BT100
Mini-ITX Industrial Motherboard
User's Manual
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Trademarks

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FCC and DOC Statement on Class B

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 when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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 into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.
Table of Contents

Copyright ............................................................................................................. 2
Trademarks ........................................................................................................ 2
FCC and DOC Statement on Class B ................................................................. 2
About this Manual .......................................................................................... 4
Warranty ............................................................................................................ 4
Static Electricity Precautions ............................................................................ 4
Safety Measures ............................................................................................... 4
About the Package............................................................................................ 5

Chapter 1 - Introduction .................................................................................. 6
Specifications ................................................................................................... 6
Features ............................................................................................................. 7

Chapter 2 - Hardware Installation ................................................................. 9
Board Layout ................................................................................................... 9
System Memory .............................................................................................. 9
Installing the DIMM Module .......................................................................... 10
Installing the Heat Sink ................................................................................... 11
Jumper Settings .............................................................................................. 12
PS/2 Keyboard/Mouse Power Select ............................................................... 12
USB Power Select .......................................................................................... 13
Clear CMOS Data .......................................................................................... 13
LCD/Inverter Power Select ............................................................................ 14
Panel Power Select ......................................................................................... 14
Backlight Power Select .................................................................................. 15
Dimming Mode Select ................................................................................... 15
COM 1/COM 3 RS232/422/485 Select ............................................................... 16
COM 1/COM 3 RS232/Power Select ................................................................. 17
Auto Power-on Select .................................................................................... 17
Digital I/O Power Select ................................................................................ 18
Digital I/O Output State ................................................................................ 18
Mini PCIe/mSATA Signal Select .................................................................... 19
Mini PCIe/mSATA Power Select .................................................................... 19
SATA 1/mSATA Signal Select ....................................................................... 20
SATA DOM Power Select ............................................................................... 20
Rear Panel I/O Ports ...................................................................................... 21
COM (Serial) Ports ......................................................................................... 21
Graphics Interfaces ......................................................................................... 22
RJ45 LAN Ports .............................................................................................. 23

Chapter 3 - BIOS Setup ................................................................................ 33
Overview ....................................................................................................... 33
AMI BIOS Setup Utility .................................................................................. 34
Main ............................................................................................................... 34
Advanced ....................................................................................................... 34
Chipset ............................................................................................................ 44
Security .......................................................................................................... 49
Boot ................................................................................................................ 49
Save & Exit ..................................................................................................... 50
Updating the BIOS ......................................................................................... 50
Notice: BIOS SPI ROM .................................................................................. 51

Chapter 4 - Supported Software ................................................................... 52

Chapter 5 - Digital I/O Programming Guide ................................................ 65

Appendix A - Watchdog Sample Code ......................................................... 67

Appendix B - System Error Message ............................................................. 68

Appendix C - Troubleshooting ...................................................................... 70
About this Manual

An electronic file of this manual is included in the CD. To view the user's manual in the CD, insert the CD into a CD-ROM drive. The autorun screen (Main Board Utility CD) will appear. Click "User's Manual" on the main menu.

Warranty

1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.

2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.

3. Unless otherwise instructed in this user’s manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.

4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.

2. Wear an antistatic wrist strap.

3. Do all preparation work on a static-free surface.

4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.

5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

Safety Measures

To avoid damage to the system:

- Use the correct AC input voltage range.

To reduce the risk of electric shock:

- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.
About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One BT100 motherboard
- One Serial ATA data cable
- One I/O shield
- One DVD
- One QR (Quick Reference)
- One Heat sink

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance to the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Optional Items

- USB port cable (2.54mm)
- USB port cable (2.0mm)
- COM port cable
- Serial ATA data cable

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance to the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- Memory module
- Storage devices such as hard disk drive, CD-ROM, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.
Chapter 1 - Introduction

Specifications

**Processor**
- Intel® Atom™/Intel® Celeron® processors
  - E45: Intel® Atom™ E8454, Quad Core, 2M Cache, 1.91GHz, 10W
  - E15: Intel® Atom™ E8115, Single Core, 0.5M Cache, 1.46GHz, 5W
  - J00: Intel® Celeron® J1900, Quad Core, 2M Cache, 2GHz (2.41GHz), 10W
- 8GB 1.170 packaging technology
- 2mm process technology

**Super I/O Address**
- NCT6106/4Eh (BT100-xC)
- NCT6102/4Eh (BT100-xD)

**System Memory**
- Two 204-pin DDR3L SODIMM sockets (-E45/-J00)
  - up to 8GB system memory
  - dual channel memory interface
- One 204-pin DDR3L SODIMM socket (-E15)
  - up to 4GB system memory
  - single channel memory interface
- Supports DDR3L 1600MHz (-E45/-J00)
- Supports DDR3L 1333MHz (-E45/-J00)
- DRAM device technologies: 1Gb, 2Gb and 4Gb DDR3L DRAM technologies are supported for x8 and x16 devices, unbuffered, non-ECC

**Expansion Interfaces**
- 1 PCIe x4 slot
  - x1 signal
- 1 Mini PCIe slot
  - Supports USB and PCIe signals
  - Supports mSATA
  - Supports half size or full size Mini PCIe card

**Graphics**
- Intel® HD Graphics
- Display ports: 1 DVI-D, 1 VGA, 1 LVDS
  - DVI-D: resolution up to 1920x1080 @60Hz
  - VGA: 24-bit, resolution up to 2560x1600 @60Hz
  - LVDS: XGA P76406, 24-bit, dual channel, resolution up to 1920x1200 @60Hz
- Supports hardware acceleration for DirectX 11, OCL 1.2, OGL 4.0, H.264, MPEG2, VC-1, WMV9 and VP8 (supported version dependent on OS)

**Audio**
- Realtek ALC888 5.1-channel High Definition Audio
- S/PDIF audio interface

**LAN**
- 2 Intel® I210AT PCI Express Gigabit Ethernet controllers
- Integrated 10/100/1000 transceiver
- Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab

**Serial ATA**
- 2 SATA 2.0 ports with data transfer rate up to 3Gb/s
  - SATA port 0 provides adequate space for SATA DOM
  - SATA port 1 multiplexed with mSATA (Mini PCIe)
- Integrated Advanced Host Controller Interface (AHCI) controller

**Trusted Platform Module - TPM** (optional)
- Provides a Trusted PC for secure transactions
- Provides software license protection, enforcement and password protection

**WatchDog Timer**
- Watchdog timeout programmable via software from 1 to 255 seconds

**BIOS**
- AMI BIOS
- 64Mbit SPI BIOS

**Rear Panel I/O Ports**
- 2 DB-9 serial ports
  - 1 RS232/422/485 (RS232 and/or power)
  - 1 RS232
  - 1 DVI-I port (DVI-D signal)
  - 1 VGA port
  - 2 RJ45 LAN ports
  - 3 USB 2.0 ports
  - 1 USB 3.0 port
  - Mic-in, Line-out jacks (default) or Mic-in, Line-in, Line-out jacks* (optional)

**I/O Connectors**
- 2 connectors for 3 external USB 2.0 ports; or
  - 1 connector for 2 external USB 2.0 ports and 1 vertical USB 2.0/1.1 port* (optional)
- 4 connectors for 4 external serial ports (2.0mm pitch) - BT100-xC
  - 1 RS232/422/485 (RS232 and/or power)
  - 3 RS232
- 1 LVDS LCD panel connector
- 1 LCD/inverter power connector
- 1 8-bit DIO and/or power connector
- 1 front audio connector for line-out and mic-in jacks
- 1 S/PDIF connector
- 1 PS/2 connector for keyboard/mouse port
- 1 LPC connector
- 1 SMBus connector* (optional)
- 1 LAN LED connector
- 2 Serial ATA connectors
- 1 24-pin ATX power connector
- 1 front panel connector
- 1 chassis intrusion connector
- 1 fan connector

**Energy Efficient Design**
- Supports ErP Lot6 power saving* (optional)
- Supports ACPI
- System Power Management
- Wake-On-Events include:
  - Wake-On-USB/PS/2 KB/Mouse* (optional)
  - Wake-On-LAN
  - RTC timer to power-on the system
- AC power failure recovery

**Damage Free Intelligence**
- Monitors CPU/system temperature and overheat alarm
- Monitors V CORE/12V/5V/3.3V voltages and failure alarm
- Monitors CPU fan speed and failure alarm
- Read back capability that displays temperature, voltage and fan speed

**Power Consumption**
- BT100-TC-E45: 12.18W with E3845 at 1.91GHz and 2x 4GB DDR3L SODIMM

**OS Support**
- Windows 7 Ultimate x86 & SP1 (32-bit)
- Windows 7 Ultimate x64 & SP1 (64-bit)
- Windows 8.1 Enterprise x86 (32-bit)
- Windows 8.1 Enterprise x64 (64-bit)
- Windows 8.1 Embedded Pro x86 (32Bit)
- Windows 8.1 Embedded Pro x64 (64Bit)
Chapter 1

Features

• **Watchdog Timer**

  The Watchdog Timer function allows your application to regularly “clear” the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

• **DDR3L**

  DDR3L is a higher performance DDR3 SDRAM interface providing less voltage and higher speed successor. DDR3L SDRAM modules support 1066/1333MHz for DDR modules. DDR3L delivers increased system bandwidth and improved performance to provide its higher bandwidth and its increase in performance at a lower power.

