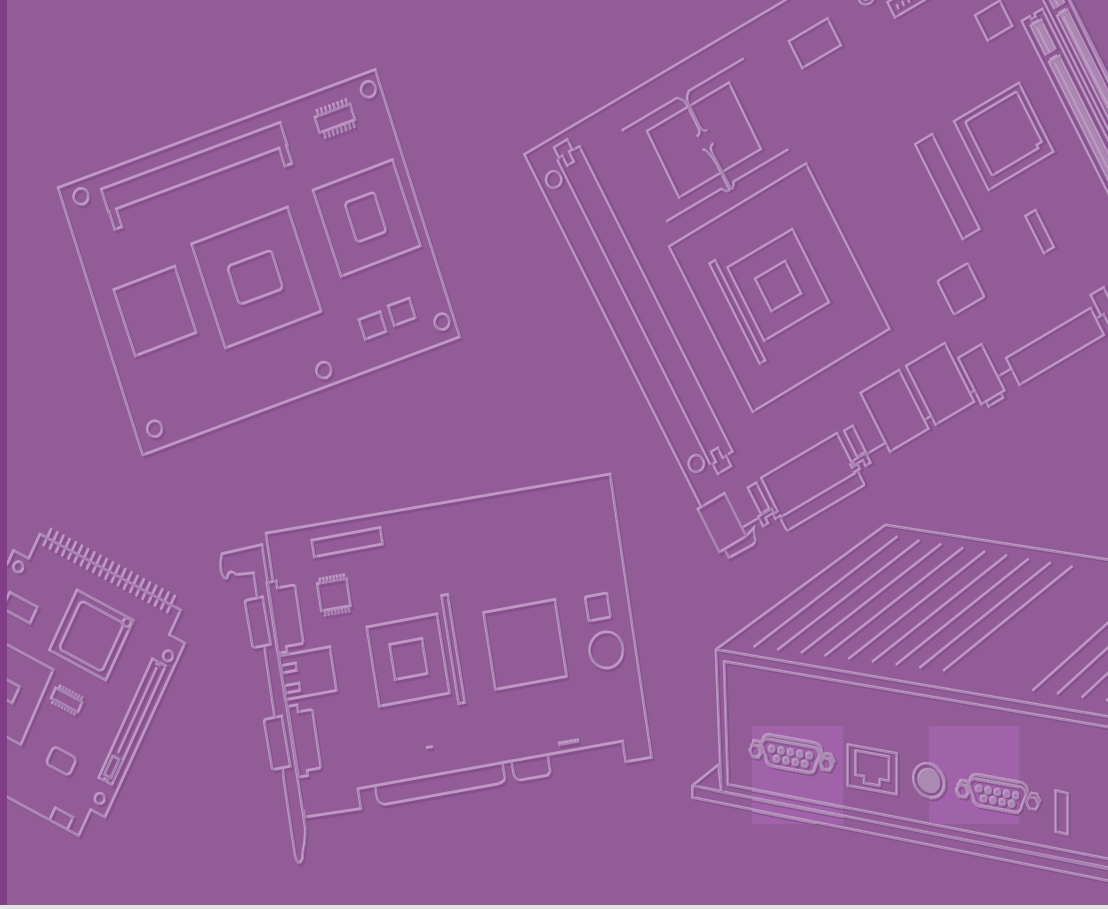


User Manual

SOM-4487

Trusted ePlatform Services

ADVANTECH

Copyright

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

Microsoft Windows and MS-DOS are registered trademarks of Microsoft Corp.

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

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. 2006448700 Edition 1

Printed in Taiwan May 2009

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FM

This equipment has passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. This equipment is compliant with the specifications of Class I, Division 2, Groups A, B, C and D indoor hazards.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- SOM-4487 module x 1
- Heatspreader x 1
- Driver CD x 1

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheishinweise

1. Bitte lesen sie Sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie Keine Flüssig-oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die NetzanschluBsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor überhitzung schützt. Sorgen Sie dafür, daB diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim. AnschluB an das Stromnetz die AnschluBwerte.
9. Verlegen Sie die NetzanschluBleitung so, daB niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
15. Netzkabel oder Netzstecker sind beschädigt.
16. Flüssigkeit ist in das Gerät eingedrungen.
17. Das Gerät war Feuchtigkeit ausgesetzt.
18. Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
19. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
20. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
21. VOSICHT: Explisionsgefahr bei unsachgemaben Austausch der Batterie.Ersatz nur durch densellben order einem vom Hersteller empfohlene-mahnlichen Typ. Entsorgung gebrauchter Batterien navh Angaben des Herstellers.
22. ACHTUNG: Es besteht die Explosionsgefahr, falls die Batterie auf nicht fachmännische Weise gewechselt wird. Verfangen Sie die Batterie nur gleicher oder entsprechender Type, wie vom Hersteller empfohlen. Entsorgen Sie Batterien nach Anweisung des Herstellers.

Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70dB(A) oder weiger.

Haftungsausschluss: Die Bedienungsanleitungen wurden entsprechend der IEC-704-1 erstellt. Advantech lehnt jegliche Verantwortung für die Richtigkeit der in diesem Zusammenhang getätigten Aussagen ab.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1

General Information

This chapter gives background information on the SOM-4487 CPU System on Module.
Sections include:

- Introduction
- Specification

1.1 Introduction

SOM-4487 is an embedded CPU module that fully complies with the SOM-ETX form factor standard. The new CPU module supports Intel 915GME/910GMLE +ICH6M chipsets which supports PCI and ISA interfaces. In a basic form factor of 95mm x 114mm, the SOM-4487 provides a scalable cost effective and easy to integrate solution for customersí applications by utilizing a plug-in CPU module on an application-specific customer solution board. The SOM-4487 with advanced I/O capacity incorporates such as PCI,ISA, IDE, USB 2.0, LVDS interfaces. SOM-4487 offers design partners more choices for their own applications needing cost effective solution while maintaining a compact form factor.

SOM-4487 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size (95 mm x 114 mm) and use of four high capacity connectors based on the proven SOM-ETX form factor, allow the SOM-ETX modules to be easily and securely mounted onto a customized solution board or our standard SOM-DB4400 development board.

1.2 Specifications

1.2.1 Standard System On Module functions

- **CPU:** Intel Pentium M/Celeron M Processor
- **BIOS:** AWARD 4 Mbit Flash BIOS
- **Chipset:** Intel 915GME (910GMLE) GMCH/ICH6M
- **System memory:** DDR2 400/533 MHz up to 2GB
- **Enhanced IDE interface:** 1 EIDE channel for two devices. BIOS auto-detect up to UDMA -100
- **Watchdog timer:** 255 timer intervals, from 1 to 255 sec or min setup by software, jumperless selection, generates system reset
- **USB interface:** Support 4 USB 2.0 ports
- **Expansion Interface:** Supports PCI,ISA interface

1.2.2 VGA/flat panel Interface

- **Chipset:** Intel 915GME(910GMLE)
- **Memory Size:** DVMT 3.0 support up to 128 MB
- **Display mode:**
  - CRT Mode: Support up to 2048 x 1536
  - LVDS Mode: Support up to 1600 x 1200, for 915GME, 1400 x 1050 for 910GMLE

1.2.3 Audio function

- **Audio interface:** Realtek ALC203 AC97codec codec

1.2.4 Mechanical and environmental

- **Dimensions:** SOM-Express form-factor, 114 mm x 95 mm (4.92" x 3.74")
- Power supply voltage: +5 V power only (+5VSB is need for ACPI and ATX power)
- Power requirement:

  Typical: +5V @ 3.66 A (P-M2.0G w/1GB DDR2 memory)
- **Operating temperature: 0 ~ 60× C (32 ~ 140× F)**

- **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
- **Weight:** 0.103 Kg (weight of total package)

Chapter 2

Mechanical Information

This chapter gives mechanical and connector information on the SOM-4487 CPU System on Module Sections include:

- Connector Information
- Mechanical Drawing

2.1 Board Connector

There are two connectors at the rear side of SOM-4487 for connecting to carrier board.

