

AEC-6520

Fanless Embedded Controller

Intel[®] ULV Celeron[®] 1.0GHz Processors

IP-65 Certified

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Packing List

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

- 1 AEC-6520 Embedded Controller
- 1 Phoenix Power Connector
- 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 65°C (149°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。

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Chapter

1

**General
Information**

1.1 Introduction

Due to the growing popularity from the IPC market, the newest Boxer series AEC-6520 has been introduced by AAEON. AEC-6520 utilizes an Intel[®] Celeron[®] processor without a fan.

New Innovation for Entertainment Multimedia Domain

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.

Stable Design for Rugged Environment

The AEC-6520 is designed for rugged environments due to the following reasons; first, it can withstand tough vibration testing up to 5G rms. With the anti-vibration hard drive device option, the AEC-6520 can be used in high vibration environments. In addition, the AEC-6520 offers low power consumption system that while operating in ambient temperatures ranging from -15° to 60°C. The MTBF(Mean Time Before Failure) rating states that the AEC-6520 can operate up to 50,000 hours at 35°C ambient temperature, which indicates its careful and long-life design.

The AEC-6520 is a standalone high performance controller designed for long-life operation and with high reliability.

1.2 Features

- Fanless Design with Intel[®] Celeron[®] M 1.0GHz Processor
- Wide Operating Temperature Design
- DC 9~30V Input With Phoenix Connector And Optional External AC Input Power Adapter
- Wallmount design suit for industrial application
- Windows XP Pro, Windows XP Embedded and Linux Red Hat are Ready For Diverse Applications

1.3 Specifications

System

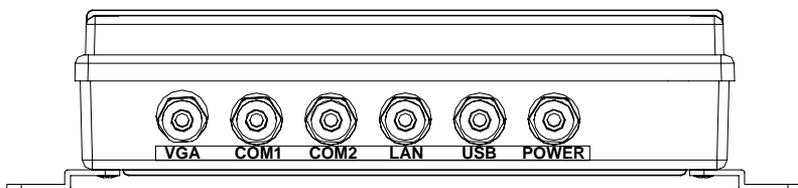
- CPU Intel® Celeron® M 1.0GHz Processor
- Memory DDR SODIMM x 1, Max. 1GB
- VGA D-sub 15 VGA Connector
- Keyboard/Mouse PS/2 Keyboard & Mouse
- Ethernet 10/100Base-TX Ethernet RJ-45 connector
- Solid Storage Disk Internal Type II CompactFlash slot x 1
- Serial port RS-232 x 1 (COM1),
RS-232/422/485 x 1 (COM2)
- USB USB2.0 x 1
- Watchdog Timer Generates a time-out system reset
- Power Supply DC Input: 9V DC~30V DC
AC Input: External power adapter (Optional)

Mechanical and Environmental

- Construction Aluminum Alloy Chassis
- Color Black
- Mounting Wallmount
- Dimension 10.83"(W) x 7.82"(H) x 2.44"(D)
(274.9 mm x 198.5 mm x 62 mm)
- Net weight 5.06 lb (2.3 kg)

- Gross weight 7.26 lb (3.3 kg)
- Operating Temperature 5°F ~ 140°F (-15°C ~ 60°C)
- Operating Humidity 5 ~ 90% @ 40°C, non-condensing
- Vibration 5g rms/ 5~500Hz/ random operation -CFD
- Shock 50g peak acceleration (11msec. duration) -CFD
- EMC CE/FCC Class A

