AR-B6002 Board

Fan-less with Intel ATOM Pineview + ICH8M

User Manual

Manual Rev.: 1.13

Revision 1.13

Copyright 2011

All Rights Reserved.

Manual’s first edition:

For the purpose of improving reliability, design and function, the information in this document is subject to change without prior notice and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this Manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Trademarks

AR-B6002 is a registered trademarks of Acrosser; IBM PC is a registered trademark of the International Business Machines Corporation; Pentium is a registered trademark of Intel Technologies Inc; Award is a registered trademark of Award Software International Inc; other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Table of Contents

1 INTRODUCTION

AR-V6002FL series with Intel Atom D425/D525 processor is a multi-function In-Vehicle computer which is suitable for using in all kind of applications. Besides basic I/O ports like VGA, USB, COM, LAN, and GPIO, AR-V6002FL has complete wireless solutions for selection, embedded CAN BUS function to allow microcontrollers and devices to communicate with each other in vehicle. In addition, AR-V6002FL has intelligent power management function with software utility to monitor power status and control power sequence, and also compliant with most industry standards for in-vehicle usage including CE, FCC, and E-Mark 13.

1.1 Specifications

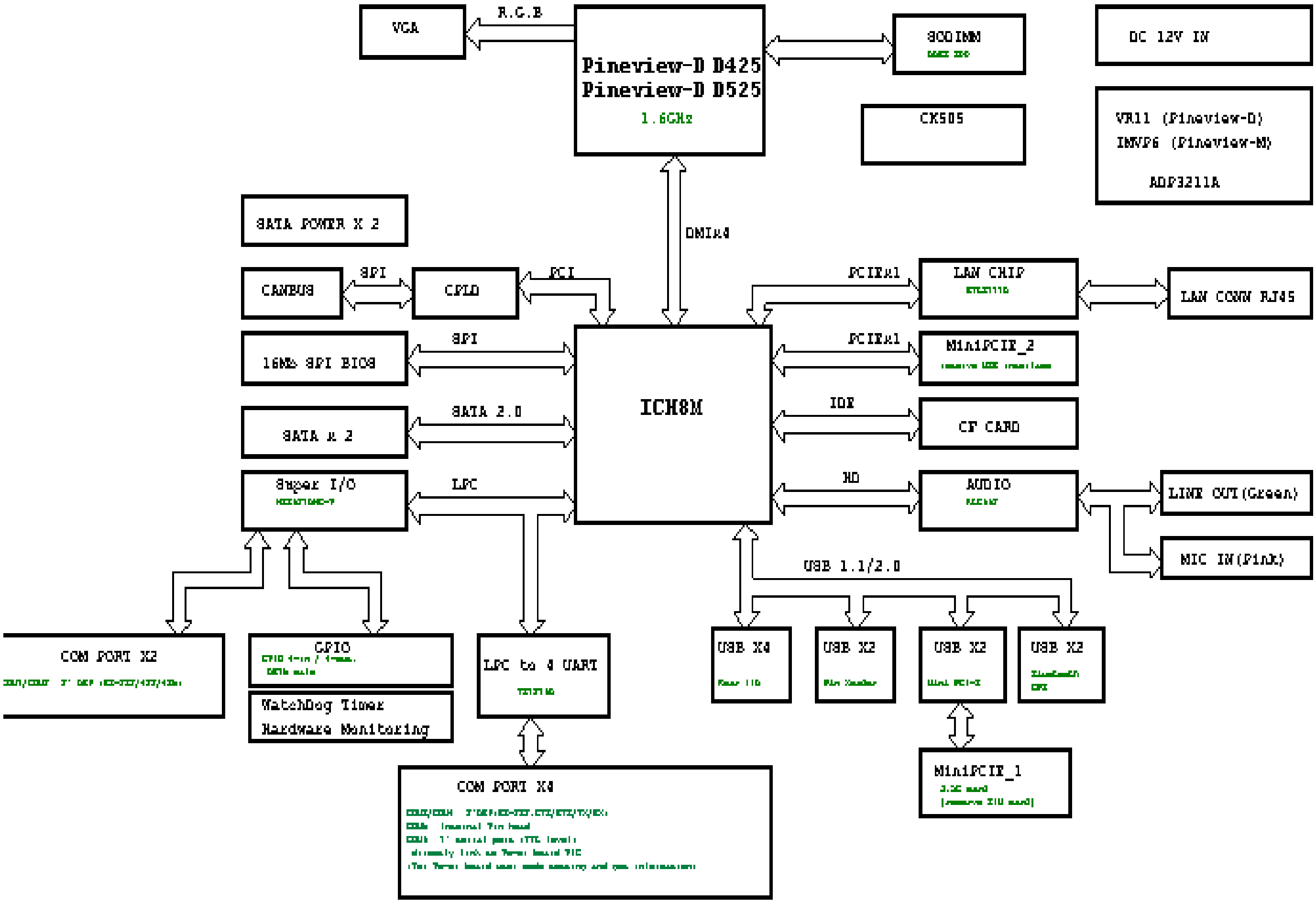
- IntelR Atom D525/D425 1.66GHz
- 1 x SO-DIMM supports DDRIII up to 4GB(Memory DDR3 data transfer rates of 800 MT/s)
- 1 x VGA
- 6 x USB2.0
- 2 x SATA
- 1 x CF II
- 5 x RS-232
- 1 x GbE (Realtek RTL8111D)
- 1 x Line-out , 1 x MIC
- 1 x Canbus (Implementation ISO 11898)
- 8-bit GPIO with 4in / 4out
- Optional WiFi/ Bluetooth/ GPS/ 3.5G solution for selection
- Intelligent power management support standard 12V/24V car battery

1.2 Package Contents

Check if the following items are included in the package.

- Quick Manual
- AR-B6002
- 1 x Software Utility CD

1.3 Block Diagram

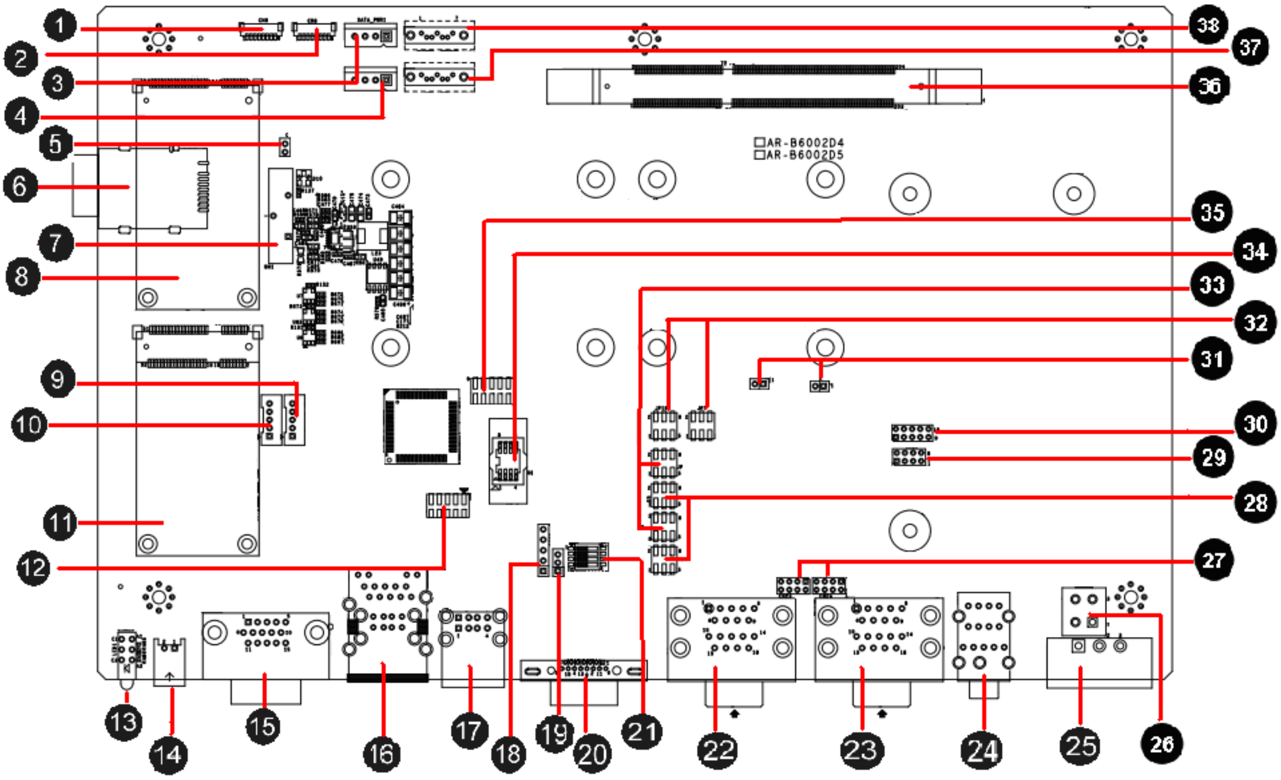


2 H/W INFORMATION

This chapter describes the installation of AR-B6050. At first, it shows the Function diagram and the layout of AR-B6050. It then describes the unpacking information which you should read carefully, as well as the jumper/switch settings for the AR-B6050 configuration

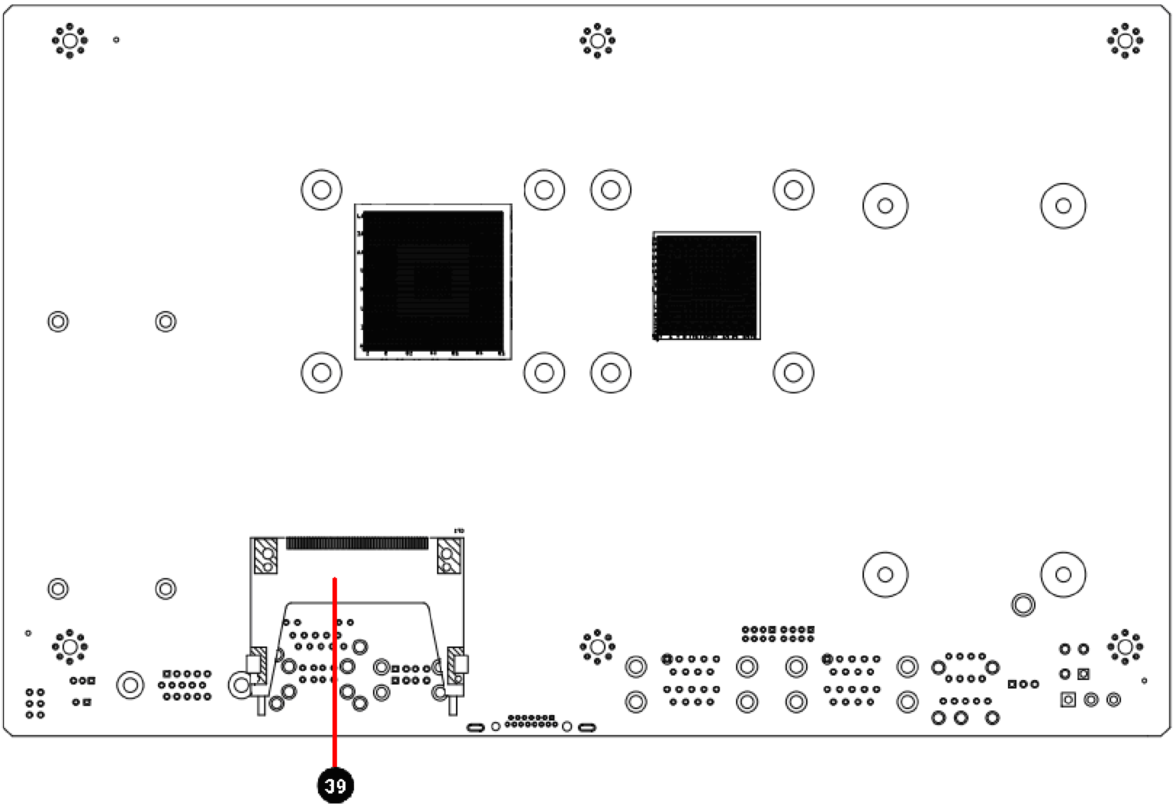
2.1 Locations of Connector and Jumper Setting

2.1.1 Locations (Top side)



1	CN6	14	CN18	27	CN23,CN24
2	CN8	15	GPIO1	28	JP8,JP11
3	SATA_PWR1	16	CN5	29	CN25 (Reserve)
4	SATA_PWR2	17	CN7	30	COM5 (Reserve)
5	CN2	18	CN28	31	JP5,JP6 (Reserve)
6	CN13	19	CN20	32	JP7,JP10
7	BH1	20	VGA1	33	JP9,JP12
8	Minipcie1	21	SW1	34	U8
9	CN9 (Reserve)	22	COM1	35	CN21
10	CN10 (Reserve)	23	COM3	36	DIMM1
11	Minipcie2	24	AUDIO1	37	SATA1
12	CN17	25	PWR1	38	SATA2
13	LED1	26	FUSE1		

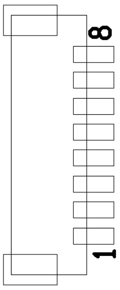
2.1.2 Locations (Bottom Side)



39	CF1

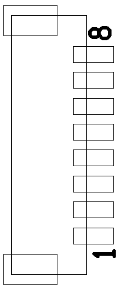
2.2 Connector and Jumper Setting Table

1. CN6: BLUETOOTH connector.



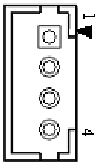
PIN	DEFINE
1	GND
2	USB_D+
3	USB_D-
4	+3.3V
5	LED
6	BT_ON
7	GND
8	+3.3V

2. CN8: GPS connector.



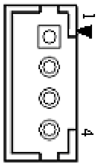
PIN	DEFINE
1	GND
2	USB_D+
3	USB_D-
4	+3.3V
5	LED
6	GPS_ON
7	GND
8	+3.3V

3. SATA_PWR1: SATA Power connector



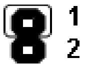
PIN	DEFINE
1	+12V
2	GND
3	+3.3V
4	+5V

4. SATA_PWR2: SATA Power connector



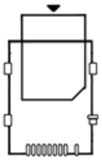
PIN	DEFINE
1	+12V
2	GND
3	+3.3V
4	+5V

5. CN2: Pin Header for clear CMOS



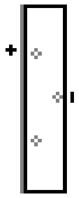
STATUS	SETTING
1-2	Clear CMOS

6. CN13: SIM Card Slot



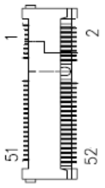
SIM Card Slot for 3G Module.