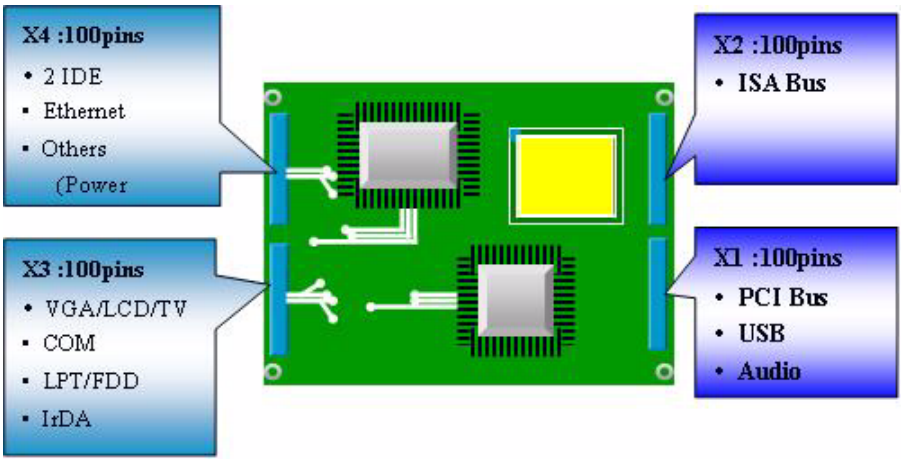


Figure 2.1 SOM-4487 Locating Connectors

- Pin Assignments for X1/2/3/4 connectors
  Please refer to SOM-ETX Design and Specification Guide.

2.2 Board Mechanical Drawing

2.2.1 Front Side

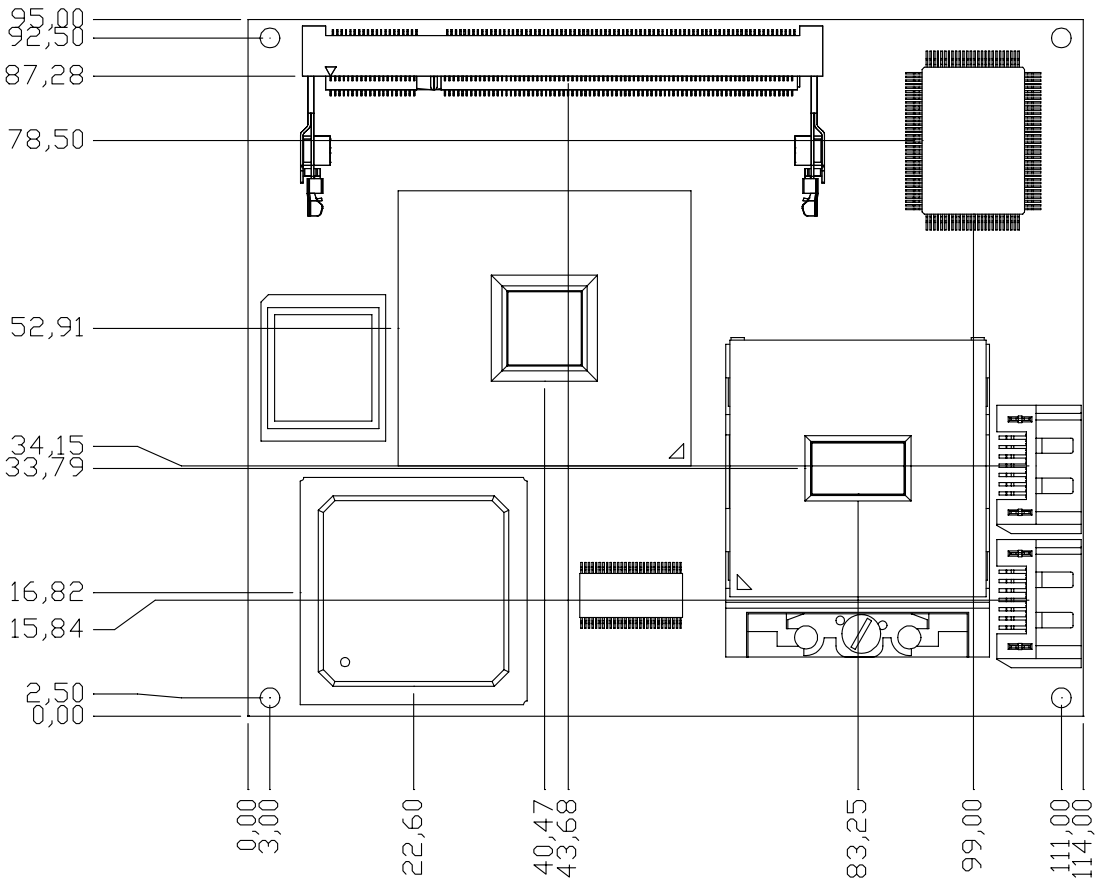


Figure 2.2 SOM-4487 Front Side Drawing

2.2.2 Rear Side

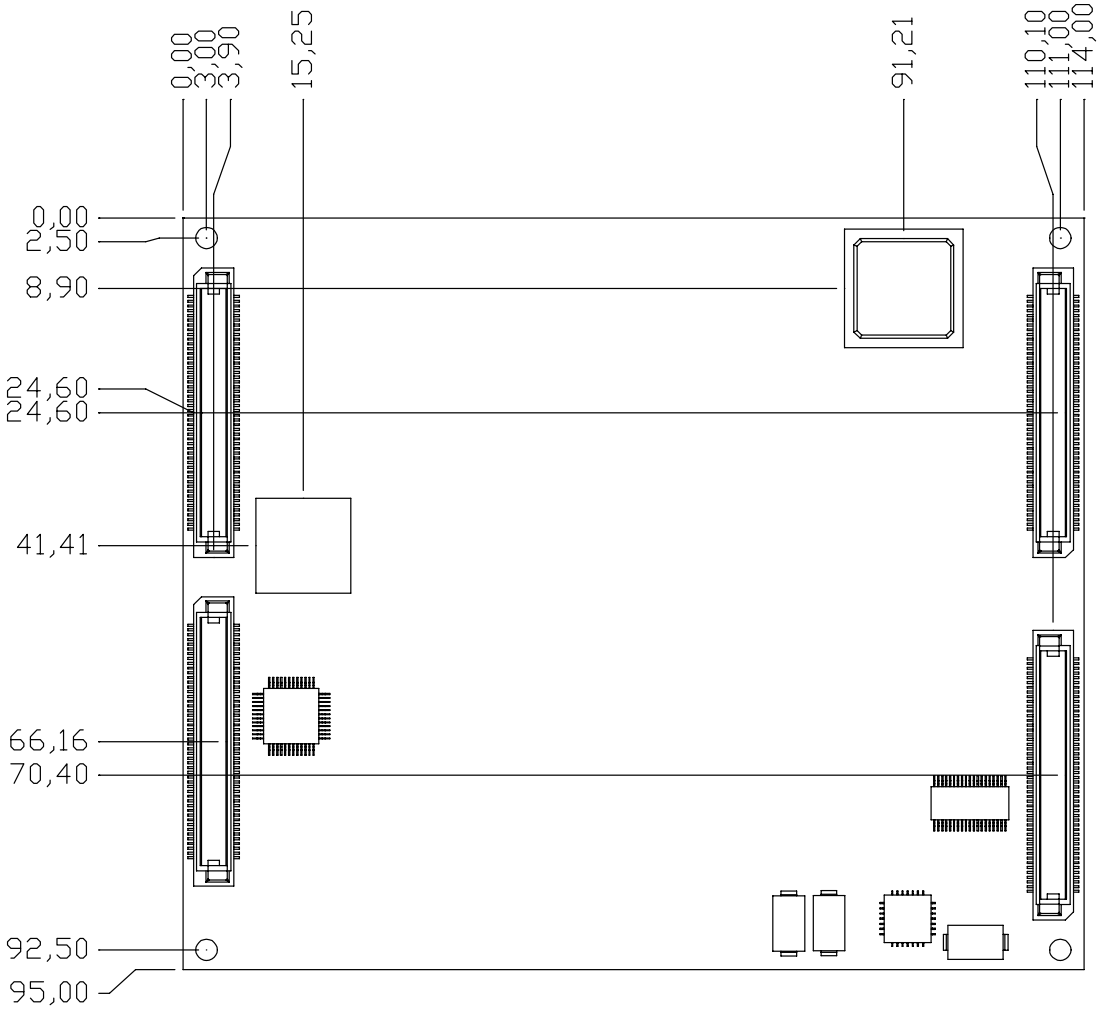


Figure 2.3 SOM-4487 Rear Side Drawing

Chapter 3

BIOS Operation

3.1 BIOS Introduction

AwardBIOS 6.0 is a full-featured BIOS provided by Advantech to deliver superior performance, compatibility, and functionality to industrial PCs and embedded boards. Its many options and extensions let you customize your products to a wide range of designs and target markets.

