

# V2401/2402 Hardware User's Manual

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# V2401/2402 Hardware User's Manual

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# Table of Contents

<b>1. Introduction</b>	<b>1-1</b>
Overview	1-2
Package Checklist	1-2
Product Features	1-3
V2401/2402 Hardware Specifications	1-3
Hardware Block Diagram	1-5
<b>2. Hardware Introduction</b>	<b>2-1</b>
Appearance	2-2
Dimensions	2-2
LED Indicators	2-3
Reset Button	2-3
Real Time Clock	2-3
<b>3. Hardware Connection Description</b>	<b>3-1</b>
Installing the V2401/2402	3-2
Wiring Requirements	3-5
Connecting the Power	3-5
Grounding the Unit	3-5
Connecting Data Transmission Cables	3-6
Connecting to the Network	3-6
Connecting to a Serial Device	3-6
Installing a CompactFlash Card	3-7
Connecting a PS/2 Keyboard and Mouse	3-8
Connecting to the USB Device	3-9
DI/DO	3-9
Connecting to a VGA Monitor	3-10
Connecting to an LVDS Monitor	3-10
Connecting to a DVI-I Monitor	3-11
Connecting to a Speaker or a Headphone	3-11
Upgrading the Memory Module	3-12
Upgrade the DOM Module	3-13
Installing a SATA Hard Disk	3-14
<b>4. BIOS Setup</b>	<b>4-1</b>
Entering the BIOS Setup Utility	4-2
Modifying the BIOS Main Settings	4-2
Basic Configuration	4-2
System Security	4-3
Advanced Settings	4-4
Hard Disk Boot Priority	4-4
Advanced BIOS Features	4-4
CPU Features	4-5
C1E Function	4-5
EIST Function	4-5
Hyper-Threading Technology	4-5
Quick Power On Self Test	4-5
Summary Screen Show	4-5
Advanced Chipset Settings	4-5
On-chip Frame Buffer Size	4-6
DVMT Mode	4-6
DVMT/FIXED Memory Size	4-6
Boot Display	4-6
LVDS Function	4-6
Panel Number	4-6
Peripherals	4-7
OnChip IDE Device	4-7
On-Chip Channel 0 PCI IDE	4-7
IDE Channel 0 Master UDMA	4-7
IDE Channel 0 Slave UDMA	4-7
On-Chip Channel 1 PCI IDE	4-8
IDE Channel 1 Master UDMA	4-8
IDE Channel 1 Slave UDMA	4-8
Onboard Device	4-8
Onboard Audio	4-8
Onboard LAN Boot ROM	4-8
Super I/O Device	4-9
Debug Port	4-9
Power on After Power Fail	4-9

Power.....	4-9
ACPI Suspend Type .....	4-10
Soft-Off by PWR-BTTN .....	4-10
Hardware Monitor .....	4-10
CPU Warning Temperature .....	4-10
Warning Beep .....	4-10
Load Defaults .....	4-11
Load System Default Settings .....	4-11
Load System Turbo Settings .....	4-11
Load CMOS from BIOS .....	4-11
Save CMOS to BIOS.....	4-11
Exiting the BIOS Setup.....	4-11
Save & Exit Setup .....	4-12
Exit Without Saving .....	4-12
Upgrading the BIOS .....	4-12
<b>A. Regulatory Approval Statement .....</b>	<b>A-1</b>

# Introduction

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The V2401/2402 Series embedded computers are based on the Intel Atom N270 x86 processor, and feature four RS-232/422/485 serial ports, eight RS-232 serial ports, dual Gigabit LAN ports, six USB 2.0 hosts, and a CompactFlash socket. The V2401 computer provides VGA, DVI, and LVDS outputs, and the V2402 computer provides both VGA and DVI outputs, making them particularly well-suited for industrial applications such as SCADA and manufacturing automation.

The V2401 and V2402 come with four RS-232/422/485 serial ports, and the V2401 has an additional eight RS-232 ports, making them ideal for connecting a wide range of serial devices. The dual 10/100/1000 Mbps Ethernet ports offer a reliable solution for network redundancy, promising continuous operations for data communication and management. As an added convenience, the V2401/2402 computers have four DIs and four DOs for connecting digital input/output devices.

In addition, the CompactFlash and USB sockets provide the V2400 computers with the reliability needed for industrial applications that require data buffering and storage expansion.

Pre-installed with Linux, Windows CE 6.0, or Windows Embedded Standard 2009, the V2401/2402 Series provides programmers with a friendly environment for developing sophisticated, bug-free application software at a low cost.

The V2402 series also offers models that support -40 to 70°C operating temperature for harsh environments.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Package Checklist**
- ❑ **Product Features**
- ❑ **V2401/2402 Hardware Specifications**
- ❑ **Hardware Block Diagram**

## Overview

The V2401 and V2402 come with four RS-232/422/485 serial ports, and the V2401 has an additional eight RS-232 ports, making them ideal for connecting a wide range of serial devices, and the dual 10/100/1000 Mbps Ethernet ports offer a reliable solution for network redundancy, promising continuous operations for data communication and management. As an added convenience, the V2401/2402 computers have 4 DIs, and 4 DOs for connecting digital input/output devices.

In addition, the CompactFlash and USB sockets provide the V2400 computers with the reliability needed for industrial applications that require data buffering and storage expansion.

Pre-installed with Linux, Windows CE 6.0, or Windows Embedded Standard 2009, the V2401/2402 Series provides programmers with a friendly environment for developing sophisticated, bug-free application software at a low cost.

In addition, the V2402 series also offers -40 to 70°C wide temperature models for harsh environments.

## Package Checklist

The V2401/2402 Series includes the following models:

### **V2401-CE:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, LVDS, DVI, Audio, 2 LANs, 12 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, WinCE 6.0

### **V2401-XPE:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, LVDS, DVI, Audio, 2 LANs, 12 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Windows Embedded Standard 2009

### **V2401-LX:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, LVDS, DVI, Audio, 2 LANs, 12 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Linux 2.6

### **V2402-CE:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, DVI, Audio, 2 LANs, 4 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, WinCE 6.0

### **V2402-XPE:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, DVI, Audio, 2 LANs, 4 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Windows Embedded Standard 2009, -10 to 60°C operating temperature

### **V2402-LX:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, DVI, Audio, 2 LANs, 4 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Linux 2.6, -10 to 60°C operating temperature

### **V2402-T-XPE:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, DVI, Audio, 2 LANs, 4 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Windows Embedded Standard 2009, -40 to 70°C operating temperature

### **V2402-T-LX:**

x86 ready-to-run embedded computer with Intel Atom N270, VGA, DVI, Audio, 2 LANs, 4 serial ports, 4 DIs, 4 DOs, 6 USB 2.0 ports, CF, Linux 2.6, -40 to 70°C operating temperature

Each model is shipped with the following items:

- 1 V2401 or V2402 computer
- Terminal block to power jack converter
- PS2 to KB/MS Y-type cable
- Wall mounting kit
- Documentation & Software CD or DVD
- Quick Installation Guide (printed)

- Product Warranty Statement (printed)

**NOTE: Please notify your sales representative if any of the above items are missing or damaged.**

## Product Features

V2401/2402 series embedded computers have the following features:

- DDR2 SODIMM socket, supporting DDR2 533 up to 2 GB (max.)
- Dual independent display (VGA, DVI, LVDS selectable) (V2401: VGA, DVI and LVDS; V2402: VGA and DVI)
- Gigabit Ethernet ports
- RS-232/422/485 serial ports, supporting non-standard baudrates
- 8 RS-232 serial ports (V2401 only)
- 6 USB 2.0 ports for high speed peripherals
- DIs, 4 Dos
- CompactFlash socket for storage expansion
- Ready-to-run Embedded Linux, Windows CE 6.0, or Windows Embedded Standard 2009 platform
- -40 to 70°C wide temperature models available (V2402-T models)

## V2401/2402 Hardware Specifications

### Computer

**CPU:** Intel Atom N270 1.6 GHz processor

**OS (pre-installed):** Linux, Windows CE 6.0 or Windows Embedded Standard 2009

**System Chipset:** Intel 945GSE + ICH7-M

**BIOS:** 8 Mbit Flash BIOS, SPI type, ACPI function supported

**FSB:** 400/533 MHz

**System Memory:** 1 x 200-pin DDR2 SODIMM socket support DDR2 533 up to 2 GB, built-in 1 GB

**USB:** USB 2.0 compliant hosts x 6, type A connector, supports system boot up

### Storage

**Built-in:** 2 GB onboard industrial DOM to store OS

**Storage Expansion:** CompactFlash socket for CF card expansion, supporting CF Type-I/II socket with DMA mode

**HDD Support:** 1 SATA-II connector for HDD expansion

### Other Peripherals

**KB/MS:** 1 PS/2 interface supporting standard PS/2 keyboard and mouse through Y-type cable

**Audio:** HD audio, with line-in and line-out interface

### Display

**Graphics Controller:** Intel Gen 2.5 Integrated Graphics Engine, 250 MHz core render clock and 200 MHz core display clock at 1.05-V core voltage

**VGA Interface:** DB15 female connector

**LVDS Interface:** Onboard HIROSE DF13-40DP-1.25 V connector (V2401 only)

**DVI Interface:** DVI-connector (chrontel CH7307 SDVO to DVI transmitter)

### Ethernet Interface

**LAN:** 2 auto-sensing 10/100/1000 Mbps ports (RJ45)

### Serial Interface

**Serial Standards:**

- V2401/2402: 4 RS-232/422/485 ports\*, software selectable (DB9 male connector)
- V2401 only: 8 RS-232 ports (68-pin VHDC connector)

\*COM1's pin 9 signal can be set by jumper as N/C (default), +5 V, or +12 V

**ESD Protection:** 4 KV for all signals

### Serial Communication Parameters

**Data Bits:** 5, 6, 7, 8

**Stop Bits:** 1, 1.5, 2

**Parity:** None, Even, Odd, Space, Mark

**Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

**Baudrate:** 50 bps to 921.6 Kbps (non-standard baudrates supported; see user's manual for details)

### Serial Signals

**RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

**RS-422:** TxD+, TxD-, RxD+, RxD-, GND

**RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND

**RS-485-2w:** Data+, Data-, GND

### Digital Input

**Input Channels:** 4, source type

**Input Voltage:** 0 to 30 VDC at 25 Hz

**Digital Input Levels for Dry Contacts:**

- Logic level 0: Close to GND
- Logic level 1: Open

**Digital Input Levels for Wet Contacts:**

- Logic level 0: +3 V max.
- Logic level 1: +10 V to +30 V (Source to DI)

**Isolation:** 3 KV optical

### Digital Output

**Output Channels:** 4, sink type

**Output Current:** Max. 200 mA per channel

**On-state Voltage:** 24 VDC nominal, open collector to 30 VDC

**Connector Type:** 10-pin screw terminal block (4 DI points, 4 DO points, DI Source, GND)

**Isolation:** 3 KV optical isolation

### LEDs

**System:** Power, Storage

**LAN:** 100M/Link x 2, 1000M/Link x 2 (on connector)

### Switches and Buttons

**Power Switch:** on/off (front panel)

**Reset Button:** For warm reboot (rear panel)

### Physical Characteristics

**Housing:** Aluminum

**Weight:**

- V2401: 2.1 kg
- V2402: 2 kg

**Dimensions:**

Without ears: 250 x 57 x 152 mm (9.84 x 2.24 x 5.98 in)

With ears: 275 x 63 x 152 mm (10.83 x 2.48 x 5.98 in)

**Mounting:** DIN-Rail, wall, VESA

### Environmental Limits

**Operating Temperature:**

- Standard models: -10 to 60°C (14 to 140°F)
- Wide temp. models: -40 to 70°C (-40 to 158°F)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Anti-vibration:** 5 g rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr/axis

