BOXER-6640

Fanless Embedded Box PC

User's Manual 1ˢᵗ Ed

Copyright Notice

Acknowledgement

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

- Microsoft Windows® is a registered trademark of Microsoft Corp.
- Intel®, Platium®, Celeron®, and Xeon® are registered trademarks of Intel Corporation
- Atom™ is a trademark of Intel Corporation

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

Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● BOXER-6640	1
● Wallmount bracket	2
● Screw Package	1
● Thermal Pad	1
● Phoenix power connector	1
● Product DVD with User's Manual (in pdf) and drivers	1

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

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the AAEON.com for the latest version of this document.

Safety Precautions

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

1.   All cautions and warnings on the device should be noted.

2.   Make sure the power source matches the power rating of the device.

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

4.   Always completely disconnect the power before working on the system's hardware.

5.   No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.

6.   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.

7.   Always disconnect this device from any power supply before cleaning.

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

9.   Make sure the device is installed near a power outlet and is easily accessible.

10.   Keep this device away from humidity.

11.   Place the device on a solid surface during installation to prevent falls.

12.   Do not cover the openings on the device to ensure optimal heat dissipation.

13.   Watch out for high temperatures when the system is running.

14.   Do not touch the heat sink or heat spreader when the system is running

15.   Never pour any liquid into the openings. This could cause fire or electric shock.

16.   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 containers.

17. 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

18. Do not leave this device in an uncontrolled environment with temperatures beyond the device's permitted storage temperatures (see chapter 1) to prevent damage.

19. Do NOT disassemble the motherboard so as not to damage the system or void your warranty.

20. If the thermal pad had been damaged, please contact AAEON's salesperson to purchase a new one. Do NOT use those of other brands.

21. The Hex Cylinder Coppers on the front panel are not removable.

22. Repeatedly assemble and disassemble the system may cause damages to the exterior paint and surface and screw holes.

23. Use the right size screwdriver.

24. Use the screwdriver correctly to remove screws from the system.

FCC Statement

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.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte.
Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Embedded Box PC/ 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 Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Embedded Box PC/ Industrial System

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	O	O	O	O	O	O
Wires & Connectors for External Connections	O	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU & RAM	O	O	O	O	O	O
Hard Disk	O	O	O	O	O	O
PSU	O	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**						

Table of Contents

Chapter 1

Product Specifications

1.1   Specifications

System	
● **Processor**	Intel® Core™ i7-7700T, Quad Core, 2.9 GHz
	Intel® Core™ i5-7600T, Quad Core, 2.8 GHz
	Intel® Core™ i3-7300T, Dual Core, 3.5 GHz
	Intel® Core™ i7-6700TE, Quad Core, 2.4 GHz
	Intel® Core™ i5-6500TE, Quad Core, 2.3 GHz
	Intel® Core™ i3-6100TE, Dual Core, 2.7 GHz
	* Note: All of the above processors operate within TDP 35W.
● **System Memory**	DDR4 1866/2133 SODIMM slot x 2, up to 32 GB, ECC or Non-ECC support
● **Display**	VGA x 1
	HDMI x 2
	combo DP X 2
● **Ethernet**	Intel® I211 AT x 1, I219LM x 1
● **Storage Device**	mSATA, SATA HDD/SSD
● **Serial Port**	RS-232 x 3
	RS-232/422/485 x 1
● **USB**	USB 3.0 x 4
	USB 2.0 x 3
● **Digital I/O**	DB-44 for 8-bit digital I/O (5V)
● **Remote I/O**	2-Pin Remote Power On/Off Connector
● **LED Indicator**	Power LED x 1
	Hard Disk Active LED x 1
● **Expansion Slot**	Full-size Mini-Card x 2

- **OS Support**

  Windows® 10 (64-bit)

  Windows® 8.1 (64-bit)

  WES7/WES8/Win 7

Mechanical

● **Construction**	Rugged aluminum extrusion and heavy-duty steel
● **Mounting**	Wallmount DIN rail (optional)
● **Dimension (W x H x D)**	264mm x 96.4mm x 186.2mm (10.4 x 3.8 x 7.3")
● **Gross Weight**	5.8kg (12.8 lb)
● **Net Weight**	4.5kg (9.9 lb)

Environmental

● **Operating Temperature**	Ambient with Airflow -20°C ~ 55°C (according to IEC68-2-14 with 0.5 m/s AirFlow ; with industrial devices)
● **Storage Temperature**	-45°C ~ 80°C (-49°F ~ 185°F)
● **Storage Humidity**	5~95% @ 40°C, non-condensing
● **Anti-Vibration**	2 Grms/ 5~500Hz/ operation – SSD/mSATA 1 Grms/ 5~500Hz/ operation – HDD
● **EMC**	CE/FCC Class A

Power Supply

● **DC Input**	9 – 36V with 3-pin terminal block

Chapter 2

Hardware Information

2.1   Dimensions

A1

282.15

100.00

186.20

264.15

298.15

186.20

96.42

110.42

186.20
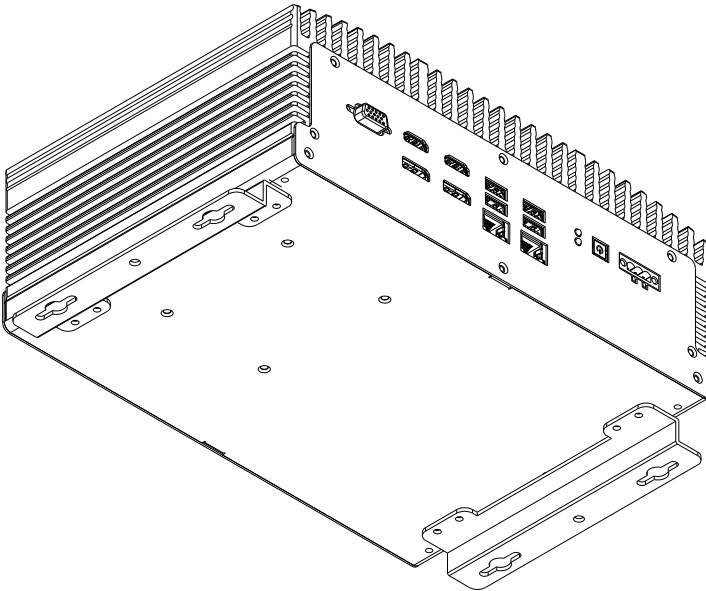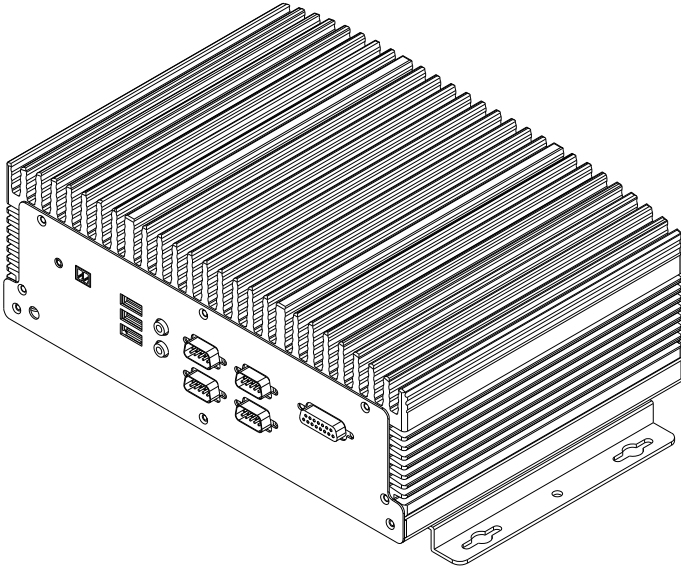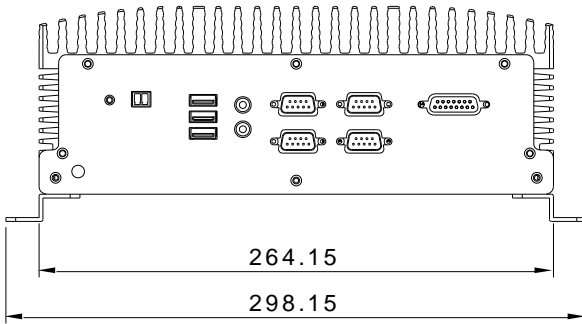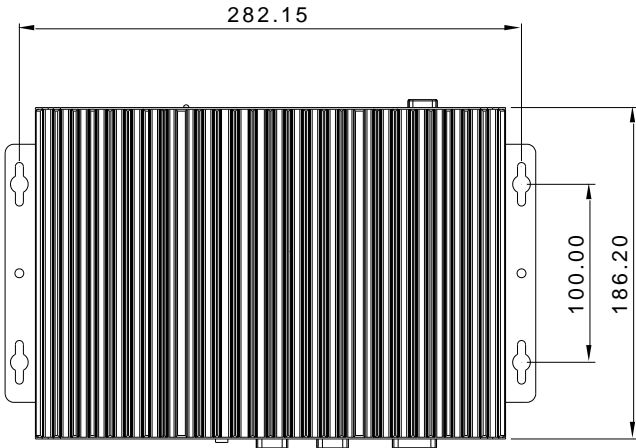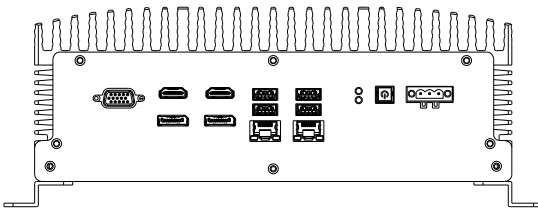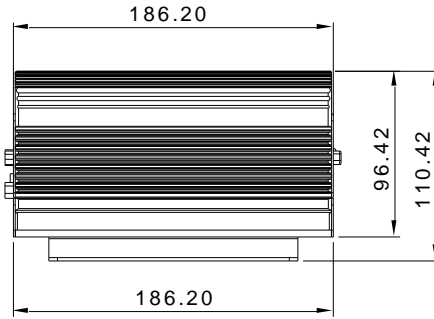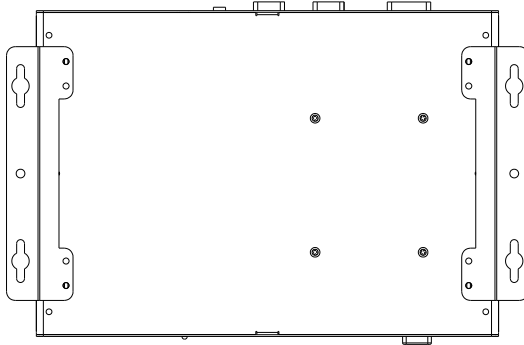
2.2 Jumpers and Connectors
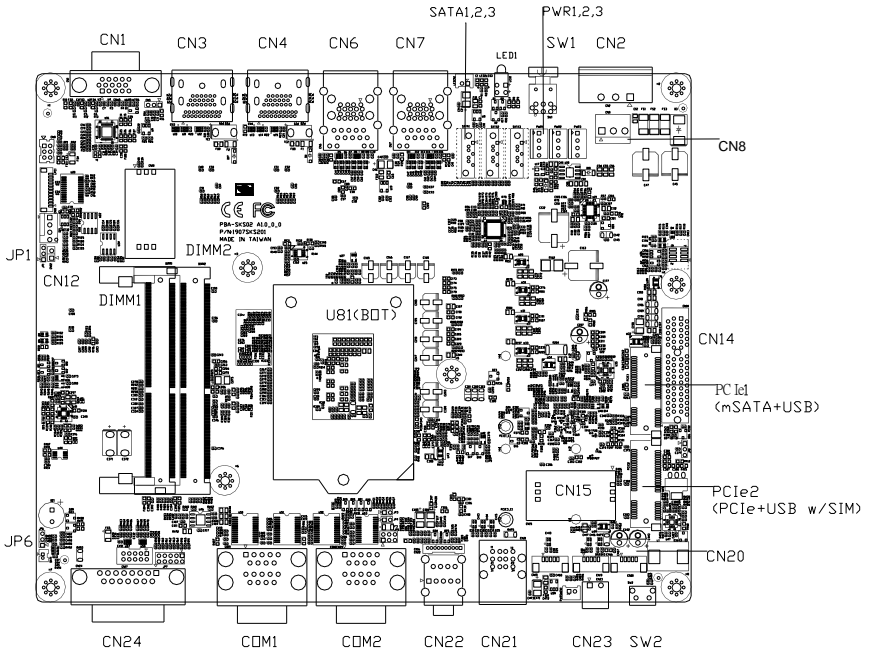
2.3   List of Jumpers