7. BH1: CMOS battery holder



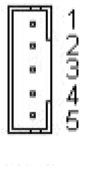
CMOS battery holder

8. MINIPCIE1: Mini PCI-E connector. (for 3.5G module)



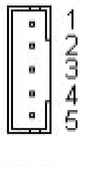
MINI PCI-E connector

9. CN9: Internal USB2.0 connector (Reserve)



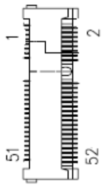
PIN	DEFINE
1	+5V
2	USB5-
3	USB5+
4	GND
5	GND

10. CN10: Internal USB2.0 connector (Reserve)



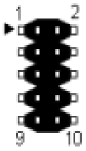
PIN	DEFINE
1	+5V
2	USB6-
3	USB6+
4	GND
5	GND

11. MINIPCIE2: Mini PCI-E connector.



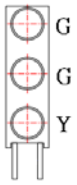
MINI PCI-E connector.

12. CN17: FPGA Programmable HEADER.



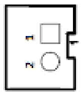
FPGA programmable header.

13. LED1: Power State



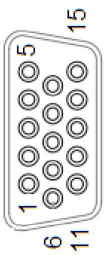
LED	SIGNAL
G	PIC LED
G	HDD LED
Y	Power LED

14. CN18: CANBUS connector



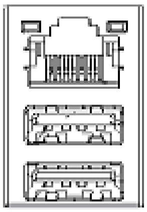
PIN	DEFINE
1	CAN_H
2	CAN_L

15. GPIO1: GPIO connector



PIN	DEFINE	PIN	DEFINE
1	GPO0	2	GPO1
3	GPO2	4	GPO3
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	GPI4	12	GPI5
13	GPI6	14	GPI7
15	N.C		

16. CN5: RJ45 + USB X 2 connector

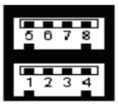


RJ45 connector for Gigabit Ethernet port #1.

Upper: Port #2.

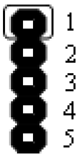
Lower: Port #1.

17. CN7: USB connector



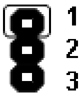
Upper: Port #4.
Lower: Port #3.

18. CN28: PIC Programming connector.



PIC programming connector.

19. CN20: Setting Voltage level of Battery



STATUS	SETTING
1-2	+24V
2-3	+12V (Default).

20. VGA1: D-SUB-15 female connector for VGA output

D-SUB-15 female connector for VGA output

21. SW1: DIP switch for power mode select (Note 1)

Mode	1	2	3	4
0	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF

22. COM1: D-SUB-9P Male connector × 2 (Note 2)

PIN	DEFINE	PIN	DEFINE
1	DCD /DT-	2	SIN /DT+
3	SOUT /422R+	4	DTR /422R-
5	GND	6	DSR
7	RTS	8	CTS
9	RI_12V		

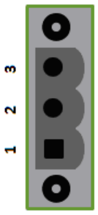
23. COM3: D-SUB-9P Male connector X 2

PIN	DEFINE	PIN	DEFINE
1	DCD	2	SIN
3	SOUT	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI_12V		

24. AUDIO1: AUDIO connector

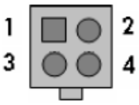
Color	SIGNAL
Blue	Remote Switch
Green	Line Out
Pink	MIC IN

25. PWR1: Power Input Terminal Block Connector



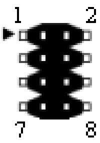
PIN	DEFINE
1	12V / 24V
2	IGN
3	GND

26. FUSE1: Fuse connector



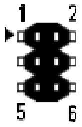
PIN	DEFINE
1,2	Fuse Out
3,4	Fuse In

27. CN23: RI SELECT for COM1/2 **CN24:** RI SELECT for COM3/4



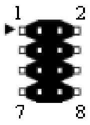
STATUS	SETTING
RI# (Default)	1-2(COM1/COM3)
+12V	3-4(COM1/COM3)
RI# (Default)	5-6(COM2/COM4)
+12V	7-8(COM2/COM4)

28. JP8,JP11: RS-232 / RS-422 / RS-485 Selection for COM1/2 (Note 2)



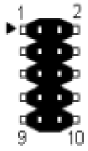
STATUS	SETTING
RS-232 (Default)	1-3 2-4
RS-422	3-5 4-6
RS-485	3-5 4-6

29. CN25: RI SELECT for COM5/6 (Reserve)



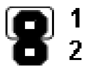
STATUS	SETTING
RI# (Default)	1-2(COM5)
+12V	3-4(COM5)
RI# (Default)	5-6(COM6)
+12V	7-8(COM6)

30. COM5: RS232 signal connector for port #5 (Reserve)



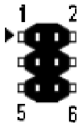
PIN	DEFINE	PIN	DEFINE
1	DCD #5	2	DSR #5
3	RX #5	4	RTS #5
5	TX #5	6	CTS #5
7	DTR #5	8	RI #5
9	GND	10	N.C

31. JP5,JP6: RS-485 Termination 120 ohm (Reserve)



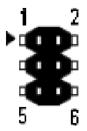
STATUS	SETTING
Enable	short
Disable	open (Default)

32. JP7,JP10: RS-232 / RS-422 / RS-485 Selection for COM1/2 (Note 2)



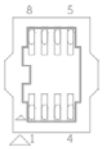
STATUS	SETTING
RS-232 (Default)	1-2
RS-422	3-4
RS-485	5-6

33. JP9,JP12: RS-232 / RS-422 / RS-485 Selection for COM1/2 (Note 2)



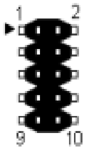
STATUS	SETTING
RS-232 (Default)	1-3 2-4
RS-422	3-5 4-6
RS-485	N / A

34. U8: SPI BIOS Socket



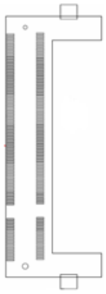
SPI BIOS Socket

35. CN21: BIOS Programmable HEADER.



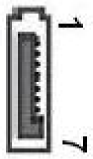
PIN	DEFINE	PIN	DEFINE
1	CS0	2	+3.3V
3	MISO	4	HOLD
5	WP	6	CLK
7	GND	8	MOSI
9	N.C	10	N.C

36. DIMM1: DDR-II SODIMM Socket.



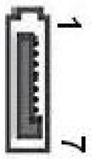
DDR-3 SODIMM Socket

37. SATA1: SATA device connector #1.



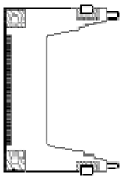
SATA device connector #1

38. SATA2: SATA device connector #2.



SATA device connector #2

39. CF1: Type-II compact flash card socket



+3.3V CF card only and UDMA mode supported

- **Note1: Power smart function**

  - Mode0: ATX function.
  - Mode1: Auto PWRBTN function.
  - Mode2, Mode3, Mode4: Smart ATX.
  - Mode5, Mode6, Mode7: Smart ATX (power-on by trigger Remote SW).
  - Others modes are reserved for test only.

Definition

1. Soft off cycle:
   A period when received power off signal to generate a off signal (A 500mS pulse, High-Low –High or Low-High-Low depends on SIO configuration, to mother board's Power Button Pin)
2. Hard Off cycle:
   A period when system off (S5) to stand by removed (G3). In another word, the A period of 5VSB on to off (when system already off)

Notes: S5 and G3 is follow by ACPI

Mode description

The main power-in is controlled by the switch on chassis.
Maximum 16 Modes adjusted by 4 switches. (Mode 8 to mode 15 are reserved for future use).

Mode 0: ATX mode.

A. 5V Standby is always on.

B. Input voltage is not monitored.

C. Power on/off is controlled by remote switch

Mode 1: Auto PWRBTN mode

A. Power output immediately after input is present.

B. Power output is off immediately when input power to off

Smart Mode (Mode 2 to Mode 7)

Mode 2: See Figure 1

A. Power on is controlled by **ignition (remote switch does not make any action to power on)**.

B. **Power on retry:** If the motherboard cannot be turned on normally (/PSON does not go to low), the Power smart function will turn off 5VSB, and then turn on 5VSB and retry. Send "on" pulse to motherboard again. The power board will re-try this procedure until successfully turn on motherboard.

C. Power smart function sends “ON” pulse to motherboard when ignition is on for more than 2 seconds.

D. Power smart function will ignore the status change of ignition after ON pulse is send to motherboard for 3 minutes. After this period, the Power smart function will start to check its status. This can avoid an improper “OFF” process before the OS is complete booted.

E. Power off is controlled by **remote switch or ignition. Remote switch** has higher priority than ignition. (Remote switch is optional).

F. Power smart function sends “off” pulse to motherboard **5 seconds** after ignition is turned off or remote switch is pressed. (Soft delay)

G. Power smart function will ignore the status change of ignition and remote switch during the “OFF” pulse is sent out and the /PSON return to high. This will avoid an improper ON process before the motherboard is completely shot off.

H. The **digital output (optional)** will go from high to low at the moment that “OFF” pulse is sent to motherboard. The low state will be kept until /PSON back to high. If the /PSON does not back to high within 3 minutes, the Power smart function will enter a retry cycle (described in next section).

I. **Power off retry:** If the motherboard cannot be shouted down normally (/PSON does not go to high) within 3 minutes after “OFF” pulse is sent, the Power smart function will send off pulse to motherboard again. If the motherboard still cannot be shouted down normally, the power output will be turned off directly. (Figure 3)

J. Hard off delay: **1 minutes,** During this period system can be turned on again if the off procedure already finished and power button is pushed again(or ignition on again)

Mode 3:

A. Same as mode 2 except for soft/hard off delay time

B. Soft off delay: **1 minute**

C. Hard off delay: **5 minutes**

Mode 4:

A. Same as mode 2 except for soft/hard off delay time

B. Soft off delay: **30 minute**

C. Hard off delay: **2 Hours**

Mode 5: See Figure 2

Same as mode 2 except that the power on is controlled by **remote switch.**

A. Power on is controlled by **remote switch (ignition must be turned on 2 seconds before remote switch is pressed)**.

B. The Smart Mode sends off pulse to motherboard **5 seconds** after ignition is turned off or remote switch is pressed. (Soft delay)

C. Hard off delay: **1 minutes**

Mode 6:

A. Same as mode 5 except for soft/hard off and delay

B. Soft off delay: **1 minute**

C. Hard off delay: **5 minutes**

Mode 7:

A. Same as mode 5 except for soft/hard off and delay

B. Soft off delay: **30 minute**

C. Hard off delay: **2 Hours**

Mode15(Software control mode):

A. Setting by AP

B. Software mode default as Hardware mode 2

C. Soft off delay time can be set

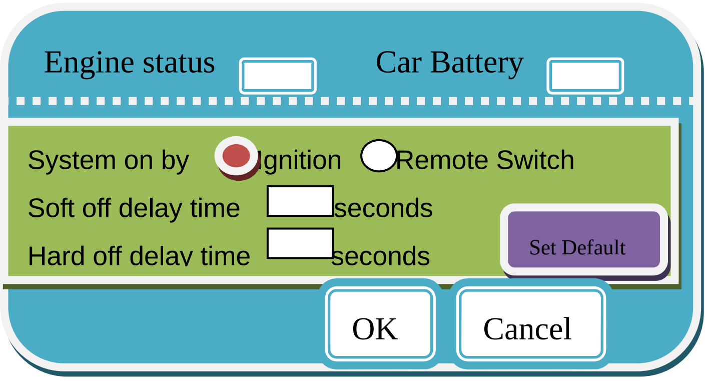
D. Hard off delay time can be set

E. In-Vehicle system power on by ignition or Remote button can be set

F. Show Ignition status / Voltage(for AP only)

G. Create a button "Set default"

Plan AP screen→



Engine status □ Car Battery □

System on by ● Ignition ○ Remote Switch

Soft off delay time □ seconds

Hard off delay time □ seconds

Table 1. Control Mode

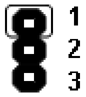
Mode	Soft OFF Delay	Hard OFF delay	Power ON Control	Power OFF Control
0 (ATX)	No	No	Remote Switch	Remote Switch
1(Auto PWRBTN)	No	No	DC ON	DC OFF
2	5 seconds	1 minute	Ignition	Ignition / Remote Switch
3	1 minute	5 minutes	Ignition	Ignition / Remote Switch
4	30 minutes	2 hours	Ignition	Ignition / Remote Switch
5	5 seconds	1 minute	Remote Switch / Ignition	Ignition / Remote Switch
6	1 minute	5 minutes	Remote Switch / Ignition	Ignition / Remote Switch
7	30 minutes	2 hours	Remote Switch / Ignition	Ignition / Remote Switch
15 (Software control)	By user setting	By user setting	By user setting	Ignition / Remote Switch

Another function of Smart Mode

1. If ignition turns back “ON” during “Off” Delay, Power smart function will stay in operation. “Off” signal will not be send to motherboard. The “Off” Delay will re-start after next ignition off.

2. Power input monitoring(before system boot on, during runtime, during soft off delay): The Power smart function will constantly monitor the input voltage. If the input voltage is below **X Voltage (the standard might have 5% tolerance)**, the Smart Mode will not start the power on procedure. When Power smart function has ran in operation and the battery drops below **Y Voltage (with 5% tolerance)** more than 10 seconds the Power smart function will shut down the motherboard following the standard shut down procedure. If the input voltage recovers in 10 seconds over **Y Voltage (with 5% tolerance)** again, the Power smart function will continue to run. (Figure 4)if this happens, ignition shall be off and on again (Mode 2, 3, 4) or press the remote switch(Mode 5,6,7) if you want to turn on system again.

Important: Please make sure the CN20 jumper is set to the right setting which meet your vehicle power system. The power subsystem uses this setting to identify the voltage of your vehicle power system.