**Anti-shock:** 50 g @ IEC-68-2-27, half sine wave, 11 ms

### Power Requirements

**Input Voltage:** 9 to 36 VDC (3-pin terminal block for V+, V-, SG)

**Power Consumption:** 26 W (without LVDS output)

2.9 A @ 9 VDC

1.08 A @ 24 VDC

720 mA @ 36 VDC

**Standards and Certifications**

**Safety:** UL 508, UL 60950-1, CSA C22.2 No. 60950-1-07, EN 60950-1, CCC (GB9254, GB17625.1)

**EMC:** EN 55022 Class A, EN 61000-3-2 Class D, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A

**Wheeled Vehicles:** e-Mark (e4)

**Green Product:** RoHS, CRoHS, WEEE

**Reliability**

**Automatic Reboot Trigger:** Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable

**MTBF (mean time between failures):**

V2401: 238,762 hrs

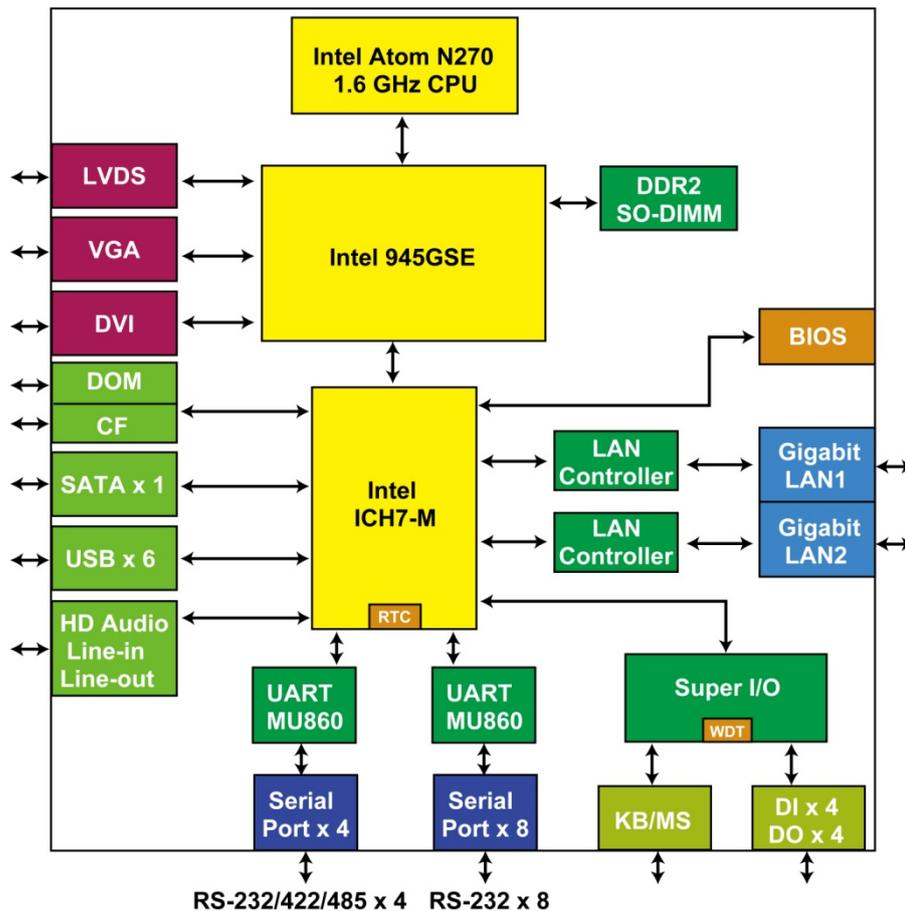
V2402: 228,172 hrs

**Warranty**

**Warranty Period:** 3 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

# Hardware Block Diagram



## Hardware Introduction

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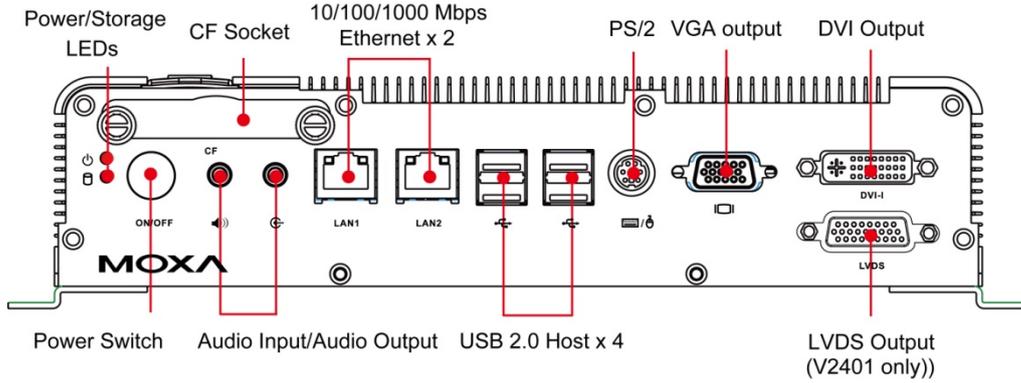
The V2401/2402 series embedded computers are compact, well-designed, and built rugged enough for industrial applications. LED indicators help you monitor performance and identify trouble spots, multiple serial ports allow you to connect different devices for wireless operation, and the reliable and stable hardware platform lets you devote your attention to developing your applications.

The following topics are covered in this chapter:

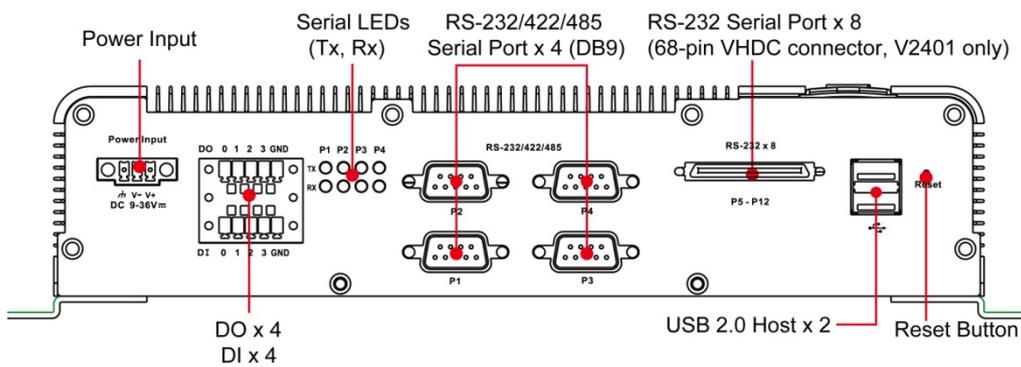
- **Appearance**
- **Dimensions**
- **LED Indicators**
- **Reset Button**
- **Real Time Clock**

# Appearance

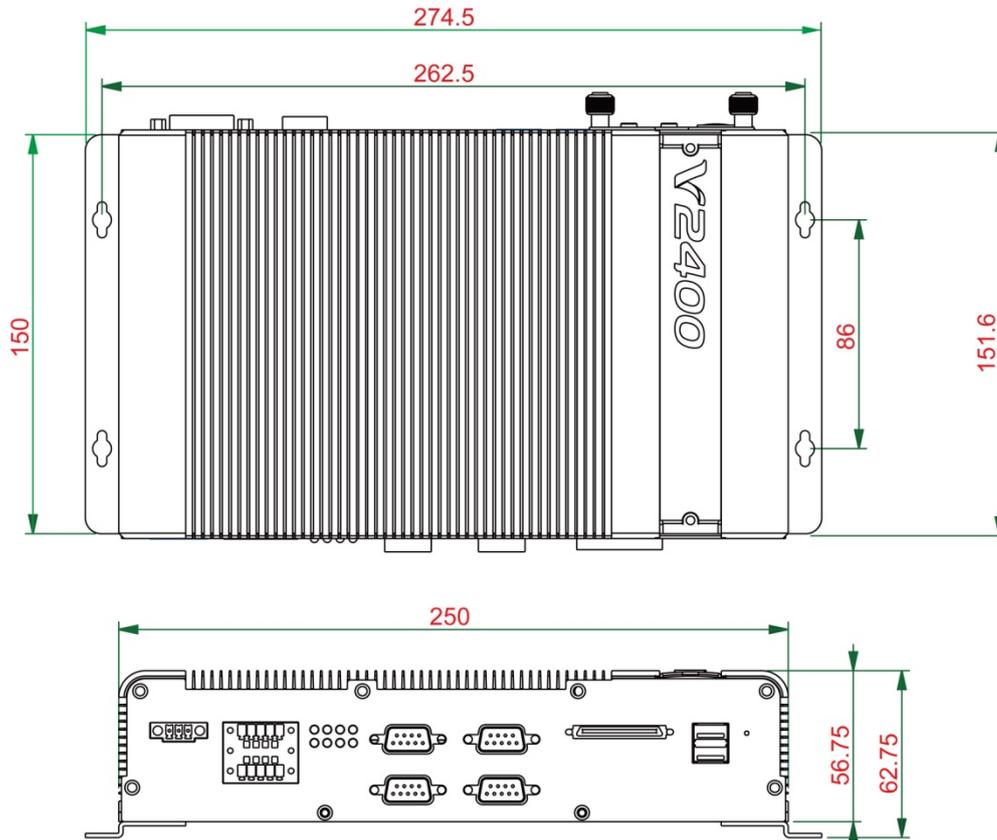
## V2401/2402 Front View



## V2401/2402 Rear View



# Dimensions



## LED Indicators

LED Name	LED Color	LED Function
Power	Green	Power is on and functioning normally
	Off	Power is off or a power error exists
Storage	Yellow	CF card is detected
	Off	CF card is not detected
LAN	Green	100 Mbps Ethernet mode
	Yellow	1000 Mbps (Gigabit) Ethernet mode
	Off	No activity or 10 Mbps Ethernet mode
Tx1 to Tx4 (P1-P4)	Green	Serial ports P1-P4 transmitting data
	Off	Serial ports P1-P4 not transmitting data
Rx1 to Rx4 (P1-P4)	Yellow	Serial ports P1-P4 receiving data
	Off	Serial ports P1-P4 not receiving data

## Reset Button

Press the **Reset Button** on the rear panel of the V2401/2402 to reboot the system automatically. The Ready LED will blink on and off for the first 5 seconds, and then maintain a steady glow once the system has rebooted.

The V2401/2402 does not support a "Reset to Default" function.

## Real Time Clock

The embedded computer's real-time clock is powered by a lithium battery. We strongly recommend that you **NOT** replace the lithium battery on your own. If the battery needs to be changed, please contact the Moxa RMA service team.



### ATTENTION

There is a risk of explosion if the wrong type of battery is used. To avoid this potential danger, always be sure to use the correct type of battery. Contact the Moxa RMA service team if you need to replace your battery.

### Caution

There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the instructions on the battery.

## Hardware Connection Description

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In this chapter, we show how to connect the embedded computers to the network and to various devices.

The following topics are covered in this chapter:

- ❑ **Installing the V2401/2402**
- ❑ **Wiring Requirements**
  - Connecting the Power
  - Grounding the Unit
- ❑ **Connecting Data Transmission Cables**
  - Connecting to the Network
  - Connecting to a Serial Device
- ❑ **Installing a CompactFlash Card**
- ❑ **Connecting a PS/2 Keyboard and Mouse**
- ❑ **Connecting to the USB Device**
- ❑ **DI/DO**
- ❑ **Connecting to a VGA Monitor**
- ❑ **Connecting to an LVDS Monitor**
- ❑ **Connecting to a DVI-I Monitor**
- ❑ **Connecting to a Speaker or a Headphone**
- ❑ **Upgrading the Memory Module**
- ❑ **Upgrade the DOM Module**
- ❑ **Installing a SATA Hard Disk**

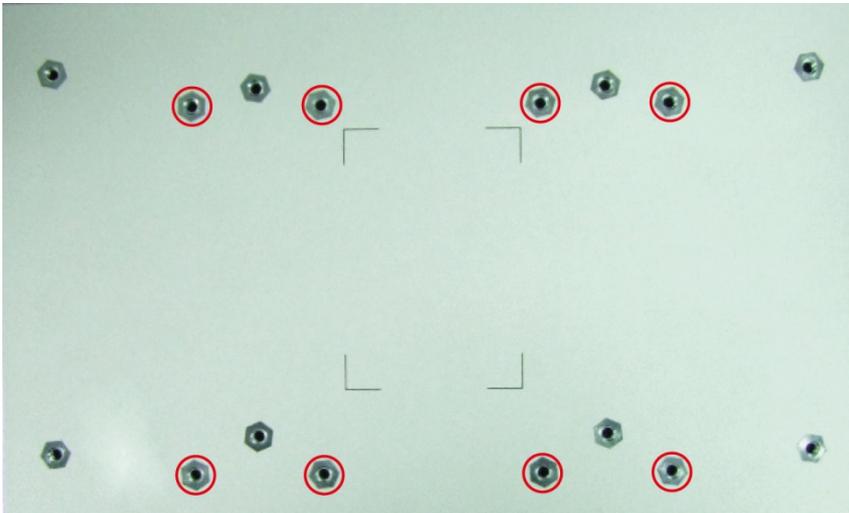
# Installing the V2401/2402

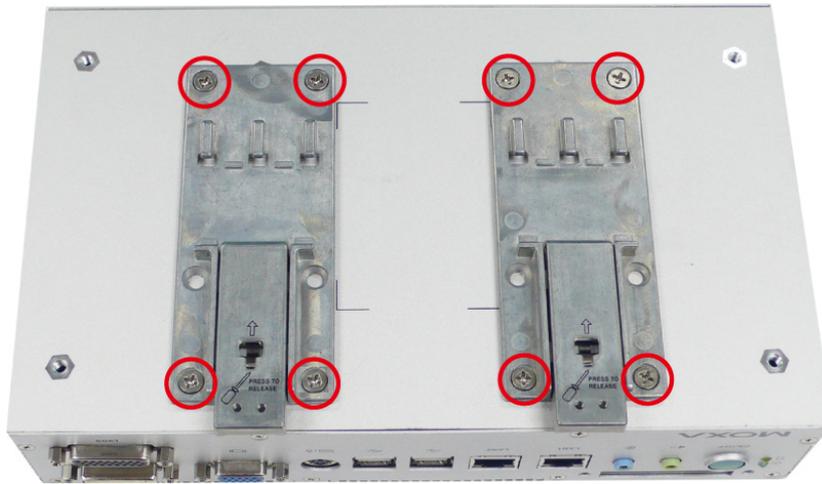
## DIN-Rail Mounting

The V2401/2402 can be installed on a DIN-rail with the optional DIN-rail kit. This DIN-rail kit must be purchased separately. It includes two DIN-rail brackets and eight screws.



