstemmelse med det europæiske direktiv 2004/108/EC & 2006/95/EC.

Dutch Dit product is in navolging van de bepalingen van Europees Directief 2004/108/EC & 2006/95/EC.

Eesti Antud toode vastab Euroopa direktiivides 2004/108/EC ja 2006/95/EC kehtestatud nõuetele.

Suomi Tämä tuote noudattaa EU-direktiivin 2004/108/EC & 2006/95/EC määräyksiä.

Français Ce produit est conforme aux exigences de la Directive Européenne 2004/108/EC & 2006/95/EC.

Deutsch Dieses Produkt entspricht den Bestimmungen der Europäischen Richtlinie 2004/108/EC & 2006/95/EC.

Ελληνικά Το παρόν προϊόν ακολουθεί τις διατάξεις των Ευρωπαϊκών Οδηγιών 2004/108/EC και 2006/95/EC.

Magyar E termék megfelel a 2004/108/EC és 2006/95/EC Európai Irányelv előírásainak.

Icelandic Þessi vara stenst reglugerð Evrópska Efnahags Bandalagsins númer 2004/108/EC & 2006/95/EC.

Italiano Questo prodotto è conforme alla Direttiva Europea 2004/108/EC & 2006/95/EC.

Latviešu Šis produkts atbilst Eiropas Direktīvu 2004/108/EC un 2006/95/EC noteikumiem.

Lietuvių Šis produktas atitinka Europos direktyvų 2004/108/EC ir 2006/95/EC nuostatas.

Malti Dan il-prodott hu konformi mal-provvedimenti tad-Direttivi Ewropej 2004/108/EC u 2006/95/EC.

Norsk Dette produktet er i henhold til bestemmelsene i det europeiske direktivet 2004/108/EC & 2006/95/EC.

Polski Niniejszy produkt jest zgodny z postanowieniami Dyrektyw Unii Europejskiej 2004/108/EC i 2006/95/EC.

Portuguese Este produto cumpre com as normas da Diretiva Européia 2004/108/EC & 2006/95/EC.

Español Este producto cumple con las normas del Directivo Europeo 2004/108/EC & 2006/95/EC.

Slovensky Tento produkt je v súlade s ustanoveniami európskych direktív 2004/108/EC a 2006/95/EC.

Slovenščina Izdelek je skladen z določbami evropskih direktiv 2004/108/EC in 2006/95/EC.

Svenska Denna produkt har tillverkats i enlighet med EG-direktiv 2004/108/EC & 2006/95/EC.

Türkçe Bu ürün, Avrupa Birliği'nin 2004/108/EC ve 2006/95/EC yönergelerine uyar.

Product Ecology Statements

The following information is provided to address worldwide product ecology concerns and regulations.

Recycling Considerations

As part of its commitment to environmental responsibility, Intel has implemented the Intel® Product Recycling Program to allow retail consumers of Intel's branded products to return used products to selected locations for proper recycling.

Please consult http://www.intel.com/intel/other/ehs/product_ecology
for the details of this program, including the scope of covered products, available locations, shipping instructions, terms and conditions, etc.

中文

作为其对环境责任之承诺的部分，英特尔已实施 Intel Product Recycling Program
（英特尔产品回收计划），以允许英特尔品牌产品的零售消费者将使用过的产品退还至指定地点作恰当的重复使用处理。

请参考http://www.intel.com/intel/other/ehs/product_ecology
了解此计划的详情，包括涉及产品之范围、回收地点、运送指导、条款和条件等。

Deutsch

Als Teil von Intels Engagement für den Umweltschutz hat das Unternehmen das Intel Produkt-Recyclingprogramm implementiert, das Einzelhandelskunden von Intel Markenprodukten ermöglicht, gebrauchte Produkte an ausgewählte Standorte für ordnungsgemäßes Recycling zurückzugeben.

Details zu diesem Programm, einschließlich der darin eingeschlossenen Produkte, verfügbaren Standorte, Versandanweisungen, Bedingungen usw., finden Sie auf der http://www.intel.com/intel/other/ehs/product_ecology

Español

Como parte de su compromiso de responsabilidad medioambiental, Intel ha implantado el programa de reciclaje de productos Intel, que permite que los consumidores al detalle de los productos Intel devuelvan los productos usados en los lugares seleccionados para su correspondiente reciclado.

