BOXER-6301VS

Embedded Box PC

Intel® Core™ i5 Processor

2 USB3.0, 2 USB2.0, 3 COM

3 MiniCard, 3 SIM Sockets

Copyright Notice

Acknowledgments

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- CFast™ is a trademark of the Compact Flash Association.
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Packing List

Before you begin installing your system, please make sure that the following materials have been shipped:

- 1   BOXER-6301VS Embedded Box PC
- 10 M2 x 3mm screws (S1A5003010)
- 2   Drive bay keys
- 1   3-pin Phoenix connector (1652003201)
- 1   Wallmount bracket
- 1   Product DVD

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

Safety & Warranty

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. Disconnect this device from any AC supply before cleaning.

2. While cleaning, use a damp cloth instead of liquid or spray detergents.

3. For any pluggable equipment, the power outlet must be installed near the device and easily accessible.

4. Keep this device away from humidity.

5. Place this device on a solid surface during installation. Dropping it or letting it fall could cause damage.

6. The openings on the device's enclosure are for dissipating heat. DO NOT COVER THE OPENINGS.

7. Watch out for high temperatures that may occur during system operation.

8. Make sure the voltage of the power source is correct before connecting the device 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 device should be noted.

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

12. Never pour any liquid into the openings. This could cause fires

or electric shocks.

13. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded devices.

14. If any of the following situations arises, please the contact our service personnel:

    i. Damaged power cord or plug

    ii. Liquid intrusion to the device

    iii. Exposure to moisture

    iv. Device is not working as expected or in a manner as described in this manual

    v. The device is dropped or damaged

    vi. Any obvious signs of damage displayed on the device

15. Do not leave this device in an uncontrolled environment where the storage temperature is below -10°C or above 60°C to prevent damage.

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.

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。

China RoHS Requirements
Poisonous or Hazardous Substances or Elements in Products
AAEON BOXER PC/ Industrial Systems

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	O	O	O	O	O
Wires & Connectors for External Connections	X	O	O	O	O	O
Chassis	X	O	O	O	O	O
CPU & RAM	X	O	O	O	O	O
Hard Disk	X	O	O	O	O	O
PSU	X	O	O	O	O	O

O：The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.

X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.

Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only

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Chapter

1

General Information

1.1 Introduction

AAEON introduces the latest entry in the BOXER series, the BOXER-6301VS embedded box PC. Utilizing the Intel$^®$ Core™ i5-4402E Processor, the system is certified with E-mark/ISO-7637 for vehicle power standards, making it ideally suited for in-vehicle applications.

In addition to a multitude of I/O ports for a variety of in-vehicle applications, the PC adopts a reliable fanless design and provides wireless communication features for users wishing to establish a network connection at any locations.

The BOXER-6301VS is a standalone high performance PC designed for extended operation and with high reliability. It can replace traditional methods and become the mainstream box PC for diversified markets.

1.2 Features

- Intel® Core™ i5-4402E, 1.6Hz Processor

- Intel QM87 Chipset

- 802.11af POE x 4 for IP/ PoE camera (Optional)

- Support vehicle power and ignition on/off

- Support UVP/reverse protection, ACC on/off delay and battery protection

- MiniCard x 3 and SIM Socket x 3

- Fanless Design

1.3 Specifications

● CPU		Intel® Core™ i5-4402E, 1.6GHz Processor (up to 2.7GHz supported)
● Chipset		QM87
● System Memory		DDR3L 1333/1600 SODIMM x 1, up to. 8GB
● Display Interface	VGA	DB-15 x 1 for VGA
● Storage Device	HDD/SSD	2.5" Drive Bay x 2
	CFast	CFast Socket x 1 (with cover)
● Network	LAN	Intel® Gigabit Ethernet
	Wireless	Optional by MiniCard (see below for MiniCard options)
● Front I/O	Audio	Line-out x 1, Mic-in x 1
	Others	SIM Socket x 3, Antenna hole x 6, POE power On/Off switch
● Rear I/O	USB Port	USB 3.0 x 2
	LAN	10/100/1000 RJ-45 x 2
	Serial Port	DB-9 for RS-232 x 2, DB-9 for RS-232/422/485 x 1
	VGA	15-pin D-SUB x 1
	POE	RRJ45 POE
	Others	Default 24V DC-in for 24V battery,

		3-pin terminal block x 1 (ACC, V-, V+)
●	Expansion MiniCard	Full MiniCard x 3 (2 for USB only, 1 full function)
	Others	SIM Socket x 3
●	Indicator	HDD LED (Red) x 1, System LED (Green) x 1
●	Power Requirement	Vehicle power:
		− Input voltage: Default 24V for 24V car battery
		− Supports Ignition cold crank
		− Supports Ignition on/off
		− Supports battery protection
		− Supports power on/off delay
●	Power Consumption	Max. 24@4.6A, Min. 24V@1.22A
●	System Cooling	Passive
●	Mounting	Wall Mount
●	Operating Temperature	-4°F ~ 131°F (-20°C ~ 55°C) with 0.5m/s Airflow
●	Storage Temperature	-22°F ~ 158°F (-30°C ~ 70°C)
●	Anti-Vibration	3 g rms/ 5~500 Hz/ operation - CFast 1 g rms/ 5~500 Hz/ operation - SSD
●	Anti-Shock	50G peak acceleration (11 msec. duration) - CFast 20G peak acceleration (11 msec. duration) - SSD

Embedded Box PC	BOXER-6301VS

- Certification   EMC   E-Mark E13
- Dimension (W x H x D)   10" x 7.5" x 3.5" (255mm x 190mm x 88mm)
- Gross Weight   10.8lbs (4.9 kg)
- Net Weight   8.6lbs (3.9kg)
- OS Support   Windows® 7

  Windows® 8.1

  Windows® Embedded Standard 7

  Windows® Embedded Standard 8

  Linux by Fedora

1.4 Notes for Windows[®] 7 Users

For Windows[®] 7 users, please set the power button from "Do Nothing" to "Shut down" when pressed to prevent problems during shut down or other errors (such as the Windows Error Recovery error message).
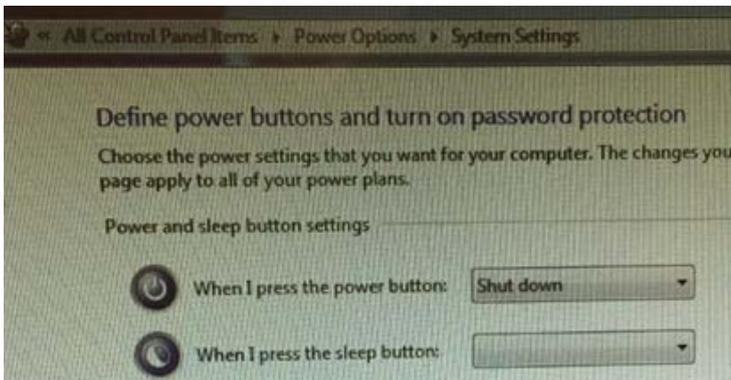
To perform this change, please follow the steps below:

1) Go to Control Panel

2) Open Power Options and select "Change what the power buttons do" option

3) Select "Shut down" from the drop-down list for the power buttons

4) Save changes and exit

Chapter

2

Quick Installation Guide

2.1 Safety Precautions

Warning!

Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.

Caution!

Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis

2.2 Dimensions and I/Os
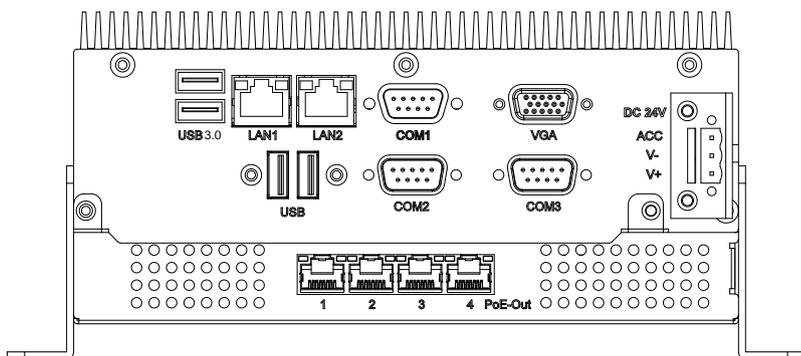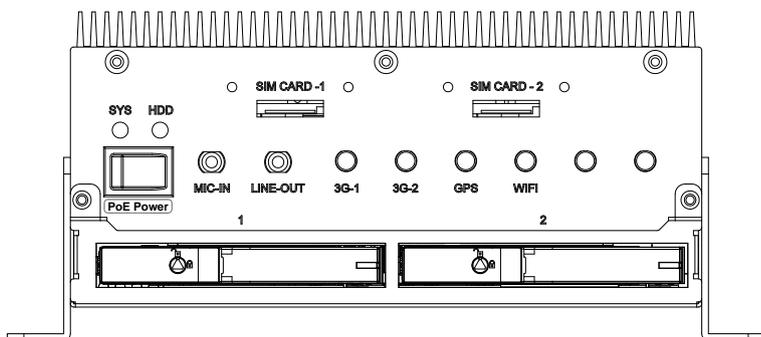
2.3 List of Jumpers

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	MiniCard with mSATA / PCIe Selection
JP10	Clear CMOS Jumper
JP11	COM2 Pin8 Function 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
LAN1	10M/100M/1G Ethernet Port 1
LAN2	10M/100M/1G Ethernet Port 2
USB	USB 2.0/3.0 Port 1 & 2
Serial Port	COM Port 1, 2, 3
VGA	VGA Port
SIM	SIM Socket 1, 2 ,3
MiniCard1	Onboard MiniCard Slot (Full Function)
MinCard2, 3	Internal MiniCard Slot (USB Signal)
CFast	CFast Slot
SODIMM	DDR3L SODIMM Slot
DC-in	DC-in Connector
SATA Power	SATA Power Connector 1, 2
SATA Signal	SATA Signal Connector 1, 2
POE	POE Port 1~4
POE Power Switch	POE Power on/off
DC in	DC inlet

2.5 Setting Jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip.

To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.