Please refer to the table below for all of the system's jumpers that you can configure for your application.

Label	Function
JP1	AT/ATX mode select
JP6	Clear CMOS

2.4 Block Diagram

Fanless Embedded Box PC

BOXER-6640

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2.4 Block Diagram

Fanless Embedded Box PC

BOXER-6640
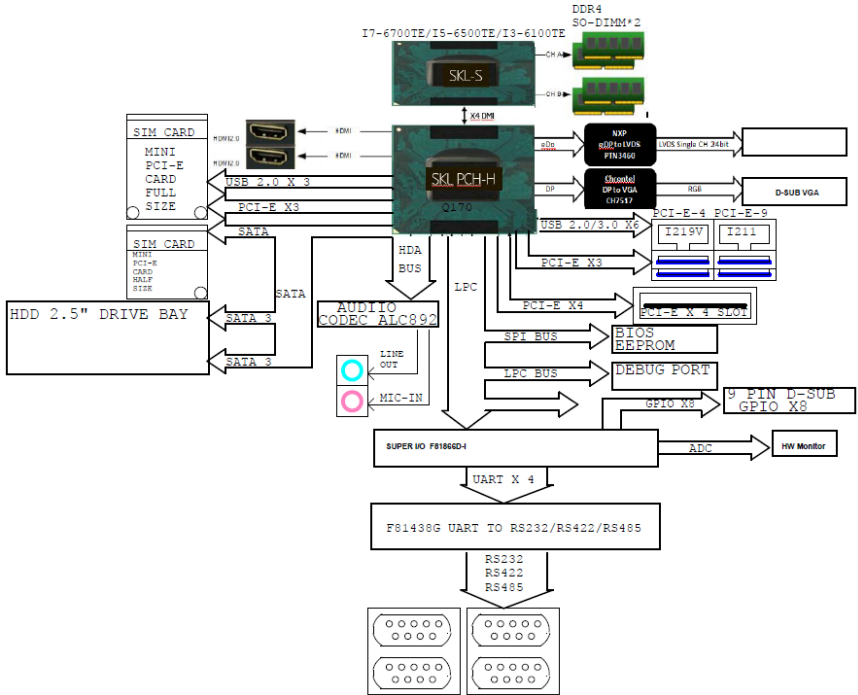
2.5   List of Connectors

Please refer to the table below for all of the system's connectors that you can configure for your application

Label	Function
CN1	CRT port
CN2/CN8	DC-IN
CN3	HDMI2/DP2 connector
CN4	HDMI1/DP2 connector
CN13	SPI ROM connector
CN24	DIO connector
CN6	Dual stack USB (3.0) + LAN
CN7	Dual stack USB (3.0) + LAN
CN22	Audio Jack
CN23	Remote button cable connector
CN20	USB 2.0 Connector(BOX connector for backup)
SW1	Power switch
SW2	H/W Reset switch
PWRSWCN1	Power switch (BOX connector for backup)
PWR1	SATA PWR connector
PWR2	SATA PWR connector
PWR3	SATA PWR connector
SATA1	SATA connector
SATA2	SATA connector
SATA3	SATA connector
BAT1	RTC battery connector
LPC1	Debug port connector
COM1	Dual COM port (COM1/ COM2)

COM2	Dual COM port (COM3/ COM4)
PCIE1	Minicard connector(SATA Only)
PCIE2	Minicard connector
CN15	SIM card connector

2.5.1 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**
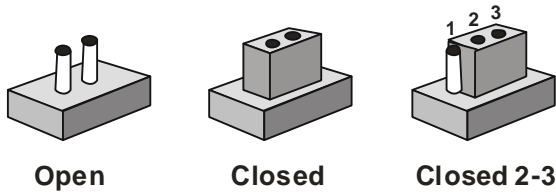
A pair of needle-nose pliers may be helpful when working with jumpers.

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.

2.5.2 Clear CMOS (JP6)

1 2 3   1 2 3

Normal (Default)   **Clear CMOS**
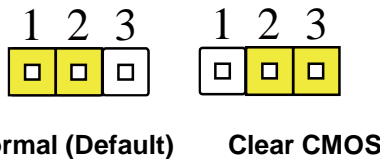
JP1	Function
1-2	Normal (Default)
2-3	Clear CMOS

2.5.3 Auto Power Button (JP1)

Disable   **Enable (Default)**
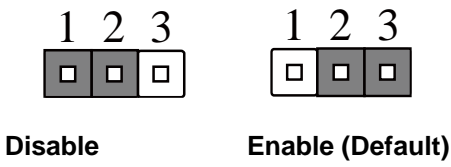
JP1	Function
1-2	Normal (Default)
2-3	Clear CMOS

2.5.4 Mini Card Connector With on board SIM
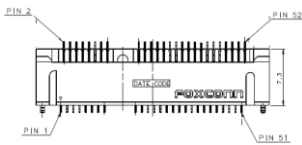
Pin	Signal	Pin	Signal
1	PCIE_WAKE#	2	+V3.3A
3	NC	4	GND
5	NC	6	+1.5V
7	PCIE_CLK_REQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	PCIE_REF_CLK-	12	UIM_CLK
13	PCIE_REF_CLK+	14	UIM_RST
15	GND	16	UIM_VPP

17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	PCIE_RST#
23	PCIE_RX-	24	+V3.3A
25	PCIE_RX+	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PCIE_TX-	32	SMB_DATA
33	PCIE_TX+	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+V3.3A	40	GND
41	+V3.3A	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+V3.3A

2.5.5 (SATA1/ SATA2/ SATA3) SATA Port

Pin 1   Pin 7
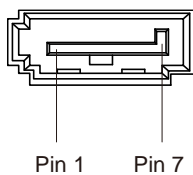
Pin	Pin Name	Signal Type	Signal level
1	GND	GND	
2	SATA_TX+	DIFF	

Pin	Pin Name	Signal Type	Signal level
3	SATA_TX-	DIFF	
4	GND	GND	
5	SATA_RX-	DIFF	
6	SATA_RX+	DIFF	
7	GND	GND	

2.5.6 (PWR1/ PWR2/ PWR3) SATA PWR Port

Pin4   Pin1
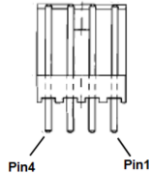
Pin	Pin Name	Level
1	+12V	12V
2	GND	GND
3	GND	GND
4	+5V	5V

2.5.7 LAN + USB 3.0
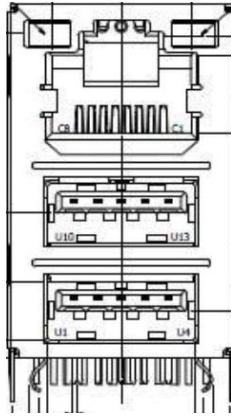
Pin	Signal	Pin	Signal
C1	MDI0+	U2	MDI0-
C3	MDI1+	U4	MDI2+
C5	MDI2-	U6	MDI1-
C7	MDI3+	U8	MDI3-
U1	VBUS_1	U10	VBUS_2
U2	(A)D-	U11	(B)D-
U3	(A)D+	U12	(B)D+
U4	GND	U13	GND
U5	(A)SSRX-	U14	(B)SSRX-
U6	(A)SSRX+	U15	(B)SSRX+
U7	GND	U16	GND
U8	(A)SSTX-	U17	(B)SSTX-
U9	(A)SSTX+	U18	(B)SSTX+

2.5.8 VGA port
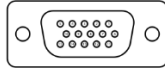
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VGA_VCC	10	GND
11	NC	12	DDC_DATA
13	VGA_HSYNC	14	VGA_VSYNC
15	DDC_CLK		

2.5.9 DC-IN

PIN1 PIN2 PIN3
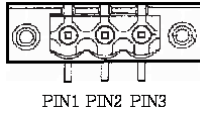
Pin	Signal	Pin	Signal
1	PWR_IN	2	GND
3	NC		

2.5.10 HDMI port
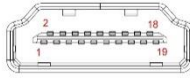
Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP		
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND

9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP		

2.5.11 DIO port

⑧⑦⑥⑤④③②①
⑮⑭⑬⑫⑪⑩⑨

Pin	Signal	Pin	Signal
1	DIO0	2	DIO1
3	DIO2	4	DIO3
5	DIO4	6	DIO5
7	DIO6	8	DIO7
9	GND	10	GND
11	GND	12	GND
13	GND	14	GND
15	+5V		

2.5.12 Remote switch connector
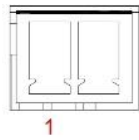
Pin	Signal	Pin	Signal
1	PANSWH#	2	GND

2.5.13 COM Port
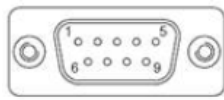
Pin	RS-232	RS422	RS-485

1	DCD	TX-	DATA-
2	RXD	TX+	DATA+
3	TXD	RX+	NC
4	DTR	RX-	NC
5	GND	NC	NC
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.6   CPU Installation

- Turn off the system, unplug the power cord and make sure the system is off.
- Have Intel Kabylake or Intel SkyLake-S FCLGA1151 Processor (Max. TDP 35W) ready.