Consulte la http://www.intel.com/intel/other/ehs/product_ecology para ver los detalles del programa, que incluye los productos que abarca, los lugares disponibles, instrucciones de envío, términos y condiciones, etc.

Français

Dans le cadre de son engagement pour la protection de l'environnement, Intel a mis en œuvre le programme Intel Product Recycling Program (Programme de recyclage des produits Intel) pour permettre aux consommateurs de produits Intel de recycler les produits usés en les retournant à des adresses spécifiées.

Visitez la page Web http://www.intel.com/intel/other/ehs/product_ecology pour en savoir plus sur ce programme, à savoir les produits concernés, les adresses disponibles, les instructions d'expédition, les conditions générales, etc.

日本語

インテルでは、環境保護活動の一環として、使い終えたインテル
ブランド製品を指定の場所へ返送していただき、リサイクルを適切に行えるよう、インテル製品リサイクル
プログラムを発足させました。

対象製品、返送先、返送方法、ご利用規約など、このプログラムの詳細情報は、http://www.intel.com/intel/other/ehs/product_ecology （英語）をご覧ください。

Malay

Sebagai sebahagian daripada komitmennya terhadap tanggungjawab persekitaran, Intel telah melaksanakan Program Kitar Semula Produk untuk membenarkan pengguna-pengguna runcit produk jenama Intel memulangkan produk terguna ke lokasi-lokasi terpilih untuk dikitarkan semula dengan betul.

Sila rujuk http://www.intel.com/intel/other/ehs/product_ecology untuk mendapatkan butir-butir program ini, termasuklah skop produk yang dirangkumi, lokasi-lokasi tersedia, arahan penghantaran, terma & syarat, dsb.

58

Portuguese

Como parte deste compromisso com o respeito ao ambiente, a Intel implementou o Programa de Reciclagem de Produtos para que os consumidores finais possam enviar produtos Intel usados para locais selecionados, onde esses produtos são reciclados de maneira adequada.

Consulte o site http://www.intel.com/intel/other/ehs/product_ecology (em Inglês) para obter os detalhes sobre este programa, inclusive o escopo dos produtos cobertos, os locais disponíveis, as instruções de envio, os termos e condições, etc.

Russian

В качестве части своих обязательств к окружающей среде, в Intel создана программа утилизации продукции Intel (Product Recycling Program) для предоставления конечным пользователям марок продукции Intel возможности возврата используемой продукции в специализированные пункты для должной утилизации.

Пожалуйста, обратитесь на веб-сайт http://www.intel.com/intel/other/ehs/product_ecology за информацией об этой программе, принимаемых продуктах, местах приема, инструкциях об отправке, положениях и условиях и т.д.

Türkçe

Intel, çevre sorumluluğuna bağımlılığının bir parçası olarak, perakende tüketicilerin Intel markalı kullanılmış ürünlerini belirlenmiş merkezlere iade edip uygun şekilde geri dönüştürmesini amaçlayan Intel Ürünleri Geri Dönüşüm Programı'nı uygulamaya koymuştur.

Bu programın ürün kapsamı, ürün iade merkezleri, nakliye talimatları, kayıtlar ve şartlar v.s dahil bütün ayrıntılarını ögrenmek için lütfen http://www.intel.com/intel/other/ehs/product_ecology web sayfasına gidin.

59

Lead-free 2LI/Pb-free 2LI Board

The electronics industry is transitioning to European Union (EU) Restriction of Hazardous Substances (RoHS)-compliant products. The RoHS legislation restricts the use of six materials. One of these restricted materials is lead. Lead is the most common and problematic of the RoHS restricted materials.

