



AXIOMTEK

tBOX312-870-FL Series

Embedded System

User's Manual



Disclaimers

This manual has been carefully checked and believed to contain accurate information. Axiomtek Co., Ltd. assumes no responsibility for any infringements of patents or any third party's rights, and any liability arising from such use.

Axiomtek does not warrant or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information in this document. Axiomtek does not make any commitment to update the information in this manual.

Axiomtek reserves the right to change or revise this document and/or product at any time without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Axiomtek Co., Ltd.

©Copyright 2014 Axiomtek Co., Ltd.
All Rights Reserved
March 2014, Version A1
Printed in Taiwan

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 tBOX312-870-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 tBOX312-870-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 tBOX312-870-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°C or above 85°C . 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 protection 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 swabs 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.

Trademarks Acknowledgments

Axiomtek is a trademark of Axiomtek Co., Ltd.

Windows® is a trademark of Microsoft Corporation.

AMI® is a registered trademark of American Megatrends Inc.

IBM, PC/AT, PS/2, VGA are trademarks of International Business Machines Corporation.

Intel® and Atom™ are trademarks of Intel Corporation.

Winbond is a trademark of Winbond Electronics Corp.

Other brand names and trademarks are the properties and registered brands of their respective owners.

Table of Contents

Disclaimers.....	ii
Safety Precautions	iii
Classification.....	iv
CHAPTER 1 INTRODUCTION.....	1
1.1 General Description.....	1
1.2 System Specifications	2
1.2.1 CPU	2
1.2.2 System I/O	2
1.2.3 System Specification.....	2
1.2.4 Driver CD Content.....	3
1.3 Dimensions	4
1.4 I/O Outlets.....	5
1.5 Packing List.....	6
CHAPTER 2 HARDWARE INSTALLATION.....	7
2.1 Installing the swappable HDD/SSD or CFast Card.....	7
2.2 Installing the Express Mini Card	8
CHAPTER 3 Jumper Setting & Connector.....	9
3.1 SBC layout.....	9
3.2 Jumper Setting Summary.....	10
3.3 Connectors	11
3.3.1 VGA & DVI Connector	11
3.3.2 Serial Port Connector	12
3.3.3 USB3.0 Stack Ports	12
3.3.4 LED Indicators.....	13
3.3.5 DC Power Input connector.....	13
3.3.6 LAN Connector (LAN1~ LAN4)	13
3.3.7 Digital I/O Connector	14
3.3.8 SIM Card Connector	14
3.3.9 PCI-Express Mini Card Connector	15
3.3.10 CFast™ Socket.....	16
3.3.11 USB2.0 Stack ports.....	17
3.3.12 CANBus Connector	17
CHAPTER 4 AMI BIOS SETUP UTILITY	19
4.1 Starting	19
4.2 Navigation Keys	20
4.3 Main Menu	21
4.4 Advanced Menu	22
4.5 Chipset Menu	31
4.6 Boot Menu	34
4.7 Security Menu	35
4.8 Save & Exit Menu	36
APPENDIX A WATCHDOG TIMER.....	37
APPENDIX B DIGITAL I/O	39

APPENDIX C POWER ON PROCEDURE.....	41
C.1 Introduction.....	41
C.2 Power Input Mode Setting.....	42
C.3 DC-inlet Introduction.....	43
C.4 Power on cabling example.....	44

CHAPTER 1 INTRODUCTION

This chapter contains general information and detailed specifications of the tBOX312-870-FL. The Chapter 1 includes the following sections:

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

1.1 General Description

The tBOX312-870-FL is an embedded system that supports onboard Intel® Core™ i7-3517UE processor (1.7 up to 2.8 GHz) or i3-3217UE processor (1.6 GHz), to provide Windows® 7 embedded, Windows® 7, Windows® WinCE embedded and Linux, suitable for the most durable operation. It features fanless design with full feature I/O, supports onboard 4GB DDR3 memory, and enhanced system dependability by built-in Watchdog Timer.

● Features

- 3rd Generation Intel® Core™ i (17W) processor onboard
- Intel® QM77 PCH
- High performance DDR3-1600 4GB memory onboard
- eMARK, ISO7637 certificate
- Fanless with Operating temperature range of -40°C ~ +70°C
- Isolated RS-232/422/485, CANbus and DIO
- Support USB 3.0 and SATA3
- 2 removable & lockable 2.5" SATA HDD and 1 CFast™
- 3 internal PCI Express Mini Card slot and one SIM slot
- Lockable I/O interface and LAN and USB connector
- Comply to fire protection of railway vehicles Europe standard PrCEN TS 45545-2
- IEEE 802.3at PoE Giga LAN

● Reliable and Stable Design

- The tBOX312-870-FL adopts the advanced cooling system and supporting the CFast™, which makes it especially suitable for vibration environments, best for industrial automation, digital signage and gaming application.

● Embedded O.S. Supported

- The tBOX312-870-FL not only supports Windows® 7, but also supports embedded OS, such as Windows® 7 embedded, WinCE and Linux. For storage device, the tBOX312-870-FL supports two 2.5" SATA HDD drive bays, and one CFast™ slot.

1.2 System Specifications

1.2.1 CPU

- **CPU**
 - Onboard Intel® Core™ i7-3517UE processor (4M Cache, 1.7 up to 2.8 GHz)
 - Onboard Intel® Core™ i3-3217UE processor (3M Cache, 1.6 GHz)
- **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 4GB DDR3-1600 Memory
- **Graphics**
 - Integrated in the Intel® HD Graphics 4000 for DVI, CRT

1.2.2 System I/O

- Three 9-pin D-Sub male connectors, COM1~3 for isolated RS-232/422/485
- One 9-pin D-sub male connectors isolated CANbus
- One 15-pin D-Sub female connector for VGA
- One DVI-D female connector
- Two screw Audio connector (Mic-IN, Line-OUT)
- Four isolated RJ-45 connector for 10/100/1000Base-T
- Two USB 2.0 connectors(rear side) and Two USB 3.0 connectors(front side)
- One isolated 4-in/4-out DIO connector
- One 12/24VDC power input connector

1.2.3 System Specification

- **Watchdog Timer**
 - Reset supported; 255 levels, 1~255 sec.
- **Power Supply**
 - 12/24VDC-in power supply
 - Power Rate:1.8A@24Vdc
- **Operation Temperature**
 - -40°C ~ 70°C (- 40°F ~ 158°F)
- **Storage Temperature**
 - -40°C ~ 85°C (- 40°F ~ 176°F)
- **Humidity**
 - 5% ~ 95% (non-condensation)
- **Vibration Endurance**
 - 5Grms w/ SSD,CFast (5 ~ 500Hz, X, Y, Z directions)

- **Weight**
 - 5.06 kg (11.15 lb) without package
 - 6.5 kg (14.33 lb) with package
- **Dimensions**
 - 288.5mm(W) x 211.3mm(D) x 85.2mm(H)



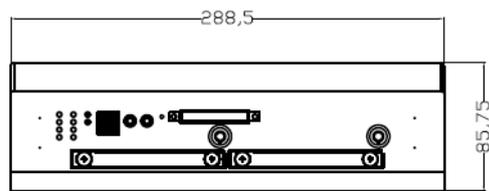
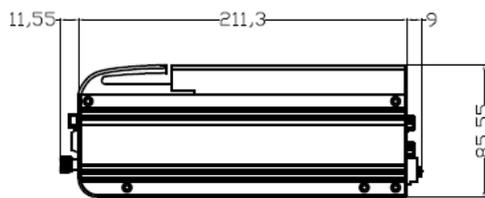
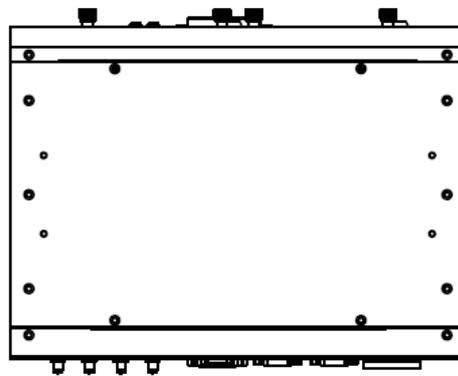
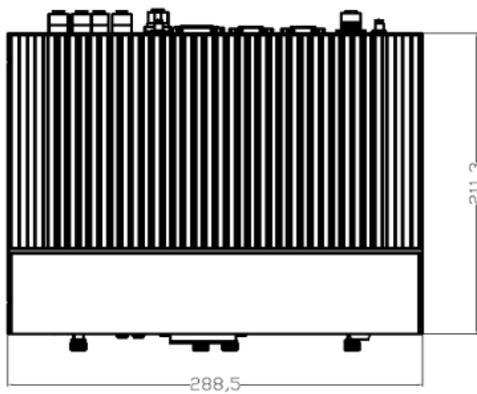
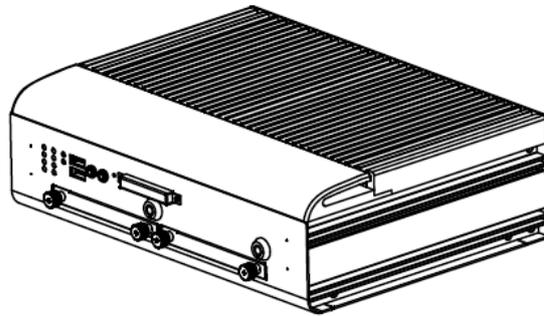
NOTE: All specifications and images are subject to change without notice.

1.2.4 Driver CD Content

- **Chipset Driver**
- **Graphic Drivers**
- **Audio Drivers**
- **Ethernet Driver**
- **User Manual**
- **Quick Manual**
- **CANBUS Command User Manual**
- **CANBUS Programmer's Guide**
- **CANBUS Library**
- **AXCAN CANBUS diagnostic tool**

1.3 Dimensions

The following diagrams show you dimensions and outlines of the tBOX312-870-FL.



X

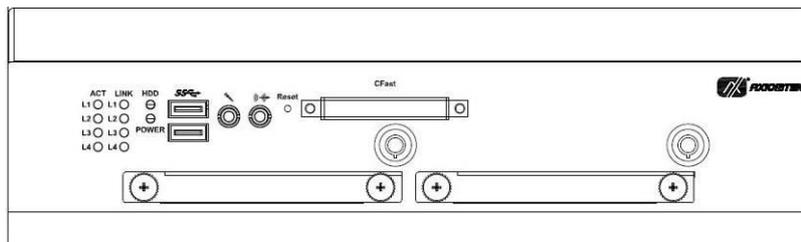
1.4 I/O Outlets

The following figures show you I/O outlets on front view of the tBOX312-870-FL.

- **Front View**



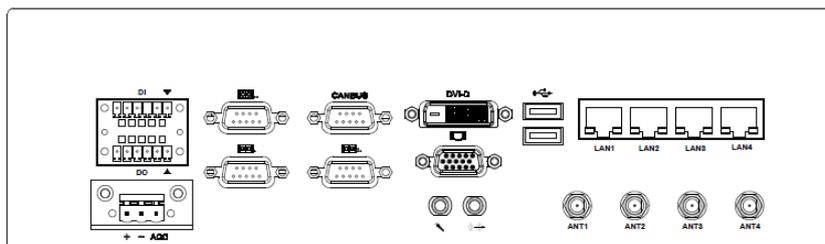
- **Front View drawing**



- **Rear View**



- **Rear View drawing**



1.5 Packing List

The package bundled with your tBOX312-870-FL should contain the following items:

- **tBOX312-870-FL System Unit x 1**
- **tBOX312-870-FL Quick Manual x 1**
- **CD x 1 (For Driver and User's Manual)**
- **Screws pack**
- **Foot pad x4**
- **Wall-mount Brackets**
- **DIO female connector**
- **HDD/SSD (optional)**
- **CFast (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 tBOX312-870-FL is convenient for your various hardware configurations, such as HDD (Hard Disk Drive), CFast™ 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. Locate thumb screw at the front side, unlock and loosen screws.



