



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

User Manual

FES-6911

Fanless Embedded Controller

Intel Atom N270 1.6GHz

Processor

2 PCI slots, PCMCIA, 4 COMs,

Audio, CompactFlash



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Packing List

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

- z 1 FES-6911 Embedded Controller
- z 1 Phoenix Power Connector
- z 2 Wallmount Brackets
- z 1 Audio Cable
- z 1 Screw Package
- z 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.



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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 causedamage.
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.



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- 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 60°C (140°F). IT MAY DAMAGE THE EQUIPMENT.

Warning!



FCC

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.

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

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	×	○	○	○	○	○
<p>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。</p> <p>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。</p> <p>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。</p>						



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

Contents

Chapter 1 General Information

1.1 Introduction.....	2-3
1.2 Features	4
1.3 Specifications	5-7

Chapter 2 Hardware Installation

2.1 Jumper and Connector.....	9-11
2.2 Dimension.....	12-13
2.3 USB1,2 (J1) & USB3,4 (J2) Power Selection.....	14
2.4 FAN Power Selection (JP1) (For special usage).....	14
2.5 PS2 Keyboard/ Mouse Power Selection (JP2).....	14
2.6 RTC Battery Selection (JP3).....	14
2.7 COM1, COM3, COM4 Pin 9 Selection (JP6, JP4,JP5)	14-15
2.8 COM2 RS-232/422/485 Selection.....	15
2.9 COM2 RS-232/422/485 Serial Port Connector.....	15-16
2.10 Hard Disk Drive Installation.....	16-22
2.11 PCI Card Installation.....	22-26
2.12 Wallmount Kit Installation.....	26-27

Chapter 3 Award BIOS Setup

3.1 System Test and Initialization.	29
3.2 Award BIOS Setup	30-31



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

Chapter 4 Driver Installation

4.1 Installation	34-35
------------------------	-------

Appendix A Programming The Watchdog Timer

A.1 Programming	37-40
A.2 IT8712 Watchdog Timer Initial Program.....	41-45

Appendix B I/O Information

B.1 I/O Address Map	47
B.2 Memory Address Map	48
B.3 IRQ Mapping Chart	49
B.4 DMA Channel Assignments	49



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Intel Atom N270 1.6GHz Processor

Chapter

1

General Information



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Intel Atom N270 1.6GHz Processor

1.1 Introduction

The FES-6911 FES-series Advanced Embedded Control system continues the FES design concept but focuses on the fast expanding Machine Automation market. The FES-6911 can provide 1~2 PCI slots for expansion. Therefore FES-6911's expandable function, compact size combined with fanless design and highly efficient heat conduction mechanism can fulfill any rugged technical application in industrial automation, factory control, test instrumentation and safety surveillance.

Outstanding Over-spec Design

Intel's® popular Pentium M processor with speeds of 1.6GHz up to 2.0GHz combined with fanless design and high performance is widely acceptable and dependable in this market. USB 2.0, Ethernet and 4 Serial ports allow communication with diverse devices with a high transfer rate. Furthermore, the FES-6911 can concurrently support three tiers of expansion interfaces - PCI, PCMCIA and mini-PCI. These interfaces are fully integrated within the FES series and allow an upgrade to their usefulness. It is a leading-edge thermal and vibration design (up to 60 degree operation and 5G RMS vibration) and also an innovation for Machine Automation in the IPC industry. FES-6911 plays a role in connecting all subsystems in common applications. Acnodes not only enhances your competitive value but also gives you an excellent solution for the future.

Strict Quality Control Process

Acnodes retains the perfect product design and management team. Our Quality Control through multiple level experience and test has earned a good reputation in IPC field. Acnodes's whole product series are subjected to high-level standards which make them our best guarantee and assurance to customers. Excellent product quality will always be Acnodes's best advertisement.



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24-hour FAE System

Acnodes's e-RMA and e-FAE 24-hour a day systems for all customers' prompt request was formally launched in 2005. No matter if it is a holiday or weekend; we can handle all kinds of requests and give you a satisfactory response in 10 days. Acnodes is proud of our quick service and professional teamwork to provide our customers with continual support.

Great design, great value and great service are hallmarks of the Acnodes FES series embedded control PCs. There really is no other choice for your application than Acnodes if you want the best performance and best value!



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1.2 Features

- o Fanless Design with Intel® Atom N270 1.6GHz Processor
- o Supports 1 or 2 PCI slots for expansion
- o 2 PCMCIA
- o 4 COM / USB 2.0 / Ethernet
- o Operating Temperature: -15oC~50oC
- o Anti-vibration up to 5grms / Anti-shock up to 50 g
- o Low Power Consumption



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1.3 Specifications

System

- o CPU: Intel® Atom N270 1.6GHz Processor
- o System Memory: DDRII SDRAM SODIMM x 1, Max. 1GB
- o Expansion: PCI slot x 2, PCMCIA x 2
- o VGA: DB-15 VGA connector, Max. Resolution: 1920 x 1080
- o Keyboard/Mouse: PS/2 Keyboard & Mouse
- o Ethernet: 10/100/1000Base-TX RJ-45 Connector x 2
- o SSD: CompactFlash™ slot x 1
- o Device Bay: Internal 2.5" Slim HDD Bay
- o Serial Port: RS-232 x 3, RS-232/422/485 x 1
- o Audio: Line-in / Line-out / MIC-in
- o Parallel Port: Parallel Port x 1
- o USB: 4 USB 2.0 ports
- o Watchdog Timer: Generates a time-out system reset, setting via software
- o Power Supply:
 1. DC Input -- Internal DC- DC Converter (Default) Input voltage: 9V DC ~ 30VDC
 2. AC Input -- External Power Adapter (Optional)
Input voltage: 100V AC ~ 240V AC @ 50 ~ 60Hz
- o System Control: Power on / off switch x 1; Reset button x 1
- o Indicators: Power LED x 1; HDD active LED x 1



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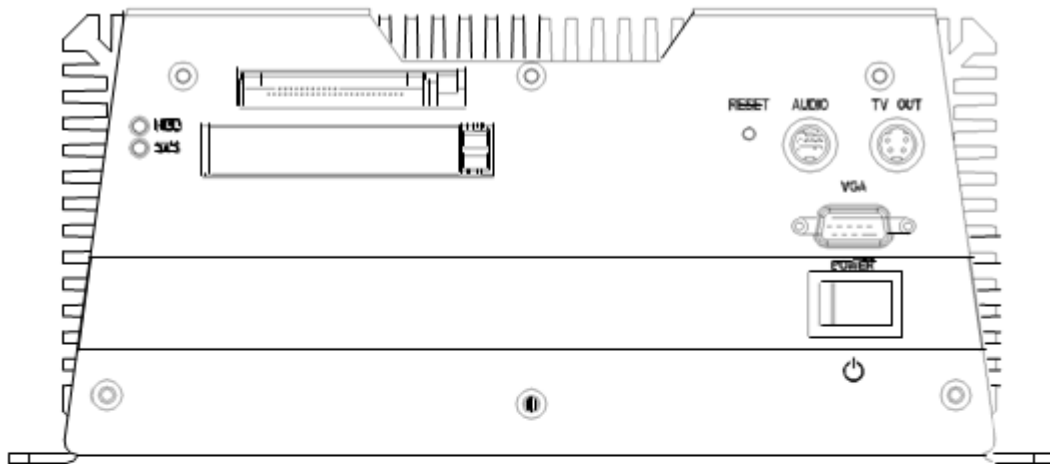
Mechanical and Environmental

- o Construction: Rugged Aluminum Alloy chassis
- o Color: Mustard
- o Mounting: Wallmount
- o Dimension: 8.4"(W) x 3.7"(H) x 9.4"(D) (214mm x 94.8mm x 237.8mm)
- o Net Weight: 12.4 lb (5.63 kg)
- o Operating Temperature: 5°F ~ 131°F (-15°C~55°C)
- o Storage Humidity: 5~90%@40°C, non-condensing
- o Vibration: 5g rms / 5~500Hz / random operation (CFD); 1g rms /5~500Hz / random operation
(Internal HDD active Module)
- o Shock: 50g peak acceleration (11msec. duration)(CFD)
20g peak acceleration (11 msec. duration) (HDD)
- o EMC: CE/FCC class B

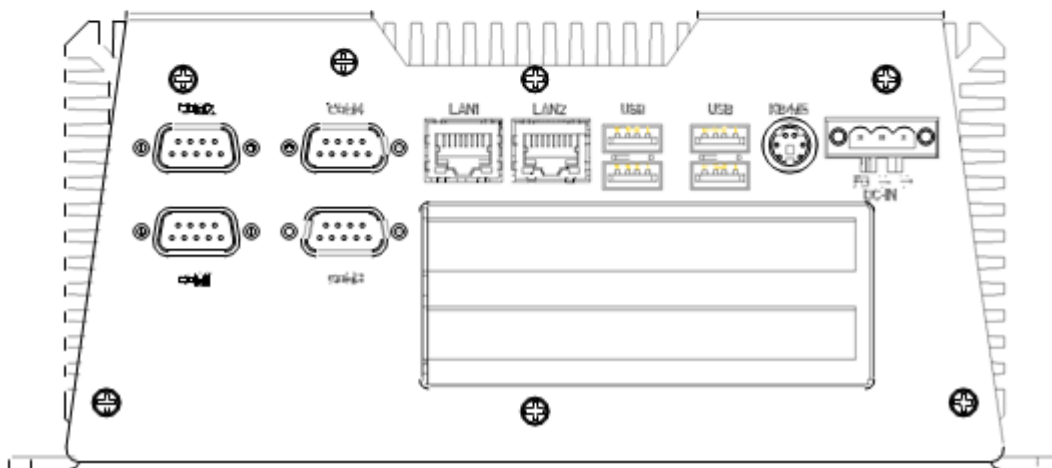
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Front side