There are exemptions in RoHS that allow the use of lead in some very limited locations in electronic products. Maximum lead concentration values have been established for RoHS-compliant electronic products that allow up to 1000 ppm of lead.
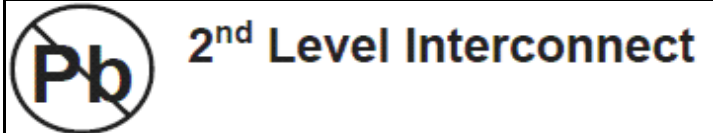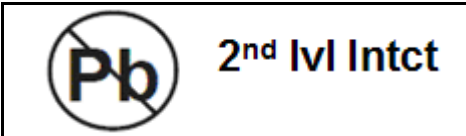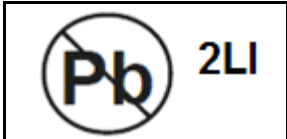
Lead-free/Pb-free is a nickname that is often used (or misused) for RoHS-compliant products. In this case, the term "Lead-free/Pb-free" means that lead has been removed where required by the RoHS legislation but still may exist as an impurity below 1000 ppm.

The term "Lead-free 2LI/Pb-free 2LI" means lead-free second level interconnect (2LI). The balls, leads, or pads used to connect the component to a printed circuit board are lead-free, but the first level interconnect (FLI) is not lead-free. The use of lead in the FLI is acceptable because of the RoHS "flip chip" or "die bump" interconnect exemption.

Intel Desktop Board D510MO is a lead-free second level interconnect product. Table 21 shows the lead-free second level interconnect marks as they appear on the board and accompanying collateral. These marks are based on JEDEC standard J-STD-609, "Marking and Labeling of Components, PCBs and PCBAs to Identify Lead, Lead Free and Other Attributes."

For more information concerning Intel's lead-free initiatives, refer to http://www.intel.com/technology/silicon/leadfree.htm.

Table 21. Lead-Free Second Level Interconnect Marks

Description	Mark
This symbol is used to identify electrical and electronic assemblies and components in which the Pb concentration level in the Desktop Board substrate and the solder connections from the board to the components (second-level interconnect) is not greater than 0.1% by weight (1000 ppm).	

Restriction of Hazardous Substances (RoHS)

European Union RoHS

EU RoHS Directive 2002/95/EC restricts the use of the following six materials in various types of electronic and electrical equipment:

- Lead
- Mercury
- Cadmium
- Hexavalent chromium
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

The maximum concentrations allowed are 0.1% or 1000 ppm (except for cadmium, which is limited to 0.01% or 100 ppm) by weight of homogeneous material.

Intel Desktop Board D510MO complies with these restrictions.

China RoHS

"China RoHS" is the term used by industry generally to describe legislation implemented by the Ministry of Information Industry (MII) in the People's Republic of China for the control of pollution by electronic information products (EIP). The official title of the China RoHS regulation is "Management Methods for Controlling Pollution by Electronic Information Products."

China RoHS bans the same substances and has the same limits as EU RoHS. However, the China RoHS regulation requires specific product marking and a self-declaration of the controlled substances contained in each product.

Intel Desktop Board D510MO is a China RoHS-compliant product.

The required China RoHS mark indicates the product's Environmental Friendly Usage Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for Intel Desktop Boards has been determined to be 10 years.

The EFUP for Intel Desktop Board D510MO is shown in Table 22.

Table 22. China RoHS Environmentally Friendly Use Period Mark

Description	Mark
This is an example of the symbol used on Intel Desktop Boards and associated collateral. The color of the mark may vary depending upon the application. The Environmental Friendly Usage Period (EFUP) for Intel Desktop Boards has been determined to be 10 years.	

The China MII also stipulates that a material Self Declaration Table (SDT) must be included in a product's user documentation. The SDT for Intel Desktop Board D510MO is shown in Figure 17.

关于符合中国《电子信息产品污染控制管理办法》的声明

Management Methods on Control of Pollution from

Electronic Information Products

(China RoHS declaration)

产品中有毒有害物质的名称及含量

部件名称 (Parts)	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主板组件 Motherboard Assembly	×	○	○	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。

○：Indicates that this hazardous substance contained in all homogeneous materials of this part is below the limit requirement in SJ/T 11363-2006.

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。

×：Indicates that this hazardous substance contained in at least one of the homogeneous materials of this part is above the limit requirement in SJ/T 11363-2006.