The modular, adaptable AwardBIOS 6.0 supports the broadest range of third-party peripherals and all popular chipsets, plus Intel, AMD, nVidia, VIA, and compatible CPUs from 386 through Pentium, AMD Geode, K7 and K8 (including multiple processor platforms), and VIA Eden C3 and C7 CPUs.

You can use Advantechís utilities to select and install features that suit your needs and your customersí needs.

3.2 BIOS Setup

The PCM-4487 system has AwardBIOS 6.0 built-in, which includes a CMOS SETUP utility that allows users to configure settings as required or to activate certain system features.

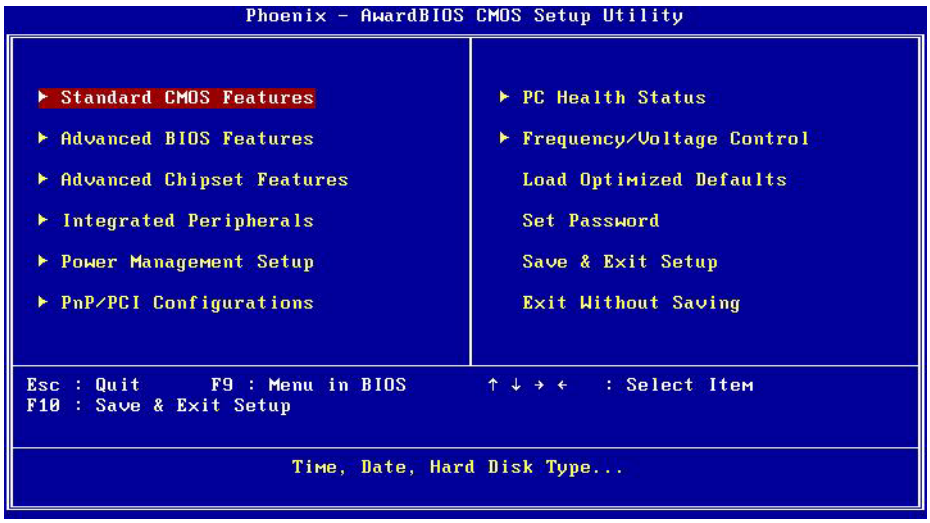
The CMOS SETUP saves configuration settings in the CMOS RAM of the motherboard. When the system power is turned off, the onboard battery supplies the necessary power to the CMOS RAM so that settings are retained.

To access the CMOS SETUP screen, press the <Del> button during the power-on BIOS POST (Power-On Self Test).

CMOS SETUP Navigation and Control Keys	
< ↑ >< ↓ >< ← >< → >	Move to highlight item
<Enter>	Select Item
<Esc>	Main Menu - Start Quit sequence
	Sub Menu - Exit the current page and return to level above
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item Help
<F5>	Load Previous Values
<F7>	Load Optimized Default
<F10>	Save all CMOS changes

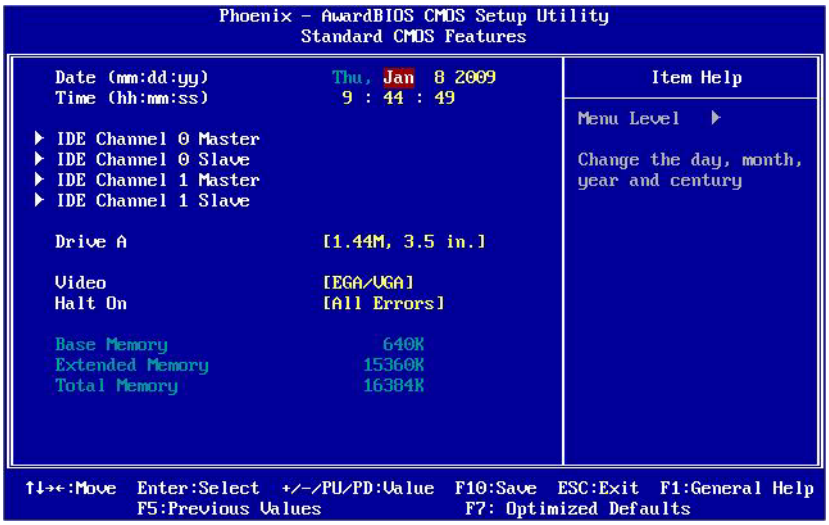
3.2.1 Main Menu

Press the <Del> key during startup to enter the BIOS CMOS Setup Utility; the Main Menu will appear on the screen. Use arrow keys to highlight the desired item, and press <Enter> to accept, or enter the sub-menu.



- **Standard CMOS Features**
  This setup page includes all the features for standard CMOS configuration.
- **Advanced BIOS Features**
  This setup page includes all the features for advanced BIOS configuration.
- **Advanced Chipset Features**
  This setup page includes all the features for advanced chipset configuration.
- **Integrated Peripherals**
  This setup page includes all onboard peripheral devices.
- **Power Management Setup**
  This setup page includes all the power management items.
- **PnP/PCI Configurations**
  This setup page includes PnP OS and PCI device configuration.
- **PC Health Status**
  This setup page includes the system auto-detect CPU and system temperature, voltage.
- **Frequency/Voltage Control**
  This setup page includes CPU host clock control, frequency ratio and voltage.
- **Load Optimized Defaults**
  This selection loads optimized values for best system performance configuration.
- **Set Password**
  Establish, change or disable passwords.
- **Save & Exit Setup**
  Save CMOS value settings to CMOS and exit BIOS setup.
- **Exit Without Saving**
  Abandon all CMOS value changes and exit BIOS setup.

3.2.2 Standard CMOS Features



- **Date**

  The date format is <week>, <month>, <day>, <year>.

Week	From Sun to Sat, determined and display by BIOS only
Month	From Jan to Dec.
Day	From 1 to 31
Year	From 1999 through 2098

- **Time**

  The times format is <hours> : <minutes> : <seconds>, base on the 24-hour time

- **IDE Channel 0/1, Master/Slave**

  IDE HDD Auto-Detection Press "Enter" for automatic device detection.

- **Drive A**

The Item identifies the types of floppy disk drive A or drive B.

None	No floppy drive installed
360K, 5.25"	5.25 inch PC-type standard drive; 360K byte capacity
1.2M, 5.25"	5.25 inch AT-type high-density drive; 1.2M byte capacity
720K, 3.5"	3.5 inch double-sided drive; 720K byte capacity
1.44M, 3.5"	3.5 inch double-sided drive; 1.44M byte capacity
2.88M, 3.5"	3.5 inch double-sided drive; 2.88M byte capacity

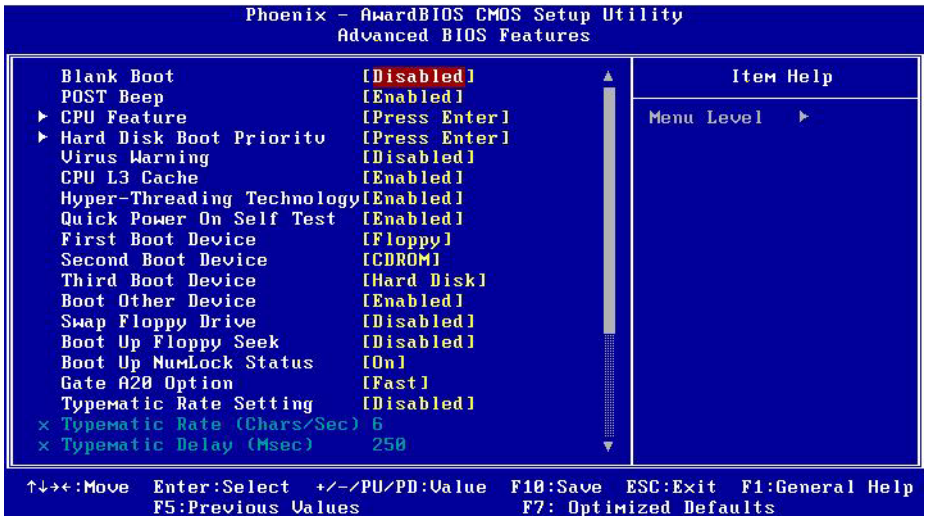
- **Halt on**

  The item determines whether the computer will stop if an error is detected during power up.