Step 2 Assembly the HDD/SSD bracket together with the SATA HDD/SSD



Step 3 Slide CFast card or HDD/SSD into slot carefully



Step 4 Fasten screws of HDD/CFast bracket



2.2 Installing the Express Mini 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.



one slot contains an internal SIM card slot which can support 2G/3G/4G modules.

Step 3 Slide SIM or Mini card into slot cautiously



Step 4 Fasten screw of Express Mini Card.

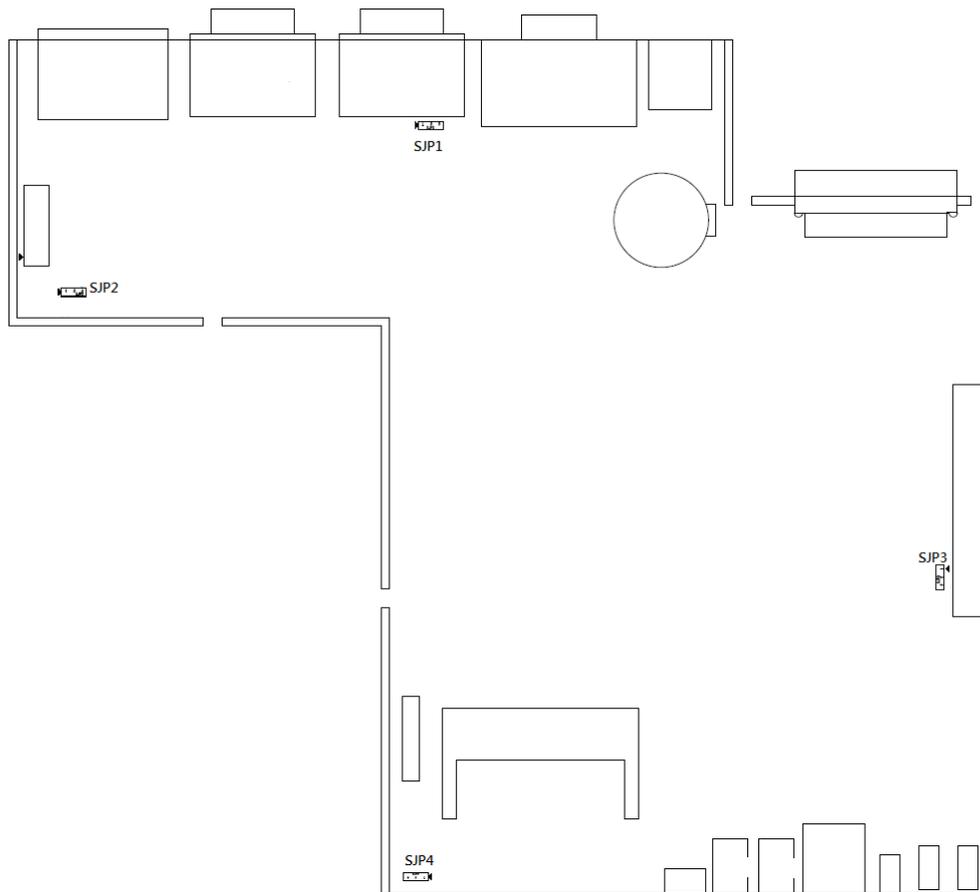


Step 5 Close the cover to the chassis, and fasten all screws.

CHAPTER 3 Jumper Setting & Connector

Proper jumper settings configure the tBOX312-870-FL to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

3.1 SBC layout



NOTE: We strongly recommended that you should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause system to become damage.

3.2 Jumper Setting Summary

Proper jumper settings configure the tBOX312-870-FL to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

Description	Function	Jumper Setting
SJP3	Normal(Default) Clear CMOS	Short 1-2 Short 2-3

You may need to use this jumper is to clear the CMOS memory if incorrect settings in the Setup Utility.

VDDM	Settings
Normal	Short 1-2 (Default)
Clear CMOS	Short 2-3



3.3 Connectors

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

3.3.1 VGA & DVI Connector

DB15 connector commonly used for the CRT Monitor.

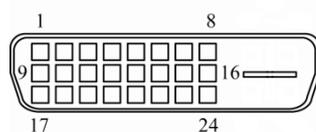
Pin	Signal	Pin	Signal	Pin	Signal
1	Red	2	Green	3	Blue
4	N.C.	5	GND	6	GND
7	GND	8	GND	9	VCC
10	GND	11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync	15	DDC CLK



DVI-D connector for the digital visual interface display.

Pin	Signal	Pin	Signal
1	TX2-	2	TX2+
3	Ground	4	No use
5	No use	6	DVI_SPD_CLK
7	DVI_SPD DATA	8	No use
9	TX1-	10	TX1+
11	Ground	12	No use
13	No use	14	VGAVCC
15	Ground	16	FPDETECT
17	TX0-	18	TX0+
19	Ground	20	NO use
21	No use	22	Ground
23	TXC+	24	TXC-

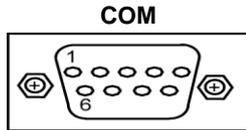
CN19B



3.3.2 Serial Port Connector

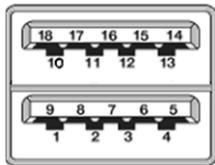
The COM1~COM3 Port connector is a standard DB-9 connector. The pin assignment of RS-232/RS-422/RS-485 is listed on the following table. If you need COM port to support RS-422 or RS-485, please selection to the BIOS items.

Pin	RS-232	RS-422	RS-485
1	DCD, Data carrier detect	TX-	Data-
2	RXD, Receive data	TX+	Data+
3	TXD, Transmit data	RX+	NC
4	DTR, Data terminal ready	RX-	NC
5	GND, ground	NC	NC
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

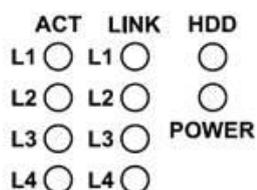


3.3.3 USB3.0 Stack Ports

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB_VCC (+5V level standby 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+



3.3.4 LED Indicators



Status\LED	ACT(L1~L4)	LINK(L1~L4)	HDD	POWER
LAN Linked	Bright			
100Mbps		Green LED		
1000Mbps		Yellow LED		
HDD Active			Flash	
Power on				Bright

3.3.5 DC Power Input connector

There are three pins of the DC-in connector as below table

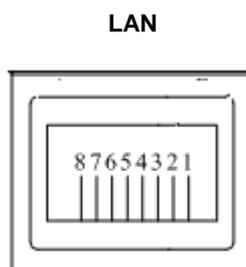
Pin	Description	Defination
1	V+	For DC power in V+.
2	V-	For DC power in V-
3	ACC	For ACC (Ignition)



3.3.6 LAN Connector (LAN1~ LAN4)

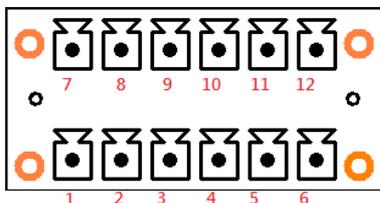
The RJ-45 LAN Connector which can support 10/100/1000Mbps

Pin	Description
1	MDI0+
2	MDI0-
3	MDI1+
4	MDI2+
5	MDI2-
6	MDI1-
7	MDI3+
8	MDI3-



3.3.7 Digital I/O Connector

The tBOX312-870-FL support an isolated 4-in/4-out Digital I/O (DIO)



Pin	Signal	Pin	Signal
1	EXT POWER	7	COM+
2	IN0	8	OUT0
3	IN1	9	OUT1
4	IN2	10	OUT2
5	IN3	11	OUT3
6	GND	12	COM-

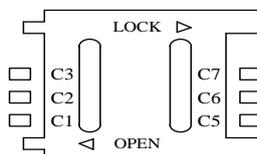


NOTE: Please refer to Appendix B for more information about Digital I/O

3.3.8 SIM Card Connector

The SIM Card slot is a ISO 7816 standard 6-pin connector for PCI Express Mini Card used.

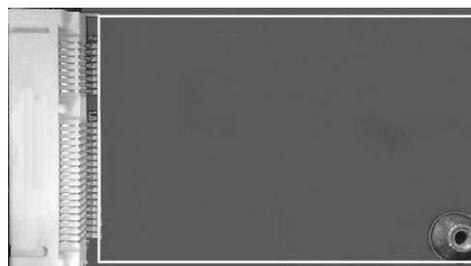
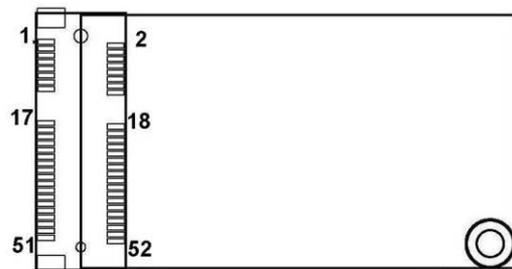
Pin	Signal
C1	SIM_PWR
C2	SIM_RESET
C3	SIM_CLK
C5	GND
C6	SIM_VPP
C7	SIM_DATA



3.3.9 PCI-Express Mini Card Connector

The PCI Express Mini Card connectors with support for a PCI Express x1 link and a USB 2.0 link. 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.

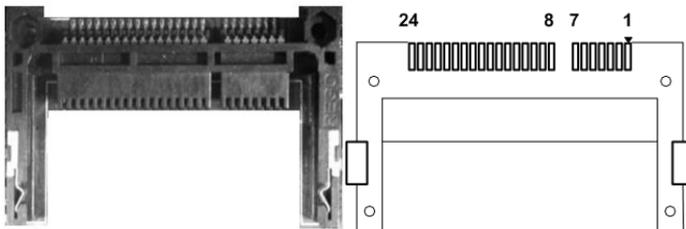
Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	+3.3VSB
21	GND	22	PERST#
23	PE_RXN4	24	+3.3VSB
25	PE_RXP4	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN4	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.

3.3.10 CFast™ Socket

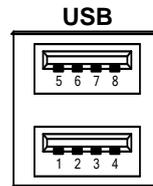
The tBOX312-870-FL is equipped with a CFast™ socket on the solder side to support an SATA interface CFast™ disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CFast™ disk card. When installing or removing the CFast™ disk card, please make sure the system power is off.



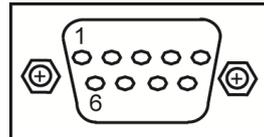
Pin	Description	Pin	Description
1	GND	13	N.C
2	SATA_TX+	14	GND
3	SATA_TX-	15	N.C
4	GND	16	CFAST_LED#
5	SATA_RX-	17	N.C
6	SATA_RX+	18	N.C
7	GND	19	N.C
8	N.C	20	+3.3V Level
9	GND	21	+3.3V Level
10	N.C	22	GND
11	N.C	23	GND
12	N.C	24	N.C

3.3.11 USB2.0 Stack ports

Pin	Signal USB Port 0	Pin	Signal USB Port 6
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #6_D-
3	USB #0_D+	7	USB #6_D+
4	Ground (GND)	8	Ground (GND)

**3.3.12 CANBus Connector**

PIN	Signal
1	N.C.
2	CAN_L Low-Level CAN Voltage I/O
3	GND CAN side GND
4	N.C.
5	N.C.
6	GND CAN side GND
7	CAN_H High-Level CAN Voltage I/O
8	N.C.
9	N.C.