Rear Side





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Chapter

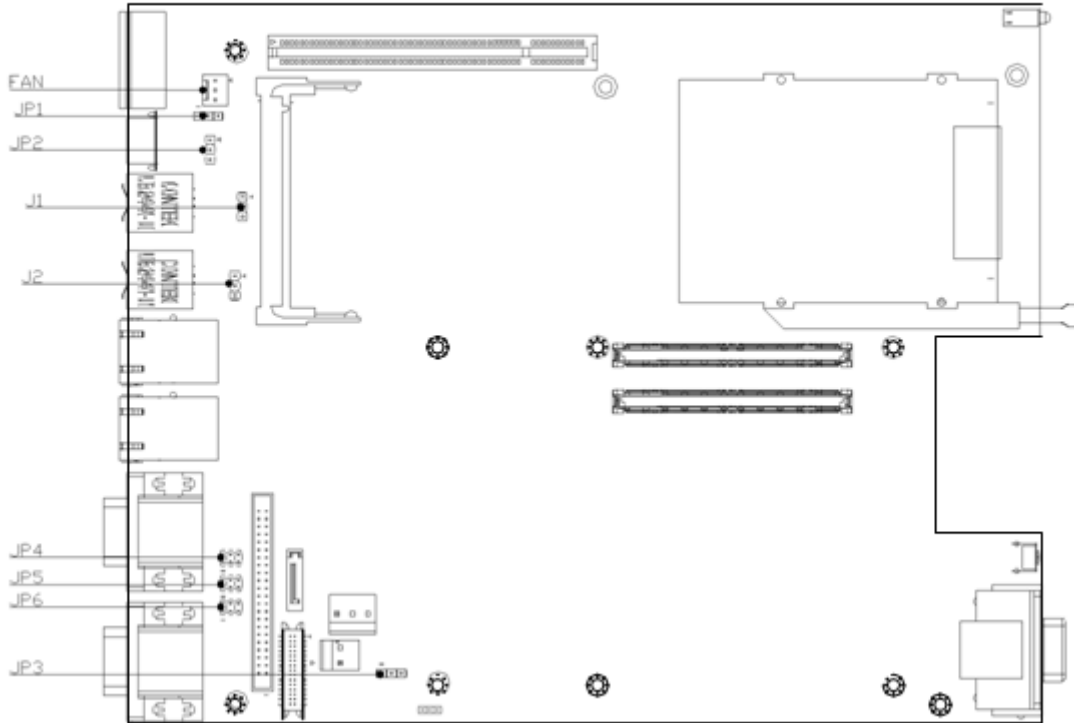
2

Hardware Installation

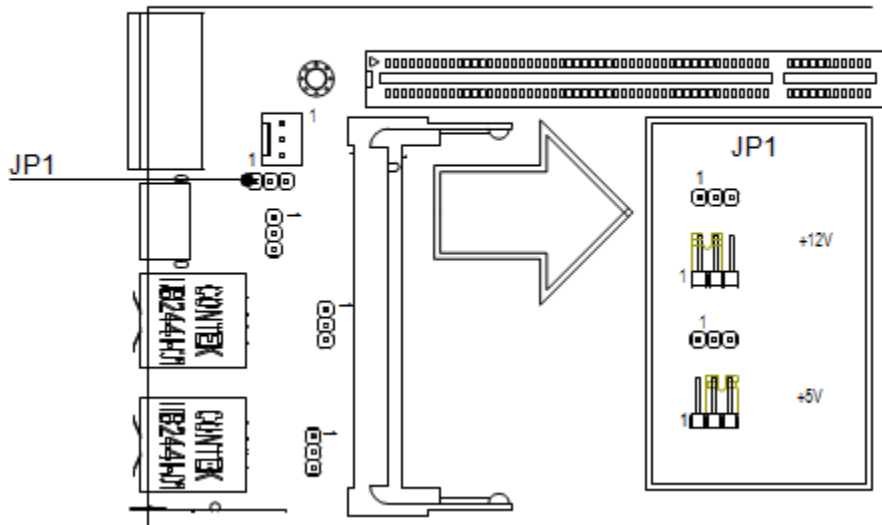
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2.1 Jumper and Connector



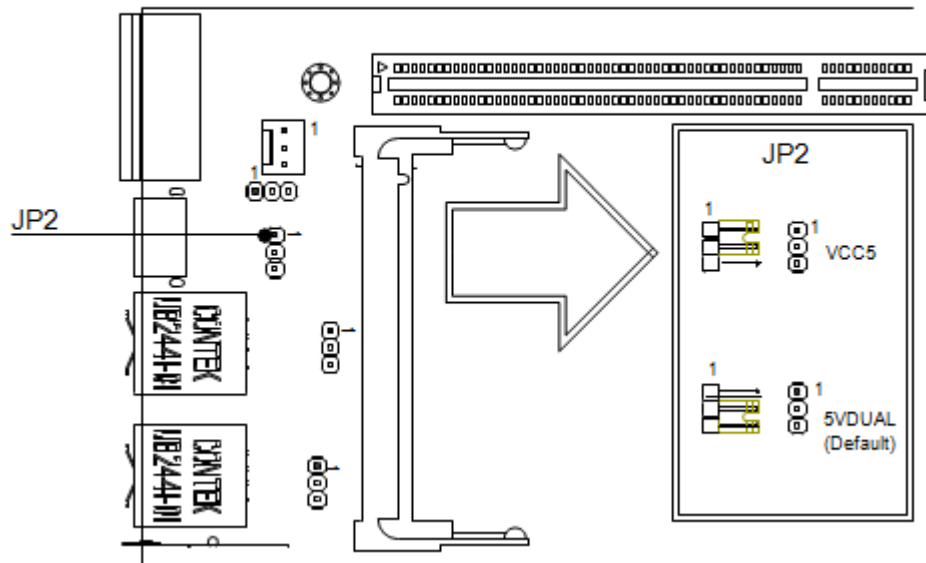
JP1



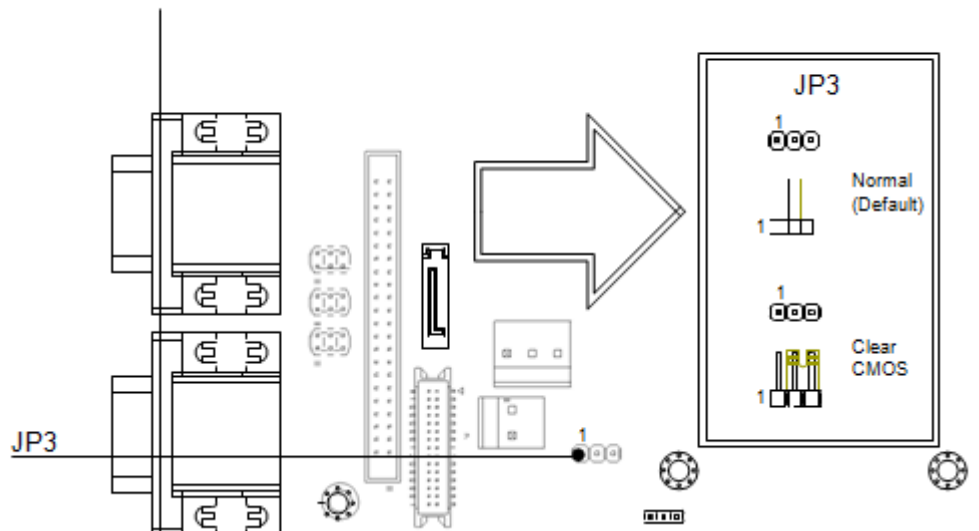
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JP2