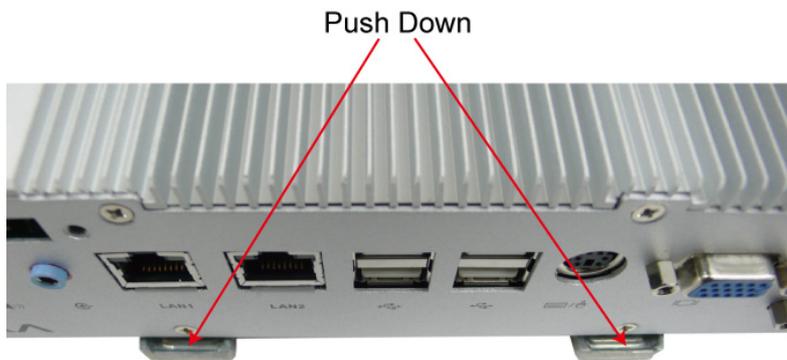
To attach the DIN-rail kit, turn the V2401/2402 over to the bottom cover. Find the locations for the screws and place the brackets on the cover. Please note that all eight screws must be firmly attached so that the computer can be securely installed on the DIN-rail.



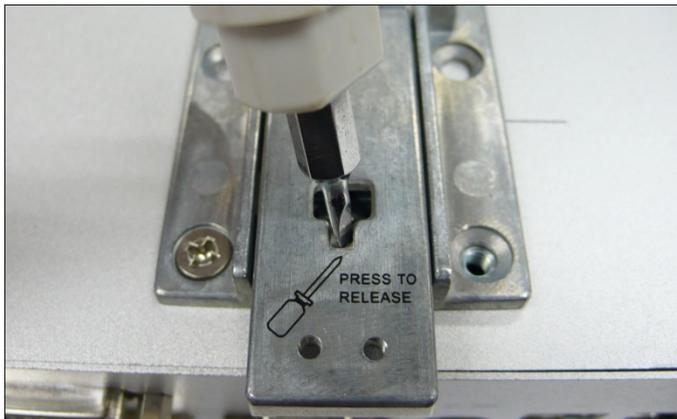


When the brackets are firmly attached with the screws, it can be installed on a DIN-rail

To release the DIN-rail kit, simply use a screwdriver to push down the lower part. Please use at least two persons to do this step as once the DIN-rail kit is pushed down, the computer will be detached immediately from the DIN-rail.



To re-install the computer on the DIN-rail, use a screwdriver to press the buckle so that it can be released. Now, it can be re-installed on the DIN-rail.



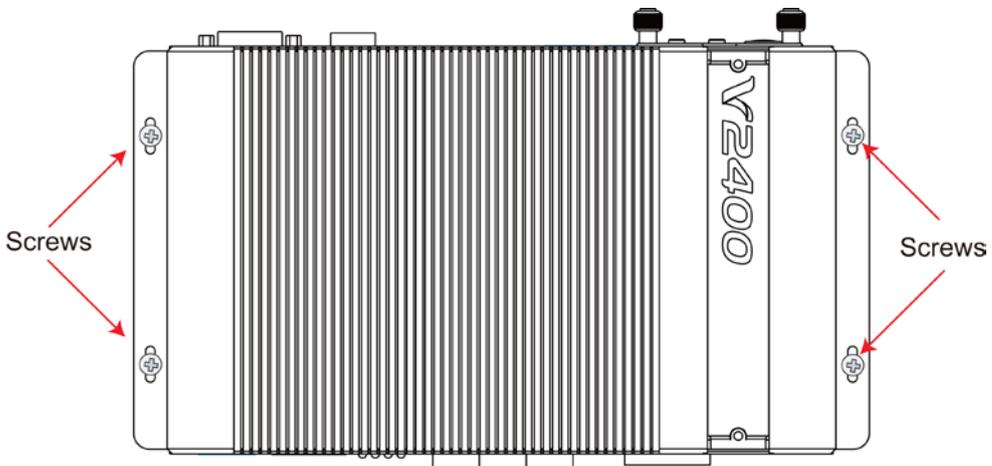
**Wall or Cabinet Mounting**

The V2401/2402 comes with two metal brackets for attaching it to a wall or the inside of a cabinet.

**Step 1:** Use two screws for each bracket and attach the bracket to the rear of the V2401/2402.

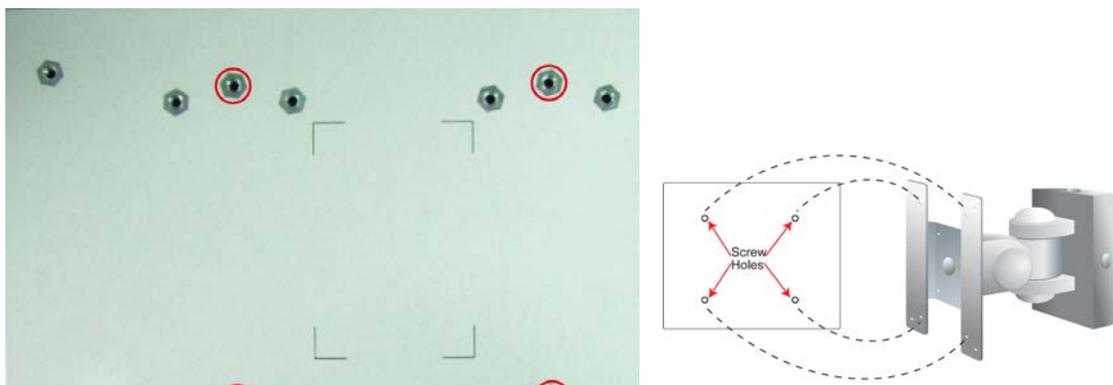


**Step 2:** Use two screws per side to attach the V2401/2402 to a wall or cabinet.



**VESA Mounting (not included in the Package)**

The V2401/2402 has four screw holes on the bottom panel for attaching the computer to a 100 x 100 mm VESA mounting kit. Use four screws to attach the computer to the VESA mounting kit.



# Wiring Requirements

This section describes how to connect serial devices to the embedded computer.

You should read and follow these common safety precautions before proceeding with the installation of any electronic device:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.  
**NOTE:** Do not run signal or communication wiring together with power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is advisable to label the wiring to all devices in the system.



## ATTENTION

### Safety First!

Be sure to disconnect the power cord before installing and/or wiring your V2401/2402.

### Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

### Temperature Caution!

Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

## Connecting the Power

The PC's power source should be provided by a UL listed class 2 or "Limited Power Source" (LPS), with external adaptor output rated 9 to 36 VDC, 1.8 A @ 9 VDC, 422 mA @ 36 VDC. If the power is supplied properly, the "Ready" LED will glow a solid green after a 25 to 30 second delay.

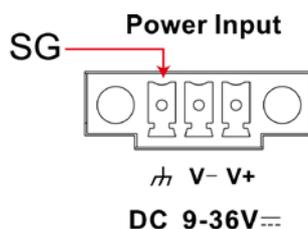
## Grounding the Unit

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Before connecting any devices, run a ground wire from the ground screw to the grounding surface.



## ATTENTION

This product should be mounted to a well-grounded mounting surface such as a metal panel.



SG: The Shielded Ground (sometimes called Protected Ground) contact is the right most of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

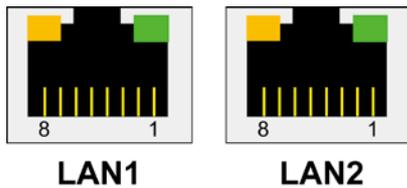
# Connecting Data Transmission Cables

This section describes how to connect the V2401/2402 embedded computers to the network and serial devices.

## Connecting to the Network

Plug your network cable into the embedded computer's Ethernet port. The other end of the cable should be plugged into your Ethernet network. When the cable is properly connected, the LEDs on the embedded computer's Ethernet port will glow to indicate a valid connection.

The 10/100/1000 Mbps Ethernet LAN port uses 8-pin RJ45 connectors. The following diagram shows the pinouts for these ports.

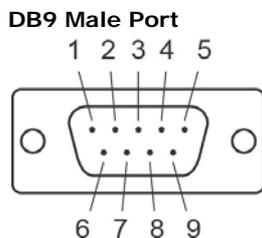


The LED indicators on the right top and right bottom corners glow a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received. The LED indicators on the left top and left bottom corners glow a solid yellow color when the cable is properly connected to a 1000 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

Pin	10/100 Mbps	1000 Mbps
1	ETx+	TRD(0)+
2	ETx-	TRD(0)-
3	ERx+	TRD(1)+
4	---	TRD(2)+
5	---	TRD(2)-
6	ERx-	TRD(1)-
7	---	TRD(3)+
8	---	TRD(3)-

## Connecting to a Serial Device

Use a serial cable to plug your serial device into the embedded computer's serial port. Serial ports P1 to P4 have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 communication by software. The pin assignments are shown in the following table:



RS-232/422/485 Pinouts

Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	---
2	RxD	TxDB(+)	TxDB(+)	---
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	---	---	---
7	RTS	---	---	---
8	CTS	---	---	---

The V2401 also includes an RS-232 connector on the front panel. It can connect eight devices with a 68-pin VHDC cable. This cable must be purchased separately. Simply connect one end of the connector to the V2401, and connect the other end to eight serial devices.

# Installing a CompactFlash Card

The V2401/2402 embedded computers come with a CompactFlash socket. To insert a CompactFlash card, follow these instructions:

1. Disconnect the V2401/2402 from its power source.
2. The CompactFlash socket is located on the left side of the front panel. Unscrew the CompactFlash socket cover.



Screws

3. There is a tenon/hook on the cover of the CF socket. Turn the CompactFlash card over and then insert the CompactFlash card into the tenon/hook of the CF socket cover.



Put CF Card into  
tenon/hook of CF socket



## ATTENTION

Be careful of how you orient the CompactFlash card. You should turn the CF card bottom side up, in order to hook CF card into the CF socket cover.

4. Gently insert the CompactFlash card into the CF socket, making sure that the card is oriented correctly.



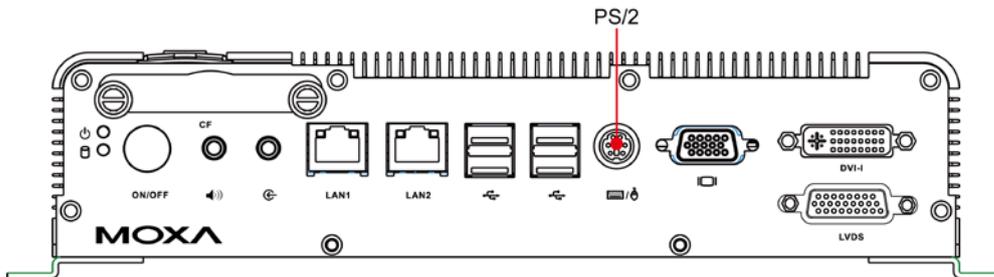


**ATTENTION**

The V2401/2402 embedded computer does not support the CompactFlash hot swap and PnP (Plug and Play) functions. It is necessary to remove power source first before inserting or removing the CompactFlash card.

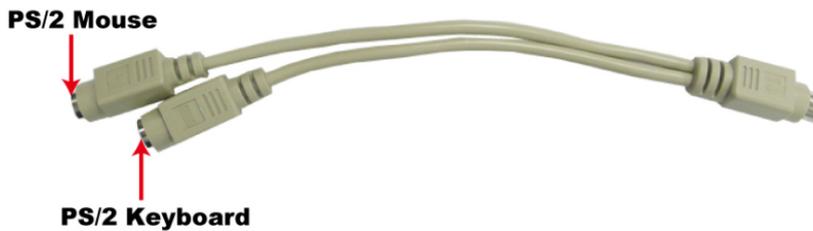
## Connecting a PS/2 Keyboard and Mouse

Your V2401/2402 embedded computers come with a PS/2 mini-DIN connector to connect to a PS/2 keyboard and PS/2 mouse. This 6-pin mini-DIN connector has the pin assignments shown below.



