tBOX322-882-FL Series

Embedded System

User's Manual

RoHS

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. User should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause system to become damage

2. The tBOX322-882-FL does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

3. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

4. Disconnect the power cord from the tBOX322-882-FL before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the tBOX322-882-FL is properly grounded.

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

6. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

7. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40℃ or above 80℃. It may damage the equipment.

8. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

   ■ Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.

   ■ When handling boards and components, wear a wrist-grounding strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against the ingress of water: IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
4. Mode of operation: Continuous

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.
2. Turn the system off before you start to clean up the component or computer.
3. Never drop the components inside the computer or get circuit board damp or wet.
4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.
5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.
- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.
- Vacuum cleaner: Absorb the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.
- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

NOTE: We strongly recommended that you should shut down the system before you start to clean any single components.

Please follow the steps below:
1. Close all application programs
2. Close operating software
3. Turn off power switch
4. Remove all device
5. Pull out power cable

Scrap Computer Recycling

If the computer equipments need the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

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Table of Contents

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the tBOX322-882-FL. The Chapter 1 includes the following sections:

- General Description
- System Specification
- Dimensions
- I/O Outlets
- Package List

1.1   General Description

The tBOX322-882-FL is an embedded system that supports onboard 4th Gen. Intel® Core™ i3 or 4th Gen. Intel® Core™ i7 processor, to provide Windows® 7, Windows® 8, Windows® Embedded and Linux, suitable for the most endurable operation. It features fanless design with full feature I/O, supports onboard 4GB/8GB DDR3L memory, and enhanced system dependability by built-in Watchdog Timer.

- **Features**
  - 4th Gen. Intel® Core™ i3 or Intel® Core™ i7 (15W) processor onboard
  - High performance DDR3L-1600 4/8 GB memory onboard
  - EN50155, EN50121 ceritificate
  - Fanless operating temperature range of -40°C ~ +70°C (EN50155 class TX)
  - Isolated RS-232/422/485 and DIO
  - Support USB 3.0 and SATA3
  - 1x removable & lockable 2.5" SATA HDD and 1x CFast™
  - 3x internal PCI Express Mini Card slot and 2x SIM slot
  - Lockable I/O interface and M12 LAN, audio, power and USB connector
  - Comply to fire protection of railway vehicles Europe standard PrCEN TS 45545-2
  - Suspension design for HDD

- **Reliable and Stable Design**
  - The tBOX322-882-FL adopts the advanced cooling system and supporting the CFast™, which makes it especially suitable for vibration environments, best for mobility control unit, passenger information system, video surveillance and many more applications.

- **Embedded O.S. Supported**
  - The tBOX322-882-FL not only supports Windows® 7, but also supports embedded OS, such as Windows® 7/8 Embedded, WinCE and Linux. For storage device, the tBOX322-882-FL support one 2.5" SATA HDD drive bay, and one CFast™ slot.

1.2   System Specifications

1.2.1   CPU

- **CPU**
  - Onboard 4th Gen. Intel® Core™ i3-4010U processor (1.7 GHz)
  - Onboard 4th Gen. Intel® Core™ i7-4650U processor (1.7GHz, up to 3.3GHz)
- **BIOS**
  - American Megatrends Inc. BIOS.
  - "Load Optimized Default" to backup customized Setting in the BIOS flash chip to prevent from CMOS battery fail
- **System Memory**
  - Onboard 4/8GB DDR3L-1600 Memory
- **Graphics**
  - Integrated in the Intel® HD Graphics 4400/5000 for HDMI, DVI-I

1.2.2   System I/O

- **2x 10/100/1000Mbps Ethernet (M12 female A-coded) (Intel® I210IT)**
- **2x isolated RS-232/422/485**
- **1x isolated DI/DO (6-IN/2-OUT)**
- **2x USB 2.0 (rear side) (M12 connector)**
- **2x USB 3.0 (front side)**
- **1x audio (Mic-in/Line-out) (M12 or screw type)**
- **1x HDMI (fixable)**
- **1x DVI-I**
- **1x VDC power input connector (M12 connector)**
- **1x reset switch**
- **1x power switch**
- **4x antenna opening**

1.2.3   System Specification

- **Watchdog Timer**
  - Reset supported; 255 levels, 0~255 sec.
- **Power Supply**
  - 14~32 VDC-in power supply (Typical: 24V)
  - Power Rate:14-32VDC, 1.8A@24Vdc
- **Operation Temperature**
  - -40℃ ~ 70℃ (- 40ºF ~ 158ºF) W/T SSD
  - -25℃ ~ 55℃ (- 13ºF ~ 131ºF) W/T HDD
- **Storage Temperature**
  - -40℃ ~ 80℃ (- 40ºF ~ 176ºF)
- **Humidity**
  - 5% ~ 95% (non-condensation)

- **Vibration Endurance**
    - 3Grms w/ SSD,CFast (5 ~ 500Hz, X, Y, Z directions)
    - 3Grms w/ HDD (5-500Hz, X, Y, Z directions)
- **Weight**
    - 2.94 kg (6.48 lb) without package
    - 3.94 kg (8.68 lb) with package
- **Dimensions**
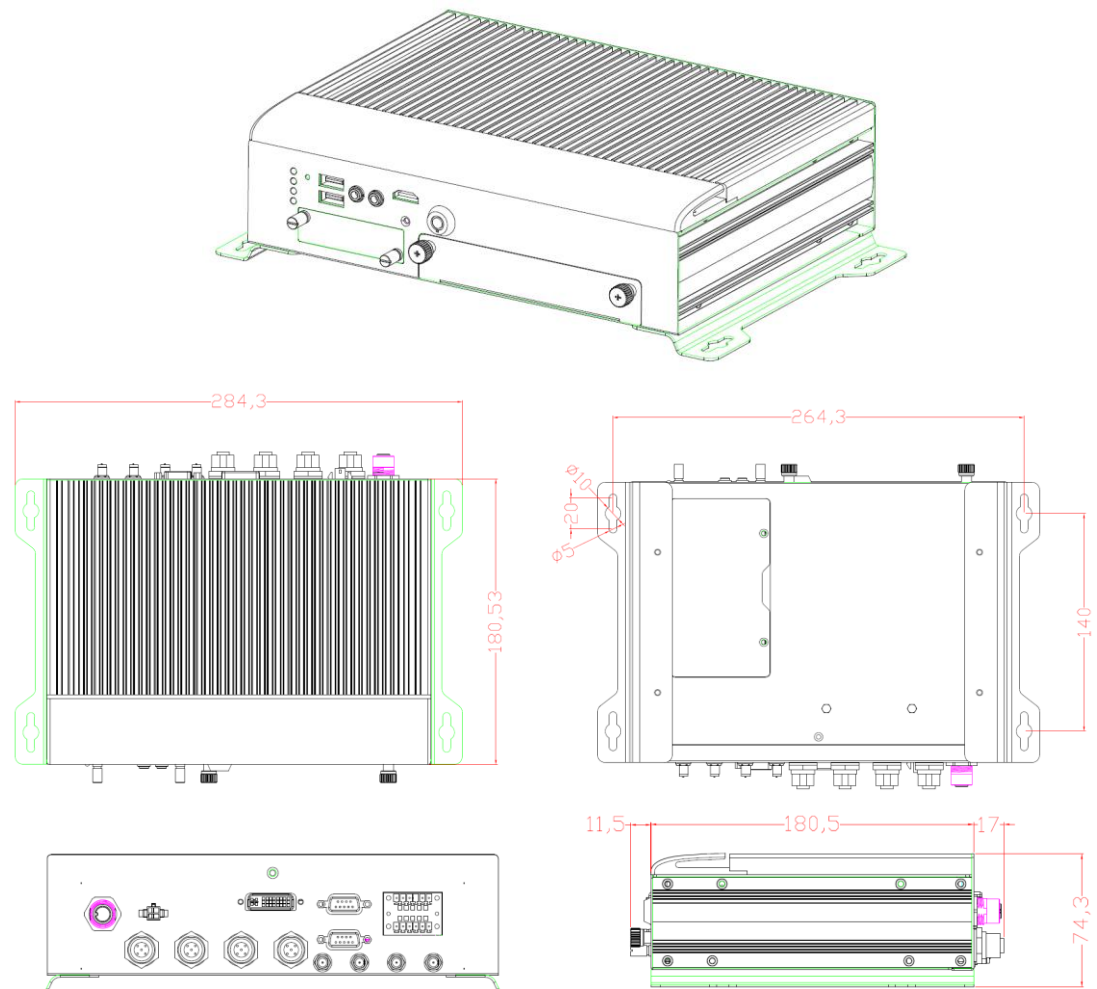   - 244mm (9.6") (W) x 180.5mm (7.1") (D) x 65.1mm (2.56") (H)

NOTE: All specifications and images are subject to change without notice.