• **Graphics**

  The integrated Intel® HD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with outstanding graphics responsiveness. These enhancements deliver the performance and compatibility needed for today’s and tomorrow’s business applications. Supports DVI-D, VGA and LVDS interfaces for 3 display outputs.

• **PCI Express**

  PCI Express is a high bandwidth I/O infrastructure that possesses the ability to scale speeds by forming multiple lanes. The PCI Express architecture also supports high performance graphics infrastructure by enhancing the capability of a PCIe x4.

• **Serial ATA**

  Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 3Gb/s (SATA 2.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s.

**Gigabit LAN**

Two Intel® I210AT Gigabit LAN controllers support up to 1Gbps data transmission.

• **Audio**

  The Realtek ALC888 audio codec provides 5.1-channel High Definition audio output.
• **RTC Timer**

The RTC installed on the system board allows your system to automatically power-on on the set date and time.

• **Power Failure Recovery**

When power returns after an AC power failure, you may choose to either power-on the system manually or let the system power-on automatically.

• **USB**

The system board supports the new USB 3.0. It is capable of running at a maximum transmission speed of up to 5 Gbit/s (625 MB/s) and is faster than USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.0 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

• **Wake-On-LAN**

This feature allows the network to remotely wake up a Soft Power Down (Soft-Off) PC. It is supported via the onboard LAN port or via a PCI LAN card that uses the PCI PME (Power Management Event) signal. However, if your system is in the Suspend mode, you can power-on the system only through an IRQ or DMA interrupt.

**Important:**
The 5V_standby power source of your power supply must support ≥720mA.

• **Wake-On-PS/2 (optional)**

This function allows you to use the PS/2 keyboard or PS/2 mouse to power-on the system.

**Important:**
The 5V_standby power source of your power supply must support ≥720mA.

• **Wake-On-USB (optional)**

This function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

**Important:**
If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the 5V_standby power source of your power supply must support ≥1.5A. For 3 or more USB ports, the 5V_standby power source of your power supply must support ≥2A.

• **ACPI STR**

The system board is designed to meet the ACPI (Advanced Configuration and Power Interface) specification. ACPI has energy saving features that enables PCs to implement Power Management and Plug-and-Play with operating systems that support OS Direct Power Management. ACPI when enabled in the Power Management Setup will allow you to use the Suspend to RAM function.

With the Suspend to RAM function enabled, you can power-off the system at once by pressing the power button or selecting “Standby” when you shut down Windows® without having to go through the sometimes tiresome process of closing files, applications and operating system. This is because the system is capable of storing all programs and data files during the entire operating session into RAM (Random Access Memory) when it powers-off. The operating session will resume exactly where you left off the next time you power-on the system.

**Important:**
The 5V_standby power source of your power supply must support ≥720mA.
Chapter 2 - Hardware Installation

Board Layout

- BT100-xC: 6 COM (COM 1 to COM 6)
- BT100-xD: 2 COM (COM 1 and COM 2)

System Memory

- Two 204-pin DDR3L SODIMM sockets (-E45/-J00)
  - up to 8GB system memory
  - dual channel memory interface
- One 204-pin DDR3L SODIMM socket (-E15)
  - up to 4GB system memory
  - single channel memory interface
- Supports DDR3L 1333MHz (-E45/-J00)
  Supports DDR3L 1066MHz (-E15)

Important:
- Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. 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 system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Important:
- When the Standby Power LED lights red, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.
The system board supports the following memory interface.

**Single Channel (SC)**

Data will be accessed in chunks of 64 bits (8B) from the memory channels.

**Dual Channel (DC)**

Data will be accessed in chunks of 128 bits from the memory channels. Dual channel provides better system performance because it doubles the data transfer rate.

---

**Important:**

1. The DDR3L sockets support no mixed Raw Card.
2. For dual channel population, the two channels must be populated the same DRAM density, chip width, number ranks and dimm speed.
3. When using DDR3L which supports 1600Mhz clock speed or more, the maximum clock speed is up to 1333Mhz (-E45/-J00) and 1066Mhz (-E15).

---

The memory data rate is fixed for each SKU. For example, a SKU that supports 1333 MT/s will only run at 1333 MT/s, nothing lower. For single channel use cases, Channel 0 must be used.

**Raw Card Support Matrix for 2 SODIMM Configuration--DDR3L**

<table>
<thead>
<tr>
<th>SODIMM</th>
<th>Raw Card B</th>
<th>Raw Card C</th>
<th>Raw Card F</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIMM0</td>
<td>B</td>
<td>C</td>
<td>F</td>
</tr>
<tr>
<td>SODIMM1</td>
<td>B</td>
<td>C</td>
<td>F</td>
</tr>
</tbody>
</table>

- DDR3L SO-DIMM Modules (unbuffered)
  - Raw Card B = 1 rank of x8 SDRAM
  - Raw Card C = 1 rank of x16 SDRAM
  - Raw Card F = 2 ranks of x3 SDRAM

**Supported DDR3L SO-DIMM Size**

<table>
<thead>
<tr>
<th>DRAM Chip Density</th>
<th>Module Size</th>
<th># of chips needed</th>
<th>DRAM Chip Data Width</th>
<th>Data Bus Width</th>
<th># of Ranks needed</th>
<th># of chips /rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Gbit</td>
<td>2GB</td>
<td>16</td>
<td>x8</td>
<td>x64</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>2Gbit</td>
<td>1GB</td>
<td>4</td>
<td>x16</td>
<td>x64</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2Gbit</td>
<td>2GB</td>
<td>8</td>
<td>x8</td>
<td>x64</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>4Gbit</td>
<td>4GB</td>
<td>16</td>
<td>x8</td>
<td>x64</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>4Gbit</td>
<td>8GB</td>
<td>16</td>
<td>x8</td>
<td>x64</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

---

**Installing the DIMM Module**

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SODIMM socket on the system board.
4. Note the key on the socket. The key ensures the module can be plugged into the socket in only one direction.
5. Grasping the module by its edges, align the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.

6. Push down the module until the clips at each end of the socket lock into position. You will hear a distinctive “click”, indicating the module is correctly locked into position.

---

**Important:**
When installing one DDR3L SODIMM only, make sure to install it into the SODIMM 1 socket.

---

**Installing the Heat Sink**

The CPU must be kept cool by using a CPU fan with heat sink. Without sufficient air circulation across the CPU and heat sink, the CPU will overheat damaging both the CPU and system board.

1. On the solder side of the board, match the retention module base to the mounting holes around the CPU socket.

2. Turn to the component side of the board making sure the retention module base is positioned and fitted properly under the board.

3. Apply a thin layer of thermal paste on top of the CPU. Do not spread the paste all over the surface. When you later place the heat sink on top, the compound will disperse evenly.
4. Place the heat sink assembly on top of the CPU. The 4 screws around the heat sink must match the screw holes of the retention module base. We strongly recommend using this type of heat sink assembly because it provides adequate cooling to the components of the system board.

Turn each Phillips head screw half way down first to initially stabilize the heat sink onto the board, then finally tighten each screw.

**Important:**
Do not turn the first screw all the way down followed by the next and so on. This is to avoid imbalance which might cause cracks or fractures to the CPU and/or heat sink assembly.

4. Place the heat sink assembly on top of the CPU. The 4 screws around the heat sink must match the screw holes of the retention module base. We strongly recommend using this type of heat sink assembly because it provides adequate cooling to the components of the system board.

Turn each Phillips head screw half way down first to initially stabilize the heat sink onto the board, then finally tighten each screw.

**Important:**
Do not turn the first screw all the way down followed by the next and so on. This is to avoid imbalance which might cause cracks or fractures to the CPU and/or heat sink assembly.

### Jumper Settings

#### PS/2 Keyboard/ Mouse Power Select

**JP10**

1-2 On: +5V (default)

2-3 On: +5V_standby

**Important:**
The +5VSB power source of your power supply must support ≥720mA.
Chapter 2 Hardware Installation

**USB Power Select**

JP5, JP6, JP18 and JP21 are used to select the power of the USB ports. Selecting +5V_standby will allow you to use a USB device to wake up the system.

**Important:**
If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the +5V_standby power source of your power supply must support ≥1.5A. For 3 or more USB ports, the +5V_standby power source of your power supply must support ≥2A.

---

**Clear CMOS Data**

If you encounter the followings,

a) CMOS data becomes corrupted.
b) You forgot the supervisor or user password.

you can reconfigure the system with the default values stored in the ROM BIOS.