PS/2 Connector	Pin No.	Signal Definition
	1	PS/2 Keyboard Data
	2	PS/2 Mouse Data
	3	GND
	4	VCC
	5	PS/2 Keyboard Clock
	6	PS/2 Mouse Clock

Use the Y-type cable to convert the mini-DIN connector into two 6-pin mini-DIN connectors to connect both a PS/2 keyboard and PS/2 mouse at the same time. You may also use the USB ports to connect your USB-based keyboard and mouse.

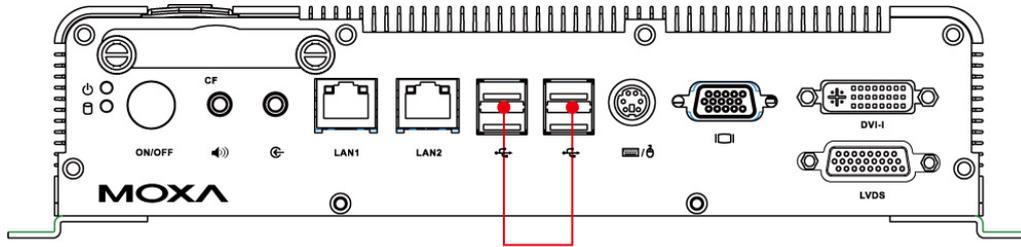


**ATTENTION**

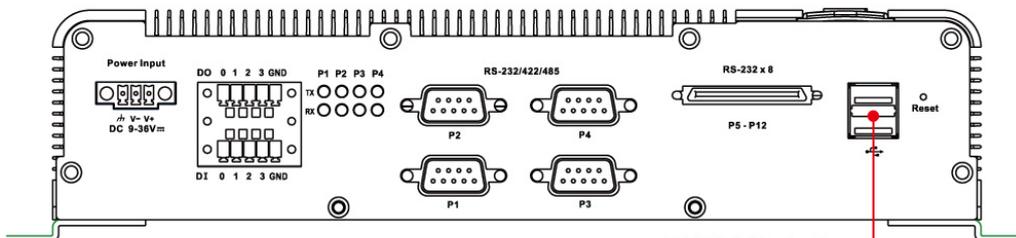
Please note that without a Y-type cable, the PS/2 connector on the V2401/2402 can only work with a PS/2 keyboard. A PS/2 mouse will not function when directly connected to the PS/2 connector on the V2401/2402 embedded computers.

# Connecting to the USB Device

The V2401/2402 comes with 6 USB 2.0 hosts. Four are located on the front panel and the other two are on the rear panel. The hosts can be used for an external flash disk or hard drive for storing large amounts of data. You can also use these USB hosts to connect to a keyboard or a mouse.



USB 2.0 Host x 4

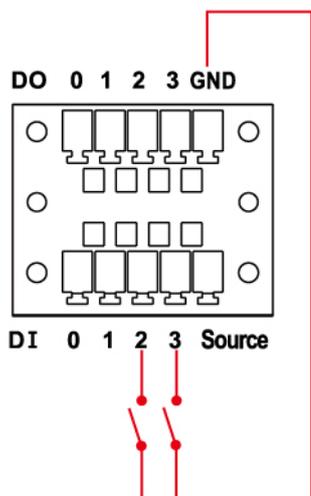


USB 2.0 Host x 2

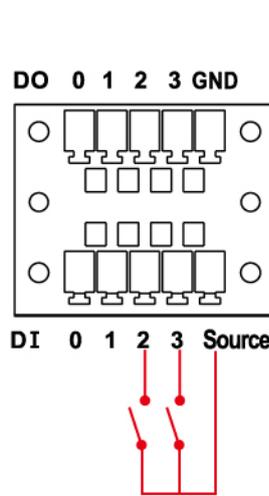
## DI/DO

The V2401/2402 comes with a 4-ch digital input and a 4-ch digital output through the terminal block. The pin assignments and the wiring methods are shown below.

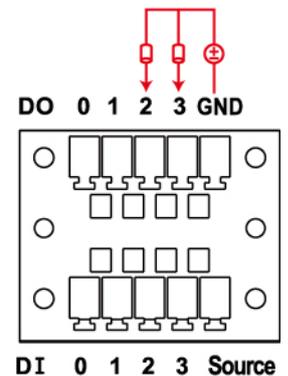
### DI Dry Contact Wiring



### DI Wet Contact Wiring



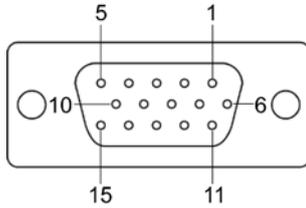
### DO Wiring



## Connecting to a VGA Monitor

The V2401/2402 comes with a D-Sub 15-pin female connector on the front panel to connect a VGA CRT monitor. To ensure that the monitor image remains clear, be sure to tighten the monitor cable after connecting it to the V2401/2402. The pin assignments of the VGA connector are shown below.

**DB15 Female Connector**

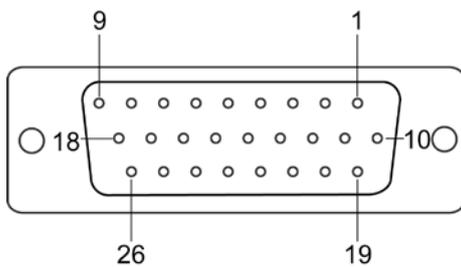


Pin No.	Signal Definition
1	Red
2	Green
3	Blue
4	NC
5	GND
6	GND
7	GND
8	GND
9	VCC
10	GND
11	NC
12	DDC2B Data
13	HSYNC
14	VSYNC
15	DDC2B Clock

## Connecting to an LVDS Monitor

The V2401 also comes with a 26-pin LVDS connector on the front panel to connect a panel with an LVDS cable. The pin assignments of the LVDS connector are shown below.

**LVDS Female Connector**



Pin No.	Signal Definition
1	VDD_12V
2	GND
3	LVDS_CLK_N
4	LVDS_DAT_P3
5	GND
6	LVDS_DAT_N2
7	LVDS_DAT_P1
8	GND
9	LVDS_DAT_NO
10	VDD_12V
11	N/C
12	LVDS_CLK_P
13	GND
14	LVDS_DAT_N3
15	LVDS_DAT_P2
16	GND
17	LVDS_DAT_N1
18	LVDS_DAT_PO
19	VDD_5V
20	VDD_5V
21	VDD_3V3
22	VDD_3V3
23	GND
24	BKLT_EN

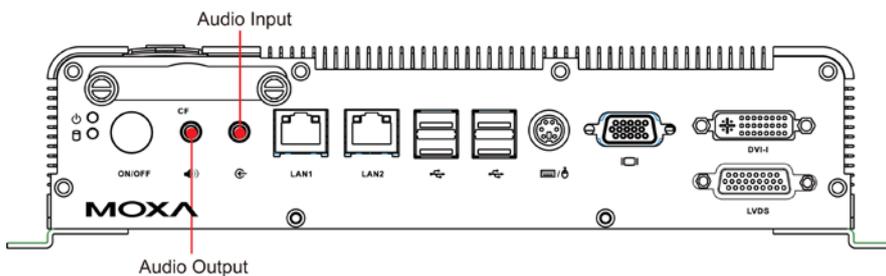
## Connecting to a DVI-I Monitor

The V2401/2402 computers come with a DVI-I connector that can connect to a DVI monitor. Use the cable to connect one end to the DVI-I connector and the other end to the monitor. See the following table for DVI-I connector pin assignments.

DVI Connector	Pin No.	Signal Definition
	1	T.M.D.S. Data2-
	2	T.M.D.S. Data2+
	3	T.M.D.S. Data2/4 Shield
	4	T.M.D.S. Data4-
	5	T.M.D.S. Data4-
	6	DDC Clock
	7	DDC Data
	8	Analog Vertical Sync
	9	T.M.D.S. Data1-
	10	T.M.D.S. Data1+
	11	T.M.D.S. Data1/3 Shield
	12	T.M.D.S. Data3-
	13	T.M.D.S. Data3+
	14	+5V Power
	15	Ground (return for +5V, HSync, and VSync)
	16	Hot Plug Detect
	17	T.M.D.S. Data0-
	18	T.M.D.S. Data0+
	19	T.M.D.S. Data0/5 Shield
	20	T.M.D.S. Data5-
	21	T.M.D.S. Data5+
	22	T.M.D.S. Clock Shield
	23	T.M.D.S. Clock+
	24	T.M.D.S. Clock-
	C1	Analog Red
C2	Analog Green	
C3	Analog Blue	
C4	Analog Horizontal Sync	
C5	Analog Ground (analog R, G, B return)	

## Connecting to a Speaker or a Headphone

The V2401/2402 comes with audio input and output interfaces for connecting a microphone and speaker or headphones. See the following figure for details.

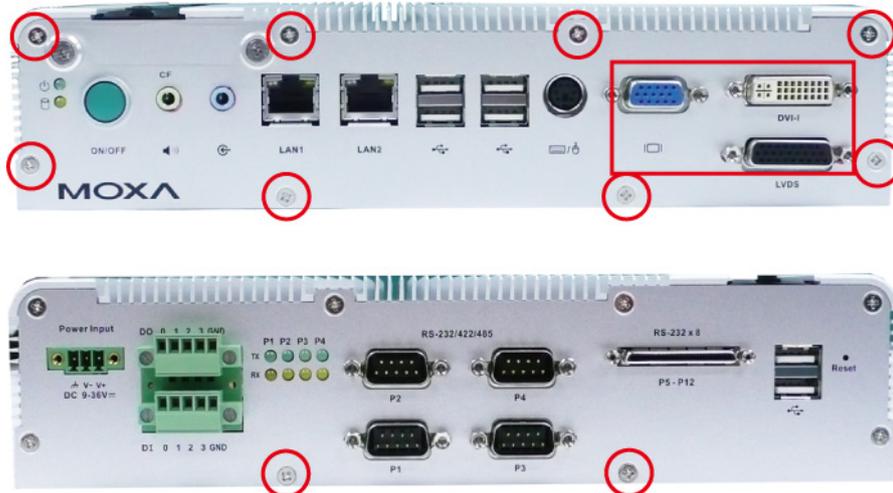


# Upgrading the Memory Module

The V2401/2402 embedded computers support one 200-pin DDR2 533 SODIMM module of up to 2GB. One DDR2 SDRAM memory module is installed at the factory. To upgrade the DDR2 SDRAM memory module, follow these instructions:

Disconnect the V2401/2402 from the power source.

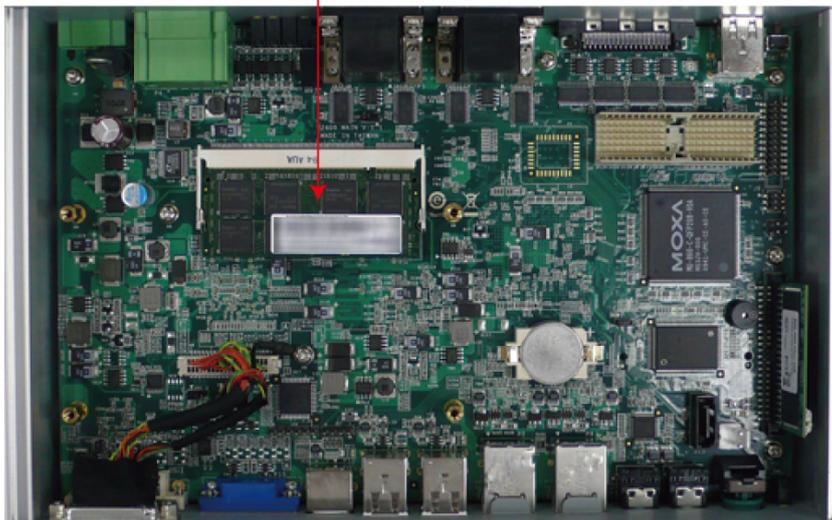
Remove the eight screws on the front panel and two screws on the rear panel. Also, you need to remove the screws on the display connectors, including VGA, DVI and LVDS. See the following figures for details.



When finished, pull up the back cover of the V2401/2402 computer.

Find the location of the memory module.

Memory Module Socket



Carefully remove the module by clicking the clutches at both sides of the module, and then replace the new module. Be sure to orient the module correctly.