This page is intentionally left blank.

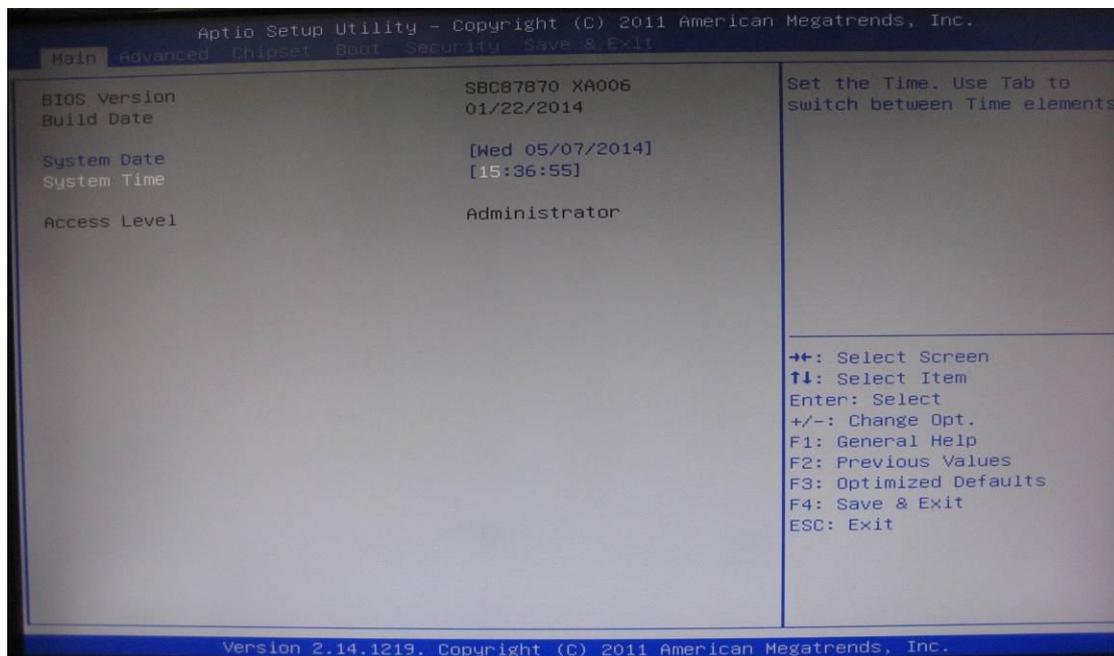
CHAPTER 4 AMI BIOS SETUP UTILITY

This chapter provides users 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 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

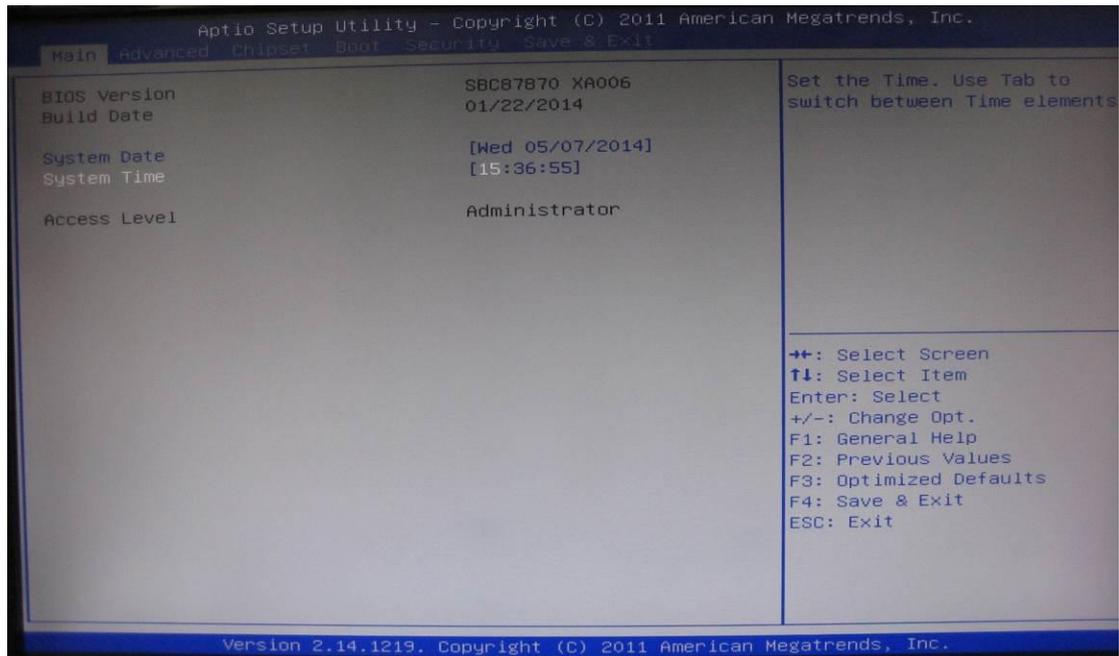
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.



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

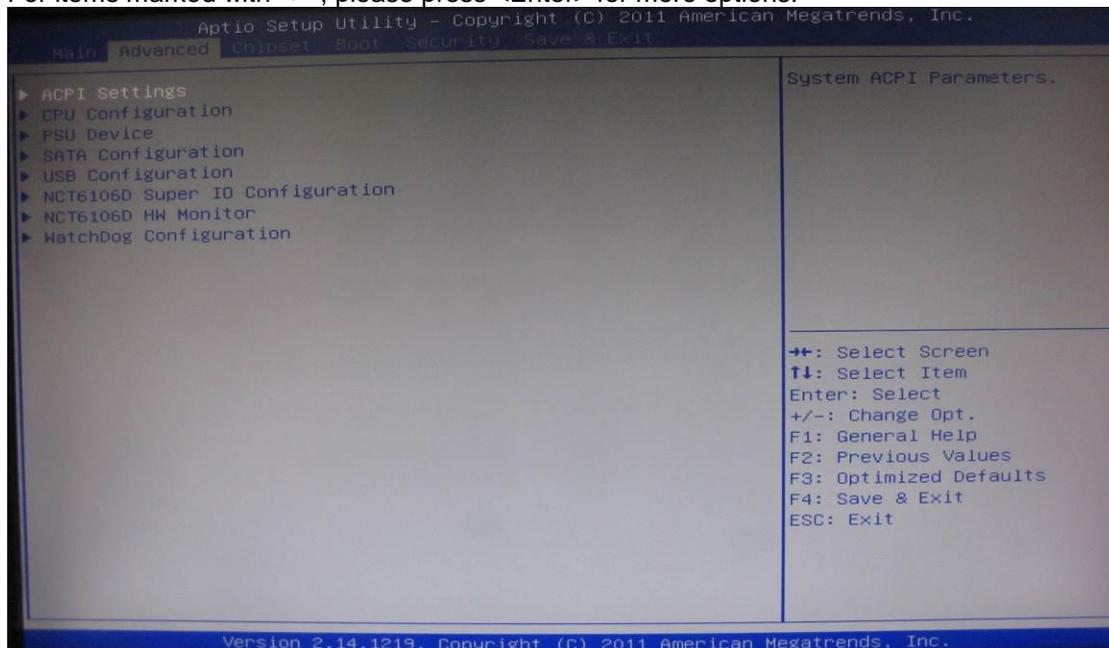
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

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:

- ▶ ACPI Settings
- ▶ CPU Configuration
- ▶ PSU Device
- ▶ SATA Configuration
- ▶ USB Configuration
- ▶ NCT6106D Super IO Configuration
- ▶ NCT6106D H/W Monitor
- ▶ WatchDog Configuration

For items marked with “▶”, please press <Enter> for more options.

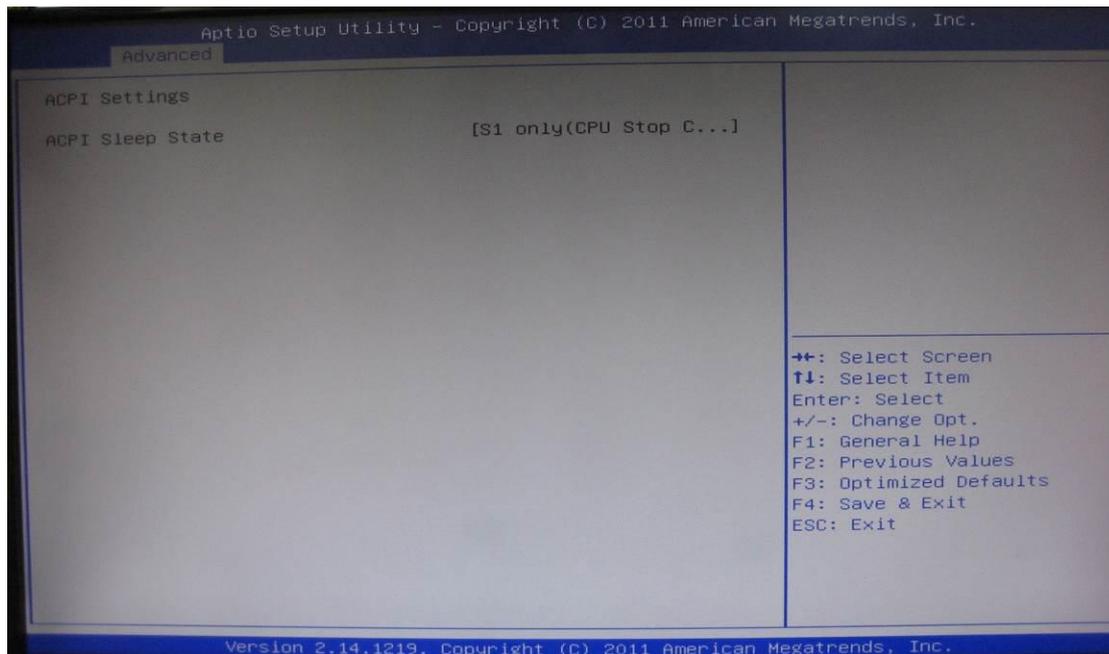


ACPI Settings

You can use this screen to select options for the ACPI Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