To load the default values stored in the ROM BIOS, please follow the steps below.

1. Power-off the system and unplug the power cord.
2. Set JP26 pins 2 and 3 to On. Wait for a few seconds and set JP26 back to its default setting, pins 1 and 2 On.
3. Now plug the power cord and power-on the system.
**Chapter 2 Hardware Installation**

**LCD/Inverter Power Select**

JP14 is used to select the power level of the LCD/inverter power connector.

1-2 On: +12V
2-3 On: +5V (default)

**Panel Power Select**

JP15 is used to select the power supplied with the LCD panel.

1-2 On: +12V
3-4 On: +5V
5-6 On: +3.3V (default)

**Important:**
Before powering-on the system, make sure that the power settings of JP15 match the LCD panel's specification. Selecting the incorrect voltage will seriously damage the LCD panel.
**Backlight Power Select**

JP13 is used to select the power level of backlight brightness control: +5V or +3.3V.

**Important:**
Before powering-on the system, make sure that the power settings of JP13 match the power specification of backlight control. Selecting the incorrect voltage will seriously damage the backlight.

**Dimming Mode Select**

JP17 allows you to select the mode for the lightness control of the LVDS panel.

**Important:**
You need to refer to your panel’s user guide to determine the type of mode (PWM or Voltage) most appropriate for your panel.
COM 1/ COM 3 RS232/ 422/ 485 Select

These jumpers allow you to configure the Serial COM ports to RS232, RS422 (Full Duplex) or RS485. JP1, JP2 and JP4 are used to configure the Serial COM port 1. JP7, JP8 and JP12 are used to configure the Serial COM port 3. The pin functions of Serial COM port 1 and COM port 3 will vary according to these jumpers’ setting.

**Note:**
COM 1/COM 3 RS232/Power Select

JP3 (for COM 1) and JP11 (for COM 3) are used to configure the Serial COM ports to pure RS232 or RS232 with power.

Auto Power-on Select

JP16 is used to select the method of powering on the system. If you want the system to power-on whenever AC power comes in, set JP16 pins 2 and 3 to On. If you want to use the power button, set pins 1 and 2 to On.

When using the JP16 "Power On" feature to power the system back on after a power failure occurs, the system may not power on if the power lost is resumed within 5 seconds (power flicker).
Chapter 2 Hardware Installation

Digital I/O Power Select

JP23 is used to select the power of Digital I/O signal.

Digital I/O Output State

Based on the power level of DIO (Digital I/O) selected on JP23, JP25 (DIO pin 3/5/7/9) and JP24 (DIO pin 11/13/15/17) are used to select the output state of Digital I/O: pull high or pull low. When selecting pull high, the power selection will be the same as JP23's setting.
Mini PCIe/ mSATA Signal Select

JP19 is used to select the Mini PCIe signal: PCIe or mSATA.

Mini PCIe/ mSATA Power Select

JP20 is used to select the power supplied with the Mini PCIe.
**SATA 1/ mSATA Signal Select**

JP22 is designed to select the SATA or mSATA signal for the SATA port 1.

**SATA DOM Power Select**

JP9 is used to select the power level of SATA DOM.

*Note: SATA port 0 provides adequate space for SATA DOM.*
Rear Panel I/O Ports

The rear panel I/O ports consist of the following:

- 2 Serial COM ports
- 1 DVI-I port (DVI-D signal)
- 1 VGA port
- 2 RJ45 LAN ports
- 3 USB 2.0 ports
- 1 USB 3.0 port
- 1 Line-out jack
- 1 Mic-in jack

COM (Serial) Ports

COM 2, COM 4, COM 5 and COM 6 are fixed at RS232.

The pin functions of COM port 1 and COM port 3 will vary according to jumpers’ setting. These jumpers allow you to configure the Serial COM ports to RS232, RS422 (Full Duplex) or RS485. JP1, JP2 and JP4 are used to configure the Serial COM port 3. Refer to “COM 1/COM 3 RS232/422/485 Select” and “COM 1/COM 3 RS232/Power Select” in this chapter for more information.

The serial ports are asynchronous communication ports with 16C550A-compatible UARTs that can be used with modems, serial printers, remote display terminals, and other serial devices.
Connecting External Serial Ports

Your COM port may come mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then insert the serial port cable to the COM connector. Make sure the colored stripe on the ribbon cable is aligned with pin 1 of the COM connector.

**BIOS Setting**

Configure the serial COM ports in the Advanced menu ("Super IO Configuration" submenu) of the BIOS. Refer to the chapter 3 for more information.

**Note:**
2. BT100-xC: 6 COM (COM 1 to COM 6).
   BT100-xD: 2 COM (COM 1 and COM 2).

Graphics Interfaces

The display ports consist of the following:
- 1 VGA port
- 1 DVI-I port (DVI-D signal)

**VGA Port**

The VGA port is used for connecting a VGA monitor. Connect the monitor’s 15-pin D-shell cable connector to the VGA port. After you plug the monitor’s cable connector into the VGA port, gently tighten the cable screws to hold the connector in place.

**DVI-I Port (DVI-D signal)**

The DVI-I port is used to connect an LCD monitor. This port supports DVI-D signal only. Connect the display device’s cable connector to the DVI-I port. After plugging the cable connector into the port, gently tighten the cable screws to hold the connector in place.

**Driver Installation**

Install the graphics driver. Refer to chapter 4 for more information.
**RJ45 LAN Ports**

**Features**
- 2 Intel® I210AT PCI Express Gigabit Ethernet controllers

The LAN ports allow the system board to connect to a local area network by means of a network hub.

**BIOS Setting**
Configure the onboard LAN in the Chipset menu (“South Bridge Configuration” submenu) of the BIOS. Refer to chapter 3 for more information.

**Driver Installation**
Install the LAN drivers. Refer to chapter 4 for more information.

---

**USB Ports**

**The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.**

The system board is equipped with one onboard USB 3.0 port (USB 2) and three onboard USB 2.0 ports (USB 0, USB 1 and USB 3). The 10-pin connector allows you to connect 2 additional USB 2.0 ports (USB 6-7). The USB port 5 is the mini USB device for the external hard drive. The additional USB ports may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis and then insert the USB port cables to a connector.

**BIOS Setting**
Configure the onboard USB in the Advanced menu (“USB Configuration” submenu) of the BIOS. Refer to chapter 3 for more information.

**Driver Installation**
You may need to install the proper drivers in your operating system to use the USB device. Refer to your operating system’s manual or documentation for more information.
Wake-On-USB Keyboard/ Mouse
The Wake-On-USB Keyboard/Mouse function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state. To use this function:

- **Jumper Setting**


### Important:
1. If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the +5V_standby power source of your power supply must support $\geq 1.5A$. For 3 or more USB ports, the +5V_standby power source of your power supply must support $\geq 2A$.
2. When installing Windows 7, only native USB 2.0 devices (USB port 0 to USB port 3) can operate under DOS mode. Please refer to the following tables for more information on the type of USB ports.

#### Table 1. OS Selection

<table>
<thead>
<tr>
<th>Operation Environment for Customers</th>
<th>DOS</th>
<th>Windows 7</th>
<th>Windows 8.x</th>
<th>Linux</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS Selection in the BIOS Advanced Menu</td>
<td>Windows 8.x</td>
<td>Windows 7</td>
<td>Windows 8.x</td>
<td>Windows 8.x</td>
</tr>
<tr>
<td>Available USB ports</td>
<td>All</td>
<td>When installing Windows 7 first time, only native USB 2.0 ports can work. Please refer to the USB type in table 2 below.</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

#### Table 2. The Type of USB Ports

<table>
<thead>
<tr>
<th>Model Name</th>
<th>BT100</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB 3.0</td>
<td>Native</td>
</tr>
<tr>
<td>USB 0</td>
<td>Native</td>
</tr>
<tr>
<td>USB 1</td>
<td>Native</td>
</tr>
<tr>
<td>USB 2</td>
<td>Native (share with USB 3.0 port)</td>
</tr>
<tr>
<td>USB 3</td>
<td>Native</td>
</tr>
<tr>
<td>USB 4</td>
<td>HSIC port 0 for Mini PCIe</td>
</tr>
<tr>
<td>USB 5</td>
<td>HSIC port 1</td>
</tr>
<tr>
<td>USB 6</td>
<td>HSIC port 2</td>
</tr>
<tr>
<td>USB 7</td>
<td>HSIC port 3</td>
</tr>
</tbody>
</table>

### Audio

#### Rear Audio
The system board is equipped with 2 audio jacks. A jack is a one-hole connecting interface for inserting a plug.

- **Line-out Jack (Lime)**
  This jack is used to connect a headphone or external speakers.
- **Mic-in/Center+Subwoofer Jack (Pink)**
  This jack is used to connect an external microphone.