I/O Connector

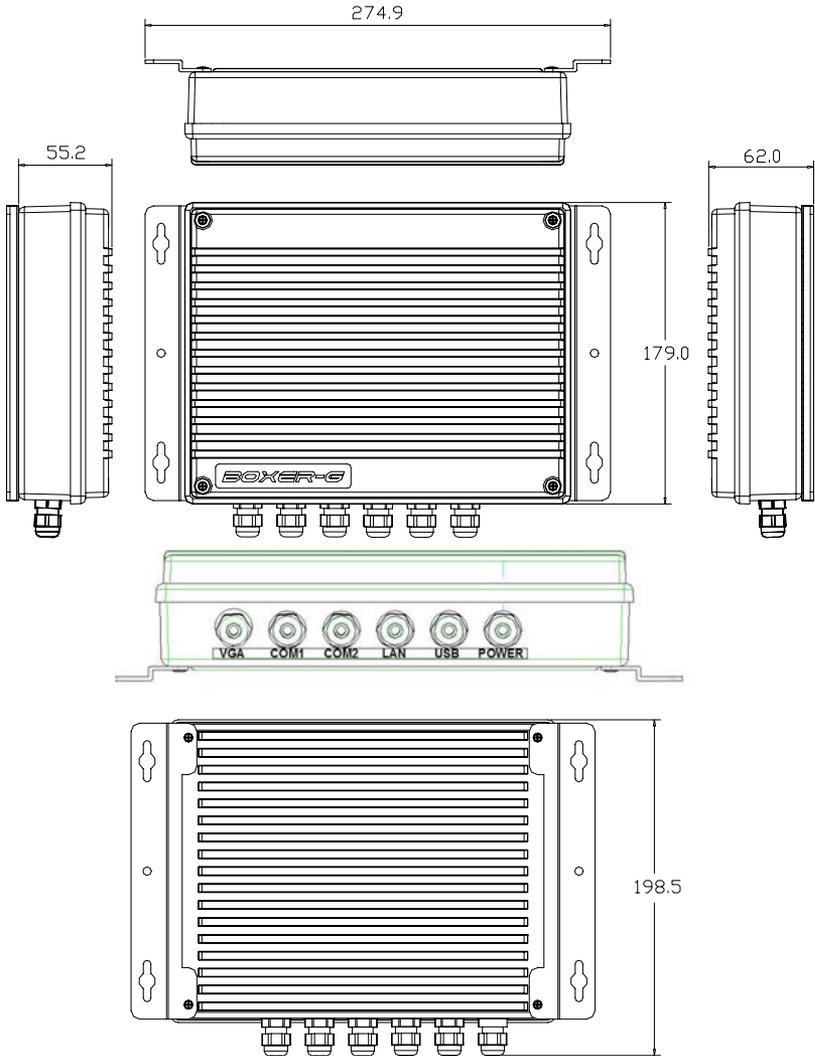


Chapter

2

**Hardware
Installation**

2.1 Dimension



2.2 USB2.0 Port 1 Connector (CN1)

Pin	Signal	Pin	Signal
1	USBVDD0-1	2	USBGND
3	USB0-	4	USBGND
5	USB0+	6	USB1+
7	USBGND	8	USB1-
9	USBGND	10	USBVDD0-1

2.3 Serial Port COM2 Connector (CN6)

COM2/ RS-232 Mode

Pin	Signal	Pin	Signal
1	DCDB	2	RXB
3	TXB	4	DTRB
5	Ground	6	DSRB
7	RTSB	8	CTSB
9	RIB	10	N/C

COM2/ RS-422 Mode

Pin	Signal	Pin	Signal
1	TXD-	2	RXD+
3	TXD+	4	RXD-
5	N/C	6	N/C
7	N/C	8	N/C
9	Ground	10	N/C

COM2/ RS-485 Mode

Pin	Signal	Pin	Signal
1	TXD-	2	N/C
3	TXD+	4	N/C

5	N/C	6	N/C
7	N/C	8	N/C
9	Ground	10	N/C

Note: COM mode-RS-232/422/485, selected by BIOS.