No Errors	The system boot will not stop for any error
All Errors	Whenever the BIOS detects a non-fatal error the system will be stopped.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors. (Default value)
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for al other errors.

- **Base Memory**
  Displays the amount of base (or conventional) memory installed in the system.
- **Extended Memory**
  Displays the amount of extended memory (above 1 MB in CPUís memory address map) installed in the system.
- **Total Memory**
  Displays the total system memory size.

3.2.3 Advanced BIOS Features



- **Blank Boot [Disabled]**
  This item allows user to enable/disable BIOS POST screen output.
- **POST Beep [Enabled]**
  This item allows user to enable/disable POST beep sound.
- **CPU Feature**
  This item allows the user to adjust CPU settings such as CPU ratio, VID and Thermal, and special features like XD flag.
- **Hard Disk Boot Priority**
  This item allows the user to select the boot sequence for system devices such as HDD, SCSI, and RAID and USB-HD.
- **Hyper-Threading Technology [Enabled]**
  This item allows the user to enable/disable Hyper-threading support for the IntelÆ PentiumÆ 4 processor with HT Technology.
- **Quick Power On Self Test [Enabled]**
  This field speeds up the Power-On Self Test (POST) routine by skipping re-testing a second, third and fourth time. The default setting is enabled.
- **First / Second / Third / Other Boot Drive**

Hard Disk	Select boot device priority by Hard Disk.
CDROM	Select boot device priority by CDROM.
USB-FDD	Select boot device priority by USB-FDD.
USB-ZIP	Select boot device priority by USB-ZIP.
USB-CDROM	Select boot device priority by USB-CDROM.
LAN	Select boot device priority by LAN.
LS120	Sets boot priority for LA120.

ZIP100	Sets boot priority for ZIP100.
Disabled	Disable this boot function.

- **Boot Up NumLock Status [On]**

  This item allows the user to activate the Number Lock key at system boot.

- **Gate A20 Option [Fast]**

  This item allows the user to switch on or off A20 control by port 92.

- **Typematic Rate Setting**

  This item allows the user to set the two typematic control items.

  This field controls the speed of:

  – Typematic Rate (Chars/Sec)

    This item controls the speed at which the system registers auto repeated keystrokes.

    The eight settings are: 6, 8, 10, 12, 15, 20, 24 and 30.

  – Typematic Delay (Msec)

    This item sets the key press delay time before auto repeat begins. The four delay rate options are: 250, 500, 750 and 1000.

  Security Option [Setup]

System	System requires correct password before booting, and also before permitting access to the Setup page.
Setup	System will boot, but requires correct password before permitting access to Setup. (Default value)

- **APIC Mode [Enabled]**

  This item allows the user to enable/disable the “Advanced Programmable Interrupt Controller”. APIC is implemented in the motherboard and must be supported by the operating system; it extends the number of IRQs available.

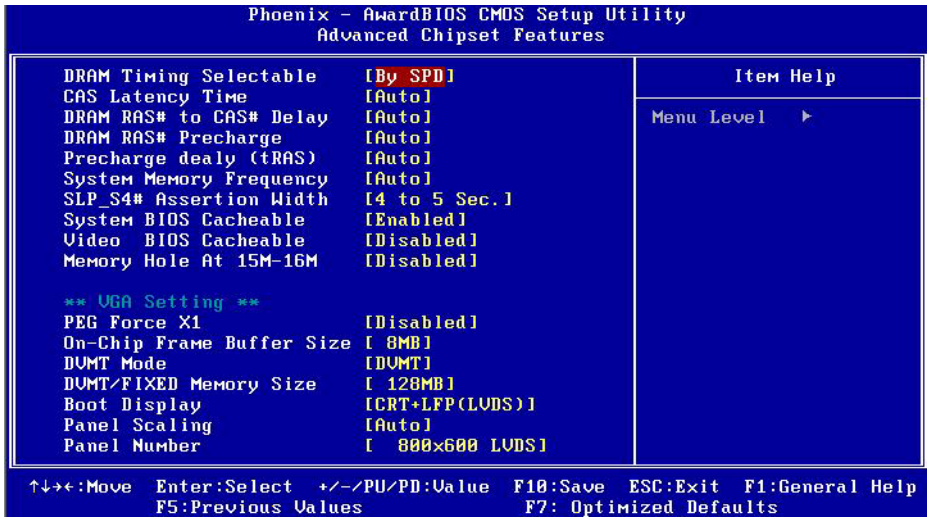
- **MPS Version Control for OS [1.4]**

  This item sets the operating system multiprocessor support version.

- **OS Select For DRAM > 64 MB [Non-OS2]**

  Select OS2 only if the system is running the OS/2 operating system with greater than 64 MB of RAM on the system.

3.2.4 Advanced Chipset Features

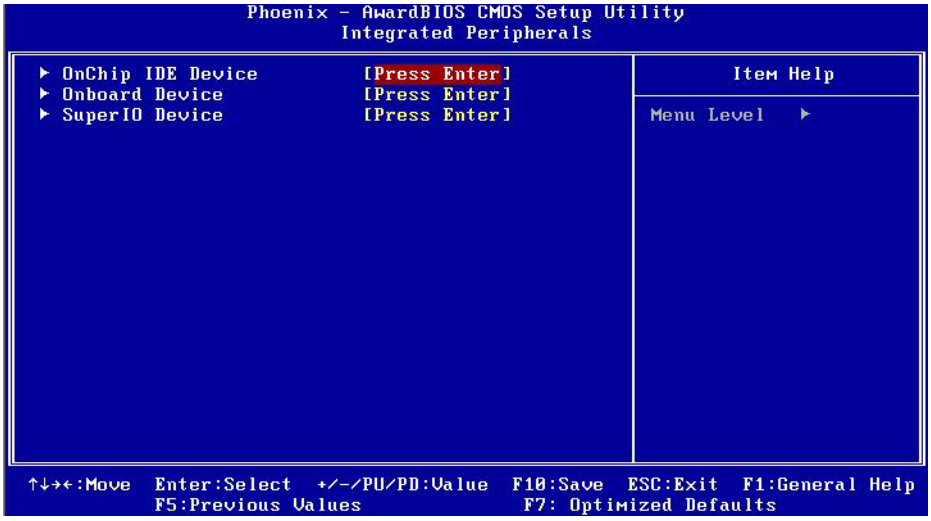


Note! *The "Advanced Chipset Features" screen controls the configuration of the boardís chipset register settings and performance tuning ñ the options on this screen may vary depending on the chipset type. It is strongly recommended that only technical users make changes to the default settings.*

- **DRAM Timing Selectable [By SPD]**
  This item allows the user to set optimal timings for items 2 through 5. The system default setting of ìBy SPDî follows the SPD information on the ROM chip and ensures the system runs stably, with optimal performance.
- **CAS Latency Time [Auto]**
  This item allows the user to set the timing delay in clock cycles before SDRAM starts a read command after receiving it.
- **DRAM RAS# to CAS# Delay [Auto]**
  This item allows the user to set the timing of the transition from RAS (row address strobe) to CAS (column address strobe) as both rows and columns are separately addressed shortly after the DRAM is refreshed.
- **DRAM RAS# Precharge [Auto]**
  This item allows the user to set the DRAM RAS# precharge timing. The system default is set to ìAutoî to reference the data from the SPD ROM.
- **Precharge delay (tRAS) [Auto]**
  This item allows the user to adjust memory precharge time.
- **System Memory Frequency [Auto]**
  This item allows the user to adjust memory frequency to improve performance.
- **SLP_S4# Assertion Width [4 to 5 sec.]**
  This item allows user to adjust SLP_S4# signal.This field indicates the minimum assertion width of the SLP_S4# signal to ensure that the DRAMs have been safely power-cycled.
- **System BIOS Cacheable [Enabled]**
  This item allows the system BIOS to be cached to allow faster execution and better performance.

