VMT12 User Manual

Rugged Vehicle Mount Terminal

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Chapter 1.Introduction

Congratulations on purchasing the VMT12 Vehicle Mount Terminal (VMT), a Microsoft Windows® XP Rugged VMT. Its special combination of features makes it perfect for using in a wide range of applications. These features as:

- High Quality 12.1" LED Backlit Panel with T/s, 1024 x 768 Resolution
- Intel Atom N450 1.66 GHz Processor
- Rugged Aluminum Enclosure and Fanless Design
- Full IP65 Dust / Water Proof Enclosures
- Wide Range 9 to 30V DC Input Acceptable
- Wide Range -30~70℃ Operating Temperature
- Flexible Expansion Capability for WiFi, GPS, WCDMA/EDGE/GPRS, Bluetooth
- Function Keys for 0%~100% Brightness Control
- VESA Standard for Flexible Mounting Kits

1.1 About this Manual

The following chapters contained in this manual are:

Chapter 1:	Introduction	General information about the VMT.
Chapter 2:	Getting started	Describe the basic use of the VMT.
Chapter 3:	H/W installation	Provide basic instructions for motherboard of the VMT.
Chapter 4:	BIOS Settings	Describe how to set the BIOS of the VMT.
Chapter 5:	S/W introduction & installation	Describe the installed applications on the VMT.

1.2 User and Product Safety

● Never use strong pressure onto the screen or subject it to severe impact, as the LCD panel could become cracked and possibility cause personal injury. If the LCD panel is broken, never touch the liquid inside because the liquid irritates the skin.

● Although the VMT has passed the test of IP65 standard for water and dust resistance, avoid prolonged exposure to rain or other concentrated moisture. Such condition exceeds the IP65 standard, and could result in water or other contaminants entering into the VMT.

● Use only the original approved AC/DC Adapter with the VMT. Use of an unapproved AC/DC Adapter could result in electrical problems, or even cause a fire or electrical shock to the user.

● Do not disassemble the VMT. Servicing should be done by supplier only. If the VMT or accessories gets damaged due to wrong handling or unauthorized repair, warranty is void. In case the warranty seals are broken, warranty is void too.

● Make regularly back-up of all important data.

● Under no circumstance will supplier be liable for any direct, indirect, consequential or incidental damages baring out of the use or inability to use the hardware and software and/or any data loss, even if supplier has been informed about the possibility of such damages.

1.3 Recycling & disposal instructions.

Do not throw this product in the home waste bin.

1.4 Regulatory information.

For CE, FCC, RoHS and other Document of Conformities, consult the Contact Window of Computer.

1.5 Product Labeling

The VMT has several labels as showed in Figure 1-1 to 1-2.

A. VMT12

Figure 1-1 **Product Labeling (Front side view)**

Label nr.	Description
1	LCD panel protection film
2	Keypad for power, brightness control buttons

Table 1-1 **Front labeling**

Figure 1-2 **Product Labeling (Back side view)**

Label nr.	Description
1	Product model name label
2	Serial number label

Table 1-2 **Rear labeling**

1.6 System Specifications

The VMT12 detailed specifications as follows. Unless otherwise noted, all the specifications are subject to change without prior notification.

Table 1-3 **System Specification**

VMT12	
Processor	- Intel Atom N450 1.66GHz CPU
Memory	- 1 x 200-pin SODIMM, Max 2GB DDR2 667
Storage	- 1 x Compact Flash Slot - 1 x HDD (SATA interface) - 1 x SDD (SATA interface)
Operating System	- Windows XP Pro. - Windows XP Embedded - Windows CE6.0
Display	- 12.1" TFT LCD with LED backlight - XGA 1024 x 768 Resolution - 500cd/m2 Brightness
Touch Panel	- 8-Wires Resistive type - USB interface
Input / Output Ports	- 1 x RS-232 - 1 x RS-232/422/485 - 2 x USB 2.0 - 2 x RJ45-10/100/1000Mbps Ethernet - 1 x VGA (DB15)
Audio	- Two mono speaker for system voice
Radio Support	- Wireless LAN: Summit 802.11b/g/n - Bluetooth: V2.0+EDR, Class II - Wireless WAN: WCDMA / EDGE / GPRS
GPS	- High-performance SiRF III Chipset
Keypad	- Power Button - Increasing Brightness Button - Decreasing Brightness Button

VMT12	
Power System	- Wide-range Input: 9~30VDC - Power Consumption: 35W typ.
Dimensions and Weight	- Dimensions (L x W x H): 320 x 260 x 63mm - Weight: 4.25Kg
Color	- Black

1.7 Environment Standard

Table 1-4 **Environment Standards**

Operating Temperature	-30~70℃
Mounting	VESA Mount, Vehicle Mount
Humidity	10～95%（Non-condensing）
Shock	5Hz~500Hz/1.60/1.96/2.18G RMX/3 Axis
Water & Dust proof	IP65 Certificated
Vibration	MIL STD 810G

1.8 Warranty and after service

Should this VMT be malfunctioned, please contact your original retailer providing information about the product name, the serial number, and the details about the problem.

Chapter 2.Getting Started

2.1 Check the package

Open the package and check all the parts are inside without shortage and damage:

A. VMT12

Figure 2-1 **Inside the package**

1. VMT12 Vehicle Terminal
2. AC-DC Power Adapter 24VDC/5A
3. Power Cord
4. WiFi TNC Type Antenna
5. DC-DC Power Adapter 24VDC/3A
6. Power Cord for DC-DC Adapter Input

2.2 General View of the VMT12

2.2.1 VMT12 general view

Figure 2-2 **VMT12 front side view**

Figure 2-3 **VMT12 back side view**

2.2.2 VMT12 input / output ports view
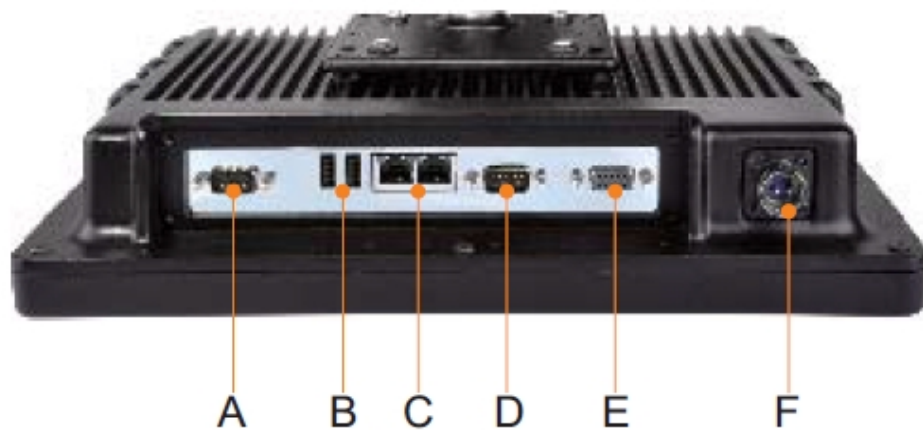
Figure 2-4 **VMT12 input/output ports view**

A: COM2 (RS-232/422/485)

B: 2 x USB2.0

C: 2 x RJ-45 10/100/1000Mbps Ethernet

D: COM1 (RS-232)

E: VGA

F: DC Power Jack (9~30VDC)

2.3 Starting the VMT12 & OS installation

Before using the VMT12, perform the basic procedure of power on through the following steps.

2.3.1 Power on the VMT12 with power adapter

1. Connect the Power cord to the Power adapter.
2. Plug in the connector of the power adapter.
3. Connect the power cord to a power source.
4. Press the power button to start up.

Figure 2-5 **Power on with power adapter**

CAUTION:	Please do not remove the power adapter from VMT12 after the device has already been shut down normally. Otherwise non-saved data will be lost.

2.3.2 Operating system installation

1. Connect the power to DC/DC adapter, and connect the power cord to the DC power inlet.
2. Press the power on switch to start the VMT12.
3. Press "DEL" to enter the CMOS setting and check the BIOS setup.
4. You may install your own O/S if it is not installed.
5. When installing O/S for the VMT12, please follow the steps and use external equipment as Keyboard and Mouse.
6. Please use external USB DVD-ROM to run the O/S and Driver setting (as picture showed below).

Figure 2-6 Operating system installation

2.3.3 Driver installation

The VMT12 comes with a User's Manual and Driver CD that contains most of the drivers and utilities of your needs.

1. Following the step by step to install Driver (Please refer Vehicle Terminal→VMT12→Driver) include: Graphic, Chipset, VGA, Audio, LAN and Touch Panel.

2. Following the step by step to install the driver of WIFI, Bluetooth and WCDMA if necessary

2.4. Handling the VMT12

2.4.1 Starting the VMT12

Press the Power button to turn on the VMT12. If the VMT12 does not power on, check the power adapter has been connected normally and you should try again.

When the VMT12 is powered on, it's operating system starts up. A splash screen (figure 2-7) appears for a short period of time followed by the Windows XP Pro. window.

This section offers the basic procedures of VMT12 using.

Figure 2-7 **Starting the VMT12**

2.4.2 Configure and calibrate the touch screen

PenMount touch screen is the most popular touchscreen on the market. Penmount software support a wide range of configuration. You can use this software to configure and calibrate the touch screen. When the operating system is started, you can see the icon of **Penmount Monitor** in the notification area.
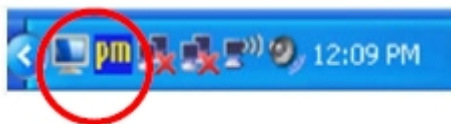
Figure 2-8 **icon of Penmount Monitor**

1. Right-click on the **PenMount Monitor** icon in the notification area and

select **Control Panel** from the menu.

Figure 2-9 **PenMount Monitor Menu**

2. **PenMount Control Panel** opens. You will be able to see the icon of
    Penmount 6000 USB under **Device** tab. In the **Device** tab, you can see the
    devices detected on your system. Select a device and press the **Configure**
    button to configure it.
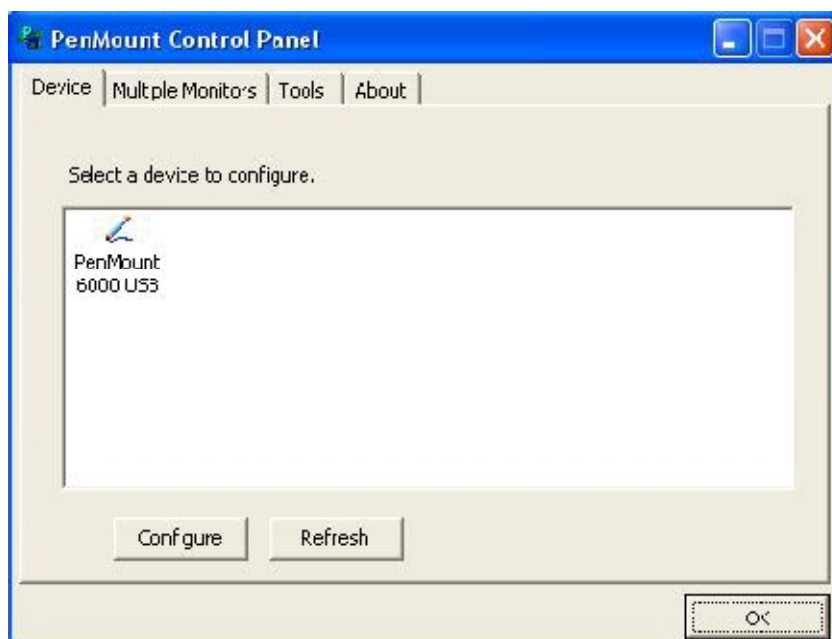
Figure 2-10 **Device Tab**

3. Click the "**Standard Calibration**" to start standard calibration.
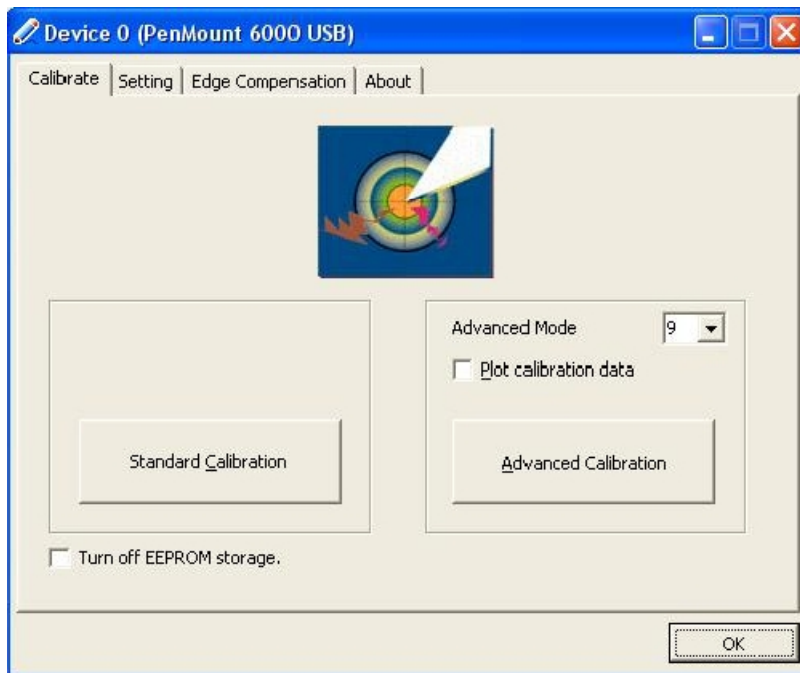
Figure 2-11 **Calibrate Tab**
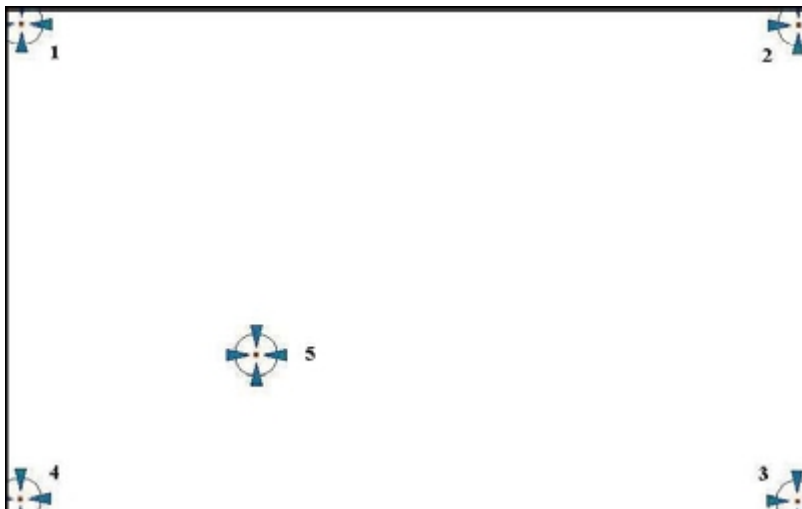
Figure 2-12 **Standard Calibrate Window**

NOTE:	The older the touchscreen gets, the more **Advanced Mode** calibration points you need for an accurate calibration. Use a stylus for **Advanced Calibration** for greater accuracy. Do the following for **Advanced Calibration**:

4. Back in Calibrate tab, press "**Advanced Calibration**" button to start

Advanced Calibration.
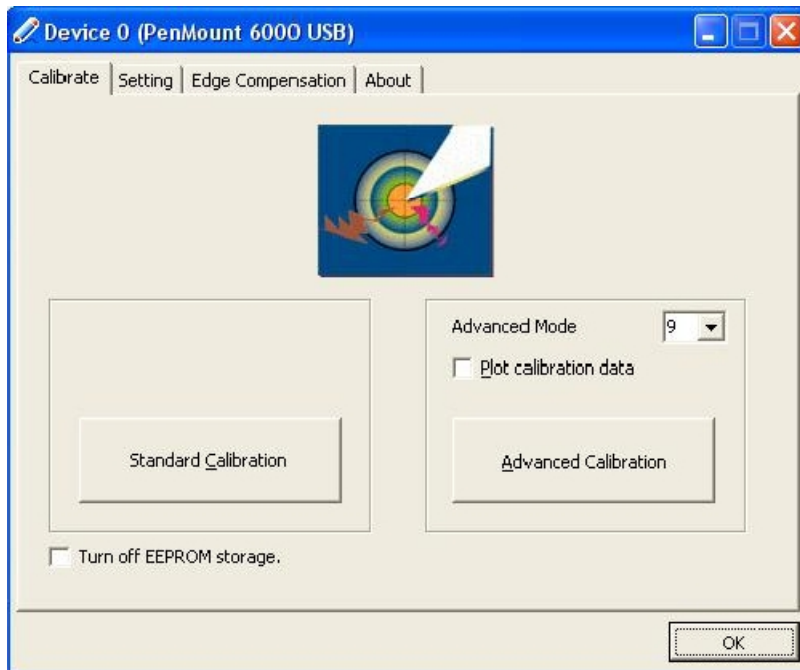
Figure 2-13 **Calibrate Tab**
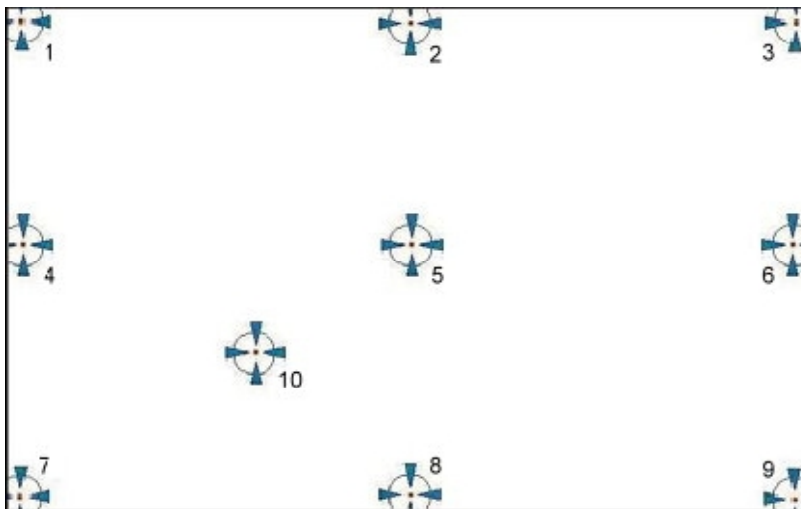
Figure 2-14 **Advanced Calibrate Window**

Table 2-1 **Advanced Tab**

Plot Calibration Data 	Check this function to have touch panel linearity comparison graph appear when you finish **Advanced Calibration**. The black lines reflect the ideal linearity assumed by PenMount's application program while the blue lines show the approximate linearity calculated by PenMount's application program as the result of user's execution of **Advance Calibration**.