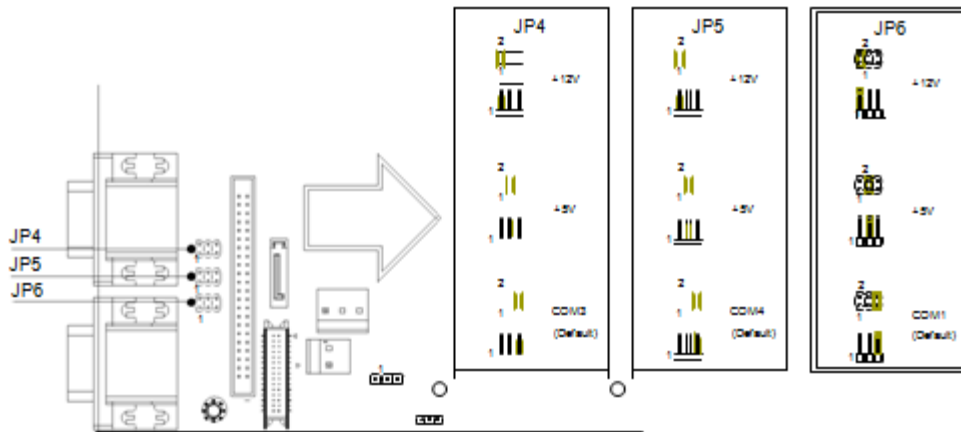
JP3



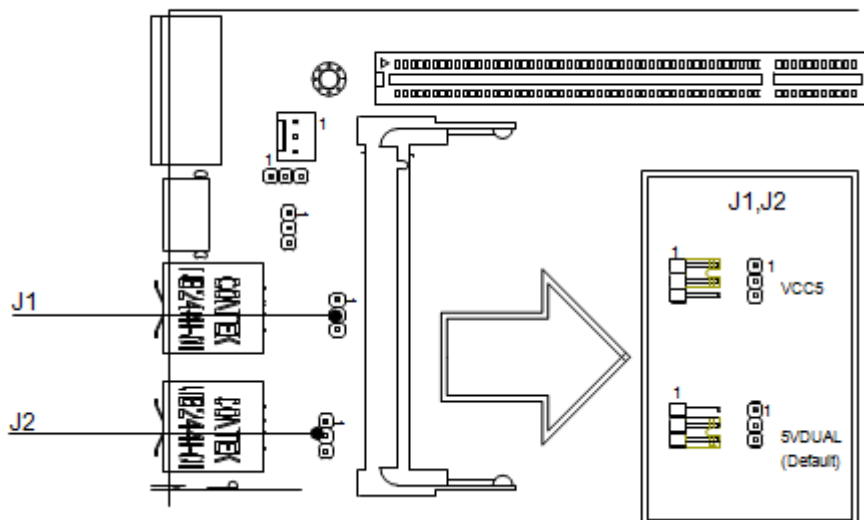
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JP4/JP5/JP6



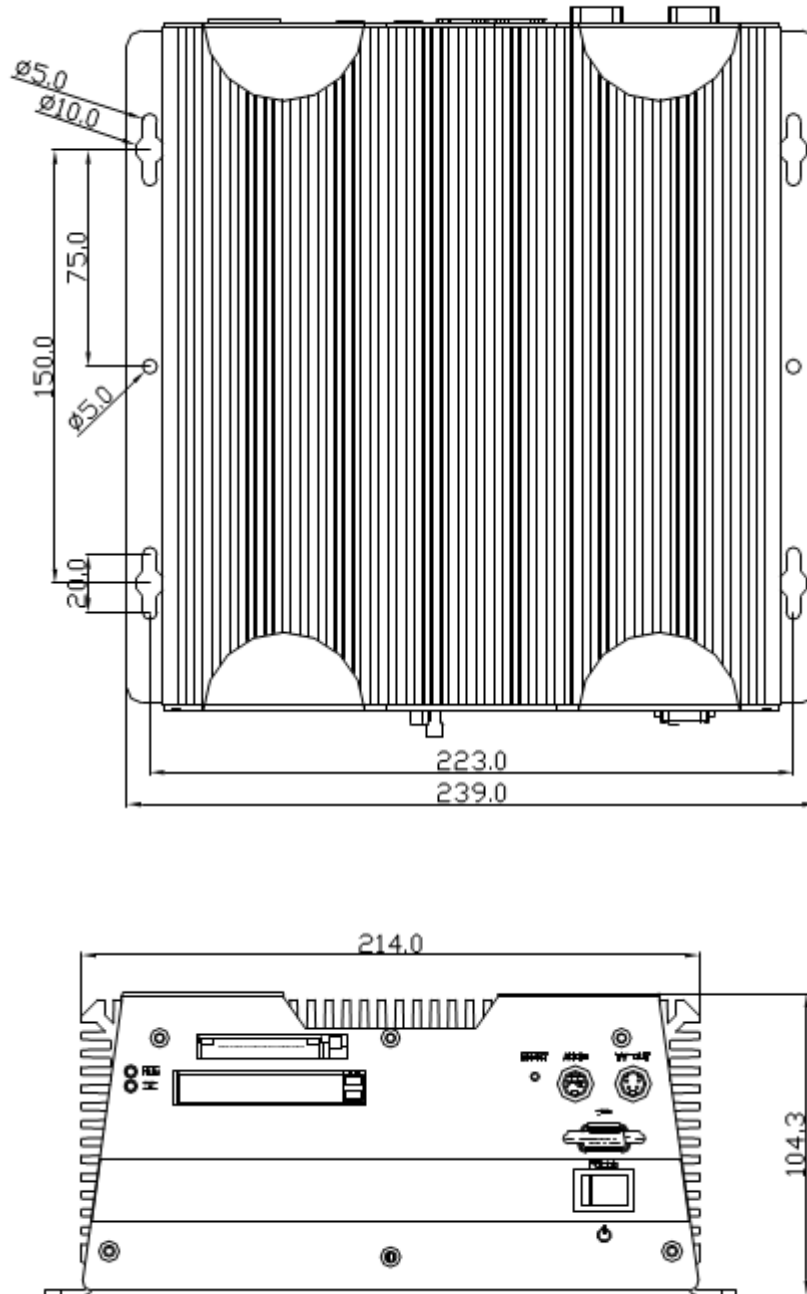
J1/J2



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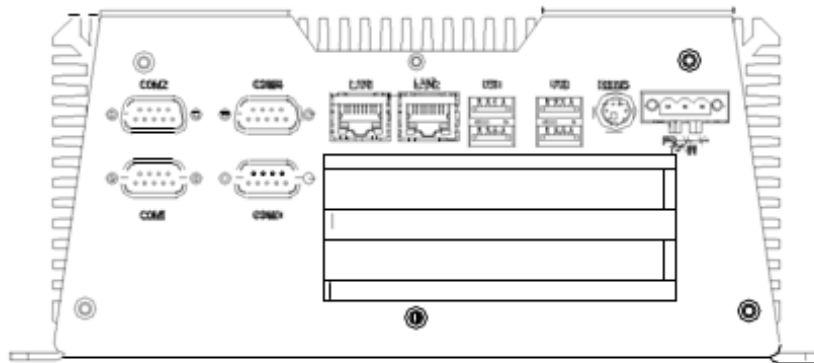
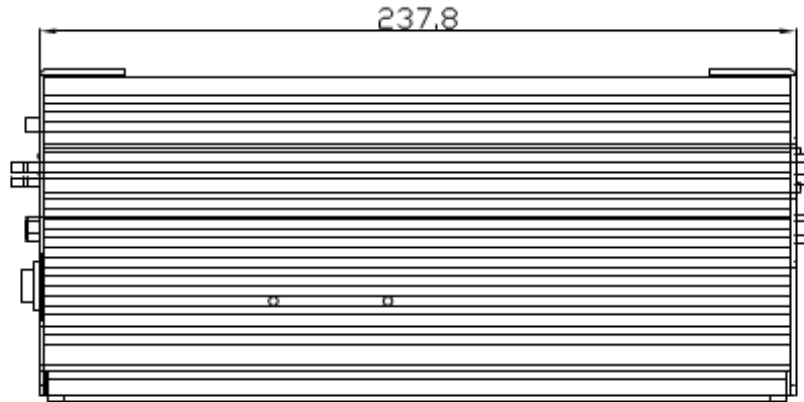
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2.2 Dimension



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2.3 USB1, 2 (J1) & USB3, 4 (J2) Power Selection

J1	Function
1-2	Normal Æ VCC5
2-3	Standby (Default) Æ 5VDUAL

J2	Function
1-2	Normal Æ VCC5
2-3	Standby (Default) Æ 5VDUAL

2.4 FAN Power Selection (JP1) (For special usage)

JP1	Function
1-2	+12V
2-3	+5V

2.5 PS2 Keyboard/ Mouse Power Selection (JP2)

JP2	Function
1-2	Normal Æ VCC5
2-3	Standby (Default) Æ 5VDUAL

2.6 RTC Battery Selection (JP3)

JP3	Function
1-2	Normal (Default)
2-3	Clear CMOS

2.7 COM1, COM3, COM4, Pin 9 Selection (JP6, JP4, JP5)

JP6	Function
1-2	+12V
3-4	+5V

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JP4	Function
1-2	+12V
3-4	+5V
5-6	RI for COM3 (Default)

JP5	Function
1-2	+12V
3-4	+5V
5-6	RI for COM4 (Default)

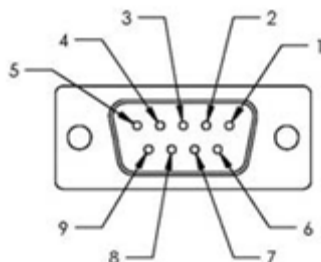
2.8 COM2 RS-232/422/485 Selection

COM2 RS-232/422/485 selection for Acnodes Corp. FES-series is set in BIOS setting as following:

Entering BIOS Setting Menu: Choose "Integrated PeripheralsÆ Super IO device Æ COM2 select". (Default setting is at "RS-232")

2.9 COM2 RS-232/422/485 Serial Port Connector

Different devices implement the RS-232/422/485 standard in different ways. If you have problems with a serial device, check the pin assignments below for the connector.