#### Front Audio
The front audio connector allows you to connect to the second line-out and mic-in jacks that are at the front panel of your system.

#### Driver Installation
Install the audio driver. Refer to the chapter 4 for more information.
I/O Connectors

Digital I/O and/or Power Connector

The 8-bit Digital I/O connector provides powering-on function to external devices that are connected to these connectors. The pin functions of the 8-bit digital I/O connector are listed below.

<table>
<thead>
<tr>
<th>Pins</th>
<th>Pin Assignment</th>
<th>Pins</th>
<th>Pin Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>2</td>
<td>+12V</td>
</tr>
<tr>
<td>3</td>
<td>DIO7</td>
<td>4</td>
<td>+12V</td>
</tr>
<tr>
<td>5</td>
<td>DIO6</td>
<td>6</td>
<td>GND</td>
</tr>
<tr>
<td>7</td>
<td>DIO5</td>
<td>8</td>
<td>+5V</td>
</tr>
<tr>
<td>9</td>
<td>DIO4</td>
<td>10</td>
<td>+5V</td>
</tr>
<tr>
<td>11</td>
<td>DIO3</td>
<td>12</td>
<td>GND</td>
</tr>
<tr>
<td>13</td>
<td>DIO2</td>
<td>14</td>
<td>+5V_Standby</td>
</tr>
<tr>
<td>15</td>
<td>DIO1</td>
<td>16</td>
<td>+5V_Standby</td>
</tr>
<tr>
<td>17</td>
<td>DIO0</td>
<td>18</td>
<td>GND</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SATA (Serial ATA) Connectors

- 2 Serial ATA 2.0 ports
- SATA 0 and SATA 1 ports with data transfer rate up to 3Gb/s
- Integrated Advanced Host Controller Interface (AHCI) controller

The Serial ATA connectors are used to connect Serial ATA devices. Connect one end of the Serial ATA data cable to a SATA connector and the other end to your Serial ATA device.

Features

- 2 Serial ATA 2.0 ports
- SATA 0 and SATA 1 ports with data transfer rate up to 3Gb/s
- Integrated Advanced Host Controller Interface (AHCI) controller

The Serial ATA connectors are used to connect Serial ATA devices. Connect one end of the Serial ATA data cable to a SATA connector and the other end to your Serial ATA device.

BIOS Setting

Configure the Serial ATA drives in the Advanced menu ("IDE Configuration" submenu) of the BIOS. Refer to chapter 3 for more information.
Chapter 2

Front Panel Connector

**HDD-LED - HDD LED**
This LED will light when the hard drive is being accessed.

**RESET-SW - Reset Switch**
This switch allows you to reboot without having to power off the system.

**PWR-BTN - Power Switch**
This switch is used to power on or off the system.

**PWR-LED - Power/Standby LED**
When the system’s power is on, this LED will light. When the system is in the S1 (POS - Power On Suspend) state, it will blink every second. When the system is in the S3 (STR - Suspend To RAM) state, it will blink every 4 seconds.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Pin Assignment</th>
<th>Pin</th>
<th>Pin Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD-LED</td>
<td></td>
<td>2</td>
<td>LED Power</td>
</tr>
<tr>
<td>3</td>
<td>HDD Power</td>
<td>5</td>
<td>Signal</td>
</tr>
<tr>
<td>5</td>
<td>Signal</td>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
<td>9</td>
<td>RST Signal</td>
</tr>
<tr>
<td>9</td>
<td>RST Signal</td>
<td>11</td>
<td>N.C.</td>
</tr>
<tr>
<td>11</td>
<td>N.C.</td>
<td>10</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Chassis Intrusion Connector

The board supports the chassis intrusion detection function. Connect the chassis intrusion sensor cable from the chassis to this connector. When the system’s power is on and a chassis intrusion occurred, an alarm will sound. When the system’s power is off and a chassis intrusion occurred, the alarm will sound only when the system restarts.
Chapter 2 Hardware Installation

LVDS LCD Panel Connector

The system board allows you to connect a LCD Display Panel by means of the LVDS LCD panel connector and the LCD/Inverter power connector. These connectors transmit video signals and power from the system board to the LCD Display Panel.

Refer to the right side for the pin functions of these connectors.

BIOS Setting

Configure the LCD panel in the Advanced/Chipset Features submenu of the BIOS. Refer to chapter 3 for more information.

Note:
DFI board’s LVDS connector: Hirose DF13-40DP-1.25V(91)/40P/1.25mm; cable side connector: Hirose DF13-40DS-1.25C.

<table>
<thead>
<tr>
<th>Pins</th>
<th>Function</th>
<th>Pins</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>LVDS_Out3+</td>
<td>4</td>
<td>LVDS_Out7+</td>
</tr>
<tr>
<td>5</td>
<td>LVDS_Out3-</td>
<td>6</td>
<td>LVDS_Out7-</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>8</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>LVDS_Out2+</td>
<td>10</td>
<td>LVDS_Out6+</td>
</tr>
<tr>
<td>11</td>
<td>LVDS_Out2-</td>
<td>12</td>
<td>LVDS_Out6-</td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>14</td>
<td>GND</td>
</tr>
<tr>
<td>15</td>
<td>LVDS_Out1+</td>
<td>16</td>
<td>LVDS_Out5+</td>
</tr>
<tr>
<td>17</td>
<td>LVDS_Out1-</td>
<td>18</td>
<td>LVDS_Out5-</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>20</td>
<td>GND</td>
</tr>
<tr>
<td>21</td>
<td>LVDS_Out0+</td>
<td>22</td>
<td>LVDS_Out4+</td>
</tr>
<tr>
<td>23</td>
<td>LVDS_Out0-</td>
<td>24</td>
<td>LVDS_Out4-</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td>26</td>
<td>GND</td>
</tr>
<tr>
<td>27</td>
<td>LVDS_CLK1+</td>
<td>28</td>
<td>LVDS_CLK2+</td>
</tr>
<tr>
<td>29</td>
<td>LVDS_CLK1-</td>
<td>30</td>
<td>LVDS_CLK2-</td>
</tr>
<tr>
<td>31</td>
<td>GND</td>
<td>32</td>
<td>GND</td>
</tr>
<tr>
<td>33</td>
<td>LVDS_DDCCLK</td>
<td>34</td>
<td>N.C.</td>
</tr>
<tr>
<td>35</td>
<td>LVDS_DDCDTA</td>
<td>36</td>
<td>+3.3V</td>
</tr>
<tr>
<td>37</td>
<td>Panel Power</td>
<td>38</td>
<td>Panel Power</td>
</tr>
<tr>
<td>39</td>
<td>Panel Power</td>
<td>40</td>
<td>Panel Power</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pins</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>Panel Inverter Brightness Voltage Control</td>
</tr>
<tr>
<td>4</td>
<td>Panel Power</td>
</tr>
<tr>
<td>5</td>
<td>+3.3V</td>
</tr>
<tr>
<td>6</td>
<td>Panel Backlight On/Off Control</td>
</tr>
<tr>
<td>7</td>
<td>LCD/Inverter Power</td>
</tr>
<tr>
<td>8</td>
<td>LCD/Inverter Power</td>
</tr>
</tbody>
</table>
Chapter 2

Important:
The 5V_standby power source of your power supply must support ≥720mA.

PS/2 Keyboard/Mouse Connector

The Keyboard/Mouse connector is used to connect PS/2 keyboard and PS/2 mouse by means of a PS/2 cable. Connect one end of the cable to the Keyboard/Mouse connector. The other ends are used to connect a PS/2 keyboard and a PS/2 mouse.

Wake-On-PS/2 Keyboard/Mouse

The Wake-On-PS/2 Keyboard/Mouse function allows you to use the PS/2 keyboard or PS/2 mouse to power-on the system. To use this function:

- **Jumper Setting**
  JP10 must be set to “2-3 On: 5V_standby”. Refer to “PS/2 Keyboard/Mouse Power Select” in this chapter for more information.

  **Important:**
The 5V_standby power source of your power supply must support ≥720mA.
Cooling Fan Connector

The fan connector is used to connect the cooling fan. The cooling fan will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components.

BIOS Setting

The Advanced menu (“PC Health Configuration” submenu) of the BIOS will display the current speed of the cooling fans. Refer to chapter 3 for more information.

LAN LED Connector

These LAN LED connector is used to detect the connection state of RJ45 LAN ports when the connection is made to an active network via a cable. The pin functions of the LAN LED connector are listed below.