对销售之日的所售产品,本表显示我公司供应链的电子信息产品可能包含这些物质。注意：在所售产品中可能会也可能不会含有所有所列的部件.

This table shows where these substances may be found in the supply chain of our electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product.

Figure 17. Intel Desktop Board D510MO China RoHS Material Self Declaration Table

EMC Regulations

Intel Desktop Board D510MO complies with the EMC regulations stated in Table 23 when correctly installed in a compatible host system.

Table 23. EMC Regulations

Regulation (Class B)	Title
FCC 47 CFR Part 15, Subpart B	Title 47 of the Code of Federal Regulations, Part 15, Subpart B, Radio Frequency Devices. (USA)
ICES-003 Issue 4	Interference-Causing Equipment Standard, Digital Apparatus. (Canada)
EN55022:2006	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (European Union)
EN55024:1998	Information Technology Equipment – Immunity Characteristics Limits and methods of measurement. (European Union)
EN55022:2006	Australian Communications Authority, Standard for Electromagnetic Compatibility. (Australia and New Zealand)
CISPR 22:2005 +A1:2005 +A2:2006	Limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment. (International)
CISPR 24:1997 +A1:2001 +A2:2002	Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement. (International)
VCCI V-3/2007.04, V-4/2007.04	Voluntary Control for Interference by Information Technology Equipment (Japan)
KN-22, KN-24	Korean Communications Commission – Framework Act on Telecommunications and Radio Waves Act. (South Korea).
CNS 13438:2006	Bureau of Standards, Metrology and Inspection. (Taiwan)

Japanese Kanji statement translation: This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

Korean Class B statement translation: This is household equipment that is certified to comply with EMC requirements. You may use this equipment in residential environments and other non-residential environments.

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Ensure Electromagnetic Compatibility (EMC) Compliance

Before computer integration, make sure that the power supply and other modules or peripherals, as applicable, have passed Class B EMC testing and are marked accordingly.

Pay close attention to the following when reading the installation instructions for the host chassis, power supply, and other modules:

- Product certifications or lack of certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mating the wrong connectors could be hazardous

If the power supply and other modules or peripherals, as applicable, are not Class B EMC compliant before integration, then EMC testing may be required on a representative sample of the newly completed computer.

Product Certifications

Board-Level Certification Markings

Intel Desktop Board D510MO has the product certification markings shown in Table 24.

Table 24. Product Certification Markings

Description	Mark
UL joint US/Canada Recognized Component mark. Includes adjacent UL file number for Intel Desktop Boards: E210882.	
FCC Declaration of Conformity logo mark for Class B equipment. Includes Intel name and D510MO model designation.	
CE mark. Declaring compliance to European Union (EU) EMC directive and Low Voltage directive.	
Australian Communications Authority (ACA) and New Zealand Radio Spectrum Management (NZ RSM) C-tick mark. Includes adjacent Intel supplier code number, N-232.	
Japan VCCI (Voluntary Control Council for Interference) mark.	
S. Korea KCC (Korean Communications Commission) mark. Includes adjacent KCC certification number: CPU-D510MO (B).	
Taiwan BSMI (Bureau of Standards, Metrology and Inspections) mark. Includes adjacent Intel company number, D33025.	
Printed wiring board manufacturer's recognition mark. Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (solder side).	V-0

Chassis and Component Certifications

Ensure that the chassis and certain components; such as the power supply, peripheral drives, wiring, and cables; are components certified for the country or market where used. Agency certification marks on the product are proof of certification. Typical product certifications include:

In Europe

The CE marking signifies compliance with all applicable European requirements. If the chassis and other components are not properly CE marked, a supplier's Declaration of Conformity statement to the European EMC directive and Low Voltage directive (as applicable), should be obtained. Additionally, other directives, such as the Radio and Telecommunications Terminal Equipment (R&TTE) directive may also apply depending on product features.

In the United States

A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. Wiring and cables must also be UL listed or recognized and suitable for the intended use. The FCC Class B logo for home or office use signifies compliance with electromagnetic interference (EMI) requirements.

In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. The Industry Canada statement at the front of this product guide demonstrates compliance with Canadian EMC regulations.

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