Turn off EEPROM storage	This function disables the write-in of calibration data in
☐ Turn off EEPROM storage.	**Controller**. This function is enabled by default.

5. **Setting** tab, you can do some configuration for the touchscreen.
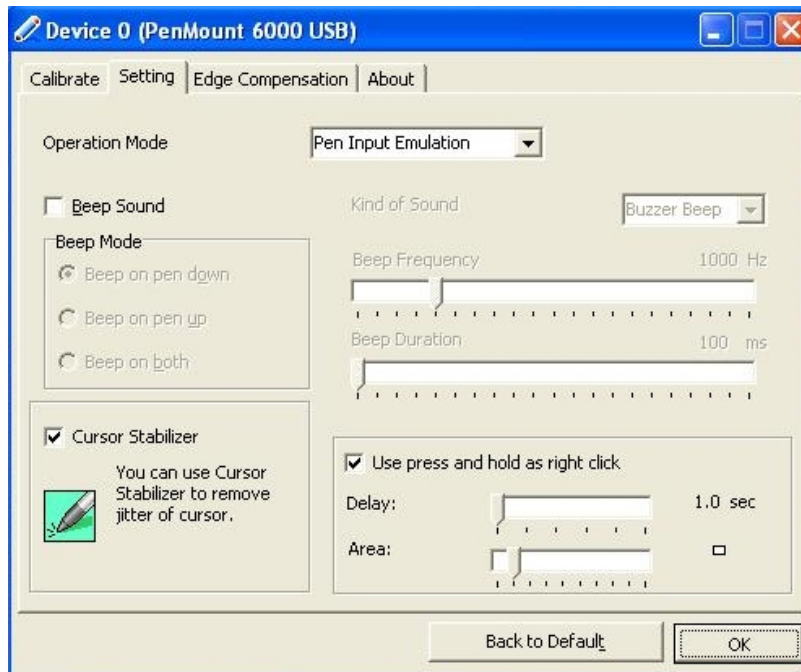
Figure 2-15 **Setting Tab**

➢ **Operation Mode**

This mode enables and disables mouse's ability of dragging on-screen icons—useful for configuring POS terminals.

Table 2-2 **Operation Mode**

Pen Input Emulation	Select this mode and mouse will emulate Windows Vista pen input device operation, by which no mouse event will be sent until the touch is dragged out of range or released from the screen.
Mouse Emulation	Select this mode and mouse functions as normal and allows dragging of icons.
Click on Touch	Select this mode and mouse only provides a click function, and dragging is disabled.
Click on Release	Select this mode and mouse only provides a click function when the touch is released.

➢ **Beep Sound**

Table 2-3 **Beep Sound**

Enable Beep Sound	turns beep function on and off.
Beep on Pen Down	beep occurs when pen comes down.
Beep on Pen Up	beep occurs when pen is lifted up.
Beep on both	beep occurs when comes down and is lifted up.
Beep Frequency	modifies sound frequency.
Beep Duration	modifies sound duration.

➢ **Cursor Stabilizer**
Enable the function support to prevent cursor shake.

➢ **Use press and hold as right click**
You can set the time out and area for you need

6. **Edge Compensation** tab, you can adjust the settings from 0 to 30 for

accommodating the difference of each touch panel.
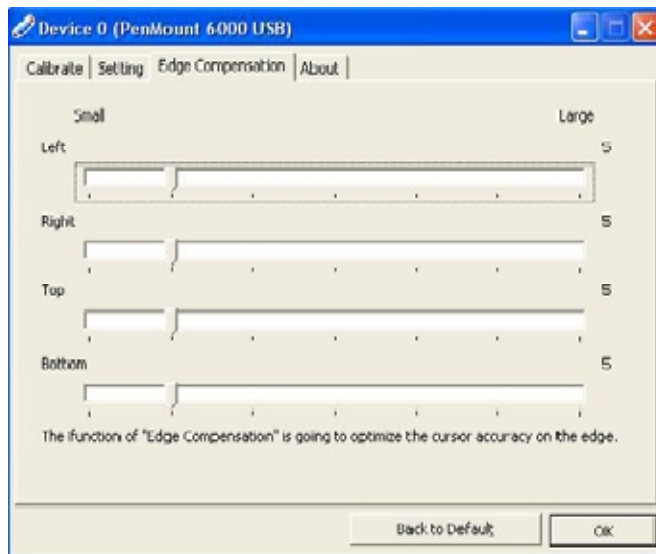
Figure 2-16 **Edge Compensation Tab**

7. **About** tab, This panel displays information about the PenMount controller and driver version
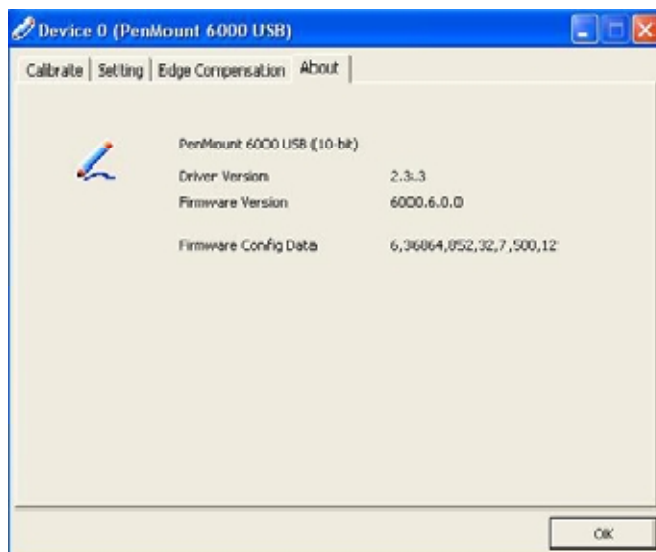
Figure 2-17 **About Tab**

2.4.3 Setting Up Wireless LAN

The Summit Client Utility (SCU) is an application designed for end users and administrators of mobile devices that use a Summit radio module. Using SCU, an end user can:

- Disable the radio (turn it off) and enable the radio (turn it on)
- View the contents of configuration profiles, or profiles, each of which houses the RF, security, and other settings for the radio
- Select the profile to be used to connect to a WLAN
- View global settings, which apply to every profile
- View status information on the radio, the access point (AP) or WLAN router to which it is connected, and the RF connection or link between the two devices
- To troubleshoot a connection or performance issue, view in-depth diagnostic information on the connection and the radio, and perform various troubleshooting and diagnostic tests

After completing an administrator login to the utility, a user can perform these additional tasks:

- Create, rename, edit, and delete profiles
- Alter global settings, which apply to every profile

SCU provides a graphical user interface (GUI) for access to all of its functions. Access to these functions also is available through an application programming interface (API), which an application programmer can use to enable another utility to manage the radio.

To initialize SCU:

- From the Start menu, select Programs
- Select the directory called Summit
- Inside the Summit directory are two items: a directory for the storage of security certificates and an SCU icon. To run SCU, double-click the SCU icon

SCU has five tabs: Main, Profile, Status, and Diags, and Global. Each tab is described in more detail in this section.

Main Tab

Figure 2-18 **Main Tab**

- **Enable/Disable Radio:** When the radio is enabled, selecting this button disables it; when the radio is disabled, selecting this button enables it.
- **Active Profile:** You can view the name of the active profile and, using the selection list, select a different profile.
  If you select "ThirdPartyConfig" then, after the device goes through a power cycle, WZC is used for configuration of the radio.
- **Status:** Indicates the radio's status.
- **Radio Type:** Indicates the type of radio in the device.
  "BG" means a Summit radio that supports 802.11b and 802.11g.
- **Regulatory Domain:** Indicates the regulatory domain or domains for which the radio is configured.
  "Worldwide" means that the radio can be used in any domain.
  The domain cannot be configured by an administrator or user.
- **Driver:** Indicates the version of the device driver that is running on the device.
- **SCU:** Indicates the version of SCU that is running on the device.
- **About SCU:** When tapped, supplies information on SCU that on a Windows application normally would appear under Help\About.

Profile Tab

Profile settings are radio and security settings that are stored in the registry as part of a configuration profile.   When a profile is selected as the active profile on the Main tab, the settings for that profile become active.   An administrator can define up to 20 profiles, edit them, and delete them on the Profile tab in SCU. ***Profile changes made on the tab are saved to the profile only when the Commit button is pressed.***

Unless it is modified, the Default profile does not specify an SSID, EAP type, or method of encryption.   If the Default profile is the active profile, then the radio will associate only to an access point that broadcasts its SSID and requires no EAP type and no encryption.
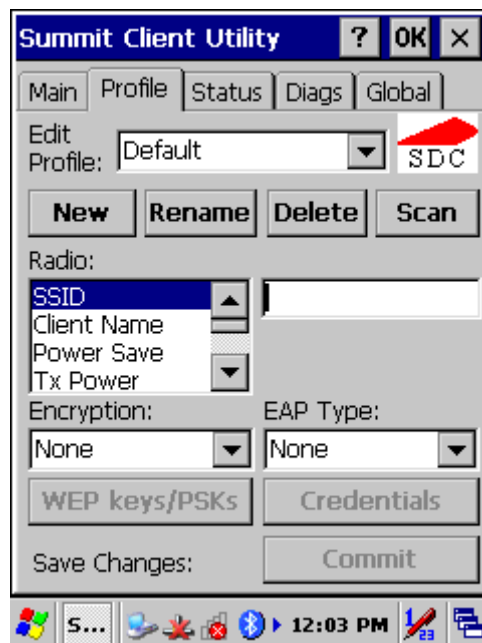
Figure 2-19 **Profile Tab**

- **Edit Profile:** This is used to select the profile to be viewed or, if you are an administrator, edited.
- **Actions:** Four actions are available, with the first three available only to an administrator:
  - **New:** Create a new profile with default settings and give it a unique name (and then change settings using other selections on the tab).
  - **Rename:** Give the profile a new name, one that is not assigned to another profile
  - **Delete:** Delete the profile, provided that it is not the active profile.
  - **Scan:** Open a window that lists access points that are broadcasting their SSIDs. Each time you tap the Refresh button, you view an updated list of

APs, with each row showing an AP's SSID, its received signal strength indication (RSSI), and whether or not data encryption is in use (true or false). You can sort the list by clicking on the column headers. If you are authorized as an administrator, select an SSID in the list, and tap Commit, you return to the Profile tab to create a profile for that SSID.

- **Radio:** Radio attributes in the list box can be selected individually. When an attribute is selected, the current setting or an appropriate selection box with the current setting highlighted appears on the right.
- **Security:** Values for the two primary security attributes, EAP type and encryption type, are displayed in separate dropdown lists, with the current values highlighted. When you as an administrator select an EAP type, the Credentials button appears; when you tap it, a dialog box appears that enables you to define authentication credentials for that EAP type. When you as an administrator select an encryption type that requires the definition of WEP keys or a pre-shared key, the PSKs/WEP Keys button appears; when you tap it, a dialog box appears that enables you to define WEP keys or a PSK.
- **Commit:** To ensure that changes to profile settings made on the tab are saved in the profile, you must tap the Commit button.

To cause a Summit radio to connect to a typical business WLAN, you must select a profile that specifies the SSID, EAP type, and encryption type supported by the WLAN:

- SSID: This is the name or identification of the WLAN.
- EAP type: This is the protocol used to authenticate the device and its user if the WLAN uses the Enterprise version of Wi-Fi Protected Access (WPA) and WPA2. SCU supports five EAP types: PEAP with EAP-MSCHAP (PEAP-MSCHAP), PEAP with EAP-GTC (PEAP-GTC), EAP-TLS, LEAP, and EAP-FAST
- Encryption: This specifies the type of key used to encrypt and decrypt transmitted data and how that key is specified or derived. Encryption options include:
  - WPA2 or WPA with dynamic keys (derived from the EAP authentication process)
  - WPA2 or WPA with pre-shared keys
  - Static WEP keys

Consult the user's guide for details on all profile settings, including security settings.

Status Tab

The Status tab provides status information on the radio.

- Active profile
- Radio's status: Down (not recognized), Disabled, Not Associated, Associated, or [EAP type] Authenticated
- Client info: Name, IP address, and MAC address
- AP info: Name, IP address, MAC address, beacon period, and DTIM interval
- Connection info: Channel, data rate, transmit power, signal strength, and signal quality
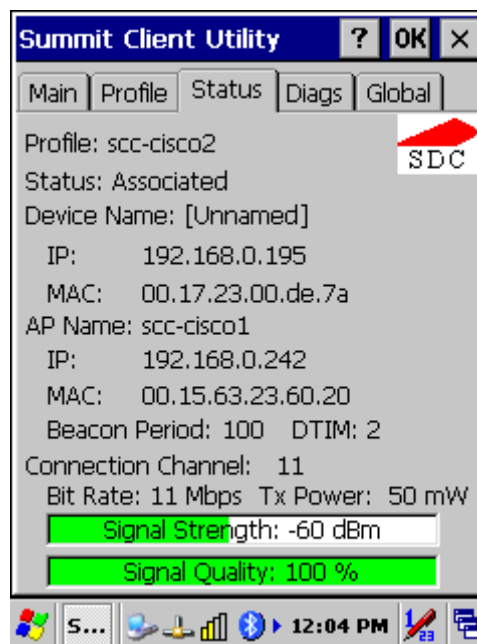
Figure 2-20 **Status Tab**

Diags Tab
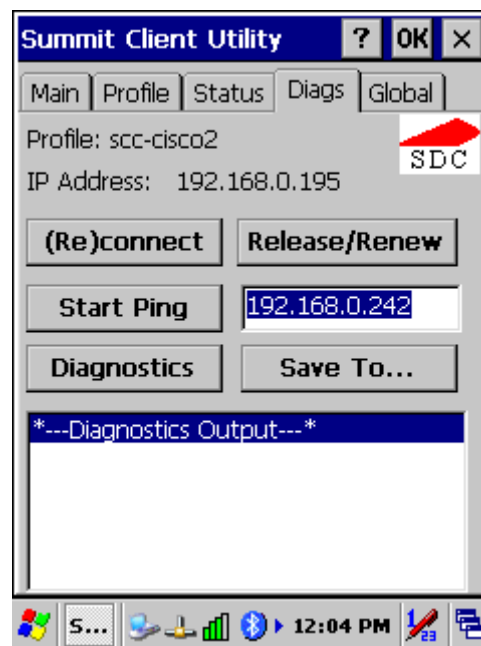
Figure 2-21 **Diags Tab**

- **(Re)connect:** Disable and enable the radio, apply or reapply the current profile, and attempt to associate and authenticate to the wireless LAN, logging all activity in the output area at the bottom.
- **Release/Renew:** Obtain a new IP address through DHCP release/renew, and log all activity in the output area at the bottom.
- **Start Ping:** Start a continuous ping to the address in the edit box next to it. Once the button is clicked, its name and function will change to Stop Ping. Moving to an SCU window other than Status or Diags also will stop the ping, as will Pings will continue until you tap the Stop Ping button, move to an SCU window other than Diags or Status, exit SCU, or remove the radio.
- **Diagnostics:** Attempt to (re)connect to an AP, and provide a more thorough dump of data than is obtained with (Re)connect. The dump will include radio state, profile settings, global settings, and a BSSID list of APs in the area.
- **Save To...:** Save the diagnostics output to a file.