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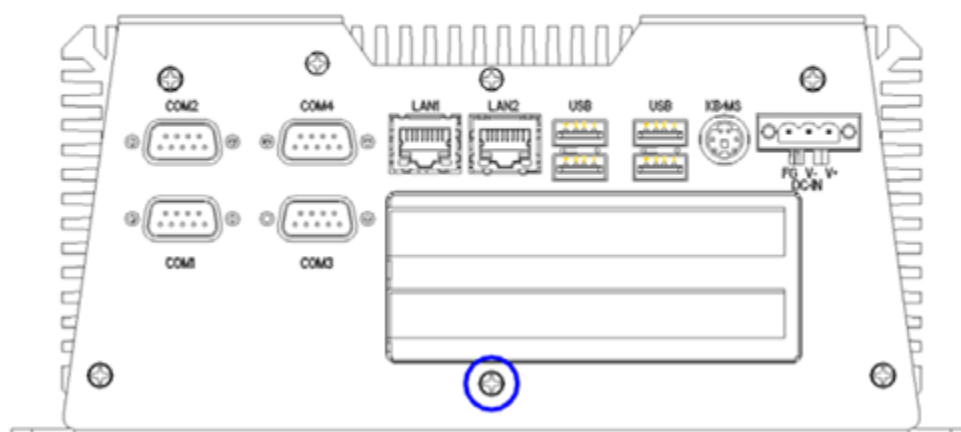
Pin	Signal	Pin	Signal
1	DCD (422TXD-/485DATA-)	2	RXD (422RXD+)
3	TXD (422TXD+/485DATA+)	4	DTR (422RXD-)
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	N.C.

2.10 Hard Disk Drive Installation

Disassemble the FES-6911

For Hard Disk Drive (HDD) installation, you have to disassemble the bottom lid of FES-6911 and some components and covers in the FES-6911.

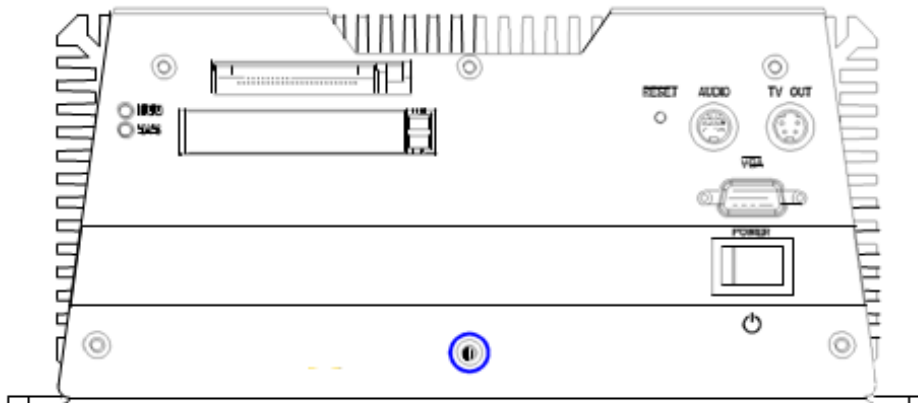
Step 1: Unfasten the two screws on the rear panel.



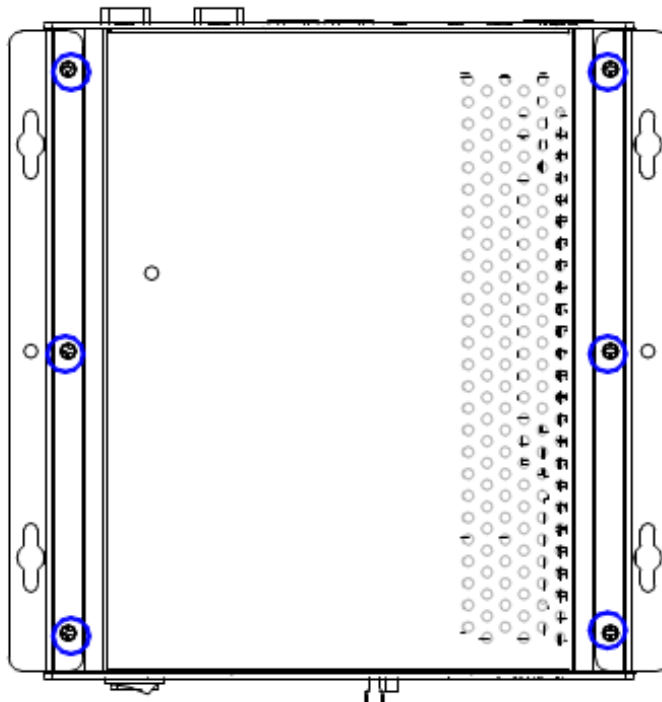
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Step 2: Unfasten the screws in blue circle on the front panel.



Step 3: Unfasten the six screws on the bottom lid.



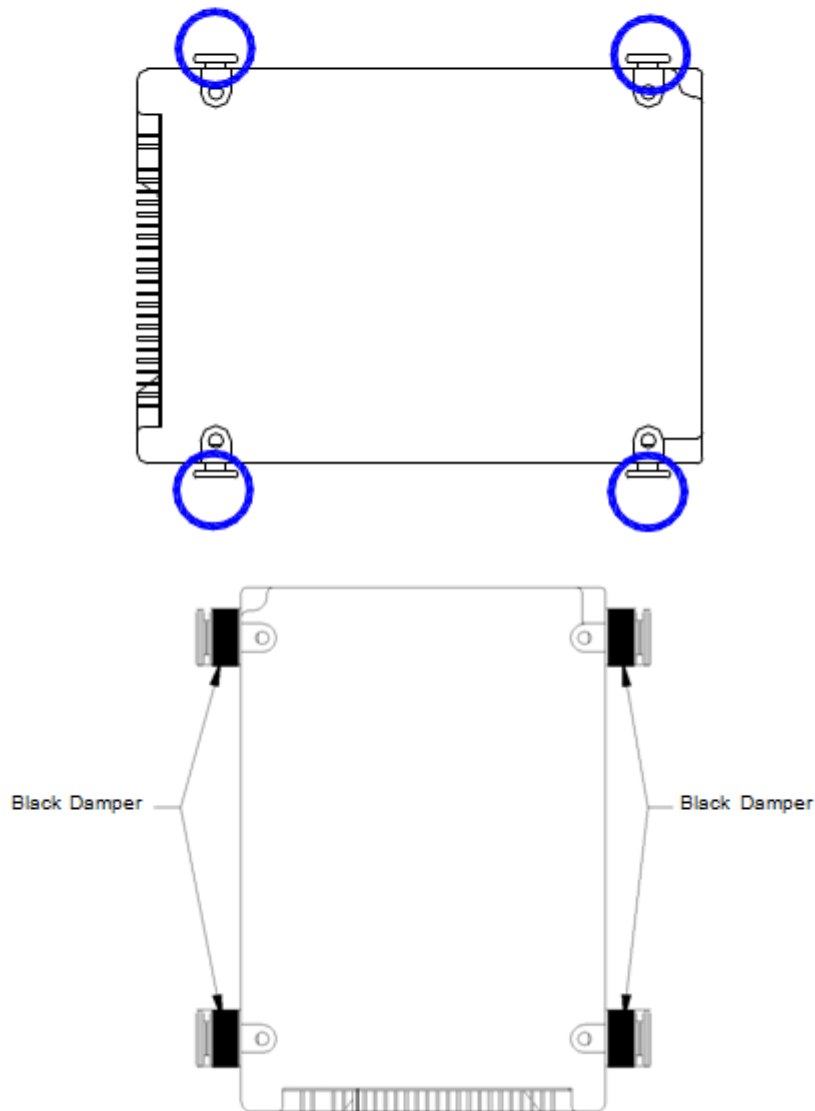
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Assemble the HDD Module

After disassembling the FES-6911, you have to get the HDD module ready for the proceeding installation.

