AEC-6611

Compact Embedded Controller

Intel® Atom™ N270 1.6GHz Processor

Dual LAN, 2 USB2.0, 4 COM, 1 VGA

AEC-6611 Manual 2nd Ed.

January 2011

Copyright Notice

Acknowledgments

All other products' name or trademarks are properties of their respective owners.

- Award is a trademark of Award Software International, Inc.

- CompactFlash™ is a trademark of the Compact Flash Association.

- Microsoft Windows® is a registered trademark of Microsoft Corp.

- Intel®, Atom™ are trademarks of Intel Corporation.

- PC/AT, PS/2, and VGA are trademarks of International Business Machines Corporation.

All other product names or trademarks are properties of their respective owners.

Packing List

Before you begin operating your PC, please make sure that the following materials are enclosed:

- 1   AEC-6611 Embedded Controller

- 2   Wallmount Brackets

- 1   Screw Package

- 1   CD-ROM for manual (in PDF format) and drivers

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

Safety & Warranty

1. Read these safety instructions carefully.

2. Keep this user's manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.

4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a firm surface during installation. Dropping it or letting it fall could cause damage.

7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.

10. All cautions and warnings on the equipment should be noted.

11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.

12. Never pour any liquid into an opening. This could cause fire or electrical shock.

13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.

14. If any of the following situations arises, get the equipment checked by service personnel:

    a. The power cord or plug is damaged.

    b. Liquid has penetrated into the equipment.

    c. The equipment has been exposed to moisture.

d.   The equipment does not work well, or you cannot get it to work according to the user's manual.

e.   The equipment has been dropped and damaged.

f.   The equipment has obvious signs of breakage.

15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20°C (-4°F) OR ABOVE 55°C (131°F). IT MAY DAMAGE THE EQUIPMENT.

FCC

Warning!

This device complies with Part 15 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.

Caution:
There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Below Table for China RoHS Requirements
产品中有毒有害物质或元素名称及含量

AAEON Boxer/ Industrial System

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
外壳	×	○	○	○	○	○
中央处理器 与内存	×	○	○	○	○	○
硬盘	×	○	○	○	○	○
电源	×	○	○	○	○	○

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

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

备注：
一、此产品所标示之环保使用期限，系指在一般正常使用状况下。
二、上述部件物质中央处理器、内存、硬盘、电源为选购品。

Chapter

1

General Information

1.1 Introduction

The newest Boxer series AEC-6611 has been introduced by AAEON and it utilizes Intel® Atom™ processor. In this era of information explosion, the advertising of consumer products will not be confined to the family television, but will also spread to high-traffic public areas, like department stores, the bus, transportation station, the supermarket etc. The advertising marketing industry will resort to every conceivable means to transmit product information to consumers. System integrators will need a multifunction device to satisfy commercial needs for such public advertising.

The AEC-6611 is designed for indoor environments due to the following reasons; first, the AEC-6611 offers low power consumption system that while operating in ambient temperatures ranging from -20° to 55°C. The MTBF (Mean Time Before Failure) rating states that the AEC-6611 can operate up to 70,000 hours at 40°C ambient temperature, which indicates its careful and long-life design.

The AEC-6611 is a standalone high performance controller designed for long-life operation and with high reliability. It can replace traditional methods and become the mainstream controller for the multimedia entertainment market.

1.2 Features

- Intel$^®$ Atom^{TM} N270 1.6 GHz Processor

- COM x 4 (Optional COM x 8)

- Gigabit Ethernet x 2

- DC 12V Power Input

- ATX Power Function

- SATA Interface Support

- Wallmount and DIN Rail Design for Industrial Applications

- Windows$^®$ CE, Windows$^®$ XP Embedded, Windows$^®$ 7 and Linux Fedora Support

1.3 Specifications

System

- CPU   Intel® Atom™ N270 1.6GHz Processor
- Memory   DDR2 400/533 SODIMM x 1, Max.
  2GB
- VGA   D-sub 15P VGA Connector
- Ethernet   10/100/1000Base-TX Ethernet RJ-45
  connector x 2
- Hard Disk Drive   2.5" SATA HDD x 1
- Expansion   Mini-PCI x 1, Mini Card x 1
- Solid Storage   Internal Type II CompactFlash™ slot
  Disk   x 1
- Serial Port   RS-232/422/485 x 1, RS-232 x 3 (x 8
  optional)
- USB   USB 2.0 x 2
- Watchdog Timer   Generates a time-out system reset
- Power Supply   DC power input 12V

Mechanical and Environmental

- Construction   Aluminum Alloy Chassis
- Color   Dark Gray
- Mounting   Wallmount and DIN rail (optional)
- Dimension   7.76"(W) x 2.25"(H) x 4.33"(D)
  (197 mm x 57.2 mm x 110 mm)
- Net Weight   4.75 lb (2.16 kg)

- Gross Weight   8.36 lb (3.8 kg)
- Operating   5°F ~ 122°F (-20°C ~ 50°C) (CFD)
  Temperature   5°F ~ 131°F (-20°C ~ 55°C) (HDD)
- Storage   -4°F ~ 158°F (-20°C ~ 70°C)
  Temperature
- Operating   5 ~ 90% @ 40°C, non-condensing
  Humidity
- Vibration   5G rms/ 5~500Hz/ random
  operation –CFD
  1G rms/ 5~500Hz/ random
  operation –HDD
- Shock   50G peak acceleration (11msec.
  duration) –CFD
  20G peak acceleration (11msec.
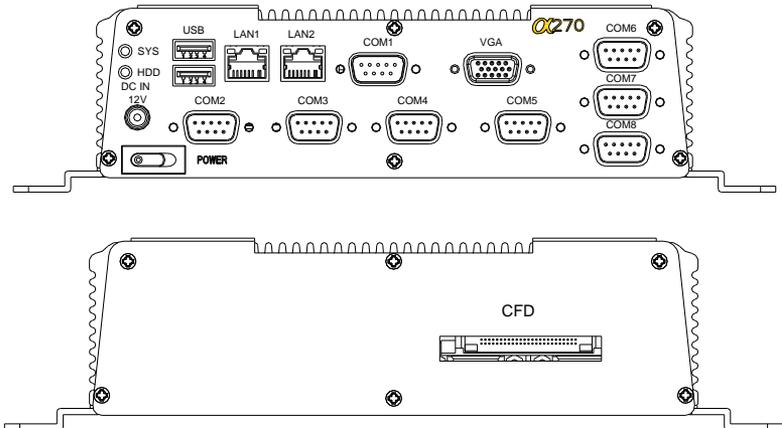 duration) –HDD
- EMC   CE/FCC Class A