Open   Closed   Closed 2-3
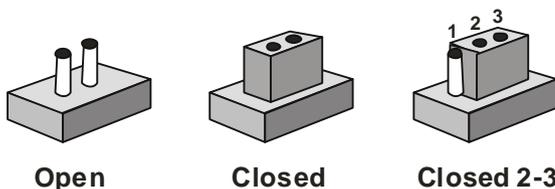
A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

2.6 MiniCard with mSATA / PCIe Selection (JP1)

1 2 3

mSATA   **PCIe (Default)**

JP1	Function
1-2	mSATA
2-3	PCIe (Default)

2.7 Clear CMOS Jumper (JP10)

1 2 3

Normal (Default)   **Clear CMOS**

JP10	Function
1-2	Normal (Default)
2-3	Clear CMOS

2.8 COM2 Pin8 Function Selection (JP11)

1 2   3 4   5 6

+12V   **Ring (Default)**   **+5V**

JP11	Function
1-2	+12V
3-4	Ring (Default)

5-6	+5V

2.9 10M/100M/1G Ethernet Port 1 (LAN1)
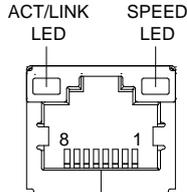
Pin	Pin Name	Signal Type	Signal Level
1	MDI0+	DIFF	
2	MDI0-	DIFF	
3	MDI1+	DIFF	
4	MDI2+	DIFF	
5	MDI2-	DIFF	
6	MDI1-	DIFF	
7	MDI3+	DIFF	
8	MDI3-	DIFF	

2.10 10M/100M/1G Ethernet Port 2 (LAN2)
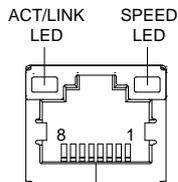
Pin	Pin Name	Signal Type	Signal Level
1	MDI0+	DIFF	
2	MDI0-	DIFF	
3	MDI1+	DIFF	
4	MDI2+	DIFF	
5	MDI2-	DIFF	
6	MDI1-	DIFF	
7	MDI3+	DIFF	
8	MDI3-	DIFF	

2.11 USB 2.0/3.0 Port 1 & 2 (USB)
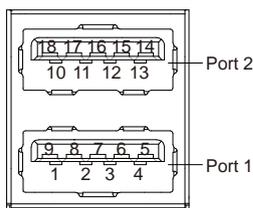
Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USB1_D-	DIFF	
3	USB1_D+	DIFF	
4	GND	GND	
5	USB1_SSRX−	DIFF	

6	USB1_SSRX+	DIFF	
7	GND	GND	
8	USB1_SSTX−	DIFF	
9	USB1_SSTX+	DIFF	
10	+5VSB	PWR	+5V
11	USB2_D-	DIFF	
12	USB2_D+	DIFF	
13	GND	GND	
14	USB2_SSRX−	DIFF	
15	USB2_SSRX+	DIFF	
16	GND	GND	
17	USB2_SSTX−	DIFF	
18	USB2_SSTX+	DIFF	

2.12 COM Port 1, 2, 3 (Serial Port)

COM1, COM3 (RS-232)
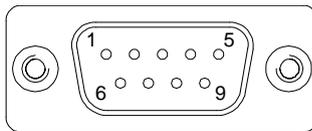
Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	RX	IN	
3	TX	OUT	±9V

Embedded Box PC		BOXER-6301VS	
4	DTR	OUT	±9V
5	GND	GND	
6	DSR	IN	
7	RTS	OUT	±9V
8	CTS	IN	
9	RI	IN	

COM 2 (RS-232)

Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	RX	IN	
3	TX	OUT	±5V
4	DTR	OUT	±5V
5	GND	GND	
6	DSR	IN	
7	RTS	OUT	±5V
8	CTS	IN	
9	RI/ +5V/ +12V	IN/ PWR	+5V/ +12V

COM 2 (RS-422)

Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±5V
2	RS422_TX+	OUT	
3	RS422_RX+	IN	±5V

4	RS422_RX-	IN	
5	GND	GND	
6	NC		
7	NC		
8	NC		
9	NC/ +5V/ +12V	PWR	+5V/ +12V

COM 2 (RS-485)

Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	OUT	±5V
2	RS485_D+	OUT	±5V
3	NC		
4	NC		
5	GND	GND	
6	NC		
7	NC		
8	NC		
9	NC/ +5V/ +12V	PWR	+5V/ +12V

2.13 VGA Port (VGA)
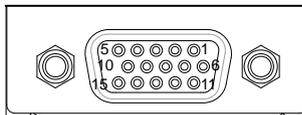
VGA

Pin	Pin Name	Signal Type	Signal Level
1	RED	OUT	
2	GREEN	OUT	
3	BLUE	OUT	
4	NC		
5	GND	GND	
6	RED_GND_RTN	GND	
7	GREEN_GND_RTN	GND	
8	BLUE_GND_RTN	GND	
9	+5V	PWR	+5V
10	GND	GND	
11	NC		
12	DDC_DATA	I/O	+5V
13	HSYNC	OUT	
14	VSYNC	OUT	
15	DDC_CLK	I/O	+5V

2.14 SIM Socket 1, 2, 3(SIM)
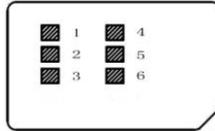
Pin	Pin Name	Signal Type	Signal Level
1	UIM_PWR	PWR	
2	UIM_RST	IN	
3	UIM_CLK	IN	
4	GND	GND	
5	UIM_VPP	PWR	
6	UIM_DATA	I/O	

2.15 Onboard MiniCard Slot (Full Function) (MiniCard1)

Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	
2	+3.3VSB	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	+1.5V	PWR	+1.5V

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7	PCIE_CLK_REQ#	IN	
8	UIM_PWR	PWR	
9	GND	GND	
10	UIM_DATA	I/O	
11	PCIE_REF_CLK-	DIFF	
12	UIM_CLK	IN	
13	PCIE_REF_CLK+	DIFF	
14	UIM_RST	IN	
15	GND	GND	
16	UIM_VPP	PWR	
17	NC		
18	GND	GND	
19	NC		
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RX-	DIFF	
24	+3.3VSB	PWR	+3.3V
25	PCIE_RX+	DIFF	
26	GND	GND	

Embedded Box PC		BOXER-6301VS	
27	GND	GND	
28	+1.5V	PWR	+1.5V
29	GND	GND	
30	SMB_CLK	I/O	+3.3V
31	PCIE_TX-	DIFF	
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+	DIFF	
34	GND	GND	
35	GND	GND	
36	USB_D-	DIFF	
37	GND	GND	
38	USB_D+	DIFF	
39	+3.3VSB	PWR	+3.3V
40	GND	GND	
41	+3.3VSB	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		
45	NC		
46	NC		

47	NC		
48	+1.5V	PWR	+1.5V
49	NC		
50	GND	GND	
51	NC		
52	+3.3VSB	PWR	+3.3V

2.16 Internal MiniCard Slot (USB Signal) (MiniCard2, 3)

Pin	Pin Name
1	NA
2	3.3V
3	MICN
4	GNDC
5	EARP
6	1.5V3
7	EARN
8	UIM_PWR (3.3V)
9	GND6
10	SCIO DAT
11	NA
12	SCCLK
13	NA
14	SCRST

15	GND5
16	VPP
17	NA
18	NA
19	NA
20	W_DISABLE#
21	GND4
22	NA
23	NA
24	3.3VAUX
25	NA
26	GNDA
27	GND3
28	NA
29	GND2
30	SMB CLK
31	NA
32	SMB DATA
33	NA
34	GND9
35	GND1
36	USB D-
37	GND0
38	USB D+

39	3.3V0
40	GND8
41	3.3V1
42	WWAN
43	GND
44	WLAN
45	NA
46	WPAN
47	NA
48	1.5V1
49	NA
50	GND7
51	NA
52	3.3V1
53	NA
54	NA

2.17 CFast Slot (CFast)

Pin	Pin Name	Signal Type	Signal Level
S1	GND	GND	
S2	SATA_TX+	DIFF	
S3	SATA_TX-	DIFF	
S4	GND	GND	

S5	SATA_RX-	DIFF	
S6	SATA_RX+	DIFF	
S7	GND	GND	
PC1	NC		
PC2	GND	GND	
PC3	NC		
PC4	NC		
PC5	NC		
PC6	NC		
PC7	GND	GND	
PC8	NC		
PC9	NC		
PC10	NC		
PC11	NC		
PC12	NC		
PC13	+3.3V	PWR	+3.3V
PC14	+3.3V	PWR	+3.3V
PC15	GND	GND	
PC16	GND	GND	
PC17	NC		

2.18 DDR3L SODIMM Slot (SODIMM)

Standard Specifications

2.19 PoE 1~4 Port (MID-SPAN) (CN4)
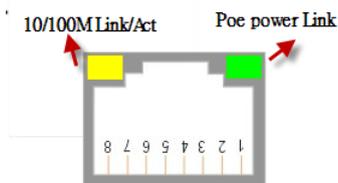
Pin	Signal	Pin	Signal
1	Tx+	2	TX-
3	Rx+	4	48V+
5	48V+	6	Rx-
7	48V-	8	48V-

LED	Definition
Green	POE power link
Yellow	10/100M Link/Act

2.20 PoE Power on/off (POE Power Switch)

Position	Definition
1	POE power on
2	POE power off

2.21 DC-Inlet (DC in)
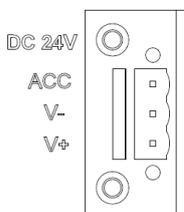
Pin	Label	Definition
1	V+	V+ for DC power
2	V-	V- for DC power
3	ACC	Accessories (Ignition)

*ACC is one of the selectable positions on a car keyhole (illustrated below). A

short form for "accessories", turning the key to this position enables all

electronic devices, such as radio and air-conditioner, to be powered by the

vehicle's battery (DC current).
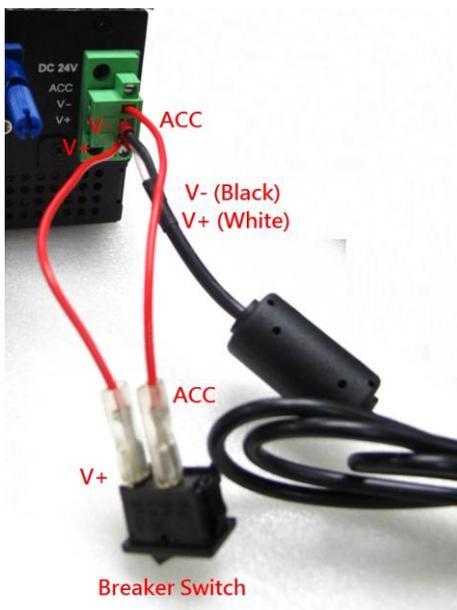
Since voltage requirement for ACC is usually the same as voltage of the battery, users may connect V+ with ACC to power up the BOXER-6301VS, or disconnect it to power off.

Because ACC signal control it is acting on PSON signal and thus can generate a smooth/clean shutdown of OS (Windows/Linux), the system supports only ATX mode.

The "Delay on/off" functions can be configured for setting up the bootup/ shutdown timer. User may refer to section 2.28 for details.

2.22 Hardware Installation

This section will explain how hardware such as RAMs and HDDs should be installed. Please follow the steps below carefully to avoid damages by improper installations.