Step 1: Remove the screws as instructed below and remove the heatsink.
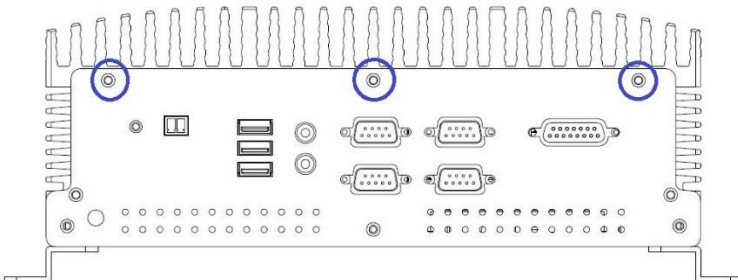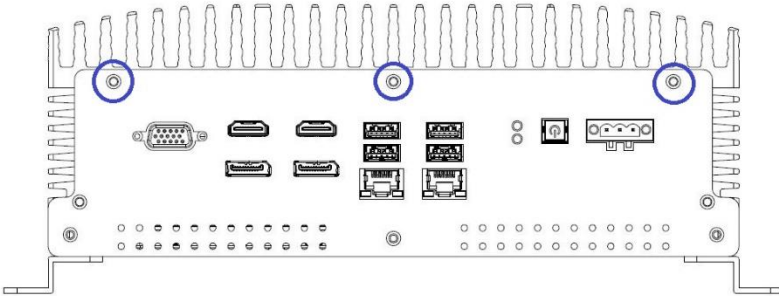
Step 2: Install the CPU into the socket and place the thermal pad onto it.

Thermal pad

CPU
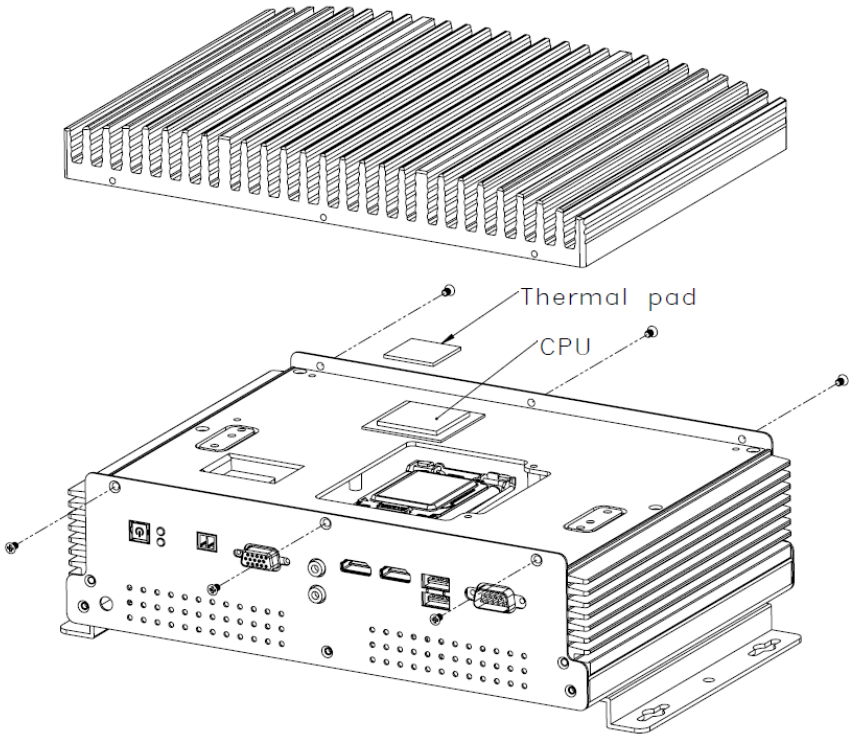
Step 3: Place the heatsink back on and fasten the screws as instructed below.
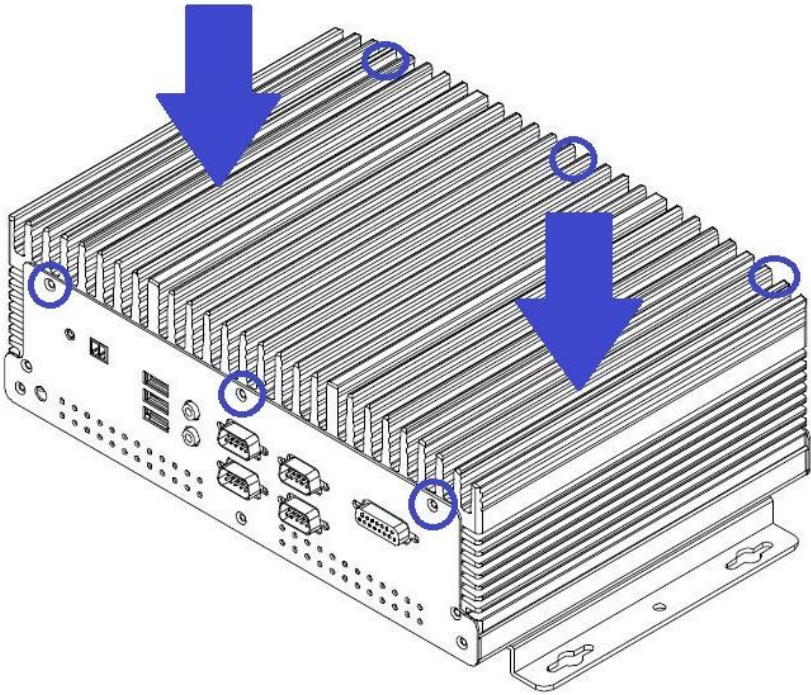
2.7 DDR4 Memory Module Installation

Step 1. Turn off the system, unplug the power cord to make sure the system is power off.

Fanless Embedded Box PC

BOXER-6640
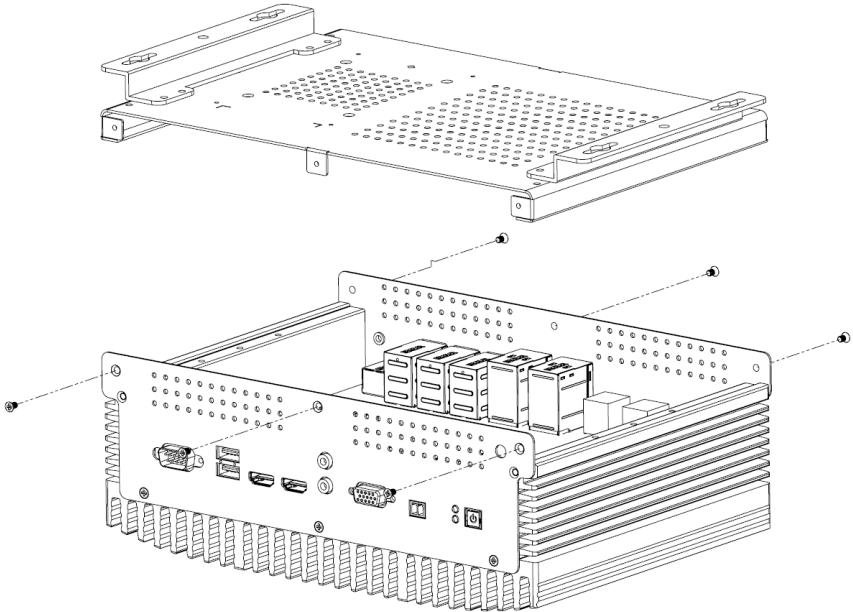
Step 2. Place the thermal pads onto the RAM modules as instructed below.

RAM

Thermal Pad
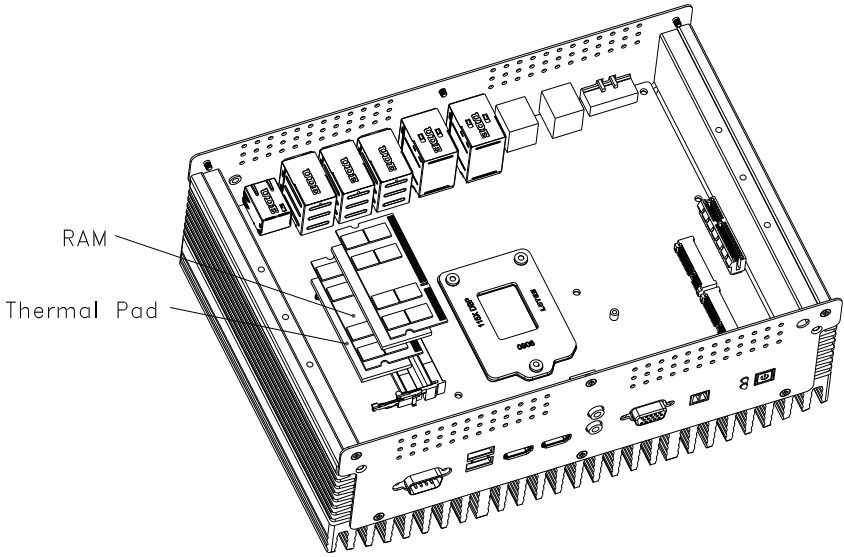
2.8   2.5" SATA Drive Installation

- Turn off the system, unplug the power cord to make sure the system is power off.