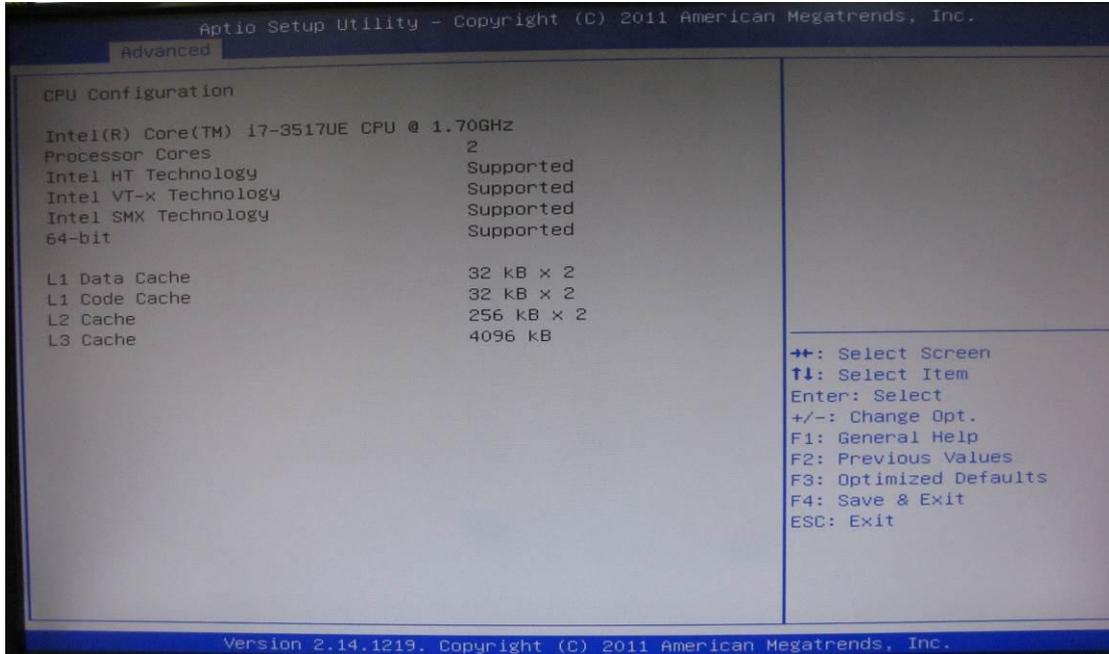
➤ ACPI Sleep State

Allow you to select the Advanced Configuration and Power Interface (ACPI) state to be used for system suspend. Here are the options for your selection, S1 (CPU Stop Clock) and S3 (Suspend to RAM).



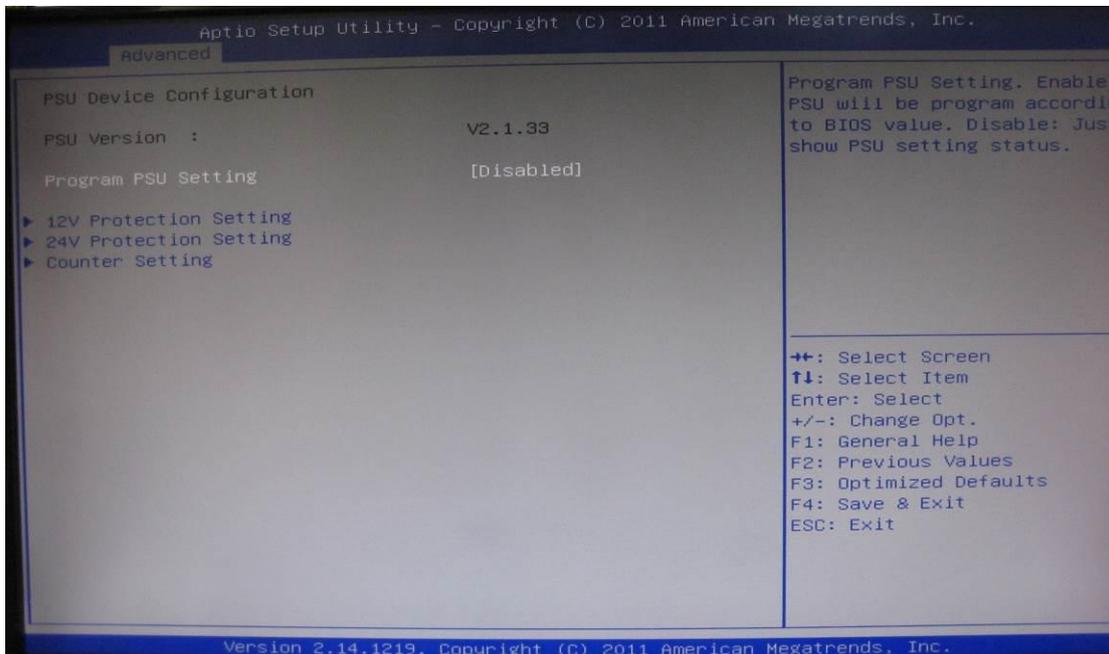
➤ **CPU Configuration**

This screen shows the CPU Configuration.

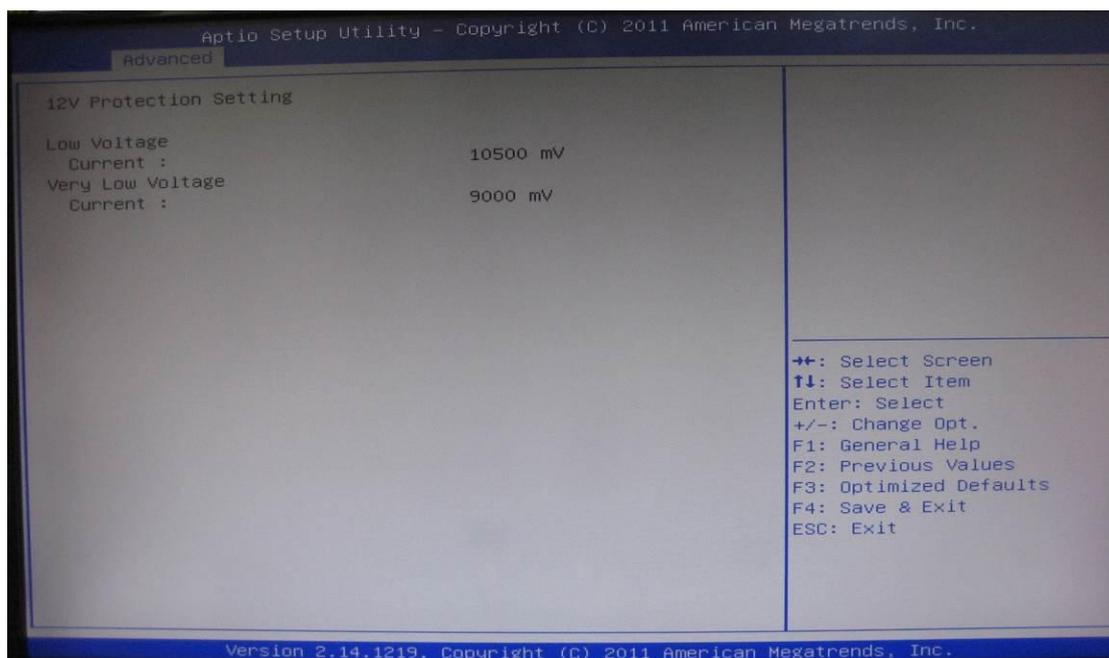


➤ **PSU Device**

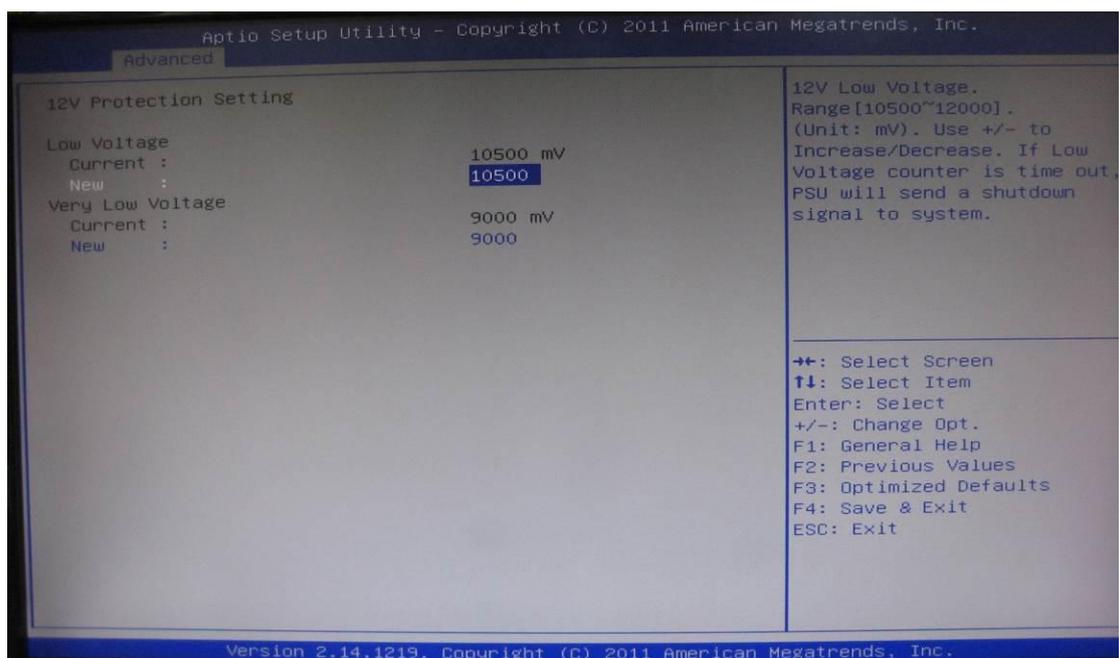
This screen shows the PSU Device Configuration.

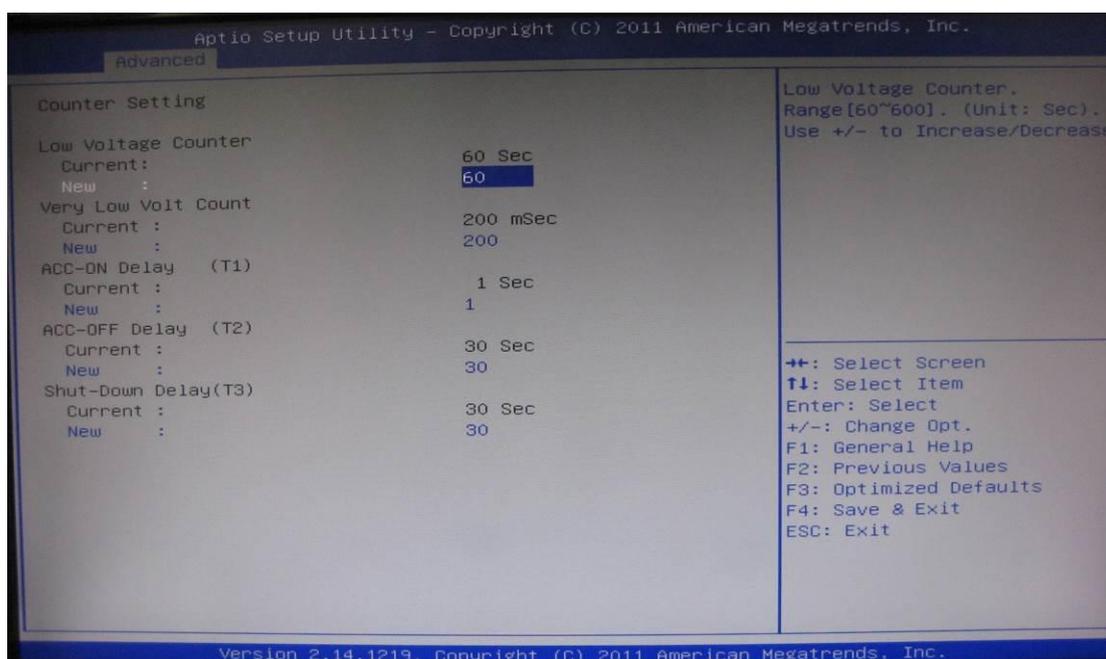
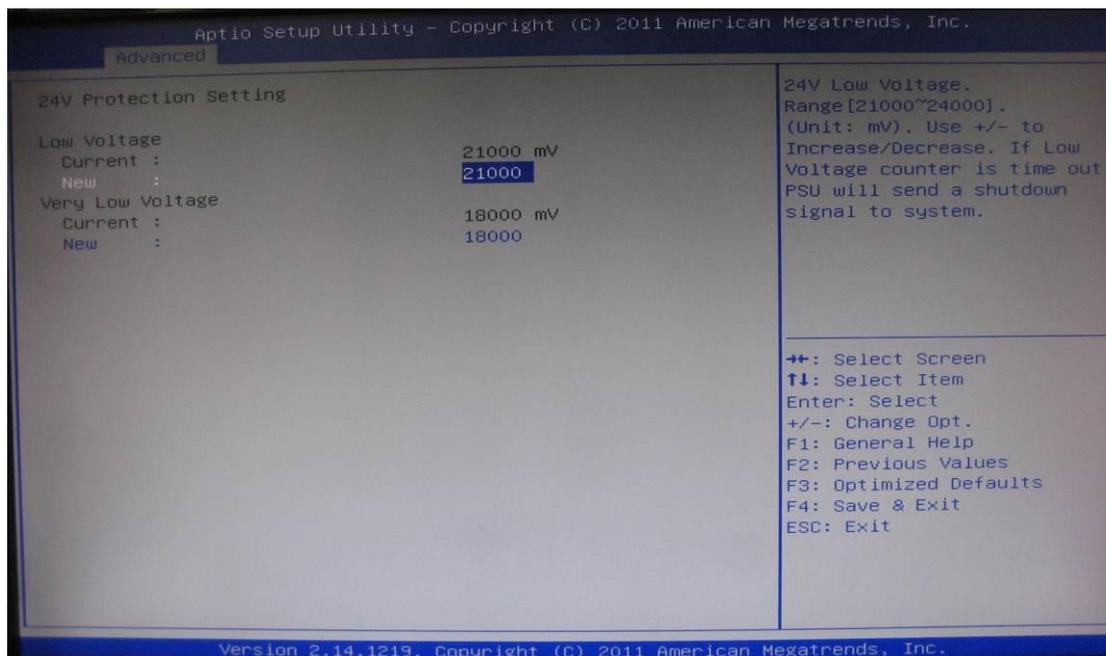