- **Video BIOS Cacheable [Disabled]**
  This item allows the video BIOS to be cached to allow faster execution and better performance.
- **Memory Hole At 15M-16M [Disabled]**
  This item reserves 15 - 16 MB of memory address space for ISA expansion cards that specifically require the setting. Memory from 15 - 16 MB will be unavailable to the system because only the expansion cards can access memory in this area.
- **On-Chip Frame Buffer Size [8 MB]**
  This item allows the user to adjust the memory buffer for on-chip graphics.
- **DVMT Mode [DVMT]**
  This item allows the user to adjust Intel's Dynamic Video Memory Technology (DVMT). The BIOS provides three options to choose from (DVMT, FIXED and Both).
- **DVMT/FIXED Memory Size [128 MB]**
  This item allows the user to adjust DVMT/FIXED graphics memory size.
- **Boot Display [CRT+LFP(LVDS)]**
  This item allows the user to decide which display mode to use for the boot display.
- **Panel Number [800 x 600 LVDS]**
  This item allows the user to adjust panel resolution.

3.2.5 Integrated Peripherals



Note! *The ìIntegrated Peripheralsî screen controls chipset configuration for IDE, ATA, SATA, USB, AC97, MC97 and Super IO and Sensor devices. The options on this screen vary depending on the chipset.*

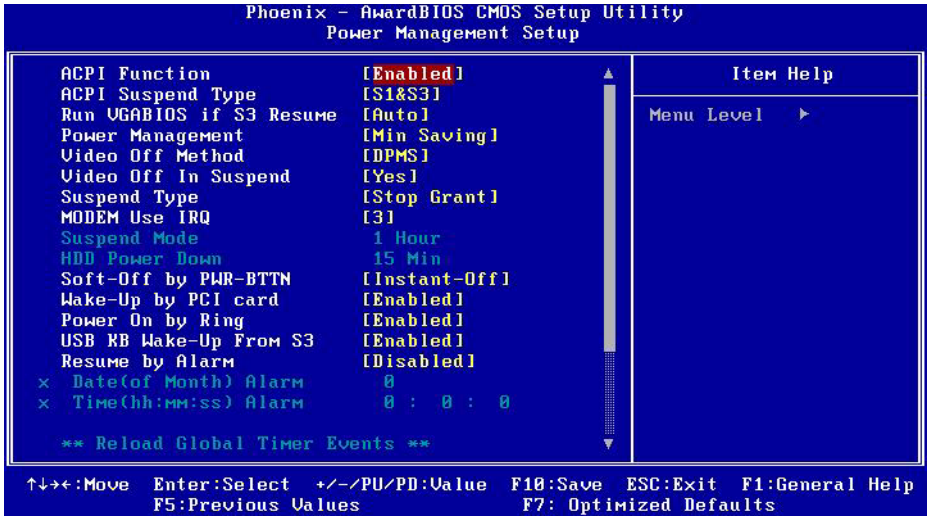
- **OnChip IDE Device**
  This item enables users to set the OnChip IDE device status, including IDE devices and setting PIO and DMA access modes. Some chipsets support newer SATA devices (Serial-ATA).
- **Onboard Device**

This item enables users to set the Onboard Device status, including USB, AC97, MC97 and LAN devices.

- **Super IO Device**

  This item enables users to set the Super IO device status, including Floppy, COM, LPT, IR and to control GPIO and Power fail status.

3.2.6 Power Management Setup



Note! *The "Power Management Setup" screen allows configuration of the system for effective energy savings while still operating in a manner consistent with intended computer use.*

- **ACPI Function [Enabled]**

  This item defines the ACPI (Advanced Configuration and Power Management) feature that makes hardware status information available to the operating system, and communicates to PC and system devices for improved power management.

- **ACPI Suspend Type [S3 (STR)]**

  This item allows the user to select the sleep state when the computer is in suspend mode.

S1(POS)	Suspend mode is equivalent to a software power down.
S3(STR)	The system shuts down with the exception of a refresh of electrical current to system memory.

- **Run VGABIOS if S3 Resume [Auto]**

  This item allows the user to enable run VGA bios if system resume from S3.

- **Power Management [Min Saving]**

  This item allows the user to select the system power saving mode.

Min Saving	Minimum power management. Suspend Mode=1 hr.
Max Saving	Maximum power management. Suspend Mode=1 min.
User Defined	Allows the user to set each mode individually. Suspend Mode= Disabled, or 1 min ~ 1 hr.

- **Video Off Method [DPMS]**

  This item allows the user to determine the manner is which the monitor is blanked.

V/H SYNC+Blank	This option will cause the system to turn off vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

- **Video Off In Suspend [Yes]**

  This item allows the user to turn off the video when the system enters suspend mode.

- **Suspend Type [Stop Grant]**

  This item allows the user to determine the suspend type.

- **Modem Use IRQ [3]**

  This item allows the user to determine which IRQ the MODEM can use.

- **Suspend Mode [1 Hour]**

  This item allows the user to determine the length of time of system inactivity after which all devices except the CPU will be shut down.

- **HDD Power Down Mode [15 Min]**

  This item allows the user to determine the system inactivity time, when the hard disk drive will be powered down.

- **Soft-Off by PWR-BTTN [Instant-Off]**

  This item allows the user to define the power button functions.

Instant-Off	Press the power button to power off instantly.
Delay 4 Sec	Press and hold the power button for 4 sec to power off.

- **Wake-Up by PCI card [Enabled]**

  This item allows the user to enable and define how PCI cards wake the system up from suspend mode.

- **Power On by Ring [Enabled]**

  This item allows the user to enable and define how the system will resume by activation of the modem ring.

- **USB KB Wake-Up From S3 [Enabled]**

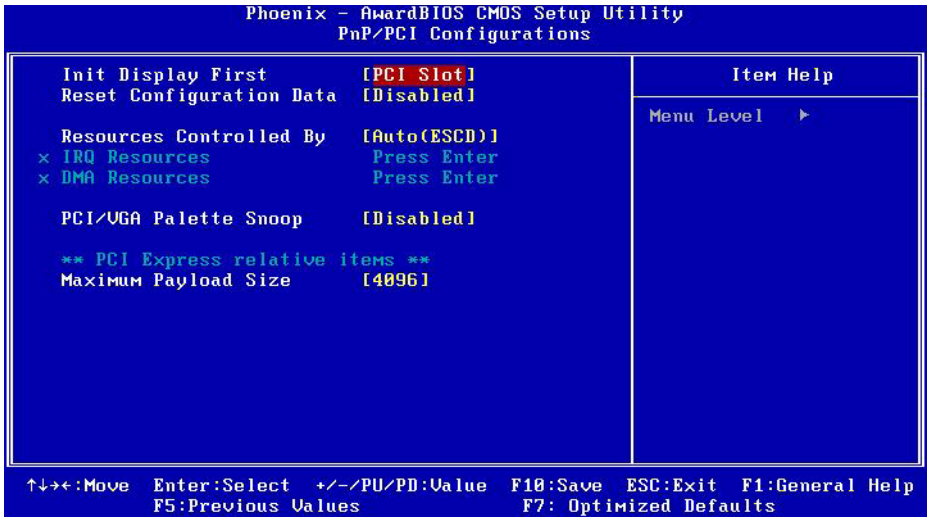
  This item allows the user to enable and define how the system will resume from S3 by activation of the USB keyboard.

- **Resume by Alarm [Disabled]**

  This item allows the user to enable and key in the date and time to power on the system.