1.2.4 Driver CD Content

- **Chipset Driver**
- **Graphic Drivers**
- **Audio Drivers**
- **Ethernet Driver**
- **User Manual**
- **Quick Manual**

1.3 Dimensions

The following diagrams show you dimensions and outlines of the tBOX322-882-FL.
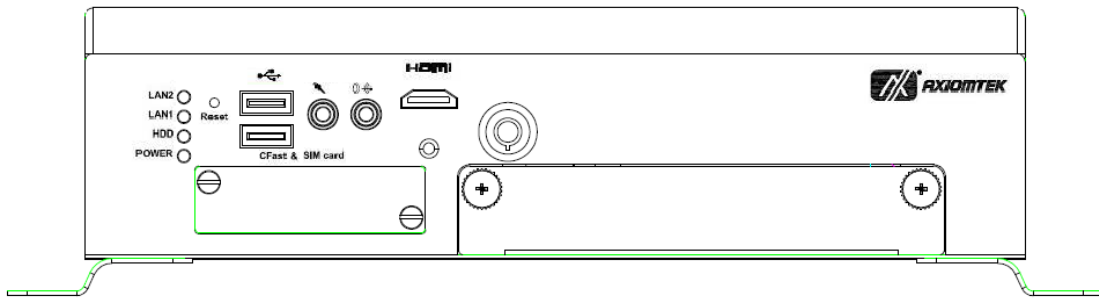
1.4   I/O Outlets

The following figures show you I/O outlets on front view of the tBOX322-882-FL.

●   **Front View**

●   **Front View drawing**

●   **Rear View**

●   **Rear View drawing**
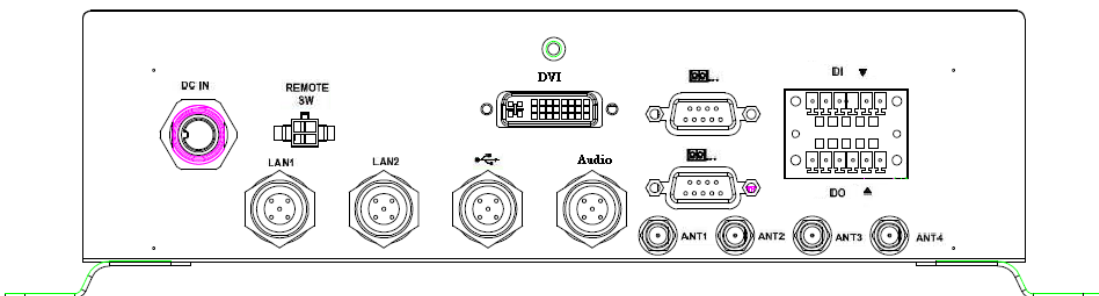
1.5   Packing List

The package bundled with your tBOX322-882-FL should contain the following items:

● **tBOX322-882-FL System Unit x 1**
● **tBOX322-882-FL Quick Manual x 1**
● **DVD disc x 1 (For Driver and User's Manual)**
● **Screws pack**
● **Foot pad x4**
● **Wall-mount kit**
● **HDMI bracket**
● **Cable tie x2**
● **DIO & Serial connector**
● **HDD/SSD (optional)**
● **CFast (optional)**
● **Remote switch cable (optional)**
● **Express Mini Card Module (optional)**

If you can not find this package or any items are missing, please contact Axiomtek distributors immediately.

CHAPTER 2
HARDWARE INSTALLATION

The tBOX322-882-FL is convenient for your various hardware configurations, such as HDD (Hard Disk Drive), CFast^{TM} card and Express Mini Card. The chapter 2 will show you how to install the hardware.

2.1   Installing the swappable HDD/SSD or CFast Card

Step 1   **Turn off the system, and unplug the power cord. Unlock screw counterclockwise on the front side as shown.**

Step 2   **Assemble the HDD/SSD bracket together with a SATA HDD/SSD, then fasten the screws on the both side**

Step 3   **Slide CFast card into slot cautiously.**

Step 4   **Fasten screws of HDD/CFast bracket**

2.2 Installing the Express Mini Card and SIM card

Step 1   Turn off the system, and unplug the power cord.

Step 2   Turn the system upside down to locate screws at the bottom, loosen screws to remove the bottom cover.
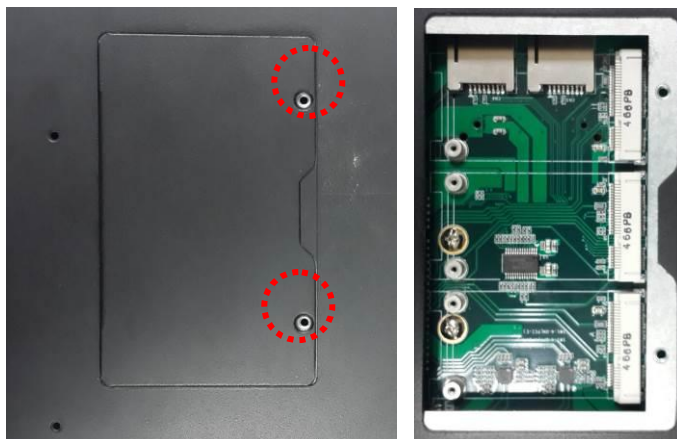
Two slots contain an internal SIM card slot which can support 3G modules.

Step 3   Slide Mini card into slot cautiously.

Step 4   Slide SIM card into slot cautiously.
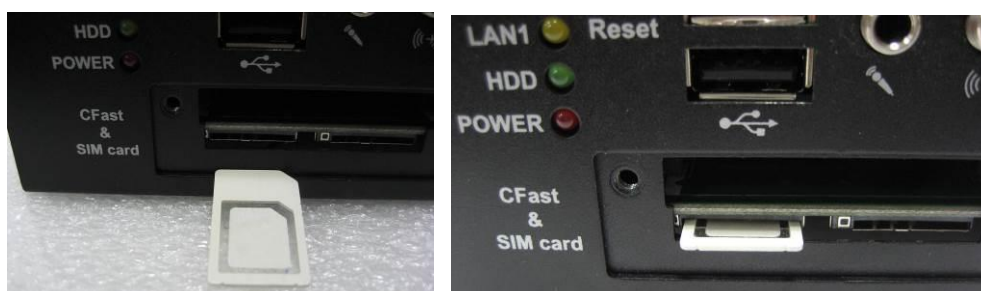
Step 5   Close the cover to the chassis, and fasten all screws.

2.3   Installing the HDMI bracket

Step 1   **Fasten the bracket at the position as shown.**

Step 2   **Connect HDMI cable and tied on bracket by cable tie as shown.**

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CHAPTER 3
JUMPER SETTING & CONNECTOR

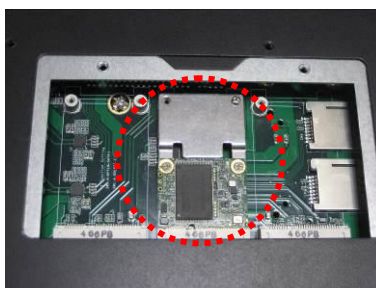## 3.1   mSATA/CFast Setting

Step 1   **Turn off the system, and unplug the power cord.**

Step 2   **Turn the system upside down to locate screws at the bottom, loosen screws to remove the bottom cover.**

Step 3   **Find the switch next to the PCIe slot.**
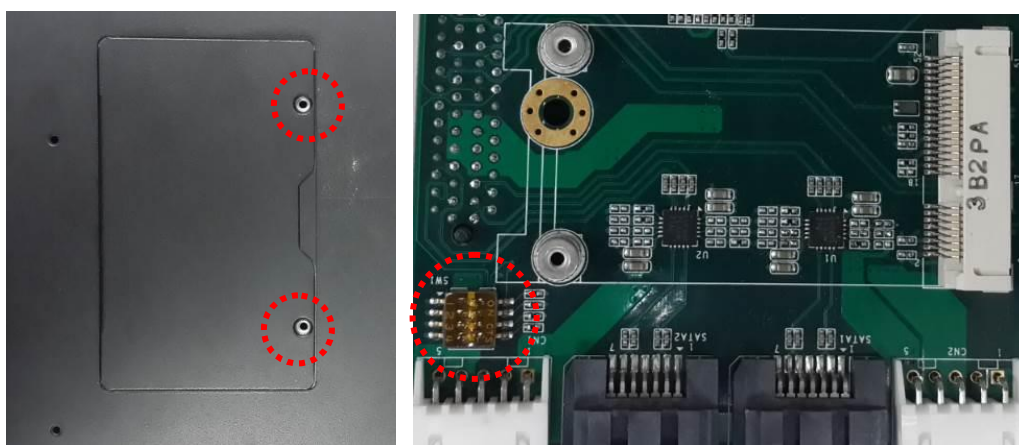
Step 4   **Change dip switch SW1 on AX93708 to select either mSATA(Only for J1) or CFast.**

SW1 setting	Function
SW1-4 OFF (marked 1234)	mSATA(Only for J1)
SW1-4 ON (marked ON)	CFast+Mini Card(USB+PCIe) (Default)

3.2 Connectors

Connectors connect the main board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected.

3.2.1 DVI-I Connector

DVI-I connector commonly is used for a monitor.

Pin	Signal	Pin	Signal
1	TMDS Data 2-	2	TMDS Data 2+
3	GND	4	CRT_SPD_Clock
5	CRT_SPD_Data	6	DV_SPD_Clock
7	DVI_SPD_Data	8	Analog Vsync
9	TMDS Data 1-	10	TMDS Data 1+
11	GND	12	N.C
13	N.C.	14	+5V
15	GND	16	Hot Plug Detect
17	TMDS Data 0-	18	TMDS Data 0+
19	GND	20	N.C
21	N.C	22	GND
23	TMDS Clock-	24	TMDS Clock+
C1	Analog RED	C2	Analog Green
C3	Analog Blue	C4	Analog Hsync
C5	GND		
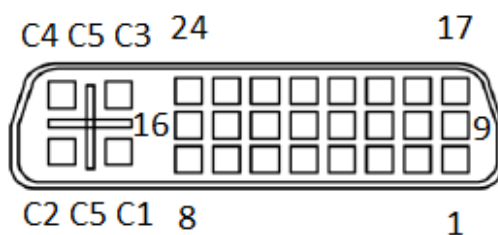
3.2.2 Serial Port Connector

The COM1~COM2 port connector is a terminal block. The pin assignment of RS-422/RS-485 is listed on the following table. If you need COM port to support RS-422 or RS-485, please selection to the BIOS items.