When program PSU setting is [Disabled] 12V or 24V Protection Setting can't modify



Enabled the program PSU setting for setting,





➤ **SATA Configuration**

You can use this screen to select options for the SATA Configuration, and change the value of the selected option.

➤ **SATA Controller(S)**

Use this item to enable or disable the integrated SATA controllers. (Default: Enabled)

➤ **SATA Mode**

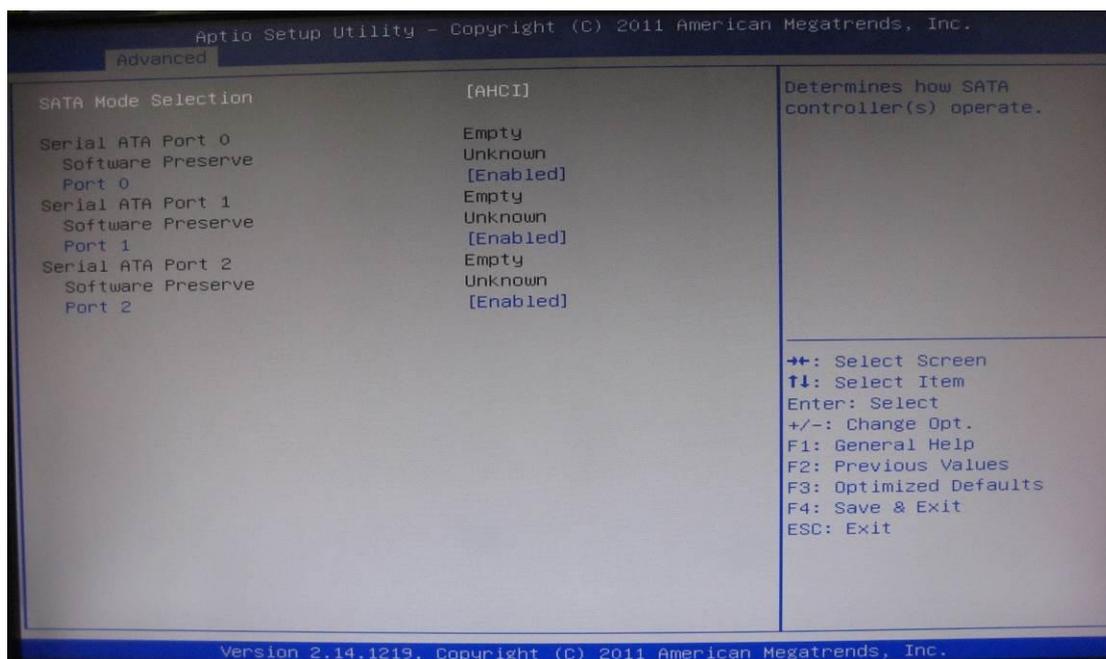
Use this item to choose the SATA operation mode. Here are the options for your selection, IDE Mode, AHCI Mode.

➤ **SATA Controller Speed**

Use this item to change the SATA transfer rate

➤ **Serial-ATA Port 0-2**

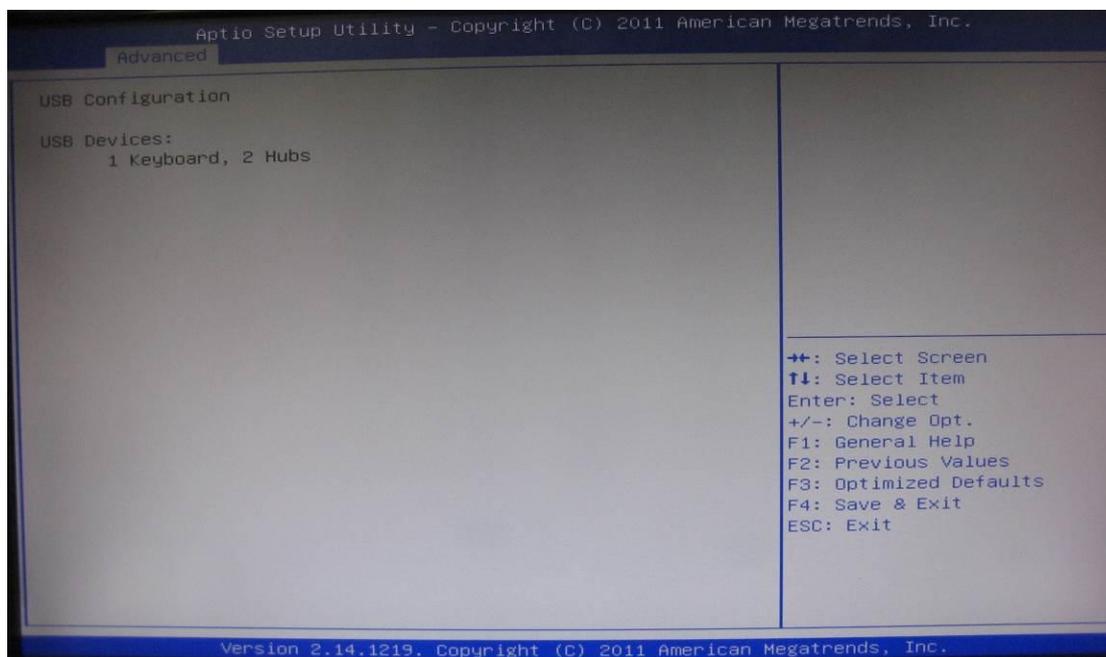
Use this item to control the onboard SATA port. Here are the options for your selection, Enabled and Disabled.



USB Configuration

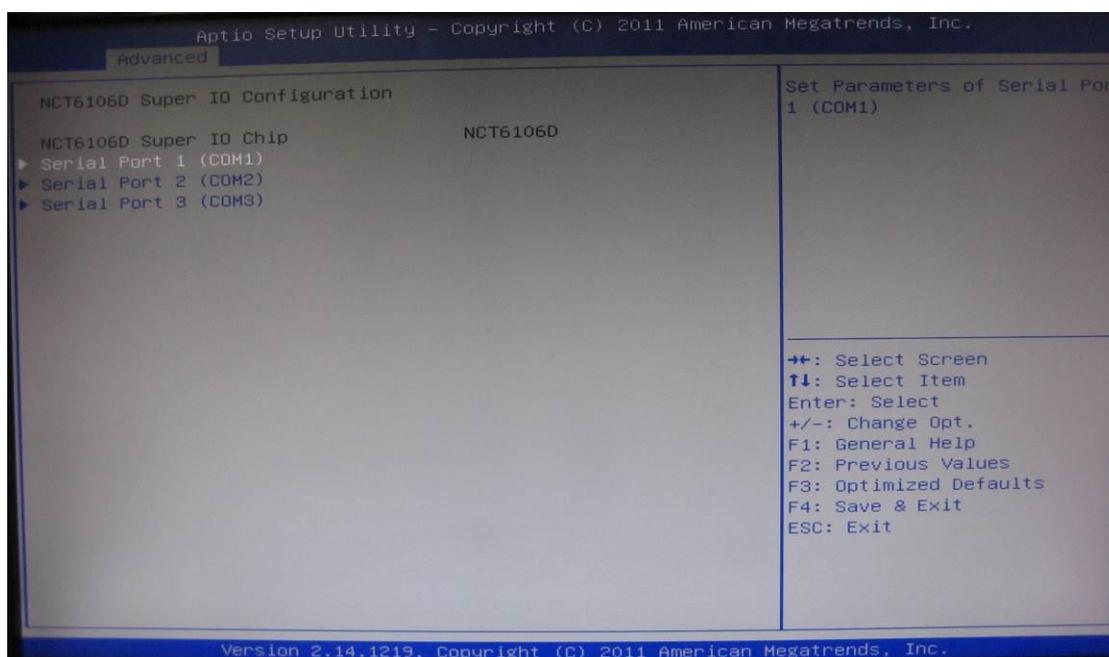
This screen shows the USB Device.

This is for supporting USB device under legacy OS, the system will automatically detect any USB device is plugged into the computer and enable USB legacy mode when a USB device plugged.