2.23 Removing the Baseplate

You can remove the baseplate by removing the screws as shown in the diagram below.
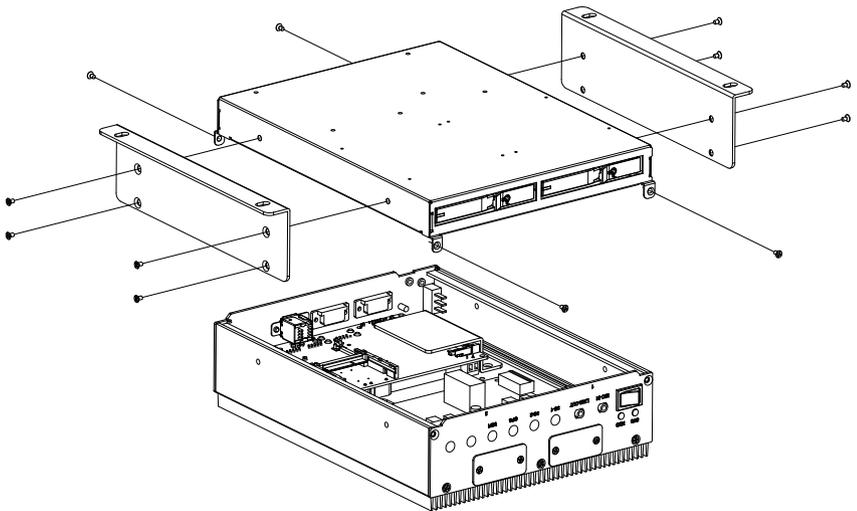
2.24 Installing the GPS/Wifi/3G/4G Module

1. Remove the plastic film covering the thermal pads
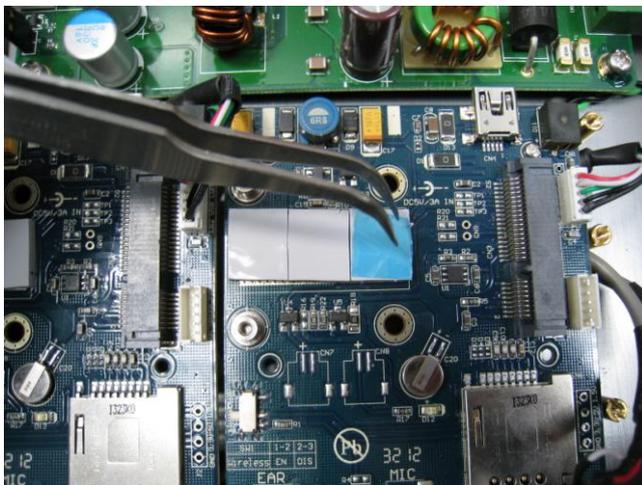
2. Slot the module in diagonally
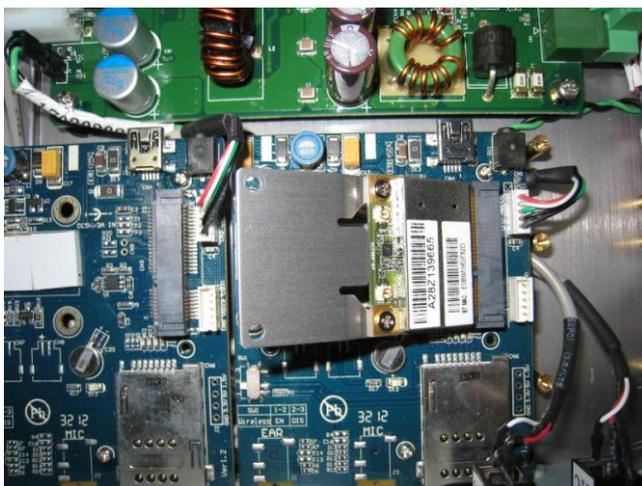
3.   Tighten the screws
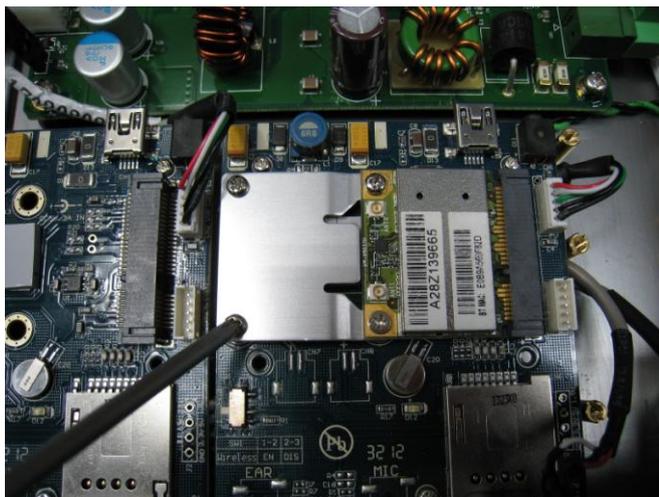
4.   Connect the antenna cable

2.25 Inserting SIM Cards

1. Remove the cover of the SIM socket at the front of the system
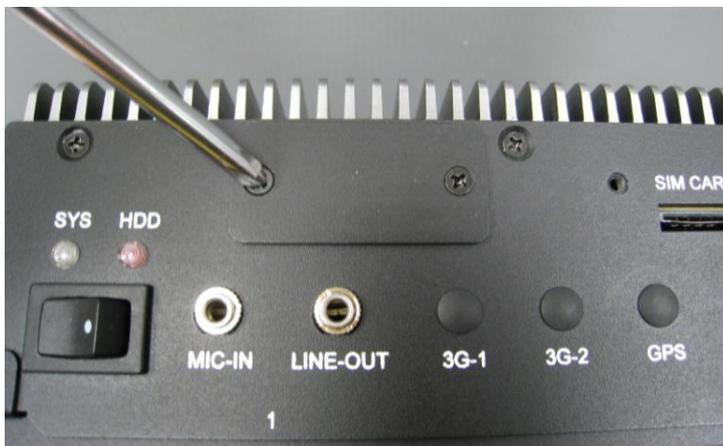
2. Insert the SIM card
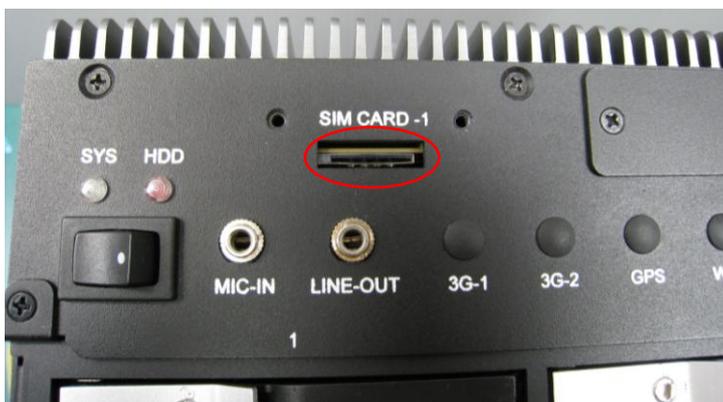
2.26 Installing 2.5" Storage Devices

1. Open the drive bay door using the drive bay key provided

2. Slot in the storage device (For removal, the storage device will be mechanically pushed out when the bay door opens)

3. Close and lock the drive bay door.

2.27 Installing RAM

1.   Remove the RAM cover.
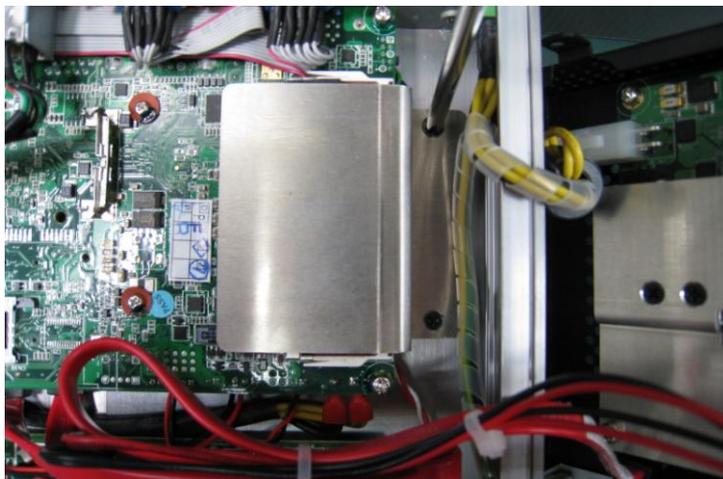
2.   Remove the thermal pad.
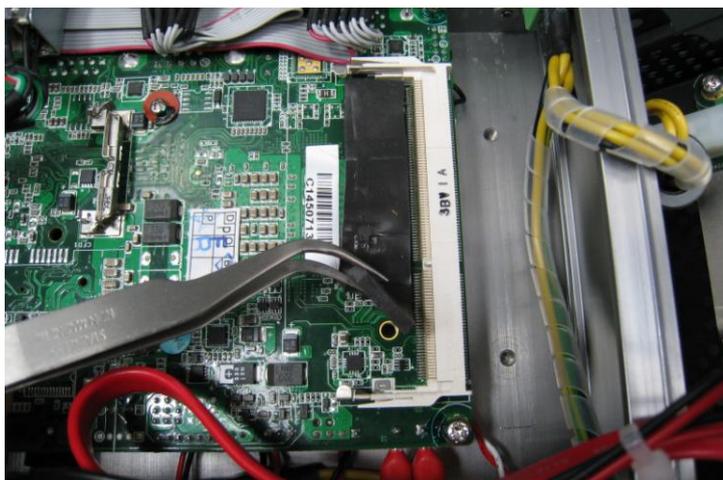
3.   Slot in the RAM diagonally, push down to secure.
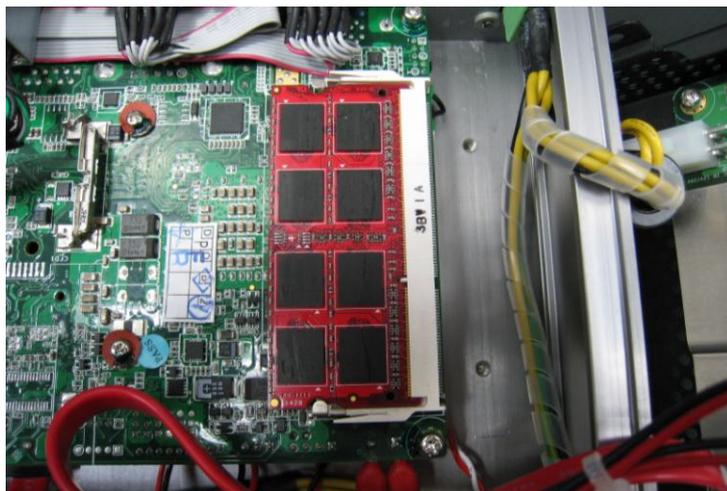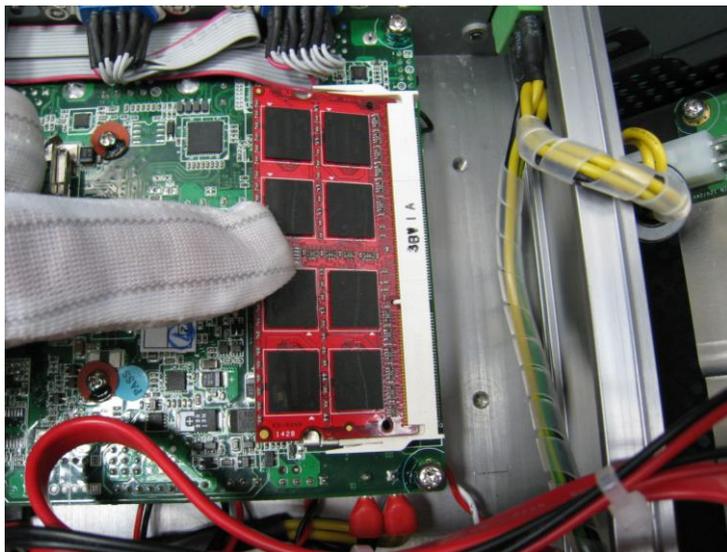
4. Place the thermal pad on the RAM.
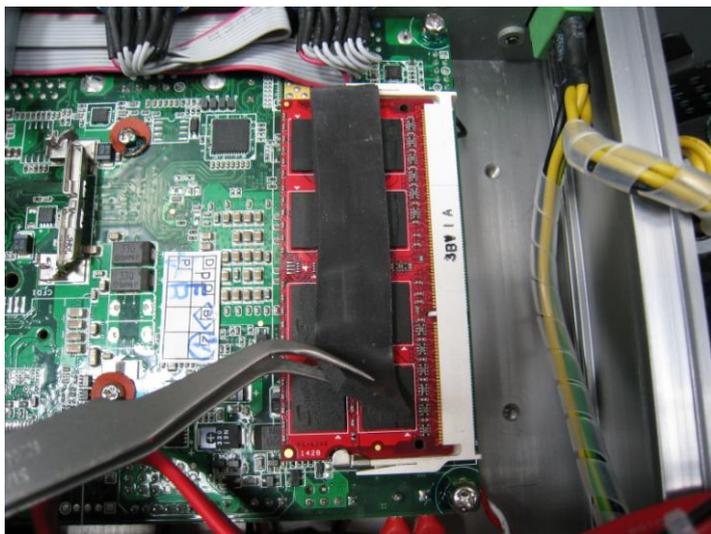
5. Place and secure the RAM cover.
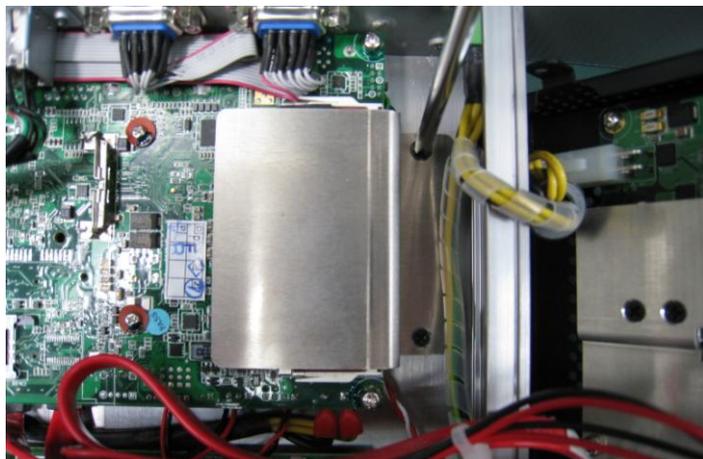
2.28 Power Management