Pin	RS-232	RS-422	RS-485
1	DCD, Data carrier detect	TX-	Data-
2	RXD, Receive data	TX+	Data+
3	TXD, Transmit data	RT+	NC
4	DTR, Data terminal ready	RX-	NC
5	GND, ground	GND, ground	GND, ground
6	DSR, Data set ready	NC	NC
7	RTS, Request to send	NC	NC
8	CTS, Clear to send	NC	NC
9	RI, Ring indicator	NC	NC
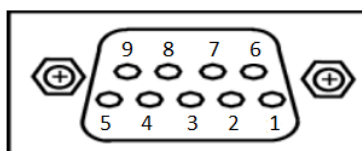
3.2.3 USB3.0 Stack Ports

Pin	Signal USB Port 0	Pin	Signal USB Port 6
1	USB_VCC (+5V level standy power)	10	USB_VCC (+5V level standby power)
2	USB_Data2-	11	USB_Data3-
3	USB_Data2+	12	USB_Data3+
4	GND	13	GND
5	SSRX2-	14	SSRX3-
6	SSRX2+	15	SSRX3+
7	GND	16	GND
8	SSTX2-	17	SSTX3-
9	SSTX2+	18	SSTX3+
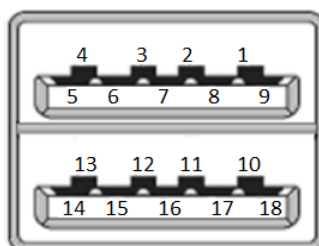
3.2.4   LED Indicators

LED Indicator	Function
Green	LAN 2 activation
Green	LAN 1 activation
Green	SATA HDD activation
Green	System power on
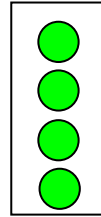
3.2.5   DC Power Input connector

The DC power input connector is M12 A-code Male 5Pin connector

Pin	Signal
1	VCC
2	VCC
3	System GND
4	System GND
5	Chassis GND
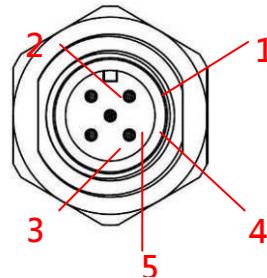
3.3.6   M12 LAN Connector (LAN1,2)

The M12-8pin LAN Connector is A-Code type which can support 10/100/1000Mbps

Pin	10/100 Mbps	1000 Mbps
1	--	MDI 2+
2	--	MDI 3+
3	--	MDI 3-
4	TX -	MDI 0-
5	RX +	MDI 1+
6	TX +	MDI 0+
7	--	MDI 2 -
8	RX -	MDI 1 -
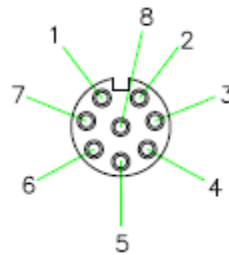
M12-A Code 8Pin/ Female

NOTE: The M12-8pin type LAN connector pin define may difference with other device.

3.2.7 Digital I/O Connector

The tBOX322-882-FL supports an isolated 6-in/2-out Digital I/O (DIO)

Pin	Signal	Pin	Signal
7	DO_COM+	1	DI 0
8	DO 0	2	DI 1
9	DO 1	3	DI 2
10	DO_COM-	4	DI 3
11	DIO_GND (For DI)	5	DI 4
12	DI_COM (For DI)	6	DI 5
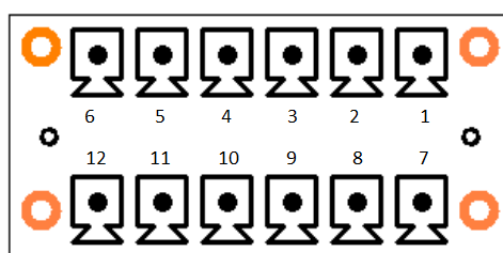
NOTE: Please refer to Appendix B for more information about Digital I/O

3.2.8 M12 USB 2.0 Connector

The DC power input connector is M12 A-code Male 5Pin connector

Pin	Signal	Pin	Signal
1	VCC	5	VCC
2	D-	6	D-
3	D+	7	D+
4	GND	8	GND
Shell	CHS GND		
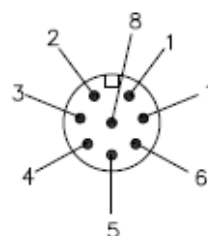
3.2.9 M12 Audio Connector

The audio connector is M12 D-code female 5P-in connector

Pin	Signal
1	Line Out - L
2	Line Out - R
3	Mic In - L
4	Mic In - R
5	Audio - GND

D12D—M205HSR

3.2.10 PCI-Express Mini Card Connector

The PCI Express Mini Card connectors are with support for a PCI Express x1 link and a USB 2.0 link. The PCI Express Mini Card can be applied to either PCI Express or USB 2.0. The USB 2.0 support will be helpful during the transition to PCI Express, because peripheral vendors will need time to design their chipsets to have the PCI Express function. During the transition, PCI Express Mini Cards can be quickly implemented by using USB 2.0.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	+3.3VSB
21	GND	22	PERST#
23	PE_RXN4	24	+3.3VSB
25	PE_RXP4	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN4	32	SMB_DATA
33	PE_TXP4	34	GND
35	GND	36	USB_D3-
37	GND	38	USB_D3+
39	+3.3VSB	40	GND
41	+3.3VSB	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	No use	46	LED_WPAN#
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
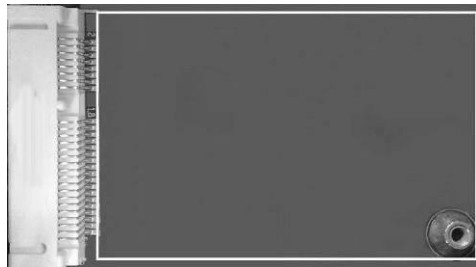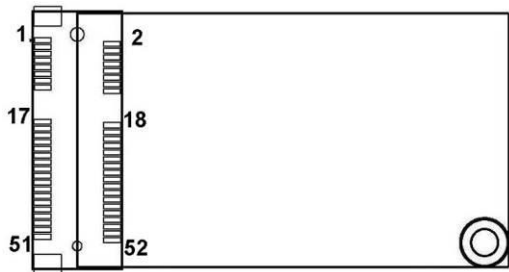
A PCI Express Mini Card can be applied to either PCI Express or USB 2.0. The USB 2.0 support will be helpful during the transition to PCI Express, because peripheral vendors will need time to design their chipsets to have the PCI Express function. During the transition, PCI Express Mini Cards can be quickly implemented by using USB 2.0.
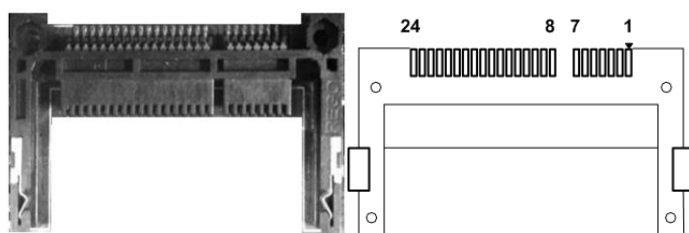
3.2.11 CFast™ Socket

The tBOX322-882-FL is equipped with a CFast^{TM} socket on the solder side to support an SATA interface CFast^{TM} disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CFast^{TM} disk card. When installing or removing the CFast^{TM} disk card, please make sure the system power is off.

Pin	Description	Pin	Description
1	GND	13	N.C
2	SATA_TX+	14	GND
3	SATA_TX-	15	N.C
4	GND	16	CFAST_LED#
5	SATA_RX-	17	N.C
6	SATA_RX+	18	N.C
7	GND	19	N.C
8	N.C	20	+3.3V Level
9	GND	21	+3.3V Level
10	N.C	22	GND
11	N.C	23	GND
12	N.C	24	N.C

3.2.12 Remote switch Connector

Remote switch is ideal for a remote botton which can act as an ATX power on/off button.

Pin	Signal	Description
1	NC	
2	Switch Signal	Low Active. Act as PC's ATX switch when external switch installed (Pin 3 Active) ****Internal pull up resister did not connect to any power source**
3	Ext. SW Sensor	Low Active. To detect external power swtich install or not. **** Internal pull up resister did not connect to any power source**
4	GND	
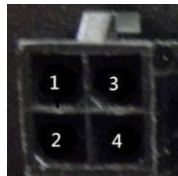
3.2.13 HDD tray locker

Lock and secure the swappable HDD/SSD bay.