Chapter

2

Hardware Installation

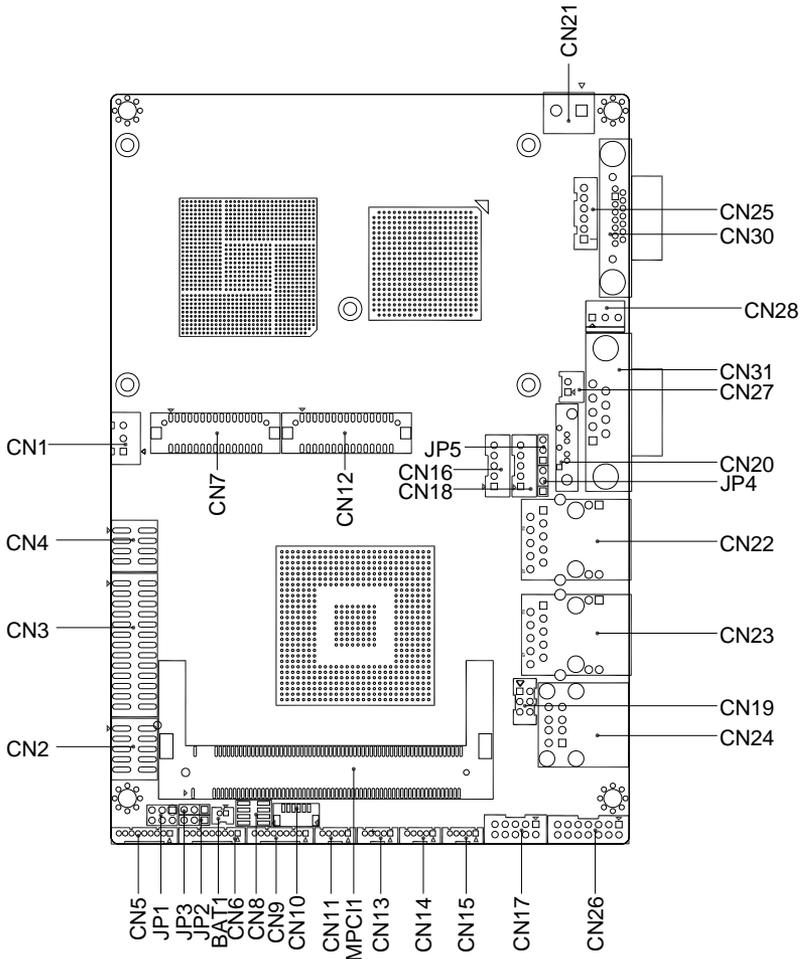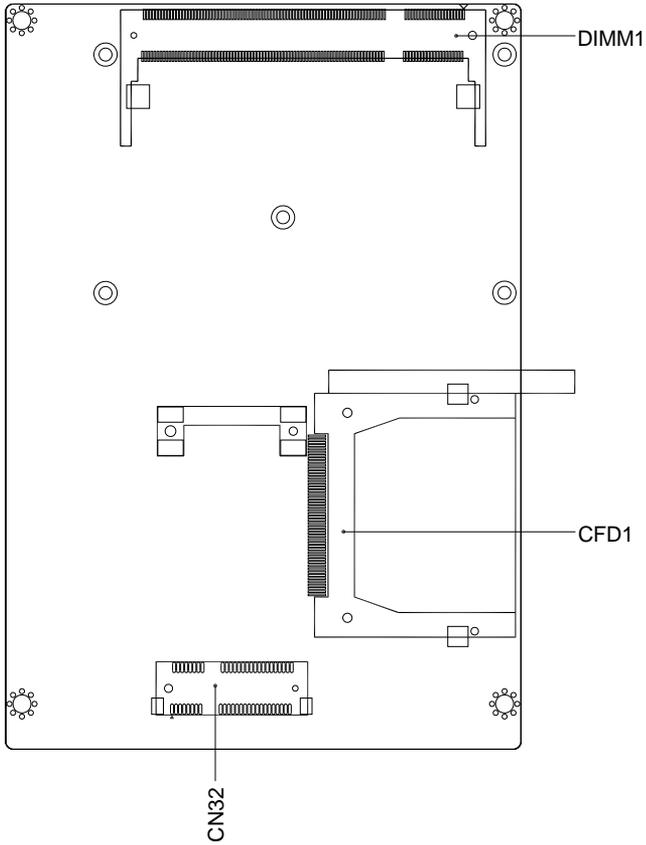## 2.1 Dimension and I/O of AEC-6611
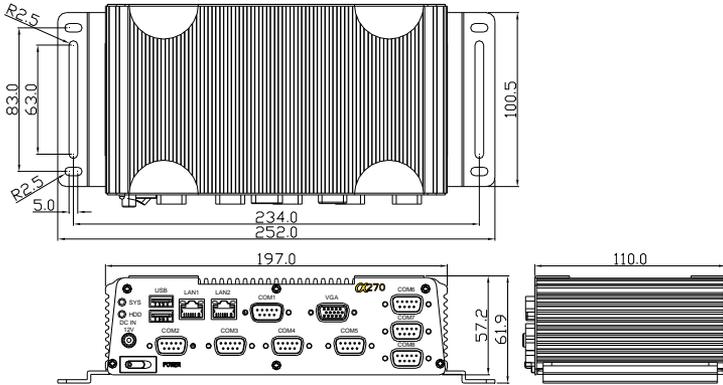
Connectors of AEC-6611

2.2 Connectors and Jumpers of The Main Board

Component Side

Solder Side

DIMM1

CFD1

CN32

2.3 List of Jumpers

The board has a number of jumpers that allow you to configure your system to suit your application.