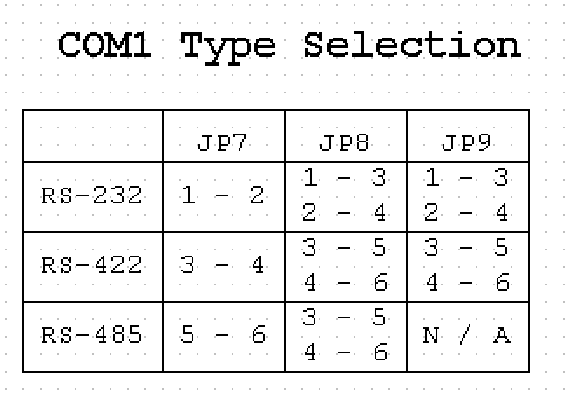


STATUS	SETTING
1-2	+24V system
2-3	+12V system (Default).

	For 12V car battery	For 24V car battery
X value (Minimum Start up voltage)	**11.2**	**23**
Y value (Auto shut down voltage)	**10.8**	**22.5**

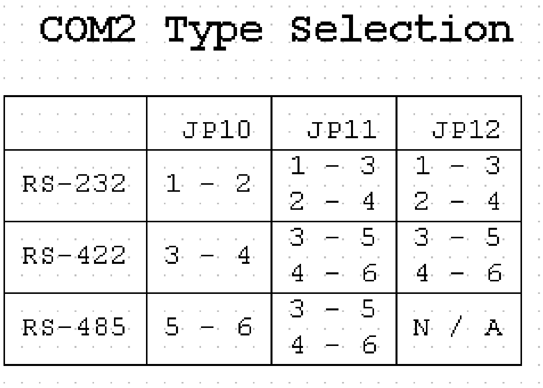
Note2: COM1 / 2 to choose RS-232 / RS-485 / RS-422 by Jump setting

- JP7,JP8,JP9 setting to COM1
- JP10,JP11,JP12 setting to COM2



COM1 Type Selection

	JP7	JP8	JP9
RS-232	1 - 2	1 - 3 2 - 4	1 - 3 2 - 4
RS-422	3 - 4	3 - 5 4 - 6	3 - 5 4 - 6
RS-485	5 - 6	3 - 5 4 - 6	N / A



COM2 Type Selection

	JP10	JP11	JP12
RS-232	1 - 2	1 - 3 2 - 4	1 - 3 2 - 4
RS-422	3 - 4	3 - 5 4 - 6	3 - 5 4 - 6
RS-485	5 - 6	3 - 5 4 - 6	N / A

Note3:

It can not use USB Hub with power adaptor that connects to USB port.

3 BIOS SETTING

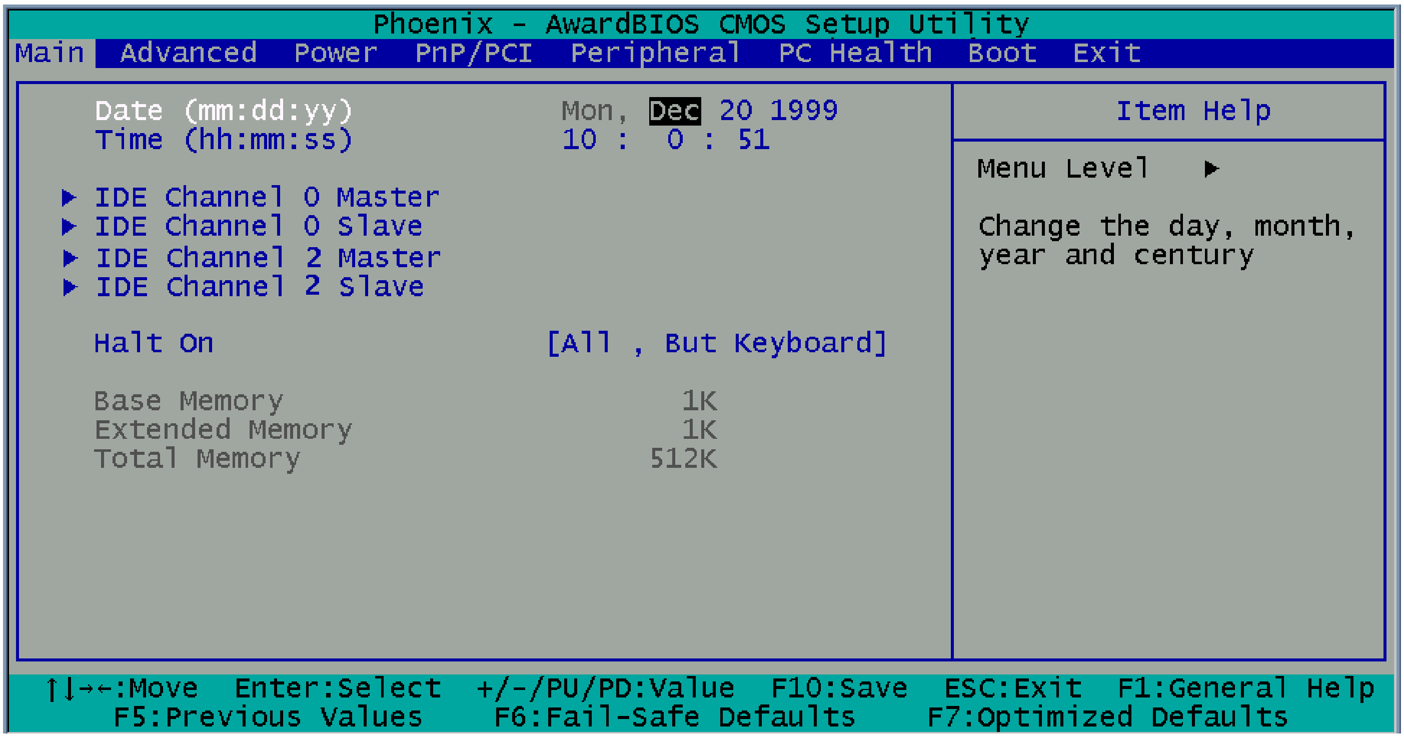
This chapter describes the BIOS menu displays and explains how to perform common tasks needed to get the system up and running. It also gives detailed explanation of the elements found in each of the BIOS menus. The following topics are covered:

- Main Setup
- Advanced Chipset Setup
- PnP/PCI Setup
- Peripherals Setup
- PC Health Setup
- Boot Setup
- Exit Setup

Once you enter the Award BIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to highlight the item and then use the <Pg Up> <Pg Dn> keys to select the value you want in each item.

3.1 Main Setup

The BIOS setup main menu includes some options. Use the [Up/Down] arrow key to highlight the option, and then press the [Enter] key to select the item and configure the functions.



```
                    Phoenix - AwardBIOS CMOS Setup Utility
Main  Advanced  Power  PnP/PCI  Peripheral  PC Health  Boot  Exit

     Date (mm:dd:yy)                Mon, Dec 20 1999    |      Item Help
     Time (hh:mm:ss)                10 :  0 : 51        |
                                                        | Menu Level   ▶
  ▶ IDE Channel 0 Master                                |
  ▶ IDE Channel 0 Slave                                 | Change the day, month,
  ▶ IDE Channel 2 Master                                | year and century
  ▶ IDE Channel 2 Slave                                 |
                                                        |
     Halt On                       [All , But Keyboard] |
                                                        |
     Base Memory                           1K           |
     Extended Memory                       1K           |
     Total Memory                        512K           |

  ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
      F5:Previous Values    F6:Fail-Safe Defaults    F7:Optimized Defaults
```

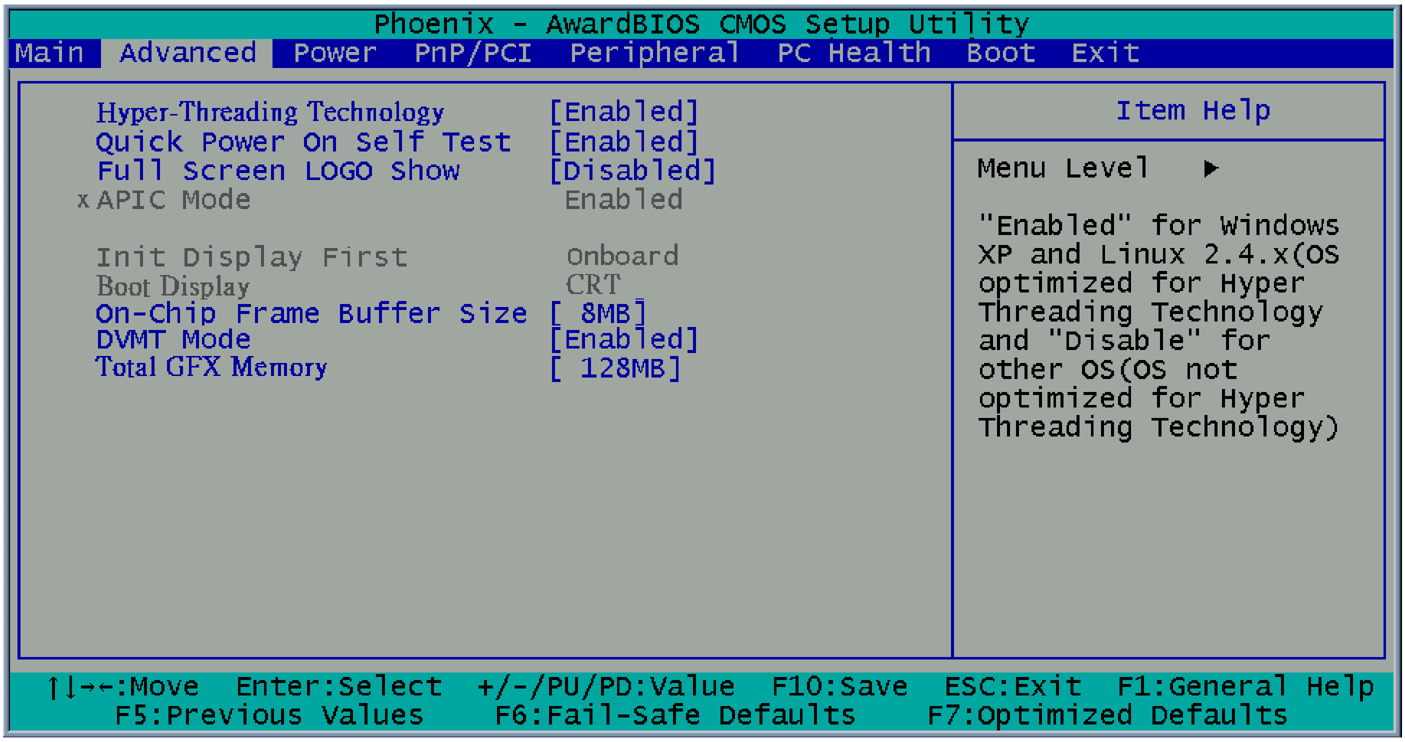
Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
System Date	Format : MM/DD/YYYY (month/day/year)	Set the system date. Note that the ‘Day’ automatically changes when you set the date.
System Time	Format: HH:MM:SS (hour:minute:second)	Set the system time.
IDE Channel 0 Master/Slave	N/A	The onboard SATA Ports support user connecting up to 2 SATA HDD. The first SATA Port is the “IDE Channel 0 Master” and the second is “IDE Channel 1 Master”. BIOS will auto-detect the HDD type.

Halt On	All Errors, No Errors, All but keyboard.	Select the situation in which you want the BIOS to stop the POST process and notify you.

3.2 Advanced Chipset Setup

This section consists of configuration entries that allow you to improve your system performance, or modify some system features according to your preference. Some entries are required and reserved by the board's design.



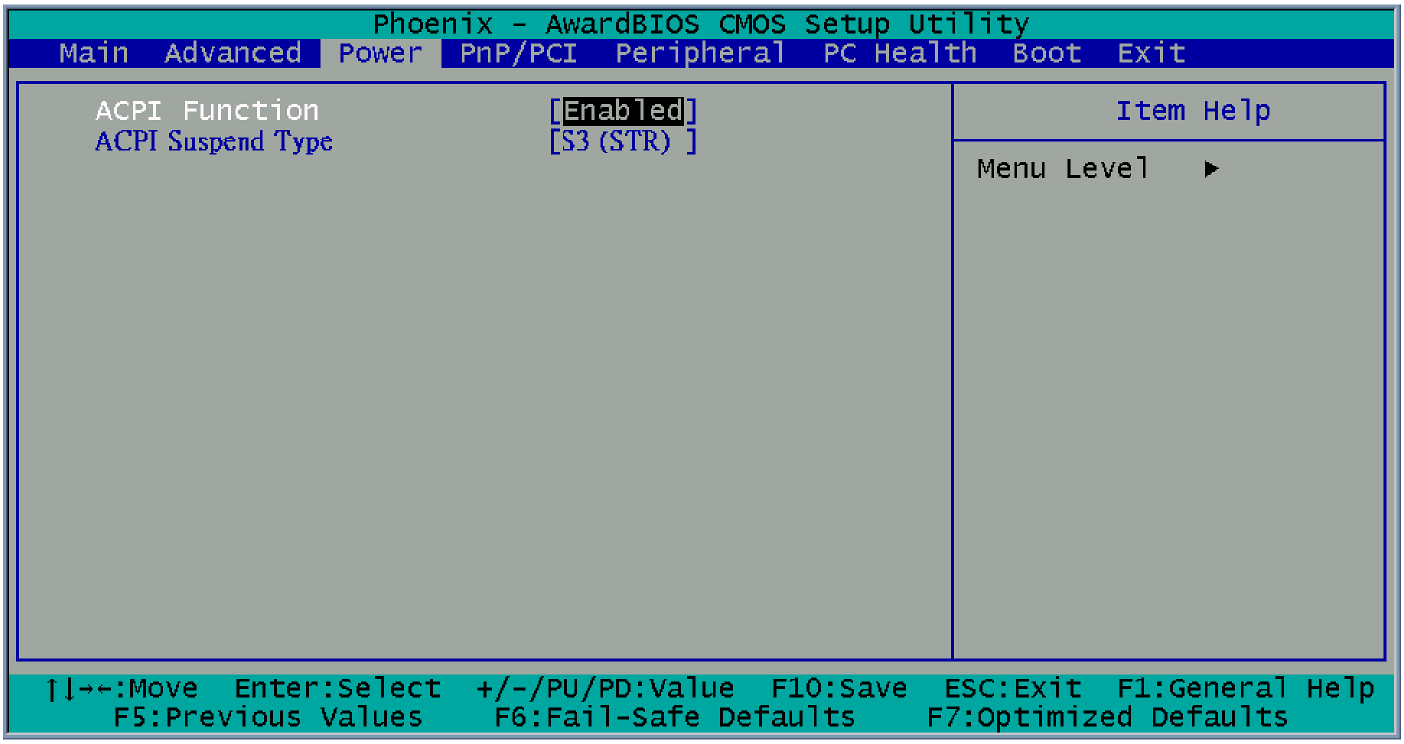
```
                 Phoenix - AwardBIOS CMOS Setup Utility
 Main   Advanced   Power   PnP/PCI   Peripheral   PC Health   Boot   Exit

      Hyper-Threading Technology      [Enabled]    |        Item Help
      Quick Power On Self Test        [Enabled]    |
      Full Screen LOGO Show           [Disabled]   | Menu Level   ►
    x APIC Mode                        Enabled     |
                                                   | "Enabled" for Windows
      Init Display First               Onboard     | XP and Linux 2.4.x(OS
      Boot Display                     CRT         | optimized for Hyper
      On-Chip Frame Buffer Size       [ 8MB]       | Threading Technology
      DVMT Mode                       [Enabled]    | and "Disable" for
      Total GFX Memory                [ 128MB]     | other OS(OS not
                                                   | optimized for Hyper
                                                   | Threading Technology)

  ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5:Previous Values    F6:Fail-Safe Defaults    F7:Optimized Defaults
```