2.4 Ethernet 10/100Base-TX RJ-45 Phone Jack Connector (CN13)

Pin	Signal	Pin	Signal
1	TX+	2	TX-
3	TCT	4	N/C
5	N/C	6	RCT
7	RX+	8	RX-
9	LINK_LED	10	ACT_LED
11	SPD_LED	12	+3.3V

2.5 Serial Port COM1 Connector (CN18)

Pin	Signal	Pin	Signal
1	DCDA	2	RXA
3	TXA	4	DTRA
5	Ground	6	DSRA
7	RTSA	8	CTSA
9	RIA	10	N/C

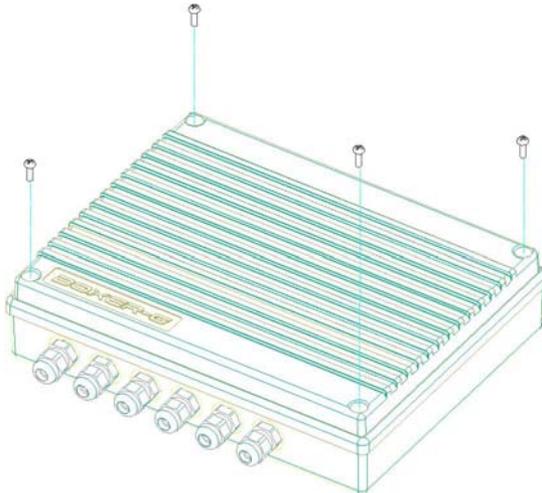
2.6 CRT Display Connector (CN19)

Pin	Signal	Pin	Signal
1	CRT_RED	9	5V
2	CRT_GREEN	10	VGA Ground
3	CRT_BLUE	11	N/C

4	N/C	12	CRT_SDA
5	VGA Ground	13	CRT_HSYNC
6	VGA Ground	14	CRT_VSYNC
7	VGA Ground	15	CRT_SCL
8	VGA Ground		

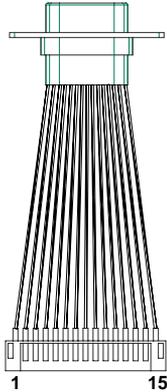
2.7 Installing Cables

Take off the lid from the chassis by loosening the four screws.

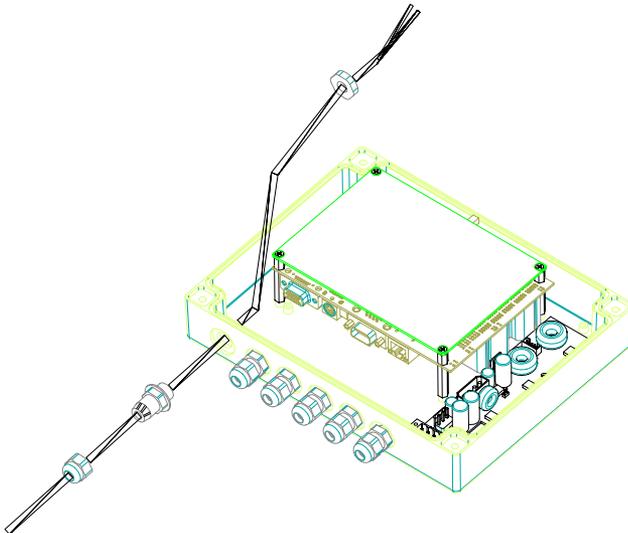


■ **Installing VGA Cable**

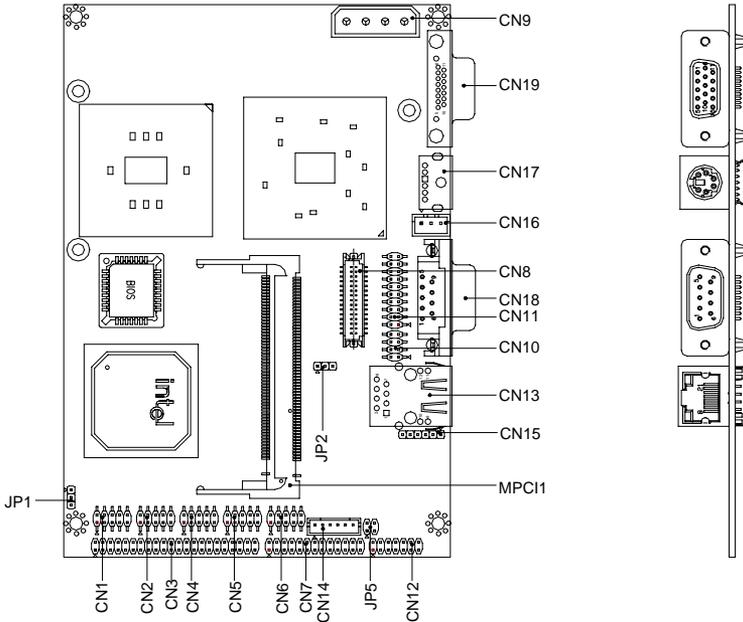
Step 1: Take the VGA Cable from the accessory kit and twist the cap of port on AEC-6520