The table below shows the function of each of the board's jumpers:

| Label	Function
JP1	COM2 RI/+5/+12V Selection
JP2	Clear CMOS Front Panel
JP3	AT/ATX Power Mode Selection
JP4	LVDS Inverter Voltage Selection
JP5	LVDS Operating Voltage Selection

2.4 List of Connectors

The board has a number of connectors that allow you to configure your system to suit your application. The table below shows the function of each board's connectors:

Label	Function
CN1	External +5V Standby Power Input and PS_ON#
CN2	Digital I/O Connector
CN3	Parallel Port Connector
CN4	TV-out Connector
CN5	COM Port 2 Connector
CN6	COM Port 3 Connector
CN7	2nd LVDS Connector for 18/24-bit LCD
CN8	Onboard BIOS Programming I/F (Optional)
CN9	COM Port 4 Connector
CN10	UIM Connector
CN11	USB Port 1 Connector
CN12	1st LVDS Connector for 18-bit LCD
CN13	USB Port 2 Connector
CN14	USB Port 3 Connector
CN15	USB Port 4 Connector
CN16	2nd LVDS Inverter Connector
CN17	Front Panel
CN18	1st LVDS Inverter Connector

| CN19	Keyboard / Mouse Connector
CN20	SATA 1 Connector
CN21	+12V Power Input Connector
CN22	RJ-45 Ethernet#1 Connector
CN23	RJ-45 Ethernet#2 Connector
CN24	USB Port 5&6 Connector
CN25	+5V Standby Power Output w/ PS_ON# & SMBus
CN26	Audio In/Out/CD-in and MIC Connector
CN27	+5V Output Connector for 2.5" SATA Hard Disk
CN28	System FAN Connector
CN30	CRT Display Connector
CN31	COM Port 1 Connector
CN32	Mini-Card Slot
CFD1	Compact Flash Disk
MPCI1	Mini-PCI Slot
DIMM1	DDR2 SODIMM Slot

2.5 Hard Disk Drive Installation
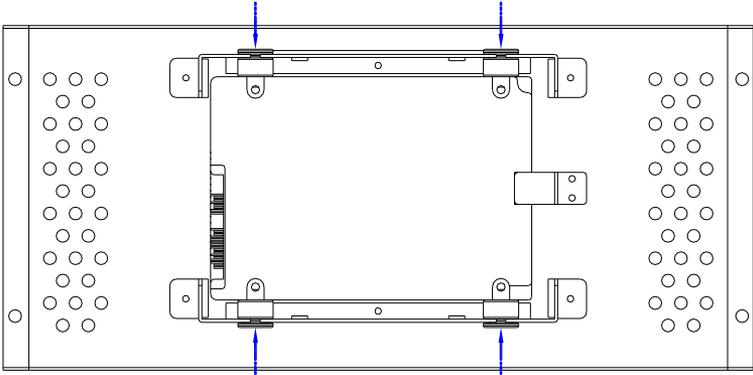
Step 1: Unfasten the screws on the front and rear panel
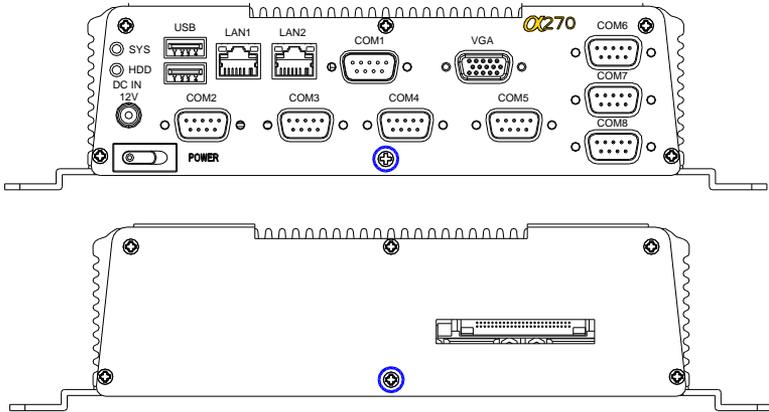
Step 2: Unfasten the four screws on the bottom lid
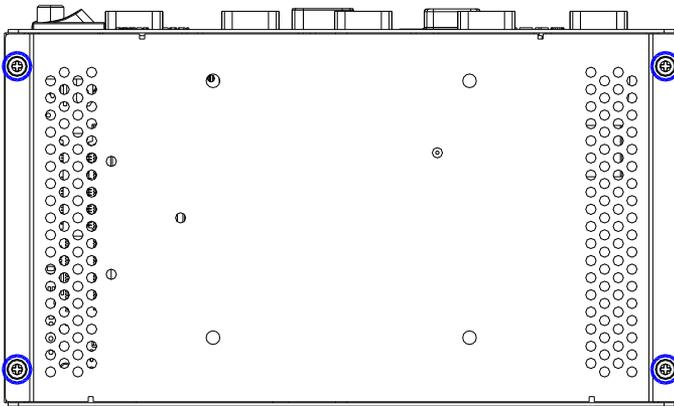
Step 3: Fasten the four HDD screws and cover with the four black damper

Black Damper

Black Damper
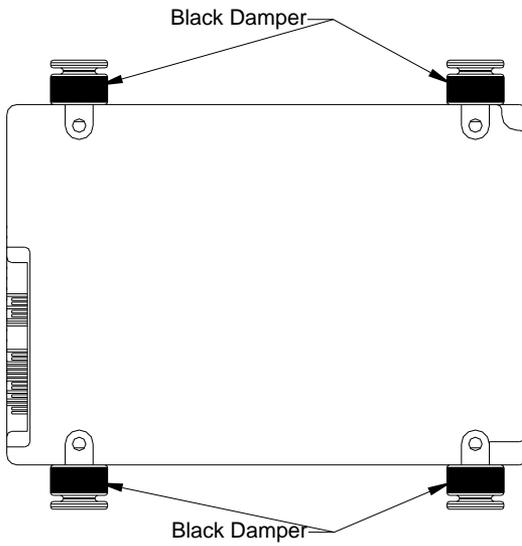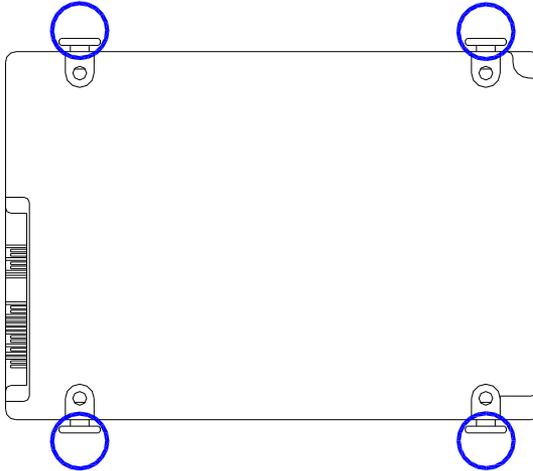
Step 4: Assembly the HDD chassis