Global Tab

Global settings include:

● Radio and security settings that apply to all profiles

● Settings that apply to SCU itself

An administrator can define and change most global settings on the Global Settings Tab in SCU.
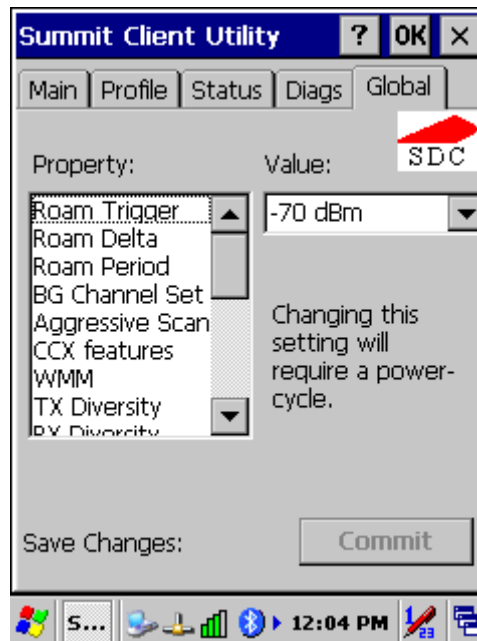
Figure 2-22 **Global Tab**

The default setting for each global setting ensures reliable operation in most environments. Consult the user's guide for details on all global settings.

2.4.4 Using HSPA (3.5G) Wireless WAN

The HSPA PCI Express Mini Card is a compact, lightweight, wireless UMTS-based modem. It provides EDGE, GPRS, GSM, WCDMA, HSDPA and HSUPA connectivity for VMT12, point-of-sale devices, telemetry products and other machine-to-machine and vertical applications over several radio frequency bands:

- **GSM, GPRS, EDGE**
  850 MHz, 900 MHz, 1800 MHz, 1900 MHz
- **UMTS WCDMA / HSDPA / HSUPA**
  800 MHz, 850 MHz, 1900 MHz, 2100 MHz
- **Receive diversity:**
  Optimized for diversity on 800, 850, 1900 and 2100 MHz

Setup connection

1. Removed the 9 screws from rear cover.

2. Open the front panel, and insert the User's SIM card to slot, make sure the User's SIM card has applied the 3G service.

 *Note: You must turn off the *! (before inserting the SIM card.*
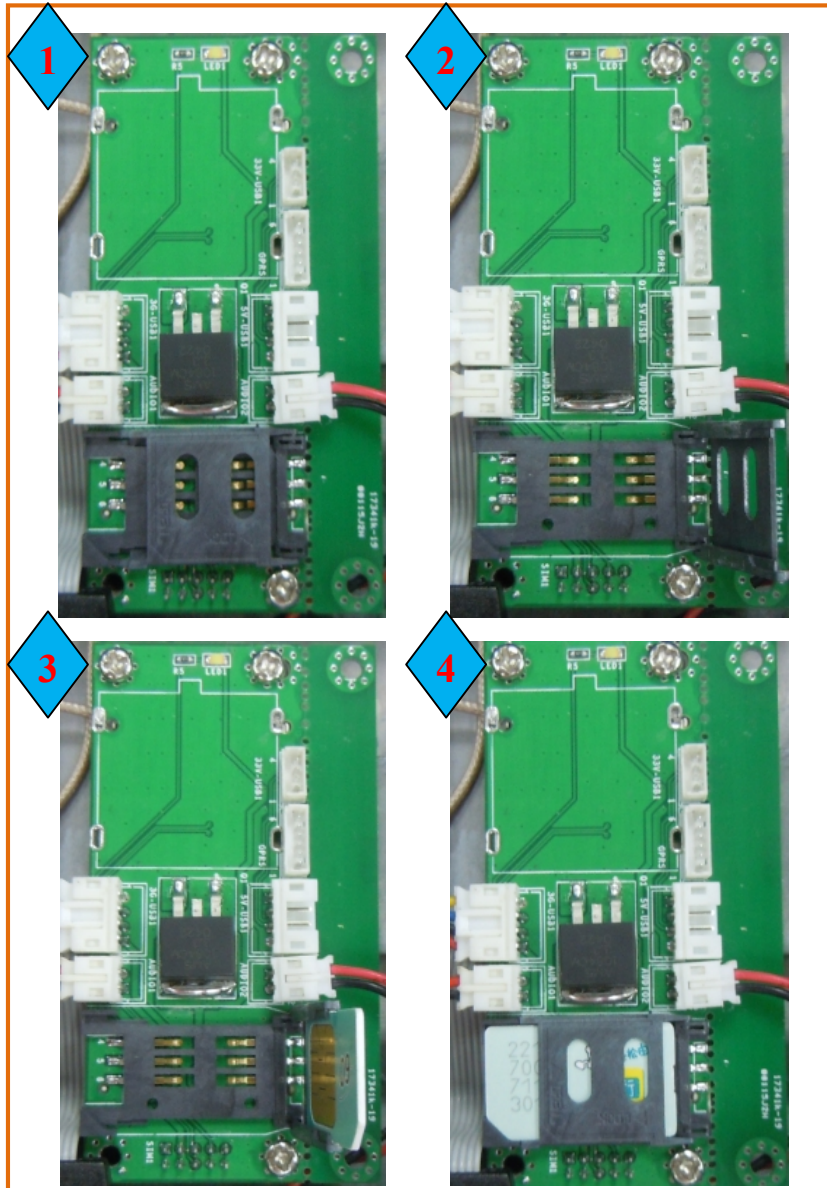
3. Turn on the VMT12, then booting into OS.

4. Check the device manager without any question mark.
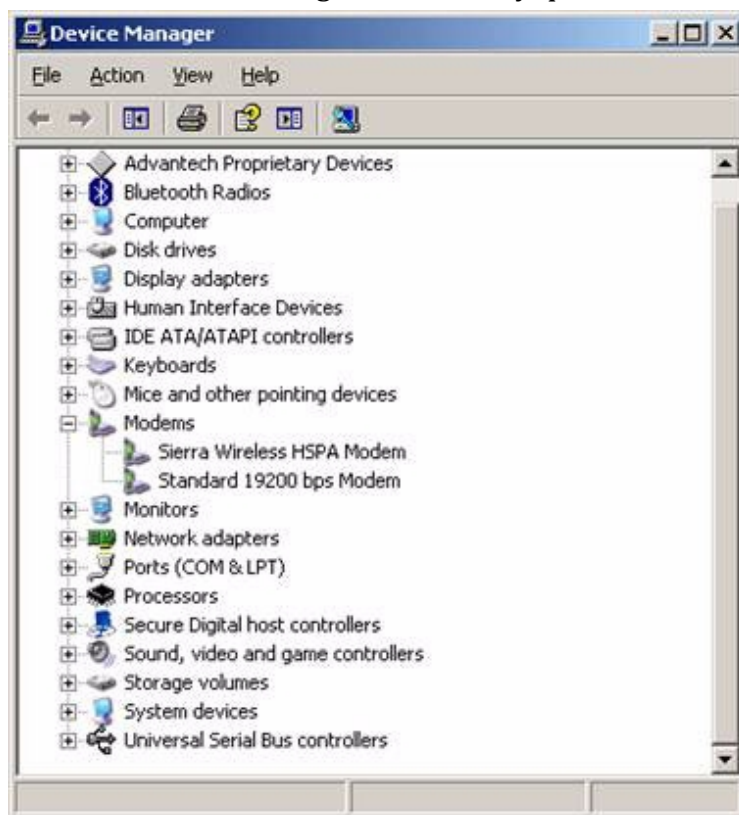
5. Double Click the "Sierra Wireless Watcher" and Click Button "Connect", then the VMT12 will connect to the internet.

6. To tap "**?**" can get help information for each program.

2.4.5 GPS Setting

Setup connection
1. Turn on the VMT12, booting into OS.
2. Double click the "VisualGPS.exe" application program icon on the desktop.
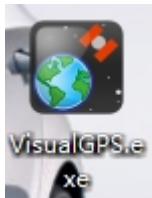
3. Start test in "Visual GPS", setting COM port (COM3) and baud rate (9600bps) use for GPS module.
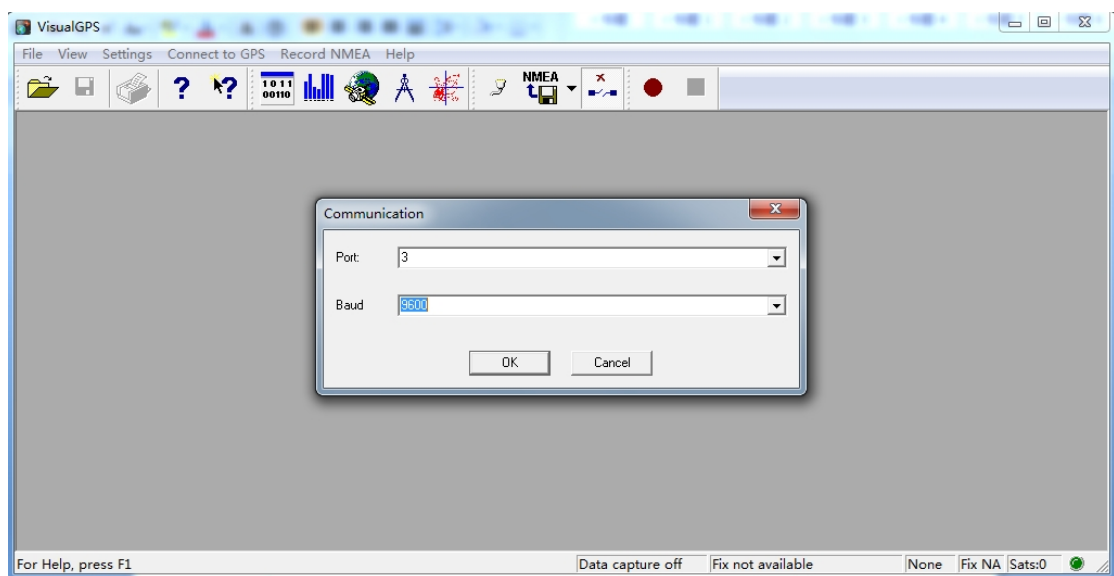
4. After start test, the NMEA output messages are display on the Command Monitor Window. And you can see more gps information on the other windows such as "Signal Quality Window", "Azimuth and Elevation window" and so on.

NMEA monitor window

The NMEA monitor window will allow you to monitor the data from the GPS receiver in real time. Any data received from the receiver is piped into this window and no filtering of any kind is performed. If the GPS receiver outputs more data than is required by VisualGPS, that data will be displayed.

This window may be sized and stretched to fit within the desired area. Using the right mouse button over the window will display various settings. These settings are described below.

```
$GPRMC, 060001, A, 3348. 795, N, 11754. 064, W, 000. 0, 000. 0, 110698, 013. 7, E*62
$GPRMB, A, , , , , , , , , , , , V*71
$GPGGA, 060001, 3348. 795, N, 11754. 064, W, 1, 07, 1. 0, 65. 8, M, -31. 9, M, , *4F
$GPGSA, A, 3, 14, 15, 16, 18, 22, 25, 29, , , , , , 2. 2, 1. 0, 1. 9*38
$GPGSV, 2, 1, 07, 14, 70, 322, 55, 15, 31, 212, 53, 16, 32, 317, 54, 18, 10, 282, 47*7C
$GPGSV, 2, 2, 07, 22, 40, 120, 53, 25, 36, 045, 52, 29, 28, 073, 50, , , , *4B
$PGRME, 19. 5, M, 44. 7, M, 48. 8, M*10
$GPGLL, 3348. 794, N, 11754. 064, W, 060002, A*3E
$PGRMZ, 217, f, 3*1F
$PGRMM, WGS 84*06
$GPBOD, , T, , M, , *47
$GPRTE, 1, 1, c, 0*07
$GPRMC, 060003, A, 3348. 794, N, 11754. 064, W, 000. 0, 000. 0, 110698, 013. 7, E*61
$GPRMB, A, , , , , , , , , , , , V*71
$GPGGA, 060003, 3348. 794, N, 11754. 064, W, 1, 07, 1. 0, 66. 2, M, -31. 9, M, , *45
$GPGSA, A, 3, 14, 15, 16, 18, 22, 25, 29, , , , , , 2. 2, 1. 0, 1. 9*38
```

Signal Quality Window

The Signal Quality Window uses the GPGSV NMEA message to extract the signal to noise ratio (SNR C/No) which is specified as a number from 0 - 99 dB. Depending on the number of satellites in view, the number of SNR bars will vary. At the top of each SNR bar, the raw SNR value is displayed. Full scale is considered any SNR value of 50 dB or above. At the bottom of each bar shows the satellite ID or Pseudo Random Number.

The signal quality bar will change its color depending if the satellite is used in the navigation solution returned by the GPGSA NMEA message. If the satellite is not used in the position fix solution, the signal quality bar will be in gray. If the satellite is used in the solution, the signal quality bar will be blue.
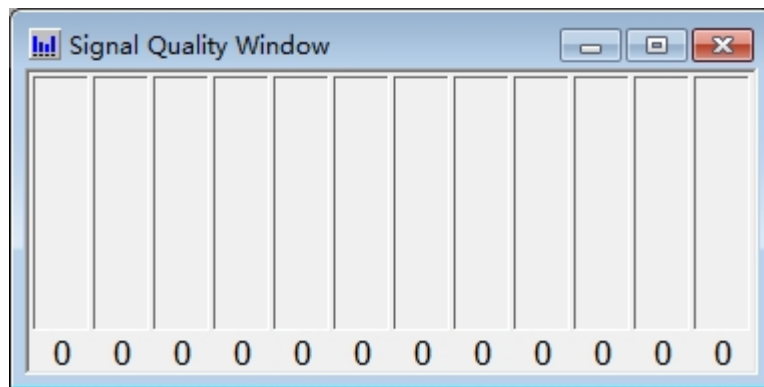
Azimuth and Elevation window

The Azimuth and Elevation window shows satellite position and the physical antenna mask angle. The satellite position is denoted using azimuth, 0° to 359°, and elevation, 0° to 90° where 90° is the horizon. The satellites are also color coded to show which is part of the navigation solution and tracked. When the satellite is highlighted in color shows that it is being used for a navigation solution and tracked. When the satellite is gray shows that the satellite is not tracked.

Like the Signal Quality Window, the Azimuth & elevation Window will use the GPGSV NMEA command to extract azimuth and elevation for each satellite that is in view. Each satellite is identified by its Pseudo Random Number (PRN) with the azimuth as the letter 'A' and elevation by the letter 'E'.

The color of the text for each satellite indicates whether the satellite is used in the position solution. When the text is in red, the satellite is used in the solution. When the text is in gray, the satellite is not used in the solution.

In stationary or static applications it is necessary to place the antenna where it can get a clear view of the sky. Sometimes there are obstructions to the antenna and knowing the effect on the tracking of satellites is essential. The Azimuth and Elevation Window has the ability to show graphically the elevation mask angle. This is the blue jagged line that is built by using satellite information. Using the information from the SNR and solution status, a graphical representation of the mask angle is built. This may take as long a 24 hours of tracking. Below is an example of how the physical elevation mask looks after 16 hours of acquisition on the West Coast on North America. See Azimuth and Elevation Properties for more information on configuration settings to the physical mask angle.
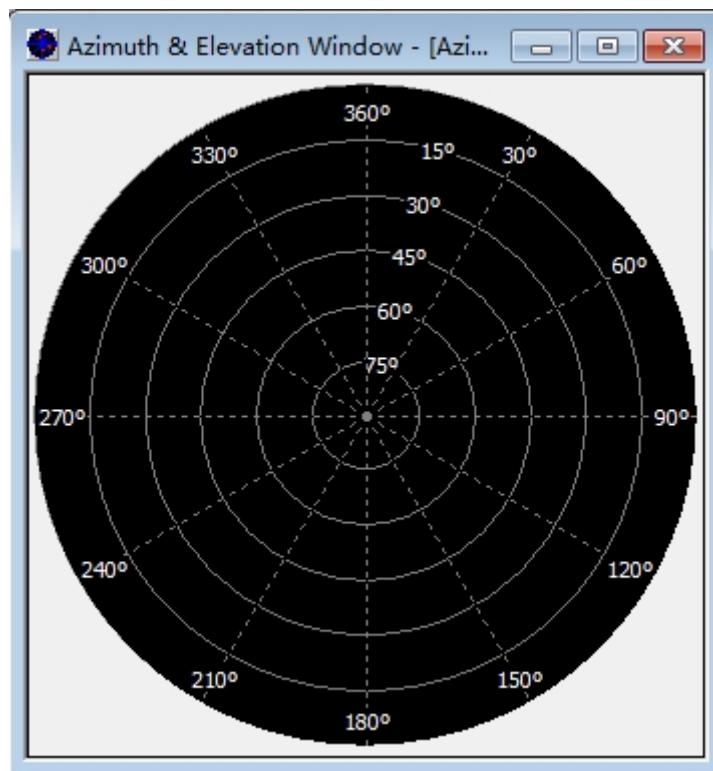
Navigation Window

The Navigation Window displays position data from the GPS receiver. This data includes latitude, longitude and altitude.
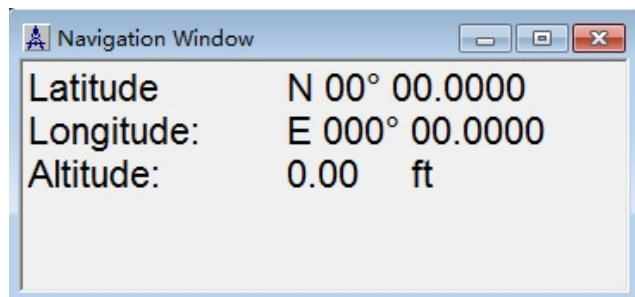
Survey Window

The Survey Window is one of the more interesting windows of VisualGPS. This window will log latitude, longitude and altitude displaying data graphically.