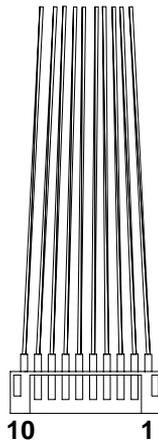
Step 2: Take the cable to pierce the aperture and then lock with corkscrews.



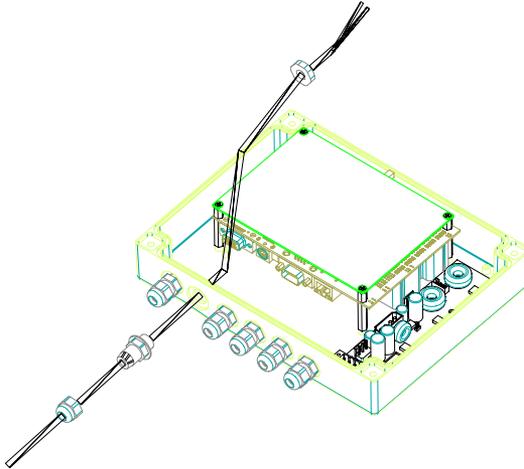
■ Installing COM1 Cable



Step 1: Take the COM Cable and twist the cap of the port on AEC-6520.

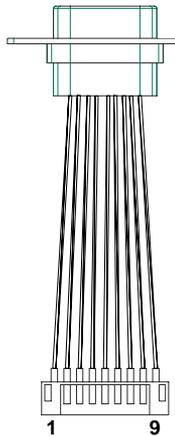


Step 2: Take the cable to pierce the aperture and then lock with corkscrews.

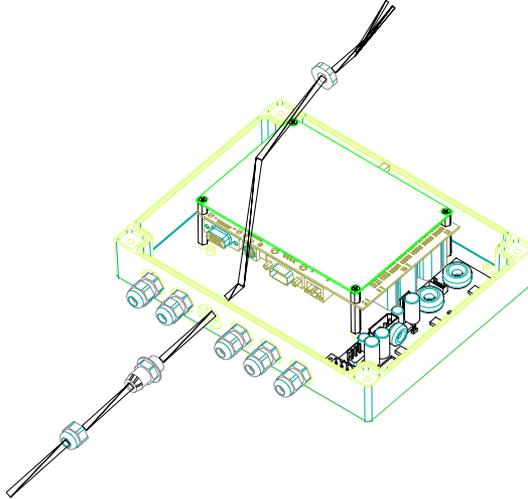


■ **Installing COM2 Cable**

Step 1: Take the COM2 Cable from the accessory kit and twist the cap of port on AEC-6520.



Step 2: Take the cable to pierce the COM2 aperture and then lock with corkscrews.



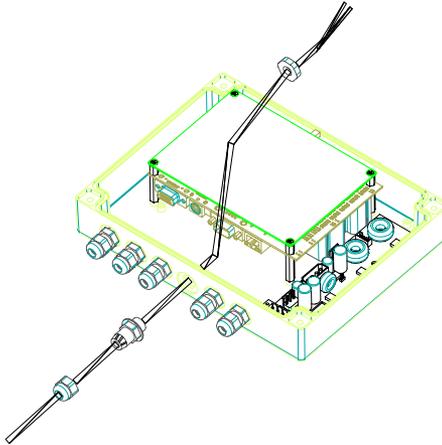
■ **Installing LAN Cable**

Step 1: Take the LAN Cable from the accessory kit and twist the cap of port on AEC-6520.