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Hyper-Threading Technology	Enabled Disabled	Enable for Windows XP and Linux Disable for other OS.
Quick Power On Self Test	Enabled Disabled	This category speeds up the Power On Self Test (POST) after you have powered on the computer. If it is set to Enabled, the BIOS will shorten or skip some check items during POST.
Full Screen Logo Show	Enabled Disabled	Select Enabled to show the full screen logo if you have an add-in BIOS.
On-Chip Frame Buffer Size	1Mb 8Mb	This Item is for setting the Frame Buffer (Share system memory as display

		memory).
DVMT mode	Enabled Disabled	This item sets the mode for dynamic video memory thechology
Total GFX Memory	128MB 256MB MAX	This item sets the mode for GFX video memory

3.3 Power Setup



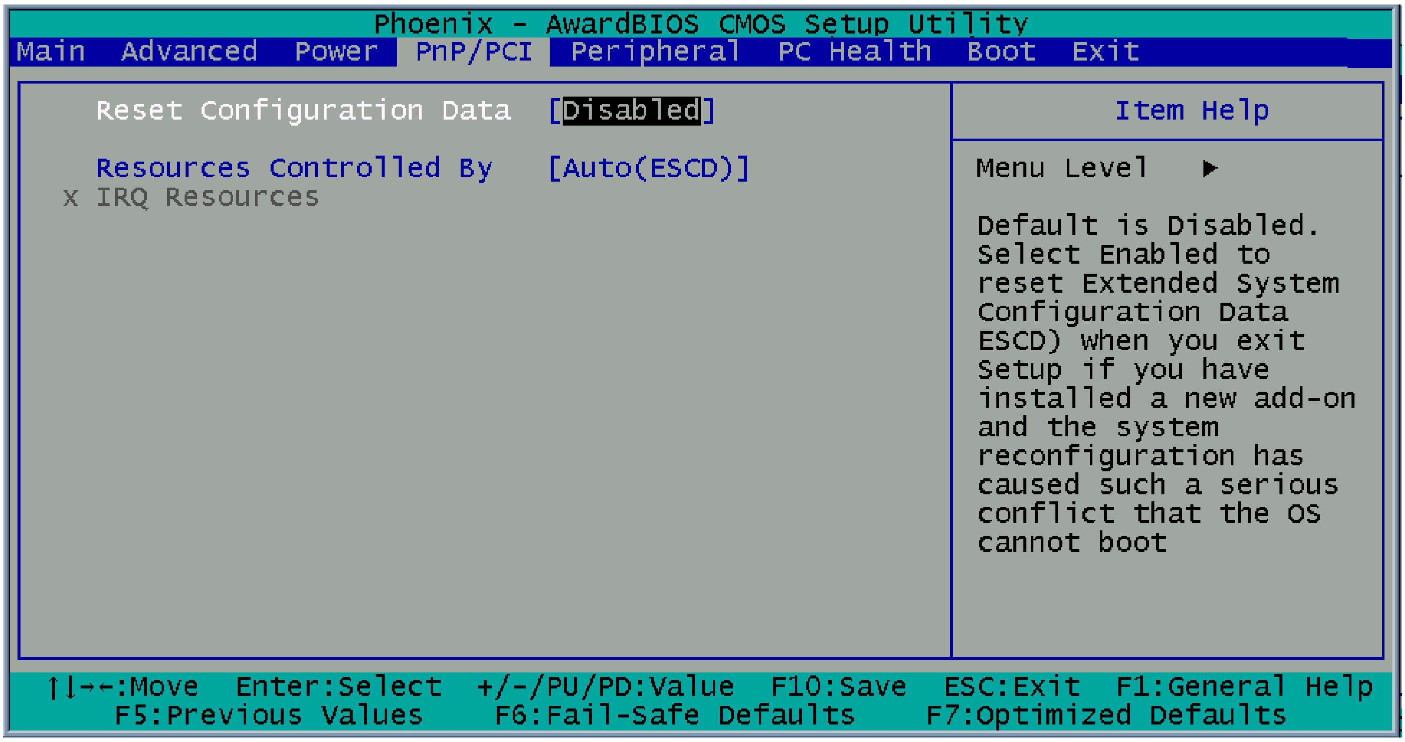
```
              Phoenix - AwardBIOS CMOS Setup Utility
  Main   Advanced   Power   PnP/PCI   Peripheral   PC Health   Boot   Exit

      ACPI Function                      [Enabled]          Item Help
      ACPI Suspend Type                  [S3 (STR) ]
                                                         Menu Level   ►

 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5:Previous Values     F6:Fail-Safe Defaults     F7:Optimized Defaults
```

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
ACPI Function	Enabled	ACPI System Support
ACPI Suspend Type	S3 S1	ACPI S1/S3 Sleep State.

3.4 PnP/PCI Setup

The option configures the PCI bus system. All PCI bus system on the system use INT#, thus all installed PCI cards must be set to this value.



```
                     Phoenix - AwardBIOS CMOS Setup Utility
Main  Advanced  Power  PnP/PCI  Peripheral  PC Health  Boot  Exit

    Reset Configuration Data   [Disabled]          Item Help

    Resources Controlled By    [Auto(ESCD)]     Menu Level   ►
  x IRQ Resources
                                                Default is Disabled.
                                                Select Enabled to
                                                reset Extended System
                                                Configuration Data
                                                ESCD) when you exit
                                                Setup if you have
                                                installed a new add-on
                                                and the system
                                                reconfiguration has
                                                caused such a serious
                                                conflict that the OS
                                                cannot boot

  ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5:Previous Values     F6:Fail-Safe Defaults     F7:Optimized Defaults
```

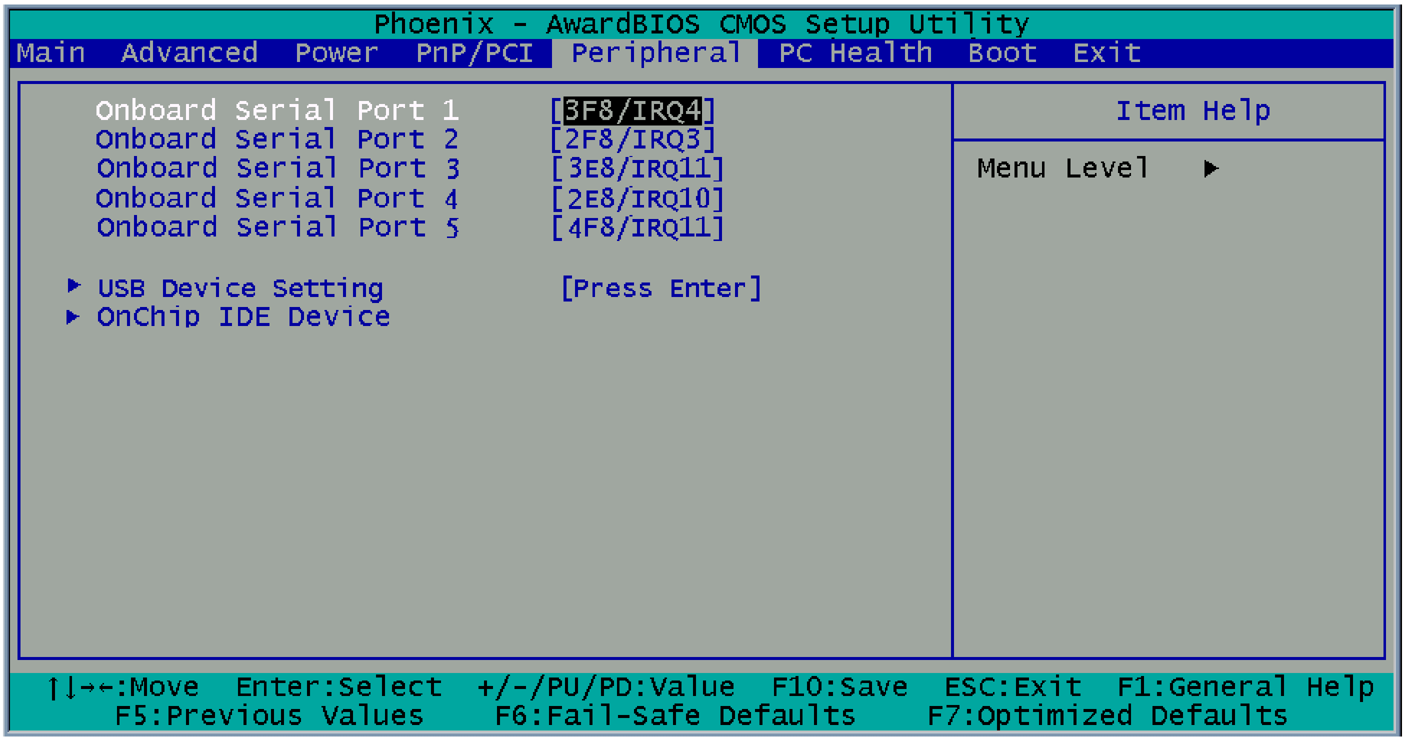
Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
Reset Configuration Data	Enabled Disabled	Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup. If you have installed a new add-on and the system reconfiguration has caused such a serious conflict, then the operating system cannot boot.
Resources Controlled By	Auto(ESCD) Manual	The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play

		operating system such as Windows 95. If you set this field to “manual,” then you may choose specific resources by going into each of the submenus.
IRQ Resources	N/A	When resources are controlled manually, assign a type to each system interrupt, depending on the type of the device that uses the interrupt

3.5 Peripherals Setup

This option controls the configuration of the board's chipset. Control keys for this screen are the same as for the previous screen.



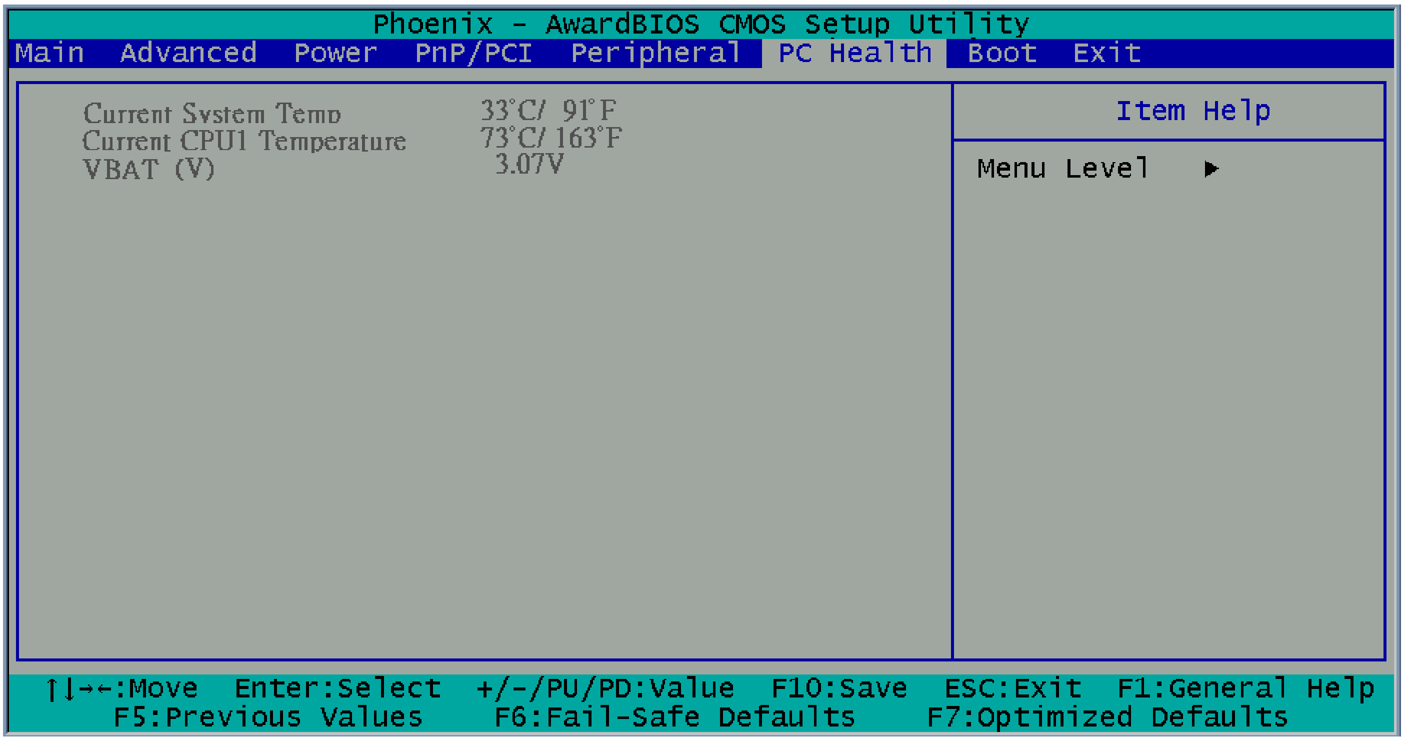
```
                    Phoenix - AwardBIOS CMOS Setup Utility
Main   Advanced   Power   PnP/PCI   Peripheral   PC Health   Boot   Exit

      Onboard Serial Port 1        [3F8/IRQ4]          Item Help
      Onboard Serial Port 2        [2F8/IRQ3]
      Onboard Serial Port 3        [3E8/IRQ11]     Menu Level   ►
      Onboard Serial Port 4        [2E8/IRQ10]
      Onboard Serial Port 5        [4F8/IRQ11]

    ► USB Device Setting            [Press Enter]
    ► OnChip IDE Device

   ↑↓→←:Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
        F5:Previous Values      F6:Fail-Safe Defaults      F7:Optimized Defaults
```

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Onboard Serial Port 1 **Onboard Serial Port 2** **Onboard Serial Port 3** **Onboard Serial Port 4** **Onboard Serial Port 5**	Serial Port 1: 3F8 / IRQ4 Serial Port 2: 2F8 / IRQ3 Serial Port 3: 3E8 / IRQ11 Serial Port 4: 2E8 / IRQ10 Serial Port 5: 4F8 / IRQ11	Select an address and the corresponding interrupt for each serial port.
USB Device Setting		Select your system contains a Universal Serial Bus (USB) controller and you have USB peripherals.
On chip IDE DEVICE		The integrated peripheral controller contains an IDE interface with support for two IDE channels.