Step 1: Use the HDD screws provided to assemble 2.5" SATA drive with the HDD

Bracket
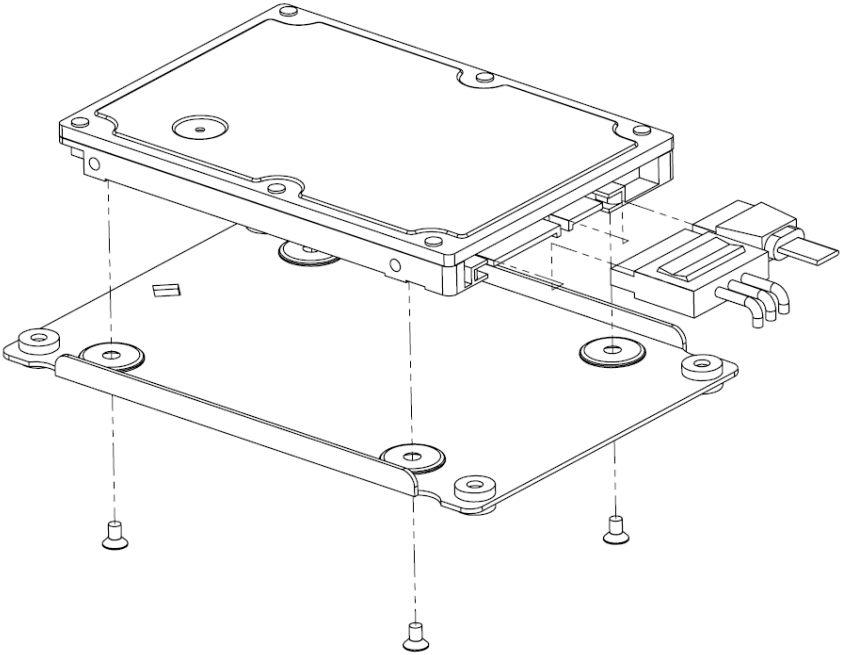
Step 2: Assemble the 2.5" HDD Driver kit with bottom case and connect the SATA

signal cable and SATA power cable with the 2.5" SATA HDD Drive.
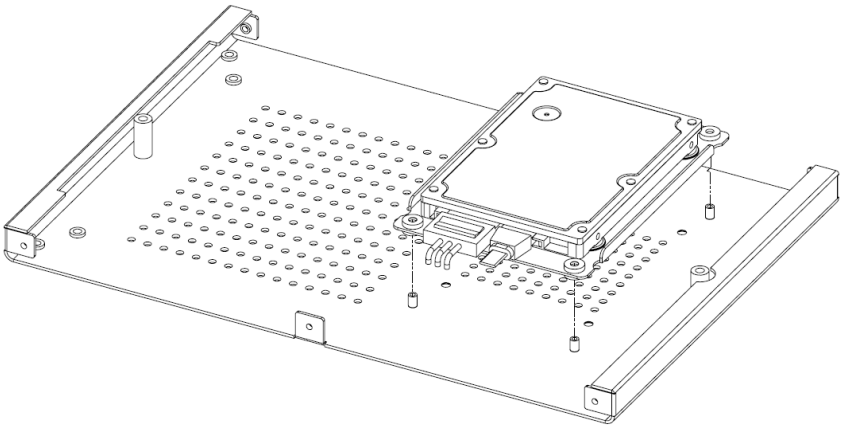
2.9   Power Connector Installation

Step 1: Take out 3-pin green phoenix power connector from the accessory kit

Step 2: Refer to below power pin out
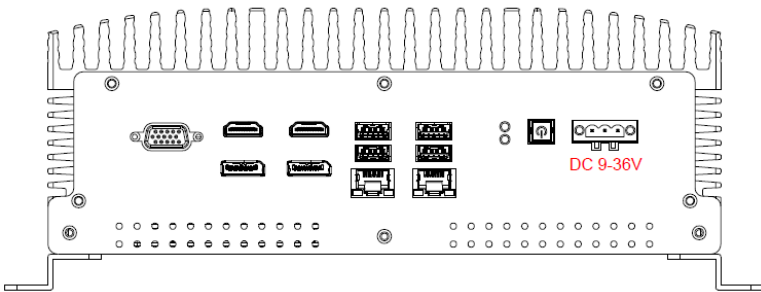
Chapter 3

AMI BIOS Setup

3.1   System Test and Initialization

The system uses certain routines to perform testing and initialization. If an error, fatal or non-fatal, is encountered, a few short beeps or an error message will be outputted. The board can usually continue the boot up sequence with non-fatal errors.

The system configuration verification routines check the current system configuration against the values stored in the CMOS memory. If they do not match, an error message will be outputted, in which case you will 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:
-       You are starting your system for the first time
-       You have changed your system's hardware
-       The CMOS memory has lost power and the configuration information is erased

The system's CMOS memory uses a backup battery for data retention, which is to be replaced once emptied.

3.2   AMI BIOS Setup

The AMI BIOS ROM has a pre-installed Setup program that allows users to modify basic system configurations, which is stored in the battery-backed CMOS RAM and BIOS NVRAM so that the information is retained when the power is turned off.

To enter BIOS Setup, press <Del> or <F2> immediately while your computer is powering up.

The function for each interface can be found below.

Main – Date and time can be set here. Press <Tab> to switch between date elements

Advanced – Enable/ Disable boot option for legacy network devices

Chipset – For hosting bridge parameters

Boot – Enable/ Disable quiet Boot Option

Security – The setup administrator password can be set here

Save & Exit –Save your changes and exit the program

3.3   Setup Submenu: Main

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

     BIOS Information                                        Set the Date. Use Tab to
         BOXER-6640 R1.0 (B640AM10)(06/30/2017)              switch between Date elements.

     BIOS Vendor                     American Megatrends
     Compliancy                      UEFI 2.6; PI 1.4

     System Date                     [Thu 06/22/2017]
     System Time                     [08:38:38]

     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 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

3.4 Setup Submenu: Advanced

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Main  Advanced  Chipset  Security  Boot  Save & Exit

 ▶ CPU Configuration                              CPU Configuration Parameters
 ▶ Trusted Computing
 ▶ SATA Configuration
 ▶ PCH-FW Configuration
 ▶ SIO Configuration
 ▶ Hardware Monitor
 ▶ USB Configuration
 ▶ Digital IO Port Configuration
 ▶ Power Management


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




            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

3.4.1 Advanced: CPU Configuration

```
                    Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

  CPU Configuration                                              Enabled for Windows XP and
                                                                 Linux (OS optimized for
  Type                              Intel(R) Core(TM)            Hyper-Threading Technology)
                                    i3-6100TE CPU @ 2.70GHz      and Disabled for other OS (OS
  ID                                0x506E3                      not optimized for
  Speed                             2700 MHz                     Hyper-Threading Technology).
  L1 Data Cache                     32 KB x 2
  L1 Instruction Cache              32 KB x 2
  L2 Cache                          256 KB x 2
  L3 Cache                          4 MB
  L4 Cache                          N/A
  VMX                               Supported
  SMX/TXT                           Not Supported
                                                                 ←→: Select Screen
  Hyper-Threading                   [Enabled]                    ↑↓: Select Item
  Intel (VMX) Virtualization        [Enabled]                    Enter: Select
  Technology                                                     +/-: Change Opt.
  Active Processor Cores            [All]                        F1: General Help
                                                                 F2: Previous Values
                                                                 F3: Optimized Defaults
                                                                 F4: Save & Exit
                                                                 ESC: Exit


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```

Options summary:

Hyper-Threading	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).		
	Disabled	
	Enabled	Optimal Default, Failsafe Default
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.		
	1	
	All	Optimal Default, Failsafe Default
Number of cores to enable in each processor package.		

3.4.2 Advanced: SATA Configuration

```
               Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   SATA And RST Configuration                           Enable/Disable SATA Device.

   SATA Controller(s)               [Enabled]
   SATA Mode Selection              [AHCI]
   SATA 1                           Empty
     Port 1                         [Enabled]
     Hot Plug                       [Disabled]
   SATA 2                           Empty
     Port 2                         [Enabled]
     Hot Plug                       [Disabled]
   Mini-Card                        Empty
     Port                           [Enabled]
     Hot Plug                       [Disabled]
                                                         ➔➔: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



               Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

SATA Controller(s)	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Device.		
SATA Mode Selection	AHCI Mode	Optimal Default, Failsafe Default
Determines how SATA controller(s) operate.		
	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		
	Enabled	
	Disabled	Optimal Default, Failsafe Default
Designates this port as Hot Pluggable.		

3.4.3 Advanced: PCH-FW Configuration

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

 ME Firmware Version              11.6.25.1229              Configure Management Engine
 ME Firmware Mode                 Normal Mode               Technology Parameters
 ME Firmware SKU                  Corporate SKU

▶ Firmware Update Configuration



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



                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

3.4.3.1 PCH-FW Configuration: Firmware Update Configuration

Options summary:

ME FW Image Re-Flash	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable or Disable ME FW Image Re-Flash function.		