Step 5: Assembly the damper bracket
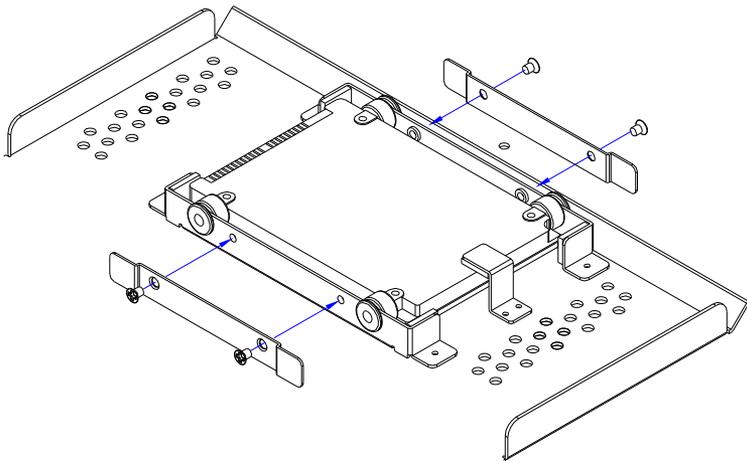
Step 6: Connect the HDD cable
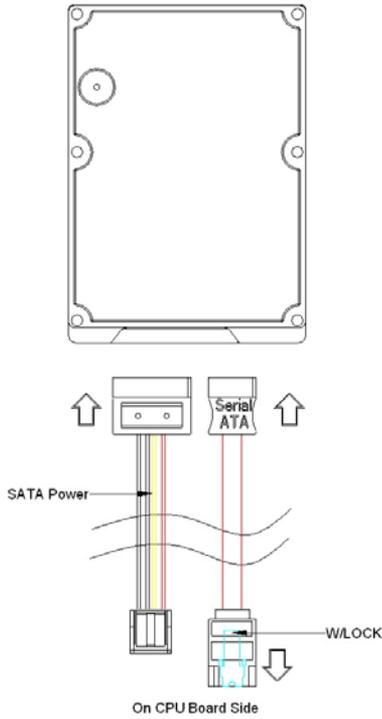
Step 7: Fasten the four screws on the bottom lid of AEC-6611
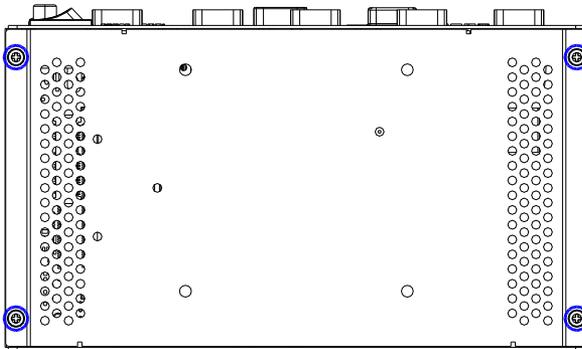
Step 8: Fasten the two screws on the front and rear panel
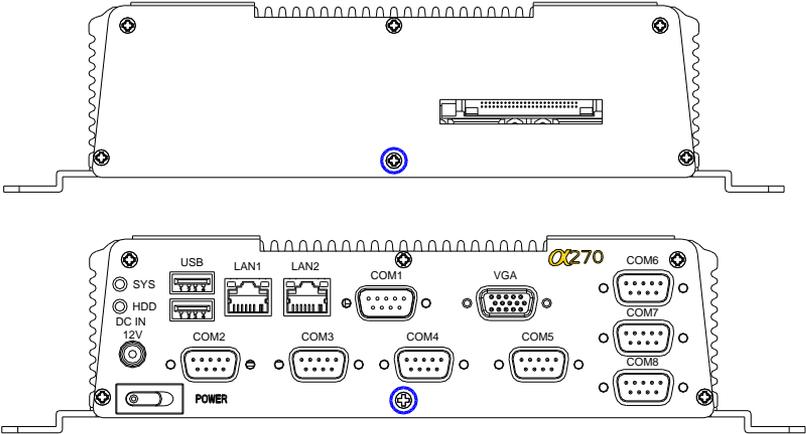
2.6 Memory Card Installation