The Survey Window is split into three frames. The first, at the top, is the Survey Frame. Here, a plot of past position history is displayed graphically and is known as paths. These paths can be saved to disk and viewed at a latter time.

The frame directly below the Survey Frame is the Altitude Frame. This frame simply plots the altitude.

To the right of the Altitude Frame is the Position Statistics frame. Displayed here are position average and Dilution of precision or DOPs.
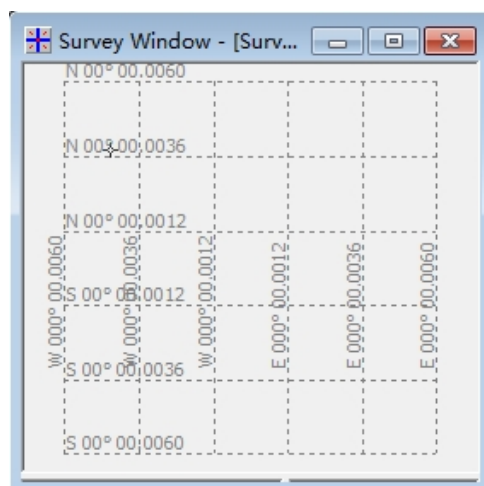
2.4.6 Bluetooth Setting & Using

Start BlueSoleil

1. Turn on the VMT12, booting into OS.
2. Double click the "BlueSoleil Space" application program icon on the desktop.

3. Make your Bluetooth devices discoverable, Double-click *"Central Sun"* icon in BlueSoleil window.

Then your Bluetooth devices will be found and listed on the orbit in BlueSoleil window.

4. Double-click your Bluetooth device icon to search services. Available services will be highlighted by service icons located on top of the BlueSoleil window.

5. Double click a service icon to initiate a connection. You might be prompted to enter a passkey to authenticate. Enter the same passkey on both sides, or enter the specific one provided by the device manufacture on your computer side only. A dialog box as shown below will pop up for you to enter a passkey.
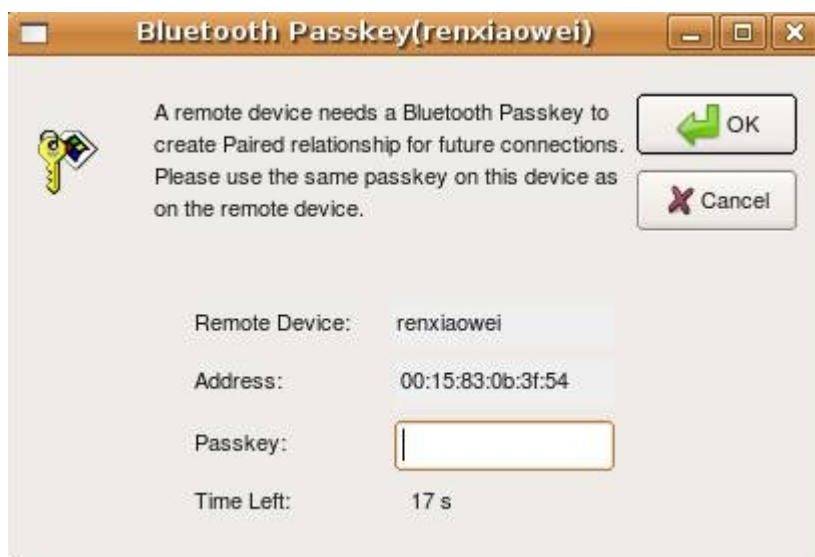
After the connection is established, both the Bluetooth device icon and the service icon will turn green.

2.4.7 Help

To tap "**?**" can get help information for each program.

Chapter 3.H/W installation

3.1 Jumpers

3.1.1 Jumper list

Table 3-1 **Jumper List**

J2	COM2 Setting
J3	AT / ATX Power SEL
J4	Clear CMOS
J5	Panel Voltage SEL

3.1.2 Jumper Settings

Table 3-2 **J2: COM2 Setting**

Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3*2P 180D(M) 2.0mm SMD SOUARE PIN
Setting	Function
(1-2)	RS232
(3-4)	RS485
(5-6)	RS422
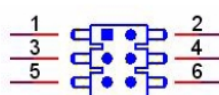
Table 3-3 **J3: AT / ATX Power SEL**

Part Number	1653002101
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2*1P 180D(M)SQUARE 2.0mm DIP W/O Pb
Setting	Function
(1-2)	AT Power SEL
EMPTY	ATX Power
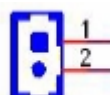
Table 3-4 **J4: Clear COMS**

Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	Function
(1-2)	Normal
(2-3)	Clear CMOS
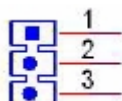
Table 3-5 **J5: PAN VOL SEL**

Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	Function
(1-2)	+5V
(2-3)	+3V
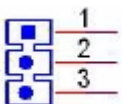
3.1.3 Jumper Description

Cards can be configured by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.
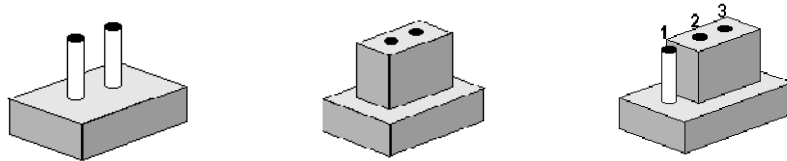
The jumper settings are schematically depicted in this manual as follows.

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

> **Warning!** *To avoid damaging the computer, always turn off the power supply before setting jumpers. Clear CMOS. Before turning on the power supply, set the jumper back to 3.0 V Battery On.*

3.2 Connectors

3.2.1 Connector list

Table 3-6 **Connector list**

CN1	Audio
CN2	SATA
CN3	SATA
CN4	GPIO
CN5	HDD & PWR LED
CN6	12V AT Power Input
CN7	COM3/COM4
CN8	AT/ATX Power Input
CN9	MIO 2.0
CN10	PS2
CN11	SMBus
CN12	COM2
CN13	Inverter Power Output
CN14	Internal USB
CN15	Internal USB
CN16	18 bits LVDS Panel
CN17	LAN (Option)
CN18	LAN1
CN19	LAN2
CN20	Power Switch (Low Active)
CN21	LPT
CN22	Standby Power Input
CN23	Reset
CN24	External USB
CN25	External USB
CN26	COM1
CN27	VGA
CN28	Mini PCIE lock
CN29	Mini PCIE slot
CN30	DDR2 SODIMM
CN31	BIOS Socket
CN32	CF

3.2.2 Connector Settings

3.2.2.1 Audio Interface (CN1)

Audio Port Connectors

One 5 x 2 pin box header for Audio connector. These audio connectors are used for audio devices. The audio jacks are differentiated by color for different audio sound effects.

3.2.2.2 SATA Connector (CN2, CN3)

VMT12 Motherboard supports Serial ATA via two connectors (CN2, CN3). Data transfer rates up to 300 MB/s are possible, enabling very fast data and file transfer, and independent DMA operation on two ports.

3.2.2.3 GPIO (General Purpose Input Output) (CN4)

The board supports 8-bit GPIO through GPIO connector. The 8 digital in and out-puts can be programmed to read or control devices, with input or out- put defined. The default setting is 4 bits input and 4 bits output.

3.2.2.4 Power & HDD LED Indicator (CN5)

The HDD LED indicator for hard disk access is an active low signal (24 mA sink rate). Power supply activity LED indicator.

3.2.2.5 Power Reset Button (CN23)

Momentarily pressing the reset button will activate a reset. The switch should be rated for 10 mA, 5 V.

3.2.2.6 Power Connectors

Main power connector, (CN6, CN8)

VMT12 Motherboard can support both ATX and AT power supply.

-AT: 5 V or 12 V, ATX: 5 V, 5 V sb (12 V is optional for LCD inverter and add on card)

-AT: 12 V, ATX: 12 V, 5 V sb

Note! *Use the ATX power cable (PN: 1700000265 ATX-20P (M)/12P (F) 10 CM) to connect CN8, it's changed from 12 pin to 20 pin, and provides 5 V and 12 V and other PS_ON signals.*

3.2.2.7 COM Port Connector (CN7, CN12,CN26)

The VMT12 Motherboard provides 4 serial ports (COM1, COM3 & COM4:

RS-232; COM2: RS-232/422/485) in one DB-9 connector (CN26) for COM1 and one 7*2P pin header (CN12) for COM2 and one 10*2P pin header(CN7) for COM3 & COM4. It provides connections for serial devices (a mouse, etc.) or a communication network. You can find the pin assignments for the COM port connector in Appendix A.

COM RS-232/422/485 setting (J2)

COM2 can be configured to operate in RS-232, RS-422, or RS-485 mode. This is done via J2.

Table 3-7 **J2: COM2 Setting**

Setting	Function
(1-2)	RS232
(3-4)	RS485
(5-6)	RS422

3.2.2.8 Keyboard and PS/2 Mouse Connector (CN10)

The board provides a keyboard connector that supports both a keyboard and a PS/2 style mouse. In most cases, especially in embedded applications, a keyboard is not used. If the keyboard is not present, the standard PC/AT BIOS will report an error or fail during power-on self-test (POST) after a reset. The product's BIOS standard setup menu allows you to select "All, But Keyboard" under the "Halt On" selection. This allows no-keyboard operation in embedded system applications, without the system halting under POST.

3.2.2.9 SMBus Connector (CN11)

The System Management Bus (abbreviated to SMBus or SMB) is a simple two-wire bus, derived from I2C and used for communication with low-bandwidth devices on a motherboard, especially power related chips such as a laptop's rechargeable battery subsystem (see Smart Battery Data). Other devices might include temperature, fan or voltage sensors, lid switches and clock chips. PCI add-in cards may connect to a SMBus segment.

The SMBus was defined by Intel in 1995. It carries clock, data, and instructions and is based on Philips' I2C serial bus protocol. Its clock frequency range is 10 kHz to 100kHz. Its voltage levels and timings are more strictly defined than those of I2C, but devices belonging to the two systems are often successfully mixed on the same bus.

3.2.2.10 Inverter Power Connector (CN13)

VMT12 Motherboard can provide +5 V and +12 V and signal to LCD inverter board via CN13.

3.2.2.11 USB Connectors (CN14, CN15, CN24, CN25)

The board provides up to six USB (Universal Serial Bus) ports. This gives complete Plug and Play, and hot attach/detach for up to 127 external devices. The USB interfaces comply with USB specification Rev. 2.0 which supports 480 Mbps transfer rate, and are fuse protected. There are 5 x 2 pin 180D (M) connectors for internal use, 4 x USB ports at CN14, CN15 and two external USB port at CN24,CN25. You will need an adapter cable if you use a standard USB connector. On one end the adapter cable has a 5 x 2-pin connector with a foolproof connection to prevent it from being plugged in the wrong way and on the other end a USB connector.

3.2.2.12 VGA/LCD/LVDS Interface Connections

The board's PCI VGA interface can drive conventional CRT displays and is capable of driving a wide range of flat panel displays, including passive LCD and active LCD displays. The board has connectors to support these displays: one for standard CRT VGA monitors and one for flat panel displays

CRT display connector (CN27)
The CRT display connector is a box header connector used for conventional CRT displays.

LVDS LCD panel connector (CN16)
The board supports 18bit LVDS LCD panel displays. Users can connect to a 18bit LVDS LCD on it.

3.2.2.13 Ethernet Configuration (CN18, CN19)

10/100/1000 Mbps connections are made via RJ-45 connectors.
The board is equipped with 2 high performance PCI Ethernet interface which is fully compliant with IEEE 802.3u 100Base-T & IEEE 802.3ab 1000Base-T. It is supported by all major network operating systems.

3.2.2.14 Power Switch Connector (CN20)

One 2 x 1 pin wafer box (CN20) for power switch.

3.2.2.15 LPT Connector (CN21)

VMT12 Motherboard can support LPT via CN21. LPT (Line Print Terminal) is the original, yet still common, name of the parallel port interface on IBM PC-compatible computers. It was designed to operate a text printer that used IBM's 8-bit extended ASCII character set.

3.2.2.16 Standby Power Connector (CN22)

VMT12 Motherboard can support both ATX and AT power supply.

3.2.2.17 Mini PCIe Connector (CN28,CN29)

PCI Express Mini Card (also known as Mini PCI Express, Mini PCIe, and Mini PCI-E) is a replacement for the Mini PCI form factor based on PCI Express. It is developed by the PCI-SIG. The host device supports both PCI Express and USB 2.0 connectivity, and each card uses whichever the designer feels most appropriate to the task. VMT12 Motherboard supports a Mini PCIe slot.

3.2.2.18 DDRII DIMM Socket (CN30)

One 200-pin/H6.5 mm DDRII DIMM socket (CN30) supports DDRII 667 MHz up to 2 GB.

3.2.2.19 CompactFlash (CN32)

VMT12 Motherboard provides a CompactFlash card type I/II socket. The CompactFlash card shares a secondary IDE channel which can be enabled/disabled via the BIOS settings.
Compact Flash set as fix master mode.