3.4.4 Advanced: SIO Configuration

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

   AMI SIO Driver Version :   A5.07.03                    View and Set Basic properties
                                                          of the SIO Logical device.
   Super IO Chip Logical Device(s) Configuration          Like IO Base, IRQ Range, DMA
 ▶ [*Active*]   Serial Port  1                            Channel and Device Mode.
 ▶ [*Active*]   Serial Port  2
 ▶ [*Active*]   Serial Port  3
 ▶ [*Active*]   Serial Port  4

   WARNING: Logical Devices state on the left side of the
   control, reflects the current Logical Device state. Changes
   made during Setup Session will be shown after you restart
   the system.
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

3.4.4.1 SIO Configuration: Serial Port 1 Configuration

```
                 Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

        Serial Port  1 Configuration                        Enable or Disable this Logical
                                                             Device.
        Use This Device                    [Enabled]

        Logical Device Settings:
        Current :     IO=3F8h; IRQ=4;

        Possible:                          [Use Automatic Settings]

        Mode    :                          [RS232]

        WARNING: Disabling SIO Logical Devices may have unwanted
        side effects.
        PROCEED WITH CAUTION.
                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit


                 Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Serial Port (COM)		
	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=3;	
	IO=3F8; IRQ=4;	
Select an optimal setting for IO device		
	RS232	
	RS422	
	RS485	
UART RS232, 422, 485 selection		

5## 3.4.4.2 SIO Configuration: Serial Port 2 Configuration

Options summary:

Use This	Disabled	
Device	Enabled	Optimal Default, Failsafe Default
Enable or Disable Serial Port (COM)		
	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=3;	
	IO=3F8; IRQ=4;	
Select an optimal setting for IO device		

3.4.4.3 SIO Configuration: Serial Port 3 Configuration

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

   Serial Port  3 Configuration                         Enable or Disable this Logical
                                                        Device.
   Use This Device                    [Enabled]

   Logical Device Settings:
   Current :     IO=3E8h; IRQ=11;

   Possible:                          [Use Automatic Settings]

   Mode    :                          [RS232]

   WARNING: Disabling SIO Logical Devices may have unwanted
   side effects.                                         ↔: Select Screen
   PROCEED WITH CAUTION.                                 ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




              Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

Options summary:

Use This	Disabled	
Device	Enabled	Optimal Default, Failsafe Default
Enable or Disable Serial Port (COM)		
	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=11;	
	IO=3F8; IRQ=11;	
Select an optimal setting for IO device		

3.4.4.4 SIO Configuration: Serial Port 4 Configuration

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

   Serial Port  4 Configuration                      Enable or Disable this Logical
                                                      Device.
   Use This Device                   [Enabled]

   Logical Device Settings:
   Current :     IO=2E8h; IRQ=11;

   Possible:                         [Use Automatic Settings]

   Mode    :                         [RS232]

   WARNING: Disabling SIO Logical Devices may have unwanted
   side effects.
   PROCEED WITH CAUTION.                              ↔: 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:

Use This	Disabled	
Device	Enabled	Optimal Default, Failsafe Default
Enable or Disable Serial Port (COM)		
	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=11;	
	IO=3F8; IRQ=11;	
Select an optimal setting for IO device		

3.4.5 Advanced: Hardware Monitor

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
         Advanced

 Pc Health Status

 CPU Temperature                    : +35 %
 System Temperature                 : +30 %
 VCORE                              : +1.016 V
 VMEM                               : +1.216 V
 +5V                                : +5.045 V
 +12V                               : +12.320 V
 +3.3V                              : +3.360 V
 3VSB                               : +3.376 V
 5VSB                               : +5.040 V
 VBAT                               : +3.216 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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```

3.4.6 Advanced: USB Configuration

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

   USB Configuration                                        Enables Legacy USB support.
                                                            AUTO option disables legacy
   USB Devices:                                             support if no USB devices are
          1 Drive, 1 Keyboard, 1 Mouse                      connected. DISABLE option will
                                                            keep USB devices available
   Legacy USB Support                 [Enabled]             only for EFI applications.




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



                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

Legacy USB Support	Enabled	Optimal Default, Failsafe Default
	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		

3.4.7 Advanced: Digital IO Port Configuration

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

 Digital IO Port Configuration                              Set DIO as Input or Output

 DIO1                              [Output]
   Output Level                    [High  ]
 DIO2                              [Output]
   Output Level                    [High  ]
 DIO3                              [Output]
   Output Level                    [High  ]
 DIO4                              [Output]
   Output Level                    [High  ]
 DIO5                              [Input ]
 DIO6                              [Input ]
 DIO7                              [Input ]
 DIO8                              [Input ]
                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit




                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

DIO Type	Output	Optimal Default, Failsafe Default
	Input	
DIO Direction Type Setting		
	Low	
	High	Optimal Default, Failsafe Default
DIO Output High/Low Setting		

3.4.8 Advanced: Power Management

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

  Power Management                                        Select system power mode.

  Power Mode                          [ATX Type]
  Restore AC Power Loss               [Last State]

  Wake Events
  RTC wake system from S5             [Disabled]



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


                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

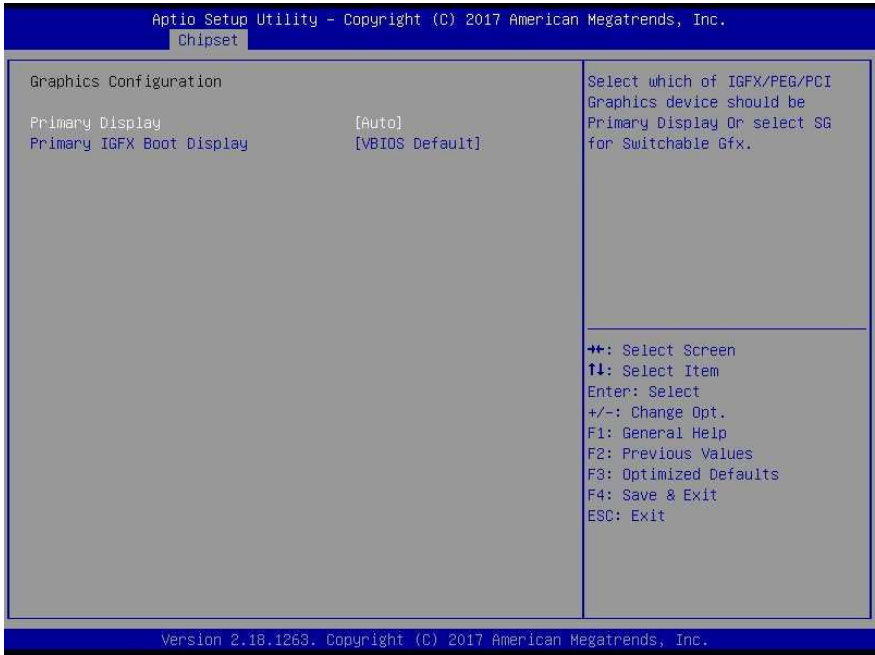| Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select power supply mode.		
	Last State	Optimal Default, Failsafe Default
	Power On	
	Power Off	
Select power state when power is re-applied after a power failure.		
	Disabled	Optimal Default, Failsafe Default
	Fixed Time	
	Dynamic Time	
Enable or disable System wake on alarm event. When enabled, System will wake on the hr::min::sec specified		

3.5   Setup submenu: Chipset

```
                Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
          Main  Advanced  Chipset  Security  Boot  Save & Exit

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




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




                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

3.5.1 Chipset: System Agent (SA) Configuration

```
               Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                     Chipset

    System Agent (SA) Configuration              Maximum Value of TOLUD (Top of
                                                 Low Usable DRAM)
    Memory Configuration                         Dynamic assignment would
    Memory Frequency              2133 MHz       adjust TOLUD automatically
    Total Memory                  4096 MB        based on largest MMIO length
                                                 of installed graphic
    Max TOLUD                     [Dynamic]      controller.
  ▶ Graphics Configuration                       Changing this value may cause
                                                 side effect, if reserved
                                                 memory is lesser than MMIO
                                                 required. This happens often
                                                 _____

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

               Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

Max TOLUD	Dynamic	Optimal Default, Failsafe Default
	1 GB	
	1.25 GB	
	1.5 GB	
	1.75 GB	
	2 GB	
	2.25 GB	
	2.5 GB	
	2.75 GB	
	3 GB	
	3.25 GB	
	3.5 GB	
Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.		

3.5.1.1 System Agent (SA) Configuration: Graphics Configuration

```
               Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                Chipset

Graphics Configuration                                    Select which of IGFX/PEG/PCI
                                                          Graphics device should be
Primary Display                    [Auto]                 Primary Display Or select SG
Primary IGFX Boot Display          [VBIOS Default]        for Switchable Gfx.




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




               Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Options summary:

Primary Display	Auto	Optimal Default, Failsafe Default
	IGFX	
	PCIE	
	VBIOS default	Optimal Default, Failsafe Default
	HDMI/DP 1	
	CRT	
	HDMI/DP 2	
	Disable	Optimal Default, Failsafe Default
	HDMI/DP 1	
	CRT	
	HDMI/DP 2	

3.5.2 Chipset: PCH-IO COnfiguration

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
              Chipset

PCH-IO Configuration                               Control Detection of the
                                                   HD-Audio device.
HD Audio                          [Auto]           Disabled = HDA will be
Mini-Card Gen Speed               [Auto]           unconditionally disabled
PCIe x4 Gen Speed                 [Auto]           Enabled = HDA will be
                                                   unconditionally enabled
                                                   Auto = HDA will be enabled if
                                                   present, disabled otherwise.


                                                   →←: 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:

HD Audio	Disabled	
	Enabled	
	Auto	Optimal Default, Failsafe Default
Control Detection of the HD-Audio device.		
	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Select PCI Express port speed		
	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Select PCI Express port speed		

3.6 Setup submenu: Security

```
             Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  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
  Administrator Password                          Enter: Select
  User Password                                   +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F3: Optimized Defaults
                                                 F4: Save & Exit
                                                 ESC: Exit




             Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

Change User/Administrator Password

You can set a User Password once an Administrator Password is set. The password will be required during boot up, or when the user enters the Setup utility. Please Note that a User Password does not provide access to many of the features in the Setup utility. Select the password you wish to set, press Enter to open a dialog box to enter your password (you can enter no more than six letters or numbers). Press Enter to confirm your entry, after which you will be prompted to retype your password for a final confirmation. Press Enter again after you have retyped it correctly.

Removing the Password

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

3.7   Setup submenu: Boot

```
              Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

   Boot Configuration                                     Enables or disables Quiet Boot
   Quiet Boot                        [Enabled]            option
   Launch PXE ROM                    [Disabled]

   Boot Option Priorities
   Boot Option #1                    [KingstonDTR30G2 PMAP]
   Boot Option #2                    [UEFI: KingstonDTR30G2
                                     PMAP, Partition 1]

   Hard Drive BBS Priorities

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

              Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

Options summary:

Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enables or disables Quiet Boot option.		
	Disabled	Optimal Default, Failsafe Default
	Enabled	
Controls the execution of UEFI and Legacy PXE OpROM.		