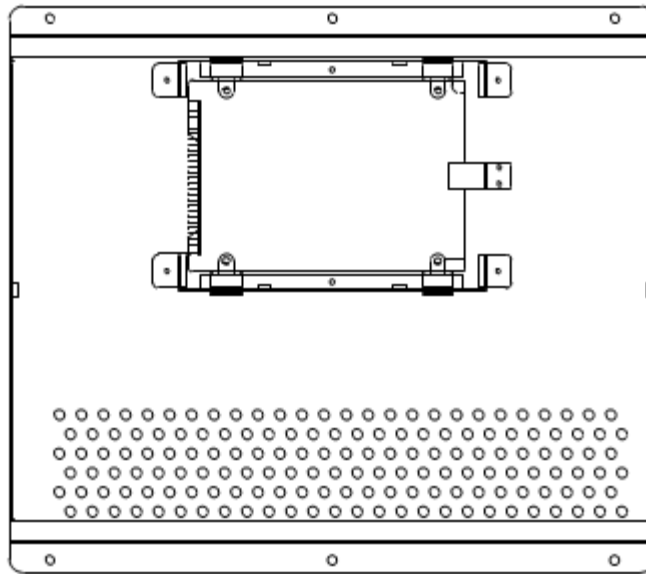
Step 1: Fasten the four HDD screws and cover with the four black damper



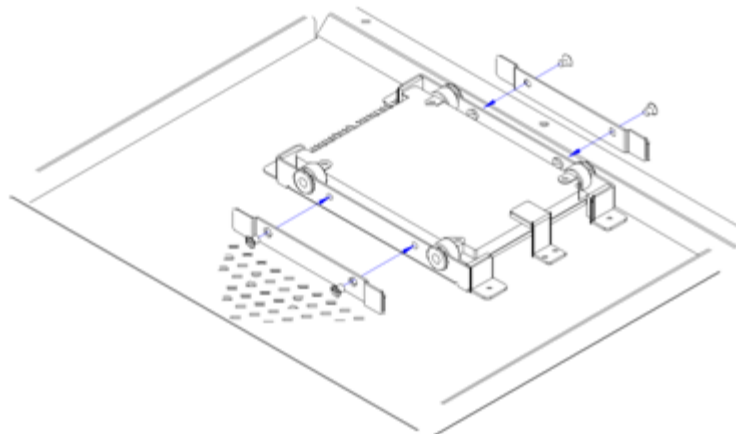
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Step 2: Assembly the HDD chassis



Step 3: Assembly the damper bracket

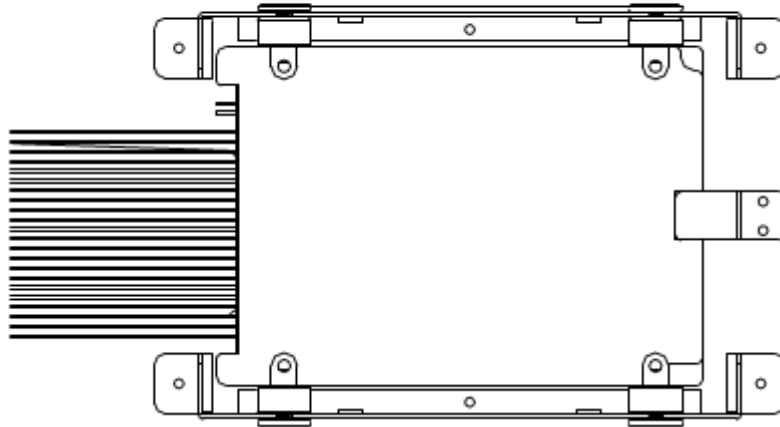


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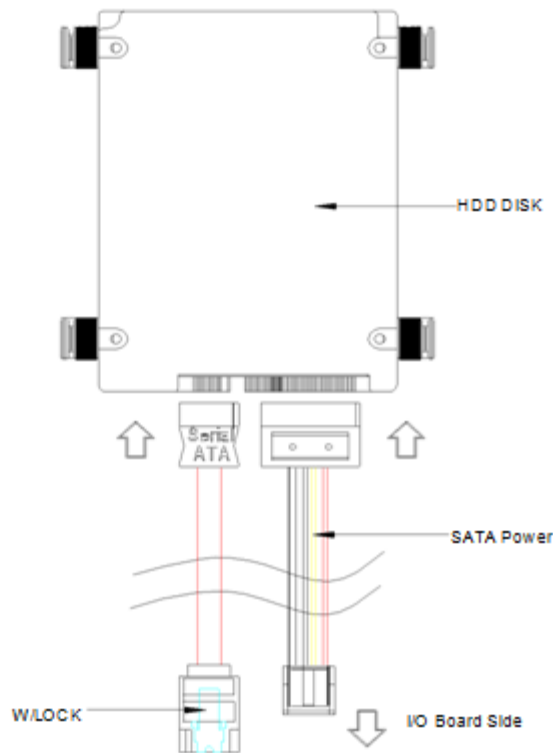
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Step 4:

Connect the HDD cable (for IDE Type HDD)



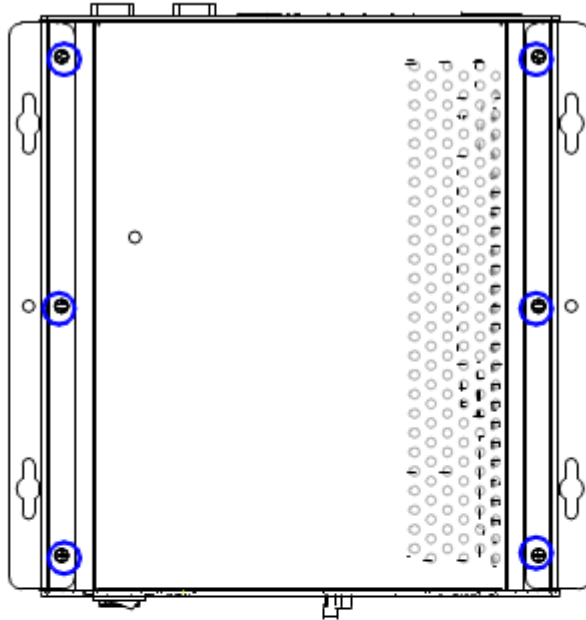
Connect the HDD cable (for SATA Type HDD)



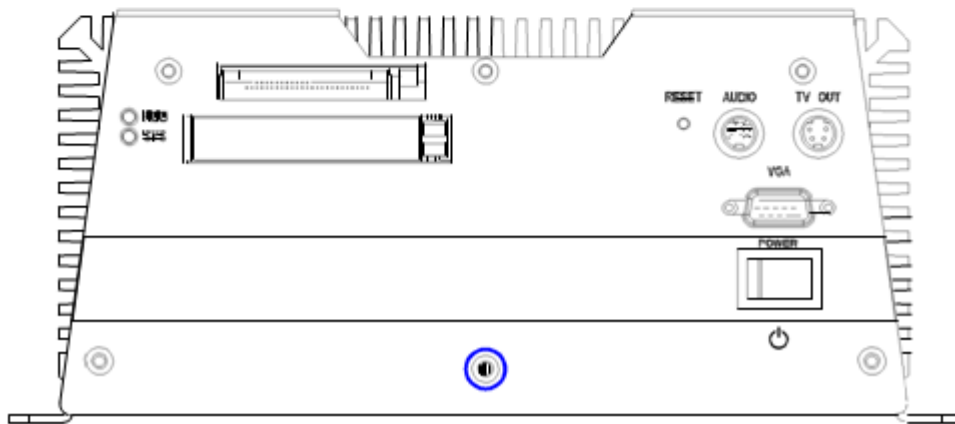
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Step 5: Fasten the six screws on the back of the FES-6911



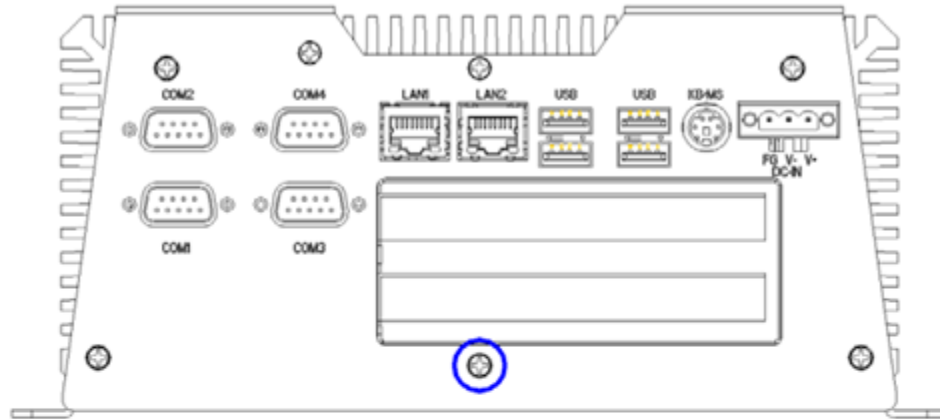
Step 6: Fasten the screw



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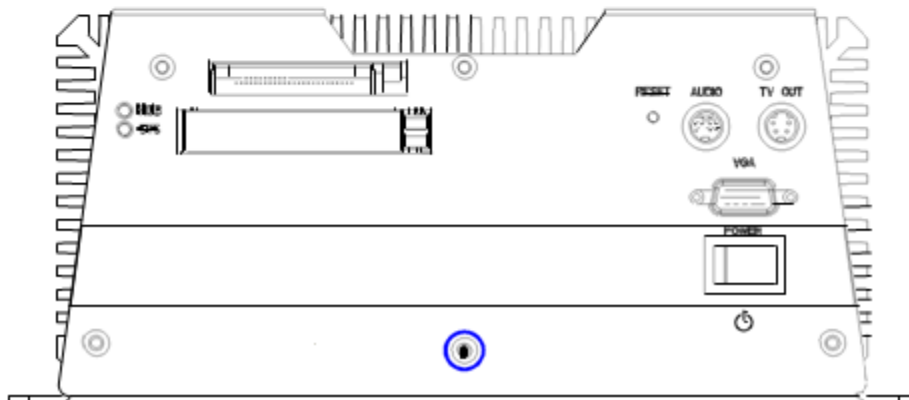
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Step 7: Fasten the screw