Stauts	Diagram
Unlocked	
Locked	

CHAPTER 4
AMI BIOS Setup Utility

This chapter introduces you with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1   Starting

To enter the setup screens, follow the steps below:
1.   Turn on the computer and press the <Del> key immediately.
2.   After pressing the <Delete> key, the main BIOS setup menu displays. You can access to other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.
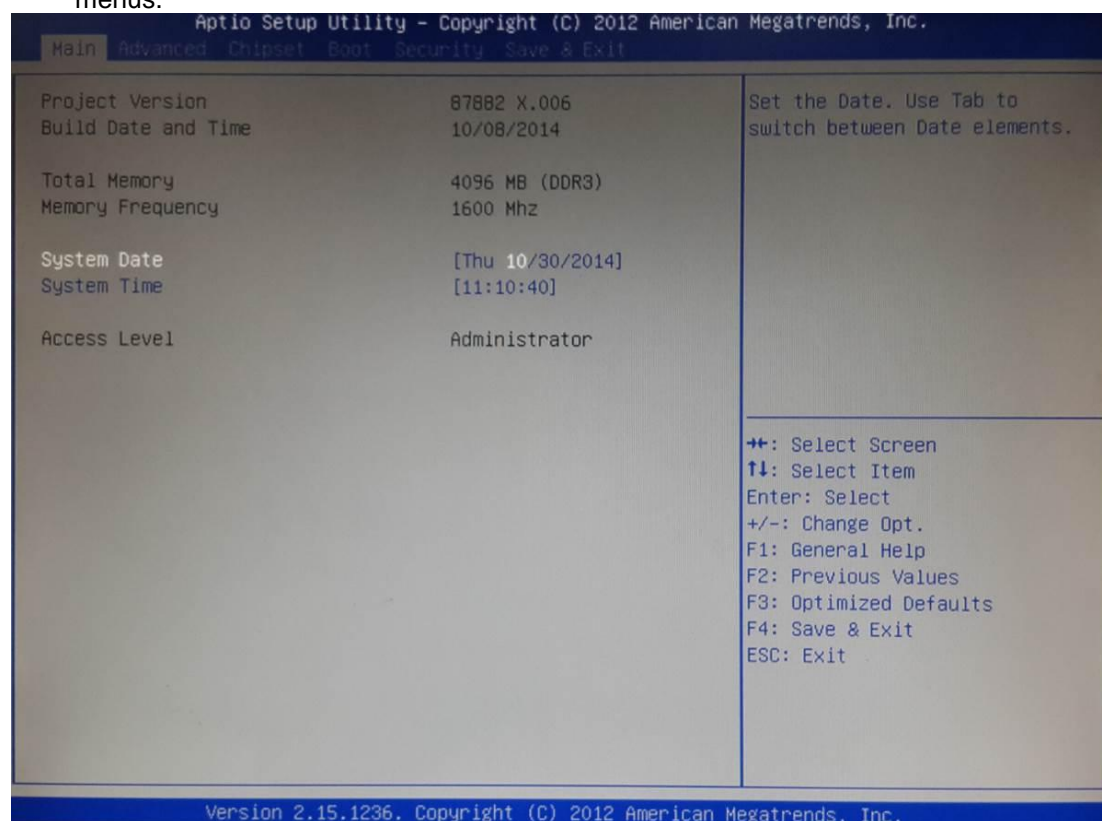
4.2   Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.
These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.

NOTE: Some of navigation keys differ from one screen to another.

Hot Keys	Description
← **Left/Right**	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ **Up/Down**	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F10	The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3   Main Menu
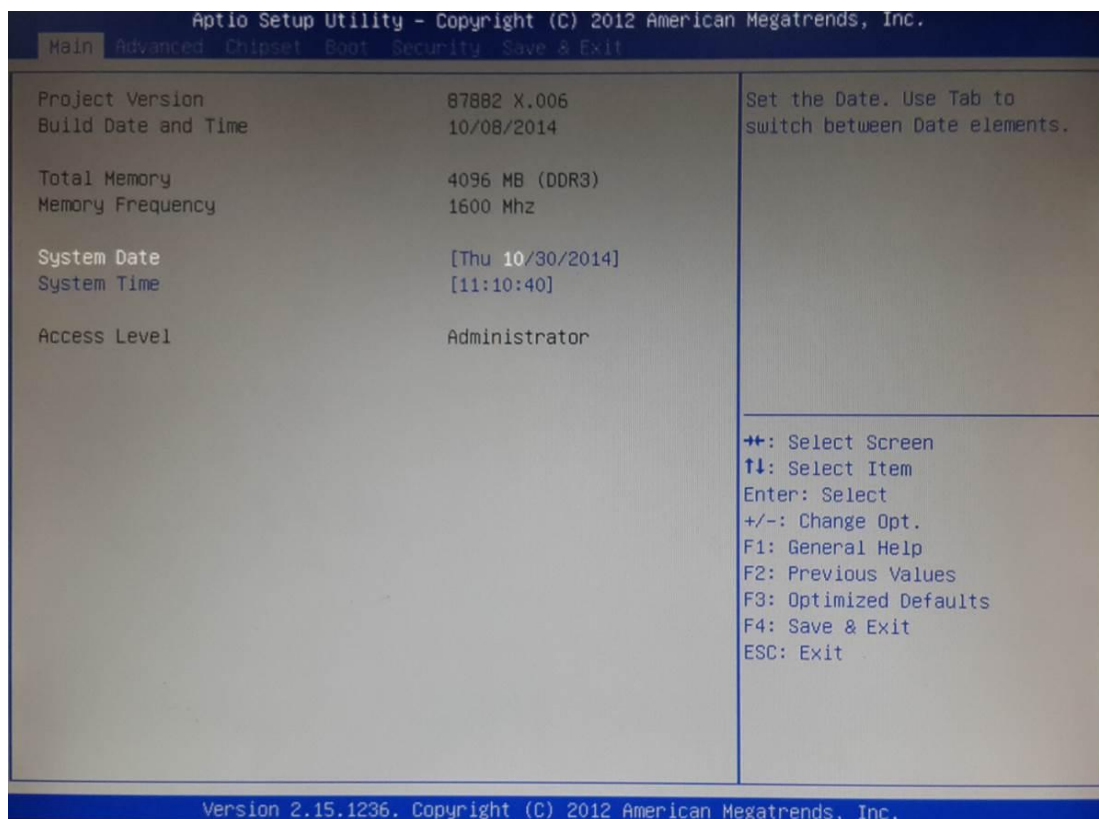
System Time/Date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

4.4   Advanced Menu

The Advanced menu allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

HIDDEN PROMPT:

This option is able to display advanced menu for further configuration setup while it showed.

►   **CPU Configuration**

►   **SATA Configuration**

►   **Super IO Configuration**

►   **H/W Monitor**

For items marked with "►", please press <Enter> for more options.

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

 HIDDEN PROMPT                      [HIDDEN]              HIDDEN PROMPT
 ▶ CPU Configuration
 ▶ SATA 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



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

CPU Configuration

This option shows the CPU configuration.
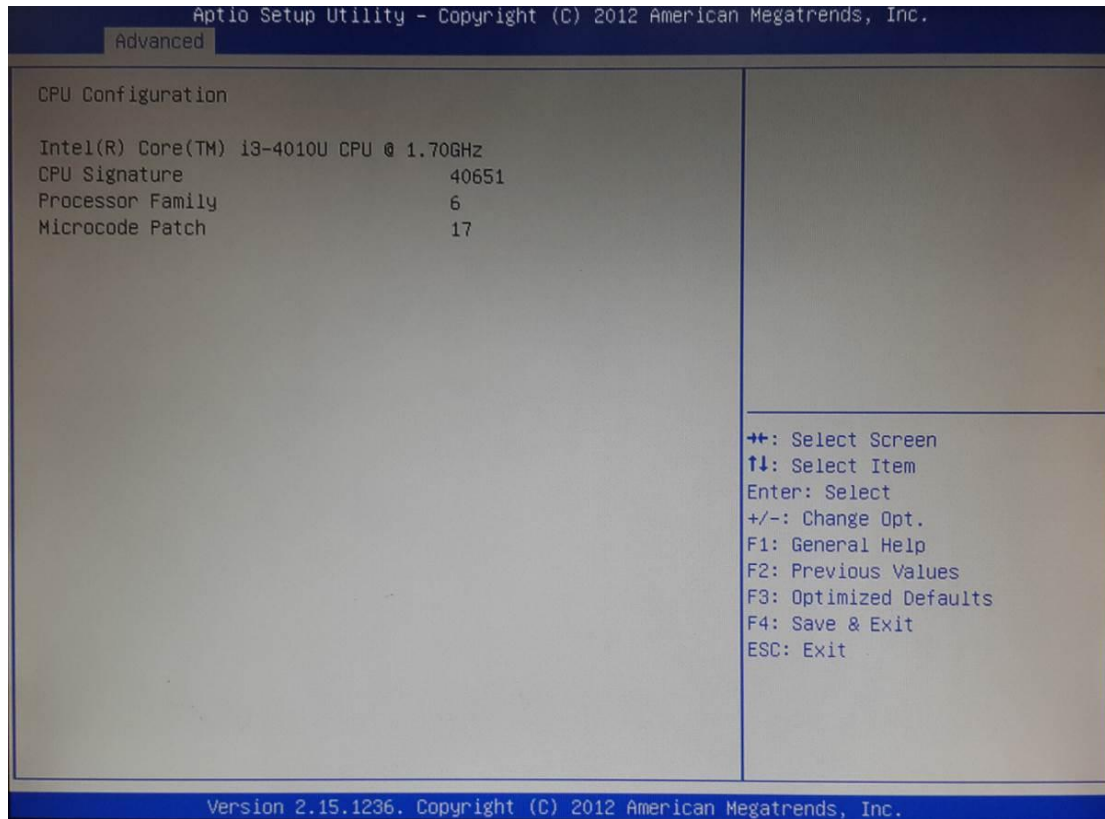
SATA Configuration