3.8   Boot: BBS Priorities

```
             Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
                                   Boot

    Boot Option #1                    [Lexar USB Flash Dri...]   Sets the system boot order
    Boot Option #2                    [P0: mSATA mini 3ME ...]




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




             Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```
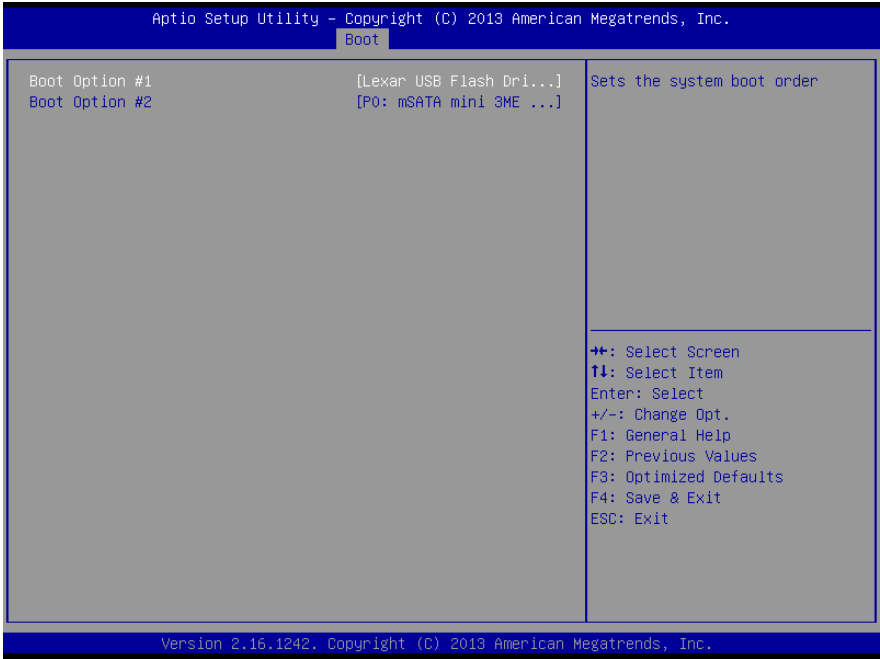
3.9   Setup submenu: Save & Exit

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

    Save Changes and Reset                              Reset the system after saving
    Discard Changes and Reset                           the changes.
    Restore Defaults




                                                        ↔: 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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```

Chapter 4

Drivers Installation

4.1   Product CD/DVD

The BOXER-6640 comes with a product DVD that contains all the drivers and utilities you need to setup your product. Insert the DVD and follow the steps in the autorun program to install the drivers.

In case the program does not start, follow the sequence below to install the drivers.

Step 1 – Install Chipset Driver

1.   Open the **Step1 - Chipset** folder and select your OS
2.   Open the **SetupChipset.exe** file in the folder
3.   Follow the instructions
4.   Drivers will be installed automatically

Step 2 – Install Graphics Driver

1.   Open the **Step2 - Graphic** 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 **Step3 - 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 **Step4 - Audio** folder and select your OS

2. followed by the **.exe** file in the folder

3. Follow the instructions

4. Drivers will be installed automatically

Step 5 – Install USB3.0 Driver

1. Open the **Step5 – USB3.0** folder and select your OS

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

3. Follow the instructions

4. Drivers will be installed automatically

Step 6 – Install ME Driver

1. Open the **Step6 - ME** folder and select your OS

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

3. Follow the instructions

4. Drivers will be installed automatically

Step 7 – Install Serial Port Driver (Optional)

For Windows 7:

1. Change User Account Control settings to **Never notify**
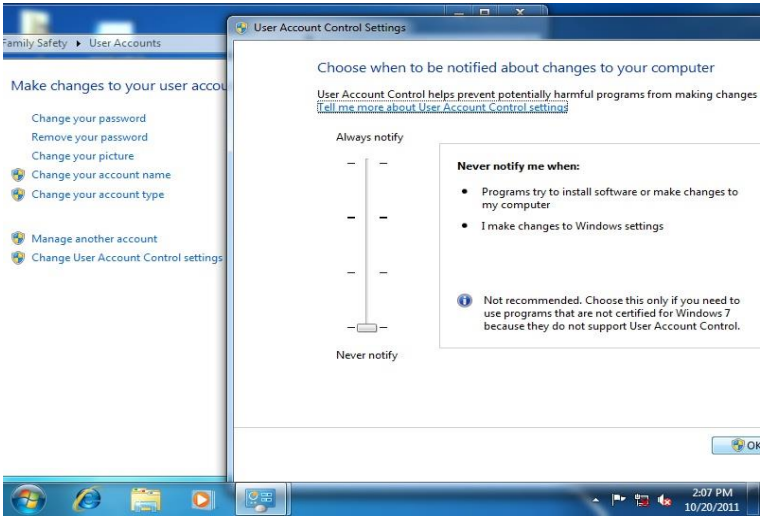
2. Reboot and log in as administrator
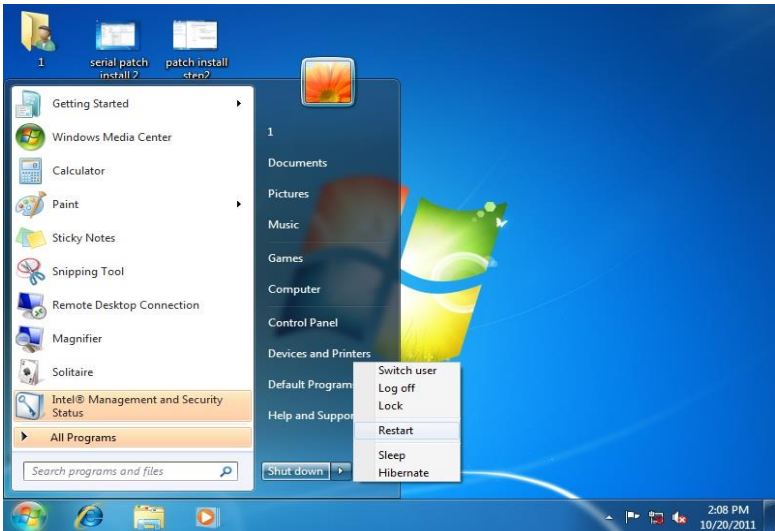
3. Run **patch.bat** as administrator
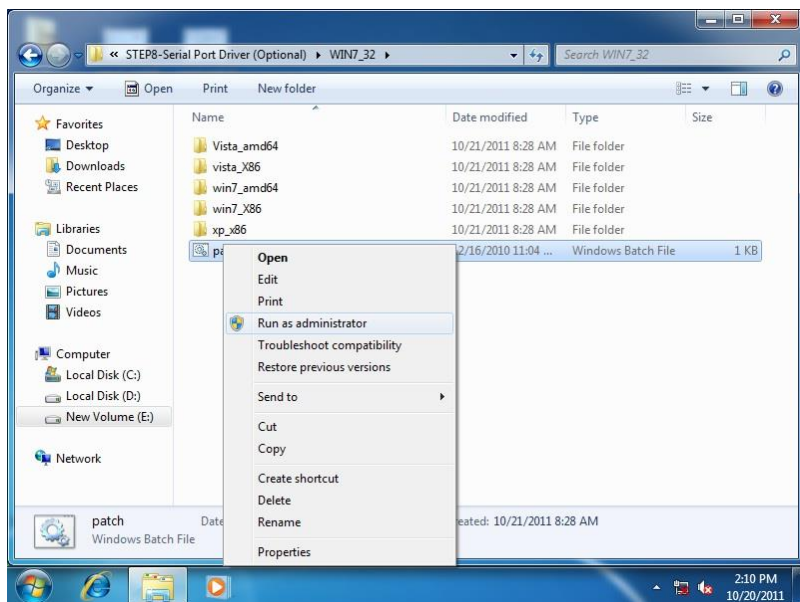
For Windows 8 and Windows 10:

1. Open the **Step 7 – Serial Port Driver (Optional)** folder and select your OS

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

3. Follow the instructions

4. Drivers will be installed automatically

Appendix A

Watchdog Timer Programming

A.1   Watchdog Timer Initial Program

Table 1 : SuperIO relative register table		
	Default Value	**Note**
Index	**0x2E**(Note1)	SIO MB PnP Mode Index Register 0x2E or 0x4E
Data	**0x2F**(Note2)	SIO MB PnP Mode Data Register 0x2F or 0x4F

Table 2 : Watchdog relative register table					
	LDN	**Register**	**BitNum**	**Value**	**Note**
Timer Counter	**0x07**(Note3)	**0xF6**(Note4)		(Note24)	Time of watchdog timer (0~255) This register is byte access
Counting Unit	**0x07**(Note5)	**0xF5**(Note6)	**3**(Note7)	**0**(Note8)	Select time unit. 0: second 1: minute
Watchdog Enable	**0x07**(Note9)	**0xF5**(Note10)	**5**(Note11)	**1**(Note12)	0: Disable 1: Enable
Timeout Status	**0x07**(Note13)	**0xF5**(Note14)	**6**(Note15)	**1**	1: Clear timeout status
Output Mode	**0x07**(Note16)	**0xF5**(Note17)	**4**(Note18)	**1**(Note19)	Select WDTRST# output mode 0: level 1: pulse
WDTRST output	**0x07**(Note20)	**0xFA**(Note21)	**0**(Note22)	**1**(Note23)	Enable/Disable time out output via WDTRST# 0: Disable 1: Enable