2.11 PCI Card Installation

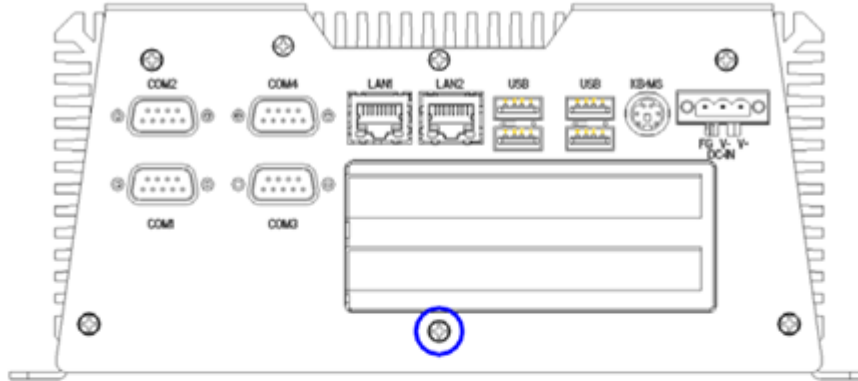
Step 1: Unfasten the screw on the front panel.



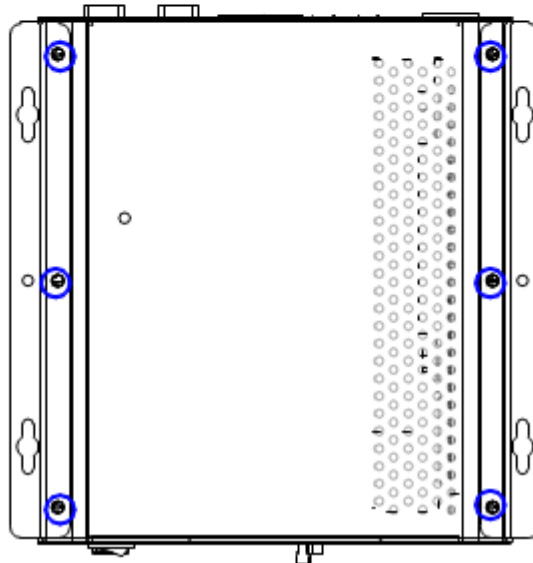
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Step 2: Unfasten the screw on the rear panel.



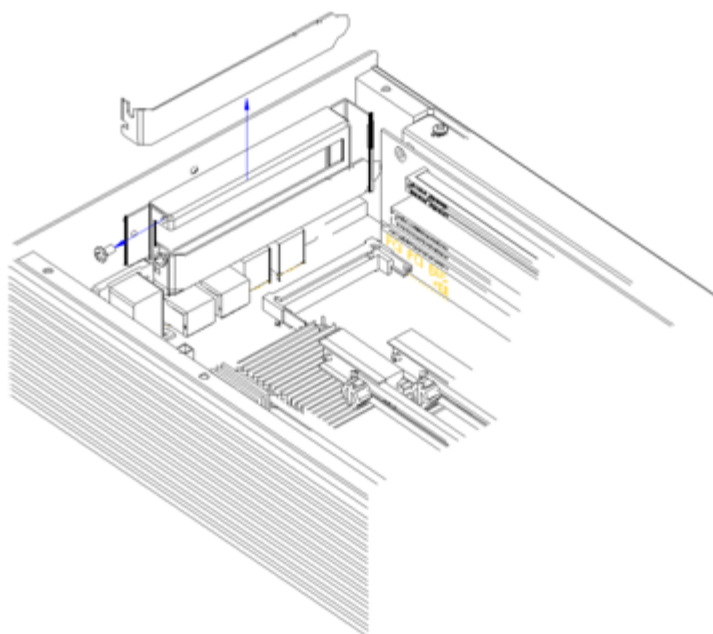
Step 3: Unfasten the six screws on the bottom lid.



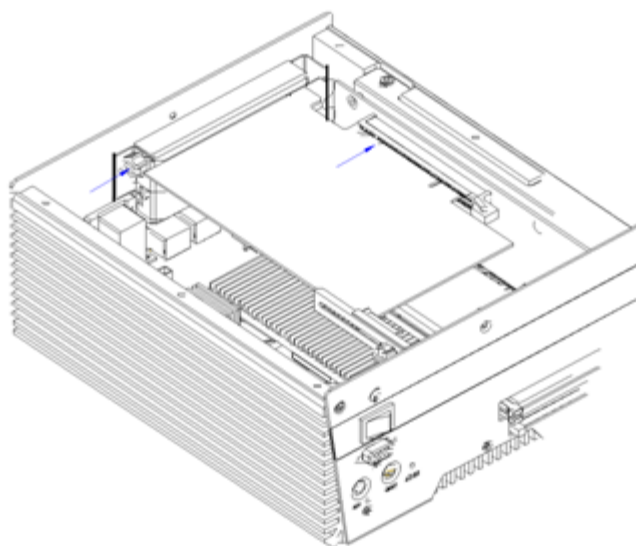
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Step 4: Remove the screw with your finger and get the PCI card ready to install. You should keep the shield and screw for use later.



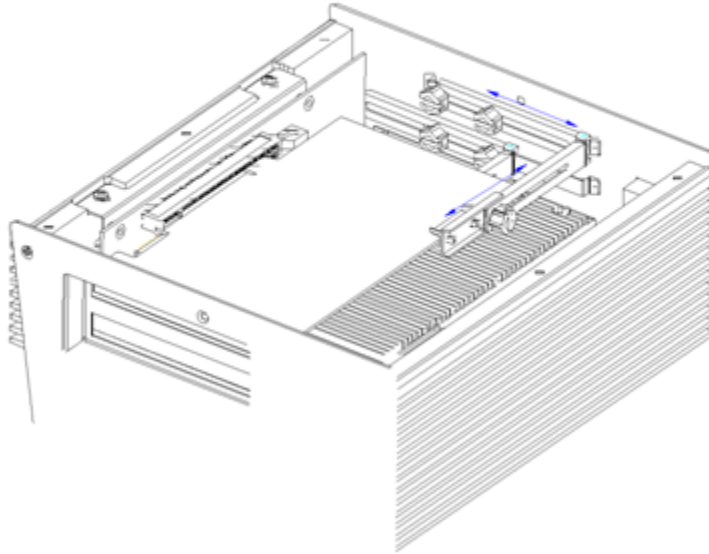
Step 5: Insert the PCI card into the PCI slot and reattach the screw.



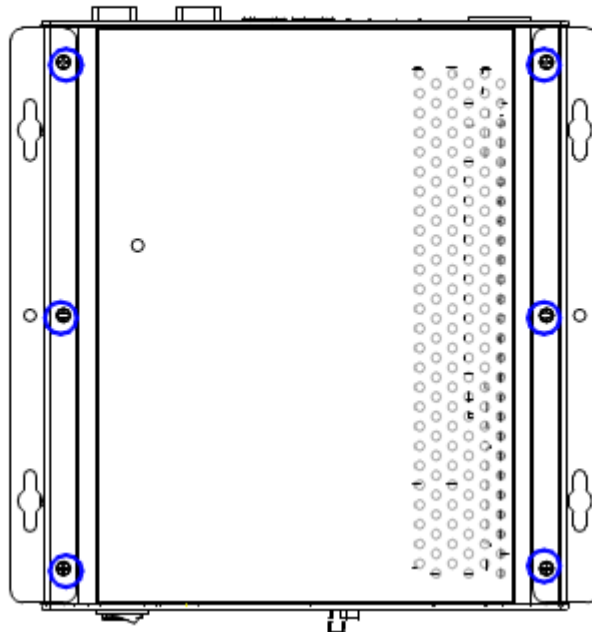
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Step 6: Unfasten the screws and push the tenon to lock the PCI card in position.