3.6 PC Health Setup

This section shows the parameters in determining the PC Health Status. These parameters include temperatures, fan speeds, and voltages.



Phoenix - AwardBIOS CMOS Setup Utility

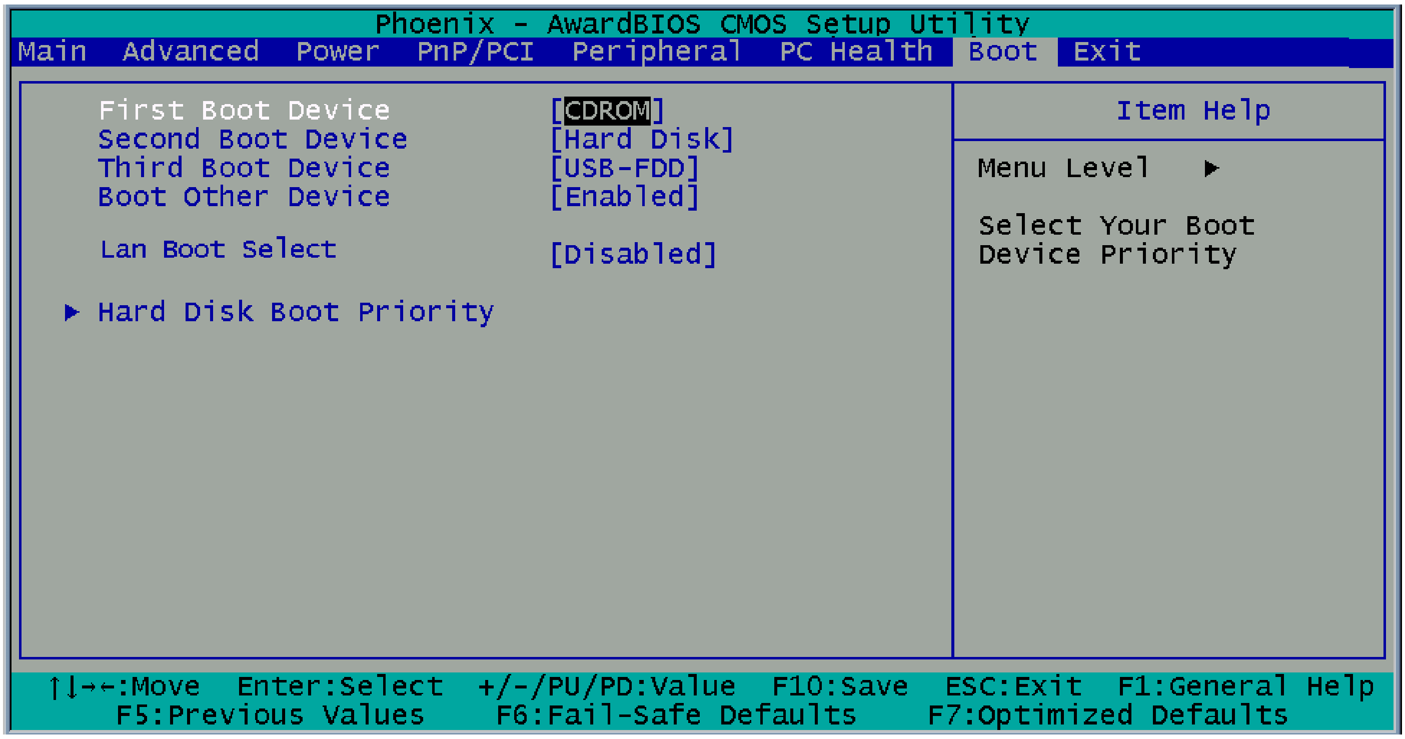
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit

```
Current System Temp              33°C/ 91°F
Current CPU1 Temperature         73°C/ 163°F
VBAT (V)                          3.07V
```

Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

3.7 Boot Setup

This option allows user to select sequence/priority of boot device(s) and Boot from LAN.



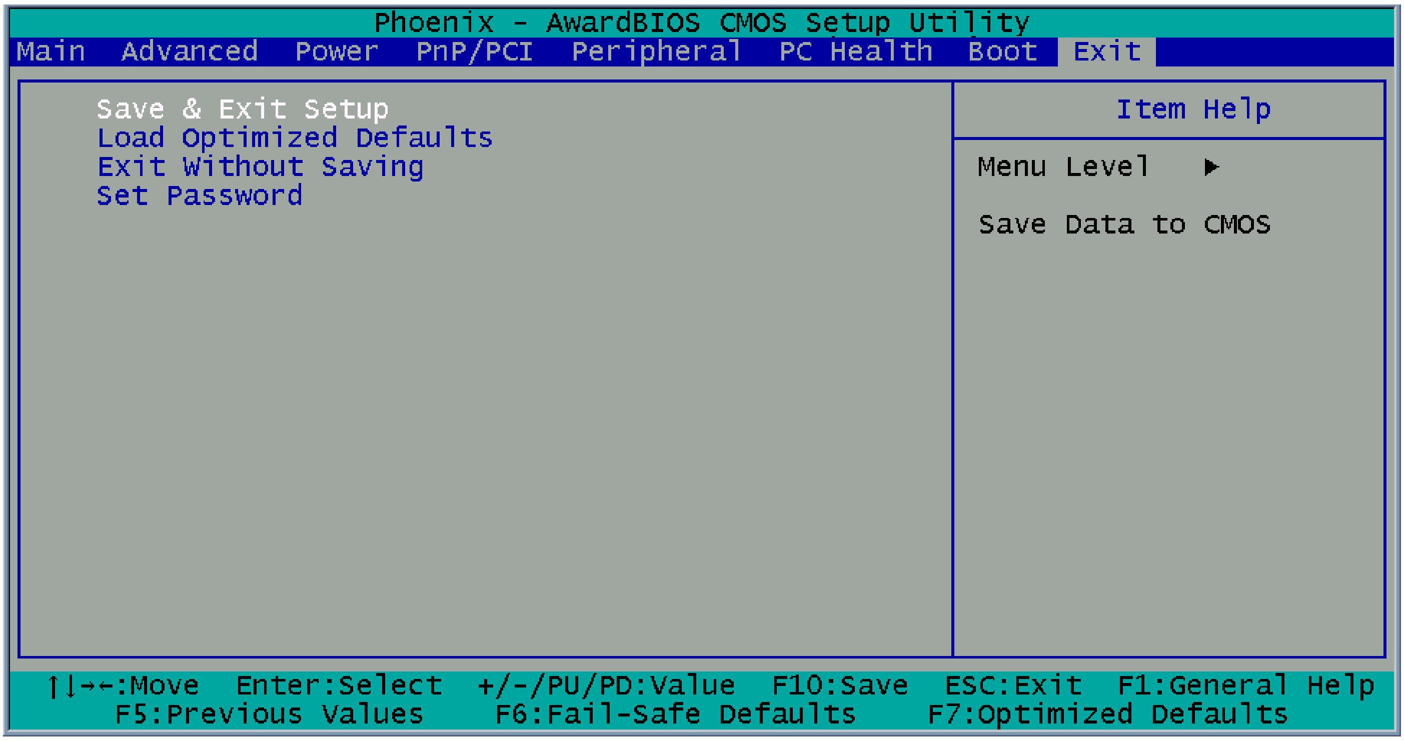
```
              Phoenix - AwardBIOS CMOS Setup Utility
Main  Advanced  Power  PnP/PCI  Peripheral  PC Health  Boot  Exit

     First Boot Device          [CDROM]          |    Item Help
     Second Boot Device         [Hard Disk]      |
     Third Boot Device          [USB-FDD]        | Menu Level   ►
     Boot Other Device          [Enabled]        |
                                                 | Select Your Boot
     Lan Boot Select            [Disabled]       | Device Priority

   ► Hard Disk Boot Priority

 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5:Previous Values    F6:Fail-Safe Defaults    F7:Optimized Defaults
```

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
First / Second / Third Boot Device/Other Boot Device	Hard Disk CDROM USB-FDD USB-CDROM LAN Disabled	The BIOS attempts to load the operating system from the devices in the selected sequence.
LAN Boot Select	Enabled Disabled	These fields allow the system to search for an OS from LAN.
Hard Disk Boot Priority	N/A	These fields set the Boot Priority for each Hard Disk.

3.8 Exit Setup

This option is used to exit the BIOS main menu and change password.



```
                     Phoenix - AwardBIOS CMOS Setup Utility
Main  Advanced  Power  PnP/PCI  Peripheral  PC Health  Boot  Exit

     Save & Exit Setup                                Item Help
     Load Optimized Defaults
     Exit Without Saving                        Menu Level   ►
     Set Password
                                                Save Data to CMOS

 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5:Previous Values     F6:Fail-Safe Defaults     F7:Optimized Defaults
```

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Save & Exit Setup	Press <Enter> on this item to confirm: **Save to CMOS and EXIT (Y/N)? Y**	Press “Y” to store the selections made in the menus in CMOS – a special section of the memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the setup selections stored in CMOS. After saving the values, the system will restart.

Load Optimized Defaults	When you press <Enter> on this item, you will see a confirmation dialog box with a message like this: **Load Optimized Defaults (Y/N)? N**	Press 'Y' to load the default values that are factory-set for optimal-performance system operations.
Exit Without Saving	Press <Enter> on this item to confirm: **Quit without saving (Y/N)? Y**	This allows you to exit Setup without storing any changes in CMOS. The previous selections remain in effect. This will exit the Setup utility and restart your computer.
Set Password	Press <Enter> on this item to confirm: **ENTER PASSWORD:**	When a password has been enabled, you will be prompted to enter your password every time you try to enter Setup. This prevents unauthorized persons from changing any part of your system configuration. Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previous password from the CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password. To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm that the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

4 WATCHDOG, GPIO, AND BYPASS PROGRAMMING

4.1 Watchdog Programming

This section describes the usage of WATCHDOG. AR-B6050 integrated the WATCHDOG that enable user to reset the system after a time-out event. User can use a program to enable the WATCHDOG and program the timer in range of 1~255 second(s)/minute(s). Once user enables the WATCHDOG, the timer will start to count down to zero except trigger the timer by user's program continuously. After zeroize the timer (stop triggering), the WATCHDOG will generate a signal to reset the system. It can be used to prevent system crash or hang up. The WATCHDOG is disabled after reset and should be enabled by user's program.

Intel also provides a Linux watchdog driver to access the feature on AR-B6050. It can be accessed via /dev/watchdog. About the related operations of Linux watchdog please refer Linux website.

Please refer to the following table to program WATCHDOG properly, and user could test WATCHDOG under 'Debug' program.

Address port: 2E and Data port: 2F	
C:>debug	To enter debug mode.
-o 2E 87 **-o 2E 01** **-o 2E 55** **-o 2E 55**	To enter configuration.
-o 2E 07	To point to Logical Device Number Reg.
-o 2F 07	To select logical device 7 (WATCHDOG).
-o 2E 72 **-o 2F 40**	To select "keyboard reset" as WATCHDOG output to reset system.
-o 2E 72	Preparing to select the unit of timer equals minute or second.
-i 2F	To read the value of index "2F".
-o 2F xx	The value "xx" equals [(value of index "2F") OR (80)]. OR (80): unit is second. OR (00): unit is minute.

-o 2E 73	Preparing to set the WATCHDOG timer value.
-o 2F ##	The value “##” ranges between 01 ~ FF (1 ~ 255 seconds). **00: To disable WATCHDOG.**
-q	To quit debug mode

Notice: The “actual” timer value may not match with the “theoretical”. That is because of the tolerance of internal oscillating clock and cannot be adjusted or optimized.