<table>
<thead>
<tr>
<th>Pins</th>
<th>Pin Assignment</th>
<th>Pins</th>
<th>Pin Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LAN0_LED_1000-</td>
<td>2</td>
<td>LAN0_LED_100-</td>
</tr>
<tr>
<td>3</td>
<td>LAN0_LED_LINK_ACT-</td>
<td>4</td>
<td>+3V_standby</td>
</tr>
<tr>
<td>5</td>
<td>LAN1_LED_1000-</td>
<td>6</td>
<td>LAN1_LED_100-</td>
</tr>
<tr>
<td>7</td>
<td>LAN1_LED_LINK_ACT-</td>
<td>8</td>
<td>+3V_standby</td>
</tr>
</tbody>
</table>
Chapter 2 Hardware Installation

ATX Power Connector

Expansion Slots

Use a power supply that complies with the ATX +12V Power Supply Design Guide Version 1.1. An ATX +12V power supply unit has a standard 24-pin ATX main power connector that must be inserted into the 24-pin connector.

The power connector from the power supply unit is designed to fit the 24-pin connector in only one orientation. Make sure to find the proper orientation before plugging the connectors.

The system board requires a minimum of 300 Watt power supply to operate. Your system configuration (CPU power, amount of memory, add-in cards, peripherals, etc.) may exceed the minimum power requirement. To ensure that adequate power is provided, we strongly recommend that you use a minimum of 400 Watt (or greater) power supply.

Important:
Insufficient power supplied to the system may result in instability or the add-in boards and peripherals not functioning properly. Calculating the system’s approximate power usage is important to ensure that the power supply meets the system’s consumption requirements.

Mini PCIe Slot
The Mini PCIe socket is used to install a half size Mini PCIe card. Mini PCIe card is a small form factor PCI card with the same signal protocol, electrical definitions, and configuration definitions as the conventional PCI. It supports PCIe and USB signals.

PCI Express x4 Slot
Install PCI Express cards such as network cards or other cards that comply to the PCI Express specifications into the PCI Express x4 slot.
Chapter 2

S/PDIF Connector

The S/PDIF connector is used to connect an external S/PDIF port. Your S/PDIF port may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then connect the audio cable to the S/PDIF connector. Make sure pin 1 of the audio cable is aligned with pin 1 of the S/PDIF connector.

LPC Connector

The LPC connector is used for the debug function and its pin functions are listed below.

<table>
<thead>
<tr>
<th>Pins</th>
<th>Pin Assignment</th>
<th>Pins</th>
<th>Pin Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CLK</td>
<td>2</td>
<td>LAD1</td>
</tr>
<tr>
<td>3</td>
<td>RST#</td>
<td>4</td>
<td>LAD0</td>
</tr>
<tr>
<td>5</td>
<td>FRAME#</td>
<td>6</td>
<td>VCC,+3V</td>
</tr>
<tr>
<td>7</td>
<td>LAD3</td>
<td>8</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>LAD2</td>
<td>10</td>
<td>x</td>
</tr>
<tr>
<td>11</td>
<td>SERIRQ</td>
<td>12</td>
<td>48MHz</td>
</tr>
</tbody>
</table>
Chapter 2 Hardware Installation

**Chapter 2**

**Battery**

The lithium ion battery powers the real-time clock and CMOS memory. It is an auxiliary source of power when the main power is shut off.

**Safety Measures**

- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.

**Standby Power LED**

This LED will light red when the system is in the standby mode. It indicates that there is power on the system board. Power-off the PC and then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.
Chapter 3 - BIOS Setup

Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board. The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message “Press DEL to run setup” will appear on the screen. If the message disappears before you respond, restart the system or press the “Reset” button. You may also restart the system by pressing the <Ctrl> <Alt> and <Del> keys simultaneously.

Note:
The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Legends

<table>
<thead>
<tr>
<th>Keys</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right and Left arrows</td>
<td>Moves the highlight left or right to select a menu.</td>
</tr>
<tr>
<td>Up and Down arrows</td>
<td>Moves the highlight up or down between submenu or fields.</td>
</tr>
<tr>
<td>&lt;Esc&gt;</td>
<td>Exit to the BIOS Setup Utility.</td>
</tr>
<tr>
<td>+ (plus key)</td>
<td>Scrolls forward through the values or options of the highlighted field.</td>
</tr>
<tr>
<td>- (minus key)</td>
<td>Scrolls backward through the values or options of the highlighted field.</td>
</tr>
<tr>
<td>Tab</td>
<td>Select a field.</td>
</tr>
<tr>
<td>&lt;F1&gt;</td>
<td>Displays general help</td>
</tr>
<tr>
<td>&lt;F2&gt;</td>
<td>Pervious values</td>
</tr>
<tr>
<td>&lt;F3&gt;</td>
<td>Optimized defaults</td>
</tr>
<tr>
<td>&lt;F4&gt;</td>
<td>Saves and resets the setup program.</td>
</tr>
<tr>
<td>&lt;Enter&gt;</td>
<td>Press &lt;Enter&gt; to enter the highlighted submenu.</td>
</tr>
</tbody>
</table>

Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

Submenu

When “▼” appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>. 
**AMI BIOS Setup Utility**

**Main**

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.

**System Date**

The date format is `<day>, <month>, <date>, <year>`. Day displays a day, from Sunday to Saturday. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1980 to 2099.

**System Time**

The time format is `<hour>, <minute>, <second>`. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

**Advanced**

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

**Important:**

Setting incorrect field values may cause the system to malfunction.

**OS Selection**

Select the OS support: Windows 7 or Windows 8.X.
Super IO Configuration

This section is used to configure the parameters of the super IO chip.

WatchDog Timer Unit

Selects the WatchDog Timer Unit: second or minute.

Super IO WatchDog Timer

Enter the value to set the Super IO WatchDog timer. 0 means disabled.

Serial Port 1 Configuration to Serial Port 6 Configuration

Sets the parameters of serial port 1 (COM A) and serial port 6 (COM F).
Serial Port

Enable or disable the serial COM port.

Change Settings

Select the IO/IRQ settings for the super I/O device.
Chapter 3 BIOS Setup

Chapter 3

HW Monitor

This section is used to monitor the hardware status.

Smart Fan Function

CPU Smart Fan Control

When this feature is set to Automatic, the CPU's fan speed will rotate according to the CPU's temperature. The higher the temperature, the faster the speed of rotation.
Chapter 3

CPU Configuration

This section is used to configure the CPU. It will also display the detected CPU information.

Active Processor Cores

Number of cores to enable in each processor package.

Intel Virtualization Technology

When this field is set to Enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

SATA Configuration

This section is used to enable or disable SATA devices.

Serial-ATA (SATA)

This field is used to enable or disable Serial ATA devices.

Serial-ATA port 0 and port 1

Enable or disable Serial ATA port 0 and port 1.
Network Stack Configuration

This section is used to enable or disable network stack settings.

---

**Ipv4 PXE Support**
When enabled, Ipv4 PXE boot supports. When disabled, Ipv4 PXE boot option will not be created.

**Ipv6 PXE Support**
When enabled, Ipv6 PXE boot supports. When disabled, Ipv6 PXE boot option will not be created.

**PXE boot wait time**
Enter the wait time value to abort the PXE boot.

---

When Network Stack is set to enabled, it will display the following information:
Chapter 3 BIOS Setup

CSM Configuration

This section configures the CSM settings.

- **Compatibility Support Module Configuration**
  - CSM Support: [Enabled]
  - CSM16 Module Version: 07.71
  - Boot option filter: [UEFI and Legacy]
  - Option ROM execution order:
    - Network: [Do not launch]
    - Video: [Legacy only]
    - Storage: [Legacy only]
    - Other PCI devices: [UEFI only]

<table>
<thead>
<tr>
<th>CSM Support</th>
<th>Enable/Disable CSM support</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Enabled]</td>
<td></td>
</tr>
</tbody>
</table>

Boot option filter

This option controls Legacy/UEFI ROMs priority.

Network

This field controls the execution of UEFI and Legacy PXE OpROM.

Storage

This field controls the execution of UEFI and Legacy Storage OpROM.

Video

This field controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

This field determines OpROM execution policy for devices other than network, storage, or video.

Trusted Computing

This section configures settings relevant to Trusted Computing innovations.

- **Configuration**
  - Security Device Support: [Disable]
  - Current Status Information: SUPPORT TURNED OFF

Security Device Support

This field is used to enable or disable BIOS supporting for the security device. O.S will not show the security device. TCG EFI protocol and INT1A interface will not be available.

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USB Configuration

This section is used to configure the parameters of USB device.

---

**Legacy USB Support**

- **Enabled**
  - Enable legacy USB.
- **Disabled**
  - Keep USB devices available only for EFI applications.
- **Auto**
  - Disable support for legacy when no USB devices are connected.

**XHCI Hand-off**

This is a workaround for OSes without the XHCI hand-off support. The change of XHCI ownership should be claimed by the EHCI driver.

**EHCI Hand-off**

This is a workaround for OSes without the EHCI hand-off support. The change of EHCI ownership should be claimed by the EHCI driver.

**USB Mass Storage Driver Support**

Enable or disable the support of the USB Mass Storage Driver.
Security Configuration

This section only displays the setting relevant to the Intel(R) Anti-Theft Technology.

Intel(R) TXE Configuration
This section is used to configure the parameters of Gigabit Ethernet device.