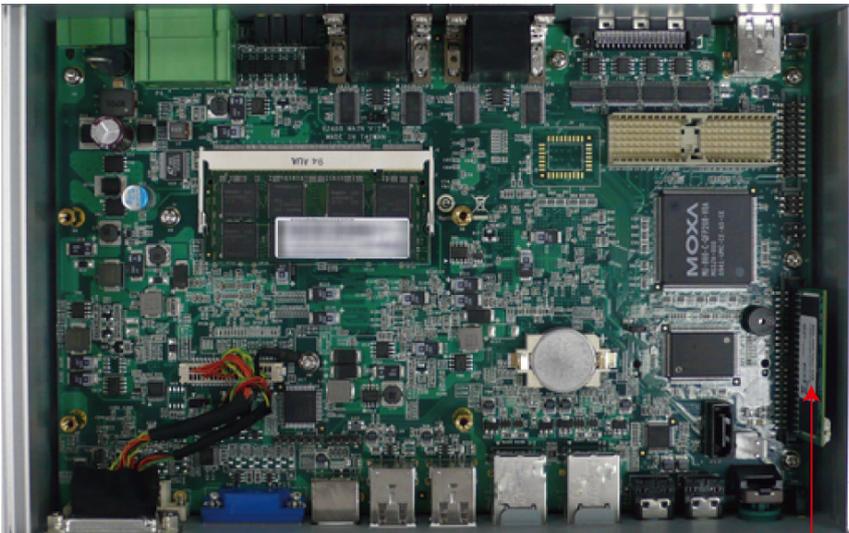


When finished, replace the back cover of the computer.

## Upgrade the DOM Module

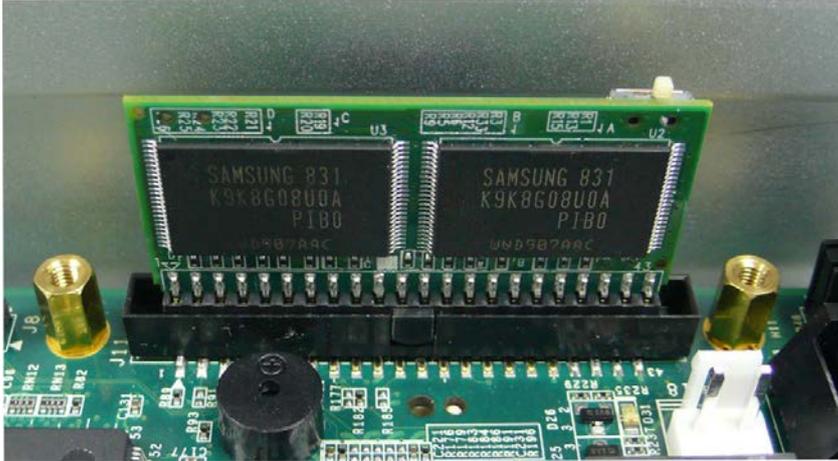
The V2401/2402 has been pre-installed with a DOM to store the OS. To upgrade the DOM module, see the following steps.

After taking off the back cover of the V2401/2402, find the location of the DOM module socket.



DOM Socket

Remove the DOM module by pulling it up.

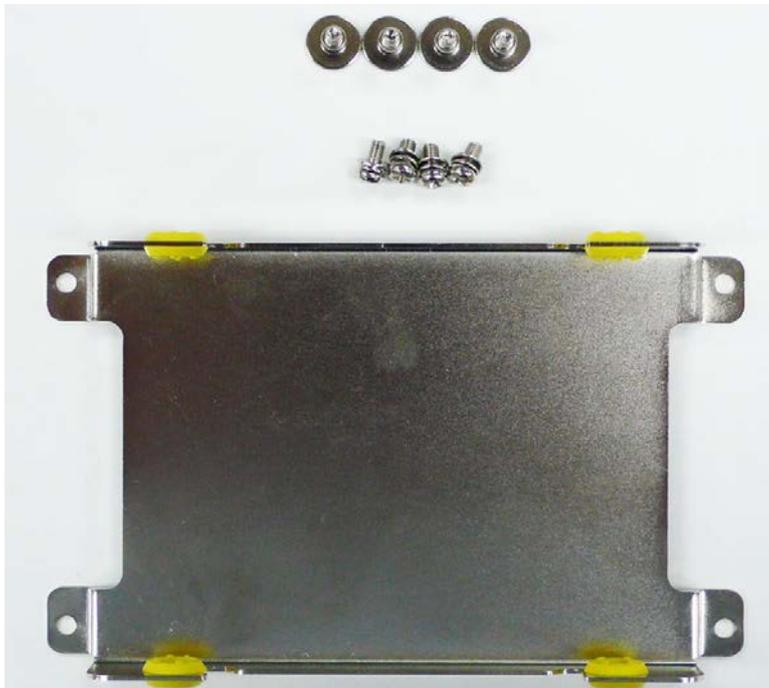


Insert the new DOM module; make sure it is firmly inserted.

## Installing a SATA Hard Disk

The V2401/2402 embedded computers have one SATA connector for installing a SATA hard disk. To install a 2.5-inch SATA hard disk, follow these instructions.

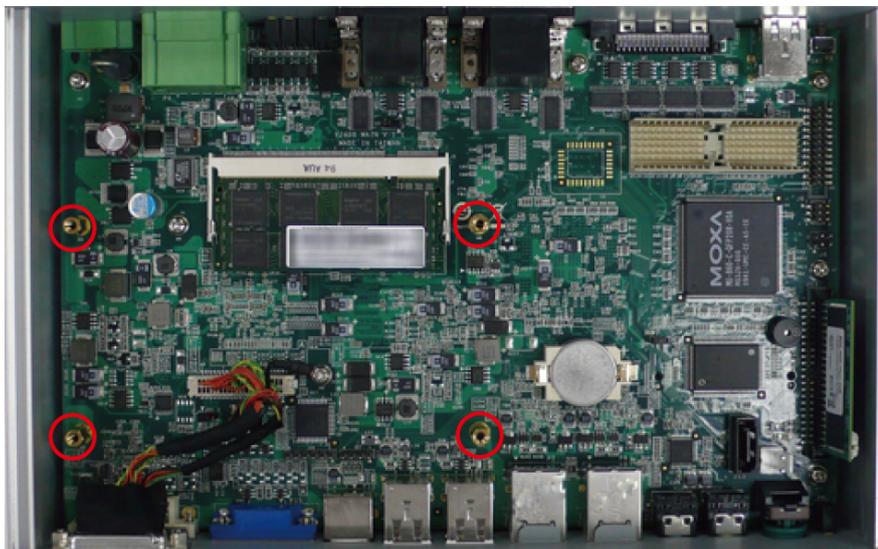
1. Disconnect the V2401/2402 from its power source.
2. The V2401/2402 has an optional hard drive disk installation kit which must be purchased separately. It includes a hard drive disk bracket, four screws to attach the hard drive disk and another four screws to attach the bracket to the computer.



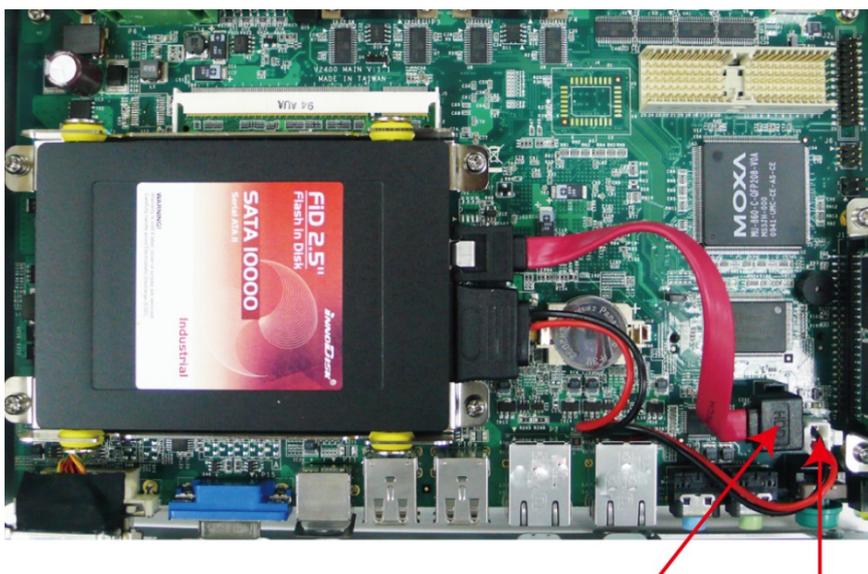
3. Place the hard drive disk on the bracket and use four screw to attach it.



4. When finished, place the bracket on the main board and find the location for attachment.



5. Make sure that four screws have been securely attached on the main board. Then use the SATA cable to connect the hard drive disk to the SATA connector, and use the power cable to connect to the power connector.



SATA Connector Power Connector

6. When finished, replace the back cover of the computer.

This chapter describes the BIOS settings of the V2401/2402 embedded computers. The BIOS is a set of input/output control routines for peripherals. The BIOS is used to initialize basic peripherals and helps boot the operating system before the operating system is loaded. The BIOS setup allows the user to modify the system configurations of these basic input/output peripherals. All of the configurations will be stored in the battery backed up CMOS RAM, which retains the system information after system reboots or the power is removed.

The following topics are covered in this chapter:

❑ **Entering the BIOS Setup Utility**

❑ **Modifying the BIOS Main Settings**

- Basic Configuration
- System Security

❑ **Advanced Settings**

- Hard Disk Boot Priority
- Advanced BIOS Features
- CPU Features
- Advanced Chipset Settings

❑ **Peripherals**

- OnChip IDE Device
- Onboard Device
- Super I/O Device

❑ **Power**

- ACPI Suspend Type
- Soft-Off by PWR-BTTN

❑ **Hardware Monitor**

- CPU Warning Temperature
- Warning Beep

❑ **Load Defaults**

- Load System Default Settings
- Load System Turbo Settings
- Load CMOS from BIOS
- Save CMOS to BIOS

❑ **Exiting the BIOS Setup**

- Save & Exit Setup
- Exit Without Saving

❑ **Upgrading the BIOS**

# Entering the BIOS Setup Utility

To enter the BIOS setup utility, press the “Del” key while the system is booting up. The main BIOS Setup screen will appear.

A basic description of each function key is listed at the bottom of the screen. Refer to these descriptions to learn how to scroll about the screen, how to select by pressing “Enter,” and how to use the other hot keys listed below.

**F1: General Help**

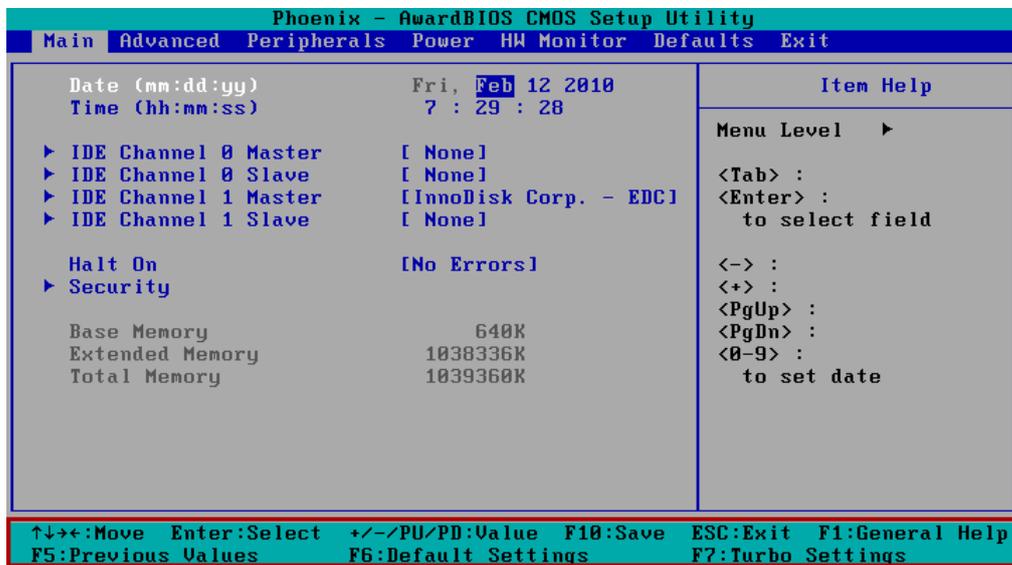
**F5: Previous Value**

**F6: Default Settings**

**F7: Turbo Settings**

**F10: Save**

**ESC: Exit**



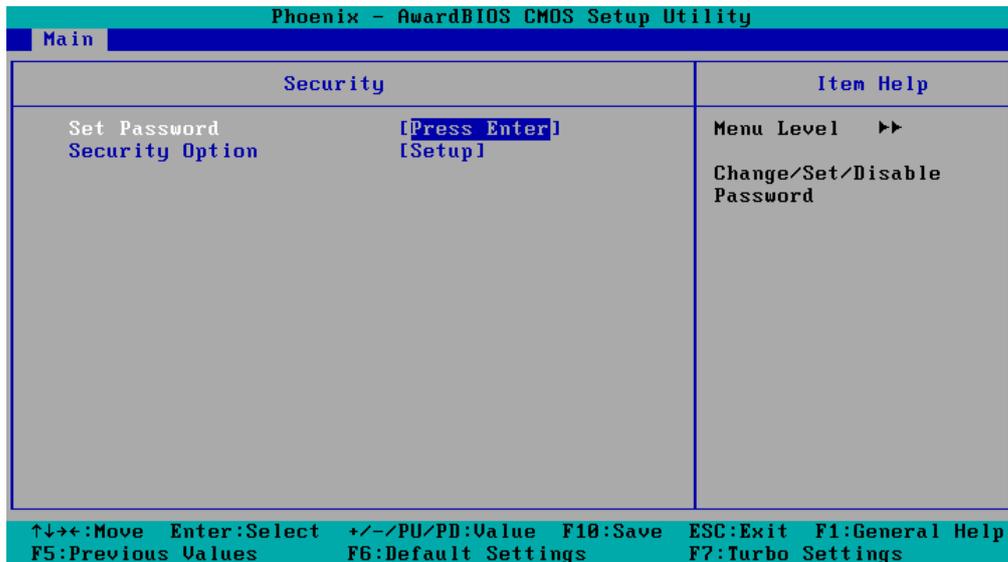
# Modifying the BIOS Main Settings

## Basic Configuration

After entering the BIOS Setup, or choosing the “Main” option, the BIOS main menu will be displayed. Use this menu to check the basic system information such as memory and IDE hard drive. You can also use the menu for configuring basic system parameters, such as date, time, hard drive, display, and system security.