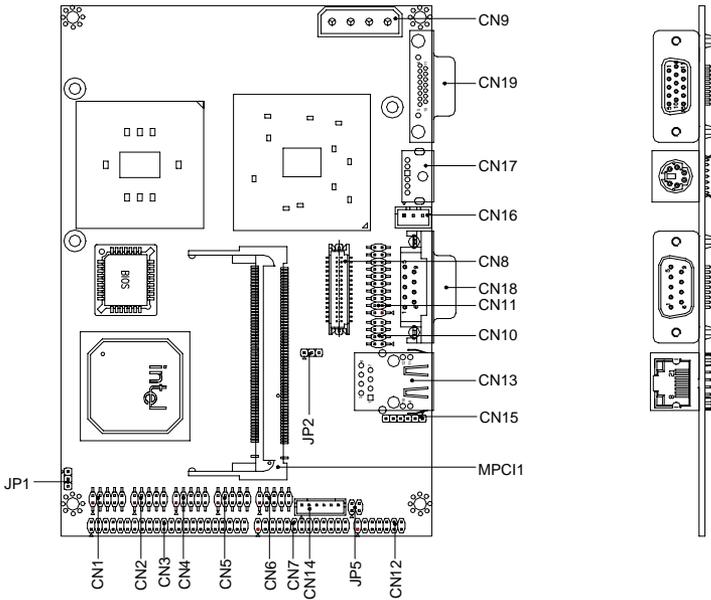


Step 2: Take the cable to pierce the LAN aperture and then lock with

corkscrews.



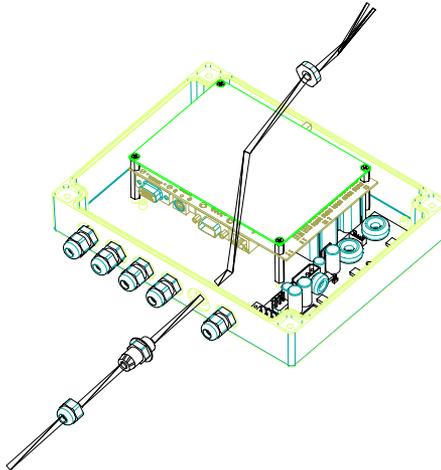
■ Installing USB Cable



Step 1: Take the USB Cable and twist the cap of the port on AEC-6520.

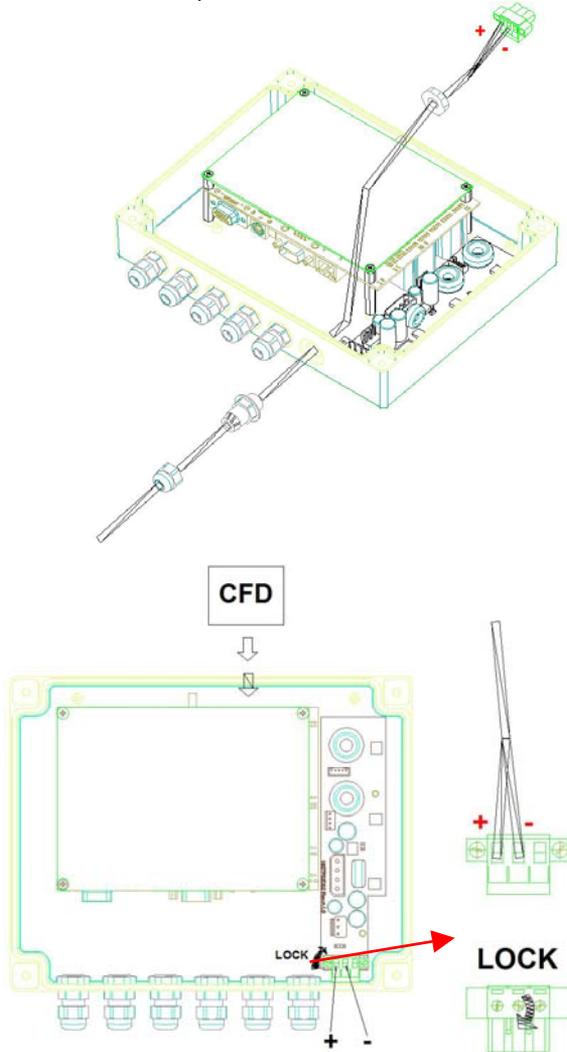


Step 2: Take the USB cable to press and lock into the board then pierce the USB aperture and lock with corkscrews.