Step 1: Unfasten the screws on the front and rear panel
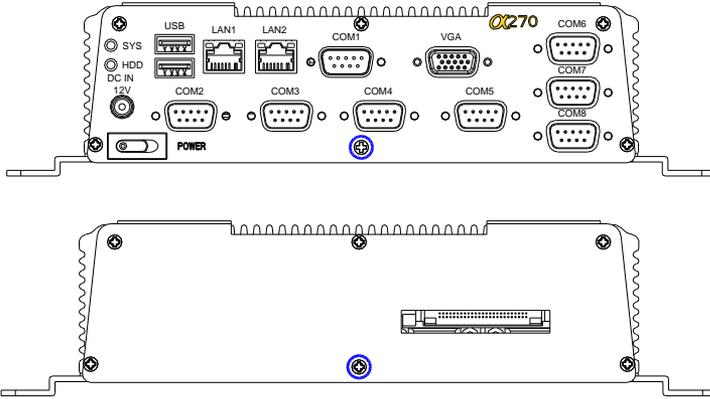
Step 2: Unfasten the four screws on the bottom lid
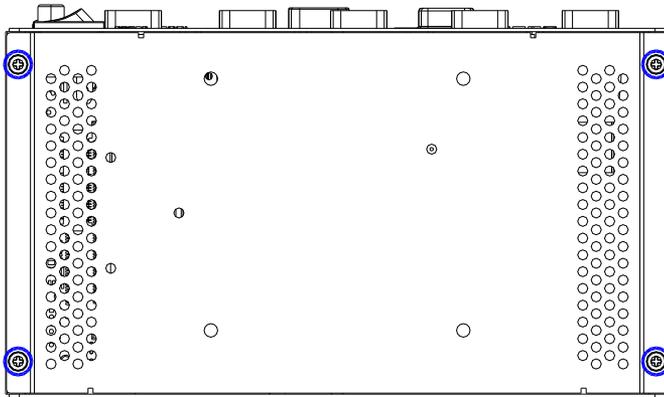
Step 3: Insert the RAM at 30-degree angle to the memory slot and press
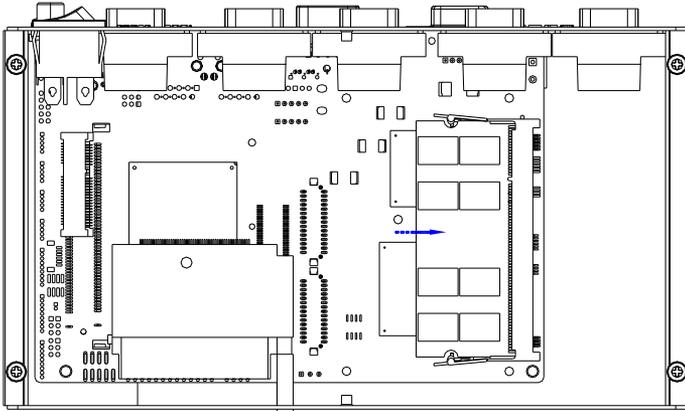
Step 4: Close the bottom case of AEC-6611 and faten the four screws of the

bottom lid
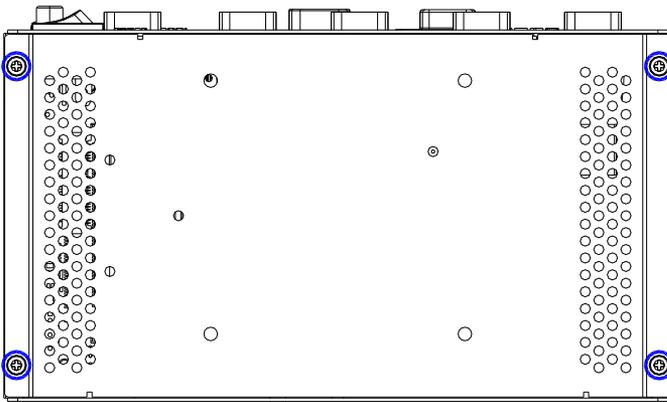
Step 5: Fasten the screws on the front and rear panel
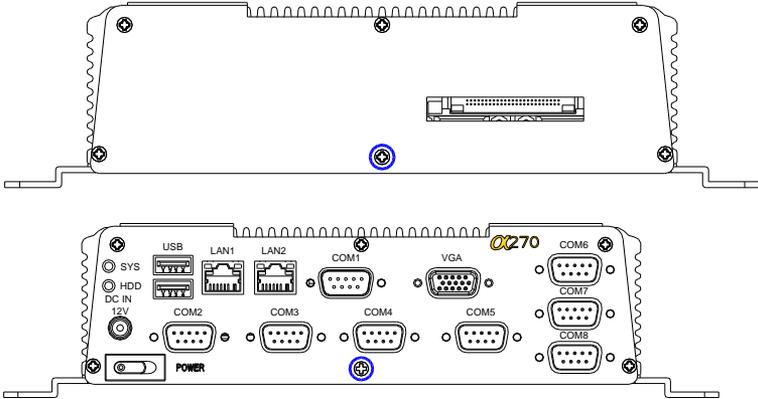
2.7 Wallmount Kit Installation

Get the brackets ready and fasten appropriate four screws on each bracket. After fastening the two brackets on the bottom lid of AEC-6611, the wallmount kit installation has been finished.
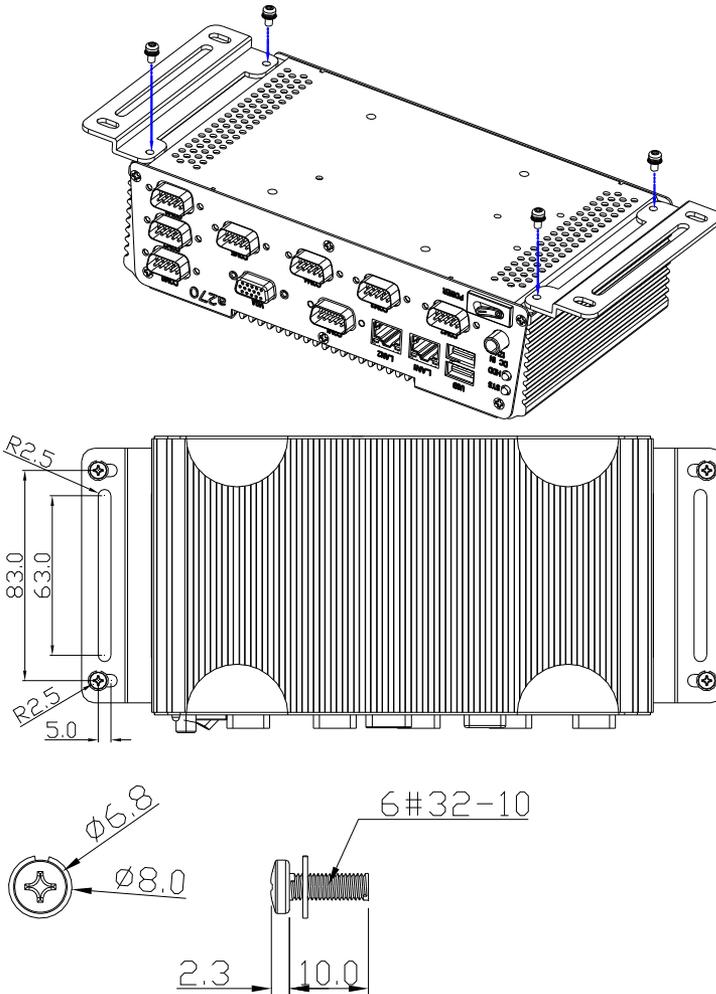
2.8 DIN Rail Kit Installation