This option shows the SATA connection configuration.
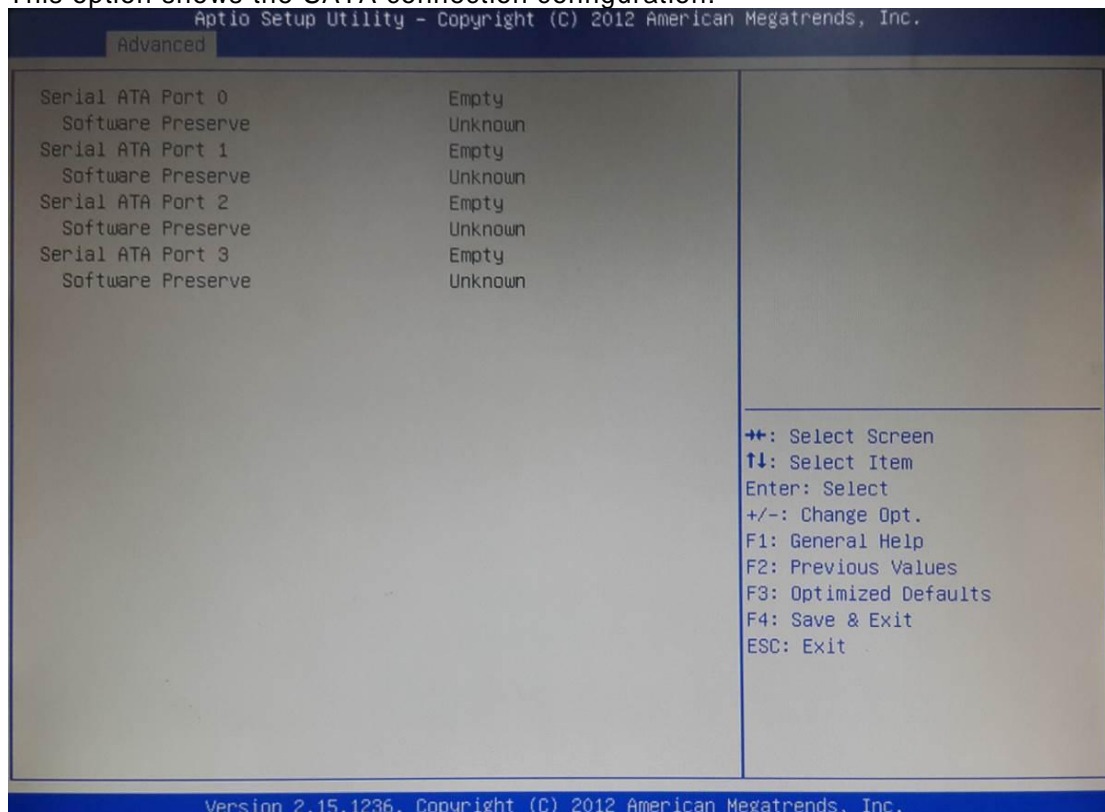
Super I/O Configuration

This option provides you to switch the COM port settings.
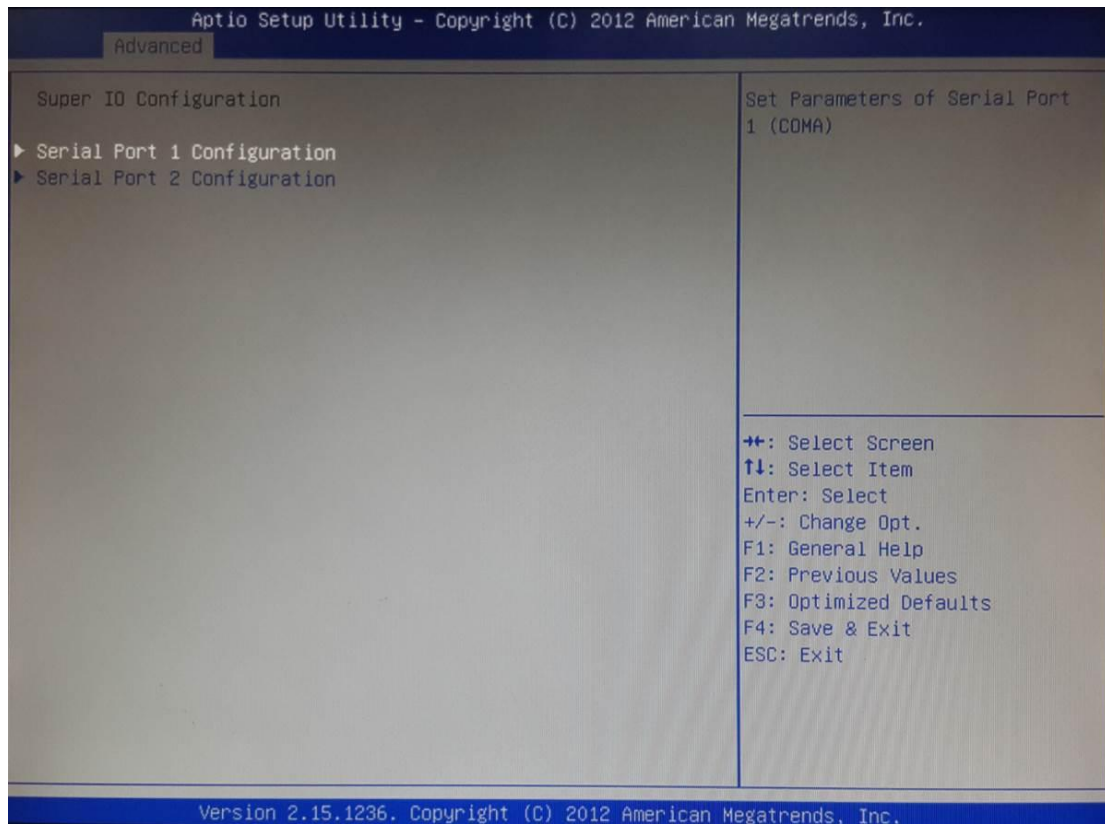
Serial Port 1-2 Configuration:

Serial Port:

This option is used to enable or disable the serial port.

Device Settings:

This item specifies the base I/O port address and Interrupt request address of serial port.

Select Mode:

This option is for RS232/RS422/RS485 slection.

H/W Monitor

This option shows hardware health configuration.
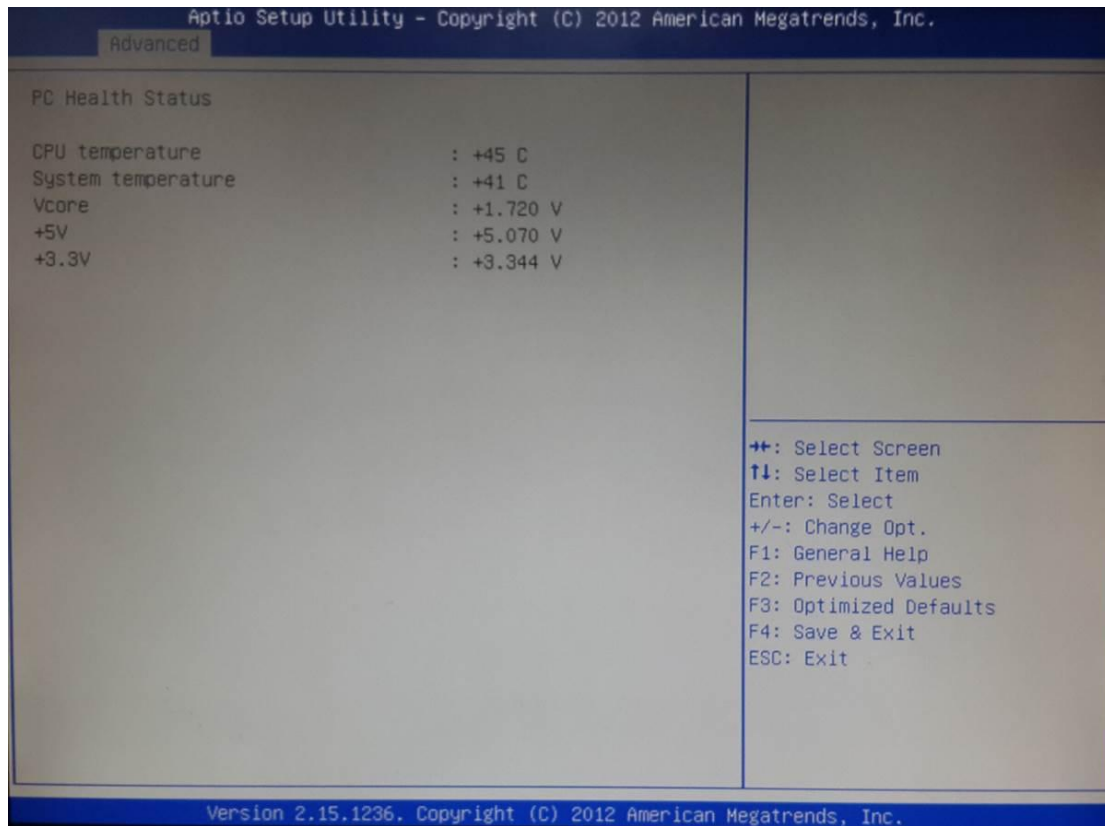
4.5   Chipset Menu

The chipset menu allows users to change advanced chipset settings.