Disabled	Disable this function.
Enabled	Enable alarm function to power on system.
Day (of month)	Alarm 1-31
Time (HH:MM:SS)	Alarm (0-23) : (0-59) : 0-59)

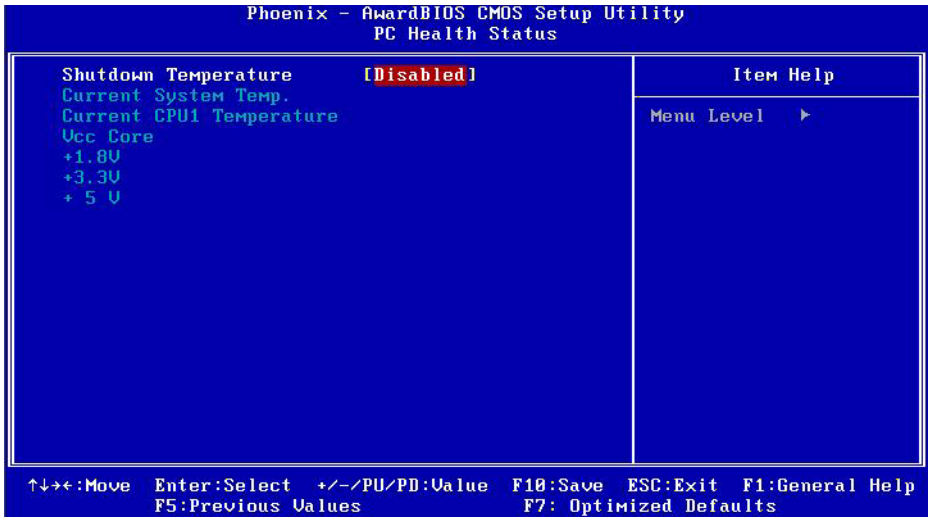
3.2.7 PnP/PCI Configurations



Note! *The "PnP/PCI Configurations" screen sets up the IRQ and DMA (both PnP and PCI bus assignments).*

- **Init Display First [PCI Slot]**
  This item is for setting start up video output from the PCI or onboard device.
- **Reset Configuration Data [Disabled]**
  This item allows the user to clear any PnP configuration data stored in the BIOS.
- **Resources Controlled By [Auto (ESCD)]**
  - IRQ Resources
    This item allows you respectively assign an interrupt type for IRQ-3, 4, 5, 7, 9, 10, 11, 12, 14, and 15.
  - DMA Resources
    This item allows you respectively assign an interrupt type for DMA-0, 1, 2, 3, 4, 5, 6, and 7.
- **PCI VGA Palette Snoop [Disabled]**
  The item is designed to solve problems caused by some non-standard VGA cards. A built-in VGA system does not need this function.
- **Maximum Payload Size [4096]**
  This item allows the user to adjust maximum TLP (Transaction Layer Packet) payload size.

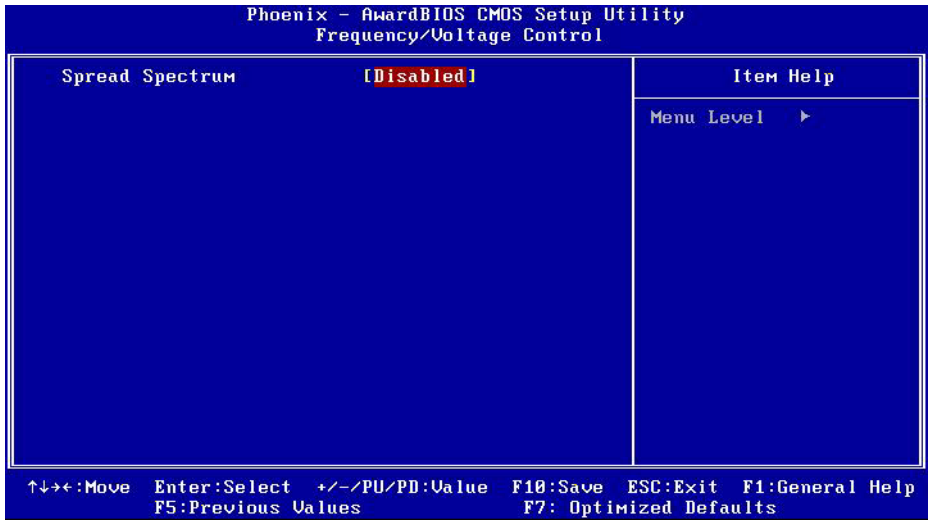
3.2.8 PC Health Status



Note! *The "PC Health Status" screen controls the thermal and voltage status of the board. The options on this page vary depending on the chipset.*

- **Shutdown Temperature [Disabled]**
  This item control when to notify ACPI OS to shutdown the system.
- **Current System/CPU Temperature [Show Only]**
  This item displays current System/CPU temperature.
- **VCC Core/ +1.8 V/ +3.3 V/ +5 V and RTC voltage [Show Only]**
  This item displays current CPU and system voltage.

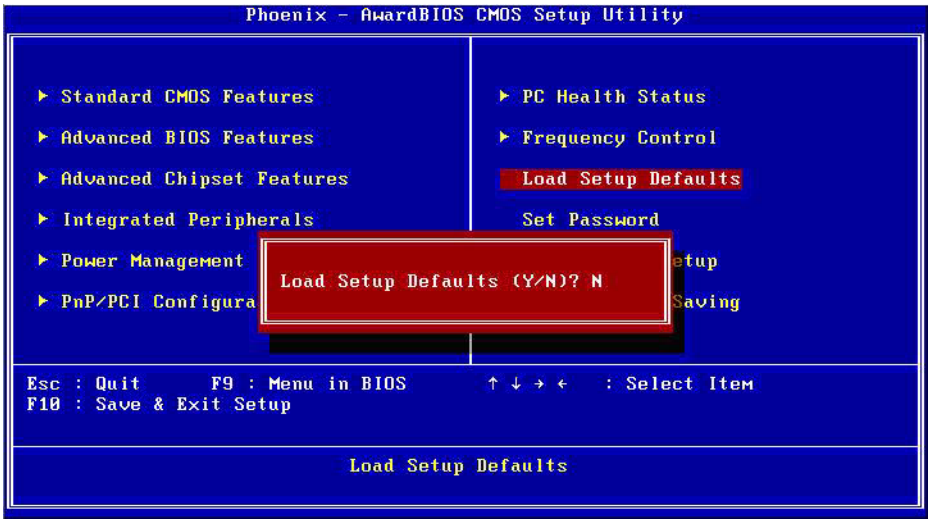
3.2.9 Frequency/Voltage Control



Note! *The "Frequency/Voltage Control" screen controls the CPU host and PCI frequency. The options on this page vary depending on the chipset; items show up according to installed CPU capacities.*

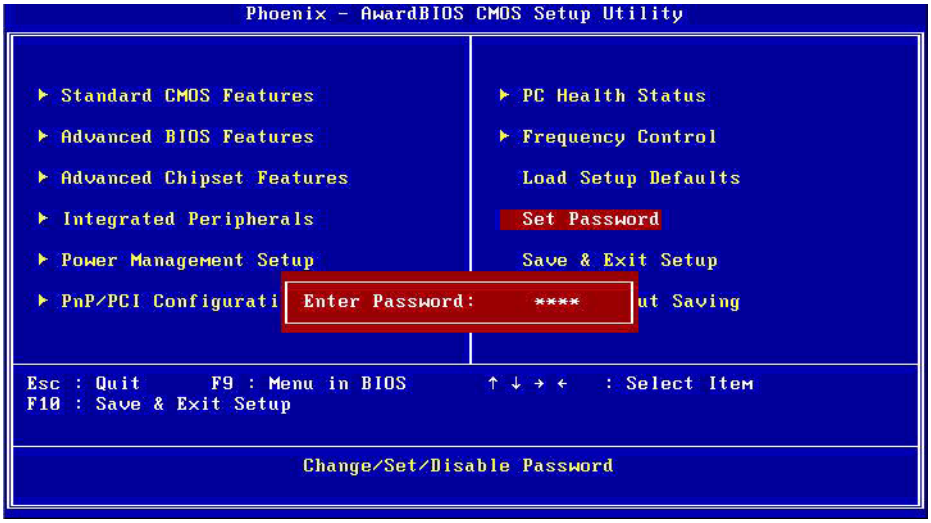
- **Spread Spectrum [Disabled]**
  This item enables users to set the spread spectrum modulation.