Blink LEDs
Identify the physical network port by blinking the associated LED.

Link Status
This field indicates the link status of the network device.

Virtual MAC Address
This field indicates programmatically assignable MAC address for the network port.
**NIC Configuration**

This field is used to configure the network device.

<table>
<thead>
<tr>
<th>Link Speed</th>
<th>Wake on LAN</th>
<th>[Auto Negotiated]</th>
<th>[Enabled]</th>
</tr>
</thead>
</table>

- **Link Speed**
  Specify the port speed which is used for the selected boot protocol.

- **Wake on LAN**
  Enables the server to be powered on using an in-band magic packet.

---

**Intel(R) I210 Gigabit Network Connection - 00:01:29:57...**

This section is used to configure the parameters of Gigabit Ethernet device.

<table>
<thead>
<tr>
<th>PORT CONFIGURATION MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NIC Configuration</strong></td>
</tr>
<tr>
<td><strong>Blink LEDs</strong></td>
</tr>
<tr>
<td><strong>PORT CONFIGURATION INFORMATION</strong></td>
</tr>
<tr>
<td>UEFI Driver:     Adapter PBA:    Chip Type    PCI Device ID    Bus: Device: Function:</td>
</tr>
<tr>
<td>Intel(R) PRO/1000 5.5.19</td>
</tr>
<tr>
<td>MAC Address    Virtual MAC Address</td>
</tr>
<tr>
<td>00:01:29:57:FF:05 00:01:29:57:FF:05</td>
</tr>
</tbody>
</table>

- **Blink LEDs**
  Identify the physical network port by blinking the associated LED.

- **Link Status**
  This field indicates the link status of the network device.

- **Virtual MAC Address**
  This field indicates programmatically assignable MAC address for the network port.
NIC Configuration

This field is used to configure the network device.

Link Speed

Specify the port speed which is used for the selected boot protocol.

Wake on LAN

Enables the server to be powered on using an in-band magic packet.
North Bridge

This section configures the North bridge parameters.

Intel IGD Configuration

Enable or disable the integrated graphics device (IGD). When enabled, the integrated graphics device is selected as the primary video adaptor.

Note:
Intel® GOP driver will display when "UEFI only" is selected in the video item of the CSM configuration.
Chapter 3 BIOS Setup

**Primary IGFX Boot Display**

Select the Video Device which will be activated during POST. This has no effect if external graphics presents. The selection of secondary boot display will appear based on your selection. VGA modes will be supported only on primary display.

**Secondary IGFX Boot Display**

Select the secondary display device: CRT, DDI-0 or DDI-1. DDI-0 is the default setting.

**LCD Panel Type**

Select the LCD panel used by Internal Graphics Device by selecting the appropriate setup item. Please refer to the screen shown below.

**LVDS Support**

Enable or disable the onboard LVDS function.
### Memory Configuration

This section only displays the parameter of memory configuration.

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Memory Information</th>
<th>Total Memory</th>
<th>Memory Slot1</th>
<th>Memory Slot2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8192 MB (LPDDR3)</td>
<td>8192 MB (LPDDR3)</td>
<td>Not Present</td>
</tr>
</tbody>
</table>

**F1: General Help**
**F2: Previous Values**
**F3: Optimized Defaults**
**F4: Save & Reset**
**ESC: Exit**

### South Bridge

This field is used to configure the parameters of the South Bridge.

**Azalia HD Audio**

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Azalia HD Audio Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel(R) I210 Controller 1</td>
</tr>
<tr>
<td></td>
<td>Intel(R) I210 Controller 2</td>
</tr>
</tbody>
</table>

**F1: General Help**
**F2: Previous Values**
**F3: Optimized Defaults**
**F4: Save & Reset**
**ESC: Exit**

### Intel(R) I210 Controller 1 and 2

Enable the Intel(R) I210 ethernet controller.
**Azalia HD Audio**

This section configures Azalia HD Audio options.

### Audio Configuration

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Audio Configuration</th>
<th>Azalia HDMI Codec</th>
<th>DP/HDMI Port C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Detection of the Azalia device. Disabled = Azalia will be unconditionally disabled. Enabled = Azalia will be unconditionally enabled. Auto = Azalia will be enabled if present disabled otherwise.</td>
<td>[Enabled]</td>
<td>[Enabled]</td>
</tr>
</tbody>
</table>

**Audio Controller**

This item controls the detection of the Azalia device.

- **Disabled**
  - Azalia will be unconditionally disabled.

- **Enabled**
  - Azalia will be unconditionally enabled.

- **Auto**
  - Azalia will be enabled automatically.

**Azalia HDMI Codec**

Enable or disable the internal HDMI codec for Azalia.

**DP/HDMI Port C**

Enable or disable the DP/HDMI Port C.

---

**PCI Express Configuration**

This section configures settings relevant to PCI Express devices.

### PCI Express Configuration

This section configures settings relevant to PCI Express devices.

**PCI Express Port 0-3**

Enable or disable the PCI Express port in the chipset.

**Speed**

Select the speed for the PCI Express devices. The options are Auto, Gen1 or Gen2.
Security

**Administrator Password**

Set the administrator password.

**User Password**

Set the user password.

Boot

**Setup Prompt Timeout**

Select the number of seconds to wait for the setup activation key. 65535(0xFFFF) denotes indefinite waiting.

**Bootup NumLock State**

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.
Save & Exit

Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

Discard Changes and Reset

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

Restore Defaults

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility, AFUDOS.EXE. Please contact technical support or your sales representative for the files.

To execute the utility, type:

```
A:> AFUDOS BIOS_Filename /b /p /n
```

then press <Enter>.

```
C:\AFU\AFUDOS>afudos
```

---

AMI Firmware Update Utility (APTI0) v2.25
Copyright (C)2008 American Megatrends Inc. All Rights Reserved.

Reading file .......... done
Erasing flash .......... done
Writing flash .......... done
Verifying flash ......... done
Erasing BootBlock ...... done
Writing BootBlock ...... done
Verifying BootBlock ... done

C:\AFU\AFUDOS>
Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.

2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.

3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.

Note:

- You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person’s instructions to confirm that the MAC address should be burned or not.
Chapter 4 - Supported Software

The CD that came with the system board contains drivers, utilities and software applications required to enhance the performance of the system board.

Insert the CD into a CD-ROM drive. The autorun screen (Mainboard Utility CD) will appear. If after inserting the CD, “Autorun” did not automatically start (which is, the Mainboard Utility CD screen did not appear), please go directly to the root directory of the CD and double-click “Setup”.

For Windows 7

![Image of Windows 7 autorun screen]

For Windows 8.x

![Image of Windows 8.x autorun screen]
Chapter 4 Supported Software

Intel Chipset Software Installation Utility

The Intel Chipset Device Software is used for updating Windows® INF files so that the Intel chipset can be recognized and configured properly in the system.

To install the utility, click “Intel Chipset Software Installation Utility” on the main menu.

1. Setup is ready to install the utility. Click Next.

2. Read the license agreement then click Yes.

3. Go through the readme document for more installation tips then click Next.

4. After all setup operations are done, click Next.

5. Click “Yes, I want to restart this computer now” then click Finish.
   Restarting the system will allow the new software installation to take effect.
Chapter 4 Supported Software

Intel HD Graphics Drivers

To install the driver, click “Intel HD Graphics Drivers” on the main menu.

1. Setup is now ready to install the graphics driver. Click Next.

By default, the “Automatically run WinSAT and enable the Windows Aero desktop theme” is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 7/Windows 8 desktop appears. The “blank screen” period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function then click Next.

2. Read the license agreement then click Yes.

3. Go through the readme document for system requirements and installation tips then click Next.

4. Setup is now installing the driver. Click Next to continue.

5. Click “Yes, I want to restart this computer now” then click Finish. Restarting the system will allow the new software installation to take effect.
Intel LAN Drivers

To install the driver, click “Intel LAN Drivers” on the main menu.

1. Setup is ready to install the driver. Click Next.

2. Click “I accept the terms in the license agreement” then click “Next”.

3. Select the program features you want installed then click Next.

4. Click Install to begin the installation.

5. After completing installation, click Finish.
Kernel Mode Driver Framework (For Windows 7 only)

To install the driver, click “Kernel Mode Driver Framework” on the main menu.

1. Click “Yes” to install the update.

2. The update is installed now.

3. Click “Restart Now” to restart your computer when the installation is complete.

Intel Trusted Execution Engine Driver

To install the driver, click “Intel Trusted Execution Engine Driver” on the main menu.

1. Tick “I accept the terms in the License Agreement” and then click “Next.”

2. The step shows the components which will be installed. Then, Click Next.
Chapter 4 Supported Software

3. The step displays the installing status in the progress.

4. Click “Finish” when the installation is complete.

Realtek Audio Drivers

To install the driver, click “Realtek Audio Drivers” on the main menu.