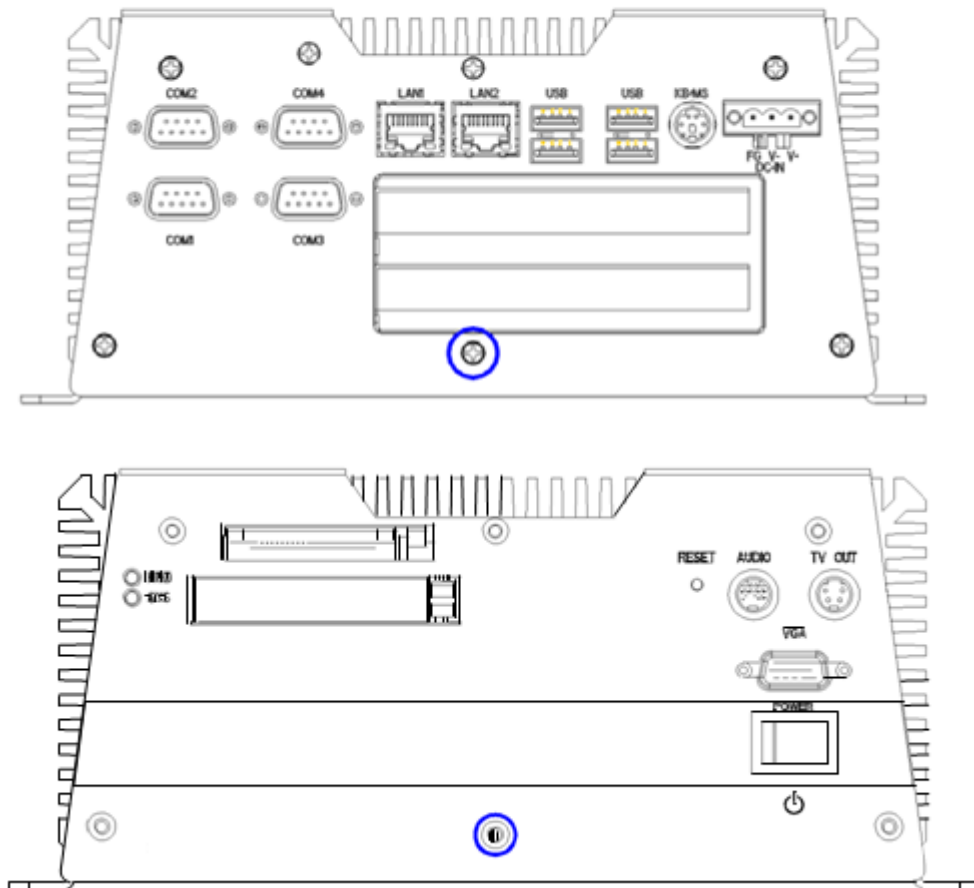
Step 7: Close the bottom lid of the FES-6911 and fasten six screws on bottom lid.



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Step 8: Fasten the one screw on the rear panel and one screw on the front panel

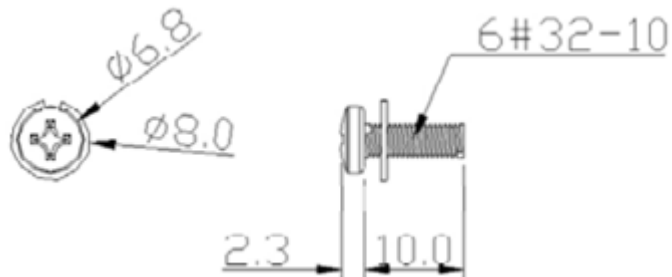
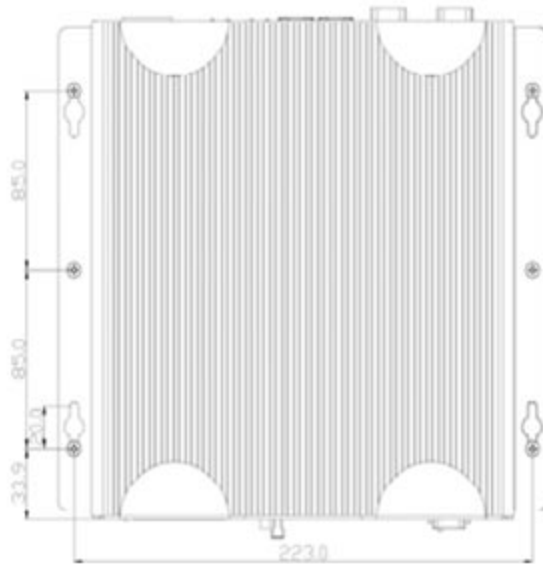
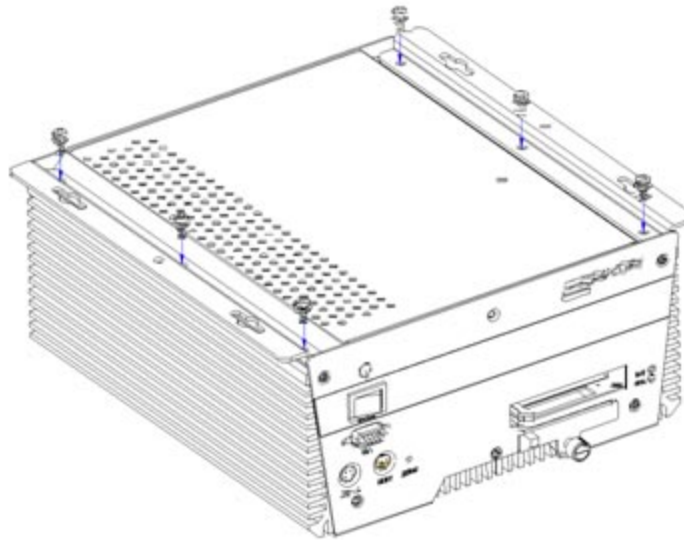


2.12 Wallmount kit Installation

Step 1: Get the brackets ready and fasten appropriate three screws on each bracket. After fastening the two brackets on the bottom lid of FES-6911, the wallmount kit installation is finished

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Chapter

3

Award

BIOS setup



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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 FES-6915 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.



FES6911

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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.)

Note: COM3, COM 4 cannot support LapLink V.5.0(LL5)

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.



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

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 "Acnodes BIOS Item Description.pdf" file in the CD for the meaning of each setting in this chapter.



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

Chapter

4

Driver

Installation



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Intel Atom N270 1.6GHz Processor

The FES-6915 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 Chip Driver

Step 2 - Install VGA Driver

Step 3 - Install LAN Driver

Step 4 - Install Audio Driver

USB 2.0 Drivers are available for download 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.



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

4.1 Installation

Insert the FES-6915 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 Chipset Driver

1. Click on the **Step 1-INF** 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 VGA Driver

1. Click on the **Step 2-VGA** folder and select the OS folder your system is
2. Double click on the **Setup.exe** located in each OS folder
3. Follow the instructions that the window shows you
4. The system will help you install the driver automatically

Caution:

In Acnodes products with Intel embedded graphics chipset, when system booting before CRT / LCD monitor has disconnected to VGA, it will cause Intel graphics chipset automatically detected without CRT / LCD connection and set CRT output to disable. Therefore, CRT / LCD screen will go black and never recovered on Windows.

Because it's a limitation on application for Intel embedded graphics driver under Windows XP. Therefore, there is a simply way to recover CRT / LCD output through Hot-Key function by Intel suggestion as follows:

You need to press **<CTRL><ALT><F1>** key simultaneously to recover VGA output again. This hot-key function is only in the Windows driver version 6.14.10.4497 or later.



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

Step 3 - Install LAN Driver

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

Step 4 - Install Audio Driver

1. Click on the **Step 4-AC97** folder and then click on the folder of **Win98ME2KXP**
2. Double click on the **wdm_a371.exe**
3. Follow the instructions that the window shows you
4. The system will help you install the driver automatically

Note:

Under the Window OS environment, if the CRT connector is connected to display monitor by the data switch device, the user need to set the color and resolution from Intel Graphic utility (VGA driver) instead of setting from the control panel in case of the wrong display appearance.



FES6911

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Appendix

A

Programming the Watchdog Timer

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A.1 Programming

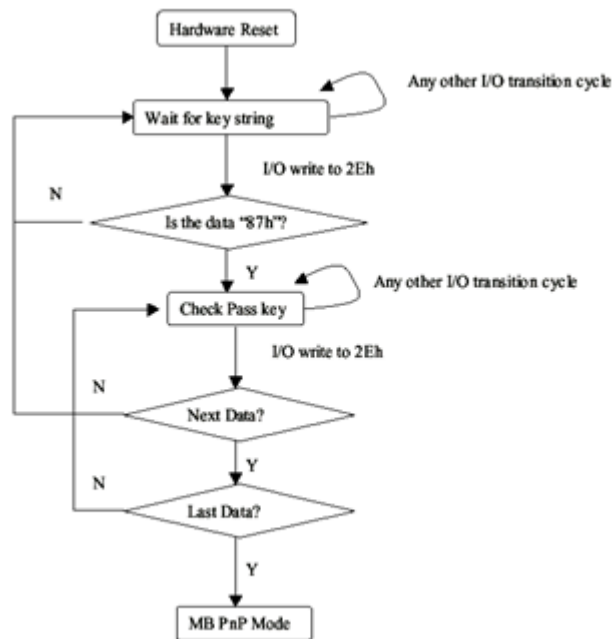
FES-6911 utilizes ITE 8712 chipset as its watchdog timer controller.

Below are the procedures to complete its configuration and the Acnodes 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.





FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

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.