Get the DIN Rail kit ready and fasten the three screws to mount the DIN Rail kit to the bottom lid of AEC-6611
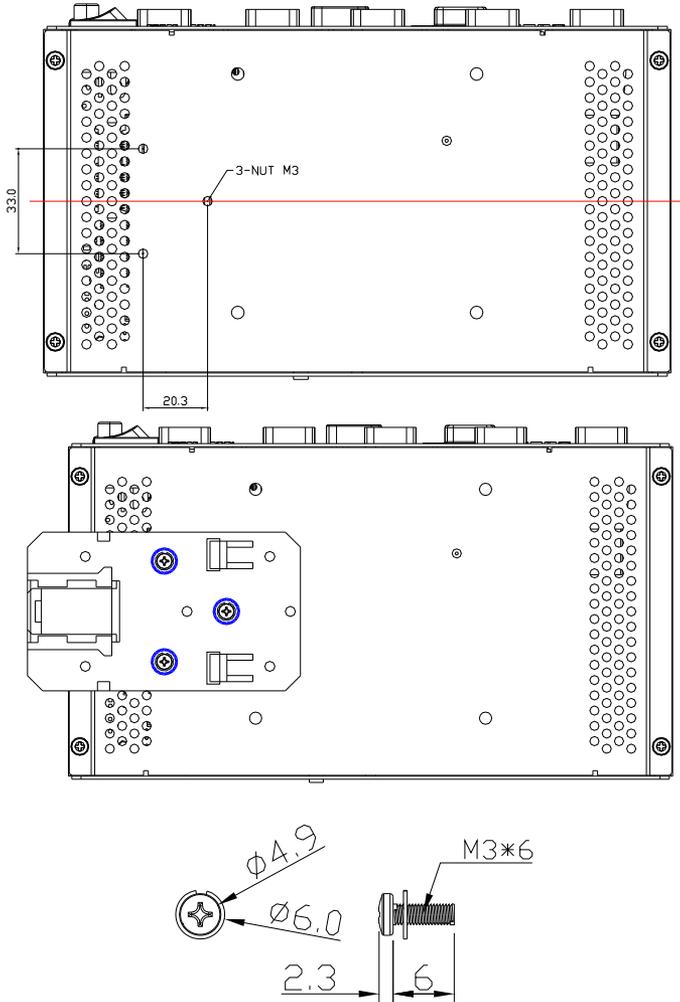
Chapter

3

Award
BIOS Setup

3.1 System Test and Initialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

Press <F1> to RESUME

Write down the message and press the F1 key to continue the boot up sequence.

System configuration verification

These routines check the current system configuration against the values stored in the CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1. You are starting your system for the first time

2. You have changed the hardware attached to your system

3. The CMOS memory has lost power and the configuration information has been erased.

The AEC-6611 CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

3.2 Award BIOS Setup

Awards BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press <Del> immediately. This will allow you to enter Setup.

Standard CMOS Features

Use this menu for basic system configuration. (Date, time, IDE, etc.)

Advanced BIOS Features

Use this menu to set the advanced features available on your system.

Advanced Chipset Features

Use this menu to change the values in the chipset registers and optimize your system performance.

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals. (keyboard, mouse etc.)

Power Management Setup

Use this menu to specify your settings for power management. (HDD power down, power on by ring, KB wake up, etc.)

PnP/PCI Configurations

This entry appears if your system supports PnP/PCI.

PC Health Status

Use this menu to set PC Health Status.

Frequency/Voltage Control

Use this menu to specify your settings for auto detect DIMM/PCI clock and spread spectrum.

Load Optimized Defaults

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. While AWARD has designated the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs.

Set Password

Use this menu to set Supervisor Password.

Save and Exit Setup

Save CMOS value changes to CMOS and exit setup.

Exit Without Saving

Abandon all CMOS value changes and exit setup.

You can refer to the "AAEON BIOS Item Description.pdf" file in the CD for the meaning of each setting in this chapter.

Chapter

4

Driver Installation

The AEC-6611 comes with a CD-ROM that contains all drivers and utilities that meet your needs.

Follow the sequence below to install the drivers:

Step 1 – Install Chipset Driver

Step 2 – Install VGA Driver

Step 3 – Install LAN Driver

Step 4 – Install Mini PCI RS-232 Module Driver

4.1 Installation:

Insert the AEC-6611 CD-ROM into the CD-ROM Drive. And install the drivers from Step 1 to Step 4 in order.

Step 1 – Install INF Driver

1. Click on the *STEP1-CHIPSET* folder and double click on the *infinst911_autol.exe*

2. Follow the instructions that the window shows

3. The system will help you install the driver automatically

Step 2 – Install VGA Driver

1. Click on the *STEP2-VGA* folder and select the OS folder your system is

2. Double click on the *.exe* in the OS folder

3. Follow the instructions that the window shows

4. The system will help you install the driver automatically

Step 3 – Install LAN Driver

1. Click on the *STEP3-LAN* folder and select the OS folder your system is

2. Double click on the *PROWin32.exe* file in the OS folder

3. Follow the instructions that the window shows

4. The system will help you install the driver automatically

Step 4 – Install Mini PCI RS-232 Module Driver

Installing Mini PCI RS-232 driver in Windows XP and Windows 7

Once the card is installed and the computer is restarted, Windows will detect the board and attempt to load the drivers for it.

1. Windows will detect a "PCI Serial Port". Select "Install from a list or specific location (Advanced)" as the shown of figure 1 and then click "Next."

Figure 1

2. Select "Search for the best driver in these locations." Next select "Include this location in this search:" and then click "Browse" to open the " CD-ROM/Driver/ STEP4-MINI PCI RS-232 Module" file as shown in figure 2 . Click "Next."