3.2.10 Load Optimized Defaults



Note! *"Load Optimized Defaults" loads the default system values directly from ROM. If the stored record created by the setup program should ever become corrupted (and therefore unusable), select Load Setup Defaults to have these default values load automatically for the next bootup.*

3.2.11 Set Password



Note! *To enable this feature, you should first go to the "Advanced BIOS Features" menu, choose the Security Option, and select either System or Setup, depending on which aspects you want password protected. System requires a password both to boot the system and to enter Setup. Setup requires a password only to enter Setup. A password may be at most 8 characters long.*

To Establish Password

1. Choose the **Set Password** option from the **CMOS Setup Utility** Main Menu and press <Enter>.
2. When you see **Enter Password**, enter the desired password and press <Enter>.
3. At the **Confirm Password** prompt, retype the desired password, then press <Enter>.
4. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

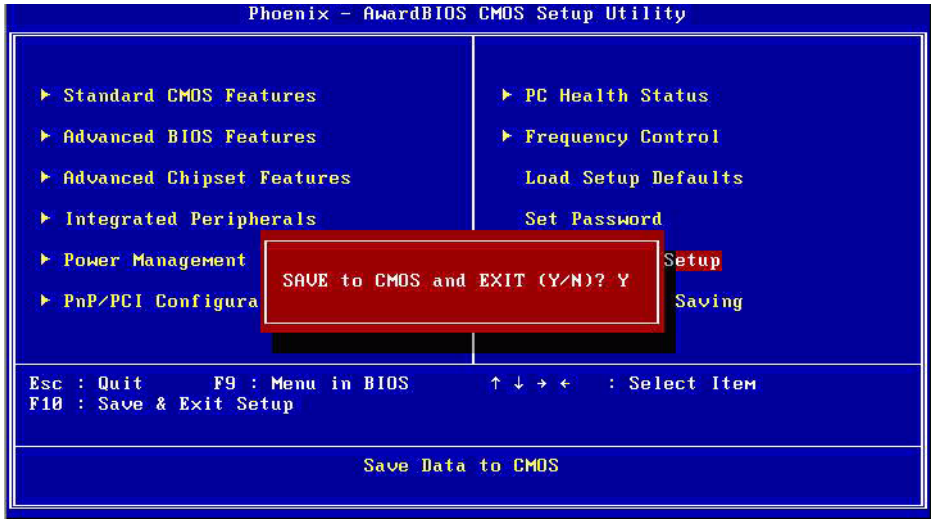
To Change Password

1. Choose the **Set Password** option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see **Enter Password**, enter the existing password and press <Enter>.
3. You will see the **Confirm Password** prompt, type it in again, and press <Enter>.
4. Select **Set Password** again, and at the **Enter Password** prompt, enter the new password and press <Enter>.
5. At the **Confirm Password** prompt, retype the new password, and press <Enter>.
6. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

To Disable a Password

1. Choose the **Set Password** option from the **CMOS Setup Utility** main menu and press <Enter>.
2. When you see the **Enter Password** prompt, enter the existing password and press <Enter>.
3. You will see **Confirm Password**, type it in again, and press <Enter>.
4. Select **Set Password** again, and at the **Enter Password** prompt, DO NOT enter anything - just press <Enter>.
5. At the **Confirm Password** prompt, again, DO NOT type in anything - just press <Enter>.
6. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

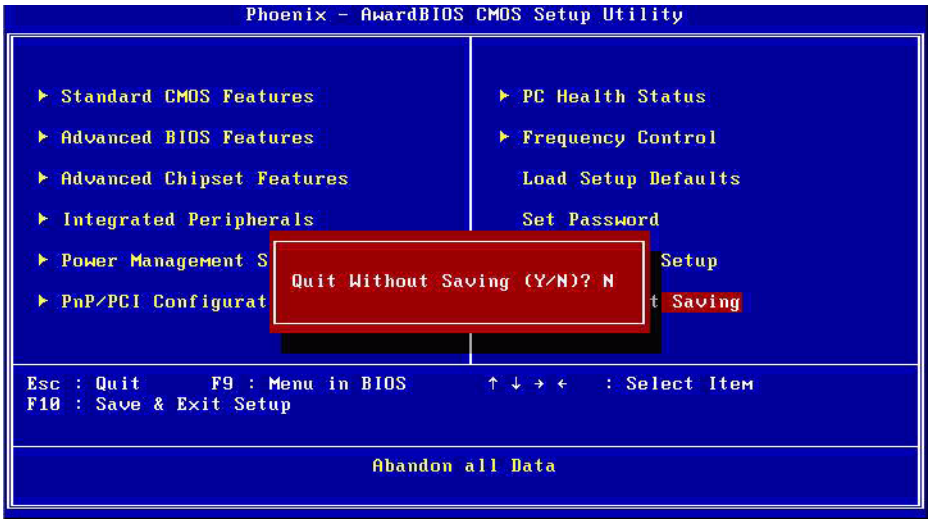
3.2.12 Save & Exit Setup



Note! *Typing <Y> will quit the BIOS Setup Utility and save the user setup values to CMOS.*

Typing <N> will return to BIOS Setup.

3.2.13 Quit Without Saving



Note! *Typing <Y> will quit the BIOS Setup Utility without saving any changes to CMOS.*

Typing <N> will return to the BIOS Setup Utility.

Chapter 4

Driver Installation

This chapter gives you the driver installation information on the SOM-4487 CPU System on Module.
Sections include:

- Driver Information
- Driver Installation

4.1 Driver Installation

The CD shipped with SOM-4487 should contain below drivers, please follow below sequence to complete the driver installation.

Step 1.Install Intel INF Update Driver for Windows XP/2000
Step 2.Install Intel Graphic Driver for Windows XP/2000
Step 3.Install Audio Driver for Windows XP/2000
Step 4.Install Intel Ethernet Driver for Windows XP/2000
Step 5.Install IT8888 PCI to ISA Inf for Windows 2000

Note! *For Windows XP Embedded, Windows CE 5.0 and Linux support, please contact sales representative or technical person.*

Note! *Downloading the update for Windows XP or Windows 2000 may be required for enabling USB 2.0 function. Details information please refers to below web link.*

http://www.microsoft.com/whdc/system/bus/USB/USB2support.mspx

4.2 Driver Installation

Insert the SOM-4487 CD into the CD-ROM device, and follow below installation process from Step 1 to Step 5 or 6.

4.2.1 Step 1- Install Intel INF Update Driver for Windows XP/2000

1. Click on the “Chipset” folder and double click the “*.exe” file.
2. Follow the instructions that the driver installation wizard shows.
3. The system will help you to complete the driver installation.

4.2.2 Step 2 - Install Intel Graphic Driver for Windows XP/2000

1. Click on the “VGA” folder and double click the “*.exe” file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

Note! *There are several hot key to allow you to switch between different displays.*

Mode	Key 1	Key 2	Key 3
CRT	CTRL	ALT	F1
LCD	CTRL	ALT	F3
Graphic Control Panel	CTRL	ALT	F12

Press Key1+Key2+Key3 at the same time to change the display mode.

4.2.3 Step 3 - Install Audio Driver for Windows XP/2000

1. Click on the “Audio” folder and double click the “*.exe” file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

4.2.4 Step 4 - Install Intel Ethernet Driver for Windows XP/2000

1. Click on the “LAN” folder and double click the “*.exe” file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

4.2.5 Step 5 - Install IT8888 PCI to ISA Inf for Windows 2000

1. Click “Start” button and choose the “Control Panel”, Click the “System” Icon.
2. Click the exclamation mark of PCI device.
3. Install the inf file in “Chipset/IT8888” folder.
4. Follow the instructions that the driver installation wizard shows. Then the inf file is installed.