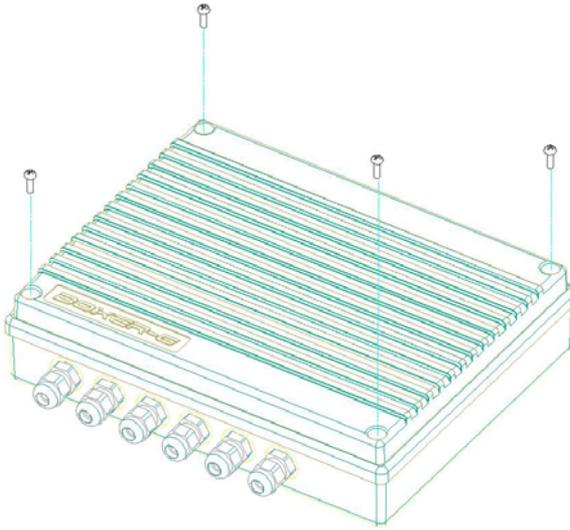


■ **Installing Power Cable**

Step 1: Take the Power cable to press and lock into power pipefitting then pierce the Power aperture and fixed.

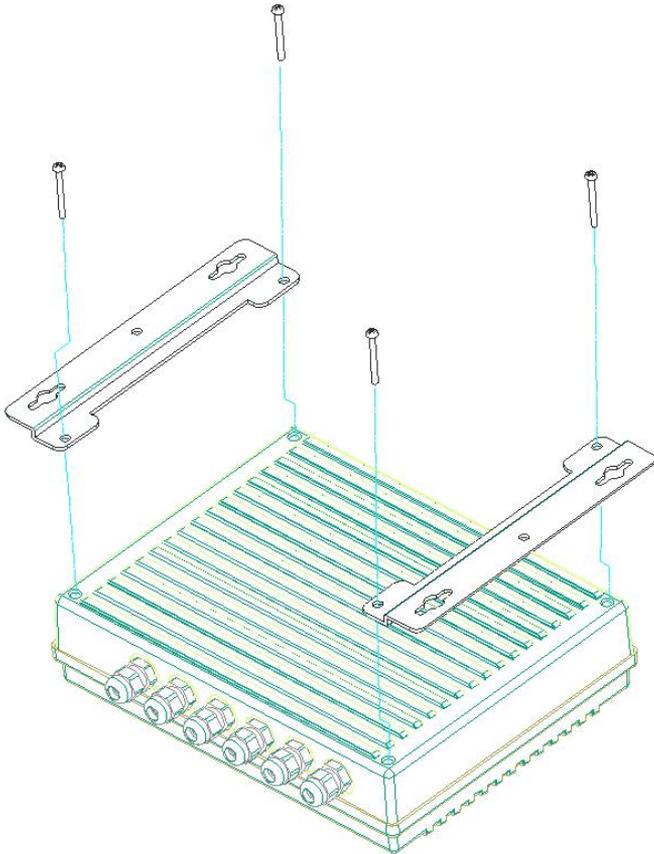


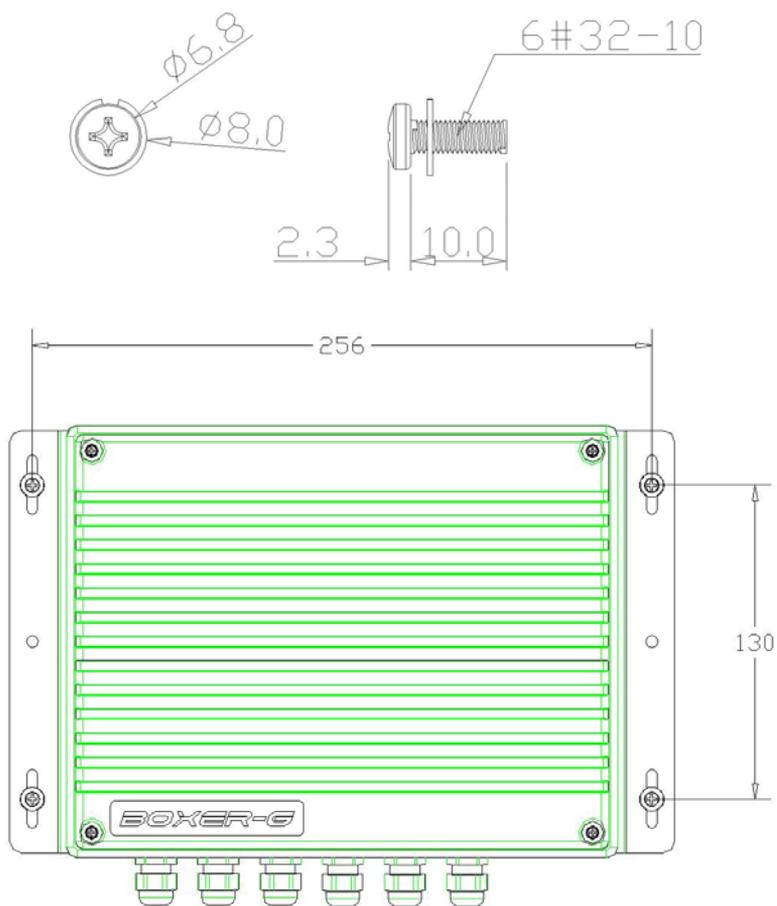
Step 2: Combine the chassis and then lock with screws.



2.8 Wallmount Kit Installation

Step 1: Get the brackets ready and fasten appropriate two screws on each brackets. After fastening the two brackets on the bottom lid of AEC-6520, the wallmount kit installation is finished





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-6520 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 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. (Primary slave, secondary slave, 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

This menu allows you to set the shutdown temperature for your system.

Frequency/Voltage Control

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

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.

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 Supervisor/User Password

Use this menu to set Supervisor/User Passwords.

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-6520 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 Intel INF Update for Windows 9x-2003 Driver

Step 2 – Install Intel Extreme Graphics 2 Driver

Step 3 – Install Intel LAN Driver

Step 4 – Install Realtek AC97 codec Driver