## System Security

To set up system security, select the "Security" option under "Main" to bring up the following screen.



This menu includes two options: "Set Password" and "Security Option."

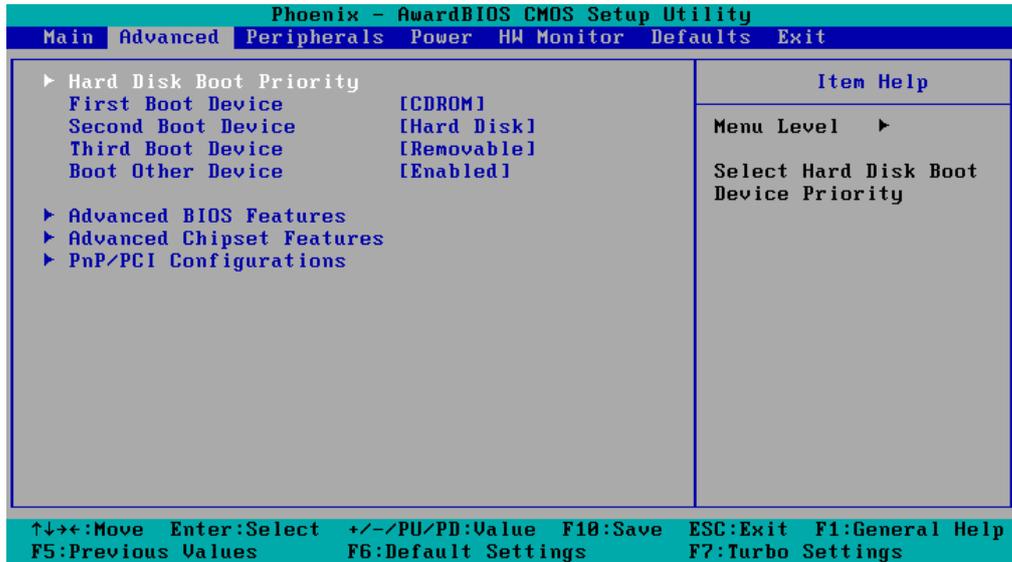
When you select the Set Password option, a pop-up "Enter Password:" window will appear on the screen. The password that you type will replace the password stored in the CMOS memory. You will be required to confirm the new password. Just re-type the password and then press **<Enter>**. You may also press **<Enter>** to abort the selection and not enter a password.

To clear an existing password, just press **<Enter>** when you are prompted to enter the password. A message will show up confirming that the password will be disabled. Once the password is disabled, the system will boot and you can enter the "BIOS Setup Menu" without entering a password.

Once a password has been set, you will be prompted to enter the password each time you enter Setup. This prevents unauthorized persons from changing any part of your system configuration. In addition, when a password setting is enabled, you can set up the BIOS to request a password each time the system is booted up. The "Security Option" setting determines when a password prompt is required. If the "Security Option" is set to "System," the password must be entered both at boot up and when entering the BIOS Setup Menu. If the password is set for "Setup," the password prompt only occurs when you enter the "BIOS Setup Menu."

# Advanced Settings

The "Advanced Features" screen will appear when choosing the "Advanced" item from the main menu.



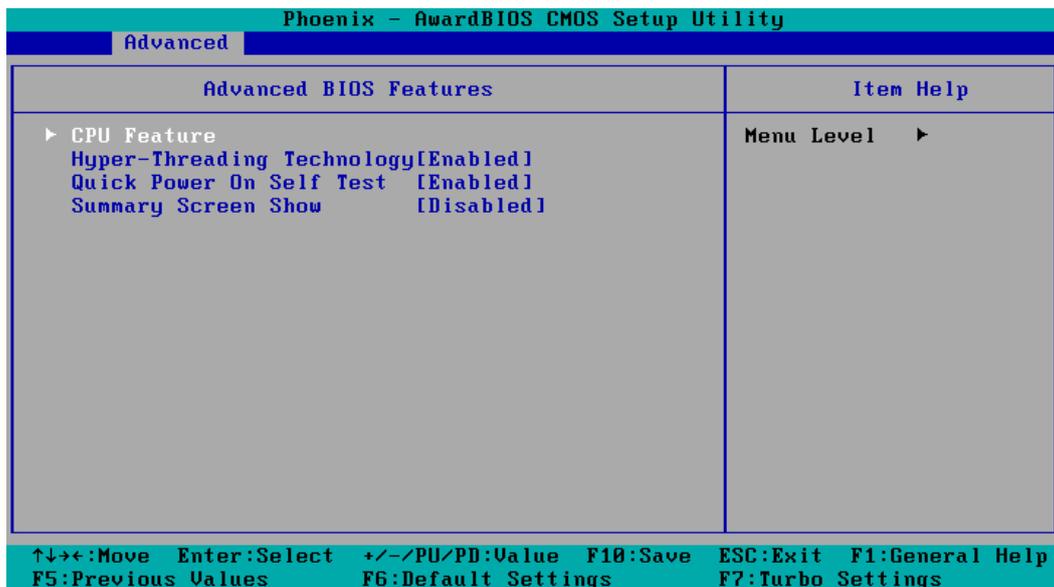
## Hard Disk Boot Priority

### First/Second/Third Boot Device

This option allows users to select or change the device boot priority. You may set 3 levels of priority to determine the boot up sequence for different bootable devices, such as a hard drive, CD-ROM, and removable devices. Select the order in which devices will be searched in order to find a boot device. The available options are "CDROM (default for first boot device)," "Removable" (default for third boot device), "Hard Disk" (default for second boot device) and "Disabled."

## Advanced BIOS Features

When you select the "Advanced BIOS Features" option under the "Advanced" menu, the following configuration menu will appear.



## CPU Features

### C1E Function

This item allows you to configure the power-saving mode when the CPU is in C1 status.

Options: Auto (default), Disabled

### EIST Function

This item allows you to configure the power saving mode with the Enhanced Intel SpeedStep Technology. This helps the system reduce the workload frequency and power consumption.

Options: Disabled (default), Enabled

### Hyper-Threading Technology

This item allows you to enable or disable the hyper-threading function, which allows the system to handle more than one thread at the same time.

Options: Enabled (default), Disabled

### Quick Power On Self Test

This setting allows the system to skip certain tests while the system boots up. Enable this feature to speed up the boot up process.

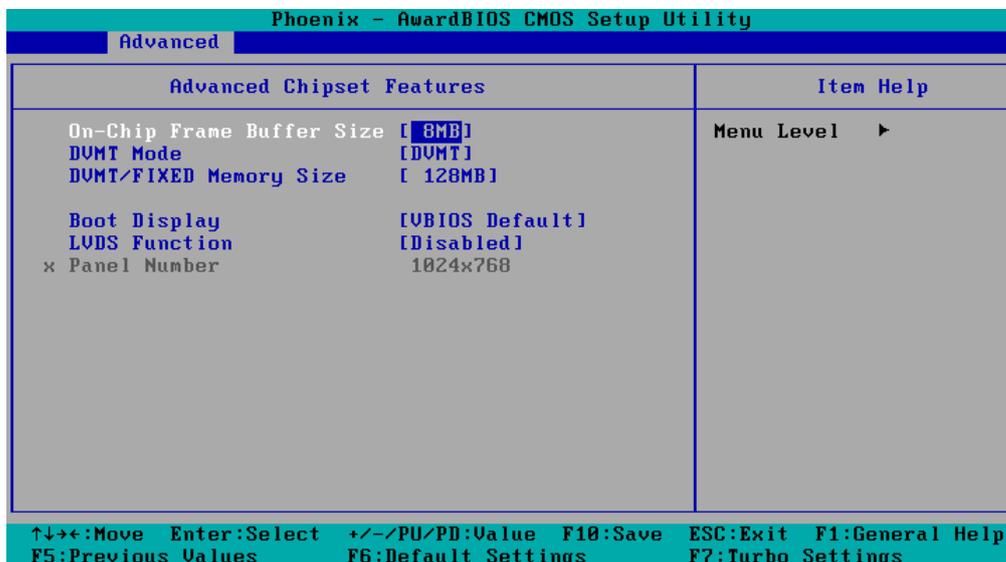
Options: Enabled (default), Disabled

### Summary Screen Show

The summary screen displays system information, including CPU, memory, disk drive, and PCI devices. The default value is disabled. You may choose "Enabled" to display this screen when the system is booting up.

Options: Disabled (default), Enabled

## Advanced Chipset Settings



## On-chip Frame Buffer Size

This item determines the frame buffer size for the VGA function, and will share the system memory.

Options: 1 MB, 4 MB, 8 MB (default),

## DVMT Mode

Sets the Dynamic Video Memory Technology operating mode. When set to "Fixed," the graphics driver will reserve a fixed portion of the system memory as graphics memory. When set to "DVMT," the graphics driver will dynamically allocate system memory as graphics memory, according to system and graphics requirements. When set to "BOTH," the graphics driver will allocate a fixed amount of memory as dedicated graphics memory, as well as allow more system memory to be dynamically allocated between the graphics processor and the operating system.

Options: FIXED, DVMT (default), BOTH

## DVMT/FIXED Memory Size

Sets the maximum amount of system memory that can be allocated as graphics memory.

Options: 64 MB, 128 MB (default).

## Boot Display

This item allows you to choose which display interface will be shown when system is booting up. Due to the display limitation, two displays at most can be shown when booting up. If you select the default option, "VBIOS Default", the displays that have been connected will be used as the default displays.

Options: VBIOS Default (default), VGA+DVI, VGA, DVI

## LVDS Function

This item allows to enable or disable the LVDS function.

Options: Disabled (default), Enabled

## Panel Number

This item allows you to select the correct resolution according to your LVDS display.