FES6911

Fanless Embedded Controller comes with Intel Atom N270 1.6GHz Processor

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

FES6911

Fanless Embedded Controller comes with Intel Atom N270 1.6GHz Processor

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

FES6911

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Intel Atom N270 1.6GHz Processor

A.2 IT8712 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
```



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

```
; 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  
Exit_Configuration_Mode PROC NEAR  
MOV AX,0202h  
CALL Write_Configuration_Data
```



FES6911

Fanless Embedded Controller comes with
Intel Atom N270 1.6GHz Processor

```
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
```



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Intel Atom N270 1.6GHz Processor

```
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
```

FES6911

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Intel Atom N270 1.6GHz Processor

```
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



FES6911

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Appendix

B

I/O Information

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B.1 I/O Address Map

Input/output (IO)

[00000000 - 0000000F]	Direct memory access controller	[000002E0 - 000002E7]	Communications Port (COM4)
[00000000 - 00000CF7]	PCI bus	[000002F0 - 000002F7]	Communications Port (COM3)
[00000010 - 0000001F]	Motherboard resources	[000002F8 - 000002FF]	Communications Port (COM2)
[00000020 - 00000021]	Programmable interrupt controller	[000003B0 - 000003BB]	Mobile Intel(R) 945 Express Chipset Family
[00000022 - 0000003F]	Motherboard resources	[000003C0 - 000003DF]	Mobile Intel(R) 945 Express Chipset Family
[00000040 - 00000043]	System timer	[000003F6 - 000003F6]	Primary IDE Channel
[00000044 - 0000004D]	Motherboard resources	[000003F8 - 000003FF]	Communications Port (COM1)
[00000050 - 0000005E]	Motherboard resources	[00000400 - 000004BF]	Motherboard resources
[00000061 - 00000061]	System speaker	[000004D0 - 000004D1]	Motherboard resources
[00000062 - 00000063]	Motherboard resources	[00000500 - 0000051F]	Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA
[00000065 - 0000006F]	Motherboard resources	[00000880 - 0000088F]	Motherboard resources
[00000070 - 00000073]	System CMOS/real time clock	[00000A79 - 00000A79]	ISAPNP Read Data Port
[00000074 - 0000007F]	Motherboard resources	[00000D00 - 0000FFFF]	PCI bus
[00000080 - 00000090]	Direct memory access controller	[0000B000 - 0000BFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
[00000091 - 00000093]	Motherboard resources	[0000BF00 - 0000BF1F]	Intel(R) PRO/1000 PL Network Connection
[00000094 - 0000009F]	Direct memory access controller	[0000C000 - 0000CFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
[000000A0 - 000000A1]	Programmable interrupt controller	[0000CF00 - 0000CF1F]	Intel(R) 82574L Gigabit Network Connection
[000000A2 - 000000BF]	Motherboard resources	[0000EF00 - 0000EFFF]	Texas Instruments PCI-1520 CardBus Controller
[000000C0 - 000000DF]	Direct memory access controller	[0000F000 - 0000F0FF]	Realtek AC'97 Audio
[000000E0 - 000000EF]	Motherboard resources	[0000F100 - 0000F1FF]	Texas Instruments PCI-1520 CardBus Controller
[000000F0 - 000000FF]	Numeric data processor	[0000F200 - 0000F2FF]	Texas Instruments PCI-1520 CardBus Controller
[000001F0 - 000001F7]	Primary IDE Channel	[0000F300 - 0000F30F]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[00000274 - 00000277]	ISAPNP Read Data Port	[0000F400 - 0000F403]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[00000279 - 00000279]	ISAPNP Read Data Port	[0000F500 - 0000F507]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[00000290 - 0000029F]	Motherboard resources	[0000F600 - 0000F603]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[000002E0 - 000002E7]	Communications Port (COM4)	[0000F700 - 0000F707]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[000002F0 - 000002F7]	Communications Port (COM3)	[0000F800 - 0000F80F]	Intel(R) 82801G (ICH7 Family) Ultra ATA Storage Controllers - 27DF
[000002F8 - 000002FF]	Communications Port (COM2)	[0000F900 - 0000F9FF]	Texas Instruments PCI-1520 CardBus Controller
[000003B0 - 000003BB]	Mobile Intel(R) 945 Express Chipset Family	[0000FA00 - 0000FA3F]	Realtek AC'97 Audio
[000003C0 - 000003DF]	Mobile Intel(R) 945 Express Chipset Family	[0000FB00 - 0000FB1F]	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
[000003F6 - 000003F6]	Primary IDE Channel	[0000FC00 - 0000FC1F]	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
[000003F8 - 000003FF]	Communications Port (COM1)	[0000FD00 - 0000FD1F]	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
[00000400 - 000004BF]	Motherboard resources	[0000FE00 - 0000FE1F]	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
[000004D0 - 000004D1]	Motherboard resources	[0000FF00 - 0000FF07]	Mobile Intel(R) 945 Express Chipset Family
[00000500 - 0000051F]	Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA		
[00000880 - 0000088F]	Motherboard resources		

FES6911

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B.2 Memory Address Map

Address Range	Device
[00000000 - 0009FFFF]	System board
[000A0000 - 000BFFFF]	Mobile Intel(R) 945 Express Chipset Family
[000A0000 - 000BFFFF]	PCI bus
[000C0000 - 000DFFFF]	PCI bus
[000DE000 - 000DEFFF]	Texas Instruments PCI-1520 CardBus Controller
[000DF000 - 000DFFFF]	Texas Instruments PCI-1520 CardBus Controller
[000E0000 - 000EFFFF]	System board
[000F0000 - 000FFFFFF]	System board
[00100000 - 1F6DFFFF]	System board
[1F6E0000 - 1F6FFFFFF]	System board
[1F750000 - FEBFFFFFF]	PCI bus
[C0000000 - CFFFFFFF]	Mobile Intel(R) 945 Express Chipset Family
[DFFF0000 - DFFF0FFF]	Texas Instruments PCI-1520 CardBus Controller
[DFFF0000 - DFFF0FFF]	Texas Instruments PCI-1520 CardBus Controller
[E0000000 - EFFFFFFF]	Motherboard resources
[F5900000 - F98FFFFFF]	Texas Instruments PCI-1520 CardBus Controller
[F9900000 - FD8FFFFFF]	Texas Instruments PCI-1520 CardBus Controller
[FD900000 - FD9FFFFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
[FDA00000 - FDAFFFFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
[FDAE0000 - FDAFFFFFF]	Intel(R) PRO/1000 PL Network Connection
[FDB00000 - FDBFFFFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
[FDD00000 - FDDFFFFFF]	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
[FDDC0000 - FDDFFFFFF]	Intel(R) 82574L Gigabit Network Connection
[FDDFC000 - FDDFFFFFF]	Intel(R) 82574L Gigabit Network Connection
[FDF00000 - FDF7FFFF]	Mobile Intel(R) 945 Express Chipset Family
[FDF80000 - FDFBFFFF]	Mobile Intel(R) 945 Express Chipset Family
[FDFFC000 - FDFFC3FF]	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
[FDFFD000 - FDFFD0FF]	Realtek AC'97 Audio
[FDFFE000 - FDFFE1FF]	Realtek AC'97 Audio
[FDFFF000 - FDFFF3FF]	Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
[FEB80000 - FEBFFFFFF]	Mobile Intel(R) 945 Express Chipset Family
[FEC00000 - FEC00FFF]	System board
[FED13000 - FED1DFFF]	System board
[FED20000 - FED3FFFF]	System board
[FED40000 - FED44FFF]	PCI bus
[FED43000 - FED43FFF]	Texas Instruments PCI-1520 CardBus Controller
[FED44000 - FED44FFF]	Texas Instruments PCI-1520 CardBus Controller
[FED45000 - FED8FFFF]	System board
[FEE00000 - FEE00FFF]	System board
[FFB00000 - FFB7FFFF]	System board
[FFB80000 - FFBFFFFFF]	Intel(R) 82802 Firmware Hub Device
[FFF00000 - FFFFFFFF]	System board

FES6911

Fanless Embedded Controller comes with Intel Atom N270 1.6GHz Processor

B.3 IRQ Mapping Chart

Interrupt request (IRQ)	
(ISA) 0	System timer
(ISA) 3	Communications Port (COM2)
(ISA) 4	Communications Port (COM1)
(ISA) 8	System CMOS/real time clock
(ISA) 9	Microsoft ACPI-Compliant System
(ISA) 10	Communications Port (COM3)
(ISA) 11	Communications Port (COM4)
(ISA) 13	Numeric data processor
(ISA) 14	Primary IDE Channel
(PCI) 15	Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA
(PCI) 16	Intel(R) 82574L Gigabit Network Connection
(PCI) 16	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
(PCI) 16	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
(PCI) 16	Mobile Intel(R) 945 Express Chipset Family
(PCI) 16	Texas Instruments PCI-1520 CardBus Controller
(PCI) 17	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
(PCI) 17	Intel(R) PRO/1000 PL Network Connection
(PCI) 17	Realtek AC'97 Audio
(PCI) 17	Texas Instruments PCI-1520 CardBus Controller
(PCI) 18	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
(PCI) 19	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
(PCI) 19	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
(PCI) 23	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
(PCI) 23	Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC

B.4 DMA Channel Assignments

Direct memory access (DMA)	
4	Direct memory access controller