```
**********************************************************************************
// SuperIO relative definition (Please reference to Table 1)
#define byte    SIOIndex    //This parameter is represented from Note1
#define byte    SIOData     //This parameter is represented from Note2
#define void    IOWriteByte(byte IOPort, byte Value);
#define byte    IOReadByte(byte IOPort);
// Watch Dog relative definition (Please reference to Table 2)
#define byte    TimerLDN    //This parameter is represented from Note3
#define byte    TimerReg     //This parameter is represented from Note4
#define byte    TimerVal     // This parameter is represented from Note24
#define byte    UnitLDN     //This parameter is represented from Note5
#define byte    UnitReg     //This parameter is represented from Note6
#define byte    UnitBit     //This parameter is represented from Note7
#define byte    UnitVal     //This parameter is represented from Note8
#define byte    EnableLDN    //This parameter is represented from Note9
#define byte    EnableReg    //This parameter is represented from Note10
#define byte    EnableBit    //This parameter is represented from Note11
#define byte    EnableVal    //This parameter is represented from Note12
#define byte    StatusLDN    // This parameter is represented from Note13
#define byte    StatusReg    // This parameter is represented from Note14
#define byte    StatusBit    // This parameter is represented from Note15
#define byte    ModeLDN     // This parameter is represented from Note16
#define byte    ModeReg     // This parameter is represented from Note17
#define byte    ModeBit     // This parameter is represented from Note18
#define byte    ModeVal     // This parameter is represented from Note19
#define byte    WDTRstLDN    // This parameter is represented from Note20
#define byte    WDTRstReg    // This parameter is represented from Note21
#define byte    WDTRstBit    // This parameter is represented from Note22
#define byte    WDTRstVal    // This parameter is represented from Note23
**********************************************************************************
```

```
**********************************************************************************

VOID   Main(){
       // Procedure : AaeonWDTConfig
       // (byte)Timer : Time of WDT timer.(0x00~0xFF)
       // (boolean)Unit : Select time unit(0: second, 1: minute).
       AaeonWDTConfig();

       // Procedure : AaeonWDTEnable
        // This procudure will enable the WDT counting.
       AaeonWDTEnable();
}
**********************************************************************************
```

```
********************************************************************************
// Procedure : AaeonWDTEnable
VOID    AaeonWDTEnable (){
        WDTEnableDisable(EnableLDN, EnableReg, EnableBit, 1);
}


// Procedure : AaeonWDTConfig
VOID    AaeonWDTConfig (){
        // Disable WDT counting
        WDTEnableDisable(EnableLDN, EnableReg, EnableBit, 0);
        // Clear Watchdog Timeout Status
        WDTClearTimeoutStatus();
        // WDT relative parameter setting
        WDTParameterSetting();
}


VOID    WDTEnableDisable(byte LDN, byte Register, byte BitNum, byte Value){
        SIOBitSet(LDN, Register, BitNum, Value);
}


VOID    WDTParameterSetting(){
        // Watchdog Timer counter setting
        SIOByteSet(TimerLDN, TimerReg, TimerVal);
        // WDT counting unit setting
        SIOBitSet(UnitLDN, UnitReg, UnitBit, UnitVal);
        // WDT output mode setting, level / pulse
        SIOBitSet(ModeLDN, ModeReg, ModeBit, ModeVal);
        // Watchdog timeout output via WDTRST#
        SIOBitSet(WDTRstLDN, WDTRstReg, WDTRstBit, WDTRstVal);
}


VOID    WDTClearTimeoutStatus(){
        SIOBitSet(StatusLDN, StatusReg, StatusBit, 1);
}
********************************************************************************
```

```
*********************************************************************************
VOID    SIOEnterMBPnPMode(){
        IOWriteByte(SIOIndex, 0x87);
        IOWriteByte(SIOIndex, 0x87);
}


VOID    SIOExitMBPnPMode(){
        IOWriteByte(SIOIndex, 0xAA);
}


VOID    SIOSelectLDN(byte LDN){
         IOWriteByte(SIOIndex, 0x07); // SIO LDN Register Offset = 0x07
        IOWriteByte(SIOData, LDN);
}


VOID    SIOBitSet(byte LDN, byte Register, byte BitNum, byte Value){
        Byte TmpValue;

        SIOEnterMBPnPMode();
         SIOSelectLDN(byte LDN);
        IOWriteByte(SIOIndex, Register);
        TmpValue = IOReadByte(SIOData);
        TmpValue &= ~(1 << BitNum);
        TmpValue |= (Value << BitNum);
        IOWriteByte(SIOData, TmpValue);
        SIOExitMBPnPMode();
}


VOID    SIOByteSet(byte LDN, byte Register, byte Value){
        SIOEnterMBPnPMode();
         SIOSelectLDN(LDN);
        IOWriteByte(SIOIndex, Register);
         IOWriteByte(SIOData, Value);
         SIOExitMBPnPMode();
}
*********************************************************************************
```

Appendix B

I/O Information

B.1   I/O Address Map

```
∨  🖳 Input/output (IO)
      🗂 [0000000000000000 - 0000000000000CF7]  PCI Express Root Complex
      🗂 [0000000000000020 - 0000000000000021]  Programmable interrupt controller
      🗂 [0000000000000024 - 0000000000000025]  Programmable interrupt controller
      🗂 [0000000000000028 - 0000000000000029]  Programmable interrupt controller
      🗂 [000000000000002C - 000000000000002D]  Programmable interrupt controller
      🗂 [000000000000002E - 000000000000002F]  Motherboard resources
      🗂 [0000000000000030 - 0000000000000031]  Programmable interrupt controller
      🗂 [0000000000000034 - 0000000000000035]  Programmable interrupt controller
      🗂 [0000000000000038 - 0000000000000039]  Programmable interrupt controller
      🗂 [000000000000003C - 000000000000003D]  Programmable interrupt controller
      🗂 [0000000000000040 - 0000000000000043]  System timer
      🗂 [000000000000004E - 000000000000004F]  Motherboard resources
      🗂 [0000000000000050 - 0000000000000053]  System timer
      🗂 [0000000000000061 - 0000000000000061]  Motherboard resources
      🗂 [0000000000000063 - 0000000000000063]  Motherboard resources
      🗂 [0000000000000065 - 0000000000000065]  Motherboard resources
      🗂 [0000000000000067 - 0000000000000067]  Motherboard resources
      🗂 [0000000000000070 - 0000000000000070]  Motherboard resources
      🗂 [0000000000000070 - 0000000000000077]  System CMOS/real time clock
      🗂 [0000000000000080 - 0000000000000080]  Motherboard resources
      🗂 [0000000000000092 - 0000000000000092]  Motherboard resources
      🗂 [00000000000000A0 - 00000000000000A1]  Programmable interrupt controller
      🗂 [00000000000000A4 - 00000000000000A5]  Programmable interrupt controller
      🗂 [00000000000000A8 - 00000000000000A9]  Programmable interrupt controller
      🗂 [00000000000000AC - 00000000000000AD]  Programmable interrupt controller
      🗂 [00000000000000B0 - 00000000000000B1]  Programmable interrupt controller
      🗂 [00000000000000B2 - 00000000000000B3]  Motherboard resources
      🗂 [00000000000000B4 - 00000000000000B5]  Programmable interrupt controller
      🗂 [00000000000000B8 - 00000000000000B9]  Programmable interrupt controller
      🗂 [00000000000000BC - 00000000000000BD]  Programmable interrupt controller
      🗂 [00000000000000F0 - 00000000000000F0]  Numeric data processor
      🖵 [00000000000002E8 - 00000000000002EF]  Communications Port (COM4)
      🖵 [00000000000002F8 - 00000000000002FF]  Communications Port (COM2)
      🖵 [00000000000003B0 - 00000000000003BB]  Intel(R) HD Graphics 530
      🖵 [00000000000003C0 - 00000000000003DF]  Intel(R) HD Graphics 530
      🖵 [00000000000003E8 - 00000000000003EF]  Communications Port (COM3)
      🖵 [00000000000003F8 - 00000000000003FF]  Communications Port (COM1)
      🗂 [00000000000004D0 - 00000000000004D1]  Programmable interrupt controller
      🗂 [0000000000000680 - 000000000000069F]  Motherboard resources
```

[0000000000000680 - 000000000000069F]	Motherboard resources
[0000000000000800 - 000000000000087F]	Motherboard resources
[0000000000000A00 - 0000000000000A0F]	Motherboard resources
[0000000000000A10 - 0000000000000A1F]	Motherboard resources
[0000000000000A20 - 0000000000000A2F]	Motherboard resources
[0000000000000D00 - 000000000000FFFF]	PCI Express Root Complex
[000000000000164E - 000000000000164F]	Motherboard resources
[0000000000001800 - 00000000000018FE]	Motherboard resources
[0000000000001854 - 0000000000001857]	Motherboard resources
[000000000000E000 - 000000000000EFFF]	Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #9 - A118
[000000000000F000 - 000000000000F03F]	Intel(R) HD Graphics 530
[000000000000F000 - 000000000000F03F]	Intel(R) HD Graphics 630
[000000000000F000 - 000000000000F03F]	Intel(R) HD Graphics 630
[000000000000F040 - 000000000000F05F]	Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123
[000000000000F060 - 000000000000F07F]	Standard SATA AHCI Controller
[000000000000F080 - 000000000000F083]	Standard SATA AHCI Controller
[000000000000F090 - 000000000000F097]	Standard SATA AHCI Controller
[000000000000FF00 - 000000000000FFFE]	Motherboard resources
[000000000000FFFF - 000000000000FFFF]	Motherboard resources
[000000000000FFFF - 000000000000FFFF]	Motherboard resources
[000000000000FFFF - 000000000000FFFF]	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) 0x00000005 (05)    Intel(R) Ethernet Connection (2) I219-LM
    🖥 (ISA) 0x00000005 (05)    Intel(R) HD Graphics 630
    🖥 (ISA) 0x00000005 (05)    Intel(R) HD Graphics 630
    🖥 (ISA) 0x00000005 (05)    Intel(R) I211 Gigabit Network Connection
    🖥 (ISA) 0x00000008 (08)    System CMOS/real time clock
    🖥 (ISA) 0x0000000B (11)    Communications Port (COM3)
    🖥 (ISA) 0x0000000B (11)    Communications Port (COM4)
    🖥 (ISA) 0x0000000D (13)    Numeric data processor
    🖥 (ISA) 0x0000000E (14)    Motherboard resources
```

Appendix C

Electrical Specifications for I/O Ports

C.1   DIO Programming

BOXER-6640 utilizes FINTEK 81866 chipset as its Digital I/O 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.