NCT6106D Super IO Configuration

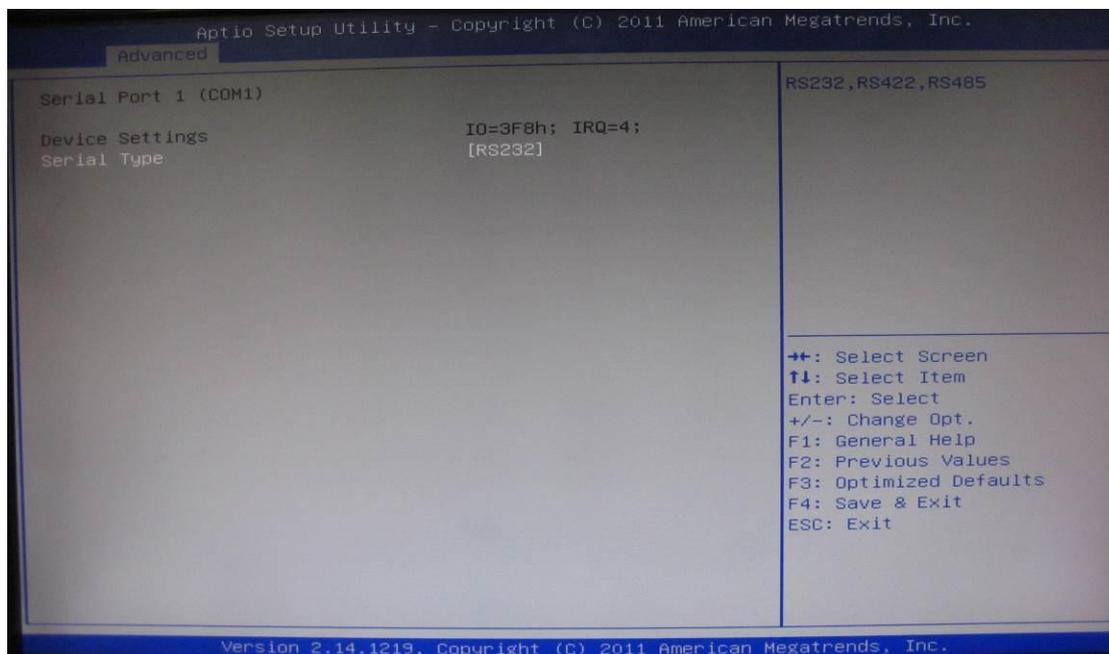
Use this screen to select options for the Super IO Configuration, and change the value of the selected option



Serial Port 0-3 configuration

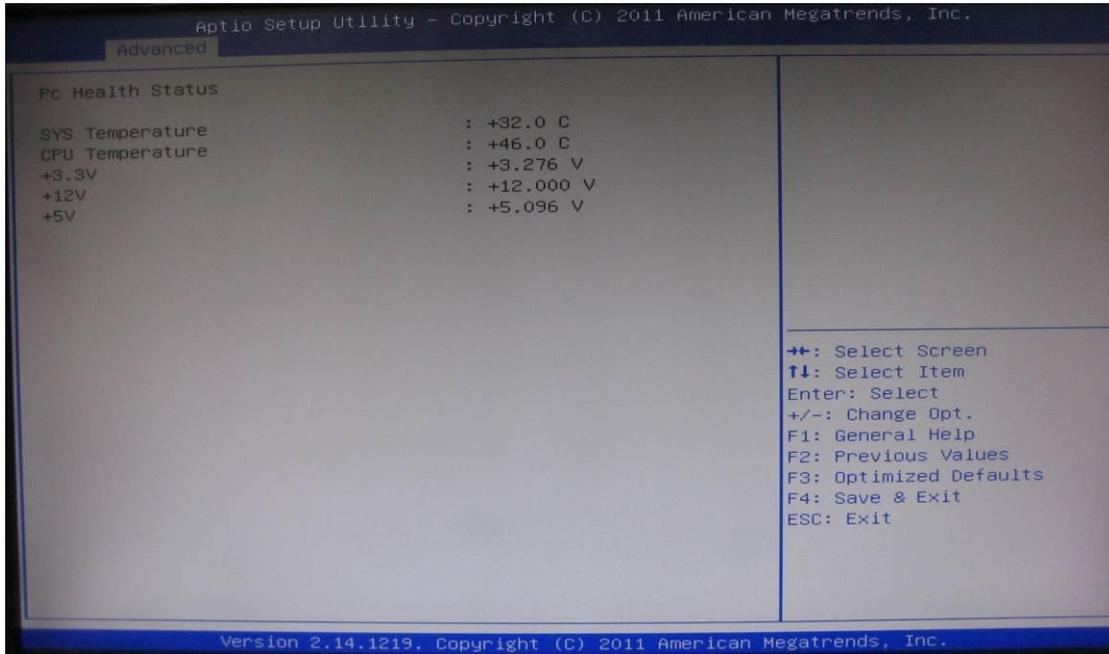
1. Serial port:

This option used to select RS232/422/485 function.



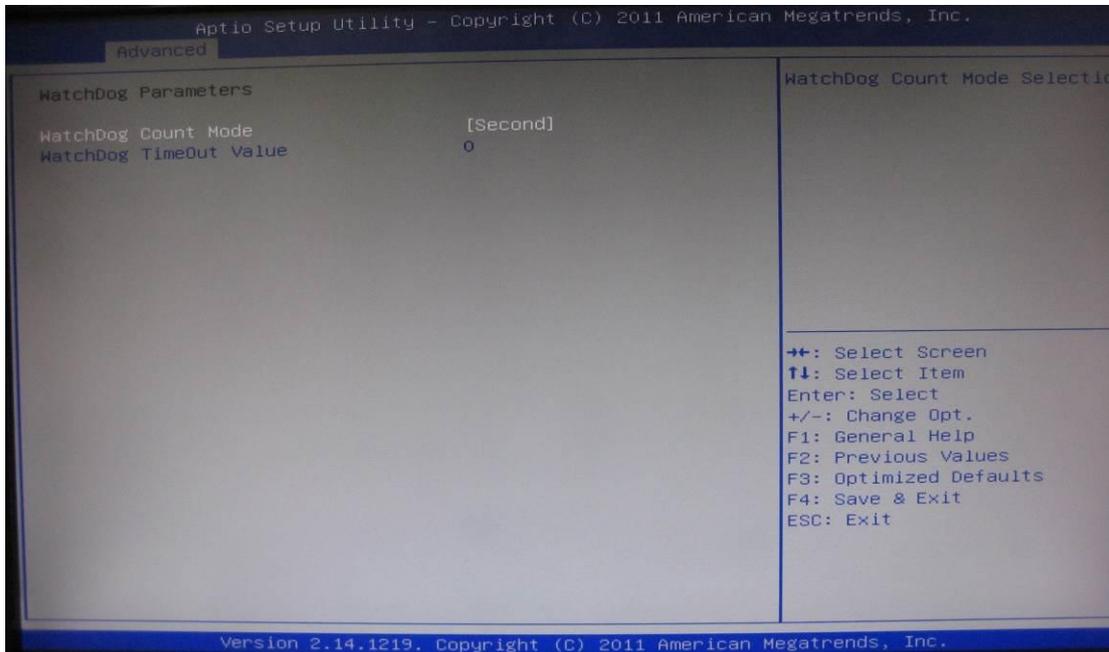
NCT6106D H/W Monitor

This screen shows the Hardware Health Configuration.



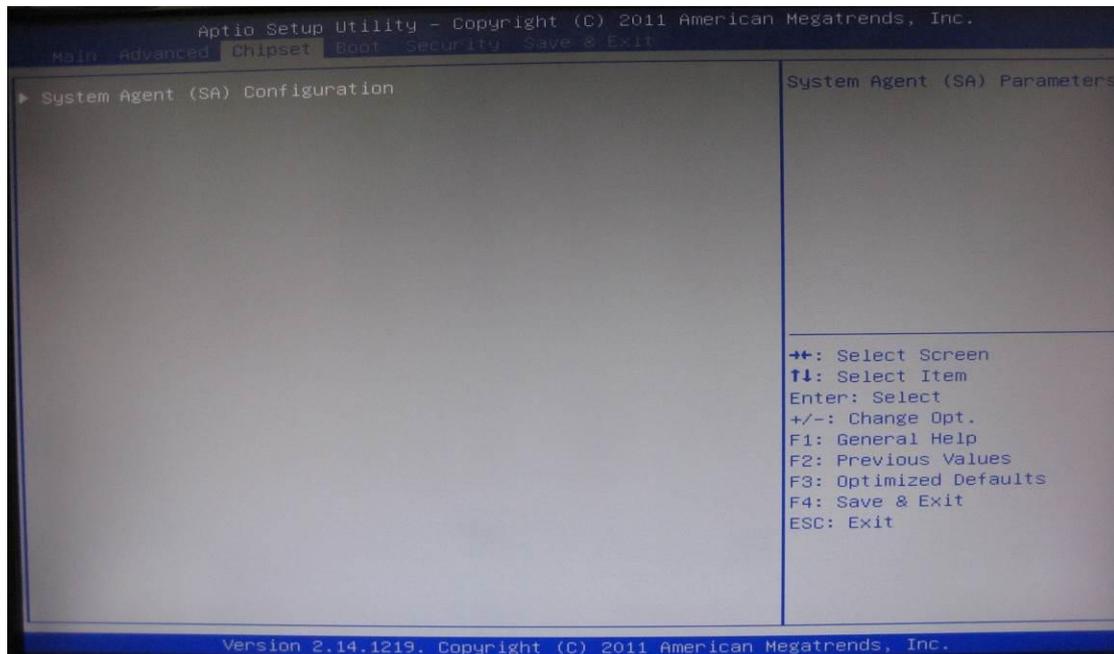
➤ WatchDog Configuration

After the system stops working for a while, it can be auto-reset by the Watchdog Timer. The integrated Watchdog Timer can be set up in the system reset mode by this option.



4.5 Chipset Menu

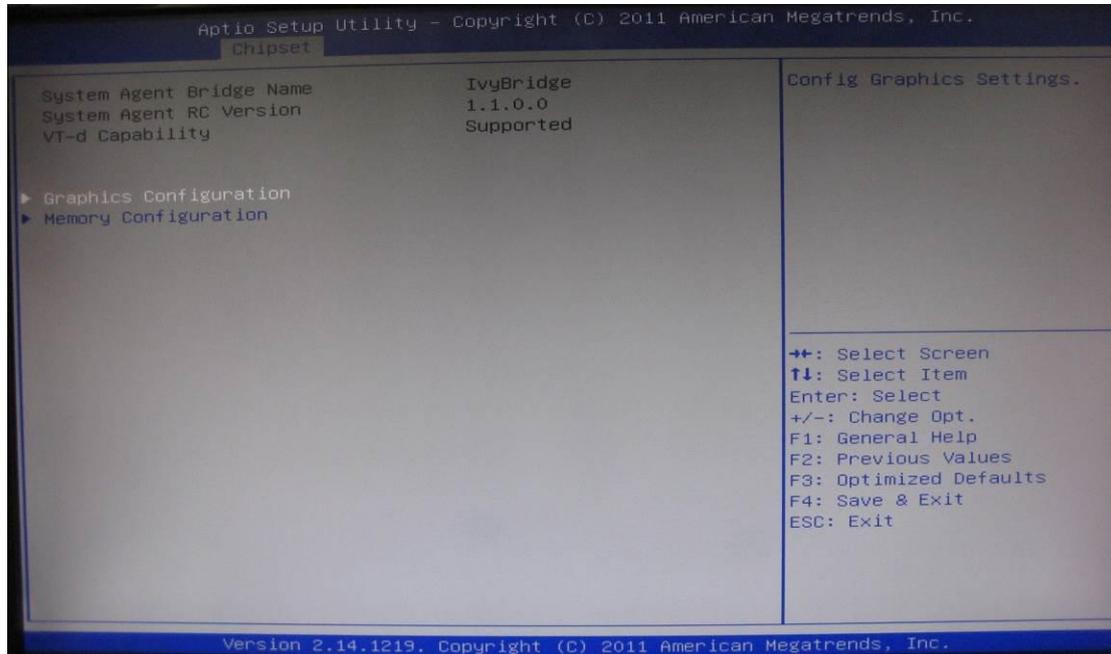
The Chipset menu allows users to change the advanced chipset settings.