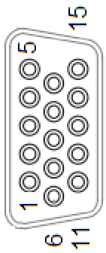
```
//=============================================================================
// Rev      Date        Name      Description
//=============================================================================
// 1.0 11/22/10   Willy W83627HG WatchDog timer test
//=============================================================================




//=============================================================================
// Turbo C++ Version 3.0 Copyright(c) 1990, 1992 by Borland International,Inc.
//=============================================================================


//=============================================================================
//   Language include files
//=============================================================================
#include <conio.h>
#include <stdlib.h>
#include <stdio.h>

//=============================================================================
//   Assember Types Define
//=============================================================================
typedef unsigned char           BYTE;
typedef unsigned short int WORD;
typedef unsigned long int   DWORD;

//=============================================================================
//   Extern Function
//=============================================================================
//=============================================================================
//   Normal procedure
//=============================================================================
void Show_Title()
{
     clrscr();
     printf("WatchDog Test for W83627HG\n");
     printf("1. WDT.EXE 10 s ==--> 10 seconds to reset.\n");
     printf("2. WDT.EXE 20 m ==--> 20 minutes to reset.\n");
}

//=============================================================================
//   Main procedure
//=============================================================================
int main(int argc, char *argv[])
{
     char Time_Format;
     BYTE  IO_Port_Address=0x2E;
     BYTE Time=10;    // Default is 10
     BYTE Format=0x00;     // Default is 0x00 = Seconds

     if ( argc != 3 )
        {   Show_Title();     return 1;        }

     clrscr();

     textcolor(YELLOW+BLINK);

     Time=atoi(argv[1]);

     Time_Format=argv[2][0];
     if(Time_Format=='m' || Time_Format=='M')
       Format=0x08;     // Minutes
     if(Time_Format=='s' || Time_Format=='S')
       Format=0x00;     // Seconds

     // Set Watchdog
```

```
    outportb(IO_Port_Address,0x87);  // (EFER) Extended Functions Enable Register
    outportb(IO_Port_Address,0x87);

    outportb(IO_Port_Address,0x2D);  // Point to Global Reg.
                        // Select Multi-Function pin, (Bit0=0 Watchdog Function)
    outportb(IO_Port_Address+1,(inportb(IO_Port_Address+1)&0xFE));

    outportb(IO_Port_Address,0x07);  // Point to Logical Device Number Reg.
    outportb(IO_Port_Address+1,0x08);      // Select logical device 8, (Watchdog Function)

    outportb(IO_Port_Address,0x30);  // Device Active register
    outportb(IO_Port_Address+1,0x01);

    outportb(IO_Port_Address,0xF5);  // Select Watchdog count mode seconds or minutes
    outportb(IO_Port_Address+1,Format);   // Default is second

    outportb(IO_Port_Address,0xF6);  // Set Watchdog Timer Value
    outportb(IO_Port_Address+1,Time);      // 0x00 to disable, max 0xFF

    while(1)
     {
       outportb(IO_Port_Address,0xF6);     // Read Watchdog Timer Value
       Time=inportb(IO_Port_Address+1);

       gotoxy(20,10);
       if(Time_Format=='m' || Time_Format=='M')
     cprintf(">>> After %d Minutes will reset the system. <<<",Time);
       if(Time_Format=='s' || Time_Format=='S')
     cprintf(">>> After %d Second will reset the system. <<<",Time);
     }

    return 0;
}
```

4.2 GPIO Programming

This section describes the usage of GPIOs.

The electrical characteristics of GPIOs and GPIO cable color as following table:



PIN	DEFINE	Color	PIN	DEFINE	Color
1	GPO0	Brown	2	GPO1	Orange
3	GPO2	Green	4	GPO3	Blue
5	GND	Black	6	GND	Black
7	GND	Red / White	8	GND	White
9	GND	Black	10	GND	Purple
11	GPI4	Light Green	12	GPI5	Light Blue
13	GPI6	Pink	14	GPI7	Brown / White
15	N.C	Yellow			

To quickly understand the GPIO programming under Linux, we also provide a sample application source code in product CD, naming gpio.c. It can be used to control GPIO pin described above and also LED.

```
//=====================================================================
// Rev      Date        Name      Description
//=====================================================================
// 1.1 06/30/10   Willy GPIO Test utility for W83627DHG.
//=====================================================================

//=====================================================================
// Turbo C++ Version 3.0 Copyright(c) 1990, 1992 by Borland International,Inc.
//=====================================================================

//=====================================================================
//   Language include files
//=====================================================================
#include <conio.h>
#include <stdio.h>
```

```
#include <dos.h>

//==========================================================================
//    Normal procedure
//==========================================================================
void Show_Help();
void Show_Fail();
void Show_Pass();

//==========================================================================
//    Main procedure
//==========================================================================
int main(int argc)
{
   char *Model_Name="AR-B6002";
   char *Version="v1.0";
   unsigned char       IO_PORT_BASE=0x2E;   // DATA_PORT = IO_PORT_BASE + 1;
   unsigned char data;
   int result=0;

   if ( argc > 1 )
      {   Show_Help();     return 1;   }

   clrscr();
   textcolor(WHITE);
   gotoxy(1, 1);
cprintf("<>==========================================================================<>");
   gotoxy(1, 2);   cprintf("|| W83627HF GPIO Test Utility %s Acrosser Technology Co., Ltd.                ||",Version);
   gotoxy(1, 3);
cprintf("<>==========================================================================<>");
   gotoxy(1, 4);
cprintf("<>==========================================================================<>");
   gotoxy(1, 5);   cprintf("|| Model Name   :                                                            ||");
   gotoxy(1, 6);   cprintf("|| SIO IO Base :                                                            ||");
   gotoxy(1, 7);
cprintf("<>==========================================================================<>");

   // Show Got Parameter Informat
```

```
textcolor(LIGHTGRAY);
gotoxy(18,5);   cprintf("%s",Model_Name);
gotoxy(18,6);   cprintf("%X",IO_PORT_BASE);

// Enter W83627HF Config
outportb(IO_PORT_BASE,0x87);
outportb(IO_PORT_BASE,0x87);

// Set Multi-function Pins to GPIO
outportb(IO_PORT_BASE,0x2C);
outportb(IO_PORT_BASE+1,(inportb(IO_PORT_BASE+1) & 0x1F));

// Select GPIO Port device
outportb(IO_PORT_BASE,0x07);
outportb(IO_PORT_BASE+1,0x09);

// Set GPIO Port Active GPIO3
outportb(IO_PORT_BASE,0x30);
outportb(IO_PORT_BASE+1,0x02);

// Set W83627HF GPIO30~33 to Output, GPIO34~GPIO37 to Input
outportb(IO_PORT_BASE,0xF0);
outportb(IO_PORT_BASE+1,0xF0);

// inversion data to correct, because the protect circuit
outportb(IO_PORT_BASE,0xF2);
outportb(IO_PORT_BASE+1,0xF0);

// Set W83627HF GPIO30~33 to 0x05
outportb(IO_PORT_BASE,0xF1);
outportb(IO_PORT_BASE+1,0x05);
// Read W83627HF GPIO34~37 Status, if not 0x50 error.
    delay(100);
data=inportb(IO_PORT_BASE+1)&0xF0;
if(data!=0x50)
    result=1;

// Set W83627HF GPIO30~33 to 0x0A
```

```
   outportb(IO_PORT_BASE,0xF1);
   outportb(IO_PORT_BASE+1,0x0A);
   // Read W83627HF GPIO34~37 Status, if not 0xA0 error.
       delay(100);
   data=inportb(IO_PORT_BASE+1)&0xF0;
   if(data!=0xA0)
       result=1;

   // Exit W83627HF Config
   outportb(IO_PORT_BASE,0xAA);

   if(result)
      Show_Fail();
   else
      Show_Pass();

   return result;
}

//=========================================================================
// Function : Show_Help()
// Input      : -
// Change  : -
// Return    : -
// Description    : Show Title string.
//=========================================================================
void Show_Help()
{
     clrscr();
     printf("GPIO Test utility for W83627HF\n\n");
     printf("GPIO0☼◀迋芼         奼迋┼☼GPIO1\n");
     printf("GPIO2☼◀迋芮芼  奼睿迋┼☼GPIO3\n");
     printf("GPIO4☼◀迋芞  ??   迋┼☼GPIO5\n");
     printf("GPIO6☼◀迋迋芞     迋迋┼☼GPIO7\n");
     printf("GND     ☼                         ☼VCC\n");
}

//=========================================================================
// Function : Show_Fail()
// Input      : -
// Change  : -
// Return    : -
// Description    : Show Fail Message.
//==========================================================================
void Show_Fail()
{
    textcolor(LIGHTRED);
    gotoxy(20,10);    cprintf(" 詗詗詗詗  詗詗詗    詗詗   詗      ");
    gotoxy(20,11);    cprintf(" 詗        詗  詗     詗    詗      ");
    gotoxy(20,12);    cprintf(" 詗詗詗   詗詗詗詗    詗    詗      ");
    gotoxy(20,13);    cprintf(" 詗       詗    詗    詗    詗      ");
    gotoxy(20,14);    cprintf(" 詗       詗    詗   詗詗   詗詗詗詗");
}

//==========================================================================
// Function : Show_Pass()
// Input      : -
// Change  : -
// Return    : -
// Description    : Show Pass Message.
//==========================================================================
void Show_Pass()
{
    textcolor(LIGHTGREEN);
    gotoxy(20,10);    cprintf(" 詗詗詗詗  詗詗詗  詗詗詗詗 詗詗詗詗");
    gotoxy(20,11);    cprintf(" 詗    詗  詗  詗  詗       詗      ");
    gotoxy(20,12);    cprintf(" 詗詗詗詗 詗詗詗詗 詗詗詗詗 詗詗詗詗");
    gotoxy(20,13);    cprintf(" 詗       詗    詗       詗       詗");
    gotoxy(20,14);    cprintf(" 詗       詗    詗 詗詗詗詗 詗詗詗詗");
}
```

5 SOFTWARE INSTALLATION AND PROGRAMMING GUIDE

5.1 Introduction

5.1.1 CAN bus

Overview

The CAN bus APIs provide interfaces to CAN bus subsystem. By invoking these APIs, programmers can implement applications which have the functions listed below:

1. Set the BAUD rate.
2. Send the CAN packages over the CAN bus.
3. Receive the CAN packages via the CAN bus hardware interface.
4. Set receive mode to normal, STD only, EXTD only, or any.
5. Set mask
6. Get mask
7. Set filter
8. Get filter

In this CAN bus API package, we provides:

1. On Linux platform:
   Linux driver module of CAN bus subsystem and the driver load / unload scripts.
   On Windows platform:
   Device driver and install program of CAN bus subsystem.
2. API header file.
   API libraries in static library format and shared library format.
3. CAN bus test utility and its source code.

Installation Procedure of CAN Bus Driver

On Linux platform:

1. Change to the ‘root’ user account.
2. In the ‘driver’ directory, execute the script ‘install’.
3. Make sure ‘arb6002’ is in the module list.

4. If the driver is no longer needed, execute the script 'uninstall' to unload the driver.

On Windows platform:

1. In the driver directory, execute the 'setup.exe' program.

The CAN bus APIs

Before executing the applications which invoke the CAN bus APIs, users should make sure that the Linux device driver or the Windows device driver of CAN bus has been installed.

On Linux platform, after successfully installing the device driver, a character device node named "/dev/can0" will be created automatically. The APIs open the device node "/dev/can0" implicitly so acquiring a file descriptor of "/dev/can0" by users is not necessary. In order not to degrade the performance of the CAN bus subsystem, the device node "/dev/can0" is limited to be opened at most once at any moment, i.e., if application A accesses CAN bus via the APIs, the application B which either tries to open '/dev/can0' or uses CAN bus API will result in failure.

On Windows platform, after successfully installing the device driver, there is a device which shows 'CAN Bus Driver' in the 'Device Manager'. The APIs on Windows platform open this device implicitly. User can call the APIs directly without opening the CAN Bus subsystem device.

CAN Message Format

```
// TPE DEFINE
typedef   char             i8;
typedef   unsigned char    u8;
typedef   short            i16;
typedef   unsigned short   u16;
typedef   unsigned long    u32;
typedef   int              i32;

    typedef   struct {
 i32                    flags;
 i32                    cob;
 u32                    id;
 struct timeval         timestamp;
 i16                    length;
 u8                     data[8];
    } canmsg_t;
```

To transmit a CAN package, the programmer has to fill in the fields in the variable of type canmsg_t and pass this canmsg_t variable as an argument to invoke the APIs. The fields in CAN message are described below:

flags:

This field holds the information of message type. Programmers can set the message type as:

1. Standard Data Frame:

```
canmsg_t msg;    // Declare a variable ‘msg’ of type ‘canmsg_t’
msg.flags = 0;    // Setting the flags field to 0 defines the ‘msg’ as an
                        // ordinary standard data frame.
```

2. Extended Data Frame:

```
canmsg_t msg;
msg.flags = 1 // flags field to 1 defines the ‘msg’ as an
                        //extend data frame.
```

cob:

This field is reserved for holding a message communication object number.

id:

CAN message ID.

timestamp:

When a CAN package is received, the CAN device driver will annotate a timestamp to the timestamp field in the canmsg_t variable and return this canmsg_t variable to the caller.

length:

The number of the data bytes which are sent or received in the ‘data’ field of CAN message. This field is necessary while transmitting a Standard or Extended Data Frame. Programmers have to explicitly set up this field. The length of data is 0~8.

For example:

```
        canmsg_t msg;

        msg.data[0] = 0xa1;
        msg.data[1] = 0xb2;
    msg.data[2] = 0xc3;

    msg.length = 3;
```

data:

The byte array which holds the message data.

5.1.2 GPIO and Watchdog

Overview

AR-B6002 provides both a GPIO interface and a Watchdog timer. Users can use the GPIO and Watchdog APIs to configure and to access the GPIO interface and the Watchdog timer. The GPIO has four input pins and four output pins. The Watchdog timer can be set to 1~255 seconds. Setting the timer to zero disables the timer. The remaining seconds of the timer to reboot can be read from the timer.

In this GPIO and Watchdog package, on Linux and Windows platform, we provide:

1. API source code.
2. GPIO and Watchdog test utility and the utility source code.

5.1.3 Power Subsystem

Overview

When the AR-B6002 is at Power Mode 15, the Power Subsystem APIs can be used to get and set the configuration of power subsystem. By invoking the Power Subsystem APIs, the users can:

1. Get the current status of ignition (ON or OFF).
2. Set the Power-On mode. This setting will be kept in the power subsystem and will take effect at next system boot.
3. From the power subsystem, get the stored setting of Power-On mode.
4. Get or set the time of Hard Off delay in seconds or in minutes.
5. Get or set the time of Soft Off delay in seconds or in minutes
6. Get the battery voltage.
7. Get the version number of the firmware of the Power Subsystem.
8. Set the Hard Off delay and Soft Off delay to the default value.

The power subsystem connects to the main system via the COM6. The Linux's default supported COM interfaces are COM1~COM4. The Power Subsystem APIs implicitly communicate with power subsystem through COM6. Users must take extra steps to configure Linux kernel in order to support COM6. Please refer to Appendix A for more information. Users don't need extraordinary setup on Windows platform to support COM6.

In this Power Subsystem package, we provide:

1. The APIs to access power subsystem and the source code of the APIs.
2. The utility and source code to monitor and set up power modes, ignition status, and power-off time.
3. On Linux platform, the Makefile to create API libraries and utility.