Figure 2

3. Windows has found an updated driver for this device as shown in figure 3 and then click "Next."

Figure 3

4. The "Completing the Found New Hardware Wizard" dialog. Appears as shown in figure 3, and then click "Finish."

5. Repeat the above process for the second, third, fourth, and fifth AAEON PCI Communications Port.

6. Please re-start your Windows.

Finalizing Mini PCI RS-232 module settings

Check your Windows System/Device Manager to confirm the proper installations of Mini PCI RS-232 drivers:

Multifunction adapters

AAEON OX16PCI954 PCI UARTs
AAEON OX16PCI95x PCI bridge

Ports(COM & LPT)

4-port Mini PCI module will show 4 AAEON PCI Communications Port and 2-port Mini PCI module will show 2 AAEON PCI Communications Port as the figure 4 shows 4 ports Mini PCI module
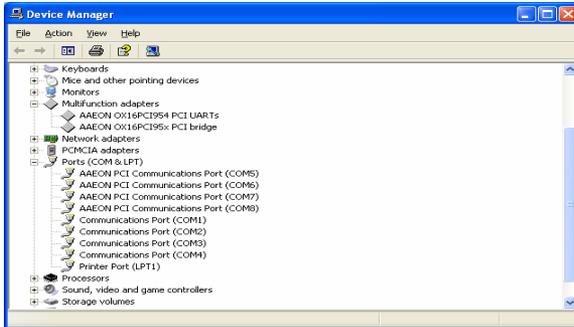
Figure 4

Mini-PCI RS-232 module set up in Linux

If the module is a 4-port Mini PCI module, you don't need to proceed with the set up process, you can use it directly. For **2-port Mini PCI module,** please use the following sequences to set up the module.

1. Open the *Termina*l screen and make a *cat /proc/tty6/driver/serial* command to check your COM port settings.
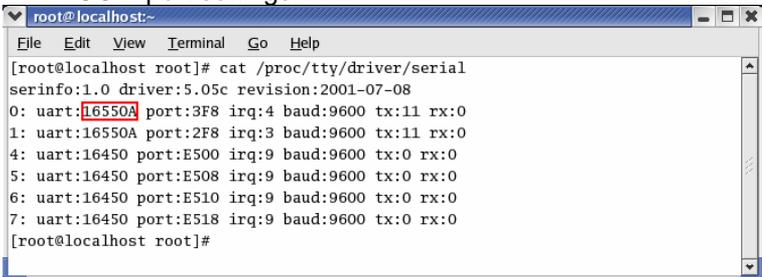
As the screen showing, use 16550A to be UART prefix is the system COM ports, and we can see this system with 2 COM ports, leave it as ttyS0, ttyS1.

2. Make *lspci -v* command to find OXmPCI952 IRQ and I/O address

As the screen showing, we can find "Serial controller: Oxford Semiconductor Ltd:" this alphabetic string and then we will see the next line with IRQ number and the next with I/O address

3. Open the file: */etc/rc.local* and add two commands

setserial /dev/ttySX1 port IOADDR1 irq Y uart 16950 baud_base 115200
setserial /dev/ttySX2 port IOADDR2 irq Y uart 16950 baud_base 115200

In above command line *X1, X2* are the COM port numbers and it must be beyond beforehand. In this case, X1 is 4, X2 is 5, and *Y* is IRQ number. Finally, we can set the I/O address individually.

setserial /dev/ttyS4 port 0xe000 irq 9 uart 16950 baud_base 115200
setserial /dev/ttyS5 port 0xe100 irq 9 uart 16950 baud_base 115200

4. Please re-start your computer.

5. Make *cat /proc/tty/driver/serial* command to see if the display is shown as below. If yes, this setup has been done successfully.
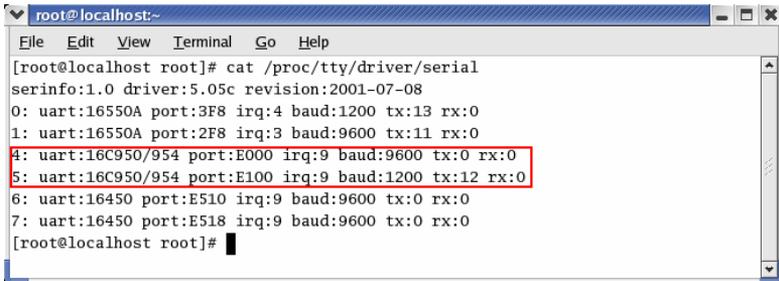
```
root@localhost:~                                              _ □ ✕
File  Edit  View  Terminal  Go  Help
[root@localhost root]# cat /proc/tty/driver/serial
serinfo:1.0 driver:5.05c revision:2001-07-08
0: uart:16550A port:3F8 irq:4 baud:1200 tx:13 rx:0
1: uart:16550A port:2F8 irq:3 baud:9600 tx:11 rx:0
4: uart:16C950/954 port:E000 irq:9 baud:9600 tx:0 rx:0
5: uart:16C950/954 port:E100 irq:9 baud:1200 tx:12 rx:0
6: uart:16450 port:E510 irq:9 baud:9600 tx:0 rx:0
7: uart:16450 port:E518 irq:9 baud:9600 tx:0 rx:0
[root@localhost root]# █
```

Appendix

A

Programming the Watchdog Timer

A.1 Programming

AEC-6611 utilizes ITE 8781 chipset as its watchdog timer controller. Below are the procedures to complete its configuration and the AAEON initial watchdog timer program is also attached based on which you can develop customized program to fit your application.

Configuring Sequence Description

After the hardware reset or power-on reset, the ITE 8781 enters the

normal mode with all logical devices disabled except KBC. The initial state (enable bit) of this logical device (KBC) is determined by the state of pin 121 (DTR1#) at the falling edge of the system reset during power-on reset.
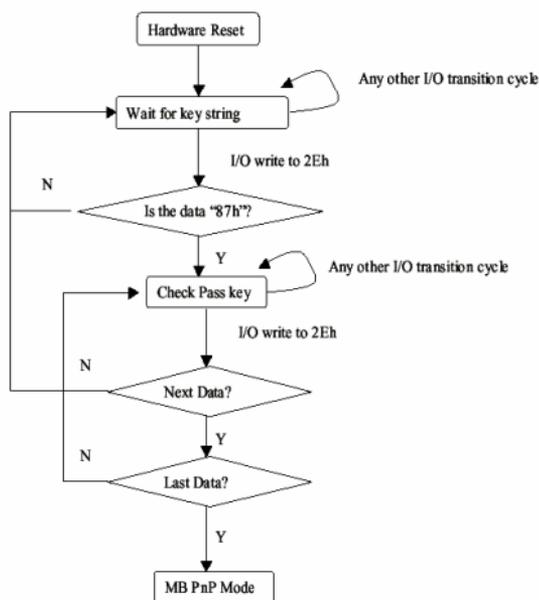
There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

(1) Enter the MB PnP Mode

To enter the MB PnP Mode, four special I/O write operations are to be performed during Wait for Key state. To ensure the initial state of the key-check logic, it is necessary to perform four write opera-tions to the Special Address port (2EH). Two different enter keys are provided to select configuration ports (2Eh/2Fh) of the next step.