➤ **System Agent (SA) Configuration**

1. Graphics Configuration

This option allows users to change the integrated graphic device settings.



Primary IGFX Boot Display

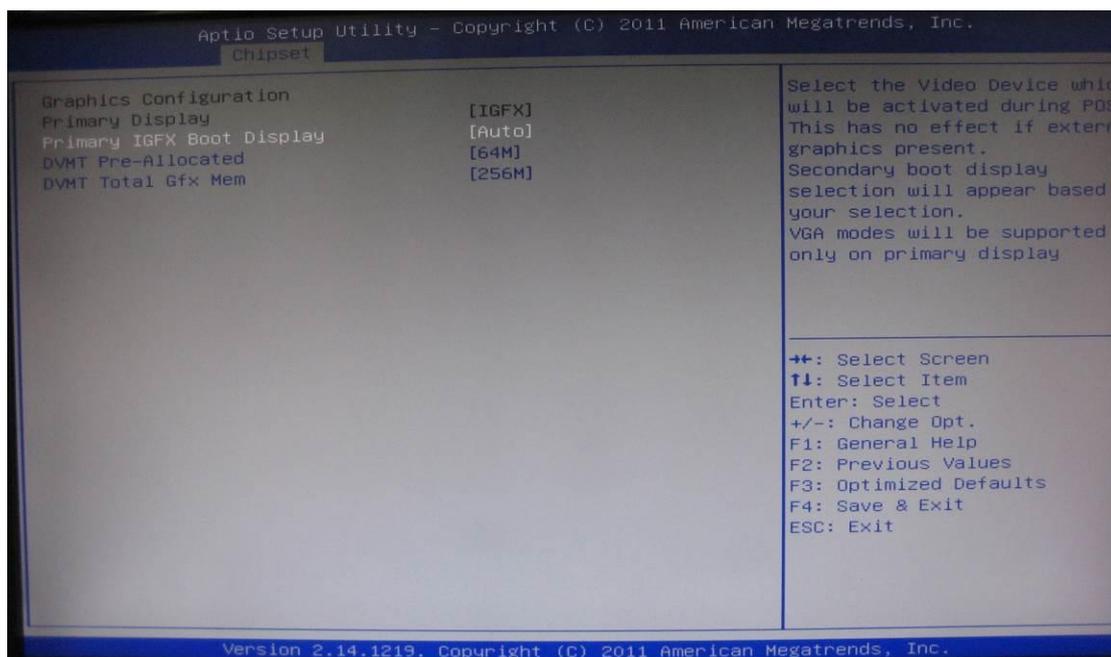
Select the video device which will be activated during POST.

DVMT Pre-Allocated

Pre-allocated memory is the small amount of system memory made available at boot time by the system BIOS for video. Pre-allocated memory is also known as locked memory. This is because it is "locked" for video use only and as such, is invisible and unable to be used by the operating system.

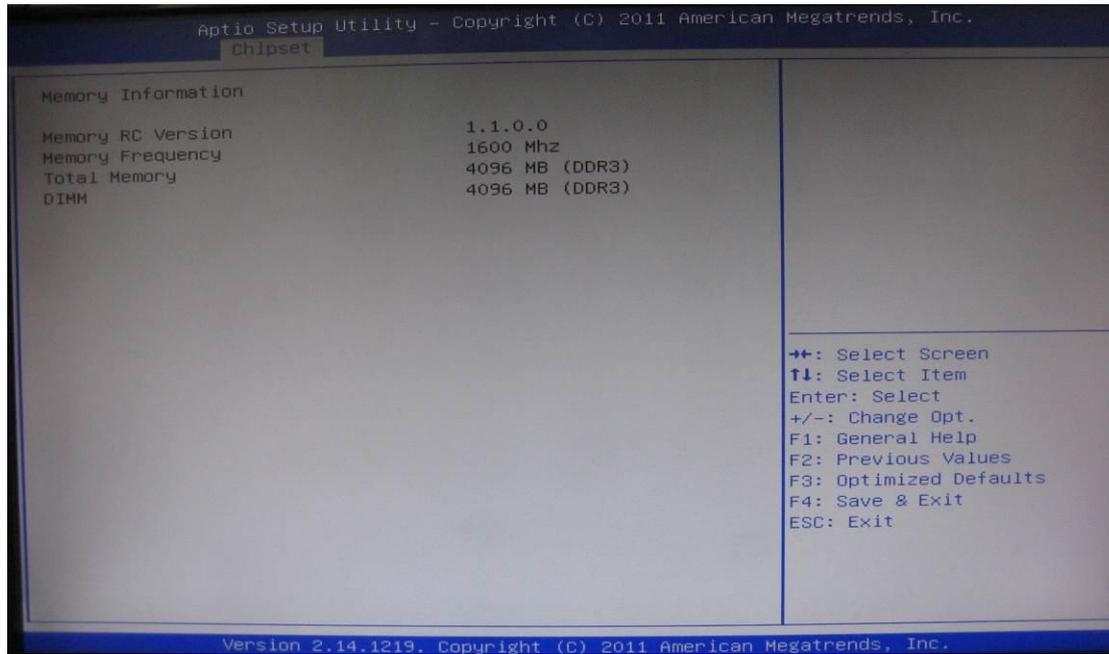
DVMT Total Gfx Mem

Allow you to allocate a fixed amount of system memory as graphics memory. Here are the options for your selection, 128MB, 256MB and Maximum DVMT.



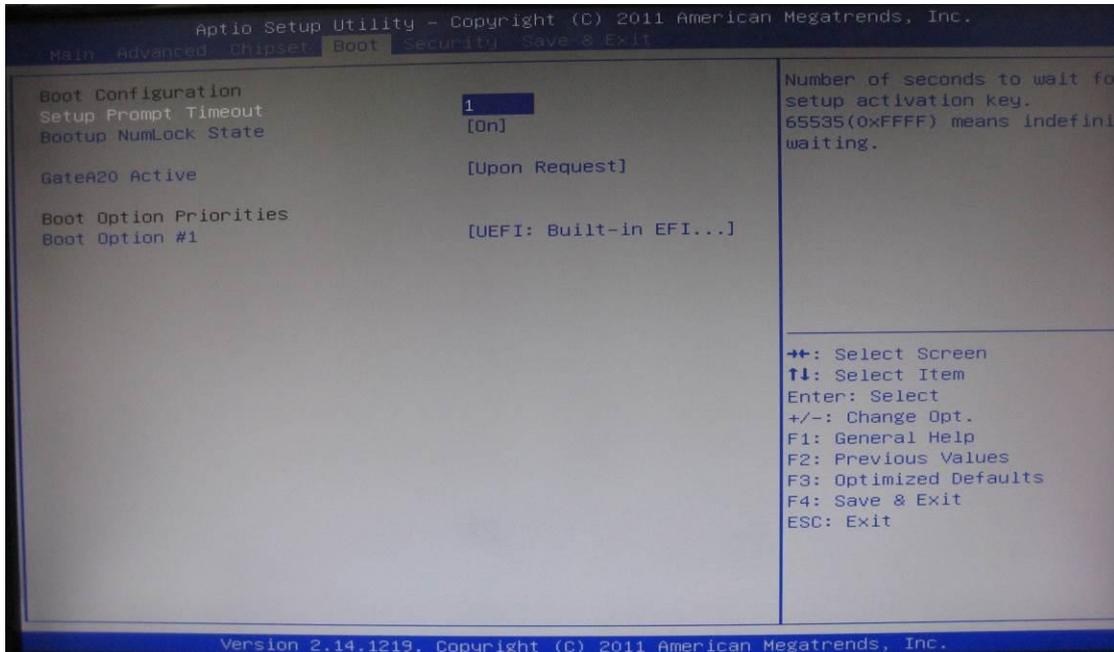
2. Memory Configuration

This screen shows the memory information.



4.6 Boot Menu

The Boot menu allows users to change boot options of the system. You can select any of the items in the left frame of the screen to go to the sub menus:



➤ **Setup Prompt Timeout**

Set the Timeout for wait press key to enter Setup Menu

➤ **Bootup NumLock State**

Use this item to select the power-on state for the NumLock. The default setting is on.

➤ **Quiet Boot**

Use this item to enable or disable the Quiet Boot state. The default setting is disabling.

➤ **Fast Boot**

Use this item to enable or disable the Fast Boot state. The default setting is disabling.

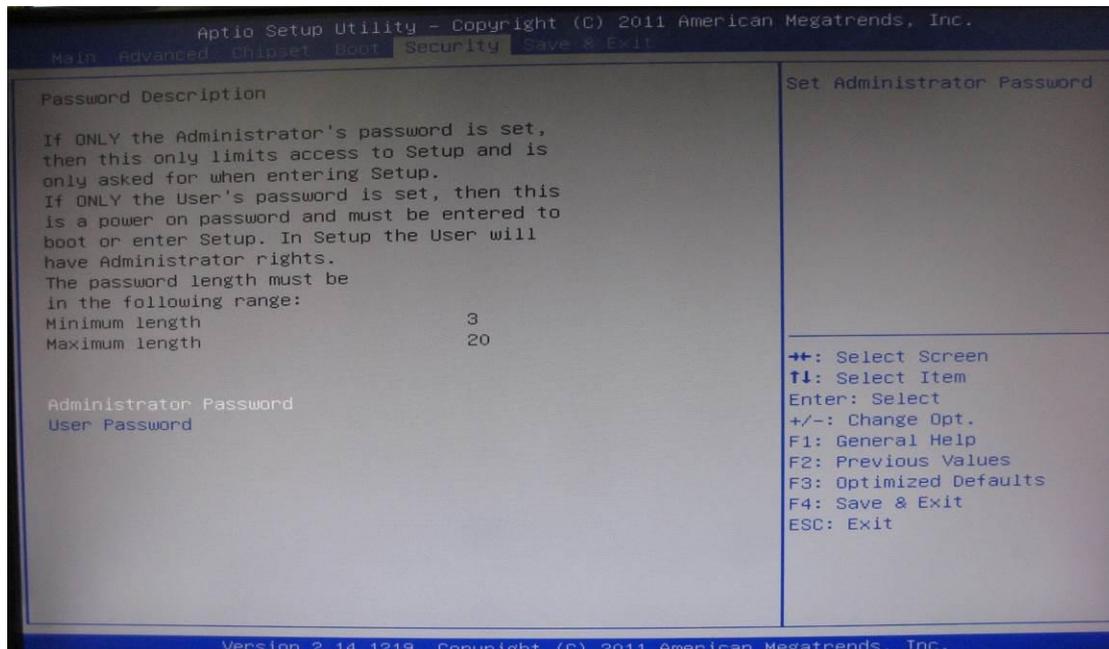
➤ **GateA20 Active**

➤ **Boot Option Priorities**

Specifies the overall boot order from the available devices.

4.7 Security Menu

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



➤ Supervisor Password

This item indicates whether a supervisor password has been set. If the password has been installed, 『Installed』 displays. If not, 『Not Installed』 displays.

➤ User Password

This item indicates whether a user password has been set. If the password has been installed, 『Installed』 displays. If not, 『Not Installed』 displays.