3.3 Mechanical

3.3.1 Jumper and Connector Location
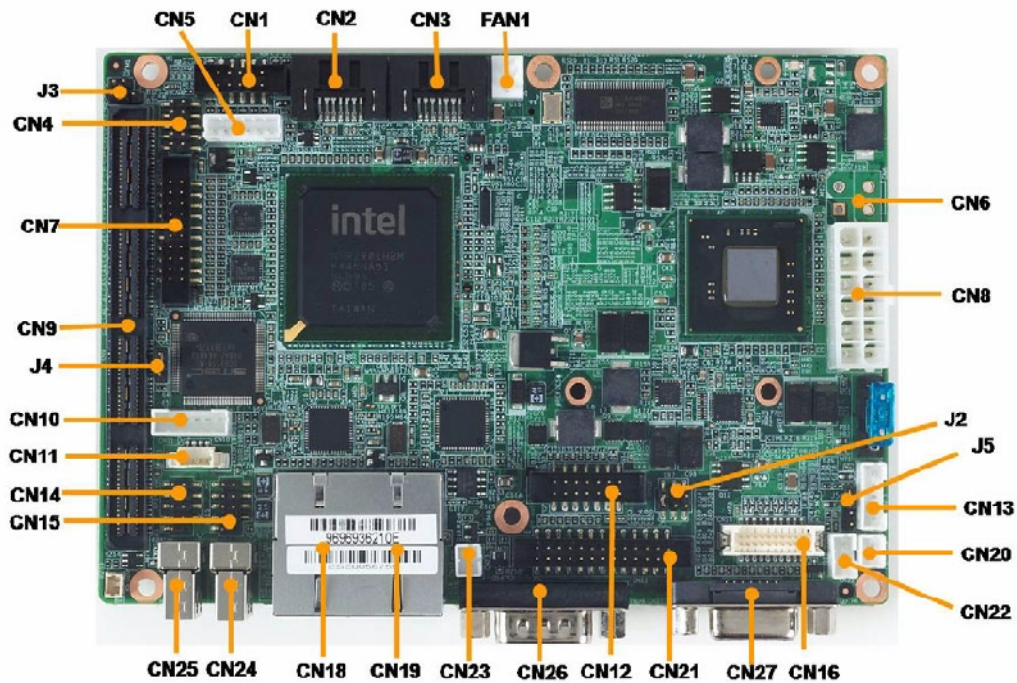
Figure 3-1 **Jumper and Connector layout (Component side)**
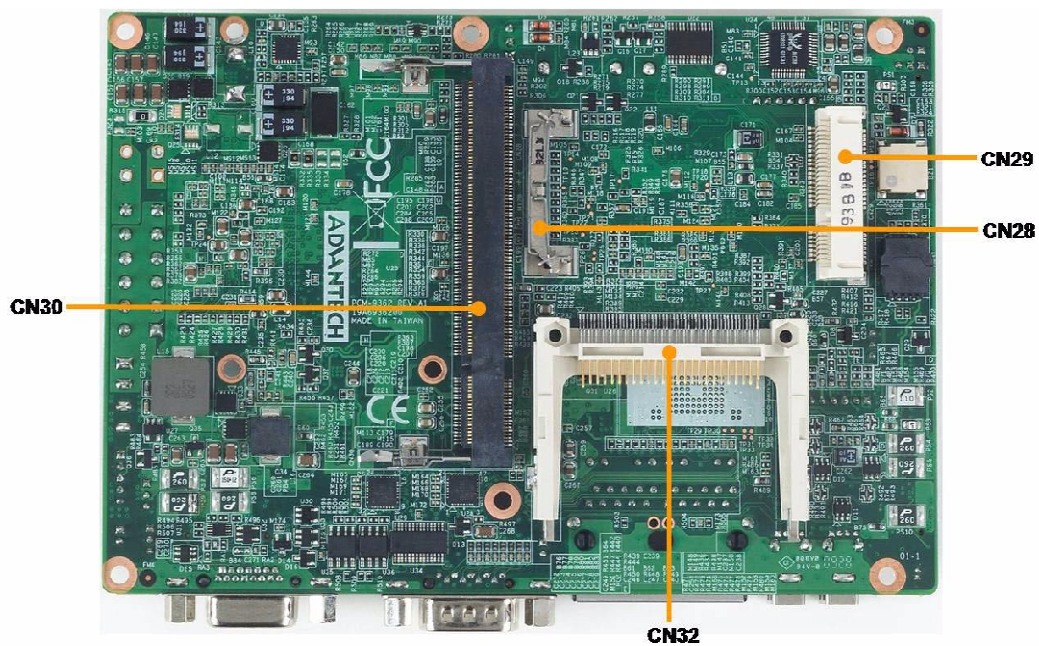
Figure 3-2 **Jumper and Connector layout (Solder side)**

3.3.2 Board Dimension
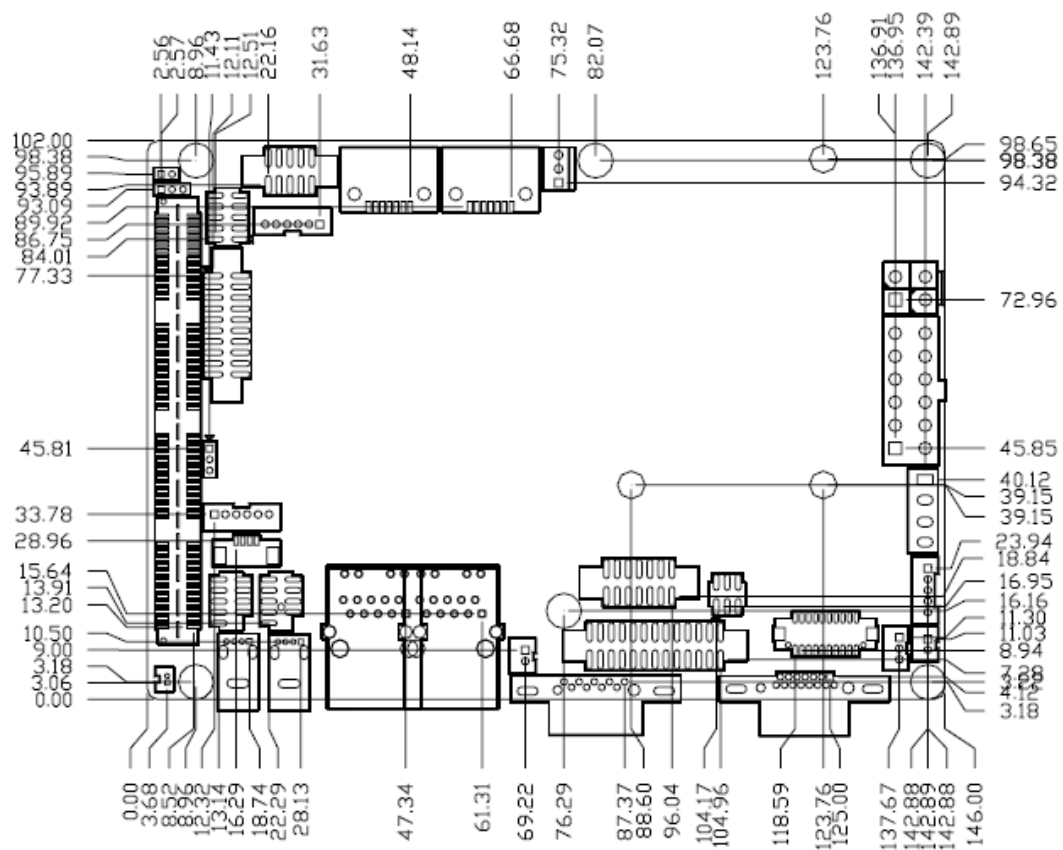
Figure 3-3 **Board Dimension layout (Component side)**
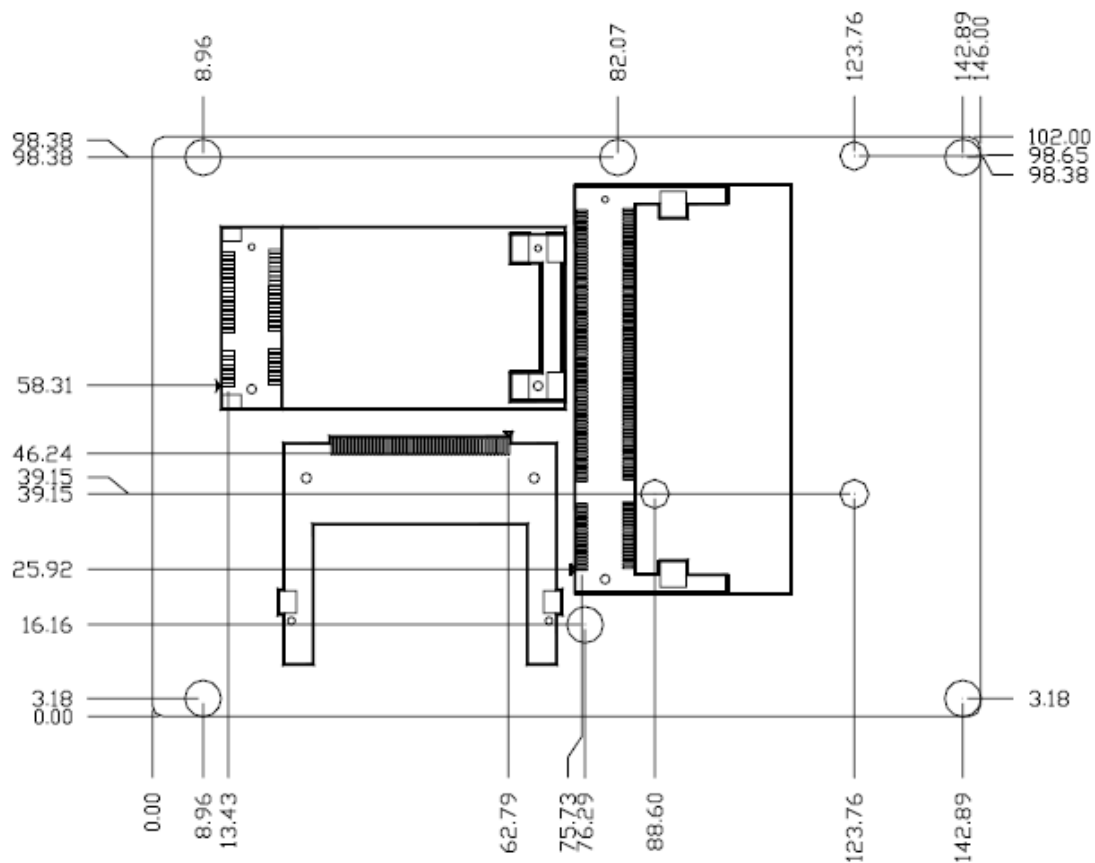
Figure 3-4 **Board Dimension layout (Solder side)**
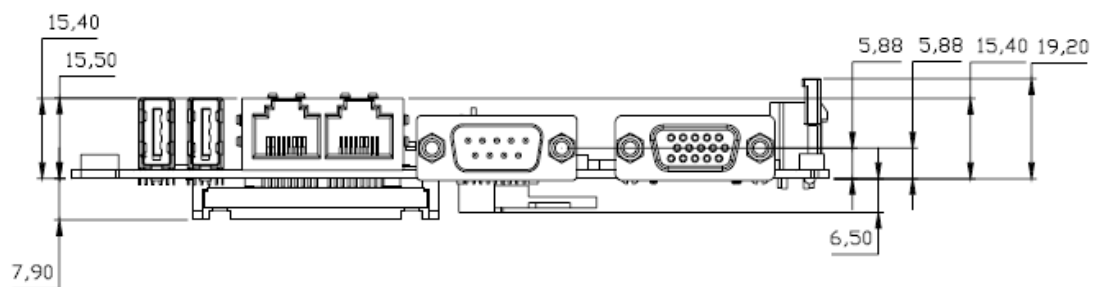
Figure 3-5 **Board Dimension layout (Coastline)**

Chapter 4.BIOS Settings

AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the VMT12 Motherboard BIOS setup screens.

Figure 4-1 **Setup program initial screen**

AMI's BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the setup information when the power is turned off.

4.1 Entering Setup

Turn on the computer and check for the "patch" code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter setup.

4.2 Main Setup

When you first enter the BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.
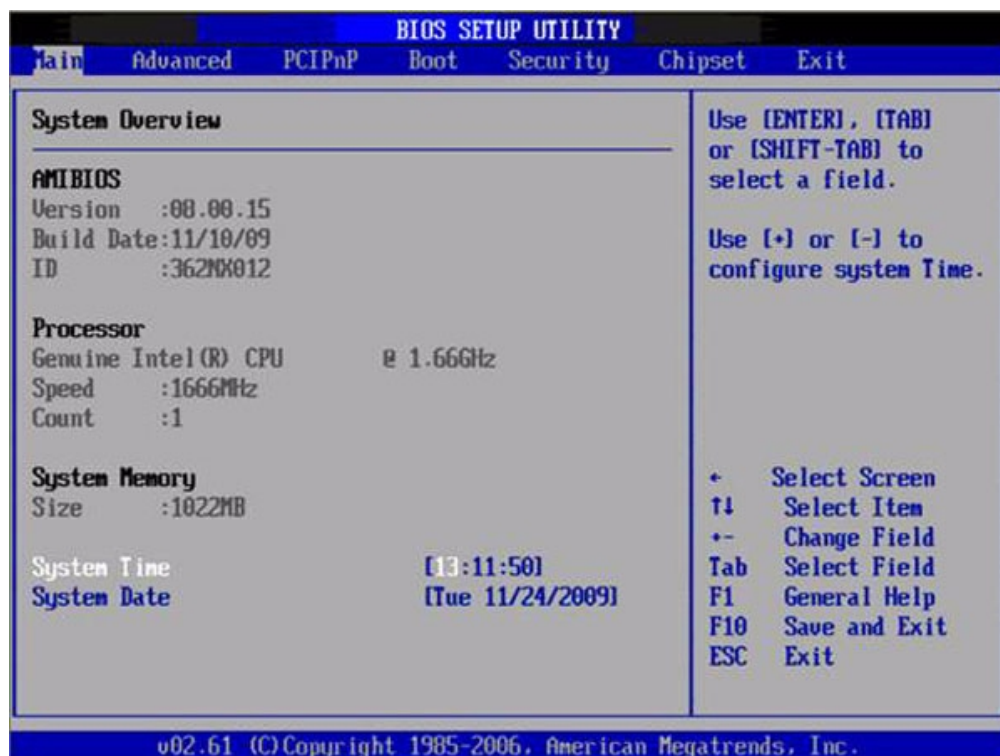
Figure 4-2 **Main setup screen**

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

4.2.1 System time / System 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 must be entered in HH:MM:SS format.

4.3 Advanced BIOS Features Setup

Select the Advanced tab from the VMT12 Motherboard setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.
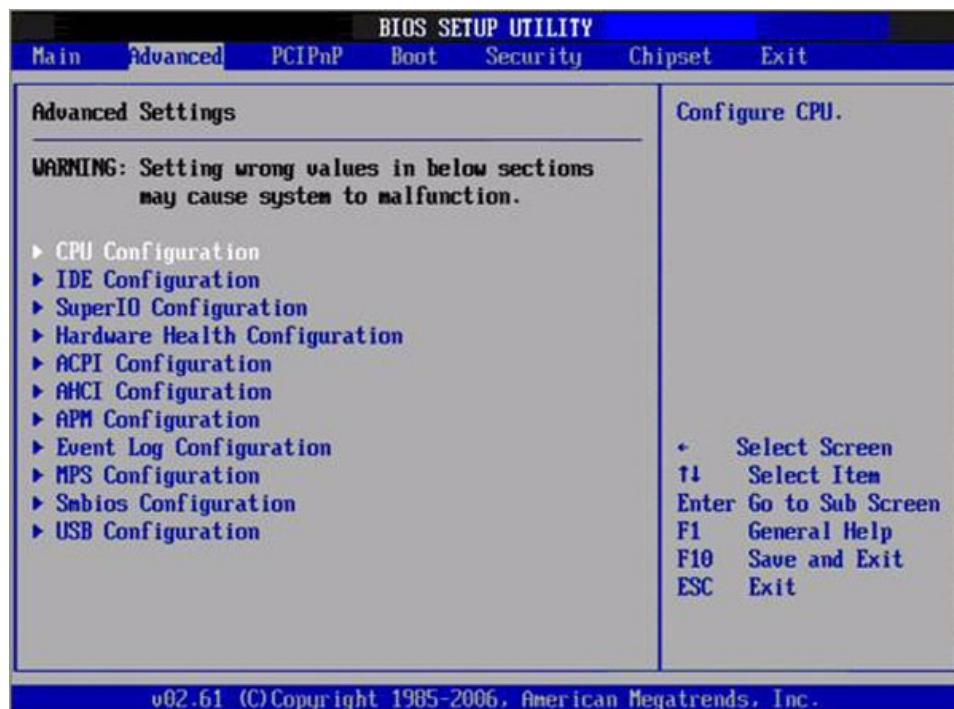
Figure 4-3 **Advanced BIOS features setup screen**

4.3.1 CPU Configuration

Figure 4-4 **CPU Configuration Setting**

Max CPUID Value Limit

This item allows you to limit CPUID maximum value.

Execute-Disable Bit Capability

This item allows you to enable or disable the No-Execution page
protection technology.

Hyper Threading Technology

This item allows you to enable or disable Intel® Hyper Threading
technology.

Intel® SpeedStep® tech

When set to disabled, the CPU runs at its default speed, when set to
enabled, the CPU speed is controlled by the operating system.

Intel® C-STATE tech

This item allows the CPU to save more power under idle mode.

Enhanced C-States

CPU idle set to enhanced C-States, disabled by Intel® C-STATE tech item.

4.3.2 IDE Configuration

Figure 4-5 **IDE Configuration**

ATA/IDE Configuration

This item allows you to select Disabled / Compatible / Enhanced.

Legacy IDE Channels

When set to Enhanced mode you can select IDE or AHCI mode. When select Compatible mode you can select SATA only / SATA pri, PATA sec or PATA only.

Primary/Secondary/Third IDE Master/Slave

BIOS auto detects the presence of IDE device, and displays the status of auto detection of IDE device.

>**Type:** Select the type of SATA driver.

  [Not Installed][Auto][CD/DVD][ARMD]

>**LBA/Large Mode:** Enables or Disables the LBA mode.

>**Block (Multi-Sector Transfer):** Enables or disables data multi-sectors transfers.

>**PIO Mode:** Select the PIO mode.

>**DMA Mode:** Select the DMA mode.

>**S.M.A.R.T.:** Select the smart monitoring, analysis, and reporting technology.

>**32Bit Data Transfer :** Enables or disables 32-bit data transfer.

Hard Disk Write Protect

Disable/Enable device write protection. This will be effective only if the device is accessed through BIOS.

IDE Detect Time Out (Sec)

This item allows you to select the time out value for detecting ATA/ATAPI device(s).