5.2 File Descriptions

5.2.1 CAN Bus

On Linux platform:

1. can.h
   The header file of the API and macro definitions.
2. libcan.a
   The API library in static library format.
3. libcan.so
   The API library in shared library format.
4. can_utility.c
   The source code of the utility.
5. Makefile

On Windows platform:

1. AR-B6002.h
   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib
   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll
   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. subdirectory AR_B6002_LIB
   The sample project by Microsoft Visual Studio 2010.

5.2.2 GPIO and Watchdog

On Linux platform:

1. sio_acce.c

   The source code of the Watchdog and GPIO APIs for accessing the SuperIO.
2. sio_acce.h

   This file includes the declarations of the APIs and macro definitions.
3. main.c

   The source code of the utility.
4. Makefile

On Windows platform:

1. AR-B6002.h

   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib

   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll

   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. subdirectory AR_B6002_LIB

   The sample project by Microsoft Visual Studio 2010.

5.2.3 Power Subsystem

On Linux platform:

1. pwr_acce.c

   The source code of the APIs for accessing the power subsystem.
2. pwr_acce.h

   This file includes the declarations of the APIs and macro definitions.
3. main.c

   The source code of the utility.
4. Makefile

On Windows platform:

1. AR-B6002.h
   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib
   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll
   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. subdirectory AR_B6002_LIB
   The sample project by Microsoft Visual Studio 2010.

5.3 API List and Descriptions

5.3.1 CAN Bus

Under linux platform:

1. **Syntax:**

   void sendCanMessages(canmsg_t *buffer, u8 count)

   Description: This function sends out CAN packages over the CAN bus.

   Parameters: If there is more than one CAN package to send, these CAN packages are stored in a 'canmsg_t' array. This function sends out packages in a sequential fashion. The memory address of the first CAN package to send is pointed at by the parameter 'buffer'. The number of CAN packages to send is indicated by the parameter 'count'. If the resource of sending out the CAN packages is temporarily unavailable, the process which invokes this function will be blocked (Block I/O) until the resource is available again.

   Return Value: None.

2. **Syntax:**

   int getCanMessages(canmsg_t *buffer, u8 count)

   Description: This function receives CAN packages from the CAN bus subsystem.

   Parameters: This function stores received CAN packages sequentially at an array of type 'canmsg_t'. The number of packages to receive is indicated by the parameter 'count'. Before finishing receiving 'count' packages, the process which invokes this function will be temporarily blocked (Block I/O) if there is no incoming CAN package.

   Return Value: If this function receives the packages successfully, it returns 0. If this function fails not 0.

3. **Syntax:**

   int CanSetBaudRate(unsigned long Baud)

Description: This function sets up the speed (Baud rate) of sending and receiving CAN packages.

Parameters: The parameter ‘Baud’ could be: (the unit is Kbps)

10 , 20 , 50 , 100 , 125 , 250 , 500 , 800 , 1000

The default speed is 0 Kbps.

Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

4. **Syntax:**

    int CanGetBaudRate(unsigned long *Baud)

Description: This function get the speed (Baud rate) of sending and receiving CAN packages.

Parameters: The parameter pointer ‘Baud’ record: (the unit is Kbps)

10 , 20 , 50 , 100 , 125 , 250 , 500 , 800 , 1000

`

Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

5. **Syntax:**

    int get_canFd(void)

Description: This function get the File Description number.

Parameters: None.

Return Value: File Description number.

6. **Syntax:**

    int lib_init (void)

Description: This function is used the library call first.

Parameters: None.

Return Value: This function returns 0, library init
successfully. If this function fails not 0.

7. **Syntax:**

int CanStop(void)

Description: This function will stop send and recive can message and into configure mode.

Parameters: None.

Return Value: This function returns 0 if it successfully. If this function fails not 0.

8. **Syntax:**

int CanStart(void)

Description: This function will resume from configure mode to normal mode.

Parameters: None.

Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

9. **Syntax:**

int setMask(unsigned long mask, int num, int extd_flag)

Description: This function setMask to canbus chip.

Parameters: num 0 is set Mask0, 1 is set Mask1.
extd_flag 1 is 29bit, 0 is 11bit
mask is mask value, if set 11bit the maxmum mask value is 0x7ff,
else the maxmum mask value is 0x1FFFFFFF

Return Value: This function returns 0 if it set the Mask successfully. If this function fails not 0.

10. **Syntax:**

void getMask(unsigned long *mask, int num, int extd_flag)

Description: This function getMask from canbus chip.

Parameters: num 0 is get Mask0, 1 is get Mask1.
extd_flag 1 is 29bit, 0 is 11bit

pointer mask is recored get mask value.

Return Value: None.

11. Syntax:

int setFilter(unsigned long filter, int num, int extd_flag)

Description: This function set Filter to canbus chip.

Parameters: num 0~5 is set filter 0~5.
extd_flag 1 is 29bit, 0 is 11bit
filter is filter value, if set 11bit the maxmum filter value is 0x7ff,
else the maxmum filter value is 0x1FFFFFFF

Return Value: This function returns 0 if it set the Filter successfully. If this function fails not 0.

.

12. Syntax:

void getFilter(unsigned long *filter, int num, int extd_flag)

Description: This function get Filter from canbus chip.

Parameters: num 0~5 is get filter 0~5.
extd_flag 1 is 29bit, 0 is 11bit
pointer filter is recored get filter value

Return Value: None.

.

13. Syntax:

int CanChipReSet(void)

Description: This function to restet canbus chip.

Parameters: None.

Return Value: This function returns 0 if it reset the chipset successfully. If this function fails not 0.

14. Syntax:

int setReciveMode(unsigned long Mode)

Description: This function set Recive Mode.

Parameters: Mode 0 is Normal Recive.
Mode 1 is Recive only STD
Mode 2 is Recive only EXTD
Mode 3 is Recive any Message

Return Value: This function returns 0 if it set the Recive Mode successfully. If this function fails not 0.

15. Syntax:

int getReciveMode(unsigned long *Mode)

Description: This function get Recive Mode from can chipset.

Parameters: pointer Mode to recored the Mode from can chipset.
Mode 0 is Normal Recive.
Mode 1 is Recive only STD
Mode 2 is Recive only EXTD
Mode 3 is Recive any Message

Return Value: This function returns 0 if it get the Recive Mode successfully. If this function fails not 0.

16. Syntax:

void lib_close(void)

Description: This function call, when you doesn’t use this library.

Parameters: None.

Return Value: None.

Under windows platform:

1. **Syntax:**

void sendCanMessages(canmsg_t* buffer, u8 count)

Description: This function sends out CAN packages over the CAN bus.

Parameters: If there is more than one CAN package to send, these CAN packages are stored in a 'canmsg_t' array. This function sends out packages in a sequential fashion. The memory address of the first CAN package to send is pointed at by the parameter 'buffer'. The number of CAN packages to send is indicated by the parameter 'count'. If the resource of sending out the CAN packages is temporarily unavailable, the process which invokes this function will be blocked (Block I/O) until the resource is available again.

Return Value: None.

2. **Syntax:**

    int getCanMessages(canmsg_t* buffer, u8 count)

Description: This function receives CAN packages from the CAN bus subsystem.

Parameters: This function stores received CAN packages sequentially at an array of type 'canmsg_t'. The number of packages to receive is indicated by the parameter 'count'. Before finishing receiving 'count' packages, the process which invokes this function will be temporarily blocked (Block I/O) if there is no incoming CAN package.

Return Value: If this function receives the packages successfully, it returns 0. If this function fails not 0.

3. **Syntax:**

    int CanSetBaudRate(unsigned long Baud)

Description: This function sets up the speed (Baud rate) of sending and receiving CAN packages.

Parameters: The parameter 'Baud' could be: (the unit is Kbps)

10 , 20 , 50 , 100 , 125 , 250 , 500 , 800 , 1000

The default speed is 0 Kbps.

Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

4. **Syntax:**

    int CanGetBauRate(unsigned long *Baud)

Description: This function get the speed (Baud rate) of sending and receiving CAN packages.

Parameters: The parameter pointer ‘Baud’ record: (the unit is Kbps)

10 , 20 , 50 , 100 , 125 , 250 , 500 , 800 , 1000

`

Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

5. **Syntax:**

   int lib_init(void)

   Description: This function is used the library call first.

   Parameters: None.

   Return Value: This function returns 0, library init successfully. If this function fails not 0.

6. **Syntax:**

   int CanStop(void)

   Description: This function will stop send and recive can message and into configure mode.

   Parameters: None.

   Return Value: This function returns 0 if it successfully. If this function fails not 0.

7. **Syntax:**

   int CanStart(void)

   Description: This function will resume from configure mode to normal mode.

   Parameters: None.

   Return Value: This function returns 0 if it set the Baud rate successfully. If this function fails not 0.

8. **Syntax:**

   int setMask(unsigned long mask, int num, int extd_flag)

   Description: This function setMask to canbus chip.

Parameters: num 0 is set Mask0, 1 is set Mask1.
extd_flag 1 is 29bit, 0 is 11bit
mask is mask value, if set 11bit the maxmum mask value is 0x7ff,
else the maxmum mask value is 0x1FFFFFFF

Return Value: This function returns 0 if it set the Mask successfully. If this function fails not 0.

9. **Syntax:**

    void getMask(unsigned long *mask, int num, int extd_flag)

Description: This function getMask from canbus chip.

Parameters: num 0 is get Mask0, 1 is get Mask1.
extd_flag 1 is 29bit, 0 is 11bit
pointer mask is recored get mask value.

Return Value: None.

10. **Syntax:**

    int setFilter(unsigned long filter, int num, int extd_flag)

Description: This function set Filter to canbus chip.

Parameters: num 0~5 is set filter 0~5.
extd_flag 1 is 29bit, 0 is 11bit
filter is filter value, if set 11bit the maxmum filter value is 0x7ff,
else the maxmum filter value is 0x1FFFFFFF

Return Value: This function returns 0 if it set the Filter successfully. If this function fails not 0.

.

11. **Syntax:**

    void getFilter(unsigned long *filter, int num, int extd_flag)

Description: This function get Filter from canbus chip.

Parameters: num 0~5 is get filter 0~5.

extd_flag 1 is 29bit, 0 is 11bit
pointer filter is recored get filter value

Return Value: None.

.

12. **Syntax:**

int CanChipReSet(void)

Description: This function to restet canbus chip.

Parameters: None.

Return Value: This function returns 0 if it reset the chipset successfully. If this function fails not 0.

13. **Syntax:**

int setReciveMode(unsigned long Mode)

Description: This function set Recive Mode.

Parameters: Mode 0 is Normal Recive.
Mode 1 is Recive only STD
Mode 2 is Recive only EXTD
Mode 3 is Recive any Message

Return Value: This function returns 0 if it set the Recive Mode successfully. If this function fails not 0.

14. **Syntax:**

int getReciveMode(unsigned long *Mode)

Description: This function get Recive Mode from can chipset.

Parameters: pointer Mode to recored the Mode from can chipset.
Mode 0 is Normal Recive.
Mode 1 is Recive only STD
Mode 2 is Recive only EXTD
Mode 3 is Recive any Message

Return Value: This function returns 0 if it get the Recive Mode successfully. If this function fails not 0.

15. **Syntax:**

    void lib_close(void)

    Description: This function call, when you doesn’t use this library.

    Parameters: None.

    Return Value: None.

5.3.2 GPIO and Watchdog

GPIO

Under linux platform:

1. **Syntax:**

   i32 getInChLevel(i32 channel, u8 *val)

   Description: Get the value of GPIO Input and put the value at *val.

   Parameters:

   I. The parameter ‘channel’ indicates the GPIO Input pins to show. Users can use the macros GPI0, GPI1, GPI2, GPI3 to indicate the GPIO Input channel. For example:

   ```
     getInChLevel( GPI2, &val);    // Indicate the GPIO Input channel 2
     getInChLevel( GPI0 | GPI3, &val);    // Indicate the GPIO Input
                                          // channel 0 and channel 3
   ```

   II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Input channel 0. The bit 1 of *val shows the value of GPIO Input channel 1. Other bits show the corresponding GPIO Input channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

   Here is an example:

   If GPIO Input channel 1 and channel 3 are both 1.

```
unsigned char ch;
getInChLevel( GPI1|GPI3, &ch );
```

The returned value of variable ‘ch’ is 0xa.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

2. **Syntax:**

    i32 setOutChLevel(i32 channel, u8 val)

Description: Set the value of GPIO Output according to the variable ‘val’.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to set. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channels.

II. The parameter ‘val’ indicate the value to be set to GPIO Output channel. The acceptable values is limited to 0 and 1.

For example:

```
/* Setting the GPIO Output channel 2 to 1 */
setOutChLevel( GPO2, 1 );

/* Setting the GPIO Output channel 0 and channel 3 to 0 */
getInChLevel( GPO0 | GPO3, 0 );
```

Return Value: If the function sets the values successfully, it returns 0. If any error, it returns –1.

3. **Syntax:**

    i32 getOutchLevel(i32 channel, u8 *val)

Description: Get the value of GPIO Output and put the value at *val.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to show. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channel. For example:

```
getOutChLevel( GPO2, &val);    // Indicate the GPIO Output channel 2
```

```
/* Indicate the GPIO Output channel 0 and channel 3. */
getOutChLevel( GPO0 | GPO3, &val);
```

II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Output channel 0. The bit 1 of *val shows the value of GPIO Output channel 1. Other bits show the corresponding GPIO Output channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

Here is an example:
If GPIO Output channel 0 and channel 2 are both 1.

```
unsigned char ch;
getOutChLevel( GPO0|GPO2, &ch );
```

The returned value of variable ‘ch’ is 0x5.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

Under windows platform:

1. **Syntax:**

```
int getGPIOBitValue(int iBitNumber, bool * bValue)
```

Description: Get the value of GPIO and put the value at * bValue.

Parameters:

I. The parameter ‘iBitNumber indicates the GPIO Input pins to show. Users can use the macros GPO_BIT_0, GPO_BIT_1, GPO_BIT_2, GPO_BIT_3, GPI_BIT_4, GPI_BIT_5, GPI_BIT_6, or GPI_BIT_7 to indicate the GPIO channel. For example:

```
getGPIOBitValue (GPO_BIT_0, &val);
      // Indicate the GPIO Output channel 0
getGPIOBitValue (GPI_BIT_6, &val);
      // Indicate the GPIO Input channel 6
```

II. The parameter ‘bValue’ is an bool pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘bValue’. True indicates HI, and false indicates LOW.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns not zero.