The BOXER-6301VS has special power supply unit (PSU) that provides the following power management functions for vehicle applications.

- Surge voltage protection
- Low voltage protection
- Reverse protection
- Load dump protection
- Programmable ACC power on/off delay
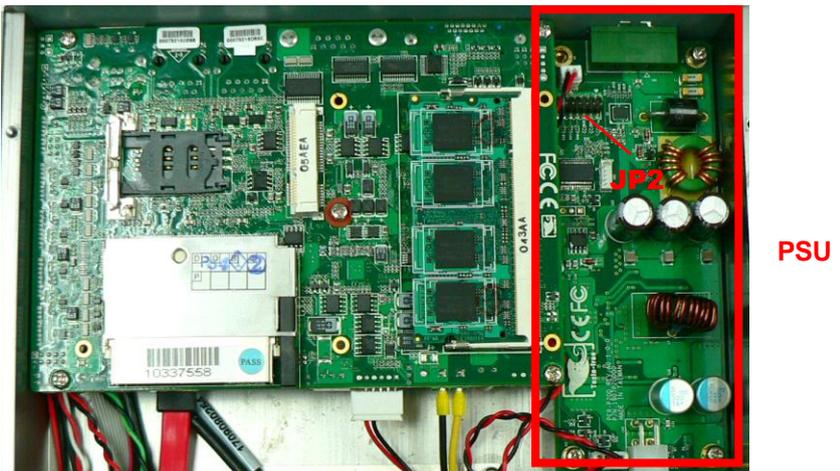
The PSU & JP2 of BOXER-6301VS

Power connector pins   JP2 (Zoomed)
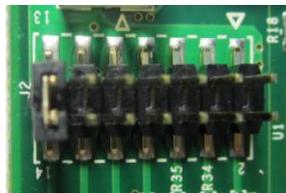
Setting DC input mode

DC Input Mode Options

Location	PIN13 and pin14	Mode	Operating Voltage	Start Voltage (Refer to note below)
JP2	OPEN	12V	9V~18V	11V ±0.2V
	SHORT	24V	18V~36V	22V ±0.4V

Note:

In most situations, the car battery voltage will remain at 13.5V~15V (@ 12V Mode), or at 27V~30V (@ 24V Mode) while the engine is running. Thus it can provide enough energy to prevent a cold crank when it is higher than 11V (@ 12V Mode) or 22V (@ 24V Mode).

The cold crank will cause the car battery voltage to drop to 6V (@ 12V mode) or lower, making it difficult to maintain a stable +12V power output to the BOXER-6301VS and causing it to cold boot.

For the Initial Start Voltage, the PSU will receive over 11V (@12V mode) or 22V (@ 24V mode) of input voltage. And will operate at 9V~18V (@12V mode) or 18V~36V (@24V mode) after ACC ON.

For +12V DC input, no jumper is needed on the power pin header. It is recommended that +24 DC input be used when using POE devices

For +24V DC input, a jumper is needed

Setting ACC ON/OFF Delay

ACC ON/OFF Delay

The function "ACC ON Delay" allows the PSU to wait for 1~30 seconds (depends on the timing you set) before turning on the BOXER-6301VS. This function is set to avoid the car's voltage failure by energizing the starter-motor circuits of the internal combustion engine (cold crank).
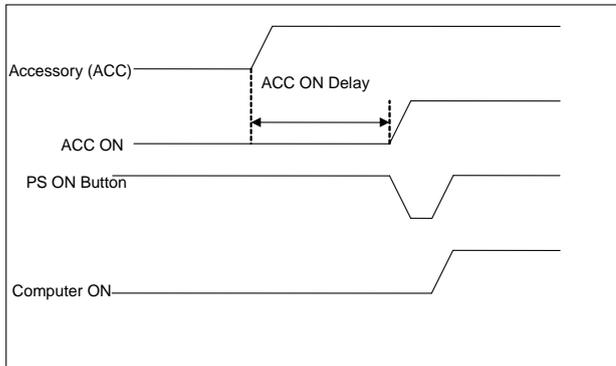
BOXER-6301VS activating after ACC ON Delay

Likewise, "ACC OFF Delay" will turn off the BOXER-6301VS after 0~120 minutes (depends on the timing you set). You can also switch it off manually during the delay since power is still on during this time.
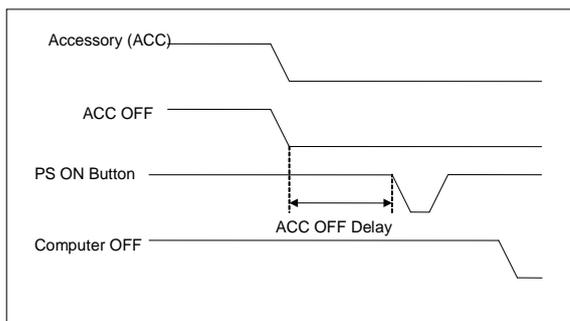
BOXER-6301VS deactivating after ACC OFF Delay

BOXER-6301VS's inner PSU provides 8 different ACC ON Delay settings (1, 3, 5, 10, 15 20, 25, 30 seconds) and 8 different ACC OFF Delay settings (1, 3, 5, 10, 30, 60, 120, 0 minutes). If you set the ACC ON Delay for 1 sec, the BOXER-6301VS will be activated after 1 second. If you set ACC OFF Delay for 0 min, the BOXER-6301VS will be power off immediately.

The following are the JP2 settings for ACC Power ON/OFF

Location	Pin Number	Function	Specification
JP2	PIN 1-6	ACC ON Delay	1sec~30sec
	PIN 7-12	ACC OFF Delay	0min~120min

ACC ON Delay
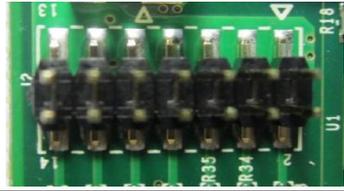
Jumper Location	Pin Condition	Set Time
	1, 2, 3, 4, 5, 6 Opened	1 sec
	1, 2 Shorted	3 sec
	3, 4 Shorted	5 sec
	1, 2, 3, 4 Shorted	10 sec
	5, 6 Shorted	15 sec
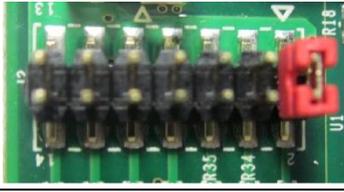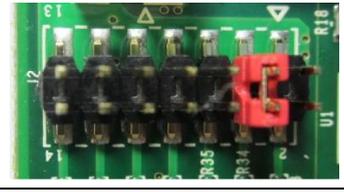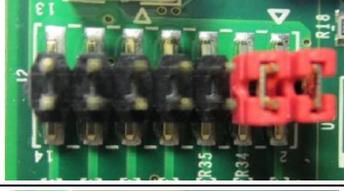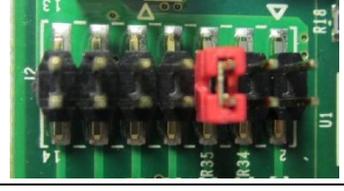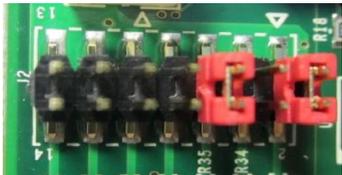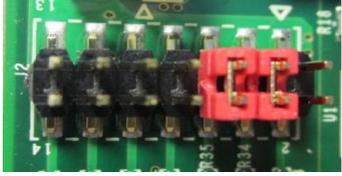
	1, 2, 5, 6 Shorted	20 sec
	3, 4, 5, 6 Shorted	25 sec
	1, 2, 3, 4, 5, 6 Shorted	30 sec
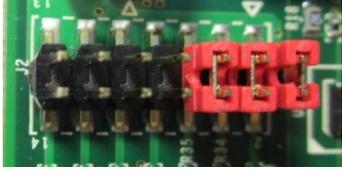
ACC Off Delay
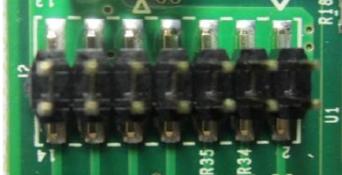
Jumper Location	Pin Condition	Set Time
	7, 8, 9, 10, 11, 12 Opened	1 min
	7, 8 Shorted	3 min
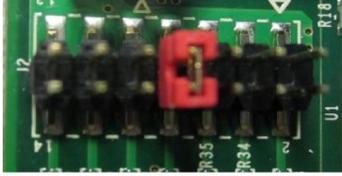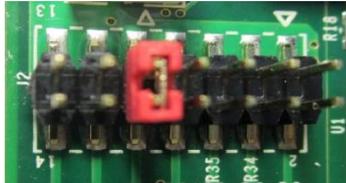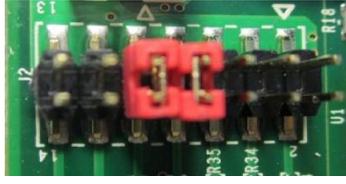
	9, 10 Shorted	5 min
	7, 8, 9, 10 Shorted	10 min
	11, 12 Shorted	30 min
	7, 8, 11, 12 Shorted	60 min
	9, 10, 11, 12 Shorted	120 min
	7, 8, 9, 10, 11, 12 Shorted	0 min
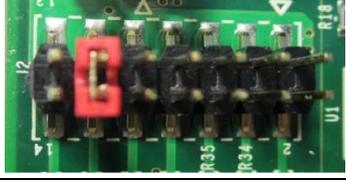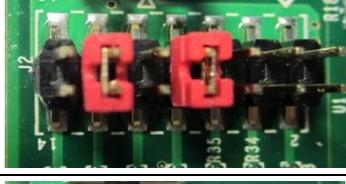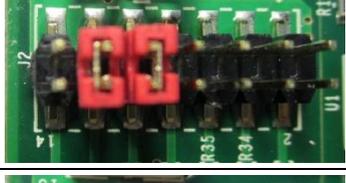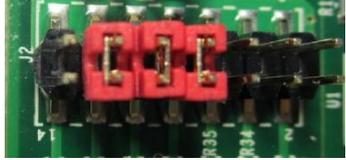
Low-voltage Protection

If the input voltage is lower than the defined low-voltage range (20.6V~21.4V @ 24V mode) after 60 seconds, the inner PSU will turn off the BOXER-6301VS automatically. Conversely, the ACC ignition will restart it if the input voltage is over 12/24 V.