4.3.3 Super I/O Configuration
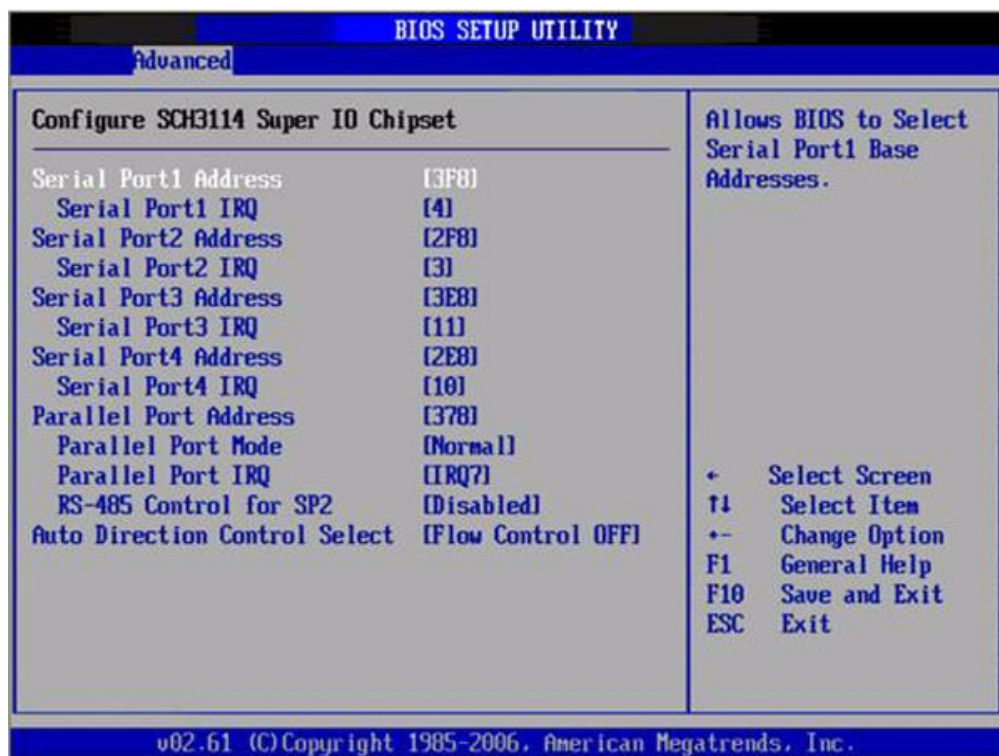
Figure 4-6 **Super I/O Configuration**

Serial Port1 / Port2 / Port3 / Port 4 address

This item allows you to select serial port1 ~ port4 of base addresses.

Serial Port1 / Port2 / Port3 / Port 4 IRQ

This item allows you to select serial port1 ~ port4 of IRQ.

RS-485 Control for SP2

This item allows you to select RS485 control.

Auto Direction Control Select

This item allows you to enable or disable auto flow control function.

4.3.4 Hardware Health Configuration
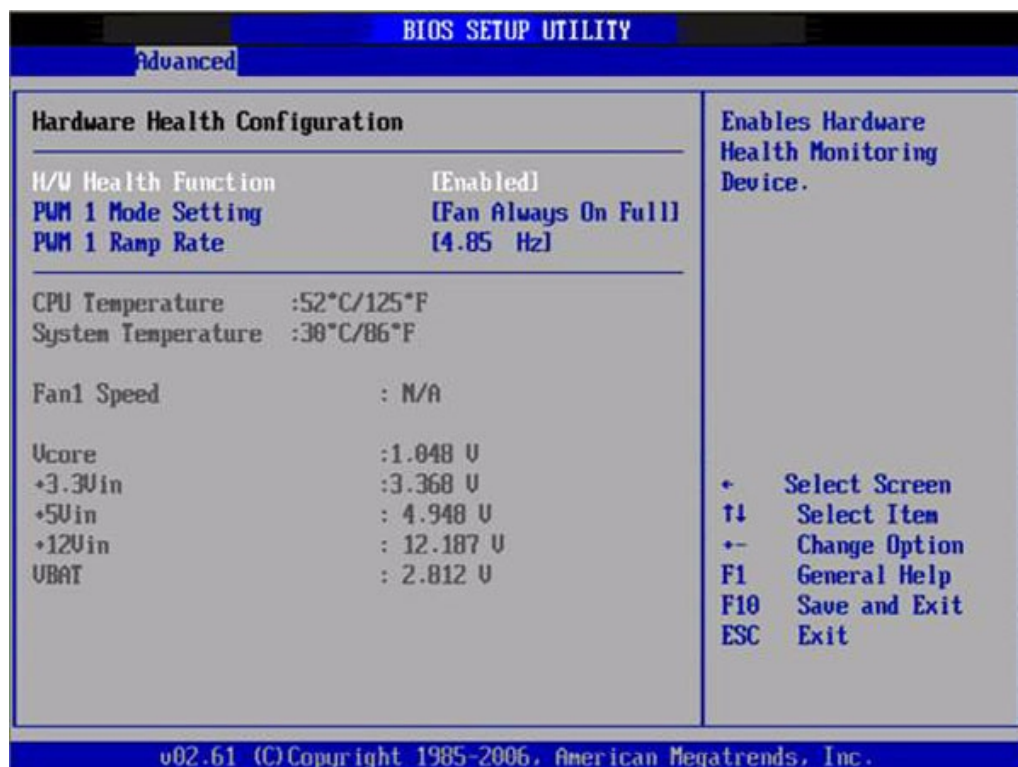
Figure 4-7 **Hardware health configuration**

H/W Health Function

This item allows you to control H/W monitoring.

Temperature & Voltage show

CPU/System Temperature

Vcore / +3.3Vin / +5Vin / +12Vin / VBAT

4.3.5 ACPI Settings

Figure 4-8 **ACPI Settings**

4.3.5.1 General ACPI Configuration
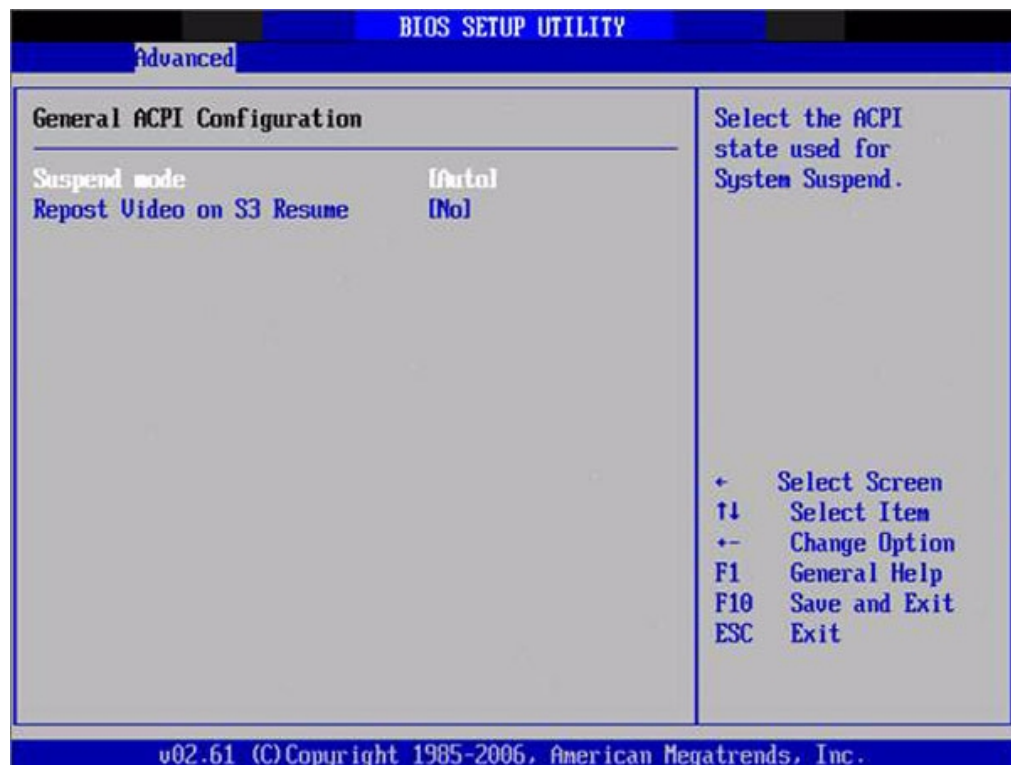
Figure 4-9 **General ACPI Configuration**

Suspend mode

Select the ACPI state used for system suspend.

Report Video on S3 Resume

This item allows you to invoke VA BIOS POST on S3/STR resume.

4.3.5.2 Advanced ACPI Configuration

Figure 4-10 **Advanced ACPI Configuration**

ACPI Version Features

This item allows you to enable RSDP pointers to 64-bit fixed system description tables.

ACPI APIC support

Include APIC table pointer to RSDT pointer list.

AMI OEMB table

Include OEMB table pointer to R(x)SDT pointer lists.

Headless mode

Enable / Disable Headless operation mode through ACPI.

4.3.5.3 Chipset ACPI Configuration

Figure 4-11 **Chipset ACPI Configuration**

Energy Lake Feature

Allows you to configure Intel's Energy Lake power management technology.

APIC ACPI SCI IRQ

Enable/Disable APIC ACPI SCI IRQ.

USB Device Wakeup From S3/S4

Enable/Disable USB Device Wakeup from S3/S4.

High Performance Event Timer

Enable/Disable High performance Event timer.

4.3.6 AHCI Configuration
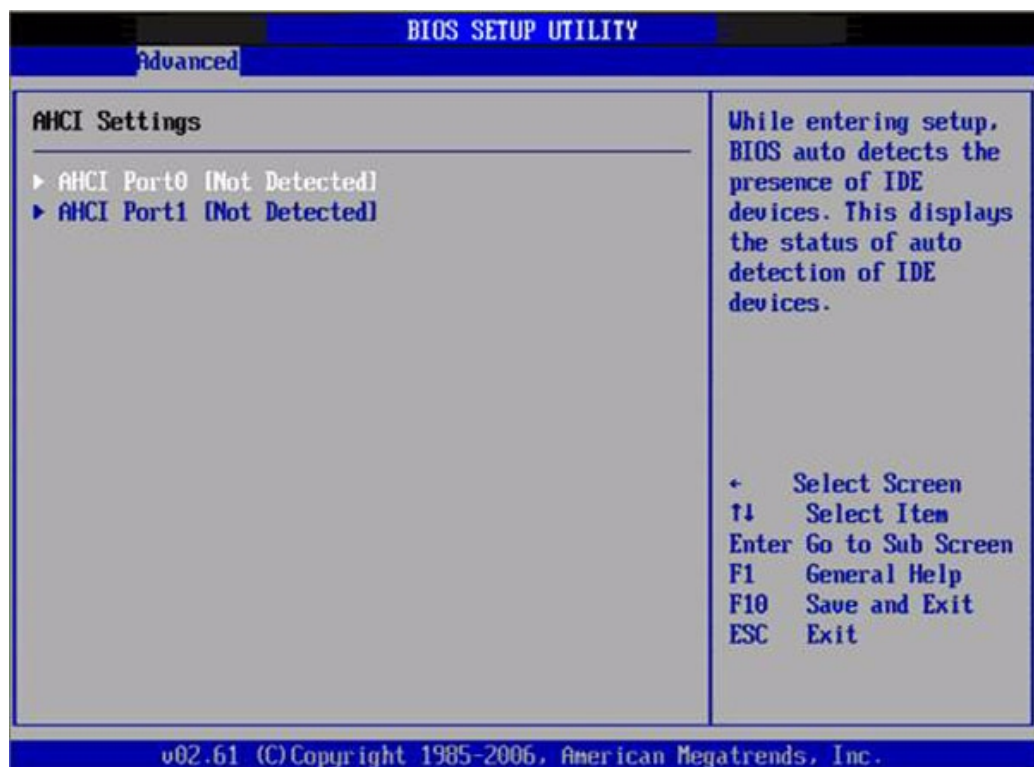
Figure 4-12 **AHCI Configuration**

AHCI Port0 / Port1

While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE device.

4.3.7 APM Configuration

Figure 4-13 **APM Configuration**

Power Management/APM

Enable or disable APM.

Power Button Mode

Power on, off, or enter suspend mode when the power button is pressed.
The following options are also available.

Restore on AC power Loss

Use this to set up the system response after a power failure. The "Off"
setting keeps the system powered off after power failure, the "On" setting
boots up the system after failure, and the "Last State" returns the system to
the status just before power failure.

Video Power Down Mode

Power down video in suspend or standby mode.

Hard Disk Power Down Mode

Power down Hard Disk in suspend or standby mode.

Standby Time Out

Go into standby in the specified time.

Suspend Time Out

Go into Suspend in the specified time.

Resume On Ring

Enable / Disable RI to generate a wake event.

Resume On PME#

Enable / Disable PME to generate a wake event.

Resume On RTC Alarm

Enable / Disable RTC to generate a wake event.

4.3.8 Event Log Configuration
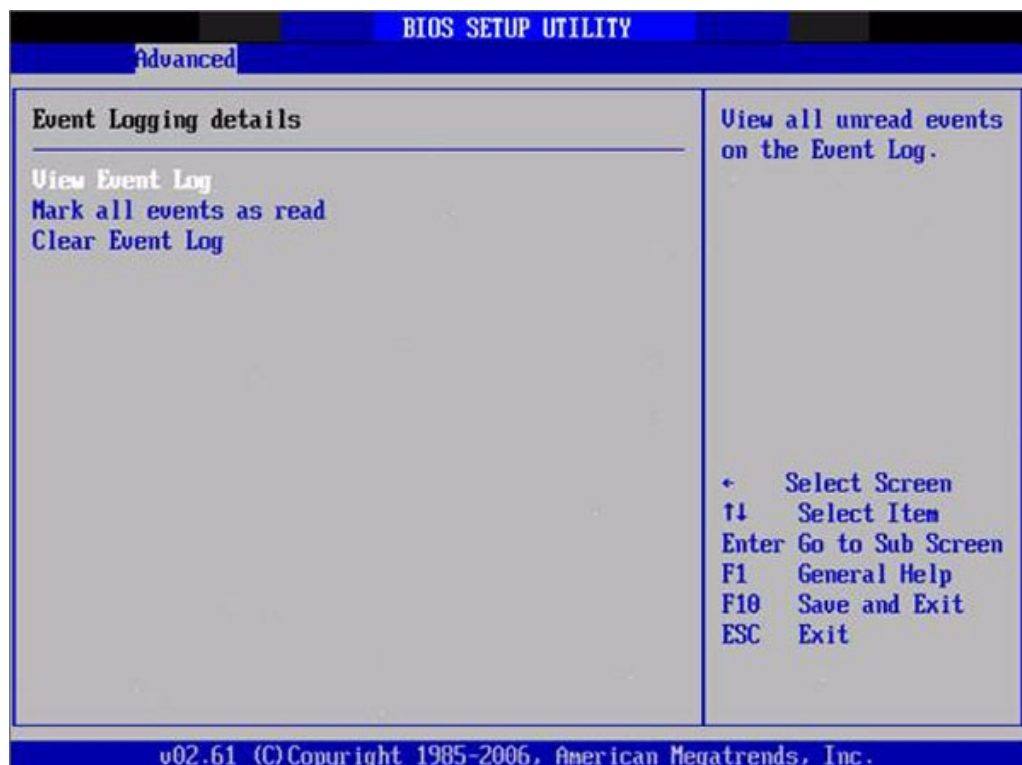
Figure 4-14 **Event Log Configuration**

View Event Log

View all unread events on the event Log.

Mark all events as read

Mark all unread events as read.

Clear Event Log

Discard all events in the event Log.

4.3.9 MPS Configuration

Figure 4-15 **MPS Configuration**

MPS Revision

This item allows you to select MPS reversion.