1. Setup is now ready to install the audio driver. Click Next.

2. Follow the remainder of the steps on the screen; clicking “Next” each time you finish a step.

3. Click “Yes, I want to restart my computer now” then click Finish.

Restarting the system will allow the new software installation to take effect.
Intel Sideband Fabric Device (MBI) Driver
(For Windows 8 only)

To install the driver, click “Intel Sideband Fabric Device (MBI) Driver” on the main menu.

1. The setup program will be installed. Click “Next” to continue.

2. Click “Yes” to accept the License Agreement.

3. The step performs setup operations. Click “Next” to continue.

4. Click “Finish” to restart the computer when the setup is completely installed.
**DFI Utility**

DFI Utility provides information about the board, HW Health, Watchdog, D/I/O, and Backlight. To access the utility, click “DFI Utility” on the main menu.

**Note:** If you are using Windows 7, you need to access the operating system as an administrator to be able to install the utility.

1. Setup is ready to install the DFI Utility driver. Click Next.

2. Click “I accept the terms in the license agreement” and then click Next.

3. Enter “User Name” and “Organization” information and then click Next.

4. Click Install to begin the installation.

5. After completing installation, click Finish.
The DFI Utility icon will appear on the desktop. Double-click the icon to open the utility.

The DFI Center interface provides the following options:

- **Information**: Displays CPU and BIOS information.
- **HW Health**: Monitors and sets system voltages, temperatures, and fans.
- **HW Health Set**: Allows setting system voltages and temperatures.
- **WatchDog**: Set watchdog timer, and configure reset and alarm settings.

![Information Screen](image1)

![HW Health Set Screen](image2)

![HW Health Screen](image3)

![WatchDog Screen](image4)
Infineon TPM Driver and Tool (option)

To install the driver, click “Infineon TPM driver and tool (option)” on the main menu.

1. The setup program is preparing to install the driver.

2. The setup program is now ready to install the utility. Click Next.

3. Click “I accept the terms in the license agreement” and then click “Next”.

DIO

Backlight
4. Enter the necessary information and then click Next.

5. Select a setup type and then click Next.

6. Click Install.

7. TPM requires installing the Microsoft Visual C++ package prior to installing the utility. Click Install.

8. The setup program is currently installing the Microsoft Visual C++ package.

9. Click Finish.
Chapter 4 Supported Software

10. Click “Yes” to restart your system.

Intel USB 3.0 Drivers (For Windows 7 Only)

To install the driver, click “Intel USB 3.0 Driver” on the main menu.

1. Setup is ready to install the driver. Click Next.

2. Read the license agreement then click Yes.
Chapter 4 Supported Software

Adobe Acrobat Reader 9.3

To install the reader, click "Adobe Acrobat Reader 9.3" on the main menu.

1. Click Next to install or click Change Destination Folder to select another folder.

2. Click Install to begin installation.

3. Go through the readme document for more installation tips then click Next.

4. Setup is currently installing the driver. After installation has completed, click Next.

5. After completing installation, click Finish.
Chapter 5 - Digital I/O Programming Guide

Register Description

The Input Port Register (register 0) reflects the incoming logic levels of the pins, regardless of whether the pin is defined as an input or output by the Configuration Register. They act only on the read operation. Writes to this register have no effect. The default value (X) is determined by the externally applied logic level. Before a read operation, a write transmission is sent with the command byte to indicate to the I²C device that the Input Port Register will be accessed next.

<table>
<thead>
<tr>
<th>BIT</th>
<th>I-7</th>
<th>I-6</th>
<th>I-5</th>
<th>I-4</th>
<th>I-3</th>
<th>I-2</th>
<th>I-1</th>
<th>I-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The Output Port Register (register 1) shows the outgoing logic levels of the pins defined as outputs by the Configuration Register. Bit values in this register have no effect on pins defined as inputs. Instead, reads from this register reflect the value that is in the flip-flop controlling the output selection, not the actual pin value.

<table>
<thead>
<tr>
<th>BIT</th>
<th>O-7</th>
<th>O-6</th>
<th>O-5</th>
<th>O-4</th>
<th>O-3</th>
<th>O-2</th>
<th>O-1</th>
<th>O-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The Polarity Inversion Register (register 2) allows polarity inversion of the pins defined as inputs by the Configuration Register. If a bit in this register is set (written with 1), the corresponding port pin’s polarity is inverted. If a bit in this register is clear (written with a 0), the corresponding port pin’s original polarity is retained.

<table>
<thead>
<tr>
<th>BIT</th>
<th>N-7</th>
<th>N-6</th>
<th>N-5</th>
<th>N-4</th>
<th>N-3</th>
<th>N-2</th>
<th>N-1</th>
<th>N-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The Configuration Register (register 3) configures the direction of the I/O pins. If a bit in this register is set to 1, the corresponding port pin is enabled as an input with a high-impedance output driver. If a bit in this register is cleared to 0, the corresponding port is enabled as an input.

<table>
<thead>
<tr>
<th>BIT</th>
<th>C-7</th>
<th>C-6</th>
<th>C-5</th>
<th>C-4</th>
<th>C-3</th>
<th>C-2</th>
<th>C-1</th>
<th>C-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Function Description

I2CWriteByte(SlaveAddr, SubAddr, Data):
Write a Byte data to a specified I2C Device.

I2CReadByte(SlaveAddr, SubAddr, *Data):
Read a Byte data from a specified I2C Device.

SetBit(*Data, Bit):
Set Data bit n as “1”.

ClrBit(*Data, Bit):
Set Data bit n as “0”.

GetBit(Data, Bit):
Return the value of data bit n.

Sample Code

GPIO Configuration

```c
#define SLAVE_ADDR  0x42
#define INPUT_PORT  0x00
#define OUTPUT_PORT 0x01
#define INVERSION_PORT 0x02
#define CONFIG_PORT  0x03

GpioCon(int PinNum, int Mode){
    BYTE Data;
    BYTE TempPinNum = PinNum%8;
    //Pin0-7 Input/Output Configuration
    I2C_ReadByte(SLAVE_ADDR, CONFIG_PORT, &Data);
    if(Mode == 1){SetBit(&Data, TempPinNum);} //Input
    else                {ClrBit(&Data, TempPinNum);} //Output
    I2C_WriteByte(SLAVE_ADDR, CONFIG_PORT, Data);
    return 1;
}
```

GPIO Output Process

```c
#define SLAVE_ADDR  0x42
#define INPUT_PORT  0x00
#define OUTPUT_PORT 0x01
#define INVERSION_PORT 0x02
#define CONFIG_PORT  0x03

GpioOut(int PinNum, int Level){
    BYTE Data;
    BYTE TempPinNum = PinNum%8;
    //Pin0-7
    I2C_ReadByte(SLAVE_ADDR, OUTPUT_PORT, &Data);
    if(Level == 0){ClrBit(&Data, TempPinNum);} else                {SetBit(&Data, TempPinNum);} 
    I2C_WriteByte(SLAVE_ADDR, OUTPUT_PORT, Data);
    return 1;
}
```

GPIO Input Process

```c
#define SLAVE_ADDR  0x42
#define INPUT_PORT  0x00
#define OUTPUT_PORT 0x01
#define INVERSION_PORT 0x02
#define CONFIG_PORT  0x03

GpioIn(int PinNum, int *Status){
    BYTE Data;
    BYTE Group = PinNum/8; BYTE TempPinNum = PinNum%8;
    //Pin0-7
    I2C_ReadByte(SLAVE_ADDR, INPUT_PORT, &Data);
    *Status = GetBit(Data, TempPinNum);
    return 1;
}
```
Appendix A - Watchdog Sample Code

; Software programming example:

; (1) Enter Super I/O Configuration mode
MOV DX, 4EH
MOV AL, 87H
OUT DX, AL
OUT DX, AL

; (2) Configuration Logical Device 8, register CRF0/CRF1 (WDT Control/WDT timer)
MOV DX, 4EH
MOV AL, 07H  ; Ready to Program Logical Device
OUT DX, AL

MOV DX, 4FH
MOV AL, 08H  ; Select Logical Device 8
OUT DX, AL

MOV DX, 4EH
MOV AL, F1H  ; Select watchdog timer register
OUT DX, AL

MOV DX, 4EH
MOV AL, 10H  ; Set watchdog timer value
OUT DX, AL

MOV DX, 4EH
MOV AL, F0H  ; Select watchdog Control Register
OUT DX, AL

MOV DX, 4EH
MOV AL, 02H  ; Set Watchdog Control Value
OUT DX, AL

; (1) Exit extended function mode
MOV DX, 4EH
MOV AL, AAH
OUT DX, AL
Appendix B - System Error Message

When the BIOS encounters an error that requires the user to correct something, either a beep code will sound or a message will be displayed in a box in the middle of the screen and the message, PRESS F1 TO CONTINUE, CTRL-ALT-ESC or DEL TO ENTER SETUP, will be shown in the information box at the bottom. Enter Setup to correct the error.