Low-voltage Protection for 24V

Input Mode	Low-voltage Condition
24V	21V ±0.4V
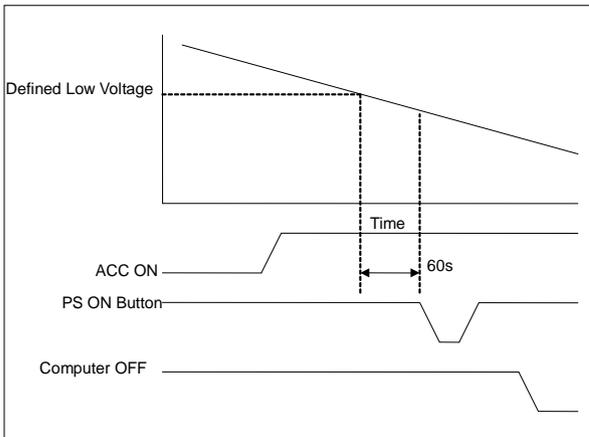
Low-voltage Protection

Critically Low-voltage Protection

If the input voltage is lower than the defined critically low-voltage range (17.6V~18.4V @ 24V mode), the BOXER-6301VS will be shut down immediately. Conversely, the ACC ignition will restart it if the input voltage is over 12/24 V.

Critically Low-voltage Protection 24V input

Input	Critically Low-voltage Condition
24V Mode	18V ±0.4V
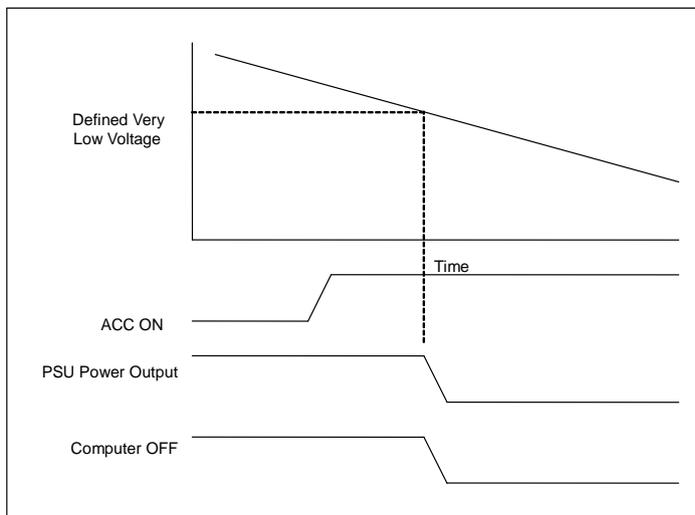
Critically Low-voltage Protection

Chapter

3

AMI 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.

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 BOXER-6301VS 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　AMI BIOS Setup

AMI 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> or <F2> immediately. This will allow you to enter Setup.

Main

Set the date, use tab to switch between date elements.

Advanced

Advanced BIOS Features Setup including TPM, ACPI, etc.

Chipset

Host bridge parameters.

Boot

Enables/disable quiet boot option.

Security

Set setup administrator password.

Save&Exit

Exit system setup after saving the changes.

<u>Setup Menu</u>

Setup submenu: Main

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
 Main  Advanced  Chipset  Boot  Security  Save & Exit

 BIOS Information                                            Set the Date. Use Tab to
    BOXER-6301VS Rx.y(B301AMxy) (MM/DD/YYYY)                 switch between Date elements.

 BIOS Vendor                      American Megatrends
 Core Version                     4.6.5.4
 Compliancy                       UEFI 2.3.1; PI 1.2

 System Date                      [Day MM/DD/YYYY]
 System Time                      [hh:mm:ss]

 Access Level                     Administrator

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit

          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

Options summary: (***default setting***)

System Date	Day MM:DD:YYYY	
Change the month, year and century. The 'Day' is changed automatically.		
System Time	HH : MM : SS	
Change the clock of the system.		

Setup submenu: Advanced

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
         Main  Advanced  Chipset  Boot  Security  Save & Exit

    ▶ ACPI Settings                                    System ACPI Parameters.
    ▶ CPU Configuration
    ▶ SATA Configuration
    ▶ AMT Configuration
    ▶ USB Configuration
    ▶ Super IO Configuration
    ▶ H/W Monitor




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/−: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

Options summary: (*default setting*)

ACPI Settings		
System ACPI Parameters		
CPU Configuration		
CPU Configuration Parameters		
SATA Configuration		
SATA Device Options Settings		
AMT Configuration		

AMT Configuration Parameters		
USB Configuration		
USB Configuration Parameters		
Super IO Configuration		
Super IO Configuration Parameters		
H/W Monitor		
Monitor hardware status		

ACPI Settings

Options summary: (**default setting**)

ACPI Sleep State	Suspend Disabled	
	S3 only(Suspend to RAM)	
Select the ACPI state used for System Suspend		

CPU Configuration

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
  Advanced

  CPU Signature                306c3                    ▲ Enables or Disables Intel(R)
  Microcode Patch              8                          TXT(LT) support.
  Max CPU Speed                1600 MHz
  Min CPU Speed                800 MHz
  CPU Speed                    2600 MHz
  Processor Cores              2
  Intel HT Technology          Supported
  Intel VT-x Technology        Supported
  Intel SMX Technology         Supported
  64-bit                       Supported
  EIST Technology              Supported
  CPU C3 state                 Supported
  CPU C6 state                 Supported
  CPU C7 state                 Supported                →←: Select Screen
                                                        ↑↓: Select Item
  L1 Data Cache                32 kB x 2                Enter: Select
  L1 Code Cache                32 kB x 2                +/-: Change Opt.
  L2 Cache                     256 kB x 2              F1: General Help
  L3 Cache                     3072 kB                  F2: Previous Values
                                                        F3: Optimized Defaults
  Hyper-threading              [Enabled]                F4: Save & Exit
  Active Processor Cores       [All]                    ESC: Exit
  Intel Virtualization Technology [Enabled]
  EIST                         [Enabled]
  Intel TXT(LT) Support        [Disabled]              ▼

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```

Options summary: (**default setting**)

Hyper-Threading	Disabled	
	Enabled	
En/Disable CPU Hyper-Threading function		
Active Processor Cores	**ALL**	

	1 to Max CPU cores	
Number of CPU cores to be active.		
Intel Virtualization Technology	Disabled	
	Enabled	
En/Disable Intel VT-x function		
EIST	Disabled	
	Enabled	
En/Disable Intel SpeedStep		
Intel TXT(LT) Support	*Disabled*	
	Enabled	
En/Disable Intel TXT(LT)		

SATA Configuration

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Advanced

 SATA Controller(s)              [Enabled]            Enable or disable SATA Device.
 SATA Mode Selection             [AHCI]

 Serial ATA Port 0               Empty
   Software Preserve             Unknown
   Port 0                        [Enabled]
   Hot Plug                      [Enabled]
 Serial ATA Port 1               Empty
   Software Preserve             Unknown
   Port 1                        [Enabled]
   Hot Plug                      [Enabled]
 Serial ATA Port 2(CFast)        Empty
   Software Preserve             Unknown
   Port 2                        [Enabled]            ➜←: Select Screen
   Hot Plug                      [Enabled]            ↑↓: Select Item
 mSATA Port                      Empty                Enter: Select
   Software Preserve             Unknown              +/-: Change Opt.
   Port                          [Enabled]            F1: General Help
   Hot Plug                      [Enabled]            F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit



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```

Options summary: (*default setting*)

SATA Controller(s)	Disabled	
	Enabled	
En/Disable SATA controller		
SATA Mode Selection	IDE	
	AHCI	
	RAID	
Configure SATA controller operating as IDE/AHCI/RAID mode.		
Port X	Disabled	

	Enabled	
En/Disable the selected port.		
Hot Plug	**Disabled**	
	Enabled	
En/Disable Hot Plug feature for specified port.		

AMT Configuration

```
           Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
        Advanced

 Intel AMT                        [Enabled]          Enable/Disable Intel (R)
 Un-Configure ME                  [Disabled]         Active Management Technology
                                                     BIOS Extension.
                                                     Note : iAMT H/W is always
                                                     enabled.
                                                     This option just controls the
                                                     BIOS extension execution.
                                                     If enabled, this requires
                                                     additional firmware in the SPI
                                                     device


                                                     ──────────────────────────
                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

Options summary: (**default setting**)

Intel AMT	**Enabled**	
	Disabled	

En/Disable Intel® Active Management Technology BIOS Extension.

Note: iAMT H/W is always enabled. This option just controls the BIOS

extension execution. If enabled, this requires additional firmware in the SPI

device

Un-Configure ME	Enabled	
	Disabled	

OEMFlag Bit 15: Un-Configure ME without password

USB Configuration

Options summary: (*default setting*)

Legacy USB Support	**Enabled**	

	Disabled	
	Auto	

Enables BIOS Support for Legacy USB Support. When enabled, USB can be functional in legacy environment like DOS. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI application

USB3.0 Support	*Enabled*	
	Disabled	

Enables BIOS Support for USB3.0 (XHCI). When disabled, PCH USB3.0 controller will also be disabled.

Device Name	**Auto**	
(Emulation Type)	Floppy	
	Forced FDD	
	Hard Disk	
	CD-ROM	

If Auto. USB devices less than 530MB will be emulated as Floppy and remaining as Floppy and remaining as hard drive. Forced FDD option can be used to force a HDD formatted drive to boot as FDD(Ex. ZIP drive)

Super I/O Configuration

```
             Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
        Advanced

  Super IO Configuration                                  Set Parameters of Serial Port
                                                          1 (COMA)
  F81866 Super IO Chip             F81866
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration



                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

Options summary: (*default setting*)