4.3.10 Smbios Configuration
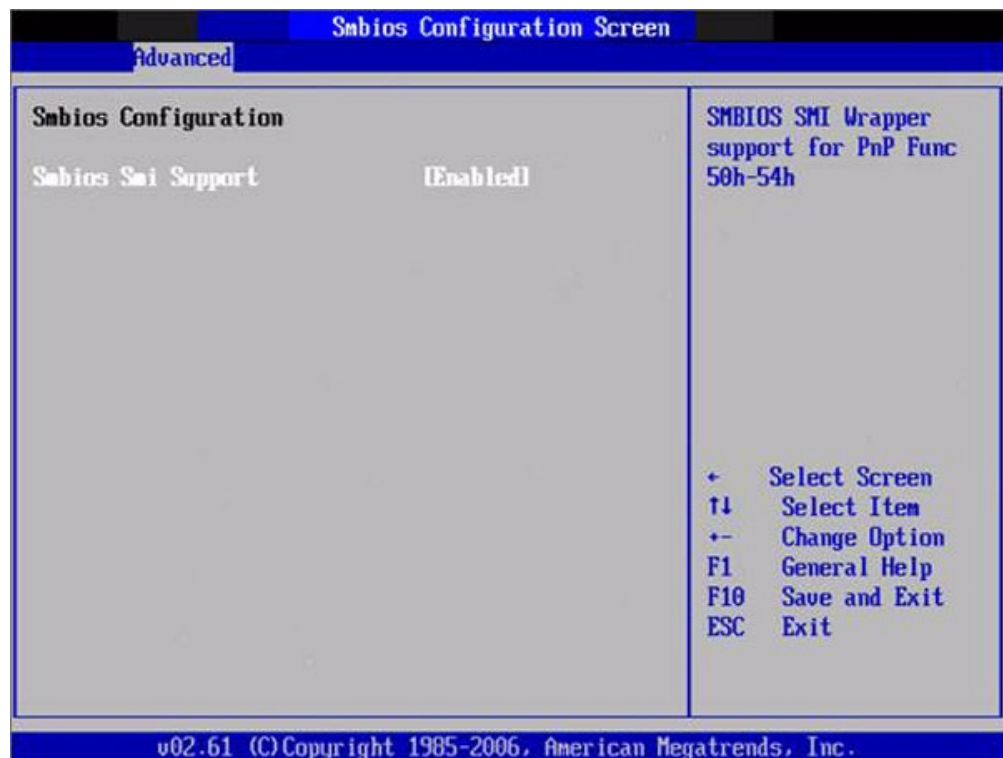
Figure 4-16 **Smbios Configuration**

Smbios Smi Support

SMBIOS SMI wrapper support for PnP function 50h-54h.

4.3.11 USB Configuration

Figure 4-17 **USB Configuration**

Legacy USB Support

Enables support for legacy USB. Auto option disables legacy support if no USB devices are connected.

USB 2.0 Controller Mode

This item allows you to select HiSpeed(480Mbps) or FullSpeed (12Mpbs).

BIOS EHCI Hand-Off

This is a workaround for OS without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

Hotplug USB FDD Support

A dummy FDD device is created that will be associated with the hotplugged FDD later. Auto option creates this dummy device only if there is no USB FDD present.

>>> USB Mass Storage Device Configuration

Figure 4-18 **USB Mass storage Device Configuration**

USB Mass Storage Reset Delay

Number of sends POST wait for the USB mass storage device after start unit command.

Emulation Type

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

4.4 Advanced PCI/PnP Settings

Select the PCI/PnP tab from the VMT12 Motherboard setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.
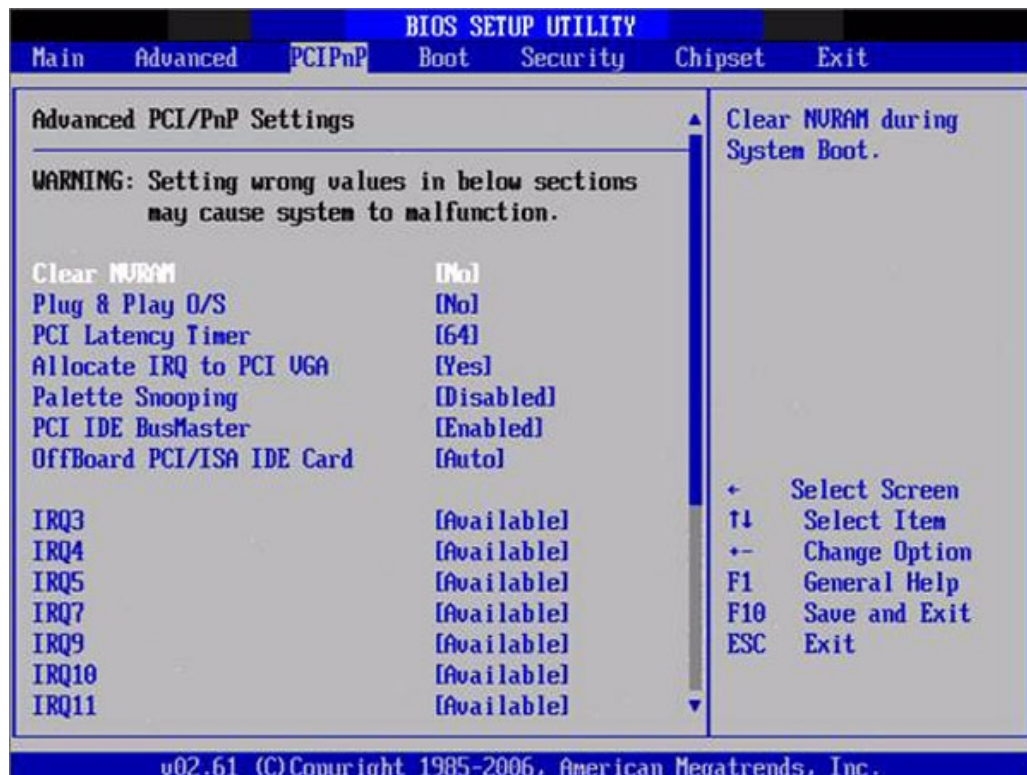
Figure 4-19 **PCI/PNP Setup (top)**

Clear NVRAM

Set this value to force the BIOS to clear the Non-Volatile Random Access Memory (NVRAM).The Optimal and Fail-Safe default setting is No.

Plug & Play O/S

When set to No, BIOS configures all the device in the system. When set to Yes and if you install a Plug and Play operating system, the operating system configures the Plug and Play device not required for boot.

PCI Latency Timer

Value in units of PCI clocks for PCI device latency timer register.

Allocate IRQ to PCI VGA

When set to Yes will assigns IRQ to PCI VGA card if card requests IRQ. When

set to No will not assign IRQ to PCI VGA card even if card requests an IRQ.

Palette Snooping

This item is designed to solve problems caused by some non-standard VGA card.

PCI IDE BusMaster

When set to enabled BIOS uses PCI busmastering for reading/writing to IDE drives.

OffBoard PCI/ISA IDE Card

Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card. When set to Auto will works for most PCI IDE cards.

IRQ3 / 4 / 5 / 7 / 9 / 10 /11

This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11.

DMA Channel 0 / 1 / 3 / 5 / 6 / 7

When set to Available will specify which DMA is available to be used by PCI/PnP devices. When set to Reserved will specify which DMA will be reserved for use by legacy ISA devices.

Reserved Memory Size

This item allows you to reserve the size of memory block for legacy ISA device.

4.5 Boot Settings
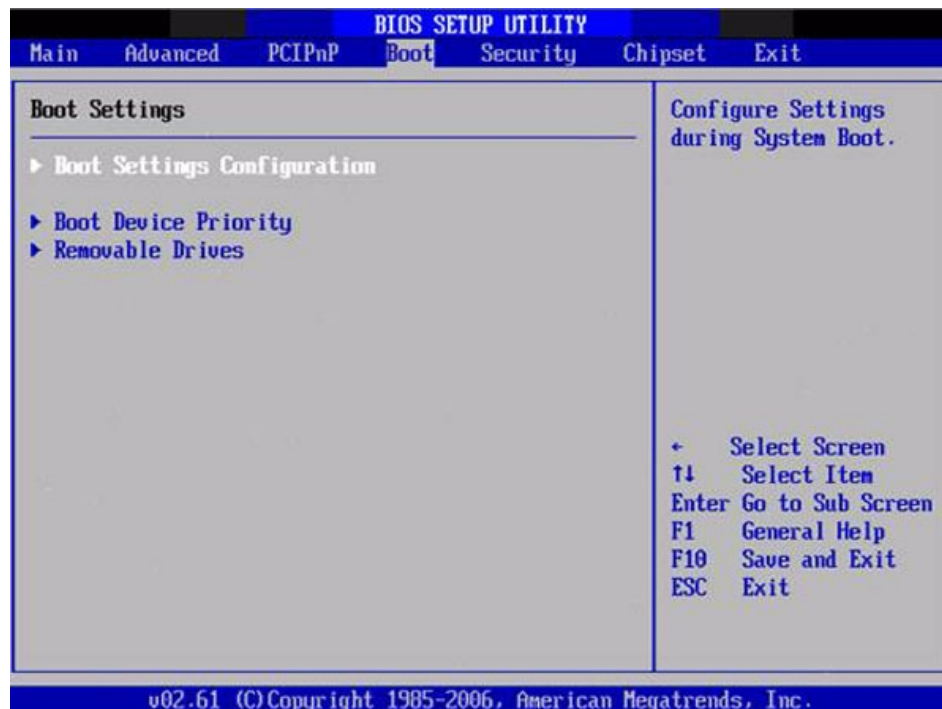
Figure 4-20 **Boot Setup Utility**

4.5.1 Boot settings Configuration

Figure 4-21 **Boot Setting Configuration**

Quick Boot

This item allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.

Quiet Boot

If this option is set to Disabled, the BIOS displays normal POST messages. If Enabled, an OEM Logo is shown instead of POST messages.

AddOn ROM Display Mode

Set display mode for option ROM.

Bootup Num-Lock

Select the Power-on state for Numlock.

PS/2 Mouse Support

Select support for PS/2 Mouse.

Wait For "F1' If Error

Wait for the F1 key to be pressed if an error occurs.

Hit "DEL' Message Display

Displays -Press DEL to run Setup in POST.

Interrupt 19 Capture

This item allows options for ROMs to trap interrupt 19.

Bootsafe function

This item allows you to enable or disable the bootsafe function.

4.6 Security Setup

Figure 4-22 **Password Configuration**

Select Security Setup from the VMT12 MOTHERBOARD Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

Change Supervisor / User Password

Boot Sector Virus protection: The boot sector virus protection will warn if any program tries to write to the boot sector.

4.7 Advanced Chipset Settings

Figure 4-23 **Advanced Chipset Settings**

4.7.1 North Bridge Chipset Configuration
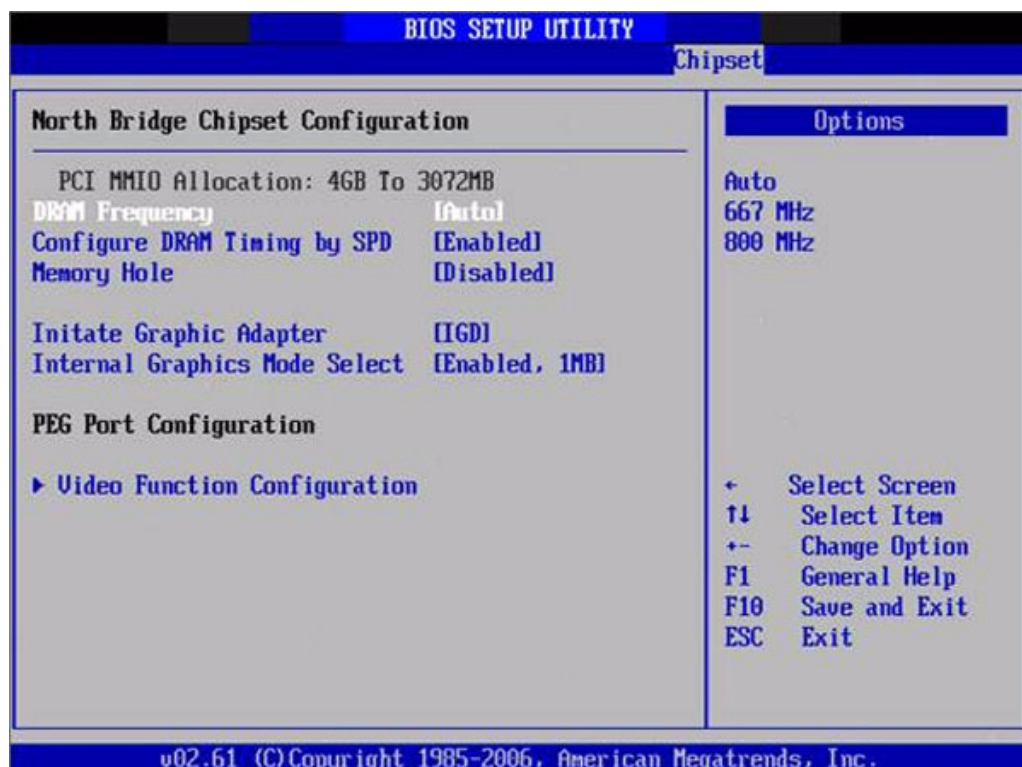
Figure 4-24 **North Bridge Configuration**

DRAM Frequency

This item allows you to manually change DRAM frequency.

Configure DRAM Timing by SPD

This item allows you to enables or disable detection by DRAM SPD.

Memory Hole

This item allows you to free 15MB-16MB of memory size for some ISA devices.

Initate Graphic Aadapter

This item allows you to select which graphics controller to use as the primary boot device.

Internal Graphics Mode Select

Select the amount of system memory used by the Internal graphics device.

Figure 4-25 **Video function configuration**

DVMT Mode Select

Displays the active system memory mode.

DVMT/FIXED Memory

Specify the amount of DVMT / FIXED system memory to allocate for video memory.

Boot Display Device

Select boot display device at post stage.

Flat Panel Type

This item allows you to select which panel resolution you want.

Spread Spectrum Clock

This item allows you to enable or disable the spread spectrum clock.

4.7.2 South Bridge Chipset Configuration

Figure 4-26 **South Bridge Configuration**

USB Functions

Disabled, 2 USB Ports, 4 USB Ports, 6 USB Ports or 8 USB Ports.

USB 2.0 Controller

Enables or disables the USB 2.0 controller.

Internal LAN controller

Enables or disables the internal LAN controller.

Internal LAN Bootroom

Enables or disables internal LAN boot.

GbE controller

Enables or disables the GbE controller.

GbE LAN Boot

Enables or disables GbE LAN boot.

GbE Wake Up From S5

Enables or disables GbE LAN wake up from S5 function.

HDA Controller

Enables or disables the HDA controller.

SMBUS Controller

Enables or disables the SMBUS controller.

SLP_S4# Min. Assertion Width

This item allows you to set a delay of sorts.

4.8 Exit Option

Figure 4-27 **Exit Option**

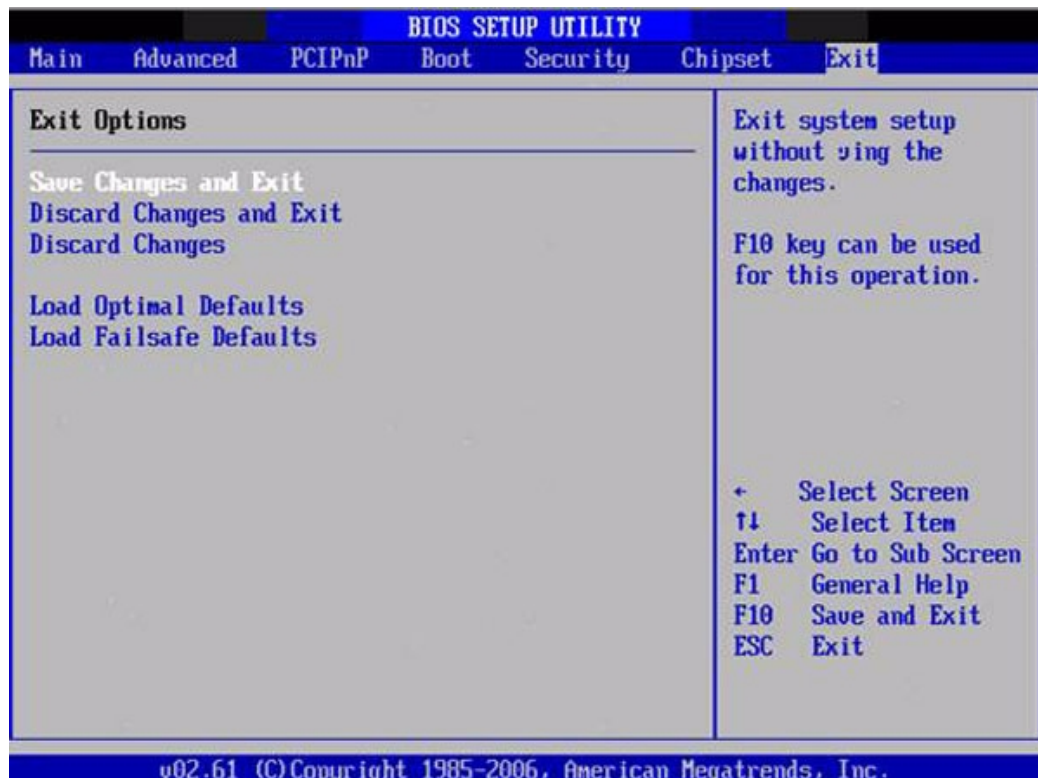### 4.8.1 Save Changes and Exit

When you have completed system configuration, select this option to save your changes, exit BIOS setup and reboot the computer so the new system configuration

parameters can take effect.