➤ Change Supervisor Password

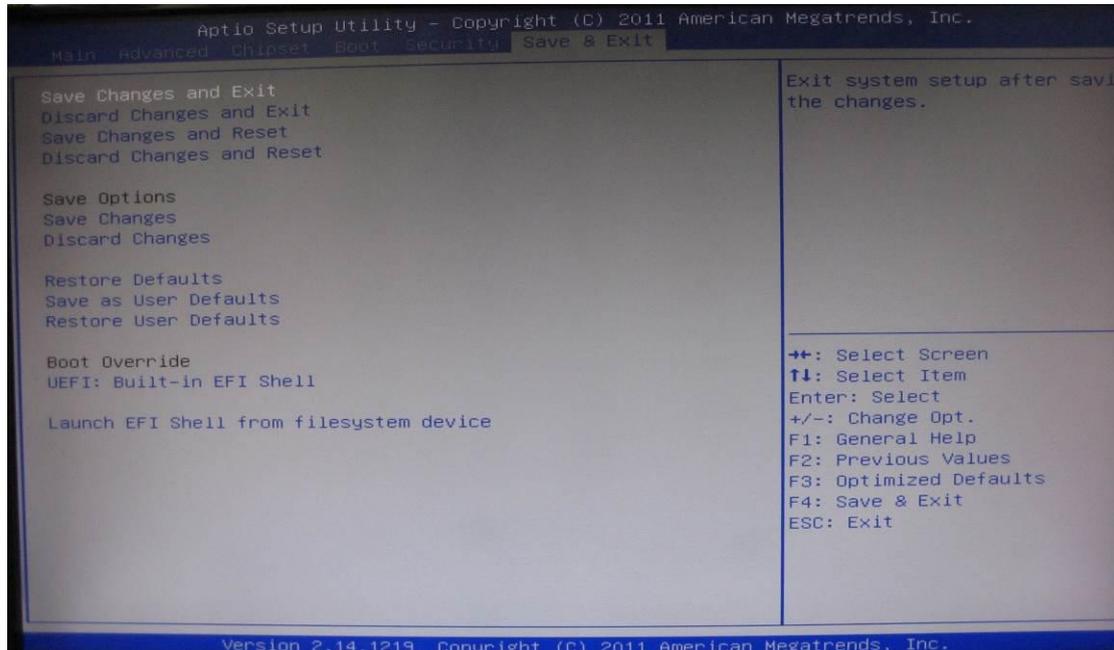
Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.

➤ Change User Password

Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.

4.8 Save & Exit Menu

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



➤ Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select *Save Changes and Exit* from the Exit menu and press <Enter>. Select Ok to save changes and exit.

➤ Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration. Select *Discard Changes and Exit* from the Exit menu and press <Enter>. Select Ok to discard changes and exit.

➤ Discard Changes

Use this item to abandon all changes.

➤ Load Optimal Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

➤ Load Fail-Safe Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press <Enter>. Select Ok to load Fail-Safe defaults.

APPENDIX A WATCHDOG TIMER

What is Watchdog Timer

The integrated Watchdog Timer can be set up by programming. There are 1~255 levels available. As long as the value 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 the Watchdog Timer

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

Enable WDT

1.Enable configuration

-O 2E 87

-O 2E 87

2. Select Logic device:

-O 2E 07

-O 2F 08

3. WDT Device Enable

-O 2E 30

-O 2F 01

5. Set timer unit

-O 2E F0

-O 2F 00 → (00: Sec; 08: Minute)

4. Set base timer:

-O 2E F1

-O 2F 0A → Set Reset Time (Ex.0A:10 Sec)

Disable WDT

1.Enable configuration

-O 2E 87

-O 2E 87

2. Select Logic device:

-O 2E 07

-O 2F 08

3. WDT Device Disable

-O 2E 30

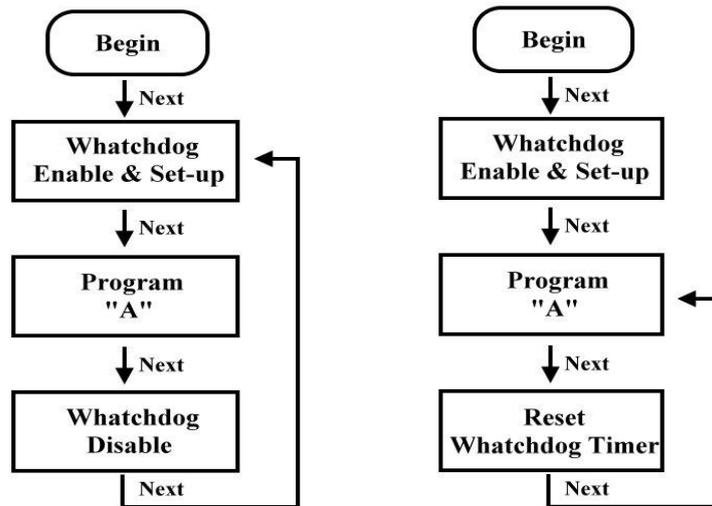
-O 2F 00

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 bigger 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.

The below flowchart can be referred to edit program A



APPENDIX B DIGITAL I/O

Digital I/O Specification

Digital Input:

Input channels: 4, sink/source type

Input voltage: 0 to 30VDC at 25Hz

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: 4, sink type

output current: 200mA max. per channel

on-state voltage: 12~ 24VDC nominal

max. voltage on COM+: 30VDC

Digital I/O Software Programming

- I2C to GPIO PCA9554PW GPIO Group0[3:0] is Output, Group0[7:4] is Input.
- I2C address: 0b0100100x.
- Registers:

Register 0: Input Group0 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 2: Output Group0 register.

Table 5. Register 1 - Output Port register bit description

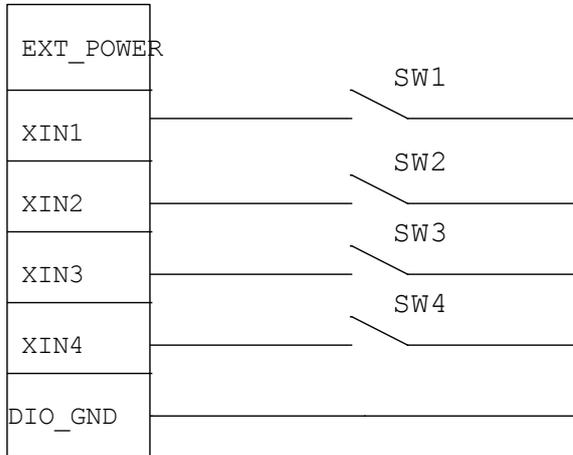
Legend: * default value.

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

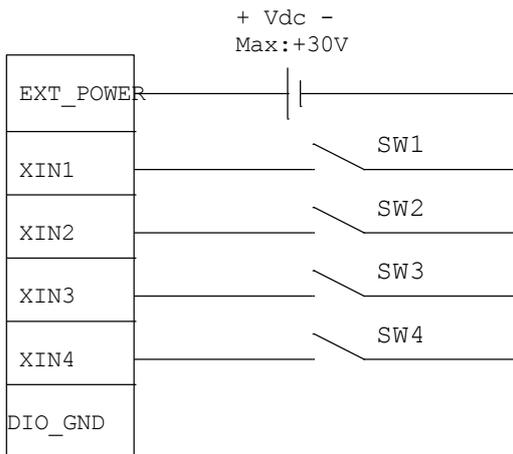
DRY contact

Logic level 0: close to ground
 Logic level 1: open

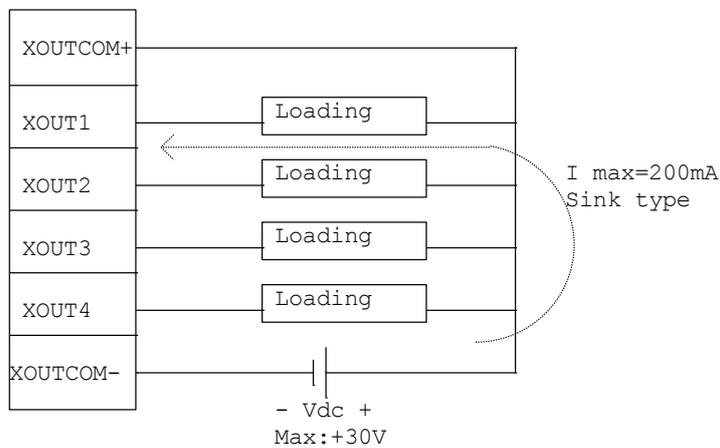


WET contact

Logic level 1: +/-3VDC max.
 Logic level 0: +/- 10VDC min. to +/-30VDC max



Digital Output Wiring



APPENDIX C POWER ON PROCEDURE

tBOX312-870-FL is an embedded system which is designed for vehicle, and supports both vehicle with +12V car battery or +24V car battery. The boot up requirement is quite different from normal embedded system. Please do follow the instruction in this section.

C.1 Introduction

Most of the times, car batteries will stay at 13.5V~15V (for 12V Mode), or at 27V~30V (for 24V Mode) while car engine is running, so specified above 13V or 26V power on will ensure that car engine is running and prevents a cold crank while car engine is started.

This cold crank will cause car battery voltage to drop to minimum 6V (at 12V mode) or more low, at this time, the most difficult task to provide a stable +12V output power to PC system to prevent PC system from cold boot.

In order to ensure the vehicle could provide a stable DC power, tBOX312-870-FL will detect the DC power from source is higher than the Start Voltage or not.

C.2 Power Input Mode Setting

To support different vehicle and battery protection, it has two types of power Input mode:

Mode	Operating Voltage	Start Voltage *	Low Voltage **	Very Low Voltage ***
12V	9V~16V	11.5V	10.5V	9V
24V	18V~32V	23V	21V	18V

*Start Voltage: The intelligent power board will start up and initial whole system when DC power source higher than this setting.

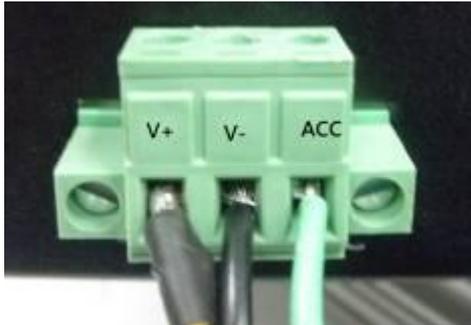
**Low Voltage: When DC power source lower than this setting, intelligent vehicle powerboard will run Low voltage Counter. When counter time out, tBOX312-870-FL will shutdown system automatically, and intelligent vehicle power board will stay in standby mode(max. power consumption is under 5mA)

**Very Low Voltage: When DC power source lower than this setting, intelligent vehicle powerboard will run Very Low voltage Counter. When counter time out, intelligent vehicle powerboard will turn off power immediately without shutdown procedure.

C.3 DC-inlet Introduction

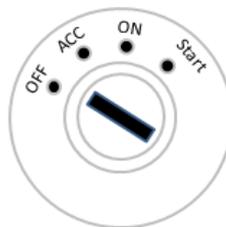
There are three pins of the DC-in connector as below table:

Pin	Description	Defination
1	V+	For DC power in V+.
2	V-	For DC power in V-
3	ACC	For ACC (Ignition)



ACC means “accessories”. Mainly, it acts both notice signal to all electrical devices, and also provides DC from battery.

When user puts car key into ignition, and turn the key to this position, user can run radio, CD player, air condition or other electrical accessories in vehicle. Below picture is a normal car ignition with ACC position:



C.4 Power on cabling example

Due to the voltage of ACC is usually the same as V+, user could connect V+ with ACC to initial the tBOX312-870-FL.

1. Power On without ACC control: ACC connect to V+.



2. Power On with ACC control: ACC connector to ignition switch.