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

  ▶ PCH-IO Configuration                            PCH Parameters




                                                  ↔: 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.
```
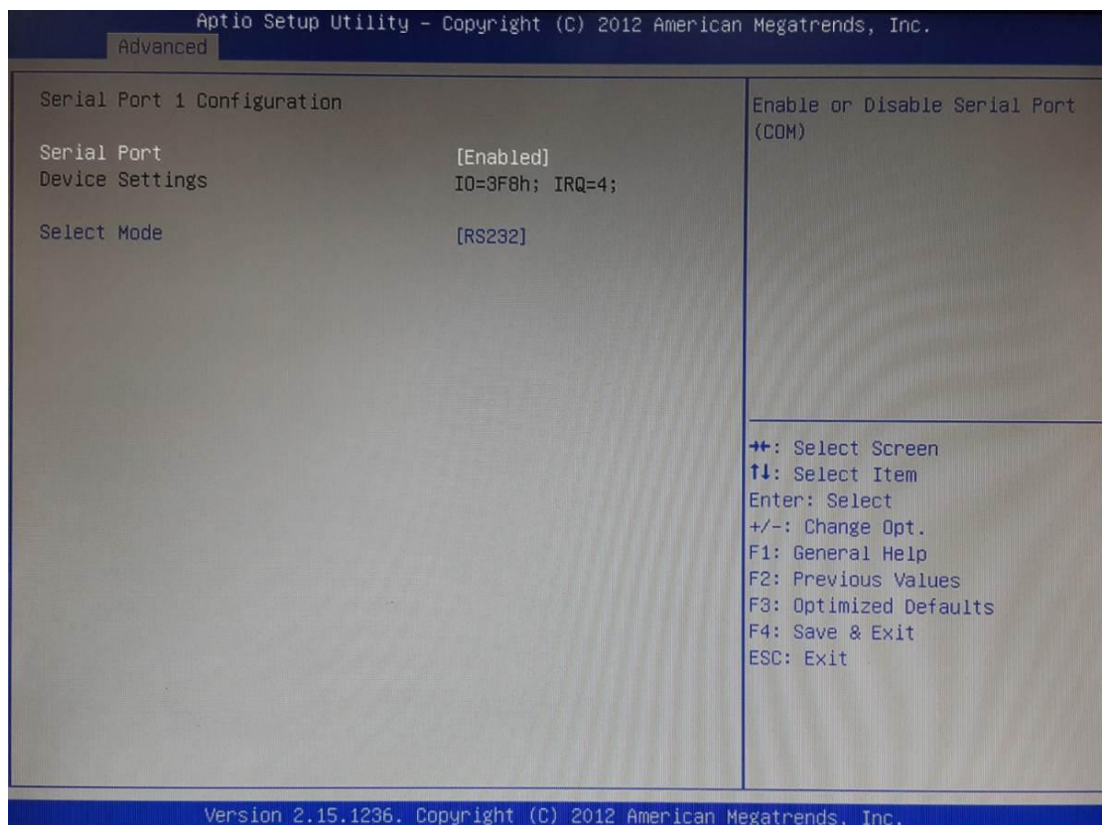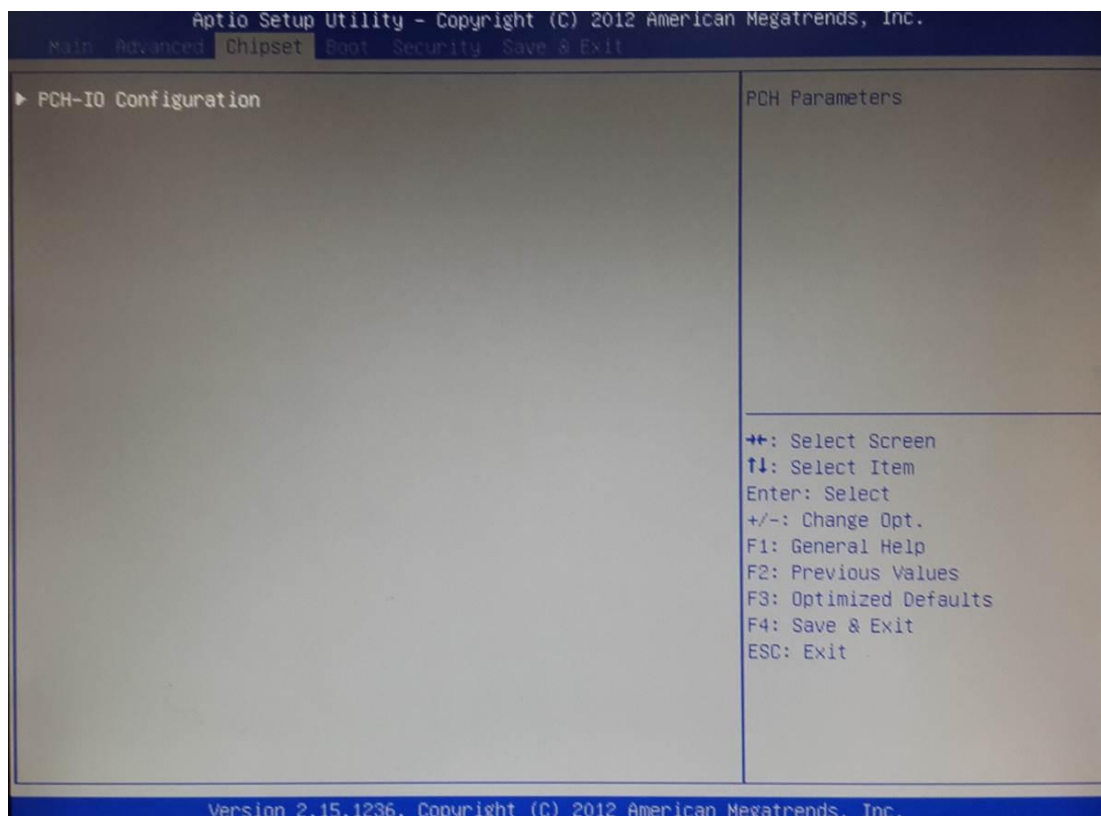
PCH-IO Configuration

This option provides you advanced PCI Express and USB configuration settings.
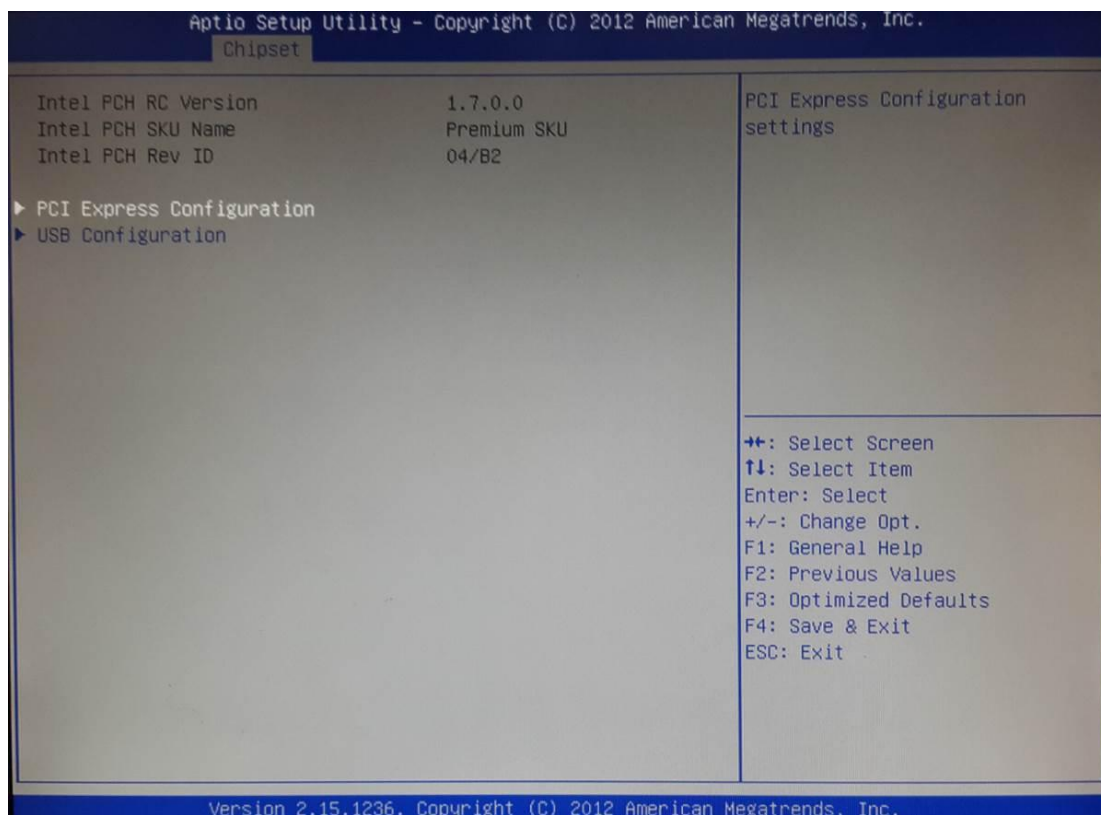
PCI Express Configuration.

This option provides you PCI Express root port 1-6 settings.

USB Configuration

This option provides you XHCI mode settings.

4.6   Boot Menu

The boot menu allows users to change system boot options. You may select items in the left frame that in order to enter advanced settings.
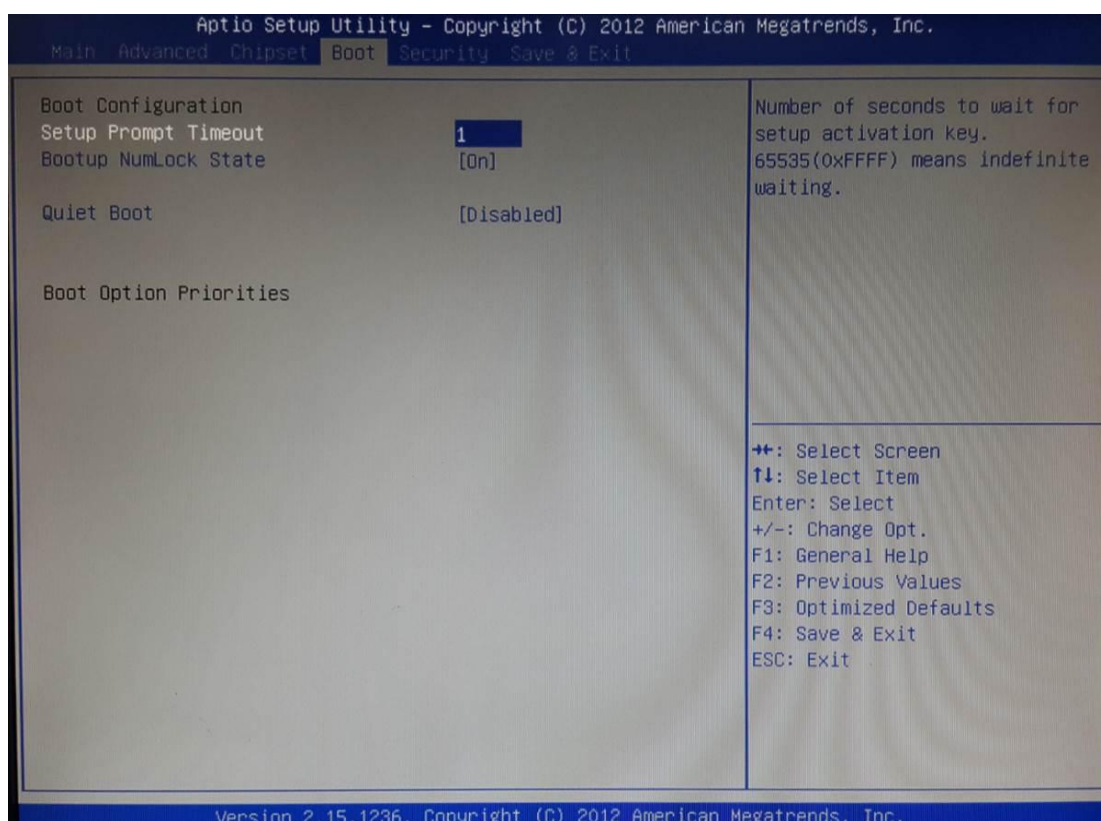
Setup Prompt Timeout

Set the timeout for idle time of booting post while system power on.

Bootup NumLock State

This option provides NumLock activation while system power on, the default setting is on.

Quiet Boot

A switch of quiet boot, the default setting is disable.

4.7　　　Security Menu

The security menu allows users to change the security settings for the system.