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.(These three steps are the same as programming WDT)

C.2   DIO Register

Table 1 : SuperIO relative register table		
	Default Value	Note
Index	**0x2E**(Note1)	SIO MB PnP Mode Index Register 0x2E or 0x4E
Data	**0x2F**(Note2)	SIO MB PnP Mode Data Register 0x2F or 0x4F

Table 2 : Digital Input relative register table					
	LDN	Register	BitNum	Value	Note
DIO-1 Pin Status	**0x06**(Note3)	**0xA2**(Note4)	**0**(Note5)		GPIO50
DIO-2 Pin Status	**0x06**(Note6)	**0xA2**(Note7)	**1**(Note8)		GPIO51
DIO-3 Pin Status	**0x06**(Note9)	**0xA2**(Note10)	**2**(Note11)		GPIO52
DIO-4 Pin Status	**0x06**(Note12)	**0xA2**(Note13)	**3**(Note14)		GPIO53
DIO-5 Pin Status	**0x06**(Note15)	**0xA2**(Note16)	**4**(Note17)		GPIO54
DIO-6 Pin Status	**0x06**(Note18)	**0xA2**(Note19)	**5**(Note20)		GPIO55
DIO-7 Pin Status	**0x06**(Note21)	**0xA2**(Note22)	**6**(Note23)		GPIO56
DIO-8 Pin Status	**0x06**(Note24)	**0xA2**(Note25)	**7**(Note26)		GPIO57

Table 3 : Digital Output relative register table					
	LDN	Register	BitNum	Value	Note
DIO-1 Output Data	**0x06**(Note27)	**0xA1**(Note28)	**0**(Note29)	(Note30)	GPIO50
DIO-2 Output Data	**0x06**(Note31)	**0xA1**(Note32)	**1**(Note33)	(Note34)	GPIO51
DIO-3 Output Data	**0x06**(Note35)	**0xA1**(Note36)	**2**(Note37)	(Note38)	GPIO52
DIO-4 Output Data	**0x06**(Note39)	**0xA1**(Note40)	**3**(Note41)	(Note42)	GPIO53
DIO-5 Output Data	**0x06**(Note43)	**0xA1**(Note44)	**4**(Note45)	(Note46)	GPIO54
DIO-6 Output Data	**0x06**(Note47)	**0xA1**(Note48)	**5**(Note49)	(Note50)	GPIO55
DIO-7 Output Data	**0x06**(Note51)	**0xA1**(Note52)	**6**(Note53)	(Note54)	GPIO56
DIO-8 Output Data	**0x06**(Note55)	**0xA1**(Note56)	**7**(Note57)	(Note58)	GPIO57

C.3   DIO Sample Program

```
**********************************************************************************
// SuperIO relative definition (Please reference to Table 1)
#define byte    SIOIndex    //This parameter is represented from Note1
#define byte    SIOData     //This parameter is represented from Note2
#define    void    IOWriteByte(byte IOPort, byte Value);
#define    byte    IOReadByte(byte IOPort);
// Digital Input Status relative definition (Please reference to Table 2)
#define byte    DInput1LDN    // This parameter is represented from Note3
#define byte    DInput1Reg    // This parameter is represented from Note4
#define byte    DInput1Bit    // This parameter is represented from Note5
#define byte    DInput2LDN    // This parameter is represented from Note6
#define byte    DInput2Reg    // This parameter is represented from Note7
#define byte    DInput2Bit    // This parameter is represented from Note8
#define byte    DInput3LDN    // This parameter is represented from Note9
#define byte    DInput3Reg    // This parameter is represented from Note10
#define byte    DInput3Bit    // This parameter is represented from Note11
#define byte    DInput4LDN    // This parameter is represented from Note12
#define byte    DInput4Reg    // This parameter is represented from Note13
#define byte    DInput4Bit    // This parameter is represented from Note14
#define byte    DInput5LDN    // This parameter is represented from Note15
#define byte    DInput5Reg    // This parameter is represented from Note16
#define byte    DInput5Bit    // This parameter is represented from Note17
#define byte    DInput6LDN    // This parameter is represented from Note18
#define byte    DInput6Reg    // This parameter is represented from Note19
#define byte    DInput6Bit    // This parameter is represented from Note20
#define byte    DInput7LDN    // This parameter is represented from Note21
#define byte    DInput7Reg    // This parameter is represented from Note22
#define byte    DInput7Bit    // This parameter is represented from Note23
#define byte    DInput8LDN    // This parameter is represented from Note24
#define byte    DInput8Reg    // This parameter is represented from Note25
#define byte    DInput8Bit    // This parameter is represented from Note26
**********************************************************************************
```

```
*********************************************************************************
// Digital Output control relative definition (Please reference to Table 3)
#define byte    DOutput1LDN    // This parameter is represented from Note27
#define byte    DOutput1Reg    // This parameter is represented from Note28
#define byte    DOutput1Bit    // This parameter is represented from Note29
#define byte    DOutput1Val    // This parameter is represented from Note30
#define byte    DOutput2LDN    // This parameter is represented from Note31
#define byte    DOutput2Reg    // This parameter is represented from Note32
#define byte    DOutput2Bit    // This parameter is represented from Note33
#define byte    DOutput2Val    // This parameter is represented from Note34
#define byte    DOutput3LDN    // This parameter is represented from Note35
#define byte    DOutput3Reg    // This parameter is represented from Note36
#define byte    DOutput3Bit    // This parameter is represented from Note37
#define byte    DOutput3Val    // This parameter is represented from Note38
#define byte    DOutput4LDN    // This parameter is represented from Note39
#define byte    DOutput4Reg    // This parameter is represented from Note40
#define byte    DOutput4Bit    // This parameter is represented from Note41
#define byte    DOutput4Val    // This parameter is represented from Note42
#define byte    DOutput5LDN    // This parameter is represented from Note43
#define byte    DOutput5Reg    // This parameter is represented from Note44
#define byte    DOutput5Bit    // This parameter is represented from Note45
#define byte    DOutput5Val    // This parameter is represented from Note46
#define byte    DOutput6LDN    // This parameter is represented from Note47
#define byte    DOutput6Reg    // This parameter is represented from Note48
#define byte    DOutput6Bit    // This parameter is represented from Note49
#define byte    DOutput6Val    // This parameter is represented from Note50
#define byte    DOutput7LDN    // This parameter is represented from Note51
#define byte    DOutput7Reg    // This parameter is represented from Note52
#define byte    DOutput7Bit    // This parameter is represented from Note53
#define byte    DOutput7Val    // This parameter is represented from Note54
#define byte    DOutput8LDN    // This parameter is represented from Note55
#define byte    DOutput8Reg    // This parameter is represented from Note56
#define byte    DOutput8Bit    // This parameter is represented from Note57
#define byte    DOutput8Val    // This parameter is represented from Note58
*********************************************************************************
```

```
********************************************************************************
VOID  Main(){
     Boolean PinStatus ;

     // Procedure : AaeonReadPinStatus
     // Input :
     //       Example, Read Digital I/O Pin 3 status
     // Output :
     //       InputStatus :
     //               0: Digital I/O Pin level is low
     //               1: Digital I/O Pin level is High
     PinStatus = AaeonReadPinStatus(DInput3LDN, DInput3Reg, DInput3Bit);


     // Procedure : AaeonSetOutputLevel
     // Input :
     //       Example, Set Digital I/O Pin 6 level
     AaeonSetOutputLevel(DOutput6LDN, DOutput6Reg, DOutput6Bit, DOutput6Val);
}
********************************************************************************
```

```
********************************************************************************
Boolean   AaeonReadPinStatus(byte LDN, byte Register, byte BitNum){
      Boolean PinStatus ;

      PinStatus = SIOBitRead(LDN, Register, BitNum);
      Return PinStatus ;
}
VOID   AaeonSetOutputLevel(byte LDN, byte Register, byte BitNum, byte Value){
      ConfigToOutputMode(LDN, Register, BitNum);
      SIOBitSet(LDN, Register, BitNum, Value);
}
********************************************************************************
```

```
*********************************************************************************
VOID   SIOEnterMBPnPMode(){
       IOWriteByte(SIOIndex, 0x87);
       IOWriteByte(SIOIndex, 0x87);
}

VOID   SIOExitMBPnPMode(){
       IOWriteByte(SIOIndex, 0xAA);
}

VOID   SIOSelectLDN(byte LDN){
        IOWriteByte(SIOIndex, 0x07); // SIO LDN Register Offset = 0x07
       IOWriteByte(SIOData, LDN);
}

VOID   SIOBitSet(byte LDN, byte Register, byte BitNum, byte Value){
       Byte TmpValue;

       SIOEnterMBPnPMode();
        SIOSelectLDN(byte LDN);
       IOWriteByte(SIOIndex, Register);
       TmpValue = IOReadByte(SIOData);
       TmpValue &= ~(1 << BitNum);
       TmpValue |= (Value << BitNum);
       IOWriteByte(SIOData, TmpValue);
       SIOExitMBPnPMode();
}

VOID   SIOByteSet(byte LDN, byte Register, byte Value){
       SIOEnterMBPnPMode();
        SIOSelectLDN(LDN);
       IOWriteByte(SIOIndex, Register);
        IOWriteByte(SIOData, Value);
        SIOExitMBPnPMode();
}
*********************************************************************************
```

```
*********************************************************************************
Boolean   SIOBitRead(byte LDN, byte Register, byte BitNum){
       Byte TmpValue;

       SIOEnterMBPnPMode();
        SIOSelectLDN(LDN);
        IOWriteByte(SIOIndex, Register);
        TmpValue = IOReadByte(SIOData);
       TmpValue &= (1 << BitNum);
       SIOExitMBPnPMode();
       If(TmpValue == 0)
               Return 0;
       Return 1;
}
VOID   ConfigToOutputMode(byte LDN, byte Register, byte BitNum){
       Byte TmpValue, OutputEnableReg;

       OutputEnableReg = Register-1;
       SIOEnterMBPnPMode();
        SIOSelectLDN(LDN);
        IOWriteByte(SIOIndex, OutputEnableReg);
        TmpValue = IOReadByte(SIOData);
        TmpValue |= (1 << BitNum);
        IOWriteByte(SIOData, OutputEnableReg);
        SIOExitMBPnPMode();
}
*********************************************************************************
```