Serial Port 1/2/3 Configuration		
Set Parameters of Serial Port 1/2/3		

Serial Port X Configuration

```
             Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
      Advanced

  Serial Port x Configuration                                   Enable or Disable Serial Port
                                                                (COM)
  Serial Port                         [Enabled]
  Device Settings                     IO=xxxh; IRQ=x;

  Change Settings                     [Auto]
    Port Mode                         [RS232]



                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit



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```

Options summary: (*default setting*)

Serial Port	Disabled	
	Enabled	
En/Disable specified serial port.		
Change Settings	*Auto*	
(COM1)	IO=3F8h; IRQ=4;	
	IO=3F8h; IRQ=3,4,5,7,10,11,12;	
	IO=2F8h; IRQ=3,4,5,7,10,11,12;	

	IO=3E8h; IRQ=3,4,5,7,10,11,12;	
	IO=2E8h; IRQ=3,4,5,7,10,11,12;	
Change Settings (COM2)	*Auto*	
	IO=2F8h; IRQ=3;	
	IO=3F8h; IRQ=3,4,5,7,10,11,12;	
	IO=2F8h; IRQ=3,4,5,7,10,11,12;	
	IO=3E8h; IRQ=3,4,5,7,10,11,12;	
	IO=2E8h; IRQ=3,4,5,7,10,11,12;	
Change Settings (COM3)	*Auto*	
	IO=3E8h; IRQ=7;	
	IO=3E8h; IRQ=3,4,5,7,10,11,12;	
	IO=2E8h; IRQ=3,4,5,7,10,11,12;	
	IO=2D0h; IRQ=3,4,5,7,10,11,12;	
	IO=2C0h; IRQ=3,4,5,7,10,11,12;	

Select a resource setting for Super IO device.		
Device Type	*RS232*	
	RS422	
	RS485	
Configure COM2 operated as RS232, RS422 or RS485.		

H/W Monitor

```
              Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
        Advanced

     Pc Health Status

     System temperature              : +44 %
     System temperature              : +30 %
     CPU temperature                 : +68 %
     CPU Fan Speed                   : N/A
     Vcore                           : +1.744 V
     V12V                            : +11.399 V
     V5V                             : +5.059 V
     Vdimm                           : +1.351 V
     VBAT                            : +3.219 V


                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/–: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

Setup submenu: Chipset

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

 ▶ PCH-IO Configuration                              PCH Parameters
 ▶ System Agent (SA) Configuration




                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit



          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

Options summary: (*default setting*)

PCH-IO Configuration		
South Bridge Parameters		
System Agent (SA) Configuration		
SA Parameters		

PCN-IO Configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
 Chipset

 Intel PCH RC Version           1.4.0.0              Enable or disable 'It is now
 Intel PCH SKU Name             QM87                 safe to turn off your
 Intel PCH Rev ID               05/C2                computer.' string

 Power Mode                     [ATX Type]



                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

Options summary: (*default setting*)

Power Mode	*ATX Type*	
	AT Type	
Enable or disable 'It is now safe to turn off your computer.' string		

System Agent (SA) Configuration

```
            Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                 Chipset

  System Agent Bridge Name        Haswell              Config Graphics Settings.
  System Agent RC Version         1.4.0.0
  VT-d Capability                 Unsupported

▶ Graphics Configuration




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

Options summary: (*default setting*)

Graphics Configuration		
Config Graphics Settings		

Graphics Configuration

```
               Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
                Chipset

   Graphics Configuration                                        Select DVMT 5.0 Pre-Allocated
   IGFX VBIOS Version              2170                          (Fixed) Graphics Memory size
   IGfx Frequency                 800 MHz                        used by the Internal Graphics
                                                                 Device.
   DVMT Pre-Allocated             [32M]
   DVMT Total Gfx Mem             [MAX]




                                                                 →←: Select Screen
                                                                 ↑↓: Select Item
                                                                 Enter: Select
                                                                 +/-: Change Opt.
                                                                 F1: General Help
                                                                 F2: Previous Values
                                                                 F3: Optimized Defaults
                                                                 F4: Save & Exit
                                                                 ESC: Exit



               Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

Options summary: (*default setting*)

DVMT Pre-Allocated	*32MB*	
	64MB~1024MB	
Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.		
DVMT Total Gfx Mem	128MB	
	256MB	
	Max	
Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device.		

Setup submenu: Boot

```
          Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

   Boot Configuration                                    Enables or disables Quiet Boot
   Quiet Boot                      [Enabled]             option


   Boot Option Priorities
   Boot Option #1                  [Device Modelname]
   Boot Option #2                  [Device Modelname]
   Boot Option #3                  [Device Modelname]
   Boot Option #4                  [Device Modelname]
   Boot Option #5                  [Device Modelname]

   CD/DVD ROM Drive BBS Priorities
   Hard Drive BBS Priorities                             →←: Select Screen
   Floppy Drive BBS Priorities                           ↑↓: Select Item
                                                         Enter: Select
                                                         +/–: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```

Options summary: (*default setting*)

Quiet Boot	Disabled	
	Enabled	
En/Disable showing boot logo.		
Launch PXE OpROM policy	*Disabled*	
	Enabled	
En/Disable PXE boot for LAN		
Boot Option #X/ XXXX Drive BBS Priorities		

The order of boot priorities.

BBS Priorities

```
            Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                          Boot

    Boot Option #1              [Device Modelname]      Sets the system boot order
    Boot Option #2              [Device Modelname]
    Boot Option #3              [Device Modelname]
    Boot Option #4              [Device Modelname]
    Boot Option #5              [Device Modelname]
    Boot Option #6              [Device Modelname]




                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



            Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Options summary: (*default setting*)

Boot Option #x	Disabled	
	Device name	
Sets the system boot order		

Setup submenu: Security

```
                 Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
          Main  Advanced  Chipset  Boot  Security  Save & Exit

   Password Description                               Set Administrator Password

   If ONLY the Administrator's password is set,
   then this only limits access to Setup and is
   only asked for when entering Setup.
   If ONLY the User's password is set, then this
   is a power on password and must be entered to
   boot or enter Setup. In Setup the User will
   have Administrator rights.
   The password length must be
   in the following range:
   Minimum length                   3
   Maximum length                  20                 ↔: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
   Administrator Password                             +/-: Change Opt.
   User Password                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
 ▶ Secure Boot menu                                   F4: Save & Exit
                                                      ESC: Exit




                 Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

Options summary: (***default setting***)

Administrator	***Not set***	
Password/		
User Password		

You can install a Supervisor password, and if you install a supervisor password, you can then install a user password. A user password does not provide access to many of the features in the Setup utility.

Install the Password:

Press Enter on this item, a dialog box appears which lets you enter a password. You can enter no more than six letters or numbers. Press Enter after you have typed in the password. A second dialog box asks you to retype the password for confirmation. Press Enter after you have retyped it correctly. The password is required at boot time, or when the user enters the Setup utility.

Removing the Password:

Highlight this item and type in the current password.   At the next dialog box press Enter to disable password protection.

Setup submenu: Exit

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
         Main  Advanced  Chipset  Boot  Security  Save & Exit

    Save Changes and Exit                              Exit system setup after saving
    Discard Changes and Exit                           the changes.
    Save Changes and Reset
    Discard Changes and Reset

    Save Options
    Save Changes
    Discard Changes

    Restore Defaults
    Save as User Defaults
    Restore User Defaults
                                                       →←: Select Screen
    Boot Override                                      ↑↓: Select Item
    Boot Device Modelname                              Enter: Select
    Boot Device Modelname                              +/-: Change Opt.
                                                       F1: General Help
    Launch EFI Shell from filesystem device           F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



              Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

 Options summary: (*default setting*)

Save Changes and Exit		
Exit system setup after saving the changes		
Discard Changes and Exit		
Exit system setup without saving any changes		
Save Changes and Reset		
Reset the system after saving the changes		
Discard Changes and Reset		
Save Changes		

Save Changes done so far to any of the setup options.		
Discard Changes		
Discard Changes done so far to any of the setup options		
Reset system setup without saving any changes		
Restore Defaults		
Restore/Load Default values for all the setup options.		
Save as User Defaults		
Save the changes done so far as User Defaults		
Restore User Defaults		
Restore the User Defaults to all the setup options		

Chapter

4

Driver Installation

.

The BOXER-6301VS comes with a driver disk that contains all drivers and utilities that can help you setup your product.

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 Audio Driver

    Step 5 – Install ME Driver

    Step 6 – Install PoE Driver

    Step 7 –Install USB3.0 Driver

    Step 8 – Install IRST Driver

    Step 9 – Install Serial Port Driver (Optional)

Please read instructions below for further detailed installations.

4.1   Installation

Insert the BOXER-6301VS driver disk into the disk drive. And install
the drivers from Step 1 to Step 9 in order.

Step 1 – Install Chipset Driver

    1.   Open the *Step 1 - Chipset* folder and select your OS

    2.   Open the *.exe* file in the folder

    3.   Follow the instructions

    4.   Drivers will be installed automatically

Step 2 – Install VGA Driver

    1.   Open the *Step 2 - VGA* folder and select your OS

    2.   Open the *Setup.exe* file in the folder

    3.   Follow the instructions

    4.   Drivers will be installed automatically

Step 3 –Install LAN Driver

    1.   Open the *Step 3 - LAN* folder and select your OS

    2.   Open the *.exe* file in the folder

    3.   Follow the instructions

    4.   Drivers will be installed automatically

Step 4 –Install AUDIO Driver

1. Open the *Step 4 - AUDIO* folder and select your OS

2. Open the *.exe* file in the folder

3. Follow the instructions

4. Drivers will be installed automatically

Step 5 – Install ME Driver

1. Open the *Step 5 – ME SW* folder

2. Open *setup.exe*

3. Follow the instructions

4. Drivers will be installed automatically

Step 6 – Install PoE Driver

1. Open the *Step 6 – PoE(PER-T263)* folder and select your OS

2. Open the *setup.exe* file in the folder

3. Follow the instructions

4. Drivers will be installed automatically

Step 7 –Install USB3.0 Driver

1. Open the *Step 7 – USB3.0* folder and select your OS

2. Open the *setup.exe* file in the folder

3. Follow the instructions

4. Drivers will be installed automatically

Step 8 – Install IRST Driver

1. Open the *STEP8 - IRST* folder

2. Open *SetupRST.exe*

3. Follow the instructions

4. Drivers will be installed automatically

Step 9 – Install Serial Port Driver (Optional)

Please follow the instructions in the *Step9 - Serial Port Driver (Optional)* folder

Appendix

A

Programming the Watchdog Timer

A.1 Programming

BOXER-6301VS utilizes FINTEK 81866 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 FINTEK 81866 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.
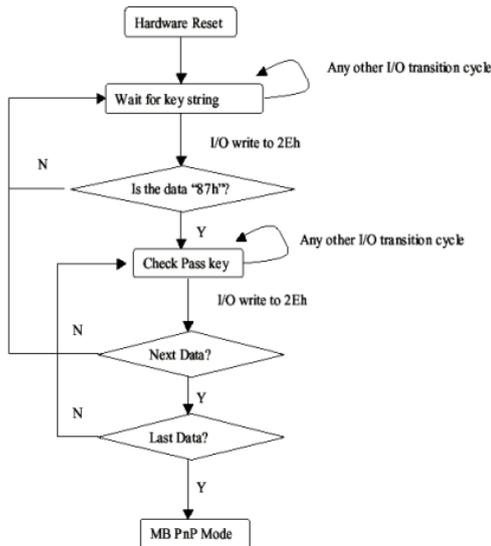
There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

(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.

```
-o 4e 87
-o 4e 87                 ( enable configuration )
```

(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

Write exit key 0xAA to the index port.