Appendix A

Watchdog Timer Programming

This appendix gives you the information about the watchdog timer programming on the SOM-4487 CPU System on Module. Sections include:

- Watchdog Timer Programming

A.1 Programming the Watchdog Timer

The sample code of programming the Watchdog Timer function:

```
-------------------------------------------------------------------------------
Enter the extended function mode, interruptible double-write |
-------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
-------------------------------------------------------------------------------
Configured logical device 8, configuration register CRF6 |
-------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
IN AL,DX
AND AL.OEFH;Setbit 4=0 Pin 89=WDTO
OUT DX,AL
MOV DX,2EH
MOV AL,07H; point to Logical Device Number Reg.
OUT DX,AL
MOV DX,2FH
MOV AL,08H; select logical device 8
OUT DX,AL;
MOV DX,2EH
MOV AL,30H;Set watch dog activate or inactivate
OUT DX,AL
MOV DX,2FH
MOV AL,01H; 01:activate 00:inactivate
OUT DX,AL;
MOV DX,2EH
MOV AL,F5H; Setting counter unit is second
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL;
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
MOV AL,05H; Set 5 seconds
OUT DX,AL
;---------------------------------------
; Exit extended function mode |
```

```
;----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

Appendix B

System Assignments

This appendix gives you the information about the system resource allocation on the SOM-4487 CPU System on Module.
Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- 1st MB Memory Map

B.1 System I/O Ports

Table B.1: System I/O ports

Addr. range (Hex)	Device
0000 - 0CF7	PCI bus
0000 - 000F	Direct memory access controller
0010 - 001F	Motherboard resources
0020 - 0021	Programmable interrupt controller
0022 - 003F	Motherboard resources
0040 - 0043	System timer
0044 - 005F	Motherboard resources
0060 - 0060	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0061 - 0061	System speaker
0062 - 0063	Motherboard resources
0064 - 0064	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0065 - 006F	Motherboard resources
0070 - 0073	System CMOS/real time clock
0074 - 007F	Motherboard resources
0080 - 0090	Direct memory access controller
0091 - 0093	Motherboard resources
0094 - 009F	Direct memory access controller
00A0 - 00A1	Programmable interrupt controller
00A2 - 00BF	Motherboard resources
00C0 - 00DF	Direct memory access controller
00E0 - 00EF	Motherboard resources
00F0 - 00FF	Numeric data processor
01F0 - 01F7	Primary IDE Channel
0274 - 0277	ISAPNP Read Data Port
0278 - 027F	Printer Port (LPT2)
0294 - 0297	Motherboard resources
02F8 - 02FF	Communications Port (COM2)
0378 - 037F	Printer Port (LPT1)
03B0 - 03BB	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
03C0 - 03DF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
03E8 - 03EF	Communications Port (COM3)
03F6 - 03F6	Primary IDE Channel
03F8 - 03FF	Communications Port (COM1)
0400 - 04BF	Motherboard resources
04D0 - 04D1	Motherboard resources
0500 - 051F	Intel(R) 82801FB/FBM SMBus Controller - 266A
0778 - 077B	Printer Port (LPT1)
0880 - 088F	Motherboard resources
0A78 - 0A7B	Motherboard resources
0B78 - 0B7B	Motherboard resources
0BBC - 0BBF	Motherboard resources
0D00 - FFFF	PCI bus
0E78 - 0E7B	Motherboard resources

Table B.1: System I/O ports	
0F78 - 0F7B	Motherboard resources
0FBC - 0FBF	Motherboard resources
C000 - C03F	Intel(R) PRO/100 VE Network Connection
D000 - D0FF	Realtek AC'97 Audio
D800 - D81F	Intel(R) 82801FB/FBM USB Universal Host Controller - 265A
D900 - D91F	Intel(R) 82801FB/FBM USB Universal Host Controller - 265B
DA00 - DA07	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
DB00 - DB1F	Intel(R) 82801FB/FBM USB Universal Host Controller - 2658
DC00 - DC3F	Realtek AC'97 Audio
DD00 - DD1F	Intel(R) 82801FB/FBM USB Universal Host Controller - 2659
DF00 - DF07	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
E000 - E003	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
E100 - E107	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
E200 - E203	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
E300 - E30F	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
F000 - F00F	Intel(R) 82801FB/FBM Ultra ATA Storage Controllers - 266F

B.2 DMA Channel Assignments

Table B.2: DMA channel assignments

Channel	Function
0	Available
1	Available
2	Available (or Standard floppy disk controller)
3	Available
4	Direct memory access controller
5	Available
6	Available
7	Available

B.3 Interrupt Assignments

Table B.3: Interrupt assignments

Interrupt#	Interrupt source
NMI	Parity error detected
IRQ 0	System timer
IRQ 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ 2	Available
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Available
IRQ 6	Standard floppy disk controller
IRQ 7	Available
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Available (or COM3)
IRQ 11	Intel(R) 82801FB/FBM SMBus Controller - 266A
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Numeric data processor
IRQ 14	Primary IDE Channel
IRQ 16	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family Intel(R) 82801FB/FBM USB Universal Host Controller - 265B
IRQ 17	Realtek AC'97 Audio
IRQ 18	Intel(R) 82801FB/FBM USB Universal Host Controller - 265A
IRQ 19	Intel(R) 82801FB/FBM USB Universal Host Controller - 2659 Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
IRQ 20	Intel(R) PRO/100 VE Network Connection
IRQ 23	Intel(R) 82801FB/FBM USB Universal Host Controller - 2658 Intel(R) 82801FB/FBM USB2 Enhanced Host Controller - 265C

B.4 1st MB Memory Map

Table B.4: 1st MB memory map

Addr. range (Hex)	Device
00000000 - 0009FFFF	System board
000A0000 - 000BFFFF	PCI bus

Table B.4: 1st MB memory map	
000A0000 - 000BFFFF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
000C0000 - 000DFFFF	PCI bus
000D1800 - 000D3FFF	System board
000E0000 - 000EFFFF	System board
000F0000 - 000F7FFF	System board
000F8000 - 000FBFFF	System board
000FC000 - 000FFFFF	System board
00100000 - 7F6DFFFF	System board
7F6E0000 - 7F6FFFFF	System board
7F6E0000 - 7F6FFFFF	System board
7F700000 - FEBFFFFF	PCI bus
C0000000 - CFFFFFFF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
D0000000 - D0000FFF	Intel(R) PRO/100 VE Network Connection
D0100000 - D017FFFF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
D0180000 - D01FFFFF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
D0200000 - D023FFFF	Mobile Intel(R) 915GM/GMS,910GML Express Chipset Family
D0240000 - D02403FF	Intel(R) 82801FB/FBM USB2 Enhanced Host Controller - 265C
D0241000 - D02411FF	Realtek AC'97 Audio
D0242000 - D02420FF	Realtek AC'97 Audio
D0243000 - D02433FF	Intel(R) 82801FBM Ultra ATA Storage Controllers - 2653
E0000000 - EFFFFFFF	Motherboard resources
FEC00000 - FEC00FFF	System board
FED13000 - FED1DFFF	System board
FED20000 - FED8FFFF	System board
FEE00000 - FEE00FFF	System board
FFB00000 - FFB7FFFF	System board
FFB80000 - FFBFFFFF	Intel(R) 82802 Firmware Hub Device
FFF00000 - FFFFFFFF	System board

Appendix C

Switch setting

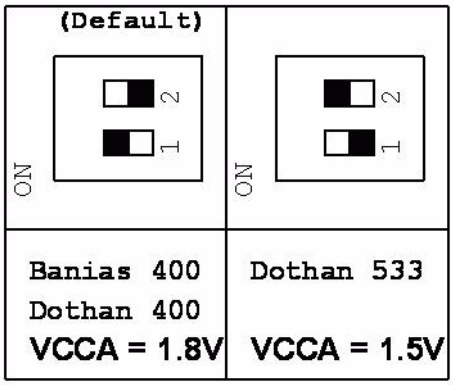
This appendix gives you the information about the switch setting of SOM-4487 CPU System on Module.
Sections include:

- Switch setting

C.1 SOM-4487 Switch Setting

For supporting different CPU, voltage must be adjusted accordingly. Please refer to the below :

SW1 : (Socket Type Only)



- **Default is 1.8V for Banias 400 / Dothan 400 FSB CPU.**
  For supporting Dothan 533FSB CPU, please change the switch setting of SW1.

- **CPU VCCA Reference:**

Processor	VCCA=1.8V	VCCA=1.5V
Intel Pentium M 760	No	Yes
Intel Pentium M 745	Yes	No
Intel Pentium M LV 738	Yes	No
Intel Celeron M 370	Yes	No
Intel Celeron M ULV 373	Yes	No

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