1. Select Exit Saving Changes from the Exit menu and press <Enter>. The following message appears: Save Configuration Changes and Exit Now? [Ok] [Cancel]
2. Select Ok or cancel.

4.8.2 Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

1. Select Exit Discarding Changes from the Exit menu and press <Enter>. The following message appears: Discard Changes and Exit Setup Now? [Ok] [Cancel]
2. Select Ok to discard changes and exit. Discard Changes
3. Select Discard Changes from the Exit menu and press <Enter>.

4.8.3 Load Optimal Defaults

The VMT12 Motherboard automatically configures all setup items to optimal settings when you select this option. Optimal defaults are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Defaults if your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

4.8.4 Load Fail-Safe Defaults

The VMT12 Motherboard automatically configures all setup options to fail-safe settings when you select this option. Fail-Safe Defaults are designed for maximum system stability, but not maximum performance. Select Fail-Safe Defaults if your computer is experiencing system configuration problems.

1. Select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The following message appears: Load Fail-Safe Defaults? [OK] [Cancel]
2. Select OK to load Fail-Safe defaults.

Chapter 5.S/W introduction & installation

5.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology." We enable Windows embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows embedded software solutions easily and widely available to the embedded computing community.

5.2 Driver Installation

To install the drivers please just insert the CD into CD-Rom, select the drivers that you want to install, then run .exe (set up) file under each chipset folder and follow Driver Setup instructions to complete the installation.

5.2.1 Windows XP Professional

To install the drivers for Windows XP Professional, insert the CD into the CD-Rom, it will auto-detect the hardware platform and then pop up with the "Embedded Computing Install Wizard box"; just select the drivers that you want to install then click Install All Selected drivers. Follow the Driver Setup Wizard instructions; click "Next" to complete the installation.

5.2.2 Other OS

To install the drivers for another Windows OS or Linux, please browse the CD to run the setup file under each chipset folder on the CD-ROM.

5.3 Value-Added Software Services

Software API: An interface that defines the ways by which an application program may request services from libraries and/or operating systems. Provides not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms. It plays the role of catalyst between developer and solution, and makes Advantech embedded platforms easier and simpler to adopt and operate with customer applications.

5.3.1 SUSI Introduction

To make hardware easier and convenient to access for programmers, Advantech has released a suite of API (Application Programming Interface) in the form of a program library. The program Library is called Secured and Unified Smart Interface or SUSI for short.

In modern operating systems, user space applications cannot access hardware directly. Drivers are required to access hardware. User space applications access hardware through drivers. Different operating systems usually define different interface for drivers. This means that user space applications call different functions for hardware access in different operating systems. To provide a uniform interface for accessing hardware, an abstraction layer is built on top of the drivers and SUSI is such an abstraction layer. SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different Advantech hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of API is defined for different Advantech hardware platforms. Also, the same set of API is implemented in different Operating Systems including Windows XP and Windows CE. This user's manual describes some sample programs and the API in SUSI. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog, I2C, SMBus, GPIO, and VGA control. Each category of API in SUSI is briefly described below.

5.3.2 Software APIs

5.3.2.1 The GPIO API

General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. It allows users to monitor the level of signal input or set the output status to switch on/off a device. Our API also provides Programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

5.3.2.2 The I2C API

I2C is a bi-directional two-wire bus that was developed by Phillips for use in their televisions in the 1980s and nowadays is used in various types of embedded systems. The strict timing requirements defined in the I2C protocol has been taken care of by SUSI. Instead of asking application programmers to figure out the strict timing requirements in the I2C protocol, the I2C API in SUSI can be used to control I2C devices by invoking other function calls. SUSI provides a consistent programming interface for different Advantech boards. That means user programs using SUSI are portable among different Advantech boards as long as the boards and SUSI provide the required functionalities. Overall product development times can be greatly reduced using SUSI.

5.3.2.3 The SMBus API

The System Management Bus (SMBus) is a two-wire interface defined by Intel® Corporation in 1995. It is based on the same principles of operation of I2C and is used in personal computers and servers for low-speed system management communications. Nowadays, it can be seen in many types of embedded systems. As with other API in SUSI, the SMBus API is available on many platforms including Windows XP and Windows CE.

5.3.2.4 The Display Control API

There are two kinds of VGA control APIs, backlight on/off control and brightness control. Backlight on/off control allows a developer to turn on or off the backlight, and to control brightness smoothly.

1. Brightness Control
   – The Brightness Control API allows a developer to interface with an embedded device to easily control brightness.
2. Backlight Control
   – The Backlight API allows a developer to control the backlight

(screen) on/off in an embedded device.

5.3.2.5 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

5.3.2.6 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as fan speed, temperature and voltage etc.
However, due to the inaccuracy among many commercially available hardware monitoring chips, Advantech has developed a unique scheme for hardware monitoring - achieved by using a dedicated micro-processor with algorithms specifically designed for providing accurate, real-time and reliable data content; helping protect your system in a more reliable manner.

5.3.2.7 The Power Saving API

1. CPU Speed
   – Make use of Intel SpeedStep technology to reduce power consumption. The system will automatically adjust the CPU Speed depending on system loading.
2. System Throttling
   – Refers to a series of methods for reducing power consumption in computers by lowering the clock frequency. APIs allow the user to lower the clock from 87.5% to 12.5%.

5.3.3 SUSI Utilities

5.3.3.1 BIOS Flash

The BIOS Flash utility allows customers to update the flash ROM BIOS version, or use it to back up current BIOS by copying it from the flash chip to a file on customers'disk. The BIOS Flash utility also provides a command line version and API for fast implementation into customized applications.

5.3.3.2 Embedded Security ID

The embedded application is the most important property of a system integrator. It contains valuable intellectual property, design knowledge and innovation, but it is easily copied! The Embedded Security ID utility provides reliable security functions for customers to secure their application data within embedded BIOS.

5.3.3.3 Monitoring utility

The Monitoring utility allows the customer to monitor system health, including voltage, CPU and system temperature and fan speed. These items are important to a device; if critical errors happen and are not solved immediately, permanent damage may be caused.

5.3.3.4 eSOS

The eSOS is a small OS stored in BIOS ROM. It will boot up in case of a main OS crash. It will diagnose the hardware status, and then send an e-mail to a designated administrator. The eSOS also provides remote connection: Telnet server and FTP server, allowing the administrator to rescue the system.

5.3.3.5 Flash Lock

Flash Lock is a mechanism that binds the board and CF card (SQFlash) together. The user can "Lock" SQFlash via the Flash Lock function and "Unlock" it via BIOS while booting. A locked SQFlash cannot be read by any card reader or boot from other platforms without a BIOS with the "Unlock" feature.

5.3.4 SUSI Installation

SUSI supports many different operating systems. Each subsection below

describes how to install SUSI and related software on a specific operating system. Please refer to the subsection matching your operating system.

5.3.4.1 Windows XP

In windows XP, you can install the library, drivers and demo programs onto the platform easily using the installation tool--The SUSI Library Installer. After the installer has executed, the SUSI Library and related files for Windows XP can be found in the target installation directory. The files are listed in the following table.

Directory	Contents
\Library	■ Susi.lib Library for developing the applications on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo	■ SusiDemo.EXE Demo program on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo\SRC	Source code of the demo program on Windows XP.

The following section illustrates the installation process.

> *Note!* *The version of the SUSI Library Installer shown on each screen shot below depends on your own particular version.*

1. Extract Susi.zip.
2. Double-click the "Setup.exe" file.
   The installer searches for a previous installation of the SUSI Library. If it locates one, a screen shot opens asking whether you want to modify, repair or remove the software. If a previous version is located, please see the section of [Maintenance Setup]. If it is not located, the following screen shot opens. Click Next.

5.3.4.2 Windows CE

In windows CE, there are three ways to install the SUSI Library, you can install it manually or use Advantech CE-Builder to install the library or

just copy the programs and the library onto a compact flash card.

Express Installation:

You can use Advantech CE-Builder to load the library into the image.

- First, you click the My Component tab.
- In this tab, you click Add New Category button to add a new category, eg. The SUSI Library
- Then you can add a new file in this category, and upload the SUSI.dll for this category. After these steps, you can select the SUSI Library category you created for every project.

Manual Installation:

You can add the SUSI Library into the image by editing any bib file.

First you open project.bib in the platform builder.

- Add this line to the MODULES section of project.bib
  Susi.dll $(_FLATRELEASEDIR)\Susi.dll NK SH
- If you want to run the window-based demo, add following line:
  SusiTest.exe $(_FLATRELEASEDIR)\SusiTest.exe
- If you want to run the console-based demo, add following lines:
  Watchdog.exe $(_FLATRELEASEDIR)\Watchdog.exe NK S
  GPIO.exe $(_FLATRELEASEDIR)\GPIO.exe NK S
  SMBUS.exe $(_FLATRELEASEDIR)\SMBUS.exe NK S
- Place the three files into any files directory.
- Build your new Windows CE operating system.

5.3.5 SUSI Sample Programs

Sample Programs

The sample programs demonstrate how to incorporate SUSI into your program. There are sample programs for two categories of operating system, i.e. Windows XP and Windows CE. The sample programs run in graphics mode in Windows XP and Windows CE. The sample programs are described in the subsections below.

Windows Graphics Mode

There are sample programs of Windows in graphics mode for two categories of operating system, i.e. Windows CE and Windows XP. Each demo application contains an executable file SusiDemo.exe, a shared library Susi.dll and source code within the release package. The files of

Windows CE and Windows XP are not compatible with each other. SusiDemo.exe is an executable file and it requires the shared library, Susi.dll, to demonstrate the SUSI functions. The source code of SusiDemo.exe also has two versions, i.e. Windows CE and Windows XP, and must be compiled under Microsoft Visual C++ 6.0 on Windows XP or under Microsoft Embedded Visual C++ 4.0 on Windows CE. Developers must add the header file Susi.h and library Susi.lib to their own projects when they want to develop something with SUSI.

SusiDemo.exe

The SusiDemo.exe test application is an application which uses all functions of the SUSI Library. It has five major function blocks: Watchdog, GPIO, SMBus, I2C and VGA control. The following screen shot appears when you execute SusiDemo.exe. You can click function tabs to select test functions respectively. Some function tabs will not show on the test application if your platform does not support such functions. For a complete support list, please refer to Appendix A. We describe the steps to test all functions of this application.

GPIO

When the application is executed, it will display GPIO information in the
GPIO INFORMATION group box. It displays the number of input pins and
output pins. You can click the radio button to choose to test either the
single pin function or multiple pin functions. The GPIO pin assignments of
the supported platforms are located in Appendix B.

■ Test Read Single Input Pin
   – Click the radio button- Single-Pin.
   – Key in the pin number to read the value of the input pin. The Pin
     number starts from '0'.
   – Click the READ GPIO DATA button and the status of the GPIO pin
     will be displayed in (R/W) Result field.

■ Test Read Multiple Input Pin
   – Click the radio button- Multiple-Pins.
   – Key in the pin number from '0x01' to '0x0F' to read the value of the
     input pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for
     GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to read
     pin 0, 1, and 3, the pin numbers should be '0x0B'.
   – Click READ GPIO DATA button and the statuses of the GPIO pins will
     be displayed in (R/W) Result field.

■ Test Write Single Output Pin
   – Click the radio button- Single-Pin.
   – Key in the pin numbers you want to write. Pin numbers start from
     '0'.

– Key in the value either '0' or '1' in (R/W) Result field to write the output pin you chose above step.

– Click the WRITE GPIO DATA button to write the GPIO output pin.

■ Test Write Multiple Output Pins

– Click the radio button- Multiple-Pins.

– Key in the pin number from '0x01' to '0x0F' to choose the multiple pin numbers to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to write pin 0, 1, and 3, the pin numbers should be '0x0B'.

– Key in the value in (R/W) Result field from '0x01' to '0x0F' to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to set pin 0 and 1 high, 3 to low, the pin number should be '0x0B/, and then you should key in the value '0x0A' to write.

– Click the WRITE GPIO DATA button to write the GPIO output pins.

I2C

When the application is executed, you can read or write a byte of data through I2C devices. All data must be read or written in hexadecimal system.

■ Read a byte

– Key in the slave device address in Slave address field.

– Key in the register offset in Register Offset field.

– Click the READ A BYTE button and then a byte of data from the device will be shown on the Result field.

■ Write a byte

– Key in the slave device address in Slave address field.

– Key in the register offset in Register Offset field.
– Key in the desirous of data in Result field to write to the device.
– Click the WRITE A BYTE button and then the data will be written to the device through I2C.

SMBus

When the application has executed, you can click the radio button to choose to test each access mode, i.e. Access a byte, Access multiple bytes and Access a word. All data must be read or written in hexadecimal except the numbers for radio button: Access multiple bytes mode must be written in decimal. You can test the functionalities of the watchdog as follows:

■ Read a byte
  – Click the radio button- Access a byte.
  – Key in the slave device address in the Slave address field.
  – Key in the register offset in the Register Offset field.
  – Click the READ SMBus DATA button and a byte of data from the device will be shown on the Result field.

■ Write a byte
  – Click the radio button- Access a byte.
  – Key in the slave device address in Slave address field.
  – Key in the register offset in Register Offset field.
  – Key the desired data in the Result field to write to the device.

– Click the WRITE SMBus DATA button and then the data will be written to the device through SMBus.

- **■ Read a word**
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the READ SMBus DATA button and then a word of data from the device will be shown on the Result field.

- **■ Write a word**
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired data, such as 0x1234, in the Result field to write to the device.
  - Click the WRITE SMBus DATA button and the data will be written to the device through the SMBus.

- **■ Read Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of radio button- Access multiple bytes. The number must be written in decimal.
  - Click the READ SMBus DATA button and then all data from the device will be divided from each other by commas and be shown in the Result field.

- **■ Write Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of the radio button- Access multiple bytes. The number must be written in decimal.
  - Key in all the desired data in the Result field in hexadecimal format,

divided by commas, for example, 0x50,0x60,0x7A.
- Click the WRITE SMBus DATA button and all of the data will be written to the device through the SMBus.

Display Control
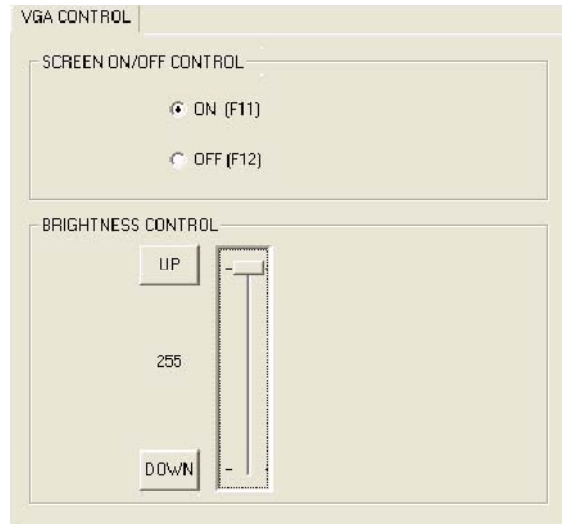
When the application is executed, it will display two blocks of VGA control functions. The application can turn on or turn off the screen shot freely, and it also can tune the brightness of the panels if your platform is being supported. You can test the functionalities of VGA control as follows:

■ Screen on/off control
- Click the radio button ON or push the key F11 to turn on the panel screen.
- Click the radio button OFF or push the key F12 to turn off the panel screen.
- The display chip of your platform must be in the support list in Appendix A, or this function cannot work.

■ Brightness control
- Move the slider in increments, using either the mouse or the direction keys, or click the UP button to increase the brightness.
- Move the slider in decrements, using either the mouse or the direction keys, or click the DOWN button to decrease the brightness.

Watchdog

When the application is executed, it will display watchdog information in the WATCHDOG INFORMATION group box. It displays max timeout, min timeout, and timeout steps in milliseconds. For example, a 1~255 seconds watchdog will has 255000 max timeout, 1000 min timeout, and 1000 timeout steps. You can test the functionality of the watchdog as follows:

■ Set the timeout value 3000 (3 sec.) in the SET TIMEOUT field and set the delay value 2000 (2 sec.) in the SET DELAY field, then click the START button. The Timeout Countdown field will countdown the watchdog timer and display 5000 (5 sec.).

■ Before the timer counts down to zero, you can reset the timer by clicking the REFRESH button. After you click this button, the Timeout Countdown field will display the value of the SET TIMEOUT field.

■ If you want to stop the watchdog timer, you just click the STOP button.

Hardware Monitor

When the Monitor application is executed by clicking the button, hardware monitoring data values will be displayed. If certain data values are not supported by the platform, the correspondent data field will be grayed-out with a value of 0. For More detail PCM-9362 software API user manual, please contact your dealer or Advantech AE. We also include these manuals in this CD.