```
-o 4e aa               ( disable configuration )
```

Watch Dog Timer 1, 2, 3 Control Register (Index=F5h,F6h,FAh Default=00h)

7.8.4 Watchdog Control Configuration Register 1 — Index F5h

Bit	Name	R/W	Reset	Default	Description
7	Reserved	R	-	0	Reserved
6	WDTMOUT_STS	R/W	5VSB	0	If watchdog timeout event occurred, this bit will be set to 1. Write a 1 to this bit will clear it to 0.
5	WD_EN	R/W	5VSB	0	If this bit is set to 1, the counting of watchdog time is enabled.
4	WD_PULSE	R/W	5VSB	0	Select output mode (0: level, 1: pulse) of RSTOUT# by setting this bit.
3	WD_UNIT	R/W	5VSB	0	Select time unit (0: 1sec, 1: 60 sec) of watchdog timer by setting this bit.
2	WD_HACTIVE	R/W	5VSB	0	Select output polarity of RSTOUT# (1: high active, 0: low active) by setting this bit.
1-0	WD_PSWIDTH	R/W	5VSB	0	Select output pulse width of RSTOUT# 0: 1 ms 1: 25 ms 2: 125 ms 3: 5 sec

7.8.5 Watchdog Timer Configuration Register 2 — Index F6h

Bit	Name	R/W	Reset	Default	Description
7-0	WD_TIME	R/W	5VSB	0	Time of watchdog timer (0~255)

7.8.6 Watchdog PME Enable Configuration Register 2 — Index FAh

Bit	Name	R/W	Reset	Default	Description
7	WDT_PME	R	5VSB	0	0: No WDT PME occurred. 1: WDT PME occurred. The WDT PME is occurred one unit before WDT timeout.
6	WDT_PME_EN	R/W	5VSB	0	0: Disable Watchdog PME. 1: enable Watchdog PME.
5	Reserved	R	-	0	Reserved
4	WDT_CLK_SEL	R/W	5VSB	1	WDT Clock Source Select 0: Internal 1KHz clock. 1: 1KHZ clock driven by CLKIN.
3-1	Reserved	R	-	0	Reserved
0	WDOUT_EN	R/W	5VSB	0	0: disable Watchdog time out output via WDTRST#. 1: enable Watchdog time out output via WDTRST#.

A.2 F81866 Watchdog Timer Initial Program

Main(){

aaeonSuperIOOpen();

aaeonWdtSetCountMode(BOOL bMinute); // Set wdt count mode

aaeonWdtSetTimeoutCount(BYTE tTimeout); // Set wdt timer

aaeonWdtSetEnable(BOOL bEnable); // Enable wdt

aaeonSuperIOClose();

}

Void aaeonSuperIOOpen(){   // Config F81866 Entry key

       aaeonioWritePortByte(F81866_INDEX, 0x87);

       aaeonioWritePortByte(F81866_INDEX, 0x87);

}

Void aaeonWdtSetCountMode(BOOL bMinute){

   BYTE WDT_CONTROL = f81866ReadByte(F81866_WDT_CONTROL_REG);

   if(bMinute)

      f81866WriteByte(F81866_WDT_CONTROL_REG, WDT_CONTROL | 0x08);

   else

      f81866WriteByte(F81866_WDT_CONTROL_REG, WDT_CONTROL & 0xF7);

}

```
Void aaeonWdtSetTimeoutCount(BYTE tTimeout){

    f81866SetLdn(0x07);

    f81866WriteByte(F81866_WDT_TIME_REG, tTimeout);

}


Void aaeonWdtSetEnable(BOOL bEnable){

    f81866SetLdn(0x07);

    if(bEnable){

        f81866WriteByte(0x30, 0x01);

        WDT_BASE_ADDR =

        (f81866ReadByte(F81866_WDT_BASEADDR_REG_MSB) << 8)

        | f81866ReadByte(F81866_WDT_BASEADDR_REG_LSB);

        WDT_STATUS = f81866ReadByte(F81866_WDT_CONTROL_REG);

        f81866WriteByte(F81866_WDT_CONTROL_REG, WDT_STATUS | 0x20);

        WDT_STATUS = f81866ReadByte(F81866_WDT_PME_REG);

        f81866WriteByte(F81866_WDT_PME_REG, WDT_STATUS | 0x01);

    }else{

        f81866WriteByte(0x30, 0x00);

        WDT_BASE_ADDR = 0;

        WDT_STATUS = f81866ReadByte(F81866_WDT_CONTROL_REG);

        f81866WriteByte(F81866_WDT_CONTROL_REG, WDT_STATUS & 0xDF);

        WDT_STATUS = f81866ReadByte(F81866_WDT_PME_REG);

        f81866WriteByte(F81866_WDT_PME_REG, WDT_STATUS & 0xFE);

    }

}
```

Void aaeonSuperIOClose(){

      aaeonioWritePortByte(F81866_INDEX, 0xaa);

}

Appendix

B

I/O Information

B.1 I/O Address Map

⊿ 📇 Input/output (IO)
- 💻 [00000000 - 0000001F] Direct memory access controller
- 💻 [00000000 - 00000CF7] PCI bus
- 💻 [00000010 - 0000001F] Motherboard resources
- 💻 [00000020 - 00000021] Programmable interrupt controller
- 💻 [00000022 - 0000003F] Motherboard resources
- 💻 [00000024 - 00000025] Programmable interrupt controller
- 💻 [00000028 - 00000029] Programmable interrupt controller
- 💻 [0000002C - 0000002D] Programmable interrupt controller
- 💻 [0000002E - 0000002F] Motherboard resources
- 💻 [00000030 - 00000031] Programmable interrupt controller
- 💻 [00000034 - 00000035] Programmable interrupt controller
- 💻 [00000038 - 00000039] Programmable interrupt controller
- 💻 [0000003C - 0000003D] Programmable interrupt controller
- 💻 [00000040 - 00000043] System timer
- 💻 [00000044 - 0000005F] Motherboard resources
- 💻 [0000004E - 0000004F] Motherboard resources
- 💻 [00000050 - 00000053] System timer
- 💻 [00000061 - 00000061] Motherboard resources
- 💻 [00000063 - 00000063] Motherboard resources
- 💻 [00000065 - 00000065] Motherboard resources
- 💻 [00000067 - 00000067] Motherboard resources
- 💻 [00000070 - 00000070] Motherboard resources
- 💻 [00000070 - 00000077] System CMOS/real time clock
- 💻 [00000072 - 0000007F] Motherboard resources
- 💻 [00000080 - 00000080] Motherboard resources
- 💻 [00000080 - 00000080] Motherboard resources
- 💻 [00000081 - 00000091] Direct memory access controller
- 💻 [00000084 - 00000086] Motherboard resources
- 💻 [00000088 - 00000088] Motherboard resources
- 💻 [0000008C - 0000008E] Motherboard resources
- 💻 [00000090 - 0000009F] Motherboard resources
- 💻 [00000092 - 00000092] Motherboard resources
- 💻 [00000093 - 0000009F] Direct memory access controller
- 💻 [000000A0 - 000000A1] Programmable interrupt controller
- 💻 [000000A2 - 000000BF] Motherboard resources
- 💻 [000000A4 - 000000A5] Programmable interrupt controller
- 💻 [000000A8 - 000000A9] Programmable interrupt controller
- 💻 [000000AC - 000000AD] Programmable interrupt controller
- 💻 [000000B0 - 000000B1] Programmable interrupt controller
- 💻 [000000B2 - 000000B3] Motherboard resources
- 💻 [000000B4 - 000000B5] Programmable interrupt controller
- 💻 [000000B8 - 000000B9] Programmable interrupt controller
- 💻 [000000BC - 000000BD] Programmable interrupt controller
- 💻 [000000C0 - 000000DF] Direct memory access controller
- 💻 [000000E0 - 000000EF] Motherboard resources
- 💻 [000000F0 - 000000F0] Numeric data processor

[000002E8 - 000002EF] Communications Port (COM4)
[000002F8 - 000002FF] Communications Port (COM2)
[000003B0 - 000003BB] Intel(R) HD Graphics 4600
[000003C0 - 000003DF] Intel(R) HD Graphics 4600
[000003E8 - 000003EF] Communications Port (COM3)
[000003F8 - 000003FF] Communications Port (COM1)
[000004D0 - 000004D1] Motherboard resources
[000004D0 - 000004D1] Programmable interrupt controller
[00000680 - 0000069F] Motherboard resources
[00000A00 - 00000A0F] Motherboard resources
[00000A10 - 00000A1F] Motherboard resources
[00000A20 - 00000A2F] Motherboard resources
[00000D00 - 0000FFFF] PCI bus
[0000164E - 0000164F] Motherboard resources
[00001800 - 000018FE] Motherboard resources
[00001854 - 00001857] Motherboard resources
[00001C00 - 00001CFE] Motherboard resources
[00001D00 - 00001DFE] Motherboard resources
[00001E00 - 00001EFE] Motherboard resources
[00001F00 - 00001FFE] Motherboard resources
[0000E000 - 0000EFFF] Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C
[0000F000 - 0000F03F] Intel(R) HD Graphics 4600
[0000F040 - 0000F05F] Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
[0000F060 - 0000F07F] Intel(R) 8 Series Chipset Family SATA AHCI Controller
[0000F0A0 - 0000F0A3] Intel(R) 8 Series Chipset Family SATA AHCI Controller
[0000F0B0 - 0000F0B7] Intel(R) 8 Series Chipset Family SATA AHCI Controller
[0000F0C0 - 0000F0C3] Intel(R) 8 Series Chipset Family SATA AHCI Controller
[0000F0D0 - 0000F0D7] Intel(R) 8 Series Chipset Family SATA AHCI Controller
[0000F0E0 - 0000F0E7] Intel(R) Active Management Technology - SOL (COM5)
[0000FFFF - 0000FFFF] Motherboard resources
[0000FFFF - 0000FFFF] Motherboard resources
[0000FFFF - 0000FFFF] Motherboard resources

B.2 Memory Address Map

```
Memory
    [000A0000 - 000BFFFF]  Intel(R) HD Graphics 4600
    [000A0000 - 000BFFFF]  PCI bus
    [000D0000 - 000D3FFF]  PCI bus
    [000D4000 - 000D7FFF]  PCI bus
    [000D8000 - 000DBFFF]  PCI bus
    [000DC000 - 000DFFFF]  PCI bus
    [000E0000 - 000E3FFF]  PCI bus
    [000E4000 - 000E7FFF]  PCI bus
    [DF200000 - FEAFFFFF]  PCI bus
    [E0000000 - EFFFFFFF]  Intel(R) HD Graphics 4600
    [F6800000 - F6FFFFFF]  Intel(R) I211 Gigabit Network Connection #2
    [F6800000 - F70FFFFF]  Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C
    [F7000000 - F7003FFF]  Intel(R) I211 Gigabit Network Connection #2
    [F7400000 - F77FFFFF]  Intel(R) HD Graphics 4600
    [F7800000 - F781FFFF]  Intel(R) Ethernet Connection I217-LM
    [F7820000 - F782FFFF]  Intel(R) USB 3.0 eXtensible Host Controller
    [F7830000 - F7833FFF]  High Definition Audio Controller
    [F7834000 - F7837FFF]  High Definition Audio Controller
    [F7839000 - F78390FF]  Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
    [F783A000 - F783A7FF]  Intel(R) 8 Series Chipset Family SATA AHCI Controller
    [F783B000 - F783B3FF]  Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
    [F783C000 - F783C3FF]  Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
    [F783D000 - F783DFFF]  Intel(R) Ethernet Connection I217-LM
    [F783E000 - F783EFFF]  Intel(R) Active Management Technology - SOL (COM5)
    [F7840000 - F784000F]  Intel(R) Management Engine Interface
    [F7FEF000 - F7FEFFFF]  Motherboard resources
    [F7FF0000 - F7FF0FFF]  Motherboard resources
    [F8000000 - FBFFFFFF]  Motherboard resources
    [FED00000 - FED003FF]  High precision event timer
    [FED10000 - FED17FFF]  Motherboard resources
    [FED18000 - FED18FFF]  Motherboard resources
    [FED19000 - FED19FFF]  Motherboard resources
    [FED1C000 - FED1FFFF]  Motherboard resources
    [FED20000 - FED3FFFF]  Motherboard resources
    [FED40000 - FED44FFF]  System board
    [FED45000 - FED8FFFF]  Motherboard resources
    [FED90000 - FED93FFF]  Motherboard resources
    [FEE00000 - FEEFFFFF]  Motherboard resources
    [FF000000 - FFFFFFFF]  Intel(R) 82802 Firmware Hub Device
    [FF000000 - FFFFFFFF]  Motherboard resources
```

B.3 IRQ Mapping Chart