USB 2.0 Drivers are available to download by using Windows Update for both Windows XP and Windows 2000. For additional information regarding USB 2.0 support in Windows XP and Windows 2000, please visit www.microsoft.com/hwdev/usb/.

Please read instructions below for further detailed installations.

4.1 Installation

Insert the AEC-6520 CD-ROM into the CD-ROM Drive. The Autorun program will run automatically. You also can choose the drivers to install from step 1 to step 4 in order as following instructions.

Step 1 – Install Intel INF Update for Windows 9x-2003 Driver

1. Click on the **Step 1 – Intel INF Update for Windows 9x-2003** folder and then double click on the **Setup.exe**
2. Follow the instructions that the window shows
3. The system will help you install the driver automatically

Step 2 – Install Intel Extreme Graphics 2 Driver

1. Click on the **Step 2 – Intel Extreme Graphics 2 Driver** folder and select the OS your system is
2. Double click on the **Setup.exe**
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

Step 3 – Install Intel LAN Driver

1. Click on the **Step 3 – Intel LAN Driver** folder and select the OS your system is
2. Double click on the **.exe** file
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

Step 4 – Install Realtek AC97 codec Driver

1. Click on the **Step 4 –Realtek AC97 codec Driver** folder and double click on the **wdm_a361.exe** file
2. Follow the instructions that the window shows
3. The system will help you install the driver automatically