2. **Syntax:**

```
int setGPIOBitValue(int iBitNumber, bool bValue)
```

Description: Set the value of GPIO Output according to the variable ‘bValue’.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to set. Users can use the macros GPO_BIT_0, GPO_BIT_1, GPO_BIT_2, or GPO_BIT_3 to indicate the GPIO Output channels.

II. The parameter ‘bValue’ indicate the value to be set to GPIO Output channel. True indicates HI, and false indicates LOW.

For example:

```
/* Setting the GPIO Output channel 2 to HI */
setGPIOBitValue (GPO_BIT_2, true );

/* Setting the GPIO Output channel 3 to LOW */
setGPIOBitValue (GPO_BIT_3, false );
```

Return Value: If the function sets the values successfully, it returns 0. If any error, it returns not zero.

Watchdog

Under linux platform:

1. **Syntax:**

```
u8 getWtdTimer(void)
```

Description: This function read the value of the watchdog time counter and return it to the caller.

Parameters: None.

Return Value: This function return the value of the time counter and return it to the caller as an unsigned integer.

2. **Syntax:**

    void setWtdTimer(u8 val)

   Description: This function sets the watchdog timer register to the value ‘val’ and starts to count down. The value could be 0 ~ 255. The unit is second. Setting the timer register to 0 disables the watchdog function and stops the countdown.

   Parameters: The parameter ‘val’ is the value to set to watchdog timer register. The range is 0 ~ 255.

   Return Value: None.

Under windows platform:

1. **Syntax:**

    int readWatchdog(unsigned char * pucValue)

   Description: This function read the value of the watchdog time counter and return it to the caller.

   Parameters: The parameter ‘pucValue’ is an unsigned character pointer. The function puts the values read from watchdog at the memory pointed by ‘pucValue’.

   Return Value: If the function gets the values successfully, it returns 0. If any error, it returns not zero.

2. **Syntax:**

    int startWatchdog(unsigned char ucUnit, unsigned char ucValue)

   Description: This function sets the watchdog timer register to the value ‘ucValue’ and starts to count down. The value could be 0 ~ 255. The unit is second. Setting the timer register to 0 disables the watchdog function and stops the countdown.

   Parameters: The parameter ‘ucUnit’ is the unit to set to watchdog timer register. ‘0’ indicates second. And ‘1’ indicates minute. The parameter ‘ucValue’ is the value to set to watchdog timer register. The range is 0 ~ 255.

   Return Value: If the function gets the values successfully, it returns 0. If any error, it returns not zero.

5.3.3 Power Subsystem

Under linux platform:

1. **Syntax:**

    i32 getIgnStatus(u8 *ignStatus)

Description: Get the current ignition status. The ignition has two statuses: ON or OFF.
Parameters: This function puts the ignition status at the memory pointed by the unsigned character pointer ‘ignStatus’. If the returned status is 0xa5, the ignition is ON. If the returned status is 0x5a, the ignition is OFF. There are macros of Ignition ON and Ignition OFF in pwr_acce.h.
Return Value: If the function gets the ignition status and put it at the memory pointed by the argument successfully, this function will return 0. If any error, the function returns –1.

2. **Syntax:**

   i32 setSoftOffDelayS(u32 setTime)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function sets up the interval in seconds.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is seconds.

   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

3. **Syntax:**

   i32 setSoftOffDelayM(u32 setTime)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function sets up the interval in minutes.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is minutes.

   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

4. **Syntax:**

   i32 setHardOffDelayS(u32 setTime)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This functions set up the interval in seconds.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is seconds.
   .
   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function

returns –1.

5. **Syntax:**

   i32 setHardOffDelayM(u32 setTime)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This functions set up the interval in minutes.

   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is minutes.

   .

   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

6. **Syntax:**

   i32 setPowerOnMode(u8 powerOnMode)

   Description: The function sets up the source of the boot-up signal of the system. There are two choices: boot from the Ignition or boot from the Remote Switch.

   Parameters:

   PowerOnMode = 0xa5, boot up by the Ignition.

   PowerOnMode = 0x5a, boot up by the Remote Switch.

There are macros of Ignition mode and Remote Switch mode in pwr_acce.h (Linux) and AR-B6002.h(Windows).

   Return Value: If the function sets power-on mode successfully, it will return 0. If any error, the function returns –1.

7. **Syntax:**

   i32 getSoftOffDelay(u32 *Time)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function gets the interval.

   Parameters: The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.

   Return Value: If the delay time is returned successfully, the function returns 0. If any error, it returns –1.

8. **Syntax:**

   i32 getHardOffDelay(u32 *Time)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This function gets the interval.

   Parameters: The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.

   Return Value: If the delay time is returned successfully, the function returns 0. If any error, it returns –1.

9. **Syntax:**

   i32 getPowerOnMode(u8 *powerOnMode)

   Description: The function gets the setting of power-on mode. There are two modes: boot from the Ignition or boot from the Remote Switch.

   Parameters: The parameter is a pointer which points to an unsigned character. The returned code is stored at this memory. There are two power-on modes:

   PowerOnMode = 0xa5, boot up by the Ignition.
   PowerOnMode = 0x5a, boot up by the Remote Switch.

   Return Value: If the power-on mode is returned successfully, the function returns 0. If any error, it returns –1

10. **Syntax:**

    i32 getBattVolt(float *volt)

    Description: The function gets the voltage reading of the battery.
    Parameters: The parameter ‘volt’ is a pointer which points to an variable of type ‘float’. The unit of the returned value is voltage.
    Return Value: If the reading of voltage is returned successfully, the function returns 0. If any error, it returns –1

11. **Syntax:**

    i32 getPicFwVer(struct PicInfo *ver)

    Description: The function gets version information of Power Subsystem firmware.

Parameters: The parameter is a pointer which points to a 'PicInfo' structure, which consists of 9 unsigned characters. Here is the definition of structure 'PicInfo':

```
type struct {
                u8 type[3];        // The type of the power subsystem
                u8 mode[4];        // The mode at which the power subsystem is
                        operating.
                u8 majorVersion;    // Major version number of the firmware
                u8 minorVersion;    // Minor version number of the firmware
} PicInfo;

PicInfo picInfo;

getPicFwVer( &picInfo );
printf("%c.%c\n", picInfo.majorVersion, picInfo.minorVersion );
```

Return Value: If the version information is returned successfully, the function returns 0. If any error, it returns –1.

12. Syntax:

i32 getPicMode(u8 *mode)

Description: The function gets the mode number at which the Power Subsystem is operating..

Parameters: The parameter is a pointer which points to a variable of type 'unsigned char'. The returned mode number is put at the memory which is pointed by parameter 'mode'.

Return Value: If the mode information is returned successfully, the function returns 0. If any error, it returns –1

13. Syntax:

i32 setPicDefault(void)

Description: The function restores the SoftOffDelay and HardOffDelay to the default value.
Parameters: None.
Return Value: If this function works successfully, the function will return 0. If any error, it will return –1.

Under windows platform:

1. **Syntax:**

    BOOL PowerPic_GetIgnitionStatus(BYTE* pStatus)

    Description: Get the current ignition status. The ignition has two statuses: ON or OFF.
    Parameters: This function puts the ignition status at the memory pointed by the BYTE pointer ‘pStatus’. If the returned status is 0xa5, the ignition is ON. If the returned status is 0x5a, the ignition is OFF. There are macros of Ignition ON and Ignition OFF.
    Return Value: If the function gets the ignition status and put it at the memory pointed by the argument successfully, this function will return TRUE. If any error, the function returns FALSE.

2. **Syntax:**

    BOOL PowerPic_SetSoftOffDelayTime(int nTime, int nTimeUnit)

    Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal.
    Parameters: The parameter ‘nTime‘ is the value to set as delay interval. The value of the parameter ‘nTime‘ ranges from 0~255. The parameter ‘nTimeUnit‘ is the unit of nTime. Users can use macros TIME_UNIT_SECOND or TIME_UNIT_MINUTE to indicate unit.

    Return Value: If the function sets the soft off delay successfully, this function will return TRUE. If any error, the function returns FALSE.

3. **Syntax:**

    BOOL PowerPic_SetHardOffDelayTime(int nTime, int nTimeUnit)

    Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off.
    Parameters: The parameter ‘nTime‘ is the value to set as delay interval. The value of the parameter ‘nTime‘ ranges from 0~255. The parameter ‘nTimeUnit‘ is the unit of nTime. Users can use macros TIME_UNIT_SECOND or TIME_UNIT_MINUTE to indicate unit.
    .
    Return Value: If the function sets the hard off delay successfully, this function will return TRUE. If any error, the function returns FALSE.

4. **Syntax:**

BOOL PowerPic_SetPowerOnMode(BYTE bMode)

Description: The function sets up the source of the boot-up signal of the system. There are two choices: boot from the Ignition or boot from the Remote Switch.

Parameters:

bMode = 0xa5, boot up by the Ignition.

bMode = 0x5a, boot up by the Remote Switch.

There are macros of Ignition mode and Remote Switch mode in pwr_acce.h (Linux) and AR_B6002_LIB.h(Windows).

Return Value: If the function sets the power on mode successfully, this function will return TRUE. If any error, the function returns FALSE.

5. **Syntax:**

BOOL PowerPic_GetSoftOffDelayTime(int* pSeconds)

Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function gets the interval.

Parameters: The parameter 'pSeconds' is a pointer which points to an int variable. The returned value is stored at this variable. The unit of the returned value is in seconds.

Return Value: If the function gets the soft off delay successfully, this function will return TRUE. If any error, the function returns FALSE.

6. **Syntax:**

BOOL PowerPic_GetHardOffDelayTime(int* pSeconds)

Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This function gets the interval.

Parameters: The parameter 'pSeconds' is a pointer which points to an int variable. The returned value is stored at this variable. The unit of the returned value is in seconds.

Return Value: If the function gets the hard off delay successfully, this function will return TRUE. If any error, the function returns FALSE.

7. **Syntax:**

BOOL PowerPic_GetPowerOnMode(BYTE* pMode)

Description: The function gets the setting of power-on mode. There are two modes: boot from the Ignition or boot from the Remote Switch.

Parameters: The parameter 'pMode' is a pointer which points to an BYTE. The returned code is stored at this memory. There are two power-on modes:

* pMode = 0xa5, boot up by the Ignition.
* pMode = 0x5a, boot up by the Remote Switch.

Return Value: If the function gets the power in mode successfully, this function will return TRUE. If any error, the function returns FALSE.

8. **Syntax:**

BOOL PowerPic_GetBatteryVoltage(float *pVoltage)

Description: The function gets the voltage reading of the battery.
Parameters: The parameter 'pVoltage' is a pointer which points to an variable of type 'float'. The unit of the returned value is voltage.
Return Value: If the function gets the battery voltage successfully, this function will return TRUE. If any error, the function returns FALSE.

9. **Syntax:**

BOOL PowerPic_GetFirmwareVersion(T_PIC_INFO *pPicInfo)

Description: The function gets version information of Power Subsystem firmware.

Parameters: The parameter is a pointer which points to a 'T_PIC_INFO' structure, which consists of 9 BYTE. Here is the definition of structure 'T_PIC_INFO':

```
type struct {
typedef struct _T_PIC_INFO {

BYTE PicType[ 3 ];
BYTE PicModel[ 4 ];
BYTE PicMajorVersion;
BYTE PicMinorVersion;

} T_PIC_INFO;
```

Return Value: If the function gets the firmware version successfully, this function will return TRUE. If any error, the function returns FALSE.

10. **Syntax:**

    BOOL PowerPic_GetPicMode(BYTE* pMode)

    Description: The function gets the mode number at which the Power Subsystem is operating..

    Parameters: The parameter is a pointer which points to a variable of type 'BYTE'. The returned mode number is put at the memory which is pointed by parameter 'pMode'.

    Return Value: If the function gets the PIC mode successfully, this function will return TRUE. If any error, the function returns FALSE.

11. **Syntax:**

    BOOL PowerPic_SetDefaultValue()

    Description: The function restores the SoftOffDelay and HardOffDelay to the default value.
    Parameters: None.
    Return Value: If the function sets the default value successfully, this function will return TRUE. If any error, the function returns FALSE.

5.4 Appendix

Users have to modify the boot loader configuration to support COM6. Take the grub configuration file as an example. Add ‘8250.nr_uarts=XX noirqdebug’ at the setting of kernel. Here, XX represents the number of COM ports the system will support. Because the power subsystem connects to main system via COM6, the XX must be greater or equal to 6.

1. Modify the grub.conf.

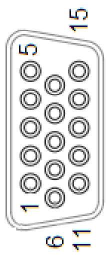
```
[root@linux ~]# vi /boot/grub/grub.conf
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Fedora Core (2.6.27.5.117.FC10)
root (hd0,0)
kernel /vmlinuz-2.6.27.5.117.FC10 ro root=/dev/hda2 rhgb quiet
8250.nr_uarts=6 noirqdebug
initrd /initrd-2.6.27.5.117.FC10.img
```

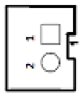
2. List the status of the COM ports in the system.

```
# setserial -g /dev/ttyS*
/dev/ttyS0, UART: 16550A, Port: 0x03f8, IRQ: 4
/dev/ttyS1, UART: 16550A, Port: 0x02f8, IRQ: 3
/dev/ttyS2, UART: 16550A, Port: 0x03e8, IRQ: 11
/dev/ttyS3, UART: 16550A, Port: 0x02e8, IRQ: 10
/dev/ttyS4, UART: 16550A, Port: 0x04f8, IRQ: 11
/dev/ttyS5, UART: 16550A, Port: 0x04e8, IRQ: 10
```

The node ‘/dev/ttyS5’ corresponds to COM6. The IO port is 0x4e8, IRQ 10.

5.5 GPIO and CAN bus cable color

	PIN	Color	PIN	Color
	1	Brown	2	Orange
	3	Green	4	Blue
	5/6/9	Black	8	White
	7	Red/White	10	Purple
	11	Light Green	12	Light Blue
	13	Pink	14	Brown/White
	15	Yellow		

	PIN	Color
	1	white
	2	purple