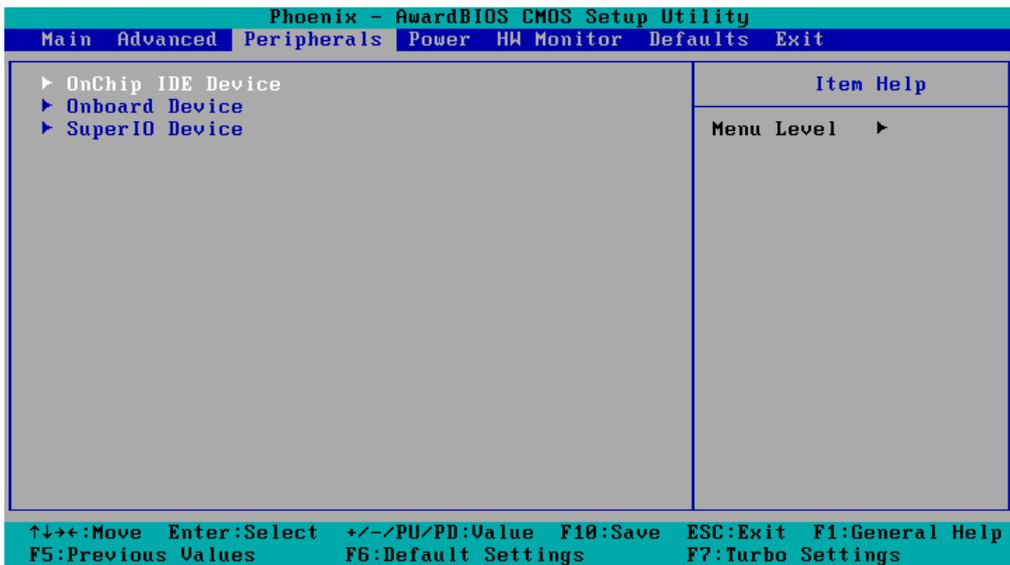


### ATTENTION

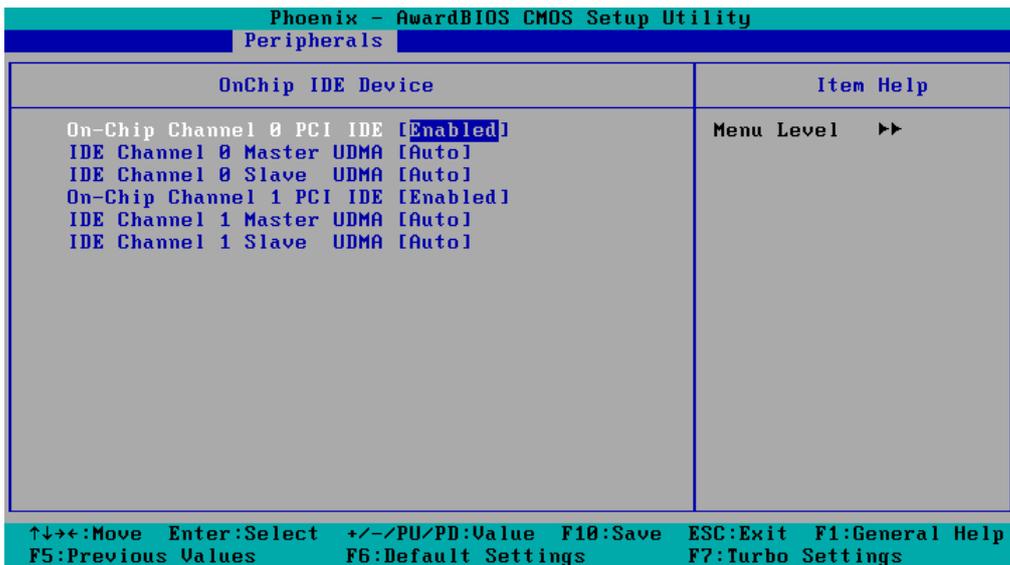
Note that you must select the correct resolution for your LVDS display based on your LVDS specifications, or it will not be properly shown on your panel. When you encounter this problem, take the following steps:

1. Press the Insert key after you hear the beep.
2. Restart your computer and press the Del key while the system is booting up.
3. Reconfigure the VGA setting in the BIOS menu and select the correct resolution and data format for your LVDS.

# Peripherals



## OnChip IDE Device



### On-Chip Channel 0 PCI IDE

This item allows you to enable or disable the Channel 0 onboard PCI device.

Options: Enabled (default), Disabled

### IDE Channel 0 Master UDMA

This item allows you to configure UDMA mode for the device on IDE channel 0 Master.

Options: Disabled, Auto (default), UDMA33, UDMA66, UDMA100

### IDE Channel 0 Slave UDMA

This item allows you to configure UDMA mode for the device on IDE channel 0 Slave..

Options: Disabled, Auto (default), UDMA33, UDMA66, UDMA100

## On-Chip Channel 1 PCI IDE

This item allows you to enable or disable the Channel 1 onboard PCI device.

Options: Enabled (default), Disabled

## IDE Channel 1 Master UDMA

This item allows you to configure UDMA mode for the device on IDE channel 1 Master.

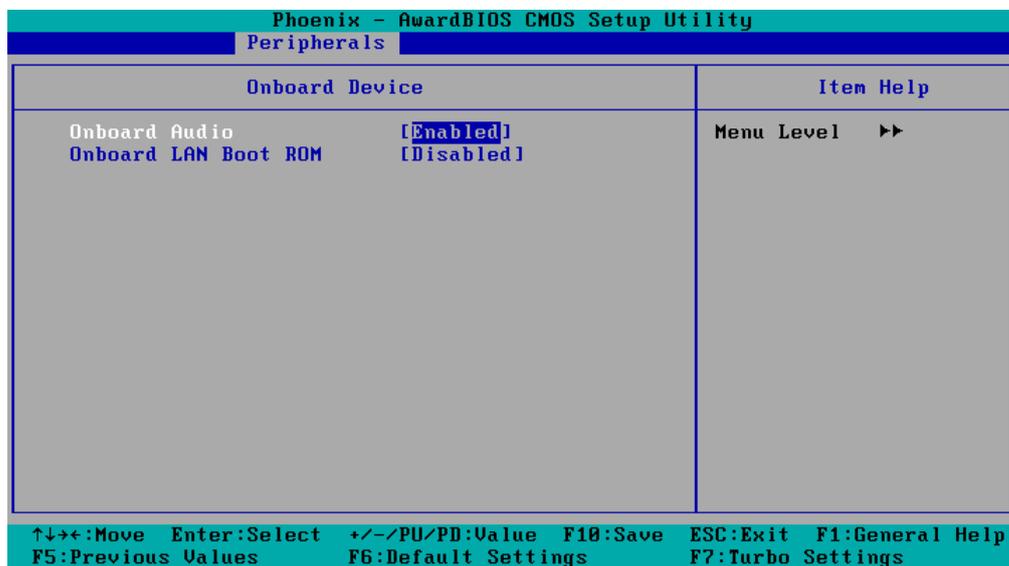
Options: Disabled, Auto (default), UDMA33, UDMA66, UDMA100

## IDE Channel 1 Slave UDMA

This item allows you to configure UDMA mode for the device on IDE channel 1 Slave..

Options: Disabled, Auto (default), UDMA33, UDMA66, UDMA100

## Onboard Device



## Onboard Audio

This feature allows you to enable/disable the audio controller.

Options: Enabled (default), Disabled

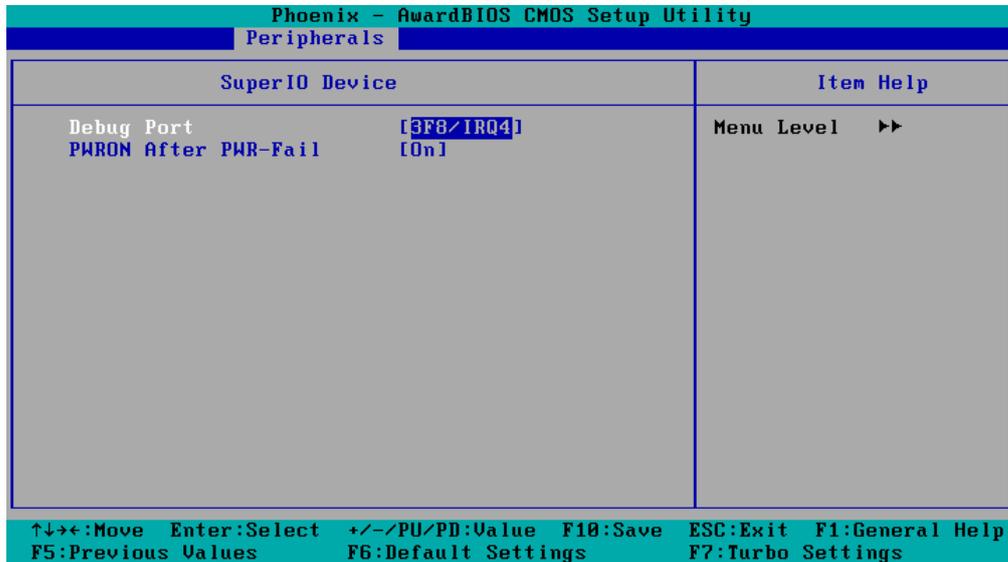
## Onboard LAN Boot ROM

Decide whether to invoke the boot ROM of the onboard LAN chip.

Options: Enabled, Disabled (default)

## Super I/O Device

### Debug Port



This function allows you to enable/disable the debug port communication. The V2401/2402 computer will automatically distribute the IRQ value for the debug port as the default value. If you wish to disable, select **Disabled**. This port is only for engineers who are debugging programs.

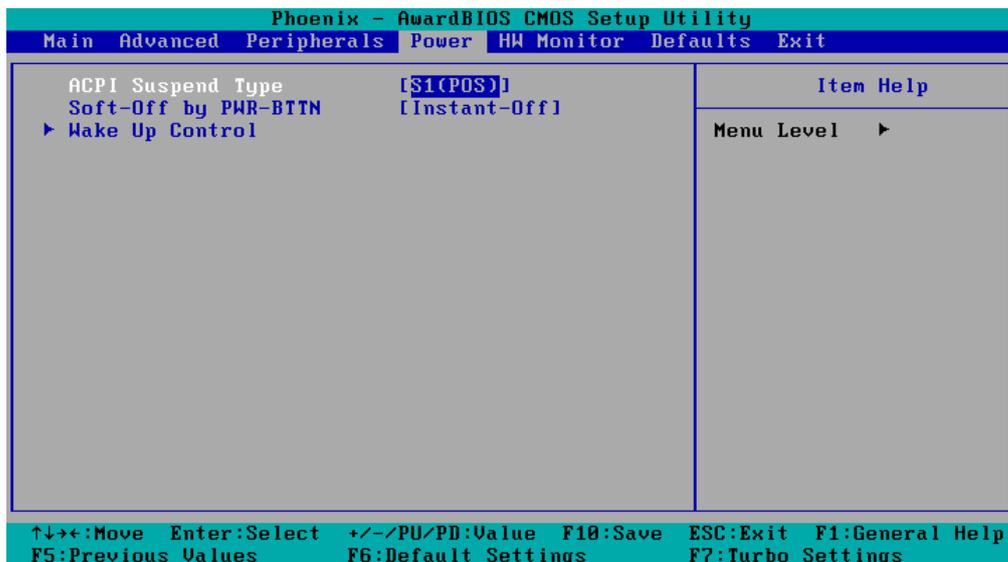
### Power on After Power Fail

This item allows you to configure the power on after power fail function.

Options: Off, On (default), Former-Sts

## Power

The Power Setup Menu allows you to configure your system power-up/ power-down options.



## ACPI Suspend Type

This item allows you to set up the ACPI suspend type for power management function.

Option: S1 (POS), (default), S3 (STR)

## Soft-Off by PWR-BTTN

This item determines the delay to stop the software when pushing the power button.

Options: Instant-Off (default), Delay 4 Sec.

## Hardware Monitor

Phoenix - AwardBIOS CMOS Setup Utility						
Main	Advanced	Peripherals	Power	HW Monitor	Defaults	Exit
CPU Warning Temperature				[ 90°C/194°F ]		Item Help
Warning Beep				[ Disabled ]		Menu Level ▶
Current System Temp				37°C / 98°F		
Current CPU Temperature				21°C / 69°F		
CPU Vcore				1.23V		
+1.05(V)				1.04V		
+1.5 (V)				1.52V		
DDR2 Vcore				1.04V		
+5.0 (V)				5.13V		
+3.3 (V)				3.34V		
AVCC (V)				3.32V		
VBAT (V)				3.29V		
3USB (V)				3.34V		
↑↓→+:-Move Enter:Select +/-PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Default Settings F7:Turbo Settings						

This item helps monitor the status of the system, including CPU temperature and the voltage of the CPU, SDRAM and battery.

## CPU Warning Temperature

This item allows you to configure what temperature will trigger a high temperature warning.

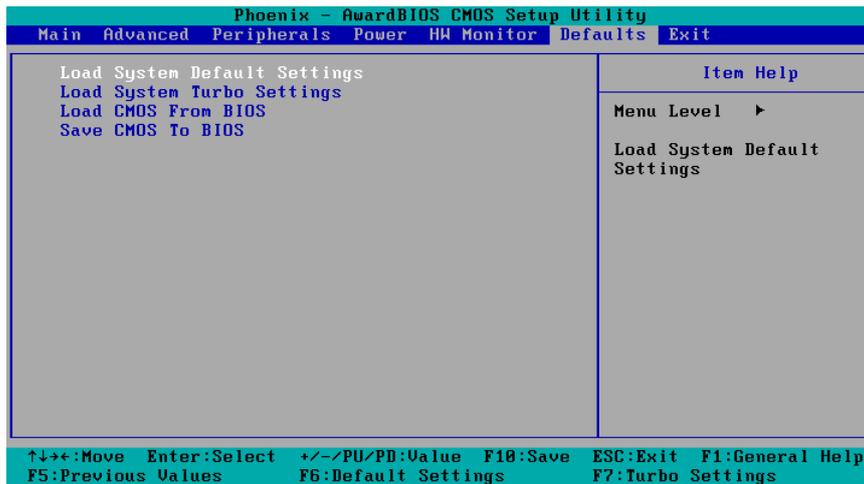
Options: 80°C/176°F, 90°C/194°F (default), 100°C/212°F, Disabled

## Warning Beep

This item allows you to enable/disable the warning beep.