```
            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
   Administrator Password                           Enter: Select
   User Password                                    +/-: 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.
```
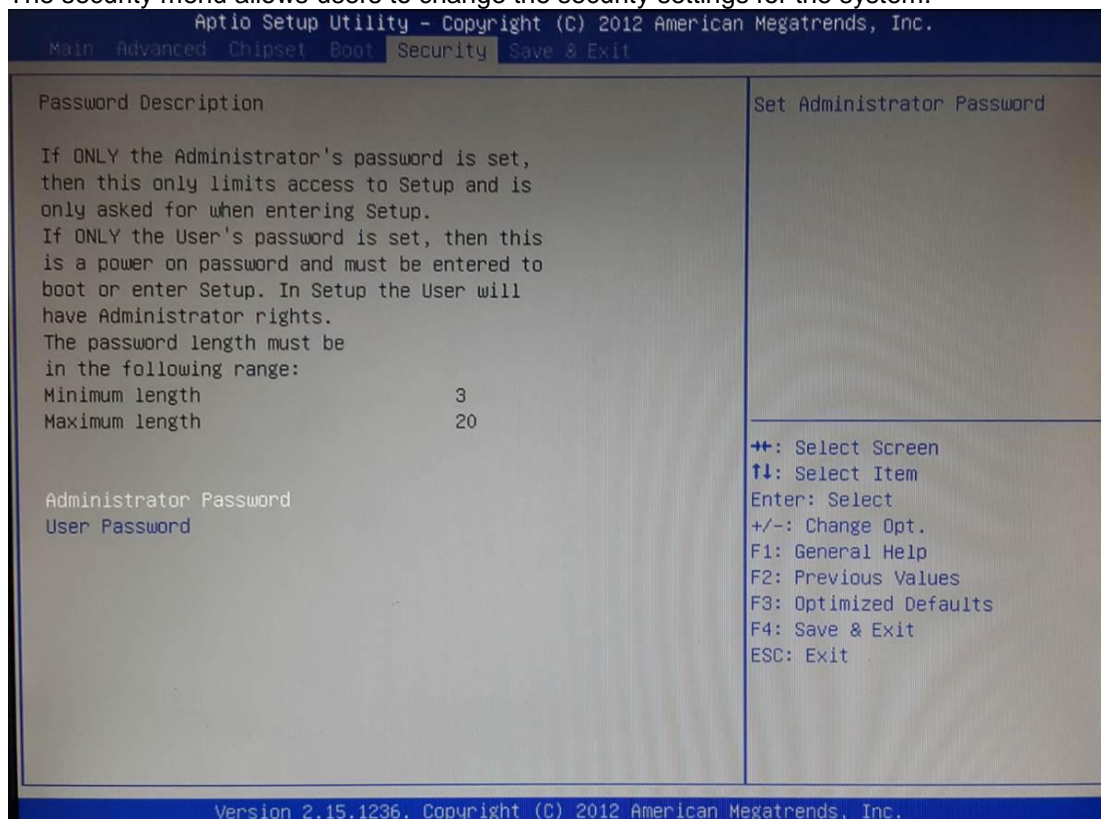
Administrator Password

This item indicates whether a supervisor password settings. It shows "Installed" if the password was set, otherwise, "Not Installed" is instead of it.

User Password

This item indicates whether a user password settings. It shows "Installed" if the password was set, otherwise, "Not Installed" is instead of it.

4.8 Save & Exit Menu

The Exit menu allows users to load the system configuration with optimal or failsafe default values.
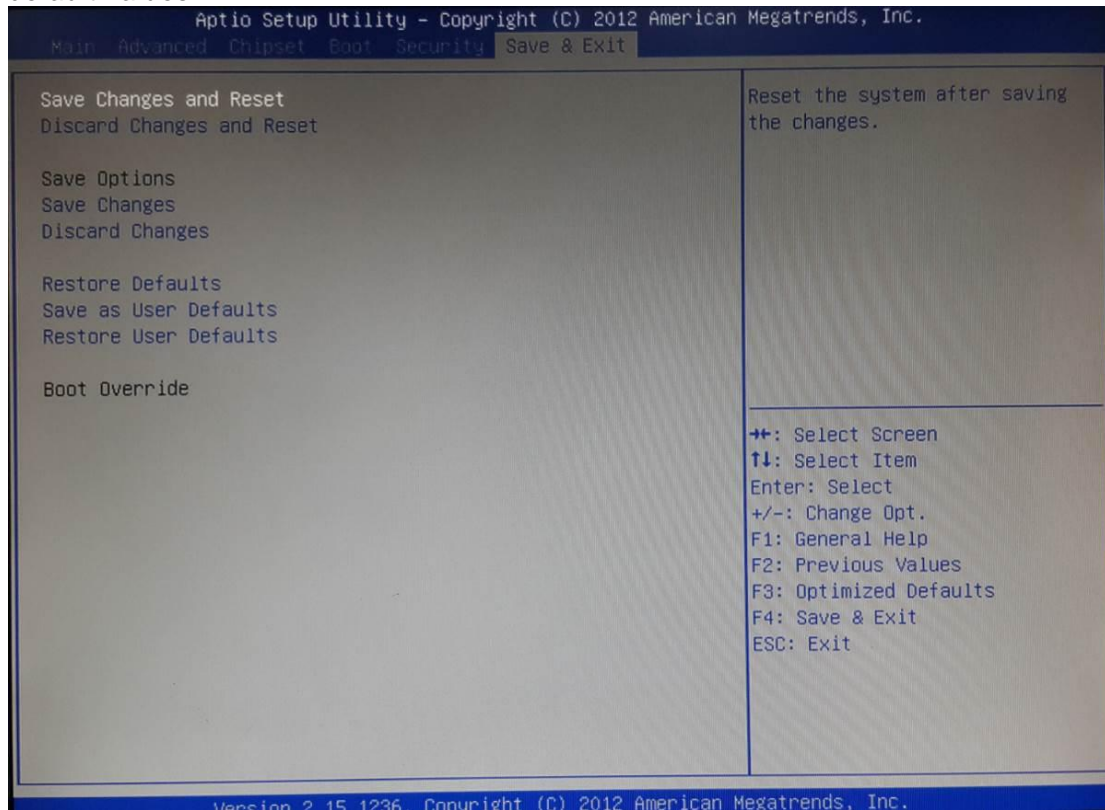
Save Changes and Reset

When you have completed the system configuration changes, select this option to save changes and quit setup, then, reboot the system, the new settings will be activated.
Select *Save Changes and Reset* and press <Enter>. Select Ok to save changes and exit.

Discard Changes and Reset

Select this option to quit setup without making any values changed in the system configuration.
Select *Discard Changes and Reset* and press <Enter>. Select Ok to discard changes and exit.

Discard Changes

This option assist you to adndon all the values changes you set.

Restore Defaults

It automatically recovers all the setup you changed as default factory mode. The optimal settings are designed for optimized system performance, but may not work for all computer applications.
Select *Load Optimal Defaults* and press <Enter>.

Restore user Defaults

It automatically reserves all the setup that you have compeleted as default settings.

APPENDIX A
WATCHDOG TIMER

What is Watchdog Timer

The integrated Watchdog Timer can be set up by programming and available in 0~255 levels. As long as the vaule of timer is set, after enabling, the countdown of the value is starting. It needs to reset or disable watchdog, otherwise auto-reset will be running when the value is counted to 0.

How to Use Watchdog Timer

(Following is example to enable configuration by using debug tool)

Assembly sample code :