Appendix

A

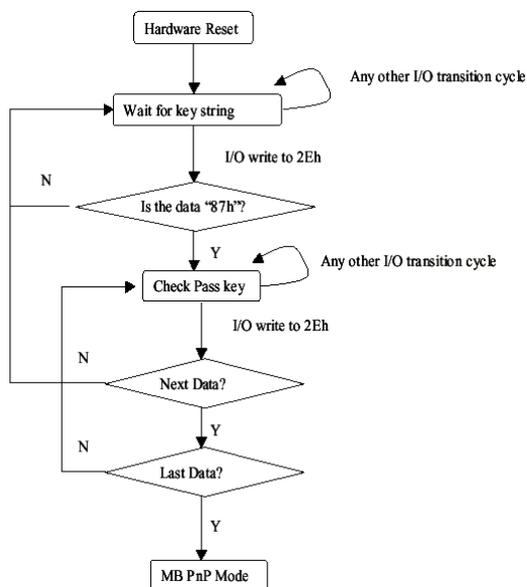
Programming the Watchdog Timer

A.1 Programming

AEC-6520 utilizes ITE 8712 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 8712 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 operations 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	N/A	Configure Control
07H	71H	R/W	00H	WatchDog Timer Control Register
07H	72H	R/W	00H	WatchDog Timer Configuration Register
07H	73H	R/W	00H	WatchDog Timer Time-out Value 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.

WatchDog Timer Control Register (Index=71h, Default=00h)

Bit	Description
7	WDT is reset upon a CIR interrupt
6	WDT is reset upon a KBC (mouse) interrupt
5	WDT is reset upon a KBC (keyboard) interrupt
4	WDT is reset upon a read or a write to the Game Port base address
3-2	Reserved
1	Force Time-out. This bit is self-clearing
0	WDT Status 1: WDT value reaches 0. 0: WDT value is not 0

WatchDog Timer Configuration Register (Index=72h, Default=00h)

Bit	Description
7	WDT Time-out value select 1: Second 0: Minute
6	WDT output through KRST (pulse) enable
5-4	Reserved
3-0	Select the interrupt level ^{Note} for WDT

WatchDog Timer Time-out Value Register (Index=73h, Default=00h)

Bit	Description
7-0	WDT Time-out value 7-0

A.2 ITE8712 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,12h

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

Appendix

B

I/O Information

B.1 I/O Address Map

Address	Description	User Address
000-01F	DMA Controller #1	000-000F
020-03F	Interrupt Controller #1, Master	020-021
040-05F	System Time	040-043
060-06F	8042 (Keyboard Controller)	060-064
070-07F	Real time Clock, NMI (non-maskable Interrupt) Mask	070-073
080-09F	DMA Page Register	080-08F
0A0-0BF	Interrupt Controller #2	0A0-0A1
0C0-0DF	DMA Controller #2	0C0-0DF
0F0-0FF	Math Coprocessor	0F0-0FF
170-177	Secondary IDE Channel	170-177
1F0-1F7	Primary IDE Channel	1F0-1F7
2F8-2FF	Serial Port 2	2F8-2FF
378-37F	Parallel Printer Port 1	378-37F
3B0-3DF	EGA / VGA card	3B0-3DF
3F8-3FF	Serial Port 1	3F8-3FF

B.2 1st MB Memory Address Map

Memory Address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-CFFFF	VGA BIOS
E0000-FFFFF	System BIOS

B.3 IRQ Mapping Chart

IRQ0	System Timer	IRQ8	System CMOS / Real time clock
IRQ1	Keyboard	IRQ9	Microsoft ACPI – Compliant system
IRQ2	Cascade to IRQ Controller	IRQ10	Unused
IRQ3	COM2	IRQ11	Unused
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	Unused	IRQ13	FPU
IRQ6	Unused	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Secondary IDE

B.4 DMA Channel Assignments

DMA Channel	Function
0	Available
1	Available
2	Unused
3	Available
4	Direct Memory Access Controller
5	Available
6	Available
7	Available