Options: Disabled (default), Enabled

# Load Defaults



## Load System Default Settings

Use this option to load system factory default settings instead of the current BIOS settings. This option is useful for when the system is unstable. Users do not need to remember what settings were active before the system fails.

## Load System Turbo Settings

Use this option to load system optimized settings. If the system is not stable, please load the system default settings.

## Load CMOS from BIOS

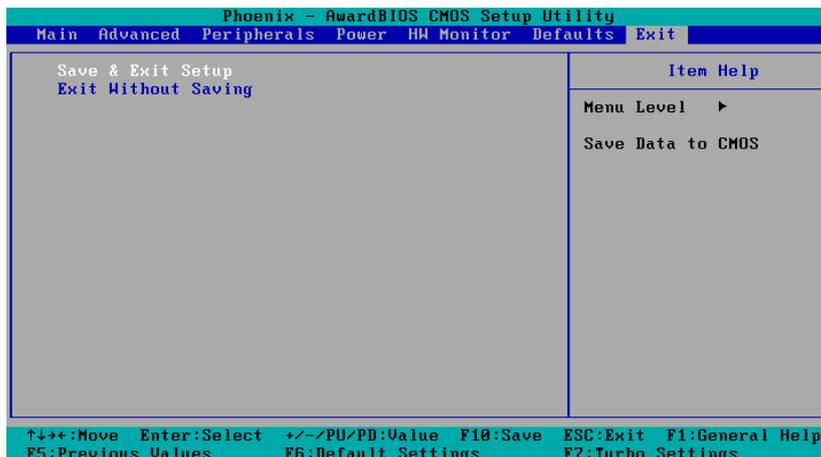
Use this option to load BIOS settings from flash ROM to CMOS.

## Save CMOS to BIOS

Use this option to save the BIOS settings from the CMOS to flash ROM.

# Exiting the BIOS Setup

To exit the BIOS setup utility, choose "Exit." Pressing <ESC> will achieve the same result.



## Save & Exit Setup

Save all configuration changes to CMOS (memory) and exit setup. A confirmation message will be displayed before proceeding.

## Exit Without Saving

Abandon all changes made during the current session and exit setup. A confirmation message will be displayed before proceeding.

## Upgrading the BIOS

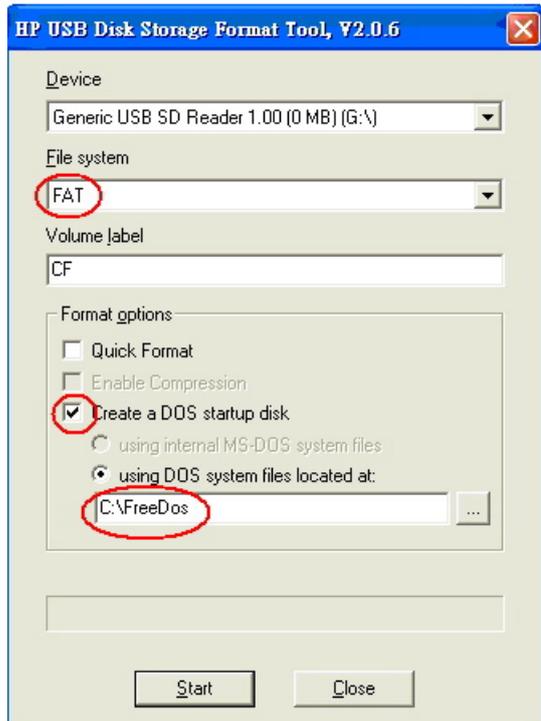
This section describes how to upgrade the BIOS. However, please note that upgrading the BIOS involves high risk of damage to your computer. We strongly recommend that you contact Moxa's TS staff for assistance and obtain all necessary tools and files before attempting to upgrade.

### Step 1: Create a Bootable USB Disk.

We suggest you use the HP USB Disk Format Tool to create a bootable USB disk. You may download this tool from the Internet. Search the Internet using the phrase "HP USB Disk Storage Format Tool", and then download the tool from one of the listed websites.

You will also need to download the FreeDos system files **kernel.sys** and **command.com** from <http://www.freedos.org/kernel/>.

1. Copy DOS system files **kernel.sys** and **command.com** to a specified directory (**C:\FreeDOS** in this example).
2. Start the HP USB Disk Storage Format Tool and select the USB device that you want to use as a bootable disk in the **Device** drop down box.
3. Select **FAT** in the **File system** drop down box.
4. Type the disk name in the **Volume label field**.
5. Check the option **Create a DOS startup disk** under format options.
6. Specify the directory of the system files (for example, **C:\FreeDOS**).
7. Click **Start** to format and create the USB disk.





**ATTENTION**

We suggest you use a USB drive with under 2 GB in disk space, as larger USB drives may not support the FAT file format and consequently fail to boot.

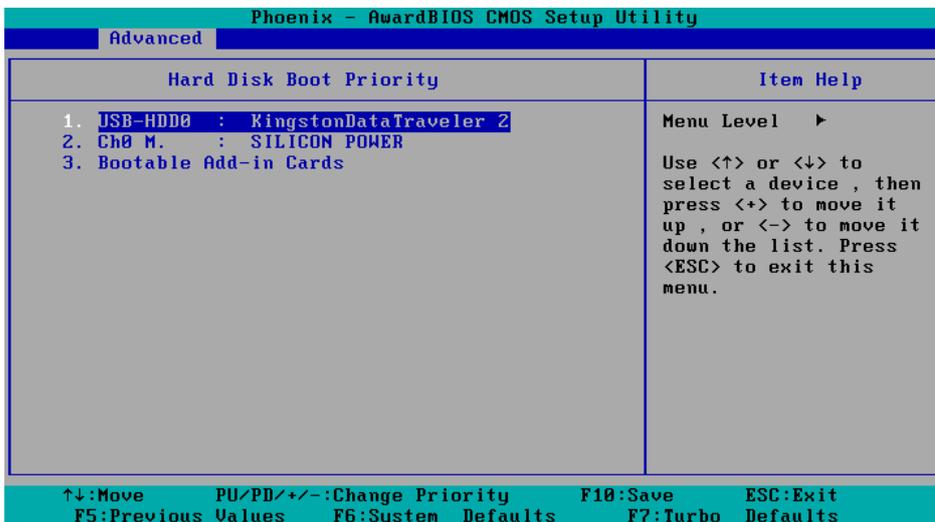
**Step 2: Prepare the Upgrade Tool and BIOS Binary File.**

You must use the BIOS upgrade installation file to upgrade the BIOS. You can send your request to Moxa's technical support team at [support@moxa.com](mailto:support@moxa.com) to get an updated version of the BIOS.

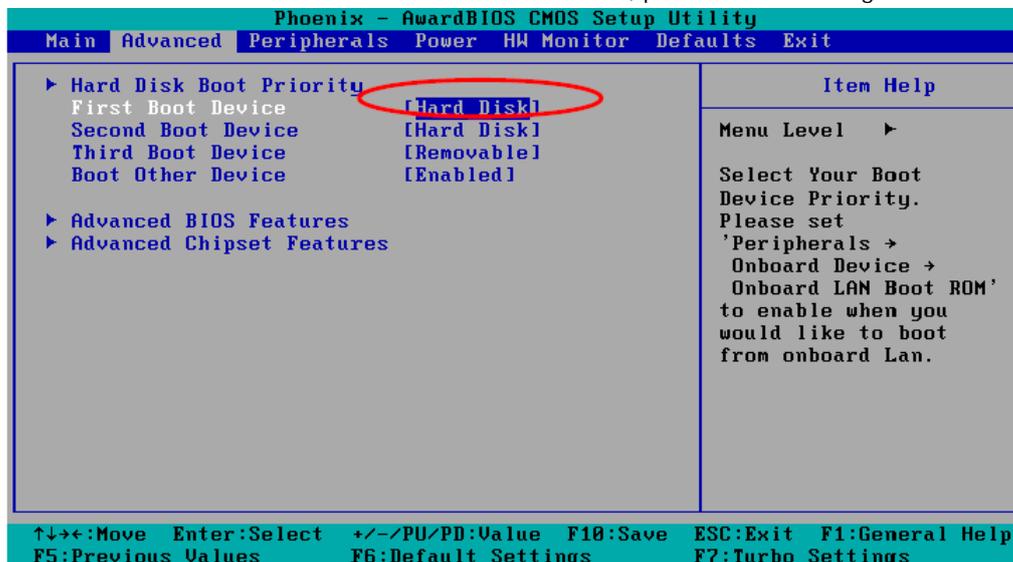
1. Get the BIOS upgrade installation file. The file name should have following format: **240010.s00**.
2. Copy the file to the Bootable USB Disk.
3. Double click to extract the BIOS update installation file. The file includes a binary file in the form **s210010.s00** and the upgrade utility named **awdf flash.exe**.

**Step 3: Set up the BIOS to Boot from the USB Disk.**

1. Insert the USB disk.
2. Power on and press **DEL** to enter the BIOS Setup menu.
3. Select **Advanced** → **Hard Disk Boot Priority** and then press **Enter**.
4. From the Setup menu, use “↑” or “↓” to select the USB device.



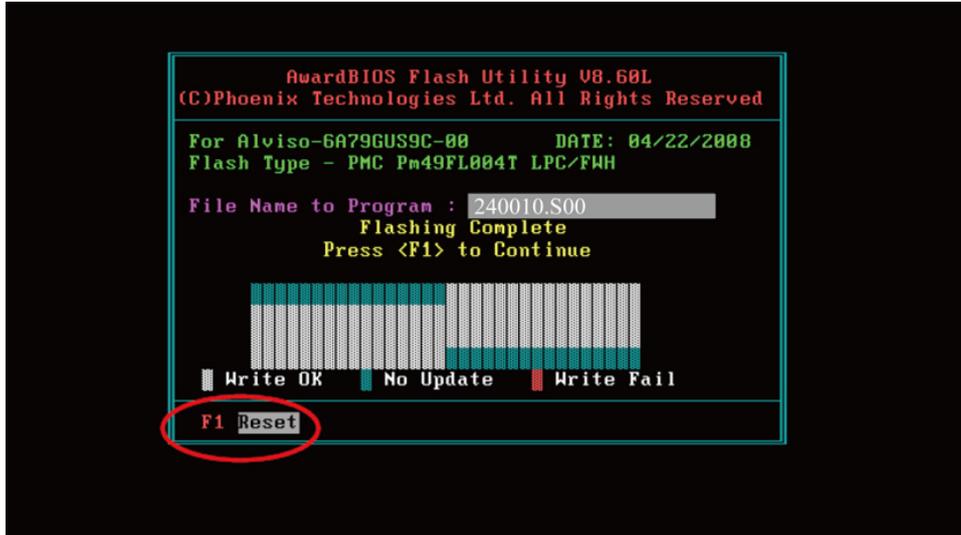
5. Press “+” to move it up to the first priority, and press “Esc” to exit the setup menu.
6. Make sure the first boot device is **Hard Disk**. If it isn't, press **Enter** to change it.



- 7. Select **Exit** → **Save & Exit Setup** and then press **Enter**.
- 8. Choose **Y** to save to the CMOS and then exit.

**Step 4: Run awdf flash.exe to upgrade the BIOS.**

- 1. While in the BIOS Setup menu and before upgrading the BIOS, you may choose to save the old BIOS files to a specific location. Type **Y** to do so, or **N** to begin the upgrade.
- 2. If the BIOS Setup is correct, it will restart and boot from the USB disk.
- 3. Run **awdf flash 240010.S00** from the command line to upgrade the BIOS. Replace xxxxxxx.Sxx with the BIOS binary file name discussed in Step 2.
- 4. Press F1 to reset the system after the bios update is complete. The system should reboot at this time.



- 5. Please note that once the BIOS is successfully upgraded, the default BIOS values will be automatically loaded. However, if you wish to re-configure the BIOS settings, press DEL while booting.



**ATTENTION**

Do **NOT** switch off the power supply during the BIOS upgrade, as doing so may cause the system to crash.

# A

## Regulatory Approval Statement

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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.

**Class A:** FCC Warning! This equipment has been tested and found to comply with the limits for a Class A 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 commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



European Community

**Warning:**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.