```
Interrupt request (IRQ)
    (ISA) 0x00000000 (00)    System timer
    (ISA) 0x00000003 (03)    Communications Port (COM2)
    (ISA) 0x00000004 (04)    Communications Port (COM1)
    (ISA) 0x00000008 (08)    System CMOS/real time clock
    (ISA) 0x0000000A (10)    Communications Port (COM3)
    (ISA) 0x0000000B (11)    Communications Port (COM4)
    (ISA) 0x0000000D (13)    Numeric data processor
    (ISA) 0x00000051 (81)    Microsoft ACPI-Compliant System
    (ISA) 0x00000052 (82)    Microsoft ACPI-Compliant System
    (ISA) 0x00000053 (83)    Microsoft ACPI-Compliant System
    (ISA) 0x00000054 (84)    Microsoft ACPI-Compliant System
    (ISA) 0x00000055 (85)    Microsoft ACPI-Compliant System
    (ISA) 0x00000056 (86)    Microsoft ACPI-Compliant System
    (ISA) 0x00000057 (87)    Microsoft ACPI-Compliant System
    (ISA) 0x00000058 (88)    Microsoft ACPI-Compliant System
    (ISA) 0x00000059 (89)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005A (90)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005B (91)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005C (92)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005D (93)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005E (94)    Microsoft ACPI-Compliant System
    (ISA) 0x0000005F (95)    Microsoft ACPI-Compliant System
    (ISA) 0x00000060 (96)    Microsoft ACPI-Compliant System
    (ISA) 0x00000061 (97)    Microsoft ACPI-Compliant System
    (ISA) 0x00000062 (98)    Microsoft ACPI-Compliant System
    (ISA) 0x00000063 (99)    Microsoft ACPI-Compliant System
    (ISA) 0x00000064 (100)   Microsoft ACPI-Compliant System
    (ISA) 0x00000065 (101)   Microsoft ACPI-Compliant System
    (ISA) 0x00000066 (102)   Microsoft ACPI-Compliant System
    (ISA) 0x00000067 (103)   Microsoft ACPI-Compliant System
    (ISA) 0x00000068 (104)   Microsoft ACPI-Compliant System
    (ISA) 0x00000069 (105)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006A (106)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006B (107)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006C (108)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006D (109)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006E (110)   Microsoft ACPI-Compliant System
    (ISA) 0x0000006F (111)   Microsoft ACPI-Compliant System
    (ISA) 0x00000070 (112)   Microsoft ACPI-Compliant System
    (ISA) 0x00000071 (113)   Microsoft ACPI-Compliant System
    (ISA) 0x00000072 (114)   Microsoft ACPI-Compliant System
    (ISA) 0x00000073 (115)   Microsoft ACPI-Compliant System
    (ISA) 0x00000074 (116)   Microsoft ACPI-Compliant System
    (ISA) 0x00000075 (117)   Microsoft ACPI-Compliant System
    (ISA) 0x00000076 (118)   Microsoft ACPI-Compliant System
    (ISA) 0x00000077 (119)   Microsoft ACPI-Compliant System
    (ISA) 0x00000078 (120)   Microsoft ACPI-Compliant System
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(ISA) 0x00000079 (121) Microsoft ACPI-Compliant System
(ISA) 0x0000007A (122) Microsoft ACPI-Compliant System
(ISA) 0x0000007B (123) Microsoft ACPI-Compliant System
(ISA) 0x0000007C (124) Microsoft ACPI-Compliant System
(ISA) 0x0000007D (125) Microsoft ACPI-Compliant System
(ISA) 0x0000007E (126) Microsoft ACPI-Compliant System
(ISA) 0x0000007F (127) Microsoft ACPI-Compliant System
(ISA) 0x00000080 (128) Microsoft ACPI-Compliant System
(ISA) 0x00000081 (129) Microsoft ACPI-Compliant System
(ISA) 0x00000082 (130) Microsoft ACPI-Compliant System
(ISA) 0x00000083 (131) Microsoft ACPI-Compliant System
(ISA) 0x00000084 (132) Microsoft ACPI-Compliant System
(ISA) 0x00000085 (133) Microsoft ACPI-Compliant System
(ISA) 0x00000086 (134) Microsoft ACPI-Compliant System
(ISA) 0x00000087 (135) Microsoft ACPI-Compliant System
(ISA) 0x00000088 (136) Microsoft ACPI-Compliant System
(ISA) 0x00000089 (137) Microsoft ACPI-Compliant System
(ISA) 0x0000008A (138) Microsoft ACPI-Compliant System
(ISA) 0x0000008B (139) Microsoft ACPI-Compliant System
(ISA) 0x0000008C (140) Microsoft ACPI-Compliant System
(ISA) 0x0000008D (141) Microsoft ACPI-Compliant System
(ISA) 0x0000008E (142) Microsoft ACPI-Compliant System
(ISA) 0x0000008F (143) Microsoft ACPI-Compliant System
(ISA) 0x00000090 (144) Microsoft ACPI-Compliant System
(ISA) 0x00000091 (145) Microsoft ACPI-Compliant System
(ISA) 0x00000092 (146) Microsoft ACPI-Compliant System
(ISA) 0x00000093 (147) Microsoft ACPI-Compliant System
(ISA) 0x00000094 (148) Microsoft ACPI-Compliant System
(ISA) 0x00000095 (149) Microsoft ACPI-Compliant System
(ISA) 0x00000096 (150) Microsoft ACPI-Compliant System
(ISA) 0x00000097 (151) Microsoft ACPI-Compliant System
(ISA) 0x00000098 (152) Microsoft ACPI-Compliant System
(ISA) 0x00000099 (153) Microsoft ACPI-Compliant System
(ISA) 0x0000009A (154) Microsoft ACPI-Compliant System
(ISA) 0x0000009B (155) Microsoft ACPI-Compliant System
(ISA) 0x0000009C (156) Microsoft ACPI-Compliant System
(ISA) 0x0000009D (157) Microsoft ACPI-Compliant System
(ISA) 0x0000009E (158) Microsoft ACPI-Compliant System
(ISA) 0x0000009F (159) Microsoft ACPI-Compliant System
(ISA) 0x000000A0 (160) Microsoft ACPI-Compliant System
(ISA) 0x000000A1 (161) Microsoft ACPI-Compliant System
(ISA) 0x000000A2 (162) Microsoft ACPI-Compliant System
(ISA) 0x000000A3 (163) Microsoft ACPI-Compliant System
(ISA) 0x000000A4 (164) Microsoft ACPI-Compliant System
(ISA) 0x000000A5 (165) Microsoft ACPI-Compliant System
(ISA) 0x000000A6 (166) Microsoft ACPI-Compliant System
(ISA) 0x000000A7 (167) Microsoft ACPI-Compliant System
(ISA) 0x000000A8 (168) Microsoft ACPI-Compliant System
(ISA) 0x000000A9 (169) Microsoft ACPI-Compliant System
(ISA) 0x000000AA (170) Microsoft ACPI-Compliant System

(ISA) 0x000000AB (171)   Microsoft ACPI-Compliant System
(ISA) 0x000000AC (172)   Microsoft ACPI-Compliant System
(ISA) 0x000000AD (173)   Microsoft ACPI-Compliant System
(ISA) 0x000000AE (174)   Microsoft ACPI-Compliant System
(ISA) 0x000000AF (175)   Microsoft ACPI-Compliant System
(ISA) 0x000000B0 (176)   Microsoft ACPI-Compliant System
(ISA) 0x000000B1 (177)   Microsoft ACPI-Compliant System
(ISA) 0x000000B2 (178)   Microsoft ACPI-Compliant System
(ISA) 0x000000B3 (179)   Microsoft ACPI-Compliant System
(ISA) 0x000000B4 (180)   Microsoft ACPI-Compliant System
(ISA) 0x000000B5 (181)   Microsoft ACPI-Compliant System
(ISA) 0x000000B6 (182)   Microsoft ACPI-Compliant System
(ISA) 0x000000B7 (183)   Microsoft ACPI-Compliant System
(ISA) 0x000000B8 (184)   Microsoft ACPI-Compliant System
(ISA) 0x000000B9 (185)   Microsoft ACPI-Compliant System
(ISA) 0x000000BA (186)   Microsoft ACPI-Compliant System
(ISA) 0x000000BB (187)   Microsoft ACPI-Compliant System
(ISA) 0x000000BC (188)   Microsoft ACPI-Compliant System
(ISA) 0x000000BD (189)   Microsoft ACPI-Compliant System
(ISA) 0x000000BE (190)   Microsoft ACPI-Compliant System
(PCI) 0x00000005 (05)   Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
(PCI) 0x00000010 (16)   High Definition Audio Controller
(PCI) 0x00000010 (16)   Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
(PCI) 0x00000010 (16)   Intel(R) Management Engine Interface
(PCI) 0x00000013 (19)   Intel(R) Active Management Technology - SOL (COM5)
(PCI) 0x00000016 (22)   High Definition Audio Controller
(PCI) 0x00000017 (23)   Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
(PCI) 0xFFFFFFF5 (-11)   Intel(R) I211 Gigabit Network Connection #2
(PCI) 0xFFFFFFF6 (-10)   Intel(R) I211 Gigabit Network Connection #2
(PCI) 0xFFFFFFF7 (-9)   Intel(R) I211 Gigabit Network Connection #2
(PCI) 0xFFFFFFF8 (-8)   Intel(R) I211 Gigabit Network Connection #2
(PCI) 0xFFFFFFF9 (-7)   Intel(R) Ethernet Connection I217-LM
(PCI) 0xFFFFFFFA (-6)   Intel(R) USB 3.0 eXtensible Host Controller
(PCI) 0xFFFFFFFB (-5)   Intel(R) HD Graphics 4600
(PCI) 0xFFFFFFFC (-4)   Intel(R) 8 Series Chipset Family SATA AHCI Controller
(PCI) 0xFFFFFFFD (-3)   Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C
(PCI) 0xFFFFFFFE (-2)   Intel(R) 8 Series/C220 Series PCI Express Root Port #1 - 8C10

B.4 DMA Channel Assignments

Direct memory access (DMA)
　　4　Direct memory access controller