	Address Port	Data Port
87h, 01h, 55h, 55h:	2Eh	2Fh

(2) Modify the Data of the Registers

All configuration registers can be accessed after entering the MB PnP Mode. Before accessing a selected register, the content of Index 07h must be changed to the LDN to which the register belongs, except some Global registers.

(3) Exit the MB PnP Mode

Set bit 1 of the configure control register (Index=02h) to 1 to exit the MB PnP Mode.

WatchDog Timer Configuration Registers

LDN	Index	R/W	Reset	Configuration Register or Action
All	02h	W	NA	Configure Control

07h	71h	R/W	00h	Watch Dog Timer Control Register
07h	72h	R/W	001s0000b	Watch Dog Timer Configuration Register
07h	73h	R/W	38h	Watch Dog Timer Time-out Value (LSB) Register
07h	74h	R/W	00h	Watch Dog Timer Time-out Value (MSB) Register

Configure Control (Index=02h)

This register is write only. Its values are not sticky; that is to say, a hardware reset will automatically clear the bits, and does not require the software to clear them.

Bit	Description
7-2	Reserved
1	Returns to the "Wait for Key" state. This bit is used when the configuration sequence is completed.
0	Resets all logical devices and restores configuration registers to their power-on states.

Watch Dog Timer 1, 2, 3 Control Register (Index=71h,81h,91h Default=00h)

Bit	Description
7	WDT Timeout Enable(WTE) 1: Disable. 0: Enable.
6	WDT Reset upon Mouse Interrupt(WRKMI) 0: Disable. 1: Enable.
5	WDT Reset upon Keyboard Interrupt(WRKBI) 0: Disable. 1: Enable.
4	Reserved
3-2	Reserved
1	Force Time-out(FTO) This bit is self-clearing.
0	WDT Status(WS) 1: WDT value reaches 0. 0: WDT value is not 0.

Watch Dog Timer 1, 2, 3 Configuration Register (Index=72h, 82h, 92h Default=001s0000b)

Bit	Description
7	**WDT Time-out Value Select 1 (WTVS)** 1: Second 0: Minute
6	**WDT Output through KRST (Pulse) Enable(WOKE)** 1: Enable 0: Disable
5	**WDT Time-out value Extra select(WTVES)** 1: 64ms x WDT Timer-out value (default = 4s) 0: Determined by WDT Time-out value select 1 (bit 7 of this register)
4	**WDT Output through PWROK (Pulse) Enable(WOPE)** 1: Enable 0: Disable During LRESET#, this bit is selected by JP7 power-on strapping option
3-0	**Select interrupt level** [Note1] **for WDT(SIL)**

Watch Dog Timer 1,2,3 Time-Out Value (LSB) Register (Index=73h,83h,93h, Default=38h)

Bit	Description
7-0	**WDT Time-out Value 7-0(WTV)**

Watch Dog Timer 1,2,3 Time-Out Value (MSB) Register (Index=74h,84h,94h Default=00h)

Bit	Description
7-0	**WDT Time-out Value 15-8(WTV)**

A.2 ITE8781 Watchdog Timer Initial Program

```
.MODEL SMALL
.CODE
Main:
CALL Enter_Configuration_mode
CALL Check_Chip
mov cl, 7
call Set_Logic_Device
;time setting
mov cl, 10 ; 10 Sec
dec al
Watch_Dog_Setting:
;Timer setting
mov al, cl
mov cl, 73h
call Superio_Set_Reg
;Clear by keyboard or mouse interrupt
mov al, 0f0h
mov cl, 71h
call Superio_Set_Reg
;unit is second.
mov al, 0C0H
mov cl, 72h
```

```
call Superio_Set_Reg
; game port enable
mov cl, 9
call Set_Logic_Device


Initial_OK:
CALL Exit_Configuration_mode
MOV AH,4Ch
INT 21h


Enter_Configuration_Mode PROC NEAR
MOV SI,WORD PTR CS:[Offset Cfg_Port]


MOV DX,02Eh
MOV CX,04h
Init_1:
MOV AL,BYTE PTR CS:[SI]
OUT DX,AL
INC SI
LOOP Init_1
RET
Enter_Configuration_Mode ENDP


Exit_Configuration_Mode PROC NEAR
MOV AX,0202h
```

```
CALL Write_Configuration_Data
RET
Exit_Configuration_Mode ENDP


Check_Chip PROC NEAR


MOV AL,20h
CALL Read_Configuration_Data
CMP AL,87h
JNE Not_Initial


MOV AL,21h
CALL Read_Configuration_Data
CMP AL,81h
JNE Not_Initial


Need_Initial:
STC
RET
Not_Initial:
CLC
RET
Check_Chip ENDP
Read_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
```

```
OUT DX,AL
MOV DX,WORD PTR CS:[Cfg_Port+06h]
IN AL,DX
RET
Read_Configuration_Data ENDP


Write_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
OUT DX,AL
XCHG AL,AH
MOV DX,WORD PTR CS:[Cfg_Port+06h]
OUT DX,AL
RET
Write_Configuration_Data ENDP


Superio_Set_Reg proc near
push ax
MOV DX,WORD PTR CS:[Cfg_Port+04h]
mov al,cl
out dx,al
pop ax
inc dx
out dx,al
ret
Superio_Set_Reg endp.Set_Logic_Device proc near
```

```
Set_Logic_Device      proc      near
push ax
push cx
xchg al,cl
mov cl,07h
call Superio_Set_Reg
pop cx
pop ax
ret
Set_Logic_Device endp
```

```
;Select 02Eh->Index Port, 02Fh->Data Port
Cfg_Port DB 087h,001h,055h,055h
DW 02Eh,02Fh
```

END Main

Note: Interrupt level mapping

0Fh-Dh: not valid

0Ch: IRQ12

.

.

03h: IRQ3

02h: not valid

01h: IRQ1

00h: no interrupt selected