Error Messages

One or more of the following messages may be displayed if the BIOS detects an error during the POST. This list indicates the error messages for all Award BIOSes:

CMOS BATTERY HAS FAILED
The CMOS battery is no longer functional. It should be replaced.

CMOS CHECKSUM ERROR
Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

DISPLAY SWITCH IS SET INCORRECTLY
The display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, either turn off the system and change the jumper or enter Setup and change the VIDEO selection.

Standard Status Codes

### PEI Status Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x11</td>
<td>Pre-memory CPU initialization is started</td>
</tr>
<tr>
<td>0x15</td>
<td>Pre-memory North Bridge initialization is started</td>
</tr>
<tr>
<td>0x19</td>
<td>Pre-memory South Bridge initialization is started</td>
</tr>
<tr>
<td>0x2A</td>
<td>OEM pre-memory initialization codes</td>
</tr>
<tr>
<td>0x2B</td>
<td>Memory initialization, Serial Presence Detect (SPD) data reading</td>
</tr>
<tr>
<td>0x2C</td>
<td>Memory initialization, Memory presence detection</td>
</tr>
<tr>
<td>0x2D</td>
<td>Memory initialization, Programming memory timing information</td>
</tr>
<tr>
<td>0x2E</td>
<td>Memory initialization, Configuring memory</td>
</tr>
<tr>
<td>0x2F</td>
<td>Memory initialization (other).</td>
</tr>
</tbody>
</table>

### PEI Error Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x50</td>
<td>Memory initialization error. Invalid memory type or incompatible memory speed</td>
</tr>
<tr>
<td>0x51</td>
<td>Memory initialization error. SPD reading has failed</td>
</tr>
<tr>
<td>0x52</td>
<td>Memory initialization error. Invalid memory size or memory modules do not match.</td>
</tr>
<tr>
<td>0x53</td>
<td>Memory initialization error. No usable memory detected</td>
</tr>
</tbody>
</table>
### DXE Phase Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x92</td>
<td>PCI Bus initialization is started</td>
</tr>
<tr>
<td>0x93</td>
<td>PCI Bus Hot Plug Controller Initialization</td>
</tr>
<tr>
<td>0x94</td>
<td>PCI Bus Enumeration</td>
</tr>
<tr>
<td>0x95</td>
<td>PCI Bus Request Resources</td>
</tr>
<tr>
<td>0x96</td>
<td>PCI Bus Assign Resources</td>
</tr>
<tr>
<td>0x99</td>
<td>Super IO Initialization</td>
</tr>
<tr>
<td>0x9A</td>
<td>USB initialization is started</td>
</tr>
<tr>
<td>0x9B</td>
<td>USB Reset</td>
</tr>
<tr>
<td>0x9C</td>
<td>USB Detect</td>
</tr>
<tr>
<td>0x9D</td>
<td>USB Enable</td>
</tr>
<tr>
<td>0xA0</td>
<td>IDE initialization is started</td>
</tr>
<tr>
<td>0xA1</td>
<td>IDE Reset</td>
</tr>
<tr>
<td>0xA2</td>
<td>IDE Detect</td>
</tr>
<tr>
<td>0xA3</td>
<td>IDE Enable</td>
</tr>
<tr>
<td>0xAE</td>
<td>Legacy Boot event</td>
</tr>
<tr>
<td>0xB4</td>
<td>USB hot plug</td>
</tr>
<tr>
<td>0xB6</td>
<td>Clean-up of NVRAM</td>
</tr>
<tr>
<td>0xB7</td>
<td>Configuration Reset (reset of NVRAM settings)</td>
</tr>
</tbody>
</table>

### DXE Error Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xD6</td>
<td>No Console Output Devices are found</td>
</tr>
<tr>
<td>0xD7</td>
<td>No Console Input Devices are found</td>
</tr>
<tr>
<td>0xD8</td>
<td>Invalid password</td>
</tr>
</tbody>
</table>

### ACPI Checkpoints

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x03</td>
<td>System is entering S3 sleep state</td>
</tr>
<tr>
<td>0x04</td>
<td>System is entering S4 sleep state</td>
</tr>
<tr>
<td>0x05</td>
<td>System is entering S5 sleep state</td>
</tr>
<tr>
<td>0x30</td>
<td>System is waking up from the S3 sleep state</td>
</tr>
<tr>
<td>0x40</td>
<td>System is waking up from the S4 sleep state</td>
</tr>
<tr>
<td>0xAC</td>
<td>System has transitioned into ACPI mode. Interrupt controller is in PIC mode.</td>
</tr>
<tr>
<td>0xAA</td>
<td>System has transitioned into ACPI mode. Interrupt controller is in APIC mode.</td>
</tr>
</tbody>
</table>

### Beep Code

<table>
<thead>
<tr>
<th>Beep</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>beeps: Flash update is failed</td>
</tr>
</tbody>
</table>
Appendix C - Troubleshooting Checklist

Troubleshooting Checklist

This chapter of the manual is designed to help you with problems that you may encounter with your personal computer. To efficiently troubleshoot your system, treat each problem individually. This is to ensure an accurate diagnosis of the problem in case a problem has multiple causes.

Some of the most common things to check when you encounter problems while using your system are listed below.

1. The power switch of each peripheral device is turned on.
2. All cables and power cords are tightly connected.
3. The electrical outlet to which your peripheral devices are connected is working. Test the outlet by plugging in a lamp or other electrical device.
4. The monitor is turned on.
5. The display's brightness and contrast controls are adjusted properly.
6. All add-in boards in the expansion slots are seated securely.
7. Any add-in board you have installed is designed for your system and is set up correctly.

Monitor/Display

If the display screen remains dark after the system is turned on:

1. Make sure that the monitor's power switch is on.
2. Check that one end of the monitor's power cord is properly attached to the monitor and the other end is plugged into a working AC outlet. If necessary, try another outlet.
3. Check that the video input cable is properly attached to the monitor and the system's display adapter.
4. Adjust the brightness of the display by turning the monitor's brightness control knob.

The picture seems to be constantly moving.

1. The monitor has lost its vertical sync. Adjust the monitor's vertical sync.
2. Move away any objects, such as another monitor or fan, that may be creating a magnetic field around the display.
3. Make sure your video card's output frequencies are supported by this monitor.

The screen seems to be constantly wavering.

1. If the monitor is close to another monitor, the adjacent monitor may need to be turned off. Fluorescent lights adjacent to the monitor may also cause screen wavering.

Power Supply

When the computer is turned on, nothing happens.

1. Check that one end of the AC power cord is plugged into a live outlet and the other end properly plugged into the back of the system.
2. Make sure that the voltage selection switch on the back panel is set for the correct type of voltage you are using.
3. The power cord may have a “short” or “open”. Inspect the cord and install a new one if necessary.

Floppy Drive

The computer cannot access the floppy drive.

1. The floppy diskette may not be formatted. Format the diskette and try again.
2. The diskette may be write-protected. Use a diskette that is not write-protected.
3. You may be writing to the wrong drive. Check the path statement to make sure you are writing to the targeted drive.
4. There is not enough space left on the diskette. Use another diskette with adequate storage space.
**Appendix C** Troubleshooting Checklist

### Hard Drive

**Hard disk failure.**

1. Make sure the correct drive type for the hard disk drive has been entered in the BIOS.
2. If the system is configured with two hard drives, make sure the bootable (first) hard drive is configured as Master and the second hard drive is configured as Slave. The master hard drive must have an active/boottable partition.

**Excessively long formatting period.**

If your hard drive takes an excessively long period of time to format, it is likely a cable connection problem. However, if your hard drive has a large capacity, it will take a longer time to format.

### Serial Port

**The serial device (modem, printer) doesn’t output anything or is outputting garbled characters.**

1. Make sure that the serial device’s power is turned on and that the device is on-line.
2. Verify that the device is plugged into the correct serial port on the rear of the computer.
3. Verify that the attached serial device works by attaching it to a serial port that is working and configured correctly. If the serial device does not work, either the cable or the serial device has a problem. If the serial device works, the problem may be due to the onboard I/O or the address setting.
4. Make sure the COM settings and I/O address are configured correctly.

### Keyboard

**Nothing happens when a key on the keyboard was pressed.**

1. Make sure the keyboard is properly connected.
2. Make sure there are no objects resting on the keyboard and that no keys are pressed during the booting process.

### System Board

1. Make sure the add-in card is seated securely in the expansion slot. If the add-in card is loose, power off the system, re-install the card and power up the system.
2. Check the jumper settings to ensure that the jumpers are properly set.
3. Verify that all memory modules are seated securely into the memory sockets.
4. Make sure the memory modules are in the correct locations.
5. If the board fails to function, place the board on a flat surface and seat all socketed components. Gently press each component into the socket.
6. If you made changes to the BIOS settings, re-enter setup and load the BIOS defaults.