```
;Enable WDT:
mov     dx,2Eh
mov     al,87               ;Un-lock super I/O
out     dx,al
out     dx,al


;Select Logic device:
mov     dx,2Eh
mov     al,07h
out     dx,al
mov     dx,2Fh
mov     al,07h
out     dx,al


;Activate WDT:
mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,01h
out     dx,al


;Set Second or Minute :
mov     dx,2Eh
mov     al,0F5h
```

```
out      dx,al

mov      dx,2Fh

mov      al,Nh              ;N=00h or 08h(see below      Note)

out      dx,al


;Set base timer :

mov      dx,2Eh

mov      al,0F6h

out      dx,al

mov      dx,2Fh

mov      al,Mh              ;M=00h,01h,...FFh (hex),Value=0 to 255

out      dx,al              ;(see below      Note)


;Disable WDT:

mov      dx,2Eh

mov      al,30h

out      dx,al

mov      dx,2Fh

mov      al,00h             ;Can be disabled at any time

out      dx,al
```

Note:

*If **N**=00h, the time base is set to second.*

M *= time value*

    00: Time-out Disable

    01: Time-out occurs after 1 second

    02: Time-out occurs after 2 seconds

    03: Time-out occurs after 3 seconds

     .

     .

    FFh: Time-out occurs after 255 seconds

*If **N**=08h, the time base is set to minute.*

***M** = time value*

    00: Time-out Disable

    01: Time-out occurs after 1 minute

    02: Time-out occurs after 2 minutes

   *03: Time-out occurs after 3 minutes*

     .

     .

    FFh: Time-out occurs after 255 minutes

Sample of Watchdog application

Assume there is program A which needs to maintain running in a system. The value of Watchdog Timer must be set longer than the running time of program A. Then, after the running time of program A is finished, either to disable or to reset watchdog timer.
When program A has problems to make system shut down, the system can be rebooted by Watchdog timer when the value of watchdog timer is countdowned to 0.

You may refer to below flowchart to editing program A.

<div align="right">
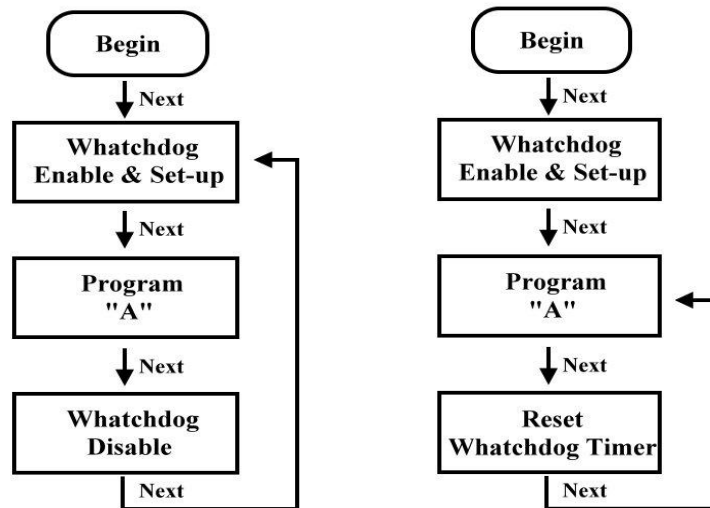
APPENDIX B
DIGITAL I/O

</div>

Digital I/O Specification

Digital Input:
  Input channels: 6, sink/source type
  Input voltage: 0 to 30VDC
  Input level for dry contacts:
      Logic level 0: close to ground
      Logic level 1: open
  Input level for wet contacts:
      Logic level 1: +/-3VDC max.
      Logic level 0: +/- 10VDC min. to +/-30VDC max. (Source to digital input)
Digital output:
  Output channels: 2, sink type
  Output current: 200mA maximum per channel
  On-state voltage: 12~ 24VDC nominal
  Maximum voltage on COM+: 30VDC

Digital I/O Software Programming

● I2C to GPIO PCA9554PW GPIO [1:0] is Output; GPIO [7:2] is Int.
● I2C address: 0b0100100x.
● Registers:

Register 0: Input port register.

Table 4.   Register 0 - Input Port register bit description

Bit	Symbol	Access	Value	Description
7	I7	read only	X	determined by externally applied logic level
6	I6	read only	X	
5	I5	read only	X	
4	I4	read only	X	
3	I3	read only	X	
2	I2	read only	X	
1	I1	read only	X	
0	I0	read only	X	

Register 1: Output port register.

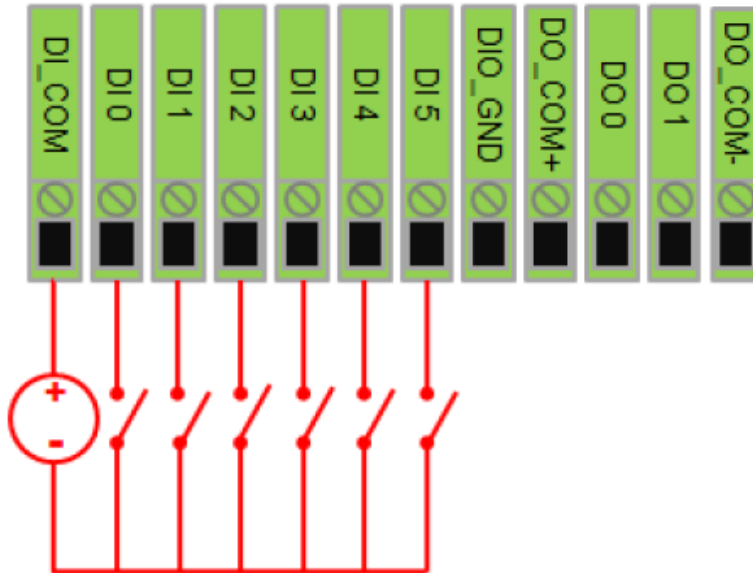**Table 5.   Register 1 - Output Port register bit description**
*Legend: * default value.*

Bit	Symbol	Access	Value	Description
7	O7	R	1*	reflects outgoing logic levels of pins defined as outputs by Register 3
6	O6	R	1*	
5	O5	R	1*	
4	O4	R	1*	
3	O3	R	1*	
2	O2	R	1*	
1	O1	R	1*	
0	O0	R	1*	

Digital Input Wiring

Dry Contact
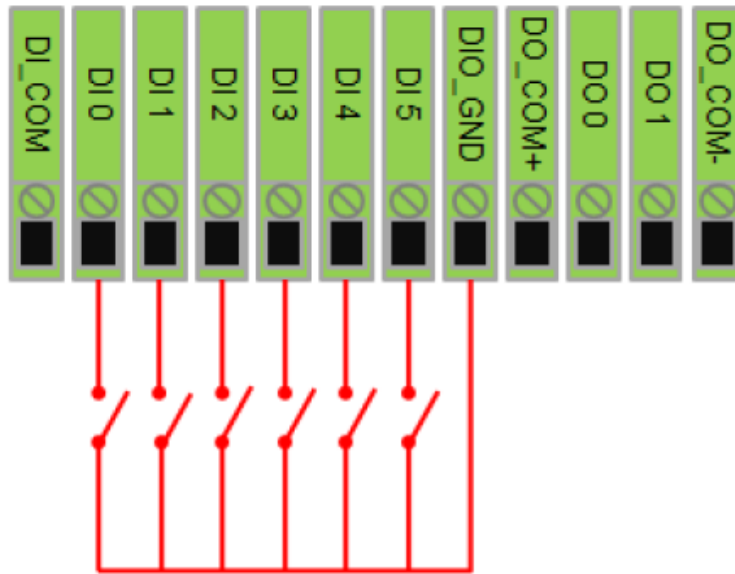
Wet Contact

Digital Output Wiring